Estimate for providing water supply scheme to Chintamani city with Bhaktharahallli Arasikere tank as source.

General: Chintamani city is a taluk head quarter in Chikkaballapur district situated at a distance of 40 KM from Chikkaballapur city and 70 KM from Bangalore. Population as per 2011 censes 76306 and present population is 80000. Chintamani city is commercial centre for ground net business with many educational institutions. The population of the city is increasing rapidly due to urbanization and up gradation of railway track from narrow gauge to broad gauge. The city is covered by under ground drainage system about 90% area of the city.

Configuration: Chintamani city is situated at latitude 13^0 25' 72" N and longitude 78^0 03' 07" E. The average elevation of the city is 945 mtr above MSL. The general ground profile is sloping towards four directions from the center of the city.

Population: The population of the city from the censes figure are given below in the table.

Sl. No.	Year of Censes	Population
1	1971	26684
2	1981	36220
3	1991	50394
3	2001	65456
4	2011	76306

The present population is about 80000.

Rainfall details:

- Average rainfall is 777 mm.
- Average Rainy days is around 55.5 days in a year
- High rainfall recorded in the month of October.
- Monsoon period (June – September)
- Non- Monsoon Period (October – May)

Details of existing water supply schemes:-

Quantity and requirement of water:

Quantity of water			
Sl No.	Source	Quantity in MLD	Remarks
1	Surface	2.50	Nekkundi tank – 1.5 MLD, Kannampalli tank - 1.0 MLD Impound reservoir at Ambaji durga hillock – not utilizing by ULB, the WTP's at Agrahara and Filter bed are in working conditions.
2	Bore wells	4.00	From 60 No. of borewells fitted with power pumps.

Present rate of supply is about 80 LPCD to the city.

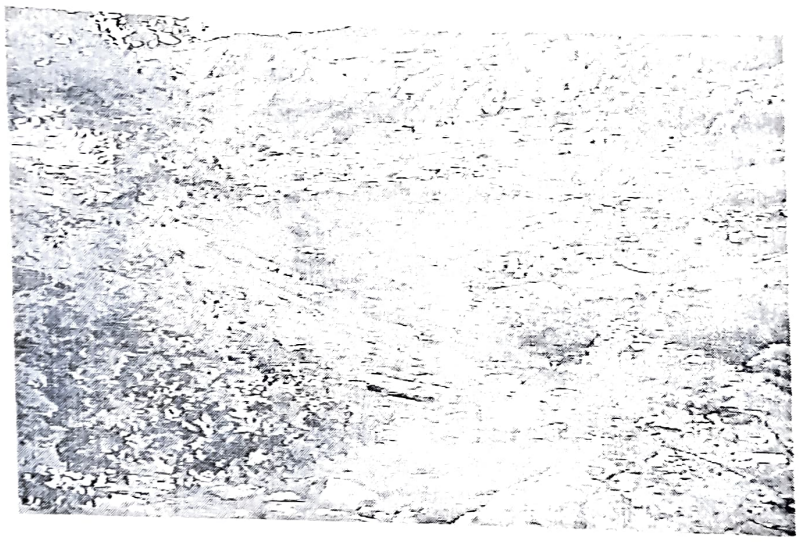
Requirement of water			
Sl No.	Present population	Quantity req at 135 LPCD including 15% loses in MLD	Remarks
1	80000	12.40	

Study of Source:

- **Surface**

Sl No	Source	Distance from the city in Km	Cap. Tank in Mcft	Water spread area	Catchment area	Remarks
1	W/S/S with Kannampalli	1.5	12.00	42.00 acres	2.20 Sq miles	Feed to 1.60 MLD at filter bed
2	W/S/S with Nekkundi Tank	1.0	16.84	60.40 Ha.	30.87 Sq. Kms	Feed to 1.50 MLD at Agrahara
3	Ambaji durga Impounding reservoir	2.0	6.00	15.00 acres	0.66 Sq miles.	Feed to 1.60 MLD WTP at filter bed

Kannampalli Tank: Kannampalli tank is main source of water supply to southern part of the Chintamani city. The tank on North-West direction surrounded by series of hillocks. Rain water from these hillocks leads to Kannampalli tank through earthen feeder channel. Rain water from the hillocks in the same series of about 2.5-3.0 km length is leading into the nalas and near by small tanks. The total yield available from these hillocks is 3.74 Mcft as per the report submitted by WRDO, Bangalore. Hence, this quantity of water can be utilized as an additional source to Kanampalli tank by diversion of this water into the Kannampalli tank.



Impounding reservoir at Ambajidurga Hillock: The Impounding reservoir at Ambajidurga hillock is surrounded by hillocks, rain water from these hillocks will directly enter into the Impounding reservoir. There is no any tanks on upstream side of the reservoir.

Nekkundi tank: The tank is very adjacent to the city, the tank will receive rain water from the hillocks and as well as from open fields. There are 2 No. of irrigation tanks on upstream side of the tank. The overflow water from these tanks will enter into the Nekkundi tank.

There is no any Industries in the catchments area of the above said tanks.

Bore wells: Generally the bore well will be drilled to a depth of 1200 to 1500 ft. Since, the ground water table is depleting day by day. The bore well water is highly contaminated by nitrates, calcium carbonate and most of the bores well are not fit for drinking purposes.

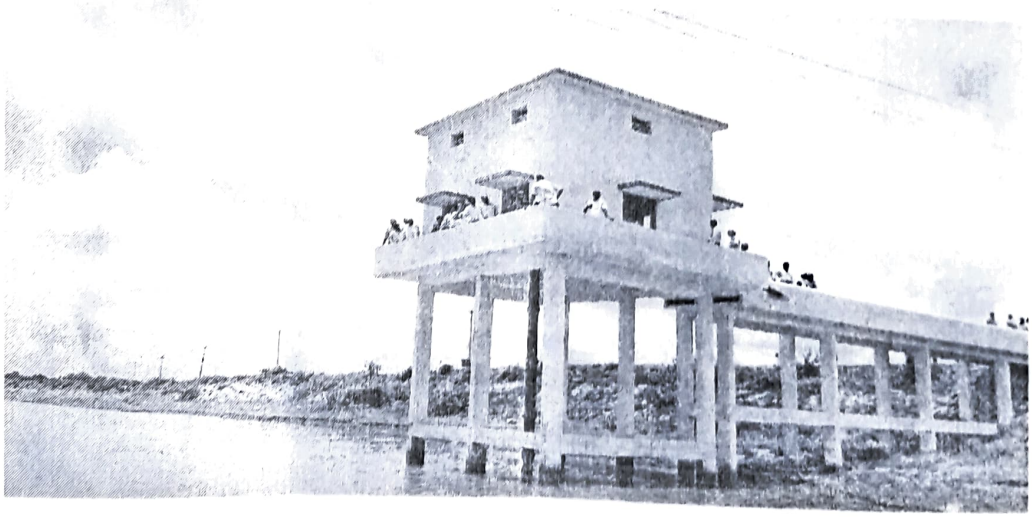
Capacities of Source:

