CHAPTER 4.1.9 GROUND WATER RESOURCES

COIMBATORE DISTRICT

INDEX

GROUND WATER REPORT OF COIMBATORE DISTRICT

INRODUCTION :

In Tamil Nadu, the surface water resources are fully utilized by various stake holders. The demand of water is increasing day by day. So, groundwater resources play a vital role for additional demand by farmers and Industries and domestic usage leads to rapid development of groundwater. About 63% of available groundwater resources are now being used. However, the development is not uniform all over the State, and in certain districts of Tamil Nadu, intensive groundwater development had led to declining water levels, increasing trend of Over Exploited and Critical Firkas, saline water intrusion, etc.

ADMINISTRATIVE SET UP

The Coimbatore distict is one of the largest district of Tamil Nadu and is situated in the western part of the state. The district has an aerial extent of 7470 sq.km or 747,079 ha, accounting for 5.74 percent of the total geographical area of the Tamil Nadu.

The district lies between North latitudes 10º 13' 00" to 11º23'30" and East longitudes 76º39'00" to 77º30'00". The district has a length of about 130 km from North to South with an average width of 70 km.

For administrative purpose, this district has been divided into nine revenue Taluks, nineteen Blocks and 33 Firkas. Totally, 481 villages exit in the district. Coimbatore is a major city next to Chennai with Corporation status .Coimbatore is an industrial city and called as the "Manchester of Soutyh India". Tiruppur, Avinashi and Pollachi are other major towns in this district.

The district has well laid out roads and railway lines connecting all major towns within and outside the state. The National Highway NH 47 connecting Chennai and Cochin passes through Coimbatore. The broad gauge railway line connecting Trivandrum and Chennai passes through this district. The district is also connected by daily air services with Chennai, Bangalore, Cochin, Trivandrum and Bombay.

Coimbatore District is totally bifurcated into 33 Firkas.

1. Hydrogelogy

(i) Major Geological formations:

Geology:

Coimbatore district is covered by a wide range of high grade metamorphic rocks of the peninsular gneissic complex. These rocks are extensively weathered and overlain by recent valley fills and alluvium at places. The major rock types occurring in the district are charnockites, granites, complex gneisses mainly hornblende biotite gneiss and sillimanite gneiss with basic and ultra basicintrusives, crystalline limestone, syenite, pegmatite and quartz veins.

Drilling of boreholes:

The occurrence and movement of groundwater in hard rock formations are restricted to the porous zones of weathered formations and the open systems of fractures, fissures and joints. Generally, in hard rock regions, occurrence of weathered layer is discontinuous both in space and depth. Hence recharge in hard rock formations is influenced by the intensity and depth of weathering. The subsurface lithological condition and the aquifer characters can be ascertained by drilling exploratory boreholes and conducting pump tests.

The State Ground and Surface Water Resources Data Centre, during the course of investigation has drilled more than 90 boreholes spread over the entire district to find out the nature and behaviour of the subsurface material and their water holding and water yielding capability. There is considerable diversity in the nature of formalities even within the short distance especially in the hard rock areas.

Aquifer parameters:

The thickness of the aquifer, weathered and jointed zones in this district is highly variable and varies from 10 to 40m below ground level. The inter granular porosity is essentially depending upon the intensity and the degree of weathering and fracture development in the bed rock and control the occurrenceand storage of groundwater. The resulting porosity, permeability, transmissivity, etc., decides the well yield. As

discussed earlier, it is noted that the thickness of weathering is more in gneissic formation and moderate in charnockite formations and accordingly the well yield and the aquifer parameters vary and are estimated through pumping tests.

The range of aquifer parameters in hard rock region of Coimbatore district is given below:

Parameters	**Range**
Well yield in LPM	50-300lpm
Transmissivity (T) m^2/day	1.49-164.18 m^2/day
Permeability (K) m/day	0.25-26.75 m/day

(iii) Drilling:

The drilling types are different according to the formation of the terrain. In general, DTH rigs are used in Hard rock formations for drilling a borewell at a depth ranges from 30m to 200m, according to the extension of joints, fractures, lineaments, etc in an area. In Sedimentary formations, rotary rigs with different rotors used according to the Tube well's diameter. The Bento novate clay is used in rotary rigs to avoid the collapse of the Tube well. The sedimentary tube wells are drilled up to a depth of 30m to 300m depending on the area, yield,etc. In alluvial formations, the hand rotary used for drilling tube wells ranges from 10m to 15m.In river beds, infiltration tube wells used for extraction of groundwater.

In Hard rock, the well designing is simple. The upper top soil and highly weathered zone is cased with PVC pipe and the remaining weathered, Fissured, Jointed portion is left as it is. In Villupuram District, the weathered zone ranges from 1.0m to 12.0m. In Granitic gneiss area, the highly weathered portion will be more up to 15m but in charnockite area, the weathered zone will extend up to 8.0m to 10.m only. In Sedimentary area, the well construction depends on the occurrence of sand thickness in

the referred area. The logger is also used in the construction to identify the area of good quality of water.

2. GROUNDWATER REGIME MONITORING:

(i) Notes on existing water level scenario:

The water level is being monitored by State Ground & Surface Water Resources Data Centre from 1971 onwards from a network of 1746 observation wells (shallow open wells) located all over the State. The water level readings are observed in the first week of every month by the field officers. In Coimbatore District, 180 observation wells and 111 piezometers,totally 291 wells are monitoring on Monthly basis. The Central Ground Water Board also monitors the water level from 900 numbers of wells spread all over the State. They observe water level four times in a year. (i.e January, May, August and November). The collected water level data are uploaded in GWDES software and database is maintained regularly for analysing the water level trend with rainfall. From the Monitoring network of wells, the selected representative wells are taken for Resource Estimation computations.

In Coimbatore District, during the pre monsoon, the water level generally in declining trend ranges from G.L. to 15m. The depth of well below GroundLevel 12.0m are become dry during hot season like May, June, July. In the post monsoon, the water level generally in upward trend due to rainfall and it may reach the Ground Level also. The water level trend maps for pre and post monsoons are included as Annexure- I & II.

(ii) Long term trend of water level:

The long term fluctuations of water levels range from G.L. to 14.0m in many parts of the Coimbatore District. The analysis reveals that the water level has gone down in the north, west and central parts of the Coimbatore District. The inference taken from the annual fluctuation is due to lack of rainfall which in turn affects the groundwater levels in phreatic aquifer. The seasonal fluctuation study reveals that due to necessity for development of ground water for different sectored needs and due to failure of monsoons, the water level has gone down. The hydrograph of observation wells water level trend from 2005 to 2017 enclosed as Annexure – III and water level

trend from 2000 to 2017 of Piezometers enclosed as Annexure – IV for Coimbatore District.

(iii) Existing network of Monitoring wells:

In Coimbatore District, the existing network of monitoring wells is 291 wells, 180 wells are observation wells and 111 wells are piezometers. These wells are observed for every month water level.

Coimbatore District: Observation Wells - Location and Co-ordinates

Well No	District	Tahsil / Taluk	Block / Mandal	Village	Latitude	Longitude
63603A	Coimbatore	Coimbatore north	S.S.Kulam	Kalipalayam	11°10'30"	76°59'10"
63306	Coimbatore	Mettupalayam	Karamadai	Tholampalayam	11°10'40"	76°49'50"
63306A	Coimbatore	Mettupalayam	Karamadai	Tolamapalayam	11°10'42"	76°44'50"
63307	Coimbatore	Mettupalayam	Karamadai	Dayanur	11°12'29"	76°52'07"
63308	Coimbatore	Mettupalayam	Karamadai	Marudur	11°13'50"	76°54'20"
63309	Coimbatore	Mettupalayam	Karamadai	Karamadai	11°14'00"	76°57'40"
63309A	Coimbatore	Mettupalayam	Karamadai	Karamadai	11°14'40"	76°57'27"
63316	Coimbatore	Mettupalayam	Karamadai	Badra Kaliamman Koil	11°18'00"	75°54'20"
63316A	Coimbatore	Mettupalayam	Karamadai	Nellithurai	11°07'03"	76°53'08"
63318	Coimbatore	Mettupalayam	Karamadai	Theram Palayam	11°16'15"	76°59'40"
63319	Coimbatore	Mettupalayam	Karamadai	Sirumugai	11°19'55"	77°00'30"
63319A	Coimbatore	Mettupalayam	Karamadai	Sirumugai	11°18'56"	77°00'30"
63320	Coimbatore	Mettupalayam	Karamadai	Pongalur	11°15'25"	77°02'15"

