



## **केंद्रीय भूमि जल बोर्ड**

जल संसाधन, नदी विकास और गंगा संरक्षण मंत्रालय

भारत सरकार

Central Ground Water Board

Ministry of Water Resources, River Development and Ganga

Rejuvenation

Government of India

Report on

## **AQUIFER MAPPING AND MANAGEMENT PLAN**

**Chikknayakanahalli Taluk, Chikballapur District,  
Karnataka**

दक्षिण पश्चिमी क्षेत्र, बेंगलोर

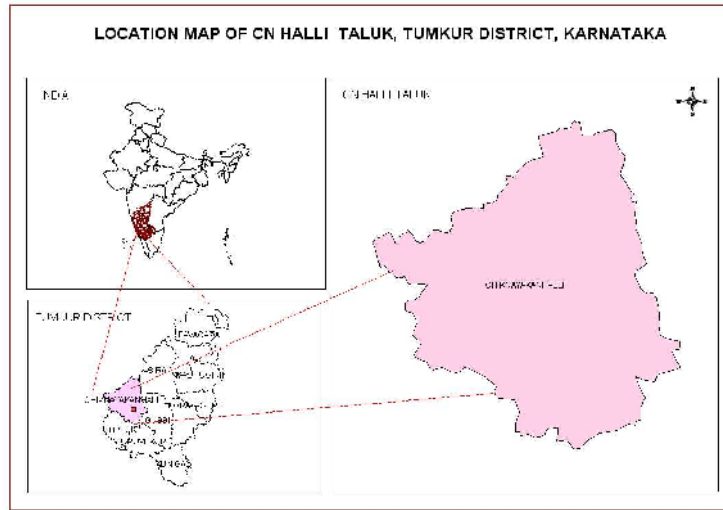
South Western Region, Bengaluru

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**Government of India  
Ministry of Water Resources, River Development  
& Ganga Rejuvenation  
Central Ground Water Board**

**CHIKKNAYAKANAHALLI TALUK AQUIFER MAPS AND  
MANAGEMENT PLANS, TUMKURU DISTRICT,  
KARNATAKA STATE**



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**CONTENTS**

<b>Sl. No.</b>	<b>Chapter Title</b>	<b>Page No.</b>
<b>1</b>	<b>SALIENT INFORMATION</b>	<b>1</b>
<b>2</b>	<b>AQUIFER DISPOSITION</b>	<b>7</b>
<b>3</b>	<b>GROUND WATER RESOURCE, EXTRACTION, CONTAMINATION AND OTHER ISSUES</b>	<b>10</b>
<b>4</b>	<b>GROUND WATER RESOURCE ENHANCEMENT</b>	<b>11</b>
<b>5</b>	<b>DEMAND SIDE INTERVENTIONS</b>	<b>12</b>

**CHIKKANAYAKANAHALLI TALUK AQUIFER MAPS AND MANAGEMENT PLANS,  
TUMKUR DISTRICT, KARNATAKA STATE**

**1. SALIENT INFORMATION**

**1.1 Name of the Taluk : CHIKKANAYAKANAHALLI (C.N.HALLI)**

**District** : Tumkur  
**State** : Karnataka  
**Area** : 1,130 sq.kms  
**Population** : 2, 12,130 (2011)  
**Annual Normal Rainfall** : 681 mm

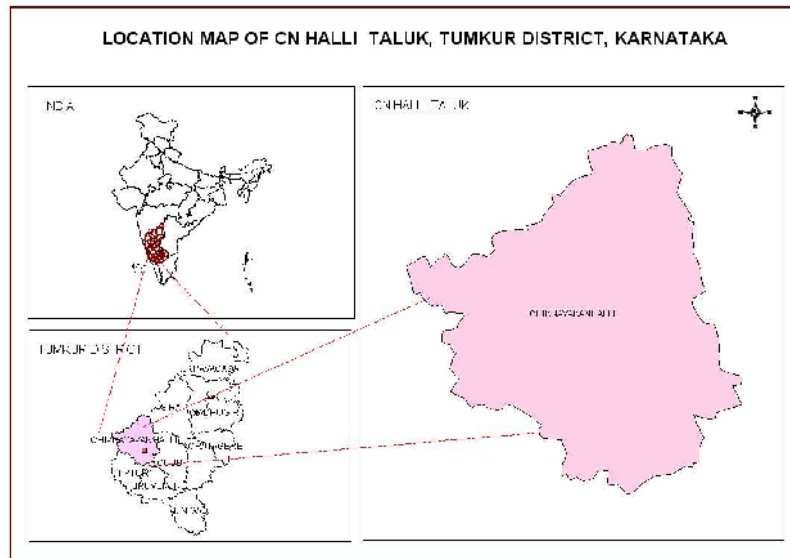


Fig 1: Administrative map of C.N.Halli taluk

**1.2 Area** : 1,130 sq.kms  
**Coordinates** : E76°18' 56.16" - 77°45' 46.87" and N 13°17' 24.75" - 13°45' 15.62"  
**SOI Toposheets** : 57 C/6, C/7, C/10, C/11 and C/15

