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# DISTRICT SURVEY REPORT (DSR) OF MALKANGIRI DISTRICT, ODISHA ON MORRUM MINING

As per Notification No. S.O. 141(E),15th January,2016 & S.O. 3611(E), 25th July, 2018, New Delhi ,MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE (MoEF & CC) .

## DISTRICT ENVIRONMENT IMPACT ASSESSMENT AUTHORITY (DEIAA) MALKANGIRI, ODISHA OCTOBER-2020

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## 0. PREFACE

The Erstwhile Ministry of Environment and Forests(MoEF), (the Government of India, made Environmental Clearance (EC) for mining of minerals mandatory through its Notification of 27th January, 1994 under the provisions of Environment Protection Act, 1986. Keeping in view the experience gained in environmental clearance process over a period of one decade, the Ministry came out with Environmental Impact Notification, SO 1533 (E), dated 14th September 2006. The Ministry of Environment, Forests & Climate Change (MoEF&CC), Government of India had amended the said vide notification S.O. 141(E) Dated 15th January, 2016. Now again Ministry of Environment, Forests & Climate Change (MoEF&CC), Government of India amended the notification S.O. 141(E) Dated 15th January, 2016 vide S.O. 3611(E) Dated 25thJuly,2018. It has been made mandatory to obtain environmental clearance for different kinds of development projects as listed in Appendix-X of the Notification.

Further, in pursuance to the order of Hon'ble Supreme Court dated the 27th February, 2012 in I.A. No.12- 13 of 2011 in Special Leave Petition (C) No.19628-19629 of 2009, in the matter of Deepak Kumar etc. Vs. State of Haryana and Others etc., prior environmental clearance has now become mandatory for mining of minor minerals irrespective of the area of mining lease; And also in view of the Hon'ble National Green Tribunal, order dated the 13th January, 2015 in the matter regarding sand mining has directed for making a policy on environmental clearance for mining leases in cluster for minor Minerals, The Ministry of Environment, Forest and Climate Change in consultation with State governments has prepared Guidelines on Sustainable Sand Mining detailing the provisions on environmental clearance for cluster, creation of District Environment Impact Assessment Authority( DEIAA) and proper monitoring of minor mineral mining using information technology and information

technology enabled services to track the mined out material from source to destination.

The DEIAA and DEAC will scrutinize and recommend the prior environmental clearance of mining of minor minerals on the basis of District Survey Report. This will be a model and guiding document which is a compendium of available mineral resources, geographical set up, environmental and ecological set up of the district and replenishment of minerals and is based on data of various departments, published reports, journals and websites.

The District Survey Report (DSR) shall form the basis for application for environment clearance, preparation of reports and appraisal of projects. The Report will be updated every five years.

Accordingly, a survey has been carried out by the ***District Level Environment Impact Assessment Authority(DEIAA), Malkangiri*** with the assistance of Geology and Mining Department and involvement all other related Departments like Revenue Department, Irrigation Department , Forest Department, etc. in the district as per the *MoEF, New Delhi, notification S.O. 141(E) dated 15th January 2016* to prepare the District survey Report (DSR) of Malkangiri District(For Sand)in the year 2019. District Survey Report of Morrum mining has been prepared in accordance with *Clause-II of Appendix X* of the said notification.

## *OBJECTIVES*

The main objective of the preparation of District Survey Report is to ensure the following –

- Identification of mineral wealth in the district.
- Identification of areas of Minor Mineral having the potential mineral where mining can be allowed. And
- Identification of areas of proximity to infrastructural structures and installations where mining should be prohibited.

## 01. INTRUDUCTION.

Malkangiri is the southernmost district of Orissa. The district is bordered in the North and West by Bastar district of Chhattisgarh and in the south by Bhadradri kothagudam district of Telegana , in the east by Koraput district, Orissa. The district lies between 17 degree 45'N to 18 degree 40'N latitudes and 81 degree 10' E to 82 degree E longitude falling in Survey of India Degree sheet Nos. 65 F,G,J.

The district has geographical area of 5791 sq km accounting for 3.72% of the state's territory. The district consists of only one sub-division namely Malkangiri, seven numbers of Tahasils namely, Malkangiri, Chitrakonda, Motu, Mathili, Khairput, Kudumulugumma and Kalimela and seven Development Blocks for administrative and development point of view. There are 111 Gram Panchayats and 1055 villages in the district having total population of 6.13 lakhs as per census 2011.

Malkangiri District is connected to major parts of Odisha and other Districts by National Highway- 326. The Malkangiri town, the district headquarter is approachable from adjacent districts through State Highways. SH-25 & SH-4 crosses within the district. The important towns of the district are well connected by road. Malkangiri is not connected with rail network. Nearest major railway stations are Koraput, Jeypore, and Jagdalpur.

It is one of the most economically backward tribal district of Orissa.

The General drainage pattern in the district is dendritic to sub-parallel. The Kolab river along with its tributaries, the Potteru and Sileru Rivers are the most prominent rivers of the region. The Kolab River issues from the Sinkaram hills and follows a south westerly course after passing over Malkangiri district. The river joins the Godavari river in Khammam district of Andhra Pradedsh.

The South Eastern Ghat occupies almost the entire Malkangiri district. It is characterized by warm climate with maximum temperature of 47°C and minimum temperature of 13°C.

## 02. OVERVIEW OF MINING ACTIVITY IN THE DISTRICT.

Other than ordinary Morrum, Stone & Sand a great variety of major mineral potential like Bauxite, Tin, Asbestos, Limestone and Specified Minor Minerals like Quartz, Talc/Soap Stone & Decorative Stone (Granite) are available in the district.

***MAJOR MINERALS***

| Sl No | MINERAL | LOCATION | RESEREVE IN MT | REMARKS |
|---|---|---|---|---|
| 1 | Bauxite | Korukonda | 0.018 | |
| 2 | Limestone | Kottameta-Nandiveda-Uksalvagu | 240 | |
| 3 | Tin | Salimi and Mundaguda | 0.000347 | |
| 4 | Asbestos | Bejingwada | - | Not estimated |

***Minor Mineral:-***

***Specified Minor Mineral:-***

| SI NO | MINERAL | LOCATION | RESEREVE IN MT | REMARKS |
|---|---|---|---|---|
| 1 | Quartz | Gorespalli,saradaput,Ramvaram,Kotapalli,MV-79, MV-127, MV-96 | - | Not estimated |
| 2 | Talc/Soap stone | Saradaput, pandripani | - | Not estimated |

***Dimension Stone:-***

Details of decorative/dimension stone in the district are given in the following table

**DISTRICT- MALKANGIRI** **NAME OF MINERAL- DECORATIVE STONE**

| Sl. No | Name of Concession | Type of Concession | Status ( Running/ Temp- closed) | Name of the concession Holder | Village | Tahasil | Co-ordinate all boundary points | | Area in Ha | Validity of concession | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Latitude | | | From | To |
| 1 | Peta | ML | Working | Ch. Venugopal. HIG-I Pahse-I BD colony, Pokhariput, Bhubaneswar-751020 | Peta | Motu | 17° 55' 00" to 17° 52' 30" | 81° 25' 00" to 81° 30' 00" | 19.425 | 07.06.2018 | 20.06.2048 |
| 2 | Peta | ML | Working | K. Srinivasa Rao. Plot No-13, Nutan colony New Bowenpally, Secuderabad | Peta | Motu | 18° 54' 48" to 18° 54' 54" | 81° 27' 28" to 81° 27' 44" | 9.981 | 02.04.2019 | 02.04.2049 |
| 3 | Peta | ML | Non-working | P. Venga! Rao16-2-836/3 Madhavnagar, Saidabad, Hyderabad | Peta | Motu | 17° 55' 27" to 17° 55' 51" | 81° 27' 36" to 81° 27' 46" | 4.917 | 01.01.2004 | 31.12.2034 |
| 4 | Ponarguda | ML | Non-working | M/S Karunei granaites . No-8, 2nd block , Koramangala, Madivala Post, Bangalore-560068 | Ponarguda | Malkangiri | 18° 20' 00" to 18° 15' 00" | 81° 45' 00" to 81° 50' 00" | 9.134 | 27.07.2004 | 26.07.2034 |
| 5 | Jagannathpali | ML | Non-working | M/S Karunei granaites . No-8, 2nd block , Koramangala, Madivala Post, Bangalore-560069 | Jagannathpali | Malkangiri | 18° 20' 00" to 18° 15' 00" | 81° 45' 00" to 81° 50' 00" | 8 | 27.07.2004 | 26.07.2034 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | Potteru | PL | applied for mining leases | M/S Aakash Stone industries Ltd. Santacruz Airport side, Marble Market, , W.E. Highway Vile Parle ( East) Mumbai-400099 | Potteru | Kalimela | 17⁰ 56' 56" to 17⁰ 57' 02" | 81⁰ 01' 20" to 81⁰ 01' 27" | 2.958 | 20.12.2006 | 19.12.2008 |
| 7 | Potteru | PL | applied for mining leases | M/S Oriental Timex Ltd . 26/25 Bazar MargOld Rajendra Nagar New Delhi-110060 | Potteru | Kalimela | 17⁰ 56' 52" to 17⁰ 57' 08" | 81⁰ 40' 13" to 81⁰ 40' 32" | 10.279 | 07.05.2007 | 06.05.2009 |
| 8 | Majhiguda | PL | applied for mining leases | M/S KPKGranaites . H. No-39-47/D Old Byepass RoadNandigama Dit-Krishna ( AP) | Majhiguda | Khairput | 18⁰ 28' 18.7" to 18⁰ 28' 28.5" | 81⁰ 15' 00.6" to 81⁰ 15' 22.7" | 19.29 | 23.08.2016 | 22.08.2018 |
| 9 | Majhiguda | PL | applied for mining leases | M/S sri Bhubaneswari Granaites . Flat No. 528 C- Block, Rajendra Vihar Forest Park , Bhubaneswar | Majhiguda | Khairput | 18⁰ 28' 28.5" to 18⁰ 28' 36.5" | 82⁰ 15' 00.9" to 81⁰ 15' 22.8" | 10.522 | 23.08.2016 | 22.08.2018 |

## *MINERAL RESOURCES*

The total good quality Limestone reserves near Kotameta, Nandiveda and Uskalvagu estimated around 240 million ton and Bauxite deposits are recoded near Korkunda estimated 0.018 Million Ton and Tin is occurred near village Salimi and Mundaguda around 0.000347 MT.

