



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

Tumkur Taluk, Tumkur District, Karnataka

दक्षिण पश्चिमी क्षेत्र, बेंगलुरु

South Western Region, Bengaluru

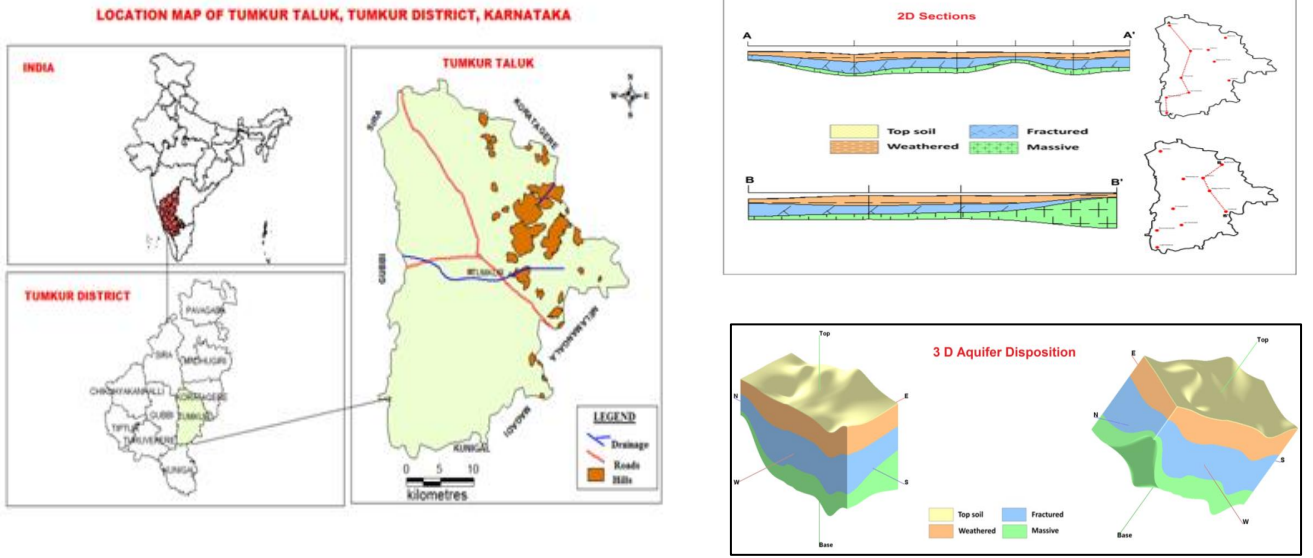
भारत सरकार
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AQUIFER MAPS AND MANAGEMENT PLAN, TUMKUR TALUK, TUMKUR DISTRICT, KARNATAKA STATE

(AAP: – 2020-2021)



By

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AQUIFER MAPS AND MANAGEMENT PLAN, TUMKUR TALUK, TUMKUR DISTRICT, KARNATAKA STATE

[AAP : 2020-2021](#)

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AQUIFER MAPS AND MANAGEMENT PLAN OF, TUMKUR TALUK, TUMKUR DISTRICT, KARNATAKA STATE

1 SALIENT FEATURES

Name of the taluk:	Tumkur
District:	Tumkur
State:	Karnataka
Area:	1026 Sq.km.
Population:	5,92,397 (as per 2011 census)
Annual NormalRainfall:	701 mm

1.1 Study area

Aquifer mapping studies have been carried out in Tumkur taluk, Tumkur district of Karnataka, covering an area of 1026 sq.kms under National Aquifer Mapping Project. Tumkur taluk of Tumkur district is located between north latitude 13°06'44" and 12°32'54" & east longitude 76°57'59" and 77°18'42" and is covered in parts of Survey of India Toposheet Nos.57C/14, 57C/15, 57C/16, 57G/2, 57G/3, 57G/4 and 57G/7. Tumkur taluk is bounded by Sira taluk on North, Koratagere on North-East, Nelamangala and Magadi on South East, Kunigal on South and Gubbi on West. Location map of Tumkur taluk of Tumkur district is presented in Fig.1. Tumkur taluk is located in Tumkur District of Karnataka State. The taluk is divided into 6 Hoblies and 41 Gram Panchayaths. There are 357 inhabited and 16 uninhabited villages.

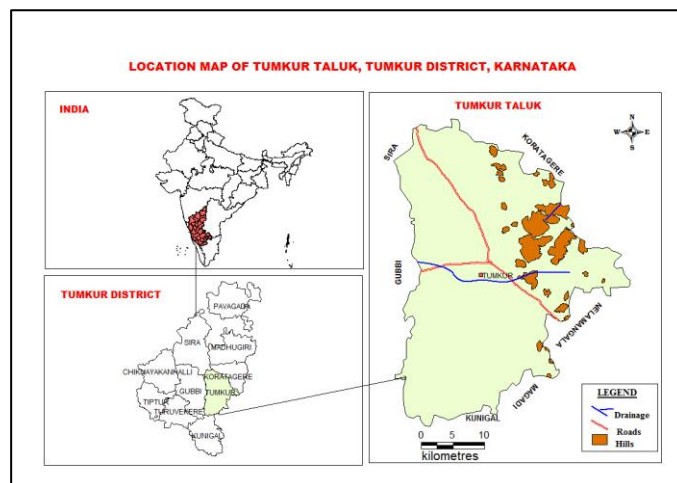


Fig.1: Location Map

1.2 Population

According to 2011 census, the population in Tumkur taluk is 5,92,397 of which rural population is 2,90,254 constituting about 49%, and the urban population is 3,02,143 constituting only about 51% of the total population. The taluk has an overall population density of 577 persons per sq.km.

1.3 Agriculture and Irrigation

Agriculture is the main occupation in Tumkur taluk. Ragi is the major crop grown in the taluk accounting for almost 61% of the total crop area, followed by Fruits (20%), Pulses (10%), Paddy (4%), Maize (3%), Vegetables (1%) and Oil seeds of the total crop area respectively (**Table.1**).

Table.1: Cropping pattern in Tumkur taluk 2015-2016(Ha)

Year	Paddy	Maize	Ragi	Pulses	Fruits	Vegetables	Oil Seeds	Sugar Cane
	Area under cultivation (in ha)							
2015-16	1056	778	16234	2717	5279	396	386	3

It is observed that net sown area accounts for about 44% of total geographical area, while area sown more than once is 4% of total geographical area in the taluk (**Table.2**). As per the data available, there are 17682 borewells for irrigation purpose and irrigates about 98% of the net area irrigated area of the taluk. Ground Water is the major source for irrigation in the taluk (**Table.3**). Land use pattern of the taluk is represented as **Fig.2**.

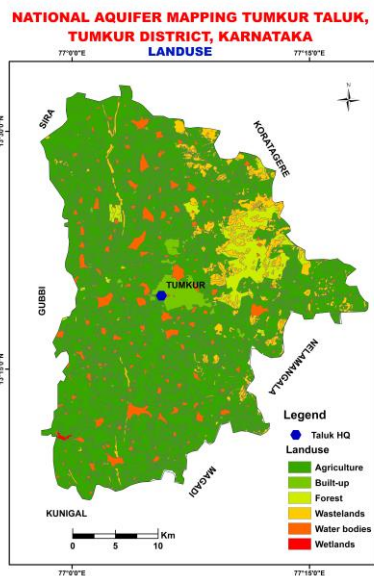


Fig.2: Landuse Map

Table.2: Details of Landuse, 2015-2016(Ha)

Taluk	Total Geographical Area	Area under Forest	Area not available for cultivation	Fallow land	Net sown area	Area sown more than once
Tumkur	103852	827	14552	29127	46137	4200

Source: District at a glance 2016-17, Govt. of Karnataka

Table.3: Irrigation details in Tumkurtaluk(Ha)

Source of Irrigation	Net area irrigated (Ha)	% of area
Canals	0	0
Tanks	370	2
Wells	63	0.4
Borewells	17682	97.6
Lift Irrigation	0	0
Other Sources	0	0
Total	18115	

Source: District at a Glance 2016-17, Government of Karnataka

1.4 Geomorphology, Physiography and Drainage

Geomorphologically, major part of the district is covered with the denudational uplands on gneisses and granites which are ideal for agriculture, industrialization and urban settlements. A narrow range of granitic hills grouped under Closepet granites occupies the eastern part which passes through the northern parts of Tumkur. The landmass in the plains ranges between 450 to 840 m above msl, while hilly areas range between 840 to 1200 m above msl. The taluk is occupied by red sandy soil and red loamy soil along the eastern part. Red sandy soils are suitable for the growth of ragi, jowar, millets and oil seeds under rainfed conditions. The irrigated areas of red loamy soils are favourable for paddy, sugarcane and vegetables (**Fig.3**). Major part of taluk is drained by Cauvery basin. The eastern part of the taluk is drained by Pennar river (**Fig.4**)

1.5 Soil

The taluk is occupied Clayey soil, Clayey mixed and Clayey Skeletal and rocky land. Formation of various types of soils is a complex function of chemical weathering of bedrocks, vegetative decay and circulation of precipitated water. Soils are mostly insitu in nature(**Fig.5**).

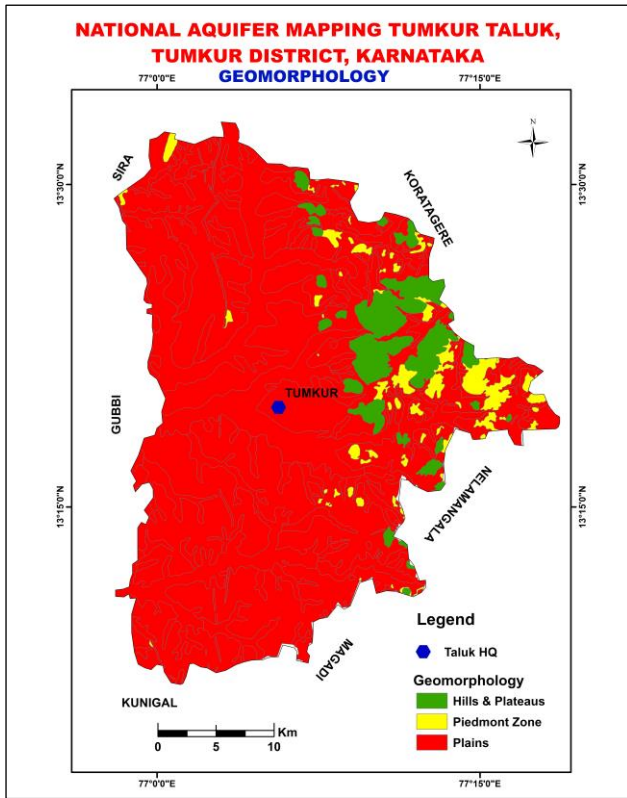


Fig.3:Geomorphology Map

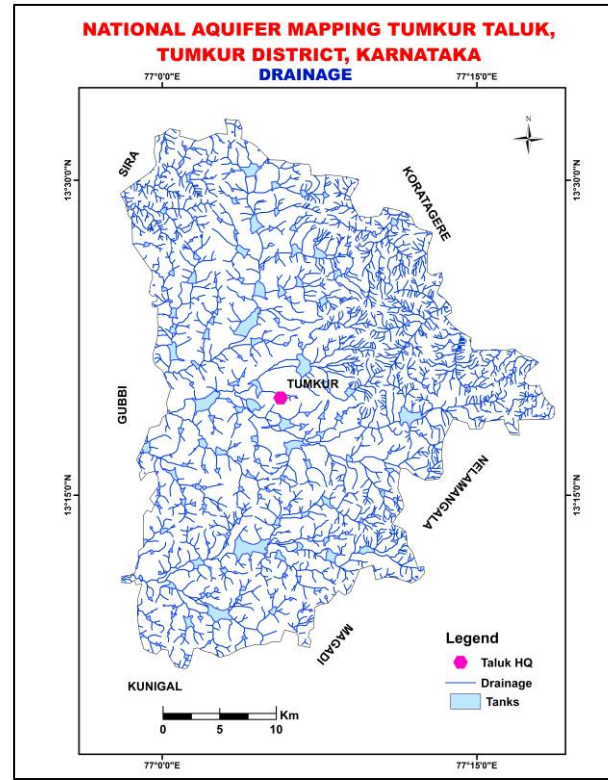


Fig.4:Drainage Map

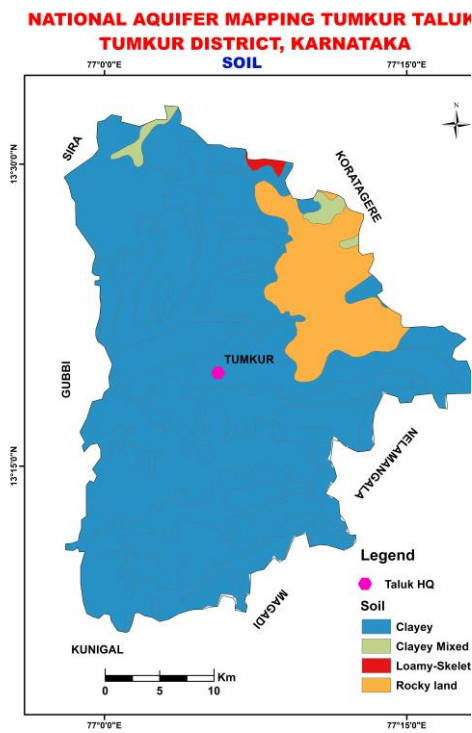


Fig.5: Soil Map

1.6 Ground water resource availability and extraction

As per the ground water resource estimation 2017 (**Table 4a**), the data on ground water resources shows that the net annual ground water availability is 9121 ham. The existing gross groundwater for irrigation is 9572 ham. The stage of groundwater development is 115% and falling under 'Over-Exploited' category.

