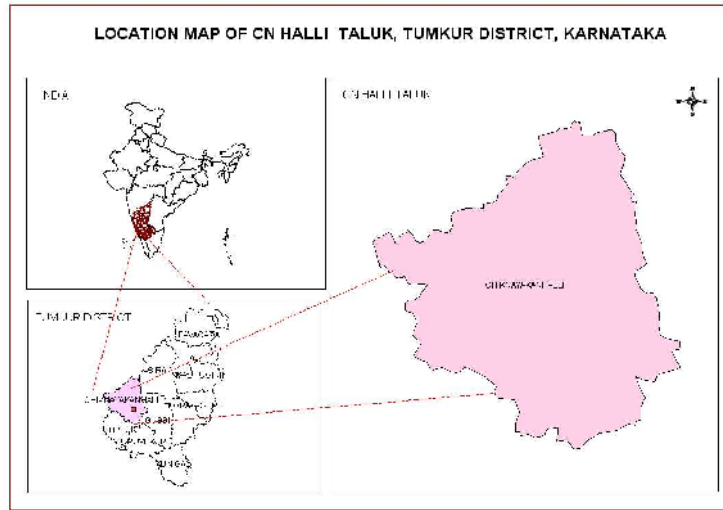


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**Government of India
Ministry of Water Resources, River Development
& Ganga Rejuvenation
Central Ground Water Board**

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



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March 2017**



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**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

