

BEFORE THE HON'BLE NATIONAL GREEN
TRIBUNAL, EASTERN ZONE BENCH,
KOLKATA

APPEAL NO. 04 OF 2025

Bholanath Padhi

...Appellant

VERSUS

State of Odisha & Ors.

...Respondents

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Place: Cuttack

MUKESH KUMAR PALAI

Date: 23.07.2025 ADVOCATE EN. NO.- O-939/2022

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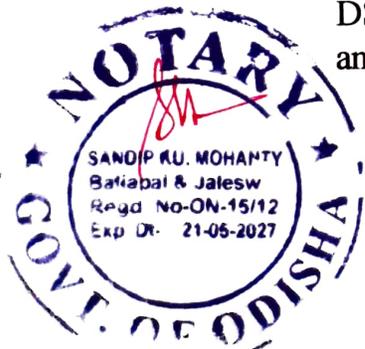
SUPPLEMENTARY / ADDITIONAL AFFIDAVIT
ON BEHALF OF THE APPELLANT

SANDIP KU. MOHANTY
Notary, ON 15 / 12

I, Bholanath Padhi, aged about 32, son of Late Purna Chandra Padhi, resident of at/po- Mahammad Nagar Patna, do hereby solemnly affirm and state as follows:

1. That the Applicant is the Appellant in the above-mentioned Appeal and is well acquainted with the facts and circumstances of the case.
2. That the Supplementary / Additional affidavit is being filed to bring on record additional documents, Guidelines and including serious factual and procedural errors in the finalization of the Draft District Survey Report (DSR) of Balasore District, Odisha, which were not considered despite timely objections raised by the Appellant.
3. That pursuant to the public notice issued for inviting objections to the Draft DSR of Balasore District on dated- 11.12.2024 the Appellant had submitted detailed written objections on several critical grounds. For the sake of brevity, those already raised in the main Appeal are not repeated herein. A copy of the impugned Draft DSR of Balasore District on dated- 11.12.2024 is annexed herewith as Annexure-6 series.

Bholanath Padhi



7/11
22.07.2025



4. That vide notice dated 25.01.2025, the Chairman, Sub-Divisional Committee, Balasore, scheduled a hearing on 29.01.2025 to consider objections received during the public consultation process prior to finalization of the DSR.

5. That on 28.01.2025, the Appellant communicated via email to the said authority expressing inability to attend the hearing in person, while reiterating the objections to the Draft DSR. A true copy of the said email communication and the attached representation dated 28.01.2025 is already annexed with the Appeal as Annexure-5 series.

6. That despite the Appellant's timely and specific objections, the final DSR as approved by SEIAA, Odisha has failed to address critical issues pertaining to the following sand sources:

- Shikharpur Sand Source
- Sekhasarai (KA) Sand Source
- Benapura-II Sand Source
- Chalanti Sand Source
- Chormara (Chandibasti) Sand Source

7. That the objections raised by the Appellant were based on the following substantive grounds:

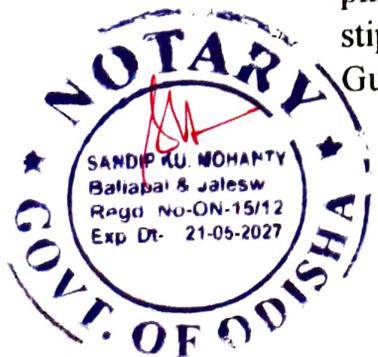
→ The non-availability of actual sand deposits at the proposed locations, as verified through physical inspection and G.P.S./ satellite imagery;

→ The active river course flowing through the proposed lease areas, rendering them ecologically sensitive and inherently unfit for any form of sand mining;

→ The complete absence of permanent boundary pillars at the site, in violation of the mandatory stipulations under the Enforcement & Monitoring Guidelines for Sand Mining (EMGSM), 2020.

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For the kind consideration of this Hon'ble Tribunal, the relevant provisions of the EMGSM Guidelines are quoted here under:

"4.1 Identification of possible sand mining sources and preparation of District Survey Report (DSR)

4.1.1 Preparation of District Survey Report.

"Sustainable Sand Mining Guidelines, 2016" issued by MoEF&CC requires preparation of District Survey Report (DSR), which is an important initial step before grant of mining lease/Lol. The guidelines emphasize detailed procedure to be followed for the purpose of identification of areas of aggradation/ deposition where mining can be allowed and identification of areas of erosion and proximity to infrastructural structures and installation where mining should be prohibited. Calculation of annual rate of replenishment, allowing time for replenishment after mining, identification of ways of scientific and systematic mining; identifying measures for protection of environment and ecology and determining measures for protection of bank erosion, benchmark (BM) with respect to mean Sea Level (MSL) should be made essential in mining channel reaches (MCR) below which no mining shall be allowed.

