केन्द्रीय भूमि जल 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

Hubli Taluk, Dharwad District, Karnataka

दक्षिण पश्चिमी क्षेत्र, बेंगलुरु
South Western Region, Bengaluru

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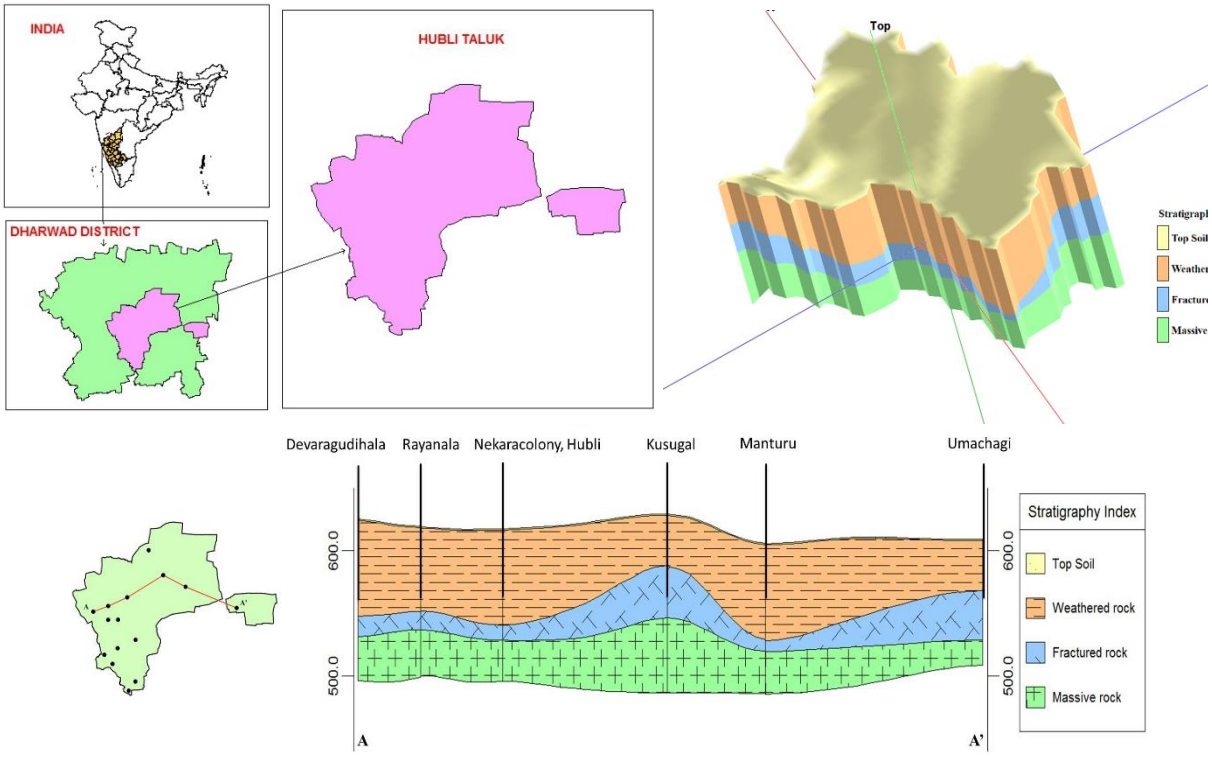
AQUIFER MAPS AND MANAGEMENT PLAN, HUBLI TALUK, DHARWAD DISTRICT, KARNATAKA STATE

(AAP – 2020-2021)



By

A. Suresha, Scientist 'D', CGWB, SWR, Bengaluru

AUGUST 2022

AQUIFER MAPS AND MANAGEMENT PLAN, HUBLI TALUK, DHARWAD DISTRICT, KARNATAKA STATE

(AAP – 2020-2021)

Contents

AQUIFER MANAGEMENT PLAN OF HUBLI TALUK, DHARWAD DISTRICT, KARNATAKA STATE

1 SALIENT INFORMATION

Name of the taluk: Hubli

District: Dharwad, State: Karnataka

Area: 631sq.km.

Population: 142807

Annual Normal Rainfall: 754mm

1.1 Aquifer management of the study area

Aquifer mapping studies have been carried out in Hubli taluk, Dharwad district of Karnataka covering an area of 631 sq.km under National Aquifer Mapping Project. Hubli taluk of Dharwad district is located between North Latitude 15°09'2.2'' and15°30'9.22'' and East Longitude between 75° 00' 50.48" and 75°27'29.65" and is falling in Survey of India Toposheets Nos48 M/3,48 M/4and 48 M/7. The Hubli taluk is bounded on the northby Dharwad and Navalgungtalukof Dharwad district, on theeast by Navalgund taluk of Dharwad district and Gadag district,south by Kundgoltaluk of Dharwad districtand west by Kalghatgi taluk of Dharwad district. Location map of Hubli taluk is presented in **Fig-1.**Hubli is the taluk head quarter and there are3hoblis, 26 grama panchayath, 51 inhabited villages and7 uninhabited villages. There are total 58 villages in the taluk.

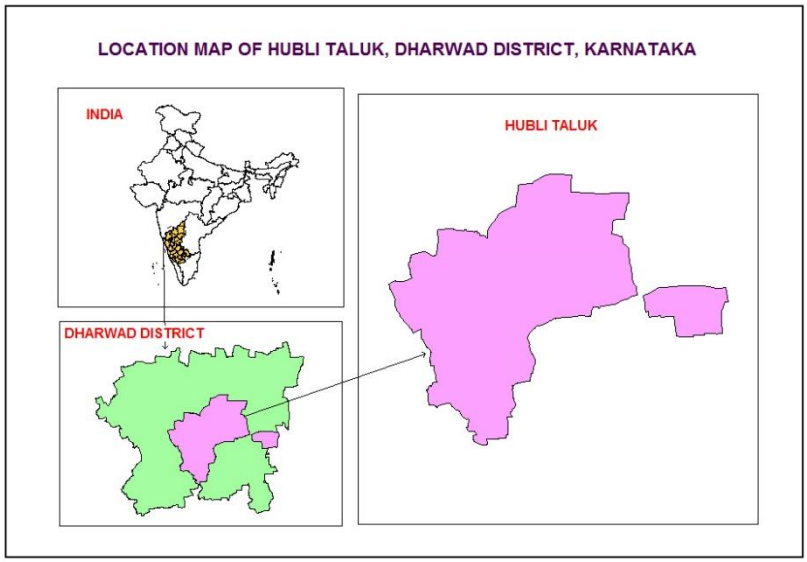


Fig-1: Location map

1.2 Population

According to 2011 census, the population in Hubli taluk is 142807. Out of which 72980 are male and69827 are female.The average sex ratio inHubli taluk is 957. The Hubli taluk has an overall population density of 226 persons per sq.km. The decadal variation in population from 2001-2011 is 10.1 %.

1.3 Climate and Rainfall

Hubli talukhas semi-arid climate. The area falls under Northerntransitionalagro-climatic zone of Karnataka state. November to January are the coolest months and February to May are the hottest months. After February, there is a steady increase in the temperature. April is generally the hottest month with the mean daily maximum temperature of 37.3° Celsius and the mean daily minimum temperature of 22.5° Celsius. During summer, the day temperature may occasionally rise up to 41° Celsiuson individual days. With the onset of the South-West Monsoon into the district during early June, there is appreciable drop in the day temperature. December is generally the coldest month with the mean daily minimum temperature of 16.5° Celsius. The mean daily maximum temperature during this month is 29.1^0 Celsius. On individual days, during the period of December to February, the minimum temperature may go down to about 11° Celsius.

The monsoon period is from June to October. The normal annual rainfall in Hubli taluk for the period from 1951 to 2010 was736mm. Seasonal rainfall pattern indicates thatmajor amount of (458 mm) rainfall was recorded during South-West Monsoon season which contributes about62% of the annual normal rainfallfollowed by North-East Monsoon season (148 mm) constituting for 20% and remaining (130 mm) 18% of rainfall was during Pre-Monsoon season. The statistical analysis of rainfall data of Hubli talukis given in **Table-1.**

Computations were carried out for the 30-year block of 1981-2010 and the mean monthly rainfall at Hubli taluk is ranging between 2mm during January to 128 mm during June. The coefficient of variation percent for pre-monsoon, monsoon and post-monsoon season is 76, 66and61 percent respectively. Annual CV at this station works out to be 34 percent.The sstatisticalanalysis of rrainfalldata of Hubli talukis given in table-1 andthe actual rainfall for the period from 2007 to 2017 is given in **Table-2**.

Table-1. Statistical analysis of rainfall data of Hubli taluk, Dharwaddistrict (1971 to 2010)

	JAN	FEB	MAR	APR	MAY	PRE	JUN	JUL	AUG	SEP	SW	OCT	NOV	DEC	NE	Annual
NRM	2	0	8	37	82	130	128	115	105	110	458	108	34	6	148	736
STDEV	5	2	18	41	76	99	95	69	49	73	185	76	55	16	90	253
CV%	319	447	223	110	92	**76**	74	60	46	66	**40**	71	163	263	**61**	34

Table -2.The actual rainfall for the period from 2007 to 2017.

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Rainfall mm	805	765	795	849	600	519	554	820	438	424	487

1.4 Agriculture & Irrigation

Agriculture is the main occupation in Hubli taluk. Major Kharif crops areJowar, Maize,Tur, Cotton and Vegetables. Main crops of Rabi season are Maize, Jowar, Wheat, Green gram, Groundnut, Bengal gram andSunflower. Water intensive crops like Sugarcaneand Paddy are grownonly in negligible area. Jowar isgrown in 16% and oil seeds in 24% of total crop area of

the taluk.Cotton accountsfor 6.5% of total crop area. The cropping pattern in Hubli taluk is given in**Table-3** and **Table.3(a).**

Table-3. Cropping pattern in Hublitaluk (2017-2018) Area under cultivation (Ha)

Wheat	Maize	Paddy	Jowar	Other cereals	Bengal gram	Green gram	Black gram	Other Pulses	Fruits	Vegetables	Oil seeds	Sugarcane	Cotton
6705	4449	106	10770	106	16700	1575	356	357	2450	2275	15528	122	4240

Source: District at a glance 2017-18, Govt. of Karnataka

Table-3(a). Cropping pattern in Hubli taluk (2017-2018) Area under cultivation (Ha)

Cereals	Pulses	Oil seed	Fruit	Vegetables	Cotton	Sugarcane	Total crop
22136	18988	15528	2450	2275	4240	122	65739

Source: District at a glance 2017-18, Govt. of Karnataka

It is observed that net sown area accounts for 78% of the total area sown and the area sown more than once is 22 % of the total sown area. The same is about 73% and 21% of the toatal geographical area.Area not available for cultivation and fallow land cover accounts for 10% &2.8% of total geographical area respectively. Irrigation is only from bore wellsand is about 5341hectares. The land use pattern and the Irrigation details in Hubli taluk is given in table- 4 and 5. The land use pattern is shown in **Fig-4**.

Table-4. Details of land use in Hubli taluk 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	Total area sown
73707	2033	7484	776	9275	54139	15630	69769

Source: District at a glance 2017-18, Govt. of Karnataka

Table-5.Detailsof irrigationin Hubli taluk(Ha)

Source of Irrigation	No.'s/Length	Net area irrigated (Ha.)	% of area
Canals	8	7000*	
Tanks	64	Nil	
Wells	422	Nil	
Bore wells	1508	Gross-5957 (Net-5341)	100%
Lift Irrigation		Nil	
Other Sources		Nil	
Total		Gross-5957, (Net-5341)	

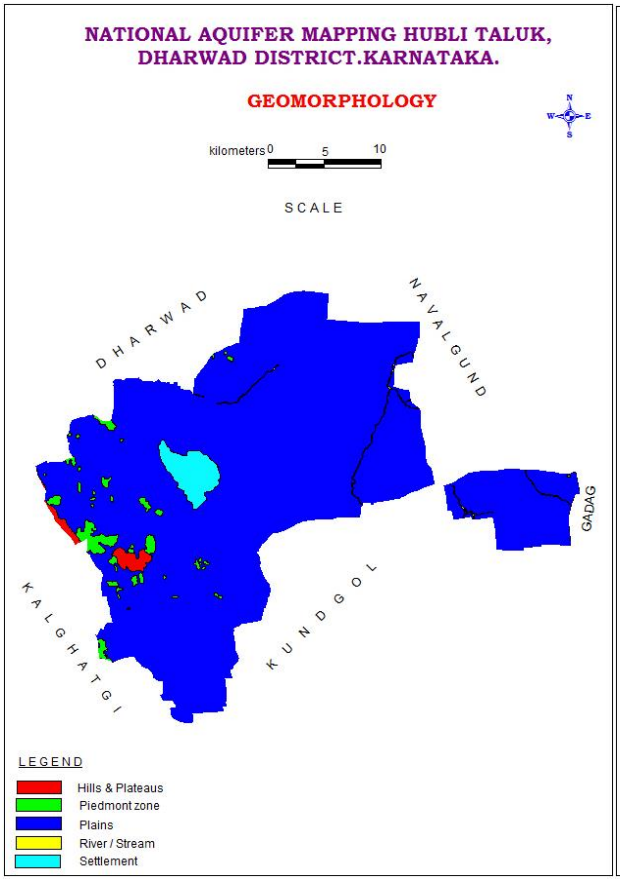
Source: District at a glance 2017-18, Govt. of Karnataka. * Source - CADA

1.5 Geomorphology, Physiography and Drainage

The area in general is a peneplain with alternating ridges and valleys in the western and extreme southern parts of the taluk. The Hubli city is located on the water divide. The general slope of the area is towards north-northwest direction in the northern part and to the south west direction in the southern part of the district. The maximum elevation is about 675 m amsl to the south west of Hubli, to the north of Chalmatti village on a north east-south west tending ridge. The Hubli town is located at the elevation of 628 mamsl. The minimum elevation is about 582 m amsl around Hebsur village in the north eastern part of the taluk and 560 mamsl

at the south west of the taluk at the outlet of the BedthiRiver in Hubli taluk. The geomorphology of the area is shown in **Fig-2**.

