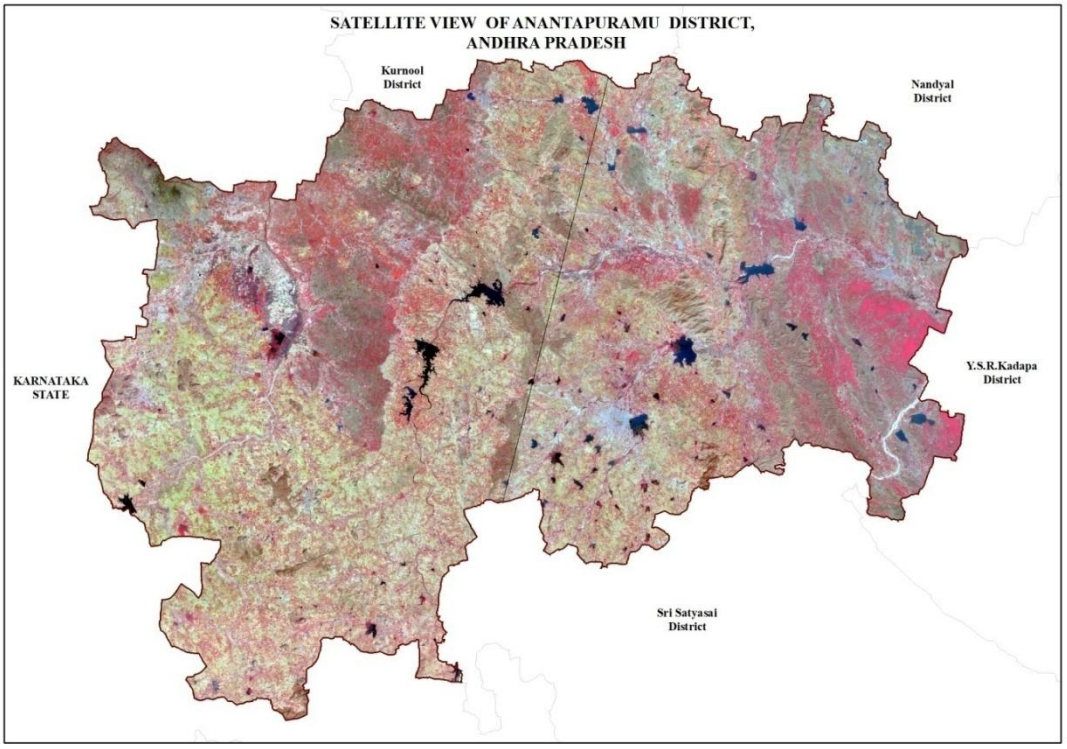
DISTRICT SURVEY REPORT
FOR
SAND AND OTHER MINOR MINERALS
ANANTAPUR DISTRICT, ANDHRA PRADESH

(FOR THE DEPARTMENT OF MINES AND GEOLOGY, GOVT. OF AP)

As per Notification No. S.O. 141 (E), 15.01.2016, S.O. 3611(E), 25.07.2018, & Enforcement & Monitoring Guidelines for Sand Mining 2020 of MOEF&CC, GoI



Prepared by

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Submitted to

DEPARTMENT OF MINES AND GEOLOGY
Government of Andhra Pradesh

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PREFACE

The Natural resource inventory is the assessment of the status of a given natural resource of an area at a given point in time. Population pressure results in over- exploitation of resources. The baseline information on the resources would help the administration for better planning and decision making. The main purpose of the report is to disseminate data on the natural resource up to the lowest administrative functionary to facilitate micro level planning and development. The efforts have been made to assess and document the information on land use/land cover, crop, surface water resource, soils, slope, groundwater prospects, groundwater quality, geological information, and minerals resources in Ananthapuramu district, Andhra Pradesh, based on the satellite remote sensing data and socioeconomic information.

The Department of Mines and Geology (DMG), Government of Andhra Pradesh (AP) requested the Andhra Pradesh Space Applications Center (APSAC) to update the district survey reports with availability of sand mineral information, major and minor mineral details, and river morphology for all the districts in the State. The District Survey report emphasizes and updated the major and minor minerals in the districts of AP. The District Survey reports are updated following the "Sustainable Sand Mining guidelines" issued in 2016 and 2020 and SO 741 of 2016 of the Ministry of Environment, Forests and Climate Change provided by the DMG. The comments received from the public, if found fit, shall be incorporated in the report. A list of leases in the district will be provided by the concerned Assistant Directors of Mines and Geology.

The report is an outcome of the efforts of the Scientists and Project Associates at APSAC. I heartily congratulate the team for compiling the report.

(Dr.Sundar Balakrishna, IFS)
Vice-Chairman
APSAC

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We would like to express our sincere gratitude to **Dr. Sundar Balakrishna, IFS**, **Special Secretary to Government,** Information Technology, Electronics and Communications (ITE&C), Govt. of Andhra Pradesh and the **Vice-Chairman, APSAC** Govt. of Andhra Pradesh, for his meticulous guidance and supervision.

We are grateful to the **Sri. V.G. Venkata Reddy**, **Director**, Department of Mines and Geology, Govt. of Andhra Pradesh for entrusting the work for the preparation of District Survey Reports of Andhra Pradesh.

We owe a great deal to **Sri. P Raja Babu, Joint Director,** Department of Mines and Geology for his overall support and guidance during the execution of this work.

We are very much thankful to **Dr.M.J.Ratnakanth Babu, Royalty Inspector (Head Office**), Mines and Geology for his support to complete the work successfully.

We are also thankful to the **District Mines and Geology Officer,** Anantapur District for their support in providing information

Our sincere thanks are due to the scientific staff of APSAC who has generated all the thematic maps for District Survey Reports.

APSAC

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List of Abbreviations

APSAC	: Andhra Pradesh Space Applications Centre
APMMC	: Andhra Pradesh Minor Mineral Concession
AMSL	: Above Mean Sea Level
AWiFS	: Advanced Wide Field Sensor
APWALTA	: Andhra Pradesh State Water, Land and Trees Authority
APMDC	: Andhra Pradesh Mineral Development Corporation
Bgl	: Below ground level
BT Road	: Bituminous Road
Cl	: Chlorine
CC Road	: Cement concrete
CRZ	: Coastal Regulatory Zone
CPSU	: Central Public Sector Undertaking
CGWB	: Central Ground Water Board
cu.m/day	: Cubic meter per day
DSR	: District Survey Report
DMG	: Directorate of Mines and Geology
DM&GO	: District Mines and Geology Officer
DES	: Directorate of Economics and Statistics
DEM	: Digital Elevation Model
dS/m	: Decisiemens per meter
EIA/EMP	: Environmental Impact Assessment
F	: Fluorine
FAC	: Full Additional Charge
FASAL	: Forecasting Agricultural output using Space, Agrometeorology and Land-based observations
Fe	: Iron
Ft	: feet
GD	: Geosciences Division
GIS	: Geographical Information System
GSI	: Geological Survey of India
Ha	: Hectare
Km	: Kilometre
IRS	: Indian Remote Sensing Satellite
ITE and C	: Information Technology Electronics and Communications
LISS	: Linear Imaging Self Scanning
LULC	: Land Use / Land Cover
Lps	: Litres per second

M	: meter
Mi	: mile
mm	: millimetre
MT	: Million Tonne
MoEF	: Ministry of Environment and Forests
MSL	: Mean Sea Level
NIRD	: National Institute of Rural Development
NH	: National Highway
$NaNO_3$	: Sodium nitrate
NRSA	: National Remote Sensing Agency
NRSC	: National Remote Sensing Centre
PESA	: Panchayats Extension to Scheduled Areas
pH	: Power of hydrogen
PSD	: Performance Security Deposit
PSU	: Public sector Undertakings
R2	: ResourceSat-2
RGNDWM	: Rajiv Gandhi National Drinking Water Mission
RWS and S	: Rural Water Supply and Sanitation
SAR	: Synthetic Aperture Radar
SEB	: Special Enforcement Bureau
SO_4	: Sulfate
Sq.Km	: Square Kilometre
Sq.m	: Square metre
TA	: Tantalum
TIN	:Triangular Irregular Network
TGA	: Total Geographical Area
TIS	: Tank Information System
TTD	: Tirumala Tirupati Devasthanams
WBM	: Water Bound Macadam

Chapter I – Introduction & General Profile

1.1 Administrative Setup

Anantapur district is one of the eight districts in the Rayalaseema region of the Indian state of Andhra Pradesh. The district headquarters is Anantapuramu city. In the year 2022, as part of re-organisation of districts, Sri Sathya Sai district was carved out.

Geographically, Anantapur district is bounded on north by Kurnool &Anantapuramu districts, on the south by Sri Sathya Sai, on the west by Chitradurga & Bellary districts in Karnataka state and on the east by Y.S.R. Kadapa district. Total geographical area of the district is 10,205 Sq.km. It is covered with 3 Revenue divisions namely Anantapuramu, Guntakal and Kalyandurg: 31 Revenue mandals and 507 Revenue villages. Tadpatri mandal is having maximum number of villages (28) and Atmakur mandal having minimum number of villages (8). Out of 31 mandals of the district, the maximum area (489 sq.km) is occupied by Kalyandurg Mandal and minimum area in Peddapappur Mandal (226 Sq.km). It is one of the driest places in South India.

The mandals covered in each Revenue division are shown in Table-1 and its spatial distribution is shown in the Figure-1. The satellite map of Ananthapur district is shown in Figure-2.

Table 1: List of mandals covered in each Revenue division

S.No	Anantapuramu Division	S.No	Guntakal Division	S.No	Kalyandurg Division
1	Anantapuramu	13	Gooty	21	Beluguppa
2	Atmakur	14	Guntakal	22	Bommanahal
3	BukkarayaSamudram	15	Pamidi	23	Brahmasamudram
4	Garladinne	16	Peddavadugur	24	D.Hirehal
5	Kudair	17	Uravakonda	25	Gummagatta
6	Narpala	18	Vajrakarur	26	Kalyandurg
7	Peddapappur	19	Vidapanakal	27	Kambadur
8	Putlur	20	Yadiki	28	Kanekal
9	Raptadu			29	Kundurpi
10	Singanamala			30	Rayadurg
11	Tadpatri			31	Settur
12	Yellanur				

Data Source: APSAC, Vijayawada.

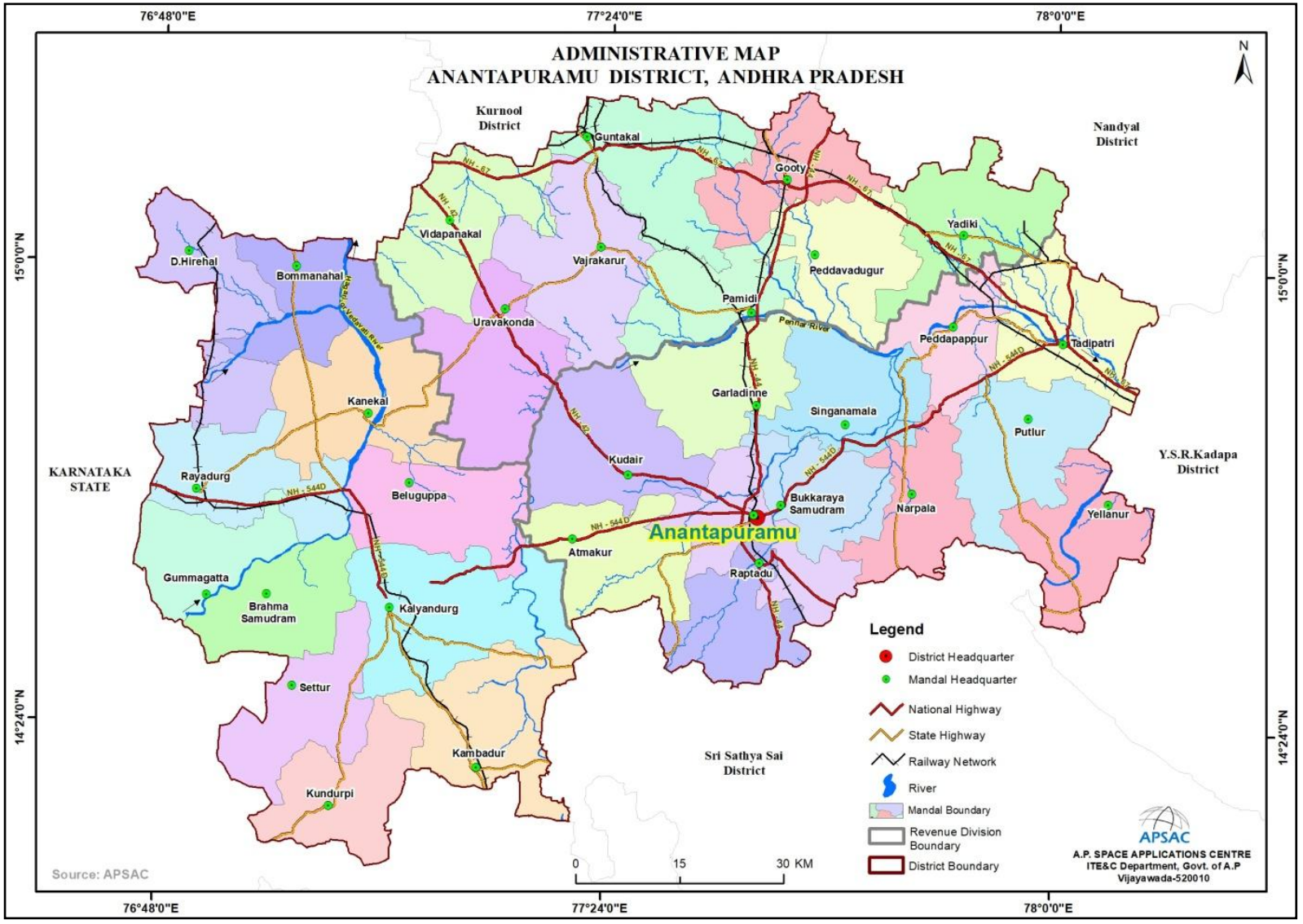

Figure-1: Administrative Map of Anantapur district, Andhra Pradesh

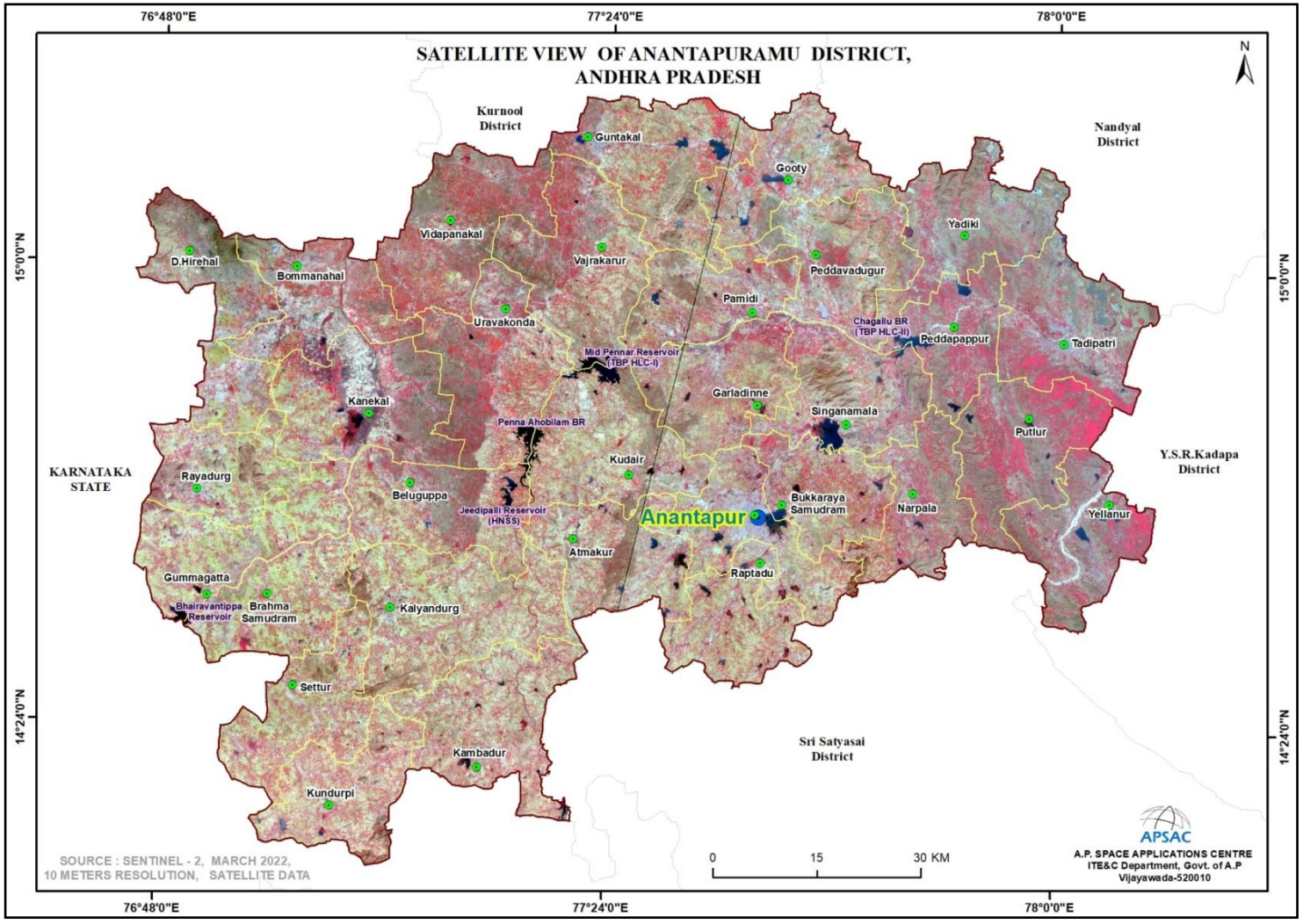

Figure-2: Satellite View of Anantapur District

1.2 Physiography

Physiographically, Anantapur District is a major pediplain. The district is mostly in all the sides is mostly covered by structural hills and valleys with dyke ridges.

1.2.1 Relief

As per the guidelines of the All India Soil and Land Use Planning (AIS & LUP) soil survey manual, the slope distribution clearly shows that the district terrain varies from plains to hilly regions. The slope is distributed from nearly level to very steep slopes over the district (Figure-3). About 29% of the land is in nearly level (0-1%) sloping areas. It can be seen in the parts of the eastern, central, and western parts of the district along with very gently sloping areas. The very gently sloping (1-3%) areas covered 48% of the districts geographical area. The gently sloping areas (3-5%) are found along the scrub lands and cover about 14% of the district total. The hilly and forest regions contain moderately sloping, strongly sloping, steeply sloping, and very steep slopes, which occupy 4.16%, 3.59%, 1.43%, and 0.64%, respectively. These areas are concentrated in the district's western eastern and central regions.

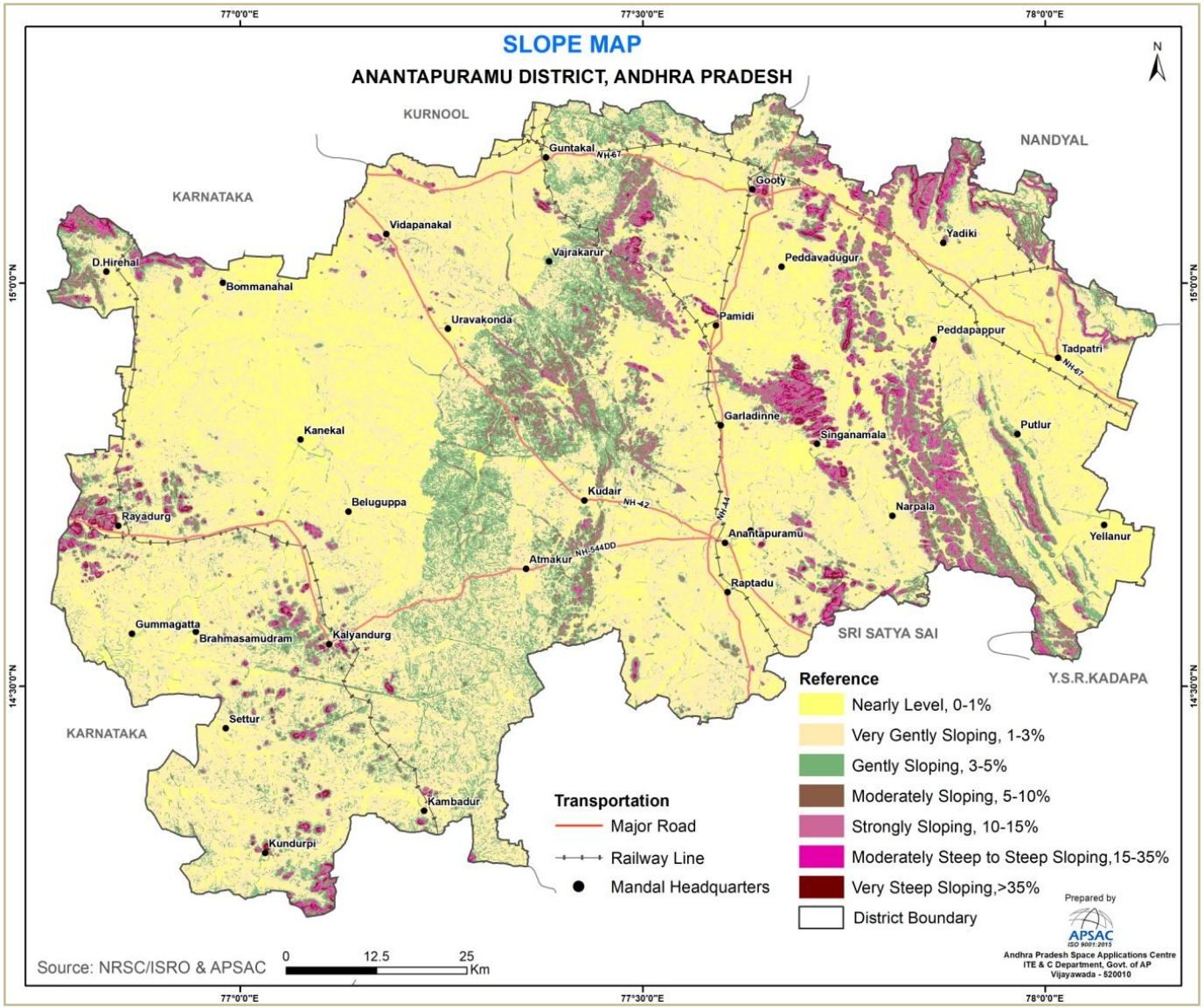

Figure-3: Slope Map of Anantapur District

1.2.2 Climate & Rainfall

1.2.2.1. Climate:

The district of Anantapuramu has a good elevation which provides the district with a tolerable climate throughout the year. It has a gradual fall from the south to the north towards the valley of the Pennar in Peddavadugur, Peddapappur and Tadipatri mandals.

The Geographical position of the Peninsula renders it the driest part of the State and hence, agriculture conditions are more often precarious. Monsoon also evades this part due to its unfortunate location. Being far from the east coast, it does not enjoy the full benefits of northeast monsoon and being cut off by the high Western Ghats, the South West Monsoon is also prevented from penetrating and punching the thirst of these parched soils. The mean minimum and maximum temperatures recorded in the district are 19°C in January and 40°C in May, respectively. The locations of Automatic Weather Stations (AWS) in Anantapuramu district are shown in Figure-4.

1.2.2.2. Rainfall:

The average annual rainfall of the district is 521.49 mm, of which 315.40 mm falls as South-West (June-September) monsoon and 133.91 mm as North-East (October-December) monsoon. The mean minimum and maximum temperatures recorded in the district are 19°C in January and 40°C in May, respectively. The average rainfall for the last 25 years is used for the analysis. The average annual rainfall is shown in Figure-5 and details are given in Table-2.

Table 2: Average Annual Rainfall (mm) in the district, during the year 1998-2021

S.No	Month	Average Annual Rainfall (mm)
1	January	2.53
2	February	1.52
3	March	6.01
4	April	16.32
5	May	45.81
6	June	58.25
7	July	60.94
8	August	77.25
9	September	118.96
10	October	98.07
11	November	30.72
12	December	5.11
	Total	**521.49**

Data source: AWS & APSDPS, Vijayawada

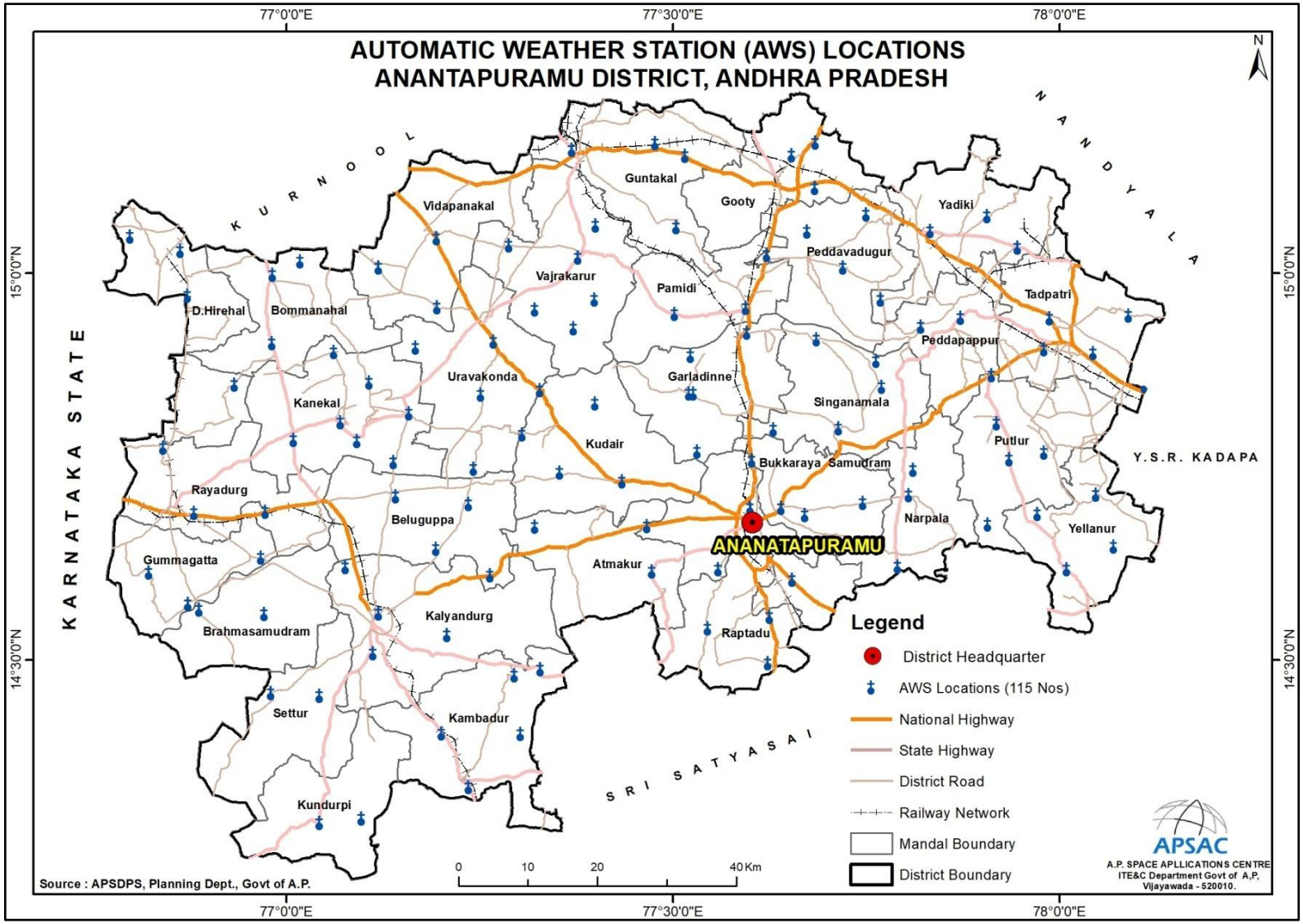

Figure-4: Locations of Automatic Weather Stations (AWS) in Anantapur District

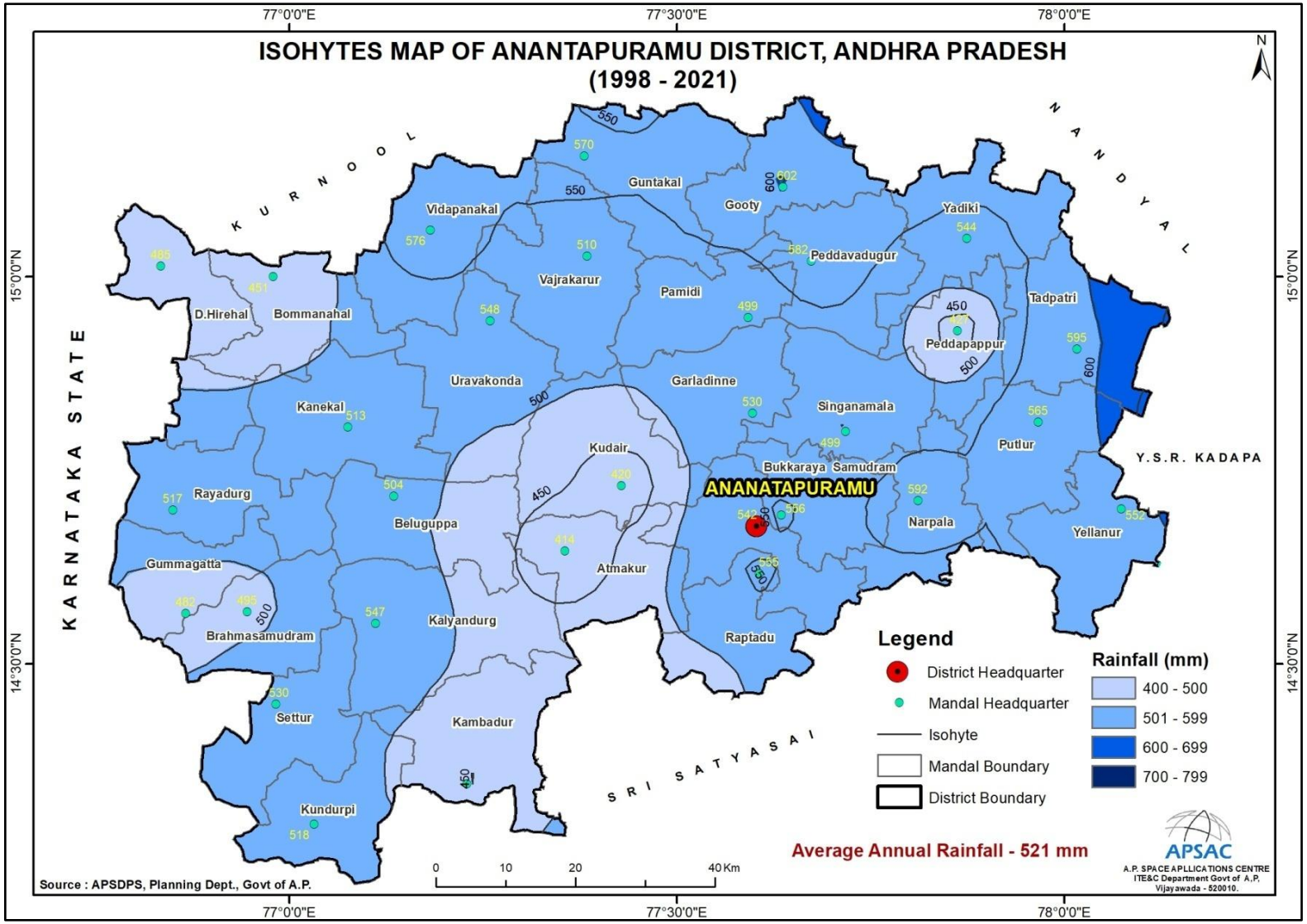

Figure-5: Rainfall distribution in Anantapur District

1.2.3 Drainage

The important river in the district is Pennar river and covered with 65% of the total area and the remaining part covered with Hagari Vedavathi (Krishna River) river. The Pennar river origin in the Nandi Hills of Karnataka State where it is called "Uttara Pinakini" and enters this district in the extreme south of Kambadur mandal and flows through Kalyandurg, Beluguppa, Uravakonda, Kudair, Vajrakarur, Pamidi, Garladinne, Singanmamala, Peddavadugur, Peddapappur and Tadipatri mandals. The river flows towards north & east directions and leaves the district near Vanganur in Tadipatri mandal. The major tributaries in the district are Tadakaleru, Chitravathi, Puli Vanka and PeddaVanka.

1.3 Population and Literacy

1.3.1. Population:

The total population of the district is 22,41,105; of which male and female are 11,32,902 and 11,08,203respectively as per the 2011 census of India. Among all mandals, Anantapuramu Mandal is having maximum population of 3,88,023; whereas Peddapappur Mandal is having minimum population of 34,629.

The total schedule caste(SC) population in the district is 3,34,142; of which male and female are 1,67,066 and 1,67,076 respectively. The schedule tribe (ST) population is 70,161; of which male and female are 36,015 and 34,146 respectively. The mandal wise population is shown in theTable-3. The mandal wise spatial distribution of total population is depicted in the Figure-6.

1.3.2. Literacy:

The total literacy in the district is 12,72,382; of which male and female are 7,32,986 and 5,39,396 respectively. The total illiterates are 9,68,723; of which male and female are 3,99,916 and 5,68,807 respectively, as per the 2011 census of India. The mandal wise Literacy is shown in the Table-4.

1.3.3. Details of the Occupational Health issues in the District (Last five-year data of number of patients of Silicosis):

No cases were reported during last 5 years due to mining activity.

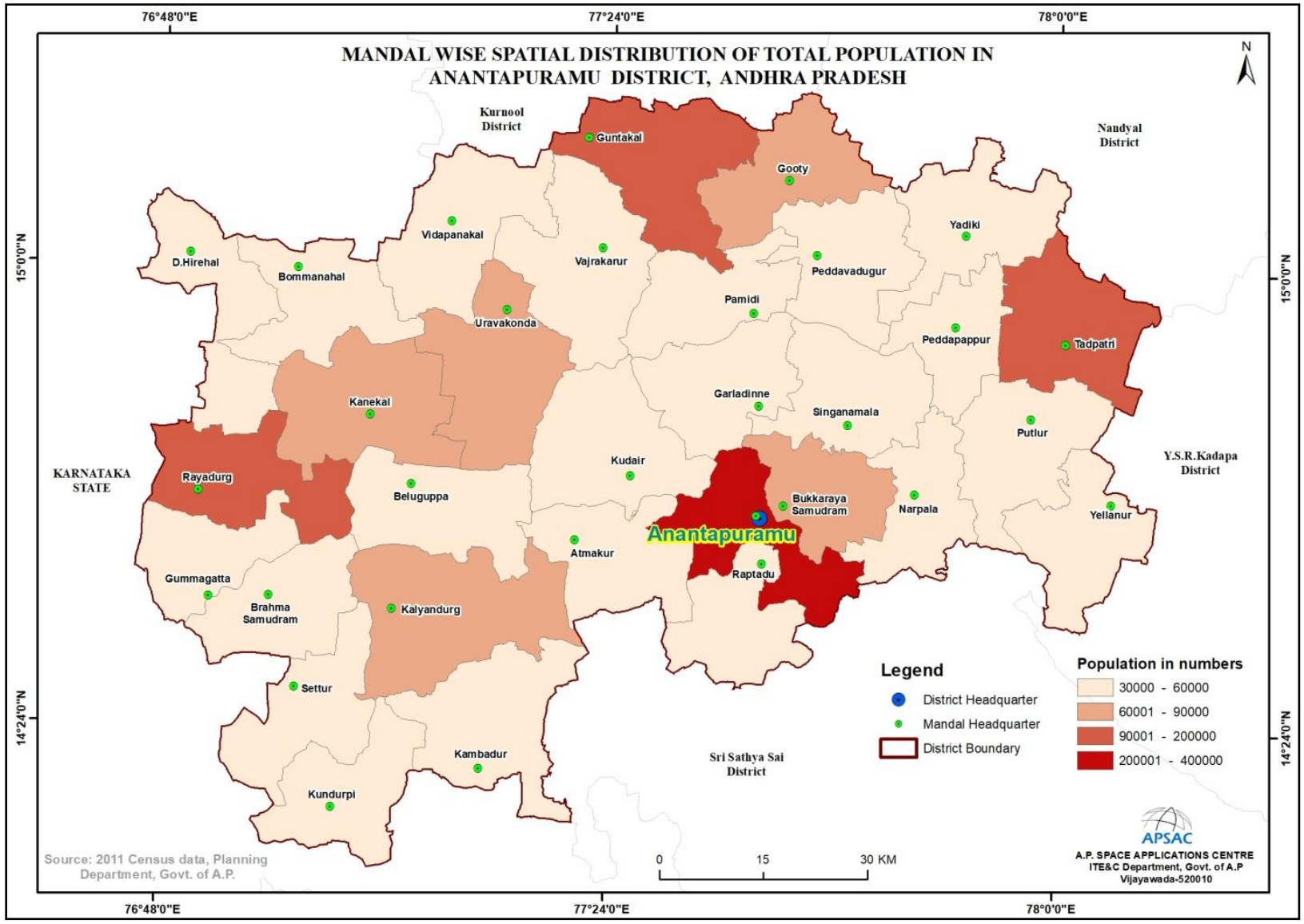

Figure-6: Mandal wise Spatial Distribution of Population in Anantapur district, Andhra Pradesh

Table 3: Population Statistics Summary of 2011 Census

S.No	Mandal Name	Total House Holds	Total Population	Total Male Population	Total Female Population	Total SC Population	Male SC Population	Female SC Population	Total ST Population	Male ST Population	Female ST Population
1	Anantapuramu	92905	388023	195645	192378	35321	17395	17926	12540	6463	6077
2	Atmakur	9796	38970	20037	18933	6306	3216	3090	3917	1994	1923
3	Beluguppa	10056	43735	22159	21576	8332	4193	4139	3434	1746	1688
4	Bommanahal	11959	55989	28121	27868	7090	3564	3526	477	238	239
5	Brahmasamudram	9363	43162	21520	21642	7515	3536	3979	1139	571	568
6	BukkarayaSamudram	16091	67384	34582	32802	10929	5557	5372	2608	1370	1238
7	D.Hirehal	9583	46613	23598	23015	6882	3462	3420	891	462	429
8	Garladinne	13192	53780	27299	26481	10077	5116	4961	1716	848	868
9	Gooty	20770	88887	44362	44525	15879	7624	8255	3357	1889	1468
10	Gummagatta	10147	49207	24958	24249	9028	4510	4518	574	297	277
11	Guntakal	39077	171655	86048	85607	23824	11819	12005	7012	3581	3431
12	Kalyandurg	20621	89879	45307	44572	13322	6610	6712	3844	1939	1905
13	Kambadur	11668	50799	25972	24827	12286	6043	6243	3232	1637	1595
14	Kanekal	13923	64979	32908	32071	9872	5001	4871	205	110	95
15	Kudair	9272	38312	19470	18842	6994	3493	3501	2061	1072	989
16	Kundurpi	11765	53180	27145	26035	9242	4688	4554	433	223	210
17	Narpala	14255	54973	28026	26947	10276	5286	4990	1012	521	491
18	Pamidi	13117	55303	28035	27268	7424	3765	3659	3181	1603	1578
19	Peddapappur	8604	34629	17600	17029	6373	3212	3161	140	76	64
20	Peddavadugur	11129	45771	23311	22460	8705	4407	4298	209	93	116
21	Putlur	9014	36902	18699	18203	6786	3389	3397	29	15	14
22	Raptadu	9377	38057	19558	18499	5089	2580	2509	511	265	246
23	Rayadurg	20939	102691	51887	50804	12022	6103	5919	3346	1726	1620
24	Settur	9476	43172	21955	21217	8467	4317	4150	730	371	359
25	Singanamala	10710	43643	22032	21611	9434	4733	4701	2262	1129	1133
26	Tadpatri	39970	165872	83197	82675	22861	11340	11521	2653	1327	1326

27	Uravakonda	18321	80201	40235	39966	12647	6206	6441	2139	1140	999
28	Vajrakarur	11186	50007	25314	24693	9173	4654	4519	5475	2781	2694
29	Vidapanakal	11562	53476	27308	26168	7805	4053	3752	154	76	78
30	Yadiki	13941	56122	28411	27711	8227	4167	4060	766	390	376
31	Yellanur	9162	35732	18203	17529	5954	3027	2927	114	62	52
Grand Total		**520951**	**2241105**	**1132902**	**1108203**	**334142**	**167066**	**167076**	**70161**	**36015**	**34146**

Data Source: 2011 Census data, Planning Department & DES.

