CHAPTER 4.1.9 GROUND WATER RESOURCES

THIRUVALLUR DISTRICT

INDEX

GROUND WATER REPORT OF THIRUVALLUR 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 extent of Tiruvallur district is 3, 42,400 hectares accounting for 2.246 percent of the total geographical area of Tamil Nadu State. The district has well laid out roads and railway lines connecting all major towns within and outside the state. The National Highway No: 5 connecting Chennai and Calcutta is passing through this district. The geographical position of this district is North Latitude between 12º 10' 00" and 13º 15' 00" and East longitude between 79 º 15' 00" and 80º20'00".

Thiruvallur District is totally bifurcated into 46 Firkas.

1. Hydrogelogy

(i) Major Geological formations:

Geology:

The Thiruvallur district can be geologically classified into hard rock and sedimentary (alluvial) formation. This district is principally made up of Archaean, upper Gondwana and the tertiary formations. These are over laid by laterites and alluvium. The oldest of the crystalline rocks of Archaean age are of Biotite and Hornblende Gneiss, Charnockite and granite. These are intruded by Amphibole dykes, and occasionally with veins of quartz and pegmatites. Granites and gneisses of Archaean

age are mainly seen in Tiruthanitaluk. These crystalline rocks have under gone weathering to variable extent.

a) Upper Gondwana

The Upper Gondwana consists of clay shales, sandstones and conglomerates. These formations are encountered in Thiruvallur district. The sathyavedu conglomerates of upper Gondwana age are found in Tiruthani and Ponneritaluks.

b) Tertiary formations

These formations comprise of shales, clays and sandstones. Sandstones and clays are important members of tertiary group. It occurs interbedded with conglomerates and shales. They are normally coarse to medium grained, brown to yellow in colour and beds varying in thickness from few inches to massive beds. These clays, shales and sandstones of tertiary formation occur in Red hills and in Ponneritaluk.

c) Laterites and conglomerates

The area around Poondi, Vembedu Reserve forest has a covering of conglomerates. These are composed of boulders and small pebbles mostly quartzites. The laterites are found in small patches as a capping over the Upper Gondwana . Laterites are seen around Red hills lake, Cholavaram tank. Laterites are porous, cellular clay like rocks of red, yellow, brown, grey and mottled colour.

d) Alluvium

The alluvial deposits own their occurrence chiefly to the Korttalaiyar and Cooumriver. The Kortallaiyaralluvium consists of unconsolidated coarse grained sands, gravels, pebbles, clay, sandstones and kankar. The Cooumalluvium consists of silt, fine grained – coarse sands, gravels and pebbles. The thickness of this river alluvium is comparatively small.

Drilling of bore wells:

a) Aquifer parameters:

The occurrence and movement of groundwater in hard rock formations are restricted to open system of fractures like fissures and joints in unweatheredportion and

also in the porous zones of weathered formations. Generally, in hard rocks regions, occurrence of weathered layer is discontinuous both in space and depth. Hence the recharge in hard rock formation is influenced by the intensity of weathering. The sub surface conditions can be ascertained by drilling exploratory bore holes and conducting pump tests. Similarly in the sedimentary formations the coarse gravelly sand and connected media hold important functioning in the aquifer system. Alternate layer of clay and sand are the predominant factors observed during drilling in various parts of the district.

In thiruvallur district, the State Ground and Surface Water Resources Data Centre during the course of investigation has drilled number of boreholes spread over the entire district both in hard rock and sedimentary formations.

b) Hard rock

In Tiruthani, Pallipattu and R.K. Pet areas the hard rock formations begins with top sandy soil to a depth of 1.5 to 3 metres followed by highly weathered formation of granites and granitic gneisses upto 7.5 metres and then well fractured formation to a depth of 30 metres from ground level.

c) Sedimentary

Similarly in sedimentary formations in Tiruvallur, Ponneri, Sholavaram, Gummudipoondi, Poonamallee and Ambattur, layers of sand and aquifers with clay intercalations at depths are recorded. The select location of lithologged boreholes spread over entire district is appended and the strata gives an idea about the stratum of the sub surface.

(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 Thiruvallur District,115 observation wells and 42 piezometers,totally 229 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 Thiruvallur 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 Thiruvallur District. The analysis reveals that the water level has gone down in the north, west and central parts of the Thiruvallur 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 Thiruvallur District.