In the Minor mineral categories the specified minor minerals like quartz occurred in the viallges of Gorespalli, Saradaput, Ramavaram, Kotapalli and MV-79,127,96 and Talc/soap stone are the resources of these minerals are not estimated by DG(O), BBSR.

The Dimension stone are located around the village Sargiguda, Goliaguda, Padmagiri, but the reserves are not estimated by DG (O), BBSR.

## 03. GENERAL PROFILE OF THE DISTRICT.

Malkangiri District is named after its headquarters town, Malkangiri. During formation of Odisha Province in 1936, Malkangiri was a 'Taluk' of Nabrangpur sub–division of Koraput District of Odisha. In 1962 it was upgraded to a subdivision of Koraput District. The present Malkangiri got its identity as an independent district due to reorganization of districts of Odisha as per a notification on 1st October, 1992 and with effect from 2nd October 1992. Covering an area of 5,791 sq. kms, it lays between 17 degree 45'N to 18 degree 40'N latitudes and 81 degree 10' E to 82 degree E longitude.

**Demography of Malkangiri District:-**

This District is sparsely populated with not much of a difference between the numbers of males and females. As per Census 2011, Malkangiri has population of 6,13,192 of which male and female were 3,03,624 and 3,09,568 respectively. In 2001 census, Malkangiri had a population of 5,04,198 of which males were 2,52,507 and remaining 2,52,691 were females. Malkangiri District accounts for 3.72 % of state's territory and shares 1.46 percent of the state's population. The density of population is 106 per sq.KM as against the 270 for Odisha. The Schedule caste population is 22.6 % (138295) and scheduled tribe population is 57.24 % ( 354614)

This District is sparsely populated with not much of a difference between the numbers of males and females. Almost the whole of the district is a vast dense jungle, with a very small percentage of the population residing in the urban areas. The district is divided into two distinct physical divisions. The eastern part is covered with steep ghats, platues and valleys, sparsely inhabited by primitive tribes, notable among who are Bondas, Koyas, Porajas and Didayis. The District is moderately literate, with the number of literate males far out numbering the number of literate females. The climate in the district is generally cold during winter

and hot in summer with temperature ranging from 13 degree C to 47 degree C. The average annual rainfall is about 1700 mm. Relative humidity is generally high, especially in the monsoon and post–monsoon months. During the rainy season, most areas of the District become impassably swampy and heavy floods isolate it from the outer world. This district lies within the malaria prone belt.

The district Malkangiri is situated at the south western part of Odisha constituting part of Western Ghat Mobile Belt normally a rugged hilly terrain. The district covers a number of new series Topo Sheets i.e. *E44P5 ,E44P9, E44P13, E44J8, E44J11, E44J12, E44J14, E44J15, E44J16, E44K2, E44K3, E44K4, E44K6, E44K7,E44K8 etc.*

Malkangiri district is physiologically a complex terrain having numerous numbers of hills, moulds, plane lands, river beds, agricultural lands, forest growth areas etc. In the eastern part of the district there is Machhkund Reservoir catchment area. Adjacent to reservoir catchment area hilly terrain present which have an elevation range from mean sea level about 400m to 900m. Hills and mounts are more common in the east to Malkangiri district headquarter where as in the north-west part there is less hills compered to east part. As the district is a part of Eastern Ghat Mobile Belt so the rock types are mostly homogeneous in nature, so the drainage pattern developed in the region is dendritic pattern. The main drainage trend flows from the south-west to north-east direction within the district. There are several seasonal nala / dry nala & a few perineal natural drainage exists within the district. Main river that touches the district is *Sileru River* & Kolab River, in addition to that a few other small rivers present within the distict namely *Potteru River, Goria Ghar, Satigura Nala, River etc.*

The main township that is developed in the district is Malkangiri also is the district head quarter, which is present in the central part of the district

and connect to all parts of the district through road ways. SH-25 & SH-47 crosses within the district.

Based on the physical and chemical characteristics, mode of origin and occurrence, soils of the district may be classified into two groups namely Alfisols (Red Soil) and Ultisols (Lateritic soil). Soil texture is sandy loam.

The agricultural activity is by and large confined to the traditional Kharif cultivation due to lack of adequate irrigation system. The principal crops of the district are Paddy, Gnut and Sesamum. Besides crops like Maize, Ragi , Jowar, Bajara,Arhar, Moong,Biri, other pulses, sweet potato and other vegetables are also grown in the district.

## 04. GEOLOGY OF THE DISTRICT.

Malkangiri District is part of Eastern Ghat Super Group, the Eastern Ghats are a discontinuous range of mountains along India's eastern coast. The Eastern Ghats run from the northern Odisha through Andhra Pradesh to Tamil Nadu in the south passing some parts of Karnataka and in the Wayanad district of Kerala. They are eroded and cut through by four major rivers of peninsular India, viz. Godavari, Mahanadi, Krishna, and Kaveri.

The mountain ranges run parallel to the Bay of Bengal. The Deccan Plateau lies to the west of the range, between the Eastern Ghats and Western Ghats. The coastal plains, including the Coromandel Coast region, lie between the Eastern Ghats and the Bay of Bengal. The Eastern Ghats are not as high as the Western Ghats. The Eastern Ghats are older than the Western Ghats, and have a complex geologic history related to the assembly and breakup of the ancient supercontinent of Rodinia and the assembly of the Gondwana supercontinent.

The Eastern Ghats on the east coast of India is a largely granulite terrain but also exposes granites, migmatites, anorthosites and alkaline rocks. This granulite belt has had a prolonged history of mountain building from late Archaean to late Proterozoic. During this long period the Eastern Ghats mobile belt witnessed repeated folding and possibly polycyclic metamorphism. Some recent findings suggest breaks between orogenic cycles and a proterozoic reworking of Archaean granulites. Extreme-temperature crustal metamorphism under fluid-absent conditions and crustal anataxis in huge thickness of pelitic to psammitic protoliths producing leptynites are some of the important results of recent investigations of the Eastern Ghats mobile belt. Different generation of charnockites are present in the Eastern Ghats belt, but charnockitisation of granitic gneisses is yet to be documented. Some apparently nascent growths, the patchy charnockites in the Chilka area are shown to be

relict of older charnockitic rocks that suffered granulite-facies metamorphism and attendant migmatisation.

Event Stratigraphy of the Eastern Ghat Mobile Belt is as follows;

| Age(Ma) | Event |
|---|---|
| 550-650 | Exhumation & Stabilisation(Pan-African) |
| 800-850 | Emplacement of Anorthosite Massifs, Some Alkaline Rocks(?)<br>Younger Granitoids are charnokites |
| 950-1100 | Main Eastern Ghat Orogeny(=Grenville) |
| Khondalite Group | Garnet-Sillimanite- Graphite Gneiss(Khondalite) with minor cordierite-Saphrine-Spinel Gneiss(Mg-Al)<br>Calc- Silicate rocks & rare Marbles<br>Quartzite (Garnet ± Sillimanite) |
| ~1500 | Emplacement of Alkaline rocks along with the rift Margin |
| 1800-1600 | Evolution of platform(Purana) basins like Cuddahpah ,Chhatishgarh, Indravati etc.<br>Evolution of Nellore-Khemmam schist belt in Dharwar Craton |
| 2600-2800 | Charnokite & Gneisses of the basement(WCZ). |

## 05. DRAINAGE AND IRRIGATION PATTERN.

Malkangiri district is a physically hilly terrain having majorly dendritic drainage pattern to sub-parallel, there is only one main river named Sileru, *Kolab River* along with its tributaries, the Potteru and Saptadhara Rivers are the most prominent rivers of the region. The Kolab River originates from the Sinkaram hills and follows a south westerly course after passing over Malkangiri district. The river joins the Godavari river in Khammam district of Andhra Pradedsh. The distance of the sources from the river origin is geologically very short, hence this can be concluded that the rate of deposition of sand in Sileru & *Kolab* River is moderate, while in rest rivers within the district the rate of deposit is slow.

Additional river source details are given in the following table

| Sl no. | Name of river | Area (sq. km drained) | % area drained in the District |
|---|---|---|---|
| 01 | Saberi / Kolab | 20427.00 | 28.34 |
| 02 | Sileru / Machhkund | 6477 | 75.80 |
| 03 | Potteru | 2188 | 100 |

## 06. LAND UTILISATION PATTERN IN THE DISTRICT: FOREST, AGRICULTURAL, HORTICULTURAL, MINING ETC.

### Forest:

Forest land use as per the concern authority is as follows;

Malkangiri division covers a geographical area of 5791.00 sq km which has 40.79% Forest cover area (2017). This Division lies between 17°-50' to 18°-45' North latitudes and 81◦ -23' to 82°-25' East longitudes. This Division has six ranges, 23 sections and 116 beats. In terms to Forest Canopy Density classes, the division has 159.93sq km under very dense forest, 765.502sq km under moderately dense forest, 1496.66 sq km under open forest and 44.16 sq km under scrub. In this Division, forest types are Moist Deciduous Forest, Southern Tropical Moist Deciduous Forests, Southern Moist Mixed Deciduous Forests, Orissa Tropical Semi Evergreen Forests, Dry Deciduous Scrub Forests and Central India South Tropical Hill Forests. There are 71 Reserve Forests Blocks (RFs) in this Division with a total area of 35256.24 ha, 105 Proposed Reserved Forests (PRFs) of area 72561.60ha, Six Protected Forests of area 22615.7ha, 51 Village Forests of area 268.2 ha, 75 Demarcated Protected Forests of area 18865.1 ha and Un-demarcated Protected Forests of area 63663.8 ha.

| Type of Forest Cover | FC Date -2015 Date Area in ha | FC Data -2017 Data Area in ha | Forest Cover change between 2015 and 2017. |
|---|---|---|---|
| Very Dense Forest(VDF) | 15952.10 | 15993.67 | 41.58 |
| Moderately Dense Forest(MDF) | 76660.03 | 76550.17 | -109.86 |
| Open Forest(OF) | 147617.44 | 149666.25 | 2048.81 |
| Total | 240229.57 | 242210.09 | 1980.52 |
| % of G.A | 40.46 | 40.79 | 0.33 |
| Scrub | 4020.31 | 4416.83 | 396.52 |
| Non-Forest | 325895.37 | 327644.94 | 1749.57 |

