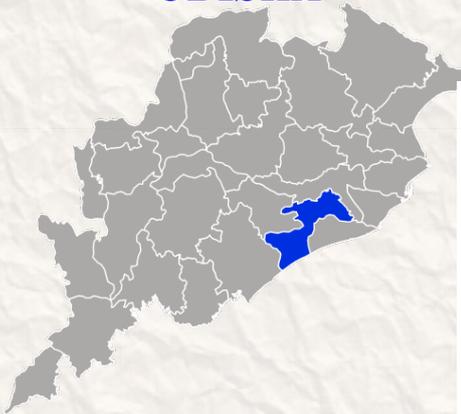




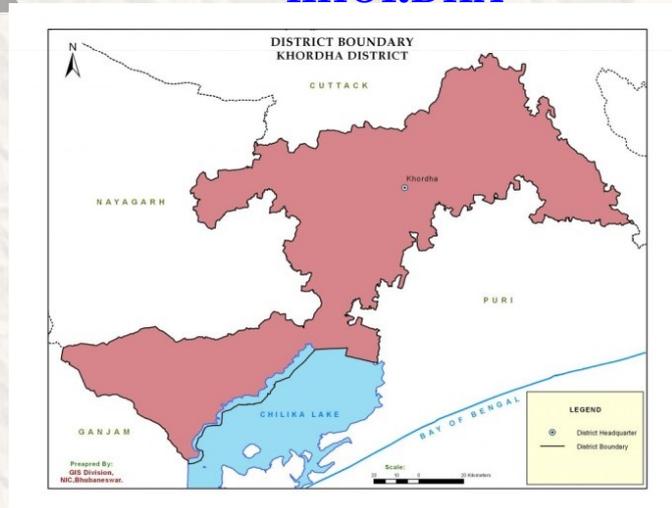
DRAFT DISTRICT SURVEY REPORT (DSR) **OF** **KHORDHA DISTRICT, ODISHA** **FOR** **LATERITE**

**(FOR PLANNING & EXPLOITING OF MINOR
MINERAL RESOURCES)**

ODISHA



KHORDHA



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

COLLECTORATE, KHORDHA

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PREFACE

In compliance to the notification issued by the Ministry of Environment and Forest and Climate Change Notification no. S.O.3611 (E) NEW DELHI dated 25-07-2018 the preparation of district survey report of road metal/building stone mining has been prepared in accordance with Clause II of Appendix X of the notification. Every effort has been made to cover road metal/building stone mining locations, future potential areas and overview of road metal mining activities in the district with all its relevant features pertaining to geology and mineral wealth. This report will act as a compendium of available mineral resources, geological set up, environmental and ecological set up of the district and based on data of various departments like Revenue, Water Resources, Forest, Geology and Mining in the district as well as statistical data uploaded by various state Government departments for preparation for district survey report. The main purpose of preparation of District Survey Report is to identify the mineral resources and developing the mining activities along with other relevant data of the District.

1. INTRODUCTION

Khordha district has a unique place in history as the last kingdom to be conquered by the British in 1803. Khordha is famous for the Paik revolution of 1817 led by Jai Rajguru and Bakshi Jagabandhu Bidyadhar. The district came into being with effect from 2nd October 1992.

Khordha district is located in the south-eastern part of Odisha, adjoining the coastal area. It occupies an area of about 2887.5 sq km. The district is bounded by latitudes 19° 40' to 20° 25' and longitudes is 84° 56' to 86°05' and occupies parts of degree sheets 73 H, L, P & 74 I,A,E. It is surrounded by Cuttack district to the north, Ganjam and part of Puri district to the south, Puri district to the east and Nayagarh district to the west. Bhubaneswar – Vizayanagaram segment of the East-coast railway runs through the district along NE –SW direction. National Highway No. 16 running almost sub-parallel to the East coast railway line, passes through Khordha, the district headquarters and Bhubaneswar the state capital. Khordha is about 30 km from

Bhubaneswar and 12 km from Jatani, the nearest railway station of East coast railway. It has an average elevation of 75 m (246ft).

2. OVERVIEW OF MINING ACTIVITIES IN THE DISTRICT.

(a) In khordha district, presently there is one specified minor mineral lease i.e. for decorative stone in Village Tutumberpalli in favour of Sri Maa Granites. The lease area is 3.399 hecets. The lease has been commenced from 22.06.2015 and the lease period is for 20 years. The mining operation of the said lease is currently stopped due to want of Consent to Operate from OSPCB.

There are two nos. of Prospecting license; one is located at Naranagarh village over an area 4.672 hecets in favour of Shree Jagannath Temple Administration, Puri which has commenced from dt. 20.03.2018 for 2 years. The final prospecting report in respect of the said PL area has been sent to the Director of Mines, Odisha, Bhubaneswar for further examination at their end. Another one is located at Santasinghpur village over an area of 3.996 hecets in favour of Sri maa Granites which has commenced from dt. 14.02.2017 for 2 years. The final prospecting report along with ML application over the said PL area has been sent to Director of Mines, Odisha, Bhubaneswar for further examination at their end.

(b) Other than specified minor minerals such as river sand, laterite slabs, building stone/black stone/road metals etc. are also available in the district. Most of the building stone/black stone/road metals potentials are located in Khordha, Begunia and Tangi tahasils of the district. Others like laterite, morrum and earth are distributed in almost all tahasils.

3. GENERAL PROFILE

Geographical position	Longitude -84 ^o 55' to 86 ^o 5' Latitude- 19 ^o 40' to 20 ^o 25'
Area & Population	The district has an area of 2813 sq. km and 22.52 lakhs of population as per 2011 census. The district accounts for 1.81 percent of the states territory and shares 5.36 percent of the state's population. The density of population of the district is 800 per sq. Km as against 270 person per sq.km of the state. It has 1534 villages (including 178 un-inhabited villages) covering 10 blocks. 10 Tahasils and 2 sub-divisions.

	As per 2011 census the schedule caste population is 297472 (13.2%) and schedule tribe population 115051 (5.1 %). The literacy percentage of the district covers 86.9 against 72.9 of the state.
Climate	The climate condition of the district is generally hot with high humidity during April and May and cold during December and January The monsoon generally breaks during the month of July
Industry & Mining	Khordha is an important centre of handloom industry. The lungi, napkin and saree produced here have an all Odisha market. Besides during the year 2014-15, 2187 nos. of small scale industries have been established with total capital investment of about Rs.10870.89 lakhs with 2176 nos. of Employment generated in the district. The district is also important for mining of minerals like decorative stone (Khondalite), building stone, laterite blocks, morrum & earth.
Power	Consumption of electricity in Khordha district during the year covers 1437.75 million units and revenue villages so far electrified as on 2013-14 is 1343 which constitutes 98.9 % to the total villages of the district.
Tourist Places	There are 19 nos. of tourist center such as Bhubaneswar, Dhauli, Khandgiri & Udayagiri, Nadankanan, Atri, Banapur, Barunei, Bhusandapur, Chilika (Barakul), Hirapur, Jayadev Kenduli, Gadamanitri, Rameswar, Madangiri (Mundiapada), Salia Dam-Barbara Hills, Kosalasuni, Thakuranipitha, Balipatna (Sisu Ananta Pitha), Shree Ananta Purusottam Dev (Jagulaipatna) and Sankat Mochan Mahavir Temple identified by department of Tourism and Culture, Odisha.
Transport & Communication	NH- 162.98 km SH- 25.97km Major district Road- 2555.08 km Other district road- 775.74 km

	Rural road- 1188.89 km Inter village road- 2424.00 km Intra village road- 1471.24 km Besides, 117.39 Kms. of Railway lines with 23 nos. of railway stations and passenger halts are there in the district.
Health	The medical facilities are provided by different agencies like Govt., Private individuals and voluntary organizations in the district. There were 282 nos. of the govt. Allopathic medical institutions with 965 beds facilities, 23 nos. of Homoeopathic dispensaries and 27 nos. of Ayurvedic dispensaries in the district during the year 2013-14.