Table 4: Literacy statistics summary of 2011 Census

S.No	Mandal Name	Total House Holds	Total Population	Total Male Population	Total Female Population	Total SC Population	Male SC Population	Female SC Population	Total ST Population	Male ST Population	Female ST Population
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3	Beluguppa	10056	43735	22159	21576	8332	4193	4139	3434	1746	1688
4	Bommanahal	11959	55989	28121	27868	7090	3564	3526	477	238	239
5	Brahmasamudram	9363	43162	21520	21642	7515	3536	3979	1139	571	568
6	BukkarayaSamudram	16091	67384	34582	32802	10929	5557	5372	2608	1370	1238
7	D.Hirehal	9583	46613	23598	23015	6882	3462	3420	891	462	429
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14	Kanekal	13923	64979	32908	32071	9872	5001	4871	205	110	95
15	Kudair	9272	38312	19470	18842	6994	3493	3501	2061	1072	989
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19	Peddapappur	8604	34629	17600	17029	6373	3212	3161	140	76	64
20	Peddavadugur	11129	45771	23311	22460	8705	4407	4298	209	93	116
21	Putlur	9014	36902	18699	18203	6786	3389	3397	29	15	14
22	Raptadu	9377	38057	19558	18499	5089	2580	2509	511	265	246
23	Rayadurg	20939	102691	51887	50804	12022	6103	5919	3346	1726	1620
24	Settur	9476	43172	21955	21217	8467	4317	4150	730	371	359
25	Singanamala	10710	43643	22032	21611	9434	4733	4701	2262	1129	1133
26	Tadpatri	39970	165872	83197	82675	22861	11340	11521	2653	1327	1326
27	Uravakonda	18321	80201	40235	39966	12647	6206	6441	2139	1140	999
28	Vajrakarur	11186	50007	25314	24693	9173	4654	4519	5475	2781	2694
29	Vidapanakal	11562	53476	27308	26168	7805	4053	3752	154	76	78
30	Yadiki	13941	56122	28411	27711	8227	4167	4060	766	390	376
31	Yellanur	9162	35732	18203	17529	5954	3027	2927	114	62	52
Grand Total		**520951**	**2241105**	**1132902**	**1108203**	**334142**	**167066**	**167076**	**70161**	**36015**	**34146**

Data Source: 2011 Census data, Planning Department & DES

1.4 Land Utilization Pattern

1.4.1 Land Use / Land Cover

The Land Use/Land Cover (LULC) pattern of any region is an outcome of various physical, cultural factors and their utilization by man in time and space. Land use refers to the type of utilization to which man has put the land. It also refers to the evaluation of the land with respect to various natural characteristics. Land cover describes the vegetal attributes of the land. Land use/land cover data is essential for planners, decision-makers and those concerned with land resources management. A proper understanding of the influence of the various human-induced land use practices with regard to environmental change is essential to help simulate the land use changes. Remote sensing technology is considered most effective as it provides timely and authentic information about the spatial distribution of land use/land cover, while the Geographical Information System (GIS) provides a flexible digital environment for collecting, storing, visualizing and analyzing the spatial data. Remote sensing as a vital tool helps in rapid assessment and monitoring of a natural resource. When combined with GIS, it makes it possible to map land use/ land cover phenomena in detail for further planning, development, and decision-making, which is essential for meeting the increasing demands and welfare of the ever-growing population.

1.4.2 Spatial Distribution of Land Use / Land Cover

Using satellite data from the three seasons (Kharif, Rabi, and Zaid), various land use/land cover categories have been identified under the level 3 classification. The LULC map of the district has been delineated by using visual image interpretation techniques i.e. size, shape, color, tone, texture, association, and pattern (NRSA, 2006). This information is used for general planning purposes at the district or mandal level. The broad categories are built-up, agricultural, forest, wastelands, and water bodies. The spatial distribution of land use and land cover of the Anantapuramu district is shown in Figure-7 and the area statistics are presented in Table-5.

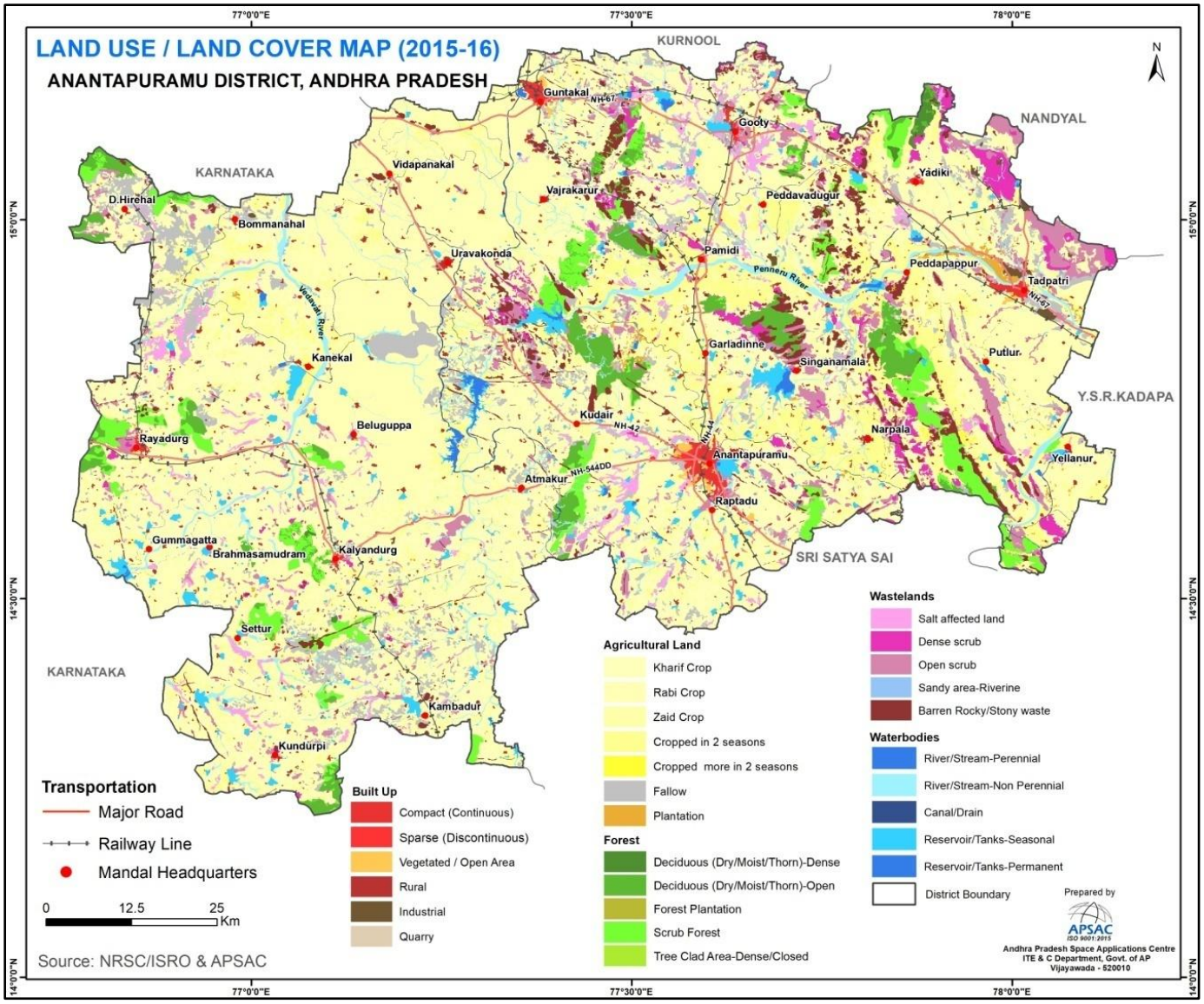


Figure-7: Land use / land cover map of Anantapur District 2015-16

Table 5: Category-wise distributions of Land Use/Land Cover during 2015-16

S. No	LULC categories	Area in sq. km	% to total
Built up		**250.32**	**2.45**
1	Compact (Continuous)	39.28	0.38
2	Sparse (Discontinuous)	23.58	0.23
3	Vegetated / Open Area	14.48	0.14
4	Rural	136.40	1.34
5	Industrial	19.19	0.19
6	Mining - Active	0.32	0.00
7	Mining - Abandoned	0.02	0.00
8	Quarry	17.04	0.17
Agricultural Land		**7728.28**	**75.73**
9	Kharif Crop	4106.00	40.24
10	Rabi Crop	1686.14	16.52
11	Zaid Crop	0.21	0.00
12	Cropped in 2 seasons	1344.27	13.17
13	Cropped more in 2 seasons	3.96	0.04
14	Fallow	541.88	5.31
15	Plantation	45.82	0.45
Forest		**630.22**	**6.18**
16	Deciduous (Dry/Moist/Thorn)-Dense/Closed	16.20	0.16
17	Deciduous (Dry/Moist/Thorn)-Open/Closed	261.77	2.57
18	Forest Plantation	0.54	0.01
19	Scrub Forest	351.71	3.45
Wastelands		**1070.46**	**10.49**
20	Salt affected land	195.90	1.92
21	Ravinous land	0.04	0.00
22	Dense scrub	170.22	1.67
23	Open scrub	424.20	4.16
24	Sandy area-Riverine	4.48	0.04
25	Barren Rocky/Stony waste	275.61	2.70
Water bodies		**525.72**	**5.15**
26	River/Stream-Perennial	242.99	2.38
27	River/Stream-Non Perennial	0.51	0.01
28	Canal/Drain	40.38	0.40
29	Lakes/Ponds-Permanent	0.19	0.00
30	Reservoir/Tanks-Permanent	37.12	0.36

31	Reservoir/Tanks-Seasonal	204.53	2.00
Total		**10205**	**100.00**

Data source: NR Census 3rd cycle mapping, NRSC/ISRO & APSAC, GoAP

1.4.2.1. Built-up

These are the areas where people live that have a front of buildings, transportation, correspondence, utilities about water, vegetation, and open spaces. It includes built-up (compact and sparse), vegetated/open areas, rural, industrial, and mining/quarry. Around 250 sq. km (2.45%) of the district's overall geographic area, has been mapped as the built-up area, of which, rural areas contribute 1.34%, which is the predominant category in the built-up category.

1.4.2.2. Built up - Compact (Continuous)

Most of the land is covered by buildings, roads, and artificially surfaced area and cover almost all the ground. The built-up-compact class is assigned where the impermeable surfaces such as the transportation network and urban structures take up more than 80% of the surface area. This category is occupied 39.28 sq. km, which is found in Anantapuramu, Tadipatri, Guntakal, Gooty, and other municipal areas.

1.4.2.3. Built up - Sparse (Discontinuous)

Most of the land is covered by the structures like buildings, roads, and artificially surfaced areas associated with vegetated areas and bare soil, which occupy discontinuous but significant surfaces. Between 30 to 80 % of the total surface should be impermeable. Scattered blocks of residential flats, hamlets, and small villages are delineated under this category. It contributes an area of 23.58 sq. km, which is found in peri-urban areas.

1.4.2.4. Vegetated / Open Area

These are vegetated areas that are part of or next to an urban agglomeration. The region is covered in vegetation, which has been specifically defined and includes trees, bushes, and herbs. This category includes open spaces that are used as parks, sporting and recreational facilities, campgrounds, sports fields, leisure parks, golf courses, racetracks, and formal parks, among others. The vegetated open area occupies about 14.48 sq. km., and is found around fringe areas of urban areas.

1.4.2.5. Built-up – Rural

These are areas that are used for human settlement and are considerably smaller than urban areas, where more than 80% of the population works in agriculture as a primary occupation. These areas are classified as being in the built-up (rural) category. The rural built-up area is the predominant category among the built-up category and is dispersed throughout the district. It contributed an area of 136.40 sq. km.

1.4.2.6. Industrial

Non-linear impervious surfaces are included in this class which is related to trade, manufacturing, distribution, and commerce. These are areas where human activity

is observed in the form of manufacturing along with other supporting establishments for maintenance. The industrial area occupies an area of 19.19 sq. km, which is observed in and around towns.

1.4.2.7. Mining – Active

Mining areas encompass area under surface operations. It is easy to spot these activities' effects on the landscape because they have left behind enormous giant pit mines. Currently, there are extensive surface operations being conducted in the active mining areas to remove economically significant ores. A total of 0.32 sq. km., is contributed by the active mining area.

1.4.2.8. Mining – Abandoned

These are the locations where extensive surface operations to remove economically significant ores were once conducted but are currently being left unfinished for a variety of reasons, including economic, operational, viability, disturbances, etc. Only about 0.02 sq. km. has been contributed under this category.

1.4.2.9. Quarry

These are signs of surface mining activities, such as small-scale land surface excavation for sand, gravel, clay-phosphate mines, limestone quarries, etc. They are mostly characterized by its nearness to urban areas. It contributes to an area of 17.04 sq km.

1.4.2.10. Agricultural Land

The land use category is primarily used to grow horticultural and commercial crops, as well as food and fiber. Cropland, fallow land, agricultural plantations, and aquaculture are all included in this category. It is determined that the agricultural category is the dominant category, accounting for 7728.28 sq km (75.73%) in 2015-16. The crops grown in the district are Rice, Peanuts, Bengal gram, Sunflower, Red gram, Sorghum, Maize, Cotton, Ragi, Tomato, Chilli Sweet Orange, Mango, Papaya, Banana, etc.

1.4.2.11. Kharif Crop

Kharif crops are those grown in agricultural areas that are planted between June/July to September/October, which coincides with the SW monsoon season. It is related to areas of paddy and other dry crops that are rain-fed and are grown in dry land farming with little to no irrigation. It is the predominant agricultural category, with an area of 4106 sq. km (40.24%).

1.4.2.12. Rabi Crop

These areas are cultivated between November/December to February/March. It is associated with areas under assured irrigation, irrespective of the source of irrigation. However, Rabi-cropped areas also exist in rain-fed areas with residual soil moisture, particularly in areas with black soil and high rainfall during the Kharif season. The extent of Rabi cropped area is about 1686.14 sq. km (16.52%).

1.4.2.13. Zaid Crop

These are the areas that are cropped during summer (April – May) which are mostly associated with irrigated areas with fertile soils, confined to plains/delta areas. The Zaid area is attributed to 0.21 sq. km only during 2015-16.

1.4.2.14. Cropped in two seasons

These are the areas that are farmed during the two harvest seasons that are frequently seen in conjunction with irrigated areas. In this category, there are three possible combinations: Kharif + Rabi, Kharif + Zaid, and Rabi + Zaid. It covers an area of 1344.27 sq. km (13.17%).

1.4.2.15. Cropped in more than two seasons

These are the areas that are cropped in more than two cropping seasons. It includes triple-cropped areas (Kharif, Rabi, and Zaid), and areas under multiple cropping. Long-duration crops like sugarcane, cotton, banana, pineapple, etc., are considered under this category. It contributes an area of 3.96 sq. km.

1.4.2.16. Fallow land

Fallow land is described as agricultural land that is actively being used for cultivation but is also temporarily allowed to rest or un-cropped for one or more seasons, but not for less than a year and not for more than five years. The fallow land covers 541.88 sq. km. (5.31%) of the total area.

1.4.2.17. Agricultural Plantation

These are the locations where agricultural tree crops have been planted and are being managed through agricultural management techniques. These also include areas of land use systems and practices wherein the cultivation of herbs, shrubs, and vegetable crops are deliberately integrated with agricultural crops, mostly in irrigated conditions, for ecological and economic reasons. These areas are separable from cropland, especially with the data acquired during the Rabi/Zaid seasons. Plantations appear in a dark-red to red tone of different sizes with regular and sharp edges, indicating the presence of a fence around it. It was found that 45.82 sq. km. of the land was under plantation crops during 2015-16.

1.4.2.18. Forest

Land with a tree canopy cover of more than 30% and a size of more than 0.5 ha is referred to as a forest. Forest is determined both by the presence of trees and the absence of other predominant land uses within the notified forest boundaries. The trees should be able to reach a minimum height of 5 m within the notified forest boundaries. The forest cover is about 630.22 sq. km (6.18%). These are found in the eastern and western parts of the district.

1.4.2.19. Deciduous (Dry/Moist/Thorn)-Dense

This category is predominantly composed of species, which shed their leaves once a year, especially during summer. These are mostly broad-leaved tropical forests with a tendency to shed their leaves annually. This category includes all the areas where the canopy cover/density is more than 40% and contributed 16.20 sq. km.

1.4.2.20. Deciduous (Dry/Moist/Thorn)-Open

This category is predominantly composed of species, which shed their leaves once a year, especially during summer. These are mostly broad-leaved tropical forests with a tendency to shed their leaves annually. This category includes all the forest areas where the canopy cover/density ranges between 10 - 40 percent. The area included in this category is 261.77 sq. km.

1.4.2.21. Forest Plantation

These are the locations where important tree species for forestry are grown and managed, particularly in notified forest areas. The majority of these are found in uplands within the notified areas. Many of these can be recognized by the distinct boundaries they display. A total of 0.54 sq. km., are covered by forest plantations.

1.4.2.22. Scrub Forest

These are the forest areas which are generally seen on the fringes of dense forest cover and settlements, where there is biotic and abiotic interference. Most times they are located closer to habitations. Forest blanks which are the openings amidst forest areas, devoid of tree cover, observed as openings of assorted size and shapes as manifested in the imagery are also included in this category. It is attributed to an area of 351.71 sq. km (3.45%).

1.4.2.23. Wastelands

Wasteland is defined as degraded land that can be brought under vegetative cover with reasonable effort, is currently underutilized, and is deteriorating due to improper water and soil management or natural causes. Wastelands can result from inherent/imposed disabilities such as location, environment, chemical and physical properties of the soil, or financial or management constraints. The area under this category is 1070.46 sq. km (10.49%). These are found in the northern, central, western and eastern parts of the district.

1.4.2.24. Salt-affected land

These lands are containing an excessive concentration of salts (soluble salts or exchangeable saline or both). Salinization can result from improper management of canal irrigation water resulting in the rise of the water table and consequent accumulation of salts in the root zone in arid, semi-arid and sub-humid (dry) conditions and ingress of sea water in coastal regions and/or use of high-salt containing groundwater. They also become saline when soils have developed on salt-containing parent materials or have saline groundwater. The salt-affected lands accounted for 195.90 sq. km in the district.

1.4.2.25. Ravinous land

The word ravine is usually associated not with an isolated gully but with an intricate network of gullies formed generally in deep alluvium and entering a nearby river, flowing much lower than the surrounding area. Ravines are basically extensive systems of gullies developed along the river course. It covers an area of 0.04 sq. km.

1.4.2.26. Dense scrub

The scrub areas are usually confined to topographically elevated areas, on hill slopes that are typically surrounded by agricultural lands. These regions have extreme slopes that have been severely eroded, chemically degraded shallow and skeletal soils, and lands that have experienced excessive aridity, with scrubs predominating the landscape. It can be found in areas ranging in size from small to large, with either a continuous pattern or a dispersed one. The dense scrub covered an area of 170.22 sq. km, mostly in hilly regions.

1.4.2.27. Open scrub

This category has a similar description as mentioned in the dense scrub except that they possess sparse vegetation or devoid of scrub and have thin soils cover. The open scrub is found in foothills, surrounded by agricultural lands with an account of 424.20 sq. km.

1.4.2.28. Riverine sand

Riverine sands are the accumulations of sand that are seen as sheets in the flood plain as a result of river flooding. The sandy areas occurring within or in continuity to the river course are to be excluded from this category. It contributes an area of 4.48 sq. km., of land along the Pennar River.

1.4.2.29. Barren Rocky/Stony waste

The barren rock exposures are especially confined to hilly terrain with downslope with rock outcrops, stony waste and fragments. The area under this category is 275.61 sq. km. It is found that most of the barren rocky areas are being quarried for various construction activities in the district.

1.4.2.30. Water Bodies

This category includes locations with surface water, either flowing as streams, rivers, canals, etc., or being impounded in the form of ponds, lakes, and reservoirs. Depending on the depth of the water, these are visible in the satellite image in a blue to dark blue or cyan colour. About 525.72 sq. km, or 5.15% of the district, is delineated in the water body category.

1.4.2.31. River/Stream-Perennial

Rivers/streams are the natural course of water flowing on the land surface along a definite channel/slope regularly or intermittently towards a sea in most cases or a lake or an inland basin in desert areas or a marsh or another river. These are the rivers/streams that flow continuously throughout the year as considered perennial. It contributes an area of 242.99 sq. km. The Pennar River flows through the district in the west-east direction.

1.4.2.32. River/Stream-Non Perennial

A non-perennial surface is one where the water is present for fewer than nine months of the year. Additionally, this refers to the dry section of the river, which is typically identified by the presence of sand or exposed rock. It is observed that the majority of the streams belong to the non-perennial category and are delineated

with an area of 0.51 sq. km (0.01%). The major streams are identified under this category.

1.4.2.33. Canal/Drain

Artificial watercourses called canals and drains are built for irrigation, navigation, or to remove extra water from agricultural lands. It covers an area of 40.38 sq. km.

1.4.2.34. Reservoir/Tanks-Permanent

The reservoir is an artificial lake made by building a dam across a river to use it for flood control, irrigation, and hydroelectric power generation, either separately or in combination. Tanks are small lakes of impounded waterways constructed on land surface for irrigation. They are associated with croplands, lowlands and reservoirs surrounded by hills without vegetation. This includes all reservoirs/tanks with water spread seen at least during one season in a year is considered under the permanent category. This category occupies an area of 37.12 sq. km.

1.4.2.35. Reservoir/Tanks-Seasonal

Dry reservoirs/tanks are those that are seasonal in nature and do not have water present throughout the year. Many of the tanks, with a total area of 204.53 sq. km, are mapped under the seasonal category.

1.4.3 Forest Cover Distribution

The interpretation of various topographical maps from different sources and satellite data were used to create the forest cover maps. Land with a tree canopy cover of more than 10% and a size of more than 0.5 ha is referred to as a forest. The notified forest boundaries are considered to contain a forest if there are both trees and no other dominant land uses there. The trees should be able to reach a minimum height of 5 m within the notified forest boundaries.

The total forest area in the district is 630.22 sq. km, accounting6.18% of the total geographical area of the district. The Anantapuramu forest division extends over the entire revenue limits in the district. The major parts of the forest are scattered and found in the east, southwest and central parts of the district. Bamboo along with timber species occurs fairly over extensive areas in the district. The predominant category is scrub forest followed by deciduous open forest. The spatial distribution of forest cover and its statistics are presented in Figure-8 and Table-6. As per the Forest Department, Government of Andhra Pradesh the Forest boundary map is presented in Figure-9.

Table 6: Forest cover distribution in Anantapur District

S. No	Forest Category	Area in sq. km	% to district total
1	Deciduous (Dry/Moist/Thorn)-Dense/Closed	16.20	0.16
2	Deciduous (Dry/Moist/Thorn)-Open/Closed	261.77	2.57
3	Forest Plantation	0.54	0.01
4	Scrub Forest	351.71	3.45
Total		**630.22**	**6.18**

Data source: NR Census 3rd cycle mapping, NRSC/ISRO & APSAC, GoAP

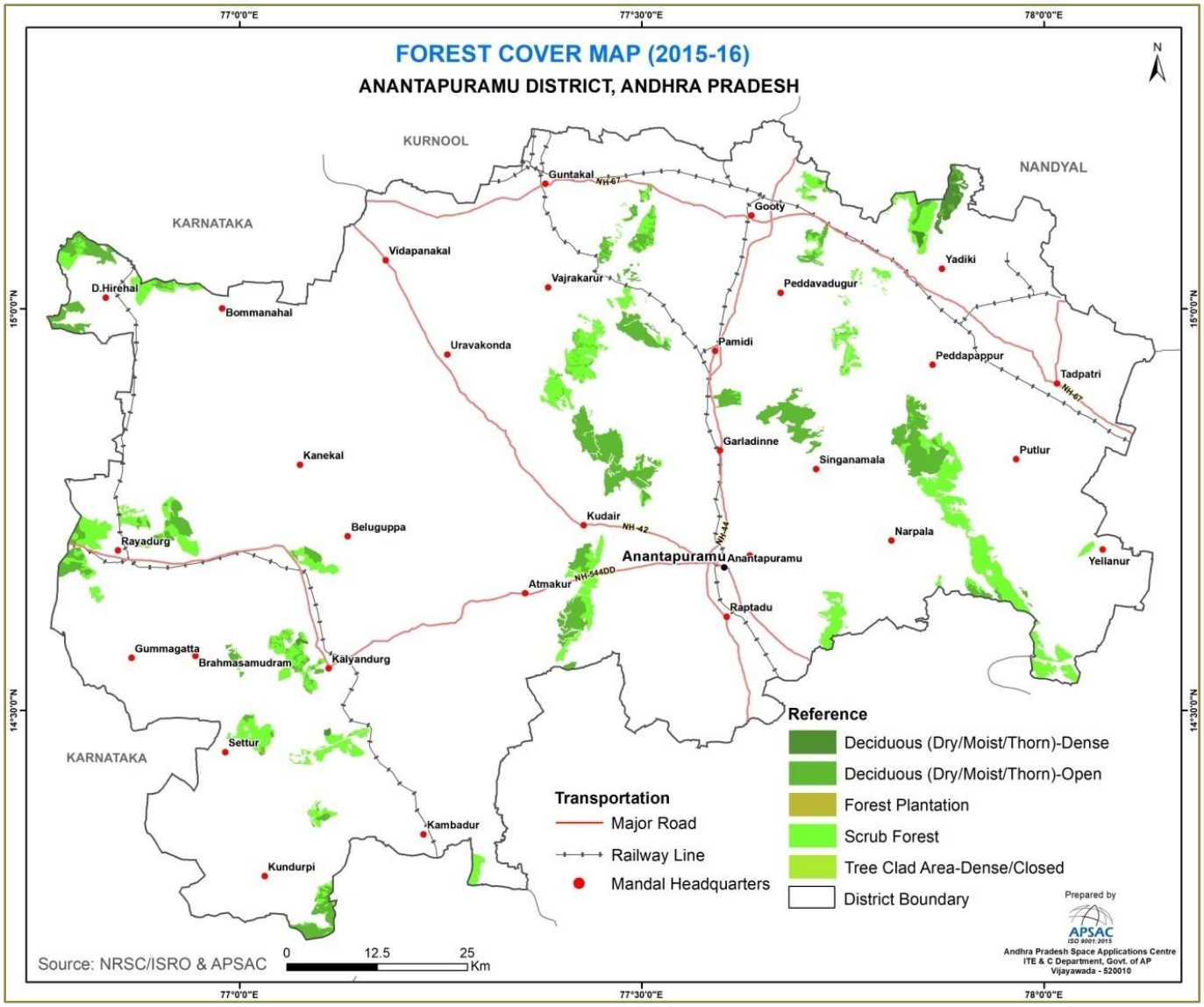


Figure-8: Forest cover map of Anantapur District

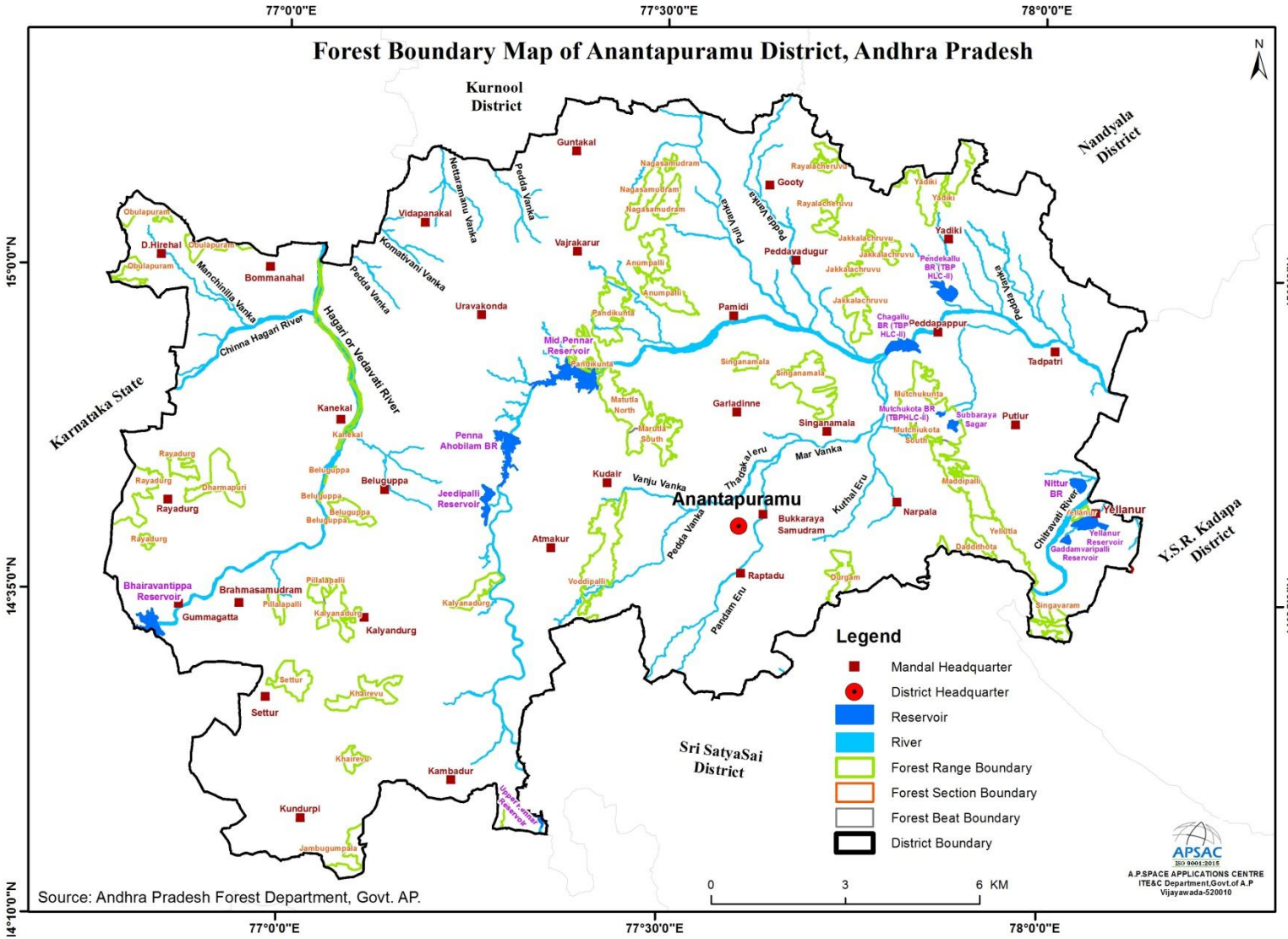


Figure-9: Forest boundary map of Ananthapuramu District

1.4.4 Agricultural Resources in Anantapur District

Over the past two decades, APSAC has effectively employed remote sensing technology in agriculture, encompassing both spatial and temporal dimensions across various projects. The continuous evolution of satellite remote sensing technology has facilitated systematic monitoring of crop conditions and vigor across extensive regions. Within the realm of spectral vegetation indices derived from remote sensing data, the Normalized Difference Vegetation Index (NDVI) stands out as the most widely utilized for operational drought assessment. Its popularity stems from its straightforward calculation, ease of interpretation, and the capacity to mitigate the impacts of atmospheric conditions, illumination geometry, and other variables.

APSAC conducted in-season crop condition assessments at the Mandal level in Andhra Pradesh. This initiative aimed to provide administrators and planners with crucial insights for strategic decision-making regarding drought management, import-export policies, and trade negotiations. The NDVI is calculated using the formula (NIR–Red)/(NIR+Red), where NIR and Red represent the reflectance in the visible and near-infrared channels, respectively. Water, clouds, and snow exhibit higher reflectance in the visible region, causing NDVI to assume negative values for these features. Bare soil and rocks, with similar reflectance in both visible and near-infrared regions, yield index values close to zero. NDVI values for vegetation typically range from 0.2 to 0.6, with higher values associated with greater green leaf area and biomass. The Shortwave Infrared (SWIR) band is sensitive to soil and crop canopy moisture. Early in the cropping season, when soil background dominates, SWIR is sensitive to top 12 cm soil moisture. As crop growth progresses, SWIR becomes sensitive to leaf moisture content, providing surface wetness information.

The Normalized Difference Wetness Index (NDWI), computed using SWIR data, complements NDVI for drought assessment, especially in the early cropping season. NDWI is derived as follows: NDWI=(NIR-SWIR)/(NIR+SWIR), where NIR and SWIR represent reflected radiation in the Near-Infrared and Shortwave Infrared channels. Higher NDWI values indicate increased surface wetness.

For satellite-based crop condition anomalies indicating agricultural drought, the Vegetation Condition Index (VCI) of both NDVI and NDWI can be computed. When combining VCI values of NDVI and NDWI, the minimum of the two can be considered. For instance, if at least one is categorized as severe, the overall category is considered severe. If at least one is moderate, the overall category is taken as moderate. The vegetation conditions and corresponding ranges are detailed in Table-7.

Table 7: Vegetation condition and range in percentage

VCI range (%)	Vegetation Condition	Description
60-100	Normal	Crop condition is Normal
40-60	Moderate	Crop condition is Moderate
0-40	Severe	Crop condition is Severe

1.4.4.1 Kharif Crop Condition Assessment

Andhra Pradesh Space Applications Centre (APSAC) conducted a crop condition assessment in Anantapur district during Kharif 2022-23 utilizing MODIS (Moderate Resolution Imaging Spectroradiometer) satellite data. The assessment revealed that out of the total mandals in the district, 25 were categorized as having a normal crop condition, 04 were classified as moderate, and 02 were identified as severe. Notably, urban and forest cover mandals were excluded from the vegetation condition assessment. This comprehensive evaluation provides valuable insights into the agricultural landscape of Anantapur district, aiding in targeted interventions and resource allocation to mitigate the impacts of varying crop conditions.

1.4.4.2 Rabi Crop Condition Assessment

During Rabi 2022-23, The assessment identified 29 mandals with normal crop conditions, 01 mandals categorized as moderate and 01 were identified as severe. Notably, mandals predominantly covered by urban or forest areas were excluded from the vegetation condition assessment. This evaluation provides valuable insights into the agricultural status of Anantapur district during the Rabi season, facilitating informed decision-making and resource allocation to support agricultural sustainability and productivity.

1.4.5 Soil Resources of the Anantapur District

In the Anantapuramu district of Andhra Pradesh, the predominant soil types are diverse and cover various extents. The most extensive soil type is gravelly clayey moderately deep desert soils, occupying 5,196.37 sq. km, which accounts for 52.42% of the district. This is followed by loamy to clayey skeletal deep reddish brown soils covering 1,956.91 sq. km (19.74%). Deep black clayey soils span 593.36 sq. km (5.99%), while moderately deep black clayey soils cover 530.67 sq. km (5.35%). Clayey to gravelly clayey moderately deep dark brown soils make up 385.66 sq. km (3.89%), and shallow gravelly red soils account for 346.13 sq. km (3.49%). Loamy to gravelly clay deep dark reddish brown soils cover 262.15 sq. km (2.64%), and moderately deep calcareous black soils span 256.39 sq. km (2.59%). Additionally, gravelly clayey moderately deep red soils cover 193.48 sq. km (1.95%), moderately deep calcareous moist clayey soils occupy 171.41 sq. km

(1.73%), and shallow loamy to gravelly clay red soils span 126.93 sq. km (1.28%). The least extensive are gravelly clayey shallow dark brown soils, covering 19.6 sq. km (0.20%). The soil resource map of the district is shown in Figure-10 and the soil category with area is shown in Table-8.