(a)

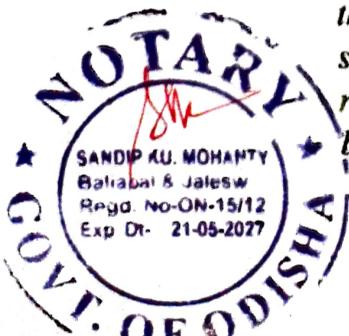
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(e) Defining the sources of Sand/M-Sand in the district is the next step for identification of the potential area of deposition/aggradation wherein mining lease could be granted. Detailed survey needs to be carried out for quantification of minerals. The purpose of mining in the river bed is for channelization of rivers so as to avoid the possibility of flooding and to maintain the flow of the rivers. For this, the entire river stretch needs to be surveyed and original ground level (OGL) to be recorded and area of aggradation/deposition needs to be ascertained by comparing the level difference



Shobanath Dasgupta

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between the outside riverbed OGL and water level. Once the area of aggradation/deposition are identified, then the quantity of River Bed Material available needs to be calculated. The next step is channelization of the river bed and for this central 3/4th part of the river, width needs to be identified on a map. Out of the 34th part area, where there is a deposition/aggradation of the material needs to be identified. The remaining 14th area needs to be kept as no mining zone for the protection of banks. The specific gravity of the material also needs to be ascertained by analyzing the sample from a NABL accredited lab. Thus, the quantity of material available in metric ton needs to be calculated for mining and no mining zone.

Note: As physical survey with conventional method is time-consuming, use of unmanned aerial vehicle (UAV) may be explored to carry out the survey and finalizing the original ground level and for developing a 3D model of the area.

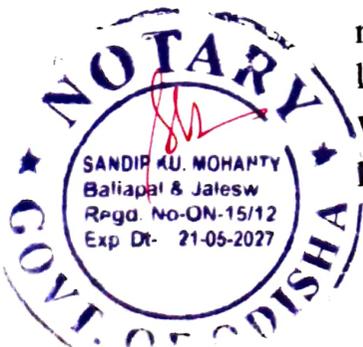
(f) The permanent boundary pillars need to be erected after identification of an area of aggradation and deposition outside the bank of the river at a safe location for future surveying. The distance between boundary pillars on each side of the bank shall not be more than 100 meters.

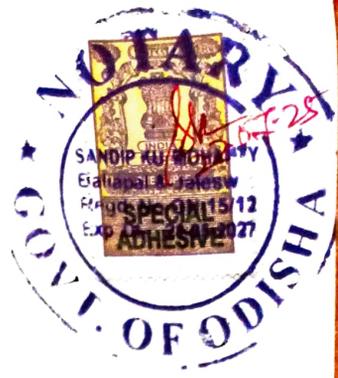
(g) Identifying the mining and no mining zone shall follow with defining the area of sensitivity by ascertaining the distance of the mining area from the protected area, forest, bridges, important structures, habitation etc. and based on the sensitivity the area needs to be defined in sensitive and non-sensitive area."

The non-compliance with the above provisions severely undermines both the environmental sustainability and legal validity of the proposed sand mining operations. It is respectfully submitted that the lessees have submitted Replacement Study Reports without conducting actual ground verification through permanent boundary pillar postings. This constitutes a

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Bholarath Padhi





gross violation of the mandatory provisions laid down under the Enforcement & Monitoring Guidelines for Sand Mining 2020 (EMGSM). A copy of the said Guidelines is annexed herewith and marked as **Annexure-7 Series.**

8. That in addition, the District Survey Report (DSR) suffers from a material omission in that it completely failed to assess or incorporate other viable sand sources such as those at Dhitpura and Kadrayan. This selective inclusion of sources reflects a non-transparent and arbitrary approach to resource mapping and violates the principles of sustainable planning envisaged in the EMGSM Guidelines.

9. That it has further come to light that the lessees are illegally constructed temporary wooden bridges across the Subarnarekha River and is transporting sand in blatant violation of the approved mining plan, environment clearance and transportation route. Similar unauthorized and ecologically damaging activities have been observed at the Rajnagar Sand Source, pointing to a pattern of regulatory disregard.