Surface Source:

A. **Kannampalli Tank:** The Gross capacity of the Tank is about 12 Mcft. The scheme was commissioned to supply 1.60 MLD with kannampalli tank as source, by constructing a 1.60 MLD cap WTP at Tank bed road, from where pure water will be pumped to the OHT located at filter bed. Since lost few years, the tank is only filled partially due to scanty of rainfall. During 2017 the tank filled and discharged.

B. **Ambajidurga Impounding reservoir:** The reservoir is located in the midst of the hillock. If the reservoir gets filled up, it can feed nearly 2 months the WTP at Tank bed Road. During 2017 the tank filled and discharged.

C. **Nekkundi Tank:** The original capacity of the tank was 7.10 Mcft. After handing over to the CMC, chintamani, under WSS to chintamani city with Nekkundi tank as source, the Total capacity was increased to 16.84 Mcft. The scheme executed to supply about 1.50 MLD water from the WTP constructed at the Agrahara. The pure water is pumped to various GLSR's near to WTP. The scheme was commissioned during 2011. However, due to scanty rainfall in the city, every year, tank gets filled partially. Due to this, there is scarcity of drinking water and through out the year, the city is depended on the bore well source only. During 2017 the filled about 90% of the total capacity.



2. Bore well source:

At present 4.00 MLD of water is available from 60 bore wells fitted with power pumps. The borewells are located in and around the city and also in the tank beds. The water from the borewells collected in the nearest sumps and supplied to the

GLSR and overhead tanks, some of the bore wells are drilled in the tank bed area of Kannampalli and Nekkundi tank were connected to nearby sumps from their water will be pumped to over head tanks. In the city limits most of the borewells fitted with power pumps are connected to nearby sumps. There is an adequate infrastructure to collected the boerwell water and surface water in the sump and to pump the water into the over the tanks. Only few borewells are directly connected to the distribution system.

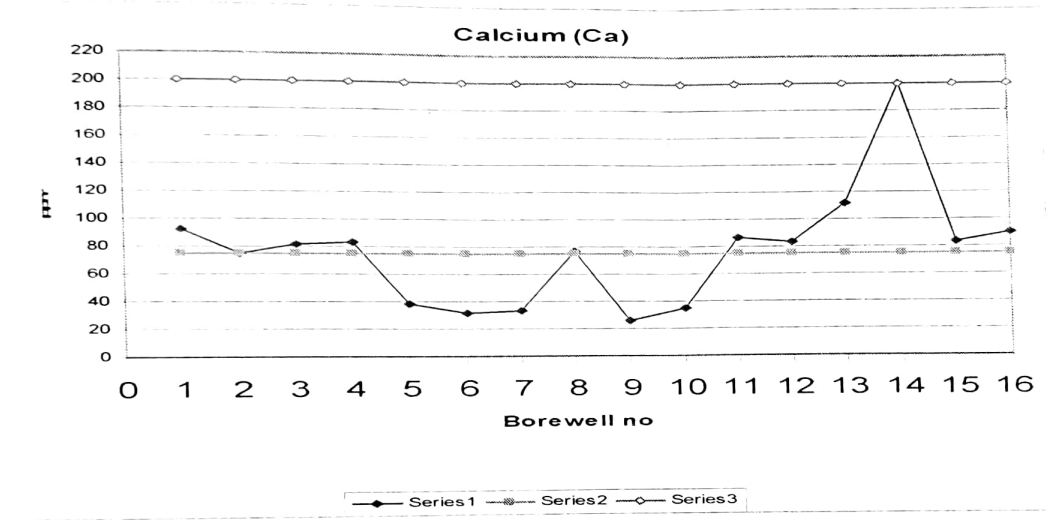
- **Quality of Surface and Bore well water:-**

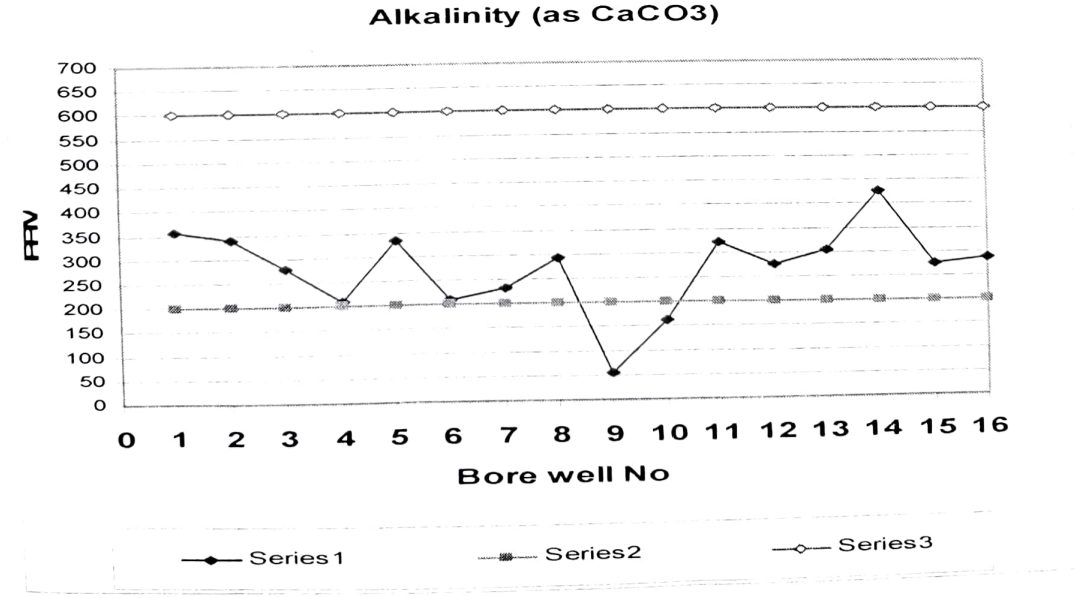
Surface:

The raw water constituents Calcium (Ca) , Magnisium (Mg), Chloride (Cl), Fluoride (F), Total Dissolved Solids (TDS), Sulphates (So4), Nitrate (No3), Total Hardness, Bacteriological. All the constituents are with in the desirable limit except Iron and Bacteriological contents.

