CHAPTER 4.1.9 GROUND WATER RESOURCES

NAMAKKAL DISTRICT

INDEX

GROUND WATER REPORT OF NAMAKKAL 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 Geographical area of the District is 342930 Heatares accountingfor 2.64% of the geographical area of the Tamilnadu.

The Namakkal District comprises of 4 Taluks, 30 Firkas,15 Panchayat Unions, 346 village Panchayaths with 391 Revenue villages. Kolli Hillsand Mohanur blocks fall in two taluks partly.

Namakkal District is Totally bifurcated into 30 Firkas.

1. Hydrogelogy

(i) Major Geological formations:

Geology

The Namakkal district is mostly underlain by the Archaean crystalline, metamorphic complex. The Geology of the district is complicated due to recurring tectonic and magmatic activities occurred during the pre Cambrian period. The famous Sithampoondi complex known for its complex geology is situated in this district.

There are four major groups of rocks in this district. They are 1. The older granulite group 2. The meta sedimentary group 3. The ultramafic and basic intrusives and 4.The younger pegmatoid granites.

a) Gneisses:

Gneisses are perhaps the oldest rocks in the district occurring widely in plains covering the four taluks. The general direction of foliation varies from EW to ENE-WSW with a high magnitude dip towards north or southeast. The gneisses are highly weathered upto 30m at some places, several ultramafic and basic rocks parallel to the foliation of the gneisses.

b) Charnockites:

The charnockites, coarse grained and bluish darkto grey in colour, have the second largest coverage in the district. They are exposed in the Kolli hills and Bodamalai hills. Some of them are garnetiferous and are massive and less weathered than the gneisses. They exhibit 2 to 3 distinct set of joints most of which are vertical, with steep dips.

These rocks occur in the Godumalai, Chitteri, Nainamalai and Valaiyapatti areas of the district. Iron ore deposits are associated with quartz felspathic gneiss, garnetiferous quartz gneisses in Nainamalai area. These rocks are highly folded and jointed and less weathered.

c) Calc-quatrzites and crystalline lime stones:

These rocks are exposed in patches in Thiruchengode and namakkaltaluks. The thickness of the bands varies from a few metres to 10 m and the length extends to few kilometres. Their trend is in the NW-SE to NNW to SSE direction.

d) Anorthosites and Pyroxenites:

Massive and poorly jointed anorthosites bearing rocks are found near Sittampoondi complex. With a wide range of rocks associated with them are Chromite, pyroxenite, Anthophyllite, diopside, etc.,

e) Dolerite dykes and other intrusives:

There are a number of basic intrusive dykes in Namakkaltaluk. They are massive running in NE-SW to NNE SSW direction, in general parallel to the foliation direction of the gneisses. They are few metres in thickness and a few kilometres in length. Their contact with country rock is sheared at many places.

f) Granites and Syenites:

These types of rocks are found in Thiruchengodetaluk. They are massive and jointed poorly.

g) Laterites:

The physical weathering and leaching in the flat topped hillocks of Kolli hills have given rise to laterites rich in alumina. There are also few pockets of bauxite in these hills. The weathering ranges from 10 to 15m.

h) Alluvium and Talus

Thin Veneer of alluvium is found along the course of the Cauvery and Thirumanimuthar. However, alluvium of few metres thickness is found near the junction of the Thirumanimuthar with the river cauvery. The thickness of alluvium is 10-15 m in Paramathi – Velur area.

Talus consisting of cobbles and boulders is found at the foot hills of Kolli hills. Alluvium of 10 – 25 m thickness, which is important for groundwater development is found in the Nadukombai areas of Kolli hills.

Several faults and shears occurring mostly with NE-SW trend, are expected to influence the course of groundwater movement, its storage and developmental potentials in the district.

Drilling of bore holes:

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.

The State Ground and Surface Water Resources Data Centre, during the course of investigation has drilled 55 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. In general the drilled bore holes indicate that the weathered zone varies from 2 to 15 m below ground level, and jointed and fractured zone varies from 15 to 55 m below ground level.

Aquifer parameters

a) Hard rock formations:

The thickness of aquifer in this district varies between ground level and 45 m below ground level. The inter-granular porosity is essentially dependent upon the intensity and degree of weathering and fracture development in the bed rock. Weathering is deep in gneissic formation and moderate in charnockite formation. The range of aquifer parameters in hard rock area is given below.

Parameters	**Range**
Well yield in LPM	23-553lpm
Transmissivity (T) m^2/day	9-25 m^2/day
Permeability (K) m/day	0.26-1.63 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 Namakkal 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 Namakkal District, 206 observation wells and 56 piezometers,totally 262 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 Namakkal 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 Namakkal District. The analysis reveals that the water level has gone down in the north, west and central parts of the Namakkal 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 Namakkal District.