Table 8: Soil classes in Anantapur district

S.No	Classification	Area in Sq.km	Percentage (%)
1	Clayey to gravelly clayey moderately deep dark brown soils	385.66	3.89
2	Deep black clayey soils	593.36	5.99
3	Gravelly clayey moderately deep desert soils	5196.37	52.42
4	Gravelly clayey moderately deep red soils	193.48	1.95
5	Gravelly clayey shallow dark brown soils	19.6	0.20
6	Loamy to clayey skeletal deep reddish brown soils	1956.91	19.74
7	Loamy to gravelly clay deep dark reddish brown soils	262.15	2.64
8	Moderately deep black clayey soils	530.67	5.35
9	Moderately deep calcareous black soils	256.39	2.59
10	Moderately deep calcareous moist clayey soils	171.41	1.73
11	Shallow gravelly red soils	346.13	3.49
12	Shallow loamy to gravelly clay red soils	126.93	1.28
	Total#	9912.13	100.00

#Excluding the Urban and Water bodies area

Data Source: APSAC, Vijayawada

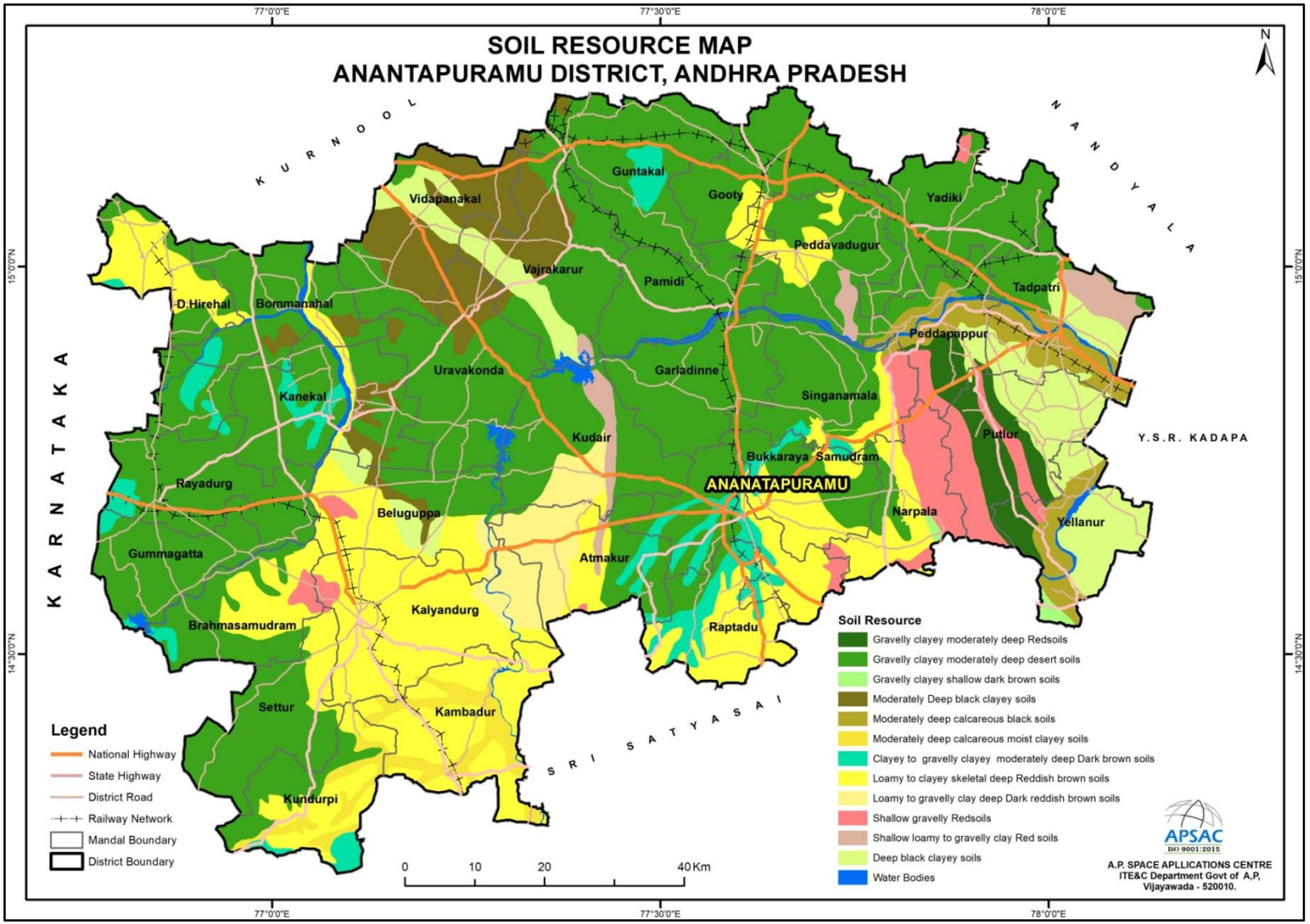
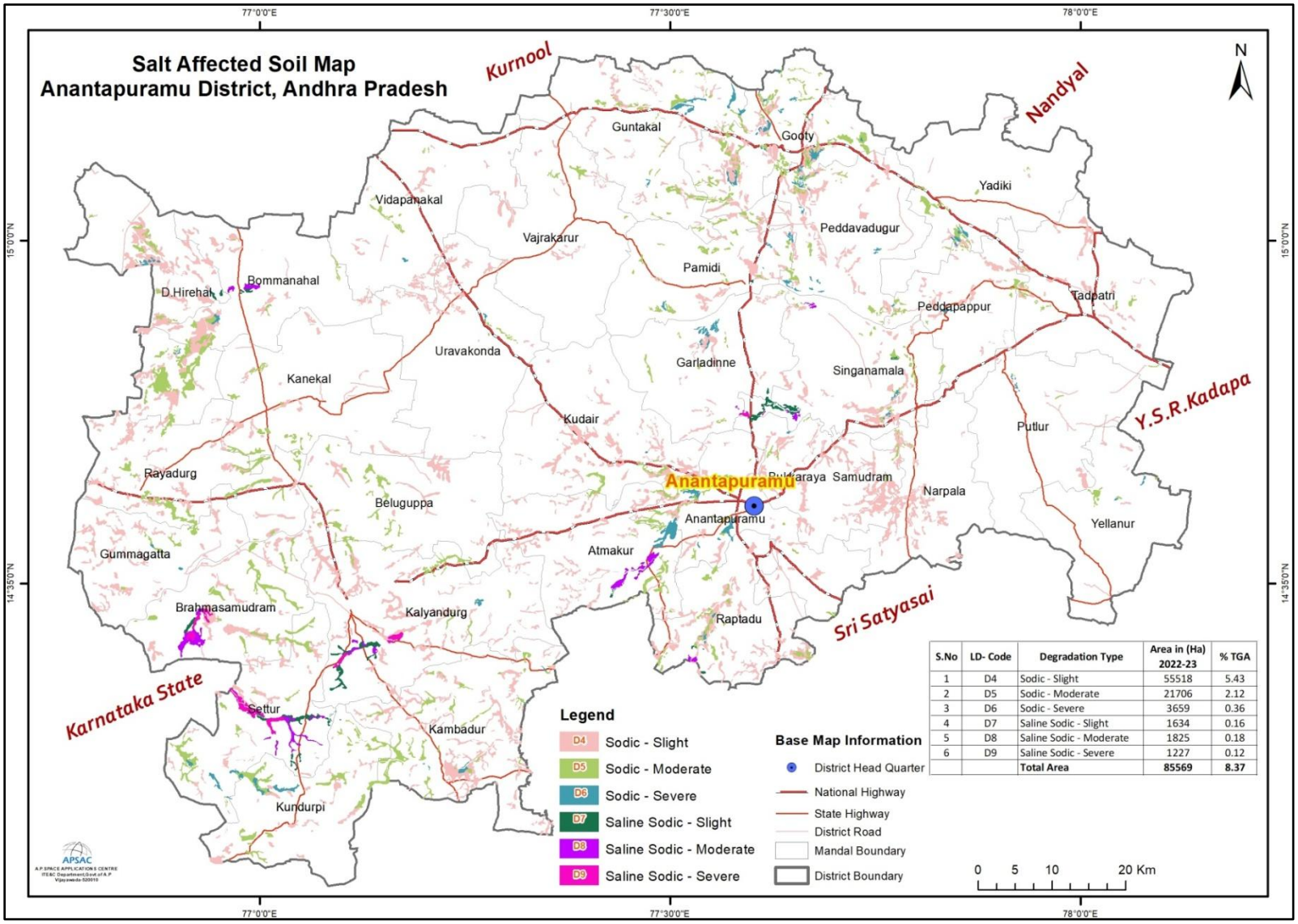


Figure-10: Soil resource map of Anantapur District

1.4.6 Salt-affected land:

The term 'salt-affected soil/land' refers to soils in which salts interfere with normal plant growth. Salt-affected soils can be divided into saline, saline-sodic and sodic, depending on salt amounts, type of salts, the amount of sodium present, and soil alkalinity. (Reference FAO Soils Portal)

These lands contain an excessive concentration of salts (soluble salts or exchangeable saline or both). Salinization can result from improper management of canal irrigation water, resulting in the rise of the water table and consequent accumulation of salts in the root zone in arid, semi-arid, and sub-humid (dry) conditions and ingress of seawater in coastal regions and/or use of high-salt containing groundwater. They also become saline when soils have developed salt-containing parent materials or have saline groundwater. Coastal saline soils may be with or without ingress or inundation by seawater. The salt-affected soil/ land area in the Anantapuramu district is 85,569 hectares. Figure-11 illustrates the spatial distribution of salt affected soil in Anantapuramu district.



S.No	LD- Code	Degradation Type	Area in (Ha) 2022-23	% TGA
1	D4	Sodic - Slight	55518	5.43
2	D5	Sodic - Moderate	21706	2.12
3	D6	Sodic - Severe	3659	0.36
4	D7	Saline Sodic - Slight	1634	0.16
5	D8	Saline Sodic - Moderate	1825	0.18
6	D9	Saline Sodic - Severe	1227	0.12
		Total Area	**85569**	**8.37**

Figure-11: Illustrates the spatial distribution of salt affected soil in Anantapur district.

1.4.7 Horticulture

Horticulture is a science, as well as, an art of production, utilization and improvement of horticultural crops, such as fruits and vegetables, spices, ornamental, plantation, medicinal and aromatic plants. It also includes plant conservation, landscape restoration, landscape, garden design, construction, maintenance, arboriculture, ornamental trees and lawns.

In the Anantapuramu district Sweet Orange is the major horticulture crop, cultivated in an area of 2851.91ha. followed by Banana (655.66 ha.), Mangoes (551.94 ha.), and Pomegranate (270.87 ha.). The total area under horticulture crops is 4608.02ha. The horticulture crop-wise detail is shown in Table-9.

Table 9: Area of horticultural crops in Anantapur district

S.No	Crop	Area in ha
1	Sapota	27.85
2	Black Berry	18.72
3	Jamun	6.05
4	Anjura(Fig)	1
5	Dragon Fruit	4.61
6	Papaya	37.1
7	Grapes	2.4
8	Banana	655.66
9	Custard Apple	4.45
10	Sweet Orange	2851.91
11	Grapevine	1.01
12	Sweet Lime	21.45
13	Ber	3.21
14	Arrecanut	6.97
15	Mangoes	551.94
16	Guava	62.39
17	Pomegranate	270.87
18	Acid Lime	22.69
19	Arecanut	32.53
20	Coco	2.02
21	Coconut	8.02
22	Mulberry	15.17
	Total Area	**4608.02**

Source: Government of Andhra Pradesh Rashtriya Krishi Vikas Yojana-2022-23.

1.5 Ground Water Prospects in the District:

Groundwater occurs in almost all geological formations and its potential depends upon the nature of geological formations, geographical setup, and incidence of rainfall, recharge, and other hydrogeological characters of the aquifer. In

consolidated formations, ground water occurs under unconfined to semi-confined conditions. Ground water is developed in these formations by dug wells, dug cum bore wells, and bore wells tapping weathered and fractured zones. The groundwater prospects are very good in fluvial landform, good to moderate in the lower part of the pediplain moderate weathered zone, moderate to poor in the parts of D.Hirehal, Bommanahal, Vidapanakal, etc., and poor to negligible in the lower areas of Narpala, Singanamala, Putlur, and its surrounding places. The ground water prospects map of Anantapuramu district is shown in Figure-12.

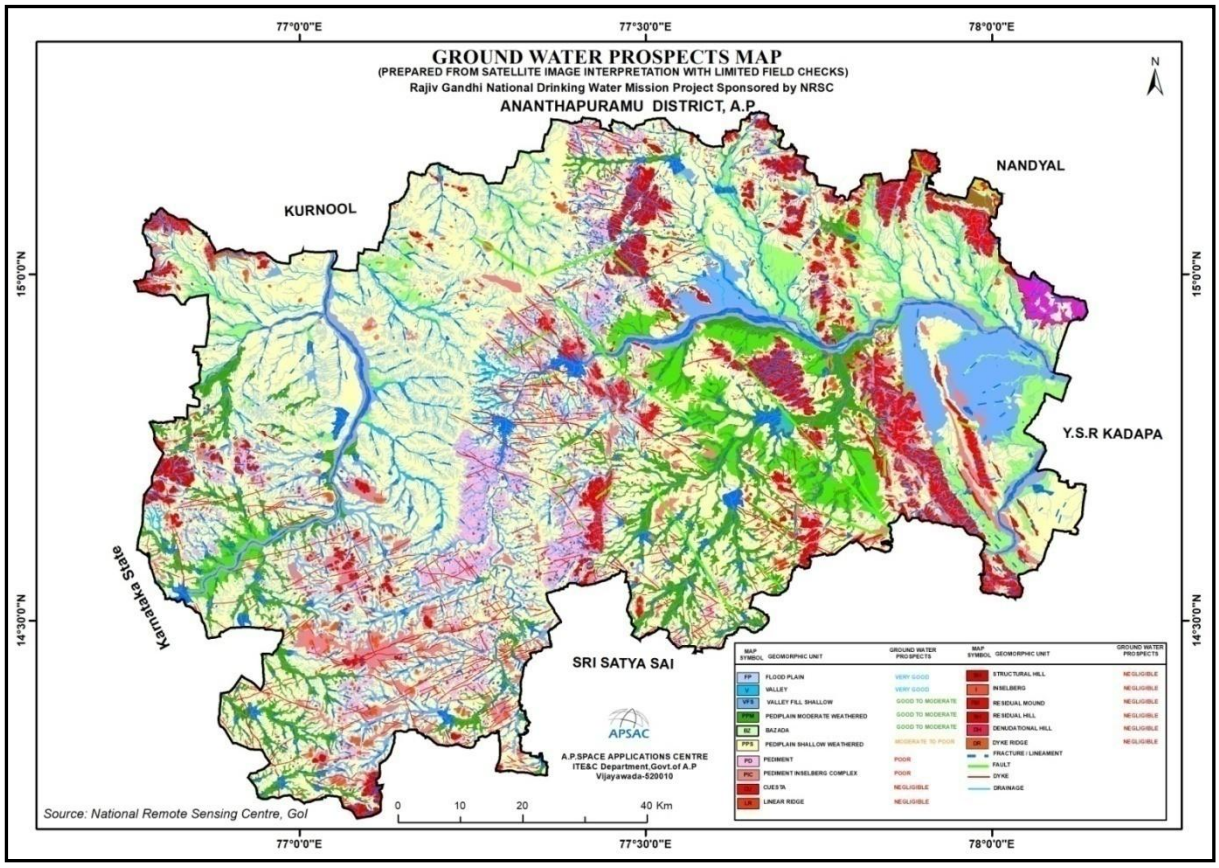


Figure-12: Ground Water prospects in Anantapur District, Andhra Pradesh

1.5.1 Ground Water in Archean Crystalline Rocks

The Archaean crystalline rocks include granites, gneisses, and Dharwarian schists. The groundwater in these formations occurs in the weathered and fractured zones of underwater table and semi-confined conditions respectively. These rock types do not possess primary porosity. Due to fractured and weathering, they have developed secondary porosity often giving rise to potential aquifers at depth. The degree of weathering in the Archaean formation is less than 20m. This weathered zone has been tapped extensively by the dug wells and dug-cum-bore wells, which invariably tap the fractures occurring below the weathered zone. Groundwater occurring in this formation is generally developed by dug-cum-bore wells and bore wells. The depth of open wells ranges from 6.0 to 25.0 m below ground level and depth to water level varies from 1.5 to 23m bgl. The yield of dug wells varies from 10-200 c.m/day for a pumping period of 3 to 6 hrs/day (CGWB, 2013).

1.5.2 Ground Water in Unconsolidated Sediments

Unconsolidated sediments occur along major river stream courses like Pennar, Chitravathi, Kunderu, Tadakaleru, and Hagari Vedavathi. Filter points shallow wells and infiltration wells have been constructed to tap the alluvium in addition to dug wells. The depth varies from 3.5 to 12.0 m bgl with yield varying from 8 to 135 cu.m/hr. These wells are also generally going dry or with less water during the summer months (CGWB, 2013). The Ground Water Department established a good network of piezometer observation wells throughout the district to monitor the depth of groundwater levels.

1.6 Infrastructure

1.6.1 Transport Network

Anantapuramu district has a well-connected by various modes of transportation such as road and rail. The connectivity of each category is also depicted in Figure-13. The details of each transport network distribution in the district is given below:

1.6.1.1. Road Transport : The road network of the district has been delineated by using high resolution satellite data under Space Based Information Support for Decentralized Planning (SIS-DP) project and arrived the lengths of the each type of road network. It can be observed that Anantapuramu district has a well-developed road network that facilitates connectivity to all towns within the district, and to other major cities and towns of nearby districts. The major road network includes National Highways (NH), State Highways (SH), and District Roads (DR). The remote rural areas of the district also good connectivity by Panchayat Raj roads / village roads.

The total length of the road network in the district is about 22,110 Km. Of which, the length of the National Highways is about 457.14 Km, State Highways is having a length of about 448.32 km connecting all major towns and cities in the district. The district roads are connecting all towns and mandals having a length of 1553.71 Km. The length of each road category covered in the district are shown in Table-10.

Table 10: Road Category wise Lengths.

S.No	Road Type	Length in Km
1	National Highway	457.14
2	State Highway	448.32
3	District Road	1553.71
4	Village Road	9815.71
5	Cart Track	7533.10
6	Foot Path	1653.43
7	City Road	648.61
	Total Length	**22110.01**

Data Source: R&B Department & APSAC, Vijayawada.

Anantapuramu district is traversed by Four National Highways. The traverse and description of each highway is as given below:

1. National Highway 544D (NH 544D):NH 544D is a National Highway in India. It is a spur road of NH 44. It traverses through Anantapuramu district and passes through the mandals Rayadurg, Kalyandurg, Atmakur, Anantapuramu, Tadipatri and connects Anantapuramu, Prakasam, Palnadu and Guntur districts, passes through the mandals Kolimigundla, Owk, Banaganapalli, Anantapuramu, Gajulapalli, Giddalur, Cumbum, Thokapalli, Vinukonda, Narasaraopet and terminates at NH 16, Guntur.

2. National Highway 67 (NH 67): National Highway 67 , is a major national highway in India. It starts at Karnataka and ends at Krishnapatnam road in S.P.S.Nellore district, Andhra Pradesh. It traverse through Anantapuramu district and passes through the mandals Guntakal, Gooty, Tadipatri and connects Jammalamadugu, Proddatur, Mydukur, Badvel, Marripadu, S.P.S. Nellore mandals which terminates at NH 16, Krishnapatnam port road in Andhra Pradesh.

3. **National Highway 42 (NH 42):** National Highway 42 is a major National Highway in India, which runs in the states of Andhra Pradesh and Tamilnadu. It traverse through Anantapuramu district and passes through the mandals Vidapanakal, Uravakonda, Kudair, Anantapuramu, Raptadu mandals and connects Y.S.R.Kadapa, S.P.S.Nellore districts passes through the mandals Kadiri, Madanapalle, Punganur and Kuppam in Andhra Pradesh. In Tamil Nadu, it connects Krishnagiri with its junction with NH 44.

4. National Highway 44 (NH 44): National Highway 44 is a major north-south National Highway in India and is the longest in the country. It passes through the Union Territory of Jammu and Kashmir to Kanyakumari. The Highway enters into Andhra Pradesh at Kurnool and passes through Veldurthy and Peapally. It traverse through Anantapuramu district and connects Gooty, Pamidi, Garladinne, Anantapuramu and Raptadu. It terminates at Sri Sathya Sai district passes through the mandals Chennekothapalle, Penukonda, Somandepalli and Chimakurthi.

Some important State Highway segments covered in the district are given below:

Damajipalli –Tadipatri road (via) Nayanapalli – Peddapappur (SH0580)
Kalyandurg to Nagepalligate via Kundurpi (SH434)
Kondapuram - Danthalapalliraod (SH420)
Bellary-Gundlapalli Road (SH410)
Guntakal – Uravakonda road (SH406)
Anantapur - Thagarakunta near hasanakota on N-P Road (SH062)
Kalyanadurg-Madakasira Road (SH432)
Dharmavaram-Tagarakunta-Kalyanadurg road (SH049)

1.6.1.2. Railways : The Indian Railway line traversing in Anantapuramu district covering the various stations to cater the transportation needs of the people. The length of Rail network in the district is about 382.47 km covering 32 railway stations. Among these, the important railway stations in the district are Anantapuramu, Gooty Junction, Guntakal Junction, Kalluru Junction, Pamidi, Rayalacheruvu and Tadipatri; and the Train stations are Avuladatla, Challavaripalle, Garladinne, Gullapalyamu, Hanuman Circle, Jakkalacheruvu, Juturu, KadiridevaraPalli, Kalyandurg, Khaderpet, Komali, Nakkanadoddi, Obulapuram, Patakottacheruvu, Prasannayana Palli, Ramarajupalli, Rayadurg, Somalapuram, Taticherla, Timmanacherla, Turkapalli, Vanganur, Vemulapadu, Venkatampalli and Zangalapalle.

Anantapuramu district is traversed by a significant railway line that connects various parts of the district and provides connectivity to neighbouring regions. Chennai-Mumbai Main Line that passes through Anantapuramu district is a major trunk route that connects Chennai in Tamil Nadu with Mumbai in Maharashtra and also facilitating passenger and freight transportation across the region. It passes through Anantapuramu district, connecting important railway stations such as Tadipatri, Rayalacheruvu, Gooty Junction and Guntakal Junction.

The Hyderabad-Bangalore high speed rail corridor is a proposed high-speed rail line connecting India's two southern metros, Hyderabad and Banglore. It passes through Anantapuramu district, connecting important railway stations such as Anantapuramu, Kallur Junction and Guntakal Junction.

Bangalore-Arsikere-Hubli line is a major railway line in the indian state of Karnataka connecting state capital Bangalore with city of Hubli in north-central Karnataka. It passes through Anantapuramu district, connecting train stations such as Obulapuram, Somalapuram and Rayadurg.

In addition to the main line, there are various branch lines and spur lines namely Rayadurg-Kambadur and Kalluru Junction to Gooty Junction that extend from the main line to connect specific towns with in Anantapuramu district. These lines provide local connectivity and transportation services to different parts of the district.

1.6.2 Irrigation

Irrigation has assumed an increasing significance in agriculture in the context of new technology, where high yielding varieties and multiple cropping is being practiced. The main reasons for low yields are inadequate rainfall, uneven and uncertain rains during the period of crop growth. It is generally found that the introduction of irrigation is associated with changes in the cropping pattern. The shift from traditional cropping pattern to the most advantageous cropping pattern is possible only in the presence of irrigation facilities. The new

agricultural technology is highly based on sufficient moisture conditions. Thus, the development of irrigation is crucial for increasing agricultural production. The major and medium irrigation projects details are shown in Table-11 and Figure-14.

1.6.2.1. Major Irrigation Projects:

In Anantapuramu district there are five major irrigation projects i.e., Tunga Bhadra Project High Level Canal System Stage -I & Stage-II (TBPHLC Stage-I & II), Ananta Venkata Reddy Handri Neeva Sujala Sravanthi Phase-I & Phase-II (HNSS Phase-I & II) and Pulivendla Branch Canal (PBC).

1.6.2.2. Medium Irrigation Projects:

In Anantapuramu district there are two completed medium irrigation projects i.e., Bhairavanithippa Project and Upper Pennar Project. The project wise ayacut details are Bhairavanithippa Project an extent of 12,000 Ac and Upper Pennar Project an extent of 3,564 Ac ayacut.

The Minor Lift Irrigation Schemes under APSIDC (14Nos) covered in the district, an extent of 5,322 Ac ayacut, Minor Irrigation Tanks (89Nos - above 100 acres ayacut) an extent of 28,764 Ac and Minor Irrigation Tanks (960Nos - bellow 100 acres ayacut) an extent of 29,490 Ac combined district ayacut.

Table 11: Major and Medium Irrigation Projects in Anantapur District

S. No	Project Type	Name of the Project	Status	Ayacut in Ac
1	Major	Tunga Bhadra Project High Level Canal System Stage -I *(TBPHLC Stage-I)*	Completed	1,07,516
2		Ananta Venkata Reddy HandriNeevaSujalaSravanthi*(HNSS Phase-I)*		1,18,800
3		Pulivendla Branch Canal (PBC)		4,761
4		Tunga Bhadra Project High Level Canal System Stage -II *(TBPHLC Stage-II - Combined District))*	Ongoing	1,33,807
5		Ananta Venkata Reddy HandriNeevaSujalaSravanthi*(HNSS Phase-II)*		33,617
6	Medium	Bhairavanithippa Project	Completed	12,000
7		Upper Pennar Project		3,564
8	Minor	Lift Irrigation Schemes under APSIDC *(13Nos -Combined District)*		6,249
9		Lift Irrigation Schemes under APSIDC (14Nos)	Ongoing	5,322
10		Minor Irrigation Tanks - 89Nos *(Ayacut above 100 Acres)*	Completed	28,764
11		Minor Irrigation Tanks - 960Nos *(Ayacut bellow 100 Acres - Combined District)*		29,490
			Total	**4,83,890**

Data source: WRD, APWRIMS, Govt. of A.P.

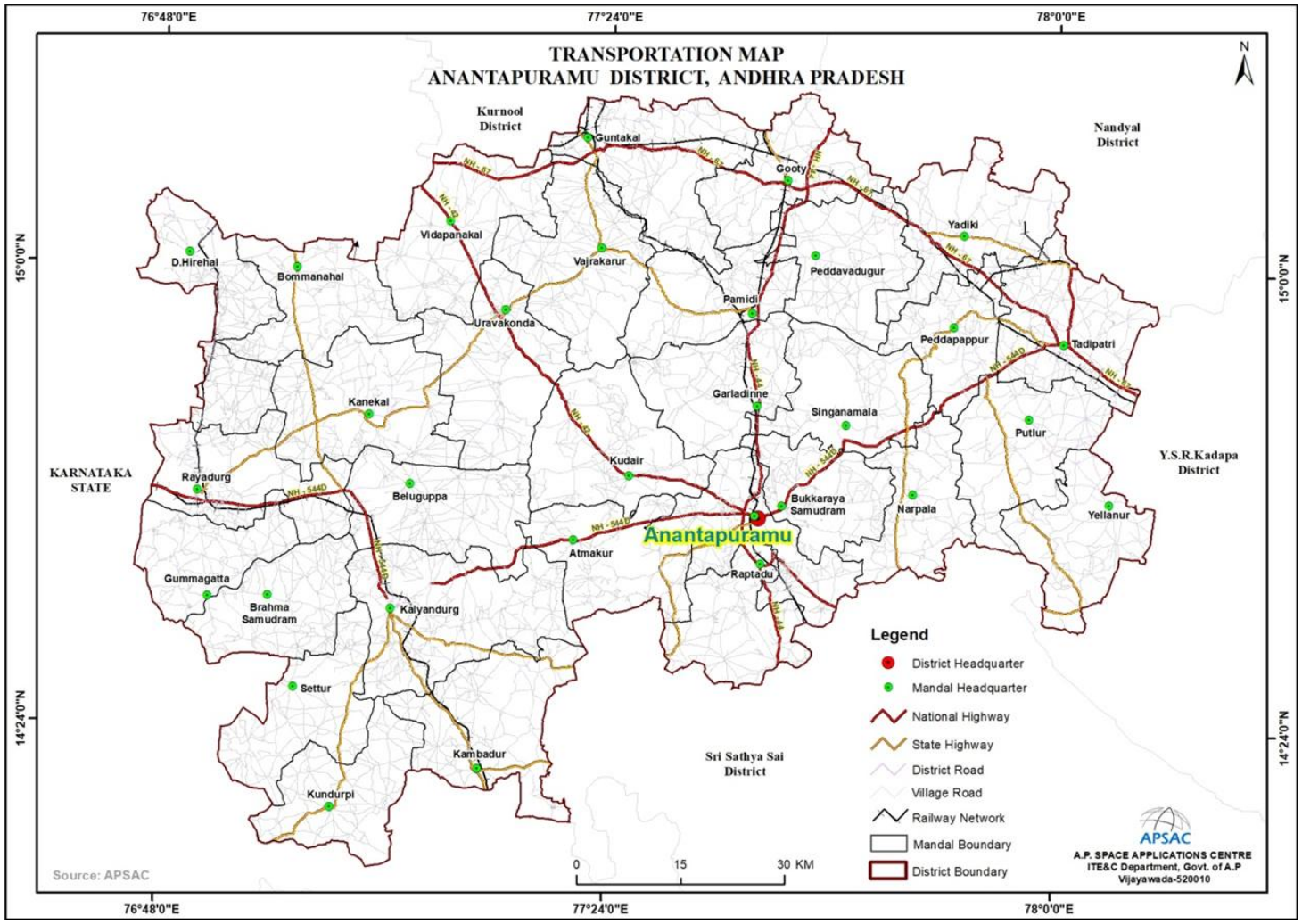


Figure: 13 Transport Network of Anantapur district, Andhra Pradesh

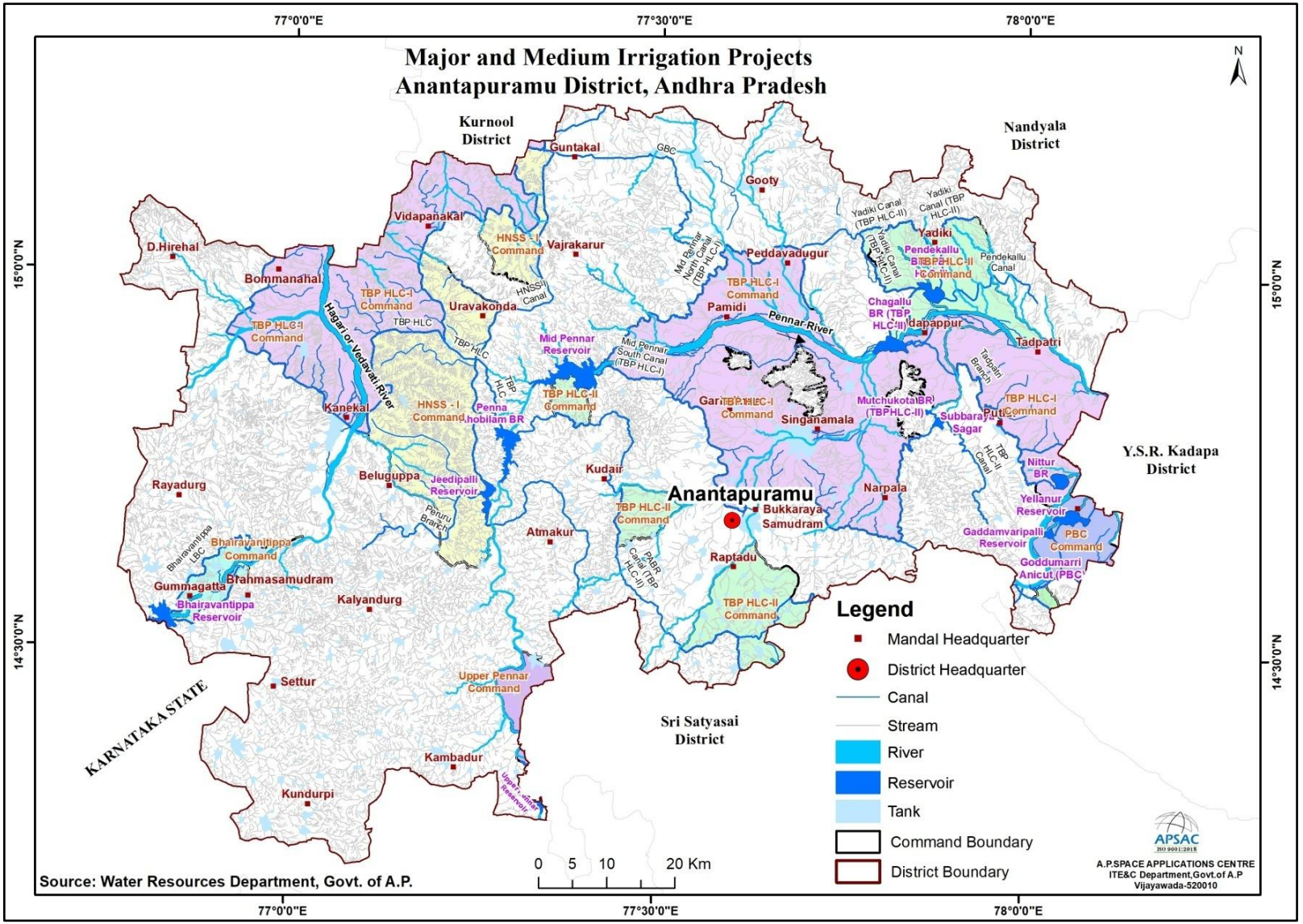


Figure-14: Major and Medium Irrigation Projects of Anantapur District

Tank Information System

As per the information of Water Resources Departmental portal Andhra Pradesh Water Resources Information & Management System (APWRIMS) and portal URL:https://apwrims.ap.gov.in/ in Anantapuramu district has 310 minor irrigation tanks. The Designed Storage Capacity of Anantapuramu district is 37,432.47 mcft and Current Storage Capacity is 3,566.4 mcft. The minor irrigation tanks are filled with HNSS Canal linking system in the district. The mandal wise minor irrigation tanks details of Anantapuramu district are shown in Table-12.

Table 12: Mandal wise Minor Irrigation Tanks details of Anantapur district

S. No	Mandal	No.of MI Tanks	Designed Storage Capacity (mcft)	Current Storage Capacity (mcft)
1	ANANTAPURAMU MANDAL	17	267.06	47.41
2	ATMAKUR	9	366.31	93.87
3	BELUGUPPA	8	125.5	0
4	BOMMANAHAL	3	78.35	32.86
5	BRAHMASAMUDRAM	15	380.26	75.6
6	BUKKARAYASAMUDRAM	10	596.78	350.76
7	D HIRCHAL	8	224.08	48.67
8	GARLADINNE	10	125.12	1.35
9	GOOTY	23	470.56	126
10	GUMMAGATTA	20	361.51	0
11	GUNTAKAL	9	460.64	209.77
12	KALYANDURG	16	231.6	19.95
13	KAMBADUR	18	436.19	78.18
14	KANEKAL	7	185.63	46.41
15	KUDAIR	8	101.57	240.11
16	KUNDURPI	13	238.82	57.94
17	NARPALA	6	44.04	8.87
18	PAMIDI	10	164.61	20.11
19	PEDDAVADUGUR	5	149.13	79.8
20	PUTLUR	1	5.38	1.35
21	RAPTADU	17	313.47	71.39
22	RAYADURG	23	452.97	0
23	SETTUR	11	277.32	34.81
24	SINGANAMALA	12	3,0932.76	1,868.47
25	TADPATRI	6	138.44	26.05
26	URAVAKONDA	8	43.53	2.03

27	VAJRAKARUR	8	38.02	9.12
28	VIDAPANAKAL	2	93.51	0
29	YADIKI	6	125.79	15.55
30	YELLANUR	1	3.51	0
	TOTAL	**310**	**37,432.47**	**3,566.4**

Data source: WRD, APWRIMS, Govt. of A.P.

1.6.3 Eco-sensitive areas ad Important places

Anantapuramu district is blessed with several tourist attractions that offer a mix of historical, cultural, and natural wonders. The important popular tourist, religious and cultural places to visit in the Anantapuramu district are shown in the Table-13 and the geographical location of each place is depicted in Figure-15.

Table 13: Important places of Tourism in Anantapur district

S.No	Name	Village	Mandal
1	BuggaRamalingeshwara Swamy	Tadpatri Rural	Tadpatri
2	ChintalaVenkataramana Swamy Temple	Tadpatri (M)	Tadpatri
3	Gooty Fort	Gooty Rural	Gooty
4	JambuDweepa	Konakonda	Vajrakarur
5	Mounagiri Temple	Gondireddipalle	Raptadu
6	Nettikanti Anjaneya Swamy Temple	Kasapuram	Guntakal
7	Silparamam	Anantapur Rural	Anantapur
8	Sri Kullai Swamy Chavidi	Gugudu	Narpala
9	Sri Ranganatha Swamy Temple	Aluru	Tadipatri
10	Veerapuram Sanctuary	Veerapuram	Tadipatri
11	Yadiki Caves	Yadiki	Yadiki

Data Source: Tourism Department, Government of Andhra Pradesh.

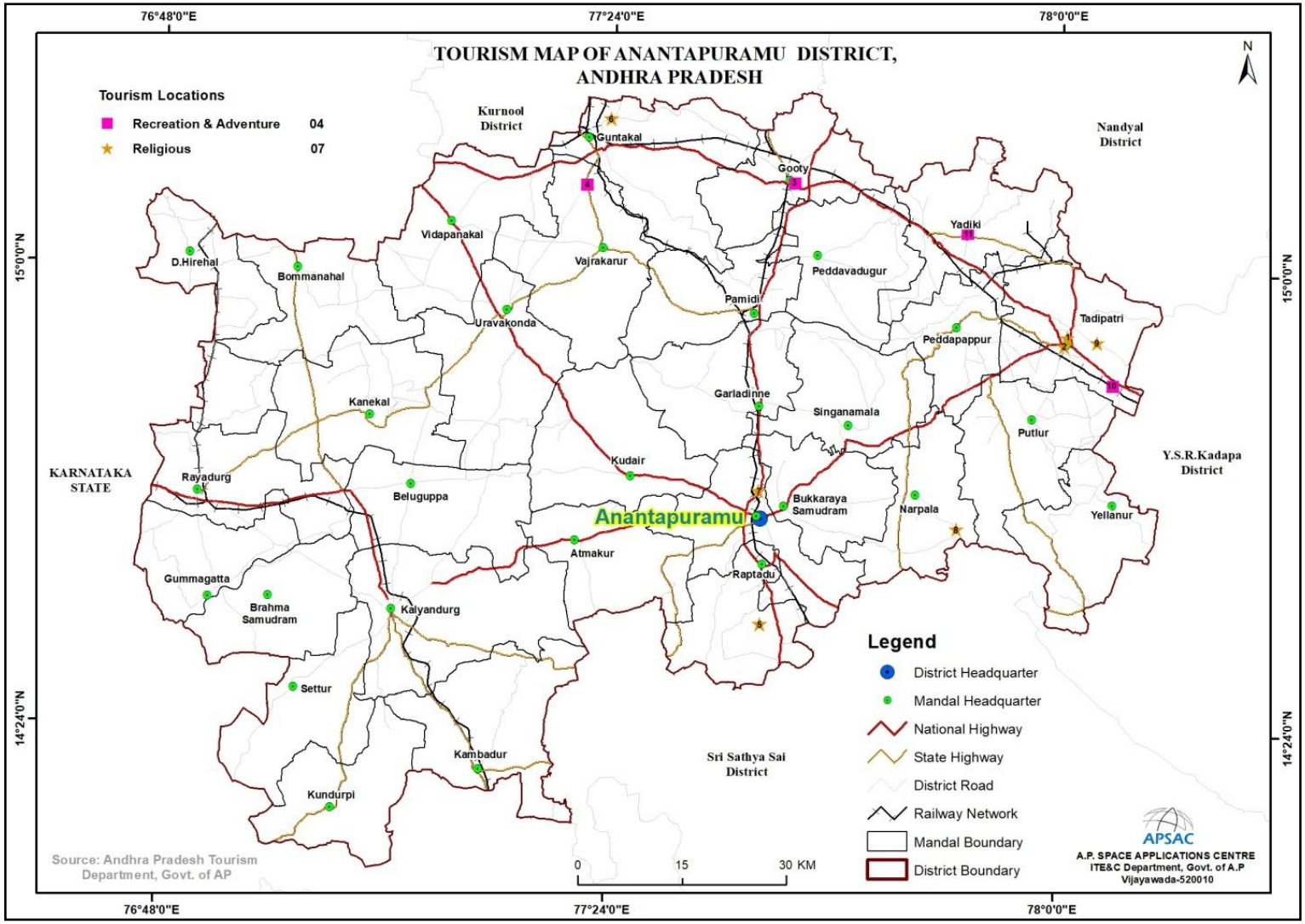


Figure-15: Tourist Map of Baptala District, Andhra Pradesh

A brief description of certain tourist places are given below:

1.6.3.1. Gooty Fort: Gooty fort is majestically located at a distance of about 52kms from Anantapuramu at a height of 300mts on a hill. It is one of the oldest hill forts in A.P. Built during the Vijayanagara era, the fort is uniquely built in the shape of a shell with 15 main doors and is significant for its water resources available at such a height.

1.6.3.2. Jambu Dweepa: The Jain Mythical cosmographical diagram of JambuDweepa engraved on a stone on the top of the hill Alchemists at Konakondla village in Vajrakarur Mandal. The pilgrims, especially south Indian Jain pilgrims are mostly attracted by this JambuDweepa which is 70 km from Anantapuramu and 10 kms from Guntakal Railway Station. Adjacent to this, there are Kambam Narasimha Swamy Hills, Rasasidda hillock and Kari Basappa hillock.

1.6.3.3. Veerapuram Sanctuary: Veerapuramu is located at a distance of about 66 km from the district headquarter Anantapuramu. It is a Sanctuary where birds come from fare away distances for breeding here. Every year we can see various no of painted stocks coming here for breeding. It's wonderful but difficult to understand the bond between the painted storks from Siberia and Veerapuram, a tiny remote village in Ananthapuramu district. The Painted Storks have settled down in Veeepuram for more than a century now.