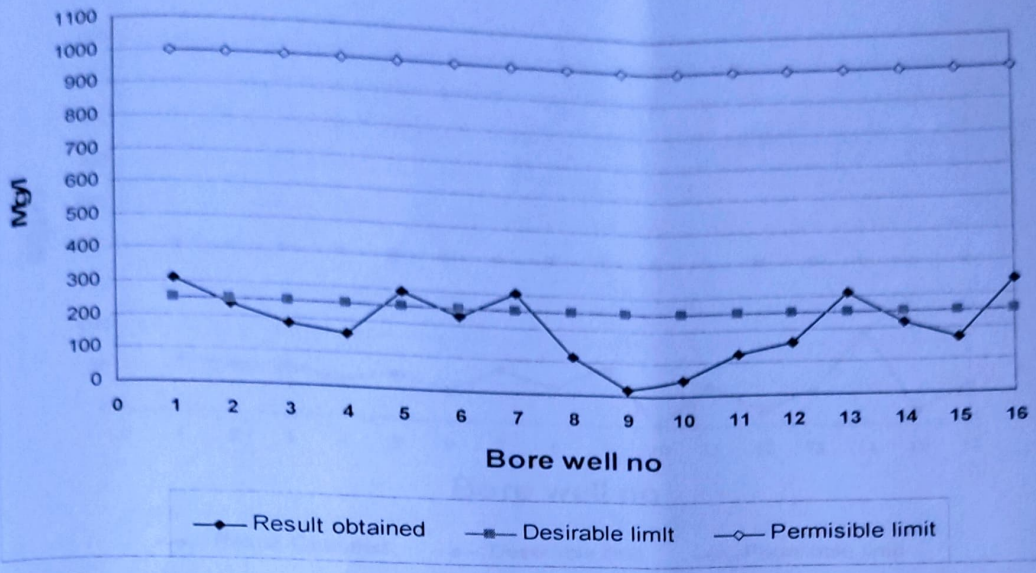
Borewells:

Charts show the results of Permissible limit and desirable limit of Calcium (Ca) , Magnisium (Mg), Chloride (Cl), Fluoride (F), Total Dissolved Solids (TDS), Sulphates (So4), Nitrate (No3), Total Hardness,

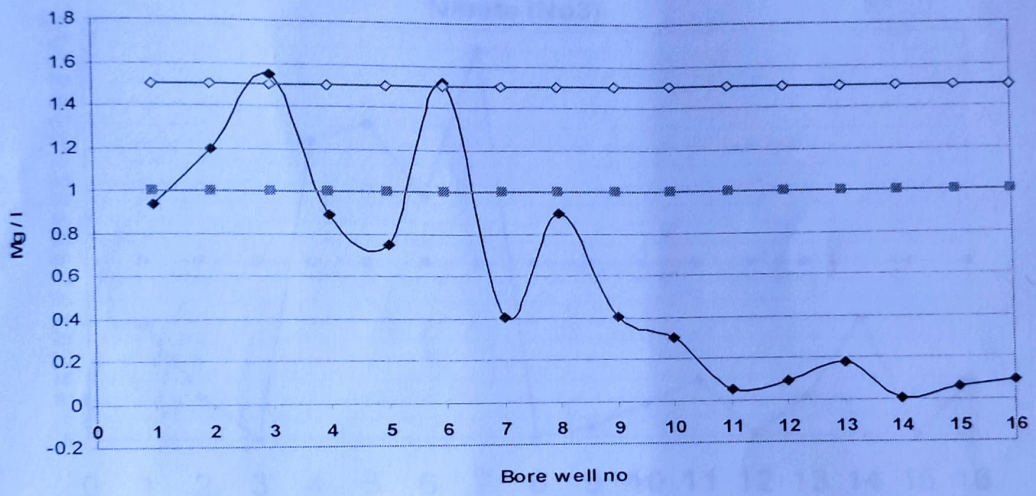




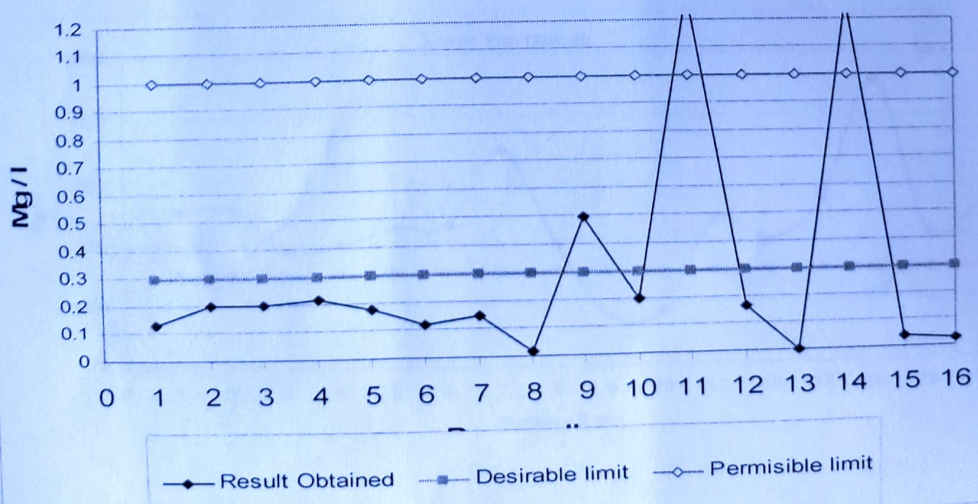
Chloride (Cl)