Aquifer-wise total ground water resources down to 200 m depth are given in **Table-4b** below as per 2017 estimations.

Table.4a: 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
9121	9572	954	10525	1028	2891	115	Over Exploited

Table.4b: Total GW Resources (2017) (Ham)

Taluk	Annual Replenishable GW resources	Fresh In-storage GW resources		Total availability of fresh GW resources
		Phreatic	Fractured (down to 200 m)	Dynamic + Phreatic in-storage + fractured
Tumkur	9121	17372	2226	28719

1.7 Existing and future water demands (as per GEC-2017 and 2020)

The details of dynamic (Phreatic) ground water resources for Tumkur taluk as on March 2020 is shown in **Table.5**. It is observed that the stage of ground water extraction is increased by 3% in the taluk from 115 % to 118 % from 2017 to 2020.

Table.5 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)
10449.01	11249.63	0	1081.34	12330.96	1183.78	3025.45	118.01	Over Exploited

1.8 Hydrogeology

(a) Hydrogeology of Phreatic Aquifer

The weathered thickness ranges from 15 m to 39 m. The pre-monsoon depth to water level ranges from 3.26 mbgl to 15.17 mbgl. The yield of the phreatic aquifer ranges from 0.4 to 0.8 m³/hr with poor sustainability of wells (Fig.6).

(b) Hydrogeology of Fractured Aquifer

The major formations are fractured Granites and Gneisses. The pre-monsoon piezometric head ranges from 11.85 mbgl to 97.45 mbgl. The yield of the fractured aquifer ranges from 0.036 to 55 m³/hr and sustainability is less than 1 hour to 2 hrs during non-monsoon and 2 to 4 hrs during monsoon (Fig.7).

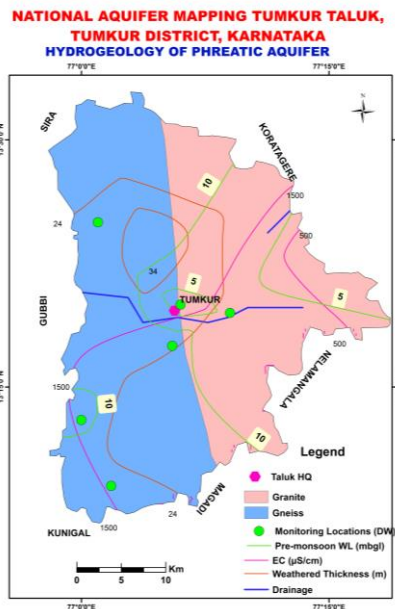


Fig.6: Hydrogeology of Phreatic Aquifer

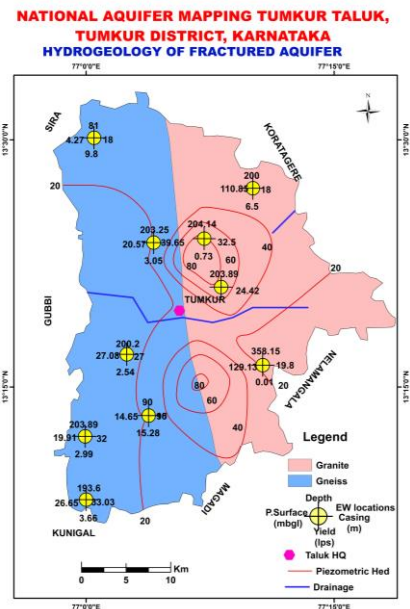


Fig.7: Hydrogeology of Fractured Aquifer

1.9 Water level behaviour

The ground water levels and their behaviour are described below for both the phreatic and fractured aquifers.

(a) Decadal Average water level

Aquifer-I

Pre-monsoon: 3.26 – 15.17 mbgl (**Fig.8**)

Post-monsoon: 3.62 – 15.8mbgl (**Fig.9**)

Aquifer-II

Pre-monsoon: 12.05 – 112.23 mbgl

Post-monsoon: 9.6 – 101.01mbgl

(b) Water level fluctuation

Aquifer-I

Decadal Fluctuation:

Pre-monsoon: About 95% of wells are showing fall in water level in the range of 0.5 m to 8.16 m. The remaining 5% of wells are showing rise in water level in the range of 0.13 m to 0.5 m (**Fig.10**).

Post-monsoon: About 95% of wells are showing fall in water level in the range of 0.37 m to 5.31 m. The remaining 5% of wells are showing rise in water level in the range of 0.1 m to 1.2 m (**Fig.11**).

**NATIONAL AQUIFER MAPPING TUMKUR TALUK,
TUMKUR DISTRICT, KARNATAKA**
Decadal Average Water Level (May 2010 to May 2019)

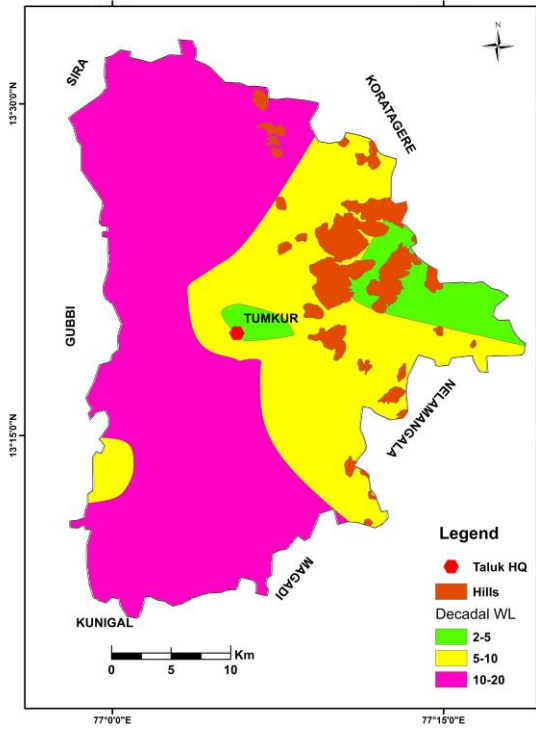


Fig.8: Decadal Average Depth to Water Level, Pre-Monsoon (DW)

**NATIONAL AQUIFER MAPPING TUMKUR TALUK,
TUMKUR DISTRICT, KARNATAKA**
Decadal Average Water Level (Nov 2010 to Nov 2019)

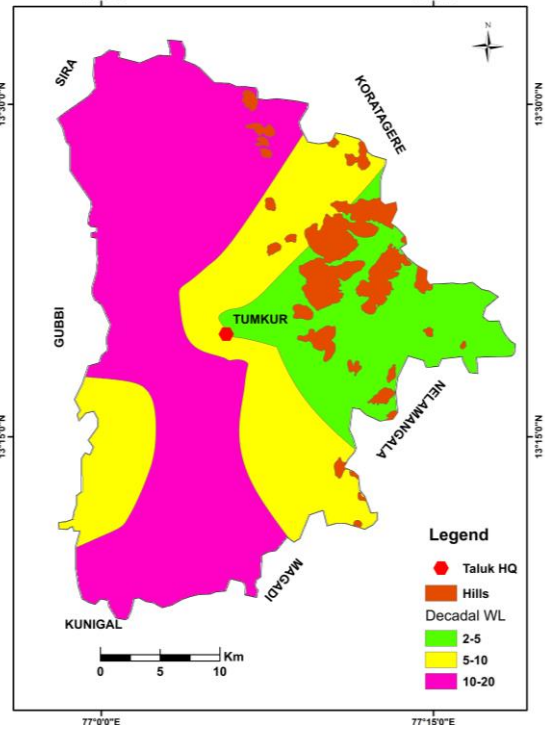


Fig.9: Decadal Average Depth to Water Level, Post-Monsoon (DW)

**NATIONAL AQUIFER MAPPING TUMKUR TALUK,
TUMKUR DISTRICT, KARNATAKA**
Fluctuation (Mean May(2009-2018)) to May 2019

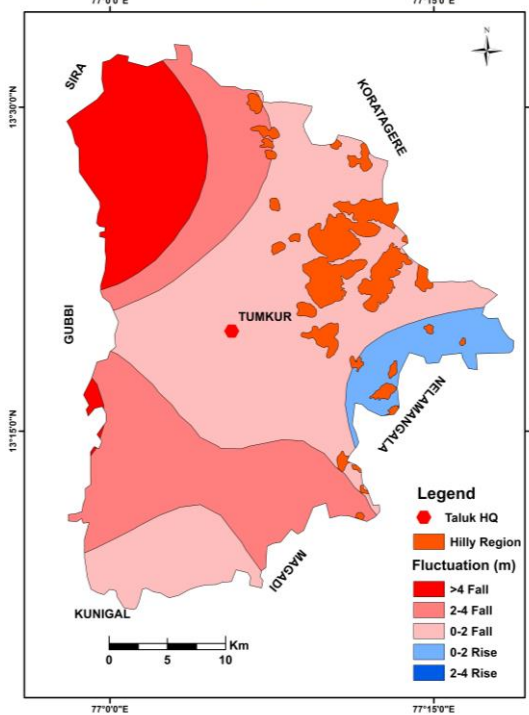


Fig.10: Decadal Fluctuation, Pre-monsoon, DW

**NATIONAL AQUIFER MAPPING TUMKUR TALUK,
TUMKUR DISTRICT, KARNATAKA**
Fluctuation (Mean Nov(2009-2018)) to Nov 2019

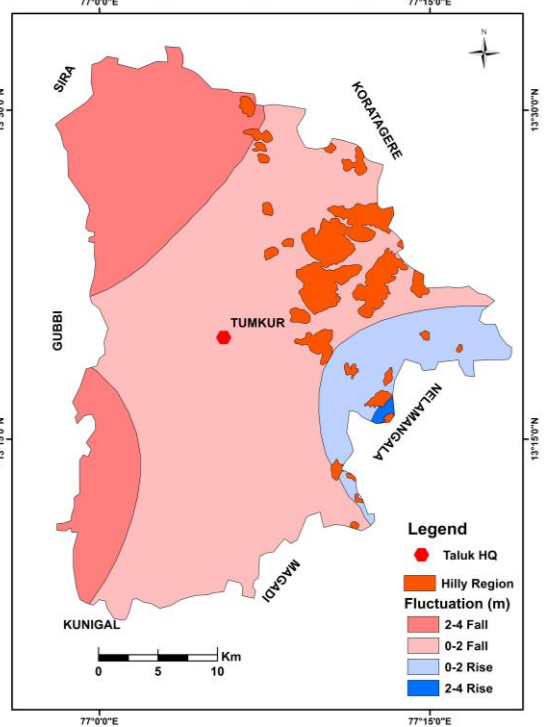


Fig.11: Decadal Fluctuation, Post-monsoon, DW

2 AQUIFER DISPOSITION

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

2.1 Aquifer Types

In Tumkur taluk, there are mainly two types of aquifer systems;

i. **Aquifer-I (Phreatic aquifer)** comprising Weathered Granite and Gneiss

ii. **Aquifer-II (Fractured aquifer)** comprising Fractured Granite and Gneiss

In Tumkur taluk, Granite and Gneiss are the major water bearing formations (**Fig.12**). Groundwater occurs within the jointed and fractured Granite and Gneiss under semi-confined to confined conditions. In Tumkur taluk borewells were drilled from a minimum depth of 81 mbgl to a maximum of 358 mbgl (**Table.6**). Depth of weathered zone (Aquifer-I) ranges from 15mbgl to 39 mbgl (**Fig13**). However, isolated patches in topographical lows are seen yielding seasonally, that too for very short durations. Ground water exploration reveals that the fractured formations (aquifer-II) were encountered between the depth of 20 to 178m bgl. Yield ranges from 0.01 to 15.28 lps.