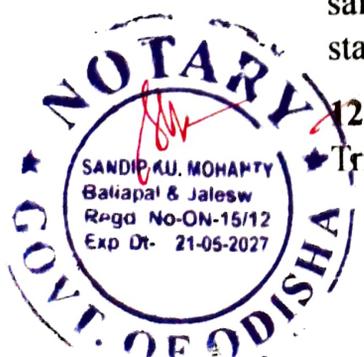
10. That at the Ambakuruchi Sand Source, active mining is being undertaken without the installation of permanent boundary pillars. This failure has resulted in mining activity exceeding permitted limits, posing serious risks of over-extraction, bank erosion, and irreversible ecological damage.

11. That the State Environment Impact Assessment Authority (SEIAA), Odisha granted approval to the impugned DSR without adequately considering the aforementioned objections and violations. Such approval constitutes procedural impropriety and reflects a complete disregard for the environmental safeguards and field realities mandated under the statutory guidelines.

12. The Appellant respectfully prays that this Hon'ble Tribunal may be pleased to take this supplementary/

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Handwritten signature in blue ink: Bholanath Das



Additional affidavit on record in support of the pending appeal and pass appropriate directions in light of the serious factual and legal violations detailed hereinabove, in the interest of environmental justice.

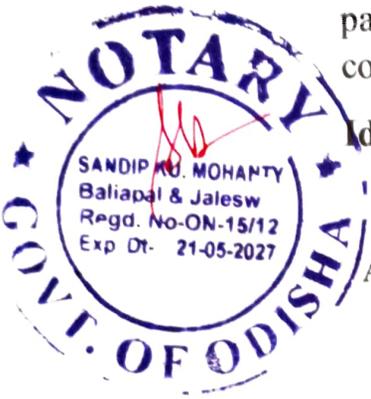


Bhokanath Padhi
DEPONENT

10/17
22.07.25

VERIFICATION

Verified on dt. 22.07.2025 at Jaleswar that the contents of the above affidavit are true and correct. No part of it is false and nothing material has been concealed there from.



Identified By

22.07.2025

Advocate

Bhokanath Padhi
DEPONENT

10/17
22.07.2025

Solemnly Sworn before me
by Bhokanath Padhi
being identified by Mr. Self .Adv
on dt. 22.07.25 at 03.14 P.m

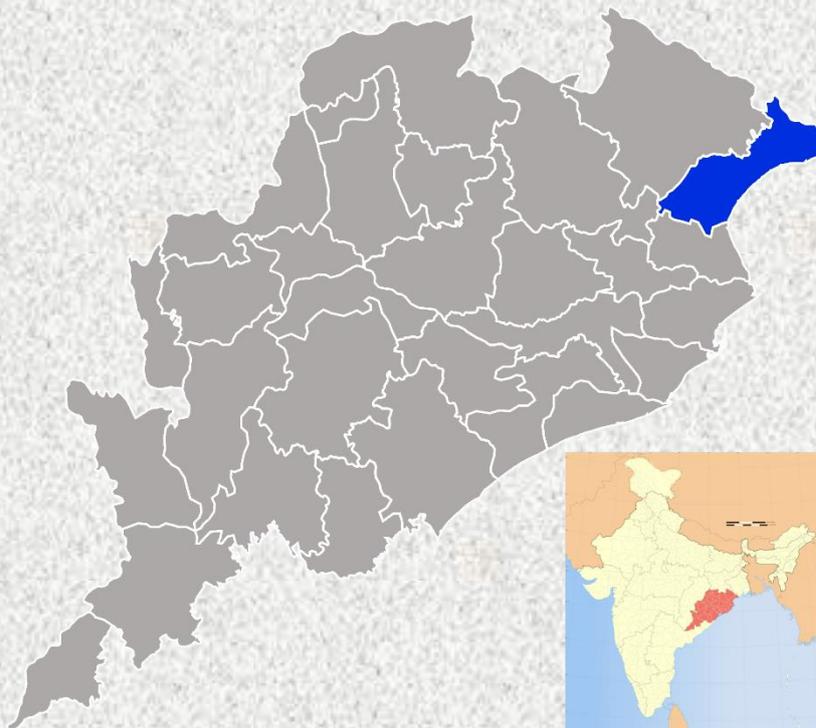
Sandip Kumar Mohanty
Notary. ON-15/12 / 22.07.2025

MPB



DISTRICT SURVEY REPORT (DSR) OF BALASORE DISTRICT, ODISHA FOR RIVER SAND 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)



**COLLECTORATE BALASORE
NOVEMBER-2024**

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0. PREFACE

Odisha is one of the Major Mineral rich State in India. Balasore is a unique District in Odisha lies on the Northern most part of the State with rich and varied mineral resource. It is a paradise for Geoscientists of India and abroad. It has preserved many important rock groups from the earliest of crust formation to the geologically recent times. The landmass constituting the Balasore District, explorers to many Entrepreneurs on account of its diverse geological setting and rich and varied mineral resources.