63321	Coimbatore	Mettupalayam	Annur	Karianur	11°19'35"	77°03'55"
63323	Coimbatore	Avinasi	Annur	Mondipalayam	11°17'35"	77°09'50"
63324	Coimbatore	Avinasi	Avinashi	Tundarkarampalayam	11°16'30"	77°12'20"
63325	Coimbatore	Avinasi	Avinashi	Savakattupalayam	11°18'35"	77°17'10"
63326	Coimbatore	Mettupalayam	Karamadai	Irumbarai	11°20'40"	77°05'40"
63327	Coimbatore	Mettupalayam	Karamadai	Chinnakallipatti	11°22'55"	77°06'35"
63328	Coimbatore	Avinasi	Annur	Kottai Kattupalayam	11°20'05"	77°13'45"
63401	Coimbatore	Palladam	Sultanpet	Senjeripudur	10°48'50"	77°16'35"
63402	Coimbatore	Palladam	Sultanpet	Vadavalli	10°52'50"	77°09'05"
63403	Coimbatore	Palladam	Sultanpet	Kavundampalayam	10°53'35"	77°13'35"
63404	Coimbatore	Palladam	Sultanpet	Manthiripalayam	10°49'50"	77°13'45"
63405	Coimbatore	Tiruppur	Pongalur	Vavipalayam	10°52'20"	77°17'05"
63406	Coimbatore	Tiruppur	Pongalur	V.vadamalaipalayam	10°53'40"	77°21'15"
63411	Coimbatore	Palladam	Palladam	Puliampatty	10°56'00"	77°13'10"
63413	Coimbatore	Palladam	Palladam	Pillaiappampalayam	10°56'15"	77°16'40"
63416	Coimbatore	Tiruppur	Pongalur	Thutheripalayam	10°56'10"	77°20'20"
63417	Coimbatore	Tiruppur	Pongalur	Pongalur	10°58'30"	77°21'50"
63418	Coimbatore	Tiruppur	Pongalur	Semmandampalayam	10°55'30"	77°24'30"

63420	Coimbatore	Tiruppur	Pongalur	Kuduvai	10°56'40"	77°26'20"
63436	Coimbatore	Palladam		Kaduvettipalayam	11°10'50"	77°08'35"
63437	Coimbatore	Pollachi		Kittampalayam	11°08'50"	77°09'55"
63438	Coimbatore	Palladam		Karumathampatti	11°06'40"	77°10'45"
63438-A	Coimbatore		Sulur	Karumathampatti	11°06'57"	77°10'47"
63439	Coimbatore	Palladam		Kamachipuram	11°00'15"	77°04'00"
63440	Coimbatore	Palladam		Sulur	11°01'20"	77°07'20"
63441	Coimbatore	Palladam		Selakkarachal	10°56'45"	77°10'00"
63442	Coimbatore	Palladam		Kallapalayam	10°57'05"	77°05'00"
63443	Coimbatore	Palladam	Palladam	Tottipalayam	11°09'00"	77°30'30"
63444	Coimbatore	Palladam		Mopiripalayam	11°08'32"	77°31'27"
63445	Coimbatore	Palladam	Palladam	Appanaickenpatti	10°58'30"	77°09'35"
63446	Coimbatore	Palladam	Sulur	Unjappalayam	11°19'27"	77°31'27"
63447	Coimbatore		Sulur	Kadampady	11°02'01"	77°09'37"
63448	Coimbatore		Sulur	Kalipalayam	11°04'37"	77°12'56"
63449	Coimbatore		Sultanpet	J.krishnapuram	10°48'18"	77°14'16"
63450	Coimbatore		Sultanpet	Bogampatti	10°54'00"	77°07'00"
63451	Coimbatore		Sultanpet	Jallipatti	10°50'51"	77°16'31"
63452	Coimbatore		Sultanpet	Pappampatti	10°57'26"	77°06'05"
63453	Coimbatore		Sultanpet	Periyakuilai	10°54'06"	77°04'33"
63454	Coimbatore		Sultanpet	Poorandampalayam	10°51'49"	77°10'20"

63455	Coimbatore		Sultanpet	Senjerimalai	10°49'54"	77°11'38"
63456	Coimbatore		Sulur	Thottipalayam	10°04'44"	77°10'36"
63603 A	Coimbatore	Coimbatore north		Kalipalayam	11°10'60"	77°23'43"
63603A	Coimbatore	Coimbatore North	Kalipalayam	Kalipalayam	11°10'34"	76°59'10"
63604	Coimbatore	Coimbatore north	P.N.Palayam	Mathampalayam	11°11'45"	76°57'40"
63604A	Coimbatore	Coimbatore north	P.n. palayam	Mathampalayam	11°11'48"	76°57'38"
63605	Coimbatore	Coimbatore north	P.N.Palayam	P.N.Palayam	11°09'00"	76°56'30"
63608	Coimbatore	Coimbatore north	P.N.Palayam	Anakatti	11°06'10"	76°44'30"
63613	Coimbatore	Coimbatore south	Madukkarai	Sugunapuram	10°55'25"	76°56'50"
63613A	Coimbatore	Coimbatore south	Madukkarai	Kuruchi	10°57'44"	76°58'25"
63614	Coimbatore	Coimbatore south	Madukkarai	Pichanur	10°15'15"	76°52'55"
63615	Coimbatore	Coimbatore south	Madukkarai	Natchipalayam	10°55'23"	76°57'20"
63616	Coimbatore	Coimbatore south		Domblipalayam	10°46'45"	76°46'50"
63617	Coimbatore	Coimbatore south		Alandurai	10°46'42"	76°46'45"
63618	Coimbatore	Coimbatore south		Puluvapatti	10°57'45"	76°49'05"

63619	Coimbatore	Coimbatore south		Karadimadai	10°56'05"	76°51'20"
63620	Coimbatore	Coimbatore south		Thelungupallam	10°58'20"	76°56'25"
63621	Coimbatore	Coimbatore south		Navakkarai	10°51'59"	76°52'38"
63622	Coimbatore	Coimbatore south		Paladurai	10°52'55"	76°57'16"
63623	Coimbatore	Coimbatore south		Myleripalam	10°52'10"	77°01'17"
63623-A	Coimbatore	Coimbatore south	Madukarrai	Myleripalayam	10°52'11"	77°01'17"
63624	Coimbatore	Coimbatore south		Chettipalayam	10°54'35"	77°02'25"
63625	Coimbatore	Coimbatore south		Vellalore	10°58'41"	77°01'38"
63626	Coimbatore	Coimbatore south		Othakkalmandapam	10°52'28"	77°00'06"
63627	Coimbatore	Coimbatore south		Ettimadai	10°53'26"	76°54'19"
63628	Coimbatore	Coimbatore south		Madukarai Marapalam	10°53'47"	76°56'03"
63629	Coimbatore	Coimbatore south		Nanjundaparaam	10°58'33"	76°59'46"
63630	Coimbatore	Coimbatore south		Sadivayel	10°56'21"	76°43'39"
63631	Coimbatore	Coimbatore south		Sundakkamuthur	10°57'46"	76°55'52"

63632	Coimbatore	Coimbatore south		Vadavalli	11°01'41"	76°54'23"
63633	Coimbatore	Coimbatore south		Vadapatti	10°59'51"	76°53'48"
63634	Coimbatore	Avinasi		Ganesapuram	11°10'30"	77°03'30"
63635	Coimbatore	Avinasi		Annur	11°13'50"	77°06'15"
63636	Coimbatore	Avinasi		Kembanaickan Palayam	11°12'31"	77°01'5 "
63637	Coimbatore	Avinasi		Pachapalayam	11°07'35"	77°05'35"
63638	Coimbatore			Daliyur	11°04'35"	76°54'25"
63639	Coimbatore			Govanur	11°08'50"	76°54'15"
63640	Coimbatore	Coimbatore north		Kallapatti Nehru Nagar	11°03'09"	77°02'24"
63641	Coimbatore			Vellakinaru	11°04'15"	76°57'25"
63641-A	Coimbatore	Coimbatore north	Periyanaickenpalayam	Vellakkinar	11°04'19"	76°57'20"
63642	Coimbatore			Saravanampatti	11°04'05"	77°01'10"
63643	Coimbatore	Coimbatore north	Sskulam	Kurumabapalayam	11°06'43"	77°01'38"
63644	Coimbatore			Athipalayam	11°07'45"	76°58'49"
63645	Coimbatore	Coimbatore north		Kattampatty	11°10'27"	77°02'25"
63646	Coimbatore	Coimbatore north		Maneeswarar Kovil	11°14'06"	77°06'13"
63647	Coimbatore	Coimbatore north		Periya Puthur	11°13'42"	77°01'44"

