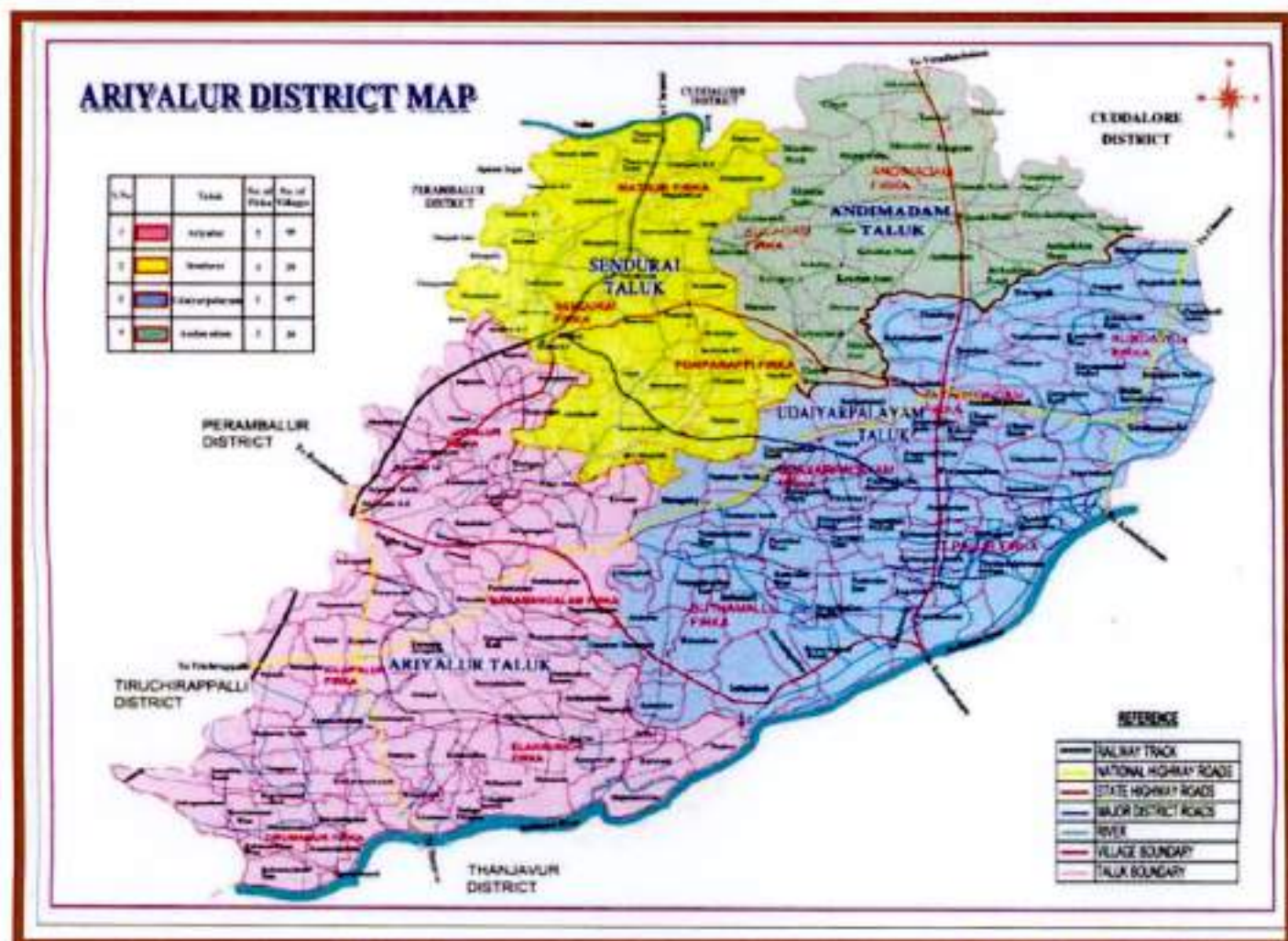


DISTRICT SURVEY REPORT FOR FIRECLAY ARIYALUR DISTRICT TAMILNADU STATE

(Prepared as per Gazette Notification S.O.3611 (E) dated 25.07.2018 of Ministry of Environment, Forest and Climate Change)



2019

Chapter	Content	Page No.
1.	Introduction	3
2.	General Profile of the District	3-4
3.	Overview of Mining Activity in the District	5-7
4.	Geology of Ariyalur District	7-11
5.	Drainage of Irrigation pattern	12
6.	Land Utilisation Pattern in the District: Forest, Agricultural, Horticultural, Mining etc.,	12-13
7.	Surface Water and Ground Water scenario of the District	13-19
8.	Climate and Rainfall of the District	19
9.	Details of Mining Leases in the District	22
10.	Details of Royalty or Revenue received in last three years	22
11.	Details of Production of Minor Mineral in last three years	22
12.	Mineral Map of the District	23
13.	List of Letter of Intent (LOI) Holder in the District along with its validity	24
14.	Total Mineral Reserve available in the district	24
15.	Quality/Grade of Mineral available in the district	25
16.	Use of Mineral	25
17.	Demand and supply of the Mineral in the last three years	25
18.	Mining Leases marked on the map of the district	25
19.	Details of the area of where there is a cluster of the mining leases	26
20.	Details of Eco-sensitive area	26-27
21.	Impact on the environment due to Mining activity	27-29
22.	Remedial measures to mitigate the impact of mining on the environment	29
23.	Reclamation of the mined out area	29
24.	Risk assessment & Disaster Management Plan	29
25.	Details of Occupational health issue in the District	31
26.	Plantation and Green belt development in respect of leases already granted in the district	31
27.	Any other information	32



Ariyalur District Map

At present, 73 nos. of limestone mines, 8 nos. of fire clay and 2 nos. of sand quarry and 1 no. of gravel quarry are in existence in Ariyalur district.



Limestone Mines of Kallankurichi formation



Fireclay Mines at Managathi Village

3.0 Overview of Mining Activity

Minerals of Economic importance found in Ariyalur District are mainly Celestite, Limestone, Shale, Sandstone, Kankar and Phosphate nodules occur at various places in the district. Limestone of sedimentary origin has been found in Ariyalur and Sendurai Taluks. The Limestone is cement grade to plus cement grade in quality and is used in the cement plants. Fireclay is used for the manufacture of floor tiles, stoneware pipes, fire bricks and in the chemical industry. Jayamkondam in Udayarpalayam Taluk is rich in Lignite, Oil and Gas reserves. Apart from the above major minerals the common use minor minerals viz., River sand, Laterite, Roughstone, Redgravel, Brickclay, pebbles, filling earth and Kankar are also found in this District.

The office of the Deputy Director, Department of Geology and Mining is functioning under the control of District Collector, Ariyalur. The Deputy Director, Geology and Mining is assisting the District Collector in the Mineral Administration works.

3.2 Location

Ariyalur District is located in central Tamil Nadu and is 265 k.m. away from Chennai. The District has an area of 1949 Sq.Km. Ariyalur railway station connected by southern railway which connects Chennai, Madurai, Tuticorin and Thirunelveli. Ariyalur is also well connected by roadways which also an important road junction on the Ariyalur-Chennai, Ariyalur-Thanjavur, and Ariyalur-Trichy roadways. SH143 Ariyalur-Thungapuram-Thittakudi, SH27 Ariyalur-Thanjavur and SH139 Ariyalur – Jayamkondam are the major roads via Ariyalur.