**1.3 Population : As per 2011 Census**

Taluk/Area	Rural	Urban	Total	Decadal Growth rate (%)	Density of Population, sq.km
C.N.Halli taluk/ 1130 sq.km	174620	37510	212130	1.20	188
Tumkur district/ 10,597 sq.km	2079902	599078	2678980	3.65	253
For the year 2025, the projected population for C.N.Halli taluk is 215641					
For the year 2025, the projected population for Tumkur district is 2810957					

**1.4 Normal Rainfall : (1981-2010) in mm**

Taluk	Annual normal Rainfall	Normal monsoon Rainfall	Normal Non-monsoon rainfall
C.N.Halli taluk	681	377	308

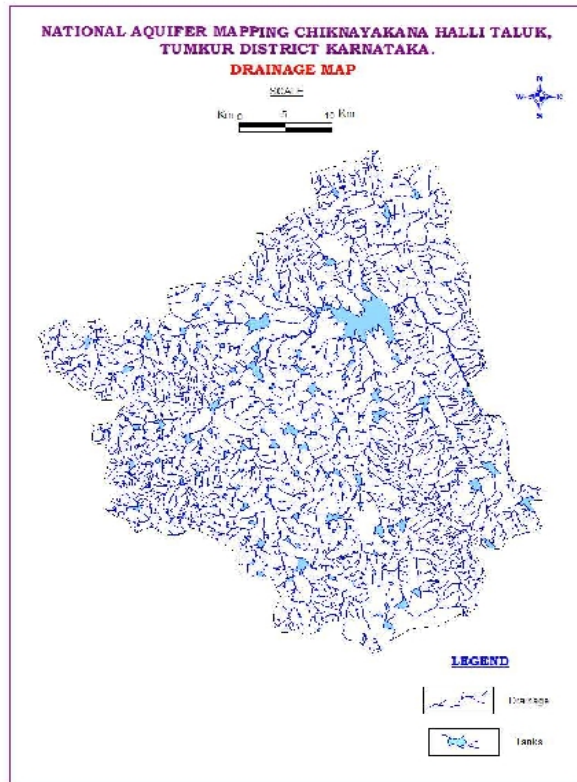


Fig. 2: Drainage map of C.N.Halli taluk

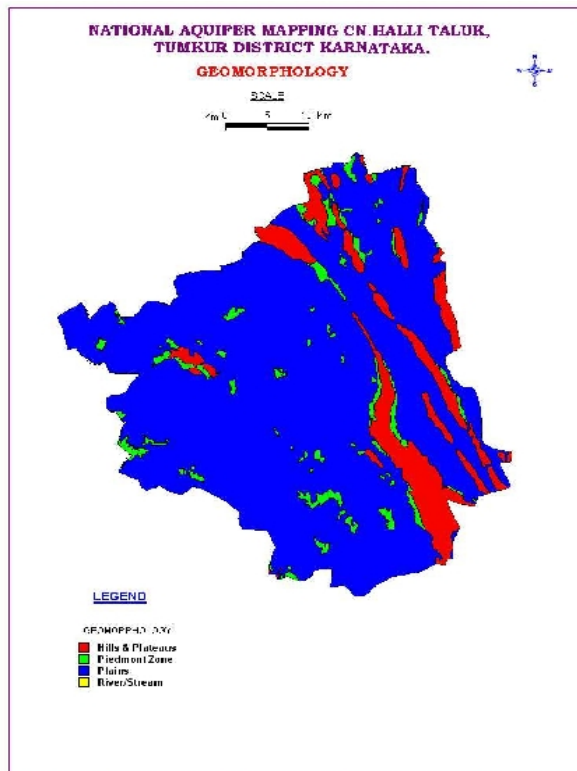


Fig. 3: Geomorphology map of of C.N.Halli taluk

### 1.5 Agriculture and Irrigation (Area in Ha)

Principal crops	Net sown Area	Gross sown Area	Cropping Intensity	Area under Irrigation
Ragi, Other cereals and minor millets, pulses, oil seeds, fruits and vegetables	63557	75516	1.18	24955

