

# Evaluation of Groundwater Quality Of Bachupally, Nizampet And Pragathinagar Village

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**Abstract :** Water is an important nature gift for the human life hence study of drinking water quality is essential requirement in the residential area. In this paper study area has latitudes and longitudes of Bachupally 17.5151N and 78.3855E, Nizampet 17.5513N and 78.3855E, Pragathinagar 17.5186N and 78.3963E it is integral part of the Hyderabad situated in the Telangana state, India. Study area contains mixed type of inhabitants such as agricultural developing farmers, pharmaceutical industries employees and general living official and business people. Since the land occupied by the several type peoples activities there are many problems with ground water resources and surface water contamination. It requires to test the water quality (WQ) in the study area to know the more extent of quality problems. WQ test has been conducted for the Alkalinity, PH, hardness of water, and turbidity etc. Water quality helps, The local authorities to solve the certain problems in the region and adopt the certain methods to solve the problems. Samples are collected from the various places from the Nizampet, Bachupally and Pragathinagar regions. Around 27 number of ground water samples (GWS) are collected and all of them selected for the analysis. Experiments are conducted for the each sample and obtain the result. It is compared with the standard values. The result obtained from the various ranges of chlorides, nitrates, total dissolved solids, conductivity values, pH. For the different areas of study region are clearly mentioned in the result discussion session. The water quality for the various places from the Nizampet, Bachupally and Pragathinagar clearly discussed in the results. Finally remedial measures to be adopted for the improvement of the quality of water.

## 1 Introduction

Water is main ingredient of the human life which contains the minerals and metals. Sufficient quality of metals and minerals is required to the human body and some quantities of metals very harmful to the health. Water is predominant source on the earth which influences all human health. Hence the quality of water is important and need to trace out metal content and chemical contamination, where pollution is more. Pollution to water sources is mainly due to the various human activities but naturally available water has abundant mineral quality. Entire globe has 71% of water and 21% earth. Study area is surrounded by the industries, some agricultural fields and newly developed improper residence sewage drains. It needs to study the quality and quantity of the related place and its surroundings. Since the area has fully developed due to modernization and is having more scarcity of water. Study areas Ground water samples (GWS) are collected from prime location where it is possibility of the pollution. Water

contamination tests are conducted using chemical analysis. chemical content related to PH, alkalinity, chlorides, Hardness and Heavy metals. All GWS tested and chemical analyzed in the laboratory and given the result, whether the sample is fit for the drinking purpose or not. After the receiving the results of test GWS are compared with the standard values.

## 2. Study Area

The study area has latitudes and longitudes of Bachupally 17.5151N and 78.3855E, Nizampet 17.5513N and 78.3855E, Pragathinagar 17.5186N and 78.3963E it is integral part of the Hyderabad situated in the Telangana state, India. Study area contains mixed type of inhabitants such as agricultural developing farmers, and contains more number of pharmaceutical industries, occupied by employees and general public regular official and farmers. Since the land occupied by the several type peoples activities there are many problems with ground water resources and surface water contamination. It requires to test the water quality (WQ) in the study area to know the more extent of quality problems. WQ test has been conducted

for the Alkalinity, PH, hardness of water, and turbidity etc. Water quality helps them, authorities to solve the certain problems in the region and adopt the certain methods to solve the problems. Samples are collected from the Various places from the Nizampet , Bachupally and Pragathinagar regions. Around 27 ground water samples (GWS) are collected and all of them selected for the analysis. Experiments are conducted for the each sample and obtain the result.

### 3 Literature review

(Water samples are collected different areas of Himayat sagar for checking water quality done by k.padmaja et.al (2017 a, b). Evaluating the quality of water and giving some ranking to the water quality is know as water quality index.. Total 40 sample collected before monsoon an after monsoon and analyzed by chemical tests done by Bob pears et.al (2016, a, b). Different well selected for the collecting 10 samples based on the Topography of the area By K. Niranjana Kumar et.al(2009). Nearly fifteen papers are analyzed for the water quality analysis which has mentioned in the references. Sudhakar Gummadi et al. (2014, a, b, c) discussed different parameters of drinking water has ranked and indexed in the order to know the WQ parameters such as TDS , dissolved oxygen etc in the Bapatla village ,A.P,INDIA. water quality in the musiri river is polluted and pollutions are compared with compared with Indian standard manual . The standard values relate to TDS and other chemical parameters by Akhil Gurijala et.al (2020a, b, c). Severe contamination for the ground water resources from in the industries and untreated sewage and local leachate from the landfills by Ranjan K. Ray (2019).

materials and Aerogel and discussed some assessment parameters affecting the energy-efficient criteria and concluded that the energy-efficient materials should be evaluated in terms of their local availability, renewable resources used in the manufacturing, thermal conductivity and cost.