3.3 Area and Population

The initial provisional data released by census India 2011, shows that density of Ariyalur district for 2011 is 389 people per sq. km. In 2001, Ariyalur district density was at 358 people per sq. km. Ariyalur district administers 1,949 square kilometers of areas. An official Census 2011 detail of Ariyalur, a district of Tamil Nadu has been released by Directorate of Census Operations in Tamil Nadu. Enumeration of key persons was also done by census officials in Ariyalur District of

Tamil Nadu. In 2011, Ariyalur had population of 7,54,894 of which male and female were 374,703 and 380,191 respectively. In 2001 census, Ariyalur had a population of 695,524 of which males were 346,763 and remaining 348,761 were females. There was change of 8.54 percent in the population compared to population as per 2001. In the previous census of India 2001, Ariyalur District recorded increase of 9.29 percent to its population compared to 1991.

3.4 Administrative set - up

Ariyalur District consists of two Revenue Divisions viz., Ariyalur and Udayarpalayam, Four Taluks viz., Ariyalur, Sendurai, Udayarpalayam and Andimadam (Andimadam Taluk is formed as per G.O.(Ms) No. 167. Revenue (RA1(1)) Department dated : 08-05-2017) comprising of 195 Revenue Villages. The District has six blocks viz. Ariyalur, Thirumanur, Sendurai, Jayankondam, Andimadam and T.Palur comprising of 201 Village Panchayats. There are two Municipalities viz. Ariyalur & Jayankondam and two Town Panchayats viz. Udayarpalayam & Varadharajanpettai.

3.5 Agricultural Resources and Irrigation

Agriculture continues to be the most predominant sector of this district economy, as 70 percent of the population is engaged in Agriculture and allied activities for their livelihood. The district has as an area of 1949 sq.km with a gross cropped area of around 1.118 lakhs Ha. Ariyalur District has a Geographical area of 1,93,338 Hectares. Of which the net area cropped is 1,11,874 Hectares(64.70%). Out of which about 45136 Ha are irrigated and about 66,738 Ha are rain fed. A total of 32,933 hectares (8.92%) are kept as fallow lands. The lands-put to non-agricultural purposes occupy 43,953 (11.91 %) hectares. The cultivable wastelands of 7,742 (2.10%) hectares can be brought in to agricultural uses by suitable measures. The River Cauvery tributary irrigates about 10,389 Ha. in Thirumanur, T.Palur and Jayankondam Block.

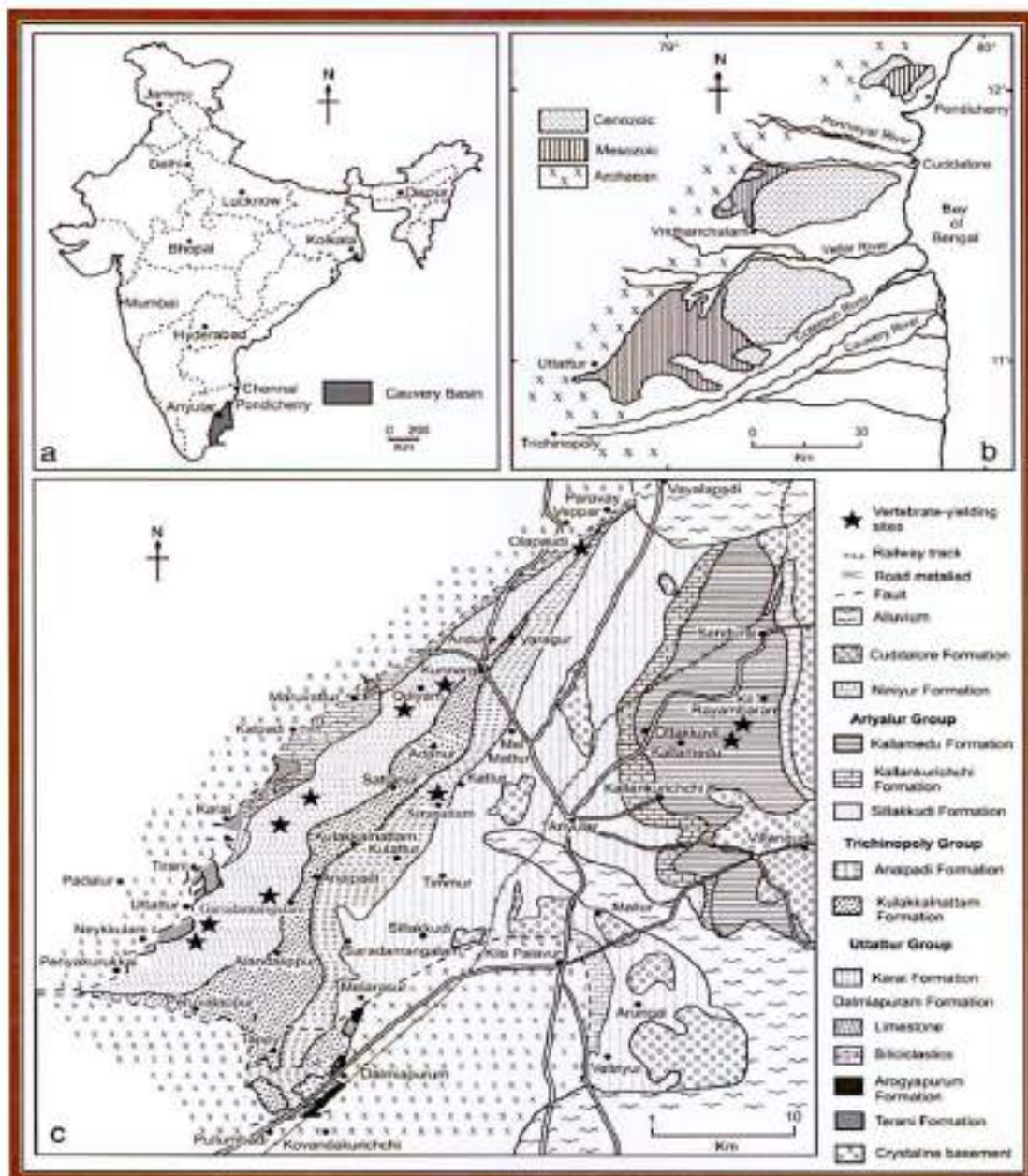
3.6 Trade and Commerce

Internal trade of the district is developing on a large scale. Cement and lime powder are manufactured in Ariyalur. These products enter into the market in

different parts of the country. Market Committees are functioning in the district for the purchase and sale of cotton, groundnut, chilly, corn and other edible oil products. The co-operative societies for milk are functioning at all parts of the district. One warehouse is present in the district for wholesale trading for chillies and onions.

4. Geology of the District

The Cretaceous formation of the Ariyalur (Ariyalur District, Tamil Nadu) is one of the best developed sedimentary sequences in South India. The Cretaceous system of Cauvery Basin consists of shallow marine sequence with a rich faunal succession of Albian–Maastrichtian.



Geological map of Ariyalur District and Cauvery basin (Sundaram et. al 2001)

Blanford (1862) was the first to work on the stratigraphy of this formation and he divided the litho-units into three groups: Uttatur, Trichinopoly and Ariyalur. These three groups are largely disconformable and occasionally unconformable at places. The geology and the stratigraphy of this area are accounted by many workers (Rama Rao, 1956; Ramanathan, 1968; Banerji, 1972, Sastri et al, 1972; ONGC, 1977; Sundaram and Rao, 1979 & 1986; Ramasamy and Banerji, 1991; Banerji et al, 1996; Gonvindan et al, 1996). Ramasamy and Banerji (1991) have revised the stratigraphic framework of the exposed Pre-Ariyalur sequence based on detailed lithological and petrographical variations. Banerji et al., (1996) have redefined the Uttatur Group and identified within it four distinct formations comprising reefoidal bodies, sandy clay, coarse sand bar and gypsiferous siltyclay units. Madavaraju (1996) has presented a detailed geochemical and petrographical account of Ariyalur Group of sediments and Kallamedu Formation is the youngest unit of this group. Further REE distribution and its importance in establishing anoxic/oxic conditions in lime rich Kallankurichi formation was attempted by Madavaraju and Ramasamy (1999).