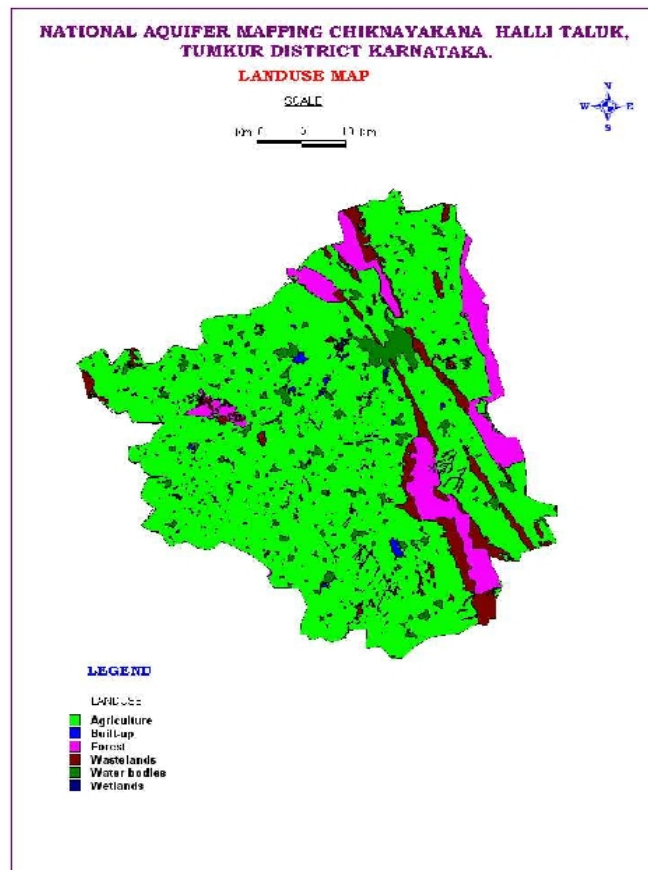


Fig. 4: Land use/land cover map of C.N.Halli taluk

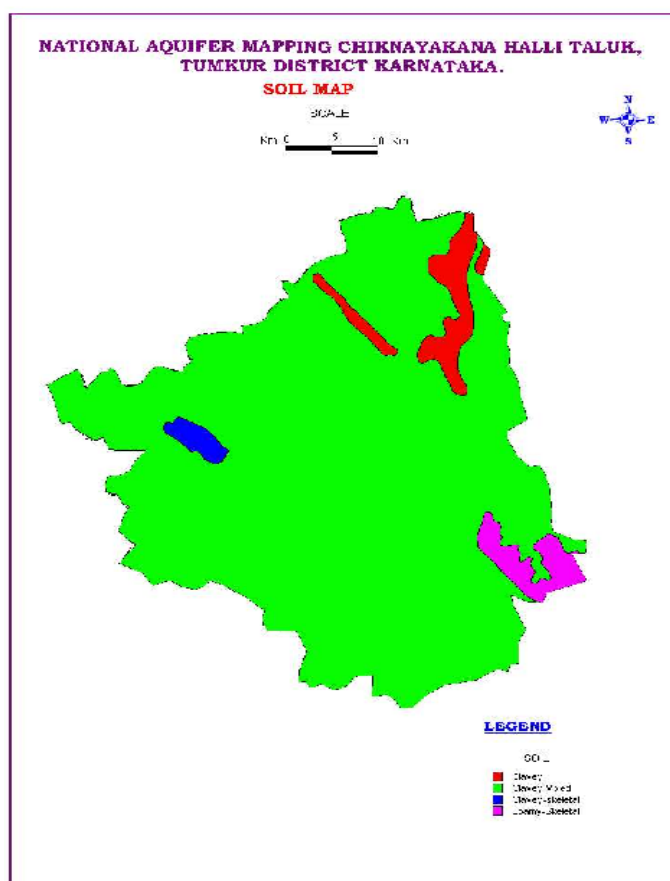


Fig. 5: Soil map of C.N.Halli taluk

### 1.6 Groundwater Resources Availability and Extraction as on 2011 (in ham): (Aquifer wise up to 200 m depth)

Taluk	Annual replenishable GW resources	Fresh in-storage GW resources		Total availability of fresh GW resources Dynamic + Phreatic in-storage + fractured
		Phreatic	Fractured (Down To 200 m)	
C.N.Halli	7396	10229	2257	19882

#### Extraction:

Taluk	Net annual GW availability	Total draft for all uses	Stage of GW development (%)	Category
C.N.Halli	7396	11133	151	Over - Exploited

### 1.7 Existing and future water demands

- No scope for further irrigation from ground water except few patches where ground water level still shallower throughout the year.
- Existing Domestic and Industrial sector demand: 4.64 MCM (as on GEC – 2011)

### 1.8 Water level behaviour (as on 2016)

#### Depth to water level

##### Aquifer – I

- Pre-monsoon : 1.82 to 12.40 m bgl

- Post-monsoon :3.20 to12.46 m bgl
  - Fluctuation : Rise - - Nil - , Fall - 0.10 to 4.03 m bgl
- Aquifer – II**
- Pre-monsoon :9.10 to 52.00 m bgl
  - Post-monsoon :13.87to88.00 m bgl
  - Fluctuation : Rise: 0.60, Fall – 2.59 to 36.00 m bgl