The RiverBedthi originates to the south of Hubli town and drains the southern parts of Hubli taluk and flows in the south west direction and joins the west flowing River Gangavalli. The River Benni halla originates to the north of Hubli and flows in the north east direction and joins the Malaprabha River at Hebbali village of Badami taluk. The eastern part of the Hubli taluk is drained by Radihalla and joins Benni halla to the south of Hebsur village. All these nalas and their tributaries together form dendritic to sub dendritic drainage pattern. About 60% of the area forms part of Malaprabha river sub basin and about 40% of the area forms the part of BedthiRiver sub basin which is the part of west flowing river basin. The drainage pattern in the area is shown in **Fig.-3.**



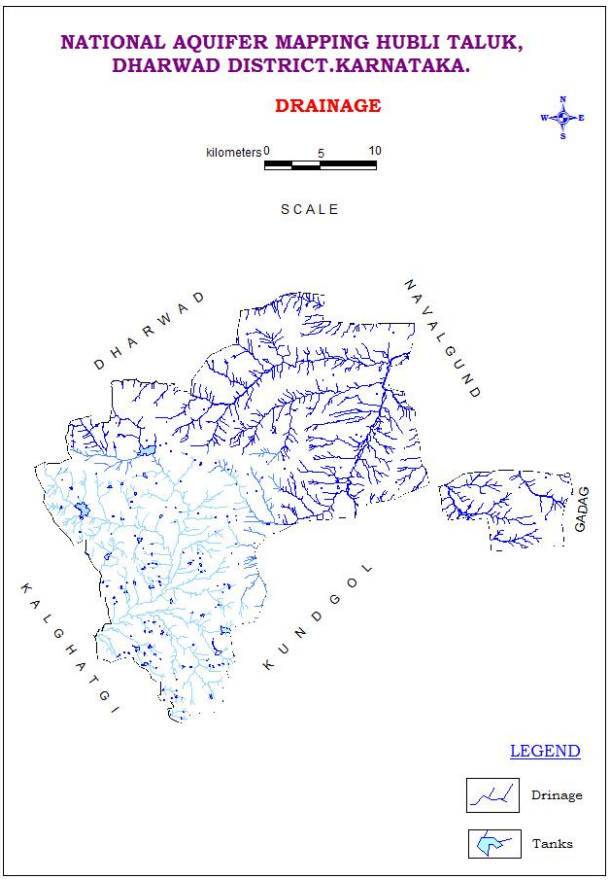


Fig-2: Goemorphology map **Fig.3: Drainage map**

1.6 Land use

The major part of the taluk is covered by agriculture land. Other land use catogories are buit-up area, forest, waster land and water bodies **(Fig.4)**

1.7 Soil

Soil is closely associated with vegetation, climate, parent rock and slope of the area. It is essential to study the soil because all kinds of life forms entirely depend on the soil nature.

The eastern part of the taluk is covered by black cotton soilwhereas western part is covered by red soil. These soils are almost neutral in nature with pH values ranging between 6 and 8. In general the black cotton soil is found at the lower elevation. The red soil has a

normalpH value and highly permeable unlike black cotton soil which is mostly impervious. The soils of Hubli taluk are clayey in nature. The soil types of the area are shown in **Fig.-5**

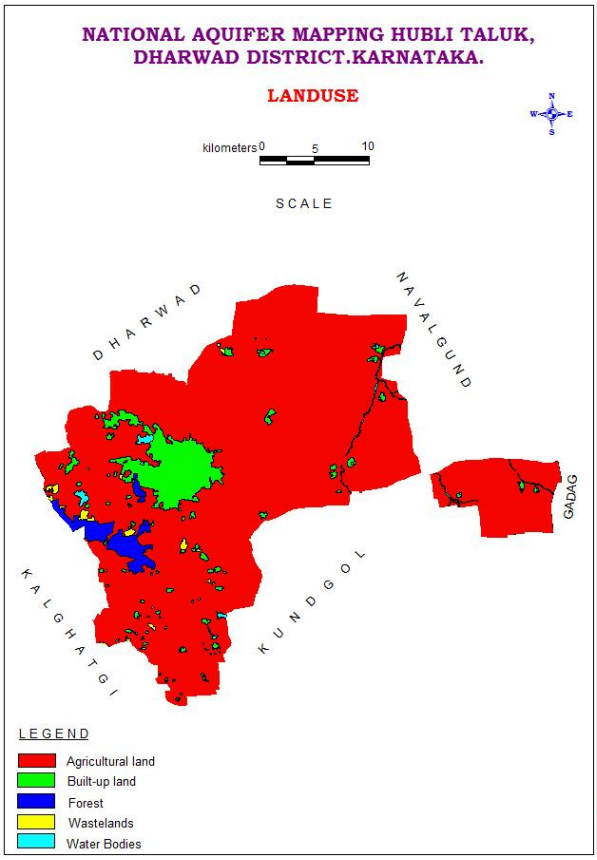


Fig-4: Land use pattern

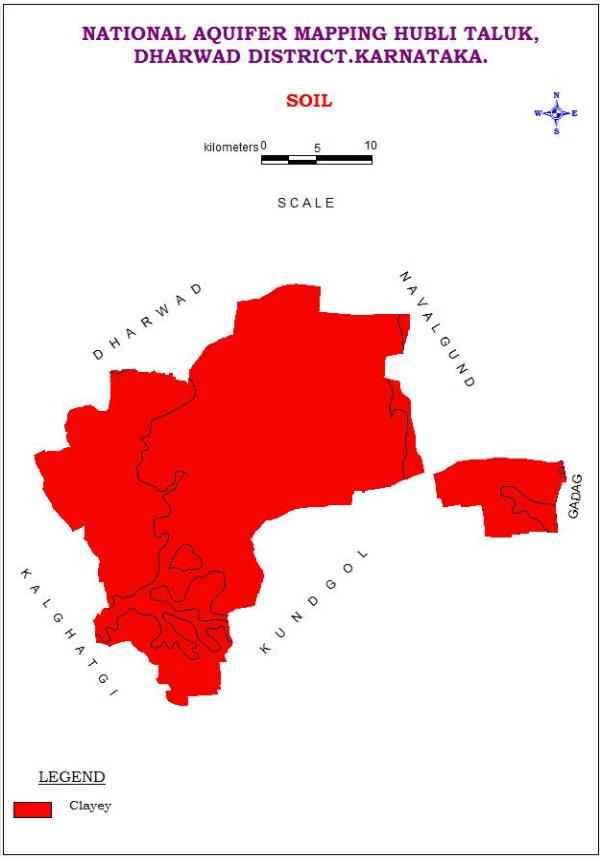


Fig-5: Soil map

1.8 Ground water resource availability and Extraction

The aquifer wise total ground water resources up to 200 m depth as on 2017 estimates is given in **Table-6.**

Table-6. Total Ground Water Resources in Ham (2017)

Annual replenishable GW resources	Fresh In-storage GW resources		Total availability of fresh GW resources
3130	Phreatic	Fractured (Down to 200m)	Dynamic + phreatic in-storage + fractured
	8069	1291	9360

1.9 Existing and future water demands (as per GEC-2017)

- Net ground water availability for future irrigation development:31.30 MCM
- Domestic (Industrial sector) allocationupto 2025 : 3.04MCM

1.10 Water level behaviour

The depth to water level of Aquifer-1 (phreaticor shallow representing weathered zone) and Aquifer-2 (representing fractured zone) for pre-monsoon and post-monsoon periods are furnished below.

(a) Depth to water level

Aquifer-I

- Pre-monsoon: 4.15 – 18.95mbgl (**Fig.-6**)
- Post-monsoon:0.34 – 21.13mbgl (**Fig.-7**)

(b) Water level fluctuation

Aquifer-I

- Seasonal Fluctuation: Rise ranges:3.00 –17.58m(**Fig.-8**)
  Fall ranges:9.08 (one well)

The water level of observation wells for the year 2019 is given in **Table-7.**The water level data is given in **Appendix-I**

Table-7. Water level data of shallow aquifer

Location	May 2019	November 2019	Seasonal fluctuation
Adaragunj	18.95	1.37	17.58
Bidnal	13.45	3.00	10.45
Hebsur1	8.40	3.15	5.25
Kunnur	4.15	1.15	3.00
Sherewad A	8.60	0.34	8.26
Sulla	12.05	21.13	-9.08

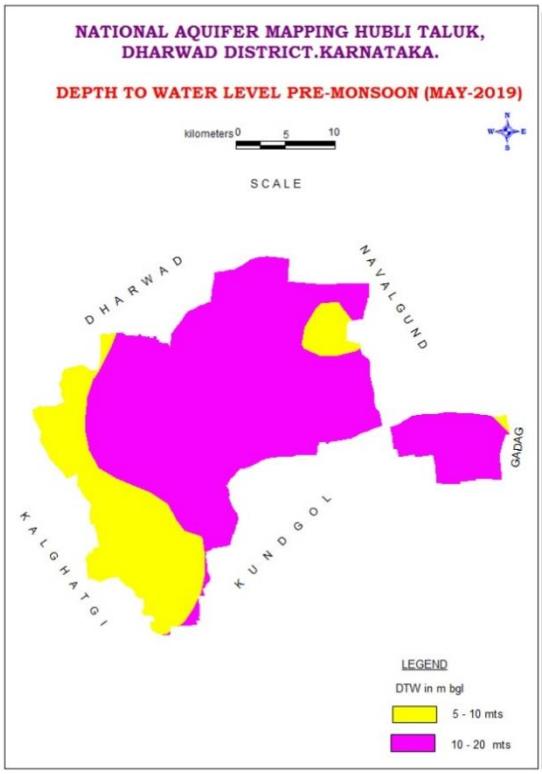


Fig-6: Pre-monsoon DTW (Aq-I)

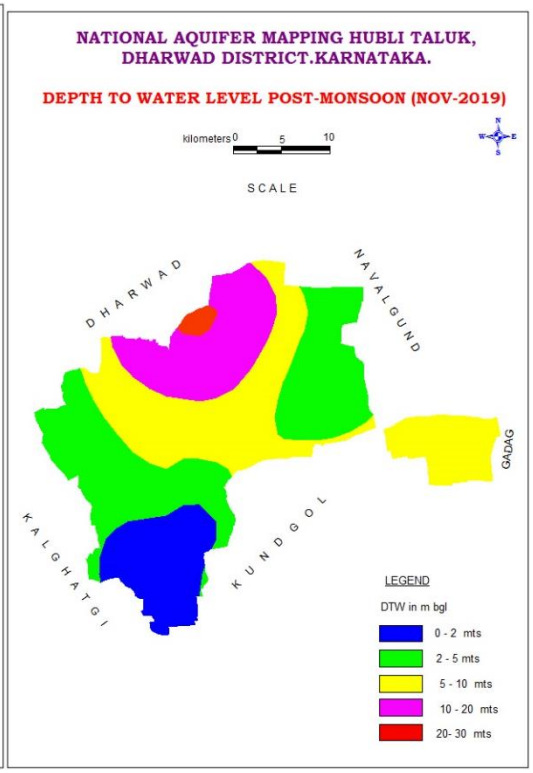


Fig-7: Post monsoon DTW (Aq-I)

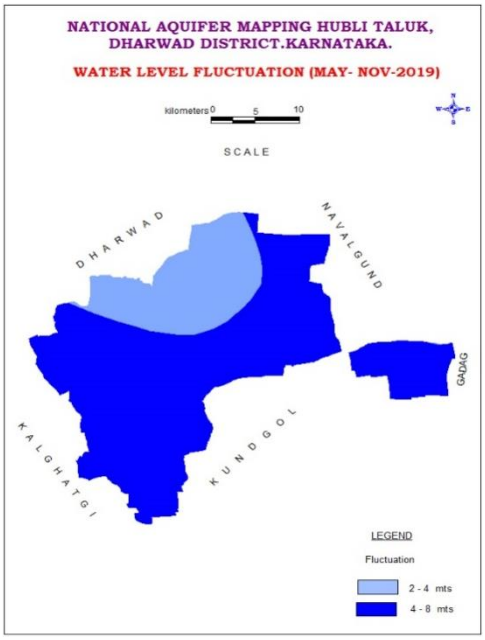


Fig.- 8: Water level fluctuation(May-Nov-2019)

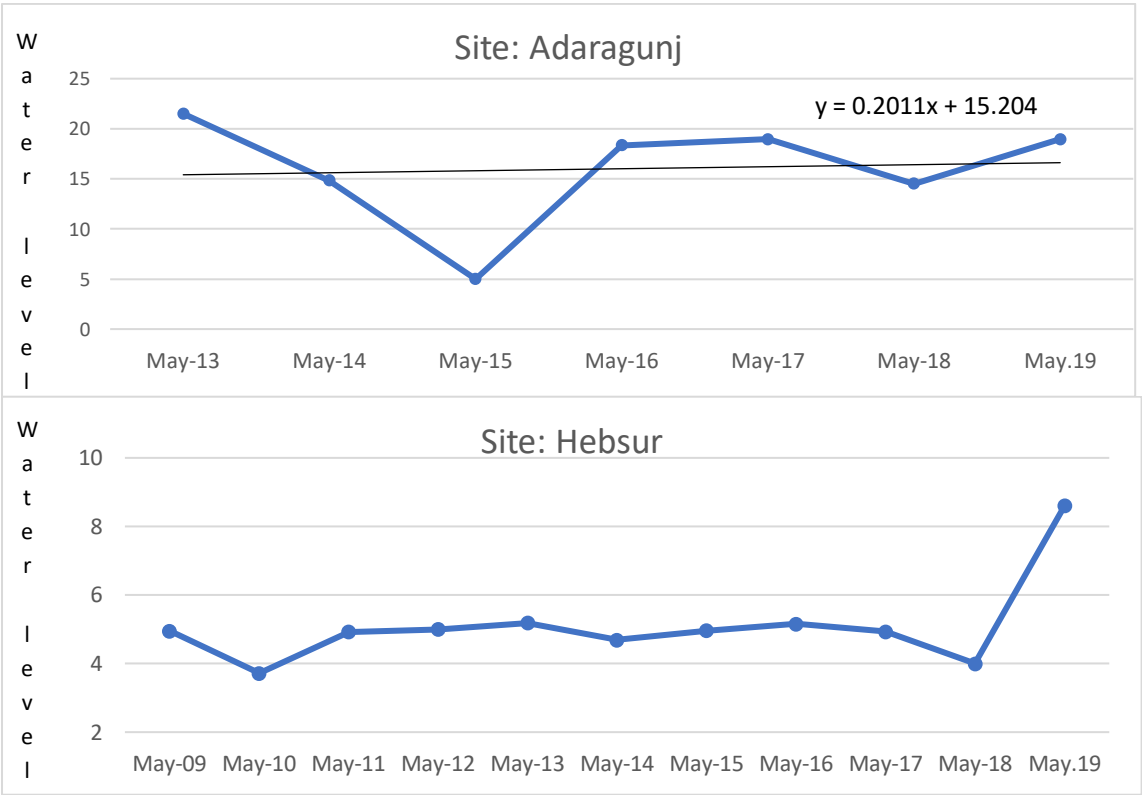
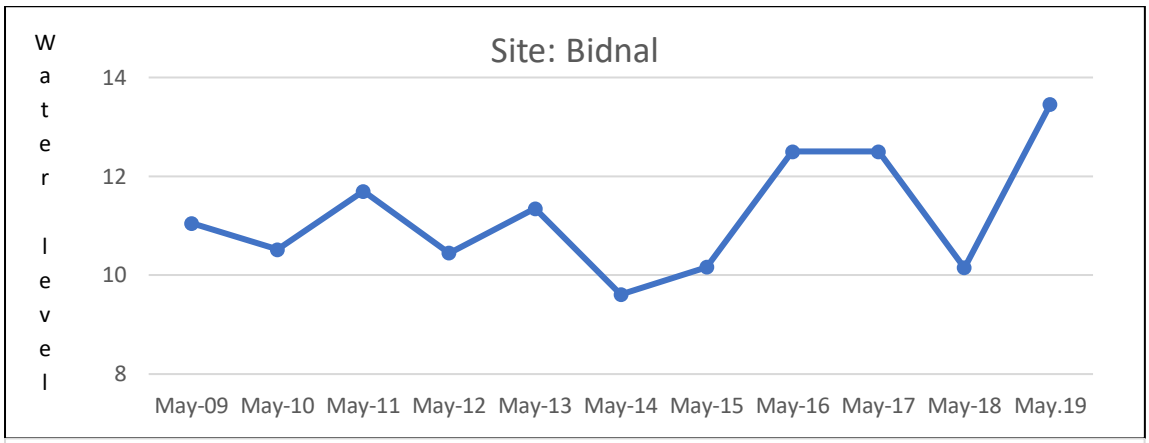