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 25th July, 2018. It has been made mandatory to obtain environmental clearance for different kinds of development projects as listed in Appendix-X of the Notification. 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 sand mining has been prepared in accordance with Clause II of Appendix X of the notification. Every effort has been made to cover river sand mining locations, future potential areas and overview of sand 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.

The Main objective of the preparation of District Survey Report is to ensure the following:-

1. Identification of Mineral Resources in the District.
2. Identification of areas of minor minerals having the potentiality where mining can be allowed.
3. Identification of area and proximity to infrastructure and installations where mining should be prohibited.

01. INTRODUCTION

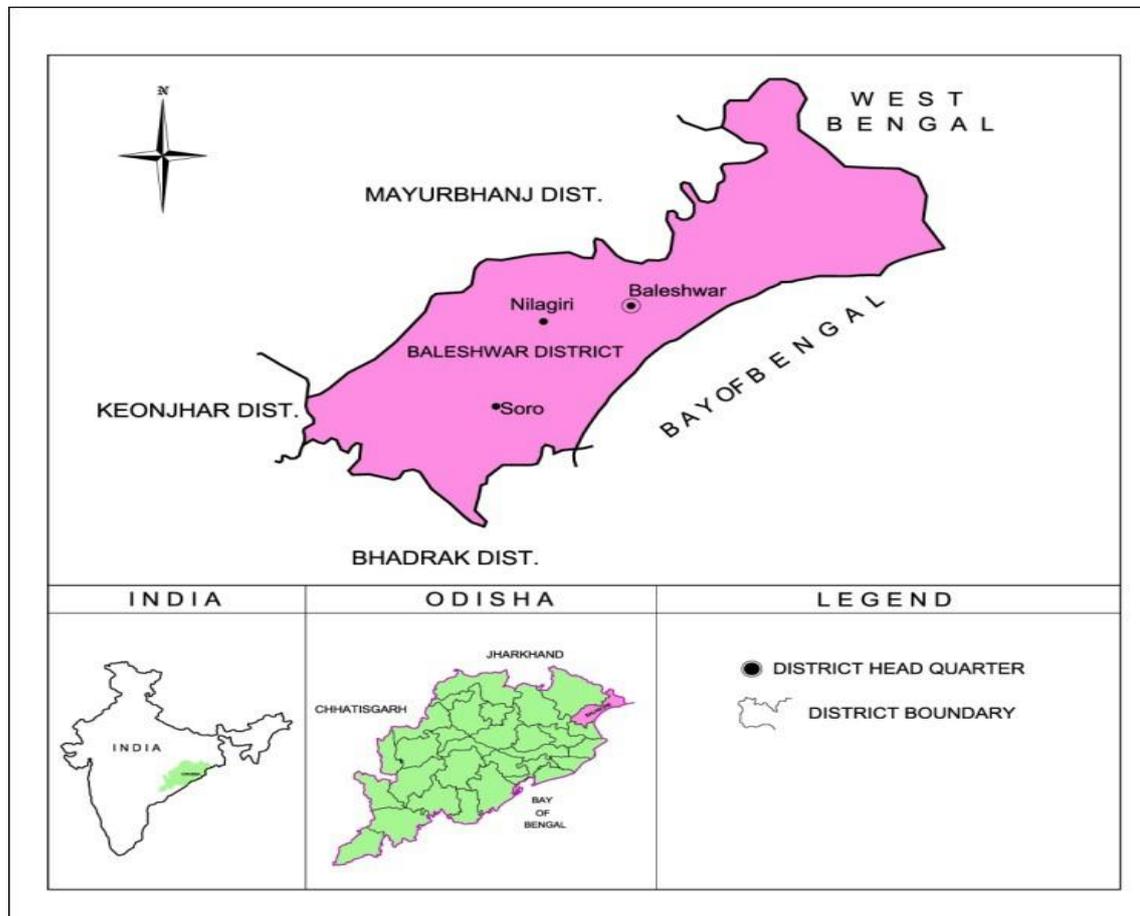
Balasore is one of the coastal Districts of Odisha. It lies on the northern most part of the state. It was a part of the ancient Kalinga which later became a territory of Toshal or Utkal, till the death of Mukunda Dev. Balasore as a separate District was created in October 1828. originally it was in Bengal presidency.