(L. Aditya et al. 2016) have discussed that due to the growth of Population industrialization is increasing by that CO2 emission is also increasing which leads to raising the Earth average temperature about 1.1– 6.4 °C by the end of 2100. It could cause severe impact on the environment and human life, so in all the sectors it is focused to bring down the energy emission mainly in our construction industry by proper insulation strategies plays a vital role. Aditya has considered some materials like fiber glass, mineral wool, foam, XPS and EPS as building

### 4. Methodology

The Lab analysis was conducted for the GW and checked for the collected WQ Analysis from the study area .Three places ( study regions) are selected for the WQ test , and From each region 9 samples are collected and analyzed for the chemical pollution . After each samples result obtained are tabulated and compare with

the standard values of water quality (IS standard). The materials and method adopted can be shown in the tabular column. Table 1. In this table first column is related to the WQ test id, second column shows the Nname of the test third column shows the material adopted for the test and final column Represents the range of values allowed in water. A flow chart is shown for the dataflow and method of execution shown Fig.1 study area has some industries surrounded GWS have collected at reference of Latitude(N) and Longitude(E) locations. Samples with the given location are named id number and further referred in the graphs.. Several papers are studied and most of them related WQ studies. some of the water quality tests literature mentioned here. yadave et.al(2010) did the quality of

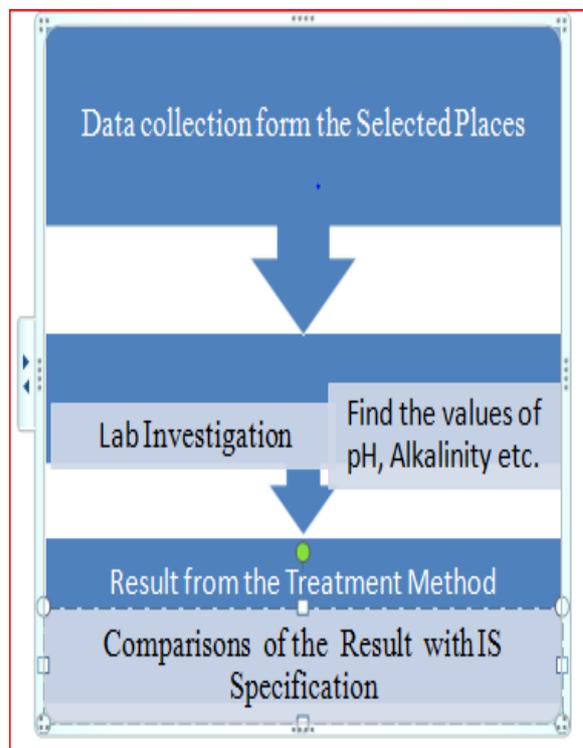


Fig 1. Showing the Work Flow Methodology

water test and Shahabad (India) . shah et.al (2012) most of the samples of water suitable for he dinking purpose in Gujrat (India). k.Niraja (2012) quality compare with I.C.M.R and found good for drinking in Bhopal. (India. K . Ramesh et.al (2012)(India) did water test for the six different places found it good quality. Subhajyoti.Das(2011) Water is precious, River Ganges should be prevented from the pollution.

### 5. Ground water Quality

WQ of the study region has need to evaluate for the safety of villagers. It is observed pollution in surface water.. Experts investigate CWS from the location as per Latitude and Longitude and checked quality of water. Study area has small lakes and storage tanks which over flows with contamination and percolating . This is one of the reason for the (GWP) Ground-water-pollution and need of the chemical tests in the study area.