63648	Coimbatore	Coimbatore north	Annur	Vadakalur	11°16'06"	77°05'53"
63649	Coimbatore	Coimbatore north	Perianaickenpalayam	Bettathapurampudur	11°13'23"	76°57'38"
63650	Coimbatore	Coimbatore north	Perianaickenpalayam	Mangarai	11°04'48"	76°49'25"
63651	Coimbatore	Coimbatore north	P.npalayam	Poochiyur	11°06'50"	76°55'35"
63652	Coimbatore	Coimbatore north	S.s.kulam	Vellanaipatti	11°05'40"	77°04'16"
63653	Coimbatore	Mettupalayam	Karamdai	Bellepalayam	11°18'40"	77°00'20"
63654	Coimbatore	Mettupalayam	Karamadai	Thekkampatti	11°15'23"	76°53'17"
63654A	Coimbatore	Mettupalayam	Karamadai	Thekkampatti	11°15'23"	76°53'17"
63655	Coimbatore	Mettupalayam	Karamadai	Chittepalayam	11°21'45"	77°03'38"
63656	Coimbatore	Mettupalayam	Karamadai	Jadayampalayam	11°17'41"	76°58'47"
63657	Coimbatore	Mettupalayam	Karamdai	Mothepalayam	11°18'29"	76°58'33"
63658	Coimbatore	Mettupalayam	Karamadai	Muthukallur	11°12'24"	76°49'36"
63702	Coimbatore	Pollachi	Kinathukadavu	Andipalayam	10°48'00"	77°06'15"
63703	Coimbatore	Pollachi	Kinathukadavu	Kattampatti	10°48'30"	77°08'40"
63704	Coimbatore	Pollachi	Kinathukadavu	Periyanegamam	10°44'50"	77°06'00"
63704A	Coimbatore	Kinathukadavu	Kinathukadavu	Perianegamam	10°44'37"	77°66'9 "
63705	Coimbatore	Pollachi	Pollachi North	Poosaripatti	10°40'15"	77°07'00"
63706	Coimbatore	Pollachi	Pollachi south	Gomangalampudur	10°37'15"	77°09'10"
63707	Coimbatore	Pollachi	Pollachi North	Unjavelampatti	10°39'30"	77°02'40"

63708	Coimbatore	Pollachi	Pollachi North	Puliampatti	10°40'40"	77°02'00"
63709	Coimbatore	Pollachi	Pollachi South	Pollachi	10°39'00"	76°59'20"
63710	Coimbatore	Pollachi	Pollachi South	Ambrampalayam	10°37'45"	76°53'00"
63711	Coimbatore	Pollachi	Pollachi South	Ganapathipalayam	10°37'15"	76°50'00"
63711A	Coimbatore	Pollachi	Anamalai	Kllavan Pudur	10°35'27"	76°50'45"
63712	Coimbatore	Pollachi	Anamalai	Anamalai	10°35'20"	77°56'10"
63713	Coimbatore	Pollachi	Anamalai	Sethumadai	10°30'40"	76°53'20"
63714	Coimbatore	Pollachi	Anamalai	Kottur	10°32'30"	76°59'15"
63715	Coimbatore	Pollachi	Anamalai	Poovalaparithiyur	10°32'45"	77°02'30"
63716	Coimbatore	Pollachi	Pollachi north	Ponnayur	10°40'30"	76°56'15"
63717	Coimbatore	Pollachi	Pollachi north	Gopalapuram	10°41'30"	76°52'45"
63718	Coimbatore	Pollachi	Pollachi north	Puravaipalayam	10°43'45"	76°56'55"
63719	Coimbatore	Pollachi	Kinathukadavu	Kinathukadavu	10°49'00"	77°01'00"
63720	Coimbatore	Pollachi		Narasingapuram	10°41'35"	76°53'35"
63721	Coimbatore	Pollachi		Thensingampalam	10°33'05"	76°59'05"
63722	Coimbatore	Pollachi		Angalakurichi	10°31'35"	76°59'50"
63723	Coimbatore	Pollachi		Paramaduiyur	10°32'55"	77°03'15"
63724	Coimbatore	Pollachi		Gomangalam	10°37'55"	77°09'40"
63725	Coimbatore	Pollachi		Koollanaichenpatti	10°32'25"	77°07'50"
63726	Coimbatore	Pollachi		Thondamuthur	10°34'40"	77°01'55"
63727	Coimbatore	Pollachi		Kolarpatti	10°37'20"	77°06'40"

63728	Coimbatore	Pollachi		Muthur	10°41'30"	76°58'15"
63729	Coimbatore	Pollachi		Kalipalayam	10°42'06"	76°57'14"
63730	Coimbatore	Pollachi		Kaliapuram	10°32'25"	79°55'09"
63731	Coimbatore	Pollachi		Kanjam Patti	10°37'18"	77°04'26"
63732	Coimbatore	Pollachi		Periya Podhu	10°36'34"	77°52'50"
63733	Coimbatore	Pollachi		Samathur	10°36'12"	77°00'55"
63734	Coimbatore	Pollachi		Chokkanur	10°48'40"	76°56'45"
63735	Coimbatore	Pollachi		Singaiyanpudur	10°48'50"	76°58'50"
63736	Coimbatore	Pollachi		Muthugoundanur	10°47'25"	76°55'30"
63737	Coimbatore	Pollachi		Vadakkipalayam	10°44'45"	76°59'10"
63738	Coimbatore	Pollachi		Thoppampatti	10°42'10"	77°03'25"
63739	Coimbatore	Pollachi		Chinneripalayam	10°44'0 "	77°05'20"
63740	Coimbatore	Pollachi		Kottampatti	10°39'40"	77°01'05"
63741	Coimbatore	Pollachi		R.ponnapuram	10°41'11"	76°59'45"
63742	Coimbatore	Pollachi		Karacheri	10°52'05"	77°03'50"
63743	Coimbatore	Pollachi		Mettupalayam	10°44'50"	77°00'45"
63744	Coimbatore	Pollachi		Kovilpallam	10°44'40"	77°04'15"
63745	Coimbatore	Pollachi	Vadachittur	Vadachittur	10°50'17"	77°05'02"
63746	Coimbatore	Pollachi	Vadachittur	Mettubavi	10°50'24"	77°07'13"
63801	Coimbatore	Udumalpet	Gudimangalam	Ramachandrapuram	10°43'30"	77°10'35"
63802	Coimbatore	Udumalpet	Gudimangalam	Ammapatty	10°43'55"	77°14'55"

63803	Coimbatore	Udumalpet	Gudimangalam	Velayuthagoundampudur	10°44'15"	77°16'40"
63804	Coimbatore	Udumalpet	Gudimangalam	Gudimangalam	10°41'10"	77°16'50"
63805	Coimbatore	Udumalpet	Gudimangalam	Ponneri	10°38'25"	77°16'05"
63806	Coimbatore	Udumalpet	Udumalpet	Kongalnagaram	10°40'35"	77°12'05"
63807	Coimbatore	Udumalpet	Udumalpet	Puduppalayam	10°40'30"	77°09'15"
63808	Coimbatore	Udumalpet	Udumalpet	Devanampudur	10°33'00"	77°05'35"
63809	Coimbatore	Udumalpet	Udumalpet	Salaiyur	10°33'15"	77°07'10"
63810	Coimbatore	Udumalpet	Udumalpet	Chinnapoolankinar	10°35'20"	77°12'15"
63811	Coimbatore	Udumalpet	Udumalpet	Udumalpet	10°34'25"	77°14'25"
63812	Coimbatore	Udumalpet	Udumalpet	Pallapalayam	10°31'15"	77°13'00"
63813	Coimbatore	Udumalpet	Udumalpet	Dhali	10°30'30"	77°11'35"
63814	Coimbatore	Udumalpet	Udumalpet	Kurichikottai	10°30'40"	77°13'25"
63815	Coimbatore	Udumalpet	Udumalpet	Manupatti	10°28'40"	77°14'10"
63816	Coimbatore	Udumalpet	Udumalpet	Perisanampatti	10°30'00"	77°17'25"
63817	Coimbatore	Udumalpet	Madathukulam	Kolumam	10°28'45"	77°21'45"
63818	Coimbatore	Udumalpet	Madathukulam	Madathukulam	10°33'30"	77°22'15"
63819	Coimbatore	Udumalpet	Madathukulam	Karatholuvu	10°37'20"	77°22'33"
63820	Coimbatore	Udumalpet	Madathukulam	Thungavi	10°37'20"	77°19'40"
63821	Coimbatore	Udumalpet	Madathukulam	Palappampatty	10°34'38"	77°18'08"
MSW02	Coimbatore	Mettupalayam		Thekkampatti	11°15'25"	76°53'15"