(iii) Existing network of Monitoring wells:

In Thiruvallur District, the existing network of monitoring wells is 229 wells, 115 wells are observation wells and 42 wells are piezometers. These wells are observed for every month water level.

Villupuram District Observation Wells - Location and Co-ordinates

Well No	District	Tahsil / Taluk	Block / Mandal	Village	Latitude	Longitude
33002	Villupuram	Gingee	Melmalaiyanur	Chinnanolambai	12°25'43"	79°20'02"
33003	Villupuram	Gingee	Melmalaiyanur	Peruvalur	12°24'18"	79°23'35"
33004	Villupuram	Gingee	Melmalaiyanur	Avalurpet	12°20'09"	79°14'25"
33005A	Villupuram	Gingee	Melmalaiyanur	Melmalaiyanur	12°20'17"	79°20'07"
33006	Villupuram	Gingee	Melmalaiyanur	Annamangalam	12°20'00"	79°23'44"
33007	Villupuram	Gingee	Vallam	Melolakkur	12°20'06"	79°29'11"
33008	Villupuram	Tindivanam	Olakkur	Vadasiruvalur	12°19'39"	79°35'08"
33009	Villupuram	Tindivanam	Olakkur	Vairapuram	12°18'54"	79°39'39"
33010 A	Villupuram	Tindivanam	Olakkur	Padhiri	12°19'02"	79°45'51"
33011	Villupuram	Tindivanam	Marakkanam	Nagar	12°14'39"	79°50'32"
33012	Villupuram	Tindivanam	Marakkanam	Kilsevur	12°14'39"	79°45'26"
33013	Villupuram	Tindivanam	Olakkur	Salavathy	12°15'03"	79°40'23"
33014	Villupuram	Tindivanam	Mailam	Salai	12°15'03"	79°34'46"
33015	Villupuram	Gingee	Vallam	Nattarmangalam	12°15'22"	79°30'14"