## 6. Contamination of Groundwater (Gwc)

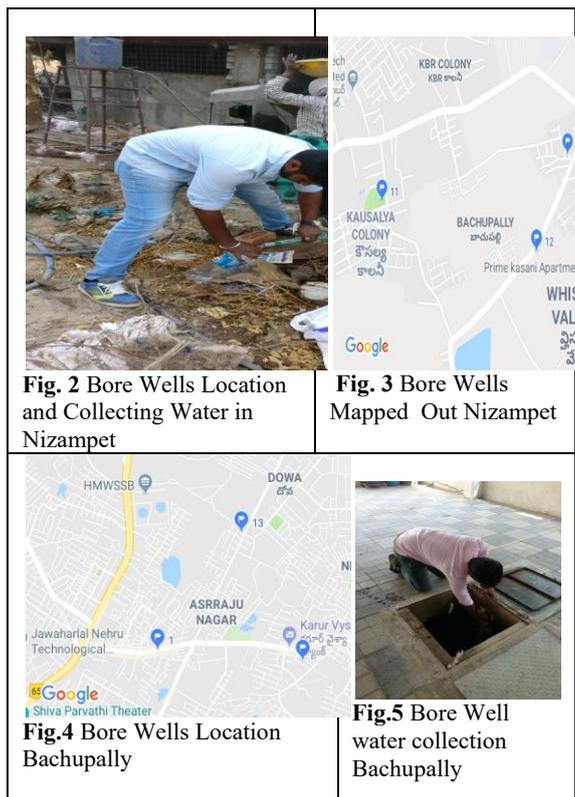
Bellow earth surface, water contamination occurs because of waste products like gasoline, chemicals , liquid generated from the road laying and chemicals from the fertilizers seeps into ground and WQ finally unsafe and unfit for daily usage. Diluted pollutants contaminated BSW. The lists of materials that cause hazardous to ground water are Chemicals that used for crops over a long period (Fig.3) , leakage and rain water mix with road chemical, pollutants released from the factory, leakages from the sewerages and garbage (Fig. 2). Used motor olis etc.

### 6.1. List of Ressources

Water Contaminations :1)Land filing with more effluents especially wet waste 2) Fuel filling stations which storage the huge quantity of the fuel store in the ground..C) Metals like arsenic, chemicals like Fluoride can easily pollute the surface and ground water. All these are reflecting On the human health and cause chronic problems

### 6.2 Effects the BSW(Bellow surface water) in the study area

Due to the pollution of sewerage water in BSW will cause the hepatitis, dysentery. Similarly due to the leakages from septic tank pollute BSW water and caused the hazardous to both human and animal life. pollutants form the industries flows over the land surface seeps in to the ground will increase the metal and chemical content that leads BSW a serious effect. And ultimately not use full for the human utility like drinking and other hygienic purposes. Farmer used many kind of the fertilizers for the i) Crop growth, ii) To kill insects iii) Increases the strength of the soil nitrites etc. since these chemical applying for the crops in very frequent intervals and used in huge quantities.. Study area Pragathinagar, Nizapet and Bachulpply villages Fig.3b ( Fig 4 to Fig.10 ) are near Hyderabad (India) sample are collected 9samples from each place and total 27 numbers analyzed in the lab tested in study area (Fig. 3a) for contents in BSW such as pH ( for acidic and basic test.), D.O., (diluted oxygen ) El.C. (electrical conductivity) TDS (Total dissolved solvents), alkalinity bases present in the water, (know the turbidity, Ca (calcium) and Mg -magnesium, hardness, total hardness, N(O)3 –nitrate, F1-fluoride, iron and Cl-chloride have been tested. It has been compared with standards (IS.10500-2012). Shown in Table 2 Detail of ground water samples (GWS) and CWS with Latitude (Lat)N and Longitude(Lon)E Table 2 location . Samples collected from the bore wells and given ID number for the easy identification of specific area.



**Fig. 2** Bore Wells Location and Collecting Water in Nizampet

**Fig. 3** Bore Wells Mapped Out Nizampet

**Fig.4** Bore Wells Location Bachupally

**Fig.5** Bore Well water collection Bachupally

## 7. Chemical test for WS(water samples

7.1 pH test should be complete within two hr of collection water sample (WS). pH of water is changes because of content co2 from atmosphere mixed in the WS. pH device (meter) for the measurement of pH. (Refer Fig.. 8(a)) . PH value refer with Id numbers of samples .

7.2 Turbidity was analyzed using the Nephelometric Turbidity meter. The combined reagent is prepared with the Hexamine and Hydrazinium Sulphate, with this solution the equipment is calibrated. Then collected samples turbidity is analyzed (Fig. 10) and compared with standard values.

7.3 (E.con) electrical conductivity calculated by taking 1/1000 (Mall samples it is with in limit .K.C.L) is used for the test of BWS (Fig.8(b)) . All the values are observed And compared how much the values are differ.

7.4. Alkaline limit is prime important to decide the water nature whether it is in acidic in nature or he basic nature./vol. of 20ml samples tested with so2 and phenol-phthalein, methyl solution tuned for the test of BWS (Refer- Fig.10) it is calculated as using Alkalinity estimated, in milligram (mg) , calcium carbonate (CaCO3/ liter) = volume of acid x normality x /volume of BWSS.