Coimbatore District: Piezometers - Location and Co-ordinates

Well No	District	Tahsil / Taluk	Block / Mandal	Village	Latitude	Longitude
61243	Coimbatore	Coimbatore south	Thondamuthur	Thondamuthur	11.066667	76.833333
61247	Coimbatore	Coimbatore south	Madukarai	Vellalore	10.978611	77.038333
61248	Coimbatore	sulur	Sulur	Subbarayanpudur	11.098889	77.213611
61249	Coimbatore	Annur	Annur	Annur	11.230278	77.111944
HP1CBE01	Coimbatore	Mettupalayam	Karamadai	Irumbarai	11.348611	77.098611
HP1CBE02	Coimbatore	Mettupalayam	Karamadai	Karamadai	11.25	76.955
HP1CBE03	Coimbatore	Coimbatore south	Madukarai	Natchipalayam	10.8625	76.958333
HP1CBE06	Coimbatore	sulur	Sultanpet	Malaimandripalayam	10.833333	77.220833
HP1CBE07	Coimbatore	sulur	Sultanpet	Senjaripudur	10.819444	77.272222
HP1CBE07(A)	Coimbatore	sulur	sulur	Senjeripudur	10.818333	77.279722
HP1CBE09	Coimbatore	Pollachi	Pollachi south	Gomangalampudur	10.616667	77.15
HP1CBE10	Coimbatore	Pollachi	Pollachi south	Unjavelampatty	10.658333	77.045833
HP1CBE11	Coimbatore	Pollachi	Anamalai	Ganapathi palayam	10.616667	76.847222
HP2CBE01	Coimbatore	Annur	Annur	Pilliappampalayam	11.1875	77.097222
HP2CBE05	Coimbatore	Mettupalayam	Karamadai	Marudhur	11.205556	76.879167
HP2CBE06	Coimbatore	Coimbatore south	Thondamuthur	Thenkarai	10.947222	76.847222
HP2CBE07	Coimbatore	Coimbatore south	Madukarai	Chettipalayam	10.895833	76.929167
HP2CBE08	Coimbatore	Coimbatore North	S.S.Kulam	Agraharasamakulam	11.15	77.075
HP2CBE09	Coimbatore	Coimbatore North	P.N.palayam	Vellamadai	11.158333	76.990278
HP2CBE10	Coimbatore	Coimbatore North	P.N.palayam	Kavundampalayam	11.041667	76.941667
HP2CBE10(A)	Coimbatore	Coimbatore north	Periyanaicken palayam	Edaiyarpalayam	11.041667	76.943333
HP2CBE11	Coimbatore	Coimbatore south	Thondamuthur	Devaravapuram	10.994444	76.816667
HP2CBE13	Coimbatore	sulur	Sulur	Kaduvettipalayam	11.147222	77.163889

HP2CBE13(A)	Coimbatore	sulur	Sulur	Nallagoundanpalayam	11.196389	77.153611
HP2CBE14	Coimbatore	sulur	Sultanpet	Pogampatti	10.9	77.116667
HP2CBE14(A)	Coimbatore	sulur	Sulthanpet	Bogampatti	10.9	77.116667
HP2CBE15	Coimbatore	Sulur	Sulur	Nilambur	11.055556	77.086111
HP2CBE15(A)	Coimbatore	Sulur	Sulur	Athinarayanapuram	11.051389	77.086667
HP2CBE17	Coimbatore	Coimbatore South	Coimbatore city	Oddar Palayam/ondipudur	10.991667	77.033333
HP2CBE22	Coimbatore	Pollachi	Pollachi	Samathur	10.608333	77.008333
HP2CBE23	Coimbatore	Kinathukadavu	Kinathukadavu	K.mettupalayam	10.747222	77.029167
HP2CBE24	Coimbatore	Pollachi	Anamalai	Sethumadhi	10.516667	76.8875
HP2CBE24(A)	Coimbatore	Pollachi	Anamalai	Sethumadai	10.516667	76.8875
HP2CBE25	Coimbatore	Pollachi	Pollachi south	Kolarpatti	10.620833	77.116667
HP2CBE26	Coimbatore	Valparai	Valparai	Valparai	10.325	76.955556
HP2CBE27	Coimbatore	Kinathukadavu	Kinathukadavu	Chokkanur	10.811111	76.929167
HP2CBE27(A)	Coimbatore	Kinathukadavu	Kinathukadavu	Kinathukadavu	10.811111	76.929167
HP2CBE28	Coimbatore	Kinathukadavu	Kinathukadavu	Vadachitoor	10.833333	77.083333
HP2CBE28(A)	Coimbatore	Kinathukadavu	Kinathukadavu	Vadachitoor	10.916667	77.083333
HP2CBE34	Coimbatore	Pollachi	Anamali	Aliyar Nagar	10.486389	76.967222
HP2CBE35	Coimbatore	Pollachi	Kottur	Angalakurchi	10.534722	76.995556
HP2CBE36	Coimbatore	Pollachi	Pollachi south	Thondamuthur	10.627222	77.111667
HP2CBE37	Coimbatore	Sulur	Sulur	Irugur	11.012778	77.067222
HP2CBE38	Coimbatore	Annur	Annur	Kunnathur Pudur	11.144722	77.050833
61243	Coimbatore	Coimbatore south	Thondamuthur	Thondamuthur	11.066667	76.833333
61247	Coimbatore	Coimbatore south	Madukarai	Vellalore	10.978611	77.038333
61248	Coimbatore	sulur	Sulur	Subbarayanpudur	11.098889	77.213611
61249	Coimbatore	Annur	Annur	Annur	11.230278	77.111944
HP1CBE01	Coimbatore	Mettupalayam	Karamadai	Irumbarai	11.348611	77.098611
HP1CBE02	Coimbatore	Mettupalayam	Karamadai	Karamadai	11.25	76.955

HP1CBE03	Coimbatore	Coimbatore south	Madukarai	Natchipalayam	10.8625	76.958333
HP1CBE06	Coimbatore	sulur	Sultanpet	Malaimandripalayam	10.833333	77.220833
HP1CBE07	Coimbatore	sulur	Sultanpet	Senjaripudur	10.819444	77.272222
HP1CBE07(A)	Coimbatore	sulur	sulur	Senjeripudur	10.818333	77.279722
HP1CBE09	Coimbatore	Pollachi	Pollachi south	Gomangalampudur	10.616667	77.15
HP1CBE10	Coimbatore	Pollachi	Pollachi south	Unjavelampatty	10.658333	77.045833
HP1CBE11	Coimbatore	Pollachi	Anamalai	Ganapathi palayam	10.616667	76.847222
HP2CBE01	Coimbatore	Annur	Annur	Pilliappampalayam	11.1875	77.097222
HP2CBE05	Coimbatore	Mettupalayam	Karamadai	Marudhur	11.205556	76.879167
HP2CBE06	Coimbatore	Coimbatore south	Thondamuthur	Thenkarai	10.947222	76.847222
HP2CBE07	Coimbatore	Coimbatore south	Madukarai	Chettipalayam	10.895833	76.929167
HP2CBE08	Coimbatore	Coimbatore North	S.S.Kulam	Agraharasamakulam	11.15	77.075
HP2CBE09	Coimbatore	Coimbatore North	P.N.palayam	Vellamadai	11.158333	76.990278
HP2CBE10	Coimbatore	Coimbatore North	P.N.palayam	Kavundampalayam	11.041667	76.941667
HP2CBE10(A)	Coimbatore	Coimbatore north	Periyanaicken palayam	Edaiyarpalayam	11.041667	76.943333
HP2CBE11	Coimbatore	Coimbatore south	Thondamuthur	Devaravapuram	10.994444	76.816667
HP2CBE13	Coimbatore	sulur	Sulur	Kaduvettipalayam	11.147222	77.163889
HP2CBE13(A)	Coimbatore	sulur	Sulur	Nallagoundanpalayam	11.196389	77.153611
HP2CBE14	Coimbatore	sulur	Sultanpet	Pogampatti	10.9	77.116667
HP2CBE14(A)	Coimbatore	sulur	Sulthanpet	Bogampatti	10.9	77.116667
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HP2CBE24(A)	Coimbatore	Pollachi	Anamalai	Sethumadai	10.516667	76.8875
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HP2CBE27	Coimbatore	Kinathukadavu	Kinathukadavu	Chokkanur	10.811111	76.929167
HP2CBE27(A)	Coimbatore	Kinathukadavu	Kinathukadavu	Kinathukadavu	10.811111	76.929167
HP2CBE28	Coimbatore	Kinathukadavu	Kinathukadavu	Vadachitoor	10.833333	77.083333
HP2CBE28(A)	Coimbatore	Kinathukadavu	Kinathukadavu	Vadachitoor	10.916667	77.083333
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HP2CBE36	Coimbatore	Pollachi	Pollachi south	Thondamuthur	10.627222	77.111667
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HP2CBE38	Coimbatore	Annur	Annur	Kunnathur Pudur	11.144722	77.050833
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61248	Coimbatore	sulur	Sulur	Subbarayanpudur	11.098889	77.213611
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HP1CBE02	Coimbatore	Mettupalayam	Karamadai	Karamadai	11.25	76.955
HP1CBE03	Coimbatore	Coimbatore south	Madukarai	Natchipalayam	10.8625	76.958333
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HP1CBE10	Coimbatore	Pollachi	Pollachi south	Unjavelampatty	10.658333	77.045833
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HP2CBE08	Coimbatore	Coimbatore North	S.S.Kulam	Agraharasamakulam	11.15	77.075
HP2CBE09	Coimbatore	Coimbatore North	P.N.palayam	Vellamadai	11.158333	76.990278
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HP2CBE11	Coimbatore	Coimbatore south	Thondamuthur	Devaravapuram	10.994444	76.816667
HP2CBE13	Coimbatore	sulur	Sulur	Kaduvettipalayam	11.147222	77.163889