**NATIONAL AQUIFER MAPPING TUMKUR TALUK,
TUMKUR DISTRICT, KARNATAKA
GEOLOGY**

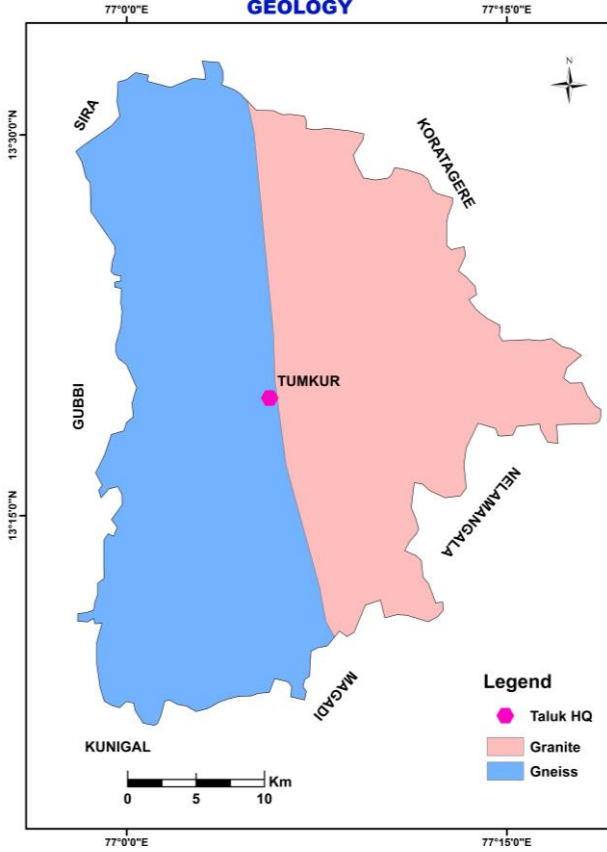


Fig.12: Geology Map

**NATIONAL AQUIFER MAPPING TUMKUR TALUK,
TUMKUR DISTRICT, KARNATAKA
WEATHERED THICKNESS MAP**

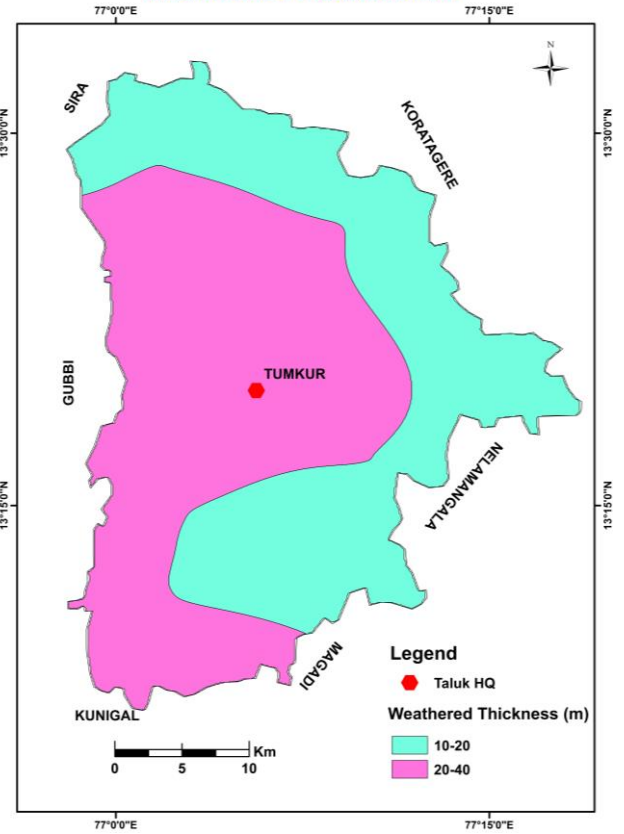


Fig.13: Weathered Thickness Map

Table.6:Detailsof Ground water Exploration

Distri ct	Taluk	Location	Latitude	Longitude	Depth Drille d (m bgl)	Casin g Dept h (m bgl)	Fractur e Zones encount ered (m bgl)	SWL (m bgl)	Q (lps)	Draw down (m)
Tumkur	Tumkur	Lakhanahalli	13°13'15.6 "	77°03'46.8 "	90	15	24- 25,55- 56,78- 79	14.65	15.28	-
Tumkur	Tumkur	Nelhalu	13°30'7.2 "	77°00'28.8 "	81	18	21-22, 60-61, 72-73	4.27	9.8	3
Tumkur	Tumkur	Arekere	13°24'	77°07'08.4 "	204.1 4	32.5	56-57, 168-169	-	0.73	-
Tumkur	Tumkur	Jujainapaly a	13°08'9.6 "	77°00'00" "	193.6	33.03	41-42, 161-162	26.65	3.66	8.77
Tumkur	Tumkur	Belgumba Thota	13°21'3.6 "	77°08'09.6 "	203.8 9	24.42	47-48, 156-157	-	Neg	-

Tumkur	Tumkur	Narasapura	13°23'45.6 "	77°04'04. 8"	203.2 5	39.6 5	42- 43,120- 121, 177- 178	20.57	3.05	9.95
Tumkur	Tumkur	Bommanahalli	13°12'	76°59'56. 4"	203.8 9	32	36-37, 145-146	19.91	2.99	13.38
Tumkur	Tumkur	D.Hosahalli	13°16'58.8 "	77°02'27. 6"	200.2	27	34.8-35.8, 153-154	27.08	2.54	-
Tumkur	Tumkur	Kolihalli	13°16'19.2 "	77°01'40. 8"	358.1 5	19.8	20.3-21.3	129.13	0.01	-
Tumkur	Tumkur	Beldhara	13°27'03. 6"	77°01'04. 8"	200	18	25-25.5, 172- 172.5	110.85	6.5	-

2.2 2 D, 3 D aquifer disposition and basic characteristics of each aquifer

The sub-surface aquifer disposition of the study area were prepared based on the drilling data obtained from exploratory drilling programme for generating 2D and 3D sections and fence diagrams/models through Rock works software. The outputs thus generated are presented in **Fig-14 a to 14c**.

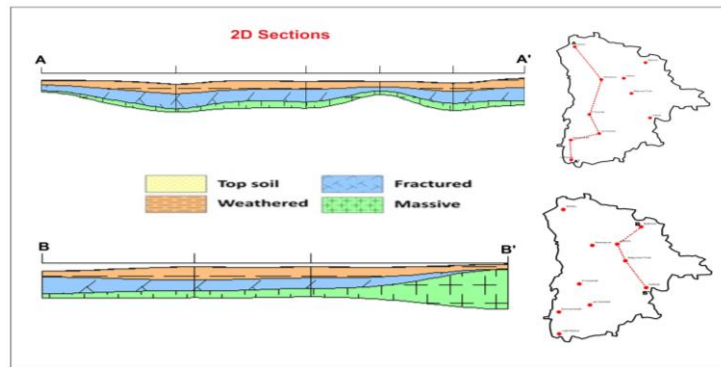


Fig.14a: 2D Aquifer sections

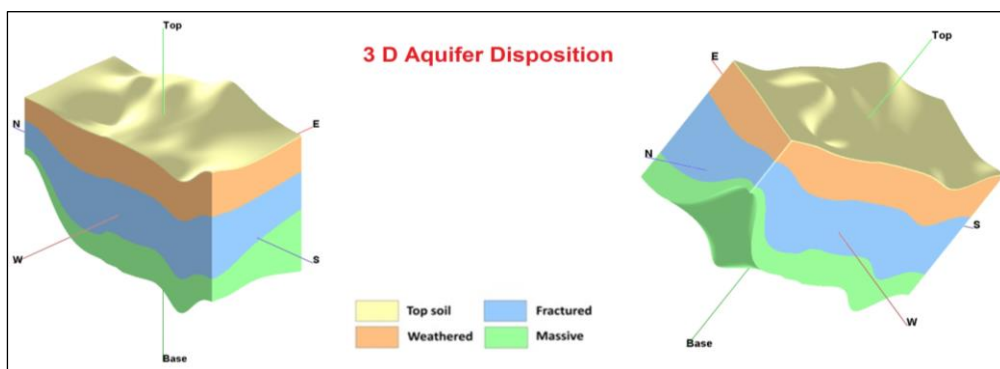


Fig.14b: 3D Aquifer Disposition

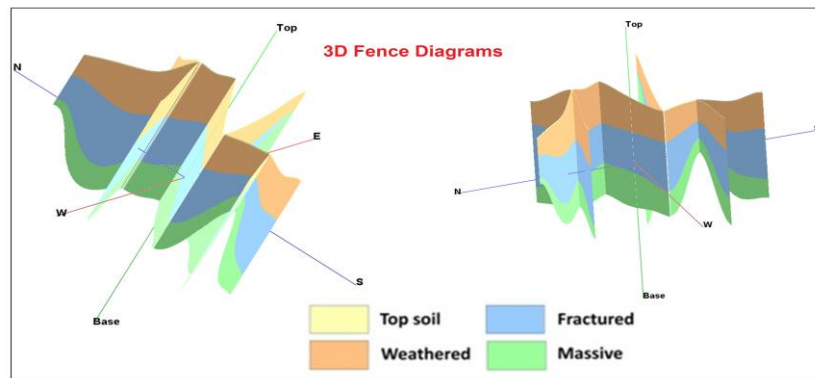


Fig.14c: 3D Fence Diagram

3 GROUND WATER RESOURCE, EXTRACTION, CONTAMINATION AND OTHER ISSUES

The main ground water issues are over exploitation, Limited Ground Water Potential / Limited Aquifer Thickness / Sustainability, deeper water levels especially in Aquifer II, declining water level trend 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 7**. It is observed that the ground water availability in 2020 is almost equal to 2017. 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 7 : 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
Tumkur	9121	10525	115	10449.01	12330.96	118.01

3.2 Chemical Quality of Ground Water and Contamination

The water samples collected from shallow aquifers during the pre-monsoon (May 2018) and analysed in the Regional Chemical Laboratory for pH, Electrical Conductivity (EC), Chloride, Nitrate and Fluoride by employing Standard methods. Based on the hydro chemical data, the portability of these samples has been assessed as per the Standards prescribed by the Bureau of Indian Standards (IS 10500: 2012) and categorized into 'Desirable', 'Permissible' and 'Unsuitable' classes.

The electrical conductivity (EC) in water samples is an indication of total dissolved ions. Thus the higher the EC, the higher the levels of dissolved ions in the sample. The perusal of the data indicates that the distribution of electrical conductivity in the taluk shows wide variations (850-2100 $\mu\text{S}/\text{cm}$ at 25° C). The BIS has recommended a drinking water standard for total dissolved solids. A limit of 500mg/l (corresponding to about EC of 750 $\mu\text{S}/\text{cm}$ at 25°C) can be extended to a TDS of 2000mg/l (corresponding to about 3000 $\mu\text{S}/\text{cm}$ at 25°C) in case of an alternate source. Water samples having TDS more than 2000mg/l are not suitable for drinking purpose. The map showing distribution of EC is shown in **Fig.15**.