4. GEOLOGY

Western & south-western part of the district is occupied by the hilly terrain of Eastern Ghats. The hilly area in the west gradually passes on to the low undulating rugged terrain towards the central part of the district. In the northern, eastern and south-eastern sides, the district is surrounded by the flood plain and deltaic deposits of Mahanadi river basin. Parts of Chilika lake and its set of tributaries are the most conspicuous geomorphic features in the south. Daya, Bhargabi, Kuakhai and Kushabhadra rivers, emerging as distributaries from Mahanadi river system, drain southerly through the eastern flank of the district and merge either with the Chilika lake or with the Bay of Bengal. Kaipadar, about 10 km south west of Khurda, marks a water divide with Ran River flowing northerly to Mahanadi and Mandakini river flowing southerly to Chilika. The highest elevation attained in the district is at 568 mts. in its southwestern corner, while Chilika represents the lowest at mean sea level.

The Major geology in the district can be broadly classified into Eastern Ghat Super Group of Archean to Proterozoic age, Proterozoic intrusive, Gondwana Super Group of Mesozoic and Pleistocene to Holocene age of Quaternary period of Cenozoic Era.

The rocks belonging to EGSG are mostly quartzite, khondalite and their variants, charnockite and pyroxene granulite. They are found mostly on the western and south western parts of the district. The Eastern Ghat Super Group of rocks have

been intruded by plugs/apophyses of anorthosite, popularly known as Banpur anorthosite/ Chilika lake complex, and are found as cluster of anorthosite bodies around Banpur, Rambha and Balugaon region in the southern & western side of Chilika lake and partly within the lake also. This pluton is emplaced in the core of an antiform (Perraju, 1960). Sarkar et al. (1981) deciphered 3 phases of folding (F_1 - F_3) in the khondalite host rocks and considered emplacement of anorthositic complex syntectonically with F_3 . Xenoliths of metasediments (khondalite and calc-silicate gneisses) and charnockite in anorthosite and locally developed pyroxene hornfels grade skarn zones indicate the intrusive nature of the complex.

The rocks of Eastern Ghat Supergroup show foliation in NE-SW direction. Joint planes, wherever present, follow the same structural alignment. A prominent fault running ENE-WSW is recorded in north-western part of the district. Major lineaments trend in NE-SW direction. The NE-SW trending lineament passing through Baghamari houses a sulphurous hot spring at Atri and is of immense tectonic significance.

Granite gneiss of Archean to Proterozoic age, exposed in the western part of the district, are well foliated and are often garnetiferous. Quartz veins cut across the granulitic country at random.

The exposures belonging to Athgarh formation of Upper Gondwanas (Lower Cretaceous) mostly occur as a cluster forming upland in the north, NE parts of the district, i.e. west of Bhubaneswar. They are comprising dominantly of sandstones classified as quartz arenite, sub-lithic arenite and lithic wacke (Mishra, 1988; Pal, 1990), characteristically lacking in feldspars in clastic components. This also includes conglomerates, grits, carbonaceous shale, variegated shale and fire clay; most of them as small lenticular bodies breaking the monotonous vastness of sandstones. Deep drilling in the coastal Odisha has indicated the extension of the formation below the alluvial cover of the Mahanadi delta and the coastal Tertiary succession (Pandya et al. 2000).

The earliest Quaternary deposit, the Bolgarh formation (Pleistocene age) occupies central and northern part of the district, overlying the khondalite group of rocks. It comprises hard crust laterite, latosol and also residual soil.

Brahmani formation (Pleistocene to Holocene) consists of residual soil and alluvium and occupies an appreciable part of the district and are particularly conspicuous in the eastern and southern part of the district adjoining Chilika lake.

Bankigarh formation (Middle to Late Holocene) is occupied by north and NE part of the district i.e. east of Bhubaneswar. It mostly comprises brownish silty clay and occur in the flood plain / deltaic plains of Mahanadi River basin.

The district lacks any major mineral deposit of economic significance. Few fire clay deposits located in the north-eastern part of the district are the only deposits of minor minerals that are being mined presently by Tata Refractories Ltd. The other deposits that are being profusely exploited as Dimension and decorative stone for construction material/polished slabs and artisan grade of khondalite around Tapanga and Kurumpada area.

Ground water occurs in the porous sedimentary formations and in the fractured igneous and metamorphic rocks in unconfined to confined conditions. The nala and gully erosion in the tributaries and distributaries of Mahanadi river basin and in Chilika lake are quite common.

Stratigraphy:

Phanerozoic	Quarternary	Mid to Late Holocene	Bankigarh Fm	Brownish silty clay
		Pleistocene to Holocene	Brahmani/ Mahanadi Fm	Residual soil and alluvium
		Pleistocene	Bolagarh Fm	Laterite/Latosol
	Gondwana Sup Gp	Lr Cretaceous	Athagarh Fm	Sandstone, Shale
Precambrian	Archean to Proterozoic	Eastern Ghat Sup Gp		Quart vein Granite gneiss Anorthosite Chanockite gp of rocks Khondalite gp of rocks Quartzite

5. DRAINAGE AND IRRIGATION PATTERN.

The drainage of the district is mainly controlled by rivers like Kuakhai, Kusabhadra, Bhargavi & Daya. Detail of the river system is narrated below.

S L NO	NAME OF RIVER	PLECE OF ORIGIN	ALTITUDE OF ORIGIN	TOTAL LENGTH IN THE DISTRICT (IN Km)	Area drained (sq.km)	%GE AREAS DRAINED IN THE DISTRICT	PROCESS OF DEPOSITION OF SEDIMENTS
1	Kushabhadra	Bhubanapur (khorda dist)	11.8m	30.0km	212.32sq.km	48.86%	Slow
2	Bhargavi	Balakati (khordha dist)	7.80 m	14.0 km	Nil	Nil	Slow
3	Kuakhi	Mukameswra	25.92 m	26.500	21.85	45.60	Moderate
4	Daya	Nathapur	18.180 m.	10.100	10.10	51.80%	slow
5	Malaguni	Baunshagarh (nayagarh dist)	21.20m	35	8.40	62.50%	slow
6	Hada	Hatibari (Nayagarh dist)	19.80m	14	0.92	60.87%	No deposition
7	Kusumidhar	Randa (khordha dist)	60m	33	1.32	100.00%	No deposition

During the year 2013-14, it is reported by District Agriculture Officer that the irrigation potential created during Kharif and Rabi are 52655 hectares and 20346 hectares respectively from all sources.

6. LANDUSE PATTERN

SI No	Landuse	Area in '000Ha
1	Forest Area	62
2	Misc.Tree & Groves	10
3	Permanent Pasture	5
4	Culturable Waste	8
5	Land Put to Non Agril Use	45
6	Barren & Unculturable Land	15
7	Current Fallow	21
8	Other Fallow	6
9	Net Area Sown	108
10	Mining	1
	Geographical Area	281

7. SURFACE WATER & GROUND WATER SCENARIO

The drainage systems i.e. rivers of the district gets filled with water during the monsoon and the gradually it decreases from the month of January to June of each year. In the summer season all rivers become almost dry excepting narrow flow of water within the basin.

The variation of ground water table in the district is as follows:

Depth of water level (mbgl)/ Period	April	August	November	January
Minimum	0.4	0.10	0.10	0.06
Maximum	14.2	6.20	9.15	12.60

8. RAINFALL & CLIMATIC CONDITION

The district is generally hot with high humidity during April and May and cold during December and January. The monsoon generally breaks during the month of July and continues till end of October. The temperature goes as high as up to 45°C in the summer and up to 7^o-8^o C during peak winter.

