OFFICE OF THE COLLECTOR & DISTRICT MAGISTRATE: SUNDARGARH
(Mining Section)
E.mail ID- dm-sundargarh@nic.in

No. 85 /XV-1/2022, Dt. 25.03.2022

To

The Member Secretary,
State Level Environment Impact Assessment Authority (SEIAA)
Odisha, 5RF-2/1, Unit-IX, Bhubaneswar-751022

Sub: - Submission of District Survey Report (DSR) on Dolomite for grant of Environmental Clearance.

Sir,

With reference to the subject cited above, I am to say that the District Survey Report (DSR) on Dolomite has been prepared and approved for grant of Environmental Clearance. The said report has also been uploaded in the District Website and published in the notice board of Collectorate, Sundargarh for information of general public.

A copy of the District Survey Report (DSR) on Dolomite is enclosed herewith for favour of your kind information and necessary action.

Yours faithfully,

Collector & District Magistrate,
Sundargarh.

Memo No. 86 /Dt. 25.03.2022

Copy forwarded the Director Environment-cum-Special Secretary to Govt. F&E Deptt. Odisha, Bhubaneswar for favour of kind information.

Collector & District Magistrate,
Sundargarh.

DISTRICT SURVEY REPORT (DSR) OF SUNDARGARH DISTRICT, ODISHA ON DOLOMITE 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) SUNDARGARH, ODISHA JANUARY-2022

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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.

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The SEIAA/DEIAA and SEAC/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), Sundargarh*** 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 Sundargarh District(For Dolomite)in the year 2021. District Survey Report of Sand 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.

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01.INTRUDUCTION.

Sundargarh district forms the North western part of Odisha state. Sundargarh town is the district headquarter. Geographically, the district is not a compact unit and consists of widely dissimilar tracts of expansive and fairly open, dotted with tree, clad isolated peaks, vast inaccessible forests, extensive river valleys and mountainous terrain. Broadly speaking, it is an undulating tableland of different elevations broken up by rugged hill ranges and cut up by torrential hill streams and the rivers IB and Brahmani. The general slope of the District is from north to south. Because of this undulating, hilly and sloping nature of landscape, the area is subjected to rapid runoff leading not only to soil erosion but also to scarcity of water for both agriculture and drinking purposes. Brahmani, Sankh, Koel and IB are the major rivers flowing though this District. Covering a geographical area of 9712 sq.kms, Sundargarh District is the second largest District of the state, accounting for 6.23 percent of its total area. Out of this total area, forests cover 4232.57 sq km, this being the second largest in the state, accounting for 8.53 percent of the state total. Sundargarh is the southernmost district of Orissa.

Sundargarh is recognized as an industrial district in the map of Odisha. Steel Plant, Fertilizer Plant, Cement factory, Ferro Vanadium Plant, Machine building factory, Glass and china clay factory and Spinning mills are some of the major industries of this District. Sundargarh occupies a prominent position in the mineral map of Odisha and is rich in iron ore, limestone, manganese, dolomite, and fire clay. Major industries are the Odisha Cements ltd, Hart Fertilizers Ltd, and Odisha Industries Ltd. The industrial town of Rourkela in this District has the first government sector plant built with foreign collaboration and was the first in India to use LD oxygen technology.

Still, more than 50 percent of the people earn their livelihoods from agriculture and allied sectors. Sundargarh District is coming under the North Western Plateau Zone as per the agro climatic zone of Odisha. Soil group of the Sundargarh district is mixture of red and yellow soil. Out of the 3,13,000 hectares of cultivated land, 52 percent is upland, 30 percent is medium land

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and 18 percent is low land. As paddy is the main crop, 75 percent of the land is covered with paddy during Kharif. Due to limited irrigation facilities, 24 percent land is irrigated during Kharif and 8 percent of land is irrigated during Rabi.

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02. OVERVIEW OF MINING ACTIVITY IN THE DISTRICT.

Other than ordinary stone & Sand a great variety of major mineral potential like Coal, Iron Ore, Manganese, Bauxite, Limestone and Specified Minor Minerals like Dolomite, Quartz, Pyroxenite & Decorative Stone (Granite) are available in the district.

As there are a major number of mines present within the district so there are two Deputy Director Mines Circles within the district i.e. DDM Koira & DDM Rourkela

The over view mining data provided by *DDM Rourkela* is as follows;

Sl No.	List of Mines	Different of Minerals with area		Name of the lessee	Period of validity	Remarks
1	Basundhara	Coal	214.300	M/s M.C. Ltd	--	Working
2	Kulda	Coal	854.320	M/s M.C. Ltd	--	Working
3	Garjanbahal	Coal	653.828	M/s M.C.Ltd	--	Working
4	Dulinga	Coal	762.420	NTPC	--	Working
5	Manoharpur	Coal	652.8853	OCPL	08.05.2047	Working
6	Dharuara-Kukuda	Limestone & Dolomite	39.42	Sri R.A.Jalan	20.02.2024	Working
7	Biramitrapur	Limestone & Dolomite	793.043	BSL Co. Ltd	31.03.2020	Working
8	Tunmura	Limestone & Dolomite	64.308	Sri V.K.Lall	31.03.2020	Working
9	Tunmura-Jharbeda	Limestone & Dolomite	87.906	Sri V.K.Lall	31.03.2020	Working
10	Gomardih	Dolomite	372.796	TATA Steel Ltd.	31.03.2020	Working
11	Lanjiberna	Limestone & Dolomite	873.057	M/s OCL India Ltd.	29.02.2040	Working
12	Khatkurbahal & Kulenbahal	Limestone & Dolomite	72.439	M/s Shiva Cement Ltd.	14.01.2042	Working
13	Timna	Decorative Stone	11.93	M/s ARC Resources	08.01.2048	Working w.e.f.24.11.2018
14	Banki	Dolomite	26.285	Sri A.N.Patnaik	11.05.2026	Non-working w.e.f.01.04.2019
15	Minmina-Satara	Dolomite	33.492	M/s Bijaya Aditya Mines	12.02.2028	Non-working w.e.f.05.12.2018
16	Banarai	Dolomite	9.324	G.C.Rout	02.09.2022	Non-Working
17	Alanda	Limestone & Dolomite	45.555	M/s B.D.Patnaik Mineral Pvt.Ltd.	16.01.2015	Non-Working

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18	Raiboga	Limestone & Dolomite	33.104	M/s Chariot Steel & Power Pvt. Ltd.	08.03.2027	Non-Working
19	Telighana Mines	Limestone & Dolomite	106.833	M/s Om Ganesh Minerals	03.01.2012	Non-Working
20	Purunapani	Limestone & Dolomite	230.525	SAIL	31.03.2020	Non-Working
21	Katang	Limestone & Dolomite	52.236	R.V.Enterprises	--	Non-Working
22	Badakuchulu	Limestone & Dolomite	64.993	R.V.Enterprises	10.12.2034	Non-Working

The over view mining data provided by *DDM Koira* is as follows;

Information on Mining Leases with Lease Validity under Koira Mining Circle					
Sl No	**List of Mines**	**Mineral with Area (in ha.)**		**Name of the Lessee**	**Lease Validity**
		Minerals	**Area (ha)**		
1	2	3	4	5	6
ML Case					
1	Bandhal Mn Mines	Mn	28.0207	Kanakdhara Mining & Minerals (P) Ltd.	13.03.2022
2	Nuagaon Iron & Mn Mines	Iron & Mn	29.257	Prabodh Mohanty	10.05.2019
3	Jamirdihi	Pyroxenite, Quartz, Quartzite, Dunite etc.	50.646	Indian Marble Company	03.07.2023
4	Bhanjapali Iron Mines	Iron Ore	18.00	J N Patnaik	31.03.2027
5	Patabeda Iron Mines	Iron Ore	14.00	M/s M G Mohanty	07.03.2026
6	Patabeda Iron Mines	Iron Ore	28.397	MGM Minerals Ltd.	07.03.2026
7	Bhanjapali Mn Mines	Mn Ore	65.710	R S Sindhu	10.01.2067
8	Oraghat	Mn Ore	11.485	S A Halim	23.09.2027
9	Adaghat	Iron Ore	15.074	National Enterprises	11.01.2067