One of the essential elements for maintaining normal development of healthy teeth and bones is Fluoride. Most of the fluoride found in groundwater is of geo-genic origin. Distribution of fluoride in the taluk ranges from 0.12 mg/l to 7.2 mg/l. Thus majority of samples in the taluk shows fluoride concentration below 1.5 mg/l rendering them suitable for drinking purpose (**Fig.16**).

Higher concentration of Nitrate above 45 mg/l in ground water is a problem as a contaminant in drinking water (primarily from groundwater and wells) due to its harmful biological effects. High concentrations can cause methemoglobinemia, and have been cited as a risk factor in developing gastric, an intestinal cancer. The distribution of nitrate in the taluk indicated that the values are in the range of 10 mg/l to 80 mg/l. Nitrate in drinking water should not exceed 45 mg/l as per BIS (ISO: 10500: 2012) standard (**Fig.17**).

Some of the ground water samples collected from the taluk indicates that the ground water is not potable for drinking purpose.

**NATIONAL AQUIFER MAPPING TUMKUR TALUK,
TUMKUR DISTRICT, KARNATAKA
DISTRIBUTION OF ELECTRICAL CONDUCTIVITY**

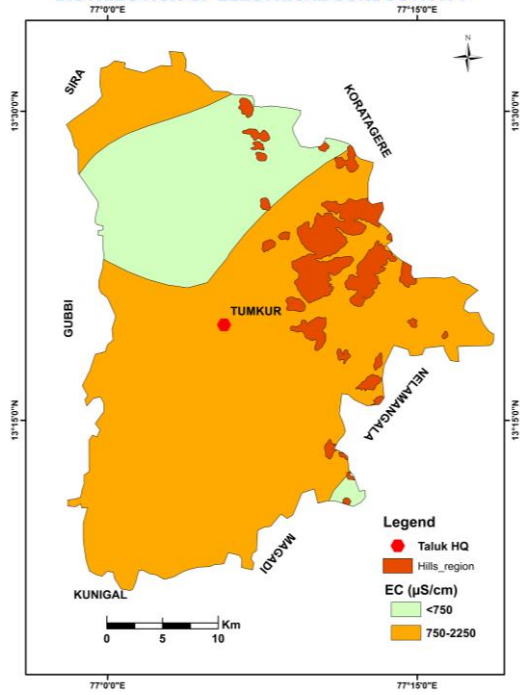


Fig.15: Distribution of EC

**NATIONAL AQUIFER MAPPING TUMKUR TALUK,
TUMKUR DISTRICT, KARNATAKA
DISTRIBUTION OF FLUORIDE**

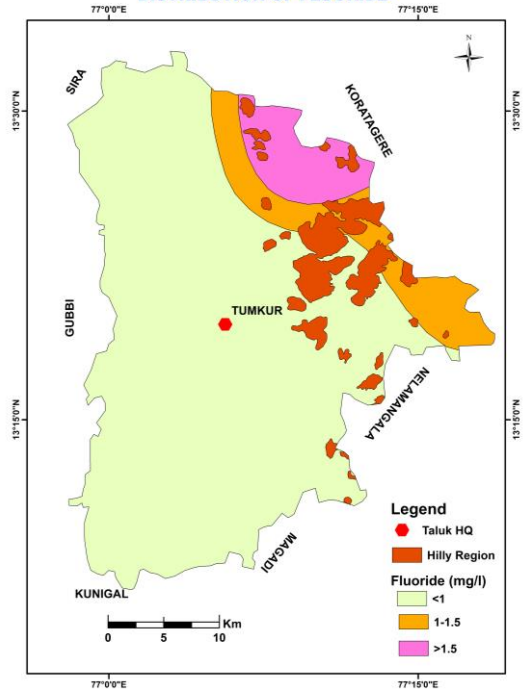


Fig.16: Distribution of Fluoride

**NATIONAL AQUIFER MAPPING TUMKUR TALUK,
TUMKUR DISTRICT, KARNATAKA
DISTRIBUTION OF NITRATE**

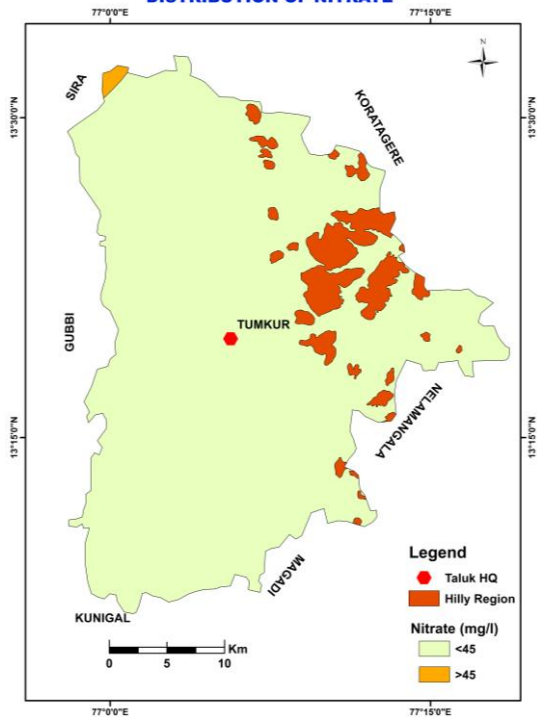


Fig.17: Distribution of Nitrate

4 GROUND WATER RESOURCE ENHANCEMENT

4.1 Aquifer wise space available for recharge and proposed interventions

The Master Plan for Artificial recharge to ground water prepared by CGWB (2020) recommended to recharge the de-saturated and dried-up phreatic aquifer (Aq-I) in the taluk, through construction of artificial recharge structures such as check dams, percolation tanks and point recharge structures(i.e bore well recharge structure) **(Table.8)**. 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. Check dams and Percolations tanks are the predominant structures proposed in the Master Plan.

Table.8: Quantity of non-committed surface runoff and expected recharge through AR structures

Artificial Recharge Structures Proposed and constructed	Tumkur Taluk
Area Feasible for Artificial Recharge	648
Non committed monsoon runoff available (Ham)	85.98
Number of existing Check Dams	21
Number of existing Point Recharge Structures	16
Number of proposed Check Dams	438
Number of proposed Percolation Tanks	77
Number of proposed Sub Surface Dyke	2
Number of proposed Borewell recharge structures (PRS)	5
Tentative total cost of the project (Rs.in lakhs)	5976
Volume of water likely to be recharged(MCM)	64.48

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. The tentative locations of sites proposed for artificial recharge is shown in **Fig.18**. The tentative list of the proposed Percolation tanks, Check dams and Filter bed for Point Recharge Structures (Bore well recharge) are listed in **Annexure 1**.

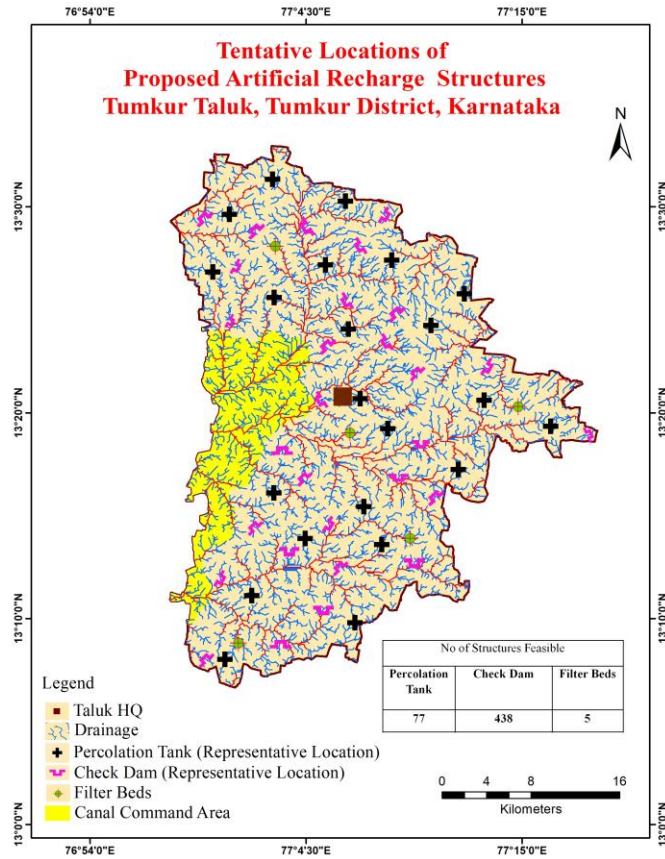


Fig.18 Map showing the tentative locations of Artificial Recharge

4.2 Improvement in GW availability due to Recharge

The improvement in ground water availability as a result of the implementation of artificial recharge structures in the taluk is detailed in **Table.9**

Table 9: Improvement in GW availability due to Recharge, Tumkur taluk

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	Additional potential from proposed irrigation development schemes through inter-basin transfer	Cumulative annual ground water availability after implementation of AR structures	Expected improvement in stage of ground water extraction after the implementation of the project
	HAM	HAM	%	HAM	HAM	HAM	%
Tumkur	9121	10525	115	6448	-	15569	68

After implementation of Artificial Recharge structures for GW recharge, the annual ground water availability will increase from 9121 to 15569 ham and the expected improvement in stage of development is likely to be 68% if implemented in toto.

4.3 DEMAND SIDE INTERVENTIONS

4.3.1 Advanced irrigation practices

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

4.3.2 Water Use Efficiency (WUE)

in irrigation like Drip irrigation has to be adopted by the farmers in the existing 19809 ha of gross irrigated area. Presently, draft through irrigation is 9572 ham. Implementation of efficient irrigation techniques will contribute in saving groundwater by 1963 ham and saving by adopting grey water is 462 ham. Thus, will improve stage of development by 10% from 68% to 58% **(Table.10)**.

4.3.3 Change in cropping pattern

In Tumkur taluk the water intensive crops grown are paddy and sugarcane. Paddy is grown in 1056 ha and sugar cane is grown in 3 ha which is basically for self consumption and hence, it may not be possible to change it.

Table10: Improvement in GW availability due to saving by adopting water use efficiency

SI No.	Resource Details	As per 2017 Estimation
1	Cumulative Ground Water availability after implementation of artificial recharge schemes (ham)	15569
2	Existing Ground Water Extraction for all uses in ham	10525
3	Expected improvement in stage of Ground Water development after implementation of artificial recharge schemes	68
4	Saving due to adopting Water Use Efficiency measures in ham	1963
5	Additional saving by adopting Grey Water (50% of Domestic Draft) in ham	462
6	Cumulative Ground Water Availability after adopting WUE and Grey water in ham	17994
7	Expected improved stage of Ground Water extraction after implementation of all interventions (%)	58
8	Total water likely to be saved after all interventions (ham)	8873
9	Additional area can be brought into irrigation by keeping the stage of extraction at existing level (ha)	22183

4.3.4 Additional area of irrigation

After adopting various water use efficiency techniques and recharge measures and its resultant savings, the stage of extraction is expected to be 58% in the taluk. It is likely that the taluk can be brought back to Safe Category from Over-Exploited category. In command area irrigation has to depend on canals only. Hence, in canal command area, bringing additional area under irrigation may not be practical with a long-term resource management point of view.

4.3.5 Regulation and Control

Tumkur taluk has been categorized as Over-Exploited, since the Stage of ground water extraction has reached 115% (GEC 2017). Hence, stringent action has to be taken up through Karnataka Ground Water Authority (KGWA) 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.

4.3.6 Other interventions proposed

Periodical maintenance of artificial recharge structures should also be incorporated in the Recharge Plan.