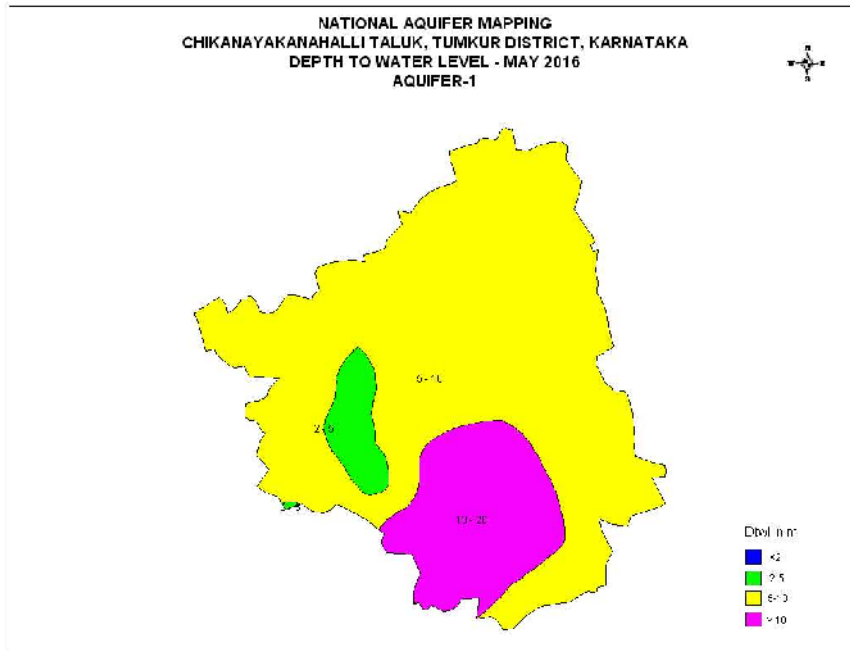


Fig. 6: Pre-monsoon depth to water level map – Aquifer I

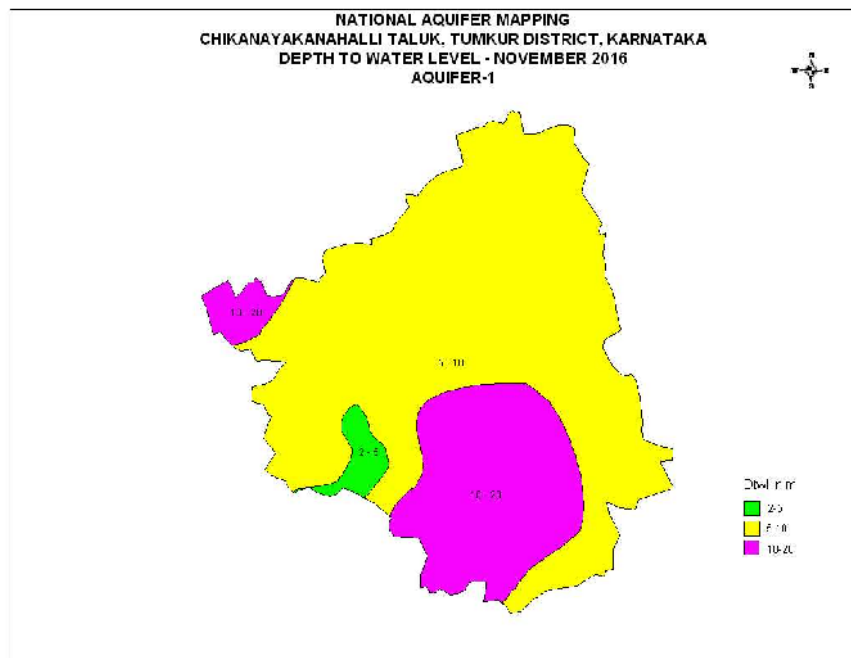


Fig. 7: Post-monsoon depth to water level map – Aquifer I



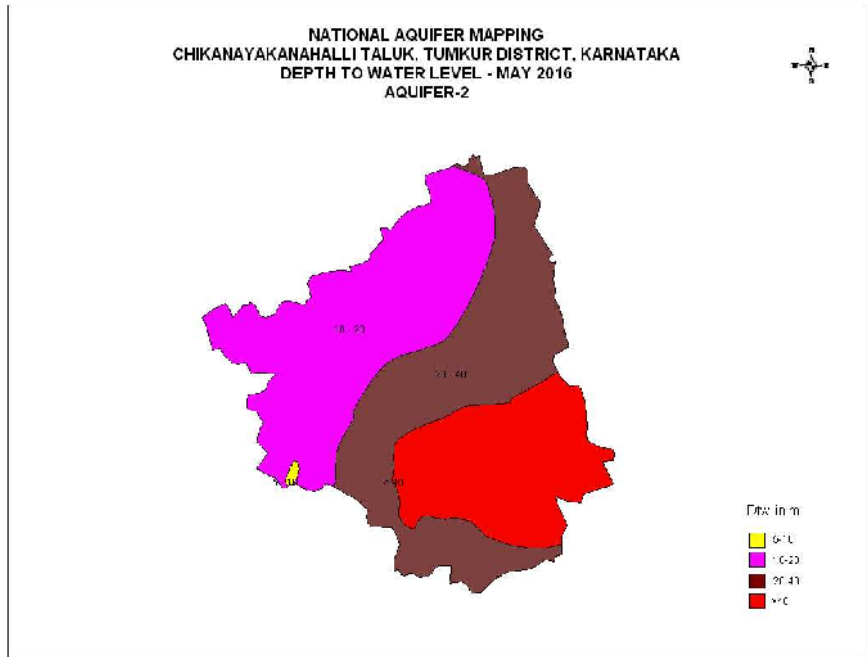


Fig 8: Pre-monsoon depth to water level map – Aquifer II

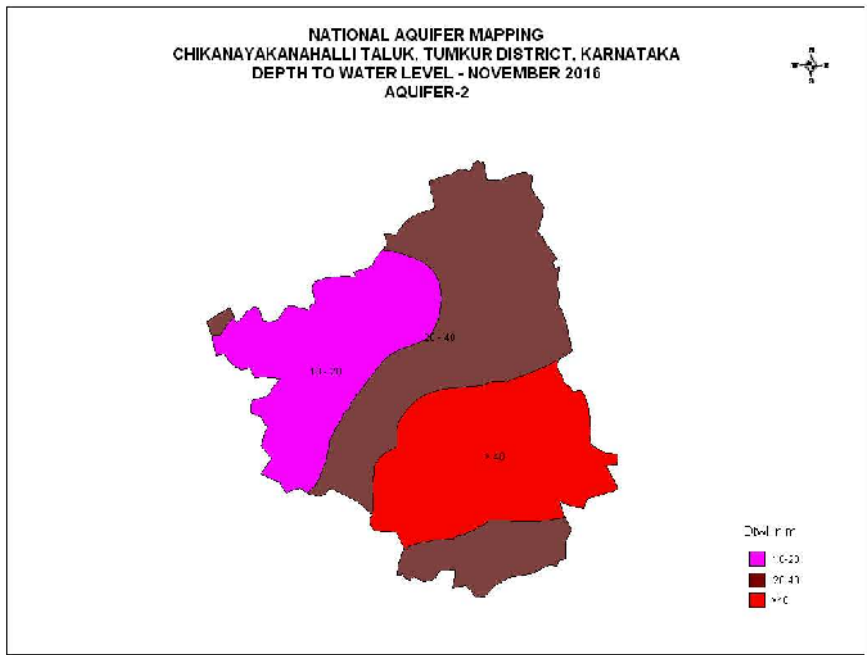


Fig 9: Post-monsoon depth to water level map – Aquifer II