33018	Villupuram	Gingee	Melmalaiyanur	Melpappampadi	12°14'50"	79°15'12"
33019A	Villupuram	Gingee	Gingee	Nallanpillaipetra l	12°11'37"	79°15'13"
33020	Villupuram	Gingee	Gingee	Devadanampett ai	12°11'09"	79°20'25"
33021A	Villupuram	Gingee	Gingee	Karai	12°09'15"	79°25'03"
33022	Villupuram	Gingee	Vallam	Kalladikuppam	12°10'15"	79°29'29"
33023A	Villupuram	Tindivanam	Mailam	Alagramam	12°09'56"	79°34'26"
33024	Villupuram	Tindivanam	Marakkanam	Omandur	12°09'47"	79°41'38"
33025	Villupuram	Vanur	Vanur	Peravur	12°09'43"	79°45'36"
33026	Villupuram	Tindivanam	Marakkanam	Munnur	12°10'45"	79°48'52"
33029	Villupuram	Vanur	Vanur	Kiliyanur	12°06'30"	79°44'40"
33030	Villupuram	Vanur	Vanur	Perumpakkam	12°05'40"	79°39'28"
33031	Villupuram	Tindivanam	Mailam	Padirappuliyur	12°05'43"	79°35'29"
33033	Villupuram	Villupuram	Kanai	Kalyanampundi	12°05'21"	79°25'23"
33034	Villupuram	Villupuram	Kanai	Pudukaruvatchi	12°05'29"	79°20'30"
33035	Villupuram	Sankarapuram	Sankarapuram	Vadaponparapp i	11°59'57"	78°57'08"
33036	Villupuram	Sankarapuram	Rishivandhiyam	Vadamamandur	12°00'09"	79°00'08"
33037	Villupuram	Sankarapuram	Rishivandhiyam	Kallippadi	11°59'53"	79°04'36"
33039	Villupuram	Thirukkoilur	Mugaiyur	Vadakaraithaya nur	11°59'48"	79°14'56"
33040	Villupuram	Thirukkoilur	Mugaiyur	Karanai	11°59'34"	79°20'08"
33044A	Villupuram	Vanur	Vanur	Vanur	12°01'55"	79°44'28"
33051	Villupuram	Thirukkoilur	Thirukkoilur	Thanaganandal	11°54'49"	79°10'36"
33053	Villupuram	Sankarapuram	Rishivandhiyam	Ariyalur	11°55'39"	78°59'50"
33054	Villupuram	Sankarapuram	Sankarapuram	Sankarapuram	11°53'12"	78°54'53"
33057	Villupuram	Sankarapuram	Rishivandhiyam	Palayasiruvang ur	11°49'10"	78°59'51"
33058	Villupuram	Sankarapuram	Rishivandhiyam	Rishivandhiyam	11°48'47"	79°05'41"
33059A	Villupuram	Ulundurpet	Ulundurpet	Kattusellur	11°50'43"	79°10'26"
33060	Villupuram	Ulundurpet	Ulundurpet	Nattamur	11°50'18"	79°14'13"
33062A	Villupuram	Ulundurpet	Ulundurpet	Padurcolony	11°44'07"	79°20'58"
33063A	Villupuram	Ulundurpet	Ulundurpet	Neyvanai Colony	11°46'07"	79°14'26"
33064A	Villupuram	Ulundurpet	Ulundurpet	Thottikunjaram	11°45'52"	79°10'59"
33065A	Villupuram	Kallakurichi	Thiyagadurgam	Thiyagadurgam	11°44'34"	79°04'23"
33066A	Villupuram	Kallakurichi	Kallakurichi	Kallakurichi	11°44'44"	78°57'48"
33067 A	Villupuram	Kallakurichi	Chinnasalem	Mattigaikurichi	11°44'30"	78°55'00"
33070A	Villupuram	Kallakurichi	Kallakurichi	Kaniyamur	11°39'34"	78°54'01"
33071A	Villupuram	Kallakurichi	Thiyagadurgam	Virugavur	11°41'08"	79°02'53"
33072 A	Villupuram	Kallakurichi	Thiyagadurgam	Nagalur	11°39'45"	79°04'46"
33074	Villupuram	Ulundurpet	Ulundurpet	Pullur	11°39'14"	79°15'58"
33076	Villupuram	Kallakurichi	Thiyagadurgam	Erangi	11°36'00"	79°10'30"
33077	Villupuram	Kallakurichi	Thiyagadurgam	Asakalathur	11°36'45"	79°04'00"
33078	Villupuram	Kallakurichi	Chinnasalem	Nainarpalayam	11°34'30"	78°55'00"
33079	Villupuram	Kallakurichi	Kallakurichi	Madur	11°44'06"	79°01'24"
33080	Villupuram	Ulundurpet	Ulundurpet	Pu. Konalavadi	11°44'11"	79°16'00"