### Agriculture:

Land utilization pattern in the district as per the department of agriculture Malkangiri is as follows;

| LAND UTILIZATION PATTERN OF MALKANGIRI DISTRICT (Area in Ha.) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sl. No. | Name of the Block | Geographical area | Forest Area | Cultivated Area | Land under Non-Agril. use | Barren & Non-Cultivable land | Permanent Pastures & other Grazing land | Land under Misc. tree, crop & groves not included net area sown | Cultivable waste | Old Fallows | Current Fallows | Net sown area | Gross cropped area | Cropping intensity % |
| 1 | Malkangiri | 77054 | 14490 | 16227 | 3091 | 1849 | 2564 | 166 | 325 | 973 | 599 | 16219 | 20140 | 124 |
| 2 | Korukonda | 87441 | 27437 | 35188 | 5736 | 4562 | 4464 | 103 | 521 | 3140 | 3244 | 35196 | 44455 | 126 |
| 3 | Mathili | 89276 | 20119 | 21884 | 5145 | 2888 | 3552 | 285 | 1601 | 816 | 3626 | 21874 | 24059 | 110 |
| 4 | Kalimela | 81982 | 27292 | 26859 | 4913 | 12074 | 3361 | 37 | 822 | 6982 | 4244 | 26279 | 48331 | 184 |
| 5 | Podia | 80688 | 21720 | 21905 | 3827 | 2475 | 3647 | 15 | 345 | 1836 | 8460 | 21747 | 26253 | 121 |
| 6 | Khairput | 63900 | 19762 | 10162 | 687 | 14204 | 2924 | 16 | 518 | 201 | 1369 | 10162 | 11045 | 109 |
| 7 | K. Gumma | 98759 | 24705 | 10515 | 1472 | 13131 | 2218 | 17 | 1025 | 1356 | 1517 | 10515 | 11260 | 107 |
| **TOTAL** | | **579100** | **155525** | **142740** | **24871** | **51183** | **22730** | **639** | **5157** | **15304** | **23059** | **141992** | **185543** | **131** |

The agricultural activity is by and large confined to the traditional Kharif cultivation due to lack of adequate irrigation system. The principal crops of the district are Paddy, pulses and oilseeds.

**Horticulture:**

In Malkangiri District, Mathili, Khairput, Malkangiri parts of Chitrakonda blocks are suitable for fruit orchards as most part of the land are upland. Plantations of cashew, mangos have been taken up in these areas. Other vegetables are also grown throughout the district as well. The crop coverage in the District both for kharif and rabi for the last four years as received from Dy Director Horticulture, Makangiri is given in the following tables.

**Season: Kharif**

**( in ha)**

| Crop | Year | | | |
|---|---|---|---|---|
| | **2015** | **2016** | **2017** | **2018** |
| Vegetables | 8665 | 9355 | 9350 | 10219 |
| Others | 2683 | 2445 | 2450 | 2404 |
| **Total** | **11348** | **11800** | **11800** | **12623** |

**Season: Rabi**

**( in ha)**

| Crop | Year | | | |
|---|---|---|---|---|
| | **2015** | **2016** | **2017** | **2018** |
| Vegetables | 8984 | 5133 | 10336 | 12952 |
| Others | 1108 | 981 | 934 | 1220 |
| **Total** | **10092** | **6114** | **11270** | **14172** |

**Mining:**

Incidence of major mineral resources is not quite encouraging in the district. Leaving aside the above major minerals, some Specified Minor Minerals like Quartz, Talc/ soap stone, Decorative stones are also available in certain areas of the District. Besides, the district is rich in minor minerals like river sand, road metals, Morrum, laterite stone etc.

The total area considered for mining activity for all minerals shall be the mining area within the district.

As per the provided data presently 858.910Ha area is considered for Major mineral leases,

For specified minor mineral 94.506 Ha area is given for decorative stone Mining purpose.

Total Area for considered for Sand mining shall be 120.589 Ha.

Total Area for considered for Stone mining shall be 80.214 Ha.

Total Area for considered for Morrum mining shall be 45.575 Ha.

## 07. SURFACE WATER AND GROUND WATER SCENARIO OF THE DISTRICT.

***(Source CGWB, Also refer Plate-III).***

The general drainage pattern in the district is dendritic to sub-parallel. The Kolab river along with its tributaries, the Potteru and Sileru rivers is the most prominent river of the region. The Kolab river issues from the Sinkaram hills and follows a south westerly course after passing over Malkangiri district. The river joins the Godavari river in Khammam district of Andhra Pradesh.

The major surface water bodies are reservoirs, rivers, streams and ponds etc. The river Potteru which is a tributary of Kolab is generally perennial in nature with a sufficient flow during summer months. The Balimela reservoir is the major irrigation project and its canal command is around 61034-Ha There are substantial numbers of tanks, ponds and water harvesting structures exist in the district, which hold considerable quantity of surface water as storage which serve the purpose for irrigation, bathing, drinking and industrial purposes.

The hydrogeology of the district varies widely depending upon the geological and geomorphic set up and soil characteristics. The major hydrgeological units may be categorized as – Consolidated formations and Unconsolidated to Semi-consolidated formations

***Consolidated formations*** - Almost the entire district is underlain by the consolidated formations, comprising granites, granite gneiss and its variants, charnockites, Khondalites, Schists, Quartzites, Limestones etc. These formations lack primary porosity and are rendered porous and permeable only

when weathered and fractured. The weathered residuum forms the main repositories of groundwater, which occurs under water table conditions and circulates through deeper fractures and fissures.

***Unconsolidated Formations***- Alluvium –Alluvium is not well developed in the area. Small and local patches occur along the Sabari river. It is generally 2-5 m in depth. Its width varies from Zero to less than a Km. Most part of the banks of Sabari, Sileru and Potteru rivers are rocky with no tendency to deposit alluvium on either side. As such these are not useful for groundwater development because of its limited areal extent and thickness.

Ground Water Occurrence: The nature of occurrence and movement of ground water were studied through periodical monitoring of ground

water and well inventory conducted during the systematic and reappraisal hydrogeological surveys in the district. The phreatic zone constitute the most potential groundwater storage in the district. The depth to water table values depend upon several factors including rainfall, topography, drainage characteristics, lithology, depth and nature of weathering, water bearing and water yielding properties of the rocks as also surface irrigation.

The aquifer parameters of various hydrogeological units were evaluated through pumping tests of representative dug wells and slug tests/compressor tests of borewells. The aquifer parameters include Transmissivity and specific capacity Index. Transmissivity indicates aquifers property to transmit water and specific capacity Index (K=C/A) of the formations is expressed in terms of flow of groundwater per meter depression of head over unit cross sectional area of inflow offered by the aquifer. Transmissivity has been calculated for borewells and specific capacity Index for open wells.

Deeper Aquifers- CGWB carried out Ground Water Exploration in the district by deploying one Down The Hole Hammer (DTH) Rig. The study was aimed at identification of deeper potential fracture zones and for assessing yield potentials. In total 8 exploratory wells and 2 observation wells have been drilled in Malkangiri District. The sites for exploration were selected taking into account the hydrogeological characteristics of formations, favourable topography and tectonic features.

All the wells were drilled in Granite Gneisses except one borewell in Kalimela. The depth of drilling ranged from 38 m to 200 m below ground level. The top 8 to 20 m of the bore wells are cased with 178 mm diameter M.S pipe to prevent collapse of the loose overburden. Rest of the borewell is left uncased to tap the water bearing fractured. The discharge of the wells as tested by compressor varied widely from negligible to 10.6 lps.

Transmissivity values ranged from 2.6 $m^2$/day to 27.5 $m^2$/day. Exploratory drilling has been carried out in all the blocks of the district. At Mathili in the North East Corner of the district fracture zones were encountered in the Hornblende Mica Schist and Granite Gneiss at depths of 100 m and 13 7 m below ground level with a cumulative discharge of 2 LPS. However towards south at Khairpur, a number of fracture zones were encountered in depth range of 24 m to 107 m below ground level. The cumulative yield of the well was 2.8 LPS. The formation continues to be Granite Gneisses, at Kudumulgumma south of Khairput.

High yielding fracture zones, eleven in number were encountered within a depth of 130 m below ground level. The aquifer is Granite Gneiss with maximum discharge recorded at 10.6 lps. The high yielding fractured granite gneisses extend southwards and at Balimela the discharge of the exploratory

well was 5.16 lps. In this well also a number of fracture zones have been encountered at various depths. However the formations are compact towards west and yield of the exploratory well at Korukunda has been negligible down to 200 m depth. Similar formations continue in the adjacent block and at Malkangiri the exploratory well yielded hardly 0.88 lps, though a number of fracture zones were encountered within a depth of 144 m. In the south western part of the district at Kalimela six fracture zones were encountered in the exploratory well down to a depth of 195.3 meter below ground level during which the yield of the well was 2.54 lps. In this well charnockite was encountered in the deeper zones. At Podia in the western most corner of the district a number of fractures were encountered within a depth of 159 meter below ground level with a cumulative discharge of 3.59 lps.

## 08. RAINFALL OF THE DISTRICT AND CLIMATIC CONDITION.

The climate in the district is generally cold during winter and hot in summer with temperature ranging from 13 degree C to 47 degree C. The average annual rainfall is about 1700 mm. Relative humidity is generally high, especially in the monsoon and post–monsoon months. During the rainy season, most areas of the District become impassably swampy and heavy floods isolate it from the outer world.