The rainfall statistics of the district for last four years is given below:

MONTH – WISE RAINFALL (mm) DATA OF KHORDHA DISTRICT (LAST 4 YEARS)													
Year/ Month	April	May	June	July	August	Sept	Oct	Nov	Dec	Jan	Feb	March	Total
15-16	72.2	14.7	135.2	225.1	252.9	198.9	43.3	4.8	3.6	0.6	3.5	9.2	964
16-17	0.7	87.9	138.64	262.83	291.25	299.37	75.9	15.4	0	0.7	0	52.7	1225.39
17-18	10.26	17.58	164.93	402.23	313.31	239.07	249.3	59.96	20.02	0	0	0	1476.66
18-19	51.89	136.37	162.23	577.66	296.79	333.66	234	2	17.02	11	8.6	11.8	1841.02
Avg.	33.8	64.1	150.3	367.0	288.6	267.8	150.6	20.0	10.2	3.1	3.0	18.4	1376.8

9. DETAILS OF MINING LEASES

Attached as Annexure I

10. DETAILS OF ROYALTY COLLECTED

Year-wise Calculation of Royalty (Rs) from Laterite Qls

Sl.No	Name Of Tahasil	2015-16	2016-17	2017-18	2018-19
1	Khordha	0	0	0	0
2	Bolagarh	0	0	0	0
3	Tangi	0	0	0	0

4	Chilika	0	0	0	0
5	Begunia	0	59075	59075	59075
6	Jatni	0	0	0	0
7	Balianta	0	0	0	0
8	Balipatana	0	0	0	0
9	Bhubaneswar	0	0	0	0
10	Balugaon	0	0	0	0
TOTAL		0	59075	59075	59075

11. DETAILS OF PRODUCTION OF MINOR MINERAL

Yearwise Production of Laterite in cum

Sl.No	Name Of Tahasil	2015-16	2016-17	2017-18	2018-19
1	Khordha	0	0	0	0
2	Bolagarh	0	0	0	0
3	Tangi	0	0	0	0
4	Chilika	0	0	0	0
5	Begunia	425	425	425	425
6	Jatni	0	0	0	0
7	Balianta	0	0	0	0
8	Balipatana	0	0	0	0
9	Bhubaneswar	0	0	0	0
10	Balugaon	0	0	0	0
TOTAL		425	425	425	425

12. MINERAL MAP OF THE DISTRICT

Attached as Plate No 4.

13. LIST OF LOI HOLDERS ALONG WITH VALIDITY

One LOI has been issued in Khordha Tahasil.

14. TOTAL MINERAL RESERVE AVAILABLE IN THE DISTRICT

Total mineral reserve of laterite is 21170231 cum which may increase after detail investigation.

Details of the potential areas submitted as Annexure II.

15. QUALITY/GRADE OF MINERAL

Due to less content of Alumina, the laterite of the district is suitable for construction of walls related boundary or houses after manual sizing of the slabs.

16. USE OF MINERAL

Laterite of the district is used mainly for construction of walls related boundary or houses after manual sizing of the slabs.

17. DEMAND & SUPPLY OF THE MINERAL

Name Of Tahasil	Year	Laterite
Bhubaneswar	2015-16	
	2016-17	4029.79
	2017-18	2290.12
	2018-19	4548.02
	2019-20	5098.67
Tangi	2015-16	
	2016-17	
	2017-18	
	2018-19	
	2019-20	1140000
Balianta	2015-16	
	2016-17	
	2017-18	
	2018-19	
	2019-20	
Jatni	2015-16	
	2016-17	3523
	2017-18	12321
	2018-19	8653
	2019-20	8200
Banpur	2015-16	
	2016-17	275
	2017-18	350
	2018-19	375
	2019-20	425
Chilika	2015-16	
	2016-17	18453
	2017-18	16542
	2018-19	19530
	2019-20	32000
Balipatna	2015-16	
	2016-17	
	2017-18	
	2018-19	
	2019-20	
Begunia	2015-16	
	2016-17	25192.30
	2017-18	28463.50
	2018-19	30056.50
	2019-20	24255.20
E.E NH Division Bhubaneswar	2015-16	
	2016-17	35
	2017-18	30
	2018-19	25
	2019-20	65
E.E R.W. Division Bhubaneswar	2015-16	
	2016-17	10286.90
	2017-18	16207.60
	2018-19	17826.10
	2019-20	20323.59
Tangi-BBSR	2015-16	

NH-16	2016-17	
	2017-18	
	2018-19	
	2019-20	
E.E (R & B) Division Bhubaneswar	2015-16	
	2016-17	802
	2017-18	726
	2018-19	492
E.E (R & B) Division II Bhubaneswar	2019-20	674
	2015-16	
	2016-17	7869.11
	2017-18	768.90
E.E (R & B) Division III Bhubaneswar	2018-19	8484.85
	2019-20	10181.82
	2015-16	
	2016-17	558.28
E.E (R & B) Division IV Bhubaneswar	2017-18	653.24
	2018-19	755.19
	2019-20	906.22
	2015-16	
E.E (R & B) Division V Bhubaneswar	2016-17	743.02
	2017-18	816.51
	2018-19	414.27
	2019-20	517.84
E.E (R & B) Division V Bhubaneswar	2015-16	
	2016-17	27254.22
	2017-18	29651.5715
	2018-19	44210.2655
Nimapara Irrigation division, Nimapara	2019-20	34899.062
	2015-16	
	2016-17	
	2017-18	
	2018-19	
	2019-20	
	2020-21 (Probable)	
2021-22 (Probable)		
E E, Prachi Division, Bhubaneswar	2022-23 (Probable)	
	2015-16	
	2016-17	
	2017-18	
	2018-19	
	2019-20	
Total		1620758.659

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

Attached as Plate No 5.

19. DETAILS OF AREAS WHERE THERE IS A CLUSTER OF MINING LEASES

Nil

20. DETAILS OF ECO-SENSITIVE AREA

Eco-Sensitive Zone of Chandaka-Damapada Wildlife Sanctuary is located within the district.

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

Activities attributed to Mining:-

Generally, the environment impact can be categorized as either primary or secondary. Primary Impacts are those, which are attributed directly by the project. Secondary impacts are those which are indirectly induced and typically include the associated investment and changed pattern of social and economic activities by the proposed action.

The impact has been ascertained for the project assuming that the pollution due to mining activity has been completely spelled out under the base line environmental status for the entire ROM which is proposed to be exploited from the mines.

Impact on Ambient Air

Mining operation are carried out by opencast manual, semi mechanized/ mechanized methods generating dust particles due to various activities likes, excavation, loading, handling of mineral and transportation. The air quality in the mining areas depends upon the nature and concentration of emissions and meteorological conditions.

The major air pollutants due to mining activities include:-

- Particulate matter (dust) of various sizes.
- Gases, such as sulphur dioxide, oxides of nitrogen, carbon monoxide etc from machine & vehicular exhaust.

Dust is the single air pollutant observed in the open cast mines. Diesel operating drilling machines, blasting and movement of machineries/ vehicles produce NO_x , SO₂ and CO emissions, usually at low levels. Dust can be of significant nuance surrounding land user and potential health risk in some circumstances.

Water Impact

Sometimes the mining operation leads to intersect the water table causing ground water depletion. Due to the interference with surface water sources like river, nallah etc drainage pattern of the area is altered.

Noise Impact

Noise pollution mainly due to operation of machineries and occasional plying of machineries. These activities will create noise pollution in the surrounding area.

Impact on Land environment

The topography of the area will change certain changes due to mining activity which may cause some alteration to the entire eco system.

Impact on Flora & Fauna

The impact on biodiversity is difficult to quantify because of its diverse and dynamic characteristics.

Mining activities generally result in the deforestation, land degradation, water, air and noise pollution which directly or indirectly affect the faunal and flora status of the project area.

However, occurrence and magnitude of these impacts are entirely dependent upon the project location, mode of operation and technology involved.

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

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 spraying 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, excavation 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) :-

As per statute all mines/quarries are to be properly reclaimed before final closure of the mine. Reclamation of exhausted mines are planned to be undertaken in below three possible means:

1. If, substantial amount of waste is there, the exhausted quarry can be fully or partly backfilled using the stored waste. The backfilled areas are to be brought under plantation of local species.
2. If the generation of waste is much less as in the case of minor mineral mining, the exhausted quarries can be reclaimed by

- a. Plantation on the broken up surface if the depth of quarry is not much below the surrounding surface level.
- b. Converted to water reservoir after stabilization of the slopes if the exhausted quarry continues much below the surrounding surface level. It is preferred to cordon the water reservoir either through wire fencing or retaining wall with plantation from the safety point of view.