1.6.3.4. Shilparamam: Shilparamam is located at a distance of about 7 km from the district headquarter Anantapuramu. The museum that is enveloped by greenery and is a typical version of a miniature Indian Village. There are fifteen life sized huts that are constructed using thatch and baked clay. A typical tribal and rural lifestyle is depicted along with the life of artisans living here. There is a beautiful lake within the premises of Shilparamam that offers joyful boating ride.

1.6.3.5. Yadiki Caves: Yadiki Caves is located at a distance of about 90 km from the district headquarter Anantapuramu. Yadiki Caves is midway between Gooty and Tadipatri. The magnificent view of the hillocks, gorges, spring, paddy fields, lake and winding roads enthrals every visitor. Geemanugavi cave is 5km in length and one can go up to 2km Inside. The intricate design of stalactite and stalagmite formations takes shape of chandeliers, bridges, globes, snakes etc. The sight of some, which glitters like diamonds is amazing.

1.6.4 Places of Religious and Cultural importance

1.6.4.1. Gugudu: The village in Narpala Mandal is at a distance of about 30 kms from Anantapuramu and is situated among the Mutchukota Hills. It is known for its Moharum Festival and Sri Kullai Swamy is the name of the much venerated saint. Barren women are said to become fertile by paying a visit to the shrine. Fire walking ceremony is conducted on the night of the 11th day of Moharrum. There is also Sri Anjaneya Swamy Temple near by the abode of Sri Kullai Swamy Chavidi.

1.6.4.2. Alurkona: This place is at a distance of about 5 km from Tadpatri& 74 km from the district headquarter Anantapuramu and is known for the Sri Ranganatha Swamy Temple built on the top of the hill. There is a waterfall nearby with perennial spring. It is not only a pilgrim centre but also a picnic spot on account of the scenic beauty of the place. Thousands of pilgrims visit the place all round the year and perform marriages and religious ceremonies. The annual Brahmostavam Festival is being celebrated on Chitra SuddahPournima attracts huge congregation.

1.6.4.3. Nettikanti Anjaneya Swamy Temple: The place is about 4 kms north of Guntakal& 86 km from the district headquarter Anantapuramu and is known for the temple of Nettikanti Veera Anjaneya Swamy . Hindu pilgrims from several parts of Anantapuramu, Kurnool and Bellary districts congregate here in large number specially on Saturdays. Even Muslims of the surrounding areas visit the place and make their offerings to this deity. A huge procession is taken out once in a year on the day next to the Telugu New Year Day.

1.6.4.4. BuggaRamalingeshwara Swamy Temple: Bugga Ramalingeshwara Swamy Temple is in Tadipatri town which is at a distance of 63 kms from Anantapuramu. From Tadipatri town at a distance of 1 km., overlooking the Penna river, the Bugga Ramalingeswara Temple is remarkable for a Lingam on a pedestal constantly filled with water from a small spring.

1.6.4.5. Mounagiri: Mounagiri is located at a distance of about 23 km from the district headquarter Anantapuramu. It is a Hindu temple near Bangalore Highway in Anantapuramu, India. The temple displays millennia of traditional Hindu and Andhra culture, spirituality, and architecture.

1.6.4.6. Sri ChintalaVenkataramana Temple: The Temple is located at a distance of about 62 km from the district headquarter Anantapuramu. It is a Hindu Vaishna temple situated at Tadipatri, a town in the Anantapuramu District of Andhra Pradesh, India. The Temple is dedicated to Venkateswara, a form of Vishnu, who is referred to as ChintalaVenkataramana. It is situated on the bank of the Penna River, which passes through the town. The temple has granite sculptures and is classified as one of the Monuments of National Importance by Archaeological Survey of India.

(Source: https://en.m.wikipedia.org>wiki, http://ipltours.in)

1.7 Drainage Pattern

1.7.1 Drainage

The important river in the district is Pennar river and covered with 65% of the total area and the remaining part covered with Hagari-Vedavathi (Krishna River) river. The Pennar river origin in the Nandi Hills of Karnataka State where it is called "Uttara Pinakini" and enters this district in the extreme south of Kambadur mandal and flows through Kalyandurg, Beluguppa, Uravakonda, Kudair, Vajrakarur, Pamidi, Garladinne, Singanmamala, Peddavadugur, Peddapappur and Tadipatri mandals. The river flows towards north & east directions and leaves the district near Vanganur in Tadipatri mandal. The major tributaries in the district are Tadakaleru, Chitravathi, Puli Vanka and PeddaVanka.

The Hagari-Vedavathi river origin in Bababudangiri Mountains of Karnataka State and enters this district in the extreme south of Gummagatta mandal near Bhairavanithippa Project. The river flows towards north direction through Gummagatta, Brahmasamudram, Rayadurg, Beluguppa, Kanekal, Bommanahal mandals and leaves the district at siddaramapuram in Bommanahal mandals.

The Chitravathi river origin in Karnataka State and enters in the district near Kodikonda village of Yellanur Mandal. The river flows towards north-east direction and leaves the district at Nitturu of Yellanur Mandal and also merged into Pennar river at Gandikota in YSR Kadapa district.

The Pandameru in Raptadu, AnantapuramuBukkarayaSamudram and Singanamala mandals and HNSS Canal linking Systems are important water supply sources to various large and medium irrigation tanks in the district. Figure-16 illustrates the drainage system and the surface water bodies.

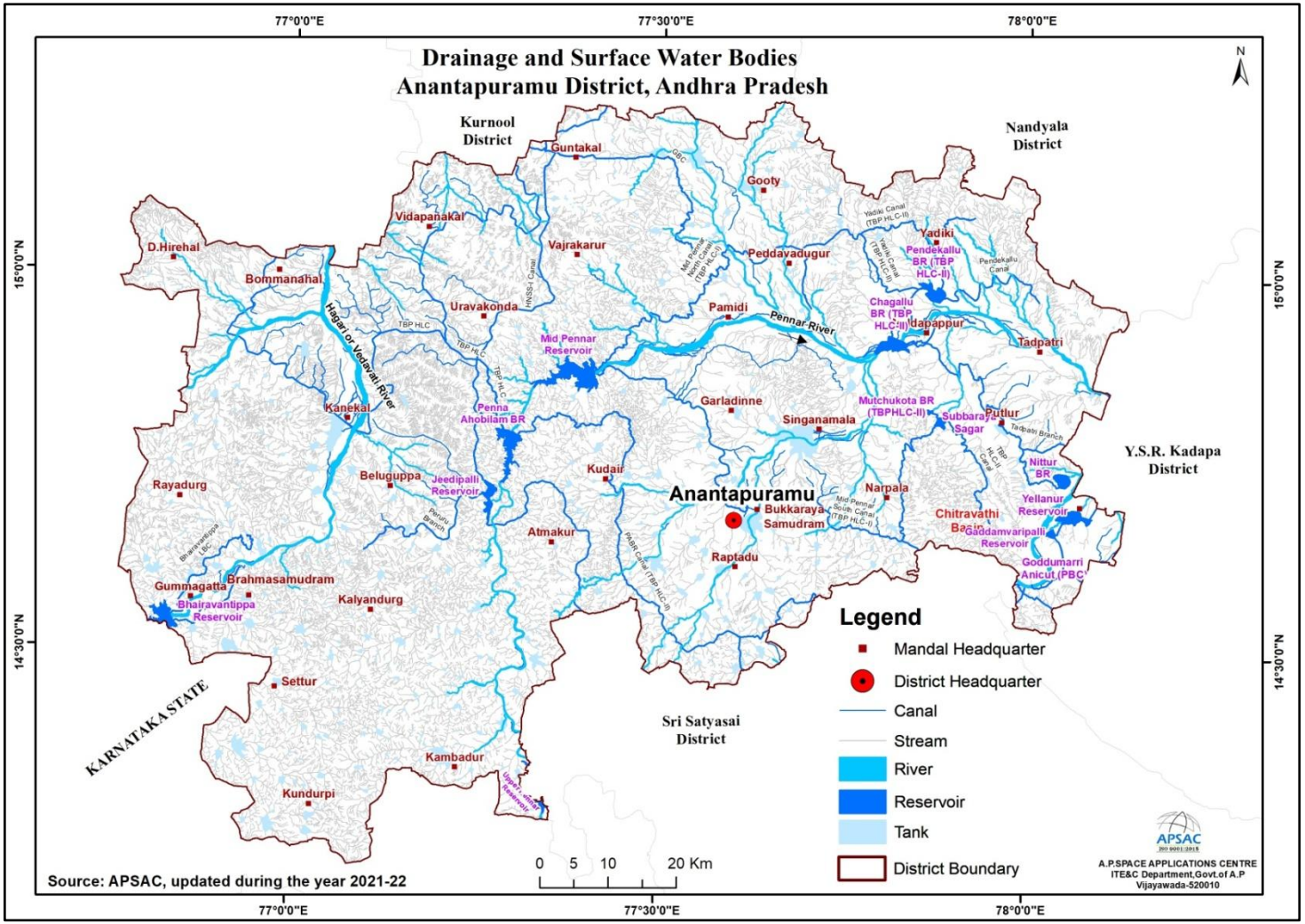


Figure - 16: Drainage Network and Surface Water Bodies of Anantapur District

1.7.2 Geomorphology of the District:

Using IRS satellite data and GIS, a detailed geomorphological and structural map of Anantapuramu District was generated according to the guidelines of the Rajiv Gandhi National Drinking Water Mission (RGNDWM) at a scale of 1:50,000. The objective of this mapping was to delineate lithology, geomorphology, and structural characteristics of the area at a 1:50,000 scale, and to integrate this information to identify potential groundwater prospect zones and recommend suitable structures for groundwater recharge. Various hydrogeomorphic units were delineated, and appropriate recharge structures were proposed for villages affected by drinking water issues under this project. The geomorphology map of Anantapuramu district is shown in Figure-17.

1.7.3 Landforms of Fluvial origin

The term 'fluvial' in earth science refers to processes and landforms created by the movement of water. Like other surface processes, flowing water can either erode material from the landscape or deposit layers of sediment. The resulting landforms can be classified as either erosional or depositional. The immense power of flowing water in shaping various landforms is well recognized. While the volume of water in a stream may be small at certain times of the year, significant volumes move through the channel, making it a crucial component of the hydrological cycle. Fluvial landscape dissection comprises valleys and their associated channel networks, forming a drainage network. These networks exhibit various quantitative regularities that aid in analyzing both the fluvial systems and the landscapes they shape (NRSA, 2007)

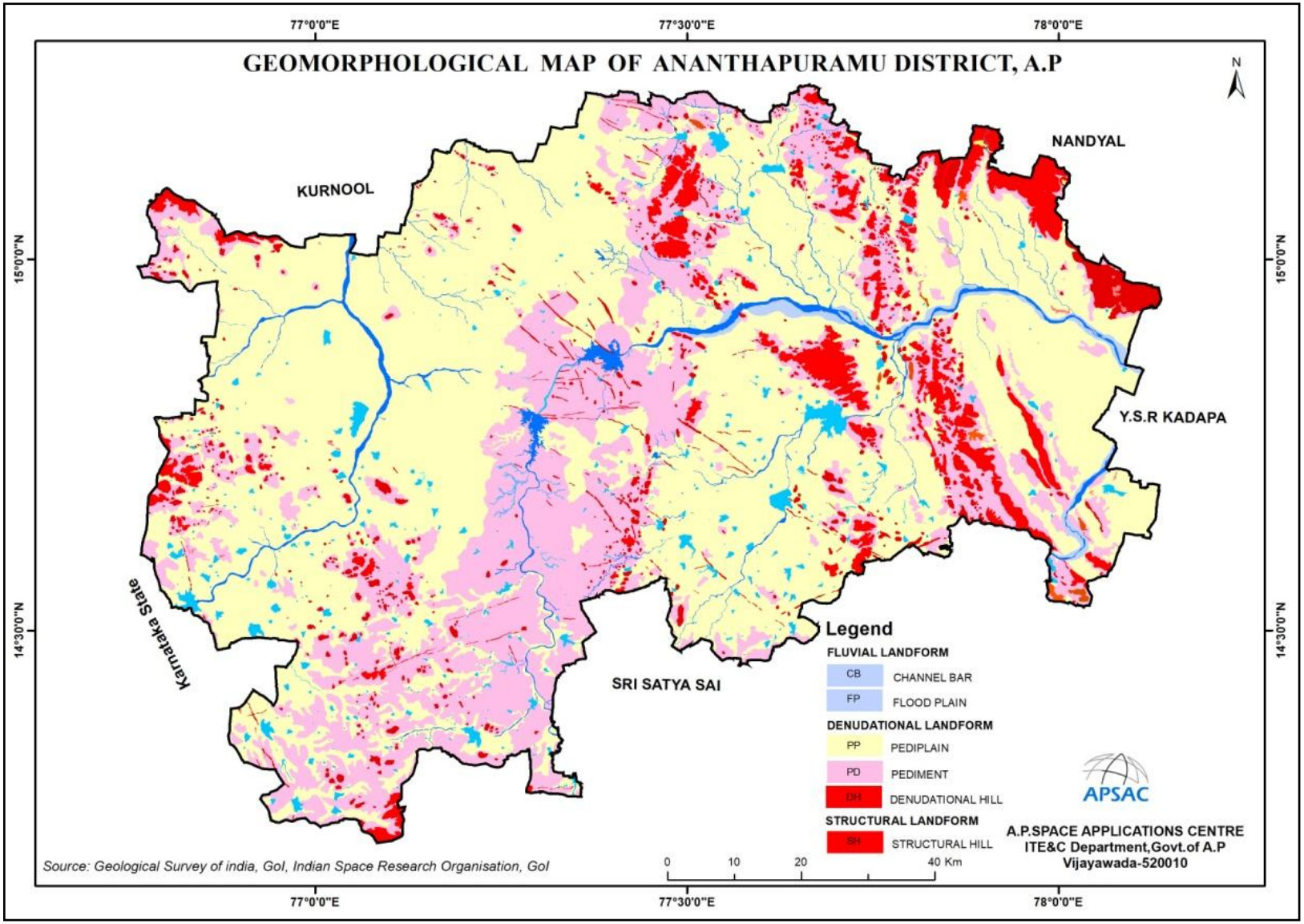


Figure 17: Geomorphology of Anantapur District, Andhra Pradesh

1.7.3.1. Flood plain: A 'floodplain' refers to the relatively flat land adjacent to a river channel, constructed or in the process of being constructed by the river's current flow. During periods of high water, the floodplain is submerged, as the river overflows its banks. It consists of alluvium carried by the river during floods and deposited in the slower-moving water beyond the swiftest currents.
1.7.3.2. Delta: A 'delta' is a low, nearly flat, alluvial land tract deposited near the mouth of a river. It typically forms a triangular or fan-shaped plain of considerable area, intersected by many distributaries of the main river. Deltas often extend beyond the coastline and result from the accumulation of sediment supplied by a river in quantities that are not removed by tides, waves, and currents

1.7.4 Landforms of Structural Origin

Landforms of structural origin are closely tied to the structural aspects of the area. Most landforms in this category owe their genesis to the underlying geological structure. The structure plays a pivotal role in reducing the resistance of rock, leading to a variety of geomorphic forms. These variations can range from minor to mega-scale, with the latter having a significant impact on landform genesis. Consequently, mapping such mega-scale forms indirectly reveals the structural setup of the area. Structural features like faults and folds, depending on their type, profoundly influence the development of structural landforms. The influence of geological structures on landscape development and appearance is substantial, ranging from large features that shape entire landscapes to small features affecting individual landforms and associated geomorphic processes. Structural control can arise from active structures whose forms directly shape the modern landscape or from ancient structural features whose influence on the modern landscape stems primarily from differential erosion (NRSA, 2007).
1.7.4.1. Structural Hills: These are hills and valleys formed due to tectonic processes and are highly dissected by drainage lines. They can be further classified as highly, moderately, or lowly dissected based on the density of joints and drainage. Interpretation of these features is often derived from planimetric satellite data, and the classification is highly subjective.

1.7.5 Landforms of denudational origins

The landforms of denudational origin are shaped primarily by processes of erosion and weathering, where denudation predominates over other geological processes. These landforms typically result from the combined effects of mechanical and chemical weathering. Denudation, the process of material removal through erosion and weathering, directly influences the relief of an area, particularly in reducing it to base level. The agents of denudation primarily include water, ice, and wind, with major influencing factors being geology, climate, tectonics, and human activities. All surface rocks and minerals undergo

physical and chemical processes, but their resistance to change varies, resulting in the formation of diverse landforms with characteristic shapes and forms. Weathering is integral to the rock cycle, as it disaggregates parent material into smaller fragments and dissolves minerals, which are then removed by agents like running water, wind, and glaciers. This process provides the raw material for sedimentary rock and soil formation (NRSA, 2007).

1.7.5.1. Denudational Hill: A highly dissected hill where structures have been largely erased.

1.7.5.2. Inselberg: A prominent, isolated, steep-sided residual knob, hill, or small mountain resulting from circumdenudation, rising abruptly from and surrounded by an extensive, nearly level, lowland erosion surface in hot, dry regions (such as the deserts of southern Africa or Arabia). Typically bare and rocky, though partly buried by debris from its slopes, it characterizes arid or semiarid landscapes in late stages of the erosion cycle.

1.7.5.3. Pediment: A broad, flat or gently sloping, rock-floored erosion surface or plain of low relief, typically formed by subaerial agents like running water, in arid or semiarid regions at the base of abrupt and receding mountain fronts or plateau escarpments. Underlain by bedrock or occasionally older alluvial deposits, it may be bare or partly mantled by discontinuous alluvial veneers derived from upland masses.

1.7.5.4. Pediplain: An extensive, multi-concave, rock-cut erosion surface resulting from the coalescence of two or more adjacent pediments and occasional desert domes, representing the mature stage of the erosion cycle (the "peneplain"). Further classified based on weathering thickness as shallow, moderate, or deep pediplains.

1.7.6 Structural Features of Anantapur District

Structural features typically comprise faults, fractures, shears, joints, or unconformities that facilitate groundwater movement. These features are identified on satellite images by observing tonal contrast, river/stream alignment, differences in vegetation cover, and knick-points in pattern terminations. Folds can be easily discerned on images by variations in trend, circular forms of lineaments, and other geomorphological features. In Anantapuramu, fractures run predominantly in an East-West, North-South, and northwest (NW)-southeast (SE) direction, characterized as tensile fractures. Bore wells drilled close to these fractures yield between 1 to 8 liters per second (lps). Conversely, fractures oriented northeast (NE)-southwest (SW) and north-northeast (NNE)-south-southwest (SSW) are shallow in nature, yielding between 0.2 to 6.0 lps (CGWB, 2013). The Structural Features map of Anantapuramu District is shown in Figure-18.

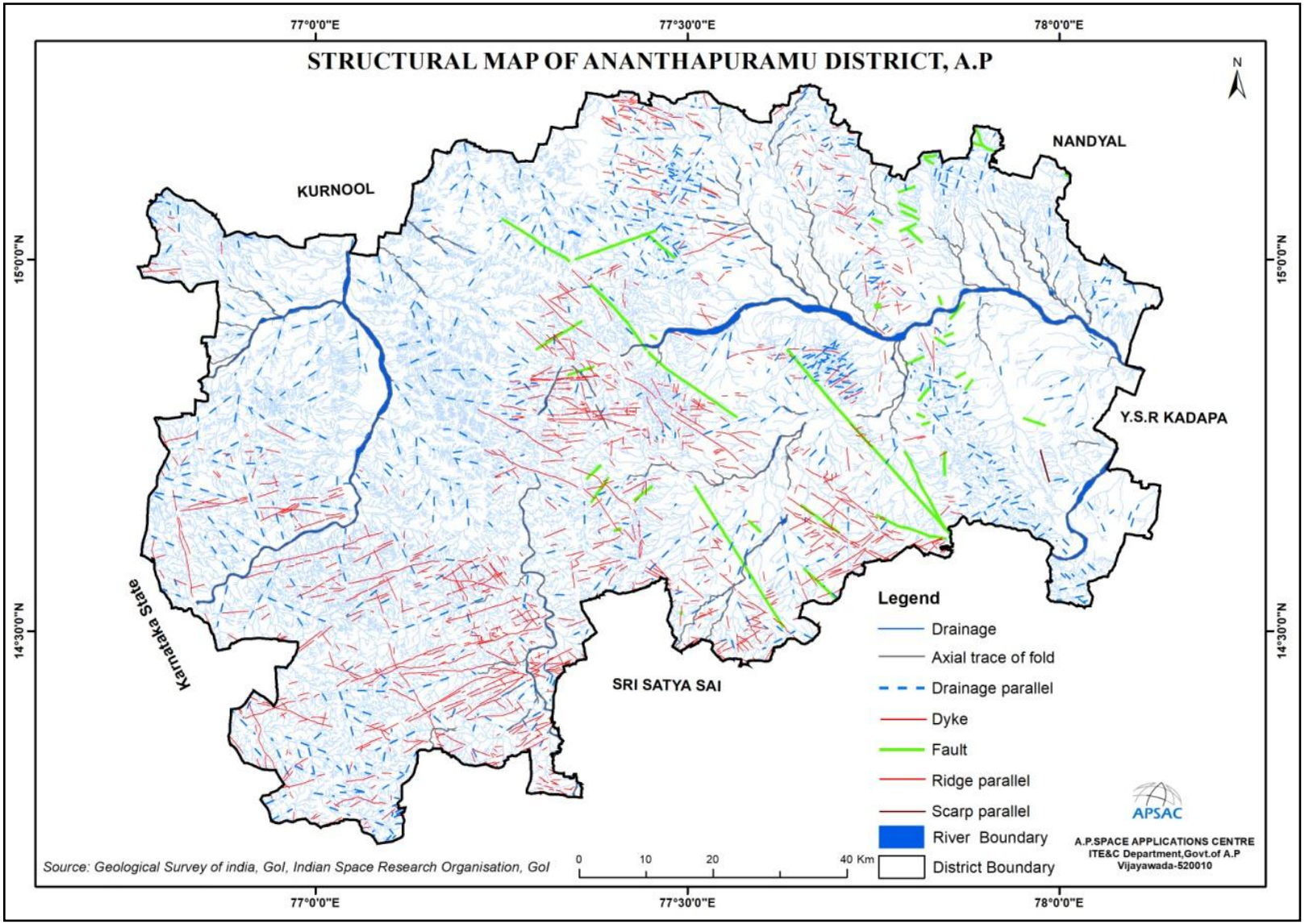


Figure-18 : Structural Map of Anantapur District, Andhra Pradesh

1.7.7 Ground Water Quality in the Anantapur District

The Groundwater Quality Laboratory analyzed physicochemical parameters such as Total Dissolved Solids, Total Hardness, Chlorides, Nitrate, pH, Fluoride, Iron, Alkalinity, and Sulphate using standard techniques. Groundwater quality samples were collected for two seasons—post-monsoon and pre-monsoon—from the Rural Water Supply and Sanitation Department (RWSS) between December 2017 and June 2019. These samples were then compared with the Bureau of Indian Standards, 2015 Groundwater Quality standards, categorized into desirable, permissible, and non-potable classes. In the analysis, blue, yellow, and red colors represent pre-monsoon quality, while + and - symbols indicate post-monsoon quality for desirable, permissible, and non-potable classes, respectively.

The analysis revealed that groundwater is polluted during both pre-monsoon and post-monsoon seasons, with approximately 80% of the area falling into the non-potable category due to high concentrations of Nitrate, Fluoride, and Iron. Additionally, about 10% of the area is classified as potable, while the remaining 10% is covered by hills and water bodies throughout the entire district. The occurrence and movement of groundwater in an area are governed by several factors, including topography, lithology, geological structure, depth of weathering, extent of fractures, drainage pattern, and climatic conditions. These factors interact to influence groundwater quality. The Groundwater Quality map of the Anantapuramu district is shown in Figure 19.

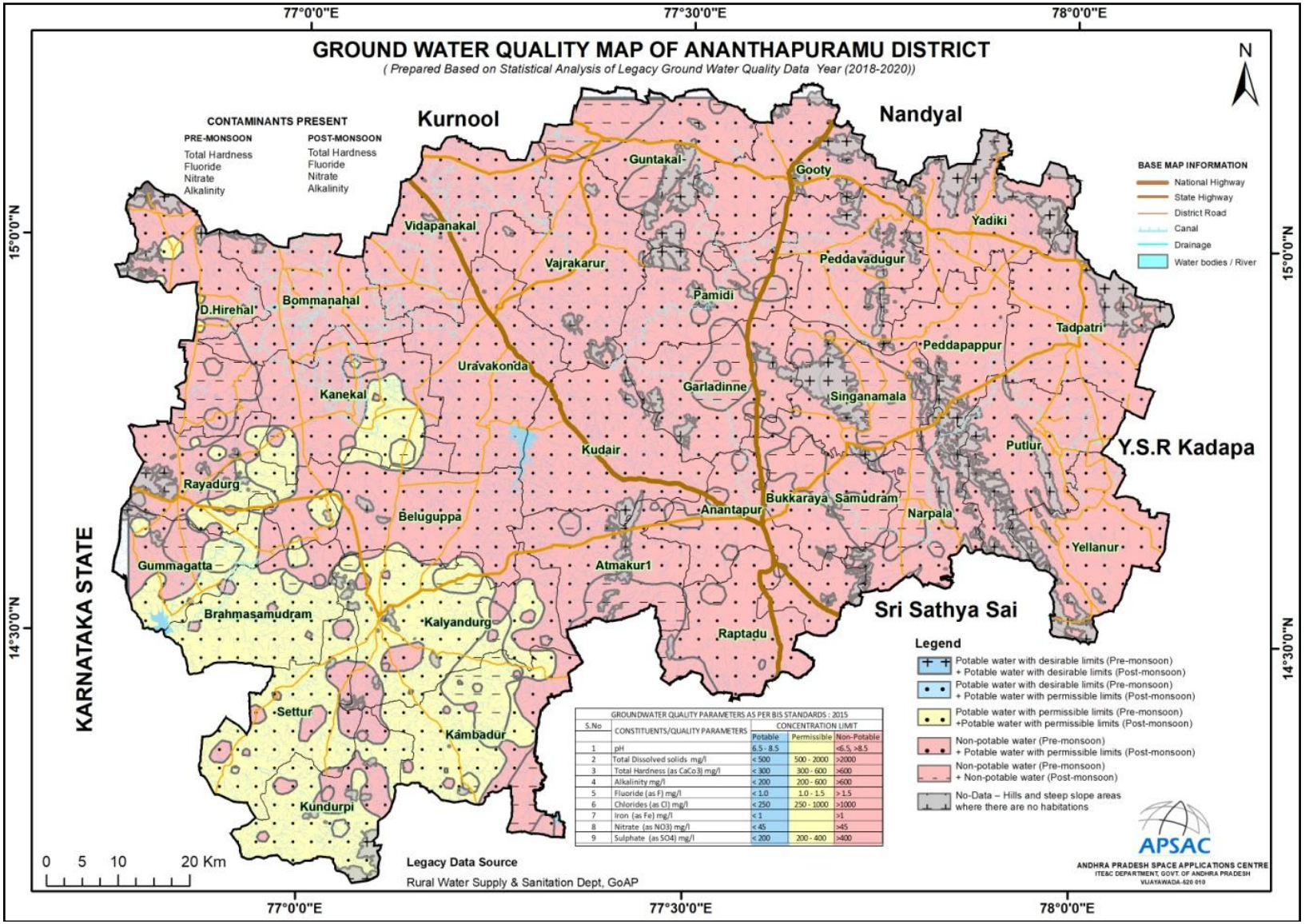


Figure-19: Ground Water Quality Map of Anantapur District

Chapter – II Minor Minerals

2.1 Overview of Mining Activity

The following leases exist in this Anantapur office jurisdiction. Mineral Regulatory, the important functioning of this office in these aspects are:-

i. Achievement of Targets of Mineral Revenue collections being fixed to this office annually
ii. Receiving and processing of the Mineral Concession Applications duly conducting the technical inspection, Survey and demarcation of the Mineral bearing applied areas
iii. Execution and Regulation of the operations of the Mining / Quarry leases in accordance with the Acts and Rules
iv. Issuing of dispatch permits duly collecting the Advance Royalty / Seig.fee from the lease holders on the minerals produced and intend to dispatch from their leased areas through online permit system
v. Controlling the illegal Mining / Quarrying and transportation by conducting the periodical inspections of the Mines and Quarries and also conducting the surprise vehicular checking and imposing the penalties
vi. Finalisation of Demand, Collection and Balance statements of the leases on annual basis

2.2 Geology of the District

Genaralized Litho-stratigraphic Succession of Andhra Pradesh

Geological Time (a)	Supergroup (b)	Group (c)	Formation (d)
Holocene	-	-	Alluvium, river terraces, beach sands and soils
Pleistocene	-	-	Laterite and Gravel
Mio-Pilocene	-	-	Rajahmundry Fm.
Late Cretaceous Eocene	-	-	Deccan Trap with infra-and inter-trappeans
Lower Cretaceous to Upper Carboniferous	Gondwana	Upper Gondwana	Godavari Valley (Fluviatile) Chikiala Fm. Gangapur Fm.
			Coastal Area (Fluvio-marine) Tirupati Fm. (Vejendla Fm) Raghavapuram Fm. (Vemavaram), Kandukuru, SriperambadurFms) Gollapalle Fm. (Satyavedu Fm.)
		Lower Gondwana	Kota Fm. Maleri Fm. Kamthi Fm. Barren

				Measures, Barakar Fm. Talchir Fm.
			Cuddapah Basin	**Pakhal Basin**
Sullavai Sandstone				
Middle to Upper Proterzoic (980-500 m.y)		Kurnool	Nandyala Shale Koilakuntla Limestone PanyamQuarzite Owk Shale Narji Limestone Banaganapalli Quartzite	Putnur Limestone Penganga Group Takalapalle Arkose
			Srisailam Quartzite	**Alabaka Sandstone**
Middle Proterozoic (1600-1300 m.y.)	Cuddapah	Nallamalai	Cumbum Fm. Mulug Group Bairankonda Quartzite Gandikota Quartzite Tadipatri Fm. Pulivendula Quartzite Mallampalli Group	Lankavaram Shale Pattipalle Quartzite Polavaram Fm. Jakaram Arkose Pandikunta Shale Gunjeda Dolomite
		Chitravathi		
		Papaghni	Vempalle Fm. Gulcheru Quartzite	Bayyaram Quartzite Bolapalle Fm.

EPARCHAEAN INTERVAL

Middle Proterozoic to Late Archean (2600-970 m.y)	Eastern Ghats	Charnockite	Charnockite with megacrystic k-feldspar charnockite
		Khondalites	Two pyrozene granulite / amphibolite Calc-silicate / granulite, Garnet-

			sillimanite-quartz-graphite gneiss (biotite-k-feldspar (Khondalite) Quartzite (gernet, sillimanite)
Late Archaean (2700 m.y)	Dharwar	Ramagiri-Penakacherla, Kolar, Kadiri, Gadwal-Narayanpet, Jonnagiri, VeligalluPeddavuru Schist Belts &W.Part of Nellore Belt.	Pyroclastic Rocks, local conglomerate / event conglomerate Metabasalt (Pillowed), Acid volcanics, minor andesite, dacite, rhyodacite, amphibolites, metaultramafics, minor quartzite, calcsilicates, phyllites, intrusives of basic rocks and granites, rare lamprophyres.
Middle Archaean (3100-2900 y.m)	Older Supracrustals (Sargur)	Eastern and Southern parts of Nellore.	High Grade schists include include garnet, staurolite, kyanite, sillimanite, cordierite (rarely sapphirine-kornuropine as in Karimnagar) Mica schists, calcilicate rocks, crystalline limestone (minor). BIF, fuchsite quartzite, hornblende granulite, amphibolite, migmatite streaky biotite gneiss.
Gneissic Complex			Banded Tonalite-Trondhjemite Gneiss.

Geologically, the State of Andhra Pradesh forms a part of peninsular India and is one of the most ancient land masses. The geological formations of Andhra Pradesh range from the oldest to the recent.

The Sargur Supracrustals constitute the oldest rock formation in Southern India, primarily occurring as enclaves within migmatitic gneiss. These supracrustals are predominantly found in the eastern and southern parts of the Nellore Schist Belt. The lithology of Sargur includes garnet, staurolite, kyanite schists, Banded Iron Formations (BIFs), quartzites, granulites, and amphibolites. The gneissic

complex consists of banded tonalite-trondhjemite gneiss, which serves as the basement rock, along with migmatitic gneiss and biotite granite gneiss. The tonalite-trondhjemite gneisses are sodic, quartz-bearing granitic rocks, with plagioclase as the predominant feldspar and varying amounts of K-feldspar. Dharwarian rocks in Andhra Pradesh are mainly exposed in the western part of the Nellore Belt and other regions such as Anantapur, Ramagiri-Penakacherla, Kolar, Kadiri, Gadwal-Narayanpet, Jonnagiri, Veligallu-Peddavuru Schist Belts, and the western part of the Nellore Belt. The lithology consists mainly of metabasalt (pillowed), acid volcanics, minor andesite, dacite, rhyodacite, amphibolites, meta-ultramafics, minor quartzite, calcsilicates, phyllites, basic rock intrusives, granites, rare lamprophyres, as well as some pyroclastic rocks and local conglomerates, defining stratigraphic hiatuses. Rocks from the middle Proterozoic to late Archaean periods are exposed in the Eastern Ghats Mobile Belt, primarily exhibiting granulite metamorphic facies. These rocks mainly comprise khondalites and charnockites. The metamorphic facies extend up to the granulite facies, characterized by charnockite with megacrystic K-feldspar, two-pyroxene granulite/amphibolite, calc-silicate/granulite, and garnet-sillimanite-quartz-graphite gneiss (biotite-K-feldspar, quartzite with garnet and sillimanite).

The Cuddapah Basin, a part of the Dharwar Craton, is the second-largest Purana basin in Peninsular India. It marks a profound unconformity, known as the Eparchaean Unconformity in early literature. The formation of the Cuddapah Basin exposes rocks ranging from late Proterozoic to upper Proterozoic periods. The Cuddapah Basin is subdivided into four groups: Nallamalai, Chitravathi, Papaghni, and Kurnool. Papaghni is composed of dolomite and limestones, Chitravathi of shale, dolomite, and quartzites, Nallamalai of shale, quartzites, and arkosic sandstones, and Kurnool of shales, quartzites, and limestones. The basin is characterized by a rhythmic pattern of quartzite-shale-carbonates cycles, with reports of uraniferous limestone. Major exposures of Purana rock formations occur in Prakasam, Kurnool, Cuddapah, Chittoor, and Nellore districts. The Deccan Traps are found in East and West Godavari districts, with exposures near Rajahmundry. Tertiary formations are found in East and West Godavari and Visakhapatnam districts, while Quaternary sediments occur as thick blankets of alluvium in river valleys, deltas, and along the East coast.

Geological formations in the Anantapuramu district can be broadly divided into distinct and well-marked groups: an older group of metamorphic rocks belonging to the Archaean, and a younger group of sedimentary rocks belonging to the Proterozoic age (GSI, 1979). The latter covers parts of Tadipatri, Putlur, and the eastern parts of Gooty and Narpala mandals. The remaining parts of the district are occupied by Archaean rocks consisting of schists, gneisses, migmatites, and younger granites, pegmatites, quartz veins, and basic dykes. Archaean rocks have undergone significant tectonic disturbances, resulting in metamorphism and recrystallization. The Geological Survey of India (GSI, 2000) provided a

detailed account of the district's geology/lithology, with a map on a 1:250,000 scale shown in Figure 20.

Some of the dykes appear to impede groundwater movement, creating areas of good groundwater potential upstream of the dykes and indicating low potential and deep water levels downstream. The northwest (NW)-southeast (SE) and East-West trending dykes act as barriers to groundwater flow, while the northeast (NE)-southwest (SW) and North-South trending dykes typically follow stream courses and lineaments, acting as conduits for groundwater flow. The area's geological formations consist of older metamorphic sequences, including biotite schist, hornblende, pyroxenite, and amphibole of Archean age, as well as younger sedimentary rocks from the Proterozoic age. Remnants of an ancient sea floor are evident, with deposits such as limestones, shales, and quartzites. Quaternary gravel is present in lensoidal bodies along the Penner River in the southern and central parts. Proterozoic rocks cover part of Tadipatri and the eastern part of Gooty and Anantapur mandals, while the rest of the district is dominated by schists, gneisses, migmatites, younger granites, pegmatites, quartz veins, and metamorphosed and recrystallized basic dykes. The Ramagiri and Kadiri schist belts are known for their gold-bearing deposits. Greenish-black bouldery dolerites are observed over several kilometers in the central part of the district, trending in the northwest (NW)-southeast (SE), East-West, and northeast (NE)-southeast (SE) directions.