33088	Villupuram	Sankarapuram	Sankarapuram	Viriyur	11°52'37"	78°57'53"
33089	Villupuram	Sankarapuram	Rishivandhiyam	Tholuvanthangal	11°56'27"	78°58'10"
33090	Villupuram	Thirukkoilur	Thiruvennainallur	Thiruvennainallur	11°52'17"	79°21'39"
OW11100	Villupuram	Villupuram	Koliyanur	Panampattu	11°55'35"	79°31'06"
OW11101	Villupuram	Villupuram	Kanai	Agaramsithamur	11°58'50"	79°24'54"
OW11102	Villupuram	Villupuram	Koliyanur	Thennamadevi	11°59'12"	79°28'57"
OW11103	Villupuram	Villupuram	Vikkiravandi	Poondi	12°03'21"	79°28'05"
OW11104	Villupuram	Villupuram	Vikkiravandi	Muttathur	12°06'45"	79°26'45"
OW11105	Villupuram	Villupuram	Vikkiravandi	Melakondhai	12°03'37"	79°31'48"
OW11106	Villupuram	Villupuram	Koliyanur	Kappiyampuliyur	11°58'37"	79°32'09"
OW11107	Villupuram	Villupuram	Kanai	Pagandai	11°58'38"	79°35'13"
OW11108	Villupuram	Gingee	Melmalaiyanur	Eyyil	12°24'58"	79°19'41"
OW11109	Villupuram	Gingee	Gingee	Jambothi	12°13'06"	79°28'21"
OW11110	Villupuram	Gingee	Vallam	Kambandhur	12°13'18"	79°29'48"
OW11111	Villupuram	Gingee	Vallam	Solakunnam	12°21'22"	79°25'34"
OW11112	Villupuram	Gingee	Gingee	Kanakankuppam	12°08'52"	79°20'03"
OW11113	Villupuram	Gingee	Gingee	Mazhavanthangal	12°05'30"	79°16'45"
OW11114	Villupuram	Tindivanam	Marakkanam	Earaiyanur	12°12'53"	79°39'56"
OW11115	Villupuram	Tindivanam	Mailam	Manampoondi	12°17'02"	79°33'43"
OW11116	Villupuram	Tindivanam	Mailam	Peramandur	12°12'39"	79°35'27"
OW11117	Villupuram	Tindivanam	Mailam	Thenkalavai	12°10'45"	79°39'00"
OW11118	Villupuram	Vanur	Vanur	Siruvai	12°03'08"	79°36'24"
OW11119	Villupuram	Vanur	Vanur	Nallavur	12°08'11"	79°45'52"
OW11120	Villupuram	Vanur	Vanur	V.parangani	12°03'47"	79°40'49"
OW11228	Villupuram	Sankarapuram	Rishivandhiyam	Kadambur	11°56'07"	79°03'38"
OW11229	Villupuram	Sankarapuram	Sankarapuram	Nedumanur	11°50'42"	78°54'20"
OW11230	Villupuram	Sankarapuram	Sankarapuram	S.Sellampattu	11°51'21"	78°51'17"
OW11231	Villupuram	Sankarapuram	Sankarapuram	Mukkaiyur	11°56'55"	78°55'37"
OW11232	Villupuram	Sankarapuram	Sankarapuram	Rangappanur	11°57'59"	78°53'11"
OW11233	Villupuram	Sankarapuram	Sankarapuram	Manalur	12°01'12"	78°56'02"
OW11234	Villupuram	Sankarapuram	Sankarapuram	Erudaiyanpattu	12°01'07"	78°59'29"
OW11235	Villupuram	Sankarapuram	Rishivandhiyam	Thiruvarangam	11°59'57"	79°03'42"
OW11236	Villupuram	Sankarapuram	Sankarapuram	Alathur	11°47'02"	78°56'49"
OW11409	Villupuram	Kallakurichi	Kallakurichi	Emaper	11°42'47"	78°57'02"
OW11410	Villupuram	Kallakurichi	Kallakurichi	Indhili	11°41'08"	78°55'30"
OW11411	Villupuram	Kallakurichi	Chinnasalem	Rayappanur	11°36'30"	78°48'49"
OW11412	Villupuram	Kallakurichi	Kallakurichi	Melur	11°40'47"	78°55'54"
OW11413	Villupuram	Kallakurichi	Kallakurichi	Sembadakurichi	11°47'05"	78°54'22"
OW11414	Villupuram	Kallakurichi	Chinnasalem	Eliayathur	11°42'46"	78°52'49"
OW11415	Villupuram	Kallakurichi	Chinnasalem	Karundalakurichi	11°33'04"	78°54'52"
OW11416	Villupuram	Kallakurichi	Chinnasalem	Veerapayangaram	11°32'41"	78°52'23"

OW11417	Villupuram	Kallakurichi	Kallakurichi	Tenthorasalur	11°39'17"	78°58'38"
OW11418	Villupuram	Ulundurpet	Thirunavalur	Pillaiyarkuppam	11°49'45"	79°27'50"
OW11419	Villupuram	Ulundurpet	Thirunavalur	Parikkal	11°47'30"	79°21'59"
OW11420	Villupuram	Ulundurpet	Thiruvennainallur	Mamandhur	11°48'50"	79°25'05"
OW11421	Villupuram	Kallakurichi	Chinnasalem	Komuki Dam	11°46'45"	78°50'15"
OW11422	Villupuram	Thirukkoilur	Mugaiyur	Manalurpettai	12°00'30"	79°05'20"
OW11423	Villupuram	Thirukkoilur	Thiruvennainallur	Sithilingamadam	11°55'06"	79°17'31"
OW11424	Villupuram	Thirukkoilur	Thiruvennainallur	Siruvanur	11°53'50"	79°22'55"
OW11425	Villupuram	Tindivanam	Olakkur	Endiyur	12°12'40"	79°41'59"
OW11426	Villupuram	Tindivanam	Marakkanam	Alathur	12°13'29"	79°52'38"
OW11427	Villupuram	Tindivanam	Marakkanam	Kurumbaram	12°12'52"	79°52'53"
OW11428	Villupuram	Tindivanam	Mailam	Kodima	12°10'11"	79°35'55"
OW11429	Villupuram	Vanur	Vanur	Karasanur	12°04'11"	79°40'15"
U33005A	Villupuram	Villupuram	Kandamangalam	Pallippuduppattu	11°52'54"	79°39'21"
U33006A	Villupuram	Villupuram	Kandamangalam	Pakkam	11°52'02"	79°40'33"
U33007	Villupuram	Villupuram	Kandamangalam	Mandagappattu	11°52'56"	79°40'01"
U33010	Villupuram	Villupuram	Kandamangalam	Kumulam	11°57'14"	79°37'47"
U33013	Villupuram	Villupuram	Koliyanur	Kilperumpakkam	11°56'47"	79°30'47"
U33015A	Villupuram	Villupuram	Vikkiravandi	Radhapuram	12°00'01"	79°35'25"
U33019	Villupuram	Villupuram	Koliyanur	Orukodi	11°55'43"	79°26'18"
U33064A	Villupuram	Ulundurpet	Thirunavalur	Serndanadu	11°42'40"	79°25'10"