Ammonite Fossil in Ariyalur formation

The sedimentary rocks of Cretaceous – Palaeocene age are well developed in the Ariyalur area, which consist both clastic and carbonate facies. The diversity of fauna is very large in the vast sedimentary basin that has attracted the attention of geologists not only from India but also from foreign countries. Sastry et al., (1972) have further divided the Ariyalur Group into four formations mainly based on lithological changes and characteristic faunal content: i) Sillakudi ii) Kallankurichi iii) Ottakoil and iv) Kallamedu Formations. This classification has been followed by various workers of varied interests. Kallamedu Formation (Late Maastrichtian) is the youngest formation of the Ariyalur Group and it exhibits large variation in lithology. The exposed area looks like a bad land topography with sparse vegetation. Excavation

at favourable spots in Kallamedu Formation has yielded a number of well-preserved skeletal parts of Carnosaurs (Yadagiri and Ayyasami, 1987). The lithological association of this formation includes sandstone, siltstone, calcareous sandstone, silty shale and thin band of limestone. The sandstone and siltstone are well exposed in the nallah sections near north of Kallamedu village (Fig. 1). Govindan et al. (1996) have assigned Maastrichtian age for the continental deposits of the Kallamedu Formation. Kallamedu Formation is overlain by the Niniyur formation of early Paleocene age.

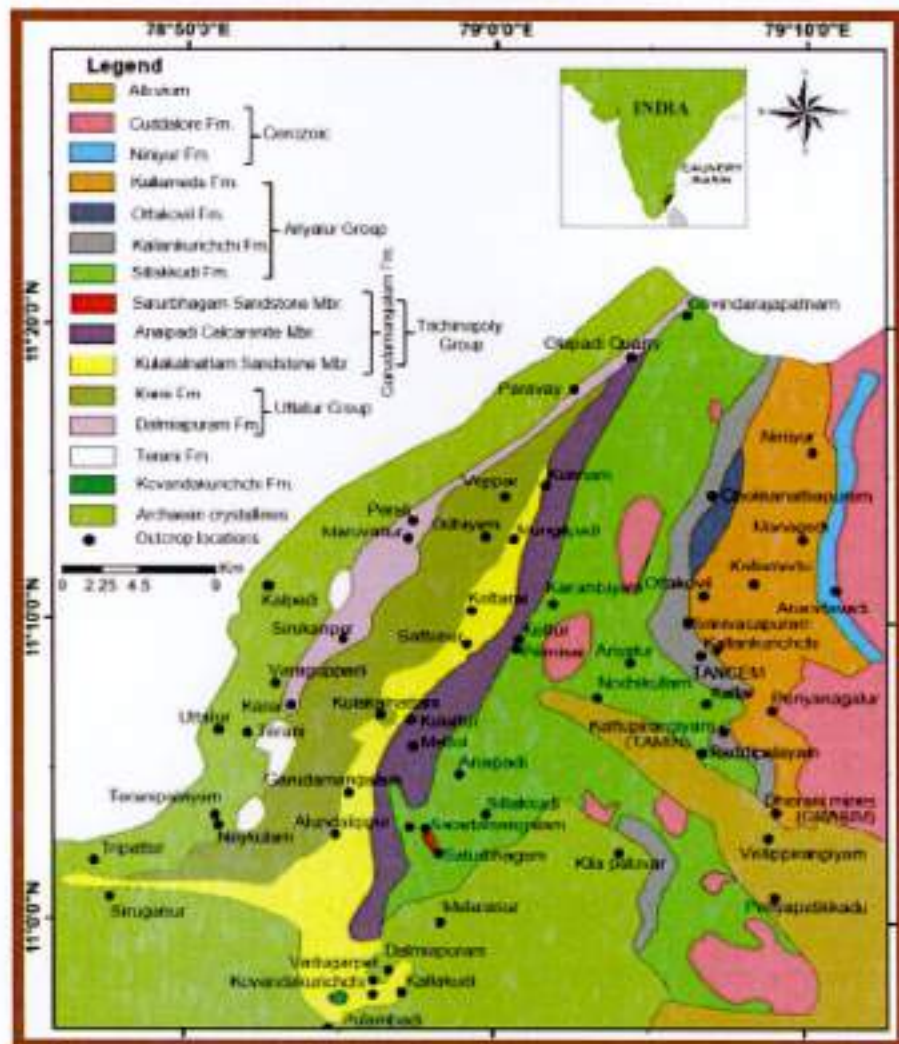
The late Cretaceous sediments are exposed in the western part of the study area and classified into Uttatur, Trichinopoly and Ariyalur formations with a maximum thickness of 900 m, 600 m and 1500 m, respectively. The Uttatur formation consists of reefoidal limestone and minor sandstone, with rich faunal assemblages. Conglomerates and quartzites are also found to occur in the Uttatur group of rocks. These rocks are exposed only in Trichirapalli area where they are overlying Gondwana and Dalmiapuram formations. The sub-surface equivalent of the Uttatur formation, is devoid of reefoidal elements. The Trichinopoly formation, unconformably overlying the Uttatur formation, comprises conglomerate, pebbly sandstone as well as gritty calcareous sandstone with bands of claystone, gypseous claystone, sandy limestone, shelly limestone and clayey limestone with abundant fauna. They are exposed in Ariyalur, Vridhachalam and Pondicherry areas. The rocks are mainly greenish grey, friable clayey sandstone, fossiliferous argillaceous limestone and sandstone. The lower part of Ariyalur formation is highly fossiliferous while the upper is largely unfossiliferous.

i) Evolution of Cauvery Basin

The Cretaceous–Paleocene sections of Cauvery Basin are closely related to the rifting and drifting phases of peninsular India. The basement is characterized by structural highs and lows, these being evidenced by strong tectonic activity affecting the basin since its inception. Two major tectonic and sedimentary phases are deciphered. The first is taphrogenic rifting and associated block movements along the dominant NE-SW trend during Late Jurassic, resulting in morphotectonic humps and deep slopes. The second phase signifies coastal progradational/deltaic sedimentation through a series of marine transgression and regression in response to the oscillatory

tectonic movements. During Paleocene, the basin continued to tilt towards east and deposits consequently shifted.

Cauvery basin comprises of depressions separated from one another by subsurface ridges; these structural elements extend into the offshore area. The structural elements from north-south are, (1) Ariyalur Pondicherry depression, (2) Kumbakonam–Madnam–Shiyal ridge (3) Tanjore Tranquibar–Nagapattinam depression (4) Pattukottai– Mannargudi ridge (5) Ramnad–Palk Bay depression (6) Mandapam - Delft ridge. The first marine transgression occurred during the close of Late Jurassic. The marine environments of sedimentation continued till Cretaceous although a series of minor transgressions and regressions. A major regression occurred during the close of Cretaceous. The basin underwent an easterly tilt and the depocentres shifted due east prior to marine transgression during the beginning of Paleocene.



Geological map of Cretaceous sediments, Ariyalur area, Cauvery basin

The evolution of Cauvery basin is largely controlled by dominant trends in the Precambrian crystalline basement as is evident from the similarity between the alignment of the basinal structural elements and the major trends in the adjoining peninsular shield. The NE-SW Eastern Ghats trends are by far the most dominant and taphrogenic movements along these basement trends resulted in a series of elongated depressions that were separated from one another by intra-depression ridges.

ii) Lithostratigraphic Classification

Blanford (1862) has classified the Cretaceous sediments of Cauvery Basin into: Uttatur plant beds, Uttatur and Trichinopoly Groups. Krishnan (1943) classified the Cretaceous sections into four stages: Uttatur (Cenomanian to Uppermost Albian), Trichinopoly (Mid-Cenomanian to Mid-Turonian), Ariyalur (Maastrichtian to Mid-Cenomanian) and Niniyur (Danian to Maastrichtian). Ramanathan (1968) has divided the Upper Jurassic to Cretaceous sections of Cauvery basin into three formations: Upper Gondwana (Bathonian to Neocomian), Uttatur (Barremian to Albian) and Trichinopoly (Turonian to Upper Cenomanian). Nair (1974) introduced two groups for the Cretaceous sections:

Ariyalur for Maastrichtian age and Uttatur for the rest part of the Cretaceous age. Sundaram and Rao (1976) proposed three groups for Cretaceous of Cauvery Basin: Uttatur, Trichinopoly and Ariyalur. Govindan (1998) compiled the outcrop and subcrop sediments are proposed the sediments classification.