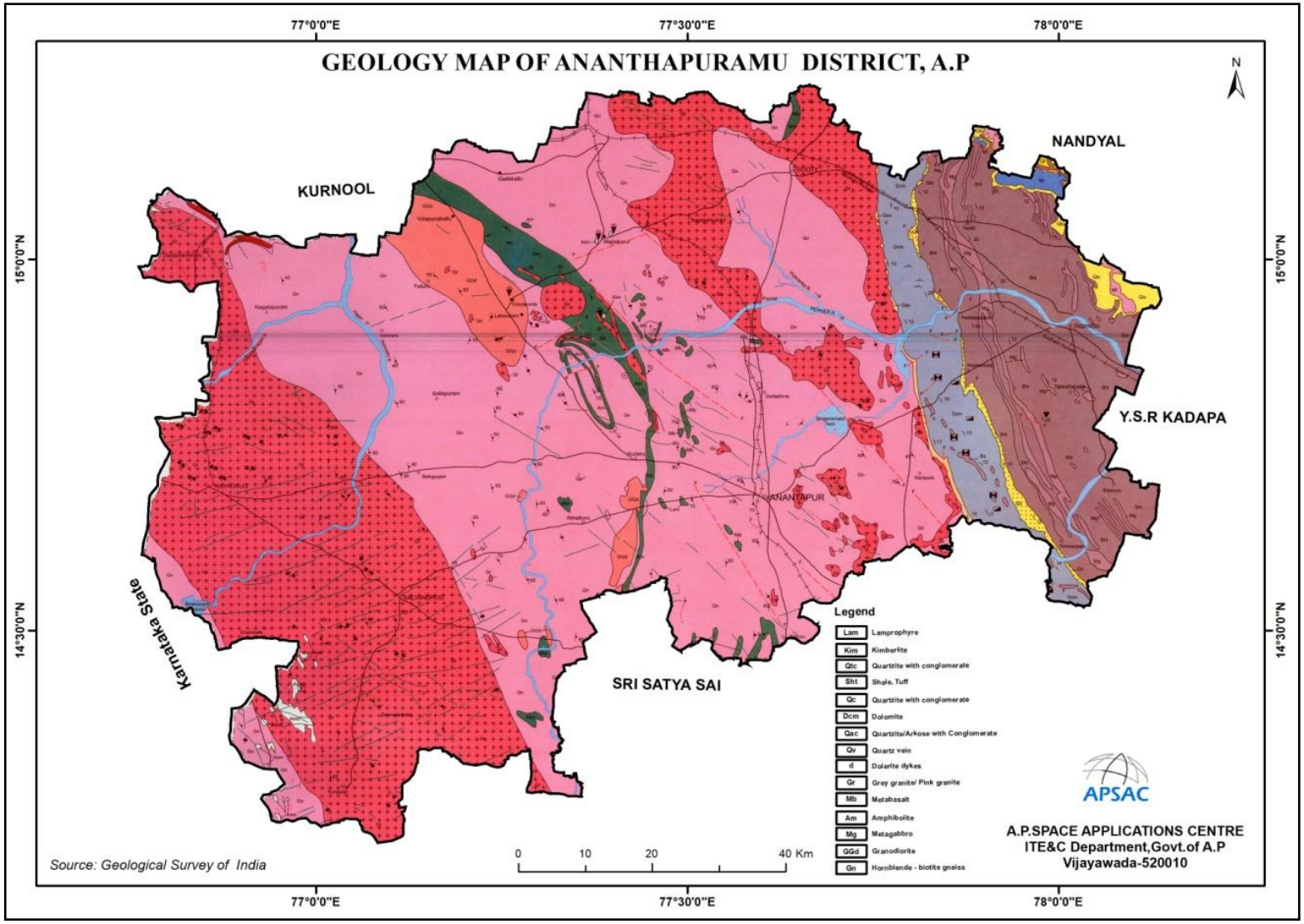
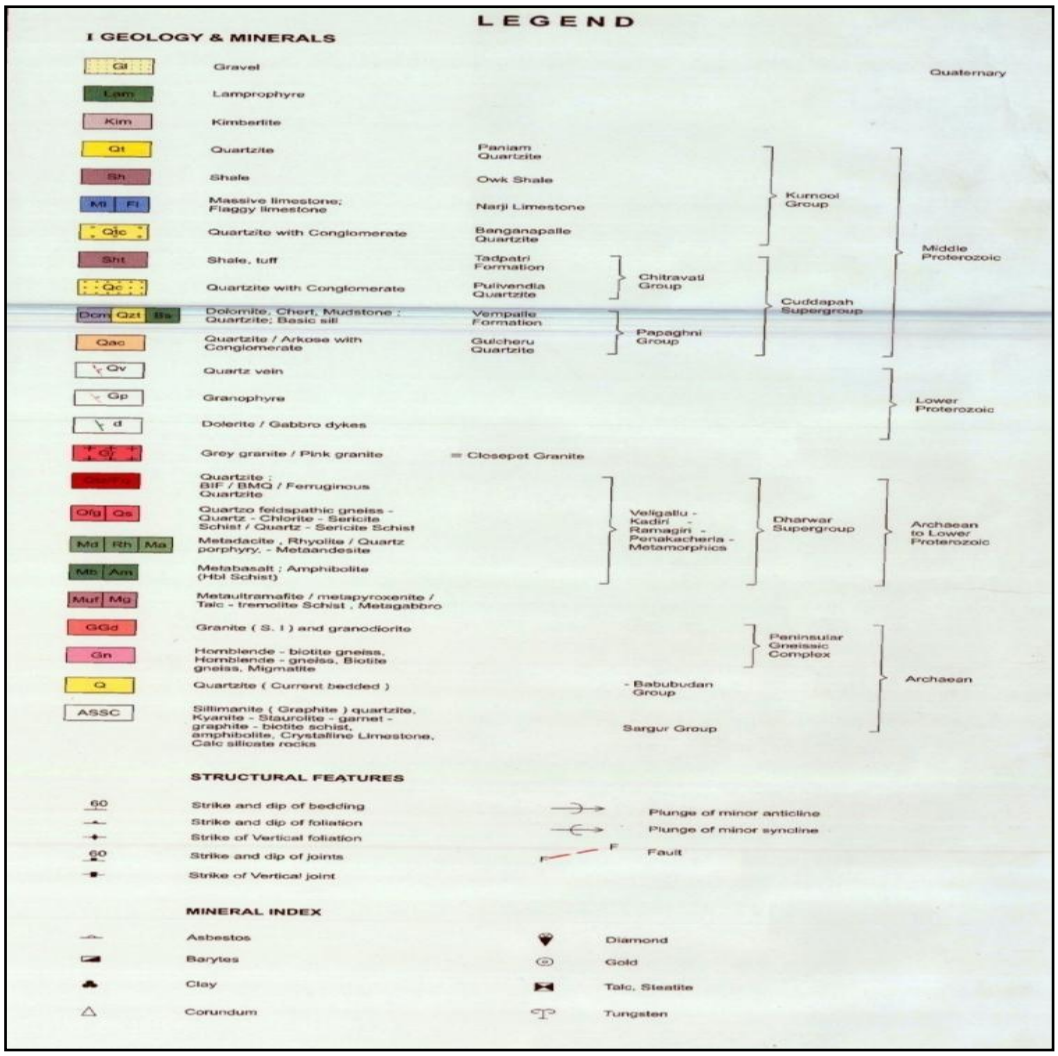


Figure 20: Geology of Anantapur District, Andhra Pradesh (Source: GSI, 2000)



Detailed Legend with Stratigraphic Sequence of Anantapur District

2.3 Minor Mineral Resources of Anantapur District:

As per literature (GSI, 2000) the following minerals are *available in Anantapuramu District. (Data Source: Assistant Director of Mines and Geology, Anantapuramu District, Andhra Pradesh).* A brief description of each mineral is as follows.

2.3.1. Gravel: Gravel is used for the construction of unpaved roads and for filling low-lying areas. It is available in Alamuru and Kodimi villages in Anantapur Mandal, Nemakallu village in Bommanahal Mandal, Bukkarayasamudram village in Bukkarayasamudram Mandal, and Jajarakal village in D. Hirchal Mandal.

Gravel occurrences are also reported in Engilibanda and Kothapeta villages in Gooty Mandal, Pamidi village in Pamidi Mandal, Jutur village in Peddapappur Mandal, and Gondireddipalle village in Raptadu Mandal.

2.3.2. Black Granite: Black granite, commercially known as G20, is a premium variety found in Ananthapuramu. Its appearance is entirely black and is mainly used for monuments, as well as for dimension stones in flooring and wall tiling.

Black Granite is also available in Chiyyedu village in Anantapur Mandal, Poletipalle village in ChenneKothapalle Mandal, Gollapalle and Rangasamudram villages in Gummagatta Mandal, Varli village in Kalyandurg Mandal, Gotukuru village in Kudair Mandal, Mulakaledu and Yatakal villages in Settur Mandal, Pandiparthi village in Somandepalle Mandal, and West Kodipalle village in Brahmasamudram Mandal.

2.3.3. Building Stone: Used for construction purposes, building stone is available in B.kothakota village in Chiyyedu, Kodimi villages in Anantapur Mandal, Bandur and Nemakallu villages in Bommanahal Mandal, Siddarampuram village in Bommanahal Mandal, D.hirehal, Hulikal, Jajarakal, Lakshmipuram, Lingamanahalli, Madenahalli, Malapanagudi, and Pulakurthi villages in D.hirehal Mandal, Bethapalle, Engilibanda, Jakkalacheruvu, Karadikonda, and Thondapadu villages in Gooty Mandal.

Building stone occurrences are also reported in Gollapalle village in Gummagatta Mandal, Mukthapuram village in Kanaganapalle Mandal, Kammuru village in Kudair Mandal, Gulimikondla and Pamidi villages in Pamidi Mandal, Chintakunta village in Putlur Mandal, Marur village in Raptadu Mandal, Veparalla village in Rayadurg Mandal, Yatakal village in Settur Mandal, Chakrayapeta village in Singanamala Mandal, Somandepalle, Velagamakulapalle, and Velidadakala villages in Somandepalle Mandal, Konakondla village in Vajrakarur Mandal, and Vidapanakal village in Vidapanakal Mandal.

2.3.4. Road Metal: Used for construction purposes and railway ballast, road metal is available in Chiyyedu, Kodimi, and Mannila villages in Anantapur Mandal, Bandur, Nemakallu, and Siddarampuram villages in Bommanahal Mandal, Hirehal, Hiredahal, Hulikal, Jajarakal, Kudulur, Lakshmipuram, Lingamanahalli, Madenahalli, Malapanagudi, and Pulakurthi villages in D.hirehal Mandal.

Road metal can be used to prepare the underlying surface and is available in Bethapalle, Engilibanda, Jakkalacheruvu, Karadikonda, and Thondapadu villages in Gooty Mandal, Gollapalle village in Gummagatta Mandal, Mukthapuram village in Kanaganapalle Mandal, Udiripikonda village in Kudair Mandal, Gulimikondla, Kandlapalle, and Pamidi villages in Pamidi Mandal, Jutur village in Peddapappur Mandal, Chintakunta village in Putlur Mandal.

It is also available in Marur village in Raptadu Mandal, Chadam, Mallapuram, and Veparalla villages in Rayadurg Mandal, Yatakal village in Settur Mandal, Chakrayapeta village in Singanamala Mandal, Somandepalle, Velagamakulapalle,

and Velidadakala villages in Somandepalle Mandal, Konakondla villages in Vajrakarur Mandal, and Vidapanakal villages in Vidapanakal Mandal.

2.3.5. Quartz: Quartz available in Ananthapuramu district is utilized in the paint, ceramic tiles, and glass industries. It is available in D.cherlopalle village in Bathalapalle Mandal, Mustikovila village in ChenneKothapalle Mandal, and D.hirehal, Obulapuram, Pulakurthi villages in D.hirehal Mandal. Quartz is also found in Jakkalacheruvu and Thondapadu villages in Gooty Mandal, Ameenpalle, Koganapalle, and Patha kothachervu villages in Guntakal Mandal, as well as Appecherla, Medimakulapalle, and Muppalaguthi villages in Peddavadugur Mandal, and Tarimela villages in Singanamala Mandal.

2.3.6. Dolomite: Dolomite is utilized instead of limestone as an aggregate for both cement and bitumen mixes, as well as a flux in blast furnaces. This mineral is available in Gugudu village in Narpala Mandal, Chagallu village in Peddapappur Mandal, Peddapappur, Peddayakkaluru, and Tabjula villages in Peddapappur Mandal, Kristipadu and Ravuludiki village in Peddavadugur Mandal, Joolakalva and Ullikallu villages in Singanamala Mandal, and Chandana and Nagarur villages in Yadiki Mandal.

2.3.7. Manufactured Sand: Used as a substitute for river sand in construction, mostly in the production of concrete and mortar mix, manufactured sand is available in Chiyyedu village in Anantapur Mandal, Engilibanda and Karadikonda villages in Gooty Mandal, Gollapalle villages in Gummagatta Mandal, Mukthapuram villages in Kanaganapalle Mandal, and Somandepalle villages in Somandepalle Mandal.

2.3.8. Color Granite: Predominantly used for monuments and as dimension stones for flooring and wall tiling, color granite is available in Theetakal and Siddarampuram village in Brahmasamudram Mandal, as well as Bramhanapalle and Ganginepalle village in ChenneKothapalle Mandal. It is also found in Gollapalle and Veerapuram villages in Gummagatta Mandal, Kambadur, Mulakanur, and Pallur villages in Kambadur Mandal, Marutla village in Kudair Mandal, Peddavadugur village in Peddavadugur Mandal, Chadam and Mallapuram villages in Rayadurg Mandal, Akuledu and Rachepalle villages in Singanamala Mandal, and Naginayani cheruvu village in Somandepalle Mandal.

2.3.9. Cubes, Kerbs: Bodiganidoddi and Kondakindaagraharam village in Bukkarayasamudram Mandal.

2.3.10. Iron Ore: Used for construction, transportation, energy infrastructure, and household appliances, iron ore is available in Obulapuram village in D.hirehal Mandal.

2.3.11. Silica Sand: Used in flooring, mortars, and cement, silica sand is available in Illuru village in Garladinne Mandal.

2.3.12. Barytes (White): Used in high-grade paint, paper-making, pharmaceuticals, rubber, cosmetics, and plastics, barytes is available in Amalladinne village in Peddapappur Mandal.

2.3.13. China Clay: China clay, utilized in making paper, rubber, paint, and many other products, can be found in Chinnayakkaluru village in Peddapappur Mandal, Kristipadu village in Peddavadugur Mandal, and Madugupalle in Putlur Mandal.

2.3.14. Limestone (Others): Limestone, used in steel manufacturing, mining, paper production, water treatment and purification, plastic production, and cement industries, is available in Peddayakkaluru village in Peddapappur Mandal, Kristipadu village in Peddavadugur Mandal, Talaricheruvu, and Uruchinthala village in Tadipatri Mandal, as well as Gudipadu, Konuppalapadu, and Nagarur villages in Yadiki Mandal, and Goddumarri village in Yellanur Mandal.

2.3.15. Mosaic Chips: Mosaic chips, utilized in flooring and outdoor decorations, are available in Chintalacheruvu village in Peddavadugur Mandal.

2.3.16. Ochre: Ochre, used in painting and plastic and other industries, is available in Putlur village in Putlur Mandal.

2.3.17. White Shale: Used to make bricks, tiles, and pottery, white shale can be found in Joolakalva villages in Singanamala Mandal, as well as Konuppalapadu and Puppala villages in Yadiki Mandal. The mineral resources map of Anantapuramu district is shown in Figure 21.

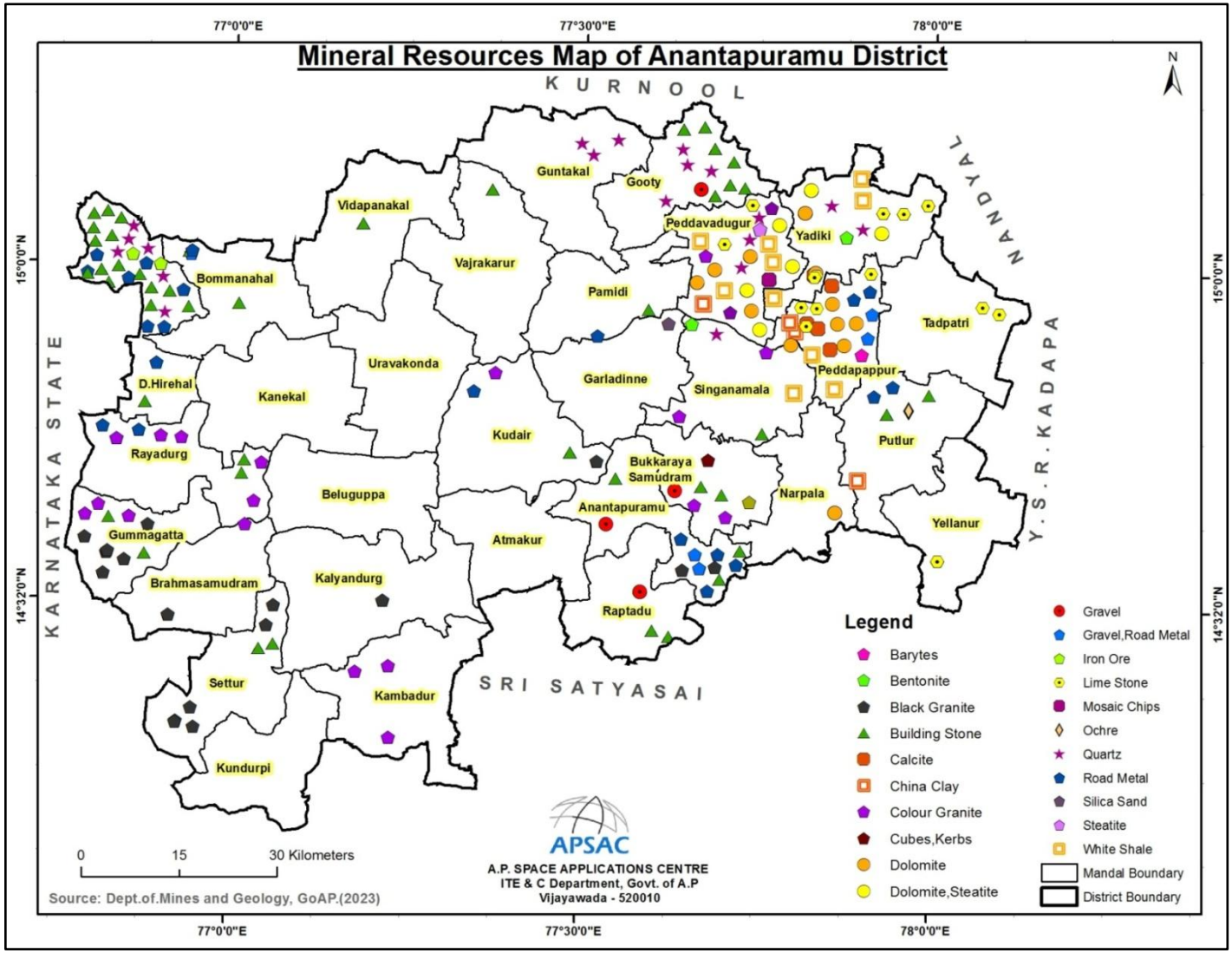


Figure-21: Mineral Resurce Map of Anantapur District

Details of Leases for Minor Minerals and Details of Lease (Erstwhile)

Table 14: The List of Leases for Minor Minerals in Anantapuramu district.

Sl.N	Office	Working	Non-working	Geo-Cordinates		Lease ID No.	Name of the Mineral (s)	Name of the Quarry Lease / Lessee Name	Name of the pro	Sy.No.	Villlage	Mandal	Extent in Ha	Lease period From	Lease period To
1	ADMG, ATP	W	-	15-03-09.02421	76-51-34.33062	**12120 70095**	Iron Ore(< 55% Fines)	SAI BALAJI MINERALS	K. PRADEEP KUMAR	370, 58/p	Obulapuram	D.Hirchal	4.046	39347	46651.00
				15-03-07.23664	76-51-35.74243										
				15-03-05.88443	76-51-38.15985										
				15-02-56.87045	76-51-42.94362										
				15-02-58.30021	76-51-37.89362										
				15-02-59.72434	76-51-38.20723										
				15-02-59.92114	76-51-36.97483										
				15-03-05.43032	76-51-35.72234										
				15-03-05.72205	76-51-33.66761										
				15-03-06.02134	76-51-31.99762										
				15-03-09.35812	76-51-32.64921										
2	ADMG, ATP	-	NW	14-29-50.28886	76-51-40.69538	**12111 40182**	Black Granite	J. R. ENTERPRISES	S. JAI PAUL	348	West kodipalle	Brahmasamudram	6	41965	49269.00
				14-29-55.21232	76-51-38.81417										
				14-30-00.42091	76-51-33.54725										
				14-30-03.00411	76-51-31.51474										
				14-30-10.60485	76-51-29.41066										
				14-30-11.42304	76-51-32.67473										
				14-30-04.71692	76-51-34.51431										
				14-30-04.19451	76-51-33.61785										
				14-30-01.41298	76-51-35.44096										
				14-29-57.21181	76-51-38.64801										
				14-29-55.35331	76-51-40.16375										
				14-29-50.43412	76-51-42.01312										
				14-29-42.26106	76-51-43.09514										
				14-29-39.77071	76-51-44.00795										
				14-29-39.59995	76-51-42.70894										
				14-29-42.13154	76-51-41.13156										
3	ADMG, ATP	W	-	14-28-44.77281	76-51-54.74643	**12111 50400**	Black Granite	M/s HIMALAYA ENTERPRISES, Mg.Part: U. SRINIVASA RAO	U. SRINIVASA RAO	348	West kodipalle	Brahmasamudram	1	30.12.2017	29.12.2037
				14-28-45.04652	76-51-57.08762										
				14-28-49.60394	76-51-56.72445										
				14-28-49.36753	76-51-54.38875										
4	ADMG, ATP	W	-	14-35-57.99975	76-49-30.17962	**12110 60070**	Black Granite	M. RAMAKRISHNAPPA	M. Ramakrishnappa	63-A	Rangasamudram	Gummagatta	2	19.03.2020	18.03.2040
				14-35-59.64031	76-49-34.55174										
				14-36-04.38462	76-49-32.03504										
				14-36-02.12808	76-49-27.99427										
5	ADMG, ATP	W	-	14-35-58.44653	76-49-31.42503	**12110 90071**	Black Granite	DHANAM IMPEX	M. Ramakrishnappa	63-A	Rangasamudram	Gummagatta	2.14	13/07/2018	12/7/2038
				14-35-59.64032	76-49-34.55172										
				14-35-55.93634	76-49-35.87724										
				14-35-53.35697	76-49-36.13295										
				14-35-53.48644	76-49-31.78714										
6	ADMG, ATP	W	-	N $14^0$38'08.7"	E $76^0$49'04.5"	**12111 70471**	Black Granite	Sri C. Afak Ahmed	Sri C. Afak Ahmed	206	Gollapalle	Gummagatta	2	16/07/2018	15/07/2038
				N $14^0$38'09.5"	E $76^0$49'07.4"										
				N $14^0$38'05.6"	E $76^0$49'08.9"										
				N $14^0$38'02.6"	E $76^0$49'09.9"										
				N $14^0$38'01.6"	E $77^0$49'07.0"										

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7	ADMG, ATP	W	-	14-31-31.54447	77-13-00.02098	**12111 80509**	Black Granite	K. Anand Mohan	K.Anand Mohan	98	Varli	Kalyandurgam	1	11/29/2008	11/28/2028
				14-31-32.78083	77-12-59.64770										
				14-31-34.49646	77-13-04.32834										
				14-31-34.57042	77-13-04.72477										
				14-31-35.04075	77-13-07.76959										
				14-31-33.74070	77-13-07.78575										
				14-31-33.27729	77-13-04.82397										
8	ADMG, ATP	-	NW	14-19-08.60883	76-55-27.67231	**12110 80086**	Black Granite	K. RAMESH	K. Ramesh	738-6B, 1185-1B, 1189-1A 1189	Mulakaledu	Settur	2	5/14/2004	5/13/2024
				14-19-08.94401	76-55-30.28623										
				14-19-02.69843	76-55-30.32631										
				14-19-00.57242	76-55-31.21031										
				14-19-00.14242	76-55-28.23714										
9	ADMG, ATP	W	-	14-22-20.00411	76-54-17.62420	**12110 90064**	Black Granite	G. R. ENTERPRISES	G. R. RAJENDRAN	193/7	Yatakal	Settur	1	24/05/2013	23/05/2033
				14-22-18.85168	76-54-18.24029										
				14-22-17.74227	76-54-18.76497										
				14-22-17.65782	76-54-17.85197										
				14-22-15.63880	76-54-19.55821										
				14-22-15.59060	76-54-16.88314										
				14-22-19.88718	76-54-14.95631										
10	ADMG, ATP	W	-	14-23-14.00669	76-54-59.68201	**12111 90572**	Black Granite	M/s Sigma Granites, Mg.Partner: Sri A. Mahendratransferred from U. Govinda Rao	Sri A. Mahendra	305/1 P, 3 P, 306/3 P, 4(4), 5 P	Mulakaledu	Settur	5	13/06/2006 (transferred on 27/02/2013)	14/06/2026
				14-23-11.04998	76-55-01.09883										
				14-23-09.35296	76-54-57.52941										
				14-23-12.79114	76-54-55.17896										
				14-23-21.12668	76-54-51.35174										
				14-23-22.36501	76-54-55.20541										
				14-23-16.18482	76-54-58.29523										
11	ADMG, ATP	-	NW	14-22-04.43777	76-54-20.45186	**12110 90313**	Black Granite	M/s RAJWIN GRANITES, Mg.Pt: Sri RS Arun Selvaraj	Mg.Pt: Sri RS Arun Selvaraj	193/2B, 3B	Mulakaledu	Settur	2	11/26/2004	11/25/2024
				14-22-08.84924	76-54-19.80092										
				14-22-13.76948	76-54-18.92997										
				14-22-14.05638	76-54-21.44925										
				14-22-09.20749	76-54-22.01323										
				14-22-04.74263	76-54-22.49725										
12	ADMG, ATP	W	-	14-19-24.17035	76-55-20.01865	**12111 30214**	Black Granite	G. T. R. ENTERPRISES	G. T. R. ENTERPRISES	739-1	Mulakaledu	Settur	1	07.05.2021	06.05.2041
				14-19-18.98265	76-55-23.69701										
				14-19-16.42801	76-55-24.72473										
				14-19-16.29354	76-55-24.46327										
				14-19-24.77892	76-55-17.76271										
13	ADMG, ATP	W	-	N 14^0 37' 22.4"	77^0 02' 48.8" E	**12111 60418**	Colour Granite	S. NARENDRANATH REDDY	S. Narendranath Reddy	287	Theetakal	Brahmasamudram	6	10.05.2022 08-12-2011	12/7/2031
				N 14^0 37' 21.6"	77^0 02' 45.3" E									05/10/2009 (Transferred on 4/24/2014)	10/4/2029
				N 14^0 37' 35.0"	77^0 02' 42.3" E									31.08.2017	30.08.2037
				N 14^0 37' 36.0"	77^0 02' 46.1" E									12/7/2018	11/7/2038
14	ADMG, ATP	W	-	14-39-58.34887	77-40-31.48679	12110 30090	Colour Granite	VASUNDHARA ENTERPRISES	G. MADHU	196	Siddarampuram	Bukkarayasamudram	5	23.12.2019	22.12.2039
				14-39-59.83204	77-40-34.45778										
				14-40-01.59247	77-40-39.72428										
				14-40-01.83004	77-40-41.60147										
				14-40-01.26847	77-40-42.69478										
				14-40-00.47649	77-40-42.98924										
				14-39-57.86647	77-40-43.59023										

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				14-39-55.46887	77-40-42.77234										
				14-39-54.77403	77-40-41.72289										
				14-39-54.69487	77-40-38.08397										
				14-39-57.18247	77-40-34.78914										
15	ADMG, ATP	W	-	14-38-32.31035	76-48-31.65224	**12111 10256**	Colour Granite	T.N Raghu transferred QL from T. UDAY BHASKAR	T.N Raghu	78-P	Gollapalle	Gummagatta	3.638	17/11/2018	16/11/2038
				14-38-43.03257	76-48-38.75320										
				14-38-45.24919	76-48-22.28583										
				14-38-37.50125	76-48-26.73057										
16	ADMG, ATP	W	-	14-39-39.77498	76-50-20.42713	**12111 40060**	Colour Granite	S SHABANA	S. Shabana	B4-1	Veerapuram	Gummagatta	3	17/11/2018	16/11/2038
				14-39-42.35111	76-50-20.75749										
				14-39-38.83033	76-50-32.86754										
				14-39-36.25418	76-50-32.53721										
17	ADMG, ATP	W	-	14-28-21.34872	77-14-27.96152	**12111 70466**	Colour Granite	Smt. G. Sarada Padma	G. Sarada Padma	399	Pallur	Kambadur	6	7/9/2011	7/8/2031
				14-28-16.79574	77-14-26.97693										
				14-28-21.40375	77-14-29.74698										
				14-28-22.37814	77-14-34.95066										
				14-28-21.33447	77-14-36.23825										
18	ADMG, ATP	W	-	14-24-31.41036	77-12-51.83053	**12111 80508**	Colour Granite	-	-	-	-	-	-	-	-
				14-24-28.58304	77-12-45.00114			-	-	-	-	-	-	-	-
				14-24-34.23312	77-12-41.76072			-	-	-	-	-	-	-	-
				14-24-38.17983	77-12-45.34355			-	-	-	-	-	-	-	-
				14-24-38.57771	77-12-46.68014			-	-	-	-	-	-	-	-
				14-24-36.24943	77-12-48.44902			-	-	-	-	-	-	-	-
				14-24-33.37845	77-12-49.43375			Smt G. Sarada Padma	G. Sarada Padma	810	Mulakanur	Kambadur	4.685	10.07.2018	09.07.2038
19	ADMG, ATP	W	-	A 14^0 22' 00.6" N	77^0 14' 06.4" E	12111 90583	Colour Granite	Benita Industries Ltd	D. Venu Gopal	82-1	Kambadur	Kambadur	19.15	30/08/2016	29/08/2036
				B 14^0 21' 57.2" N	77^0 14' 05.9" E									31.07.2019	30.07.2039
				c 14^0 21' 56.0" N	77^0 14' 07.8" E									6/17/1998 (Renewal applied)	6/16/2013
				d 14^0 21' 55.1" N	77^0 14' 15.7" E									3/5/2012	3/4/2032
				e 14^0 21' 56.0" N	77^0 14' 20.6" E									1/8/2004	1/7/2024
				f 14^0 21' 55.9" N	77^0 14' 23.4" E									11/3/1999 (Renewal applied)	11/2/2019
				g 14^0 21' 50..4" N	77^0 14' 17.1" E									11/1/2000 (Renewal applied)	10/31/2020
				h 14^0 21' 52.5" N	77^0 14' 16.5" E									7/11/2001 (renewal applied)	7/10/2021
				i 14^0 21' 48.4" N	77^0 14' 15.6" E									28.04.2020	27.08.2040
				j 14^0 21' 47.8" N	77^0 14' 14.3" E									10/17/1997 (Renewal applied)	10/16/2017
20	ADMG, ATP	-	NW	14-49-33.58135	77-22-12.73246	**12111 80553**	Colour Granite	-	-	-	-	-	-	12/30/1998 (Renewal applied)	12/29/2018
				14-49-34.23724	77-22-26.78503			-	-	-	-	-	-		
				14-49-35.78352	77-22-26.83041			-	-	-	-	-	-		
				14-49-37.12301	77-22-12.78245			D V S S Ramesh	D V S S Ramesh	579	Marutla	Kuderu	2		
21	ADMG, ATP	-	NW	14-49-33.58135	77-22-12.73246	**12111 80554**	Colour Granite	Sai Shakthi Infratech Pvt LTd	D V S S Ramesh	579	Marutla	Kuderu	4.45	22.03.2021	21.03.2041
				14-49-34.23724	77-22-26.78503										
				14-49-30.80935	77-22-26.68574										
				14-49-32.15487	77-22-12.63196										
22	ADMG, ATP	W	-	14-40-31.01987	77-02-31.50487	**12111 20073**	Colour Granite								
				14-40-32.40382	77-02-35.60024										

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				14-40-31.78743	77-02-35.84325			-	-	-	-	-	-	-	-
				14-40-32.83574	77-02-40.04451			-	-	-	-	-	-	-	-
				14-40-26.38324	77-02-42.35196			-	-	-	-	-	-	-	-
				14-40-25.49197	77-02-38.21055			-	-	-	-	-	-	-	-
				14-40-31.39084	77-02-35.97034			-	-	-	-	-	-	-	-
				14-40-30.03721	77-02-31.81112			SOMESHWARA GRANITES	G. SREERAMA REDDY	406/P	Veparalla	Rayadurg	3.238	05.11.2017 (1st Renewal granted) 05.11.2007	04.11.2027 04.11.2017
23				14-46-57.67343	76-49-59.29764	**12111 80507**	-	-	-	-	-	-	-	-	-
				14-47-04.45184	76-49-58.78851		-	-	-	-	-	-	-	-	-
				14-47-04.02671	76-49-50.59644		-	-	-	-	-	-	-	-	-
				14-47-01.84671	76-49-51.00942		-	-	-	-	-	-	-	-	-
				14-46-57.37356	76-50-00.26636		-	-	-	-	-	-	-	-	-
	ADMG, ATP	W	-	14-46-59.85746	76-49-51.45678		Colour Granite	Sri K. Shashi Narayana	Sri K. Shashinarayana ,	11/7	Mallapuramu	Rayadurg	4	12/8/2015	11/8/2025
24	ADMG, ATP	W	-	14-46-04.88671	76-52-15.07972	**12111 60426**	Colour Granite	A. MARRI SWAMY REDDY	-	-	-	-	-	-	-
				14-46-04.28066	76-52-14.73121				-	-	-	-	-	-	-
				14-46-02.56727	76-52-15.98236				-	-	-	-	-	-	-
				14-46-02.48134	76-52-11.95412				-	-	-	-	-	-	-
				14-46-05.80258	76-52-12.21687				-	-	-	-	-	-	-
				14-46-06.77078	76-52-11.56375				-	-	-	-	-	-	-
				14-46-07.05969	76-52-14.37623				A. MARRI SWAMY REDDY	170-B	Chadam	Rayadurg	1.214	12/8/2015	11/8/2025
25	ADMG, ATP	-		15-00-30.07701	76-48-51.27885	**12129 90083**	Quartz	-	-	-	-	-	-	-	-
				15-00-33.83642	76-48-51.49888			-	-	-	-	-	-	-	-
				15-00-34.64264	76-48-57.32513			-	-	-	-	-	-	-	-
				15-00-22.77307	76-48-56.80971			-	-	-	-	-	-	-	-
				15-00-22.82746	76-48-56.45046			-	-	-	-	-	-	-	-
				15-00-21.92481	76-48-55.08697			-	-	-	-	-	-	-	-
				15-00-20.00914	76-48-52.19312			-	-	-	-	-	-	-	-
				15-00-19.65693	76-48-51.41112			-	-	-	-	-	-	-	-
				15-00-26.41136	76-48-52.27501			-	-	-	-	-	-	-	-
				15-00-26.27798	76-48-53.18043			-	-	-	-	-	-	-	-
				15-00-27.59173	76-48-54.75698			-	-	-	-	-	-	-	-
				15-00-29.38447	76-48-53.36224			-	-	-	-	-	-	-	-
			NW	15-00-29.72574	76-48-53.60482			D. KRISTAPPA	D. Kristappa	461/P	D.hirehal	D.Hirchal	6	2/7/2008 (Renewal applied)	1/7/2028
26	ADMG, ATP	-	NW	15-11-31.82142	77-29-55.41395	**12120 00128**	-	-	-	-	-	-	-	-	-
				15-11-23.37513	77-30-05.21589		-	-	-	-	-	-	-	-	-
				15-11-19.04408	77-30-08.91685		-	-	-	-	-	-	-	-	-
				15-11-16.65847	77-30-03.90401		-	-	-	-	-	-	-	-	-
				15-11-18.23306	77-30-02.95798		-	-	-	-	-	-	-	-	-
				15-11-18.04197	77-30-01.60609		-	-	-	-	-	-	-	-	-
				15-11-25.52498	77-29-49.40756		Quartz	V. SUDHAKAR	V. Sudhakar	1/1-P	Ameenpalle	Guntakal	11.384	15.05.2013	14.05.2023
27	ADMG, ATP	W	-	15-10-36.05692	77-31-23.60498	12120 10133	-	-	-	-	-	-	-	-	-
				15-10-27.70693	77-31-18.29083		-	-	-	-	-	-	-	-	-
				15-10-48.32223	77-30-43.89723		-	-	-	-	-	-	-	-	-
				15-10-56.66493	77-30-49.21493		Quartz	D. MANJULA	D. Manjula	40/p	Patha kothacheruvu	Guntakal	36.423	12.08.2015	11.08.2025

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28	ADMG, ATP	-	NW	14-35-11.65442	77-41-08.22645	**12110 70110**	Road Metal & Building Stone	-	-	-	-	-	-	-	-
				14-35-11.59436	77-41-14.23555			-	-	-	-	-	-	-	-
				14-35-08.03905	77-41-13.90084			-	-	-	-	-	-	-	-
				14-35-08.09919	77-41-07.89123			VAKULA DEVI	VAKULA DEVI	231-P	Chiyyedu	Anantapur	2	27.02.2013	26.02.2023
29	ADMG, ATP	-	NW	14-35-00.26523	77-41-31.16262	**12111 50382**	-	-	-	-	-	-	-	-	-
				14-35-06.84247	77-41-35.76968		-	-	-	-	-	-	-	-	-
				14-35-06.64447	77-41-34.16549		-	-	-	-	-	-	-	-	-
				14-35-07.58047	77-41-29.24342		-	-	-	-	-	-	-	-	-
				14-35-07.06562	77-41-28.68332		-	-	-	-	-	-	-	-	-
				14-35-01.49643	77-41-27.61325		Road Metal & Building Stone	K. BASHA	K. Basha	231	Chiyyedu	Anantapur	3.25	05.12.2019	04.12.2029
30	ADMG, ATP	-	NW	14-35-07.06562	77-41-28.68332	**12111 50383**	-	-	-	-	-	-	-	-	-
				14-35-01.49643	77-41-27.61325		-	-	-	-	-	-	-	-	-
				14-35-05.87043	77-41-17.88732		-	-	-	-	-	-	-	-	-
				14-35-10.42801	77-41-23.09326		-	-	-	-	-	-	-	-	-
				14-35-09.52803	77-41-24.59183		-	-	-	-	-	-	-	-	-
				14-35-08.45163	77-41-24.61623		-	-	-	-	-	-	-	-	-
				14-35-07.92245	77-41-27.16836		Road Metal & Building Stone	K. SAMBHASIVUDU	K. Sambhasivudu	231	Chiyyedu	Anantapur	4.6	17-09-2021	16-09-2031
31	ADMG, ATP	W	-	14-34-33.47404	77-41-38.92936	**12111 70457**	Road Metal & Building Stone	BSCPL Infrastructure Limited	B. Seenaiah Naidu	28	Mannila	Anantapur	9.357	21.09.2021	20.09.2031
				14-34-34.73408	77-41-32.98951										
				14-34-38.25848	77-41-36.05789										
				14-34-44.01487	77-41-36.63475										
				14-34-45.26763	77-41-36.62624										
				14-34-40.11968	77-41-45.18747										
				14-34-39.97923	77-41-45.37247										
				14-34-38.14328	77-41-48.59514										
				14-34-35.37127	77-41-53.34466										
				14-34-33.39848	77-41-56.80623										
				14-34-31.39323	77-42-00.02954										
				14-34-28.74367	77-41-59.14068										
				14-34-29.28368-	77-41-56.45657										
				14-34-40.09448	77-41-40.26738										
				14-34-35.55487	77-41-35.82652										
32	ADMG, ATP	W	-	14-35-07.36281	77-41-16.66714	**12111 80546**	Road Metal & Building Stone	M/s Sri Srinivasa Stone Crushers, Transfer from M. VAKULA DEVI	Mg.Part: Sri M. Venkata Naidu	231/P	Chiyyedu	Anantapur	2	13.12.2018	12.12.2028
				14-35-07.44967	77-41-07.83001										
				14-35-07.44289	77-41-07.13865										
				14-35-05.16693	77-41-07.10234										
				14-35-05.08697	77-41-16.63759										
33	ADMG, ATP	-	NW	14-35-05.08697	77-41-16.63759	**12111 90556**	Road Metal & Building Stone	M/s Sri Srinivasa Stone Crushers, transfer from R. Sreenivasul	Mg.Part: Sri M. Venkata Naidu	231/P	Chiyyedu	Anantapur	3	26-07-2021	25-07-2031
				14-35-05.16693	77-41-07.10234										
				14-35-04.12015	77-41-07.08574										
				14-35-01.29136	77-41-09.31521										
				14-35-01.40954	77-41-16.79978										