(iv) Data Constraints:

The following are constraints in collecting the water level data in the field and validating the data are:

1) The water level data are collected on the monthly basis in the referred observation wells and piezometers. The collected data is not sufficient quantity for analyzing purpose due to drying of wells, Wells abounded by various reasons, lack of selecting the alternate wells, lack of open wells available for monitoring purpose due to increased usage of bore wells in the villages, Panchayats, etc. In many villages, the water supply schemes implemented by overhead tank supply or mini energised pumps and the existing open wells are not used generally by the villagers and moreover, they filled with garbage.
2) The number of bore wells should be increased for monitoring purpose.
3) The site selection of new bore wells should be based on the Geological methods.
4) Strengthening the network of monitoring wells by closing the gaps in the network.
5) Maintenance cost should be allotted to maintain the bore wells on the periodical basis to maintain the quality as well as yield.
6) Installation of Automatic water level recorders in the sensitive and more water level fluctuation in the bore wells will helpful to monitor the extensive depletion of groundwater areas.

7) Upgrading the measuring instruments will helpful to take accurate reading of water levels in the field.
8) Upgrading the soft ware will helpful to minimize the errors and increasing the accuracy of data.
9) Erecting the Telemetric water level recorders in the over exploited Firkas will helpful to monitor the over extraction of groundwater.

10) Lack of manpower and transporting vehicles are also major problems for data collection in the field in proper time.

3. DYNAMIC GROUND WATER RESOURCES:

The State Ground and Surface Water Resources Data Centre has estimated the ground water resources of Tamil Nadu periodically in co-ordination with the Central Ground Water Board, Government of India , Ministry of Water Resources, Chennai, based on the Methodology evolved by the Ground Water Resources Estimation Committee, 1997 (GEC 97).

Groundwater potential assessment is a dynamic one and not static. While assessing an area, the following factors can be considered such as Geology, Total Irrigated Area, Total Number of Wells used for Irrigation, Water Level Data for the past five years, Average Rainfall, Total Recharge, Irrigation methods adopted in the area, Cropping pattern details, Seepage factor, Specific yield, Geological conditions prevailing in that area, Recharge through Artificial recharge structures, etc.

Groundwater potential assessment proposal should be presented for approval in the Central and State Level Working Group Committees and then, presented for final approval in the Central Level Committee as well as State Level Committees.

The Ground Water Potential Assessments as on January 1992 and January 1997 were done in the State, taking the Panchayat Union Block as an Assessment Unit and the entire State **was categorized as Dark, Grey and White areas**. The Blocks with more than 85% to 100% ground water development (extraction) were categorized as “Dark Blocks” and the blocks with ground water development

between 65% to 85% were categorized as “Grey Blocks” and blocks with less than 65% ground water development were categorized as “White Blocks”.

Subsequently, the **Ground Water Potential Assessment was done as on March 2003 and as on March 2009.** In these assessments, the Panchayat Union Blocks in Tamil Nadu were **categorized as Over-Exploited, Critical, Semi-Critical, Safe and Saline instead of Dark, Grey and White blocks.** The Blocks with more than 100% extraction were categorized as “Over Exploited Blocks”, the blocks with 90% to 100% extraction as “Critical Blocks”, the blocks with 65% to 90% extraction as “Semi Critical Blocks”, the blocks with less than 65% extraction as “Safe Blocks” and the bad quality blocks were categorized as “Saline Blocks”. No schemes should be formulated in over exploited and critical blocks - “Notified Blocks – A category – (Stage of Groundwater extraction is 90% and above)”.

The re-estimation of groundwater resources in the State as on March 2011 and as on March 2013 can be assessed in Micro Level basis. In these assessments, the assessing unit is Firka (Unit of Taluk) and **categorized as Over-Exploited, Critical, Semi-Critical, Safe, and Saline Firkas.** As on March 2013 assessment, in the Coimbatore District

Based on the Estimation of Ground Water Resources of Tamil Nadu State as on March 2013, Out of 1139 Firkas in the State, 358 Firkas are categorized as “Over Exploited Firkas”, 105 Firkas are categorized as “Critical Firkas”, 212 Firkas are categorized as “Semi Critical Firkas”, 429 Firkas are categorized as “Safe Firkas” and 35 Firkas are categorized as “Saline Firkas”.

When compared to last assessment as on March 2011, the “Over Exploited Firkas” comes down from 374 to 358 Firkas, the “Critical Firkas” increased from 48 to 105 Firkas, the “Semi Critical Firkas” comes down marginally from 235 to 212 Firkas, the “Safe Firkas” comes down marginally from 437 to 429 Firkas and the “Saline Firkas” remains same as 35 Firkas. The alteration of Firkas are due to the construction of Artificial Recharge structures such as Check Dams, Recharge Wells, Recharge shafts, percolation ponds; etc was constructed in the “Over Exploited Firkas” by various departments.

Methodology adopted for Estimation of Ground Water Potential :

The present methodology used for resources assessment is known as Ground Water Resource Estimation Methodology - 1997 (GEC'97) .In GEC'97, two approaches are recommended - **water level fluctuation method and norms of rainfall infiltration method**. The water level fluctuation method is based on the concept of storage change due to differences between various input and output components. Input refers to recharge from rainfall and other sources and subsurface inflow into the unit of assessment. Output refers to ground water draft, ground water evapotranspiration, base flow to streams and subsurface outflow from the unit. Since the data on subsurface inflow / outflow are not readily available, it is advantageous to adopt the unit for ground water assessment as basin / sub basin / watershed, as the inflow / outflow across these boundaries may be taken as negligible.

In each assessment unit, hilly areas having slope more than 20% are deleted from the total area to get the area suitable for recharge. Further, areas where the quality of ground water is beyond the usable limits should be identified and handled separately. The remaining area after deleting the hilly area and separating the area with poor ground water quality is to be delineated into command and non-command areas. Ground water assessment in command and non-command areas are done separately for monsoon and non-monsoon seasons.

The rainfall recharge during monsoon season computed by Water Level Fluctuation (WLF) method is compared with recharge figures from Rainfall Infiltration Factor (RIF) method. In case the difference between the two sets of data are more than 20% then RIF figure is considered, otherwise monsoon recharge from WLF is adopted. While adopting the rainfall recharge figures, weight age is to be given to WLF method over adhoc norms method of RIF. Hence, wherever the difference between RIF & WLF is more than 20%, data have to be scrutinized and corrected accordingly.

During non-Monsoon season, rainfall recharge is computed by using Rainfall infiltration Factor (RIF) method. Recharge from other sources is then added to get total non-Monsoon recharge. In case of areas receiving less than 10% of the annual rainfall during non-monsoon season, the rainfall recharge is ignored.

The total annual ground water recharge of the area is the sum-total of monsoon and non-monsoon recharge. An allowance is kept for natural discharge in the non-monsoon season by deducting 5 to 10 % of total annual ground water recharge.

The balance ground water available accounts for existing ground water withdrawal for various uses and potential for future development. This quantity is termed as Net Ground Water Availability.

Net Ground Water Availability = Annual Ground Water Recharge - Natural discharge during non-monsoon season.