**Table 1.** Showing Type Of Chemical Test , Material Require And (I.S ) Standard (10500- 2012) Specification values

S No.	Chemical Test	Material need for Test	Allowable range of quality of water(IS 10500-1991)mg/l
1	PH	1. Distilled Water 2. Buffer Capsules-4.0 3. Buffer Capsules-9.2	6.5 to 8.5
2	Turbidity	1. Hexamine 2. Hydrazinium Sulphate 3. Distilled Water	5-10 N.T.U
3	Alkanity	1. Sulphuric Acid 0.1 N 2. Methyl Orange Indicator 3. Phenophtalein	200 m.g/ lit
4	Chlorides	1. Potassium Chromate 2. Silver Nitrate 3. NaCl solution	250 m.g/ lit
5	Nitrates	1. Potassium Chromate Sulphuric Acid 2. NaCl solution 3. UV-Visible spectrophotometer	45

7. 5 (Cl) chloride evaluated using k.cl sol. Combined to water BWSS and adopted lab procedure to obtain the chloride test. (Fig. 12) . In the study region it is observed in the limited Range.

7.6. Spectra-photometric- méthode-Nitrate content determination:  $\text{KNO}_3$  sol. and quantity of nitrate keep above  $100^\circ\text{C}$  about one day . found out with standard laboratory laboratory procedure. More value of nitrate value Id numbers are noted separately .

7.7 A curve plotted for the absorption and concentration of RWSS to obtain the absorption . General This method useful water quality and test carried out in the lab with proper procédural masure.

7.8 Location of samples Table 2 and collected semples Table 4 Is show .The guidelines for the comparison is shown in Table 3.



**Fig. 9** Turbid meter , pH Meter

**Table 2** Details of GWS (Grounds Water Sources)

I . D of Collection point	Name of the Collection Area	Collection ressourcés	Level of ground water (Feet)	N(Latitude) Location in Dégréé and seconds	E (Longitude) Location in Dégréé and seconds
1	Nizampet	Bore Well	250'	17.553682	78.388100
2	Nizampet	Bore Well	290'	17.518345	78.463113
3	Pragathinagar	Bore Well	210'	17.513301	78.393431
4	Pragathinagar	Bore Well	70'	17.514024	78.398157
5	Pragathinagar	Bore Well	180'	17.514261	78.390717
6	Pragathinagar	Bore Well	240'	17.519341	78.398716
7	Pragathinagar	Bore Well	120'	17.532561	78.394310
8	Bachupally	Bore Well	250'	17.543662	78.472957
9	Bachupally	Bore Well	100'	17.543698	78.372641
10	Bachupally	Bore Well	150'	17.538246	78.363548
11	Bachupally	Bore Well	80'	17.528616	78.358119
12	Bachupally	Bore Well	270'	17.534938	78.365553
13	Nizampet	Bore Well	300'	17.506951	78.378053
14	Nizampet	Bore Well	80'	17.514267	78.384930
15	Nizampet	Bore Well	150'	17.520348	78.367415
16	Nizampet	Bore Well	240'	17.503682	78.588100
17	Nizampet	Bore Well	270'	17.518345	78.463113
18	Pragathinagar	Bore Well	201'	17.513301	78.693431
19	Pragathinagar	Bore Well	990'	17.514024	78.398157
20	Pragathinagar	Bore Well	683'	17.514261	78.490717
21	Pragathinagar	Bore Well	220'	17.519341	78.398716
22	Pragathinagar	Bore Well	120'	17.532561	78.694310
23	Bachupally	Bore Well	210'	17.543662	79.372957
24	Bachupally	Bore Well	320'	17.543698	79.772641
25	Bachupally	Bore Well	150'	17.538246	79.063548
26	Bachupally	Bore Well	80'	17.528616	78.358119
27	Bachupally	Bore Well	700'	17.534938	78.365553
Collected water samples (CWS)					