Sl.N	Office	Working	Non-working	Geo-Cordinates		Lease ID No.	Name of the Mineral (s)	Name of the Quarry Lease / Lessee Name	Name of the pro	Sy.No.	Villlage	Mandal	Extent in Ha	Lease period From	Lease period To
								u							
34	ADMG, ATP	-	NW	14-35-03.04803	77-42-06.87553	**12111 30056**	Road Metal & Building Stone	A. Sivaram Krishna Reddy	A. Sivaram Krishna Reddy	231	Chiyyedu	Anantapur	3	21-05-2019	20-05-2029
				14-35-07.89005	77-42-06.82815										
				14-35-07.51206	77-42-00.16179										
				14-35-02.63676	77-42-00.21095										
35	ADMG, ATP	-	NW	14-34-55.34046	77-41-58.54948	**12110 80216**	Road Metal & Building Stone	-	-	-	-	-	-	-	-
				14-34-56.43487	77-41-55.48316			-	-	-	-	-	-	-	-
				14-35-01.89247	77-41-59.12516			-	-	-	-	-	-	-	-
				14-35-00.80169	77-42-02.19146			O. VENKATESWARA REDDY	O. Venkateswara Reddy	231/P	Chiyyedu	Anantapur	2	26.07.2021	25.07.2031
36	ADMG, ATP	-	NW	14-35-11.10485	77-42-06.73362	**12111 30205**		-	-	-	-	-	-	-	-
				14-35-07.89005	77-42-06.82815			-	-	-	-	-	-	-	-
				14-35-07.51206	77-42-00.16179			-	-	-	-	-	-	-	-
				14-35-10.78809	77-42-00.07963		Road Metal & Building Stone	K. PRASANNA	K. Prasanna	231	Chiyyedu	Anantapur	2	03.03.2021	02.03.2031
37	ADMG, ATP	-	NW	14-35-13.26398	77-41-10.53362	**12111 50384**	Road Metal & Building Stone	M. GNANESWAR	M. Gnaneswar	231	-	-	-	-	-
				14-35-13.09095	77-41-15.99336						-	-	-	-	-
				14-35-11.50621	77-41-15.89487						-	-	-	-	-
				14-35-11.58522	77-41-10.78654						Chiyyedu	Anantapur	0.76	11.01.2021	10.01.2031
38	ADMG, ATP	-	NW	14-35-14.88225	77-41-10.26584	**12111 50385**	Road Metal & Building Stone	M. GAYATHRI	M. Gayathri	231	Chiyyedu	Anantapur	1	24/11/2008 (transferred on 15/07/2013)(Renewal applied)	23/11/2018
				14-35-14.36789	77-41-17.45118										
				14-35-13.04446	77-41-17.45724										
				14-35-13.26392	77-41-10.53362										
39	ADMG, ATP	-	NW	14-35-11.56791	77-41-18.27348	**12111 60403**	Road Metal & Building Stone	M. VAKULA DEVI	M. Vakula Devi	231	Chiyyedu	Anantapur	2	8/9/2008 (Renewal applied)	7/9/2018
				14-35-11.59434	77-41-14.23591										
				14-35-08.03908	77-41-13.90086										
				14-35-08.09912	77-41-07.89137										
				14-35-07.44967	77-41-07.83001										
				14-35-07.34745	77-41-18.22886										
40	ADMG, ATP	-	NW	14-34-55.34046	77-41-58.54948	**12110 80232**	Road Metal & Building Stone	O. VENKATESWARA REDDY	O. Venkateswara Reddy	231-P	Chiyyedu	Anantapur	1.5	29/08/2009 (Renewal applied)	30/12/2019
				14-34-56.43487	77-41-55.48316										
				14-35-01.89247	77-41-59.12516										
				14-35-00.80169	77-42-02.19146										
41	ADMG, ATP	-	NW	14-36-18.86352	77-41-29.37163	**12110 90202**	Road Metal & Building Stone	D. NAGABHUSHAN REDDY, M/S NEELAKANTESWARA CONSTRUCTIONS	D. Nagabhushan Reddy	77-1	Chiyyedu	Anantapur	2	29/08/2008 (Renewal applied)	28/08/2018
				14-36-20.95111	77-41-33.20742										
				14-36-16.75942	77-41-35.76825										
				14-36-14.68543	77-41-31.92475										
42	ADMG, ATP	W	-	14-34-56.57514	77-41-43.45916	**12111 30236**	Road Metal & Building Stone	arunachala Mining Company	A.Vijaya Bhaskar	231	Chiyyedu	Anantapur	3.65	2/9/2008 (Renewal applied)	1/9/2018
				14-34-57.03553	77-41-31.46201										
				14-35-01.58554	77-41-31.69834										
				14-34-58.65859	77-41-43.46421										
43	ADMG, ATP	w	-	14-37-57.19008	77-23-34.68274	**12111 80547**	Road Metal & Building Stone	SRC Infra Developers private limited	D. VENKATESULU	384	Atmakur	Atmakur	3	10/10/2008 (Renewal applied)	9/10/2018
				14-37-55.73162	77-23-27.83684										
				14-38-00.37871	77-23-26.86464										
				14-38-00.83154	77-23-29.76701										

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				14-38-01.51431	77-23-34.12004										
44	ADMG, ATP	-	NW	15-01-03.57732	76-57-15.74443	**12110 80005**	Road Metal & Building Stone	M. Subramanyeswara Rao	M. Subramanyeswara Rao	253	Nemakallu	Bommanahal	1	21.11.2019	20.11.2029
				15-01-04.01683	76-57-19.08051										
				15-01-00.80671	76-57-19.47402										
				15-01-00.36719	76-57-16.13795										
45	ADMG, ATP	-	NW	15-01-07.24862	76-56-39.53472	**12110 80244**	Road Metal & Building Stone	M/s MODEL ENTERPRISES	P AJAY KUMAR	253	Nemakallu	Bommanahal	10.382	28-09-2021	27-09-2031
				15-01-10.87661	76-56-50.70941										
				15-00-59.90473	76-56-51.43572										
				15-00-59.87273	76-56-47.57967										
				15-01-00.68364	76-56-47.54182										
				15-01-00.61342	76-56-41.26981										
				15-00-58.01342	76-56-41.16873										
				15-00-57.91173	76-56-44.84942										
				15-00-55.55333	76-56-44.58181										
				15-00-55.99271	76-56-40.08602										
46	ADMG, ATP	-	NW	15-01-00.61342	76-56-41.26981	**12110 80284**	Road Metal & Building Stone	T. Rajesh Reddy	T. Rajesh Reddy	253	Nemakallu	Bommanahal	1.056	28.07.2018	27.07.2038
				15-01-00.68364	76-56-47.54182										
				15-00-59.87273	76-56-47.57967										
				15-00-59.85182	76-56-45.06951										
				15-00-57.91173	76-56-44.84942										
				15-00-58.01342	76-56-41.16873										
47	ADMG, ATP	-	NW	15-00-55.09124	76-57-14.47921	**12110 80353**	Road Metal & Building Stone	J. SADASIVA RAO	J. Sadasiva Rao	253	Nemakallu	Bommanahal	1	29.06.2019	28.06.2029
				15-00-58.08853	76-57-14.24279										
				15-00-58.37504	76-57-17.89882										
				15-00-55.37269	76-57-17.94053										
				15-00-55.12181	76-57-16.72152										
48	ADMG, ATP	-	NW	15-01-11.29275	76-56-51.81061	**12110 80412**	Road Metal & Building Stone	M/s SRI ANJANEYASWAMY STONE CRUSHERS	A. RAVINDRA NAIDU	253	Nemakallu	Bommanahal	4.5	15.05.2020	14.05.2030
				15-01-11.65853	76-56-57.72302										
				15-01-03.18041	76-56-57.63853										
				15-01-02.86633	76-56-51.95765										
49	ADMG, ATP	-	NW	15-00-51.29654	76-56-35.37849	**12110 70104**	Road Metal & Building Stone	Nemakal Mineral	H E Dadakhalandar	253	Nemakallu	Bommanahal	2	16.09.2020	15.09.2030
				15-00-50.76968	76-56-42.05063										
				15-00-47.66614	76-56-41.19132										
				15-00-48.19279	76-56-34.51924										
50	ADMG, ATP	-	NW	15-00-59.63001	76-57-10.07324	**12110 80270**	Road Metal & Building Stone	J Sada Siva Rao	J Sada Siva Rao	253	Nemakallu	Bommanahal	1.869	05.05.2019 5/5/2009 (Renewal granted)	04.05.2029 4/5/2019
				15-00-59.98248	76-57-14.09361										
				15-00-55.09124	76-57-14.47921										
				15-00-55.02905	76-57-09.93452										
				15-00-44.43875	76-56-56.26235										
51	ADMG, ATP	-	NW	15-00-44.69845	76-57-05.32764	**12111 30230**	Road Metal & Building Stone	MAHA MARUTHI MINERALS	T. SRINIVASA RAO	253	Nemakallu	Bommanahal	2.286	24/09/2012	23/09/2022
				15-00-41.52982	76-57-05.53658										
				15-00-41.21724	76-57-02.48763										
				15-00-42.23001	76-57-02.42079										
				15-00-41.91118	76-56-56.36582										
52	ADMG, ATP	-	NW	14-38-12.82568	77-39-44.98134	**12111 00228**	Road Metal & Building Stone	D. SHANKHAR REDDY	D. SHANKHAR REDDY	393	Siddarampuram	Bukkarayasamudram	1.214	6/17/2008 (Renewal Applied)	6/16/2018
				14-38-13.03445	77-39-49.00987										
				14-38-09.83047	77-39-49.68503										
				14-38-09.37689	77-39-46.02123										
53	ADMG, ATP	W	-	14-47-10.89174	76-51-47.71977	**12111 80519**	Road Metal & Building Stone	Sri B. Vasu Babu,	Sri B. Vasu Babu,	134/A1	Hullukikallu	D. Hirehal	3.408	12/4/2013	12/3/2023
				14-47-10.27962	76-51-42.41201										
				14-47-17.29987	76-51-41.51055										
				14-47-17.88982	76-51-46.49523										

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54	ADMG, ATP	W	-	14-55-36.88325	76-52-28.71243	**12110 80282**	Road Metal & Building Stone	K. Markandeyulu	K. Markandeyulu	8	Somalapuram	D.Hirchal	2	8/1/2013	7/1/2023
				14-55-37.06687	76-52-29.96754										
				14-55-38.69748	76-52-31.29934										
				14-55-38.85241	76-52-32.04546										
				14-55-42.84487	76-52-33.17614										
				14-55-42.86287	76-52-32.10569										
				14-55-44.09767	76-52-32.03578										
				14-55-44.61964	76-52-30.70834										
				14-55-45.45846	76-52-29.74548										
55	ADMG, ATP	W	-	14-59-21.87961	76-47-34.86534	**12110 90003**	Road Metal & Building Stone	Sandeep Minerals (P) Ltd.	M. Gadilingana Goud	56	Lakshmipuram	D.Hirchal	4.95	17/04/2013	16/04/2023
				14-59-20.04368	76-47-34.05597										
				14-59-17.51648	76-47-29.78115										
				14-59-17.26086	76-47-23.74904										
				14-59-25.17367	76-47-25.23648										
56	ADMG, ATP	W	-	14-59-10.18231	76-50-38.87235	**12110 90114**	Road Metal & Building Stone	B B Minerals	H E Dadakhalandar	42	Jajarakal	D.Hirchal	5.04	15/09/2014	14/09/2024
				14-59-09.11175	76-50-37.16953										
				14-59-07.63119	76-50-38.54669										
				14-59-05.35354	76-50-38.01072										
				14-59-02.95086	76-50-39.01003										
				14-59-01.83336	76-50-40.46995										
				14-59-01.83672	76-50-41.83664										
				14-59-02.60189	76-50-42.64892										
				14-59-02.78554	76-50-44.61928										
				14-59-03.88023	76-50-45.39147										
				14-59-07.89447	76-50-45.14448										
				14-59-10.45886	76-50-44.16442										
				14-59-10.08184	76-50-41.85371										
				14-59-10.15179	76-50-39.84876										
57	ADMG, ATP	W	-	14-53-28.25881	76-52-39.54147	**12111 20105**	-	-	-	-	-	-	-	-	-
				14-53-31.10180	76-52-31.10178		Road Metal & Building Stone	SS Crusher,Mg. Part: P. Sudheer Kumar transfer from Y Maruthi Prasad Reddy	Mg.Part: P. Sudheer Kumar	65 of Kudulur	Kudulur	D.Hirchal	3.125	23.09.2021	22.09.2031
				014-53-23.36287	076-52-39.71083										
				014-53-24.17280	076-52-35.21127										
				014-53-29.81156	076-52-34.87430										
58	ADMG, ATP	-	NW	15-03-19.81514	76-48-24.90562	**12111 00125**	Road Metal & Building Stone	M. AJAY KUMAR	M. Ajay Kumar	47	Malapanagudi	D.Hirchal	5	20/12/2010 (Renewal applied)	19/12/2020
				15-03-19.46104	76-48-27.57165										
				15-03-15.26515	76-48-25.70734										
				15-03-15.46073	76-48-24.72214										
				15-03-16.74549	76-48-21.74543										
				15-03-18.47541	76-48-19.21498										
				15-03-18.35188	76-48-15.98427										
				15-03-23.88274	76-48-18.00022										
59	ADMG, ATP	-	NW	14-59-02.33104	76-51-51.11023	**12110 50041**	Road Metal & Building Stone	T. Sreemannarayana	T. Sreemannarayana	294	Hiredahal	D.Hirchal	4	12.12.2018	11.12.2028
				14-59-02.39195	76-51-47.34282										
				14-59-04.53293	76-51-47.34282										
				14-59-09.16944	76-51-48.11424										
				14-59-09.18385	76-51-46.94665										
				14-59-10.93024	76-51-48.46852										

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				14-59-11.14808	76-51-50.84514										
				14-59-11.07563	76-51-51.57253										
				14-59-09.85592	76-51-52.66694										
				14-59-07.51125	76-51-53.62065										
				14-59-05.30642	76-51-53.17543										
60	ADMG, ATP	-	NW	14-59-02.33104	76-51-51.11023	**12110 80042**	Road Metal & Building Stone	T. Sreemannar ayana	T. Sreemannar ayana	294	Hiredahal	D.Hirchal	1.115	15.05.2020	14.05.2030
				14-59-02.39194	76-51-48.01424										
				14-59-04.53293	76-51-47.34283										
				14-59-09.16943	76-51-48.11425										
				14-59-09.18387	76-51-46.94666										
				14-59-06.93565	76-51-46.53465										
				14-59-04.49665	76-51-46.19846										
				14-59-02.28823	76-51-46.54858										
				14-59-01.46598	76-51-47.26477										
				14-59-01.19464	76-51-49.62072										
61	ADMG, ATP	-	NW	15-01-01.59214	76-47-51.94197	**12111 00288**	Road Metal & Building Stone	N Sandeep	N Sandeep	1	H.hossahal li	D.Hirchal	2.611	7/4/2018	6/4/2028
				15-00-54.29772	76-47-53.59918										
				15-00-54.47543	76-47-49.50964										
				15-01-00.41827	76-47-48.90379										
				15-01-03.59456	76-47-49.20274										
62	ADMG, ATP	-	NW	14-59-00.49563	76-47-59.66274	**12111 30008**	Road Metal & Building Stone	J. Rama Murthy	J. Rama Murthy	48	Lakshmipu ram	D.Hirchal	5.853	1/9/2008 (Renewal applied)	1/9/2028
				14-58-58.85769	76-47-59.63448										
				14-58-57.71647	76-47-59.75014										
				14-58-55.95247	76-48-00.01306										
				14-58-52.14007	76-47-51.07257										
				14-58-58.41487	76-47-47.44021										
63	ADMG, ATP	-	NW	14-59-00.22569	76-47-32.55857	**12111 30012**	Road Metal & Building Stone	P. Sekhar	P. Sekhar	48	Lakshmipu ram	D.Hirchal	5.8	28.11.2017	27.11.2027
				14-59-02.12645	76-47-39.70225										
				14-58-53.73125	76-47-40.89744										
				14-58-51.79804	76-47-33.76268										
64				14-55-44.73178	76-52-25.74145	**12110 30019**	-	-	-	-	-	-	-	-	-
	ADMG, ATP	-	NW	14-55-46.55281	76-52-26.44304		Road Metal & Building Stone	K. Suresh Kumar	K. Suresh Kumar	8	Somalapur am	D.Hirchal	2	27.10.2018	26.10.2028
				14-55-49.18081	76-52-15.84363		-	-	-	-	-	-	-	-	-
				15-55-47.32325	76-52-15.16415		-	-	-	-	-	-	-	-	-
65				14-55-37.40168	76-52-27.26597	**12110 70014**	-	-	-	-	-	-	-	-	-
	ADMG, ATP	-	NW	14-55-39.08287	76-52-23.70679		Road Metal & Building Stone	Arunodaya Stone Crushing Industry	Mg.Part: Sri K. Suresh Kumar	8	Somalapur am	D.Hirchal	2.9	18.08.2019 (1st Renewal granted) (18/08/2009)	17/08/2029 (17/08/2019)
				14-55-47.50327	76-52-26.79103		-	-	-	-	-	-	-	-	-
				14-55-45.45843	76-52-29.74543		-	-	-	-	-	-	-	-	-
66				14-59-17.01607	76-47-19.96257	**12110 90015**	-	-	-	-	-	-	-	-	-
	ADMG, ATP	-	NW	14-59-23.49247	76-47-20.79102		Road Metal & Building Stone	P. Mohan Reddy	P. Mohan Reddy	56	Lakshmipu ram	D.Hirchal	3	27.02.2019 (Renewal granted) 27/02/2009	26.02.2029 26/02/2019
				14-59-26.25725	76-47-21.72689		-	-	-	-	-	-	-	-	-
				14-59-25.17369	76-47-25.23648		-	-	-	-	-	-	-	-	-
				14-59-17.26087	76-47-23.74904		-	-	-	-	-	-	-	-	-
67				14-58-59.82412	76-49-21.56615	**12111**	-	-	-	-	-	-	-	-	-

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				14-58-59.79811	76-49-20.01612	**30233**	-	-	-	-	-	-	-	-	-
	ADMG, ATP	-	NW	14-58-58.12601	76-49-17.79051		Road Metal & Building Stone	B. MUSTAQ HUSSAIN	B. MUSTAQ HUSSAIN	1-1	Lingamana halli	D.Hirchal	3.24	18.08.2019 (Renewal granted) 18/08/2009 (Transferred on 18/07/2013)	17.08.2029 17/08/2019
				14-58-50.90582	76-49-17.34752		-	-	-	-	-	-	-	-	-
				14-58-51.23071	76-49-20.09631		-	-	-	-	-	-	-	-	-
				14-58-50.31542	76-49-21.79992		-	-	-	-	-	-	-	-	-
							-	-	-	-	-	-	-	-	-
68				14-38-38.53571	76-50-35.23706		-	-	-	-	-	-	-	-	-
				14-38-35.51906	76-50-30.47424		-	-	-	-	-	-	-	-	-
	ADMG, ATP	-	NW	14-38-39.13274	76-50-29.28831	**12111 00098**	Road Metal & Building Stone	SRI SRISRI BHAM BHAM BABA	K. RAVI CHANDRA	221	Veerapura m	Gummag atta	2	15/04/2008 (Renewal applied)	14/04/2018
				14-38-42.15802	76-50-34.04475		-	-	-	-	-	-	-	-	-
69				14-37-56.94013	76-48-46.80843		-	-	-	-	-	-	-	-	-
				14-37-57.51852	76-48-55.76512		-	-	-	-	-	-	-	-	-
	ADMG, ATP	W	-	14-37-56.19864	76-48-55.68414		Road Metal & Building Stone	G. Satyanaraya na Reddy	G. Satyanaraya na Reddy	206	Gollapalli	Gummag atta	3	6/3/2010 (Renewal applied)	5/3/2020
				14-37-54.73196	76-48-55.95865		-	-	-	-	-	-	-	-	-
				14-37-53.13044	76-48-53.90434		-	-	-	-	-	-	-	-	-
				14-37-52.00694	76-48-50.28592	**12111 80549**	-	-	-	-	-	-	-	-	-
				14-37-53.37042	76-48-49.42443		-	-	-	-	-	-	-	-	-
70				14-32-16.93324	77-09-54.05094		-	-	-	-	-	-	-	-	-
	ADMG, ATP	-	NW	14-32-13.92362	77-09-55.68061	**12111 60413**	Road Metal & Building Stone	Smt. B. ANJINAMMA	B. Anjinamma	55	East kodipalle	Kalyandu rg	2.48	06.08.2019	05.08.2029
				14-32-12.39364	77-09-55.09235		-	-	-	-	-	-	-	-	-
				14-32-11.76361	77-09-53.00351		-	-	-	-	-	-	-	-	-
				14-32-14.22245	77-09-49.38834		-	-	-	-	-	-	-	-	-
71				14-49-02.86884	77-21-48.99457		-	-	-	-	-	-	-	-	-
				14-49-05.00957	77-21-53.00374		-	-	-	-	-	-	-	-	-
				14-49-06.46039	77-21-53.59621		-	-	-	-	-	-	-	-	-
				14-49-06.94876	77-21-56.69847		-	-	-	-	-	-	-	-	-
	ADMG, ATP	W	-	14-49-04.75804	77-21-59.93745	**12111 70458**	Road Metal & Building Stone	SRC Infra Developers private limited	D. VENKATESU LU	680	Udiripikond a	Kuderu	4.856	24.12.2019	23.12.2029
				14-49-04.16248	77-21-59.66864		-	-	-	-	-	-	-	-	-
				14-49-00.09637	77-21-56.61869		-	-	-	-	-	-	-	-	-
				14-49-01.48704	77-21-55.17375		-	-	-	-	-	-	-	-	-
				14-49-00.05881	77-21-55.08123		-	-	-	-	-	-	-	-	-
				14-48-58.79965	77-21-55.41728		-	-	-	-	-	-	-	-	-
				14-48-59.75297	77-21-50.43112		-	-	-	-	-	-	-	-	-
72				14-59-51.98287	77-35-17.47968		-	-	-	-	-	-	-	-	-
	ADMG, ATP	W	-	14-59-58.31887	77-35-17.74325	**12111 80486**	Road Metal & Building Stone	Sri Y. Raj Kumar	Sri Y. Raj Kumar	127	G. Kottala	Pamidi	2.9	15/05/2008 (Renewal applied)	14/05/2028

Sl.N	Office	Working	Non-working	Geo-Cordinates		Lease ID No.	Name of the Mineral (s)	Name of the Quarry Lease / Lessee Name	Name of the pro	Sy.No.	Villlage	Mandal	Extent in Ha	Lease period From	Lease period To
				14-59-58.35487	77-35-22.62724		-	-	-	-	-	-	-	-	-
				14-59-52.01887	77-35-22.29687		-	-	-	-	-	-	-	-	-
73	ADMG, ATP	-	NW	14-59-57.40807	77-35-13.99558	**12110 80124**	-	-	-	-	-	-	-	-	-
				14-59-57.23882	77-35-17.13536		-	-	-	-	-	-	-	-	-
				14-59-52.69201	77-35-17.40405		Road Metal & Building Stone	SRI LAKSHMI VENKATESWARA STONE CRUSHERS	N. KAMBAGIRI RAMUDU	127	Kandlapalle	Pamidi	1.5	16/09/2003 (Renewal applied)	15/09/2023
				14-59-52.74608	77-35-13.55726		-	-	-	-	-	-	-	-	-
74	ADMG, ATP	W	-	14-31-24.18964	77-38-11.84325	**12111 70461**	Road Metal & Building Stone	-	-	-	-	-	-	-	-
				14-31-25.23724	77-38-16.62458			-	-	-	-	-	-	-	-
				14-31-24.33001	77-38-17.21574			-	-	-	-	-	-	-	-
				14-31-23.95568	77-38-14.94135			Sri B. Yogeswara Reddy	Sri B. Yogeswara Reddy	65(New) 56 (old)	Marur	Raptadu	2.259	21/07/2005 (Renewal applied)	19/07/2017
				14-31-18.36125	77-38-16.55402			-	-	-	-	-	-	-	-
				14-31-17.74568	77-38-12.79559			-	-	-	-	-	-	-	-
75	ADMG, ATP	-	NW	14-31-16.77195	77-38-08.56012	**12111 80540**	Road Metal & Building Stone	Siddartha civil works Pvt Ltd	P. Sudhakar	65	Marur	Raptadu	5.4	17/11/2006 (Renewal applied)	16/11/2016
				14-31-19.86782	77-38-09.58124										
				14-31-18.02195	77-38-12.32925										
				14-31-16.73496	77-38-12.13618										
				14-31-16.60967	77-38-15.54506										
				14-31-14.27934	77-38-15.80382										
				14-31-13.99442	77-38-18.85407										
				14-31-11.40825	77-38-17.99442										
				14-31-09.89189	77-38-15.90274										
				14-31-09.30905	77-38-14.64465										
				14-31-10.20215	77-38-12.25678										
				14-31-11.92604	77-38-10.46705										
				14-31-13.68251	77-38-09.43125										
76	ADMG, ATP	W	-	14-46-12.74152	76-51-14.85004	**12110 90275**	Road Metal & Building Stone	M Jagan Mohan Reddy	M. Jagan Mohan Reddy	97	Chadam	Rayadurg	4.95	30.01.2021	29.01.2031
				14-46-11.33692	76-51-08.73152										
				14-46-07.68364	76-51-09.71806										
				14-46-03.52202	76-51-10.56392										
				14-46-02.75962	76-51-16.53419										
77	ADMG, ATP	W	-	14-45-53.25951	76-50-32.29634	**12110 90324**	Road Metal & Building Stone	P.Thimma Reddy	P. Thimma Reddy	116/E	Mallapuram	Rayadurg	4	26-07-2021	7/25/2031
				14-45-52.75643	76-50-34.36965										
				14-45-52.21865	76-50-36.56672										
				14-45-46.46725	76-50-39.55913										
				14-45-44.21954	76-50-36.16763										
				14-45-45.59346	76-50-34.23864										
				14-45-48.70752	76-50-32.25623										
				14-45-51.18981	76-50-31.60934										
78	ADMG, ATP	W	-	14-46-11.37316	76-51-08.72177	**12111 30046**	Road Metal & Building Stone	Sree Ganesh Enterprises	Smt. D. Lakshmi	116	Mallapuram	Rayadurg	4.98	9/9/2021	08-09-2026
				14-46-06.24362	76-51-03.04589										
				14-45-58.61483	76-51-04.53671										
				14-46-03.52206	76-51-10.56393										
				14-46-07.68364	76-51-09.71805										
79	ADMG, ATP	W	-	14-42-51.51634	77-01-36.07951	**12111 80548**	Road Metal &	Dwarakamai Construction	D. MADAN MOHAN	142	Veparalla	Rayadurg	1.837	1/24/2022	1/23/2027
				14-42-51.51352	77-01-42.27883										

Sl.N	Office	Working	Non-working	Geo-Cordinates		Lease ID No.	Name of the Mineral (s)	Name of the Quarry Lease / Lessee Name	Name of the pro	Sy.No.	Villlage	Mandal	Extent in Ha	Lease period From	Lease period To
				14-42-49.62814	77-01-37.87965		Building Stone	s	REDDY						
				14-42-45.95738	77-01-37.45197										
				14-42-42.91205	77-01-38.21962										
				14-42-42.98379	77-01-36.63904										
				14-42-47.11262	77-01-35.49905										
80	ADMG, ATP	-	NW	14-42-51.51352	77-01-42.27883	**12111 20045**	Road Metal & Building Stone	D. Madan Mohan Reddy	D. Madan Mohan Reddy	142	Veparalla	Rayadurg	2	5/19/2022	5/18/2032
				14-42-47.02765	77-01-43.88472										
				14-42-46.72368	77-01-44.24817										
				14-42-44.97445	77-01-43.24102										
				14-42-48.61839	77-01-41.75724										
				14-42-46.38122	77-01-40.20605										
				14-42-45.95738	77-01-37.45197										
				14-42-49.62814	77-01-37.87965										
8	ADMG, ATP	-	NW	14-46-01.24642	76-56-51.59892	12111 00248	Road Metal & Building Stone	SAI SUDHIR INFRA STRUCTURES LTD.,	D SRIDHAR REDDY	205 B	Gramadatla	Rayadurg	2.226	6/23/2022	6/22/2032
				14-45-59.11262	76-56-53.95731										
				14-45-57.65681	76-56-53.95796										
				14-45-58.35401	76-56-58.36166										
				14-46-04.46921	76-56-56.14346										
82	ADMG, ATP	-	NW	14-40-58.57301	77-39-09.58063	**12111 20341**	Cubes &Kerbs	M/s HILL STONE GRANITES PVT. LTD.	B. SIVA NARAYANA	396-7	Bukkaraya samudram	Bukkarayasamudram	0.995	9/5/2022	9/4/2032
				14-40-56.07185	77-39-08.84659										
				14-40-56.20291	77-39-04.67338										
				14-40-58.70415	77-39-05.40741										
83	ADMG, ATP	W				12112 30715	Road Metal, Building Stone	Smt N. Shanthamma,	Smt N. Shanthamma,	187	Gulapalyam	Vajrakarur	1	2/3/2023	02-02-2033.
84	ADMG, ATP	W				12112 20721	Road Metal & Building Stone	Smt. Lakshmi Dandamudi	Smt. Lakshmi Dandamudi	116/A	Mallapuram	Rayadurgam	4.95	3/28/2023	27-03-2043

Data Source: District of Mines and Geology, Anantapur District, Andhra Pradesh

The Details of statement showing the letter of intent (LoI) in the district is showing in Table-15:

Table 15: Statement showing the list of the letter of intent (LoI) in the district

Sl. No.	**Name of the applicant**	**Land Classifications**	**Mineral**	**Details of the Location**				**ADM&G File No.**	**DDM&G File No.**	**Whether the application received in the subject area have been made ineligible**	**Status / Remarks**	Geo- cordinates	
				Sy.No.	**Village**	**Mandal**	**Extent**					Latitude	Longitude

										(Yes / No)			
AREAS WITH EXTENT 4 HECTARES AND ABOVE													
1	Sri D. Manjunatha	Govt. Land	Road Metal, Building Stone & M.Sand	97	Chadum	Rayadurgam	4.950	4591/QL/RM/2013	3917/QL-ATP/2021			14-46-02.75957 14-46-12.74146 14-46-13.42081 14-46-13.47672 14-46-16-42278 14-46-16.44494 14-46-01.90705 14-46-02.25742 14-46-02.19042	76-51-15.53407 76-51-14.84999 76-51-14.73331 76-51-15.06272 76-51-18.32783 76-51-18.81223 76-51-20.51949 76-51-17.48111 76-51-16.61512
2	Sri Munikrrishna Lakappa	Govt. Land	Road Metal & Building Stone	505	Chinnaganipalli	Amadagur	4.900	4089/QL/RM&BS/2020	3535/QL-ATP/2021	-	-	13-51-31.94867 13-51.32.71345 13-51-37.80314 13-51-38.23697 13-51-38.99774 13-51-38.06265 13-51-35.88851 13-51-35.71335 13-51-34.08706 13-51-33.81267 13-51-33.15502 13-51-33.17168 13-51-31.94867 13-51-31.76397 13-51-31.32184	77-58-19.81475 88-58-14.78365 77-58-23.85184 77-58-25.16458 77-58-27.16458 77-58-27.70713 88-58-27.43226 88-58-28.01847 77-58-28.54571 77-58-23.68365 77-58-22.11436 77-58-20.42106 77-58-19.81475 77-58-17.01964 77-58-14.97085
AREAS WITH EXTENT LESS THAN 4 HECTARES													
3	Sri P. Chennakesava Reddy	Govt. Land	Road Metal & Building Stone	306/6	Yerraguntla	Kanekal	3.941	4342/QL/RM/2019	2224/QL-QL/ATP/2021	-	-	14-48-23.16689 14-48-25.72345 14-48-33.17436 14-48-33.95847 14-48-31.29054 14-48-30.14708 14-48-27.49183 14-48-25.79278 14-48-25.79279 14-48-21.22232 14-48-23.02254	76-58-11.15714 76-58-12.50994 76-58-18.82326 76-58-22.61368 76-58-21.45401 76-58-18.33215 76-58-16.70658 76-58-16.80905 76-58-16.80905 76-58-15.35468 76-58-16.31175
4	Sri U. Chandra Shekar	Govt. Land	Road Metal & Building Stone	306/6	Yeeraguntla	Kanekal	3.942	4343/QL/RM/2019	2224/QL-ATP/2021	-	-	14-48.27.92895 14-48.-32.76238 14-48-34.21514 14-48-32.31535 14-48-33.17436 14-48-25.72341	76-58-08.39854 76-58-10.58471 76-58-14.35496 76-58-14.69529 76-58-18.82326 76-58-12.50998
5	Sri Sompalli Somanath	Govt. Land	Road Metal, Building Stone & Gravel	231/ P	Chiyyedu	Ananthapuramu	2.341	2517/QL/RM&Gravel/2020	2901/QL-ATP/2021	-	The applicant filed Writ Petition filed Writ Petition before the Hon'ble High Court in respect of Quarry lease application over an extent of 4.99 Hects. in Sy. No.231 of Chieyydu Village, Ananthapuramu Mandal, Ananatapuram District. Subsequently, Hon'ble High Court vide WP No.14238 of 2021, dt:23.07.2021	14-35-57.00184 14-35-00.05151 14-35-01.04222 14-35-02.13453 14-35-02.86953 14-35-03.16530 14-35-03.22655	77-42-02.40609 77-42-01.54373 77-42-02.13255 77-41-59.03041 77-42-00.22020 77-42-05.49061 77-42-05.45311

										directed that **Considering the reasonability in the prayer of the petitioner, this writ petition is allowed at the stage of admission and the respondents 1 to 4 are directed to consider the application of the petitioner in the light of the report said to be submitted by the Tahsildar, Ananthapuramu and if necessary, after affording a personal hearing to the petitioner, pass an appropriate order in accordance with the governing Law and Rules expeditiously but not later than three(3) weeks from the date of receipt of a copy of this order. No costs. Miscellaneous applications pending, if any, shall stand closed in consequence. Accordingly the DDM&G, Ananthapuramu vide Lr.No.793/Court Cases/2021-1, Dated:13.08.2021 directed the ADM&G, Ananthapuramu to implement the Hon'ble High Court orders.**

MASTER DATA - PENDING PROPOSALS FOR ISSUE OF LOI'S WHRE PREMIUM AMOUNT PAID/NOT PAID (O/o DM&GO, Ananthapuramu)

Sl. No.	**Name of the District**	**Name of the Office**	**Name of the applicant**	**Mineral**	**Details of the Location**				**Premium amount**	**Premium amount letter issued Yes / No**	**Premium amount paid Yes / No**	**ADM&G File No.**	**DM&G File No.**	**Land Classification (Govt./ Pvt./Forest)**	**Status / Remarks**	Geo- Cordinates	
					Sy.No.	**Village**	**Mandal**	**Extent**								N- Latitude	E- Longitude
1	Anantapur	Anantapur	Sri C. Elangovan	Colour Granite	53-1	Theetakallu	Brahmsamudram	3.726	4843800	Yes	No	1145/GQL/CG/ 2019	6184/D11-ATP/2020	Govt Land	Court case filed on premium letter	14-35-34.52968 14-35-39.83224 14-35-39.60035 14-3-37.28514 14-35-38.78812 14-35-33.36901	77-0-'54.63778 77-00-55.42097 77-00-58.83869 77-00-59.28387 77-01-03.74169 77-00-02.81436
2	Anantapur	Anantapur	Sri K. Shashi Narayana	Colour Granite	44388	Mallapuramu	Rayadurg	6	7800000	Yes	No	6474/GQL/CG/ 2018	703/D11-ATP/2020	Govt Land	PA not paid	14-46-57.69821 14-46-57.36513 14-46-57.55991 14-46-58.65201 14-47-03.79852 14-47-06.76952 14-47-05.39572 14-47-04.66922	76-49-59.21847 76-50-00.24614 76-50-02.59317 76-50-06.14025 76-50-07.19854 76-50-07.58714 76-49-58.57434 76-49-58.62104
3	Anantapur	Anantapur	Sri K. Ranganayakulu	Colour Granite	330/P	Kalagalla	Kudair	4.9	6370000	Yes	No	2338/GQL/CG/ 2019	3307/D11-ATP/2021	Govt Land	PA not paid	14- 47- 47.98053 14- 47- 41.93314 14- 47- 40.59431 14- 47'-43.97526	77- 22-58.70878 77- 23-01.95712 77-22-52.67102 77-22-51.93847
4	Anantapur	Anantapur	Sri K. Ramesh	Black Granite	738/6	Mulakaledu	Settur	0.813	1056900	Yes	No	1269/GQL/BG/ 2013	8180/D11-ATP/2018	Govt Land	PA not paid	14-19.00.58804 14-18-57.30754 14-18-58.37402 14-19-00.17046	76-55-31.25986 76-55-32.58983 76-55-28.40772 76-55-28.28675
5	Ananta	Ananta	Sri K.	Colou	330		Kudair	4.9	637000	Yes	No	2339/GQL/CG/	3306/D1	Govt	PA not	14-47-52.06844	77-23-02.31166

	pur	pur	Jagannatha	r Granite		Kalagalla			0			2019	1-ATP/2021	Land	paid	14-47-50.04181 77-23-04.61478 14-47-45.04181 77-23-06.92452 14-47-41.81626 77-23-04.54517 14-47-41.10276 77-23-02.45126 14-47-41.93314 77-23-01.95712 14-47-47.98053 77-22-58.70878 14-47-53.09227 77-23-02.61478
6	Anantapur	Anantapur	Sri Y. Guru Raju	Black Granite	181/14B	Uravakonda	Uravakonda	1.902	2472600	Yes	No	3565/GQL/BG/2015	4890/D11-ATP/2020	Govt Land	File sent to DB	14-58-23.04642 77-15-36.32941 14-58-19.43012 77-15-35.90485 14-58-18.56262 77-15-36.64821 14-58-17.16841 77-15-36.03532 14-58-16.74001 77-15-39.37972 14-58-21.46093 77-15-40.54782
7	Anantapur	Anantapur	Sri S. Sriraj Hussain	Colour Granite	956	Kambadur	Kambadur	8	10400000	No	-	4623/QL/RM/2017	11005/D11-ATP/2021	Govt Land	Fresh proposal	14-19-43.83721 77-13-41.06076 14-19-52.75790 77-13-38.51011 14-19-55.88606 77-13-43.76945 14-19-52.47437 77-13-50.66811 14-19-47.45057 77-13-48.14851
10	Anantapur	Anantapur	Sri Muddasir Shariff	Colour Granite	956	Kambadur	Kambdur	4.875	6337500	Yes	No	1151/GQL/CG/2021	4757/D11-ATP/2021	Govt Land	PA not paid	14-19.40.83956 77-13-30.75799 14-19-40.24872 77-13.27.89893 14-19-41.33042 77-13-25.52210 14-19-52.06335 77-13-33.96874 14-19-49.87566 77-13-36.99546
8	Anantapur	Anantapur	M/s. Shrekhar Mining Company, Mg.P; Sri K.Niranjan	Colour Granite	573	Udiripliko nda	Kudair	4.959	6446700	Yes	No	4026/GQL/CG/2019	4871/D11-ATP/2021	Govt Land	PA not paid	Data will be submitted soon after tracing shadow files
9	Anantapur	Anantapur	Sri T. Narasimhaiah	Black Granite	501	P. C. Pyapili	Vajrakarur	3.000	3900000	Yes	No	1442/GQL/BG/2014	12020/D11-ATP/2014	Govt Land	PA not paid	Data will be submitted soon after tracing shadow files

Data Source: District of Mines and Geology, Anantapur District, Andhra Pradesh

2.4 Details of Royalty in last 3 years

The details of the royalty in last 3 years in the distritt are show in Tabe-16.