5 SUMMARY OF GROUND WATER MANAGEMENT PLANS

- Ground water resource enhancement: Continuous drought, increase in agricultural activity, excessive ground water withdrawals etc. are leading to depletion of ground water table, reduction in yield and deterioration of ground water quality in the taluk. These issues suggest a need for proper ground water management and enhancement of storage capacity of aquifers, protection of ground water quality and proper utilization of ground water. To enhance the storage capacity of aquifers, the dewatered aquifers are to be recharged, for which the artificial recharge structures like Check dams, percolation tanks, point recharge structures(bore well recharge structures) have to be implemented in feasible areas of the taluk as detailed in the report.
- Quantity of water available through non-committed surface run-off: The surplus non-committed monsoon run off is calculated to be 85.98 MCM this can be used to recharge the aquifer through suitable recharge structures like percolation tanks, check dams and point recharge structures, which augments the net ground water availability in the area,
- Advanced irrigation practices: Major crop of Tumkur Taluk is Ragi which is rain fed crop. Remaining crops like some of the pulses, vegetables, paddy and fruits are depending upon the ground water source. The ground water for irrigation is being developed through irrigation bore wells. The irrigation practices like drip in water distribution system is comparatively less with poor irrigation potential which has resulted economy in water usage. If these methods of drip and sprinkler irrigation systems are increased, maximum available ground water can be conserved judiciously. This ultimately enhances the area under irrigation potential,
- Change in cropping pattern: Farmers are facing inadequacy of groundwater for agriculture so they have to change their cropping pattern and water economy irrigation practices. If they also adopt the water use efficient irrigation practices like mulching-plastic sheeting, spread on the ground around

plants to prevent excessive evaporation or erosion, enrich the soil, etc., there will be additional saving in water. Therefore, encouragement from government is essential for achieving full target of water use efficiency (WUE) in the taluk,

- Regulation and control: The taluk is over-exploited and notified by Karnataka Ground Water Authority (KGWA). Considering the current existing ground water draft for all use. It is mandatory to plan to augment the ground water through artificial recharge besides use of ground water judiciously.
- Other Interventions proposed: The major issue in the taluk is water scarcity for drinking and irrigation. To mitigate this critical issue of scarcity for safe drinking water, construction of rain water harvesting units at the household level are must. Implementation of artificial recharge structures as proposed to recharge the ground water is also necessary.
- Participatory management: Awareness programmes and practice of participatory approach needs to be strengthened with the involvement of all the stake holders for sustainable management. Micro level ground water studies are recommended for effective management of ground water resource.
- 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.

**(a) Tentative Locations of Proposed Percolation tanks,
Tumkur Taluk, Tumkur District.**

SL. No	Longitude	Latitude	Village	Grama Panchayat	Taluk
1	77.0497226	13.1261371	Sangalapura	Hebbur	Tumkur
2	77.0093907	13.1335135	Bannikuppe	Kanakoppe	Tumkur
3	77.0002438	13.1523925	Ramakrishnapura (Bisalehalli Kaval)	Kanakoppe	Tumkur
4	77.1147228	13.1631454	Thondagere Kavalu	Nidavalalu	Tumkur
5	77.1010409	13.1711761	Bidhanagere	Nidavalalu	Tumkur
6	77.0773243	13.1730125	Honnenahalli	Nidavalalu	Tumkur
7	77.1283662	13.1749899	Thavarekere	Nidavalalu	Tumkur
8	77.0528121	13.1787886	Belageri Kavalu	Ballagere	Tumkur
9	77.0837451	13.1814536	Pogadamarnahalli Kavalu	Honasigere	Tumkur
10	77.0310162	13.1849752	Kembalalu	Gangonahalli	Tumkur
11	77.1740606	13.2206986	J.I.Siddhapura	Haralur	Tumkur
12	77.1364353	13.2264986	Arehalli	Honnudike	Tumkur
13	77.0384461	13.2294771	J.I. Thimmasandra	Nagavalli	Tumkur
14	77.0743049	13.2313831	Banavara	Holakal	Tumkur
15	77.0566351	13.2377695	S.I. Dommanakuppe	Galigenahalli	Tumkur
16	77.1688555	13.2385446	Kethohalli	Haralur	Tumkur
17	77.0478906	13.2394589	S.I. Dommanakuppe	Galigenahalli	Tumkur
18	77.0699422	13.2454968	Akkathangira Kattekavalu	Holakal	Tumkur
19	77.1398558	13.2559444	Ketha Maranahalli	Haralur	Tumkur
20	77.1220099	13.2571341	Akkathangira Kattekavalu	Holakal	Tumkur
21	77.0916717	13.2620418	Akkathangira Kattekavalu	Holakal	Tumkur
22	77.0490224	13.2682103	Akkathangira Kattekavalu	Holakal	Tumkur
23	77.0833944	13.2770688	Guluru	Gulur	Tumkur

24	77.1984500	13.2873235	Chikkahalli	Hirehalli	Tumkur
25	77.0919605	13.2942009	Guluru	Gulur	Tumkur
26	77.0533029	13.2984773	Kambatthanahalli	Hethenahalli	Tumkur
27	77.2161473	13.2990721	Hodhekallu	Mydala	Tumkur
28	77.1412993	13.3203148	Kyathasandra		Tumkur
29	77.2734031	13.3222719	S.I.Sheethakallu	Seethakallu	Tumkur
30	77.1033231	13.3245502	Upparahalli		Tumkur
31	77.1281072	13.3246513	Batawadi		Tumkur
32	77.2687929	13.3347640	S.I.Sheethakallu	Seethakallu	Tumkur
33	77.2576074	13.3414444	Sathagatta	Urdigere	Tumkur
34	77.2193456	13.3433479	Aregujjanahalli	Aregujjanahalli	Tumkur
35	77.1190539	13.3445652	Tumkur		Tumkur
36	77.1816550	13.3462033	Janapanahalli	Aregujjanahalli	Tumkur
37	77.1432029	13.3496297	Belagumba	Belagumba	Tumkur
38	77.2479726	13.3545433	Sathagatta	Urdigere	Tumkur
39	77.1626094	13.3549895	Belagumba	Belagumba	Tumkur
40	77.1999372	13.3590048	Devarayadurga Forest (Poojari Linganahalli)	Urdigere	Tumkur
41	77.1639479	13.3706047	Devarayadurga Forest (Poojari Linganahalli)	Urdigere	Tumkur
42	77.1097717	13.3764060	Antharasanahalli		Tumkur
43	77.1696625	13.3776122	Devarayadurga Forest (Poojari Linganahalli)	Urdigere	Tumkur
44	77.1548147	13.3981707	Devarayadurga Forest (Poojari Linganahalli)	Urdigere	Tumkur
45	77.1364610	13.4000252	J.I. Amalapura	Arakere	Tumkur
46	77.1094244	13.4009472	Annenahalli	Urukere	Tumkur
47	77.1762913	13.4037684	Devarayadurga Forest (Poojari Linganahalli)	Urdigere	Tumkur

48	77.0284877	13.4045871	Echalukunte	Bugudanahalli	Tumkur
49	77.1563633	13.4091222	Chinaga	Obalapura	Tumkur
50	77.1822261	13.4137800	Devarayadurga Forest (Poojari Linganahalli)	Urdigere	Tumkur
51	77.0578979	13.4138670	Hebbaka	Urukere	Tumkur
52	77.0673205	13.4151519	Hebbaka	Urukere	Tumkur
53	77.1313790	13.4201272	Dasarahalli (Thippanahalli)	Arakere	Tumkur
54	77.0152103	13.4235752	Bellavi	Bellavi	Tumkur
55	77.1831778	13.4242496	J.I. Ahobala Agrahara	Beladhara	Tumkur
56	77.0492876	13.4263733	Shingrihalli	Kora	Tumkur
57	77.2033557	13.4293893	Jakkanahalli	Beladhara	Tumkur
58	77.1130869	13.4308348	Seegepalya	Arakere	Tumkur
59	77.0658929	13.4332834	Kora	Kora	Tumkur
60	77.0436211	13.4424205	Haralakatte	Thimmarajanahalli	Tumkur
61	76.9995059	13.4471318	Appinaikanahalli	Sorekunte	Tumkur
62	77.0907344	13.4528425	Brahmasandra	Kora	Tumkur
63	77.0373903	13.4552243	Nagajjanahalli	Thimmarajanahalli	Tumkur
64	77.1444917	13.4566861	Bammanahalli	Obalapura	Tumkur
65	77.0196930	13.4570089	Harivanapura	Thimmarajanahalli	Tumkur
66	77.1242406	13.4608755	Chikkathotlukere	Chikkathotlakere	Tumkur
67	77.1330405	13.4691783	Sogenahalli	Chikkathotlakere	Tumkur
68	77.1008709	13.4724017	Ganganala	Devalapura	Tumkur
69	77.0399185	13.4745574	Vasanthanarasapura	Thimmarajanahalli	Tumkur
70	77.0524727	13.4796829	Kempanadodderi	Kesthur	Tumkur
71	77.0281699	13.4873470	Nagenahalli	Thimmarajanahalli	Tumkur
72	77.0439338	13.4897264	Kempanadodderi	Kesthur	Tumkur
73	77.0129261	13.4939596	Giriyannanahalli	Nelahal	Tumkur

74	77.0557564	13.5015263	Bathsandra	Kesthur	Tumkur
75	77.1069895	13.5045981	Geragondanahalli	Devalapura	Tumkur
76	77.0420507	13.5056666	Yaladhadlu	Nelahal	Tumkur
77	77.0479041	13.5222276	Sangenahalli	Kesthur	Tumkur

(Source: Master Plan, CGWB, 2020. It is likely that the number of structures proposed may vary depending upon the ground truth verification and feasibility criteria)

**(b) Tentative Locations of Proposed Check dams,
Tumkur Taluk, Tumkur District.**

SL. No	Longitude	Latitude	Village	Grama Panchayat	Taluk
1	77.0134467	13.1138711	Bannikuppe	Kanakoppe	Tumkur
2	77.0167395	13.1223382	Bannikuppe	Kanakoppe	Tumkur
3	77.0190593	13.1237104	Bannikuppe	Kanakoppe	Tumkur
4	77.0060680	13.1252435	Bannikuppe	Kanakoppe	Tumkur
5	77.0425498	13.1274833	S.I. Kallakere	Hebbur	Tumkur
6	76.9978966	13.1313729	Ramakrishnapura (Bisalehalli Kaval)	Kanakoppe	Tumkur
7	77.0433981	13.1316203	Sangalapura	Hebbur	Tumkur
8	77.0340344	13.1324100	S.I. Kallakere	Hebbur	Tumkur
9	76.9924570	13.1338350	Kuduvanakunte	Kanakoppe	Tumkur
10	77.0413318	13.1345781	S.I. Kallakere	Hebbur	Tumkur
11	77.0245728	13.1395302	Ramenahalli	Kanakoppe	Tumkur
12	77.0155093	13.1401871	Bychenahalli	Kanakoppe	Tumkur
13	77.0831379	13.1404035	Niduvalalu	Nidavalalu	Tumkur
14	76.9833359	13.1412881	Kuduvanakunte	Kanakoppe	Tumkur
15	77.0258492	13.1425352	Ramenahalli	Kanakoppe	Tumkur
16	77.0177431	13.1449010	Bychenahalli	Kanakoppe	Tumkur
17	77.0373402	13.1453540	Hebburu	Hebbur	Tumkur
18	77.0542504	13.1477623	Narasapura	Hebbur	Tumkur