**Table 3** The average values of parameters for every sample (mg/l)

Sample ID No.	PH	Turbidity	Conductivity	Alkanity	Chlorides	Nitrates	TDS
1	7.66	0.816	50.33	141.66	133.67	12.3	327
2	7.36	0.866	47.66	161.66	71.48	24.15	258
3	7.42	0.833	48.33	151.66	87.44	13.2	356
4	6.67	0.883	48	168.33	128.79	5.11	356
5	6.38	1.383	47	156.66	110.48	26.15	290
6	7.5	1.033	47	125	24.45	64.69	343
7	6.65	0.833	49.33	123.33	292.47	35.55	225
8	7.27	0.966	47.33	175	277.66	52.78	213
9	7.26	0.95	48.33	163.33	73.58	16.47	255
10	7.37	0.983	49.33	171.66	260.7	17.29	358
11	7.05	0.966	50.33	186.66	121.11	88.54	310
12	6.35	0.883	49.33	161.66	84.99	74.52	222
13	6.8	0.9	49.66	140	80.94	21.74	312
14	6.41	0.916	49	118.33	40.17	68.74	356
15	6.96	0.95	48	175.66	145.79	36.44	234
16	7.56	0.719	47.33	141.66	133.67	23.3	257
17	7.36	0.669	40.66	161.66	71.48	26.15	243
18	7.42	0.833	4433	151.66	87.44	24.2	320
19	6.67	0.883	49	168.01	118.79	9.11	255
20	6.38	1.383	48	146.62	100.48	29.15	290
21	7.5	1.033	49.5	124.3	22.45	63.69	333
22	6.65	0.833	45.33	121.12	282.47	65.55	456
23	7.27	0.966	42.33	160.12	287.66	64.78	356
24	7.26	0.95	46.33	163.33	173.58	46.47	380

25	7.37	0.983	42.33	181.66	160.7	40.29	243
26	7.05	0.966	33.33	180.66	141.11	58.54	220
27	6.06	0.93	48	170.66	154.79	43.44	290

Table 4. Showing (I.S ) Standard (10500- 2012) Spécification values			
S No.	Chemical Test	Material need for Test	Allouable range of qualité of water(IS 10500-1991)mg/l
1	PH	4. Distilled Water 5. Buffer Capsules-4.0 6. Buffer Capsules-9.2	6.5 to 8.5
2	Turbidity	4. Hexamine 5. Hydrazinium Sulphate 6. Distilled Water	5-10 N.T.U
3	Alkanity	4. Sulphuric Acid 0.1 N 5. Methyl Orange Indicator 6. Phenophtalein	200 m.g/ lit
4	Chlorides	4. Potassium Chromate 5. Silver Nitrate 6. NaCl solution	250 m.g/ lit
5	Nitrates	4. Potassium Chromate Sulphuric Acid 5. NaCl solution 6. UV-Visible spectrophotometer	45