Table 16: Royalty in last 3 years

Royalty for 2022-23 (Anantapur Office)

S. No.	Mineral	Royalty (in Rs. Lakhs)	Consideration Amt. (in Rs. Lakhs)	DMF (In Rs. Lakhs)	MERIT (in Rs. Lakhs)
1	Black Granite	52.11	26.055	6.512	1.042
2	Building Stone	0.6	0.6	0.18	0.012
3	Building Stone	0.27	0.27	0.081	0.005
4	Colour Granite (Others)	127.009	63.5045	15.85	2.536
5	Dimensional Stone used for Kerbs and Cubes	4.666	4.666	1.388	0.093
6	Dolomite	1.355	1.355	0.407	0.027
7	Gravel	31.28	31.28	9.384	0.626
8	Quartz	13.227	13.227	3.968	0.265
9	Road Metal	583.103	583.103	174.931	11.662
10	Road Metal	57.381	57.381	17.214	1.148
11	Silica Sand	0.4	0.4	0.12	0.008
12	Steatite (Other than Insecticide (Filler) grade)	5.225	5.225	1.568	0.105
Total		**877**	**787**	**232**	**18**

Royalty for 2022-23 (Tadipatri Office)

S. No.	Mineral	Royalty (in Rs. Lakhs)	Consideration Amt. (in Rs. Lakhs)	DMF (In Rs. Lakhs)	MERIT (in Rs. Lakhs)
1	Barytes (Off-Color)	16.24	16.24	4.872	0.325
2	Barytes (White)	5.258	5.258	1.577	0.105
3	Building Stone	0.234	0.234	0.07	0.005
4	Calcite	2.209	2.209	0.663	0.044
5	Dolomite	345.559	345.559	103.66	6.911
6	Gravel	2.43	2.43	0.729	0.049
7	Mosaic Chips	11.663	11.663	3.499	0.233
8	Quartz	10.655	10.655	3.197	0.213
9	Road Metal	53.75	53.75	16.125	1.075
10	Road Metal	15.057	15.057	4.517	0.301
11	Silica Sand	4.537	4.537	1.361	0.091
12	Steatite (Insecticide	17.186	17.186	5.156	0.344

	(Filler) grade)				
13	Steatite (Other than Insecticide (Filler) grade)	48.538	48.538	14.52	0.968
Total		533	533	160	11

Royalty for 2021-22 (Anantapur Office)

S. No.	Mineral	Royalty (in Rs. Lakhs)	Consideration Amt. (in Rs. Lakhs)	DMF (In Rs. Lakhs)	MERIT (in Rs. Lakhs)
1	Black Granite	114.232	28.558	14.27	2.283
2	Building Stone	0.18	0.09	0.054	0.004
3	Colour Granite (Others)	187.054	46.7635	22.652	3.624
4	Cubes	0.851	0.4255	0.255	0.017
5	Dimensional Stone used for Kerbs and Cubes	4.791	2.3955	1.437	0.096
6	Gravel	10.276	5.138	3.083	0.206
7	Kerbs	0.891	0.4455	0.267	0.018
8	Quartz	4.761	2.3805	1.428	0.095
9	Road Metal	711.966	355.983	213.583	14.239
10	Road Metal	79.915	39.9575	23.975	1.598
Total		1115	482	281	22

Royalty for 2021-22 (Tadipatri Office)

S. No.	Mineral	Royalty (in Rs. Lakhs)	Consideration Amt. (in Rs. Lakhs)	DMF (In Rs. Lakhs)	MERIT (in Rs. Lakhs)
1	Barytes (Off-Color)	10.505	5.2525	3.152	0.21
2	Barytes (White)	6.028	3.014	1.808	0.121
3	Calcite	0.18	0.09	0.054	0.004
4	Colour Granite (Others)	0.805	0.20125	0.101	0.016
5	Dolomite	369.364	184.682	110.789	7.386
6	Gravel	1.53	0.765	0.459	0.031
7	Manufactured Sand	0.09	0.045	0.027	0.002
8	Mosaic Chips	8.044	4.022	2.413	0.161
9	Quartz	7.827	3.9135	2.348	0.157
10	Road Metal	100.841	50.4205	30.252	2.017
11	Road Metal	9.3	4.65	2.79	0.186
12	Silica Sand	6.418	3.209	1.925	0.128

S. No.	Mineral	Royalty (in Rs. Lakhs)	Consideration Amt. (in Rs. Lakhs)	DMF (In Rs. Lakhs)	MERIT (in Rs. Lakhs)
13	Steatite (Insecticide (Filler) grade)	37.643	18.8215	11.293	0.753
14	Steatite (Other than Insecticide (Filler) grade)	78.188	39.094	23.456	1.564
Total		637	318	191	13

Royalty for 2020-21 (Anantapur Office)

S. No.	Mineral	Royalty (in Rs. Lakhs)	DMF (In Rs. Lakhs)	MERIT (in Rs. Lakhs)
1	Black Granite	85.498	10.687	1.71
2	Building Stone	1.2	0.36	0.024
3	Colour Granite (Others)	143.155	17.894	2.863
4	Cubes	0.945	0.284	0.019
5	Dimensional Stone used for Kerbs and Cubes	3.923	1.177	0.078
6	Gravel	128.331	38.499	2.567
7	Kerbs	1.337	0.401	0.027
8	Quartz	11.7	3.51	0.234
9	Road Metal	639.49	191.847	12.79
10	Road Metal	43.482	13.045	0.87
11	Road Metal/Building Stone/Rough Stone	45	13.5	0.9
Total		1104	291	22

Royalty for 2020-21 (Tadipatri Office)

S. No.	Mineral	Royalty (in Rs. Lakhs)	DMF (In Rs. Lakhs)	MERIT (in Rs. Lakhs)
1	Barytes (Off-Color)	9.56	2.868	0.191
2	Barytes (White)	6.919	2.076	0.138
3	Calcite	0.415	0.124	0.008
4	Colour Granite (Others)	5.293	0.662	0.106
5	Dolomite	455.616	136.685	9.112
6	Gravel	2.16	0.648	0.043
7	Grey Barytes - B	0.923	0.277	0.018
8	Mosaic Chips	16.925	5.078	0.339
9	Quartz	6.68	2.004	0.134
10	Road Metal	193	57.9	3.86
11	Road Metal	2.4	0.72	0.048
12	Silica Sand	3.3	0.99	0.066
13	Steatite (Insecticide (Filler) grade)	39.749	11.925	0.795
14	Steatite (Other than	67.848	20.354	1.357

S. No.	Mineral	Royalty (in Rs. Lakhs)	DMF (In Rs. Lakhs)	MERIT (in Rs. Lakhs)
	Insecticide (Filler) grade)			
Total		811	242	16

Data Source: District Mines and Geology Officer, Anantapur District

2.5 Details of Production in last 3 years

The details of production in last 3 years in the distritt are show in Tabe-17.

Table 17: Production in last 3 years

Production for 2022-23 (Anantapur Office)

S. No.	Mineral	Unit	Production (in MT)
1	Black Granite	Cubic Meter	2124.939
2	Building Stone	MT	0
3	Building Stone	Cubic Meter	300
4	Colour Granite (Others)	Cubic Meter	4925
5	Dimensional Stone used for Kerbs and Cubes	MT	3370.5
6	Dolomite	MT	1332
7	Gravel	Cubic Meter	67737.57
8	Quartz	MT	14607
9	Road Metal	Cubic Meter	644370.763
10	Road Metal	MT	95530
11	Silica Sand	MT	375
12	Steatite (Other than Insecticide (Filler) grade)	MT	813

Production for 2022-23 (Tadipatri Office)

S. No.	Mineral	Unit	Production (in MT)
1	Barytes (Off-Color)	MT	3248
2	Barytes (White)	MT	478
3	Building Stone	Cubic Meter	260
4	Calcite	MT	2454
5	Dolomite	MT	343852.95
6	Gravel	Cubic Meter	5303
7	Mosaic Chips	MT	12959
8	Quartz	MT	11839
9	Road Metal	Cubic Meter	59074
10	Road Metal	MT	25095
11	Silica Sand	MT	4537
12	Steatite (Insecticide (Filler) grade)	MT	17161
13	Steatite (Other than Insecticide (Filler)	MT	8665.6

	grade)		

Production for 2021-22 (Anantapur Office)

S. No.	Mineral	Unit	Production (in MT)
1	Black Granite	Cubic Meter	4280.565
2	Building Stone	MT	160
3	Colour Granite (Others)	Cubic Meter	7221.597
4	Cubes	MT	570
5	Dimensional Stone used for Kerbs and Cubes	MT	3549
6	Gravel	Cubic Meter	22109.29
7	Kerbs	MT	660
8	Quartz	MT	5259
9	Road Metal	Cubic Meter	785687.888
10	Road Metal	MT	133192

Production for 2021-22 (Tadipatri Office)

S. No.	Mineral	Unit	Production (in MT)
1	Barytes (Off-Color)	MT	2091
2	Barytes (White)	MT	548
3	Calcite	MT	200
4	Colour Granite (Others)	Cubic Meter	32.594
5	Dolomite	MT	369136
6	Gravel	Cubic Meter	2745
7	Manufactured Sand	Cubic Meter	100
8	Mosaic Chips	MT	8935.5
9	Quartz	MT	8697
10	Road Metal	Cubic Meter	111558
11	Road Metal	MT	12308
12	Silica Sand	MT	6418
13	Steatite (Insecticide (Filler) grade)	MT	37407
14	Steatite (Other than Insecticide (Filler) grade)	MT	14079

Production for 2020-21 (Anantapur Office)

S. No.	Mineral	Unit	Production (in MT)
1	Black Granite	Cubic Meter	3433.689
2	Building Stone	MT	2000
3	Colour Granite (Others)	Cubic Meter	5707.997
4	Cubes	MT	700
5	Dimensional Stone used for Kerbs and Cubes	MT	2903
6	Gravel	Cubic Meter	82135
7	Kerbs	MT	870
8	Quartz	MT	13000
9	Road Metal	Cubic Meter	704638.725

10	Road Metal	MT	72470
11	Road Metal/Building Stone/Rough Stone	Cubic Meter	0

Production for 2020-21 (Tadipatri Office)

S. No.	Mineral	Unit	Production (in MT)
1	Barytes (Off-Color)	MT	1843
2	Barytes (White)	MT	629
3	Calcite	MT	251
4	Colour Granite (Others)	Cubic Meter	262.779
5	Dolomite	MT	452930
6	Gravel	Cubic Meter	1626
7	Grey Barytes - B	MT	110
8	Mosaic Chips	MT	18794.7
9	Quartz	MT	7422
10	Road Metal	Cubic Meter	214404
11	Road Metal	MT	0
12	Silica Sand	MT	3300
13	Steatite (Insecticide (Filler) grade)	MT	39003.4
14	Steatite (Other than Insecticide (Filler) grade)	MT	12332

Data Source: District Mines and Geology Officer, Anantapur District

2.6 Impact on environment

The extraction and utilization of minor minerals have become integral to our modern way of life, fueling infrastructure development, construction, and various industries. However, the impact of these activities on the environment cannot be underestimated. Minor minerals, which include granite, road metal, gravel, clay, and more, play a significant role in shaping the natural landscape and ecosystems. The various environmental consequences associated with the extraction and use of minor minerals are:

i. **Habitat Destruction:** The mining of minor minerals often entails the removal of topsoil and vegetation, leading to habitat destruction. This can disrupt ecosystems, displace wildlife, and threaten the survival of numerous species. Loss of biodiversity is a significant concern in regions with extensive mining operations.

ii. **Land Degradation:** Mining activities can lead to land degradation, including soil erosion and compaction. This not only reduces the land's fertility but also affects its ability to support agriculture and vegetation

growth. Moreover, land degradation can contribute to increased vulnerability to natural disasters like floods.

iii. **Water Pollution:** Mining operations can contaminate nearby water bodies through the discharge of sediments, chemicals, and heavy metals. This pollution can have detrimental effects on aquatic life, disrupt local hydrology, and compromise the quality of water available for human consumption.

iv. **Air Quality:** Dust emissions from mining sites can deteriorate air quality in surrounding areas. The fine particles and pollutants released during excavation and transportation of minor minerals can pose health risks to both workers and nearby communities.

v. **Regulatory Challenges:** Enforcing regulations and monitoring mining activities in remote or unregulated areas can be challenging, allowing illegal and unsustainable practices to persist.

The extraction and utilization of minor minerals are essential for economic development, but they come at a cost to the environment. Recognizing the environmental impacts of these activities is crucial for sustainable resource management.

2.7 Remedial Measures

The provisions of Rule 12 (1) and Rule 12 (5) and of Andhra Pradesh Minor Mineral Concession Rules, 1966 allows the State Government to issue the Letters of Intent with the stipulated conditions to submit Approved Mining Plan (AMP), Environment Clearance (EC) and Consent for Establishment (CFE) for grant of lease.

Mine Plan stipulate the maximum permissible annual production of the mineral from the designated lease area and also includes estimated quantum of solid waste generation and its method of disposal, etc. Based on the Approved Mine Plan projections, Environment Management Plan shall be prepared and SEIAA makes the decision to grant the EC based on the EMP.

Leaseholders commit to all the remedial measures in the Mining Plan and the State Environment Impact Assessment Authority (SEIAA) ensures the remedial measures are being adhered to during the tenure of the Environmental Clearance.

Leaseholders in the district have adopted various remedial measures to mitigate the impact of mining on the environment. These measures aim to

reduce the environmental footprint of mining operations and address the associated challenges. Some common practices include:

i. **Environmental Impact Assessments (EIAs):** Leaseholders conduct comprehensive EIAs to evaluate the potential environmental consequences of mining projects. They shall use this information to develop mitigation strategies.

ii. **Reclamation and Rehabilitation:** Leaseholders work to restore mined areas by recontouring landscapes, replanting native vegetation, and stabilizing soils to promote ecosystem recovery.

iii. **Water Management:** Proper management of water resources is crucial. Leaseholders use techniques like sedimentation ponds, water recycling, and water treatment facilities to minimize water pollution and ensure responsible water use.

The following preventive measures are being followed for minimizing adverse effects on water regime:

- Small Gully checks, gully check dams, silt settling tanks, silt traps, etc. shall be constructed.
- Along all discharge points leaving the mining lease, into the surrounding area, suitable number of filter walls of sufficient lengths shall be erected across the flow, at intervals, all along the length to prevent suspended solids entering the surrounding streams/ drains/ water courses, to confine the discharge water quality to the permissible limits.
- Regular monitoring may be carried out and further remedial steps as may be necessary may be taken.

iv. **Waste Management:** Effective management of mining waste, such as tailings and slag, involves containment in secure facilities to prevent soil and water contamination. Advances in waste disposal technologies are also being explored.

Steps being followed for effective waste management:

- Implementation of practices to minimize waste generation at the source. This involves optimizing extraction techniques, reducing overburden removal, and improving resource utilization.
- Encouraging recycling and reuse of waste materials wherever possible within the mining operation.

- Selection of an appropriate disposal methods based on waste characteristics and environmental considerations. Common methods include landfilling, controlled dumping, and backfilling.
- Treatment of contaminated water and effluents using appropriate technologies before discharge.

v. **Afforestation:** Leaseholders carry out a year-wise afforestation plan for the initial years with detailed costing of each plant, its maintenance per piece, etc.

While these measures represent positive steps toward mitigating environmental impact, it's important to note that the effectiveness of these practices can vary widely depending on factors such as the location, scale, and specific mineral being mined. Continuous improvement and adaptation are essential in the mining industry's ongoing efforts

2.8 Reclamation Measures

As per Rule 7A (ii) of Andhra Pradesh Minor Mineral Concession Rules, 1966, Mine Closure Plan shall be submitted by the leaseholder before 6 months of expiry of the lease in the proforma as prescribed by the Director. The Deputy Director concerned shall approve the mine closure plan and ensure compliance of conditions of the approved mine closure plan before expiry of the lease period.

Financial assurance of Rs.50,000/-(Rupees Fifty Thousand) for the quarry lease granted below five(5) hectares and Rs.10,000/- (Rupees Ten Thousand) per Hectare or part thereof for the quarry lease granted five (5) hectares and above, shall be submitted in the form of deposit. If the leaseholder does not reclamate the area as mentioned in the Mine Closure Plan, the deposit shall be forfeited and the Department of Mines & Geology ensure the proper implementation of the Mine Closure Plan.

2.9 Risk Assessment & Disaster Management Plan

Leaseholders conduct comprehensive risk assessment, prepare a model disaster management plan and submit in the Mining Plan.

The leaseholders maintain and arrange following resources at the mine site:

a) Firefighting equipment

b) Ambulance services with location

c) List of volunteer organizations

d) List of Civil, Police and other authorities to be informed in case of an accident

e) Last of mobile crane operators (Government, Public Sector, and Private Sector).

f) List of mines, contacts, facility available nearby

g) List of first aiders and contacts.

h) List of Officers of DGMS to be informed in case of serious accidents Concerned DGMS officers concerned is displayed at the mine head.

The leaseholders shall monitorthe total execution of the disaster management plan. The resources of all departments including men and material are being promptly made available. They are also conducting regular mock rehearsals with their staff to update the risk register and accordingly, disaster management plan

2.9.1. Mineral Regulatory:

The important functioning of District Mines and geology Officer, Anantapur are:-

1. Achievement of Targets of Mineral Revenue collections being fixed to this office annually

2. Receiving and processing of the Mineral Concession Applications duly conducting the Technical inspection, Survey and demarcation of the Mineral bearing applied areas

3. Execution and Regulation of the operations of the Mining / Quarry leases in accordance with the Acts and Rules

4. Issuing of dispatch permits duly collecting the Advance Royalty / Seig.fee from the lease holders on the minerals produced and intend to dispatch from their leased areas through online permit system

5. Controlling the illegal Mining / Quarrying and transportation by conducting the periodical inspections of the Mines and Quarries and also conducting the surprise vehicular checking and imposing the penalties

6. Finalisation of Demand, Collection and Balance statements of the leases on annual basis

2.10 Plantation & Green Belt Development

Leaseholders are complying with the plantation and green belt development programmes as committed in their Mining Plans.

CHAPTER III: SAND

3.1 Sand Mineral Resources of the Anantapur District

3.1.1 General Sand Mineral Details Anantapur District

(Prepared as per Sustainable Sand Mining Management Guidelines 2016 and 2020)

The important river in the district is the Pennar River, which covers 65% of the total area, while the remaining part is covered by the HagariVedavathi (Krishna River). The Pennar River flows in north and east directions and leaves the district near Vanganur in Tadipatri Mandal. The major tributaries in the district are Tadakaleru, Chitravathi, Puli Vanka, and PeddaVanka, as shown in Table-18

Table 18: Details of Production of Sand in Last three years in the District

Year	Production (In MTs)
2020-21	---
2021-22	877380
2022-23	474297

Data Source: District Mines and Geology Officer, Anantapur District

3.1.2 River Basins in Anantapur District

The Pennar river basin mainly covered in Anantapuramu district and the remaining part covered with Krishna basin (HagariVedavati). The Pennar major river basin dived into seven minor river basins i.e., Tadakaleru, Middle Pennar Part-I, Middle Pennar Part-II, Chitravathi, Upper Pennar, Papagni and Kunderu basins.

The Pennar river tributaries are Chitravathi river, Puli Vanka and PeddaVanka in the district. The Pennar and Chitravathi rivers are rises near Nandidurg hills in the Karnataka state and enters into Andhra Pradesh near Hindupur and Chilamaturu mandals in Anantapuramu district. The Chitravathi and Pennar rivers joining at Gandikota reservoir, Gandikota in YSR Kadapa district. The HagariVedavathi river origin in Bababudangiri Mountains of Karnataka State and enters this district in the extreme south of Gummagatta mandal near Bhairavanithippa Project.

The Pennar and HagariVedavati basin areas are 6,607.13 Sq.km and 3,566.22 Sq.km in the district. The district having total number of tanks including ponds and minor irrigation tanks 1,302. The district is divided into two major river

basins and six minor river basins, further divided into 59 Nos of sub basins and also 638 Nos of cascades. The Hydrological units of Anantapuramu district is shown in Table-19 and Figure-22, Drainage system with description of main rivers is shown in Table-20, Salient features and altitudes origin of rivers is shown in Table-21 and rivers lengths of Anantapuramu district is shown in Table-22.

Table 19: Hydrological units of Anantapur District

S.No	Major Basin	Minor Basin	Catchment Area (Sq.km)	No of. Sub Basins	No of. Cascades	No of. Tanks
1	Krishna	HagariVedavathi	3,566.22	17	36	511
2	Pennar	Chitravathi	513.66	5	219	50
3		Kunderu	8.19	1	1	0
4		Middle Pennar Part-I	1,448.08	8	87	246
5		Middle Pennar Part-II	2,929.55	14	128	312
6		Papagni	16.14	1	4	0
7		Tadakaleru	1,674.26	9	94	179
8		Upper Pennar	17.25	1	3	4
		Total	**10,173.35**	**56**	**572**	**1,302**

Data source: APSAC, Vijayawada

Table 20: Drainage System with Description of main rivers

S.No	Name of the River	Area Drained (Sq.Km)	% of Area Drained in the District
1	HagariVedavathi	3,589.53	35.10
2	Papagni	13.87	0.14
3	Tadakaleru	1,680.12	16.43
4	Chitravathi	517.73	5.06
5	Kunderu	32.54	0.32
6	Middle Pennar Part-II	2,922.62	28.58
7	Upper Pennar	17.50	0.17
8	Middle Pennar Part-I	1,453.07	14.21

Data source: APSAC, Vijayawada

Table 21:Salient Features of Important Rivers in Anantapur District

S.No	Name of the River	Place of Origin	Altitude at Origin (m)
1	HagariVadavathi	Bababudangiri Mountains of Karnataka	360
2	Pennar	Nandi Hills, Chikballapur District, Karnataka	1,500
3	Tadakaleru	Kuderu RF, Atmakur mandal in Sri Satya	579

		Sai district	
4	Chitravathi	Nandi Hills, Chikballapur District, Karnataka State	905
5	Puli Vanka	Peapally RF, Peapally in Anantapuramu district	659
6	PeddaVanka	Tuggali RF, Tuggali in Kurnool district	608

Data source: APSAC, Vijayawada

Table 22: River Lengths in Anantapur District

S.No	Name of the Major Basin	Name of the Minor Basin	Name of the River	River Length in Km
1	Krishna	Vedavathi	ChinnaHagari River	27.52
2			GangammaVanka	3.95
3			GondeHalla	4.92
4			Hagari or Vedavati River	138.65
5			KomativaniVanka	19.84
6			ManchinillaVanka	31.47
7			NettaramanuVanka	29.47
8			PeddaVanka	65.37
9	Pennar	Chitravathi	Chitravati River	86.98
10			GundlamadaVanka	10.53
11		Middle Pennar Part-I	PeddaVanka	19.69
12			Pennar River	119.60
13		Middle Pennar Part-II	MadireVanka	14.62
14			MarunaVanka	14.03
15			PandalaVagu	6.51
16			PeddaVanka	107.63
17			Pennar River	157.01
18			Puli Vanka	88.57
19			RayalacheruvuVanka	12.17
20			UraVanka	21.11
21		Tadakaleru	AkuleduVanka	6.60
22			ErraVanka	13.61
23			KuthalEru	44.04
24			Mar Vanka	32.38
25			PandamEru	47.47
26			PeddaVanka	72.58
27			Pennar River	49.06
28			Thadakaleru	19.77
29			VanjuVanka	16.25
30		Upper Pennar	Pennar River	69.91

Total	**1,351.33**

Data source: APSAC, Vijayawada

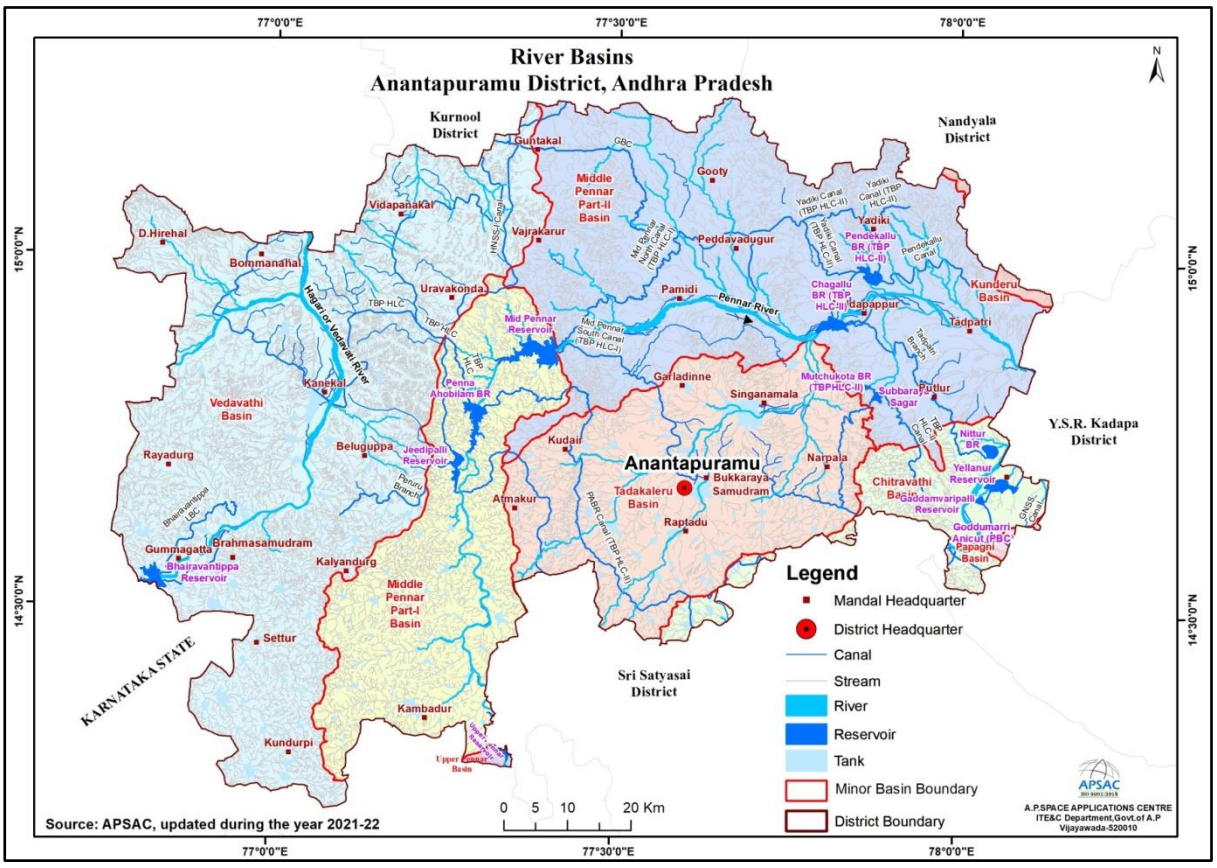

Figure-22: *Major and Minor river basin boundaries in Anantapur District*

3.1.3 Process of Deposition of Sediments in the Rivers of the District

Sediment transport is a natural process, and many have argued that the point of rivers is to move sediment downstream. However, with land use changes, e.g., deforestation and construction; agricultural practices; and development activities, accelerated erosion rates is ubiquitous. Sediment in the water column reduces transparency and can be deposited downstream and exacerbate flooding. Three principal sources of sediment are the following:

Sediment transport is the movement of organic and inorganic particles by water. In general, the greater the flow, the more sediment that will be conveyed. Water flow can be strong enough to suspend particles in the water column as they move downstream, or simply push them along the bottom of a waterway. Transported sediment may include mineral matter, chemicals and pollutants, and organic material. Another name for sediment transport is sediment load. The total load includes all particles moving as bedload, suspended load, and wash load.

3.1.3.1. Bedload

As the name suggests, this element of sediment movement consists of loose, granular particles at the sediment-water interface (such as a stream bed or tidal flat). Air or water that moves across the bed will being to move grains if the flow velocity is great enough to overcome the force of gravity and any resistance at grain contacts. This is the **threshold velocity**.(Figure-23)
The bedload contains two main components:

- the **traction load**, or traction carpet, and
- the saltation loads.

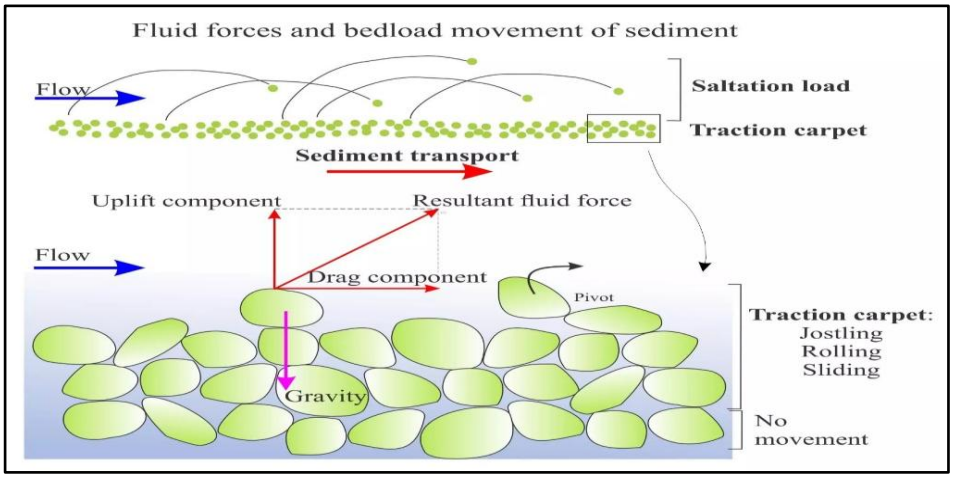

Figure-23: Bedload Movement of Sediment

The various components of force involved in initiation of grain movement are shown above. Here, fluid flowing over a sediment bed produces shear stresses that can be resolved into a component of drag (parallel to the bed) and a lift component normal to the bed. At the threshold velocity when the resultant fluid force on grains is greater than gravity, grains begin to roll, slide and jostle along the bed like a moving carpet – the **traction carpet**.

3.1.3.2. Suspended Load

Most natural flows in rivers, shallow marine settings and air are turbulent. Even at low-flow velocities, the speed and trajectories of flow can vary considerably – witness the eddies and boils in seemingly tranquil streams. Very fine particulate sediment (particularly clays) can be kept in suspension for long periods by turbulence; the stresses generated by turbulent flow balance or overcome the gravitational force acting on the particles.
If turbulence decreases significantly, for example when a river empties into a lake, then most particles will gradually settle to the sediment bed. The rate at which a particle settles out of suspension is called the **settling velocity**, where the force of gravity (downwards) exceeds the combined effects of upward-directed **buoyancy forces** acting on a grain and the drag on a particle caused by **fluid (viscous) resistance**. Thus, the rate of settling depends on the size, shape and density of particles, and the viscosity of the fluid. In general, settling through air is much more rapid than through water.

Both bedload and suspension load are important processes in the generation of sedimentary structures. In particular, bedload transport of loose sand is the critical process for growth of bedforms and their internal cross-stratification (crossbedding). The description of **bedforms** (crossbeds) and the flow conditions (**flow regime**) under which they form have been described in other posts (Figure-24).

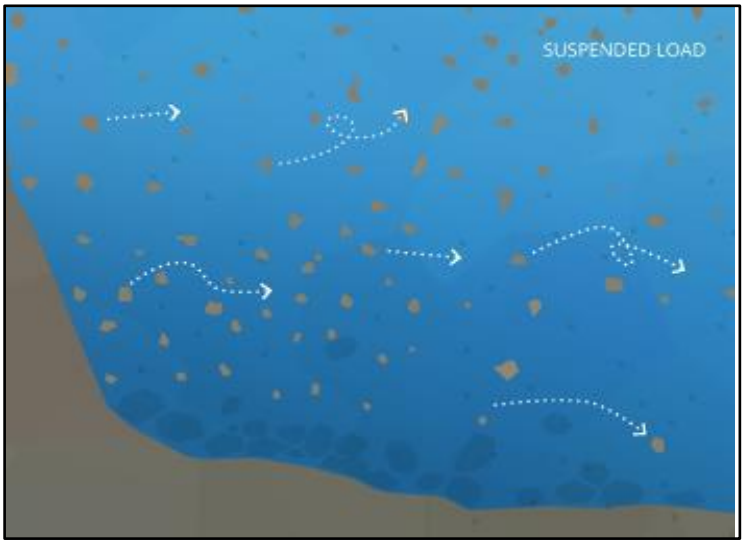

Figure-24: Sediment Load

3.1.3.3. Wash Load

The wash load is the portion of sediment that will remain suspended even when there is no water flow. The wash load is a subset of the suspended load. This load is comprised of the finest suspended sediment (typically less than 0.00195 mm in diameter). The wash load is differentiated from the suspended load because it will not settle to the bottom of a waterway during a low or no flow period. Instead, these particles remain in permanent suspension as they are small enough to bounce off water molecules and stay afloat. However, during flow periods, the wash load and suspended load are indistinguishable. Turbidity in lakes and slow-moving rivers is typically due the wash load 8. When the flow rate increases (increasing the suspended load and overall sediment transport), turbidity also increases. While turbidity cannot be used to estimate sediment transport, it can approximate suspended sediment concentrations at a specific location (Figure-25).

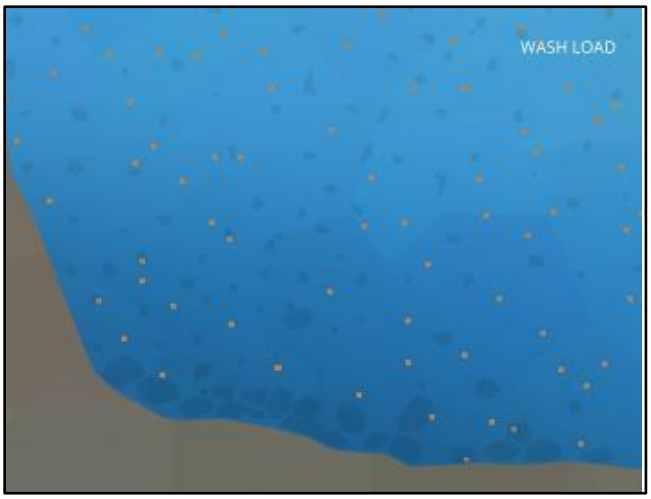

Figure-25: Wash Load

3.1.3.4. Settleable Solids

The suspended particles that fall to the bottom of a water body are called settleable solids. As they are found in riverbeds and streambeds, these settled solids are also known as bedded sediment. The size of settleable solids will vary by water system – in high flow areas, larger, gravel-sized sediment will settle out first. Finer particles, including silt and clay, can be carried all the way out to an estuary or delta (Figure-26).

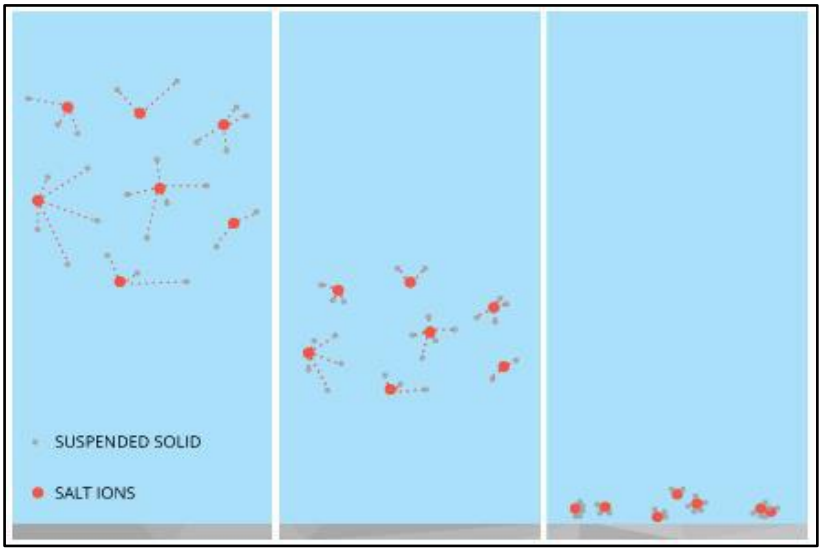

Figure-26: Settleable Solids

3.1.3.5. Sediment Deposition

Sediment is necessary to the development of aquatic ecosystems through nutrient replenishment and the creation of benthic habitat and spawning areas. These benefits occur due to sediment deposition – when suspended particles settle down to the bottom of a body of water. This settling often occurs when water flow slows down or stops and heavy particles can no longer be supported by the bed turbulence. Sediment deposition can be found anywhere in a water

system, from high mountain streams, to rivers, lakes, deltas and floodplains. However, it should be noted that while sediment is important for aquatic habitat growth, it can cause environmental issues if the deposition rates are too high, or too low. Sediment transportation and Deposition depends upon various factors like Slope of the Area, Annual Rainfall, Lithology, flow intensity of River, Geomorphology, Soil, Geology and Land use.

In sediment transport a distinction is generally made between fine and coarse sediment, because the transport mechanisms differ. Coarse sediment (grain size >63 μm) tends to be characterised by particles that remain separate and are chemically inert; fine sediments (<63 μm) on the other hand tend to come together as flocculated populations (flocs) and have the tendency to attract organic material and contaminants to their surface. A great deal has been researched and written about the break up and flocculation of these primary particles under turbulence and subsequent settling (e.g., Uncles et al., 2010). These differences imply important variations in the rate of transport and settling characteristics for the same flow conditions for different sediments. The nature of the physical environment also has an important bearing on this, in that fine sediment tend to be found in sheltered environments (shallow, enclosed estuarine systems), while beaches on open coasts are characterised by coarser materials. This reflects the energy of the water in which the particles become suspended and their subsequent fate.

Rates of transport of material are generally expressed in terms of a flux, as kg/s for example, where this figure is generally obtained by considering the product of the flow rate (in m^3/s) and the concentration of material in suspension (kg/m^3). This does not necessarily imply a requirement for the material to be suspended; it is equally possible to express a bed load using the same units, for example, but it does imply that to obtain an estimate of the sediment flux it is necessary to know both the concentration and the flow rate over a given cross section. Both these quantities can be measured and there are a variety of techniques available to do this, using insitu collection or sampling, in situ optical or acoustic methods, or remote sensing from aircraft or satellites (Uncles and Mitchell, 2017) (Figure-27)

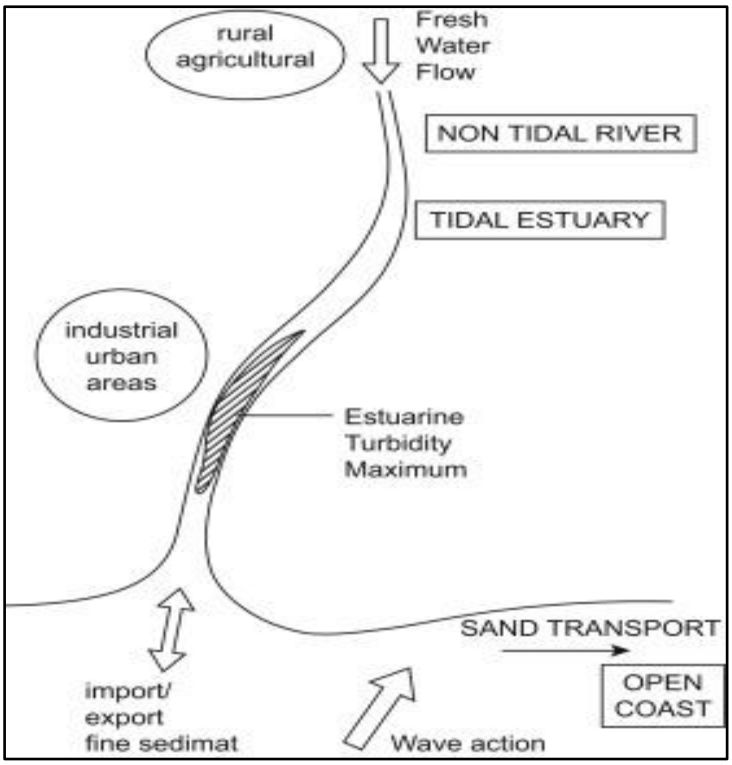

Figure-27: Sediment Deposition Process

Process of Deposition of Sediments in the Rivers of the District Sand is deposited because of the following reasons: (a) Floods: The surface or strip of relatively smooth land adjacent to a river channel constructed (or in the process of being constructed) by the present river in its existing regimen and covered with water when the river overflows its banks at times of high water. It is built of alluvium carried by the river during floods and deposited in the sluggish water beyond the influence of the swiftest current (b) Valley fill: The unconsolidated sediment deposited by any agent so as to fill or partly fill a valley.