Balasore also gets its name from the Persian word Bala–e–Shore, meaning 'Town in the sea'. Historical legend ascribes the naming of this District as per Lord Baneshwar (Lord Shiva) of the town, which subsequently changed to Balasore during the Mughul rule. There are many historical monuments in the Balasore District. Some of the major monuments in Balasore District includes the rich sculptural remains found in Ayodhya. The ruin of the old Buddhist monastery and temple is there in Kupali in Balasore District. Some of the ruined forts at the Jayachandi forests in Raibania are also there in the District. The major religious monument found in the District is the Lord Chandaneswar Shrine.

There are beautiful sea beaches and many temples attract local and national tourists. Chandipur, Talasari sea beach, Chawmukh sea beach, Kashaphal sea beach are the famous sea beaches of the District. Temples like Panchalingeswar, Khirochora Gopinath, Langaleswar, Laxmannath, Chandaneswar, Maninageswar are the point of attractions.

Balasore is the District Head Quarter, spreading over an area of 3634 sq.km lies between 20° 48' North to 21° 59' North latitudes and 86°16' to 87°29' East longitudes. The District is surrounded by Medinipur District of West Bengal on its Northern side, Bay of Bengal on its East, Bhadrak District on its South and Mayurbhanj & Keonjhar Districts lies on its Western side. It is best known for Chandipur Beach. The Indian Ballistic Missile Defense Program's Integrated Test Range is located at a distance of 18 km towards South of Balasore. It is the largest city of North Odisha. This District consists of two Sub-Divisions namely Balasore and Nilgiri. There are 12 Tahasils for 12 Blocks of this District. Balasore is the main town as well as the Centre of Economic Growth in the district. The primary occupation of people in the District is cultivation. This District is mainly known for cultivation of paddy. Industries, Agriculture, Fishing and Tourism are the four major Revenue

sources of Balasore District. Birla Tyres, Balasore Alloys Limited, Emami Paper Mills Limited and Polar Pharma India Limited are some of the Large–Scale Industries functioning in this District. Balasore occupies a unique position being endowed with lush green vegetation, different fauna & flora and rich Cultural Heritage. The District has a rich mineral base of river sand, and Road Metal which are mainly used in construction purpose in the District. The huge deposits of granite stones at Nilgiri, Khaira, Soro region provides tremendous scope for development of few more Industries based on these resources. Except these, no major mineral in large quantity which can be explored for commercial purpose found in the District. The location of the District has been presented in a map below.



02. OVERVIEW OF MINING ACTIVITY IN THE DISTRICT.

Balasore District has transitional landform features between coastal plain and hilly region. Most of the mineralized area coming under Eco-Sensitive Zone (Kuldiha Wildlife Sanctuary). Thus mining activities are confined only to the areas outside of Eco-Sensitive Zone. The mining activity in the District is restricted only to Minor Mineral i.e. of sand, road metal, decorative stone and brick clays. These are being given to various user agencies as lease agreement governed and regulated by Revenue Department under the legal provision stated under Odisha Minor Mineral Concession Rules, 2016. There is no lease of Major Mineral in the District. At present Leases of stone, sand and bricks making units are operational in the District. Stone chips, ordinary sand constitute the principal mining activity of Soro, Khaira, Jaleswar, Nilgiri area etc. of Balasore District. Huge granite stone deposits as road metal are available in Khaira, Nilgiri, Soro area and major sand sources having good potential are available in Jaleswar, Remuna and Nilagiri area of the District. These sources have been providing tremendous scope for development of few more Industries based on these Resources.