GEC'97 methodology has recommended norms for various parameters being used in ground water recharge estimation. These norms vary depending upon water bearing formations and agroclimatic conditions. While norms for specific yield and recharge from rainfall values are to be adopted within the guidelines of GEC'97, in case of other parameters like seepage from canals, return flow from irrigation, recharge from tanks & ponds, water conservation structures, results of specific case studies may replace the adhoc norms.

The Gross yearly ground water draft is to be calculated for Irrigation, Domestic and Industrial uses. The gross ground water draft would include the ground water extraction from all existing ground water structures during monsoon as well as during non-monsoon period. While the number of ground water structures should preferably be based on latest well census, the average unit draft from different types of structures should be based on specific studies or adhoc norms given in GEC'97 report.

The stage of Ground water Development is defined by

$$\text{Stage of Ground water Development (\%)} = \frac{\text{Existing Gross Ground water Draft for all uses}}{\text{Net annual Ground Water Availability}} \times 100$$

The units of assessment are categorized for ground water development based on two criteria – a) stage of ground water development and b) long-term trend of pre and post monsoon water levels. Four categories are - Safe areas which have

ground water potential for development; Semi-critical areas where cautious ground water development

is recommended; Critical areas; Over -exploited areas where there should be intensive monitoring and evaluation and future ground water development be linked with water conservation measures.

The criteria for categorization of assessment units are as follows:

S. No.	Stage of Groundwater Development	Significant Long term Decline		Categorization
		Pre-monsoon	**Post -monsoon**	
1.	<=70%	No	No	SAFE
		Yes / No	No / Yes	To be re-assessed
		Yes	Yes	To be re-assessed
2.	>70% and <=90%	No	No	To be re-assessed
		Yes / No	No / Yes	SEMI – CRITICAL
		Yes	Yes	SEMI – CRITICAL
3.	>90 and <=100%	No	No	To be re-assessed
		Yes / No	No / Yes	CRITICAL
		Yes	Yes	CRITICAL
4.	>100%	No	No	To be re-assessed
		Yes / No	No / Yes	OVER- EXPLOITED
		Yes	Yes	OVER- EXPLOITED

Note:' *To be re-assessed' means that data is to be checked and reviewed. If the ground water resources assessment and the trend of long term water levels contradict*

each other. This anomalous situations requires a review of the ground water resource computations, as well as the reliability of water level data.

The long term ground water level data should preferably be for a period of 10 years. The significant water level decline may be taken in consideration between 10 to 20 cm/ year depending upon the local hydro geological conditions.

Dynamic Ground Water Resources Estimation of Tamil Nadu As on March 2013

District Summary

(in ha.m)

COIMBATORE DISTRICT							
Sl.No	District	Net Annual Ground Water Availability	Existing Draft for Irrigation	Existing Draft for domestic and industrial use	Total Draft (4+5)	Stage of Ground Water Development {(6/3)*100} %	No of Over Exploited Firkas
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1	COIMBATORE	44,950.83	37,775.17	5,131.28	42,906.45	95	21

Firka Wise Summary

(in ha.m)

COIMBATORE DISTRICT							
Sl.No	**Assessment Unit (Firka)**	**Net Annual Ground Water Availability**	**Existing Draft for Irrigation**	**Existing Draft for domestic and industrial use**	**Existing Gross Ground Water Draft for All uses (4+5)**	**Stage of Ground Water Development {(6/3)*100} %**	**Category of the Firka**
1	ALANDURAI	1,696.44	1,247.18	102.34	1,349.51	80	SEMI CRITICAL
2	ANAMALAI	4,228.01	1,870.13	72.60	1,942.73	46	SAFE
3	ANNUR(N)	1,390.92	1,710.90	64.31	1,775.21	128	OVER EXPLOITED
4	ANNUR(S)	1,399.19	1,248.20	93.07	1,341.27	96	CRITICAL

5	ANUPPARPALAYAM	253.37	91.63	359.44	451.07	178	OVER EXPLOITED
6	COIMBATORE SOUTH	383.79	226.40	245.20	471.60	123	OVER EXPLOITED
7	GANAPATHI	168.00	40.10	358.99	399.09	238	OVER EXPLOITED

COIMBATORE DISTRICT

Sl.No	Assessment Unit (Firka)	Net Annual Ground Water Availability	Existing Draft for Irrigation	Existing Draft for domestic and industrial use	Existing Gross Ground Water Draft for All uses (4+5)	Stage of Ground Water Development {(6/3)*100} %	Category of the Firka
8	KARAMADAI	1,744.12	1,381.10	116.01	1,497.11	86	SEMI CRITICAL
9	KARUMATHAMPATTI	1,122.38	1,033.44	134.09	1,167.53	104	OVER EXPLOITED
10	KINATHUKATAVU	1,163.94	1,574.06	68.87	1,642.93	141	OVER EXPLOITED
11	KOLARPATTI	914.88	1,499.94	36.88	1,536.83	168	OVER EXPLOITED
12	KOTTUR	2,314.40	1,550.93	100.76	1,651.69	71	SEMI CRITICAL
13	KOVILPALAYAM	1,015.66	1,721.15	235.82	1,956.97	193	OVER EXPLOITED
14	MADUKKARAI	1,569.40	1,245.75	97.21	1,342.96	86	SEMI CRITICAL
15	MARCHINAICKENPALAYAM	1,400.57	1,100.15	59.28	1,159.43	83	SEMI CRITICAL
16	METTUPALAYAM	2,681.89	2,076.06	169.95	2,246.00	84	SEMI CRITICAL
17	OTTAKKAL MANDABAM	971.34	953.10	87.02	1,040.12	107	OVER EXPLOITED
18	PERIANEGAMAM	1,075.36	1,685.46	43.47	1,728.93	161	OVER EXPLOITED
19	PERIYANAICKENPALAYAM	1,191.16	1,324.74	113.80	1,438.54	121	OVER EXPLOITED
20	PERUR	829.57	359.70	321.18	680.88	82	SEMI CRITICAL
21	POLLACHI(N)	888.02	1,034.05	189.89	1,223.94	138	OVER EXPLOITED
22	POLLACHI(S)	1,518.17	1,700.93	256.31	1,957.24	129	OVER EXPLOITED
23	RAMAPATTINAM	1,773.52	1,956.10	655.56	2,611.66	147	OVER EXPLOITED
24	SARAVANAMPATTI	595.94	406.75	107.26	514.01	86	SEMI CRITICAL
25	SARKAR SAMAKULAM	888.54	743.05	62.30	805.35	91	CRITICAL
26	SELAKKARICHAL	942.45	1,108.34	42.91	1,151.25	122	OVER EXPLOITED

27	SINGANALLUR	275.17	92.80	357.44	450.24	164	OVER EXPLOITED
28	SULUR	883.63	816.85	137.51	954.36	108	OVER EXPLOITED
29	THONDAMUTHUR	1,471.30	1,470.00	90.68	1,560.68	106	OVER EXPLOITED
30	THUDIALUR	1,100.69	1,042.20	121.59	1,163.79	106	OVER EXPLOITED
31	VADACHITTUR	1,437.68	1,474.60	44.31	1,518.91	106	OVER EXPLOITED
32	VALPARAI	4,041.59	-	121.47	121.47	3	SAFE
33	VARAPATTI	1,619.72	1,989.40	63.75	2,053.15	127	OVER EXPLOITED
TOTAL		**44,950.83**	**37,775.17**	**5,131.28**	**42,906.45**	**95**	

4. Groundwater quality issues:

The rainfall is the main source for the availability of water both in surface and sub surface. The quantum of rainfall varies every year depending upon the monsoon. However, the extraction of surface and sub surface water is increasing year by year. It leads to environmental impact on the water sources like depletion of water level, deterioration of water quality. It makes the demand for the quantification of available water and also its quality for various purposes like agriculture, industries, drinking and domestic purposes.

For the present assessment, the value of Total Dissolved Solids (TDS) have been considered for demarcation of good / bad quality areas. For this purpose, the TDS value of less than or equal to 2000 mg/l have been considered as good quality and the value more than 2000 mg/l have been considered as bad quality areas.

The presence of fluoride in natural Ground Water is having its merits and demerits depending upon the concentration. Presence of fluoride <1.0 mg/l in drinking water reduces dental diseases whereas higher level > 1.50 mg/l will affect the health and causes dental fluoridise. Nitrate is noted significantly in Ground Water due to use of chemical fertilizer for agriculture and other local pollution rocks and soils are also contributing nitrate to Ground Water. Arsenic is another poisonous heavy metal in Ground Water. The allowable limits for drinking purposes are 0.05 mg/l.