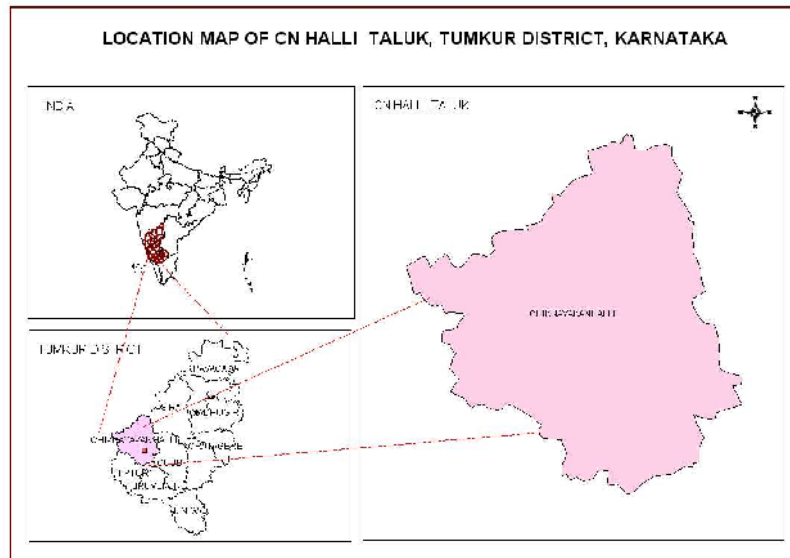


Fig 1: Administrative map of C.N.Halli taluk

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 |

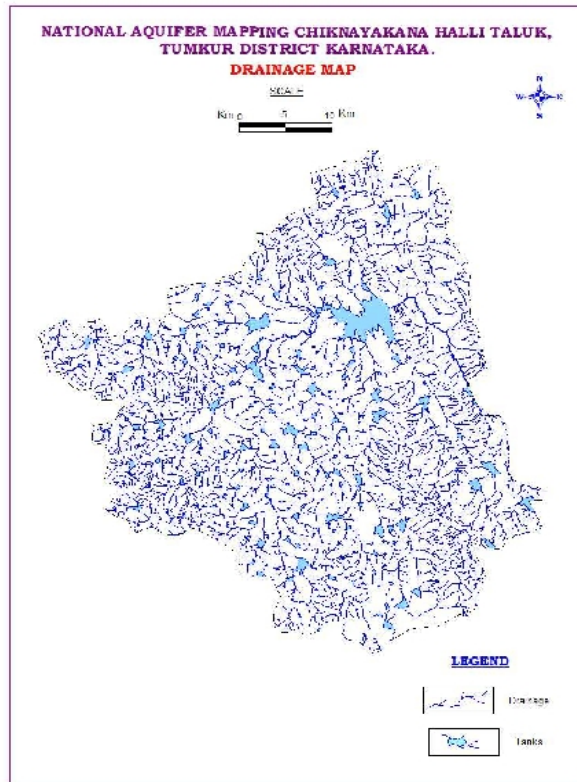


Fig. 2: Drainage map of C.N.Halli taluk