3.1.4 Replenishment Study

A replenishment study for riverbed sand is required in order to nullify the adverseimpacts arising due to excessive sand extraction. Mining within or near the riverbed has a direct impact on the stream's physical characteristics, such as channel geometry, bedelevation, substratum composition and stability, in-stream roughness of the bed, flowvelocity, discharge capacity, sediment transport capacity etc. For sustainable river sand mining, it is necessary that the mine pits formed as a result of sand excavation are refilled with sand by the natural process of replenishment in a reasonable period so that the area is again available for mining. The rate of gross erosion is dependent upon many physical factors like climatic conditions, the nature of the soil, the slope of the area, topography and land use. The effect of any of these variables may vary greatly from one geographic location to another, and the relative importance of controlling factors often varies within a given land resource area(Dendy, 1976).

There is no denial of the fact that bed load changes from hour to hour, day to day, and year to year; estimating annual bed load rates is a dynamic

process involving careful examination. Therefore, proper care has been taken before applying the empirical model to calculate the sediment yield from the watershed.

The estimation of sand replenishment is based on empirical and analytical approaches. There are many sediment transport equations as well as models which are suitable for use in the prediction of the replenishment rate of rivers/watersheds. The sedimentation models include SWAT, HEC-HMS etc. These models are developed based on the fundamental hydrological and sediment logical processes. They may provide detailed temporal and spatial simulation but usually require extensive data input. Hourly/daily input values of meteorological and radiation variables are required for continuous simulations. Some of the empirical equations for estimating sediment transport are as follows.

Annual Replenishment Rate for sand for Major Sand Resource Area is determined using emperical mathematical expression Dendy Bolton Equation and reproduced below:

- Einstein (1950)
- Laursen (1958)
- Bagnold (1966)
- Engelund-Hansen equation (1967)
- Yang equations (1973)
- Dendy- Bolton equation (1976)
- Modified Universal Soil Loss Equation (MUSLE) developed by Williams and Berndt (1977)
- Van Rijn (1984)
- Zanke (1987)

To estimate the transport capacity or the sediment load being conveyed by a water stream, one of the many transport equations that are available in the literature is frequently used. Einstein (1950) introduced statistical methods to represent the turbulent behaviour of the flow. Bagnold (1966) introduced an energy concept and related the sediment transport rate to work done by the fluid. Engelund and Hansen (1967) presented a simple and reliable formula for the total load transport in rivers. The Yang equation makes use of the total bed hydraulic radius, and studies show that it is good for estimating the sediment transport in the channel for the condition of dunes on the bed. MUSLE includes only one type of sediment

yield (sheet and rill Erosion). Van Rijn (1984) solved the equations of motions of an individual bed-load particle and computed the saltation characteristics and the particle velocity as a function of the flow conditions and the particle diameter for plane bedconditions. The equations of Zanke and Van Rijn seem to be only moderately satisfactory in estimating the sediment transport in the channel for the condition of dunes on the bed. However, it appears that no single equation could provide reliable estimates of a total load of sediment transport for all of the bed forms that could occur sequentially or randomly in alluvial channels or

natural water courses. The comparison of the equations for estimating sediment rate is given below –

Sl.No.	Sediment Transport Equation	Remarks
1	Einstein (1950)	Bed load function was determined for many but not all types of stream channels
2	Laursen (1958)	Laursen equation outperforms other transport equations in the silt range
3	Bagnold (1966)	Bagnold related the sediment transport rate to work done by the fluid
4	Engelund-Hansen equation (1967)	The original Engelund-Hansen relation (OEH) is based on a single characteristic grain size, which limits its applicability in sand-bed rivers with a wide GSD
5	Yang equations (1973)	It makes use of a total bed hydraulic radius
6	Dendy- Bolton equation (1976)	It uses both drainage area and means annual runoff for estimation of sediment yield. It calculates all types of sediment yield like sheet and rill erosion, gully erosion, channel bed and bank erosion and mass movement
7	Modified Universal Soil Loss Equation (MUSLE) developed by Williams and Berndt (1977)	MUSLE includes only one type of sediment yield (sheet and rill Erosion)
8	Van Rijn (1984)	Calculated equations of motions of an individual bed-load particle for plane bed conditions
9	Zanke (1987)	Zanke was found to be moderately satisfactory for the condition of the dunes on the bed.

In this study, the rate of gross silt production in the watershed and the ability of the stream system to transport the eroded material in a river have been carried out by the Dendy-Bolton equation. Dendy-Bolton formula is often used to calculate the sedimentation yield as it uses both drainage area and mean annual runoff as key parameters to give a yield value. Also, Dendy-Bolton equation calculates all types of sediment yield like sheet and rill erosion, gully erosion, channel bed and bank erosion and mass movement.

The entrance of Penna River in Anantapur district is at Chenampalli (V), Kambadur (M) and the end point is at Veerapuram (V), Tadipatri (M). The Water Resource Department of Andhra Pradesh records the surplus discharge of Penna

River. For calculation of sediment yield, the total surplus discharge of water for water year 2022-23 (June 2022 to May 2023) of 153 TMC is taken as run-off. Annual Replenishment Rate for sand for Major Sand Resource Area is determined using emperical mathematical expression Dendy Bolton Equation and reproduced below:

For Average Annual Run-off less than 2"

S = 1280 x Q0.46 [1.43 – 0.26 log(A)]-------- FORMULA (A)

For Average Annual Run-off more than 2"

S = 1965 x ($e^{-0.055 \times Q}$) [1.43 – 0.26 log(A)]-------- FORMULA (B)

Q = Mean Annual Run-off in inches

A = Net drainage Area in Sq. miles

S = Sediment yield (tons/Sq. miles/yr)

The sedimentation yield for Krishna River in Ananthapur District is arrived based on the above Dendy Bolton Equation or Formula (B). The Sedimentation yield for Krishna River in Palnadu District is shown in Table-23.

Table 23: Sedimentation yield for Penna River in Anantapur District

Name of the River	Area Drained (sq. km)	Mean Annual Run-off (in mm)	Rate of Annual Deposition in the River (tons / sq. km /year)	Annual Deposition (ton/year)
Penna	4393.19	128.29	94.42	4,14,808*

In this report, the mineble area sediment yield was calculated using the standard records of Department of Water Resources. To ensure systematic and scientific studies, Department of Mines & Geology is in the process of selection of NABET Accredited agency for conducting detailed & regular replenishment studies for potential sand bearing areas.

***Note**: Total area and actual sedimentation yield was calculated manually by APSAC and the value is 1**4,90,847 Tons/ year.** The details are provided as an Annexure at page number 114.

3.1.5 Details of Sand Mining Leases:

The rivers Vedavathi-Hagari, Penna and Chitravathiare the main source of sand in the district flowing in Anantapur district through following mandals

Sl.No	Name of the river	List of Mandals
01	Vedavathi-Hagari	Brahma Samudram, Gummagatta, Beluguppa, Rayadurgam, Kanekal&Bommanahal.
02	Penna	Kambadur, Kalyanadurg, Beluguppa, Atmakur, Kuderu, Uravakonda, Pamidi, Peddavaduru, Garladinne, Singanamala, PeddaPappuru&Tadipatri.

03	Chitravathi	Yellanur.

Proposed potential Sand Mining Leasesin Anantapur district shown in Table-24.

Table 24: The detail of Potential Sand Mining Leases

Reach Name	Quantity (in MTs)	Remarks	Geo-Coordinates
Chilamakur	63450	Proposed	14°40'48.1"N 78°01'38.7"E 14°40'36.1"N 78°01'31.2"E 14°40'37.7"N 78°01'29.2"E 14°40'46.8"N 78°01'35.2"E 14°40'52.2"N 78°01'34.0"E
Pamidi	27915	Proposed	14°56'33.0"N 76°36'28.4"E 14°56'31.0"N 76°36'28.3"E 14°56'33.1"N 76°36'38.7"E 14°56'35.0"N 76°36'38.3"E
Illuru	21216	Proposed	14°56'50.6"N 77°37'55.2"E 14°56'50.7"N 77°37'47.8"E 14°56'48.6"N 77°37'51.4"E 14°56'47.0"N 77°37'56.0"E
Karthanaparthi	26700	Proposed	14°28'39.09"N 77°18'44.90"E 14°28'38.10"N 77°18'44.80"E 14°28'37.30"N 77°18'53.50"E 14°28'38.80"N 77°18'54.30"E 14°28'38.70"N 77°18'55.80"E
Thimmalapuram	13200	Proposed	14°55'22.6"N 76°57'29.3"E 14°55'24.2"N 76°57'28.7"E 14°55'28.4"N 76°57'35.1"E

			14°55'29.1"N 76°57'34.2"E
Junjurampalli	34974	Existing (Semi-Mechanized)	
Peddapappur	71017.05	Existing (Semi-Mechanized)	
Veparala	21576	Existing (Semi-Mechanized)	
Nitturu	43620	Existing (Semi-Mechanized)	

Data Source: District Mines and Geology Officer, Anantapur District, Andhra Pradesh

Probable Sand Mining reaches in Ananthapuramu district shown in Table-26. Name of the sand bearing index are given from North to South direction. The Probable Sand bearing areas were identified through field survey with the help of hand held GPS (Global Positional System) and the help of existing literature.

Table 25: Probable Sand Mining reaches in Ananthapuramu district

S.No	Name of the River	Sand Bearing Area	Central Coordinates		Area in Ha.
			Latitude	Longitude	
1	Hagari or Vedavati River	A	14° 34' 26.578" N	76° 54' 10.321" E	4.43
2	Hagari or Vedavati River	B	14° 36' 58.530" N	76° 57' 35.092" E	4.07
3	Hagari or Vedavati River	C	14° 38' 25.706" N	77° 2' 10.997" E	3.08
4	Hagari or Vedavati River	D	14° 40' 8.858" N	77° 3' 12.245" E	4.74
5	Hagari or Vedavati River	E	14° 43' 18.005" N	77° 3' 11.302" E	5.15
6	Hagari or Vedavati River	F	14° 55' 48.486" N	76° 58' 2.808" E	5.48
7	Hagari or Vedavati River	G	14° 28' 44.820" N	77° 19' 12.701" E	0.55
8	Hagari or Vedavati River	H	14° 56' 10.974" N	77° 39' 15.905" E	12.72
9	Hagari or Vedavati River	I	14° 56' 21.423" N	77° 51' 49.839" E	7.21
10	Hagari or Vedavati River	J	14° 40' 22.438" N	78° 1' 23.038" E	17.37
11	Hagari or Vedavati River	K	14° 44' 36.940" N	78° 4' 31.225" E	10.82

Data Source: District Mines and Geology Officer, Anantapur District, Andhra Pradesh

3.1.6 Details of De-Siltation Location: (Lakes/Ponds/Dams etc.)

The detail of potential of de-siltation location in Anantapur District is shown in Table-26.

Table 26: List of Potential De-Siltation Location: (Lakes/Ponds/Dams etc.)(Existing and proposed)

De-siltation Points	Quantity (in MTs)	Remarks
Goddumari Anicut	285000	Existing

Data Source: District Mines and Geology Officer, Anantapur District, Andhra Pradesh

3.1.7 Details of Patta Lands in the District:

The detail list of Patta Lands in the Anantapur district is shown in Table-27.

Table 27: Details of Patta Lands.

Owner	Sy. No.	Area (Ha)	District	Tehsil	Village	Total Reserve (MT)	Total Mineral to be mined (MT)	Existing/ Proposed
Nil								

Data Source: District Mines and Geology Officer, Anantapur District, Andhra Pradesh

3.1.8 Details of M-Sand Plants in the District:

The details list of Manufacturing Sand in Anantapur district is shown in Table-28.

Table 28: Shown Details of Details of M-Sand Plants

Plant Name	Owner	District	Tehsil	Village	Geo-location	Quantity Tonnes/Annum
NIL						

Data Source: District Mines and Geology Officer, Anantapur District, Andhra Pradesh

3.1.9 Details of Cluster of Sand Mining Leases

The area of Cluster of Mining Leases in Anantapur jurisdiction is shown in Table-29.

Table 29: Details Cluster of Mining Leases in Anantapur District

Sl.No	Name of the Cluster	Location (Latitude and Longitude)	Extent (in Ha)	Total No. of Mining Leases in the Cluster	No.of Leases working	Extent of the working leases (in Ha)
NIL						

Data Source: District Mines and Geology Officer, Anantapur District, Andhra Pradesh

3.1.10 Details of Contiguous Clusters

The area of Contiguous Cluster of Sand Reaches in Ananatapur jurisdiction is shown in Table-30.

Table 30: Details of Contiguous Cluster of Sand Reaches in Anantapur District

Sl.No	Name of the Cluster	Location (Latitude and Longitude)	Extent (in Ha)	Total No. of Mining Leases in the Cluster	No.of Leases working	Extent of the working leases (in Ha)
NIL						

Data Source: District Mines and Geology Officer, Anantapur District, Andhra Pradesh

3.1.11 Sand Reaches Details in Anantapur District

The Department of Mines and Geology has already identified sand reach points in Anantapuramu district. Additionally, several sand reach points have been identified near the Pennar and HagiriVedavati river locations. The details of the sand reach points' locations are provided by the District Mining Office. Based on these location details, the sand reach points are shown in Figure-28 and Figure-29. In addition to the existing ones, new sand reaches have been identified and are depicted in Figure-30. Furthermore, the sand reaches in the river are illustrated in maps Figure-31 and Figure-32.

Probable sand-bearing areas were identified through field surveys aided by handheld GPS (Global Positioning System) devices and existing literature. The probable sand-bearing areas in the Anantapur District are shown in Figure-33.

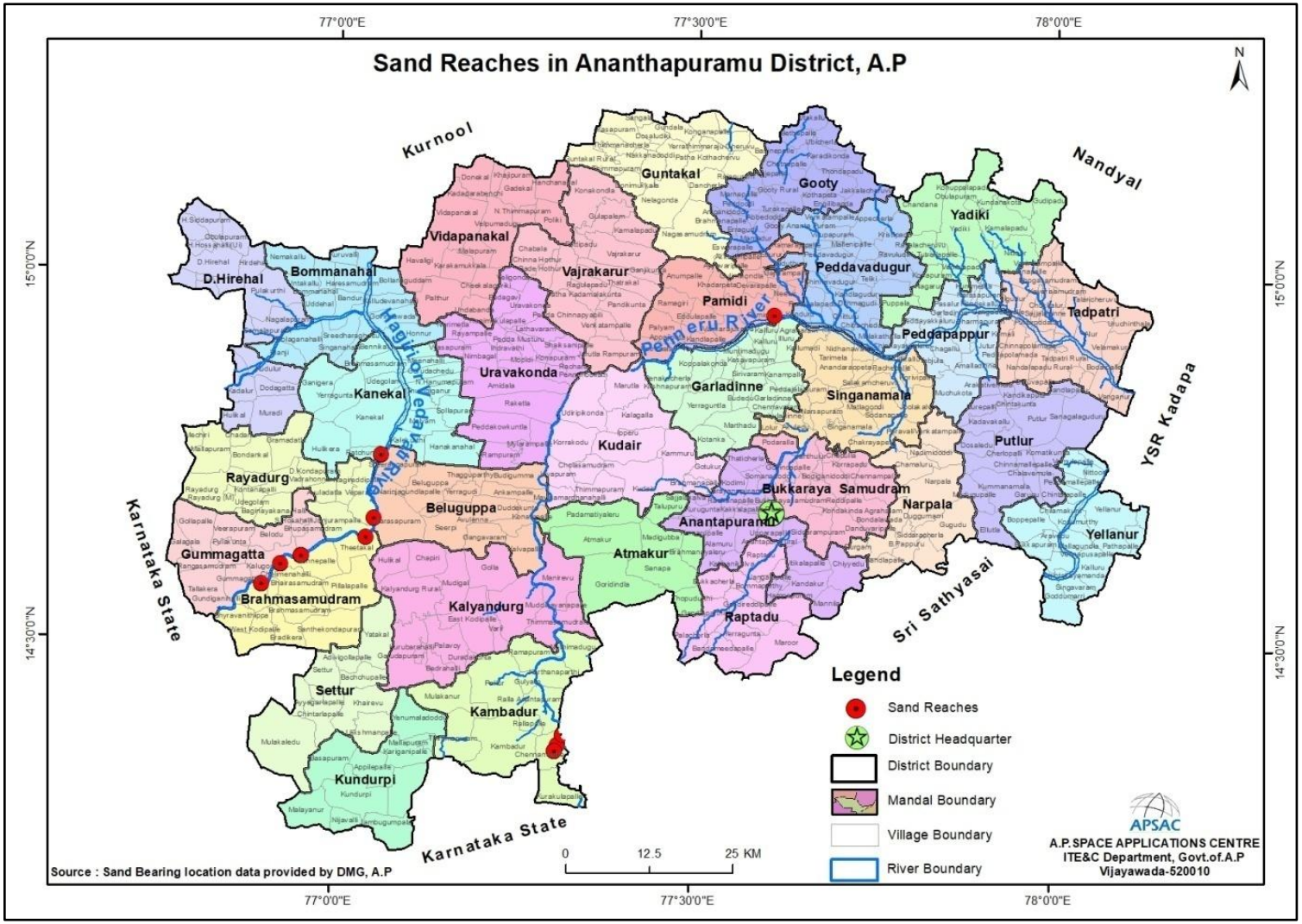

Figure-28: Location map of sand reaches in Anantapur District.

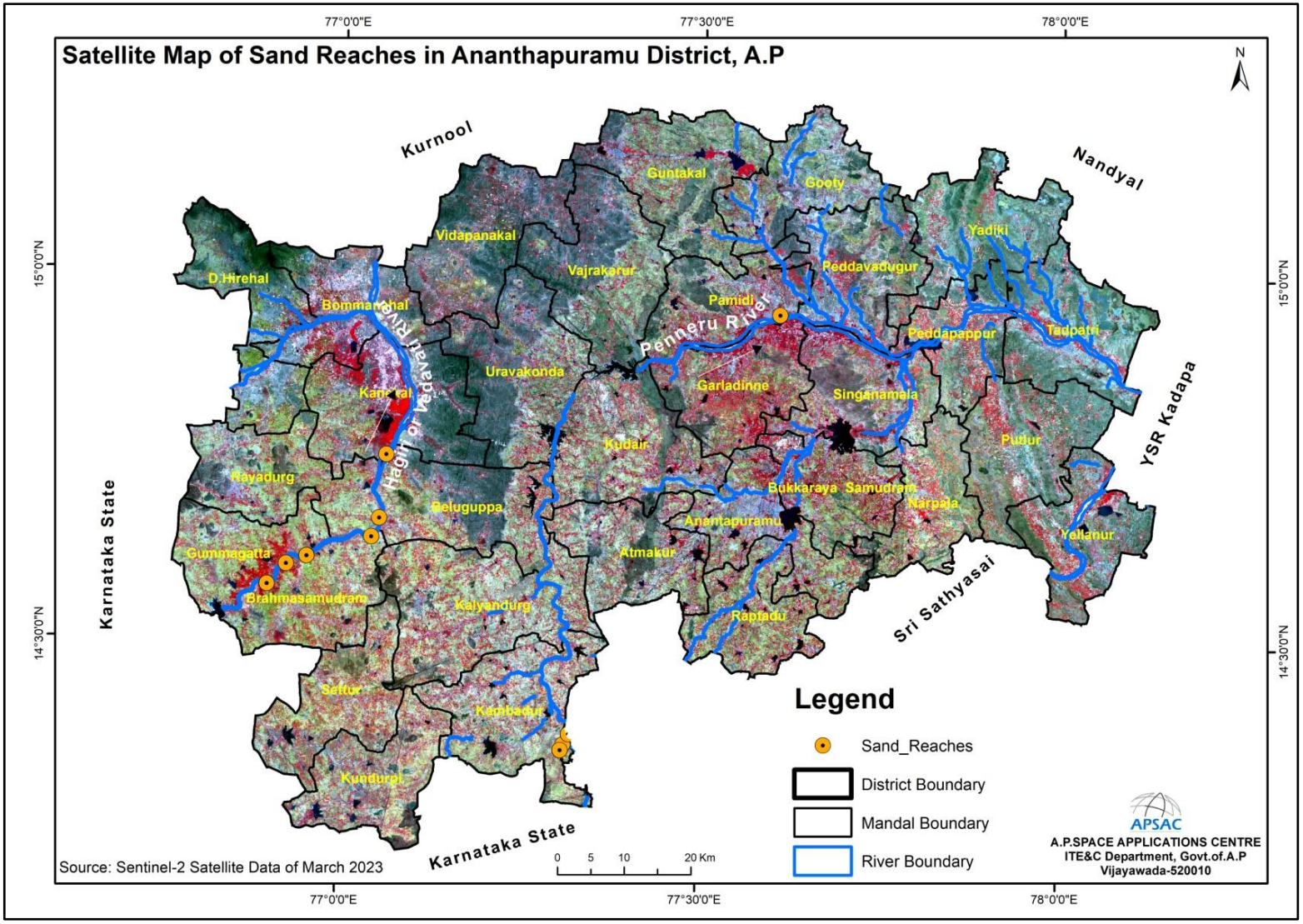

Figure-29: Satellite Map of Sand reaches in Anantapur District

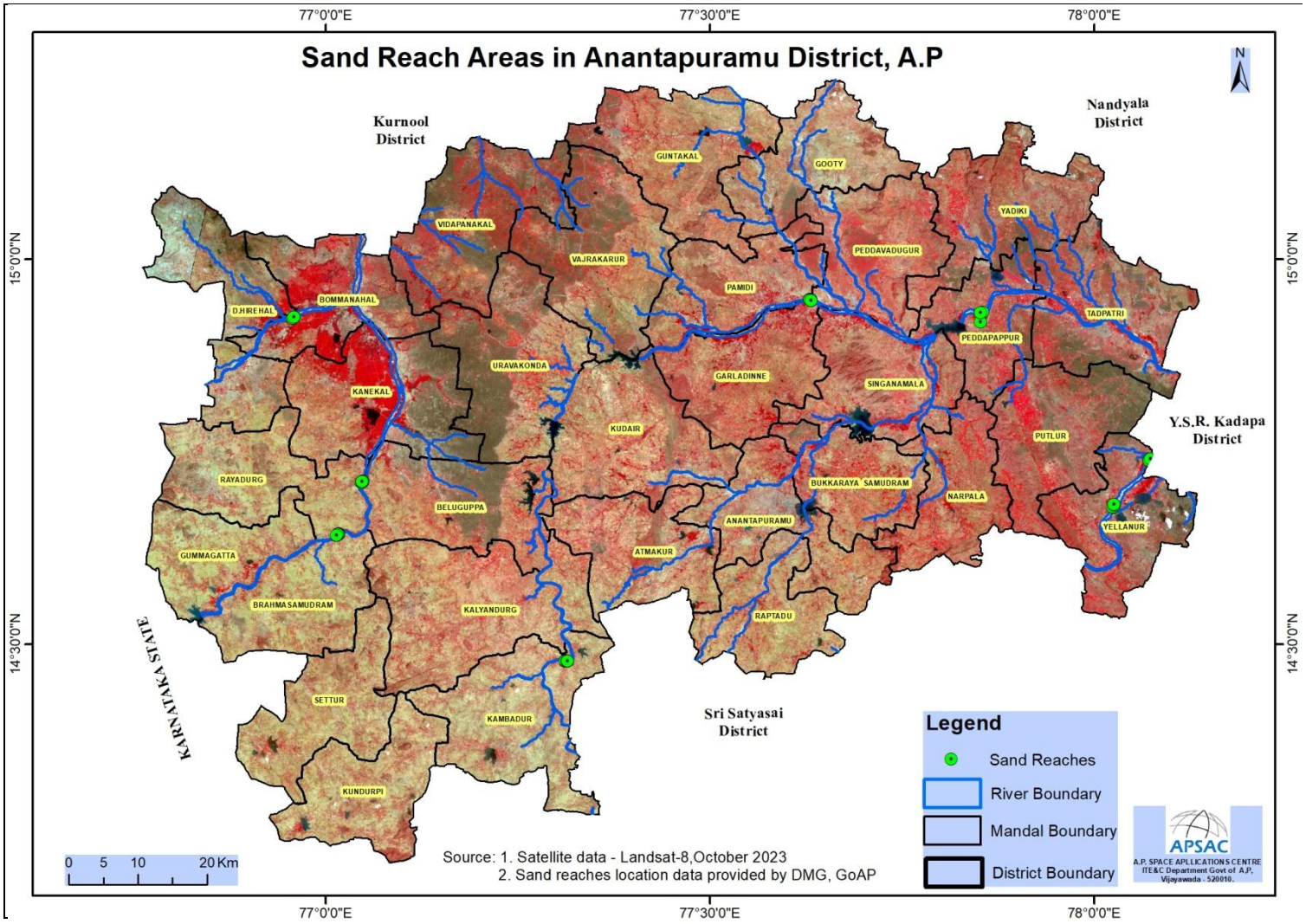

Figure-30: Satellite Map of Sand reaches in Anantapur District

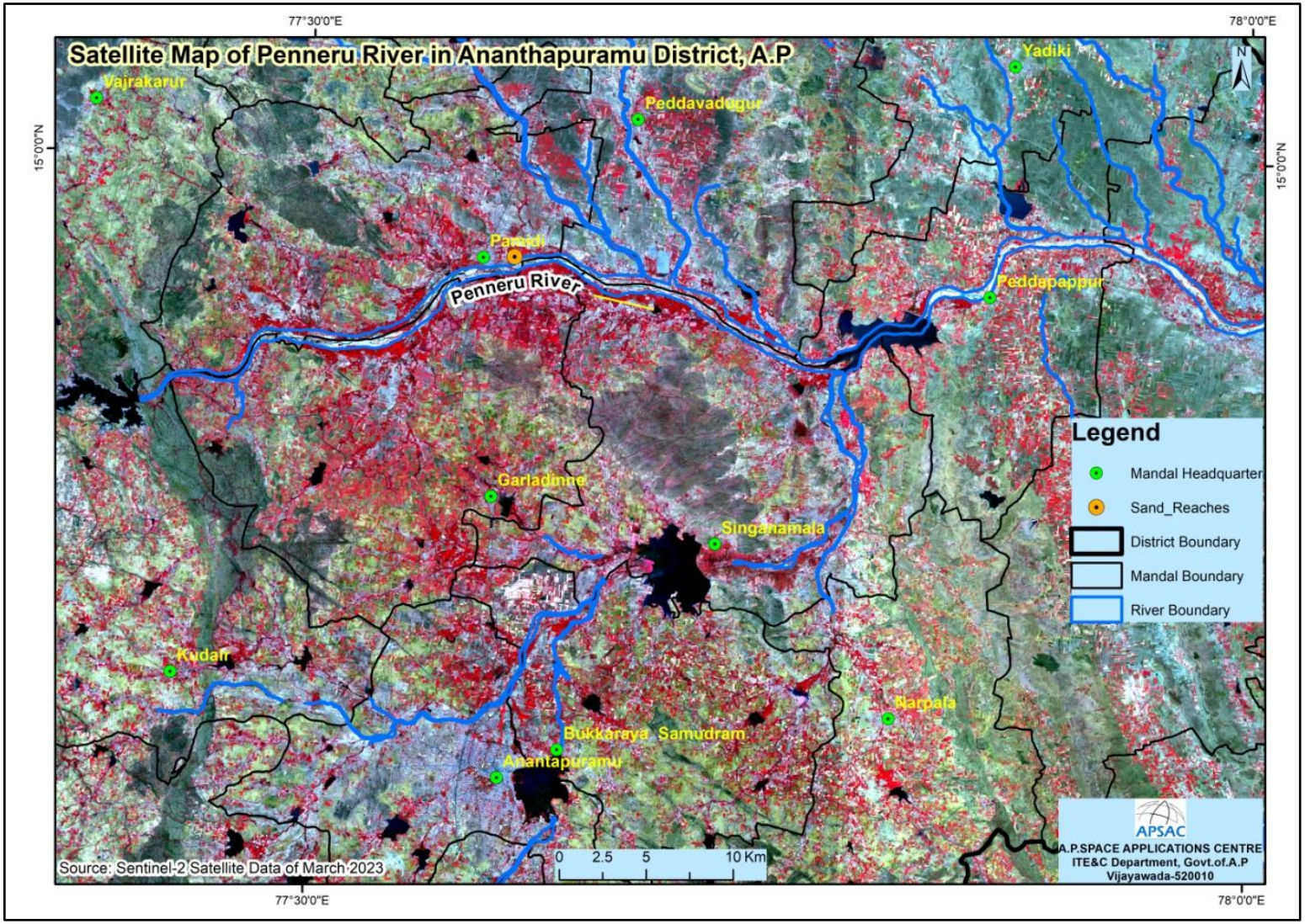

Figure-31: Satellite map of Penner River in Anantapuramu District

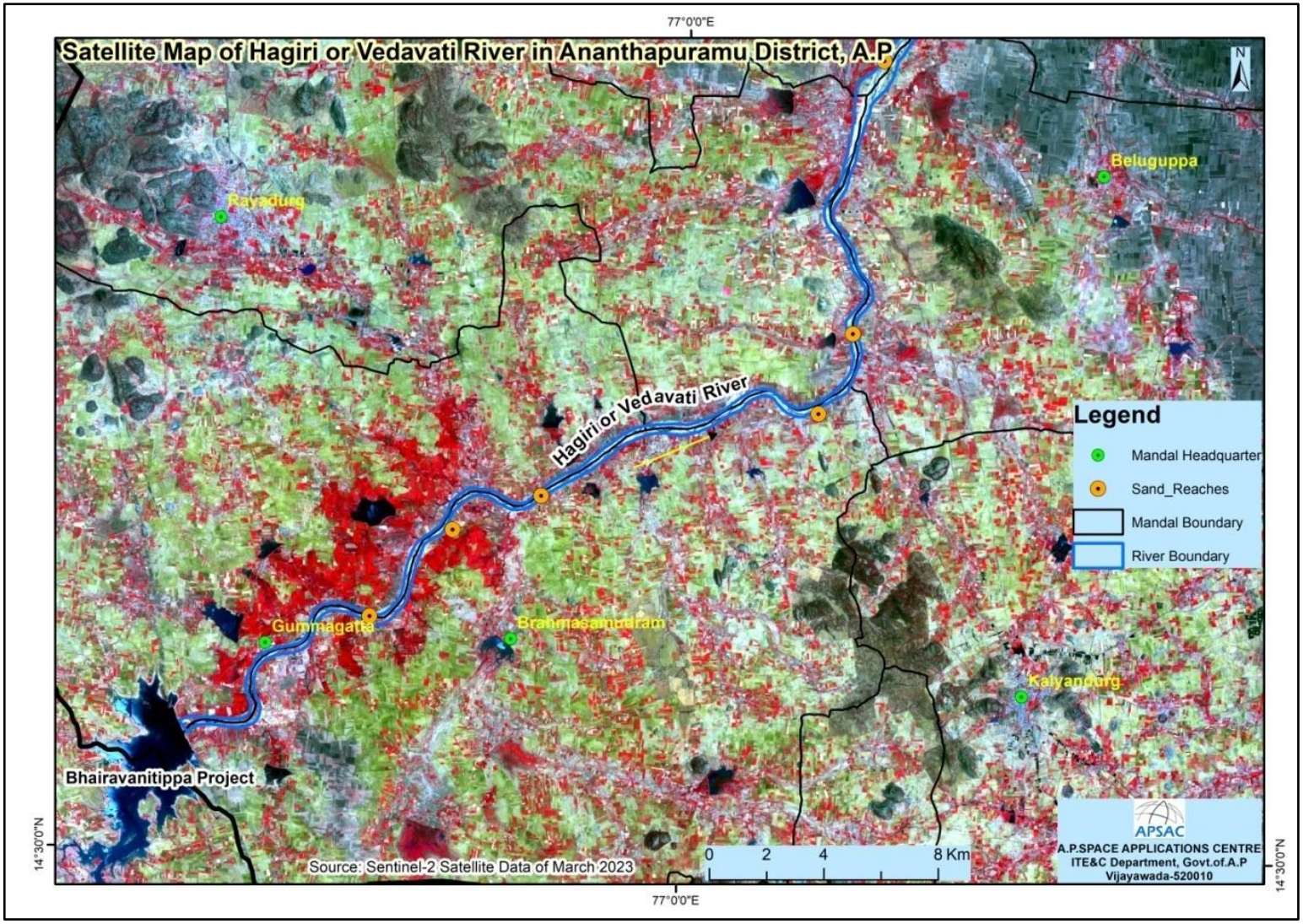

Figure-32: Satellite map of Vedavathi River in Anantapuramu District

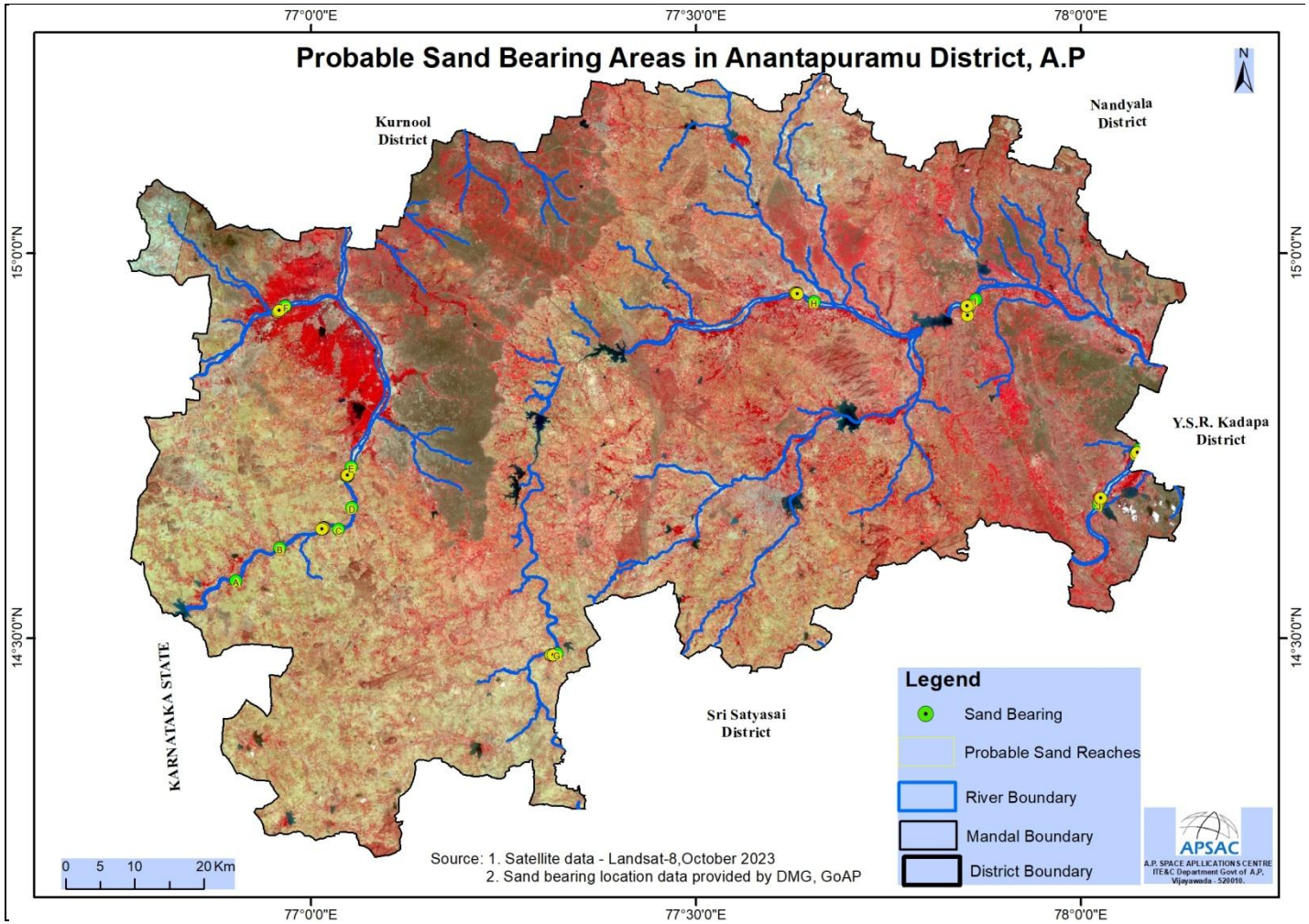

Figure-33: Satellite map of Vedavathi River in Anantapuramu District

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ANNEXURE

As the average annual run-off more than 2" in the Ananthapur District, the sedimentation yield in Pennar River in Ananthapur District was manually arrived by the APSAC based on the Dendy Bolton Equation or Formula and is given below.

$$S = 1965 \times (e^{-0.055 \times Q}) [1.43 - 0.26 \log (B)]$$

Q = Mean Annual Run-off in mm
A = Net drainage Area in Sq. km
S = Sediment yield (tons/Sq. km/yr)

Sedimentation yield for the Pennar River in Ananthapur District

Name of the River	Area Drained (sq. km)	Mean Annual Run-off (in mm)
Pennar	4393.19	128.29

Data Source: District Mines and Geology Officer, Ananthapur District, Andhra Pradesh and APSAC, Vijayawada

The given drained area value converted from Sq.Km to Sq.mile and the mean annual run-off converted from mm to inches for the calculations.

$$S = 1965 \times (e^{-0.055 \times Q}) [1.43 - 0.26 \log(A)]$$ **Tons/sq.mile/year**

Drainage Area (A) = 4393.19sq. Km (1 Sq.km = 0.386 Sq.mile)
= 4393.19 x 0.386
A = 1695.771 Sq.mile ----------(1)

Mean Annual Run-off (Q) = 128.29 mm (1 mm = 0.0393 inches)
= 128.29 x 0.0393
Q = 5.041797 inches ----------(2)

e is Euler's number and the value is =2.718 ----------(3)

$$S = 1965 \times (e^{-0.055 \times Q}) [1.43 - 0.26 \log (A)]$$ **Tons/sq.mile/year**

$$S = 1965 \times (2.718^{-0.055 \times 5.041797}) [1.43 - 0.26 \log (1695.771)]$$

Log 16 of 9 = 0.2279
0.5 = 14
As per base, the value = 3.0000
(+)
Log 1695.771 =3.2293 **----------**(4)

$= 1965 \times (2.718^{-0.055 \times 5.041797}) [1.43 - 0.26 \times 3.2293]$
$= 1965 \times (2.718^{-0.2773}) [1.43 - 0.83964]$
$= 1965 \times (2.718^{-0.2773}) [0.59036]$

The value of $2.718^{-0.2773}$
$1/2.718^{0.2773}$ = 0.75785 ----------(5)

= 1965 x 0.75785 x 0.59036
= 879.156

S = 879.156 Tons/sq.mile/year ----------(6)

For total district Sedimentation Yield =
Per Sq.mile Sedimentation Yield (6) x Total Drainage Area (1)
879.156 x 1695.771 = 4,90,847

As the Sedimentation yield calculated manually,
The sedimentation in the total River
in the Ananthapur District = **4,90,847 Tons/ year**

END