Fig- 8a& 8b. Hydrographs of of NHS stations in Hubli taluk



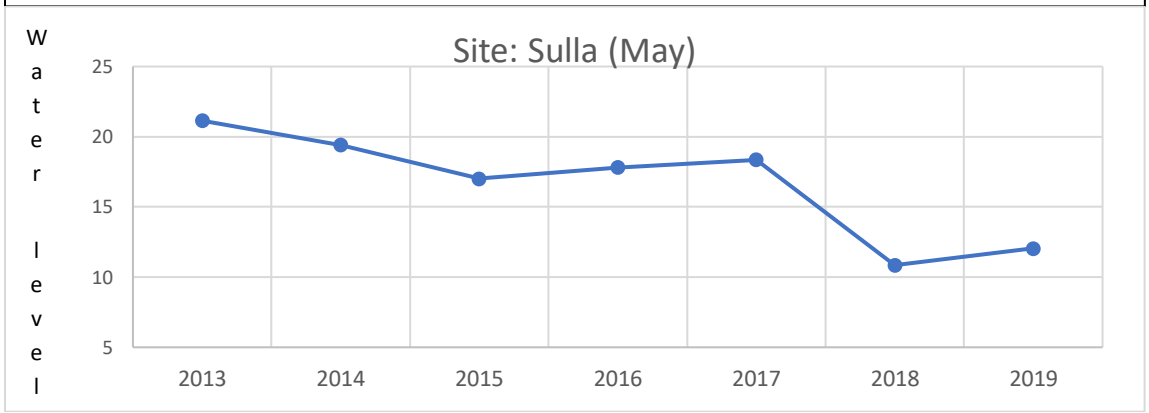


Fig- 8c & 8d. Hydrographs of of NHS stations in Hubli taluk

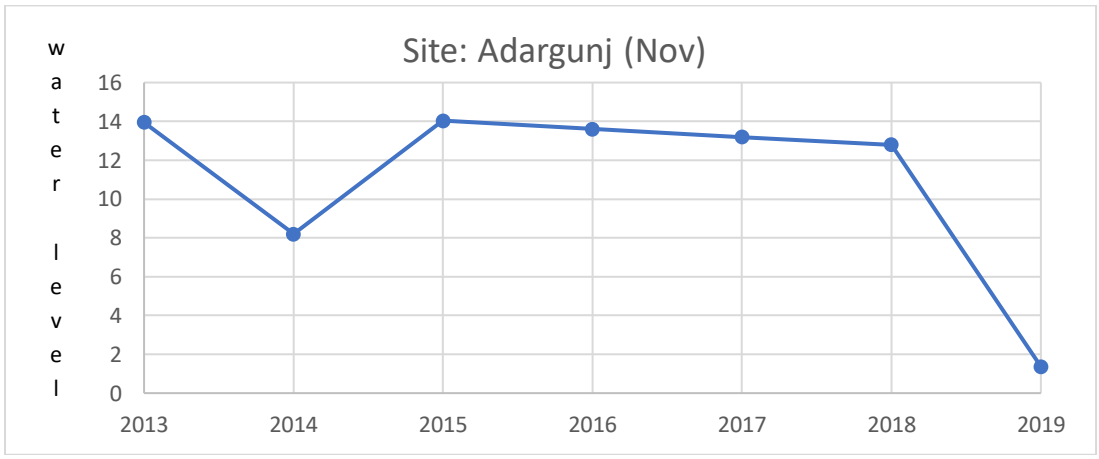


Fig- 8e. Hydrographs of of NHS station in Hubli taluk

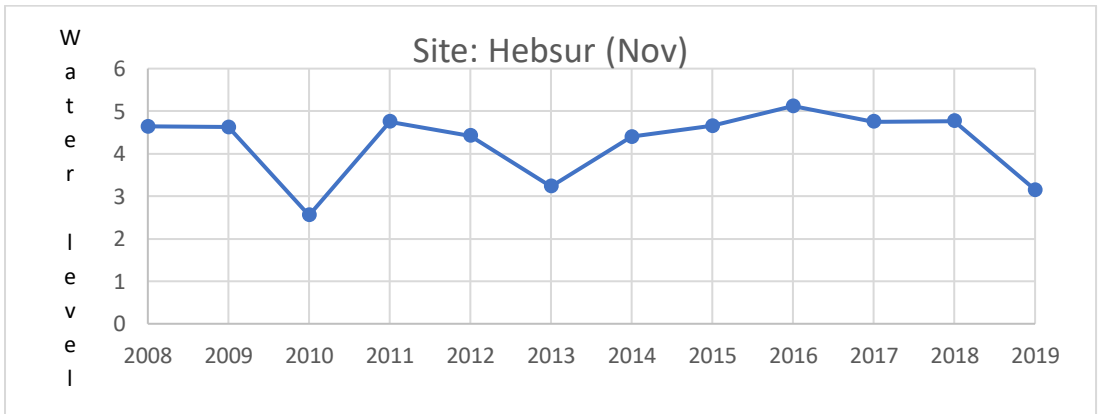


Fig- 8f. Hydrographs of of NHS station in Hubli taluk

2 AQUIFER DISPOSITION

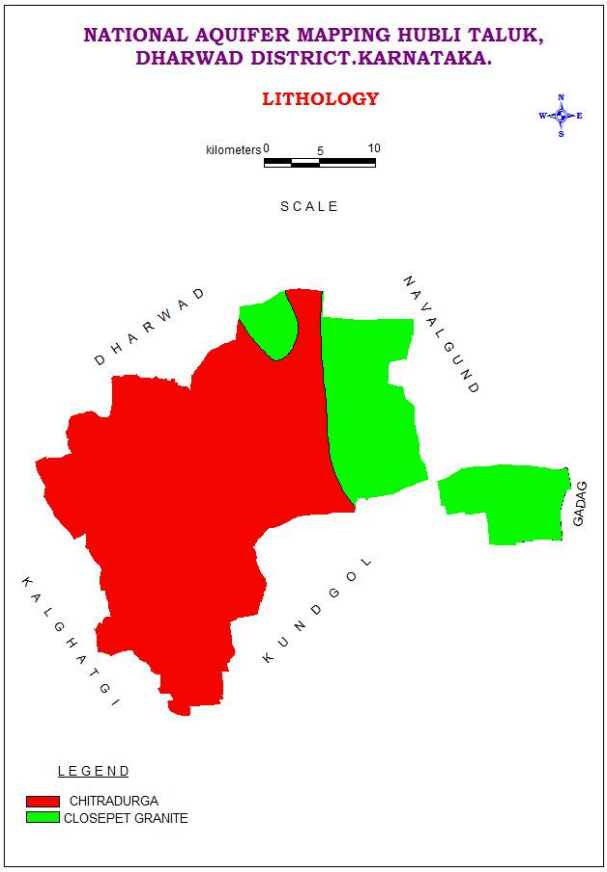
2.1 Types of Aquifers

In Hubli taluk, mainly two types of aquifer systems are present;

i. **Aquifer-I (Phreatic aquifer)** Weathered schist and gneiss
ii. **Aquifer-II (Fractured aquifer)** Fracturedschist and gneiss

Main rock formations in the area are the Gneissic-granites and Schists. Thesecondary structures like joints, fissures and faults present in themact as the aquifers.Ground water in the aquifer generally occurs underunconfined/phreatic to semi-confined conditions. The ground water occurrence and movement are controlled by the degree of weathering, fracturing and geomorphological set up in the area. In general, the ground water in Hubli taluk occurs under phreatic condition and at times in semi confined conditions.

Hubli talukis underlain by formations of Dharwar schist belt and Peninsular gneiss. The major part of the taluk is underlain by shale and grey wake comprises of phyllites, argillite, felsites, hematite, quartzites, schist (talc schist). The trend of foliation in the schistose formation is NNW-SSE with dip ranging from 45 to 75° to the northeast direction. The granite gneiss is found in the northeast and eastern part of the taluk. The weathered mantle generally covers the formations. The weathered thickness of the shale is about 60 to 75 m and that of greywacke is about 5 to 20 m. The weathered thickness of gneissic formation is about 10 to 15 m. The lithological units and geology of the area is shown in **Fig.9**and**Fig.10** respectively.



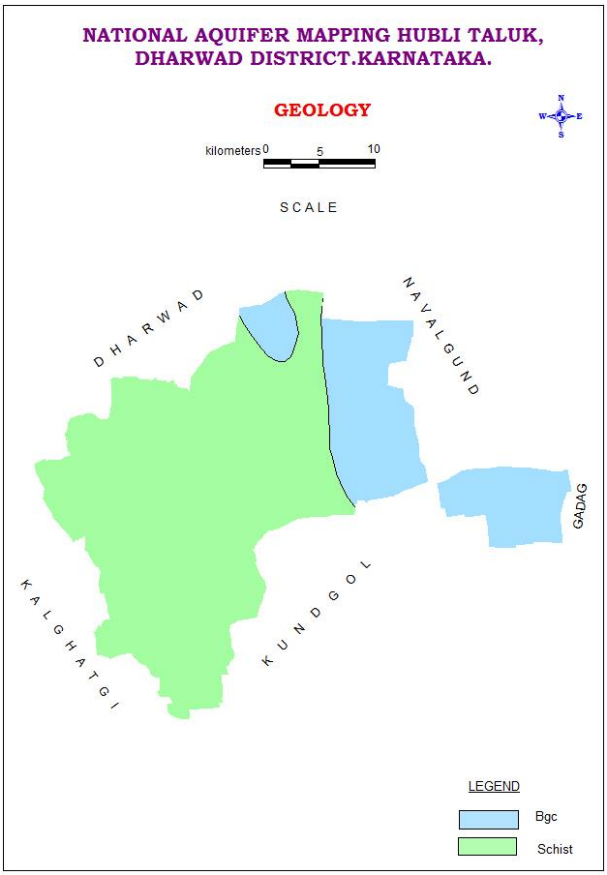
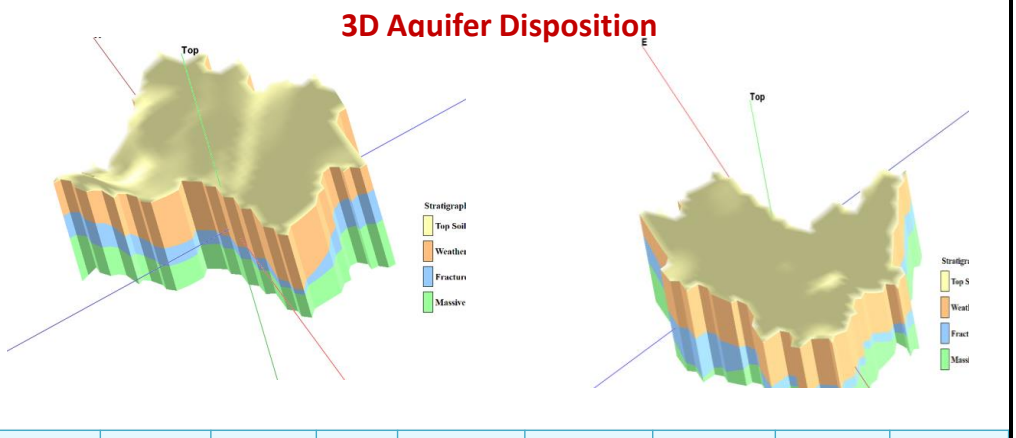


Fig-9: Lithology map **Fig-10: Geology map**

Sub-surface aquifer disposition are prepared based upon the outcome of ground exploration programme. Mainly. Four zones are categorized namely Top soil, Weathered, Fractured and Massive zones. These zones are represented using rockworks to depict the subsurface sections and models and presented in **Fig.-10A, Fig.-10B and Fig.10C.**



Type of Aquifer	Formation	Thickness (m)	Yield ranges (lps)	Transmissivity (m^2/day)	Sustainability of wells	EC (µ/mhos/cm at 25°C)	Fluoride (mg/l)	Nitrate (mg/l)
Aquifer – I Phreatic/ Weathered	Schist and Granite gneiss	32-45	<1 to 2	-	1 to 2hrs	799 to 5450	0.38 to 0.61	6 to 87
Aquifer – II Fractured	Schist and Granite gneiss	30 – 80 (most frequent)	<1 to 4	<1 – 4.0	1 to 5 hrs	-	-	-

Fig-10 A: 3D Aquifer Disposition

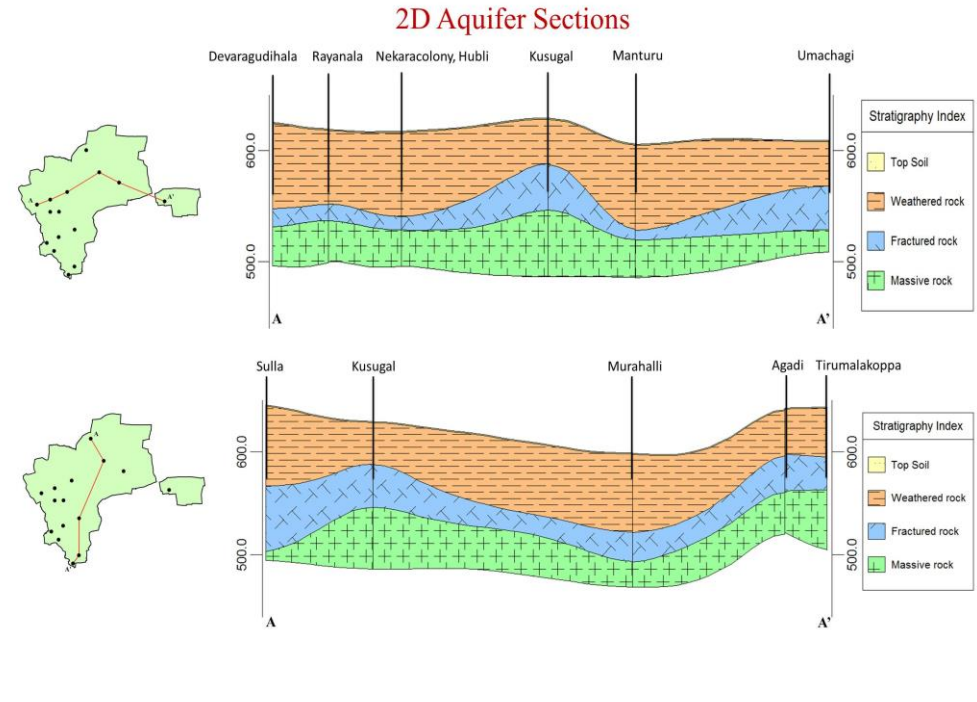


Fig-10 B: Lithological Cross sections in different directions

The ground water exploration was carried out in the taluk to evaluate the aquifer geometry. In the first phase of drilling only two wells were constructed in the taluk and the details are given in the **Table-8**. It shows that the aquifer in the taluk area is less potential.