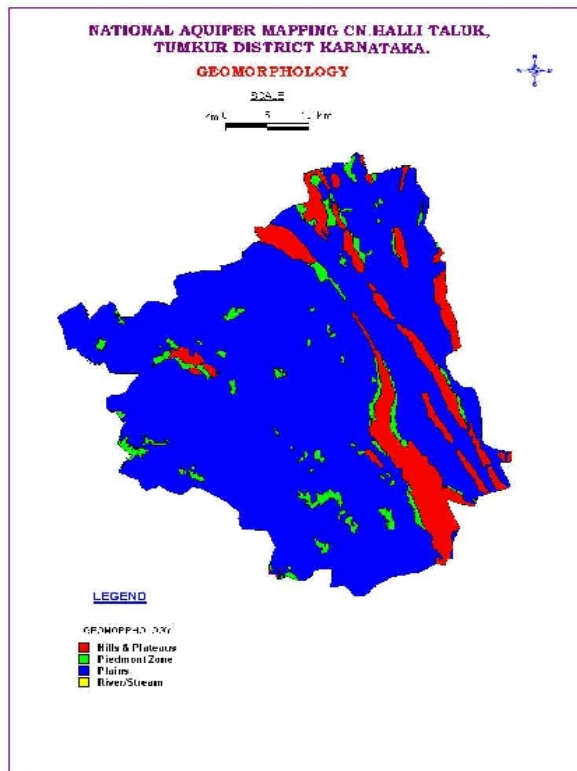


Fig. 3: Geomorphology map of of C.N.Halli taluk

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 |

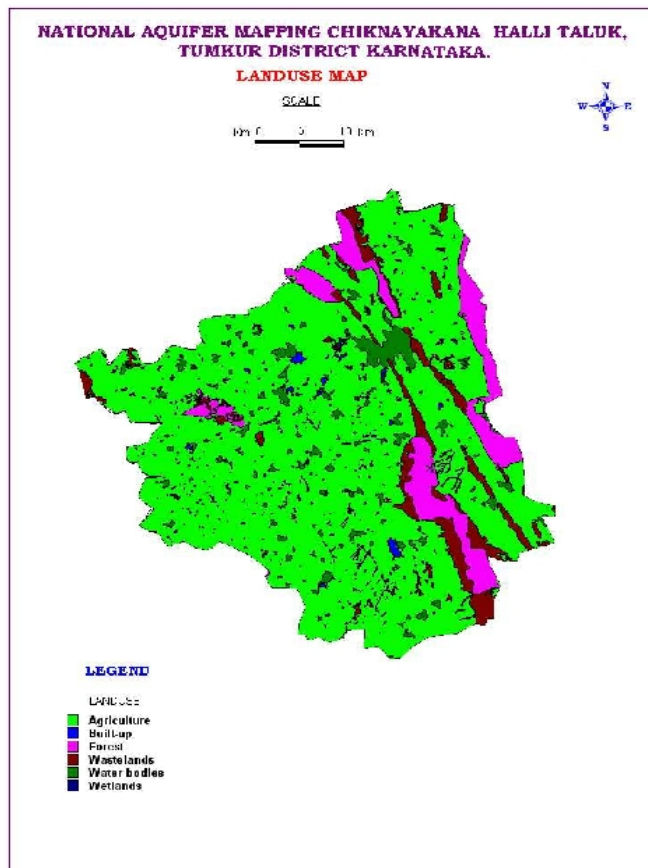


Fig. 4: Land use/land cover map of C.N.Halli taluk