19	76.9948569	13.1490358	Ramakrishnapura (Bisalehalli Kaval)	Kanakoppe	Tumkur
20	77.1118483	13.1490645	S.I. Huliypura	Nidavalalu	Tumkur
21	77.0054206	13.1498462	S.I. Garagadhakuppe	Kanakoppe	Tumkur
22	76.9907360	13.1504980	Doddagollahalli	Kanakoppe	Tumkur
23	77.0621331	13.1513543	Narayanakere	Nidavalalu	Tumkur
24	77.1063060	13.1522680	Thondagere	Nidavalalu	Tumkur
25	77.0173823	13.1535056	Hobburu Amanikere	Hebbur	Tumkur
26	77.0045677	13.1539871	S.I. Garagadhakuppe	Kanakoppe	Tumkur
27	77.0485640	13.1543143	Hobburu Amanikere	Hebbur	Tumkur
28	76.9868508	13.1544568	Doddagollahalli	Kanakoppe	Tumkur
29	77.0961828	13.1565546	Bidhanagere	Nidavalalu	Tumkur
30	77.0874359	13.1568746	Niduvalalu	Nidavalalu	Tumkur
31	76.9881162	13.1578522	Doddagollahalli	Kanakoppe	Tumkur
32	77.1119930	13.1594046	Thondagere Kavalu	Nidavalalu	Tumkur
33	77.0539793	13.1610697	Karnakuppe	Ballagere	Tumkur
34	77.0904526	13.1620696	Bidhanagere	Nidavalalu	Tumkur
35	77.0641219	13.1639240	Karnakuppe	Ballagere	Tumkur
36	77.0538372	13.1643486	Karnakuppe	Ballagere	Tumkur
37	77.0589197	13.1651860	Karnakuppe	Ballagere	Tumkur
38	77.1010852	13.1682351	Bidhanagere	Nidavalalu	Tumkur
39	77.0351226	13.1711841	Kalyanapura	Ballagere	Tumkur
40	77.0153843	13.1718716	Hobburu Amanikere	Hebbur	Tumkur
41	77.0879842	13.1729333	Honnenahalli	Nidavalalu	Tumkur
42	77.0381243	13.1735771	Kalyanapura	Ballagere	Tumkur
43	76.9967352	13.1736527	Kanakuppe	Kanakoppe	Tumkur
44	77.0703986	13.1743119	Belageri Kavalu	Ballagere	Tumkur
45	77.0314296	13.1748336	Kembalapura	Ballagere	Tumkur

46	77.1449509	13.1751409	Ramanahalli	Honasigere	Tumkur
47	77.1118850	13.1752054	Thavarekere	Nidavalalu	Tumkur
48	77.1219594	13.1754622	Thavarekere	Nidavalalu	Tumkur
49	77.0694430	13.1767218	Karnakuppe	Ballagere	Tumkur
50	77.0171308	13.1775685	Kembalapura	Ballagere	Tumkur
51	76.9962892	13.1786120	Kanakuppe Amanikere	Kanakoppe	Tumkur
52	77.1056479	13.1802858	S.I. Karenahalli	Nidavalalu	Tumkur
53	77.0660200	13.1805878	Belageri Kavalu	Ballagere	Tumkur
54	77.0946597	13.1820874	Chikkapura	Honasigere	Tumkur
55	77.0485559	13.1826499	Kalyanapura	Ballagere	Tumkur
56	77.0936052	13.1844778	Chikkapura	Honasigere	Tumkur
57	77.0520269	13.1857243	Kalyanapura	Ballagere	Tumkur
58	77.0785619	13.1862127	Pogada Maravahalli	Honasigere	Tumkur
59	77.0929297	13.1864950	Chikkapura	Honasigere	Tumkur
60	77.1767826	13.1876952	Bammenahalli	Maskal	Tumkur
61	77.1966245	13.1878134	Pullasandra	Maskal	Tumkur
62	77.1273334	13.1878723	Lingapura	Honasigere	Tumkur
63	77.1443295	13.1891591	Ramanahalli	Honasigere	Tumkur
64	77.1165250	13.1903281	Beguru	Honasigere	Tumkur
65	77.0551758	13.1904012	Ballagere	Ballagere	Tumkur
66	77.0306672	13.1904816	Kembalalu	Gangonahalli	Tumkur
67	77.1461631	13.1905677	Ramanahalli	Honasigere	Tumkur
68	77.1269467	13.1907873	Kodihalli	Honasigere	Tumkur
69	77.1680693	13.1913595	Bammenahalli	Maskal	Tumkur
70	77.0371433	13.1927217	Cholapura	Ballagere	Tumkur
71	77.0194092	13.1932005	Kembalalu Amanikere	Gangonahalli	Tumkur

72	77.1376138	13.1956310	Kodihalli	Honasigere	Tumkur
73	77.0481207	13.1963681	Ballagere	Ballagere	Tumkur
74	77.0989353	13.1964097	Chikkapura	Honasigere	Tumkur
75	77.1904602	13.1973755	Chikkakoratagere	Maskal	Tumkur
76	77.0134335	13.1975055	Kodi Muddanahalli	Gangonahalli	Tumkur
77	77.0620948	13.1976792	Yaladhahalli	Ballagere	Tumkur
78	77.0058127	13.1979865	Rayapura	Sirivara	Tumkur
79	77.0983360	13.1984002	Chikkapura	Honasigere	Tumkur
80	77.1547438	13.1989166	J.I. Varadhenahalli	Maskal	Tumkur
81	77.0687835	13.2009491	Yaladhahalli	Ballagere	Tumkur
82	77.0592421	13.2026914	Nagavalli Amanikere	Nagavalli	Tumkur
83	77.0389045	13.2028875	Nagavalli Amanikere	Nagavalli	Tumkur
84	77.1846688	13.2034268	Maskallu	Maskal	Tumkur
85	76.9936202	13.2047515	Bommanahalli	Sirivara	Tumkur
86	77.1305372	13.2058182	Honnudike	Honnudike	Tumkur
87	77.0368727	13.2082879	Gangonahalli	Gangonahalli	Tumkur
88	77.1007152	13.2093183	J.I. Mulukunte	Honasigere	Tumkur
89	77.1508642	13.2101262	Sasalu	Maskal	Tumkur
90	77.1621383	13.2102820	J.I. Varadhenahalli	Maskal	Tumkur
91	77.0258085	13.2119001	Sheenappanahalli	Gangonahalli	Tumkur
92	77.0987355	13.2121762	J.I. Mulukunte	Honasigere	Tumkur
93	77.0767525	13.2139445	Lakkenahalli	Nagavalli	Tumkur
94	76.9926159	13.2145851	Shiravara	Sirivara	Tumkur
95	77.1695620	13.2160013	Bidharakatte	Maskal	Tumkur
96	77.1176328	13.2173258	J.I. Veeranaikanahalli	Honnudike	Tumkur
97	77.1283274	13.2176674	Arehalli	Honnudike	Tumkur
98	77.1408787	13.2199500	Bhochanahalli	Honnudike	Tumkur

99	77.0072349	13.2199892	Shiravara	Sirivara	Tumkur
100	77.0617765	13.2203108	Nagavalli	Nagavalli	Tumkur
101	77.0520371	13.2207699	Nagavalli	Nagavalli	Tumkur
102	77.0738494	13.2214830	Lakkenahalli	Nagavalli	Tumkur
103	77.1102575	13.2222730	J.I. Veeranaikanahalli	Honnudike	Tumkur
104	77.1212794	13.2227700	Gandhamachanahalli	Honnudike	Tumkur
105	77.0933388	13.2234513	Virapasandra	Holakal	Tumkur
106	77.0541332	13.2236612	Nagavalli	Nagavalli	Tumkur
107	77.0022879	13.2239072	Shiravara	Sirivara	Tumkur
108	77.0195906	13.2245413	Puradhakatte	Sirivara	Tumkur
109	77.0733640	13.2251156	Lakkenahalli	Nagavalli	Tumkur
110	77.0241414	13.2260742	Puradhakatte Kavalu	Sirivara	Tumkur
111	77.0499928	13.2262256	J.I. Thimmasandra	Nagavalli	Tumkur
112	77.0857326	13.2264033	Banavara	Holakal	Tumkur
113	77.0426054	13.2267576	J.I. Thimmasandra	Nagavalli	Tumkur
114	77.0793427	13.2290263	Banavara	Holakal	Tumkur
115	77.1600948	13.2299057	Iynapura	Haralur	Tumkur
116	77.0594714	13.2300137	Sopannahalli	Nagavalli	Tumkur
117	77.1600246	13.2324341	Iynapura	Haralur	Tumkur
118	77.0498367	13.2336775	Sopannahalli	Nagavalli	Tumkur
119	77.0906929	13.2340099	Banavara	Holakal	Tumkur
120	77.0632855	13.2343722	Pannasandra	Nagavalli	Tumkur
121	77.1647091	13.2344003	Kethohalli	Haralur	Tumkur
122	77.1550933	13.2350963	Gunigollahalli	Haralur	Tumkur
123	77.1452890	13.2355466	Kottigegollahalli	Haralur	Tumkur
124	77.0171485	13.2367719	Gollahalli	Ariyur	Tumkur
125	77.1195343	13.2380810	Holakallu	Holakal	Tumkur

126	77.0842697	13.2390597	Banavara	Holakal	Tumkur
127	77.0634423	13.2392010	Pannasandra	Nagavalli	Tumkur
128	77.1761814	13.2424878	Baichapura	Haralur	Tumkur
129	77.0935379	13.2427889	Naraganahalli	Holakal	Tumkur
130	77.0481332	13.2434299	S.I. Dommanakuppe	Galigenahalli	Tumkur
131	77.0319562	13.2434684	Bidarakatte	Galigenahalli	Tumkur
132	77.1409629	13.2446339	Kottigegollahalli	Haralur	Tumkur
133	77.1844355	13.2450336	Palasamudra	Haralur	Tumkur
134	77.1262177	13.2464876	Holakallu	Holakal	Tumkur
135	77.1412800	13.2475093	Kottigegollahalli	Haralur	Tumkur
136	77.1041425	13.2478463	Akkathangira Kattekalu	Holakal	Tumkur
137	77.1747284	13.2479135	Baichapura	Haralur	Tumkur
138	77.1050334	13.2483139	Akkathangira Kattekalu	Holakal	Tumkur
139	77.0321636	13.2490131	Myanasandra	Galigenahalli	Tumkur
140	77.1607842	13.2520676	Haraluru	Haralur	Tumkur
141	77.0752412	13.2524302	Akkathangira Kattekalu	Holakal	Tumkur
142	77.1690072	13.2530739	Haraluru	Haralur	Tumkur
143	77.0833822	13.2541141	Akkathangira Kattekalu	Holakal	Tumkur
144	77.0594262	13.2546940	Shettappanahalli	Galigenahalli	Tumkur
145	77.0623705	13.2548300	Shettappanahalli	Galigenahalli	Tumkur
146	77.0754766	13.2551639	Cholenahalli	Holakal	Tumkur
147	77.1641000	13.2556140	Haraluru	Haralur	Tumkur
148	77.0799540	13.2558943	Vaddarahalli	Holakal	Tumkur
149	77.0359564	13.2575333	Myanasandra	Galigenahalli	Tumkur
150	77.1178047	13.2580789	Akkathangira	Holakal	Tumkur

			Kattekavalu		
151	77.1441215	13.2598525	Ketha Maranahalli	Haralur	Tumkur
152	77.1160777	13.2619239	Honnenahalli	Palasandra	Tumkur
153	77.1147967	13.2622671	Honnenahalli	Palasandra	Tumkur
154	77.0188932	13.2623350	Karadagere	Ariyur	Tumkur
155	77.0579887	13.2623384	J.I. Yallapura	Galigenahalli	Tumkur
156	77.0974352	13.2626551	Akkathangira Kattekavalu	Holakal	Tumkur
157	77.0768350	13.2636525	Akkathangira Kattekavalu	Holakal	Tumkur
158	77.1786983	13.2666638	S.I. Sangapura	Hirehalli	Tumkur
159	77.0432562	13.2674390	Karadagere Kavalu	Galigenahalli	Tumkur
160	77.0953904	13.2676290	Manangi	Gulur	Tumkur
161	77.1249248	13.2699157	J.I. Gangasandra	Palasandra	Tumkur
162	77.1643197	13.2701635	Bairasandra (Haraluru)	Haralur	Tumkur
163	77.1025938	13.2716294	Manangi	Gulur	Tumkur
164	77.0939610	13.2722081	J.I. Hosuru	Gulur	Tumkur
165	77.1956634	13.2723278	Chikkahalli	Hirehalli	Tumkur
166	77.0314438	13.2729585	S.I. Galigenahalli	Galigenahalli	Tumkur
167	77.1785127	13.2735160	S.I. Kolihalli	Hirehalli	Tumkur
168	77.1184750	13.2739700	J.I. Gangasandra	Palasandra	Tumkur
169	77.0774235	13.2753912	Akkathangira Kattekavalu	Holakal	Tumkur
170	77.0429050	13.2761175	S.I. Galigenahalli	Galigenahalli	Tumkur
171	77.0528683	13.2782374	Chikkasarangi	Galigenahalli	Tumkur
172	77.0307095	13.2786752	Hosahalli	Hethenahalli	Tumkur
173	77.1008485	13.2790591	Manangi	Gulur	Tumkur
174	77.0615609	13.2797465	S.I. Nandihalli	Hethenahalli	Tumkur