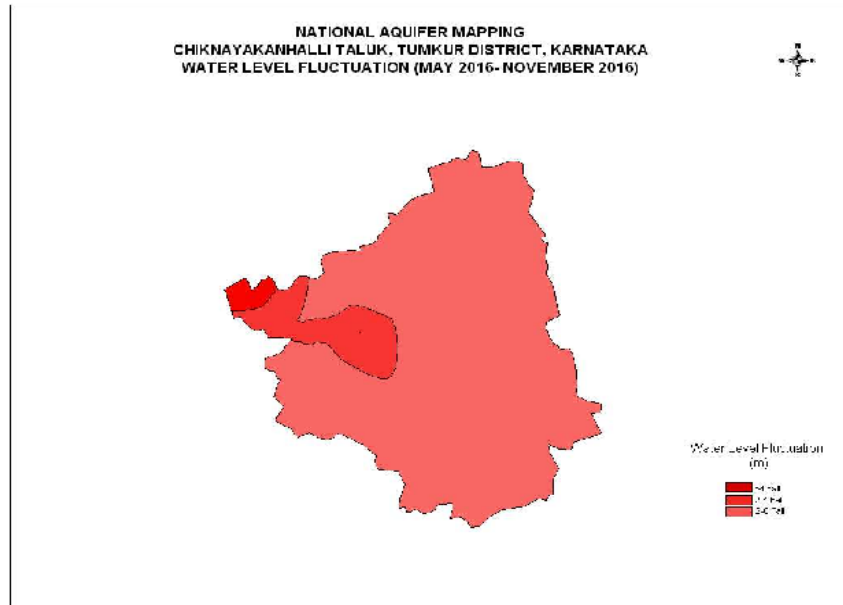


Fig 10: Water level fluctuation map – Aquifer I &II

## 2. AQUIFER DISPOSITION

In the area, there are mainly two types of aquifer systems:

- i) Aquifer – I (Phreatic aquifer) comprising weathered gneiss and schist.
- ii) Aquifer – II (Fractured, multi-aquifer system) comprising fractured gneisses and schist