(iii) Existing network of Monitoring wells:

In Namakkal District, the existing network of monitoring wells is 262 wells, 206 wells are observation wells and 56 wells are piezometers. These wells are observed for every month water level.

Namakkal District: Observation Wells - Location and Co-ordinates

Well No	District	Tahsil / Taluk	Block / Mandal	Village	Latitude	Longitude
53607 AY	Namakkal	Namakkal	Erumaipatti	Mettupatti	11°05'40"	78°14'20"
53614 AY	Namakkal	Namakkal	Puduchatram	Elur	11°21'00"	78°06'35"
53616AY (A)	Namakkal	Namakkal	Mohanur	Palapatty	11°05'18"	78°04'35"
53617 AY	Namakkal	Namakkal	Paramathy	Velur	11°06'35"	78°00'40"
53619 AY	Namakkal	Namakkal	Paramathy	Nallur(Kandampalayam)	11°15'30"	78°00'40"
53622 AY	Namakkal	Namakkal	Kabilarmalai	Ayyampalayam	11°06'20"	77°53'40"
53851 AY	Namakkal	Rasipuram	Namagiripetai	Thimmanaickenpatti	11°35'20"	77°26'48"
53852 AY	Namakkal	Rasipuram	Namagiripetai	Malayalapatti	11°32'30"	78°19'25"
53854 AY	Namakkal	Rasipuram	Namagiripetai	Pudupatti	11°29'35"	78°16'30"
53855 A	Namakkal	Rasipuram	Namagiripetai	Namagiripet	11°27'17"	78°16'44"
53903 AY	Namakkal	Thiruchengodu	Elachipalayam	Velegoundanpatti	11°17'30"	78°03'40"
53904 AY	Namakkal	Thiruchengodu	Elachipalayam	Sanarpalayam	11°19'35"	78°02'35"
53906 AY	Namakkal	Thiruchengodu	Mallasamudram	Ramapuram	11°26'00"	78°00'45"
53907 AY	Namakkal	Thiruchengodu	Mallasamudram	Mallasamudram	11°29'10"	78°02'05"
53601	Namakkal	Namakkal	Sendamangalam	Naducombai	11°19'45"	78°18'25"

53602	Namakkal	Namakkal	Erumaipatti	Erumaipatti	11°08'55"	78°17'35"
53603	Namakkal	Namakkal	Sendamangalam	Kalkurichi	11°24'20"	78°15'40"
53604	Namakkal	Namakkal	Puduchatram	Solaiyudaiyampatti	11°20'55"	78°12'55"
53605	Namakkal	Namakkal	Sendamangalam	Pattathiyankuttai	11°18'15"	78°14'20"
53606	Namakkal	Namakkal	Erumaipatti	Muthugapatti	11°14'40"	78°14'00"
53607	Namakkal	Namakkal	Erumaipatti	Mettupatti	11°05'40"	78°14'20"
53608	Namakkal	Namakkal	Mohanur	Parali	11°06'55"	78°11'30"
53609	Namakkal	Namakkal	Mohanur	Aniyapuram	11°08'30"	78°09'05"
5361(A)	Namakkal	Namakkal	Mohanur	Palapatty	11°05'18"	78°04'35"
53610	Namakkal	Namakkal	Namakkal	Nallipalayam	11°14'15"	78°09'05"
53611	Namakkal	Namakkal	Puduchatram	Thalambadi	11°18'00"	78°09'20"
53612	Namakkal	Namakkal	Puduchatram	Manoochavadi	11°24'40"	78°09'45"
53612A	Namakkal	Namakkal	Namakkal	Moonuchavadi	-	-
53613	Namakkal	Namakkal	Puduchatram	Puduchatram	11°23'05"	78°09'55"
53613(A)	Namakkal	Namakkal	Puduchatram	Thathayangarpatti	11°23'05"	78°09'55"
53614	Namakkal	Namakkal	Puduchatram	Elur	11°21'00"	78°06'35"
53615	Namakkal	Namakkal	Namakkal	Ernapuram	11°14'35"	78°05'55"
53616(A)	Namakkal	Namakkal	Mohanur	Palapatty	11°05'18"	78°04'35"
53616A	Namakkal	Namakkal	Mohanur	Palapatty	11°05'18"	78°04'35"
53617	Namakkal	Namakkal	Paramathy	Velur	11°06'35"	78°00'40"
53618	Namakkal	Thiruchengodu		Sl Pudupalayam	12°21'40"	78°52'50"
53619	Namakkal	Namakkal	Paramathy	Nallur(Kandampalayam)	11°15'30"	78°00'40"