Thiruvallur District- Piezometers - Location and Co-ordinates

Well no	District	Tashil/Taluk	Block/Mandal	Village	Latitude	Longitude
PZ130244795624	Thiruvallur	Thiruvallur	Kadambathur	Illupur	13.045556	79.940000
PZ130300800630	Thiruvallur	Poonamallee	Poonamallee	Poonamallee	13.050000	80.108333
PZ130341800258	Thiruvallur	Poonamallee	Poonamallee	Thirumazhisai	13.061389	80.049444
PZ130424795105	Thiruvallur	Thiruvallur	Kadambathur	Pudhumavilangai	13.073333	79.851389
PZ130452801041	Thiruvallur	Ambatthur	Ambathur	Mugapair West	13.081111	80.178056
PZ130512795430	Thiruvallur	Thiruvallur	Kadambathur	Melnallathur	13.086667	79.908333
PZ130522400810	Thiruvallur	Ambatthur	Ambathur	Iyapakkam	13.089444	80.136111
PZ130547795134	Thiruvallur	Thiruvallur	Kadambathur	Kadambathur	13.096389	79.859444
PZ130623792204	Thiruvallur	Pallipattu	R.k.pet	Peddaramapuram	13.106111	79.367778
PZ130705800622	Thiruvallur	Ambattur	Villivakkam	Avadi	13.118056	80.106111
PZ130736795437	Thiruvallur	Thiruvallur	Thiruvallur	Thiruvallur	13.134722	79.911111
PZ130912800310	Thiruvallur	Poonamallee	Ambathur	Palavedu	13.153333	80.052778
PZ131012792617	Thiruvallur	Pallipattu	R.K.Pet	R.K.Pet	13.151389	79.438889
PZ131024793014	Thiruvallur	Tiruthani	Tiruthani	Beerakuppam	13.163889	79.508333
PZ131057793532	Thiruvallur	Tiruthani	Thirutani	Dharanivaraghapuram	13.150000	78.550000
PZ131149794305	Thiruvallur	Tiruthani	Thiruvalangadu	Illuppur	13.196944	79.718056
PZ131232795357	Thiruvallur	Thiruvallur	Poondi	Neyveli	13.209167	79.899167