**MONTH WISE RAINFALL DATA OF MALKANGIRI DISTRICT FOR 2018 Fig. in MM**

| Month | Total | Average | Normal |
|---|---|---|---|
| Jan .2018 | 0.00 | 0.00 | 2.70 |
| Feb .2018 | 0.00 | 0.00 | 4.10 |
| March .2018 | 0.00 | 0.00 | 8.90 |
| April.2018 | 445.00 | 63.57 | 34.80 |
| May. 2018 | 329.96 | 47.14 | 49.10 |
| June .2018 | 1336.27 | 190.90 | 212.20 |
| July .2018 | 5331.10 | 761.59 | 465.70 |
| Aug. 2018 | 5212.17 | 744.60 | 472.80 |
| Sept. 2018 | 2639.60 | 377.09 | 281.20 |
| Oct. 2018 | 409.40 | 58.49 | 109.50 |
| Nov. 2018 | 0.00 | 0.00 | 23.60 |
| Dec. 2018 | 116.30 | 16.61 | 3.00 |
| **TOTAL** | **15819.80** | **2259.97** | **1667.60** |
| **BLOCK WISE RAINFALL DATA OF MALKANGIRI DISTRICT FOR 2019** | | | |
| Jan .2019 | 8.00 | 1.14 | 2.70 |
| Feb .2019 | 0.00 | 0.00 | 4.10 |
| March.2019 | 13.00 | 1.86 | 8.90 |
| April. 2019 | 38.00 | 5.43 | 34.80 |
| May.2019 | 236.00 | 33.71 | 49.10 |
| June .2019 | 1060.40 | 151.49 | 212.20 |
| July .2019 | 4436.90 | 633.84 | 465.70 |
| Aug.2019 | 5343.40 | 763.34 | 472.80 |
| Sept,2019 | 2379.20 | 339.89 | 281.20 |
| Oct,2019 | 1194.30 | 170.61 | 109.05 |
| **TOTAL** | **14709.2** | **2101.31** | **1640.55** |

**09. DETAILS OF THE MINING LEASES IN THE DISTRICT AS PER THE FOLLOWING FORMAT. (*Please Refer Table In Annexure-I.*)**

**10. DETAILS OF ROYALTY OR REVENUE RECEIVED IN LAST THREE YEARS**

*Revenue collected for* ***Morrum.***

*No revenue collected in the form of royalty from Morrum sairat source in last three years.*

**11. DETAILS OF PRODUCTION OF MINOR MINERAL IN LAST THREE YEARS.**

*Production of* ***Morrum.***

*No official production from Morrum sairat source in last three years.*

**12. MINERAL MAP OF THE DISTRICT.**

***Please refer Plate-IV.***

**13. LIST OF LETTER OF INTENT (LOI) HOLDERS IN THE DISTRICT ALONG WITH ITS VALIDITY AS PER THE FOLLOWING FORMAT.**

*No Letter of Intent (LOI) has been issued.*

**14. TOTAL MINERAL RESERVE AVAILABLE IN THE DISTRICT.**

Geologically Morrum is a kind of top surficial layer of earth surface, normally sits above the laterites. Morrum capping on surface of earth, the depth of top capping may vary from no capping to few meters in geologically up lifted areas. In Malkangiri district reserve depends upon the proposed lease areas as per the competent authority.

**15. QUALITY /GRADE OF MINERAL AVAILABLE IN THE DISTRICT.**

We know Malkangiri district is part of Eastern Ghat Province, hence the area is rich in hilly terrains composed of various meta-igneous group of rocks like Granite gneiss, charnokite, Khondalite etc. Geologically Morrum is a weathered product of the above rock types.

**16. USE OF MINERAL.**

Morrum is generally used as back filling , filling in the road constructions, levelling of lands etc. Morrum can be used directly as an end product.

## 17. DEMAND AND SUPPLY OF THE MINERAL IN THE LAST THREE YEARS.

Certainly there is an unavoidable gap between the demand and supply of Morrum in the district, hence to balance the demand–supply gap a few number of Morrum quarries have been proposed in certain areas.

## 18. MINING LEASES MARKED ON THE MAP OF THE DISTRICT.

***Please refer Plate-V***

## 19. DETAILS OF THE AREA OF WHERE THERE IS A CLUSTER OF MINING LEASES VIZ. NUMBER OF MINING LEASES, LOCATION (LATITUDE AND LONGITUDE).

*Quarries existing within 500m radius are considered as cluster of Mining Leases as per the MoEF guide lines. No clusters identified in the district.*

## 20. DETAILS OF ECO-SENSITIVE AREA, IF ANY, IN THE DISTRICT.

Eco-Sensitive Zones or ecologically fragile areas are notified by the Ministry of Environment, Forest and climate Change, Government of India around protected areas, National Parks and Wildlife sanctuaries. But there are no Eco-sensitive zones exists in Malkangiri District.

## 21. IMPACT ON THE ENVIRONMENT (AIR, WATER, NOISE, SOIL, FLORA & FAUNA, LAND USE, AGRICULTURE, FOREST ETC.) DUE TO MINING ACTIVITY.

Mining is the extraction of minerals and other geological materials of economic value from deposits on the Earth. Mining adversely affects the environment by inducing loss of biodiversity, soil erosion, and contamination of surface water, groundwater, and soil. Mining can also trigger the formation of sinkholes. The leakage of chemicals from mining sites can also have detrimental effects on the health of the population living at or around the mining site.

As mentioned above, mining activities can harm the environment in several ways.

Mining of major minerals in the Division is not a common feature, though forests areas are rich in Tin ore in Tulsi RL of Mathili Range and Quartzite in Challanguda and Mendikuli area of Mathili. This Division is receiving Prospecting License Application for Granite in Motu Area from Deputy Director, Mines, and Koraput. But till date no mining work has been started. Recently the Mining Department has approached this Division for DGPS Survey of Limestone area for mining purpose at Kotamateru, Uskalbag, Nandiguda and Daranpalli. Other minor mineral like murum and boulders are collected by the contractor and in some case private too on a regular basis, in some area by the local people also to earn their livelihood. This collection is destructive to forests. Mainly stone quarry are going on in the District. Several serious environmental impacts related to quarrying activities on and near the river, such as vibration, land degradation, land subsidence and landslides, water pollution and air pollution, will lead to health related problems and loss of biodiversity.

**Impacts on Air**

Air quality is adversely affected by mining operations. Unrefined materials are released when mineral deposits are exposed on the surface through mining. Wind erosion and nearby vehicular traffic cause such materials to become airborne. Lead, arsenic, cadmium, and other toxic elements are often present in such particles. These pollutants can damage the health of people living near the mining site. Diseases of the respiratory system and allergies can be triggered by the inhalation of such airborne particles.

**Impacts on Water**

Mining also causes water pollution which includes metal contamination, increased sediment levels in streams, and acid mine drainage. Pollutants released from processing plants, tailing ponds, underground mines, waste-disposal areas, active or abandoned surface or haulage roads, etc., act as the top sources of water pollution. Sediments released

through soil erosion cause siltation or the smothering of stream beds. It adversely impacts irrigation, swimming, fishing, domestic water supply, and other activities dependent on such water bodies.

High concentrations of toxic chemicals in water bodies pose a survival threat to aquatic flora and fauna and terrestrial species dependent on them for food. The acidic water released from metal mines or coal mines also drains into surface water or seeps below ground to acidify groundwater. The loss of normal pH of water can have disastrous effects on life sustained by such water.

**Noise impacts**

Noise pollution mainly due to operation of machineries , occasional plying of machineries and drilling & blasting. These actives will create noise pollution in the surrounding area that affects the life of the near by habitats.

**Impact on Soil**

Soil disruptions can contribute to the deterioration of the area's flora and fauna. There is also a huge possibility that many of the surface features that were present before mining activities cannot be replaced after the process has ended. The removal of soil layers and deep underground digging can destabilize the ground which threatens the future of roads and buildings in the area.

**Impacts on Flora & Fauna**

Often, the worst effects of mining activities are observed after the mining process has ceased. The destruction or drastic modification of the pre-mined landscape can have a catastrophic impact on the biodiversity of that area. Mining leads to a massive habitat loss for a diversity of flora and fauna ranging from soil microorganisms to large mammals. Endemic species are most severely affected since even the slightest disruptions in their habitat can result in extinction or put them at high risk of being wiped out. Toxins released through mining can wipe out entire populations of sensitive species.

## 22. REMEDIAL MEASURES TO MITIGATE THE IMPACT OF MINING ON THE ENVIRONMENT.

The major potential environmental impacts associated with mining and associated mineral processing operations are related to erosion-prone landscapes, soil and water quality, and air quality. These potential impacts are recognized and addressed in current mining operations as well as in some former mining operations by reclaiming areas of physical disturbance to prevent erosion, stabilizing soils containing metals or chemicals to prevent unwanted metal releases into the environment, preventing and/or treating water contamination, and controlling air emissions.

Mine closure and a number of activities to mitigate the impacts of mining are an integral part of all mine planning and mineral development from the discovery phase through to closure:

Reclamation
Soil treatment
Water treatment
Preventing acid rock drainage
Controlling gas emissions

***Air***

Mitigation measures suggested for air pollution controls are to be based on the baseline ambient air quality of the project/cluster area and would include measures such as:

- Dust generation shall be reduced by using sharp teeth of shovels.
- Wet drilling shall be carried out to contain the dust particles.
- Controlled blasting techniques shall be adopted.
- Water sprinkling on haul roads, service roads and overburden dumps will help in reducing considerable dust pollution.
- Proper and regular maintenance of mining equipment's have to be undertaken.
- Transport of materials in trucks are to be covered with tarpaulin.

- The mine pit water can be utilized for dust suppression in and around mine area.
- Information on wind diction and meteorology are to be considered during planning, so that pollutants, which cannot be fully suppressed by engineering techniques, will be prevented from reaching the nearby agricultural land, if any.
- Comprehensive greenbelt around overburden dumps and periphery of the mining projects/clusters has to be carried out to reduce to fugitive dust transmission from the project area in order to create clean & healthy environment.

***Water***

- Construction of garland drains and settling tanks to divert surface run –off of the mining area to the natural drainage.
- Construction of checks dams/ gully plugs at strategic places to arrest silt wash off from broken up area.
- Retaining walls with weep hole are to be constructed around the mine boundaries to arrest silt wash off.
- The mined out pits shall be converted in to the water reservoir at the end of mine life. This will help in recharging ground water table by acting as a water harvesting structure.
- Periodic analysis of mine pit water and ground water quality in nearby villages are to be undertaken.
- Domestic sewage from site office & urinals/latrines provided within ML/QL areas is to be discharged in septic tank followed by soak pits.

***Noise***

- Periodic maintenance of machineries, equipments shall be ensured to keep the noise generated within acceptable limit.

- Development of thick green belt around mining/cluster area, haul roads to reduce the noise.
- Provision of earplugs to workers exposed to high noise generating activities like blasting, excavtion site etc. Worker and operators at work sites will be provided with earmuffs.
- Conducting periodical medical checkup of all workers for any noise related health problems.
- Proper training to personnel to create awareness about adverse noise related effects.
- Periodic noise monitoring at locations within the mining area and nearby habitations to assess efficacy of adopted control measures.
- During blasting optimum spacing, burden and charging of holes will be made under the supervision of competent qualified mines foreman, mate etc.

***Biological Environment***

- Development of green belt/gap filling saplings in the safety barrier left around the quarry area/ cluster area.
- Carrying out thick greenbelt with local flora species predominantly with long canopy laves on the inactive mined out upper benches.
- Development of dense poly culture plantation using local floral species in the mining areas at conceptual stage if the mine is not continued much below the general ground level.
- Adoption of suitable air pollution control measures as suggested above.
- Transport of materials in trucks covered with tarpaulin.