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10	Kadalia, Sanrusibenua, Basada in Sundargarh District; & Pirapokhari & Handibhanga in Keonjhar District	Iron Ore	874.290	Nilachal Ispat Nigam Limited	10.01.2067
11	Gonua & Mandajoda	Iron & Mn	12.080	B C Dagara	02.05.2025
12	Dalita	Iron & Mn	22.165	B C Dagara	07.09.2023
1st RML Case					
13	Koira	Iron	90.143	Essel Mining & Industries Ltd.	26.08.2021
14	Sanindpur	Iron/Buxt.	147.1	Rungta Sons (P) Ltd.	05.09.2035
15	Raikela	Iron	207.113	Jindal Steel & Power Ltd.	24.05.2035
16	Tantra	Iron	72.56	Korp Resources (P) Ltd.	21.11.2035
17	Patabeda	Iron/Mn	19.425	M/s M.G. Mohanty	02.04.2036
18	Raikela & Tantra	Iron	49.372	PTA Ltd.	02.12.2036
19	Oraghat	Iron	82.961	Rungta Sons (P) Ltd.	09.12.2032
20	Raikela	Iron	18.315	S.N. Mohanty	02.04.2032
21	Gonua	Iron/Mn	13.796	S.N. Mohanty	05.06.2020
22	KJST (Jaldihi)	Iron/Mn/Buxt.	188.268	S.N. Mohanty	19.01.2037
23	Toda RF	Iron	77.94	SAIL	28.04.2030
24	Kusumdihi	Mn/Bux.	52.176	B.I.Co. Ltd.	31.03.2020
25	Kamanda	Bauxite	43.067	Rungta Sons (P) Ltd.	25.02.2035
26	Sarkunda	Iron/Mn	393.556	Feegrade & Co. (P) Ltd.	31.03.2020
27	Raikela	Iron	67.586	Geetarani Mohanty	01.07.2041
28	Rantha	Iron	408.8731	OMC Ltd.	30.12.1998
29	Kashira	Iron	418.355	OMC Ltd.	12.10.2026
30	Kanther Koira	Iron/Mn.	13.270	B.S.Mishra	19.09.2002
31	Raikela	Iron Ore	69.606	C.P. Sharma	16.04.2006
32	Kulijhar	Quartzite	24.167	JK & KP Jhunjhunwala	07.07.2001
33	Gonua	Iron/Mn	12.56	K.C. Pradhan	14.03.2011
34	Nuagaon	Mn	39.89	K.C. Pradhan	18.10.2004

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35	Jaldihi & Tantigram	Iron/Mn/Bux.	29.575	K.J.S. Ahluwalia	23.07.2011
36	Gonua	Iron/Mn	23.30	K.J.S. Ahluwalia	15.07.2008
37	Kusumdihi	Mn	47.486	Kavita Agarwal	27.03.2004
38	Raikela	Iron	45.932	National Enterprises	20.12.2033
39	Bhanjapali & Koira	Iron	141.235	OMC Ltd.	06.05.2012
40	Kusumdihi	Bauxite	102.79	ORIND	31.07.1997
41	Tantra, Bandhal & Rengua	Buxt./Iron/Mn	106.128	P.D. Agarawal	07.07.2011
42	Raikela	Iron	14.933	S.D. Sharma	20.01.2012
43	Nuagaon	Iron/Mn	12.542	S.D. Sharma	06.05.2005
44	Toda RF	Iron	3.34	SAIL	17.01.2004
45	Tantra	Bauxite	117.44	SAIL	17.08.1989
46	Patmunda	Mn	81.197	Sun Alloys & Minerals (P) Ltd.	11.02.2006
47	Teherai-Sonua	Iron/Mn	29.076	Tarini Meinerals	25.12.2000
48	Nuagaon	Mn	7.85	Tarini Menerals	25.02.2000
49	Kamanda	Mn	60.7	U.C. Mishra	07.08.2008
50	Gonua	Iron/Mn	129.179	Zenith Mining (P) Ltd.	22.10.2001
51	Bhaludunguri	Soap Stone	155.43	Shiv Dutt Sharma	02.12.2004
52	Sanindpur	Iron/ Mn	70.917	National Enterprises	09.09.2020
53	Oraghat	Iron /Mn	25.847	S A Halim	08.04.2018
2nd RML Case					
54	Kurmitar Pahar	Iron	651	OMC Ltd.	28.04.2035
55	Barsuan	Iron	2486.382	SAIL	05.01.2030
56	Kalta	Iron		SAIL	
57	Taldihi	Iron		SAIL	
58	Bhaludunguri	Soap Stone	110.479	J.C. Budharaj	21.03.1993
59	Gonua	Iron/Mn	83.151	M.G. Mohanty	29.11.1991
60	Gonua	Iron/Mn	86.886	P.K. Ahluwalia	31.03.2020
61	Toda RF	Iron	25.981	SAIL	16.01.2025
3rd & 4th RML Case					
62	Narayanposhi	Iron/Mn	399.838	A.M.T.C. Ltd.	31.03.2020
63	Mahulsukha	Mn	349.839	A.M.T.C. Ltd.	31.03.2020
64	Nadidihi	Iron/Mn	73.855	B.I.Co. Ltd.	31.03.2020
65	Teherai	Iron/Mn	137.46	B.I.Co. Ltd.	31.03.2020
66	Nadidihi	Iron/Mn	121.405	Feegrade & Co. (P) Ltd.	31.03.2020
67	Kolmong	Mn	218.53	Rungta Mines Ltd.	31.03.2020
68	Kanther-Koira	Mn	73.653	Rungta Mines Ltd.	31.03.2020

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69	Khajurdihi (C-Block) Mandajoda (A-Block) & Dalita (B-Block)	Iron/Mn	Block-A: 55.605 Block-B: 32.375 Block-C: 31.566	Matadin Sharda	30.08.1987
70	Kusumdihi	Mn	31.549	O.M. & M Ltd.	31.03.2020
71	Sanpatholi	Mn	23.29	O.M. & M Ltd.	31.12.1999
72	Orahuri	Mn	51.476	O.M. & M Ltd.	31.03.2020
73	Patmunda	Mn	807.316	O.M. & M Ltd.	31.03.2020
74	Tentulidihi & Dengula	Mn	35.61	O.M. & M Ltd.	31.12.1999
75	Bhanjikusum	Mn	8.498	O.M. & M Ltd.	31.03.2020
76	Malda	Mn	822.00	Tata Steel Ltd.	(RML applied up to 12.08.2030)
77	Sarkunda	Mn	160.90	EMI Ltd.	03.12.2002

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03. GENERAL PROFILE OF THE DISTRICT.

Sundargarh District was constituted on the 1st January, 1948, out of the two ex–States of Gangpur and Bonai, which merged with Odisha on that day. True to its name, this beautiful District of Sundargarh with about 43 percent of its total area under forest cover and numerous colourful tribes dotting its landscape and with abundant mining potential is bounded by Ranchi District of Jharkhand on the North, Raigarh District of Chhatisgarh on the west and North West, Jharsuguda, Sambalpur and Angul Districts of Odisha on the South and South East and Singhbhum District of Jharkhand and Keonjhar District of Odisha on the east.

Sundargarh is recognized as an industrial district in the map of Odisha. Steel Plant, Fertilizer Plant, Cement factory, Ferro Vanadium Plant, Machine building factory, Glass and china clay factory and Spinning mills are some of the major industries of this District. Sundargarh occupies a prominent position in the mineral map of Odisha and is rich in iron ore, limestone, manganese, dolomite, and fire clay. Major industries are the Odisha Cements ltd, Hart Fertilizers Ltd, and Odisha Industries Ltd.

Sundargarh District has 3 sub divisions, 16 Tehsils, 17 Blocks and 262 Gram panchayats. Topographically, this district is located between latitude 21 degree 36' N to 22 degree 32' N and longitude 83 degree 32' E to 85 degree 22' E. The population of this District is 2,080,664, this being the fifth most populous District of the state. Its rural population exceeds twelve lakhs and the urban population is more than six lakhs. The male literacy rate is 82.13 and female literacy rate in the District is 65.93.

The climate of this District is characterized by extremely hot summers and cool winters. Climate is hot & moist sub humid. Normal rainfall of the District is approximately 1230 mm, but there is a deviation in receipt of rainfall pattern which is influencing crop production.

The education circle of Sundargarh revenue District was bifurcated from Sundargarh to Sambalpur education circle and came to existence since

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1968 with area of operation within the geographical territory of Sundargarh revenue District. There are several educational institutions in Sundargarh District. National Institute of Technology NIT at Rourkela, Government college Rourkela, S.G. Women's College Rourkela etc are prominent among them.

Sundargarh District celebrates many festivals around the year. Important festivals of the District are Nuakhai, Rath Yatra, Ramanavami and Nama Sankirtana. Nama Sankirtana is a form of worshipping Lord Krishna and Lord Rama in a gathering.

Sundargarh District is one of the tourist attraction spots of Odisha. The District is visited by a large number of tourists round the year. Places like Rourkela, Vedavyasa, Manikmonda, Mandindra dam, Ghogar, Khandadhar and Darjeeng are the important tourist spots of the district.

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04. GEOLOGY OF THE DISTRICT.

Physiography

Being the part of the Chhota- Nagpur Plateau, major parts of the district has rough and hilly terrain and rich in mineral resources as well. Hills of Sundargarh district may be classified in to three broad categories, Bonai hills, Sundargarh hills, Biramitrapur hills. The Bonai hills which further elongate into the Keonjhar district are known for their iron ore resources, whereas Sundargarh hills famous for coal deposits, which further elongate into Jharsuguda district and Chhatisgarh state as well.

The hills are mainly extensions of the Deccan and Chhota-Nagpur Plateau. In Sundargarh and Panposh Sub-Divisions there are mainly three hill ranges apart from a few isolated outcrops. The one, in the reserved forest blocks of Mahabir Chhatam, Topkurlu, Bhaismunda and Chirobeda on the South-East forming the boundary between Sambalpur and this district, runs East-West direction. The second, in the centres starts from Gurabasa reserved forest in South-West to North-East direction and runs through Kumbahal, Runga, Peruabhadi, Panchara and Brahmani reserved forest ending near the Sankha River. The third, on the western border of the district running South-East to the North-West direction is an extension of the wide range of hills forming the watershed between the river Mahanadi and her affluent IB. Thus these mountain ranges seem to have started from a point in the middle of the southern boundary of the district and outflanking in three different directions divide the country into separate plains.