PZ131241794244	Thiruvallur	Tiruthani	Thiruvalangadu	Arcot Kuppam	13.205556	79.713889
PZ131251800520	Thiruvallur	Uthukottai	Ellapuram	Puchi Attipattu	13.212500	80.087778
PZ131258795639	Thiruvallur	Thiruvallur	Poondi	Monnavedu	13.216111	79.944167
PZ131346794027	Thiruvallur	Tiruthani	Thiruvalangadu	Arungulam	13.229444	79.674167
PZ131346800133	Thiruvallur	Thiruvallur	Thiruvallur	Thamaraipakkam	13.229444	80.025833
PZ131350793553	Thiruvallur	Tiruthani	Thiruvalangadu	Ponpadi	13.227778	79.600000
PZ131420801200	Thiruvallur	Ponneri	Cholavaram	Budur	13.238889	80.200000
PZ131437792621	Thiruvallur	Pallipattu	Pallipattu	Athamanjeri	13.252778	79.438889
PZ131531801524	Thiruvallur	Ponneri	Cholavaram	Seemavaram	13.263889	80.255556
PZ131540800528	Thiruvallur	Uthukottai	Ellapuram	Neyveli	13.261111	80.091111
PZ131648801709	Thiruvallur	Ponneri	Minjur	Koranjur	13.280556	80.286111
PZ131733801301	Thiruvallur	Ponneri	Minjur	Mettupalayam	13.291667	80.216667
PZ131754801541	Thiruvallur	Ponneri	Minjur	Kalpakkam	13.298611	80.263889
PZ131815800937	Thiruvallur	Ponneri	Cholavaram	Andar Kuppam	13.304167	80.158333
PZ131822795809	Thiruvallur	Uthukottai	Ellapuram	Lachivakkam	13.306111	79.969167
PZ131843800021	Thiruvallur	Uthukottai	Ellapuram	Thandalam	13.312222	80.005833
PZ131844801241	Thiruvallur	Ponneri	Minjur	Pulikulam	13.312222	80.211111
PZ131941800652	Thiruvallur	Ponneri	Cholavaram	Chinnambedu	13.328056	80.114444
PZ131948792625	Thiruvallur	Pallipattu	Pallipattu	Pallipattu	13.331944	79.447222
PZ132111801701	Thiruvallur	Ponneri	Minjur	Kattur	13.353056	80.283611
PZ132156801209	Thiruvallur	Ponneri	Minjur	Uppalam	13.365556	80.202500
PZ132718800455	Thiruvallur	Gummidipoondi	Gummidipoondi	Kongal	13.452778	80.083333
PZ132804800944	Thiruvallur	Gummidipoondi	Gummidipoondi	Kanlur	13.467778	80.162222
PZ132807800946	Thiruvallur	Gummidipoondi	Gummidipoondi	Rakkampalayam	13.466667	80.163889

(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 Villupuram 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 TamilNadu As on March 2013

District Summary

(in ha.m)

THIRUVALLUR 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	THIRUVALLUR	70,462.05	29,548.04	18,598.82	48,146.86	68	4

Firka Wise Summary

(in ha.m)

THIRUVALLUR 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	AMBATTUR	1,279.60	121.00	1,165.63	1,286.63	101	OVER EXPLOITED
2	AMMANAMBAKKAM	1,267.85	727.50	255.78	983.28	78	SEMI CRITICAL

3	ARANI	1,853.89	480.00	735.80	1,215.80	66	SAFE
4	AVADI	698.19	103.75	453.73	557.48	80	SEMI CRITICAL
5	BALAPURAM	1,068.95	1,028.35	22.72	1,051.07	98	CRITICAL
6	CHERUKKANOOR	1,347.16	1,047.24	334.91	1,382.15	103	OVER EXPLOITED
7	ELAVUR	2,778.85	754.50	597.27	1,351.77	49	SAFE
THIRUVALLUR DISTRICT							
SI.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	ERUMBI	699.22	632.90	24.02	656.92	94	CRITICAL
9	GNAYIRU	2,259.21	863.45	448.43	1,311.88	58	SAFE
10	GUMMIDIPOONDI	1,620.88	885.23	586.24	1,471.47	91	CRITICAL
11	KADAMBATHUR	2,165.75	885.55	1,086.64	1,972.19	91	CRITICAL
12	KANAGAMMACHATTRAM	1,296.34	935.30	49.48	984.78	76	SEMI CRITICAL
13	KANNIGAIPAIR	2,060.95	842.70	1,051.37	1,894.07	92	CRITICAL
14	KATTUR	1,870.94	555.50	893.40	1,448.90	77	SEMI CRITICAL
15	KOLUR	2,090.58	859.90	544.98	1,404.88	67	SAFE
16	MADHARPAKKAM	2,698.77	534.25	738.49	1,272.74	47	SAFE
17	MADHAVARAM	261.97	109.80	106.95	216.75	83	SEMI CRITICAL
18	MADURAVOIL	644.95	252.65	146.25	398.90	62	SAFE
19	MANAVOR	930.75	414.05	1.20	415.25	45	SAFE
20	MAPPEDU	1,401.32	560.70	722.63	1,283.33	92	CRITICAL
21	MINJUR	-	-	-	-	--	SALINE
22	MORAI	1,582.03	636.03	533.57	1,169.60	74	SEMI CRITICAL
23	PALLIPATTU	1,369.68	1,155.60	56.36	1,211.96	88	SEMI CRITICAL
24	PANDUR	2,591.94	474.15	91.60	565.75	22	SAFE
25	PENNALURPETT	1,695.06	495.60	270.96	766.56	45	SAFE