## 23. RECLAMATION OF MINED OUT AREA (BEST PRACTICE ALREADY IMPLEMENTED IN THE DISTRICT, REQUIREMENT AS PER RULES AND REGULATION, PROPOSED RECLAMATION PLAN).

Mine reclamation is the process of restoring land that has been mined to a natural or economically usable state. Although the process of mine reclamation occurs once mining is completed, the planning of mine reclamation activities occurs prior to a mine being permitted or started. Mine reclamation creates useful landscapes that meet a variety of goals ranging from the restoration of productive ecosystems to the creation of industrial and municipal resources. Modern mine reclamation minimizes and mitigates the environmental effects of mining.

In Malkangiri district no stone Quarry has been reported as exhausted of mineral, hence no reclamation approach has been implemented in present date. Mainly two types of reclamation proposal are normally proposed i.e. Firstly Back filling of the exhausted mine by mine generated waste and capping of top soil for forest plantation and growth. Secondly proper fencing of quarried area and can be developed as water reservoir, fishery development or tourist attraction points after the life of the mine.

## 24. RISK ASSESSMENT & DISASTER MANAGEMENT PLAN.

Risk assessment is the determination of quantitative or qualitative value of risk related to a concrete situation and a recognized threat. Activities requiring assessment of risk due to occurrence of most probable instances of hazard and accident are both onsite and off-site.

It must be realized that any incident may develop into a major emergency even with the best safety measures and programmes in any industry. Hence, an Emergency procedure will be planned properly and documented to help in reducing time loss, chaos and confusion at the hour of need by assigning person who will engage in meeting emergency smoothly and effectively. Any accident which has potential to develop into a major emergency can threaten large number of person or large area of the industries on the site may affect safety of the public, property and environment. Hence, it is absolutely essential that emergency procedures will be properly planned and documented.
Stone quarry mining is an opencast practice in the district, hardly cause disastrous situation except bench failure if the slope of the benches are not well maintained and height of the benches are exceptionally high not executed as per the approved Plan. Any disastrous situation raised in the mining area must be reported to the concern authorities as soon as possible.

## 25. DETAILS OF THE OCCUPATIONAL HEALTH ISSUES IN THE DISTRICT. (LAST FIVE-YEAR DATA OF NUMBER OF PATIENTS OF SILICOSIS & TUBERCULOSIS IS ALSO NEEDS TO BE SUBMITTED).

As per the data provided by CDMO, Malkangiri *Tuberculosis* patients cases of last 5 years is as follows;

| Sl No | Year | TB Cases |
|---|---|---|
| 01 | 2015 | 1058 |
| 02 | 2016 | 1104 |
| 03 | 2017 | 1288 |
| 04 | 2018 | 1041 |
| 05 | 2019 | 965(up to Aug-2019) |

No case of Silicosis recorded in the district.

## 26. PLANTATION AND GREEN BELT DEVELOPMENT IN RESPECT OF LEASES ALREADY GRANTED IN THE DISTRICT.

As the stone quarry lease within the district are non-forest lands rather revenue lands. As per the guidelines prescribed by OMMCR-2016 a safety zone of 7.5m has been considered for all quarry leases all along the inside of boundary line. Plantation proposal has been usually stated in the approved Mining Plans for all quarry leases. Saplings of local plants has been proposed to be planted in the safety zone area of quarries.

Forest Division could not take up the Plantation works in mining areas due to non-receipt of any fund for the same. But large numbers of plantations have been raised under different schemes in and outside the Reserved Forest and Proposed Reserved Forest. Year wise area planted w.e.f 2007-8 to 2018-19 produced below for reference.

## AR (BLOCK PLANTATION)

| Year | Area Planted (in Ha) | Component | Remarks |
|---|---|---|---|
| 2007-08 | 115 | AR Block Plantation | Under State Plan & CAMPA |
| 2008-09 | 239 | AR Block Plantation | |
| 2009-10 | 280 | AR Block Plantation | |
| 2010-11 | 285 | AR Block Plantation | |
| 2011-12 | 50 | AR Block Plantation | |
| 2012-13 | 65 | AR Block Plantation | |
| 2013-14 | 300 | AR Block Plantation | |
| 2014-15 | 270 | AR Block Plantation | |
| 2015-16 | 270 | AR Block Plantation | |
| 2016-17 | 200 | AR Block Plantation | |
| 2017-18 | 275 | AR Block Plantation | |
| 2018-19 | -0.00 | No Block Plantation | |
| | 2349 Ha | | |

## ANR ( GAP PLANTATION)

| Year | Achievement (in Ha) | Component | Remarks |
|---|---|---|---|
| 2007-08 | 155 | ANR work | Under State Plan & CAMPA |
| 2008-09 | 1190 | ANR work | |
| 2009-10 | 520 | ANR work | |
| 2010-11 | 1556.76 | ANR work | |
| 2011-12 | 50 | ANR work | |
| 2012-13 | 265 | ANR work | |
| 2013-14 | 1130 | ANR work | |
| 2014-15 | 555 | ANR work | |
| 2015-16 | 1570 | ANR work | |

| | | | |
|---|---|---|---|
| 2016-17 | 1000 | ANR work | |
| 2017-18 | 60 | ANR work | |
| 2018-19 | 500 | ANR work | |
| | 8551.76 | | |

## 27. ANY OTHER INFORMATION.

Malkangiri district has a glorious rich cultural past, rich in agriculture. It is at the northern marginal area of Eastern Ghat Province having potential of several valuable minerals like Tin, Quartzite, Limestone, gem stones, dimension stones, ordinary stones, sand etc. Systematic & scientific application of technologies in all fields will definitely enhance the livelihood of the common man of the area and the district can contribute a major part in thriving of the state as well as the nation.

***As per Point-09 of notification the details of the leases in the district as per the following format are:*** **ANNEXURE-I**

*In this case only* ***Morrum*** *has been considered.*

| Sl.No. | Name of the Mineral | Name of the Lessee | Adress & Contact No. of lesee | Mining lease Grant Order No. & date | Area of Mining lease (in Hc) | Period of Mining lease ( Initial) | | Date of commencement of mining operaion | Status (Working Non Working/Temp. working for despatch etc.) | Captive/Non captive | Obtained Environvental clearence (Y/N) if Y letter No. with date of grant of E.C | Location of the mining lease (Latitude & Longitute) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | From | To | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 11 | 12 | 13 | 14 | 15 |
| **Name of the Tahasil:- Malkangiri** | | | | | | | | | | | | |
| 1 | Jagannathpali Morrum Quarry | | | | 4.800 | | | | Non Working | Non captive | No | Khata No-118 Plot No-362 Area-3.440Hc, Plot No-498 Area-1.360Hc Kisam-Pahada latitude of 18°18'08.04"N to 18°18'20.21"N and longitude of 81°50'34.10"E to 81°50'48.84"E |
| 2 | Buduguda Morrum Quarry | | | | 4.000 | | | | Non Working | Non captive | No | Khata No-262 Plot No-1592 Area-4.000Hc Kisam-Pahada latitude of 18°16'23.28"N to 18°16'31.40"Nand longitude of 81°55'51.75"E to 81°56'01.75"E |