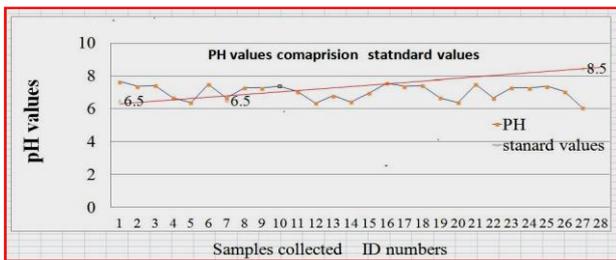


Fig.10 Graph showing PH value comparison with standard values

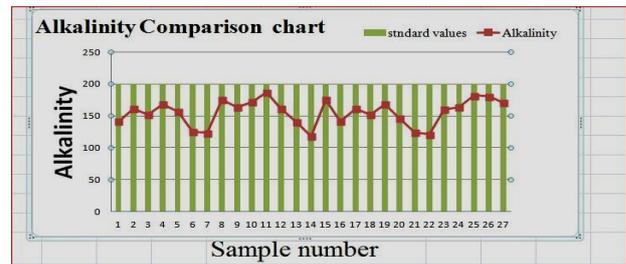


Fig. 12 Graph showing Alkalinity value comparison with standard values

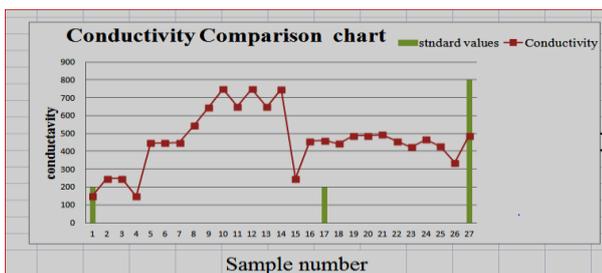


Fig . 11 . Graph showing conductivity value comparison with standard values

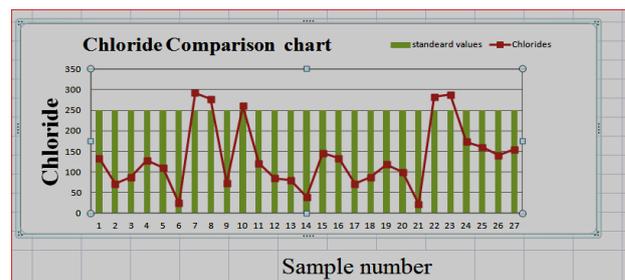
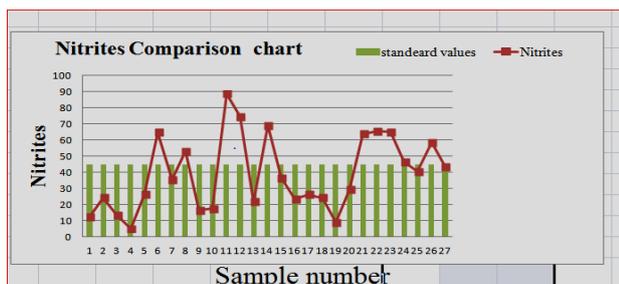
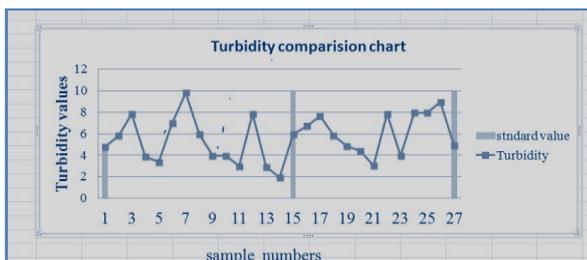


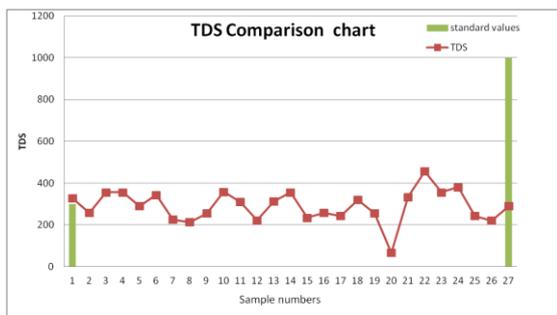
Fig .13 Graph showing chlorides value comparison with standard values



**Fig . 14** Graph showing Nitrates value comparison with standard values



**Fig . 15 .** Graph showing turbidity value comparison with standard values



**Fig 16.** Graph showing TDS value comparison with standard values

## 8. Results

Groundwater studies have been carried out to determine according to the standard of consuming Domestic purposes especially in. Paragathinagar, Nizampet and Bachupally villages(INDIA) , the pH values of CWS ranges 6.35 to 7.66 as shown in the Table-4. Except for the sample-5, sample-12 & sample-14,26,27 are near to the acidic nature . pH levels within the limits. It is suggested that remaining 11 samples can be used for drinking purpose. pH ranges of 6.5 hazardous to Health (acidité). For all (GWS) ground water samples chlorite values estimated between 10 - 161 mg/l which are permissible limits. Nitrates values from Id. No ,12 14,,21, 22, 24 , 26 are above High values and standard is between 5 - 74 mg/l. and max limited to 45 mg/l. from results 4 (CWS ) High Nitrate values was due to more irrigation and Domestic waste over the land surface , agricultural fertilizers mixed in to water bodies. More content of Nitrate presence in water cause health problems like , goiter, and blood pressure , tensions. The Chloride ranges from 24 to 250 mg/l samples were under permissible limits. Id no 6,8,22,23 is more chlorine ,turbidity, alkalinity TDS value for the satisfied usage values (all CWS are satisfied range

## 9. Conclusion

Since continues dumping of the liquid waste and chemicals over the land fillings are caused extensive contaminating to the ground water and other water resources. Hence control measures towards chemical and physical are to taken in the study area. Some of the methods will consider preventing the water pollution and keeping the hygienic ground WQ they are

- Construction and laying sewage lines with proof leak materials and immediate rectification of the leakages. Pragatinagar region. Hyderabad, T.S, India.
- Avoid the open drainage flows in the villages near the Nizampet and Bachupally area, Hyderabad, T.S,India
- Avoid excess usages of chemical application to the crop and other in the Bachcupally near surrounding .
- Chlorination excessive for the drinking and ground water is observed in some samples can be rectified by de-chlorination methods placed in proper locations Future there is wide scope of check the ground water and surface water quality in the study area.

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