03. THE LIST OF MINING LEASES IN THE DISTRICT WITH LOCATION, AREA & PERIOD OF VALIDITY.

Sl.No.	Name of River/Stream	Name of the Mineral	Name of the Lessee	Address & Contact No. of lessee	Mining lease Grant Order No. & date	Area of Mining lease (in AC/HC)	Period of Mining lease (Initial)		Date of commencement of mining operation	Status (Working Non Working/Temp. working for dispatch etc.)	Obtained Environmental clearance (Y/N) if Y letter No. with date of grant of E.C	Location of the mining lease Land Schedule and (Latitude & Longitude)
							From	To				
1	2	3	4	5	6	7	8	9	10	11	13	14
A. Name of the Tahasil:-Basta												
A1	SUBARNA REKHA	AMBAKURUCHI SAND SOURCE	PANKAJ KUMAR JENA	AT:- SEKHBAD,P.O.:- JALESWAR, P.S.:- JALESWAR, DIST. BALASORE	Letter no-1537/19-06-2020	7.40 acre/2.69Ha	14-Dec-20	13-Dec-25	14-Dec-20	Working	YES SIA/OR/MIN/2962 13/2023 & 02-May-2023	MOUZA AMBAKURUCHI KHATA NO :304, PLOT: 1450, (AREA 7.400 AC),KISSAM :NADI, Longitude 87°12'05.4" TO 87°12'16.5",Latitude 21°43'54.7" TO 21°43'46.6"
A2	SUBARNA REKHA	DEVOG SAND SOURCE	NIRANJAN PRADHAN	AT:- DATUNDA, P.O.:- DEBHOG, P.S.:- BALIAPAL, DIST. BALASORE	Letter no-1633/26-06-2020	12.35 acre/4.5 Ha	23-Nov-20	22-Nov-25	23-Nov-20	Working	YES SIS\OR\MIN\296 213\2023 & 02-May-2023	MOUZA DEVOG KHATA NO :392, PLOT: 1178, (AREA 12.350 AC),KISSAM :NADI,Longitude 87°12'30.00" TO 87°12'42.8",Latitude 21°44'05.1" TO 21°44'16.3"
A3	SUBARNA REKHA	DHITPURA SAND SOURCE	SAWMYADIP CHAKRABARTY	AT:- KHAGADAPAL, P.O.:- BADASIMULIA, P.S.:- BALIAPAL, DIST. BALASORE	Docs Not Available	12.35 acre./4.5Ha	29-Jan-21	28-Jan-26	29-Jan-21	Working	YES SIA/OR/MIN/2962 42/2023 & 28-Dec-2023	MOUZA DHITPURA, KHATA NO :97, PLOT: 214, (AREA 12.350 AC),KISSAM :NADI, Longitude 87°11'01.5" TO 87°11'14.3",Latitude 21°45'05.1" TO 21°45'9.7"
A4	SUBARNA REKHA	KADARAYAN SAND SOURCE	BHABESH KUMAR GHOSH	AT-DHARASTOCK,P O/PS-JALESWAR	Letter no-1536/19-06-2020	12.350 acre./4.5Ha	02-Dec-20	01-Dec-25	02-Dec-20	Working	YES SIA/OR/MIN/2962 40/2023 20-12-2023	MOUZA KADRAYAN, KHATA NO :257, PLOT: 1, (AREA 12.350 AC),KISSAM :NADI,Longitude87°12'29.76" TO87°12'43.22",Latitude 21°44'52.57" TO 21°45'02.43"
A5	JALAKA RIVER	MATHANI & PUNSITA SAND BED	AMULYA BEHERA	AT-WARD NO 12,MAHAPUR, PO-KABARPUR,DIST-JAJPUR	Letter no-2621/20-11-2021	3.08 acre./1.246Ha				Non-Working	YES SIA/OR/MIN/2343 97/2021&30-04-2022	MOUZA MATHANI & PUNSITA, KHATA NO :143,227, PLOT: 37,25, (AREA 3.08 AC),KISSAM :NADI,Longitude87°03'53.2" TO 87°04'01.9",Latitude 21°40'08.2" TO 21°40'25.8"
A6	SUBARNA REKHA	BENAPURA-II SAND SOURCE				14.52 acre/5.876Ha				Non-Working		MOUZA BENAPUR, KHATA NO:152, PLOT: 285, (AREA 14.52 AC), KISSAM: NADI, lat- 21° 45' 26.53910" to 21° 45' 39.04554", long- 87° 10' 03.41272" to 87° 10' 16.94709"