Most of the quarry/mining lease areas are yet to be exhausted from ore point of view. Hence, reclamation would be taken up only after exhaustion of the ore/mineral content from these areas. The exhausted minor mineral quarries of the district have been converted to water reservoirs.

24. RISK ASSESSMENT & DISASTER MANAGEMENT PLAN

The only risk involved related to mining of minor mineral excepting natural calamities is slope failure and probable accidents due to high and ill maintained bench walls. This can only be addressed through making of regular benches and undertaking mining in benching pattern.

The disaster management plan (DMP) is supposed be a dynamic, changing, document focusing on continual improvement of emergency response planning and arrangements.

The disaster management plan is to be aimed to ensure safety of life, protection of environment, protection of installation, restoration of production and savage operations in this same order of priorities. For effective implementation of the disaster management plan, it should be widely circulated through rehearsal/induction conducted by the respective department from time to time .

General responsibilities of employees' during an emergency:

During an emergency, it becomes more enhanced and pronounced when an emergency warning is raised, the worker in charge, should adopt safe and emergency shut down and attend to any prescribed duty. If no such responsibility is assigned, the workers should adopt a safe course to assembly point and wait instructions. He should not resort to spread panic. On the other hand, he must assist emergency personnel towards objectives of DMP.

Co-ordination with local authorities:

The Mine Manger who is responsible for emergency will always keep a jeep ready at site. In case of any eventuality, the victim will be taken to the nearby hospitals after carrying out the first aid at the site. The Manger should collect and have adequate information of the nearby hospitals, fire station, police station, village panchayat heads, taxi stands, medical shops, district revenue authorities etc. and use them efficiently during the case of emergency.

25. DETAILS OF THE OCCUPATION 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 guidelines of the Mine Rules 1995, occupational health safety has been stipulated by the ILO/WHO. The proponent's will take necessary precautions to fulfill the stipulations. Normal sanitary facilities have to be provided within the lease area. The management will carry out periodic health checkup of workers.

Occupational hazards involved in mines are related to dust pollution, noise pollution, blasting and injuries from moving machineries & equipment and fall from high places. DGMS has given necessary guidelines for safety against these occupational hazards. The management has to strictly follow these guidelines.

All necessary first aid and medical facilities are to be provided to the workers. The mine shall be well equipped with personal protective equipment (PPE). Further, all the necessary ported equipments such as helmet, safety goggles, earplugs, earmuffs ets are to be provided to mine workers as per Mines Rules. All operators and mechanics are to be trained to handle fire fighting equipments.

TUBERCULOSIS DATA RNTCP KHORDHA

YEAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	TOTAL
15-16	95	85	83	93	87	75	86	79	78	92	88	84	1025
16-17	96	84	86	88	78	69	104	103	98	118	115	128	1167
17-18	127	113	130	142	102	105	97	83	84	121	102	140	1346
18-19	160	156	124	121	119	116	98	124	123	117	142	130	1530
TOTAL	478	438	423	444	386	365	385	389	383	448	447	482	5068
AVG.	120	110	106	111	97	91	96	97	96	112	112	121	1267

There is no case of Silicosis found in khordha within the time frame mentioned above.

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

As most of the minor mineral mines/quarries of the district are yet to be exhausted of their mineral content no sort of reclamation measures including plantation has been undertaken excluding gap plantation of local species in the peripheral safety zones of the quarries/ clusters and in some of the haul roads.

27. ANY OTHER INFORMATION

Nil

LATERITE SAIRATS ALREADY LEASED OUT AND EXECUTED

Annexure I

Sl. No.	Name of Tahasil	Name of Minor Mineral	Status	Name of village/ Date of registration of lease	Name of lessee	Address & contact No of lessee	Mining lease grant order No & date	Period of QL		Date of commencement of mining operation	Status (working/ non-working /Temp working for departh)	Captive or Non - captive	Lt No & date of grant of EC	Location of Resource (GPS co-ordinates or Khata & Plot No) (Sketch map to be attached)	Length of area leased for mineral concession (in km)	Average width of area leased for mineral concession (in km)	Area leased for mineral concession (in sq m)	Mineable mineral potential as per approved mining plan (in cum)
								From	To									
A	B	C		D									E	F	G	H	I	
1	Begunia	Moorum and Laterite	Running	Chhatrapada/16.11.2016	Dinesh ranjanpradhan, S/O- KartikchandraPradhan	Village-Nabinabag, PO/PS/Dist - Khordha Mob no.- 8908181285	Order no 5452 /Dtd 02.12. 2016	2016-17	2020-21	16.11.2016	Working	Non - captive	1141 / Dtd 19.05. 2017	Khata No. 410, Plot No. 1322	0.038	0.030	1214.057	425

POTENTIAL LATERITE AREAS

ANNEXURE ii

Sl. No.	Name of Tahasil	Name of village	Status	Name of Minor Mineral and Area of Sairat	Location of the Source (Total Hillock) recommended for mineral concession (GPS co-ordinates or Khata & Plot No) (Sketch map to be attached)	Area of the mineral potential patch (in sq m)	Average height of potential patch (in m)	Mineable mineral potential (in cum)
A	B	C	D	E	F	G	H	I
1	Begunia	Balibareni	New	Laterite/3.43	Khata No. 619, Plot No. 497	34399	PLAIN LAND	137596
2	Begunia	Balibareni	New	Laterite/9.358	Khata No. 619, Plot No. 498	93585	PLAIN LAND	374340
3	Begunia	Balibareni	New	Laterite/10.572	Khata No. 619, Plot No. 510	105726	PLAIN LAND	422904
4	Begunia	Uttareshwar	New	Laterite/9.810	Khata No. 306, Plot No. 213	98106	PLAIN LAND	392424
5	Begunia	Uttareshwar	New	Laterite/5.827	Khata No. 306, Plot No. 337	58276	PLAIN LAND	233104
6	Begunia	Uttareshwar	New	Laterite/1.354	Khata No. 306, Plot No. 327	135418	PLAIN LAND	541672
7	Begunia	Uttareshwar	New	Laterite/6.920	Khata No. 306, Plot No. 325	6920	PLAIN LAND	27680
8	Begunia	Uttareshwar	New	Laterite/11.017	Khata No. 308, Plot No. 209	110178	PLAIN LAND	440712
9	Begunia	Rautapada	New	Laterite/15.501	Khata No. 1011, Plot No. 1533(P)	155014	PLAIN LAND	620056
10	Begunia	Rautapada	New	Laterite/10.334	Khata No. 1011, Plot No. 1533(P)	103342	PLAIN LAND	413368
11	Begunia	Rautapada	New	Laterite/8.872	Khata No. 1011, Plot No. 1289	88729	PLAIN LAND	354916
12	Begunia	Rautapada	New	Laterite/5.473	Khata No. 1008, Plot No. 1486	54734	PLAIN LAND	218936
13	Begunia	Dingar	New	laterite 14.270	Khata No. 479, Plot No. 95/1831	142703	PLAIN LAND	570812
14	Begunia	Dingar	New	Laterite/13.279	Khata No. 479, Plot No.	132788	PLAIN LAND	531152