53620	Namakkal	Namakkal	Kabilarmalai	Kabilarmalai	11°08'40"	78°56'45"
53621	Namakkal	Namakkal	Kabilarmalai	Pandamangalam	11°06'05"	77°53'40"
53622	Namakkal	Namakkal	Kabilarmalai	Ayyampalayam	11°06'20"	77°53'40"
53622 AY	Namakkal	Namakkal	Kabilarmalai	Ayyampalayam	11°06'20"	77°53'40"
53622AY	Namakkal	Namakkal	Kabilarmalai	Ayyampalayam	11°06'20"	77°53'40"
53623	Namakkal	Namakkal	Sendamangalam	Pottanam	11°17'40"	78°14'40"
53624	Namakkal	Namakkal	Puduchatram	Elur	11°21'02"	78°06'31"
53625	Namakkal	Namakkal	Puduchatram	Vinaitheerthapuram	11°19'14"	78°10'36"
53626	Namakkal	Namakkal	Namakkal	Thirumalaipatti	11°21'37"	78°12'05"
53627	Namakkal	Namakkal	Puduchatram	Kalangani	11°20'07"	78°10'19"
53628	Namakkal	Namakkal	Puduchatram	S.Nattamangalam	11°37'33"	78°08'17"
53629	Namakkal	Namakkal	Senthamangalam	Belukurichi	11°23'08"	78°15'15"
53630	Namakkal	Namakkal	Senthamangalam	Kalappanaickenpatty	11°19'47"	78°15'02"
53631	Namakkal	Namakkal	Senthamangalam	Senthamangalam	11°16'48"	78°14'03"
53632	Namakkal	Namakkal	Erumaipatti	Kasthuripatti	11°08'28"	78°20'00"
53633	Namakkal	Namakkal	Erumaipatti	Varadharajapuram	11°07'51"	78°19'18"
53634	Namakkal	Namakkal	Namakkal	Vagurampatti	11°11'01"	78°10'36"
53635	Namakkal	Namakkal	Namakkal	Mudalaipatti	11°15'23"	78°09'55"
53636	Namakkal	Namakkal	Namakkal	Thipramadevi	11°08'17"	78°15'06"
53637	Namakkal	Namakkal	Namakkal	Pavithram	11°08'32"	78°21'46"
53638	Namakkal	Namakkal	Namakkal	Alanganatham	11°11'10"	78°15'19"
53638(A)	Namakkal	Namakkal	Erumaipatti	Pottireddipatti	11°10'08"	78°16'28"

53639	Namakkal	Namakkal	Namakkal	Vallipuram	11°12'19"	78°07'35"
53640	Namakkal	Namakkal	Elachipalayam	Iluppuli	11°21'11"	78°00'49"
53851	Namakkal	Rasipuram	Namagiripetai	Thimmanaickenpatti	11°35'20"	77°26'48"
53851 AY	Namakkal	Rasipuram	Namagiripettai	Thimmanaickenpatti	11°35'20"	77°26'48"
53851AY	Namakkal	Rasipuram	Namagiripetai	Thimmanaickenpatti	11°35'20"	77°26'48"
53852	Namakkal	Rasipuram	Namagiripetai	Malayalapatti	11°32'30"	78°19'25"
53852 AY	Namakkal	Rasipuram	Namagiripettai	Malayalapatti	11°32'30"	78°19'25"
53852AY	Namakkal	Rasipuram	Namagiripetai	Malayalapatti	11°32'30"	78°19'25"
53853	Namakkal	Rasipuram	Namagiripetai	Ayilpatti	11°32'40"	77°21'10"
53853(A)	Namakkal	Rasipuram	Namagiripettai	Ayilpatti	11°32'32"	78°20'32"
53854	Namakkal	Rasipuram	Namagiripetai	Pudupatti	11°29'35"	78°16'30"
53854 AY	Namakkal	Rasipuram	Namagiripettai	Pudupatti	11°29'35"	78°16'30"
53854AY	Namakkal	Rasipuram	Namagiripetai	Pudupatti	11°29'35"	78°16'30"
53855	Namakkal	Rasipuram	Namagiripetai	Namagiripet	11°27'17"	78°16'44"
53855 A	Namakkal	Rasipuram	Namagiripettai	Namagiripet	11°27'17"	78°16'44"
53855A	Namakkal	Rasipuram	Namagiripetai	Namagiripet	11°27'17"	78°16'44"
53856	Namakkal	Rasipuram	Rasipuram	Rasipuram	11°27'30"	78°11'30"
53856(A)	Namakkal	Rasipuram		Rasipuram	11°26'42"	78°10'44"
53856A	Namakkal	Rasipuram	Rasipuram	Rasipuram	11°27'30"	78°11'30"
53857	Namakkal	Rasipuram	Vennandur	Pallavanaickanpattimettur	11°32'20"	78°10'00"
53858	Namakkal	Rasipuram	Rasipuram	Singalandapuram	11°25'05"	78°13'28"