AGE	Ma	GROUP	FORMATION	
			OUTCROP	SUBSURFACE
DANIAN			NINIYUR	
MAASTRICHTIAN	65	ARIYALUR	KALLAMEDU Sandstone	PORTONOVO Shale
			OTTAKOVIL Sandstone	
			KALLANKURICHCHI Limestone	NANNILAM
CAMPANIAN	70	SILLAKKUDI Sandstone	KUDAVASAL	
SANTONIAN	83	GARUDAMANGALAM (Anaiyadi) Calcarenite		KOMARAKSHI
CONIACIAN	85	TRICHINOPLY		
	89			

5. Drainage of Irrigation pattern

The regional slope is towards east. Denudational, structural and fluvial processes mainly control the geomorphic evolution of the area. Mainly the varying resistance of geological formations to those processes has governed the evolution of various landforms. Various land forms occurring in the area such as structural hills, erosional plains, residual hills rolling uplands and pediments of different facies belonging to the denudational and structural land forms. Fluvial landforms caused by the activity of Cauvery, Marudayar and Vellar river systems, include younger flood plains, older flood plains and buried pediments.

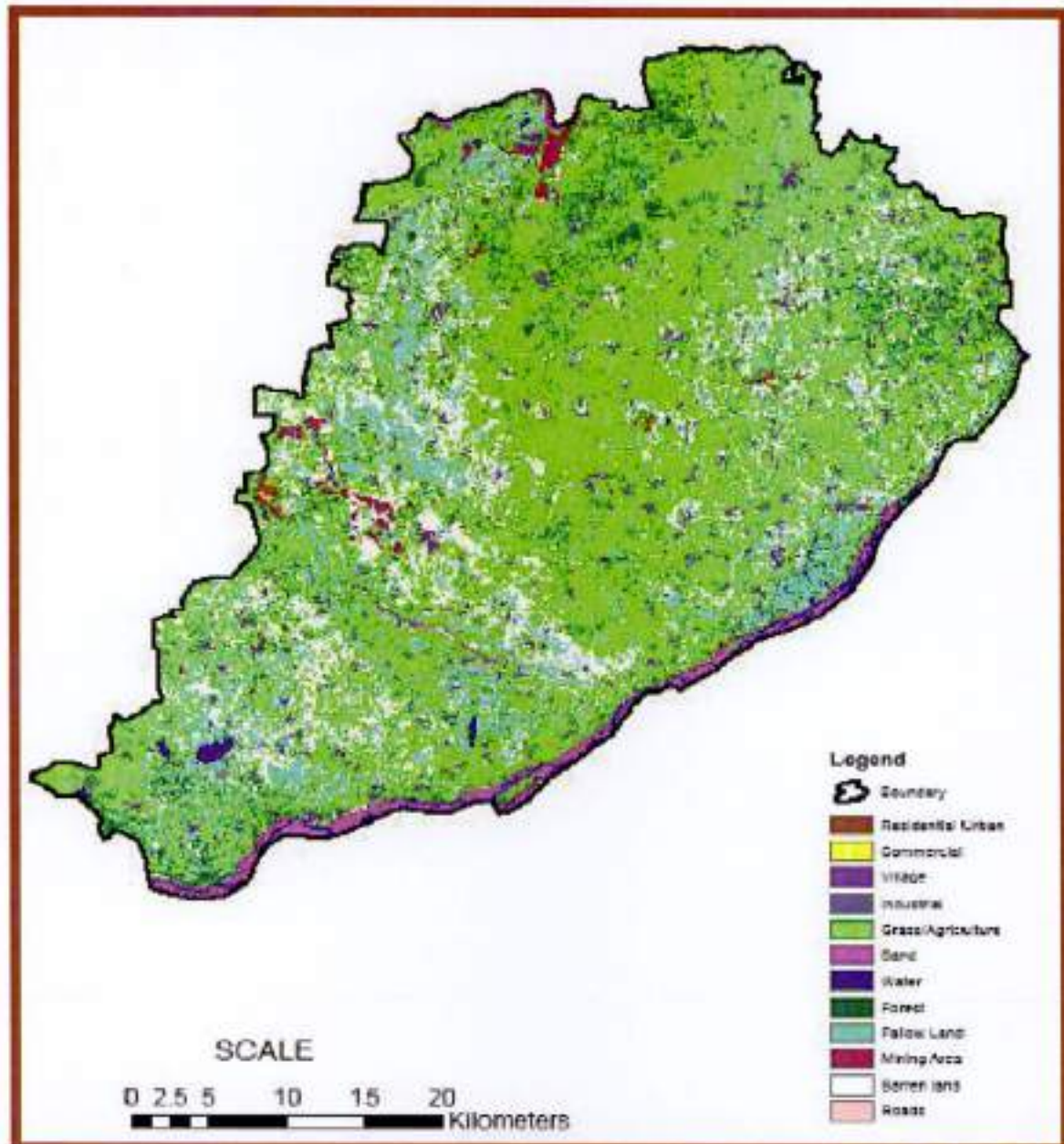
The land use classification (2010-11) for the Ariyalur district is given below:

Sl.No	Classification	Area (' 000 Hect.)
1	Forest Area	9.00
2	Land under non-agricultural use	27.40
3	Permanent pastures	1.30
4	Cultivable waste land	3.8
5	Land under Misc.tree crops and groves	6.40
6	Barren and uncultivable land	36.10
7	Current fallows	9.1
8	Other fallow lands	2.60

6. Land Utilisation Pattern in the District: Forest, Agricultural, Horticultural, Mining etc.,

Agriculture continues to be the most predominant sector of this district economy, as 70 percent of the population is engaged in Agriculture and allied activities for their livelihood. The district has as an area of 1949 sq.km with a gross cropped area of around 1.118 lakhs Ha. District has a Geographical area of 1,93,338 Hectares. Of which the net area cropped is 1,11,874 Hectares(64.70%). Out of which about 45136 Ha are irrigated and about 66,738 Ha are rainfed. A total of 32,933 hectares (8.92%) are kept as fallow lands. The lands-put to non-agricultural purposes occupy 43,953 (11.91 %) hectares. The cultivable wastelands of 7,742 (2.10%) hectares can be

brought in to agricultural uses by suitable measures. The River Cauvery tributary irrigates about 10,389 Ha. in Thirumanur, T.Palur and Jayankondam Block.



Landuse and Landcover Map of Ariyalur District

7. Surface Water and Ground Water Scenario of the District

7.1 Hydrogeology

The major aquifer systems in the district are constituted by (1) Basal crystalline rocks consisting mainly of Charnockites, Granites and Gneisses of Archean age and (2) Sedimentary formations ranges in age from Cretaceous to Recent.

Alluvial Formations

In the river alluvium ground water occurs under water table condition. The maximum thickness is 37 m and the average thickness of the aquifer is approximately 12 to 15 m. These formations are porous and permeable, which have good water bearing zones.

Tertiary formation

Tertiary formations are mainly Cuddalore Sandstone, mottled ferrugeneous clays and pebbles. The ground water occurs in semi-confined conditions and confined conditions with good ground water potentials in these aquifers. The Specific Capacity in the Tertiary formations ranges from 40 to 1627 lpm/m/dd.