					95/1832			
15	Begunia	Dingar	New	Laterite/11.179	Khata No. 479, Plot No. 95	111796	PLAIN LAND	447184
16	Begunia	Dingar	New	Laterite/4.942	Khata No. 479, Plot No. 1329	49421	PLAIN LAND	197684
17	Begunia	Dingar	New	laterite0.971	Khata No. 479, Plot No. 1331	9712	PLAIN LAND	38848
18	Begunia	Bhuinpur	New	Laterite/0.617	Khata No. 218, Plot No. 227	6171	PLAIN LAND	24684
19	Begunia	Phoolachh anchuni	New	Laterite/0.202	Khata No. 199, Plot No. 219	2023	PLAIN LAND	16069
20	Begunia	Chhima	New	Laterite/4.593	Khata No. 320, Plot No. 1152 Khata No- 318, plot No. – 1120,1150,1151	45932	PLAIN LAND	183728
21	Begunia	Jalavar	New	Laterite/0.149	Khata No. 441, Plot No. 1625	1497	PLAIN LAND	14491
22	Begunia	Chhatrapda	Running	Laterite	Khata No. 410, Plot No. 1322	1214.057	PLAIN LAND	425
24	Chilika	Parabal	New	Laterite	Khata-538 Plot-318 Point -1. Latitude-190 50' 17" , Longitude 850 19' 55" Point-2. Latitude-190 50' 18" , Longitude 850 19' 53" Point 3. Latitude-190 50' 20" , Longitude 850 19' 53" Point -4. Latitude-190 50' 19" , Longitude 850 19' 56"	41107.5	5	205537.5
25	Chilika	Parabal	New	Laterite	khata-538 plot-376 Point -1. Latitude-190 50' 32" , Longitude 850 19' 47" , Point-2. Latitude-190 50' 35" , Longitude 850 19' 51" , Point 3. Latitude-190 50' 32" , Longitude 850 19' 52" Point -4. Latitude-190 50' 30" , Longitude 850 19' 49"	123727.5	5	618637.5
26	Chilika	Parabal	New	Laterite	khata-538 plot-324 Point -1. Latitude-190 50' 26" , Longitude 850 19'	64638	5	323190

					57", Point-2. Latitude-190 50' 26", Longitude 850 20' 00", Point 3. Latitude-190 50' 22", Longitude 850 20' 03" Point -4. Latitude-190 50' 27", Longitude 850 19' 34"			
27	Chilika	Gainada	New	Laterite	khata-837 plot-483 Point -1. Latitude-190 50' 31", Longitude 850 22' 01", Point-2. Latitude-190 50' 31", Longitude 850 22' 05", Point 3. Latitude-190 50' 29", Longitude 850 22' 04" Point -4. Latitude-190 50' 29", Longitude 850 '22' 01"	963697.5	5	4818488
28	Chilika	Olasingh	New	Laterite Stone (29.210 Ac)	Mz-Olasingh, Khata no.372,plot no.541	118209	6	425552
29	Khordha	Dakshineswar	New	Laterite & Morrum/DAKSHINESWAR (KA)	Khata No.- 536/3, Plot No.- 238 (P)	32200	PLAIN LAND	56000
30	Khordha	Dakshineswar	New	Laterite & Morrum/DAKSHINESWAR (KHA)	Khata No.- 536/3, Plot No.- 238 (P)	38900	PLAIN LAND	68000
31	Khordha	Dakshineswar	New	Laterite & Morrum/DAKSHINESWAR (GA)	Khata No.- 536/3, Plot No.- 234,229	87500	PLAIN LAND	15800
32	Khordha	Dakshineswar	New	Laterite & Morrum/DAKSHINESWAR (GHA)	Khata No.- 536/3, Plot No.- 240	51300	PLAIN LAND	82000
33	Khordha	Dakshineswar	New	Laterite & Morrum/DAKSHINESWAR (UNA)	Khata No.- 536/3, Plot No.- 465,236	52800	PLAIN LAND	84000
34	Khordha	Dakshineswar	New	Laterite & Morrum/DAKSHINESWAR	Khata No.- 536/3, Plot No.- 242,243	42900	PLAIN LAND	76000

				AR (CHA)				
35	Khordha	Dakshineswar	New	Laterite & Morrum/DAKSHINESWAR (CHHA)	Khata No.- 536/3, Plot No.- 247	31900	PLAIN LAND	52000
36	Khordha	Dakshineswar	New	Laterite & Morrum/DAKSHINESWAR (JA)	Khata No.- 536/3, Plot No.- 248	27300	PLAIN LAND	44000
37		Dakshineswar	New	Laterite & Morrum/DAKSHINESWAR (JHA)	Khata No.- 536/3, Plot No.- 249 (P)	70300	PLAIN LAND	120000
38	Khordha	Dakshineswar	New	Laterite & Morrum/DAKSHINESWAR (NIA)	Khata No.- 536/3, Plot No.- 249 (P)	84000	PLAIN LAND	128000
39	Khordha	Nijagarhtapang	New	Laterite & Morrum/NIJAGARHTAPANG (KA)	Khata No.- 832/1, Plot No.- 2054	52600	PLAIN LAND	80000
40	Khordha	Nijagarhtapang	New	Laterite & Morrum/NIJAGARHTAPANG (KHA)	Khata No.- 832/1, Plot No.- 2056	52500	PLAIN LAND	80000
41	Khordha	Nijagarhtapang	New	Laterite & Morrum/NIJAGARHTAPANG (GA)	Khata No.- 832/1, Plot No.- 2052 (P)	76500	PLAIN LAND	136000
42	Khordha	Nijagarhtapang	New	Laterite & Morrum/NIJAGARHTAPANG (GHA)	Khata No.- 832/1, Plot No.- 2052 (P)	85300	PLAIN LAND	152000
43	Khordha	Nijagarhtapang	New	Laterite & Morrum/NIJAGARHTAPANG (UNA)	Khata No.- 832/1, Plot No.- 834 (P)	63700	PLAIN LAND	112000
44	Khordha	Nijagarhtapang	New	Laterite & Morrum/NIJAGARHTAPANG (CHA)	Khata No.- 832/1, Plot No.- 834 (P)	100600	PLAIN LAND	180000

45	Khordha	Nijagarhtapang	New	Laterite & Morrum/ NIJAGARHTAPANG (CHHA)	Khata No.- 832/1, Plot No.- 834 (P)	74700	PLAIN LAND	130000
46	Khordha	Nijagarhtapang	New	Laterite & Morrum/ NIJAGARHTAPANG (JA)	Khata No.- 832/1, Plot No.- 834 (P)	72600	PLAIN LAND	130000
47	Khordha	Jhinkijhari	New	Laterite & Morrum/ JHINKIJHARI(KA)	Khata No.- 600, Plot No.- 1301	68400	PLAIN LAND	120000
48	Khordha	Jhinkijhari	New	Laterite & Morrum/ JHINKIJHARI(KHA)	Khata No.- 557/7, Plot No.- 1332(P)	108100	PLAIN LAND	180000
49	Khordha	Jhinkijhari	New	Laterite & Morrum/ JHINKIJHARI(GA)	Khata No.- 600, Plot No.- 1330(P)	79700	PLAIN LAND	140000
50	Khordha	Narshinghprasad	LOI issued	Laterite & Morrum/ NARSHINGHPRASAD(K A)	Khata No.- 377/6, Plot No.- 76	76600	PLAIN LAND	136000
51	Khordha	Narshinghprasad	New	Laterite & Morrum/ NARSHINGHPRASAD(K HA)	Khata No.- 377/6, Plot No.- 205 (P)	79000	PLAIN LAND	140000
52	Khordha	Narshinghprasad	New	Laterite & Morrum/ NARSHINGHPRASAD(GA)	Khata No.- 377/6, Plot No.- 205 (P)	67600	PLAIN LAND	120000
53	Khordha	Chatipur	New	Laterite & Morrum/ CHATIPUR	Khata No.- 17, Plot No.- 1503	56700	PLAIN LAND	100000
54	Khordha	Dhaulimuhan	New	Laterite & Morrum/ DHAULIMUHAN	Khata No.- 667/15, Plot No.- 107	123600	PLAIN LAND	220000
55	Khordha	Narasinghprasad	New	Laterite/0.08	Khata No. 383, Plot No. 25	809	PLAIN LAND	10000
57	Khordha	Champajhara	New	Laterite/1.133	Khata No. 448, Plot No. 480	11331	PLAIN LAND	200000
58	Khordha	Champajhara	New	Laterite/0.084	Khata No. 448, Plot No.	842	PLAIN LAND	10000