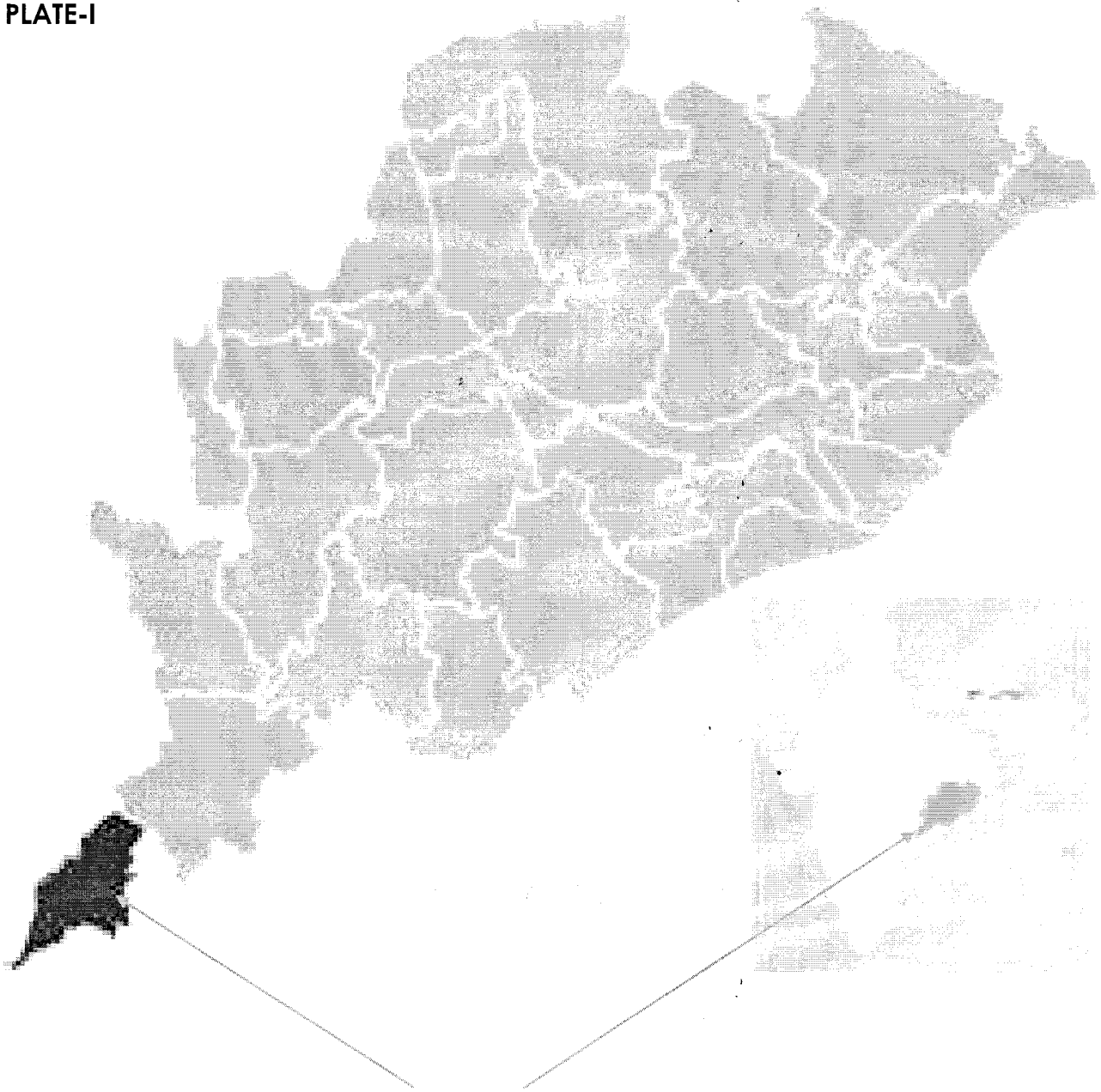
| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | Nilimari Morrum Quarry | | | | 2.205 | | | | Non Working | Non captive | No | Khata No-288<br>Plot No-1808<br>Area-2.205Hc<br>Kisam-Patita<br>latitude of 18°17'40.72"N to 18°17'48.24"Nand longitude of 81°55'34.51"E to 81°55'39.20"E |
| 4 | Malkangiri Morrum Quarry | | | | 2.080 | | | | Non Working | Non captive | No | Khata No-1005<br>Plot No-193<br>Area-0.290Hc<br>Kisam-Patita<br>Plot No-194<br>Area-1.790Hc<br>Kisam-Patita |
| 5 | Kanjali Morrum Quarry | | | | 2.000 | | | | Non Working | Non captive | No | Boilapari mauza<br>Khata No-312<br>Plot No-153<br>Area-2.000Hc<br>Kisam-Gochar |
| **Name of the Tahasil:- Mathili** | | | | | | | | | | | | |
| 1 | Kutunipali Morrum Quarry | | | | 1.619 | | | | Non-Working | Non-Captive | No | Khata No-122<br>Plot No-198<br>Area-0.607Hc<br>Kisam-Patita<br>Khata No-122<br>Plot No-199<br>Area-1.012Hc<br>Kisam-Patita" |
| 2 | Kathiguda Morrum Quarry | | | | 3.720 | | | | Non-Working | Non-Captive | No | Khata No-58<br>Plot No-211/1<br>Area-3.015Hc<br>Kisam-Goachar<br>Khata No-58<br>Plot No-216/1<br>Area-0.090Hc<br>Kisam- Goachar<br>Khata No-58<br>Plot No-215/1<br>Area-0.615Hc<br>Kisam- Goachar |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | Damapada Morrum Quarry | | | | 1.260 | | | | Non-Working | Non-Captive | No | Khata No-97<br>Plot No-771<br>Area-1.2605Hc<br>Kisam-G. Jungle |
| **Name of the Tahasil:- Kalimela** | | | | | | | | | | | | |
| 1 | Anantapalli Morrum Quarry | | | | 5.000 | | | | Non-Working | Non-Captive | No | Khata No-226<br>Plot No-252/3<br>Area-5.000Hc<br>Kisam-Pahad<br>latitude of 17°51'53.51"N to 17°52'00.21''N and longitudes of 81°34'12.01''E to 81°34'24.57''E |
| 2 | Ambaguda Morrum Quarry | | | | 5.000 | | | | Non-Working | Non-Captive | No | Khata No-153<br>Plot No-456<br>Area-5.000Hc<br>Kisam-Parbat<br>latitude of 18°06'10.52"N to 18°06'19.05"N and longitude of 81°46'01.43"E to 81°46'10.51"E |
| 3 | Tigal Morrum Quarry | | | | 4.920 | | | | Non-Working | Non-Captive | No | Khata No-561<br>Plot No-2543/4319/1<br>Area-4.920Hc<br>Kisam-Pahad<br>latitude of 18°01'46.19"N to 18°01'56.56"N and longitude of 81°38'45.46"E to 81°38'54.02"E |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Name of the Tahasil:- Motu** | | | | | | | | | | | | |
| 1 | Kunchanpally Morrum Quarry | | | | 2.140 | | | | Non-Working | Non-Captive | No | Khata No-234<br>Plot No-1999<br>Area-2.140Hc<br>Kisam-Patharbani<br>latitude of 18°08'24.55"N to 18°08'31.03"Nand longitude of 81°31'28.36"E to 81°31'36.24"E |
| 2 | Uskalbag Morrum Quarry | | | | 3.240 | | | | Non-Working | Non-Captive | No | Khata No-145<br>Plot No-1985<br>Area-3.240Hc<br>Kisam-Gochar |
| **Name of the Tahasil:- Chitrakonda** | | | | | | | | | | | | |
| 1 | Kopatuti Morrum Quarry | | | | 2.591 | | | | Non-Working | Non-Captive | No | Khata No-33<br>Plot No-167<br>Area-2.591Hc<br>Kisam-Parbat |
| 2 | Dudhupalli Morrum Quarry | | | | 1.000 | | | | Non-Working | Non-Captive | No | Khata No-28<br>Plot No-309<br>Area-1.000Hc<br>Kisam-Parbat |

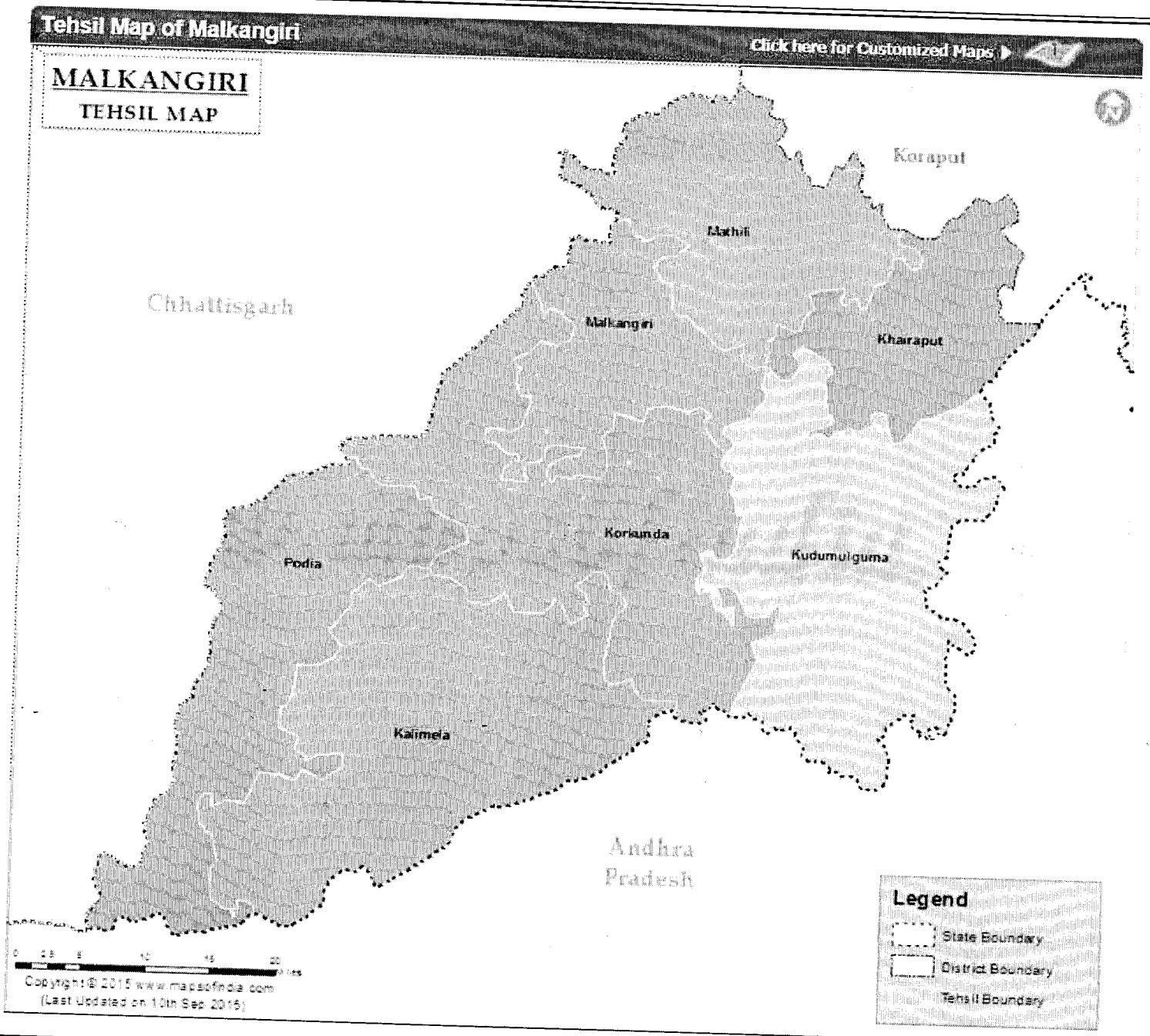
***NB**: in the above table omitted Columns are,*
*Column **10** & **11** Period of Mining lease (1st/2nd...renewal)-**NA***
*Column **16** Method of Mining (Opencast/Underground) - **All Open cast***