Cretaceous formations

Cretaceous formations comprises white Sandy Lime stones and Sand stones with fossils, Calcareous mottled sandstones with fossils, shell Limestones, clays, sand stones with fossils, Basal Limestone, clays and sandy beds with fossils. Ground water in the sandy clay lenses and fine sands underlain by white and black clay beds constitutes phreatic five aquifers in the depth range 10.0 to 15.0 m below ground level. Phreatic aquifers in the limestone are more potential. The Specific Capacity in the cretaceous formation ranges from 18.77 to 90.66 lpm/m/dd.

Hard Rock formations

Hard rock formations include Charnockites, Granites and Gneisses traversed by Quartz and Pegmatite veins. Ground water occurs under water table conditions in weathered mantle and semi-confined conditions in fractured zones depend on the joints, fracture and its development.

i. Pre-monsoon water level:

The depth of water level during pre-monsoon (May2006) ranges from 1.10 to 8.55 m bgl. In major part of the district the depth to water level during pre-monsoon is in the range of >2 – 5 m bgl.

ii. Post-monsoon water level:

The depth of Water level during post-monsoon (Jan2007) ranges from 1.10 to 6.78 m bgl. Almost in entire district, depth to water level during post-monsoon is in the range of >2 – 5 m bgl, except some isolated patches.

Long term Fluctuation (1998-2007) indicates rise in water levels is in the range of 0.0027 to 0.16 m/year. The fall in water level ranges between 0.05 and 0.07 m/year.

Aquifer Parameters:

In the Cretaceous formation Transmissivity is $234 \text{ m}^2 / \text{day}$ and storativity is in the order of 3.527×10^{-4} . Transmissivity ranges from 620 to $1455 \text{ m}^2 / \text{day}$ and storativity ranges from 3.29 to 7.74×10^{-5} in Tertiary formation.

Ground Water Quality

Ground water in phreatic aquifers in this district is, in general, colorless, odorless and predominantly alkaline in nature. The specific electrical conductance of ground water in the phreatic zone (in microsiemens at 25°C) during May 2006 was in the range of 1030 to 10,110 in the district. Conductance below $750 \mu\text{S cm}^{-1}$ has not been observed in any part of the district. Saline ground water ($\text{EC} > 10,000$) is observed at select pockets of the district. It is observed that the ground water is suitable for drinking and domestic uses in respect of all the constituents except total hardness and nitrate in about 64% of the samples. Total hardness as CaCO_3 is observed to be in excess of permissible limits in 54% of the samples analyzed whereas nitrate is found in excess of 45 mg l^{-1} in about 73% of samples. Excess fluoride more than the permissible limit of 1.5 mg l^{-1} is observed at Thirumanur area and found to be localized phenomena. The incidence of high total hardness is attributed to the composition of litho units constituting the aquifers in the district, whereas nitrate pollution is most likely due to the use of fertilizers and other improper waste disposal. With regard to irrigation suitability based on specific electrical conductance and Sodium adsorption Ratio (SAR), it is observed that ground water in the phreatic zone may cause high to very high salinity hazard and medium to very high alkali hazard

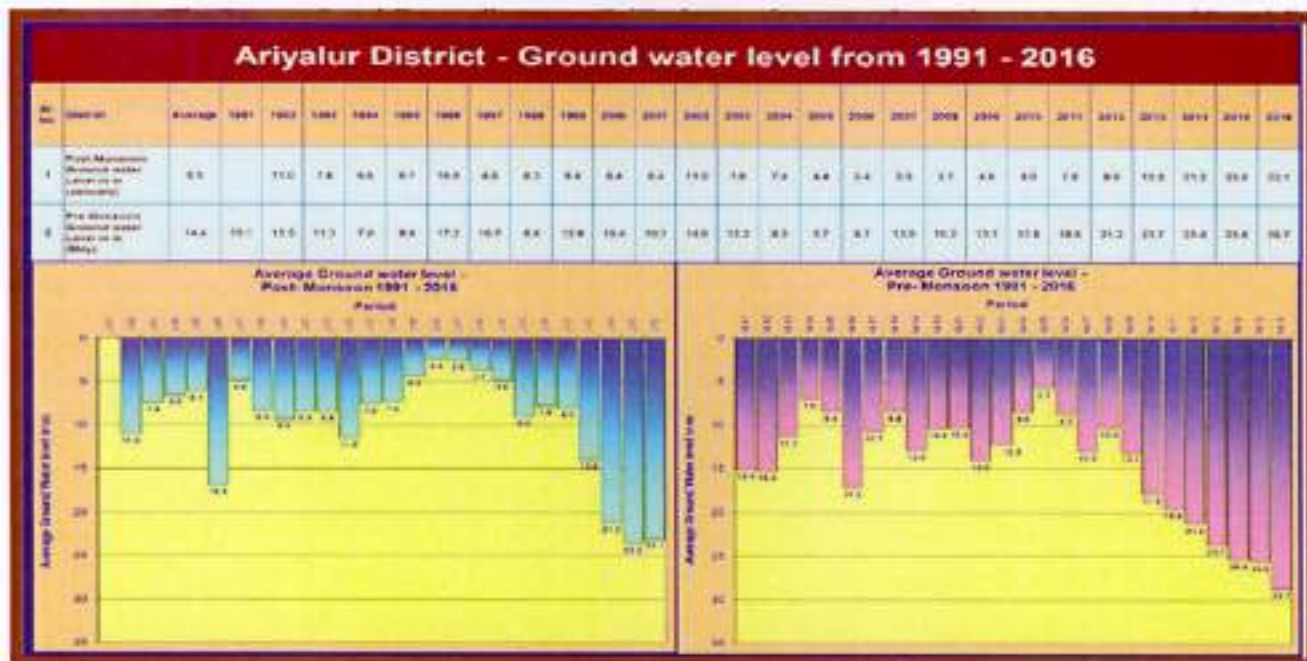
when used for irrigation. Proper soil management strategies are to be adopted in the major part of the district while using ground water for irrigation.

The district receives the rainfall under the influence of both southwest and northeast monsoon. There is a gradual decrease in precipitation from northeast to southwest over the district. The normal rainfall for the period (1901-70) ranges from 843.5 to 1123.3 mm. It is lowest in the Vembavur area and highest in the Jayankondam areas. Ariyalur district enjoys a typical semi arid climate with hot summers and moderately cool winters. The hottest season is from March to May. During the period the maximum temperature often exceeds 40°C. The winter season is spread over two months viz. January and February and the nights are cool and pleasant. The district generally has a high humidity. The district experiences strong winds during the southwest monsoon season. The wind speed during June to August is more than 25 km/hr. Thereafter there is a gradual decrease in speed reaching the lowest value 7.7 km/hr.

Rainfall data for the period 2012- 2016 has been tabulated below:

YEAR	JAN		FEB		MAR		APR		MAY		JUN	
	R/F	%DEP	R/F	%DEP	R/F	%DEP	R/F	%DEP	R/F	%DEP	R/F	%DEP
2012	10.5	-50	0	-100	8.5	-35	0.8	-96	34	-50	5.5	-89
2013	0	-100	7.3	-35	6.5	-50	12	-47	12	-83	3.7	-93
2014	0	-100	1	-91	0	-100	0	-100	129	92	9	-83
2016	0	-100	0	-100	0	-100	0	-100	89	34	28	-45

YEAR	JUL		AUG		SEPT		OCT		NOV		DEC	
	R/F	%DEP	R/F	%DEP	R/F	%DEP	R/F	%DEP	R/F	%DEP	R/F	%DEP
2012	30.8	-58	140	8	126	-9	237	22	66	-68	11	-92
2013	7.7	-89	169	31	165	19	74	-62	159	-22	53	-64
2014	80.5	11	93	-28	26	-81	183	-6	90	-56	88	-40
2016	91.2	25	142	10	58	-59	62	-68	30	-85	36	-75



Ground water level data Ariyalur District for the period 1991-2016

Ground Water Development

Groundwater development in 6 Blocks viz., Andimadam, Ariyalur, Jayankondan, Sendurai, T.Palur and Thirumanur are moderate and categorized as safe blocks. Cuddalore sandstone occurring in these blocks may be developed by deeper Tube wells down to a depth of more than 150 m. The expected yield range is 2.5 to 30 lps. The Alluvial tract bordering the north of River Kollidam, occurring in Tirumanur, T.Palur blocks may be developed by dug wells as well as by Filter Points down to a depth range of 12 to 37 m bgl. Cretaceous formations in and around Ariyalur block has to be developed with Tube wells avoiding the saline and brackish water patches.