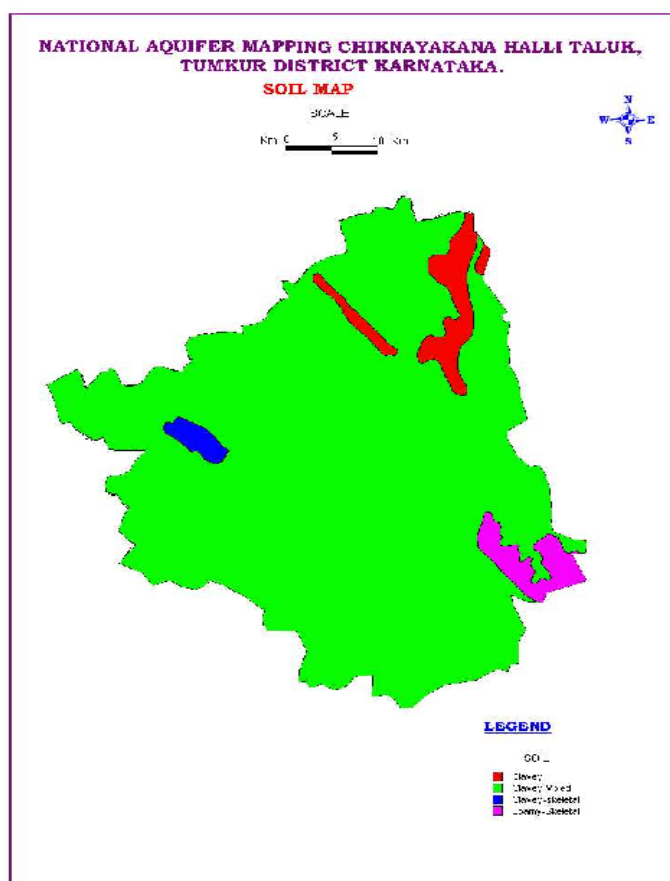


Fig. 5: Soil map of C.N.Halli taluk

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

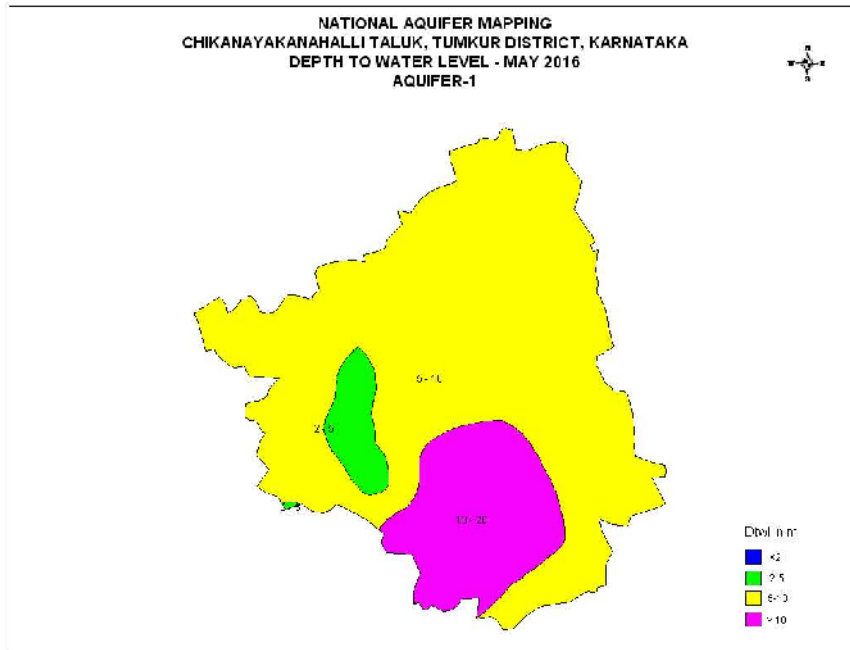