The Hemgir plateau is flanked by a system of mountain which starts from Garjanjore (1966' or 599m.) and runs due South-East up to Bendrichuan (1343' or 409m.). There is an abrupt swing near the latter due West up to the water parting between the Garjhor and the Jhulenbar after which there is again a gentle bend due North-West up to the border of Raigarh district.

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Among the ridges mention may be made of the great ridge, an extension of the Karampada range of Singhbhum , which apparently seems to be the spine of the Toda area in East Bonai. It extends from North-East to South-West and is capped with an immense deposit of high grade hematite. The Rontha plateau (2500'-3000' or 762-914m) from which descends Khandadhar water fall is also covered with iron ore. The Bichakhani hill yields millions of tones of iron ore which feed the Rourkela steel plant. A new railway line has been laid to the foot of the hill at Dumaro for transportation of the iron ore.

The territory covered by Sundargarh and Panposh Sub-Divisions (comprising the ex-State of Gangpur) consists of a long undulating table-land about 700ft. (213) above the sea level dotted with hill ranges and isolated peaks of considerable height. On the West of Sundargarh Sub-Division lies the Hemgir Plateau, nearly 1150 ft (351m) high, in the centre of which is located the village Hemgir. To the North of Hemgir the land is considerably hilly while to the South it is relatively plain with a minimum elevation of 709 ft (516m) near the Chuanbahal village. The eastern tract of the Sub-Division intervening between Chota Nagpur plateau and Mahavir range, for the most part, is open and well cultivated, the general elevation of which varies from 700' to 1000' (213m TO 305m) but that of the reserved forests except, of course, a few patches, comes under 1000' to 1500' (305m to 457m). Besides, numerous isolated hills and sharp ranges running generally East to West are also evenly distributed throughout the country. On the North the Chota Nagpur plateau with its foot-hills gradually falls away to the plain while the Mahavir range in the South, springs abruptly in an irregularly wall of tilted and disrupted rock and forms for some length the boundary between Sambalpur and this district. On the southern border, dense forests linking up with the forest-clad ranges of Bonai Sub-Division are also seen. Didhrapahar, the highest peak 2509' (765m) of Sundargarh Sub-Divisiion is located near the tri-

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junction of Sundargarh Sub-Division , Bonai Sub-Division and Sambalpur district.

The block to the North formed by the broad valleys of the Sankh, the South Koel and the Deo, although interspersed with isolated hills and series of small ridges striking East and West, is generally plain, but the tract to the South is comparatively more hilly and wooded expecting the valley of the Brahmani which extends to an appreciable distance South of Panposh. The region extending from South of Bisra to South of Chirobeda is much broken and hilly, it raises along the Singhbhum and Bonai boundaries to an elevation of 1800' to 2000' (549m) to (610M) the highest peak being Bhaisamunda Pahar 2234' (681m). In the plains the elevation is about 600' to 700' (183m to 213m) the lowest point on the Brahmani vally on the Bonai border near Banki village being 575' (175m). The land is completely denuded of its fertility and is unsuitable for cultivation.

The principal peaks are Mankarnacha (3664ft or 1117m) and Badamgarh (3525ft or 1074m), both on Keonjhar boundary, Kumritar (3495ft or 1065m), the Bichakani (2964ft or 903m), and Khandadhar (3000ft or 914m), all in Bonai Police Station, Rengalbera (2179ft or 664m) in Banki Police Station, Baghbindha (2650ft or 808m), Raipiri (2620ft or 799m) and the Kantamunda (2524ft or 769m), all in Gurundia Police Station, Chelliakota (3331ft to 1015m), in Mahulpada Police Station, Balia (3313ft or 1010m) and the Karaspani (2483ft or 757m), both in Koira Police Station. All the above peaks are in Bonai Sub-Division, Besides, some unnamed peaks of considerable heights are also found. No hills of any significant height are found in Panposh Sub-Division. Among the peaks in Sundargarh Sub-Division mention may be made of Man (1935ft or 590m) on the Madya Pradesh border, Satparlia (1327ft or 404m) and Jogijogan (1471ft or 448m), both in Sundargarh Police Station, Mahabir (1861ft or 567m) in Bargaon Police Station, Didra (2509ft to 765m) in Rajgangpur Police Station on the trijunction of Bonai and Sundargarh

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Sub-Divisions and Sambalpur district. Other peaks on the Didra range are Bhaisamunda (2234ft or 681m) and Kichimir (2050ft or 625m). The last named peak is also in the Rajgangpur Police Station. Andiabira (1455ft or 443m) and Bilpahari (1333ft or 406m) are among the less prominent peaks.

GEOLOGY-

Sundargarh District is part of Gangpur Group, South Singhbhum Granite-Iron Ore Series as per the studies done by several Geologists namely J. A. Dunn, Sarkar & Saha, M.S. Krishnan etc at different times.

Part of sundargarh district under reference represents a part of the Archean complex with deformed meta sediments belonging to the Biramitrapur limestone and dolomite belt in Gangpur group of Precambrian age. The litho units encountered in the area includes Quartzite, Quartz-mica-schist, slates and phyllite, limestone and dolomite, Gondite and Epidiorite, Quartz veins traversing the Gangpur group of rocks represent a phase of later geological activity. Laterites which are commonly seen in the area have been resulted from a process of residual weathering. These group of rocks are separated from the quartzite and quartz schists of the iron ore group by the persistent zone of crushed quartzite and conglomerate (Raghunath Palli Conglomerate) to the south.

To the west of the Singhbhum district, in Gangpur (now called as Sundargarh), there is an anticlinorium or geanticline which has an ENE-WSW axial direction. The structure is closed towards the east but is cut up and obscured by granitic intrusive to the west. The strike becomes WNW-ESE in eastern Gangpur, in conformity with and influenced by the structural trends of the Mahanadi & Brahmani valleys just to the south and southwest of this region.

The anti-clinorium shows the following succession of rocks, as worked out by Krishnan and named by him Gangpur Series.

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Iron-ore Series (?)	Phyllites, Slates and Lavas
	Raghunathpali Conglomeretate
----------Shear zone----------	
Gangpur Series	Phellytes and Mica –schists
	Upper Carbonaceous Phyllites
	Calcitic Marbles
	Dolomitic Marbles
	Mica-schist and Phyllites
	Lower Carbonaceous Quartzites and Phyllites
	Gondites with associated Phyllites
	Base not seen

Regional Structural Set-up- There is a general increase in the grade of metamorphism when the rocks are followed from the Singhbhum boarder on the east to the centre of the anti-clinorium on the west. It should, how ever, be noted that some of the rocks , which have phyllitic appearance and characters, are really products of retrogressive metamorphism, containing relics of garnet, stourolite, biotite etc. The Satpura strike (ENE-WSW) is found to be superimposed on an earlier , presumably Eastern Ghats, strike which is prominent.

Several large scale and many minor scale faults occurs in the area. Most of them are the block fault type.

The oldest rocks are Gondites found in the central or axial region of the anticlinorium. They contains, besides quartz-spesartite rocks, also those with rhodonite, blandfordite, winchite etc., associated with workable bodies of manganese ore. They are succeeded by carbonaceous quartzite and phyllites, dolomitic and calcitic marbles and carbonaceous phyllites , these being intercalated with phyllites and mic-

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schists. The carbonaceous phyllites are flaggy slaty in certain places while the marbles contains very large reserve of good limestone & dolomite which are now being used as fluxes in the irons-smlenting furnaces of Odisha, Bengal, Jharkhand & Bihar. Large quantities of the limestones also burnt in to Quick-lime well known in the Calcutta market as Bisra lime , named after Bisra railway station near the Singhbhum-gangpur boarder . At the top of the succession is a shear zone in which the Raghunathpali Conglomerate is involved. It is a sedimentary conglomerate which has suffered intense shearing as a result of which an autoclastic character has been imposed in it. The over lying beds are phyllites and mica-schists belonging to some parts of the Iron ore Series. The Gangpur Series is intruded by basic sills(Dalma traps) and by the bosses of the Chhota Nagpur granite. The basic rocks have been converted in to schistose , amphibolites and epidiorites containing amphibole , clinozoisite and magnetite.

Radiometric age dating of biotite etc from three different horizons in the Gangpur Series has given ages of 910 MY to 990 MY indicating that the rocks were folded and metamorphosed at the time of folding of the rocks north of the Copper Belt and the intrusion of Chhota Nagpur granite gneiss. This needs conformation by future work.