Status of Ground Water Development:

Groundwater resources of the district has been estimated using GEC-97 methodology, jointly by Central Ground Water Board and State Ground and Surface Water Resources Data Centre, Govt. of Tamil Nadu. The six blocks in the district are under safe category and feasible for groundwater development. Safe blocks may be developed for further along with conservation strategies for sustainable development of available potential. The overall district shows the level of groundwater development at 81 % as on 31st March 2004.

S. No.	Name of Ground Water Assessment Unit Block	Command/ Non-command Total	Net G.W availability	Existing gross draft for irrigation	Existing gross draft for domestic and industrial water supply	Existing gross draft for all uses	Allocation for domestic and industrial requirement for next 25 yrs.	G.W availability for future development	Storage of ground water development	Remarks
1	2	3	4	5	6	7	8	9	10	11
1	Andimadam	Total	6014.55	2993.69	232.60	3226.29	241.66	2779.20	54	Safe
2	Ariyalur	Total	3539.60	1832.00	127.35	1959.35	132.31	1575.20	55	Safe
3	Jayankondam	Total	8268.83	3747.18	307.37	4054.56	319.34	4202.30	49	Safe
4	Sendurai	Total	6749.98	2992.39	217.12	3209.52	225.58	3532.01	48	Safe
5	T.Pulur	Total	7423.89	2447.89	208.56	2656.46	216.69	4759.31	36	Safe
6	Thirumanur	Total	10583.8	4621.76	244.48	4866.24	254.00	5708.06	46	Safe

Water conservation and artificial recharge:

Central Ground Water Board had prepared a master plan to augment groundwater potential by saturating the shallow aquifer taking into consideration the available unsaturated space during post monsoon and available uncommitted surplus run off. Subsequently, computations have been made for Drought Prone Area Programme (DPAP) for over exploited and critical blocks in the districts warranting immediate attention. Institute of Remote Sensing, Anna University had prepared block wise maps demarcating potential zones for artificial recharge for the State of Tamil Nadu. Subsequently, State Government agencies have constructed artificial recharge structures with their own fund or with fund from Central Government, dovetailing various government programmes.

Since 2009-10 to 2014-15 Government of India notified 35 water shed areas to protect soil and water conservation in Ariyalur District. Under PMKST/IWMP, District Watershed Development Agency is doing construction of check dam, new pond, farm pond, renovation of pond and recharge soft for water harvesting and soil

??

and water conservation. So far out of 35, 23 water shed works completed. Remaining 12 watershed going to be completed coming May 2019. The scheme after implementation will prove to be beneficial to the irrigation sector. The available uncommitted surplus run off has to be recomputed, taking into consideration the quantum of recharge affected through existing irrigation dug wells also. The existing structures and uncommitted surplus flow should be considered for further planning of artificial recharge programme. On the basis of experimental studies, it has been found that de-silting of existing tanks followed by percolation pond with recharge wells, recharge shafts are economical. There is considerable scope for implementation of roof-top rainwater harvesting in the district. Central Ground Water Board is also providing free technical guidance for implementation of roof top rainwater harvesting schemes.

8. Climate and Rainfall of the District

Climate:

The climate of Ariyalur district is sub-tropical. The average rainfall which the district receives during Northeast monsoon is 485 mm and during Southwest monsoon is 357 mm respectively. The normal onset of Southwest monsoon is first week of June whereas for Northeast monsoon is second week of October.

Rainfall:

The annual rainfall normal (1970-2000) of Ariyalur district is 949 mm.5 Projections of rainfall over Ariyalur for the periods 2010-2040 (2020s), 2040-2070 (2050s) and 2070-2100 (2080s) with reference to the baseline (1970-2000) indicate a decrease of 2.0%, 3.0% and 3.0% respectively.

Fireclay :

Government of India, Ministry of Mines, New Delhi in Notification S.O.423(E) dated 10.02.2015 has declared Fireclay as minor mineral. Fireclay deposit is found in Udayarpalayam Taluk in Ariyalur District. At present, 09 quarrying leases have been granted in Keelanatham and Managethi Villages in Udayarpalayam Taluk in Ariyalur district.

9. Details of the mining leases in the District as per the following format:

Sl. No	Name of the Mineral	Name of the Lessee	Address & Contact No. of Lessee	Mining Lease Grant order No. & Date	Area of Mining Lease (Ha.)	Period of Mining Lease (Initial)		Period of Mining lease (1 st /2 nd renewal)		Date of Commencement of Mining Operations	Status (Working / Non-Working /Temp. Working for dispatch etc.,)	Capitive / Non-Capitive	Obtained Environmental clearance (Yes/No), If yes letter No, with date of grant of EC.	Location of the Mining Lease (Latitude & Longitude)	Method of Mining (Opencast /Underground)
						From	To	From	To						
1	Fire clay	Thiru. M.Vijayarajar	SSV Mines, No. 26, Ram Nagar, Karumandapam Tiruchirappalli.	2825/MM 3/2002 dated 20.09.2002	0.67.0	7.10.2002	6.10.2022	--	--	7.10.2002	Non Working	Non Capitive	---		Open Cast Semi-mechanized
2	Fire clay	Thiru. A. Abdullah	S/o.Adam, 10/10B, North Street, T.Pottakkolai, Z.Thathanur(v), Udayarpalayam(Tk)	8814/MM/2004 Dated 07.03.2005	2.26.0	04.04.05	04.04.25	--	--	04.04.05	Non Working	Non Capitive	---	N 11°09' 06.06" E 79° 14' 51.89"	Open Cast Semi-mechanized
3	Fire clay	P. Muralitharan	OM Sakthi Mineral Works, No.44,	4042/MM3/2002 Dated	1.22.5	11.04.05	10.04.25	--	--	11.04.05	Non Working	Non Capitive	---	N 11° 09' 19.1" E 79° 14' 52.8"	Open Cast Semi-mechanized

			Anna Nagar, AriyalurTk	03.03.2005											
4	Fire clay	P. Muralidaran,	OM Sakthi Mineral Works, No.44, Anna Nagar, AriyalurTk	5032/MM3/2004 Dated 15.09.2004	1.83.5	22.11.04	21.11.24	--	--	22.11.04	Non Working	Non Capative	---	N 11° 10' 00" E 79° 15' 00"	Open Cast Semi-mechanized
5	Fire clay	K. Ezhilarasan,	Parhavan Hospital, Pullambadi Post, Laigudi Taluk, Trichy District.	13004/M M3/2004 dated 22.05.06.	1.31.5	20.11.06	19.11.26	--	--	20.11.06	Non Working	Non Capative	---	N 11° 08' 20" E 79° 14' 30"	Open Cast Semi-mechanized
6	Fire clay	P.Sundarapandiyan	S/o Panchapakesan 8-4/13 Annanagar Ariyalur Tk	13072/M M3/2010 dated 12.04.13.	4.00.5	02.01.14	01.01.34	--	--	02.01.14	Non Working	Non Capative	---	N 11° 02' 180" E 79° 14' 901"	Open Cast Semi-mechanized
7	Fire clay	P.Ravichandran	S/o.Panchapakesan 43 Annanagar Ariyalur Tk	13071/M M3/2010 dated 12.04.13.	4.22.5	02.01.14	01.01.34	--	--	02.01.14	Non Working	Non Capative	---	N 11° 02' 02" E 79° 14' 55"	Open Cast Semi-mechanized
8	Fire clay	P.Rajachandrasekaran	S/o.Panchapakesan 44 Annanagar Ariyalur Tk	13073/M M3/2010 dated 12.04.13.	4.14.0	02.01.14	01.01.34	--	--	02.01.14	Non Working	Non Capative	---	N 11° 02' 16" E 79° 14' 47"	Open Cast Semi-mechanized
9	Fire clay	Thiru. E. Logeshkumar,	S/o.Shri.Elangoan, No.1, Bajana	G.O.(2D). No.17 Industries	4.50.5	10.09.2018	09.09.2028	--	--	10.09.2018	Working	Non Capative	Lr.No. DEIAA-ALR/	N 11° 09' 16.71" E 79°	Open Cast Semi-mechanized