**PLATE-I**



**MALKANGIRI**

PLATE-II



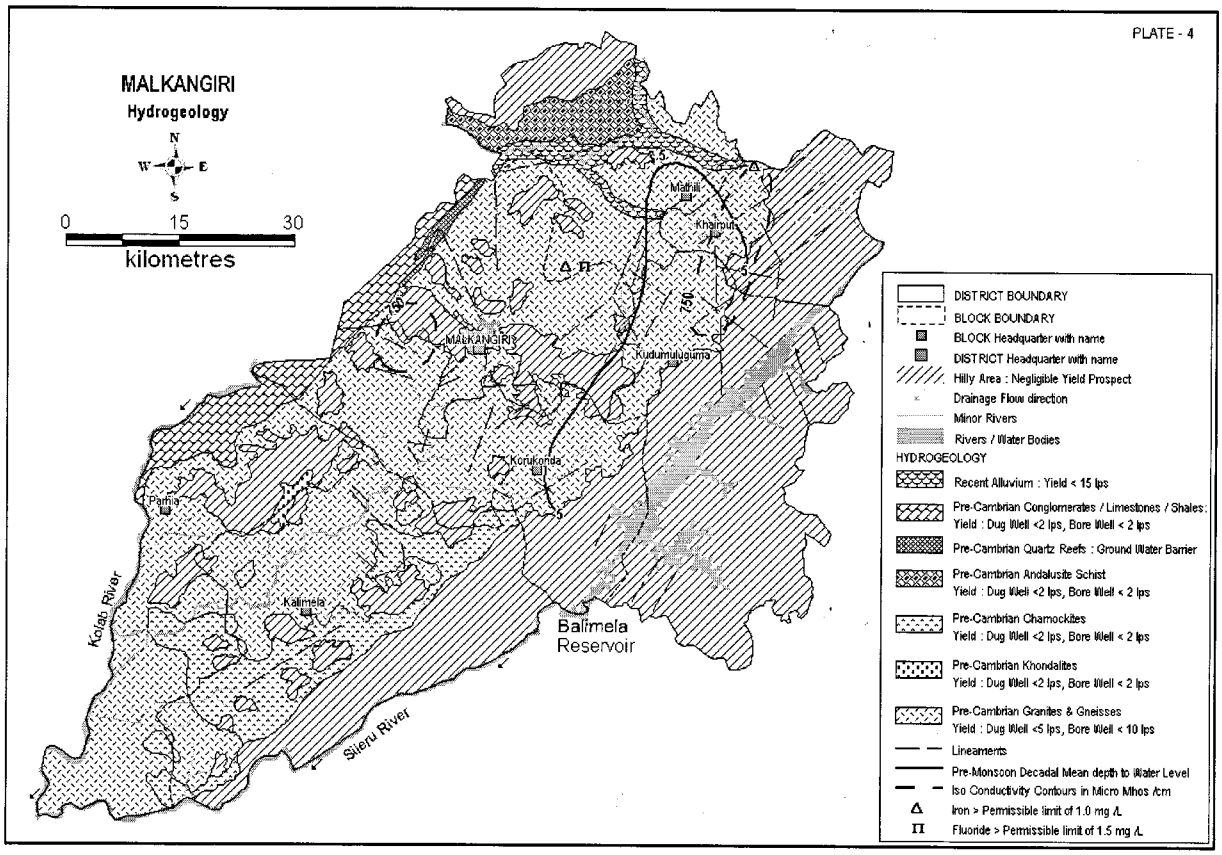
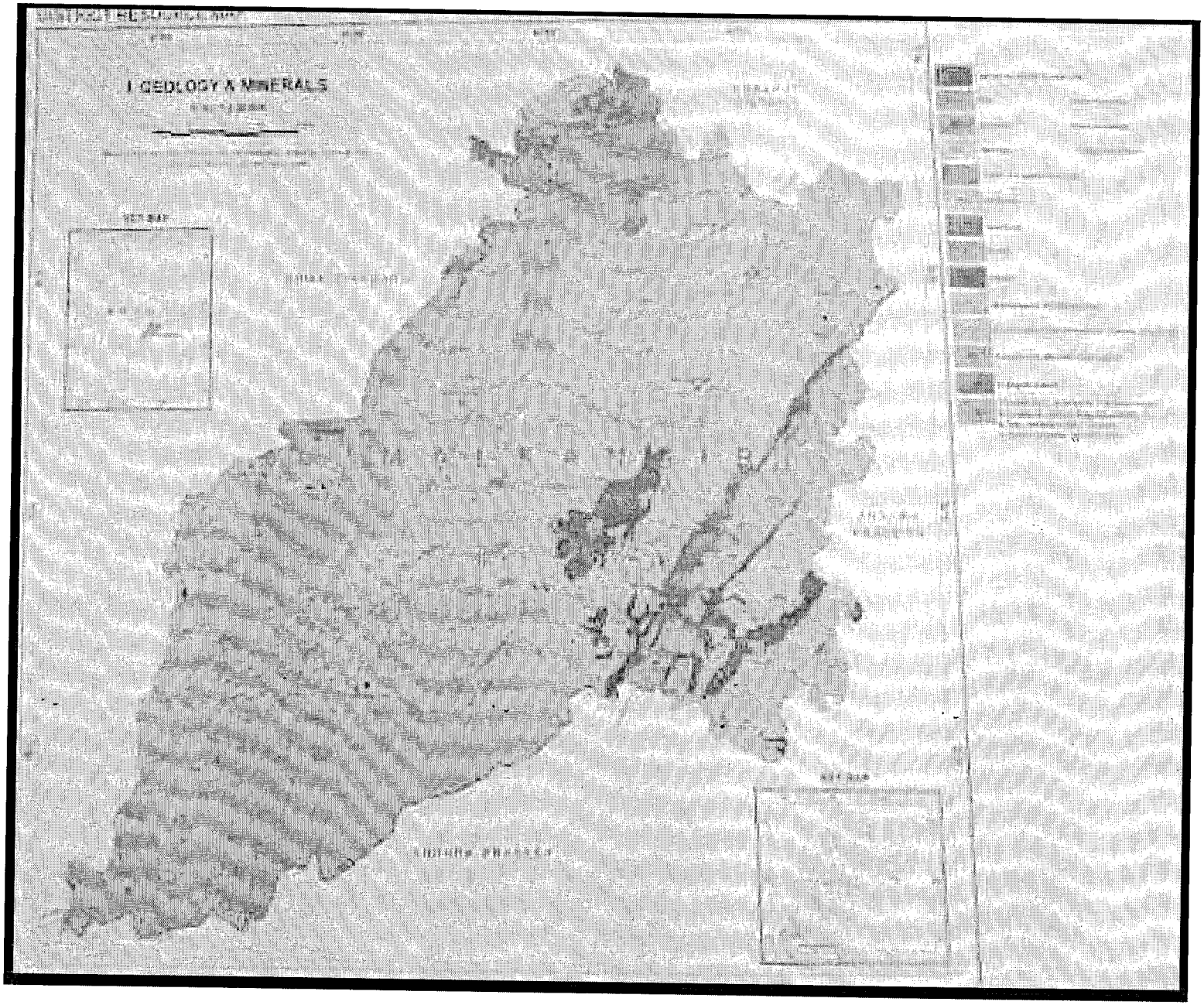


PLATE - 4
MALKANGIRI
Hydrogeology
N
W
E
S
0
15
30
kilometres
Mathili
Khairput
MALKANGIRI
Kudumulugumma
Korukonda
Pamia
Kalimela
Kolab River
Balimela
Reservoir
Sileru River
DISTRICT BOUNDARY
BLOCK BOUNDARY
BLOCK Headquarter with name
DISTRICT Headquarter with name
Hilly Area : Negligible Yield Prospect
Drainage Flow direction
Minor Rivers
Rivers / Water Bodies
HYDROGEOLOGY
Recent Alluvium : Yield < 15 lps
Pre-Cambrian Conglomerates / Limestones / Shales : Yield : Dug Well <2 lps, Bore Well < 2 lps
Pre-Cambrian Quartz Reefs : Ground Water Barrier
Pre-Cambrian Andalusite Schist Yield : Dug Well <2 lps, Bore Well < 2 lps
Pre-Cambrian Chamockites Yield : Dug Well <2 lps, Bore Well < 2 lps
Pre-Cambrian Khondalites Yield : Dug Well <2 lps, Bore Well < 2 lps
Pre-Cambrian Granites & Gneisses Yield : Dug Well <5 lps, Bore Well < 10 lps
Lineaments
Pre-Monsoon Decadal Mean depth to Water Level
Iso Conductivity Contours in Micro Mhos /cm
Iron > Permissible limit of 1.0 mg /L
Fluoride > Permissible limit of 1.5 mg /L

PLATE-IV

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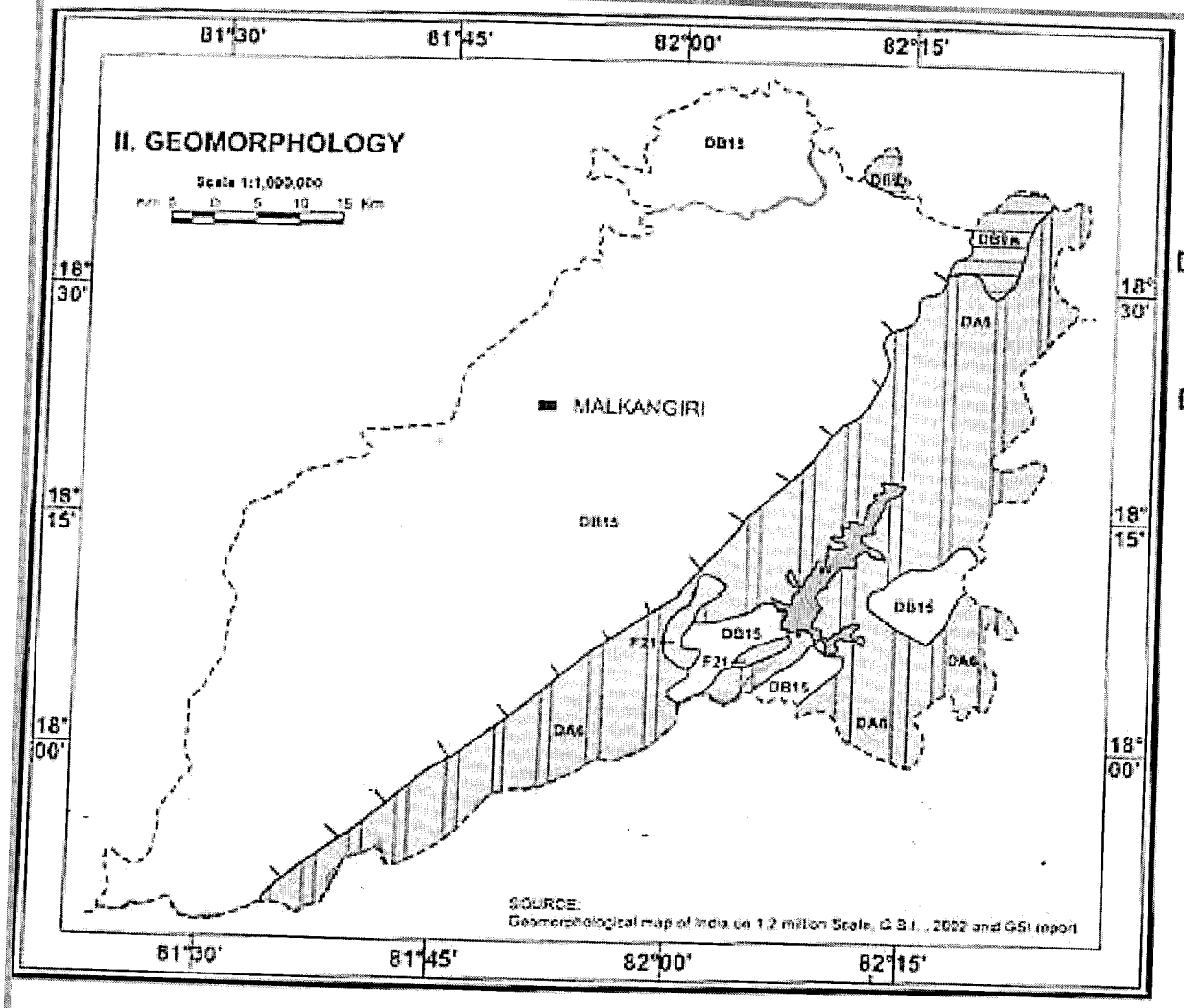