		ara			327			
59	Khordha	Lahanga	New	Laterite/0.768	Khata No. 571, Plot No. 59	7689	PLAIN LAND	15000
60	Khordha	Panichhatra	New	Laterite/0.0404	Khata No. 306, Plot No. 327	404	PLAIN LAND	5000
61	Khordha	Mundamba	New	Laterite/0.4046	Khata No. 306, Plot No. 325	4046	PLAIN LAND	50000
62	Jatani	Paniora	New	Laterite 0.7466	Khata- 315, Plot- 1112, Point-1- 20.2344337 85.6631094 Point- 2 - 20.2340710 85.6635248 Point-3-20.2337693 85.6631554 Point-4- 20.2338974 85.6624928	7466	2	15000
63	Jatani	Paniora	New	Laterite 0.0809	Khata- 315, Plot- 1045 Point-1- 20.238623 85.6648777 Point- 2- 20.2317896 85.6651714	809	2	1500
64	Jatani	Plashpur	New	Laterite 2.0234	Khata- 363, Plot- 129 Point-1- 20.2487055 85.6630725 Point-2- 20.2467788 85.6644452 Point-3-20.2475627 85.6625787	20234	2	40000
65	Jatani	Madhupur	New	Laterite 2.7518	Khata- 232, Plot- 557 Point-1- 20.2320847 85.6313732 Point-2-20.2321234 85.6331119 Point-3-20.2311648 85.6341664 Point-4- 20.2308295 85.6361475 Point-5- 20.2316676 85.6313085 Point-6- 20.2314127 85.6329010 Point-7- 20.2308465 85.6333808	27519	2	55000

					Point-8- 20.2302824			
66	Jatani	Madhupur	New	Laterite 1.7806	Khata- 232, Plot- 558 Point-1- 20.2308295 85.6361475 Point-2- 20.2309349 85.6371654 Point-3- 20.2313838 85.6380894 Point-4- 20.2302824 85.6356986 Point-5- 20.2302595 85.6371651 Point-6- 20.2301997 85.6383389	17806	2	35000
67	Jatani	Taraboi	New	Laterite 2.0234	Khata- 839, Plot- 231 Point-1- 20.1460541 85.6375778 Point-2- 20.1463641 85.6389702 Point-3- 20.1451359 85.6392807 Point-4- 20.1448287 85.6377488	20234	7.5	125000
68	Jatani	Haridamad a	New	Laterite 2.0234	Khata- 311, Plot- 104 Point-1- 20.1514374 85.6456795 Point-2- 20.1514349 85.6468495 Point-3- 20.1499237 85.6468143 Point-4- 20.1499451 85.6456838	20234	7.5	150000
73	Tangi	Olasingh	New	Laterite Stone (25.590 Ac)	Mz-Olasingh, Khata no.372,plot no.337	103560	6	372816
74	Tangi	Olasingh	New	Laterite Stone (20.640 Ac)	Mz-Olasingh, Khata no.372,plot no.593	83527	6	300697
75	Tangi	Olasingh	New	Laterite Stone (29.210 Ac)	Mz-Olasingh, Khata no.372,plot no.541	118209	6	425552
76	Tangi	Olasingh	New	Laterite Stone (23.280 Ac)	Mz-Olasingh, Khata no.372,plot no.1006	94211	6	339160
77	Tangi	Damanbhui	New	Laterite Stone (10.230 Ac)	Mz-Damanbhui, Khata	41400	6	149040

		n		Ac)	no.708,plot no.2161			
78	Tangi	Damanbhui n	New	Laterite Stone (41.600 Ac)	Mz-Damanbhui, Khata no.708,plot no.942	168350	6	606060
79	Tangi	Damanbhui n	New	Laterite Stone (20.005 Ac)	Mz-Damanbhui, Khata no.705,plot no.731	80958	6	291449
80	Tangi	Gayaband ha	New	Laterite Stone (31.580 Ac)	Mz-Gayabandha, Khata no.338,plot no.763	127800	6	406080
81	Tangi	Arang	New	Laterite Stone (47.670Ac)	Mz-Arang, Khata no.518,plot no.1049	192914	6	694490
82	Tangi	Sahadagha i	New	Laterite Stone (6.325 Ac)	Mz-Sahadaghai, Khata no.278,plot no.719	25596	6	92146
83	Tangi	Sahadagha i	New	Laterite Stone (7.312Ac)	Mz-Sahadaghai, Khata no.278,plot no.720	29591	6	106528
84	Tangi	Sahadagha i	New	Laterite Stone (3.950 Ac)	Mz-Sahadaghai, Khata no.278,plot no.754	15985	6	57546
85	Tangi	Sahadagha i	New	Laterite Stone (6.425Ac)	Mz-Sahadaghai, Khata no.278,plot no.755	26001	6	93604
86	Tangi	Nayakota	New	Laterite Stone (20.005 Ac)	Mz-Nayakota, Khata no.293,plot no.440	80958	6	291449
87	Tangi	Nayakota	New	Laterite Stone (5.630Ac)	Mz-Nayakota, Khata no.293,plot no.424	22784	6	13670
88	Tangi	Nayakota	New	Laterite Stone (1.000Ac)	Mz-Nayakota, Khata no.293,plot no.685	4047	6	14569
90	Tangi	Jagatpur	New	Laterite Stone quarry	Khata No.395,(banabibibhag),pl ot no.246, Ac. 4.000,Kisam- Chhotajungle	-16187	6	58273
91	Tangi	Jagatpur	New	Laterite Stone quarry	Khata No.392,(Anabadi),plot no.262, Ac. 2.605,Kisam- Pathartangi	10542	6	37951
93	Tangi	Bariko	New	LS-0.5 AC	Mz-Bariko, Khata-270, plot- 673	2023	6	7283
94	Tangi	Talagada Kuhudi	New	Laterite Stone Talagada Kuhudi LS Q No.1(5.170 Ac)	Khata no-226, Plot No.283	20085	4	57096
95	Tangi	Talagada Kuhudi	New	Laterite Stone Talagada Kuhudi LS Q No.5(4.963 Ac)	Khata no-226, Plot No.283	20234	4	41126

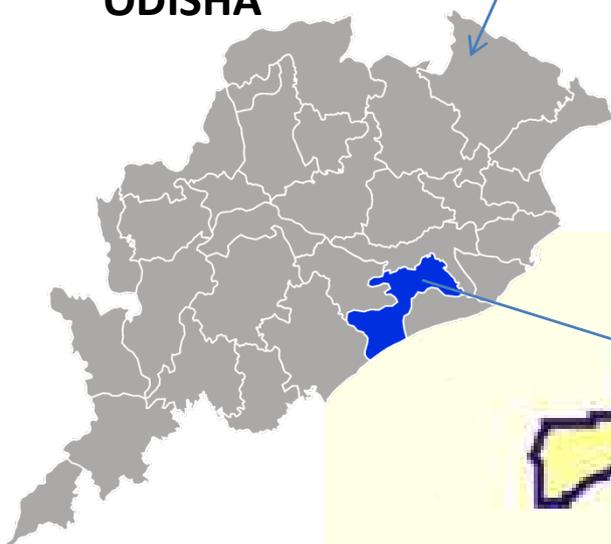
96	Tangi	Talagada Kuhudi	New	Laterite Stone Talagada Kuhudi LS Q No.6(5.000 Ac)	Khata no-226, Plot No.283	20234	4	60507
97	Tangi	Talagada Kuhudi	New	Laterite Stone Talagada Kuhudi LS Q No.7(5.000 Ac)	Khata no-226, Plot No.283	20234	4	52178
98	Tangi	Talagada Kuhudi	New	Laterite Stone Talagada Kuhudi LS Q No.8(5.000 Ac)	Khata no-226, Plot No.283	20234	4	47187
99	Tangi	Talagada Kuhudi	New	Laterite Stone Talagada Kuhudi LS Q No.9(5.000 Ac)	Khata no-226, Plot No.283	20234	4	64800
100	Tangi	Jagatpur	LOI issued	Jagatpur Laterite Stone quarry No.1	Khata no-286, Plot No.68	5301	6	9836
101	Tangi	Jagatpur	LOI issued	Jagatpur Laterite Stone quarry No.2	Khata no-286, Plot No.77	2040	6	15720
103	Tangi	Patrapada	LOI issued	Patrapada LSQ No.1	Khata no-107, Plot No.207	1202	6	8232
104	Tangi	Rasulpur	LOI issued	Rasulpur LSQ No.1	Khata no-286, Plot No.68	5301	6	9836
105	Tangi	Rasulpur	LOI issued	Rasulpur LSQ No.2	Khata no-286, Plot No.77	2040	6	15720
106	Tangi	Sundarpur	LOI issued	Sundarpur LSQ	Khata no-986, Plot No.2511	1396	6	13508
107	Tangi	Singarama	LOI issued	Singarama Laterite Stone quarry no-1 (2.081 Ac.)	Khata no-211, Plot No.42	8422	6	17375
108	Tangi	Singarama	LOI issued	Singarama LS Q No-2(0.793 AC	Khata no-211, Plot No.217	3209	6	12632
109	Tangi	Ramachan drapur	LOI issued	Ramachandrapur LSQ No-1 0.868 AC	Khata no-463, Plot No.651	3513	6	25592
110	Tangi	Ramachan drapur	LOI issued	Ramachandrapur LSQ No-2	Khata no-465, Plot No.640	19526	6	70293