			Koil Street, Avvaiyarku ppam, Villupuram	(MMC.2) Departme nt dated.09.0 8.2018									F.No.272-4/ G&M/2018, dated : 57.07.18	14' 38.78"	ed
--	--	--	---	---	--	--	--	--	--	--	--	--	---	---------------	----

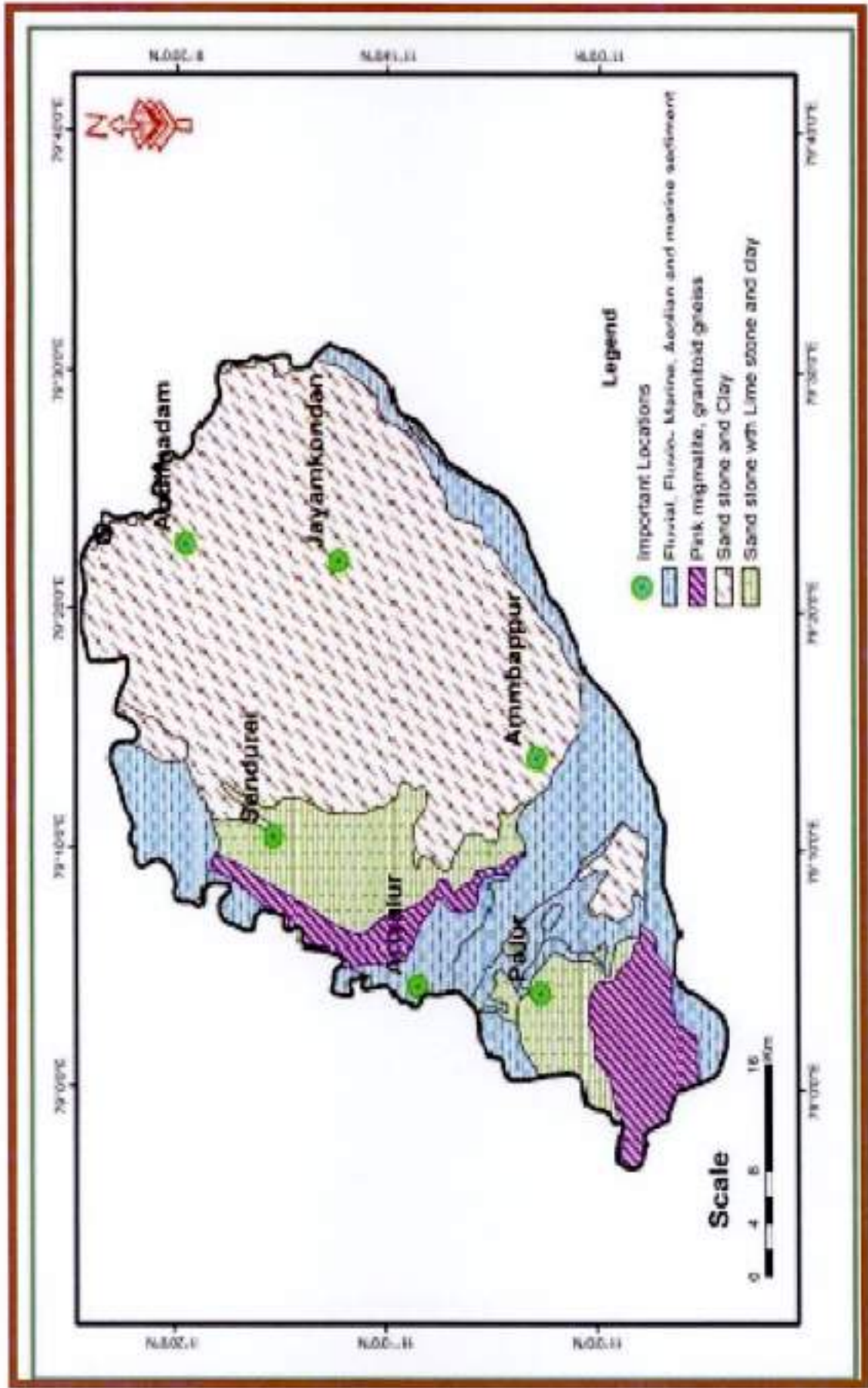
10. Details of seigniorage fee received from Fireclay during the last three years

Year	Seigniorage Fee (in Rs.)	DMF (in Rs.)	NMET (in Rs.)
2016-17	96,85,228	--	--
2017-18	--	51,05,997	--
2018-19	--	--	--

11. Details of production of Fireclay during the last three years:

Year	Fireclay Production in CBM
2016-17	252000
2017-18	--
2018-19	--

12. Mineral map of the district:



13. List of Letter of Intent (LOI) holders for Fireclay in district along with its validity as per the following format

Sl. No	Name of the Mineral	Name of the lessee	Address & contact no. of letter of Intent holder	Letter of Intent Grant order No. & date	Area of mining lease to be allotted (Ha)	Validity of LOI	Use (Captive / Non-captive)	Location of the Mining lease (Latitude & Longitude)

14.0 Total Fireclay Reserve available in the district

Sl.No.	Name of the Lessee/LOI Holder	Village	Taluk	Fireclay Geological Reserves (Million Tonnes)

15. Quality /Grade of Mineral availability in the district

The general chemical composition of the Fireclay available in the district is given below:

- Al₂O₃ - 29% to 37%
- SiO₂ - 36% to 47%
- Fe₂O₃ - 2% to 10%
- CaO - 1% to 4%
- TiO₂ - 1% to 10%

16. Use of Mineral

The Fireclay available in the district is mainly used in the manufacture of bricks, blocks, mortars, masses, pottery, floor tiles etc.,

17. Demand and supply of Fireclay in the last three years

Year	2016-17	2017-18	2018-19
Demand (CBM)	252000	--	--
Supply (CBM)	252000	--	--

18. Mining leases (Fireclay) marked on the map of the district

At present, there 09 quarrying leases for quarrying Fireclay in 09 quarrying leases have been granted in Keelanatham and Mangethi Villages in Udayarpalayam Taluk in Ariyalur district and the lease granted area is marked in the map.