J. A. Dunn remapped parts of the Iron-ore Series of South Singhbhum and re-interpreted the succession. He thought that the older metamorphosed by the SINGHBHUM GRANITE. The conglomerates and sandstones south of Chaibasa were assighed to the lower part of the KOLHAN SERIES, which include also limestone and shales. These limestones are worked near Chaibasa for cement manufacture. This series lies partly on the Singhbhum Granite, but is much younger then the iron-ore Series

Based on the presently available knowledge, the succession in Singhbhum will be as follows :

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Newer dolerite

Soda granite and Cu-U mineralization

Chota Nagpur Granite-Gneiss

Dhanjori Orogeny (Singbhum Orogeny of Sarkar and Saha)

Dalma and Dhanjori lavas

Dhanjori Stage (Kolhan Series)

Singhbhum Singbhum granite
Orogeny (Iron-ore Orogeny Sarkar and Saha)
Iron-ore Series

The geology of the area north of the Singhbhum thrust zone and east of the large Singhbhum granite exposure has been described by Sarkar and Saha(1962) and iyengar and Alwar(1965).According to the latter authors, a geosyncline developed to the north and east of the Singhbhum granite craton, in the Dhanjori and Dalma areas. The Basal quartzite-conglomerates in this basin are followed by black carbonaceous phyllites and aturbidite sequence which is overlain and intercalated with submarine volcanic flows and tuffs. Marginal factures in the Mayurbhanj and Dhanjori areas were intruded by gabbro-anorthosites accompanied by vanadiferous magnetite lenses and pyroxene-granulite granophyre. A quartzite conglomerate horizon occurs above the carbonaceous phyllites. This geosyncline was the subjected to folding and intrusion of granites,viz.,the ROMAPAHARI GRANITE in Mayurbhanj, the CHAKRADHARPUR GARNITE IN Ghatsila region and the Soda-Granite in the Singhbhum shear zone. The Dhanjori geosyncline contains some 9,000 m of sediments but the thickness is about 4,500 m to the north of the shear zone. The cratonic region also experienced intrusion of ultrabasic lenses and dykes of Newer Dolerite. These authors also believe that the Mayurbhanj iron formation is older

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than the Iron-ore Series of Keonjhar-Bonai and that the sequence found to the north of the Singhbhum Copper Belt shear is younger than the Iron-ore Series as it the same as, and continuous with, that in the Dhanjori syncline.

The sequence in north Singhbhum and in Dhanjori and Mayurbhanj may now be given as below:

Romapahari (Mayurbhanj),Kuilipal (Dhanjori) and Arkasani Soda-Granite (shear zone),all
Syntectonic
"Dhanjori orogeny" (Singhbhum orogeny of Sarkar and Saha)
Pyroxene granite-granophyre
Gabbro-anorthosite (V magnetite in places)
Spilitic Laveas and quartzite (Dhanjori and Dalma Lavas)
Turbidite sequence with quartz-conglomerate
Black phyllite
Conglomerate
----------Unconformity----------
Singhbhum Granite, mostly syntectonic
"Singhbhum orogeny" and folding of Iron-ore Series (-Iron-ore Orogeny of Sarkar and Saha)
Iron-ore Series of S. Singhbhum -Keonjhar-Bonai

Sarkar and Saha called the mountain building movements which followed the deposition of Iron-ore Series and which was accompanied by the intrusion of the Singhbhum Granite as "Iron-ore Orogeny". It would most appropriately be called the SINGHBHUN OROGENY, particularly as Iyengar and Alwar have now designated the one following the Dhanjori-Dalma assemblage of rocks as DHANJORI OROGENY.

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Intrusive into the Iron-ore Series are ultramafic rocks, the Chota Nagpur Granite-Gneiss, Singhbhum Granite, the Arkasani Soda granite and dykes of Newar Dolerite.

Ultramafic Rocks.—In South Singhbhum there is a patch of altered peridotitic rock near Nurda which may be pre-Singhbhum in age. To the same ago may belong the chromite bearing rocks (saxonite, lherzolite etc.) found near Chaibasa. The chromite bodies in them have been worked for nearly 50 years.

The gabbro-anorthosites associated with lenses of vanadiferous magnetite in East Singhbhum and the pyroxene-ricbeekite-granite-granophyre of Simlipal in Mayurbhanj belong to the period of development of marginal fractures along the Dhanjori geosyncline, prior to the Dhamjori Orogeny and the emplacement of the Romapahari and Kuilipal Granites. These granites appear to be a later age, probably contemporaneous with the formation of the shear zone and its mineralization by copper and uranium bearing fluids

The Chota Nagpur Granite-gneiss occupies an immense tract to the north of the Dharwarian rocks of Singhbhum and Gangpur. The northern belt of this extends from Santhal Parganas through Hazaribagh to Palamau and the southern one from Bankura to Ranchi and Jashpur and farther west. It is distinctly intrusive into the Iron-ore Series and assumes a banded and composite aspect near the margins of the schistose rocks, as for example along the Gangpur-Ranchi border. It is generally coarse and porphyritic and contains quartz, microcline orthoclase, oligoclase, biotite, a little apatite (and occasionally some green hornblende, in Singhbhum).Tourmaline is frequently seen but especially abundant in the pegmatite phase as in Southern Ranchi. In parts of Manbhum, Ranchi and Hazaribagh, it weathers into tors and is called the Dome Gneiss. The composite form of the rock used to be referred to as the Bengal Gneiss in earlier geological literature. Its later

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phases are pegmatites, aplites and quartz veins, the last being often auriferous in Chota Nagpur.

Singhbhum Granite.-This great batholithic mass occupies an area of several hundred sq. km. in Singhbhum , Keonjhar and Mayurbhanj from Chaibasa in the north and to beyond Keonjhargarh in the south. According to A. K. Saha, who has made a detailed study of the northern part of this mass, it consists of a series of domed up intrusions varying in composition from biotite-granodiorite to adamallite,biotite-trondjhemite and leucogranite. The margins are hornblendic, chloritic or epidotic granodirites and pyroxene-diorites derived by the granitisation of the country rocks. The main mass shows distinct N.-S. or N.N.W.-S.S.E. foliation which tends to become parallel to the margin of the country rocks. A few patches unassimilated older basic rocks and quartzites occur in the granite. The common granodioriti consists of perthitic microcline (20 to 30 per cent Ab.) with oligoclase-andesine (12 to 28 per cent An.), Quartz, biotite, Subordinate muscovite and chlorite. The accessory minerals are epidote, sphene, zircon, apatite and rutile. The marginal structures have been controlled by the country rocks, while the central portions show evidences of forceful intrusion. The granite is traversed by numerous dykes of NEWER DOLERITE. Iyenger and Alwar believe that the bgranite, especially near its eastern margin, may contain younger intrusive units belonging to the Dhanjori orogeny which appears to be contemporaneous with the Satpura orogeny of the Bihar Mica Belt (950-1000 M.Y.) associated with intrusion of granite and mica bearing pegmatites.

The Arkasani Soda-granite—This rock, which is granophyric in part,is found along the thrust zone of the Copper Belt In several places. It varies from a feldspathic schist to a fairly coarse-grained granite, the former often showing thin bands and streaks of mafic minerals. Granophyric texture is fairly common in some exposures. The typical rock contains partly altered plagioclase, quartz, muscovite, biotite and grains of magnetite and apatite. Sericitisation make up the epidotisation of the feldspars is common. The first two minerals make up the bulk of the rock. It is regarded as having been

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formed from the granitization and replacement of muscovite-quartz-schists which originally occupied much of the thrust zone. Radiometric dating seems to show that it is approximately of the same age as the mica bearing pegmatites of Bihar (about 950 M.Y.)

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05. DRAINAGE AND IRRIGATION PATTERN.

Sundargarh district is a physically hilly terrain having majorly dendritic drainage pattern to sub-parallel, there are two main rivers named IB River & *Brahmani River. Brahmani river* along with its tributaries, the Sankha & koel Rivers flows within the district. There are few other small rivers flows within the district. The Brahmani River originates from the vedavyas at Rourkela within Sundargarh district. 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 the above River is moderate, while in rest small rivers within the district the rate of deposit is slow.

Additional river source details are given in the following table

DRAINAGE SYSTEM WITH DESCRIPTION OF MAIN RIVERS

Sl No.	Name of the River	Area Drained (Sq. Km)	% Area Drained in the District
1	IB	7623.00	38.16
2	Madalghat Nallah Sukhajore	27.00	100.00
3	Safai	1102.25	100.00
4	Ustalli Nallah	50.00	100.00
5	Gahirajore Nallah	45.00	100.00
6	Sarswati Nallah	26.00	100.00
7	Ichha	400.00	100.00
8	Sankha	10835.00	12.69
9	Koel	12230.00	9.57
10	Badjore Nallah (Sankh)	35.00	100.00
11	Deo Nallah	132.00	31.50
12	Brahamani River	26190.00	11.93
13	Siudhi Nallah	18.50	100.00
14	Kuradi Nallah	32.00	100.00
15	Amruti Nallah	42.00	100.00
16	Saplata Nallah	22.00	100.00
17	Rukura Nallah (Down stream of Rukura Reserver)	32.00	100.00

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

The best cultivated lands of Sundargarh are located along the valleys of the two main rivers, the Bramhani and IB and their tributaries viz., the Sankha the Koel, the Safai, the Ichha etc. The cultivable area of the district is 6,72,000 hect., out of which percentage of land under highland, medium land and low land are respectively **0%, 27.7%** and**22.3%.** As in 2011, the net area sown in the district was **3,32,056** hect., which constitute 49.4% of the gross cultivable area. The land use pattern of the district out of the surveyed area of 715280 hect. and 715256 hect. In 2009-10 and 2010-11 respectively, is given in the following table. The detailed Block and ULB-wise land use pattern is elaborated in TABLE.