53858A	Namakkal	Rasipuram	Rasipuram	Singalandapuram	11°25'05"	78°13'28"
53859	Namakkal	Rasipuram	Rasipuram	Pillanallur	11°25'40"	78°07'55"
53860	Namakkal	Rasipuram	Vennandur	Ayeepalayam	11°30'30"	78°08'45"
53861	Namakkal	Rasipuram	Vennandur	Sowdapuram	11°28'30"	78°05'20"
53862	Namakkal	Rasipuram	Vennandur	Vennandur	11°30'42"	78°05'45"
53863	Namakkal	Rasipuram	Vennandur	Thengalpalayam	11°29'58"	78°09'50"
53864	Namakkal	Rasipuram	Vennandur	Karadiyanoor	11°29'16"	78°10'17"
53865	Namakkal	Rasipuram	Rasipuram	R.pudupalayam	11°28'53"	78°11'36"
53866	Namakkal	Rasipuram	Rasipuram	R.pattanam	11°28'24"	78°12'35"
53867	Namakkal	Rasipuram	Rasipuram	Pattanam Muniappampalayam	11°29'12"	78°13'52"
53868	Namakkal	Rasipuram	Namagiripettai	Seerapalli	11°27'21"	78°14'45"
53869	Namakkal	Rasipuram	Namagiripettai	Oduvankurichi	11°26'39"	78°14'49"
53870	Namakkal	Rasipuram	Namagiripettai	Mullukurichi	11°26'50"	78°24'03"
53871	Namakkal	Rasipuram	Vennandur	Nadupatti	11°29'20"	78°05'48"
53872	Namakkal	Rasipuram	Rasipuram	Vadugam	11°29'31"	78°14'50"
53873	Namakkal	Rasipuram	Namagiripettai	Easwaramoorthypalayam	11°34'09"	78°23'29"
53873(A)	Namakkal	Rasipuram	Namagiripettai	Easwaramoorthypalayam	11°34'07"	78°23'44"
53874	Namakkal	Rasipuram	Namagiripettai	Rajapalayam	11°30'25"	78°21'21"
53875	Namakkal	Rasipuram	Vennandur	Athanur	11°30'14"	78°08'12"
53876	Namakkal	Paramathivellur	Paramathi	Solasiramani	11°14'19"	77°52'26"
53877	Namakkal	Paramathivellur	Paramathi	Kothamangalam	11°06'13"	77°53'43"

53878	Namakkal	Paramathivellur	Kabilarmalai	Kabilakurichi	11°08'46"	77°57'03"
53879	Namakkal	Paramathivellur	Paramathi	Piranthagam	11°12'31"	78°02'32"
53880	Namakkal	Paramathivellur	Paramathi	Pillur	11°11'54"	78°01'16"
53881	Namakkal	Paramathivellur	Paramathi	Paramathi	11°09'15"	78°01'23"
53882	Namakkal	Paramathivellur	Kabilarmalai	Perunkurichi	11°11'47"	77°52'47"
53883	Namakkal	Paramathivellur	Paramathi	Sithampoondi	11°14'31"	77°53'15"
53884	Namakkal	Paramathivellur	Paramathi	Kunjampalayam	11°12'31"	78°00'17"
53885	Namakkal	Paramathivellur	Paramathi	Kunnamalai	11°13'01"	78°00'19"
53886	Namakkal	Paramathivellur	Kabilarmalai	Periyasolipalayam	11°09'09"	77°55'51"
53887	Namakkal	Paramathivellur	Paramathi	Kandipalayam	11°07'32"	77°53'29"
53888	Namakkal	Paramathivellur	Paramathi	Kolaram	11°20'24"	77°58'45"
53889	Namakkal	Paramathivellur	Kabilarmalai	Thidumalpudur	11°11'25"	77°55'22"
53901	Namakkal	Thiruchengodu	Elachipalayam	Vaiappamalai	11°25'05"	78°00'05"
53902	Namakkal	Thiruchengodu	Elachipalayam	Bommanpatti	11°07'15"	78°07'40"
53903	Namakkal	Thiruchengodu	Elachipalayam	Velegoundanpatti	11°17'30"	78°03'40"
53903 AY	Namakkal	Thiruchengode	Elachipalayam	Velegoundanpatti	11°17'30"	78°03'40"
53903(A)	Namakkal	Tiruchengode	Elachipalayam	Marukkalampatti	11°17'51"	78°04'16"
53903AY	Namakkal	Thiruchengodu	Elachipalayam	Velegoundanpatti	11°17'30"	78°03'40"
53904	Namakkal	Thiruchengodu	Elachipalayam	Sanarpalayam	11°19'35"	78°02'35"
53904 AY	Namakkal	Thiruchengode	Elachipalayam	Sanarpalayam	11°19'35"	78°02'35"
53904AY	Namakkal	Thiruchengodu	Elachipalayam	Sanarpalayam	11°19'35"	78°02'35"
53905	Namakkal	Thiruchengodu	Elachipalayam	Elachipalayam	11°23'10"	78°00'40"