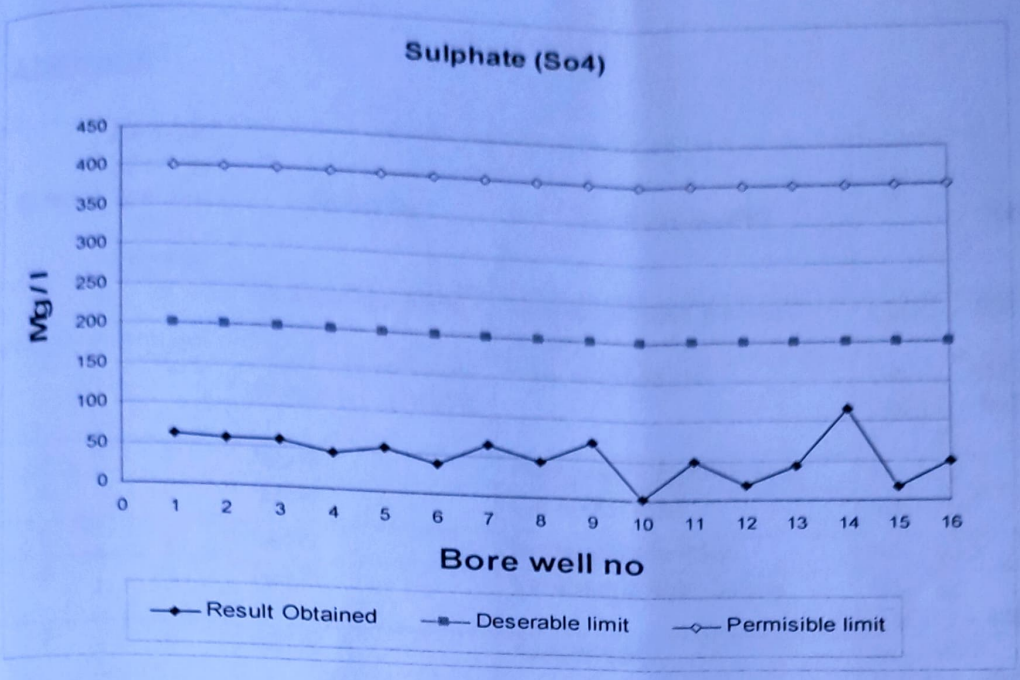


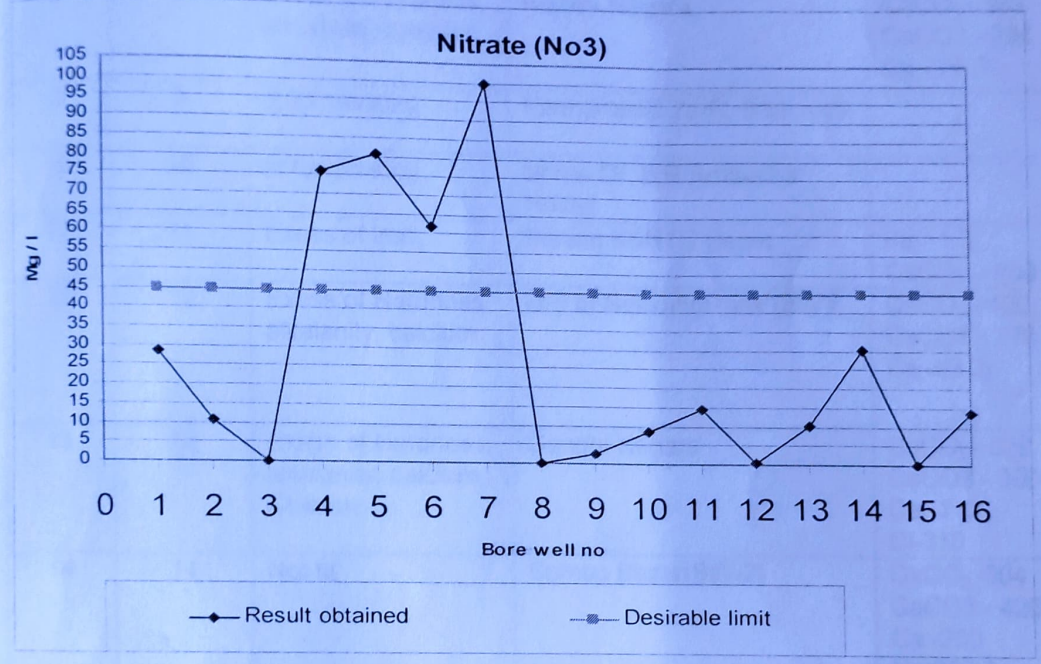
Fluride (F)

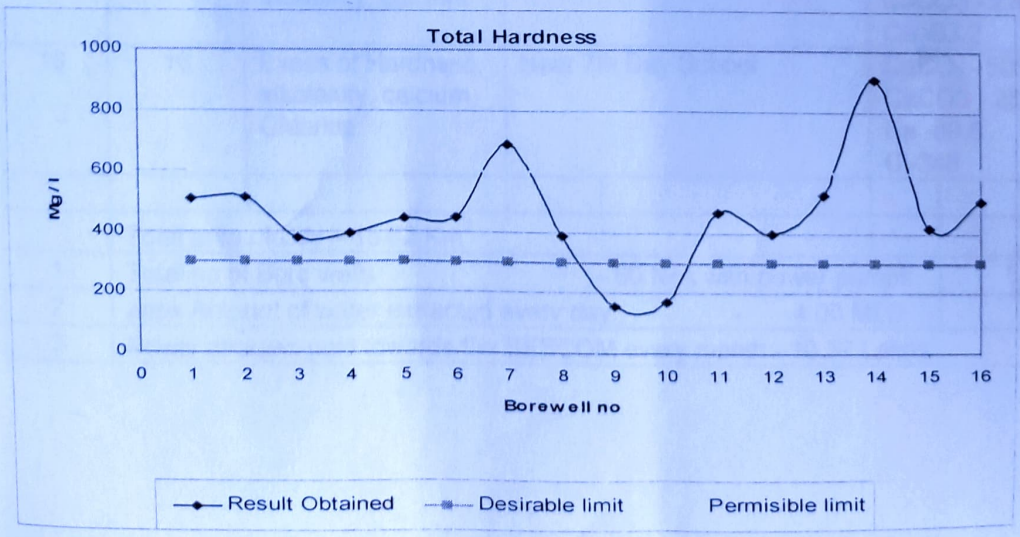


Iron (as Fe)