Year	**2009-10**		**2010-11**	
Land use	**Area in Ha**	**% of surveyed area**	**Area in Ha**	**% of surveyed area**
Forest	176151	24.63	152013	21.25
Land put to non-agriculture use	67568	9.45	72033	10.07
Barren and non-cultivable land	60788	8.50	63222	8.84
Permanent pastures and other grazing land	35324	4.94	34230	4.79
Land under Misc. tree crop & grooves, not included in net area sown	1484	0.21	2206	0.31
Cultivable waste	40313	5.64	45154	6.31
Old fallows	48007	6.71	54575	7.63
Current fallows	64937	9.08	61549	8.61
Net area sown	220708	30.86	230274	31.19

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Forest:

There are three forest divisions in the district namely, Sundargarh Forest Division, Rourkela Forest Division, Bonai Forest Division.

As per the data provided by the ***Divisional Forest Officer Cum Wild Life Warden, Rourkela*** Forest Division; the land use in the division is as follows

forest area cover (1) Proposed Revenue Forest U/s-4 OFA, 1972=2143.199 ha. (14 nos), (2) Demarcated Protected Forest=3919.42 (38 nos), (3) Un Demarcated Protected Forests=15929.713 ha (269 nos), (4) Village Forest=229.176 ha (35 nos),(5) Un-Classed Forest=29.869 ha Total Forest Area in Rourkela Forest Division 22251.377 ha.

Out of 22251.377 ha, an area of 157.108 ha of forest land has been diverted for non-forestry purpose. The detail of diverted forest land is furnished below.

Sl No	Purpose for diversion	Forest Area diverted in ha.	No. of Project in Nos
1	2	3	4
1	Industry	24.34	1
2	Transmission	28.801	3
3	Road	77.796	3
4	Water Supply	1.25	1
5	Railway	17.87	1
6	Pipeline	7.051	1
	Total:	**157.108**	**10**

As per the data provided by the ***Divisional Forest Officer, Sundergarh*** Forest Division; the land use in the division is as follows

Forest Division the forest area cover (1) 94 nos. of Revenue Forest Blocks=101186.87 ha (2) 26 nos. of Proposed Revenue Forest U/s-4 OFA, 1972=5580.80 ha. (3) 92 nos. of Demarcated Protected Forest=14876.84 ha.(4) Un Demarcated Protected Forests=45342.23 ha. (5) Village Forest 146 nos. =1048.10 ha,(6) Un-Classed Forest= 80.43 ha (7) Land having Forest growth=3939.15 ha. Total Forest Area in Sundargarh Forest Division =172054.42 ha.

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Out of 172054.42 ha, an area of 2225.0015 ha of forest land has been diverted for non-forestry purpose. The detail of diverted forest land is furnished below.

Sl No	Purpose for diversion	Forest Area diverted in ha.	No. of Project in Nos
1	2	3	4
1	Mining	1264.943 ha.	9 nos.
2	Transmission	543.679 ha.	18 nos.
3	Road Project	85.987 ha.	3 nos.
4	Railway Project	270.642 ha.	5 nos.
5	Irrigation Project	21.921 ha.	2 nos.
6	Other	37.84 ha.	4 nos.
	Total	1954.37 ha.	41 nos.

Against the total diverted land 2980.171 acers has been identified for raising Compensatory Afforestation.

As per the data provided by the ***Divisional Forest Officer, Bonai*** Forest Division; the land use in the division is as follows;

Total 203268.864 ha of forest area cover in Bonai Forest Division, Details of Category-wise forest area cover in this division is furnished below;

Sl No	Category of forest	Number	Area(ha)
1	RF(Reserve forest)	45	102894.567
2	PRF(Proposed Reserve forest)	41	34105.896
3	VF(Village forest)	32	166.790
4	UDPF(Un-demarcated Protected forest)	406	37291.831
5	DLC land	-	22331.549
6	Un-classed forest	-	61.731
7	DPF(Demarcated demarcated protected forest)	25	5849.793
8	PF(U/s-33)(Protected forest)	27	566.707
	Total forest area	-	203268.864

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Out of 203268.864 Ha. Total forest area, 6996.398Ha. of forest land has been diverted for no-forestry purpose. The details of diverted forest land is as furnished below;

Sl no	Purpose of diversion	Total(ha)	Number of project
1	Mining	6441.759	49
2	Industries	0.817	2
3	Irrigation	386.799	3
4	Road	91.144	2
5	Electric	47.346	1
6	Exploration drilling	0.000023	1
7	diverted under Forest Right Act, 2006 below 1ha.	28.533	67
		6996.398	125

Against the total diversion area, 5523.833 ha. Of land (degraded forest land-4357.699ha.+ non-forest land -1166.134ha.) has been identified for the purpose of compensatory afforestation in Bonai forest division.

Agriculture:

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

Sl. NO.	Name of the ADO Circle	Geographical Area	Forest Area	Cultivated area				Paddy Area				Non Paddy Area	Total	Crop achievement	
				High	Medium	Low	Total	High	Medium	Low	Total			Kharif (in Ha.)	Rabi (in Ha.)
1	ADO, Lephripra	18226	94419	28595	15894	8260	52749	13892	15894	8260	38046	14703	52749	51984	13901.8
2	ADO,Sundargarh	176892	95523	23887	16506	13808	54201	8825	16506	13808	39139	15062	54201	53267	15528
3	ADO, Rajgangpur	102443	14731	30459	15098	9055	54612	10929	15098	9055	35082	19530	54612	53924	19062.4
4	ADO, Panposh	194024	46918	49693	22358	12007	84058	30383	22358	12007	64748	19310	84058	84058	30143
5	ADO, Bonai	315659	186569	30366	25144	11870	67380	11971	25144	11870	48985	18395	67380	61080	19926
	Total:	**971244**	**438160**	**163000**	**95000**	**55000**	**313000**	**76000**	**95000**	**55000**	**226000**	**87000**	**313000**	**304313**	**98561.2**

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The agricultural activity is by and large confined to the traditional Kharif cultivation due to lack of adequate irrigation system.

Horticulture:

Land utilisation pattern in the district as per the horticulture department Sundergarh is as follows;

LAND UTILISATION PATTERN IN SUNDERGARH DISTRICT(Area in Ha.)				
Kharif	**YEAR**			
	2016	2017	2018	2019
Vegetables	12460	13390	18765	13500
Spices	3900	4121	4320	4510
Fruit	16300	17406	17850	19708
Rabi				
Vegetables	30974	26476	24612	36090
Spices	5429	5600	7124	5853

Mining:

Incidence of major mineral resources is 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.

Major mineral areal details are given in the over view of mining activities chapter.

Total Area for considered for Sand mining shall be sum of the area of Sand leases.

Total Area for considered for Stone mining shall be sum of the area of Stone leases.

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

(Source CGWB, Also refer Plate-III).

Surface Drainage : The district is drained by a network of rivers and streams, the IB and Brahmani rivers being the most important. The drainage pattern is dendritic in nature. The easterly flowing sankh and westerly flowing koel rivers join at Vedavyas near Rourkela to form the Brahmani river. The Brahmani river along with its numerous tributaries control the drainage of the eastern part of the district. The river, Ib a tributary of Mahanadi controls the drainage of the western parts of the district. The smaller streams are in general epehemeral flowing 6-9 months in a year.

The hydrogeological conditions vary from place to place depending upon the aquifer characteristics of the litho units, sources of groundwater recharge and the structural setting of the area. The hydrogeological units of the area are broadly categorized into three groups namely:

A. Consolidated formations.

B. Semi Consolidated formations

C. Unconsolidated formations

<u>Consolidated Formations</u>:

Except for small strips along major drainage courses, almost the entire district is occupied by the consolidated formations comprising of Precambrian metasediments of Gangpur series and Iron ore series and also granite gneiss, metasediments like amphibolite, epidiorite etc. Ground water is stored mainly in the secondary porosity resulting from weathering and fracturing of the rocks. The aquifer materials are highly heterogeneous in character showing both vertical and lateral variations. The weathered residuum form the main repository of ground water, in which ground water occurs under water table condition and circulates through deeper fractures and fissures. Ground water occurs under confined to semi-confined condition in the deeper fractured zones. The

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water yielding capacity of fractured rocks largely depends on the extent (depth and degree) of fracturing, openness and size of fractures and extent of their interconnections to the near surface weathered zone. Usually two to four water bearing fracture zones occur down to a depth of 100 m bgl.

Water Bearing Properties of Major Litho Units :

Mica Schist:-These rocks are highly weathered. The depth of the open wells varies from 5.55 to 16.38m and the depth to water level varies from 4.57 to 11.50m during premonsoon periods with an average of 7m. The seasonal average water level fluctuation is of the order of 3m. The recorded yield of the bore well is around 2.25 lps and of open wells 2 to 4.16 lps.

Carbonaceous phyllites:-These rocks are highly jointed and well foliated. The depth of the open wells in phyllites ranges from 11.82 and the depth to water level during premonsoon period varies from 1.4 to 13.07m below the land surface. The seasonal water level fluctuation is of the order of 4m. The yield of the bore wells is very low, the maximum being 2 lps.