53906	Namakkal	Thiruchengodu	Mallasamudram	Ramapuram	11°26'00"	78°00'45"
53906 AY	Namakkal	Thiruchengode	Mallasamudram	Ramapuram	11°26'00"	78°00'45"
53906AY	Namakkal	Thiruchengodu	Mallasamudram	Ramapuram	11°26'00"	78°00'45"
53907	Namakkal	Thiruchengodu	Mallasamudram	Mallasamudram	11°29'10"	78°02'05"
53907 AY	Namakkal	Thiruchengode	Mallasamudram	Mallasamudram	11°29'10"	78°02'05"
53907AY	Namakkal	Thiruchengodu	Mallasamudram	Mallasamudram	11°29'10"	78°02'05"
53908	Namakkal	Thiruchengodu	Elachipalayam	Morepalayam	11°28'40"	77°52'25"
53909	Namakkal	Thiruchengodu	Elachipalayam	Pathampatti	11°25'35"	77°57'50"
53910	Namakkal	Thiruchengodu	Elachipalayam	Unjanai	11°20'10"	77°58'00"
53911	Namakkal	Thiruchengodu	Thiruchengodu	Chithalandur	11°18'50"	77°55'30"
53912	Namakkal	Thiruchengodu	Thiruchengodu	Thiruchengodu	11°22'30"	77°54'00"
53913	Namakkal	Thiruchengodu	Pallipalayam	Makkiripalayam	11°25'20"	77°47'30"
53913A	Namakkal	Tiruchengode	Tiruchengode	Patharai	11°25'20"	77°47'30"
53913AY	Namakkal	Thiruchengodu	Pallipalayam	Makkiripalayam	11°25'20"	77°47'30"
53914	Namakkal	Thiruchengodu	Thiruchengodu	Erayamangalam	11°15'50"	77°50'05"
53914AY	Namakkal	Thiruchengodu	Thiruchengodu	Erayamangalam	11°15'50"	77°50'05"
53915	Namakkal	Thiruchengodu	Pallipalayam	Kokorayanpattai	11°18'56"	77°47'00"
53915(A)	Namakkal	Tiruchengode		Kokkarayanpettai	11°18'47"	77°47'11"
53915AY	Namakkal	Thiruchengodu	Pallipalayam	Kokorayanpattai	11°18'56"	77°47'00"
53916	Namakkal	Thiruchengodu	Pallipalayam	Komarapalayam	11°26'35"	77°41'20"
53916(A)	Namakkal	Tiruchengode		Komarapalayam	11°26'51"	77°41'39"
53917	Namakkal	Tiruchengode	Elachipalayam	Chinnamanali	11°22'34"	78°04'35"
53918	Namakkal	Thiruchengodu	Thiruchengodu	S.L.Pudupalayam	11°14'20"	77°58'07"

53919	Namakkal	Tiruchengode	Elachipalayam	Thondipattipudur	11°20'55"	78°04'24"
53920	Namakkal	Tiruchengode	Elachipalayam	Kilapalayam	11°21'44"	78°00'34"
53921	Namakkal	Tiruchengode	Mallasamudram	Suriyagoundampalayam	11°29'11"	78°01'13"
53922	Namakkal	Tiruchengode	Mallasamudram	Morangam	11°25'54"	78°04'10"
53923	Namakkal	Tiruchengode	Mallasamudram	Palamedu Pudur	11°11'25"	77°55'22"
53924	Namakkal	Tiruchengode	Mallasamudram	Kalipatti	11°31'03"	78°02'14"
53925	Namakkal	Tiruchengode	Elachipalayam	Akkalampatti	11°18'12"	78°04'20"
53926	Namakkal	Tiruchengode	Pallipalayam	Anangur	11°23'42"	77°49'19"
53927	Namakkal	Tiruchengode	Thiruchengode	Thokkavadi	11°21'53"	77°51'12"
53928	Namakkal	Tiruchengode	Thiruchengode	Chinnathambipalayam	11°25'06"	77°56'52"
53929	Namakkal	Tiruchengode	Pallipalayam	Pallakkapalayam	11°27'11"	77°46'44"
53930	Namakkal	Tiruchengode	Pallipalayam	Ilanthakuttai	11°24'07"	77°46'55"
53931	Namakkal	Tiruchengode	Thiruchengode	Sirumolasi	11°14'00"	77°51'49"
53932	Namakkal	Tiruchengode	Thiruchengode	Puliyampatti	11°18'54"	77°55'21"
53933	Namakkal	Tiruchengode	Thiruchengode	Piradai	11°17'15"	77°51'26"
53934	Namakkal	Tiruchengode	Thiruchengode	Emapalli	11°19'03"	77°50'17"
53935	Namakkal	Tiruchengode	Pallipalayam	Odapalli	11°19'35"	77°46'26"
53936	Namakkal	Namakkal	Tiruchengode	Patlur	13°01'26"	80°07'08"