			d	4.825 AC				

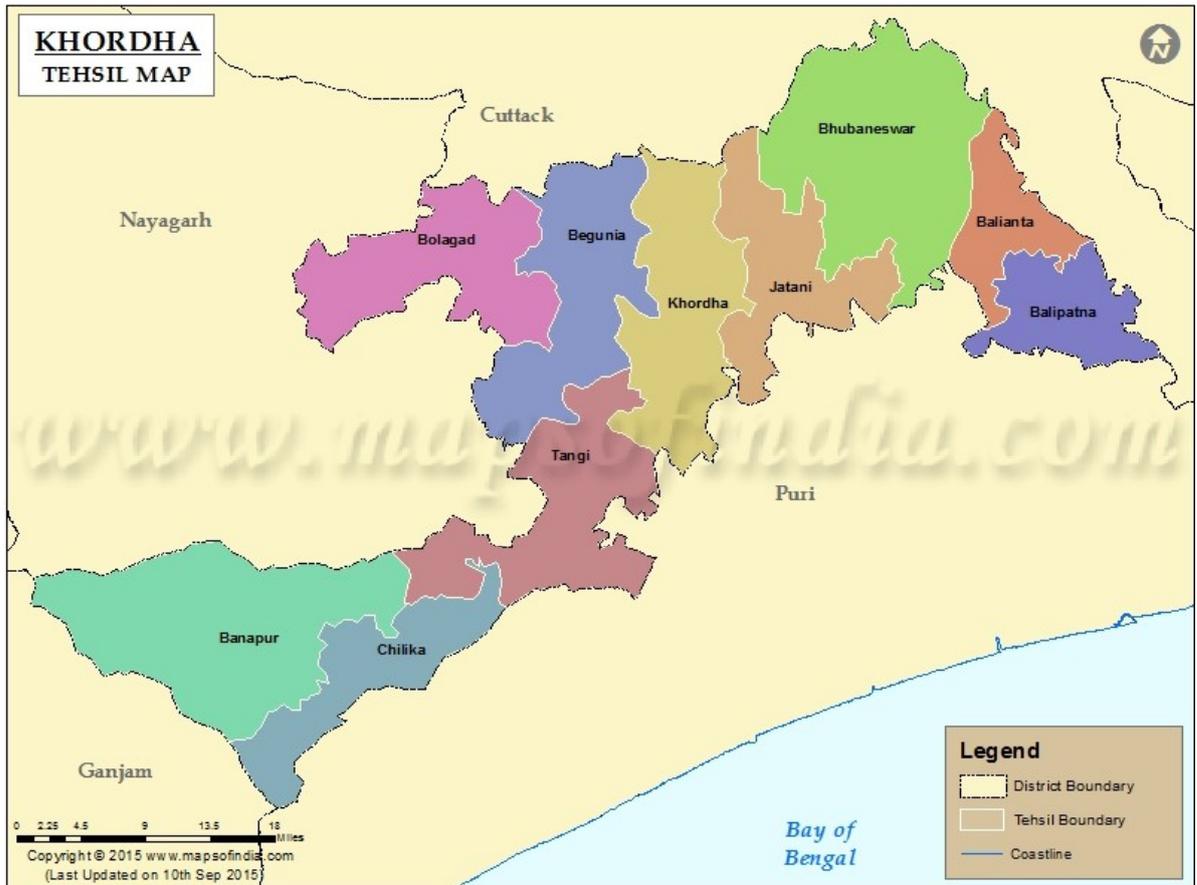
INDEX MAP



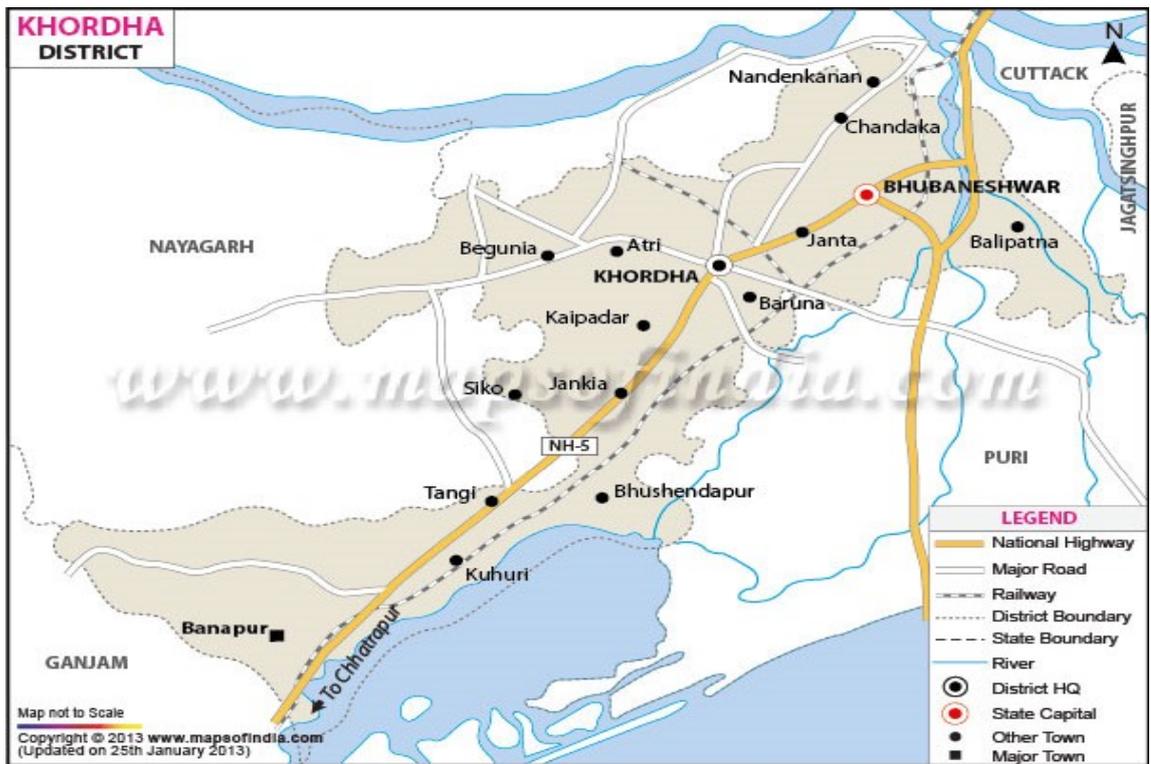
ODISHA



MAP SHOWING THE TAHASILS OF KHORDHA DISTRICT



MAP SHOWING THE MAJOR ROADS OF KHORDHA DISTRICT

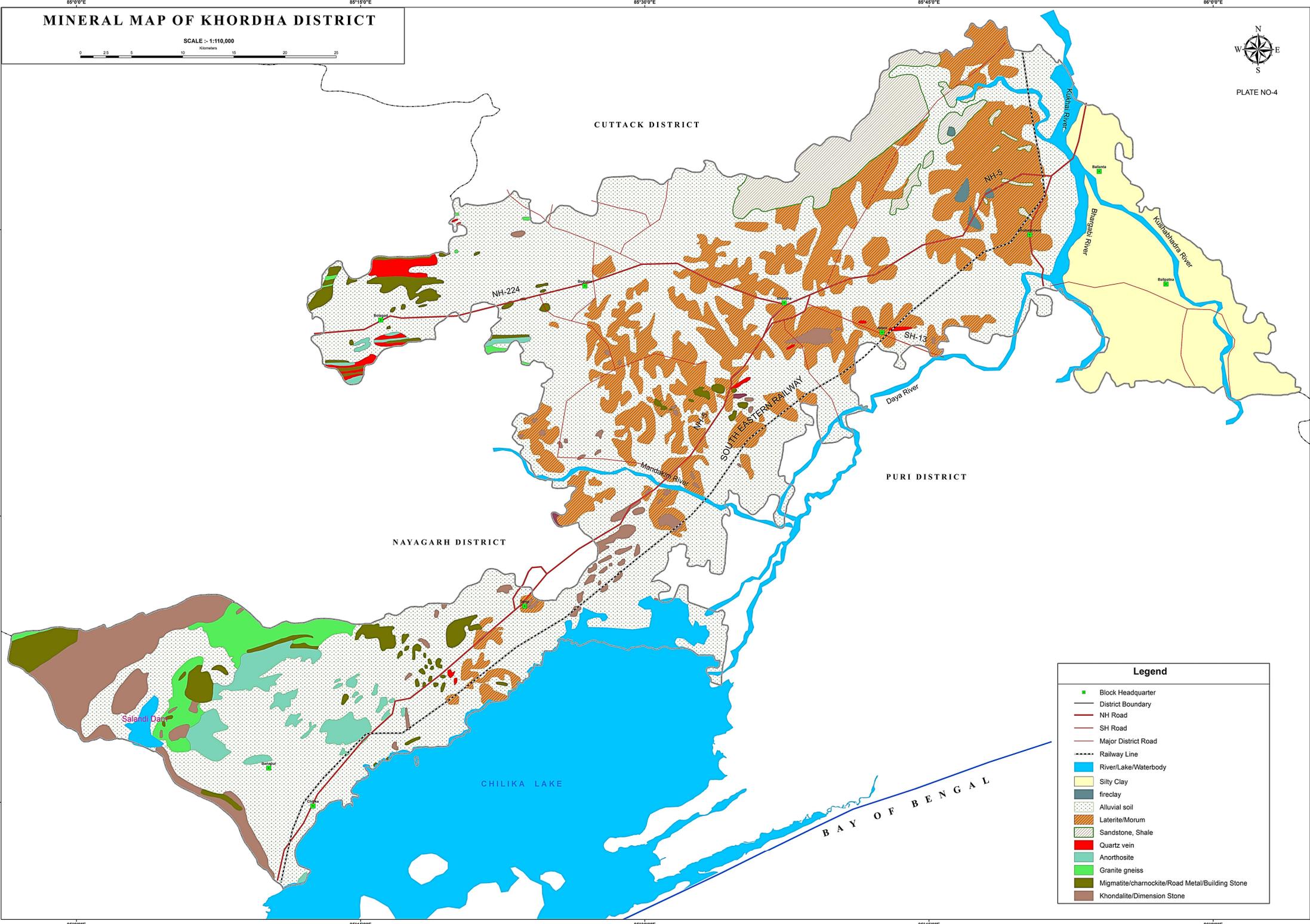


MINERAL MAP OF KHORDHA DISTRICT

SCALE :- 1:110,000



PLATE NO-4



Legend

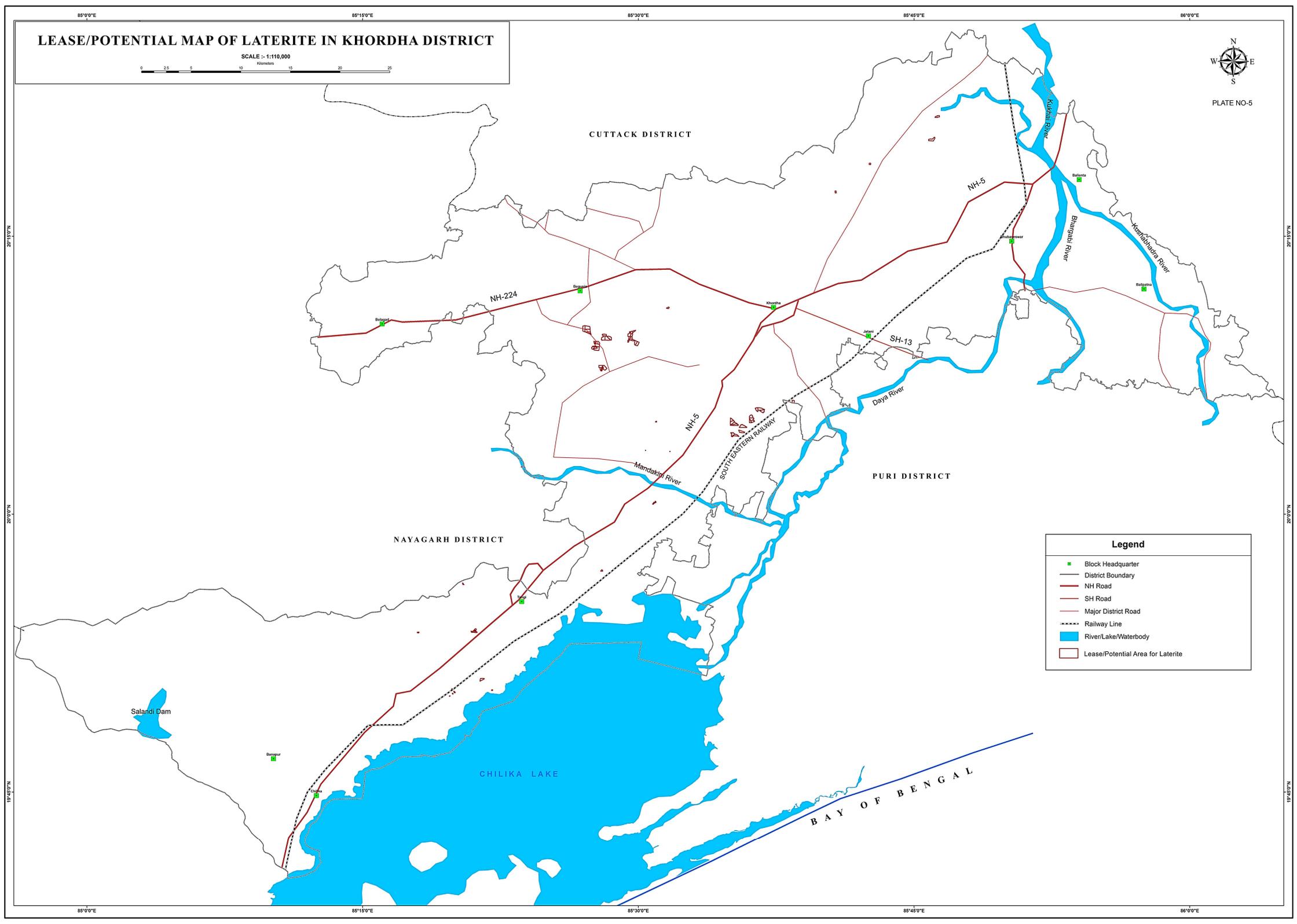
- Block Headquarter
- District Boundary
- NH Road
- SH Road
- Major District Road
- Railway Line
- River/Lake/Waterbody
- Silty Clay
- fireclay
- Alluvial soil
- Laterite/Morum
- Sandstone, Shale
- Quartz vein
- Anorthosite
- Granite gneiss
- Migmatite/charnockite/Road Metal/Building Stone
- Khondalite/Dimension Stone

LEASE/POTENTIAL MAP OF LATERITE IN KHORDHA DISTRICT

SCALE : 1:1,110,000
Kilometres



PLATE NO-5



Legend

- Block Headquarter
- District Boundary
- NH Road
- SH Road
- Major District Road
- Railway Line
- River/Lake/Waterbody
- Lease/Potential Area for Laterite