Metasbasics:- Amphibolites are most common metabasic rocks in the district occurring usually as bands. Epidiorites also occur in the district. These rocks are highly jointed. Open wells located in the meta basics sometimes provide a good source of water. Depth of the open wells ranges from 4.42 to 9.00m and premonsoon depth to water levels ranges from 4.10 to 8.34m below ground level. Seasonal water level fluctuation is around 3lps and the yield from 1.36 to 7.4 lps.

Lime stone and Dolomite:- Lime stone and dolomite occur in Nuagaon, Kuarmunda and Rajgangpur blocks. These rocks show Krastification in varying degrees. Solution cavities are also present in the Birmitrapur limestones. Karst development has been facilitated by vertical as well as low dipping joints. The krastification and occurrence of solution cavities

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are confined to shallow depths. The depth to water level during premonsoon varies from 3.56 to 5.8m.

Granite and Granite gneiss:-These are the major rock types occurring in Bonaigarh and Sudargarh areas. The texture varies from coarse grained to fine grained types. These rocks are well foliated and joined and generally have a thick weathered zone. The depth of the open wells generally varies from 4.00 to 18.00m and the depth to water level during premonsoon period varies from 3.11 to 12.21 m. The seasonal average water level fluctuation is around 3m. The weathered and fractured granite gneiss form the most productive aquifer in the terrain. The maximum yield of the bore well is 7 lps.

Quartzites: Quartzites occur mainly as bands and are resistant to weathering. These rocks have very thin weathered mantle and are devoid of joints and other weak planes. These rocks have very poor potential for ground water development except when

fractured and fissured. The depth of the open wells varies from 5.92 to 12.50m and the depth to water levels during premonsoon period varies from 3.07 to 9.50 m below ground level. The yield of the open well is generally less than 2 lps.

Semi-Consolidated formation: The semi consolidated formation is constituted of sand stone, shales, conglomerates, grits etc belonging to Talcher, Barakar and Kamth is of lower Godwin. The Barakar formation is very well developed and often constitute potential aquifer in the area. The coarse grained gritty sandstone on weathering give rise to porous sandy materials. Large diameter open wells and medium deep tube wells are feasible in this formation. The depth of the open wells ranges from 7.25m to 18.42m and the premonsoon depth to water level varies from 6.65m to 15.99m below ground level.

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The shale, sandstones of Talcher formation do not form productive aquifer. However the needle shales having intersecting joints often form moderately good aquifers.

Unconsolidated Formation: Laterites and alluvium of Sub-recent to Recent age constitute the unconsolidated formations. Laterites occurring as capping over older formations are highly porous in nature and form good aquifers to be tapped through dug wells. The alluvial deposits of recent origin occur as thin discontinuous patches along the prominent drainage channels. The alluvium strips constitute the most potential aquifers due to their high degree of porosity and permeability but are only limited in their occurrence. Ground water in these formations occurs under unconfined to semi-confined condition. These mainly consist of silt, sand with gravel & pebble, which form potential shallow aquifers tapped through dug wells. The yield of the open wells is generally 5-6 lps though higher yield of 10 lps is not uncommon.

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08. RAINFALL OF THE DISTRICT AND CLIMATIC CONDITION.

The district enjoys sub-tropical climate characterized by hot and dry summer, cold winter and erratic rainfall in monsoon. The winter season extends from November to end of February, which is followed by summer season from March to the middle of June, and rainy season from middle of June to middle of October. During summer months the maximum temperature rises up to 43° C and May is the hottest month. December is the coldest month of the year when the average daily temperature drops down to 8° C. Relative humidity is around 60-70% throughout the year. The highest and lowest monthly mean relative humidity so far recorded is 97% (Dec) and 26% (April).

The District Rainfall in milli-meters (R/F) shown below are the arithmetic averages of Rainfall of Stations under the District.

Month	Year wise rainfall in mm			
	2016	2017	2018	2019
Jan	6.02	3.32	Nil	8.45
Feb	18.56	Nil	0.74	38.82
Mar	11.62	0.41	1.16	28.82
April	Nil	0.45	38.2	37.98
May	23.31	46.77	106.04	25.91
June	90.4	230.77	150.91	119.82
July	330.12	499.18	311.86	221.84
Aug	307.08	260.06	403.33	447.78
Sept	233.62	183.39	203.06	313.29
Oct	31.34	60.44	10.47	66.75
Nov	Nil	3.25	Nil	Nil
Dec	Nil	Nil	86.52	5.38
Total:-	1052.07	1288.04	1312.29	1314.84

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

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

*Revenue collected for **Stone/Road metal.***

Name of the District	Name of Mineral	Revenue Collected for last three years (in Rs)		
		2018-19	2019-20	2020-21
Sundargarh	Dolomite	9,55,53,728,00	10,20,33,039,00	13,07,15,910,00

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

*Production of **Stone/Road metal.***

Name of the Tahasil	Name of Mineral	Production for last three years (in Cum)		
		2018-19	2019-20	2020-21
Sundargarh	Dolomite	1347564.020	1510931.810	1671526.900

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.

Sl. No	Name of the Mineral	Name of the Lessee	Address & Contact No. of Letter of Intent Holder	Letter of Intent Grant Order No. & date	Area of Mining lease to be allotted (ha.)	Validity of LOI	Location of the Mining lease
1	2	3	4	5	6	7	9
01	Dolomite/ Limestone	M/s Shiva Cement Ltd.	Plot No-YY-5 Civil Township 7&8 area, Rourkela Odisha, India-769004	9010/S&M IV(Misc)SM-66/2016(Pt) dt-18.11.2019 & 1216/S&M AE(Exp.)SM-05/2021 dt-02.02.2021 Bhubaneswar	156.43 Hectare	Three Years	Khatkurbahal (North) Block, Sundargarh District

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14. TOTAL MINERAL RESERVE AVAILABLE IN THE DISTRICT.

Reserve & Resource potential Evaluation;

As per UNFC (*United Nations Framework Classification*) of potentials of minerals, A '***Mineral Reserve***' is the economically mineable part of a Measured and/or Indicated Mineral Resource. It includes diluting materials and allowances for losses which may occur when the material is mined. Appropriate assessments, which may include feasibility studies, have been carried out, and include consideration of, and modification by, realistically assumed mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors. These assessments demonstrate at the time of reporting that extraction is justified.

The mineability (Economic Viability) is demonstrated in consecutive Feasibility Assessment stages which may be, in order of increasing detail, Prefeasibility Study and Feasibility Study/Mining Report. A Probable Mineral Reserve may derive from a Prefeasibility study and a Proved Mineral Reserve from a Feasibility Study or mining activity documentation. Hence for the Reserve Potential estimation of the Sundargarh district, the approved Mining Plans of each existing Quarry has been referred as it provides a details of the Mineable & Geological Reserve potentials of the Quarry lease.

As per the approved Mining Plans of the quarry leases in Sundargarh District the Total mineral potential of stone/road metal are as follows;

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Potential Reserve as per Approved Mining plan of Existing Sources of Stone

RESERVE ESTIMATION OF DOLOMITE AS PER MINING PLAN UNDER ROURKELA MINING CERCLE ROURKELA.							
Sl No	**Name of Lessees**	**Location of the Lease**	**Area in Hects.**	**Name of the Mineral**	**As per Mining plan Dolomite Reserves (QTY . in M.T)**	**Status**	**Remark**
1	Sri R.A.Jalan	Dharuara-Kukuda	39.42	Limestone & Dolomite	1698000.000	Working	Lease for Limestone & Dolomite
2	V.K. Lal	Tunmura	64.304	Limestone & Dolomite	5122547.000	Working	Lease for Limestone & Dolomite
3	B S L Co. Ltd	Biramitrapur	793.966	Limestone & Dolomite	134367480.000	Working	Lease for Limestone & Dolomite
4	OCL India Ltd	Lanjiberna	873.057	Limestone & Dolomite	5949000.000	Working	Lease for Limestone & Dolomite
5	M/s. Shiva Cement Ltd	Khatkurbahal	72.439	Limestone & Dolomite	NIL	Working	Lease for Limestone & Dolomite
6	TATA Steel Ltd	Gomardihi	372.796	Dolomite	62990980.000	Lease Expired	Lease for Dolomite
7	A.N.Patnaik	Banki	26.2849	Dolomite	8372948.000	Non-Working	Lease for Dolomite
8	Bijaya Aditya Mines	Minmina-Satra	32.492	Dolomite	971231.000	Non-Working	Lease for Dolomite
9	G.C.Rout	Banrai	9.324	Dolomite	1117624.160	Non-Working	Lease for Dolomite
10	V.K.Lal	Tunmura-Jharbeda	87.906	Limestone & Dolomite	8033040.000	Non-Working	Lease for Limestone & Dolomite
11	M/s B.D. Patnaik Minerals Pvt., Ltd	Alanda	45.555	Limestone & Dolomite	63875.000	Non-Working	Lease for Limestone & Dolomite
12	M/s. Om Ganesh Minerals	Talighana	106.833	Limestone & Dolomite	40765.000	Non-Working	Lease for Limestone & Dolomite
13	M.L.Jain & Sons	Litibeda-Katang	60.461	Limestone & Dolomite	4355622.000	Lapsed	Lease for Limestone & Dolomite
14	R.V.Enterprises	Litibeds-Katang 7 Kutra	164.65	Limestone & Dolomite	5332900.000	Lapsed	Lease for Limestone & Dolomite