In Coimbatore District, the quality of Ground Water generally ranges from moderate to good quality both in the shallow dug well and bore wells except in & around

the Kazhuveli tank, where the water quality is poor due to seawater intrusion in the lagoons during high tide seasons, the production of salt and Aquaculture farming.

5. Groundwater issues and challenges:

The groundwater quantity and quality are to be highlighted and may be analyzed in terms of :

(i)Problems posed by nature:

In terms of Quantitative aspects, nowadays, rainfall may more within the short period of duration. Due to this aspect, recharge is less and runoff will be more. The availability of groundwater is less due to over extraction than recharge. The Percentage of OE/Critical Firkas increased due to this reason. Increasing the artificial recharge structures in the proper areas may avoid the depletion of groundwater especially in OE/Critical Firkas.

(ii) Problems caused by anthropogenic activities:

The problems caused due to intensive groundwater extraction, intensive surface water irrigation, intensive mining activities, growing urban complexes and industrial establishments will lead to drastic depletion in groundwater resources only. Proper alternative recharge structures must be established.

(iii) Problems caused by socio-economic condition:

The land holdings of farmers may be different from another. One farmer having more than 5 Acres has less expense than a farmer having one acre. The free electric supply to all farmers have chance to extract more groundwater. To avoid this, proper guidance will be given to the farmers for the usage of groundwater.

(iv) Administrative issues:

To control, regulate and manage the Ground Water Resources in the State, there is no groundwater act, now in force. But, the **Chennai Metropolitan Area Ground Water (Regulation) Act, 1987** is in force and it extends to Chennai City and notified 302 revenue villages in Kanchipuram and Thiruvallur Districts, only.

The rest of Tamilnadu, **G.O.(Ms).No.142, Public Works (R2) Department, dated: 23.07.2014** and **G.O.(Ms).No.113, Public Works (R2) Dept , Dt:09.06.2016** are regulate and manage the groundwater resources. The Government of Tamil Nadu had enacted the **Tamil Nadu Ground Water (Development and**

Management) Act, 2003. However, this **Act was repealed on 14.09.2013**, in order to enact a comprehensive law to develop and manage the groundwater in the changed scenario in the State.

The pricing policy for groundwater users is also an important strategy in controlling the illegal extraction of groundwater by taking from lorries,etc. The unused dug wells and bore wells can be used as artificial recharge structures will be good concept in recharging the ground water.

6. Groundwater Management and Regulations:

(i) <u>Statute/Law/Policy/Regulations if any</u>:

The Central Ground Water Authority has been constituted to regulate, control, development and management of ground water resources for whole country based on overall situation prevailing in India. But, the ground water conditions are varying from State to State. **Ground Water is a State subject and the State Government has every right to protect and regulate their own precious ground water resources according to the prevailing conditions in the State.**

The Tamil Nadu Government had enacted **"The Tamil Nadu Ground Water (Development and Management) Act, 2003"** which was subsequently **repealed in 2013**, so as to bring out an effective management Act considering the present scenario. **As an interim measure, for regulating the exploitation of ground water, the Government have issued G.O. (Ms) No.142,PWD dated 23.07.2014 for regulations for management of ground water for safe guarding the scarce groundwater resources in Tamil Nadu State.** In the absence of an Act, the Government executes this Government order to control, regulate and manage the Ground Water Resources while taking into consideration of the future of the State and its people.

The State Ground and Surface Water Resources Data Centre has estimated the Ground Water resources of Tamil Nadu State periodically in co-ordination with the Central Ground Water Board, Government of India, SECR, Chennai,

based on the Methodology evolved by Ground Water Resources Estimation Committee, 1997 (GEC 97).

Accordingly, **the Ground Water Potential Assessment done as on January 1992 and as on January 1997 on the basis of Panchayat Union Blocks as assessment units** in Tamil Nadu and **categorized as Dark, Grey and White areas.** The Blocks with more than 85% to 100% ground water development were categorized as “Dark Blocks” and the blocks with ground water development between 65% to 85% were categorized as “Grey Blocks” and less than 65% ground water development were categorized as “White Blocks” and the Government approved the categorisation and released as Government order and G.O.No:326, PW (R2) Dept, dated: 23.11.1993. It was in effect up to the next assessment done as on March 2003.

Subsequently, **the Ground Water Potential Assessment done as on March 2003**, **categorized the blocks as Over Exploited, Critical, Semi Critical, Safe, Saline instead of Dark, Grey and White blocks**. The Blocks with more than 100% were categorized as “Over Exploited Blocks”, the blocks in between 90% to 100% as “Critical Blocks”, the blocks in between 65% to 90% as “Semi Critical Blocks” and less than 65% as “Safe Blocks” and the bad quality blocks were categorized as “Saline Blocks” and the same was approved by the Government and released as G.O.No:51, PW (R2) Dept, dated: 11.02.2004. It was in effect up to the next assessment done as on March 2009.

The Next **Ground Water Potential Assessment done as on March 2009**, and the same was approved by the Government and **released as G.O.No:52,PW(R2) Dept, dated: 02.03.2012.**

As per G.O.No.52,PW(R2) Dept, dated: 02.03.2012 and G.O. (Ms) No.142,PW(R2)Dept dated 23.07.2014, the State Government have authorized and empowered the Chief Engineer, State Ground and Surface Water Resources Data Centre, Chennai for issuing permission or license or No Objection Certificate/renewal for drawal and transportation of Ground Water based on the hydro geological conditions to the New Industries, Packaged Drinking Water Companies, Infrastructures and Mining

projects, etc except the areas to which the Chennai Metropolitan Area Ground Water (Regulation) Act,1987 extends.

Subsequently, the next **Ground Water Resources Assessment of the State was completed as on March 2011** and taking **Firka as an assessment unit** in the State of Tamil Nadu. Based on the above assessment, **the Government had approved and issued G.O.(Ms).No.113, Public Works (R2) Dept , Dt:09.06.2016** for categorisation of the Firkas in the State as Over Exploited, Critical, Semi-Critical and Safe Firkas. All the Over Exploited and Critical Firkas are notified as **"A" Category** (where the stage of ground water extraction is 90% and Above) and all the Semi Critical and Safe Firkas are notified as **"B" Category** (where the stage of ground water extraction is below 89%). In this Government Order, the Government had directed that **no Schemes should be formulated in the "A" Category Firkas and in "B" Category Firkas, all the Schemes should be formulated through State Ground and Surface Water Resources Data Centre by issuing No Objection Certificate for Ground Water Clearance.**

The term "Schemes" excludes Energisation of Agricultural pump sets by the Tamil Nadu Electricity Board. The present order may also exclude the Ground Water drawal for a). Domestic purpose by individual household, b). Domestic Infrastructure project (Housing), c).Government's Drinking Water Supply Schemes and d). non water based industries, (i.e.- the industries which do not require and use water, either as raw material or for other processing). However, the domestic use of water by this non water based industries will be permitted by the Chief Engineer / State Ground and Surface Water Resources Data Centre based on hydro geological conditions. (i.e. NOC from Chief Engineer, State Ground and Surface Water Resources Data Centre, Water Resources Department, Chennai). The list of non water based industries will be issued by the Industries Department of Government of Tamil Nadu separately.

Appropriate rain water harvesting and Artificial recharge schemes should be carried out in the categories viz , Over exploited , Critical , Semi Critical and Safe blocks of Tamil Nadu. While carrying out the above schemes, priority should be given to marginal quality and bad quality areas so as to avoid further deterioration.

All the schemes and proposals based on Ground Water will have to adhere to the Government orders and conditions. The Chief Engineer, State Ground and Surface Water Resources Data Centre had received the Government approval on Groundwater Assessment as on March 2011.

Regarding granting permission/ License for transportation of ground water for water suppliers/ private water tankers for selling the water on commercial basis, the State Ground and Surface Water Resources Data Centre, Public Works Department is not issuing any No Objection Certificate.

The Chief Engineer, SG&SWRDC have empowered to issue the NOC for drawal of Ground Water is up to 1 Million Gallons per day. Beyond this, the firms should get an approval in Water Utilisation Committee for drawal of both Surface and Ground Water resources in Tamil Nadu.

(ii) <u>Suggestions for improvement of groundwater governance</u>.

Groundwater is recognized as a common pool resource. The use of groundwater by anybody should in no way cause adverse impacts on realization of other person's fundamental right to safe water for life. Access to groundwater without any discrimination, equitable distribution, and sustainable use considering the needs of future generations are considered. Right to water for life is the first priority and then to agriculture, and eco system needs. The precautionary principle and the polluter pay principle only to conserve and recharge groundwater.