Fig. 6: Pre-monsoon depth to water level map – Aquifer I

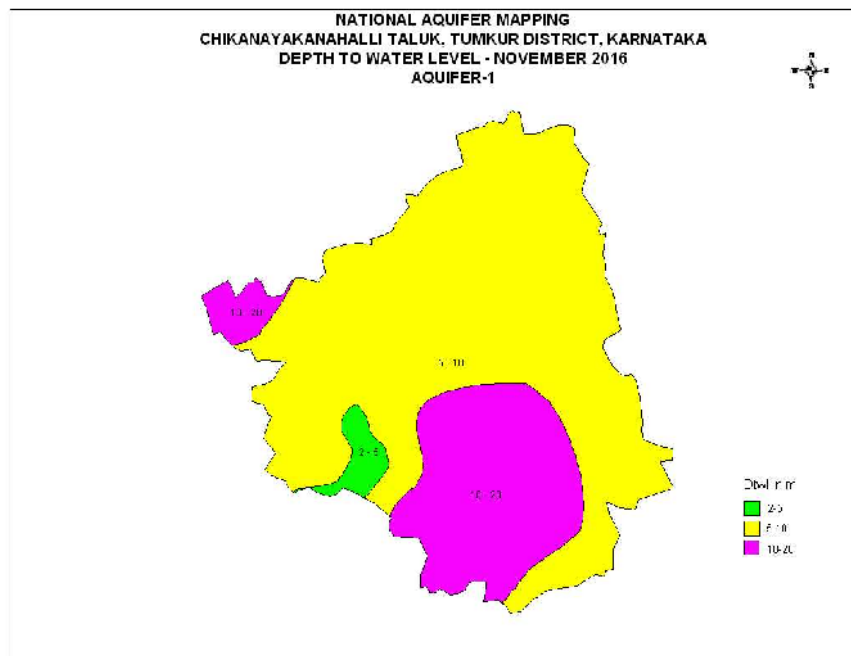


Fig. 7: Post-monsoon depth to water level map – Aquifer I

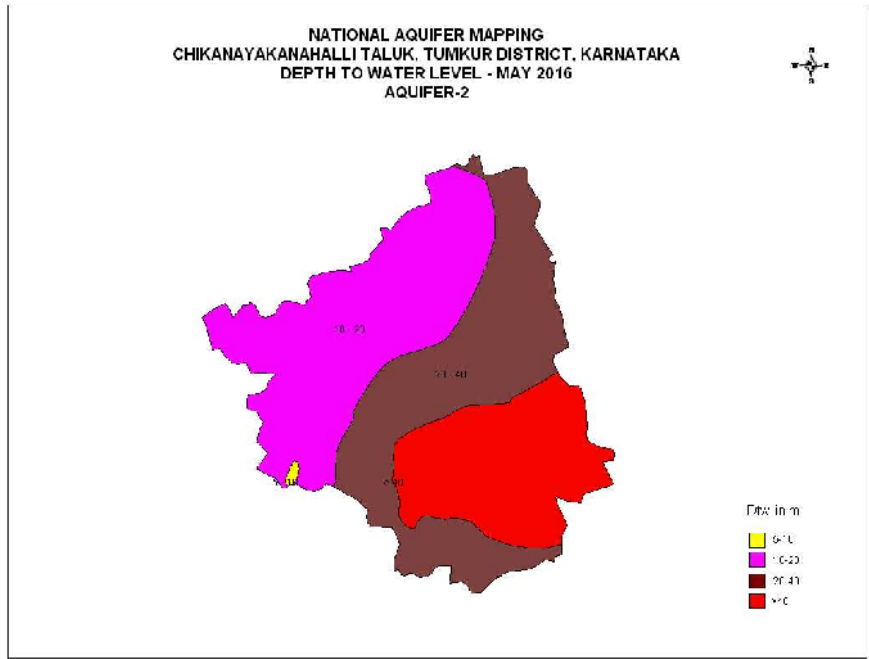


Fig 8: Pre-monsoon depth to water level map – Aquifer II