19. Details of the area of where there is a cluster of mining leases Viz. Number of mining leases, location (Latitude and Longitude)

Sl. No.	Name of the Mineral	Letter of Intent Grant order No. & date	Area of mining lease to be allotted (Ha)	Village	Taluk	District	Fireclay Geological Reserves (Mill.Tons)	Use (Capitive /Non-capitive)	Location of the Mining lease (Latitude & Longitude)
Not Applicable									

20. Details of Eco-Sensitive area, if any in the district

Karaivetti Bird Sanctuary is located in Ariyalur District, Ariyalur taluk (about 20 kms from Ariyalur Town) of Tamil Nadu, between 79° 2' 6.56" E and 79° 3' 26.2" E longitude and 10° 58' 12.19" N and 10° 58' 50" N latitude, encompassing an area of 4.53715 square kilometres. The sanctuary is surrounded by Kilakavattankuruchi, Karaivetti, Kovilesanai east, Suttamalli, Sathamangalam, Venganur and Vetriyur Revenue villages. The sanctuary is one of the most important fresh water feeding ground for migratory water birds in the State of Tamil Nadu. The sanctuary stakes a claim of 188 recorded species of birds including 82 water birds. At any instance at least 45 bird species can be spotted offering a choice location for ornithologists and researchers besides bird watching enthusiasts. About 50,000 to 60,000 birds frequently come to this bird sanctuary annually. The bird species viz., Open billed stork, White Ibis, Black Ibis, Darter, Spot billed pelican, Cormorant and many other species breed in this sanctuary. The plan showing the eco sensitive zone declared as per the Ministry of Environment, Forest & Climatic Change draft notification vide S.O. 2144(E) dated 24.05.2018 is given below:

GOOGLE MAP OF ECO-SENSITIVE ZONE OF KARAIVETTI BIRD SANCTUARY



21. Impact on the Environment (Air, Water, Noise, Soil Flora & Fauna, Land use, Agriculture, Forest etc.,) due to Mining Activity

Mining and allied operations may affect the existing environmental setup in the area unless proper mitigation measures are not taken. Hence it is essential to assess the impacts of mining on various environmental parameters so that abatement measures could be planned in advance for systematic, sustainable and eco-friendly mining in the area.

21.1 Air Environment

The mining and allied operations may cause deterioration of air quality due to pollution if prompt care is not taken. The principal sources of air pollution in general due to mining and allied activities will be the dust generation in the mine due to:

- Excavation of Fireclay .
- Movement of HEMM such as excavators, tippers etc.,
- Loading and unloading operation
- Fireclay transportation

Beside the above mentioned fugitive dust emissions, atmospheric fugitive dust emissions, atmospheric pollution can occur as a result of emission of SO₂, Nox, CO etc., from diesel driven mining equipment, compressors, generators etc., Larger suspended particles are generally filtered in the nose and throat and do not cause problems.

Particulate matter smaller than 10 microns, referred to as PM₁₀, can settle in the bronchi and lungs and cause health problems like Bronchitis, Emphysema, Bronchi Asthma, Irritation of mucus membranes of eyes etc. Particles smaller than 2.5micrometers(PM 2.5), tend to penetrate into the lungs and very small particles (<100 nanometers) may pass through the lungs to affect other programs.

21.2 Water Environment

The major sources of water pollution normally associated due to mining and allied operations are:

- Generation of Industrial effluent water from workshop, service building.
- Disturbance to drainage course or water bodies in the project area, if any.
- Washouts from waste dumps/embankment, if any.
- Domestic effluent
- Mine discharge water pumped out from opencast mines, if any and effect on ground water table.

Direct impact on human beings due to poor water quality consequent to mining operation can lead to various water borne diseases like diarrhoea, jaundice, dysentery, typhoid etc. Besides, the polluted water may not be useful for animal or human consumption, vegetation and may affect aquatic life, if effluents are not properly treated to remove the harmful pollutants.

21.3 Noise & Vibration

The impact prediction and control measure for noise environment due to mining and allied activities are described below:

Noise is one of the inevitable causes of pollution in mining operations largely due to the extensive mechanization adopted. Since the Fireclay in the District is in friable form no drilling and blasting is required for the excavation. Hence the major source of noise will be from the equipment's such as Excavation, loading & unloading & movement of vehicles etc., will produce noise of considerable magnitude in mining operations. Prolonged exposure to a high noise level is harmful to the human auditory system and can create mental fatigue, rebellious attitude, annoyance and carelessness, which may lead to neglect of work and also results in accidents.

The Fireclay in this region is in friable form and can be excavated directly by using hydraulic excavator and there will not be any drilling and blasting involved in the mining operation. Hence, vibration due to blasting is not envisaged.

21.4 Impact on Land Environment:

Due to mining and its allied activities there will be some changes to the pre-mining land status due to the following activities:

- Excavation of Ore and waste/ Overburden
- Temporary side casting / Backfilling of waste / overburden.
- Construction of Infrastructure facilities such as office, road, site services etc.,

21.5 Impact on Biological Environment

The major possible impact on biological environment due to mining is given below:

- Clearance of vegetation due to mining and allied activities
- Retardation of tree growth, tip burning etc., due to deposition of dust and the particulate matter generated from the mining operation.
- Presence of Schedule-I fauna in the mining area.
- Proposed impact on surface water quality that also provides water to wildlife
- Risk of fall/slip or cause death to wild animals due to project activities
- The project releases effluents into water bodies that also supplies water to wildlife
- Diversion of Agricultural and forest lands for mining

22. Remedial Measure to mitigate the impact of Mining on the Environment

The following remedial measures to be taken during mining

1) Outline of Disaster management plan :-

The purpose of disaster management plan is to restore the normalcy for early resumption of mining operation due to an unexpected, sudden occurrence resulting to abnormality in the course of mining activity leading to a serious danger to workers or any machinery or the environment.

2) System of communication:-

An internal communication system should be provided. Telephone nos. and addresses of adjoining mines, rescue station, police station, Fire service station, local hospital, electricity supply agency and standing consultative committee members should be properly updated and displayed.

3) Consultative committee:-

A standing consultative committee will be formed under the head of Mines. The members consists of Mines manager /safety officer / medical officer / public relation officer/Foreman/ and environmental engineer.

4) Facilities & Accommodation:-

Accommodation and facilities for medical centre, rescue room and for various working groups shall be provided. Regular checking of these facilities shall be undertaken.

5) First Aid & medical facilities:-

The mine management should be having first aid / medical centre for use in emergency situation. All casualties should be registered and should be given first aid. The centre should have facilities for first aid & minor treatment, resuscitation, ambulance and transport. Proper telephone / wireless should be provided for quick communication with hospitals where the complicated cases are to be referred. Regular checking of these facilities shall be undertaken by the doctor and the in charge of the first aid room.

6) Stores and equipment :-

A detailed list of equipment available, its type & capacity and items reserved for emergency should be maintained.

7) Transport services:-

A well defined transport control system should be provided to deal with the situation.

8) Functions of public relations group:-

Liaison with representatives of the mine workers is required to ameliorate the situation of panic, tension, sentiments, grievances and misgivings created by any disaster. Management is required to ameliorate the injured, survivors and family members of affected persons by providing material, finance, moral support and establishing contact with relatives of victims. The consultative committee formed, especially the nominated public relation officer shall look into these aspects.

9) Security :-

Manning of security posts is very essential during the disaster management.

10) Catering & Refreshment :-

Arrangement will be made for the victims, rescue teams and others.

25. Details of Occupational health issue in the District (last five –year data of number of patients of silicosis & Tuberculosis is also needs to be submitted)

The details of number of patients treated for silicosis and Tuberculosis for the last five years in the district is given below:

Sl.No.	Year	Number of patients treated for silicosis	Number of patients treated for Tuberculosis
1	2017	Nil	681
2	2016	Nil	795
3	2015	Nil	811
4	2014	Nil	775
5	2013	Nil	792

26. Plantation and Green belt development in respect of leases already granted in the district

It is necessary to develop Green belt in and around the polluted site with suitable species to reduce the air pollution effectively. Implementation of afforestation program is of paramount importance. In addition to augmenting existing vegetation, it

also checks soil erosion, make the ecosystem more complex and functionally more stable and make the climate more conducive.

Fireclay deposits being shallow in depth, mining simultaneous backfilling method will be followed in most of the mining areas. During the operations, the plantation will be proposed and will be carried out on the safety barrier areas and also on the mined out and backfilling areas.

27. Any other Information

Nil


**Deputy Director
Geology and Mining,
Ariyalur**


**District Collector
Ariyalur**