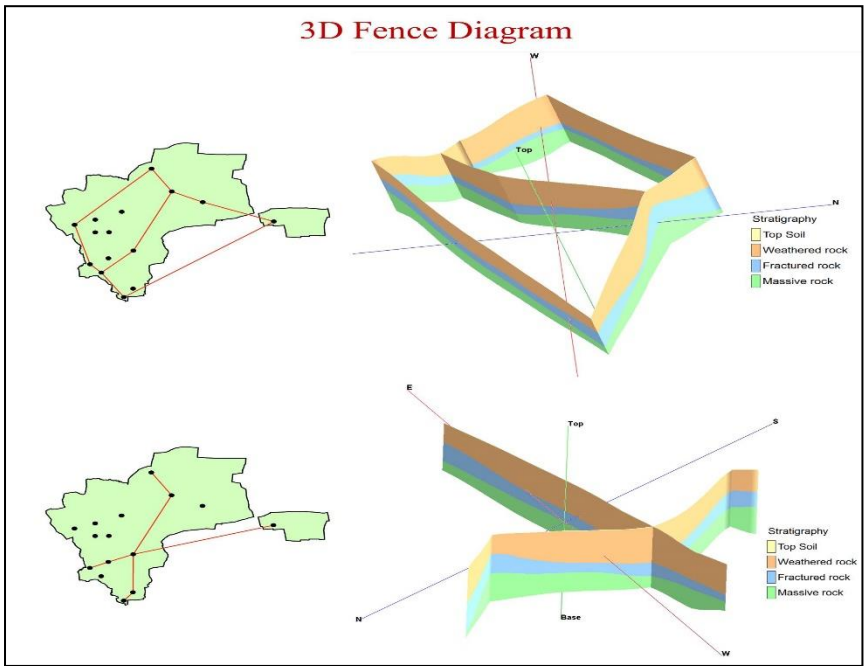


Fig-10C: 3D Aquifer Fence Diagram

Table-8. Details of Ground Water Exploration

S. No	Location	Depth drilled m.b.g.l	Casing m.bgl	Aquifer Zones m.bgl	Formation	Q (lpm)	DTW m bgl	T m^2/day
1.	Kusugal-EW 15°23' 40'' 74°12' 37''	153.75	38.31	26.65-27.75 58.50-53.60 57.00-57.95	Granite/ Meta Greywake	43.80	15.20	3.70
2	Sankdal-EW 15°47' 30'' 74°19' 30''	90.00	32.40	39.60-40.65 58.90-59.95	Gneiss/ Schist	7.80	25.77	-

2.2 Ground water resource, extraction, contamination and other issues

The main ground water issues are Limited Ground Water Potential / Limited Aquifer Thickness / Sustainability, declining water level trend which are all inter-related or inter dependent and Inferior ground water quality due to nitrate contamination in major part of the area.

2.3 Aquifer wise resource availability and extraction

The details of ground water resource in the taluk are given in **Table-9a, 9b and 9c**.

Table- 9a. Dynamic Ground Water Resourceof Hubli (2020) (in ham)

Annual Extractable Ground Water Resource (Ham)	Ground Water Extraction for Irrigation Use (Ham)	Ground Water Extraction for Industrial Use (Ham)	Ground Water Extraction for Domestic Use (Ham)	Total Extraction (Ham)	Annual GW Allocation for Domestic Use as on 2025 (Ham)	Net Ground Water Availability for future use (Ham)	Stage of Ground Water Extraction (%)	Categorization (Over-ExploitedE/Critical/Semicritical/Safe/Saline)
4288.78	1853.06	0.00	314.61	2167.67	337.82	2097.90	49.15	safe

Table- 9b. Total Ground Water Resource (2017) (in ham)

Taluk	Annual replenishable GW resources (in ham)	Fresh In-storage GW resources (in ham)		Total availability of GW resource (in ham)
		Phreatic	Fractured	Dynamic + phreatic in-storage + fractured in-storage
HUBLI	3130	8069	1291	12490

Table- 9c. Comparison of ground water availability and draft scenario (in ham)

GW availability (in ham)	GW draft (in ham)	Stage of GW development	GW availability (in ham)	GW draft (in ham)	Stage of GW development	GW availability (in ham)	GW draft (in ham)	Stage of GW development	GW availability (in ham)	GW draft (in ham)	Stage of GW development	GW availability (in ham)	GW draft (in ham)	Stage of GW development
2009			2011			2013			2017			2020		
3152	1460	46	3092	1486	48	3413	1802	53	3130	1673	53	3286	1700	52

From the above comparison, it can be observed that the stage of ground water extraction is more or less remaining in the same level during the period from 2009 to 2011 with a slight increase during the period from 2009 to 2020.

2.4 Ground WaterQuality and Contamination

The Chemical Analysis results of phreatic aquifer issummarized below and the analytical results are given in **Table-10.**

- ELECTRICAL CONDUCTIVITY: EC values range from 799 to 5450 µ/mhos/cm at 25^{o}C.
- FLUORIDE: Fluoride concentration in ground water ranges between 0.38and 0.61 mg/l.
- NITRATE: Nitrate value ranges from6to87 mg/l.

The ground water quality maps show that the ground water quality is better in Bedthiriver sub basin to the south west of the taluk where the rain fall is higher in comparison with the rest of the taluk. Red soil is prevalent in this area. In the rest of the taluk, ground water quality is relatively poor for both domestic and irrigation purpose. In more than 60% of the taluk area, the EC value is more than 3000 micro-mhos at 25^{0}C. ElectricalConductivityvaluein between 750 and 2250 is observed in about 30% of the taluk distributed in the southern part. In the northern part of the taluk in about 35% of the area, the chloride concentration is more than 1000ppm whereas in about 45% of the area, the chloride concentration is in the range of 251 to 1000ppm. The chloride concentration less than 250 ppm is found only in 20% of the taluk area in the southern part. Nitrate concentration is more than 45 ppmin almost entire taluk.The Electrical Conductivity, Chloride,Nitrate and Fluoride distribution maps are given in **Fig-11, 12, 13 and 14**respectively.

Table-10. Quality of ground water (Aquifer-I) in Hubli taluk

Location	pH	EC	TH	Ca	Mg	Na	K	CO3	HCO3	CL	SO4	NO3	F
Adaragunji	8.06	886	340	60	46	49	2	0	122	163	41	53	0.49
Bidnal	8.15	1393	410	54	67	164	4	0	140	298	63	87	0.61
Hebsur	8.96	5450	1180	120	214	689	79	30	238	1576	308	6	0.38
Sherewad	8.49	799	180	24	29	84	2	18	207	114	51	33	0.60
Sulla	8.14	1133	375	54	58	77	8	0	140	234	68	49	0.42

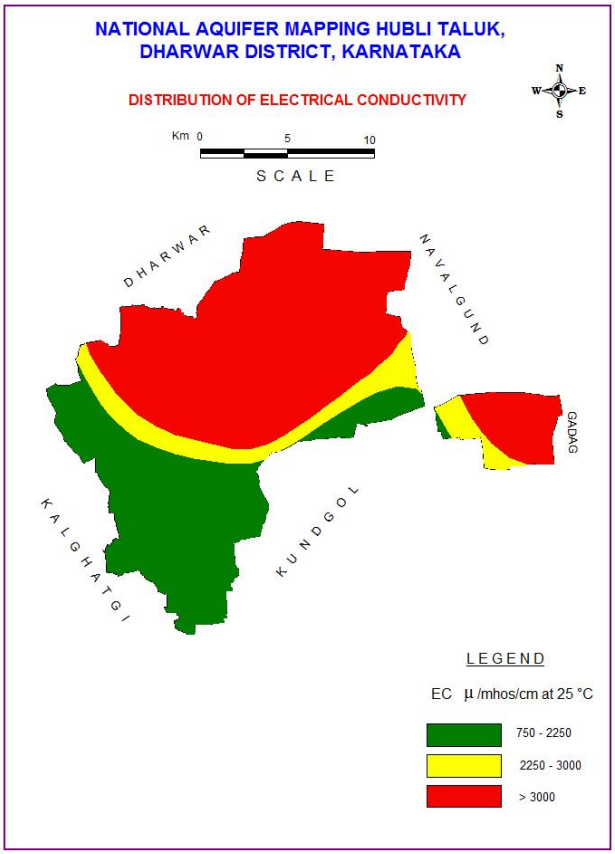


Fig-11: E C distribution map

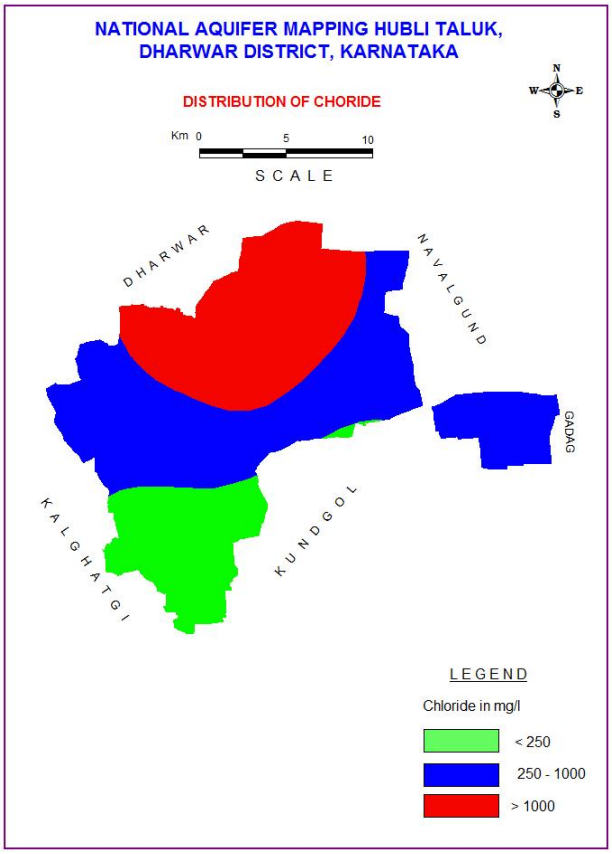


Fig-12: Chloridedistribution map

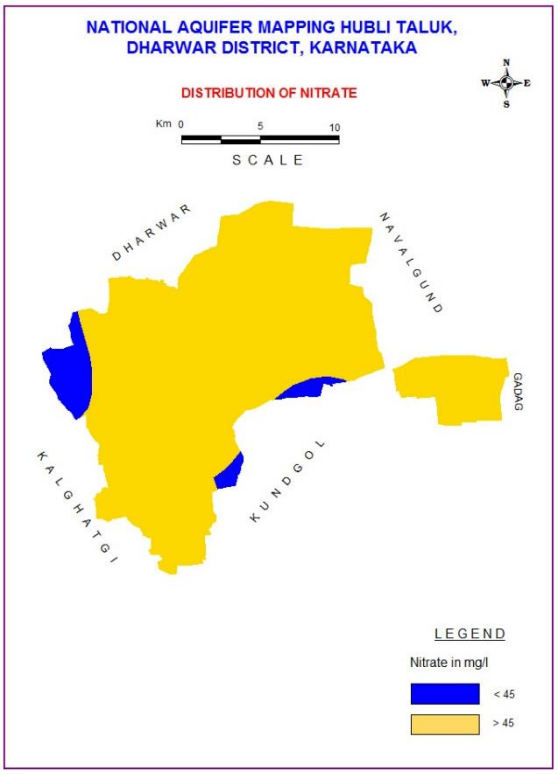


Fig-13: Nitrate distribution map

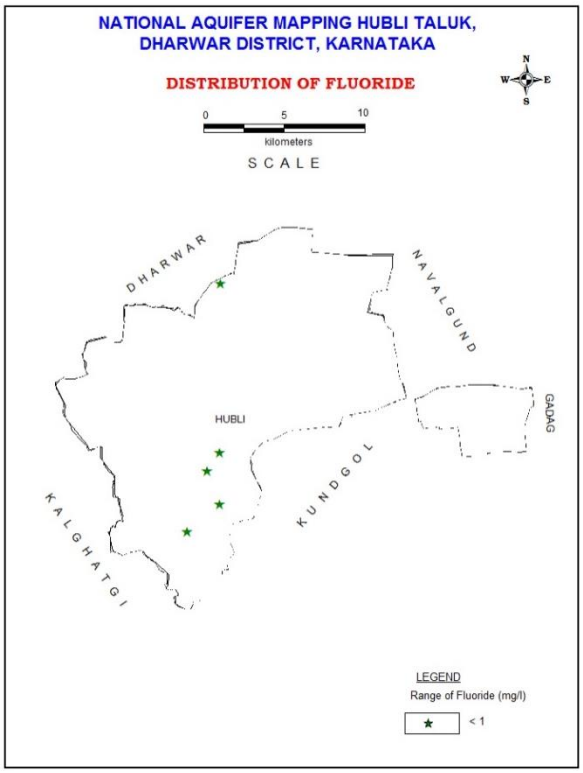


Fig-14: Fluoride distribution map

3 GROUND WATER RESOURCE ENHANCEMENT

3.1 Resource Enhancement by Supply side Interventions

To enhance the ground water resources of the dried-upaquifer in the taluk, artificial recharge structures like check dams, percolation tanks and point recharge structures are recommended. 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.By constructing 450 check dams, 79 percolation ponds and 2 subsurface dykesin the taluk, 3383 hectares of additional irrigation potential can be created ORthe existing 49.15% of stage of ground water extraction would reduce to 33.41% **(Table 11 and 12)**.The tentative locations of proposed AR structures and area feasible for recharge is shown in **Fig.-15**, whereas the location details of check dams and percolation tanks are presented in **Annexure-II and III** respectively.