A7	SUBARNA REKHA	BENAPURA-I SAND SOURCE				12.45acre/5.014 Ha					Non-Working		MOUZA-BENAPUR, KHATA-150, PLOT-142, KISSAM-NAYANJARI, LAT-21.772, LONG- 87.163
NEW SOURCE													
A8	SUBARNA REKHA	GOPINATHPUR SAND SOURCE				12.355acre/ 5.0 Ha							Mouza-Gopinathpur, Khata- 153, Plot- 340, Area- 5Ha Out Of 22.743Ha,LAT-21.742, LONG-87.214
B. Name of the Tahasil:-Remuna													
B1	SUNAI	PURUKHI SAND SOURCE	RAGHUNATH DAS	AT-KALYANI PS-NILGIRI DIST-BALASORE	Letter no-6387/08-12-2021	12.300 acre/4.997Ha	20-Dec-23	19-Dec-28	20-Dec-23	Working	YES SIA/OR/MIN/300142/2023 & 28-07-2023	MOUZA PURUKHI, KHATA NO:420, PLOT: 1340, (AREA 12.300 AC),KISSAM:NADI, Longitude86°47'37.9" TO 86°48'2.00", Latitude 21°34'15.10" TO 21°34'20.50"	
B2	BUDHABA LAGA	SAHUPADA & DUMUDA SAND SOURCE	MADHUSUDAN JENA	At-Gobindapur. Po- Sahupada, PS- Sadar, Dist.- Balasore, odisha. Pin-756003	Letter no-2678/22-06-2020	12.35 acre/5.00Ha	21-Feb-24	13-Dec-29	21-Feb-24	Non-Working	YES SIA/OR/MIN/468301/2024 & 17-Jun-2024	MOUZA SAHUPADA & DUMUDA, KHATA NO:223,281, PLOT: 237,238,239,240,15, (AREA 12.35 acers KISSAM:NADI, Longitude-86°54'51.6" TO 86°55'13.2", Latitude -21°33'51.6" TO 21°33'56.2"	
B3	BUDHABA LAGA	AMBULKUDA SAND SOURCE	BIMBADHARA SAMAL	AT-DALOGOHIRA,P OST- UDAMBER, P.S- REMUNA, DIST- BALASORE	Letter no-5990/22-11-2021	12.300 acre/4.997Ha	30-Dec-23	29-Dec-28	30-Dec-23	Working	YES SIA/OR/MIN/300111/2023 & 28-07-2023	AMBULAKUDA, KHATA NO:133, PLOT: 531, (AREA 12.300 acre AC), KISSAM: NADI, Longitude86°54'11.20" TO 86°54'16.80", Latitude 21°35'4.10" TO21°35'18.50"	
B4	SUNAI	Hatiagand Mukundapur Patripal sand sairat				12.35 acre/4.99Ha				Non-Working	YES SIA/OR/MIN/249820/2022 & 31-03-2022	HATIAGAND, MUKUNDAPUR, PATRIPAL, KHATA NO:313,197,69, PLOT: 223,1121,3,1 (AREA-12.35 acre AC), KISSAM: NADI, Longitude86°51'37.00" TO 86°51'58.00", Latitude 21°32'57.00" TO 21°33'02.00"	
B5	SUNAI	Udambar sand sairat source				8.20 acre/3.318Ha				Non-Working	YES AEIAA-1788/08-2021 & 28-09-2021	UDAMBER, KHATA NO: 211, PLOT: 1 (AREA 8.20 acre), KISSAM: NADI, Longitude 86°53'35.50" TO 86°53'57.1", Latitude 21°33'17.1" TO 21°33'22.6"	
B6	BUDHABA LAGA	Makanda sand sairat source	Sri Pradeep Kumar Dash (MOBALASORE)	Plot no-VIP-113, Nayapalli,Dist- Khurda,Bhubaneswar,751015	Letter no-5989/22-11-2021	12.22 acre/4.945Ha				Non-Working	YES SEIAA-1794/08-2021 & 07-10-2021	MAKANDA, KHATA NO:337 PLOT: 691,692 (AREA 12.22 acre), KISSAM: NADI, Longitude 86°54'37.00" TO 86°54'54.00", Latitude 21°34'51.00" TO 21°34'57.00"	

B7	BUDHABALANGA	GAMBHARIA SAND SOURCE				94.99 acre/38.44Ha					Non-Working	MOUZA- GAMBHARIA, RUDRAGOPALPUR SAMIL NAHARPATANA, KHATA NO 430,236 PLOT: 574,722,1,510 (AREA 94.99 acre), KISSAM: NADI, LAT- 21.704, LONG- 87.23
B8	SUNAI	BAITABANK A SAND SOURCE	UPENDRA KUMAR SINGH	At-DEULASAH,CHURCHGALI,PO-BARIPADA,PS-BARIPADA,DIST-MAYURBHANJ	Letter no-6388/08-12-2021	12.20 acre/4.937Ha					Non-Working	YES SIA/OR/MIN/300132/2023 & 28-07-2023 Mouza: GHUNGIA, KHATA NO 261,261 PLOT: 338,440 (AREA 12.20 acre), KISSAM: NADI, Longitude-86°49'21.0" TO 86°54'43.70", Latitude 21°33'32.7" TO 21°33'48.8"
B9	BUDHABALANGA	KATHASANGADA SAND SOURCE-2				2.60 acre/1.052Ha					Non-Working	YES SEIAA-1703/05-2021 & 28-09-2021 Mouza: KATHASANDASA, HALADIA, KHATA NO- 286 PLOT: 106(AREA 2.60 acre), KISSAM: NADI, Longitude -86°54'35.8" TO 86°54'42.3", Latitude 21°33'29.0" TO 21°33'43.8"
B10	BUDHABALANGA	KATHASANGADA SAND SOURCE-1	SAUMYA RANJAN BEHERA JADAV	At-AKATPUR,PO-SUNHAT,DIST-BALASORE	Letter no-6957/24-12-2021	9.75 acre/3.945Ha					Non-Working	YES SIA/OR/MIN/301023/2023 & 12-07-2023 Mouza: KATHASANDASA, HALADIA, KHATA NO 286,458 PLOT: 123,145,1952 (AREA 9.75 acre), KISSAM: NADI, Longitude -86°54'42.40" TO 86°54'49.70", Latitude -21°33'18.40" TO 21°33'34.30"