175	77.1500193	13.2800696	Bammenahalli	Kesaramadu	Tumkur
176	77.1949779	13.2801129	Chikkahalli	Hirehalli	Tumkur
177	77.0717815	13.2824944	Gondapura	Hethenahalli	Tumkur
178	77.0320795	13.2826127	Hosahalli	Hethenahalli	Tumkur
179	77.1650310	13.2826237	Bammenahalli	Kesaramadu	Tumkur
180	77.0437774	13.2828114	Hosahalli	Hethenahalli	Tumkur
181	77.2004997	13.2846083	Chikkahalli	Hirehalli	Tumkur
182	77.0333520	13.2849012	Hosahalli	Hethenahalli	Tumkur
183	77.1833655	13.2862033	Hirehalli	Hirehalli	Tumkur
184	77.0406849	13.2870859	Doddasarangi	Hethenahalli	Tumkur
185	77.0523195	13.2874886	S.I.Sarangipalya	Hethenahalli	Tumkur
186	77.2134201	13.2905100	Dananaikanapura	Hirehalli	Tumkur
187	77.0800543	13.2909496	Kallumata	Hethenahalli	Tumkur
188	77.0815497	13.2916813	Kaidhala	Hethenahalli	Tumkur
189	77.0684325	13.2959173	Hethenahalli	Hethenahalli	Tumkur
190	77.0717402	13.2975988	Hethenahalli	Hethenahalli	Tumkur
191	77.0870425	13.2992592	Guluru Amanikere	Gulur	Tumkur
192	77.0877444	13.3015988	Guluru Amanikere	Gulur	Tumkur
193	77.1465922	13.3030922	Maidhala Amanikere	Kesaramadu	Tumkur
194	77.1809549	13.3032257	Maidhala Amanikere	Kesaramadu	Tumkur
195	77.1652189	13.3037942	Chikkonahalli	Kesaramadu	Tumkur
196	77.0565943	13.3042270	Kambatthanahalli	Hethenahalli	Tumkur
197	77.2140483	13.3054266	Hodhekallu	Mydala	Tumkur
198	77.2787156	13.3055193	S.I.Kalenahalli	Seethakallu	Tumkur
199	77.1672057	13.3071293	Maidhala Amanikere	Kesaramadu	Tumkur
200	77.1555549	13.3085693	Kyathasandra		Tumkur
201	77.1778056	13.3095171	Maidhala Amanikere	Kesaramadu	Tumkur

202	77.0782595	13.3096477	Guluru Amanikere	Gulur	Tumkur
203	77.2102037	13.3097432	Hodhekallu	Mydala	Tumkur
204	77.1488478	13.3113124	Kyathasandra		Tumkur
205	77.1396131	13.3113666	Baddihalli		Tumkur
206	77.0639584	13.3120967	Kambatthanahalli	Hethenahalli	Tumkur
207	77.0983651	13.3123127	Maraluru		Tumkur
208	77.1385694	13.3126288	Baddihalli		Tumkur
209	77.0582529	13.3155948	Kambatthanahalli	Hethenahalli	Tumkur
210	77.1093905	13.3156076	Gedhlahalli		Tumkur
211	77.3055028	13.3158435	S.I.Linganahalli	Seethakallu	Tumkur
212	77.1157358	13.3166656	Shettyhalli		Tumkur
213	77.2102790	13.3181426	Aregujjanahalli	Aregujjanahalli	Tumkur
214	77.2879463	13.3185527	S.I.Dyapenahalli	Seethakallu	Tumkur
215	77.1077017	13.3190161	Gedhlahalli		Tumkur
216	77.1301685	13.3198499	Batawadi		Tumkur
217	77.0827040	13.3202661	Gangasandra	Mallasandra	Tumkur
218	77.0762864	13.3211428	Gangasandra	Mallasandra	Tumkur
219	77.2959586	13.3238744	S.I.Gidaganahalli	Seethakallu	Tumkur
220	77.2648320	13.3264812	Kadugujjanahalli	Seethakallu	Tumkur
221	77.2778658	13.3266742	S.I.Sheethakallu	Seethakallu	Tumkur
222	77.2833495	13.3284336	S.I.Sheethakallu	Seethakallu	Tumkur
223	77.2892195	13.3284560	S.I.Dyapenahalli	Seethakallu	Tumkur
224	77.2648766	13.3287775	Kadugujjanahalli	Seethakallu	Tumkur
225	77.1035507	13.3292214	Upparahalli		Tumkur
226	77.2192268	13.3319455	Aregujjanahalli	Aregujjanahalli	Tumkur
227	77.1325485	13.3331308	Batawadi		Tumkur
228	77.1947431	13.3338474	Kadharanahalli	Aregujjanahalli	Tumkur

229	77.2142447	13.3340999	Aregujjanahalli	Aregujjanahalli	Tumkur
230	77.2494689	13.3371020	Sathagatta	Urdigere	Tumkur
231	77.1821300	13.3376906	Janapanahalli	Aregujjanahalli	Tumkur
232	77.1100185	13.3382415	Tumkur		Tumkur
233	77.2478109	13.3404596	Sathagatta	Urdigere	Tumkur
234	77.1647125	13.3421740	Haralihalu	Belagumba	Tumkur
235	77.2058433	13.3424776	Aregujjanahalli	Aregujjanahalli	Tumkur
236	77.0971200	13.3434661	Tumkur		Tumkur
237	77.0854060	13.3434866	Tumkur Amanikere		Tumkur
238	77.1994591	13.3440163	Aregujjanahalli	Aregujjanahalli	Tumkur
239	77.2294309	13.3445255	Urdigere	Urdigere	Tumkur
240	77.1090452	13.3458393	Tumkur Amanikere		Tumkur
241	77.1672984	13.3469021	Haralihalu	Belagumba	Tumkur
242	77.2264845	13.3480981	Urdigere	Urdigere	Tumkur
243	77.1264748	13.3486524	Tumkur		Tumkur
244	77.1936156	13.3504676	Gollahalli	Aregujjanahalli	Tumkur
245	77.1304555	13.3508975	Belagumba	Belagumba	Tumkur
246	77.0876378	13.3521526	Tumkur Amanikere		Tumkur
247	77.1016495	13.3528873	Tumkur Amanikere		Tumkur
248	77.0911792	13.3544864	Tumkur Amanikere		Tumkur
249	77.2363636	13.3545264	Urdigere	Urdigere	Tumkur
250	77.1505487	13.3545661	Belagumba	Belagumba	Tumkur
251	77.1811942	13.3548454	Devarayadurga Forest (Poojari Linganahalli)	Urdigere	Tumkur
252	77.2444844	13.3554114	Sathagatta	Urdigere	Tumkur
253	77.2203876	13.3556238	Devarayadurga Forest (Poojari Linganahalli)	Urdigere	Tumkur

254	77.1855246	13.3560966	Devarayadurga Forest (Poojari Linganhalli)	Urdigere	Tumkur
255	77.2925767	13.3568008	S.I.Suragondanahalli	Seethakallu	Tumkur
256	77.2360938	13.3568092	Urdigere	Urdigere	Tumkur
257	77.1189985	13.3568274	J.I. Sathyamangala		Tumkur
258	77.2632037	13.3569829	S.I.Hiredoddavadi	Seethakallu	Tumkur
259	77.1440961	13.3570950	Belagumba	Belagumba	Tumkur
260	77.2618993	13.3584862	S.I.Hiredoddavadi	Seethakallu	Tumkur
261	77.1103912	13.3590555	Tumkur Amanikere		Tumkur
262	77.2310257	13.3638327	Urdigere	Urdigere	Tumkur
263	77.1627319	13.3673594	Devarayadurga Forest (Poojari Linganhalli)	Urdigere	Tumkur
264	77.1444833	13.3674155	Muthsandra	Swandenahalli	Tumkur
265	77.1297131	13.3681814	J.I. Sathyamangala		Tumkur
266	77.2240745	13.3698237	S.I.Bellibatlahalli	Urdigere	Tumkur
267	77.1970051	13.3702982	Devarayadurga Forest (Poojari Linganhalli)	Urdigere	Tumkur
268	77.0933388	13.3703750	Honnenahalli		Tumkur
269	77.1498808	13.3705654	Muthsandra	Swandenahalli	Tumkur
270	77.0810205	13.3715596	Honnenahalli		Tumkur
271	77.0987062	13.3718023	Lingapura		Tumkur
272	77.1389472	13.3744640	Beeranakallu	Swandenahalli	Tumkur
273	77.0872990	13.3751752	Honnenahalli		Tumkur
274	77.1197192	13.3755835	Antharasanahalli		Tumkur
275	77.2330773	13.3783004	S.I.Bellibatlahalli	Urdigere	Tumkur
276	77.0797853	13.3805190	Maralenahalli		Tumkur
277	77.1770037	13.3822439	Devarayadurga Forest (Poojari)	Urdigere	Tumkur

			Linganahalli)		
278	77.1341855	13.3837647	Beeranakallu	Swandenahalli	Tumkur
279	77.1752756	13.3854900	Devarayadurga Forest (Poojari Linganahalli)	Urdigere	Tumkur
280	77.1577199	13.3868859	Swandhenahalli	Swandenahalli	Tumkur
281	77.1121777	13.3872708	Antharasanahalli		Tumkur
282	77.1527542	13.3872808	Swandhenahalli	Swandenahalli	Tumkur
283	77.1872270	13.3884383	Devarayadurga Forest (Poojari Linganahalli)	Urdigere	Tumkur
284	77.0901772	13.3887058	Maralenaahalli		Tumkur
285	77.1397043	13.3907956	Ajjappanahalli	Swandenahalli	Tumkur
286	77.0352482	13.3969003	Ballapura	Bugudanahalli	Tumkur
287	77.0551406	13.3978462	Narasapura	Urukere	Tumkur
288	77.0856058	13.3982856	Urukere	Urukere	Tumkur
289	77.0756440	13.4000124	Hebbakadha Amanikere	Urukere	Tumkur
290	77.0541302	13.4007092	Narasapura	Urukere	Tumkur
291	77.1010963	13.4007872	Annenahalli	Urukere	Tumkur
292	77.1158527	13.4012064	Arakere	Arakere	Tumkur
293	77.1870871	13.4012350	Devarayadurga Forest (Poojari Linganahalli)	Urdigere	Tumkur
294	77.0024599	13.4017782	Shingipura (Singripura)	Bellavi	Tumkur
295	77.1869963	13.4037780	Devarayadurga Forest (Poojari Linganahalli)	Urdigere	Tumkur
296	77.0203723	13.4037981	Thimmalapura	Bellavi	Tumkur
297	77.1293311	13.4045629	J.I. Amalapura	Arakere	Tumkur

298	77.1015063	13.4049497	Annenahalli	Urukere	Tumkur
299	77.0144482	13.4069119	Bellavi	Bellavi	Tumkur
300	77.1450382	13.4069207	Hosahalli	Arakere	Tumkur
301	77.0240556	13.4071019	Echalukunte	Bugudanahalli	Tumkur
302	77.0628124	13.4076064	Hebbaka	Urukere	Tumkur
303	77.1352799	13.4087175	Hosahalli	Arakere	Tumkur
304	76.9974128	13.4089630	T. Gollahalli	Bellavi	Tumkur
305	77.0603391	13.4092872	Hebbaka	Urukere	Tumkur
306	77.2102663	13.4097135	Anupanahalli	Aregujjanahalli	Tumkur
307	77.0565818	13.4107600	Hebbaka	Urukere	Tumkur
308	77.1134444	13.4109949	Mallenahalli	Arakere	Tumkur
309	77.0126607	13.4116008	Bellavi	Bellavi	Tumkur
310	77.0923531	13.4132263	Urukere	Urukere	Tumkur
311	77.0275491	13.4157785	Chikkabellavi	Bellavi	Tumkur
312	77.1468448	13.4160384	Lingapura	Obalapura	Tumkur
313	77.0935450	13.4162792	Kucchangi	Arakere	Tumkur
314	77.1189522	13.4173723	Dasarahalli (Thippanahalli)	Arakere	Tumkur
315	76.9957634	13.4177029	T. Gollahalli	Bellavi	Tumkur
316	77.0411177	13.4186108	Lingenahalli	Thimmarajanahalli	Tumkur
317	77.1536341	13.4188830	Chinaga	Obalapura	Tumkur
318	77.1017989	13.4205591	Kucchangi	Arakere	Tumkur
319	77.0327840	13.4210902	Chikkabellavi	Bellavi	Tumkur
320	77.1631365	13.4218659	Chinaga	Obalapura	Tumkur
321	77.1730404	13.4220700	Chinaga	Obalapura	Tumkur
322	77.0009601	13.4225121	Dodderi	Bellavi	Tumkur
323	77.0539139	13.4239766	Shingrihalli	Kora	Tumkur
324	77.1073785	13.4245134	Kucchangi	Arakere	Tumkur