Namakkal District - Piezometers - Location and Co-ordinates

Well No	District	Tashil/Taluk	Block/Mandal	Village	Latitude	Longitude
53616(A)	Namakkal	Paramathivellur	Paramathi	Palapatti	11.088333	78.076389
53624	Namakkal	Namakkal	Puduchatram	Elur	11.375833	78.113611
53912(A)	Namakkal	Tiruchengode	Tiruchengode	Thiruchengodu	11.375000	77.900000

53915(A)	Namakkal	Tiruchengode	Pallipalayam	Vittampalayam	11.315556	77.783333
HP1S13	Namakkal	Namakkal	Puduchatram	Puduchatram	11.384722	78.165278
HP1S13(A)	Namakkal	Namakkal	Puduchatram	Puduchatram	11.384722	79.165278
HP1S14	Namakkal	Namakkal	Puduchatram	Elur	11.350000	78.109722
HP1S15	Namakkal	Namakkal	Namakkal	Nallipalayam	11.237500	78.151389
HP1S16	Namakkal	Namakkal	Mohanur	Aniapuram	11.141667	78.151389
HP1S17	Namakkal	Namakkal	Erumaipatti	Muthagapatti	11.244444	78.233333
HP1S18	Namakkal	Namakkal	Erumaipatti	Erumaipatti	11.148611	78.293056
HP1S19	Namakkal	Namakkal	Erumaipatti	Mettupatti	11.094444	78.238889
HP1S20	Namakkal	Namakkal	Sendamangalam	Periyakulam	11.304167	78.238889
HP1S21	Namakkal	Namakkal	Sendamangalam	Nadukombai	11.329167	78.306944
HP2N01	Namakkal	Tiruchengode	Mallasamudram	Senbahamadevi	11.503056	77.991389
HP2N02	Namakkal	Tiruchengode	Mallasamudram	Ramapuram	11.438056	78.001111
HP2N03	Namakkal	Tiruchengode	Elachipalayam	Kuppandampalayam	11.394444	77.945833
HP2N04	Namakkal	Tiruchengode	Elachipalayam	Kokkalai	11.376944	78.053611
HP2N05	Namakkal	Tiruchengode	Mallasamudram	Morangam	11.435556	78.071389
HP2N06	Namakkal	Tiruchengode	Mallasamudram	Killakku Munjanur	11.444722	77.101944
HP2N07	Namakkal	Rasipuram	Rasipuram	Singalanthapuram	11.414167	78.223889
HP2N08	Namakkal	Rasipuram	Namagiripettai	Udayarpalayam	11.506389	78.354167
HP2N09	Namakkal	Rasipuram	Rasipuram	Easwaramoorthypalayam	11.570278	78.396667
HP2S04	Namakkal	Tiruchengode	Mallasamudram	Avinasipatti	11.416667	78.005556
HP2S05	Namakkal	Tiruchengode	Mallasamudram	Morangam	11.433333	78.077778
HP2S06	Namakkal	Tiruchengode	Pallipalayam	Odapalli	11.362778	77.766667
HP2S07	Namakkal	Tiruchengode	Pallipalayam	Padaiveedu	11.439444	77.811111
HP2S08	Namakkal	Tiruchengode	Tiruchengode	Emapalli	11.333333	77.841667
HP2S09	Namakkal	Rasipuram	Rasipuram	Vadugam	11.475000	78.213889
HP2S09(A)	Namakkal	Rasipuram	Rasipuram	Vadugam	11.475000	78.213889
HP2S10	Namakkal	Rasipuram	Vennandur	Puduppalayam	11.475000	78.188889
HP2S11	Namakkal	Rasipuram	Namagiripettai	Easwaramoorthypalayam	11.566667	78.400000
HP2S12	Namakkal	Paramathivellur	Paramathivellur	Ramadevam	11.247222	77.983333
HP2S13	Namakkal	Paramathivellur	Mohanur	Keelmugam	11.111111	78.052778
IBH-51748	Namakkal	Namakkal	Namakkal	Konur I	11.174444	78.074722
IBH-51749	Namakkal	Namakkal	Namakkal	Konur II	11.174444	78.074722
IBH-51750	Namakkal	Rasipuram	Rasipuram	Udayarpalayam	11.507500	78.354444
IBH-51751	Namakkal	Namakkal	Namakkal	Vagurampatti	11.179444	78.179722
IBH-51752	Namakkal	Namakkal	Namakkal	Valayapatti	11.123056	78.228889
MWSN01	Namakkal	Tiruchengode	Pallipalayam	Kadachanallur	11.366667	77.751389
MWSN02	Namakkal	Rasipuram	Rasipuram	Andalur Gate	11.445000	78.158333
MWSN03	Namakkal	Rasipuram	Vennandur	Alavaipatty	11.535278	78.125000
MWSN04	Namakkal	Tiruchengode	Pallipalayam	Kumarapalayam	11.443056	77.688889
MWSN05	Namakkal	Rasipuram	Namagiripettai	Mathuruttu	11.559722	78.450000
MWSN06	Namakkal	Rasipuram	Namagiripettai	Naraikinaru	11.488889	78.409722
MWSN07	Namakkal	Rasipuram	Namagiripettai	Moolaipallipatty	11.559444	78.313333
MWSN08	Namakkal	Rasipuram	Namagiripettai	Chalakkadu	11.421667	78.414167
MWSN09	Namakkal	Rasipuram	Namagiripettai	Mullukurichi	11.452778	78.400000