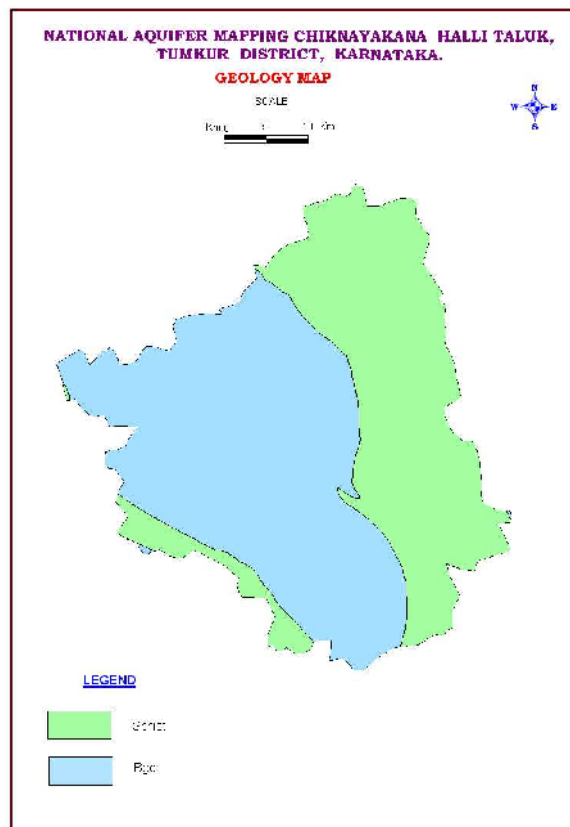


Fig 11: Geology map of C.N.Halli taluk

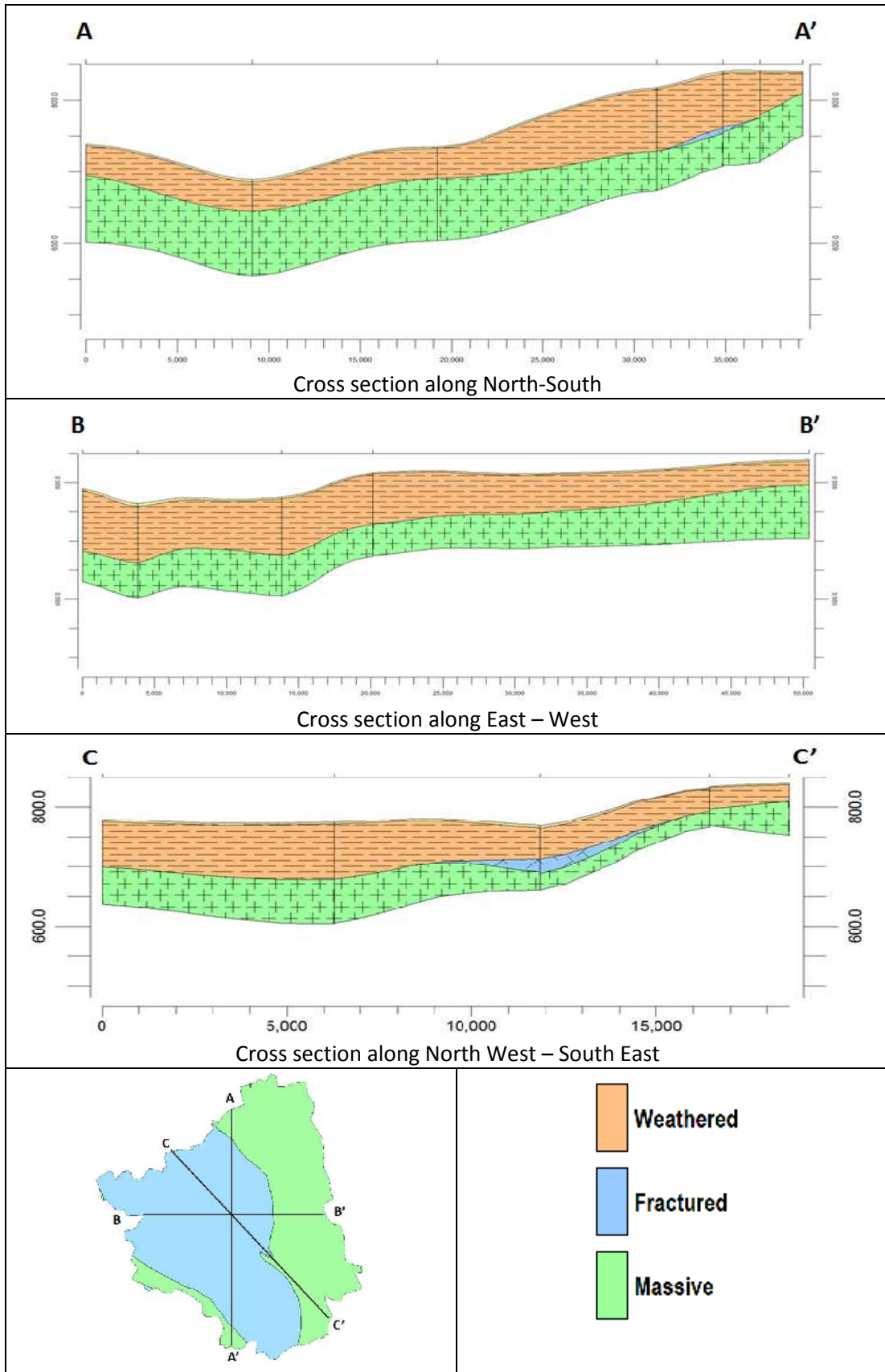


Fig 12: Aquifer cross sections in C.N.Halli taluk

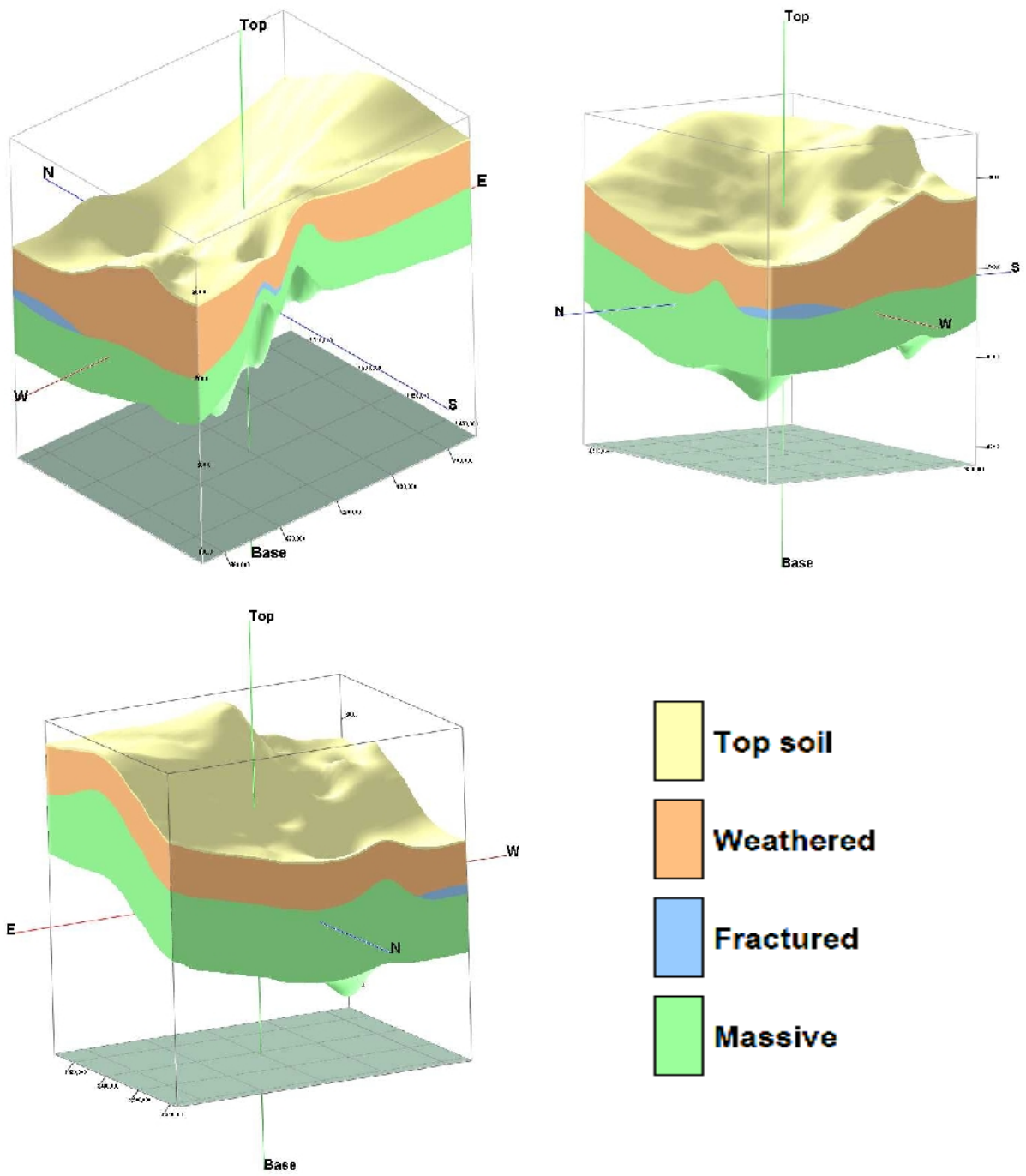


Fig 13: Aquifer 3D - disposition models of C.N.Halli taluk

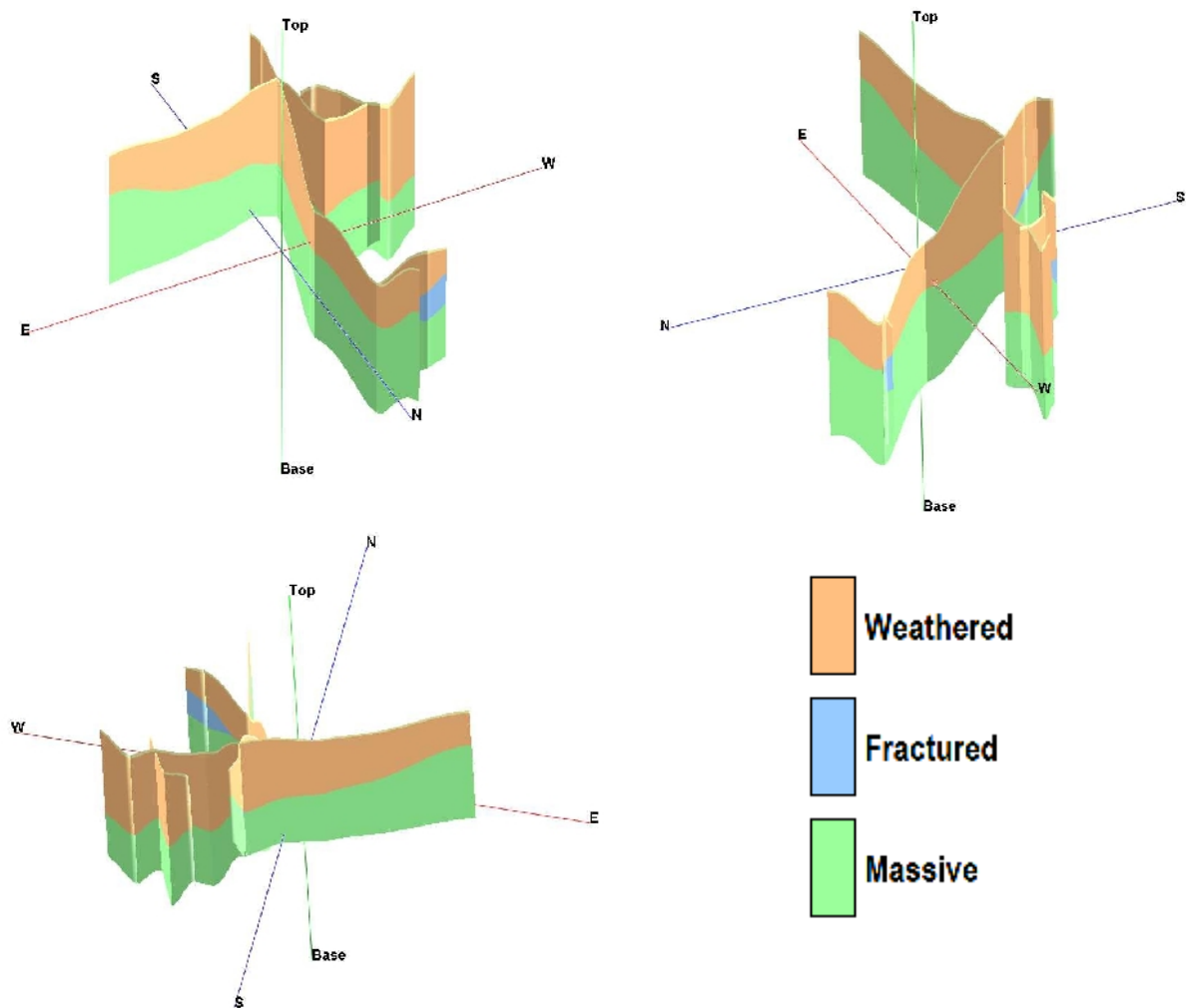


Fig 14: Fence diagrams of C.N.Halli taluk.

### 3. GROUND WATER RESOURCES, EXTRACTION, CONTAMINATION AND OTHER ISSUES

#### 3.1 Groundwater Resource (2011) (Ha m)

Taluk	Net annual GW availability	Total draft for all uses	Stage of GW development (%)	Category
C.N.Halli	7396	11133	151	Over Exploited

#### Total GW Resources (2009) (Ha m)

Taluk	Annual replenishable GW resources	Fresh In-storage GW resources		Total availability of fresh GW resources
		Phreatic	Fractured	Dynamic + Phreatic in-storage + Fractured
C.N.Halli	8201	10299	2257	20757

### 3.2 Groundwater Quality (May 2014)

- Generally the ground water is good and potable.
- EC Range: 510 – 2810  $\mu\text{S}/\text{cm}$  at 25°C
- Fluoride range: 0.25 – 0.90 mg/l
- Nitrate range: 6 – 80 mg/l

### 3.3 Poor sustainability

- Ground water is the sole source
- Rainfall is the only source of recharge