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15	Shree Ranisati Mining Traders	Chutia-Kadalibahal	132.82	Limestone & Dolomite	57459790.000	Lapsed	Lease for Limestone & Dolomite
16	R.V.Enterprises	Badakuchul	64.993	Limestone & Dolomite	1455363	Non-Working	Lease for Limestone & Dolomite
17	G.S Sarma & Sons	Jharbeda	54.062	Limestone & Dolomite	19699.200	Lapsed	Lease for Limestone & Dolomite
18	Dr.N.R. Pradhan	Rokedega	34.916	Limestone & Dolomite	696668.000	Lapsed	Lease for Limestone & Dolomite
19	S.Khirwal	Banrai	48.69	Limestone & Dolomite	3102977.00	Lapsed	Lease for Limestone & Dolomite
20	United Mineral	Alanda	67.33	Limestone & Dolomite	1126000.000	Suspended	Lease for Limestone & Dolomite
21	S.C.Padhi	Jalangbira	68.708	Limestone & Dolomite	320331.000	Lapsed	Lease for Limestone & Dolomite
22	M/S. Mid East Carbon Pvt Ltd.,	Dahijira-Khatkurbahal	72.916	Dolomite	4752000.000	Lapsed	Lease for Limestone & Dolomite
23	Rungta & Sons Pvt Ltd	Jauramunda-Kulenbahal	15.00	Limestone & Dolomite	151541.000	Lapsed	Lease for Limestone & Dolomite
24	Patnaik Minerals Pvt Ltd	Jaidega	54.53	Limestone & Dolomite	687000.000	Lapsed	Lease for Limestone & Dolomite
25	M/s. Sadasiva Tripathy	Khatkurbahal	113.583	Limestone & Dolomite	857775.000	Lapsed	Lease for Limestone & Dolomite
26	Balasore Mineral	Bimta-Bonailata	183.176	Limestone & Dolomite	1400000.000	Lapsed	Lease for Limestone & Dolomite

Mineral Reserve as per the Approved Mining Plan is in the above table.

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

Dolomite is an anhydrous carbonate mineral composed of calcium magnesium carbonate, ideally CaMg(CO3)2. i.e. 30.4% CaO, 21.7% MgO & 47.9% Co2 in its purest form, the other minor contents are silica, alumina, iron oxide, alkalies, P.S etc.The term is also used for a sedimentary carbonate rock composed mostly of the mineral dolomite. An alternative name sometimes used for the dolomitic rock type is dolostone. Dolomites are mainly produced by the secondary alteration or replacement of limestones; i.e., the mineral dolomite [CaMg(CO3)2] replaces the calcite and aragonite minerals in limestones during diagenesis. Dolomite is used as a concrete aggregate, an ornamental stone and a source of magnesium oxide, as well as in the Pidgeon process for the production of magnesium. It is an important petroleum reservoir rock. Where calcite limestone is uncommon or too costly, dolomite is used in its place as a flux for the smelting of iron and steel. Large quantities of processed dolomite are used in the production of float glass.

16. USE OF MINERAL.

Dolomite is primarily used as a flux for steel making. The dolomite produce at mines is dispatch to various steel plant like Rourkela steel plant, Durgapur steel plant, Bihar sponge, Orissa sponge plant, Kalinga Iron Works, Chandil sponge plant etc. Specifications required by different industries are as follow

Required specification of dolomite ore as per consuming industry					
Items	Iron Making	Steel Making	Ferro-Manganese	Refectory	powder industry
CaO%	29.0 (+ /- 1)	30.0	28 -30	20(min)	20-30
MgO%	19.0 (+/- 1)	20.0	19-20	30(min)	15-20
SiO_2%	5.0 (+/- 1)	3.0 max	2-5	1(max)	2-4
Al_2O_3%	-	-	2.2.5	1(max)	1(max)
Fe_2O_3 %	-	-	1.0 max	10(max)	1.0(max)
Size	-50mm	30-60mm	30-60	Fine grained	30-150mm

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The size specification of dolomite ore of Banarai mines is Lumpy (-150 mm + 30 mm), which is required by consumers. Therefore, change of specification is not required. Cut off grade of dolomite is taken as the minimum percentage of MgO as 16% and CaO as 28%.

Threshold values for dolomite ore has been taken as 15% MgO, hence the sub-grade shall be blended with the grade ore for sell.

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

As per the data provided by the DDM the production or supply of the Dolomite mineral in the district is as follows,

2018-19	2019-20	2020-21
1347564.020	1510931.810	1671526.900

Out of the total production almost consumed by the private companies as raw material for processing/manufacturing of various products. The certainty of the exact demand in the district depends upon various Govt/private projects & schemes etc, hence quite not possible to quantify the exact demand. Certainly there is an unavoidable gap between the demand and supply of Dolomite in the district.

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.

Lease areas in the details may be seen in reserve table of Point 14.

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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 Sundargarh 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

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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

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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.

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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.

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- 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/cluster 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.

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- 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, excavation site etc. Worker and operators at work sites will be provided with earmuffs.
- Conducting periodical medical check-up 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.

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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 Sundargarh 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.

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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.

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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, Sundargarh *Tuberculosis* & *Silicosis* patients cases of last 5 years is as follows;

HIGHLIGHTS OF TUBERCULOSIS & SILICOSIS REPORT FOR LAST FIVE YEARS OF SUNDARGARH					
TB ACTIVITIES	**2015**	**2016**	**2017**	**2018**	**2019**
Total number of patients diagnosis	15327	16558	17684	17254	20154
Total number of patients notified	3094	3064	2687	2745	3553
MDR TB	15	12	16	10	33*
COMPLETED	2859	2847	2445	2431	1398*
DIED	119	114	120	147	155*
LTF	110	98	104	101	60*
FAILURE	13	12	17	29	12*
TREATMENT CHANGED	2	4	9	4	11*
NOT EVALUATED	1	1	6	5	0*
ON TREATMENT	0	0	2	38	1809
NOT STARTED TREATMENT	0	0	0	0	101*
Silicosis ACTIVITIES	**2018**	**2016**	**2017**	**2018**	**2019**
OPD PATIENT	10997	13124	17084	20750	10740
IPD PATIENT	29	39	122	63	10
DEATH	0	0	0	0	0

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

As per the guidelines prescribed 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.

27. ANY OTHER INFORMATION.

Sundargarh 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 Coal Iron Ore, Manganese, bauxite, Dolomite, Limestone, Pyroxenite, 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.