MWSN10	Namakkal	Namakkal	Erumaipatti	Palayapalayam	11.215556	78.240000
MWSN11	Namakkal	Namakkal	Erumaipatti	Kalisettipatti	11.152500	78.250833
MWSN12	Namakkal	Namakkal	Erumaipatti	Pavithram	11.142500	78.361111
MWSN13	Namakkal	Namakkal	Namakkal	Vasanthapuram	11.179444	78.186111
MWSN14	Namakkal	Namakkal	Mohanur	Rasipalayam	11.074167	78.152222
MWSN15	Namakkal	Paramathivellur	Kabilarmalai	Sirunalli Koil	11.181944	77.903333
MWSN16	Namakkal	Tiruchengode	Elachipalayam	Mugasi-kilapalayam	11.344444	77.991667
MWSN17	Namakkal	Rasipuram	Namagiripettai	Mangalapuram	11.564444	78.378333

(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 Namakkal 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

Stage of Ground water = Existing Gross Ground water Draft for all uses X 100
Development (%) Net annual Ground Water Availability

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 TamilNadu As on March 2013

District Summary

(in ha.m)

NAMAKKAL DISTRICT							
Sl.No (District))	**District**	**Net Annual Ground Water Availability**	**Existing Gross Ground Water Draft for Irrigation**	**Existing Gross Ground Water Draft for domestic and industrial water supply**	**Existing Gross Ground Water Draft for All uses (4+5)**	**Stage of Ground Water Development {(6/3)*100} %**	**No of Over Exploited Firkas**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1	NAMAKKAL	36,411.04	43,872.62	2,194.58	46,067.20	127	20

Firka Wise Summary

(in ha.m)

NAMAKKAL DISTRICT							
Sl.No	**Assessment Unit (Firka)**	**Net Annual Ground Water Availability**	**Existing Gross Ground Water Draft for Irrigation**	**Existing Gross Ground Water Draft for domestic and industrial water supply**	**Existing Gross Ground Water Draft for All uses (4+5)**	**Stage of Ground Water Development {(6/3)*100} %**	**Category of the Firka**
1	ALANGANATHAM	965.97	1,060.90	75.42	1,136.32	118	OVER EXPLOITED
2	ELACHIPALAYAM	2,973.17	2,849.40	71.39	2,920.79	98	CRITICAL
3	ERUMAIPATTI	1,334.09	1,881.38	79.48	1,960.86	147	OVER EXPLOITED
4	JEDARPALAYAM	2,081.26	1,745.43	42.39	1,787.81	86	SEMI CRITICAL
5	KALAPPANAIKANPATTI	1,494.17	2,574.15	44.75	2,618.90	175	OVER EXPLOITED
6	KUMARAPALAYAM	1,019.65	818.40	37.11	855.51	84	SEMI CRITICAL
7	MALLASAMUDRAM	966.67	1,145.80	34.07	1,179.87	122	OVER EXPLOITED
NAMAKKAL DISTRICT							
Sl.No	**Assessment Unit (Firka)**	**Net Annual Ground Water Availability**	**Existing Gross Ground Water Draft for Irrigation**	**Existing Gross Ground Water Draft for domestic and industrial water supply**	**Existing Gross Ground Water Draft for All uses (4+5)**	**Stage of Ground Water Development {(6/3)*100} %**	**Category of the Firka**
8	MANGALAPURAM	615.59	1,164.50	42.05	1,206.55	196	OVER EXPLOITED
9	MANICKAMPALAYAM	974.88	710.08	42.49	752.56	77	SEMI CRITICAL
10	MOHANUR	1,099.05	1,247.50	575.93	1,823.43	166	OVER EXPLOITED
11	MOLASI	2,000.42	1,316.70	240.12	1,556.82	78	SEMI CRITICAL
12	MULLUKURICHI					167	OVER