Sulphate (So4)
Mg / l
450
400
350
300
250
200
150
100
50
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Bore well no
Result Obtained
Deserable limit
Permisible limit


Nitrate (No3)
Mg / l
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Bore well no
Result obtained
Desirable limit


Total Hardness
Mg / l
1000
800
600
400
200
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Borewell no
Result Obtained
Desirable limit
Permisible limit

Abstract:

Sl No	Borewell sl no as per the CMC register	Remarks	Location of BW	Remarks
1	1	Exess of Hardness, chlorides	Venkatagiri Kote Kannada school	$CaCO_3$ – 508, Cl – 310
2	2	Exess of Hardness, alkalanity, chlorides	Near Suddukunte	$CaCO_3$ - 512 CaCO3 - 340 F - 1.20
3	3	Not fit	Bagepalli cross (Ashraya)	Fl - 1.55
4	4	Not fit	Old DYSP road	No_3 - 76.1
5	5	Not fit	Narappakunte Road	No_3 - 80.5
6	6	Not fit	Venkatagiri Kote Colony	No_3 - 62 CaCO3 – 448
7	7	Not fit	Kannampalli	No_3 - 99.7 CaCO3 – 692
8	8	Exess of Hardness, alkalanity, calcium	Rajeev Nagara	$CaCO_3$ - 388 CaCO3 - 294 Ca - 76.8
9	9	fit for drinking	Kannampalli Tank, Bore well	
10	10	fit for drinking	Shree Dr. B.R Ambedkar Hostel	
11	11	Exess of Iron,	Behind KSRTC Depot	Fe - 1.3, $CaCO_3$ – 468
12	12	Exess of Hardness, alkalanity, calcium	D/S of Nekkundi tank (BW)	$CaCO_3$ - 400 CaCO3 - 276 Ca -83.2
13	13	Exess of Hardness, alkalanity, calcium, Chloride	Gandhi Nagara	$CaCO_3$ - 528 CaCO3 - 306 Ca -112 Cl-310
14	14	Not fit	Bombo Bazar(BW-2)	$CaCO_3$ -904 CaCO3 - 426 Ca -200 Na-252.7
15	15	Exess of Hardness, alkalanity, calcium	Nekkundi tank (Murli Bore)	$CaCO_3$ - 420 CaCO3 - 276 Ca -83.2
16	16	Exess of Hardness, alkalanity, calcium, Chloride	Near 7th Day School	$CaCO_3$ - 508 CaCO3 - 288 Ca -89.6 Cl-346
	Total area of City – 15.02 Km^2			
1	Total no of Bore wells - 60 Nos with power pumps			
2	appx Amount of water extracted every day. - 4.00 MLD			
3	Power charges paid towards the BESCOM every month - 10.37 Lakhs			

Details of existing infrastructure of the water supply

1. Over head tanks and ground level service reservoirs:-

Sl. No.	OHT Location	Capacity in LL	Remarks
1	Filter bed	5.00	Good condition
2	I.B. Tank	5.00	
3	Market area	5.00	
4	Chelur Road	5.00	
5	Thimmasandra	1.50	
Capacity		**21.50**	

2. Ground level service reservoirs is as follows:

Sl. No.	GLSR Location	Capacity in LL	Remarks
1	Kannampalli	5.00	Good condition
2	Ashraya layout	5.00	
3	NNT area	2.00	
4	Agrahara	5.00	
5	Nallagutta	5.00	
6	Brahmaiah mutta GLSR	5.00	
Capacity		**27.00**	

Total capacity = 21.20 + 27.00 = 48.20 LL.

3. Details of pump houses, Rising mains & pumping machineries:

Sl. No.	Location of the pump houses	Capacity of the sump in liters	Pumping machinery		Rising main			Pumped To	
			H.P / No.	C.F/ Mono block/ Submersible	Dia	Material	Length in mtr	Location	OHT / GLSR / Sump
1	2	3	4	5	6	7	8	9	10
1	Vaddihalli	90000	30.00 / 2	Centrifugal pump	160	PVC	4190	Bangalore Road pumphouse	Sump
2	Jackwell at Kannampalli	-	7.50 / 1	Mono block pump	160	PVC	2840	Filter bed	WTP
3	Bangalore Road	45400 – 2 Nos.	30.00 / 2	Centrifugal pump	150	CI	520	I.B	OHT
4	Sump cum pumphouse at filter bed	45000	15.00 / 2	Mono block pump	150	CI	20	Filter bed	OHT
5	Siddlaghatta Road	70000 – 2 Nos.	40.00 / 1 50.00 / 2	Centrifugal pump Centrifugal pump	150	CI	460	Varadadri hillock	GLSR
6	Nayanahalli	90000	10.00 / 2	Centrifugal pump	160	PVC	2520	Siddlaghatta Road	Sump
7	Someshwara Temple	90000	15.00 / 2	Mono block pump	160	PVC	500	Agrahara	GLSR
8	Bukkanahalli	45000	15.00 / 1 15.00 / 1	Submersible pump Mono block pump	160 110	PVC PVC	1040 300	Someshwara temple Agrahara	Sump GLSR
9	Chelur Road	45000	10.00 / 1 20.00 / 1	Centrifugal pump Mono block pump	150	CI	-	-	OHT
10	Kolar Road	45000	25.00 / 2	Centrifugal pump	160 110		1420 1600	Market Chellur Road	OHT OHT
11	Housing chamber at Nekkundi	-	17.50 / 2	DWT pump H – 24 mtr Q – 34.71 LPS	200		1020	Agrahara	WTP
12	Pumphouse at WTP Agrahara	-	25.00 / 2	Centrifugal pump H – 34 mtr Q – 34.72 LPS	200		490	Agrahara	GLSR