325	77.0407616	13.4246292	Lingenahalli	Thimmarajanahalli	Tumkur
326	77.1449038	13.4252491	Lingapura	Obalapura	Tumkur
327	77.1485213	13.4255318	Lingapura	Obalapura	Tumkur
328	77.1366200	13.4256586	Gerahalli	Obalapura	Tumkur
329	77.0547202	13.4256601	Shingrihalli	Kora	Tumkur
330	77.0606930	13.4272076	Kattigenahalli	Kora	Tumkur
331	76.9954335	13.4273083	Dodderi	Bellavi	Tumkur
332	77.1600462	13.4280172	Chikka Kodathakallu	Obalapura	Tumkur
333	77.0229358	13.4292749	Channanahalli	Thimmarajanahalli	Tumkur
334	77.1371081	13.4310342	Heeregundakallu	Chikkathotlakere	Tumkur
335	77.1875708	13.4322032	J.I. Ahobala Agrahara	Beladhara	Tumkur
336	77.0742789	13.4333669	Kora Amanikere	Kora	Tumkur
337	77.1511085	13.4334125	Obalapura	Obalapura	Tumkur
338	77.0059616	13.4349984	Dodderi	Bellavi	Tumkur
339	77.1706335	13.4351768	Hire Kodathakallu	Obalapura	Tumkur
340	77.0361446	13.4363781	Haralakatte	Thimmarajanahalli	Tumkur
341	77.0843213	13.4364905	Melehalli	Kora	Tumkur
342	77.0188145	13.4374783	Channanahalli	Thimmarajanahalli	Tumkur
343	77.0536900	13.4376643	Ajjagondanahalli	Thimmarajanahalli	Tumkur
344	77.0920902	13.4382982	Hirethotlukere	Chikkathotlakere	Tumkur
345	77.1340730	13.4384515	Heeregundakallu	Chikkathotlakere	Tumkur
346	77.0352365	13.4384690	Haralakatte	Thimmarajanahalli	Tumkur
347	77.0056646	13.4388387	Channanahalli	Thimmarajanahalli	Tumkur
348	77.1223164	13.4388398	Heeregundakallu	Chikkathotlakere	Tumkur
349	77.1611580	13.4414576	Appaihanapalya	Obalapura	Tumkur
350	77.2085483	13.4416356	Jakkanahalli	Beladhara	Tumkur
351	77.0901090	13.4419165	Hirethotlukere	Chikkathotlakere	Tumkur

352	77.1379940	13.4432573	Bammanahalli	Obalapura	Tumkur
353	77.0606719	13.4433277	Kora Amanikere	Kora	Tumkur
354	77.1856374	13.4434375	J.I. Ahobala Agrahara	Beladhara	Tumkur
355	77.1108243	13.4436737	Chikkathotlukere	Chikkathotlakere	Tumkur
356	77.0977645	13.4443240	Hirethotlukere	Chikkathotlakere	Tumkur
357	77.1253810	13.4453056	Chikkathotlukere	Chikkathotlakere	Tumkur
358	77.0512975	13.4463946	Ajjagondanahalli	Thimmarajanahalli	Tumkur
359	77.0293683	13.4466016	Masanapura	Thimmarajanahalli	Tumkur
360	77.0781380	13.4483446	Brahmasandra	Kora	Tumkur
361	77.1878055	13.4485240	J.I. Ahobala Agrahara	Beladhara	Tumkur
362	76.9840579	13.4493768	Doodaveeranahalli	Bellavi	Tumkur
363	76.9918440	13.4500039	Appinaikanahalli	Sorekunte	Tumkur
364	77.0751942	13.4501256	Brahmasandra	Kora	Tumkur
365	77.0197749	13.4508622	Harivanapura	Thimmarajanahalli	Tumkur
366	77.0319746	13.4510340	Nagajjanahalli	Thimmarajanahalli	Tumkur
367	77.1217860	13.4533930	Chikkathotlukere	Chikkathotlakere	Tumkur
368	77.1114212	13.4539327	Chikkathotlukere	Chikkathotlakere	Tumkur
369	77.1260137	13.4547432	Thirumalanapalya	Chikkathotlakere	Tumkur
370	77.0477814	13.4559189	Bommanahalli	Thimmarajanahalli	Tumkur
371	76.9998172	13.4583770	Channanahalli	Thimmarajanahalli	Tumkur
372	77.1140110	13.4590467	Chikkathotlukere	Chikkathotlakere	Tumkur
373	77.0721183	13.4598400	Brahmasandra	Kora	Tumkur
374	77.1042041	13.4626034	Karikere	Chikkathotlakere	Tumkur
375	77.0907980	13.4628362	Honnenahalli	Chikkathotlakere	Tumkur
376	76.9969556	13.4635172	Hucchabasavanahalli	Sorekunte	Tumkur
377	76.9789054	13.4635235	Appinaikanahalli	Sorekunte	Tumkur
378	77.0143627	13.4636308	Majjige Kempanahalli	Sorekunte	Tumkur

379	77.0115104	13.4636536	Majjige Kempanahalli	Sorekunte	Tumkur
380	77.0304297	13.4659925	Kurikempanahalli	Thimmarajanahalli	Tumkur
381	77.1021983	13.4663689	Karikere	Chikkathotlakere	Tumkur
382	77.1892694	13.4672479	Gollahalli	Beladhara	Tumkur
383	77.0955408	13.4677105	Karikere	Chikkathotlakere	Tumkur
384	76.9923551	13.4679647	Hucchabasavanahalli	Sorekunte	Tumkur
385	77.1405018	13.4685025	Amruthagiri	Devalapura	Tumkur
386	77.1178251	13.4685923	Sogenahalli	Chikkathotlakere	Tumkur
387	77.0460771	13.4690710	Chikkonahalli	Thimmarajanahalli	Tumkur
388	77.1063889	13.4715708	Ganganala	Devalapura	Tumkur
389	77.0521968	13.4725621	Chikkonahalli	Thimmarajanahalli	Tumkur
390	77.0200002	13.4781116	Gollahalli	Sorekunte	Tumkur
391	77.0987856	13.4783308	Ganganala	Devalapura	Tumkur
392	77.0894766	13.4784955	Kallushettykunte	Devalapura	Tumkur
393	77.1497443	13.4786821	Amruthagiri	Devalapura	Tumkur
394	77.0010590	13.4789545	S.I.Svarekunte	Sorekunte	Tumkur
395	77.1135403	13.4800094	Ganganala	Devalapura	Tumkur
396	77.0266011	13.4801391	Thimmarajanahalli	Thimmarajanahalli	Tumkur
397	77.0996999	13.4808701	Devalapura	Devalapura	Tumkur
398	77.1423733	13.4810029	Amruthagiri	Devalapura	Tumkur
399	77.0322735	13.4830235	Thimmarajanahalli	Thimmarajanahalli	Tumkur
400	77.0747564	13.4838836	Kallanapalya	Devalapura	Tumkur
401	77.0578599	13.4841330	Kempanadodderi	Kesthur	Tumkur
402	77.0543965	13.4842619	Kempanadodderi	Kesthur	Tumkur
403	77.0539212	13.4862098	Kempanadodderi	Kesthur	Tumkur
404	77.1448375	13.4911988	Bittanakurke	Devalapura	Tumkur
405	77.0489185	13.4912316	Kempanadodderi	Kesthur	Tumkur

406	77.1168668	13.4918700	Konthishalli	Devalapura	Tumkur
407	77.1130795	13.4919146	Hottemallanapalya	Devalapura	Tumkur
408	77.0058435	13.4923103	S.I.Svarekunte	Sorekunte	Tumkur
409	77.0568213	13.4923481	Bathsandra	Kesthur	Tumkur
410	76.9924344	13.4924058	S.I.Svarekunte	Sorekunte	Tumkur
411	77.1392963	13.4925384	Bittanakurke	Devalapura	Tumkur
412	77.0975398	13.4936715	Devalapura	Devalapura	Tumkur
413	77.0359607	13.4937218	Nagenahalli	Thimmarajanahalli	Tumkur
414	77.0601588	13.4952551	Bathsandra	Kesthur	Tumkur
415	77.0791050	13.4955460	Mavukere	Devalapura	Tumkur
416	77.1270593	13.4956023	Bittanakurke	Devalapura	Tumkur
417	76.9968260	13.4957308	S.I.Svarekunte	Sorekunte	Tumkur
418	77.0243226	13.4964632	Nagenahalli	Thimmarajanahalli	Tumkur
419	77.0969743	13.4969113	Rampura	Devalapura	Tumkur
420	77.0925898	13.4981162	Mavukere	Devalapura	Tumkur
421	77.0892390	13.4988676	Mavukere	Devalapura	Tumkur
422	77.0328426	13.4997748	Nagenahalli	Thimmarajanahalli	Tumkur
423	77.0346865	13.5024926	Yaladhadlu	Nelahal	Tumkur
424	77.0737140	13.5081367	Kesthuru Amanikere	Kesthur	Tumkur
425	77.0560465	13.5091703	Kenchenahalli	Kesthur	Tumkur
426	77.0992850	13.5099537	Geragondanahalli	Devalapura	Tumkur
427	77.0785684	13.5134798	Kesthuru	Kesthur	Tumkur
428	77.1093555	13.5141928	Veeranapalya	Devalapura	Tumkur
429	77.0389941	13.5153320	Yaladhadlu	Nelahal	Tumkur
430	77.0508504	13.5160509	Sangenahalli	Kesthur	Tumkur
431	77.0801083	13.5166360	Kesthuru	Kesthur	Tumkur
432	77.0656984	13.5203306	Shambonahalli	Kesthur	Tumkur

433	77.0507649	13.5232877	Sangenahalli	Kesthur	Tumkur
434	77.0021450	13.5261049	S.I.Chikkaseebi	Nelahal	Tumkur
435	77.0239621	13.5265056	Kempna Dhalahalli	Nelahal	Tumkur
436	77.0189725	13.5265730	Kolalakunte	Nelahal	Tumkur
437	77.0375210	13.5344026	Kodithimmanahalli	Nelahal	Tumkur
438	77.0435583	13.5349392	Kodithimmanahalli	Nelahal	Tumkur

(Source: Master Plan, CGWB, 2020. It is likely that the number of structures proposed may vary depending upon the ground truth verification and feasibility criteria)

**(c) Tentative Locations of Proposed Filter Beds
(Point Recharge Structures), Tumkur Taluk, Tumkur District**

SL.No	Longitude	Latitude	Village	Grama Panchayat	Taluk
1	77.0203681	13.1467892	Hobburu Amanikere	Hebbur	Tumkur
2	77.1594940	13.2314707	lynapura	Haralur	Tumkur
3	77.1109201	13.3169454	Gedhlahalli		Tumkur
4	77.2471008	13.3381269	Sathagatta	Urdigere	Tumkur
5	77.0503567	13.4681258	Chikkonahalli	Thimmarajanahalli	Tumkur

(Source: Master Plan, CGWB, 2020. It is likely that the number of structures proposed may vary depending upon the ground truth verification and feasibility criteria)