- Deep borewells of more than 1200 feet with deep seated fractures are not sustainable under OE condition
- Deep fractured aquifers are not annually getting recharged and hence, due to prevailing heavy over-draft condition, fractured aquifers are not sustainable.

## 4. GROUND WATER RESOURCES ENHANCEMENT

### 4.1 Aquifer wise space available for recharge and proposed interventions:

Quantity of water available through non-committed surface runoff

Artificial Recharge Structures Proposed	C.N.Halli taluk
Non committed monsoon runoff available (Ham)	1100
Number of Check Dams	68
Number of Percolation Tanks	5
Number of Point Recharge structures	7
Tentative total cost of the project (Rs. in lakhs)	252
Excepted recharge (MCM)	6.223
Expected rise in water level (m)	0.336
Cost Benefit Ratio (Rupees/ cu.m. of water harvested)	4.255

## 4.2 Improvement in groundwater availability due to recharge as on 2013.

### GROUND WATER AVAILABILITY AND DRAFT SCENARIO AND EXPECTED IMPROVEMENT IN STAGE OF GROUND WATER DEVELOPMENT

Taluk	NET ANNUAL GROUND WATER AVAILABILITY	EXISTING GROSS GROUND WATER DRAFT FOR ALL USES	EXISTING STAGE OF GROUND WATER DEVELOPMENT	EXPECTED RECHARG FROM ARTIFICIAL RECHARGE PROJECTS	ADDITIONAL POTENTIAL