Gravity main

13	Impounding reservoir at Ambajidurga	-	-	-	150	CI tyton	3390	WTP at filter bed	

4. Present UGD system:

1. The ground profile of the city is sloping in all four directions from the hillock situated in the heart of the city. The average elevation of the city is 945 mtr above MSL.
2. Underground drainage system facilities provided in 3 stages and 3rd stage UGD scheme is nearing to completion.
3. The city has been covered with UGD facilities to an extent of an about 90% and the efficiency of the system is about 70%.
4. The sizes of the internal sewers and outfall sewers of size varies from 150 to 600 mm dia of stone glazed stone wear pipes and RCC pipes.
5. Earlier the sewage water which was entering into the Nekkundi tank has been diverted through outfall sewer line of 600 mm dia for which sewage treatment plant of 6.4 MLD is proposed near Chokkareddy halli tank. The DPR cleared in the 280th Board meeting held on 27-10-2017 and will be submitted to Govt. for approval amounting to Rs. 1440.00 lakhs.
6. Presently 2.00 MLD sewage treatment plant consisting of waste stabilization ponds. wetwell, screen & parshial flumes and non-clog sewage pumps are working near Gopasandra tank.
7. The total length of sewer lines is about 118.00 Km and No. of manholes are 4600 Nos.
8. The ponds and lakes in the city are not contaminated by sewage water.
9. The domestic sewage through open drains which is entering into the drinking water supply Nekkundi tank. Action has been taken by local body for diversion of domestic sewage.

Length of sewer line	Type of STP provided	What extent sewer line functioning in %	What extent STP functioning %	Present cost of maintenance of sewer line per annum	Present cost of maintenance of STP per annum	Cost of power charges per annum	Remarks
118.20	WSP	70%	30%	8.00	1.00	0.375	

5. Transportation of Water from Source to WTP:

a) Raw water from the Kannampalli tank will be pumped to the 1.60 MLD WTP at Filter bed through 160 mm dia PVC pipeline.
b) Raw water from the Nekkundi tank will be pumped to the 1.50 MLD WTP at Agrahara through 200 mm dia DI pipeline.
c) Raw water from the Impounding reservoir at Ambajidurga hillock will be supplied by gravity through 150 mm dia CI tyton pipe to 1.60 MLD WTP at Filter bed. But, the ULB not utilizing water from the impounding reservoir.

6. Capacity of WTP:

Sl No.	Location	WTP Capacity in MLD	Source	Water available in MLD	Water supplying areas
1	2	3	4	5	6
1	Filter Bed at Anjani extension	1.60	Raw water from Kannmpalli tank and Ambajidurga	1.00	• Treated water will be pumped to 5.00 LL OHT at Filter bed OHT.

			impounding reservoir.		• Water will be distributed to Anjani extension, Ashraya layout, Tankbund Road, Ashwini badavane etc.,
2	Agrahara	1.50	Raw water from Nekkundi tank.	1.50	• Treated water will be pumped to 5.00 LL GLSR at Nallagutta & GLSR at Agrahara. • Water will be distributed to NNT area, Shanthi nagar, Mehaboob Nagar, Nekkundi pet & Pattalamma layout.

7. Pure Water mains:

There is no provision for Chlorination points near the distribution system. The pure water from the pump houses will be pumped through PVC, DI & CI pipes.

8. Distribution System:

a) Service reservoir details:

(i) Overhead tanks:

Sl. No.	Location	Capacity in LL	Position of inlet / outlet	
			LWL in mtr	MWL in mtr
1	Filter bed	5.00	896.50	915.50
2	I.B. Tank	5.00	885.39	901.39
3	Market area	5.00	883.09	802.09
4	Chelur Road	5.00	879.07	898.07
5	Thimmasandra	1.50	890.29	900.29
	Total	**21.50**		

(ii) GLSR:

Sl. No.	Location	Capacity in LL	Position of inlet / outlet	
			LWL in mtr	MWL in mtr
1	Kannampalli	5.00	906.75	910.75
2	Ashraya layout	5.00	916.41	920.41
3	N.N.T area	2.00	905.43	909.43
4	Agrahara	5.00	903.82	906.82
5	Nallagutta	5.00	898.31	902.31
6	Bramaiah mutta GLSR	5.00	900.29	904.65
	Total	**27.00**		

b) Materials of the network (including internal linings).

The existing distribution system comprises of CI pipes in the old city and PVC pipes in newly developed layouts. The distribution system has been expended over time without proper planning and network efficiency is very low due to poorly engineered connections by the local plumbers. The distribution system was frequently changed from surface to borewell supply and

again from borewell to surface source dependence up on the availability of surface water. The local body gradually replacing the old CI pipes by PVC pipes on both side of the roads to avoid the un-necessary road cuttings.

c) Normal range of pressures, flows, water age and retention time:

The distribution network was designed for intermittent system, the water being supplying from the storage reservoirs only few borewells are connected to direct distribution. There is a sufficient infrastructure like storage ground level sumps, storage reservoirs, rising mains and pumping machineries.

d) Contamination of distribution system:

Sl No	Details required	Compliance
1	Any sort of contamination in the distribution system.	a) Due to low pressure water supply at few areas. the residents fetch water from the pits and from open spouts. This leads to contamination of distribution systems. b) Damage of distribution lines, which are crossed open drains in the city.
2	What is the residual chlorine at the consumer end at the taps?	
3	Control measures adopted in the board to overcome the hazards?	
4	What is the water pressure at the consumer end?	4 to 7 mtr at few areas.

Details of Materials used for distribution System:

Sl No	Description	Type	Age	Condition
1	Pipe	PVC / CI / DI / Tyton	10 – 25 years	CI pipe are in deterioration condition
2	Valves	CI	10 – 25 years	Partial re-placement is required.
3	End caps	PVC	-	Good

Necessary of additional surface source:

- The present population of city is about 80000 including floating population. The ground water table is depleting day by day due to inconsistent rain fall and city is facing acute scarcity of water.
- The Borewell water is not dependable for long time and the bore wells water is highly contaminated by Nitrates, Calcium, Carbonate. Most of the bore wells are not fit for drinking purpose. Hence, it is inevitable to identify the addition surface source.
- Under the circumstance explained above, the Bhaktharahalli Arasikere tank was identified as additional surface source, the tank is about 14 Km from the city.
- The local body and Hon'ble MLA have requested to prepare estimate for providing water supply for the said tank (Letters enclosed). The estimate amounting to Rs. 1630.00 lakhs was submitted to Govt. for approval vide MD ltr No. 437 dtd: 25-5-2016 with provision for 3.00

MLD to Chintamani city & 0.50 MLD to enroute villages. The estimate is yet to be approved.