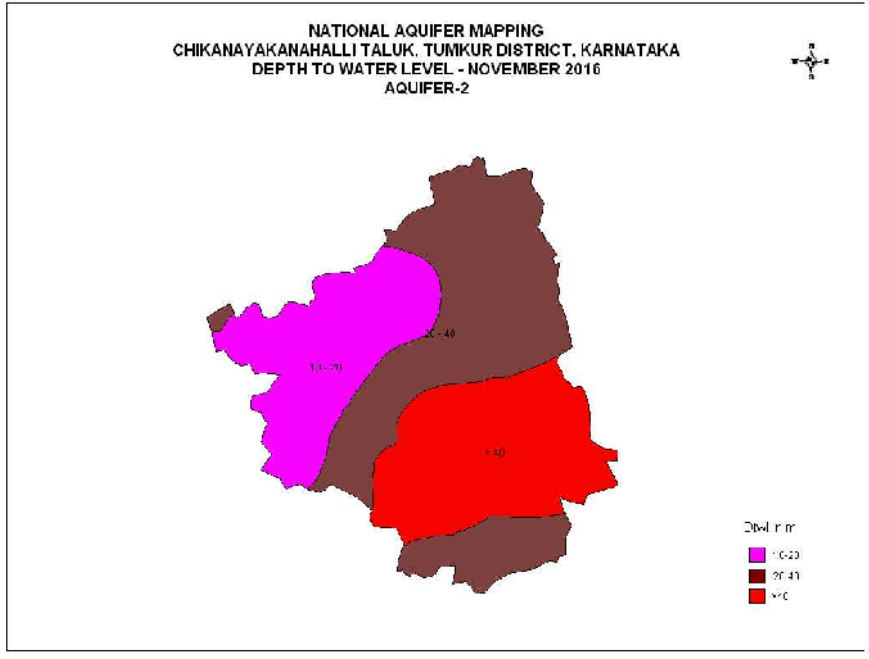


Fig 9: Post-monsoon depth to water level map – Aquifer II

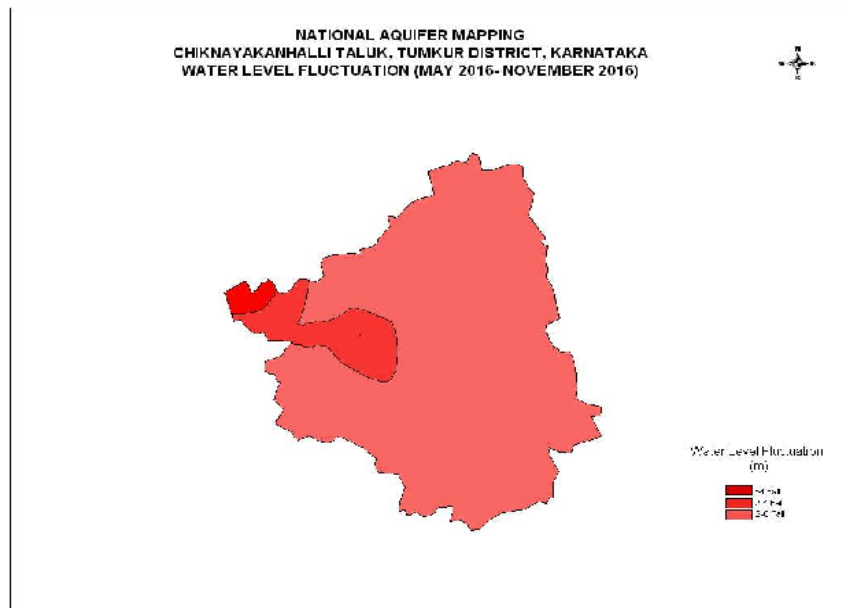


Fig 10: Water level fluctuation map – Aquifer I &II