Table-11. Quantity of non-committed surface runoff & expected recharge through AR structures

Artificial Recharge Structures proposed	Hubli taluk
Non committed monsoon runoff available (MCM)	87.97
Subsurface dyke	2
Percolation tank	79
Number of Check Dams	450
Filter bed	Nil
Number of Point Recharge structures	Nil
Tentative total cost of the project (Rs. in Cr)	61.32
Excepted recharge (MCM)	21.99
Additional Irrigation Potential Created @ 0.65 m	3383 ha

Table-12.Improvement in GW availability as per GWRA 2020 due to recharge inHubli taluk

Taluk	Net annual ground water availability	Existing gross ground water draft for all uses	Existing stage of ground water development	Expected recharge from proposed artificial recharge structures	Expected improvement in stage of ground water development after the implementation of the project	Likely improvement in overall stage of ground water development
	HAM	HAM	%	HAM	%	%
Hubli	4288.78	2167.67	49.15	2199	15.74	From 49.15 % to 33.41%

3.2 Regulation and Control

Hubli taluk has been categorized as **safe**, since the Stage of ground water development is53**%** as March 2017 and 47% as on March 2020. However, action has to be taken up through Karnataka StateGround Water Authority to control while developing further ground water in the future as per the guidelines prevailing from time to time.Ground water recharge component needs to be made mandatory in the non-command area of the taluk.

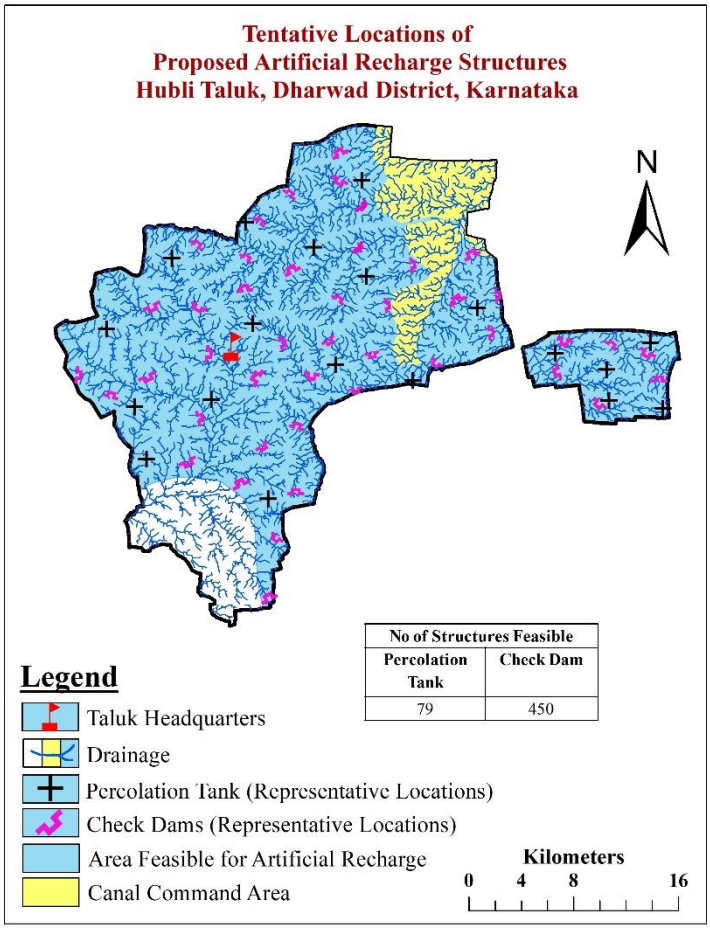


Fig-15: Tentative locations of representative artificial recharge structures

3.3 Other Interventions Proposed

- Periodical maintenance of artificial recharge structures should also be incorporated in the Recharge Plan.
- Any excess nitrate and fluoride concentration are found in ground water samples require remedial measures like: -
  - Dilution of nitrate rich ground water through artificial recharge & water conservation.
  - Roof top rain water harvesting.
- Micro irrigation is to be made mandatory.
- **Conjunctive use plan in water logged area:** Out of the total 71.3 sq.km(7130 ha) of the canal command area in the northern part of the taluk, 1187 ha is water logged. Out of this, 591 ha is reclaimed and 596 ha is yet to be reclaimed (Source: CADA as on March 2021). In addition to this reclamation, conjunctive use plan by construction of shallow borewells is also recommended to benefit the tail end area of the irrigation command.

3.4 Ground Water Development Plan

In Hubli taluk, the present stage of ground water extraction (2020) is 52% with net ground water availability of 3286 ham and total extraction of 1700 ham. The ground water draft for irrigation purpose is 1426 ham, thus indicating that ground water irrigation needs to be encouraged in the area. Also the moderate ground water development is most probably linked to the low ground water potential areasand limited aquifer thickness in Aquifer-II. To

overcome these, it is imperative to have a robust ground water resource development plan for the area, which can be implemented in scientific manner. The implementation of the plan needs to be based on site specific detailed hydrogeological, geophysical and scientific surveys for pinpointing the sites for construction of dugwells and borewells.

Considering the average unit draft figures for the taluk, about 101dugwells (10-15 m depth; 3 to 5 m diameter) are recommended to be constructed in feasible areas. Further as per the estimate about, 243 borewells (100 to 150 m depth; 150 mm dia) are also recommended to be drilled in feasible areas. The likely additional irrigation potential which can be created considering prevailing crop water requirement for the area is will be 624 ha. The detailed ground water development strategy to uplift the ground water use in the feasible areas is presented in Table – 13.

Table – 13: Feasibility of Additional GW abstraction structures based on GWRA 2020 availability

Annual Extractable GW Resource (Ham)	Stage of GW Extraction (%)	GWR required to take SOE to 60%	Present Draft	Balance GWR available to make SOE 60%	No. of DW feasible @ 25% with unit draft of 1 ham	No. of BWs feasible @ 75% with unit draft of 1.25 ham	Additional irrigation potential created considering crop water requirement of 0.65 m (Ha)	Additional irrigation potential created considering crop water requirement of 0.65 m (Ha)
4288.78	49.15	2573.268	2167.67	405.59	101	243	156	468

4 SUMMARY AND RECOMMENDATIONS

The main ground water issues are Low Ground Water Development, Limited Ground Water Potential / Limited Aquifer Thickness / Sustainability, which are all inter-related or inter dependent and Inferior Ground Water Quality due to nitrate contamination major part of the area. The summary of ground water management plan of Belagavi taluk is given in **Table-14.**

Table-14. Summary of Management plan of Hubli taluk

Stage of GW Extraction and Category (2020)	49.15%, Safe
Annual Extractable GW Resource (Ham)	4288.78
Total Extraction (Ham)	2167.67
Ground Water Draft for Irrigation (Ham)	1853.06
Ground Water Resource Enhancement by Supply side Interventions	
No of Proposed AR structures SSD PT CD	 2 79 450
Expected Additional Recharge to GW due to AR (Ham)	2199
Additional Irrigation Potential that can be created (Ha) OR	3383
Change in Stage of GW Extraction (%)	From 49.15 % to 33.41%
Total Estimated Expenditure (Rs. in Cr.)	61.32
Ground Water Resource Savings by Demand side Interventions	

Not proposed as SOE has been brought down to 33.41% by supply side interventions	
Ground Water Resource Development Plan	
Balance GWR available to enhance SOE 60% (Ham)	405.59
No. of wells proposed **DW** – 10-15 m depth; 3 to 5 m diameter, Av. Annual Gross draft – 1.00 ham **BW** – Depth: 100 to 150 m, Dia: 150 mm, Av. Annual Gross draft – 1.25 ham	 101 243
Additional irrigation potential created considering crop water requirement of 0.65 m (Ha)	624
Increase in Stage of GW Extraction (%)	49.15 to 60

Ground Water Quality – Nitrate contamination	Improving quality by proper drainage of sewage and Limited usage of Nitrogenous fertilizers. Dilution of nitrate rich ground water through artificial recharge, water conservation and Roof top rain water harvesting.
Conjunctive use plan in water logged area	1187 ha is water logged, out of this, 591 ha is reclaimed and 596 ha is yet to be reclaimed (Source: CADA as on March 2021). In addition to this reclamation, conjunctive use plan by construction of shallow borewells is also recommended in 596 ha area to benefit the tail end area of the irrigation command

As per the resource estimation – 2020, Hubli taluk falls under Safe category with the stage of ground water extraction is 49.15%. However, there is need to formulate management strategy to tackle theLow Ground Water Development, mitigate water scarcity and ground water quality related issues in the taluk. It is suggested to adopt ascientific and multi-pronged ground water management strategy covering supply side interventions aspects as mentioned in the management plan suggested above.

Ground water resource enhancement by supply side interventions:To enhance the ground water resources of the dried-upaquifer in the taluk, artificial recharge structures like check dams, percolation tanks and point recharge structures are recommended. 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. By constructing 450 check dams, 79 percolation ponds and 2 subsurface dykesin the taluk, 3383 hectares of additional irrigation potential can be created ORthe existing 49.15% of stage of ground water extraction would reduce to 33.41%.

Ground Water Development Plan: In Hubli taluk, the present stage of ground water extraction (2020) is 52 % with net ground water availability of 3286 ham and total extraction of 1700 ham. Thus, indicating that ground water irrigation needs to be encouraged in the area. The implementation of the plan needs to be based on site specific detailed hydrogeological, geophysical and scientific surveys for pinpointing the sites for construction of dugwells and borewells.Considering the average unit draft figures for the taluk, about 101dugwells (10-15 m depth; 3 to 5 m diameter) are recommended to be constructed in feasible areas. Further as per the estimate about, 243 borewells (100 to 150 m depth; 150 mm dia) are also recommended to

be drilled in feasible areas. The likely additional irrigation potential which can be created considering prevailing crop water requirement for the area is will be 624 ha.

Advanced irrigation practices: There are two agricultural seasons namely Kharif (June – October) and Rabi season (Mid October – Mid February). Major *Kharif* crops are maize, Jowar, Tur, and vegetables. Main crops of Rabi season are Maize, Jowar, Groundnut, Bengal gram and Sunflower.Irrigation is (100 %) by bore wells (ground water). The irrigation practices like drip and sprinkler irrigation are comparatively less practiced in comparison with other mode of irrigation which needs to be expanded to save irrigation water by way of precision farming mechanism. This ultimately enhances the area under irrigation potential. This will also improve the stage of ground water extraction for the taluk.

Conjunctive use plan in water logged area: Out of the total 71.3 sq.km(7130 ha) of the canal command area in the northern part of the taluk, 1187 ha is water logged. Out of this, 591 ha is reclaimed and 596 ha is yet to be reclaimed (Source: CADA as on March 2021). In addition to this reclamation, conjunctive use plan by construction of shallow borewells is also recommended to benefit the tail end area of the irrigation command.

Change in cropping pattern: Agriculture is the main occupation in Hubli taluk. Major Kharif crop is Jowar. Main crops of Rabi season are Gram. Other than these oil seeds and cotton are the major crops grown in the taluk. The water intensive crops like fruits and vegetable are grown significantly in the taluk. However, the supply side and demand side interventions will be sufficient for sustainable ground water development, **hence change in cropping pattern is not recommended**.

Drinking water Supply: In view of ground water contamination with mainly higher concentration EC and Nitrate, drinking water supply from surface water needs to be explored/ ensured. This will also help to aquifer sustainability in the taluk.

Regulation and control: Taluk is categorised as **"Safe".** However, the mandatory guidelines like rainwater harvesting and artificial recharge issued by Karnataka Ground Water Authority (KGWA) 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.

Water Linkages with other Activities: Water sector has strong linkages with other developmental activities. Hence, the proposed management plans cannot be considered as static and needs to be reviewed and improved from time to time.