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PLATE-I

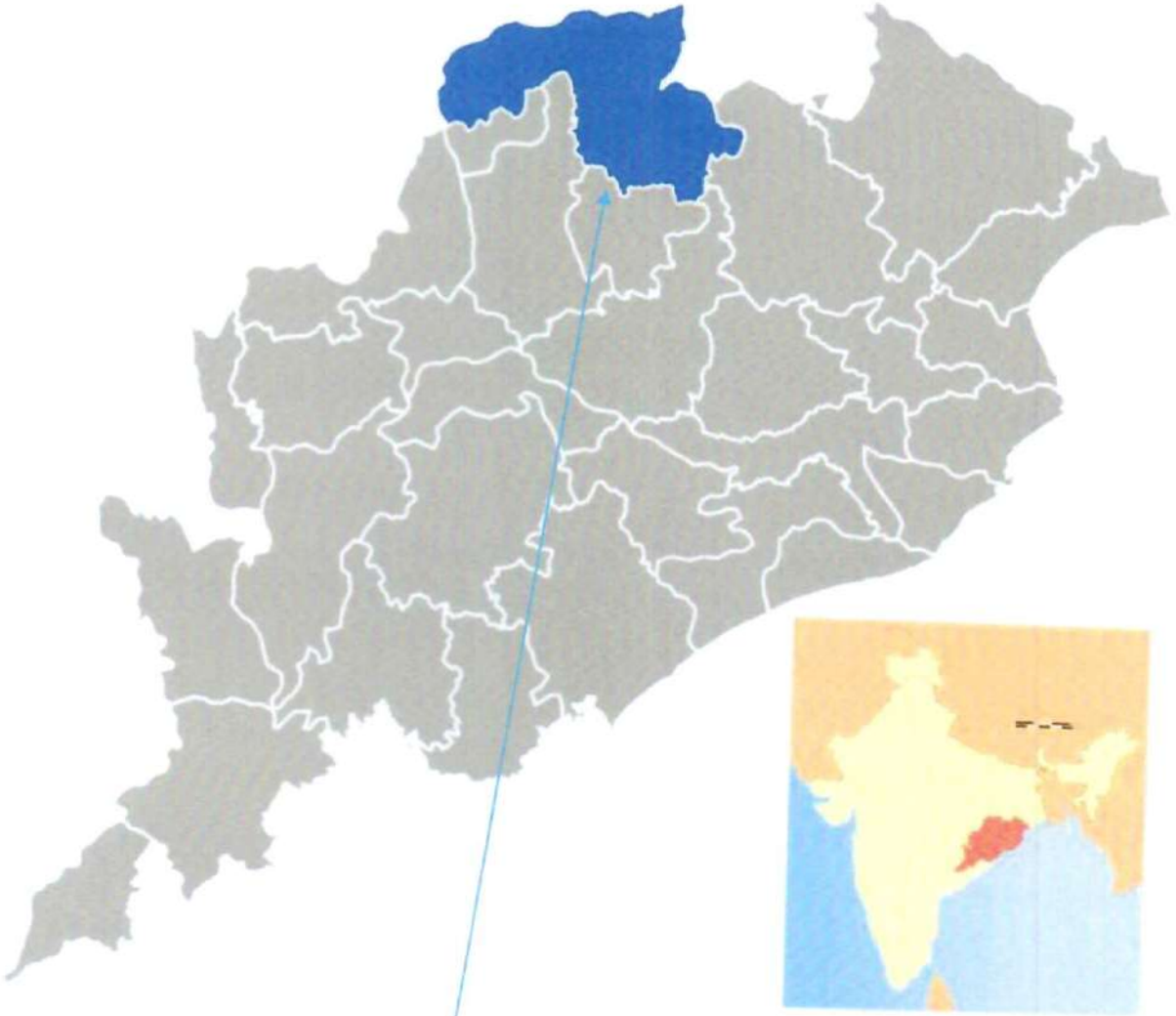

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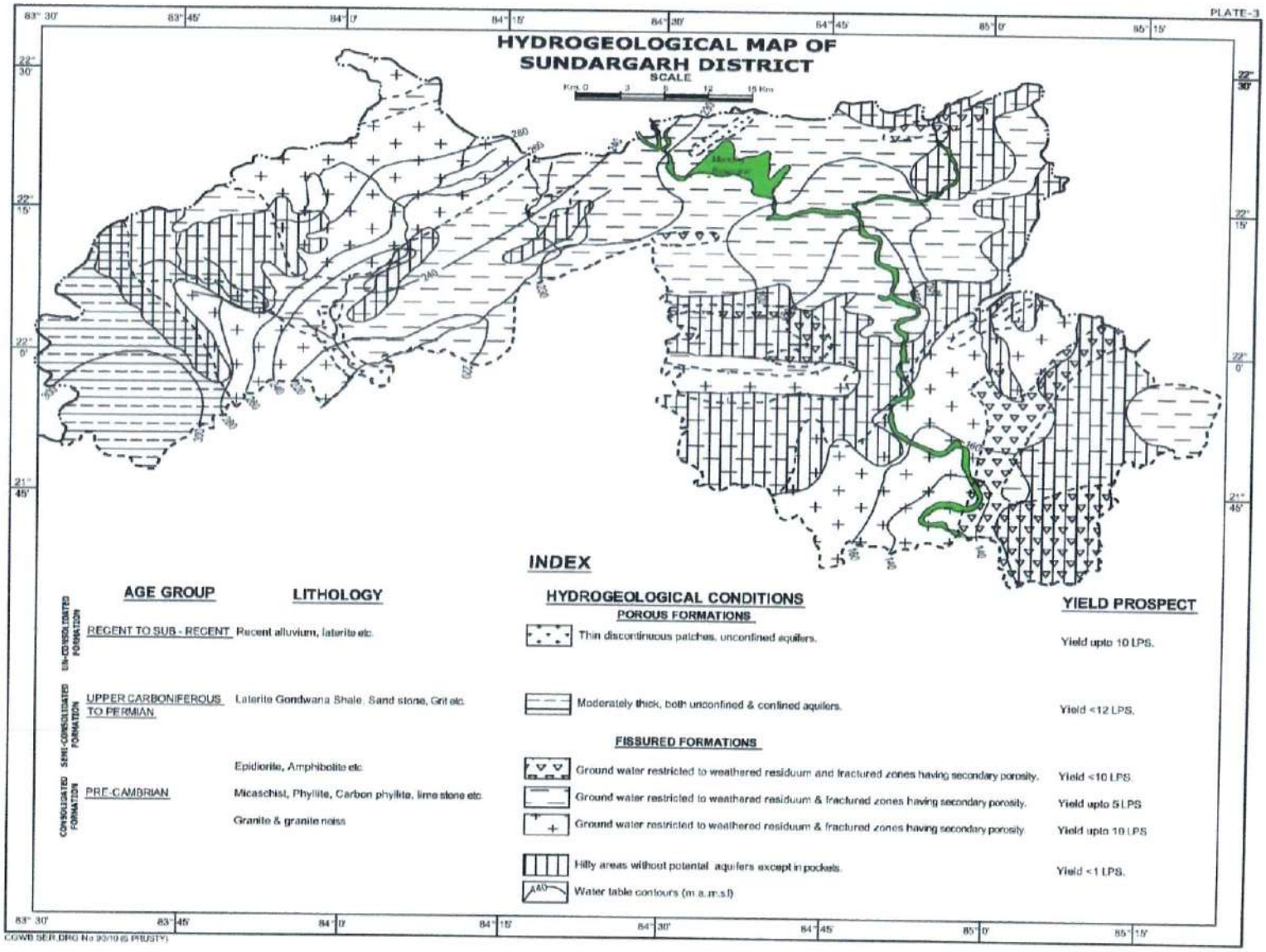
PLATE-3



17

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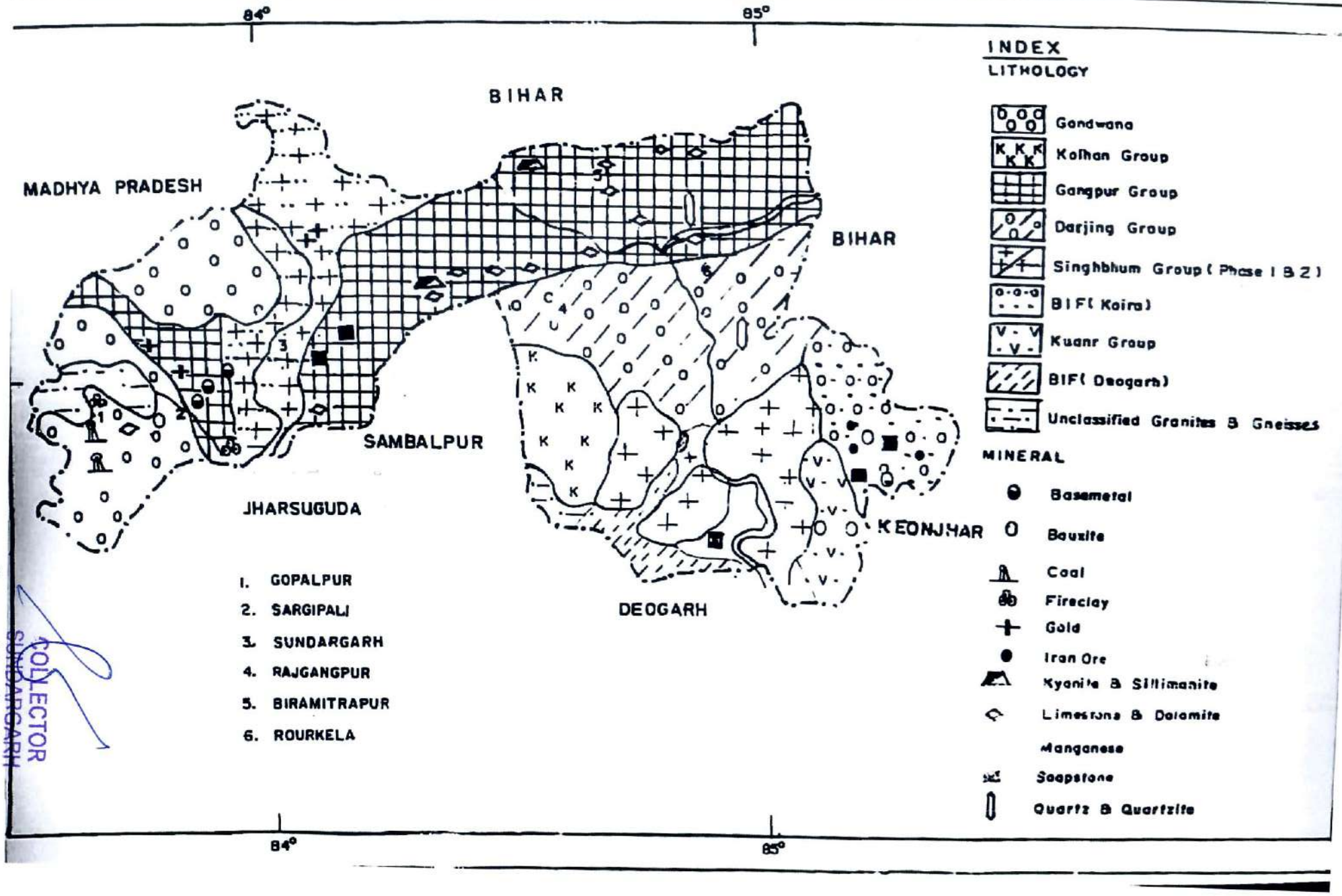
GEOLOGICAL AND MINERAL MAP OF SUNDARGARH DISTRICT.

10 5 0 10 20 30 40 50Kms

SCALE : 1 CM =10 Kms.



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