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

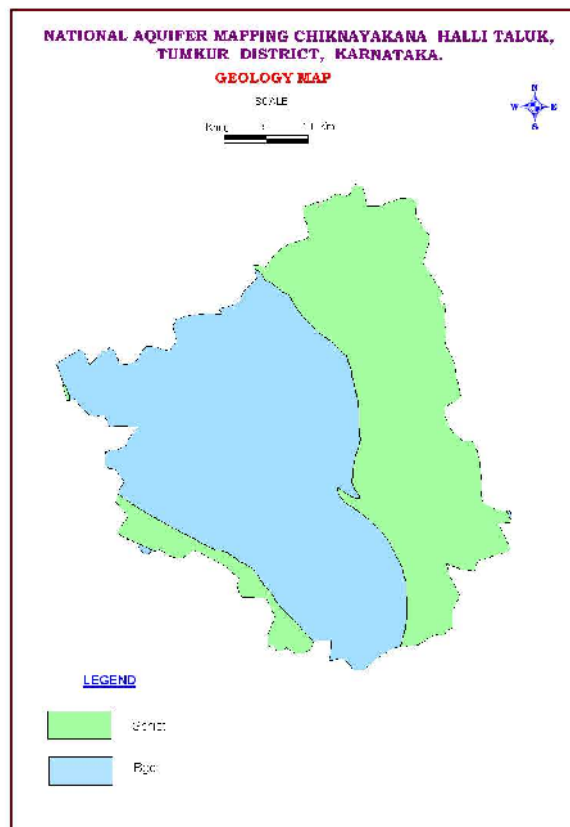


Fig 11: Geology map of C.N.Halli taluk

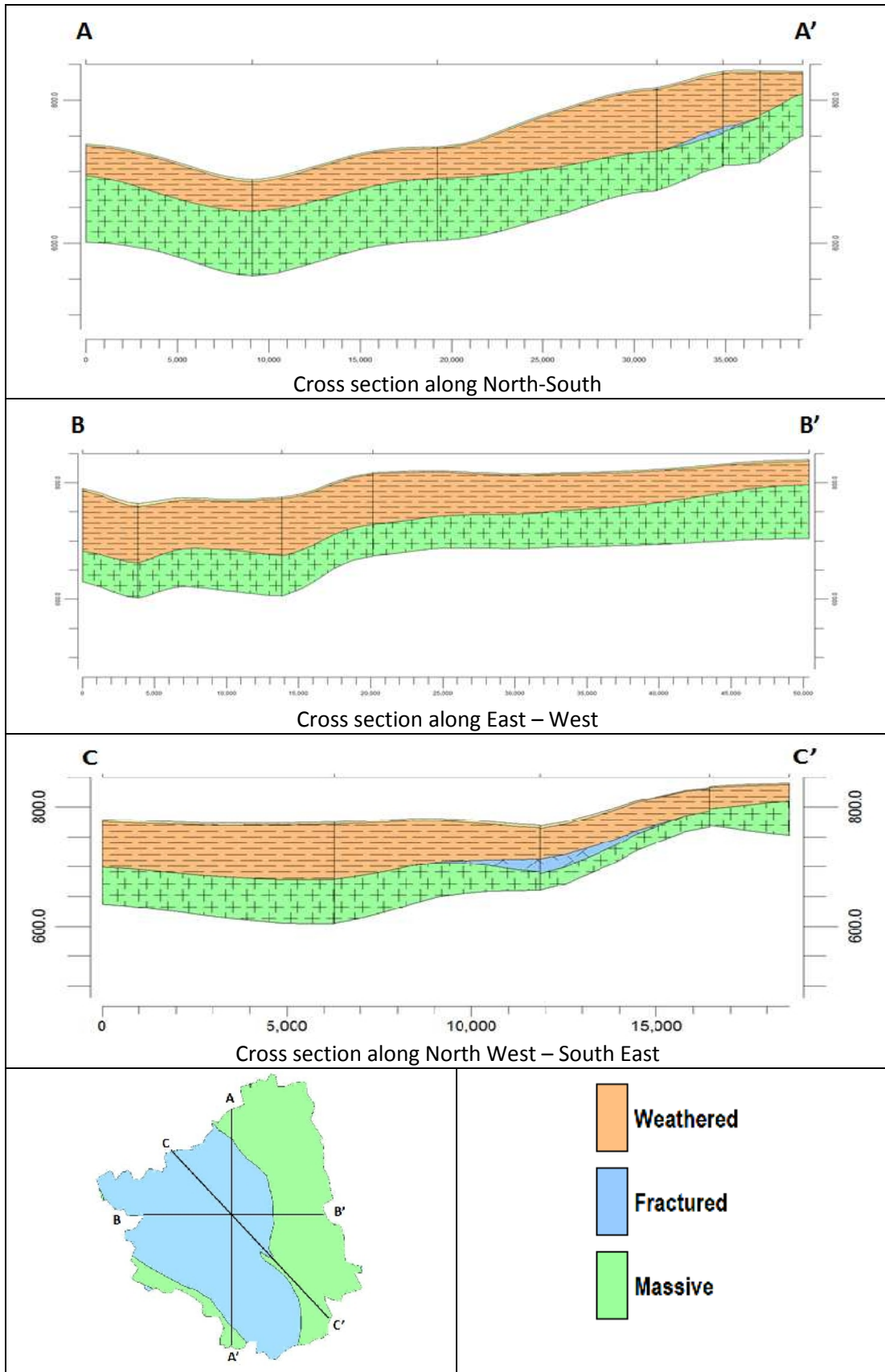


Fig 12: Aquifer cross sections in C.N.Halli taluk