Appendix-I: Water level data of National hydrograph monitoring stations in Hubli taluk

Premonsoon (May)

Location	May-08	May-09	May-10	May-11	May-12	May-13	May-14	May-15	May-16	May-17	May-18	May.19
Adargunj						21.5	14.84	4.99	18.33	18.95	14.5	18.95
Annigeri	7.95	8.95	7.5	8.4	7.36		8.49	7.77	6.08			9.2
Behatti	7.95	19.05	8.2	12.02	9.85							
Bidnal		11.05	10.52	11.7	10.45	11.35	9.61	10.16	12.5	12.5	10.15	13.45
Hebsur	5.5	5.58	5.4									
Hebsur-1		4.95	3.72	4.92	5	5.18	4.69	4.96	5.16	4.93	4	8.6
Kunnur						7.03	2.52	7.41		10.98	2.55	4.15
Sherewad	2.65	2.7	2.3	3.4			5.98					
Sherewad A				3.8	4.7	8.88		5.41	7.95	8.2	6.5	8.6
Sulla						21.14	19.41	17.02	17.82	18.35	10.85	12.05

Postmonsoon (November)

Location	Nov-08	Nov-09	Nov-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16	Nov-17	Nov-18	Nov-19
Adargunj						13.95	8.2	14.04	13.6	13.2	12.8	1.37
Annigeri	12.2	6.43	5.82	7.3	8.55			8.33				
Behatti	14.57	7.55	7.67	8.45	9.2							
Bidnal	9.05	7.87		8.25	9.6	8.44	8.35	10.85	11.4	10.5	13.05	3
Hebsur	5.32	4.87	4.13									
Hebsur-1	4.64	4.62	2.55	4.75	4.42	3.23	4.4	4.65	5.12	4.75	4.77	3.15
Kunnur						0.67	1.02	1.85	3		1.25	1.15
Sherewad	2.5	2.75	1.2			3.12	2.9		6.15			
Sherewad A				2.9	4.78	3.52		5.5		5	6.1	0.34
Sulla							12.65	19.05	18.05	12.65	7.5	21.13

Appendix-II: Proposed Tentative Locations of Check Dams in Hubli Taluk

S. No	Longitude	Latitude	Village	Gram Panchayath	Taluk
1	75.1627	15.1802	Agadi	Agadi	Hubli
2	75.1665	15.1912	Agadi	Agadi	Hubli
3	75.1603	15.2027	Bhu.Aralikatte	B.Aralikatti	Hubli
4	75.1770	15.2133	Bhu.Aralikatte	B.Aralikatti	Hubli
5	75.1676	15.2206	Chebbi+minirayanakoppa	Chabbi	Hubli
6	75.1645	15.2324	Chebbi+minirayanakoppa	Chabbi	Hubli
7	75.1563	15.2381	Chebbi+minirayanakoppa	Chabbi	Hubli
8	75.1718	15.2411	Chebbi+minirayanakoppa	Chabbi	Hubli
9	75.1602	15.2448	Pale+mitlagatti	Belagali	Hubli
10	75.1512	15.2468	Pale+mitlagatti	Belagali	Hubli
11	75.1962	15.2470	Chebbi+minirayanakoppa	Chabbi	Hubli
12	75.1826	15.2531	Sherawada	Sharewada	Hubli
13	75.1671	15.2531	Sherawada	Sharewada	Hubli
14	75.1971	15.2554	Sherawada	Sharewada	Hubli
15	75.1737	15.2563	Sherawada	Sharewada	Hubli
16	75.0791	15.2582	Ramapura	Channapura	Hubli
17	75.1421	15.2593	Sherawada	Sharewada	Hubli
18	75.0893	15.2622	Channapura	Channapura	Hubli
19	75.1501	15.2622	Sherawada	Sharewada	Hubli
20	75.1002	15.2639	InamVeerapura	Belagali	Hubli
21	75.1106	15.2641	Giriyala	Katnur	Hubli
22	75.1993	15.2643	Sherawada	Sharewada	Hubli
23	75.1906	15.2648	Sherawada	Sharewada	Hubli
24	75.1256	15.2652	Belagali	Belagali	Hubli
25	75.1595	15.2675	Nulvi	Noolvi	Hubli
26	75.1843	15.2677	Nulvi	Noolvi	Hubli
27	75.0716	15.2677	Chavaragudda	Channapura	Hubli
28	75.1678	15.2690	Nulvi	Noolvi	Hubli
29	75.0850	15.2696	Channapura	Channapura	Hubli
30	75.1741	15.2707	Nulvi	Noolvi	Hubli
31	75.0952	15.2717	Channapura	Channapura	Hubli
32	75.1171	15.2721	Katnura	Katnur	Hubli
33	75.1043	15.2738	Katnura	Katnur	Hubli
34	75.1861	15.2753	Nulvi	Noolvi	Hubli
35	75.1674	15.2759	Nulvi	Noolvi	Hubli
36	75.0712	15.2769	Chavaragudda	Channapura	Hubli
37	75.1741	15.2771	Nulvi	Noolvi	Hubli
38	75.1081	15.2773	Katnura	Katnur	Hubli
39	75.1942	15.2774	Nulvi	Noolvi	Hubli
40	75.1189	15.2777	Katnura	Katnur	Hubli
41	75.0844	15.2784	Channapura	Channapura	Hubli
42	75.1469	15.2790	Adharagunji	Adaragunchi	Hubli
43	75.1114	15.2802	Katnura	Katnur	Hubli
44	75.0984	15.2811	Katnura	Katnur	Hubli
45	75.0881	15.2834	Channapura	Channapura	Hubli

S. No	Longitude	Latitude	Village	Gram Panchayath	Taluk
46	75.1587	15.2840	Adharagunji	Adaragunchi	Hubli
47	75.0728	15.2840	Budnala	Anchatageri	Hubli
48	75.1371	15.2844	Budarashingi	Katnur	Hubli
49	75.1688	15.2845	Adharagunji	Adaragunchi	Hubli
50	75.1477	15.2853	Adharagunji	Adaragunchi	Hubli
51	75.1307	15.2874	Budarashingi	Katnur	Hubli
52	75.1416	15.2882	Budarashingi	Katnur	Hubli
53	75.1936	15.2883	Adharagunji	Adaragunchi	Hubli
54	75.1644	15.2889	Adharagunji	Adaragunchi	Hubli
55	75.1824	15.2899	Adharagunji	Adaragunchi	Hubli
56	75.0769	15.2936	Budnala	Anchatageri	Hubli
57	75.1570	15.2941	Kotagondahunasi	Adaragunchi	Hubli
58	75.1318	15.2948	Ajjapura	Adaragunchi	Hubli
59	75.1099	15.2953	Bavanura	Katnur	Hubli
60	75.1493	15.2954	Kotagondahunasi	Adaragunchi	Hubli
61	75.0611	15.2955	Budnala	Anchatageri	Hubli
62	75.0953	15.2970	Anchatageri	Anchatageri	Hubli
63	75.1891	15.2971	Adharagunji	Adaragunchi	Hubli
64	75.1773	15.2971	Adharagunji	Adaragunchi	Hubli
65	75.0834	15.2982	Anchatageri	Anchatageri	Hubli
66	75.1658	15.2985	Kotagondahunasi	Adaragunchi	Hubli
67	75.0724	15.2985	Budnala	Anchatageri	Hubli
68	75.1568	15.2991	Kotagondahunasi	Adaragunchi	Hubli
69	75.1840	15.2996	Adharagunji	Adaragunchi	Hubli
70	75.1407	15.3000	Ajjapura	Adaragunchi	Hubli
71	75.1511	15.3010	Kotagondahunasi	Adaragunchi	Hubli
72	75.4062	15.3026	Koliwada	Koliwad	Hubli
73	75.1133	15.3030	Agrahara Thimmasagara	Anchatageri	Hubli
74	75.1574	15.3045	Kotagondahunasi	Adaragunchi	Hubli
75	75.1905	15.3046	Adharagunji	Adaragunchi	Hubli
76	75.1271	15.3047	Gabbura	Hubli	Hubli
77	75.0752	15.3056	Budnala	Anchatageri	Hubli
78	75.4154	15.3066	Koliwada	Koliwad	Hubli
79	75.0962	15.3067	Anchatageri	Anchatageri	Hubli
80	75.1336	15.3068	Gabbura	Hubli	Hubli
81	75.0490	15.3081	Devaragudihala	Devaragudihal	Hubli
82	75.4346	15.3083	Koliwada	Koliwad	Hubli
83	75.1474	15.3083	Gabbura	Hubballi Nagara	Hubballi Nagara
84	75.1219	15.3092	Agrahara Thimmasagara	Anchatageri	Hubli
85	75.1794	15.3100	Kotagondahunasi	Adaragunchi	Hubli
86	75.1104	15.3100	Agrahara Thimmasagara	Anchatageri	Hubli
87	75.2018	15.3105	Halyal	Halyala	Hubli
88	75.0571	15.3108	Devaragudihala	Devaragudihal	Hubli
89	75.0877	15.3117	Anchatageri	Anchatageri	Hubli
90	75.1291	15.3118	Agrahara Thimmasagara	Anchatageri	Hubli

S. No	Longitude	Latitude	Village	Gram Panchayath	Taluk
91	75.1399	15.3121	Gabbura	Hubballi Nagara	Hubballi Nagara
92	75.1574	15.3122	Gabbura	Hubballi Nagara	Hubballi Nagara
93	75.0643	15.3123	Devaragudihala	Devaragudihal	Hubli
94	75.1468	15.3132	Gabbura	Hubballi Nagara	Hubballi Nagara
95	75.1188	15.3135	Agrahara Thimmasagara	Anchatageri	Hubli
96	75.3955	15.3135	Koliwada	Koliwad	Hubli
97	75.1655	15.3142	Gabbura	Hubli	Hubli
98	75.1525	15.3144	Gabbura	Hubballi Nagara	Hubballi Nagara
99	75.2104	15.3144	Halyal	Halyala	Hubli
100	75.4385	15.3150	Koliwada	Koliwad	Hubli
101	75.0927	15.3153	Anchatageri	Anchatageri	Hubli
102	75.1746	15.3157	Gabbura	Hubli	Hubli
103	75.0799	15.3162	Parasapura	Devaragudihal	Hubli
104	75.0464	15.3168	Devaragudihala	Devaragudihal	Hubli
105	75.1144	15.3174	Ayodhya	Hubballi Nagara	Hubballi Nagara
106	75.1869	15.3183	Halyal	Halyala	Hubli
107	75.0679	15.3184	Parasapura	Devaragudihal	Hubli
108	75.4182	15.3184	Koliwada	Koliwad	Hubli
109	75.1294	15.3188	Agrahara Thimmasagara	Anchatageri	Hubli
110	75.2056	15.3188	Halyal	Halyala	Hubli
111	75.1793	15.3198	Gabbura	Hubli	Hubli
112	75.0517	15.3206	Devaragudihala	Devaragudihal	Hubli
113	75.1933	15.3209	Halyal	Halyala	Hubli
114	75.1701	15.3210	Gabbura	Hubli	Hubli
115	75.1005	15.3211	Ayodhya	Hubballi Nagara	Hubballi Nagara
116	75.2262	15.3212	Halyal	Halyala	Hubli
117	75.1068	15.3214	Ayodhya	Hubballi Nagara	Hubballi Nagara
118	75.0390	15.3218	Devaragudihala	Devaragudihal	Hubli
119	75.1426	15.3220	Gabbura	Hubli	Hubli
120	75.2198	15.3221	Halyal	Halyala	Hubli
121	75.2129	15.3221	Halyal	Halyala	Hubli
122	75.0448	15.3221	Devaragudihala	Devaragudihal	Hubli
123	75.1358	15.3229	Gabbura	Hubballi Nagara	Hubballi Nagara
124	75.0604	15.3229	Devaragudihala	Devaragudihal	Hubli
125	75.1505	15.3235	Gabbura	Hubli	Hubli
126	75.0786	15.3235	Parasapura	Devaragudihal	Hubli
127	75.1240	15.3236	Ayodhya	Hubballi Nagara	Hubballi Nagara
128	75.1598	15.3239	Gabbura	Hubli	Hubli
129	75.0861	15.3241	Gangivala	Rayanal	Hubli

S. No	Longitude	Latitude	Village	Gram Panchayath	Taluk
130	75.0938	15.3255	Gangivala	Rayanal	Hubli
131	75.2348	15.3258	Mantura	Mantur	Hubli
132	75.0521	15.3262	Devaragudihala	Devaragudihal	Hubli
133	75.0459	15.3262	Devaragudihala	Devaragudihal	Hubli
134	75.1880	15.3268	Halyal	Halyala	Hubli
135	75.4127	15.3273	Koliwada	Koliwad	Hubli
136	75.2569	15.3277	Nagarahalli	Mantur	Hubli
137	75.1188	15.3279	Ayodhya	Hubballi Nagara	Hubballi Nagara
138	75.3567	15.3279	Umachagi	Umachagi	Hubli
139	75.2240	15.3283	Halyal	Halyala	Hubli
140	75.2109	15.3290	Halyal	Halyala	Hubli
141	75.1332	15.3291	Ayodhya	Hubballi Nagara	Hubballi Nagara
142	75.0372	15.3300	Devaragudihala	Devaragudihal	Hubli
143	75.1779	15.3301	Bidanala	Hubballi Nagara	Hubballi Nagara
144	75.0761	15.3306	Parasapura	Devaragudihal	Hubli
145	75.4409	15.3307	Malligawada	Umachagi	Hubli
146	75.1592	15.3314	Yallapura	Hubballi Nagara	Hubballi Nagara
147	75.2760	15.3315	Nagarahalli	Mantur	Hubli
148	75.1655	15.3318	Yallapura	Hubballi Nagara	Hubballi Nagara
149	75.3810	15.3319	Koliwada	Koliwad	Hubli
150	75.1860	15.3324	Halyal	Halyala	Hubli
151	75.1077	15.3324	Ayodhya	Hubballi Nagara	Hubballi Nagara
152	75.0842	15.3327	Rayanala	Rayanal	Hubli
153	75.0708	15.3329	Gokula	Hubballi Nagara	Hubballi Nagara
154	75.1532	15.3330	Yallapura	Hubballi Nagara	Hubballi Nagara
155	75.1916	15.3332	Halyal	Halyala	Hubli
156	75.2342	15.3335	Mantura	Mantur	Hubli
157	75.0268	15.3342	Revadihala	Devaragudihal	Hubli
158	75.0410	15.3346	Revadihala	Devaragudihal	Hubli
159	75.2186	15.3347	Halyal	Halyala	Hubli
160	75.1346	15.3350	Shahara Hubli	Hubballi Nagara	Hubballi Nagara
161	75.0643	15.3358	Gokula	Hubballi Nagara	Hubballi Nagara
162	75.2654	15.3359	Nagarahalli	Mantur	Hubli
163	75.3650	15.3360	Umachagi	Umachagi	Hubli
164	75.2066	15.3364	Halyal	Halyala	Hubli
165	75.2874	15.3373	Shiraguppi	Shiraguppi	Hubli
166	75.4232	15.3374	Koliwada	Koliwad	Hubli
167	75.1398	15.3375	Shahara Hubli	Hubballi Nagara	Hubballi