FROM PROPOSED YETTINAHOLE PROJECT	CUMULATIVE ANNUAL GROUND WATER AVAILABILITY	EXPECTED IMPROVEMENT IN STAGE OF GROUND WATER DEVELOPMENT AFTER THE IMPLEMENTATION OF THE PROJECT	EXPECTED IMPROVEMENT IN OVERALL STAGE OF GROUND WATER DEVELOPMENT
	HAM	HAM	%	HAM	HAM	HAM		%
C. N. Halli	7457	11398	153	622	0	8079	141	12

## 4.3 Other interventions proposed, if any: Nil

## 5. DEMAND SIDE INTERVENTIONS

### 5.1 Advanced irrigation practices:

- Efficient irrigation practices like drip irrigation and sprinkler are already adopted by farmers in few pockets of the area.
- Existing ground water draft for irrigation is 10882 has as on GEC 2013

### 5.2 Change in cropping pattern:

Not necessary as due to water scarcity, heavy duty crops are not grown in the taluk.

### 5.3 Alternative water sources:

- Inter-basin transfer from west-flowing river of Yettinahole project (taluk wise quantity to be assessed)
- Transporting tertiary treated water from Bangalore city and filling minor irrigation tanks for ground water recharge (talukwise quantity to be assessed)

### 5.4 Regulation and Control:

The Taluk is notified by Karnataka Ground Water Authority.

### 5.5 Other interventions proposed, if any: - Nil