26	PERIYAPALAYAM	1,759.32	611.75	642.40	1,254.15	71	SEMI CRITICAL
27	PONNERI	2,396.41	903.60	650.78	1,554.38	65	SAFE
28	POONAMALLEE	688.06	169.80	337.18	506.98	74	SEMI CRITICAL
29	POONDI	1,438.71	511.45	218.44	729.89	51	SAFE
30	POONIMANGADU	1,008.62	847.00	14.21	861.21	85	SEMI CRITICAL
31	POOVALAMBEDU	2,414.63	655.05	399.11	1,054.16	44	SAFE
32	POTHATTURPETTAI	1,436.07	1,018.35	43.79	1,062.14	74	SEMI CRITICAL
33	R.K.PET	1,111.62	1,112.00	44.90	1,156.90	104	OVER EXPLOITED
34	REDHILLS	700.54	50.43	405.08	455.51	65	SAFE
35	SHOLAVARAM	1,498.25	811.40	89.94	901.34	60	SAFE
36	THIRUMAZHISAI	1,430.65	387.90	696.93	1,084.83	76	SEMI CRITICAL
37	THIRUNINRAVUR	741.04	217.80	495.51	713.31	96	CRITICAL
38	THIRUPALAIVANAM	2,027.30	576.90	260.24	837.14	41	SAFE
39	THIRUVALANGADU	1,177.37	640.70	29.85	670.55	57	SAFE
40	THIRUVALLUR	1,949.83	457.35	282.42	739.77	38	SAFE
41	TIRUR	1,987.80	610.05	257.54	867.59	44	SAFE
42	TIRUTTANI	1,203.29	832.20	72.55	904.75	75	SEMI CRITICAL
43	UTHUKKOTTAI	2,336.94	1,492.40	634.46	2,126.86	91	CRITICAL
44	VELAKAPURAM	1,777.61	1,082.80	175.69	1,258.49	71	SEMI CRITICAL
45	VELLIYUR	2,224.22	991.55	474.64	1,466.19	66	SAFE
46	VENGATHUR	1,618.96	211.88	1,454.76	1,666.63	103	OVER EXPLOITED
TOTAL		**70,462.05**	**29,548.04**	**18,598.82**	**48,146.86**	**68**	

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 Thiruvallur 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 14 blocks in Thiruvallur District, 6 blocks are categorized as Over Exploited and remaining 8 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 Thiruvallur District, totally 46 Firkas, 14 Firkas are categorized as Over Exploited and remaining 32 Firkas are categorized as Semi Critical and Safe blocks and Saline.

  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 42.85%, but, the total percentage of over exploited and critical Firkas as on March 2011 Assessment is 52.17%, in the Thiruvallur 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 46 Firkas, the total percentage of over exploited and critical Firkas is 52.17%, but, In 2013 assessment, out of 46 Firkas, it has been come down marginally to 26.08%, in the Thiruvallur 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 46 Firkas in the District, 4 Firkas are categorized as “Over Exploited Firkas”, 8 Firkas are categorized as “Critical Firkas”, 14 Firkas are categorized as “Semi Critical Firkas”, 19 Firkas are categorized as “Safe Firkas”, 1 Firkas are categorized as “Saline”.

Based on the Estimation of Ground Water Resources of Tamil Nadu State as on March 2011, Out of 46 Firkas in the District, 4 Firkas are categorized as “Over Exploited Firkas”, 8 Firkas are categorized as “Critical Firkas”, 14 Firkas are categorized as “Semi Critical Firkas”, 19 Firkas are categorized as “Safe Firkas”, 1 Firkas are categorized as “Saline”.

When compared to last assessment as on March 2011, the “Over Exploited Firkas” comes down from 12 to 4 Firkas, the “Critical Firkas” increased from 2 to 8 Firkas, the “Semi Critical Firkas” increased marginally from 11 to 14 Firkas, the “Safe Firkas” decreased from 20 to 19 Firkas and the “Saline Firkas” maintains same as 1 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	12	4
2	Critical	2	8
3	Semi Critical	11	14
4	Safe	20	19
5	Saline	1	1
TOTAL		46	46

(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.