S. No	Longitude	Latitude	Village	Gram Panchayath	Taluk
					Nagara
168	75.0970	15.3379	Rayanala	Rayanal	Hubli
169	75.2967	15.3395	Shiraguppi	Shiraguppi	Hubli
170	75.1984	15.3399	InamVeerapur	Hubballi Nagara	Hubballi Nagara
171	75.4013	15.3399	Koliwada	Koliwad	Hubli
172	75.4496	15.3400	Malligawada	Umachagi	Hubli
173	75.1628	15.3402	Bammapura	Hubballi Nagara	Hubballi Nagara
174	75.1874	15.3410	InamVeerapur	Hubballi Nagara	Hubballi Nagara
175	75.2804	15.3411	Shiraguppi	Shiraguppi	Hubli
176	75.2238	15.3411	Halyal	Halyala	Hubli
177	75.3512	15.3411	Umachagi	Umachagi	Hubli
178	75.1144	15.3414	Krishnapura	Hubballi Nagara	Hubballi Nagara
179	75.0708	15.3423	Gokula	Hubballi Nagara	Hubballi Nagara
180	75.0656	15.3423	Gokula	Hubballi Nagara	Hubballi Nagara
181	75.1792	15.3423	Bammapura	Hubballi Nagara	Hubballi Nagara
182	75.2936	15.3424	Shiraguppi	Shiraguppi	Hubli
183	75.2038	15.3431	InamVeerapur	Hubballi Nagara	Hubballi Nagara
184	75.2155	15.3432	Halyal	Halyala	Hubli
185	75.0258	15.3436	Tharihala	Hubballi Nagara	Hubballi Nagara
186	75.1376	15.3440	Shahara Hubli	Hubballi Nagara	Hubballi Nagara
187	75.0546	15.3440	Revadihala	Devaragudihal	Hubli
188	75.0406	15.3440	Revadihala	Devaragudihal	Hubli
189	75.0836	15.3444	Rayanala	Rayanal	Hubli
190	75.3021	15.3445	Shiraguppi	Shiraguppi	Hubli
191	75.2284	15.3446	Mantura	Mantur	Hubli
192	75.1658	15.3457	Bammapura	Hubballi Nagara	Hubballi Nagara
193	75.1582	15.3458	Bammapura	Hubballi Nagara	Hubballi Nagara
194	75.1052	15.3459	Krishnapura	Hubballi Nagara	Hubballi Nagara
195	75.0749	15.3463	Gokula	Hubballi Nagara	Hubballi Nagara
196	75.4315	15.3467	Koliwada	Koliwad	Hubli
197	75.1547	15.3468	M. Aralikatti	Hubballi Nagara	Hubballi Nagara
198	75.1467	15.3476	Shahara Hubli	Hubballi Nagara	Hubballi Nagara
199	75.0941	15.3477	Rayanala	Rayanal	Hubli

S. No	Longitude	Latitude	Village	Gram Panchayath	Taluk
200	75.1209	15.3480	Krishnapura	Hubballi Nagara	Hubballi Nagara
201	75.2352	15.3482	Mantura	Mantur	Hubli
202	75.4441	15.3486	Koliwada	Koliwad	Hubli
203	75.0658	15.3488	Gokula	Hubballi Nagara	Hubballi Nagara
204	75.1774	15.3489	Bammapura	Hubballi Nagara	Hubballi Nagara
205	75.4139	15.3495	Koliwada	Koliwad	Hubli
206	75.3146	15.3499	Shiraguppi	Shiraguppi	Hubli
207	75.3251	15.3502	Shiraguppi	Shiraguppi	Hubli
208	75.0370	15.3503	Tharihala	Hubballi Nagara	Hubballi Nagara
209	75.2831	15.3504	Shiraguppi	Shiraguppi	Hubli
210	75.3972	15.3506	Koliwada	Koliwad	Hubli
211	75.0767	15.3511	Gokula	Hubballi Nagara	Hubballi Nagara
212	75.1442	15.3513	Shahara Hubli	Hubballi Nagara	Hubballi Nagara
213	75.2737	15.3516	Shiraguppi	Shiraguppi	Hubli
214	75.2973	15.3517	Shiraguppi	Shiraguppi	Hubli
215	75.2475	15.3517	Mantura	Mantur	Hubli
216	75.2161	15.3527	Bammapura	Hubballi Nagara	Hubballi Nagara
217	75.0538	15.3528	Gokula	Hubballi Nagara	Hubballi Nagara
218	75.1928	15.3529	Bammapura	Hubballi Nagara	Hubballi Nagara
219	75.3093	15.3543	Shiraguppi	Shiraguppi	Hubli
220	75.0445	15.3549	Tharihala	Hubballi Nagara	Hubballi Nagara
221	75.1157	15.3551	Jangamarakoppa	Hubballi Nagara	Hubballi Nagara
222	75.1819	15.3554	Bammapura	Hubballi Nagara	Hubballi Nagara
223	75.1727	15.3554	M. Aralikatti	Hubballi Nagara	Hubballi Nagara
224	75.2266	15.3556	Mantura	Mantur	Hubli
225	75.4215	15.3558	Koliwada	Koliwad	Hubli
226	75.3731	15.3558	Umachagi	Umachagi	Hubli
227	75.0215	15.3559	Tharihala	Hubballi Nagara	Hubballi Nagara
228	75.4055	15.3560	Koliwada	Koliwad	Hubli
229	75.3255	15.3562	Shiraguppi	Shiraguppi	Hubli
230	75.3354	15.3563	Shiraguppi	Shiraguppi	Hubli
231	75.2893	15.3564	Shiraguppi	Shiraguppi	Hubli
232	75.0652	15.3564	Gokula	Hubballi Nagara	Hubballi Nagara
233	75.4445	15.3565	Koliwada	Koliwad	Hubli

S. No	Longitude	Latitude	Village	Gram Panchayath	Taluk
234	75.3162	15.3566	Shiraguppi	Shiraguppi	Hubli
235	75.2780	15.3566	Shiraguppi	Shiraguppi	Hubli
236	75.1582	15.3568	Keshwapura	Hubballi Nagara	Hubballi Nagara
237	75.1651	15.3570	Keshwapura	Hubballi Nagara	Hubballi Nagara
238	75.1503	15.3570	Keshwapura	Hubballi Nagara	Hubballi Nagara
239	75.0956	15.3578	Unakal	Hubballi Nagara	Hubballi Nagara
240	75.2097	15.3581	Bammapura	Hubballi Nagara	Hubballi Nagara
241	75.2981	15.3583	Shiraguppi	Shiraguppi	Hubli
242	75.3881	15.3585	Koliwada	Koliwad	Hubli
243	75.1804	15.3585	Keshwapura	Hubballi Nagara	Hubballi Nagara
244	75.2035	15.3590	Bammapura	Hubballi Nagara	Hubballi Nagara
245	75.1400	15.3590	Nagashettykoppa	Hubballi Nagara	Hubballi Nagara
246	75.1046	15.3596	Unakal	Hubballi Nagara	Hubballi Nagara
247	75.3129	15.3604	Shiraguppi	Shiraguppi	Hubli
248	75.0359	15.3606	Tharihala	Hubballi Nagara	Hubballi Nagara
249	75.0591	15.3608	Gokula	Hubballi Nagara	Hubballi Nagara
250	75.0741	15.3610	Gokula	Hubballi Nagara	Hubballi Nagara
251	75.1933	15.3614	Bammapura	Hubballi Nagara	Hubballi Nagara
252	75.2916	15.3614	Shiraguppi	Shiraguppi	Hubli
253	75.3062	15.3621	Shiraguppi	Shiraguppi	Hubli
254	75.2832	15.3625	Shiraguppi	Shiraguppi	Hubli
255	75.3202	15.3627	Shiraguppi	Shiraguppi	Hubli
256	75.0656	15.3627	Gokula	Hubballi Nagara	Hubballi Nagara
257	75.2275	15.3631	Mantura	Mantur	Hubli
258	75.1274	15.3632	MariyanaThimmasagara	Hubballi Nagara	Hubballi Nagara
259	75.0459	15.3635	Tharihala	Hubballi Nagara	Hubballi Nagara
260	75.0254	15.3637	Tharihala	Hubballi Nagara	Hubballi Nagara
261	75.0343	15.3639	Tharihala	Hubballi Nagara	Hubballi Nagara
262	75.2960	15.3640	Shiraguppi	Shiraguppi	Hubli
263	75.3300	15.3651	Shiraguppi	Shiraguppi	Hubli
264	75.0694	15.3654	Gokula	Hubballi Nagara	Hubballi Nagara

S. No	Longitude	Latitude	Village	Gram Panchayath	Taluk
265	75.0830	15.3662	Myadagoppa	Hubballi Nagara	Hubballi Nagara
266	75.1462	15.3671	Bengeri	Hubballi Nagara	Hubballi Nagara
267	75.2377	15.3673	Bandiwada	Bhandiwada	Hubli
268	75.1702	15.3673	Nagashettykoppa	Hubballi Nagara	Hubballi Nagara
269	75.1791	15.3675	Nagashettykoppa	Hubballi Nagara	Hubballi Nagara
270	75.1070	15.3677	Unakal	Hubballi Nagara	Hubballi Nagara
271	75.1613	15.3677	Bengeri	Hubballi Nagara	Hubballi Nagara
272	75.2874	15.3685	Shiraguppi	Shiraguppi	Hubli
273	75.2057	15.3685	Kusugalla	Kusugal	Hubli
274	75.3160	15.3698	Shiraguppi	Shiraguppi	Hubli
275	75.3293	15.3699	Shiraguppi	Shiraguppi	Hubli
276	75.3048	15.3700	Shiraguppi	Shiraguppi	Hubli
277	75.2971	15.3705	Shiraguppi	Shiraguppi	Hubli
278	75.0553	15.3707	Gamanagatti	Hubballi Nagara	Hubballi Nagara
279	75.1163	15.3713	Unakal	Hubballi Nagara	Hubballi Nagara
280	75.3228	15.3715	Shiraguppi	Shiraguppi	Hubli
281	75.1243	15.3728	Unakal	Hubballi Nagara	Hubballi Nagara
282	75.2829	15.3732	Shiraguppi	Shiraguppi	Hubli
283	75.0707	15.3734	Gamanagatti	Hubballi Nagara	Hubballi Nagara
284	75.1551	15.3736	Bengeri	Hubballi Nagara	Hubballi Nagara
285	75.2374	15.3742	Bandiwada	Bhandiwada	Hubli
286	75.1406	15.3746	Gopanakoppa	Hubballi Nagara	Hubballi Nagara
287	75.1899	15.3757	Kusugalla	Kusugal	Hubli
288	75.3064	15.3763	Shiraguppi	Shiraguppi	Hubli
289	75.0913	15.3764	Myadagoppa	Hubballi Nagara	Hubballi Nagara
290	75.1823	15.3770	Nagashettykoppa	Hubballi Nagara	Hubballi Nagara
291	75.0454	15.3779	Gamanagatti	Hubballi Nagara	Hubballi Nagara
292	75.0793	15.3785	Gamanagatti	Hubballi Nagara	Hubballi Nagara
293	75.2892	15.3790	Shiraguppi	Shiraguppi	Hubli
294	75.1117	15.3794	Unakal	Hubballi Nagara	Hubballi Nagara
295	75.3285	15.3808	Shiraguppi	Shiraguppi	Hubli
296	75.1209	15.3811	Unakal	Hubballi Nagara	Hubballi Nagara

S. No	Longitude	Latitude	Village	Gram Panchayath	Taluk
297	75.2473	15.3819	Bandiwada	Bhandiwada	Hubli
298	75.1447	15.3820	Gopanakoppa	Hubballi Nagara	Hubballi Nagara
299	75.3180	15.3824	Shiraguppi	Shiraguppi	Hubli
300	75.1875	15.3826	Kusugalla	Kusugal	Hubli
301	75.1635	15.3826	Bengeri	Hubballi Nagara	Hubballi Nagara
302	75.3060	15.3837	Shiraguppi	Shiraguppi	Hubli
303	75.1767	15.3838	Bengeri	Hubballi Nagara	Hubballi Nagara
304	75.0590	15.3848	Gamanagatti	Hubballi Nagara	Hubballi Nagara
305	75.1160	15.3858	Unakal	Hubballi Nagara	Hubballi Nagara
306	75.1521	15.3866	Gopanakoppa	Hubballi Nagara	Hubballi Nagara
307	75.2961	15.3870	Shiraguppi	Shiraguppi	Hubli
308	75.2134	15.3871	Kusugalla	Kusugal	Hubli
309	75.1089	15.3871	Byridevarakoppa	Hubballi Nagara	Hubballi Nagara
310	75.3259	15.3885	Ingalahalli	Ingalahalli	Hubli
311	75.3208	15.3885	Ingalahalli	Ingalahalli	Hubli
312	75.2380	15.3885	Bandiwada	Bhandiwada	Hubli
313	75.3113	15.3887	Ingalahalli	Ingalahalli	Hubli
314	75.1382	15.3889	Unakal	Hubballi Nagara	Hubballi Nagara
315	75.1773	15.3892	Gopanakoppa	Hubballi Nagara	Hubballi Nagara
316	75.2260	15.3900	Kusugalla	Kusugal	Hubli
317	75.0913	15.3904	Amaragola	Hubballi Nagara	Hubballi Nagara
318	75.1268	15.3907	Unakal	Hubballi Nagara	Hubballi Nagara
319	75.1980	15.3913	Kusugalla	Kusugal	Hubli
320	75.1217	15.3920	Unakal	Hubballi Nagara	Hubballi Nagara
321	75.1683	15.3923	Gopanakoppa	Hubballi Nagara	Hubballi Nagara
322	75.1884	15.3925	Kusugalla	Kusugal	Hubli
323	75.0698	15.3928	Suthagatti	Hubballi Nagara	Hubballi Nagara
324	75.3161	15.3929	Ingalahalli	Ingalahalli	Hubli
325	75.1034	15.3933	Byridevarakoppa	Hubballi Nagara	Hubballi Nagara
326	75.2165	15.3936	Kusugalla	Kusugal	Hubli
327	75.1462	15.3937	Gopanakoppa	Hubballi Nagara	Hubballi Nagara
328	75.0528	15.3937	Suthagatti	Hubballi Nagara	Hubballi Nagara

S. No	Longitude	Latitude	Village	Gram Panchayath	Taluk
329	75.2393	15.3951	Kusugalla	Kusugal	Hubli
330	75.2568	15.3957	Ingalahalli	Ingalahalli	Hubli
331	75.1810	15.3961	Gopanakoppa	Hubballi Nagara	Hubballi Nagara
332	75.0614	15.3964	Suthagatti	Hubballi Nagara	Hubballi Nagara
333	75.3088	15.3967	Ingalahalli	Ingalahalli	Hubli
334	75.3013	15.3975	Ingalahalli	Ingalahalli	Hubli
335	75.1585	15.3979	Gopanakoppa	Hubballi Nagara	Hubballi Nagara
336	75.2664	15.3981	Ingalahalli	Ingalahalli	Hubli
337	75.3236	15.3981	Ingalahalli	Ingalahalli	Hubli
338	75.1176	15.3981	Unakal	Hubballi Nagara	Hubballi Nagara
339	75.2291	15.3996	Kusugalla	Kusugal	Hubli
340	75.1924	15.4002	Kusugalla	Kusugal	Hubli
341	75.1693	15.4005	Gopanakoppa	Hubballi Nagara	Hubballi Nagara
342	75.0827	15.4009	Amaragola	Hubballi Nagara	Hubballi Nagara
343	75.2051	15.4020	Kusugalla	Kusugal	Hubli
344	75.1407	15.4023	Unakal	Hubballi Nagara	Hubballi Nagara
345	75.2976	15.4023	Ingalahalli	Ingalahalli	Hubli
346	75.3062	15.4025	Ingalahalli	Ingalahalli	Hubli
347	75.1006	15.4030	Amaragola	Hubballi Nagara	Hubballi Nagara
348	75.1535	15.4032	Unakal	Hubballi Nagara	Hubballi Nagara
349	75.3242	15.4032	Ingalahalli	Ingalahalli	Hubli
350	75.3159	15.4032	Ingalahalli	Ingalahalli	Hubli
351	75.2211	15.4038	Kusugalla	Kusugal	Hubli
352	75.1148	15.4039	Unakal	Hubballi Nagara	Hubballi Nagara
353	75.1454	15.4053	Unakal	Hubballi Nagara	Hubballi Nagara
354	75.2405	15.4056	Kusugalla	Kusugal	Hubli
355	75.1789	15.4071	Gopanakoppa	Hubballi Nagara	Hubballi Nagara
356	75.1308	15.4074	Unakal	Hubballi Nagara	Hubballi Nagara
357	75.2143	15.4083	Kusugalla	Kusugal	Hubli
358	75.2658	15.4085	Ingalahalli	Ingalahalli	Hubli
359	75.3027	15.4088	Ingalahalli	Ingalahalli	Hubli
360	75.3216	15.4092	Ingalahalli	Ingalahalli	Hubli
361	75.1625	15.4104	Unakal	Hubballi Nagara	Hubballi Nagara
362	75.0895	15.4105	Amaragola	Hubballi Nagara	Hubballi Nagara