# GEOMORPHOLOGY

## I. UNITS OF DENUDATIONAL ORIGIN

**DENUDATION STRONGLY CONTROLLED BY STRUCTURE**

- DA6 — Ridges / Hills with or without valleys

**DENUDATION WITH MINIMAL CONTROL OF STRUCTURE**

- DB9a — Undissected Plateaus
- DB9b — Dissected Plateaus
- DB15 — Planation surface (Pediments / Pediplains and Peneplains)

## II. UNITS OF FLUVIAL ORIGIN

- F21 — Colluvial Footslopes

## GEOMORPHIC FORMS

**FORMS OF DENUDATIONAL ORIGIN**

- Escarpment

## FORMS OF FLUVIAL AND LACUSTRINE ORIGIN

- W — Waterbody
- River

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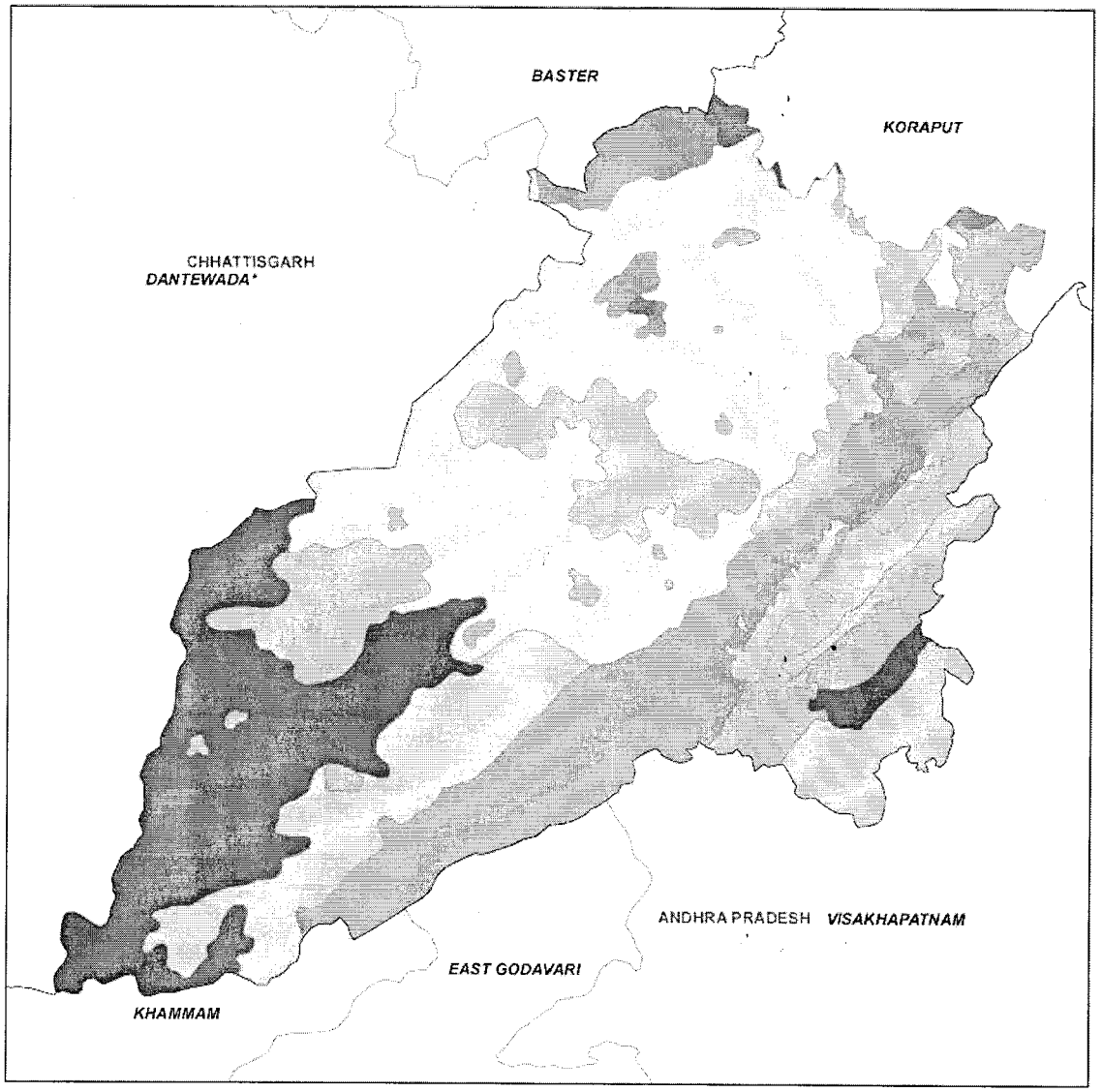
# DISTRICT ATLAS : MALKANGIRI

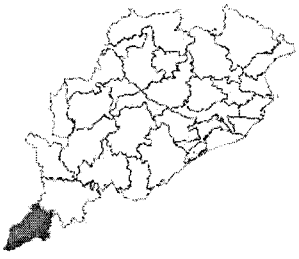



Legend

State Boundary

District Boundary

ORISSA



SOIL MAP

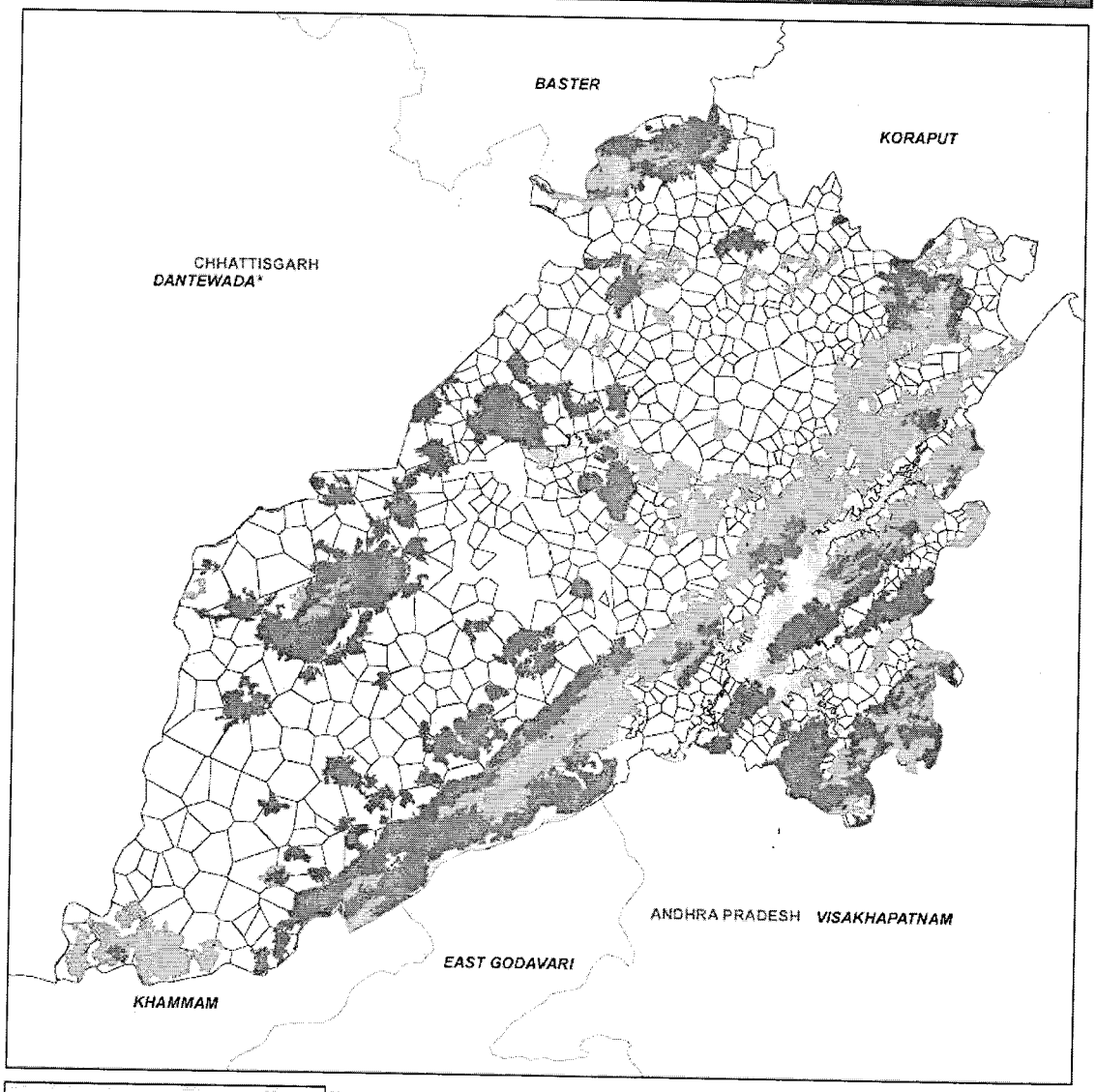
2

0 3.5 7 14 21 28 35 km

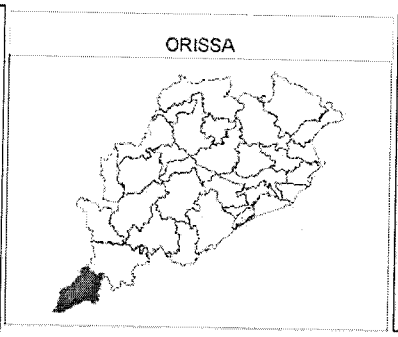
Source : SOI

Maps Composed by NIC

# DISTRICT ATLAS - MALKANGIRI




Legend
- Dense Forest
- Non Forest
- Open Forest
- Scrubland
- Waterbody
- State Boundary
- District Boundary
- VILLAGE BOUNDARY




FORECT MAP

2

0 3.5 7 14 21 28 35 km

Source : SOI

Maps Composed by NIC

DRAFT COPY