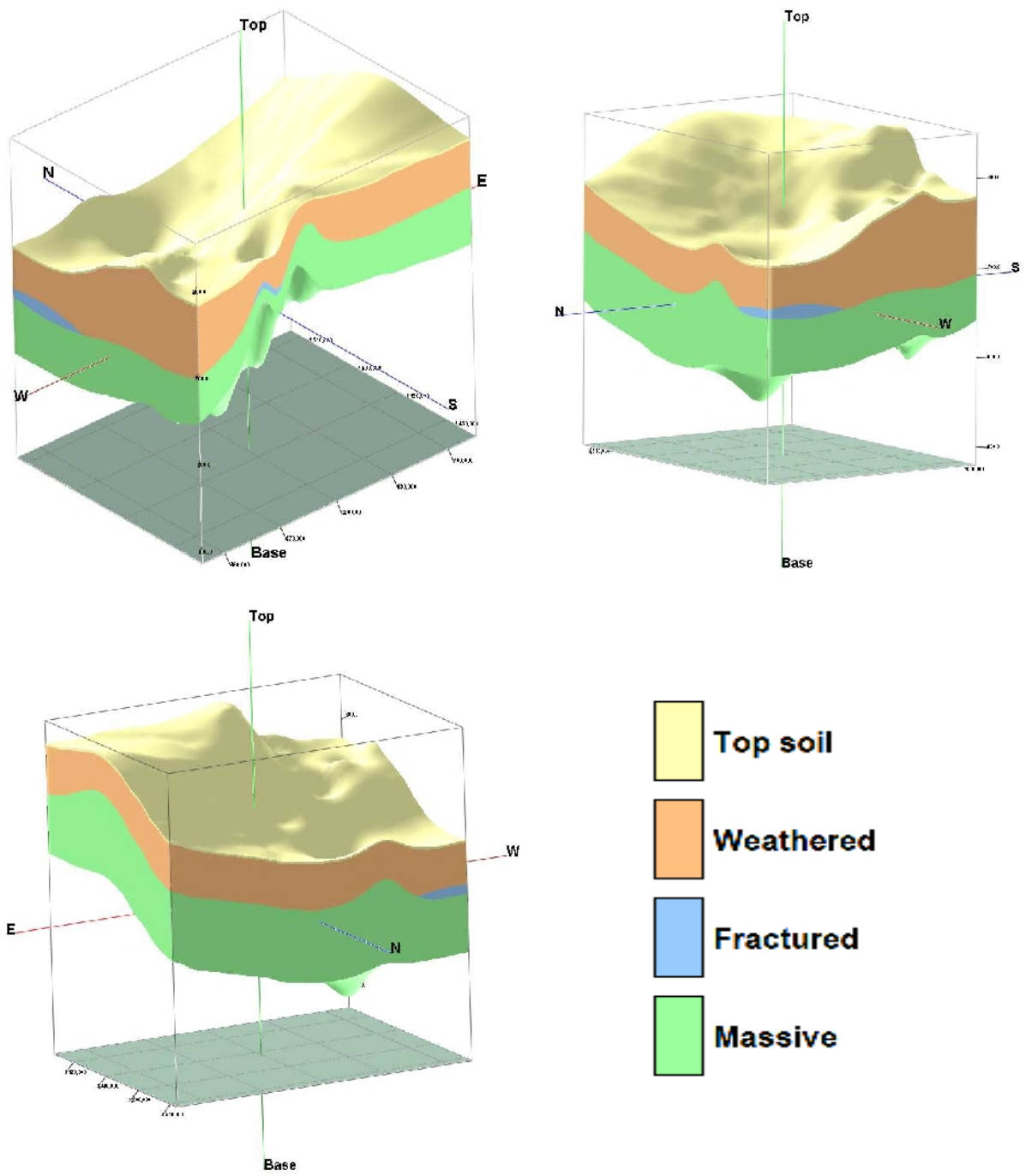


Fig 13: Aquifer 3D - disposition models of C.N.Halli taluk

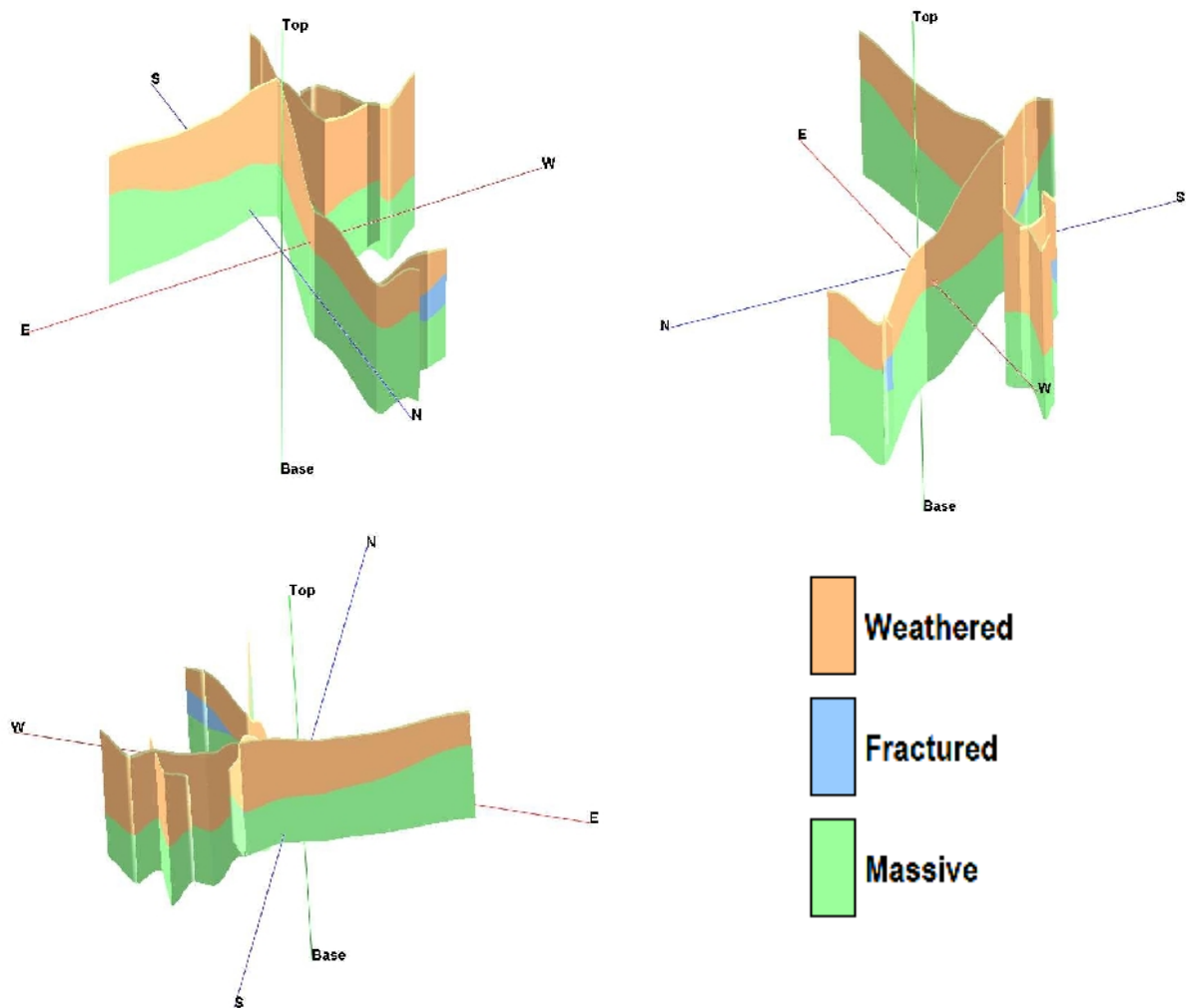


Fig 14: Fence diagrams of C.N.Halli taluk.

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