S. No	Longitude	Latitude	Village	Gram Panchayath	Taluk
363	75.3114	15.4109	Ingalahalli	Ingalahalli	Hubli
364	75.1330	15.4134	Unakal	Hubballi Nagara	Hubballi Nagara
365	75.2076	15.4136	Byahatti	Byahatti	Hubli
366	75.2291	15.4136	Kusugalla	Kusugal	Hubli
367	75.1967	15.4141	Kusugalla	Kusugal	Hubli
368	75.1841	15.4141	Sulya	Sulla	Hubli
369	75.1114	15.4143	Byridevarakoppa	Hubballi Nagara	Hubballi Nagara
370	75.1481	15.4152	Unakal	Hubballi Nagara	Hubballi Nagara
371	75.1667	15.4158	Sulya	Sulla	Hubli
372	75.1259	15.4164	Unakal	Hubballi Nagara	Hubballi Nagara
373	75.0930	15.4174	Amaragola	Hubballi Nagara	Hubballi Nagara
374	75.1736	15.4176	Sulya	Sulla	Hubli
375	75.2603	15.4178	Ingalahalli	Ingalahalli	Hubli
376	75.2452	15.4178	Kusugalla	Kusugal	Hubli
377	75.1003	15.4179	Amaragola	Hubballi Nagara	Hubballi Nagara
378	75.2541	15.4184	Ingalahalli	Ingalahalli	Hubli
379	75.3070	15.4186	Ingalahalli	Ingalahalli	Hubli
380	75.2113	15.4201	Byahatti	Byahatti	Hubli
381	75.1598	15.4203	Sulya	Sulla	Hubli
382	75.1382	15.4206	Unakal	Hubballi Nagara	Hubballi Nagara
383	75.1237	15.4209	Unakal	Hubballi Nagara	Hubballi Nagara
384	75.0819	15.4214	Amaragola	Hubballi Nagara	Hubballi Nagara
385	75.2251	15.4217	Byahatti	Byahatti	Hubli
386	75.1901	15.4225	Sulya	Sulla	Hubli
387	75.1191	15.4239	Unakal	Hubballi Nagara	Hubballi Nagara
388	75.1129	15.4242	Byridevarakoppa	Hubballi Nagara	Hubballi Nagara
389	75.1289	15.4245	Unakal	Hubballi Nagara	Hubballi Nagara
390	75.1056	15.4247	Byridevarakoppa	Hubballi Nagara	Hubballi Nagara
391	75.2164	15.4251	Byahatti	Byahatti	Hubli
392	75.1490	15.4269	Sulya	Sulla	Hubli
393	75.0830	15.4278	Amaragola	Hubballi Nagara	Hubballi Nagara
394	75.1977	15.4280	Byahatti	Byahatti	Hubli
395	75.0900	15.4283	Amaragola	Hubballi Nagara	Hubballi Nagara
396	75.2263	15.4284	Byahatti	Byahatti	Hubli

S. No	Longitude	Latitude	Village	Gram Panchayath	Taluk
397	75.0947	15.4287	Amaragola	Hubballi Nagara	Hubballi Nagara
398	75.2453	15.4289	Byahatti	Byahatti	Hubli
399	75.2357	15.4291	Byahatti	Byahatti	Hubli
400	75.1733	15.4299	Sulya	Sulla	Hubli
401	75.2544	15.4301	Kiresura	Kiresur	Hubli
402	75.2019	15.4344	Byahatti	Byahatti	Hubli
403	75.1898	15.4347	Byahatti	Byahatti	Hubli
404	75.1629	15.4354	Sulya	Sulla	Hubli
405	75.2221	15.4366	Byahatti	Byahatti	Hubli
406	75.1792	15.4366	Sulya	Sulla	Hubli
407	75.2095	15.4383	Byahatti	Byahatti	Hubli
408	75.1573	15.4393	Sulya	Sulla	Hubli
409	75.2451	15.4394	Byahatti	Byahatti	Hubli
410	75.1957	15.4397	Byahatti	Byahatti	Hubli
411	75.1716	15.4419	Sulya	Sulla	Hubli
412	75.2271	15.4421	Byahatti	Byahatti	Hubli
413	75.2174	15.4438	Byahatti	Byahatti	Hubli
414	75.2377	15.4442	Byahatti	Byahatti	Hubli
415	75.1943	15.4486	Byahatti	Byahatti	Hubli
416	75.2108	15.4488	Byahatti	Byahatti	Hubli
417	75.2263	15.4493	Byahatti	Byahatti	Hubli
418	75.1871	15.4495	Byahatti	Byahatti	Hubli
419	75.2027	15.4531	Byahatti	Byahatti	Hubli
420	75.1807	15.4541	Byahatti	Byahatti	Hubli
421	75.1659	15.4553	Sulya	Sulla	Hubli
422	75.2300	15.4559	Byahatti	Byahatti	Hubli
423	75.1733	15.4565	Sulya	Sulla	Hubli
424	75.2187	15.4567	Byahatti	Byahatti	Hubli
425	75.1960	15.4579	Byahatti	Byahatti	Hubli
426	75.2347	15.4588	Byahatti	Byahatti	Hubli
427	75.2056	15.4593	Byahatti	Byahatti	Hubli
428	75.1790	15.4593	Sulya	Sulla	Hubli
429	75.2239	15.4631	Byahatti	Byahatti	Hubli
430	75.2125	15.4655	Byahatti	Byahatti	Hubli
431	75.2017	15.4665	Byahatti	Byahatti	Hubli
432	75.1886	15.4667	Byahatti	Byahatti	Hubli
433	75.1938	15.4670	Byahatti	Byahatti	Hubli
434	75.2199	15.4672	Byahatti	Byahatti	Hubli
435	75.2096	15.4718	Byahatti	Byahatti	Hubli
436	75.1928	15.4730	Byahatti	Byahatti	Hubli
437	75.2293	15.4741	Byahatti	Byahatti	Hubli
438	75.2417	15.4746	Byahatti	Byahatti	Hubli
439	75.1933	15.4787	Byahatti	Byahatti	Hubli
440	75.1867	15.4813	Byahatti	Byahatti	Hubli
441	75.2293	15.4825	Byahatti	Byahatti	Hubli

S. No	Longitude	Latitude	Village	Gram Panchayath	Taluk
442	75.1960	15.4856	Byahatti	Byahatti	Hubli
443	75.2017	15.4868	Byahatti	Byahatti	Hubli
444	75.2251	15.4873	Byahatti	Byahatti	Hubli
445	75.2128	15.4878	Byahatti	Byahatti	Hubli
446	75.2086	15.4880	Byahatti	Byahatti	Hubli
447	75.1899	15.4883	Byahatti	Byahatti	Hubli
448	75.2170	15.4942	Byahatti	Byahatti	Hubli
449	75.2301	15.4957	Byahatti	Byahatti	Hubli
450	75.2219	15.4973	Byahatti	Byahatti	Hubli

Appendix-III: Proposed Tentative Locations of Percolation Tanks in Hubli Taluk

S.No	Longitude	Latitude	Village	Gram Panchayath	Taluk
1	75.1622	15.2106	Bhu.Aralikatte	B.Aralikatti	Hubli
2	75.1675	15.2252	Chebbi+minirayanakoppa	Chabbi	Hubli
3	75.1829	15.2437	Chebbi+minirayanakoppa	Chabbi	Hubli
4	75.1650	15.2458	Pale+mitlagatti	Belagali	Hubli
5	75.1898	15.2541	Sherawada	Sharewada	Hubli
6	75.1760	15.2623	Sherawada	Sharewada	Hubli
7	75.0785	15.2732	Chavaragudda	Channapura	Hubli
8	75.1797	15.2738	Nulvi	Noolvi	Hubli
9	75.1788	15.2822	Nulvi	Noolvi	Hubli
10	75.0987	15.2890	Katnura	Katnur	Hubli
11	75.1556	15.2897	Adharagunji	Adaragunchi	Hubli
12	75.0871	15.2914	Anchatageri	Anchatageri	Hubli
13	75.1692	15.3038	Kotagondahunasi	Adaragunchi	Hubli
14	75.1052	15.3049	Anchatageri	Anchatageri	Hubli
15	75.4460	15.3079	Koliwada	Koliwad	Hubli
16	75.0698	15.3093	Budnala	Anchatageri	Hubli
17	75.0504	15.3127	Devaragudihala	Devaragudihal	Hubli
18	75.4076	15.3135	Koliwada	Koliwad	Hubli
19	75.1246	15.3143	Agrahara Thimmasagara	Anchatageri	Hubli
20	75.1554	15.3198	Gabbura	Hubballi Nagara	Hubballi Nagara
21	75.4278	15.3218	Koliwada	Koliwad	Hubli
22	75.0324	15.3225	Devaragudihala	Devaragudihal	Hubli
23	75.1760	15.3245	Gabbura	Hubli	Hubli
24	75.2679	15.3276	Nagarahalli	Mantur	Hubli
25	75.1241	15.3287	Ayodhya	Hubballi Nagara	Hubballi Nagara
26	75.4207	15.3302	Koliwada	Koliwad	Hubli
27	75.1157	15.3339	Krishnapura	Hubballi Nagara	Hubballi Nagara
28	75.4059	15.3348	Koliwada	Koliwad	Hubli
29	75.1723	15.3368	Yallapura	Hubballi Nagara	Hubballi Nagara
30	75.0762	15.3369	Gokula	Hubballi Nagara	Hubballi Nagara
31	75.2130	15.3386	Halyal	Halyala	Hubli
32	75.3837	15.3417	Koliwada	Koliwad	Hubli
33	75.4094	15.3422	Koliwada	Koliwad	Hubli
34	75.3961	15.3429	Koliwada	Koliwad	Hubli
35	75.2477	15.3444	Mantura	Mantur	Hubli
36	75.3695	15.3461	Umachagi	Umachagi	Hubli
37	75.3174	15.3470	Shiraguppi	Shiraguppi	Hubli
38	75.4498	15.3476	Koliwada	Koliwad	Hubli
39	75.2929	15.3477	Shiraguppi	Shiraguppi	Hubli
40	75.1908	15.3500	Bammapura	Hubballi Nagara	Hubballi Nagara
41	75.3050	15.3510	Shiraguppi	Shiraguppi	Hubli
42	75.1054	15.3511	Krishnapura	Hubballi Nagara	Hubballi Nagara
43	75.1616	15.3514	M. Aralikatti	Hubballi Nagara	Hubballi Nagara

S.No	Longitude	Latitude	Village	Gram Panchayath	Taluk
44	75.4370	15.3534	Koliwada	Koliwad	Hubli
45	75.0891	15.3539	Rayanala	Rayanal	Hubli
46	75.3993	15.3541	Koliwada	Koliwad	Hubli
47	75.2362	15.3561	Bandiwada	Bhandiwada	Hubli
48	75.0500	15.3631	Gokula	Hubballi Nagara	Hubballi Nagara
49	75.2035	15.3636	Bammapura	Hubballi Nagara	Hubballi Nagara
50	75.2217	15.3668	Kusugalla	Kusugal	Hubli
51	75.1542	15.3670	Bengeri	Hubballi Nagara	Hubballi Nagara
52	75.1831	15.3705	Nagashettykoppa	Hubballi Nagara	Hubballi Nagara
53	75.1671	15.3739	Bengeri	Hubballi Nagara	Hubballi Nagara
54	75.3139	15.3777	Shiraguppi	Shiraguppi	Hubli
55	75.1305	15.3784	Unakal	Hubballi Nagara	Hubballi Nagara
56	75.2303	15.3800	Kusugalla	Kusugal	Hubli
57	75.2067	15.3840	Kusugalla	Kusugal	Hubli
58	75.0833	15.3868	Gamanagatti	Hubballi Nagara	Hubballi Nagara
59	75.0473	15.3877	Suthagatti	Hubballi Nagara	Hubballi Nagara
60	75.3124	15.3930	Ingalahalli	Ingalahalli	Hubballi Nagara
61	75.1132	15.3963	Unakal	Hubballi Nagara	Hubballi Nagara
62	75.2348	15.3995	Kusugalla	Kusugal	Hubli
63	75.1848	15.4034	Kusugalla	Kusugal	Hubli
64	75.3097	15.4060	Ingalahalli	Ingalahalli	Hubli
65	75.2511	15.4084	Kusugalla	Kusugal	Hubli
66	75.0966	15.4119	Amaragola	Hubballi Nagara	Hubballi Nagara
67	75.0816	15.4169	Amaragola	Hubballi Nagara	Hubballi Nagara
68	75.1975	15.4196	Byahatti	Byahatti	Hubli
69	75.1645	15.4268	Sulya	Sulla	Hubli
70	75.2123	15.4288	Byahatti	Byahatti	Hubli
71	75.2346	15.4347	Byahatti	Byahatti	Hubli
72	75.1488	15.4366	Sulya	Sulla	Hubli
73	75.1806	15.4460	Sulya	Sulla	Hubli
74	75.1680	15.4505	Sulya	Sulla	Hubli
75	75.2319	15.4658	Byahatti	Byahatti	Hubli
76	75.1858	15.4728	Byahatti	Byahatti	Hubli
77	75.2208	15.4751	Byahatti	Byahatti	Hubli
78	75.2030	15.4790	Byahatti	Byahatti	Hubli
79	75.2183	15.4851	Byahatti	Byahatti	Hubli