The responsibility of the State for ensuring every person's right to safe water even when water service is delegated to a private agency. Groundwater is not amenable to ownership by the State, communities or persons and the State is the public trustee of groundwater. It also deals elaborately on groundwater protection and groundwater security plans.

The Groundwater Act should incorporate legal pronouncement on groundwater such as the public, trust doctrine and recognition of the right to groundwater. It addresses the deficiencies in the present legal frame work in dealing with over exploitation and includes the improvements to the control mechanism to

ensure the qualitative and quantitative sustainability of groundwater resources. It proposes to strengthen the regulating powers of Panchayat and Municipal bodies related to Ground water in line with articles 243G and 243W of the constitution.

The Pricing of Ground Water for irrigation, Industrial and domestic purposes and collecting fees by water users association should be left to the State decision.

(iii) <u>Institutions governing/managing/monitoring the resources and Institutional structure, gaps if any</u> :

While framing the Groundwater Act, the recommendation for the constitution of (1) Gram Panchayat Groundwater Sub-Committee, (2) Block Panchayat Groundwater Management, (3) Ward Groundwater Committee, (4) Municipal Water Management Committee, (5) District Ground Water Council and (6) State Ground Water Advisory Council to control and manage Ground water should be considered.

- The constitution of aforesaid committees is completely based on administrative boundaries such as village, block, ward, municipality, district etc. But, with respect to water resources control and management issues and conflicts, the boundary should be based on river basins to have efficient monitoring and management of water resources. The Government of India, in all issues related to water resources considered only the basin boundary concept. Hence, the institutional frame work has to be revised so as to have the jurisdiction of the committees with respect to basin / watershed concept. Further, Government of India, MoWR, RD &GR advocates time and again integrated water resources management. The above institutional frame work separately for groundwater is not in line with that.
- Further, it has also provided for many committees, viz., Gram Panchayat Groundwater Sub-Committee, Village Water and Sanitation Committee, Ward Committee, Municipal Committee, Block level Committee, District level Committee and State level Committee. For managing surface water resource water users association already exists. Too many committees at village / ward level would

jeopardize the very purpose of managing the Groundwater resources efficiently and may invite lot of conflicts.

(iv) <u>Areas of people/private participation if any</u>:

The participation of people or private parties in the groundwater management is not suggestible, acceptable one and more chances of making litigations in the society and has unnecessary law and order problems may arise.

7. Tools and Methods

(i) Water Level and quality measurements through wells, piezometers, DWLR with telemetry, ground water elevation.

In general, water levels in the observation wells and piezometers can be taken manually by measuring tape. This is the simple, cost effective, good accuracy and less maintenance method. Water Levels are observed above the Measuring point.

Monitoring water level in DWLR with telemetry is costly, high maintenance, good accuracy, get the data immediately on desktop, easy to analysis purpose.

The water quality generally is analysed in the Chemical Lab only by collecting water samples in Pre Monsoon and post Monsoon period in the field. Sometimes, instant kits are used for analyzing the TDS and Ph level in the water.

(ii) Metering water supply to confirm contribution from groundwater.

Metering the water supply is essential one to monitor the overall usage of groundwater by different sectors. Flow meter must be fixed in every extraction structure and it has to be monitored periodically by Government officials.

8. Performance Indicators:

(i) Bench Marks/ Norms/ Standards and deviation from the norms/bench marks/ standards currently.

The Ground Water resources of State periodically estimated in co-ordination with the Central Ground Water Board, Government of India, SECR, Chennai,

based on the Norms evolved by Ground Water Resources Estimation Committee, 1997 (GEC 97).

The ground water potential assessment can be assessed based on the bench marks such as Average Rainfall, Total recharged Area, Monthly Water Level Data, Total no of wells in the area, Irrigation methods adopted, Cropping pattern details, Geological conditions prevailing in that area, Specific yield, Seepage factor, Constructed Artificial recharge structures, etc and various calculations methods, etc, have to be considered.

Status of various Performance Indicators

(ii) Percentage of over exploited ,critical, Semi critical , Safe and Saline/Poor quality Firkas/area units

- Trend of over exploited and critical Firkas to total Firkas as per pervious assessment. (2009 Assessment Vs 2011 Assessment)

  The Ground Water Potential Assessment as on March 2009, Out of 12 blocks in Coimbatore District, 6 blocks are categorized as Over Exploited and Critical blocks and remaining 6 blocks are categorized as Semi Critical and Safe blocks.

  The next Ground Water Resources Assessment of the State was done as on March 2011 and taking Firka as an assessment unit. In Coimbatore District, totally 33 Firkas, 22 Firkas are categorized as Over Exploited and remaining 11 Firkas are categorized as Semi Critical and Safe blocks.

  Instead of taking Block as an assessment, Firka can be taken as assessment unit is to concentrate the assessment in micro level. For Eg, a block contains more than three to four Firkas. In this block, two Firkas may have good groundwater potential than other two Firkas but it may to categorize as Over Exploited. To avoid this, assessment done on the basis of Firkas for the benefit of farmers to the implementation of schemes related to Irrigation.

  The percentage of over exploited and critical Firkas has been increased by changing the concept from Block to Firka assessment. The total percentage of over exploited and critical Blocks for 2009 Assessment is 50%,

but, the total percentage of over exploited and critical Firkas as on March 2011 Assessment is 66.66%, in the Coimbatore District.

- Trend of over exploited and critical Firkas to total Firkas as per latest assessment

  The percentage of over exploited and critical Firkas has been decreased in 2013 latest assessment when compared to 2011 assessment. In 2011 assessment, out of 33 Firkas, the total percentage of over exploited and critical Firkas is 66.66%, but, In 2013 assessment, out of 33 Firkas, it has been come down marginally to 69.69%, in the Coimbatore District.

- Existing state of groundwater resources as compared to previous assessment (2013 Vs 2011 assessment).

  Based on the Estimation of Ground Water Resources of Tamil Nadu State as on March 2013, Out of 33 Firkas in the District, 21 Firkas are categorized as “Over Exploited Firkas”, 2 Firkas are categorized as “Critical Firkas”, 8 Firkas are categorized as “Semi Critical Firkas”, 2 Firkas are categorized as “Safe Firkas”.

  Based on the Estimation of Ground Water Resources of Tamil Nadu State as on March 2011, Out of 33 Firkas in the District, 21 Firkas are categorized as “Over Exploited Firkas”, 1 Firkas are categorized as “Critical Firkas”, 9 Firkas are categorized as “Semi Critical Firkas”, 2 Firkas are categorized as “Safe Firkas”.

  When compared to last assessment as on March 2011, the “Over Exploited Firkas”maintains the same as 21 firkas, the “Critical Firkas” increased from 1 to 2 Firkas, the “Semi Critical Firkas” decreased marginally from 9 to 8 Firkas, the “Safe Firkas” maintains the same as 2 Firkas and the “Saline Firkas” remains Nil Firkas. The alteration of Firkas are due to the construction of Artificial Recharge structures such as Check Dams, Recharge Wells, Recharge shafts, percolation ponds; etc was constructed in the “Over Exploited Firkas” by various departments.

S.No	Categorisation	No of Firkas	
		2011	2013
1	Over Exploited	21	21
2	Critical	1	2
3	Semi Critical	9	8
4	Safe	2	2
5	Saline	Nil	Nil
TOTAL		33	33

(iii) Water Level(Well hydrographs and water level trends – pre and post monsoon such as declining trend/rising trend,etc).

(iv) Comparison of area irrigated from groundwater resources (Current assessment 2013 to previous assessment 2011).

S.No	Description	2011 Assessment	2013 Assessment
1	Area Irrigated from ground water resources(In hm)	6538.07	6505.06

(v) No. of groundwater abstraction structures (existing no. over the year and trends).

S.No	Description	2011 Assessment	2013 Assessment
1	No of groundwater abstraction structures for Irrigation	1,71,071 Wells	1,70,983 Wells

(vi) Trend in water quality (no of habitations affected with groundwater contamination like As, F, Salinity etc. Change in contamination level over the years.

(vii) Source augmentation (Groundwater)

- Area covered with infrastructure for recharging groundwater:

  The proper artificial recharge structures has to be constructed based on local geological conditions in the areas of existing infrastructure for recharging groundwater according to their extraction needs.

- GW recharge plan to combat adversaries:

  Groundwater recharge plans has to be strictly followed by with of implementing the groundwater laws to combat adversaries.

9. Reforms undertaken/being undertaken/proposed if any.

10. Road Map of activities/tasks proposed for better governance with timelines and agencies responsible for each task/activity.