- Due to delay in approval of estimate from the Govt. the Project Director, District Urban development cell, Chikkaballapur has requested to take up the water supply scheme from Bhakthrahalli Arasikere tank at the cost of Rs. 1215.00 lakhs vide ltr No. 190 dtd: 17-8-2017 under Nagarothana phase III (letter enclosed).
- The details of the water stored in the tank as furnished by the Assistant Executive Engineer, Minor Irrigation Department Chikkaballapur vide ltr No. 181 dtd: 29-8-2016.

a. Water stored since last 10 years

Year	% water stored
2006	40
2007	60
2008	80
2009	80
2010	75
2011	70
2012	60
2013	60
2014	84
2015	100
2016	80

It is observed that, during 2017 the tank filled upto FTL and discharged.

b. Details of the tank and availability of water:

- Distance from the city - 14 Km
- Capacity of the tank - 35.07 Mcft
- Water spread area - 69.85 acres
- Catchment area - 2.1875 Sq.miles
- Command area - 103.74 acers

} As information furnished by AEE, MI, CBPur vide ltr No. 226 dtd: 22-3-2014

Additional information:

- Present storage capacity due to silt up - 26.91 Mcft (as per contour level)
- Average water stored from lost 12 years 70% of 26.91 Mcft - 18.83 Mcft
- Loses due to evaporation & percolation @ 30% of 26.91 Mcft - 5.64 Mcft
- Net water available (18.83 – 5.64) - 13.19 Mcft
- No. of days water available @ 2 MLD / day - 186 Days
- Dead storage of tank - 1.75 Mcft or 50 ML
- Hence, the tank is required de-silting to utilize the full capacity of 35.07 Mcft of water.
- It is proposed to supply 3.50 MLD of water to Chintamani city and there is no provision for enroute villages since the scheme to proposed to take up under D.C. grants of Nagarothana III. The said tank is also proposed to fill the 50% of the storage capacity from the Yethinahole source as informed by AEE, KNNL, Yethinahole sub division, Chikkaballapur vide ltr No. 215 dtd: 12-9-2016. In addition to this, the line estimate amounting to Rs. 12400.00 lakhs is prepared for providing water supply to Chintamani city from Yethina hole source.

MLD to Chintamani city & 0.50 MLD to enroute villages. The estimate is yet to be approved.

- Due to delay in approval of estimate from the Govt. the Project Director, District Urban development cell, Chikkaballapur has requested to take up the water supply scheme from Bhakthrahalli Arasikere tank at the cost of Rs. 1215.00 lakhs vide ltr No. 190 dtd: 17-8-2017 under Nagarothana phase III (letter enclosed).
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2012	60
2013	60
2014	84
2015	100
2016	80

It is observed that, during 2017 the tank filled upto FTL and discharged.

b. Details of the tank and availability of water:

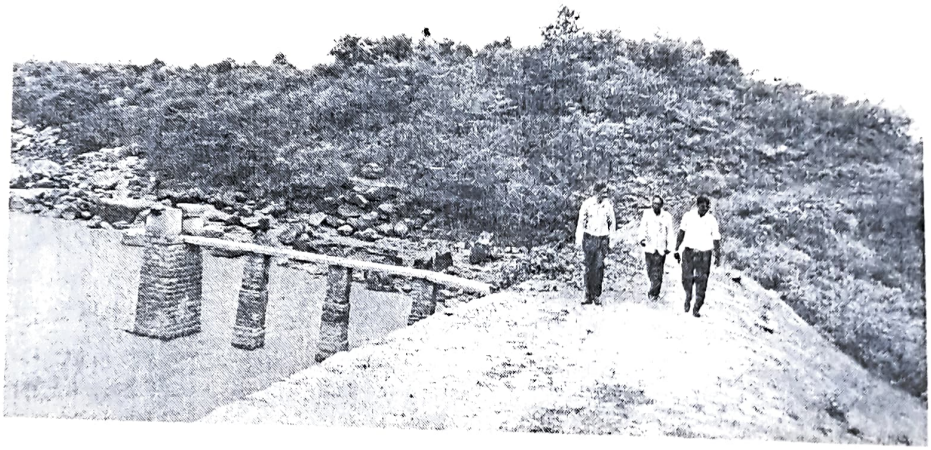
• Distance from the city	-	14 Km	As information furnished by AEE, MI. CBPur vide ltr No. 226 dtd: 22-3-2014
• Capacity of the tank	-	35.07 Mcft	
• Water spread area	-	69.85 acres	
• Catchment area	-	2.1875 Sq.miles	
• Command area	-	103.74 acers	

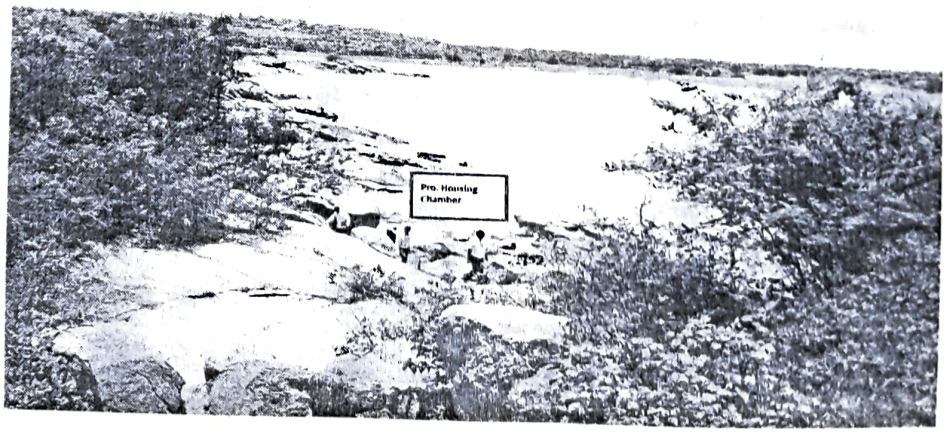
Additional information:

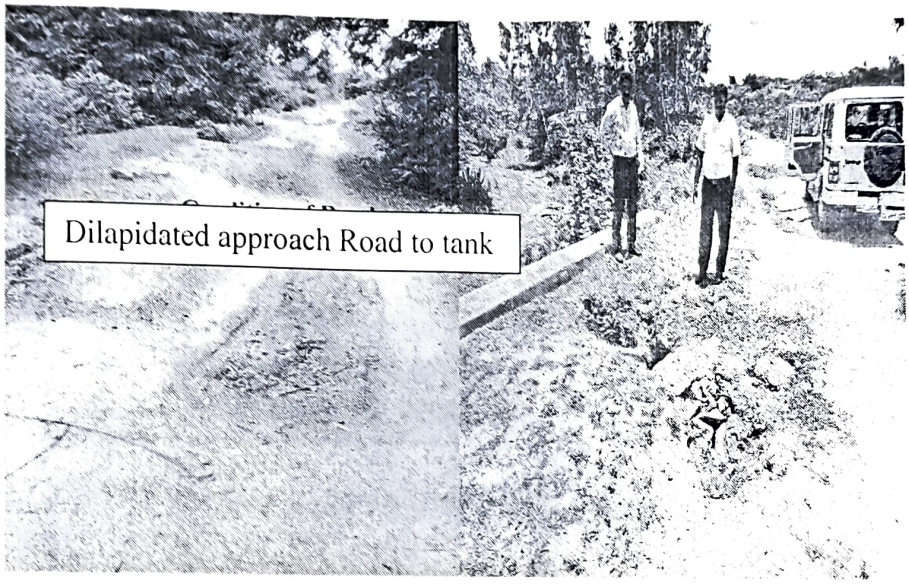
• Present storage capacity due to silt up	-	26.91 Mcft (as per contour level)
• Average water stored from lost 12 years 70% of 26.91 Mcft	-	18.83 Mcft
• Loses due to evaporation & percolation @ 30% of 26.91 Mcft	-	5.64 Mcft
• Net water available (18.83 – 5.64)	-	13.19 Mcft
• No. of days water available @ 2 MLD / day	-	186 Days

- Hence, the tank is required de-silting to utilize the full capacity of 35.07 Mcft of water.
- It is proposed to supply 3.50 MLD of water to Chintamani city and there is no provision for enroute villages since the scheme to proposed to take up under D.C. grants of Nagarothana III. The said tank is also proposed to fill the 50% of the storage capacity from the Yethinahole source as informed by AEE, KNNL, Yethinahole sub division, Chikkaballapur vide ltr No. 215 dtd: 12-9-2016. In addition to this, the line estimate amounting to Rs. 12400.00 lakhs is prepared for providing water supply to Chintamani city from Yethina hole source.

- The water resource department has accorded permission to draw water from the said tank for drinking purpose vide Govt. order No. 110 /2015-16 Bengaluru dtd: 5-2-2016 with a condition to make a provision for drinking water supply to villages of command area.
- The ULB has given consent letter for providing drinking water to enroute villages if proposal is given by the Rural Water Supply Department vide ltr No. 55 dtd: 4-11-2017.







The provisions for de-silting and bund improvements were made in the previous estimate which was submitted to Govt. for approval. The ULB has requested to take up the following works and also informed that the de-silting works will be taken up in future under Govt. grants vide ltr No. 55 dtd: 18-09-2017. Accordingly, the estimate is prepared and submitted to project direct DUDC, Chikkaballapur vide EC ltr No. 1961 dtd : 27-11-2017 for counter signature of the estimate and to deposit the estimate cost of Rs. 1215.00 lakhs.

Further, the estimate submitted to Govt. for counter signature and approval of estimate by Deputy Commissioner, Chikkaballapur. The estimate was approved from the Govt. vide ltr No. ನಅಇ/414/ನಮನ 2018, ಬೆಂಗಳೂರು dtd: 17-05-2019 amounting to Rs. 1095.00 lakhs. In the approved estimate the ETP & Contingency charges is reduced to 5% against 15% provision made in the estimate which was submitted to Govt.

Hence, the estimate is re-casted to current SR of Board & PWD, BESCOM, prevailing market rate & quotation amounting to **Rs. 1095.00 lakhs** by considering 5% as ETP & Contingency charges. The provision made in the estimate is as following.

1) **Construction of 5 x 6 mtr housing chamber:** The housing chamber is proposed to accommodate 2 Nos. of 80 HP deepwell turbine pumpsets, allied accessories like panel board etc., with footbridge of 30 mtr length.

Providing & laying 300 mm dia DI & 355.6 mm dia MS rising main: The ground profile of initial reaches from Bhakthrahalli Arasikere tank is uneven. The total head as per the Eco main including friction loss and other loss is 82 mtr at Housing chamber. The MS pipe line of 355.6 mm dia OD is proposed from 0 CH to 1200 mtr due uneven ground. As per the L-section the max head is 52.54 mtr at chainage 11220 mtr. Hence, K-7 DI pipe is proposed for a length of 14800 mtrs to connect the existing WTP's at Agrahara & Filter bed including trenchless technology for crossing railway track, thrust blocks, valve chambers & pipe supports. The necessary arrangements for linking to existing pipe lines at both the WTP aerators with valves for standby arrangements and to avoid the over flow.

2) **Deepwell turbine pumpsets:** The deepwell turbine pumpsets of 80 HP 2 No. are proposed for pumping raw water from Bhakthrahalli arasikere tank to WTP's at 2 locations with discharge of 48.61 LPS & head of 82 mtrs.

3) **11 KV express feeder line:** The 11 KV express feeder line of 16 km from Chintamani city is proposed for power supply t housing chamber at Bhakthrahalli Arasikere tank.

4) **Formation of Murrum Road:** The existing narrow road to Bhakthrahalli Arasikere tank is dilapidated condition and found that it is very difficult for movement of vehicles. Hence, the provision has been made for formation of murrum road and removal of bid rock boulders near proposed housing chamber site.

5) **Flow meters:** The provision has been made for 300 mm dia flow meters for measuring the supply of water at housing chamber & at 2 Nos. WTP's.

The estimate may kindly be approved under D.C. works of Nagarothana grants -3.

Assistant Executive Engineer,
KUWS & D.B, Sub Division,
Chikkaballapur.

Executive Engineer,
KUWS & D.B, Division,
Kolara.