		1,100.72	1,800.70	41.32	1,842.02		EXPLOITED
13	NALLIPALAYAM	1,231.60	1,952.83	52.19	2,005.01	163	OVER EXPLOITED
14	NALLUR	838.91	1,956.70	39.77	1,996.47	238	OVER EXPLOITED
15	NAMAGIRIPETTAI	1,780.82	3,395.60	78.85	3,474.45	195	OVER EXPLOITED
16	NAMAKKAL	725.37	1,148.80	67.24	1,216.04	168	OVER EXPLOITED
17	PALLAPATTI	1,527.09	1,383.58	50.23	1,433.80	94	CRITICAL
18	PALLIPALAYAM	1,405.34	794.10	94.41	888.51	63	SAFE
19	PANDAMANGALAM	1,875.23	1,876.08	58.93	1,935.00	103	OVER EXPLOITED
20	PARAMATHI	1,452.67	1,832.10	23.68	1,855.78	128	OVER EXPLOITED
21	PUDUCHATRAM	741.64	1,162.36	42.53	1,204.89	162	OVER EXPLOITED
22	RASIPURAM	350.13	756.23	18.08	774.31	221	OVER EXPLOITED
23	SELLAPPAMPATTI	693.57	1,065.49	43.81	1,109.29	160	OVER EXPLOITED
24	SENTHAMAGALAM	1,075.80	2,298.53	36.12	2,334.64	217	OVER EXPLOITED
25	THIRUPULI NADU	701.73	139.70	21.15	160.85	23	SAFE
26	TIRUCHENGODE	1,226.91	828.10	56.37	884.47	72	SEMI CRITICAL
27	VAIYAPPAMALAI	792.49	1,317.20	36.16	1,353.36	171	OVER EXPLOITED
28	VALAIYAPATTI	868.03	1,358.25	33.98	1,392.23	160	OVER EXPLOITED
29	VALAVANTHI NADU	1,006.80	101.40	35.10	136.50	14	SAFE
30	VENNANDUR	1,491.27	2,190.68	79.49	2,270.17	152	OVER EXPLOITED
TOTAL		**36,411.04**	**43,872.62**	**2,194.58**	**46,067.20**	**127**	

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 Namakkal 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 15 blocks in Namakkal District, 8 blocks are categorized as Over Exploited and Critical blocks and remaining 7 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 Namakkal District, totally 30 Firkas, 18 Firkas are categorized as Over Exploited and remaining 12 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 53.33%, but, the total percentage of over exploited and critical Firkas as on March 2011 Assessment is 60%, in the Namakkal 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 30 Firkas, the total percentage of over exploited and critical Firkas is 60%, but, In 2013 assessment, out of 30 Firkas, it has been come down marginally to 73.33%, in the Namakkal 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 30 Firkas in the State, 20 Firkas are categorized as “Over Exploited Firkas”, 2 Firkas are categorized as “Critical Firkas”, 5 Firkas are categorized as “Semi Critical Firkas”, 3 Firkas are categorized as “Safe Firkas”.

Based on the Estimation of Ground Water Resources of Tamil Nadu State as on March 2011, Out of 30 Firkas in the State, 18 Firkas are categorized as “Over Exploited Firkas”, 8 Firkas are categorized as “Semi Critical Firkas”, 4 Firkas are categorized as “Safe Firkas”.

When compared to last assessment as on March 2011, the “Over Exploited Firkas” increased from 18 to 20 Firkas, the “Critical Firkas” increased from Nil to 2 Firkas, the “Semi Critical Firkas” decreased from 8 to 5 Firkas, the “Safe Firkas” decreased from 4 to 3 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	18	20
2	Critical	Nil	2
3	Semi Critical	8	5
4	Safe	4	3
5	Saline	Nil	Nil
TOTAL		30	30

(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.