C. Name of the Tahasil: -Nilgiri

C1	SUNAI	PUNDAL-1 SAND BED	PADMALOSHAN JENA	S/O-ANANTA CH. JENA AT-BHASKARGANJA, BALASORE	Letter no-2572/18-06-2020	12.350 acre/5.00Ha	10-Feb-21	09-Feb-26	10-Feb-21	Working	YES SIA/OR/MIN/464921/2024 14-05-2025 MOUZA: PUNDAL, KHATA NO 556, PLOT:1347/1 (AREA 12.350 acre), KISSAM: NADI, Longitude-86°46'24.40" TO 86°46'35.00", Latitude -21°34'40.70"TO21°34'48.70"
C2	SUNAI	PUNDAL-2 SAND BED	BIKRAMANANDA MOHANTY	AT-POSTAL COLONY,PO-AZIMABAD ,BALASORE	Letter no-2573/18-06-2020	3.40Ac/1.37Ha	09-02-2021	08-02-2026	09-02-2021	Non-Working	YES SEIAA-857/11-2020&02.02.2021 MOUZA: PUNDAL, KHATA NO 556, PLOT:1347(AREA 3.40 acre), KISSAM: NADI, Longitude -86°46'47.5" TO 86°46'52.3", Latitude 21°34'35.6" TO 21°34'41.6"
C3	SUNAI	DUMAGANDIRA-LAICHHANPUR SAND BED	ASHOK KUMAR NAYAK	S/O-NITYANANDA NAYAK AT/PO-PUNDAL, NILGIRI, BALASORE	Letter no-2571/18-06-2020	12.350 acre/5.00Ha	09-Dec-20	08-Dec-25	09-Dec-20	Working	YES SIA/OR/MIN/296273/2023 & 02-May-2023 MOUZA: DUMAGANDIRA,LAICHHANPUR KHATA NO 157,155 PLOT:385,36 (AREA 12.350 acre), KISSAM: NADI, Longitude -86°48'50.80" TO 86°49'04.50", Latitude 21°34'21.40" TO 21°34'27.50"

C4	SUNAI	BAINCHAN ARANPUR-1 SAND BED	HARA PRASAD SENAPATI	S/O- JADUMANI SENAPATI AT- BAPUJINAGAR, BHUBANESWAR	Letter no- 5057/08 -12-2021	12.35 acre/4.9 9Ha	20-Jan-22	19-Jan-27	20-Jan-22	Working	YES SIA/OR/MIN/-300312/2023 & 30-01-2024	MOUZA: BAINCHANARANPUR KHATA NO 266 PLOT:383 ,384(AREA12.35acre), KISSAM: NADI, Longitude 86°42'51.90" TO 86°43'01.50", Latitude 21°34'57.10" TO 21°35'11.50"
C5	SUNAI	BALIPAL SAND BED				12.300 acre./4. 97Ha				Non-Working		MOUZA: BALIPAL KHATA NO 156,156 PLOT:7,495(AREA 12.350 acre AC), KISSAM: NADI, Longitude 86°44'34.00" TO 86°44'34.20", Latitude 21°34'30.60" TO 21°34'32.00"
C6	SUNAI	PRATAPPUR SAND BED	KAMALAKAN TA PATRA	S/O- PRANAKRUSHNA PATRA AT/PO- KAHALIA, PS- NILGIRI DIST.- BALASORE	Letter no- 1191/08 -03-2021	12.250 acre/4.9 5Ha.	31-Mar-21	30-Mar-26	31-Mar-21	Working	YES SIA/OR/MIN/2962 90/2023 & 02-05-20223	MOUZA: AJODHYA (PRATAPPUR) KHATA NO 814, PLOT:388(AREA 12.25 AC), KISSAM: NADI, Longitude - 86°44'53.4" TO 86°45'12.9", Latitude 21°34'19.9" TO 21°35'27.8"
C7	SUNAI	BAINCHAN ARANPUR-3 SAND BED				8.70Ac/ 3.520Ha				Non-Working	SIA/ORMIN/2653 32/2022 & APPLY Dt.- 03.04.2022	MOUZA: BAINCHANARANPUR KHATA NO 266 PLOT: 516 (AREA 8.700 AC), KISSAM: NADI, Longitude 86°42'20.2" TO 86°42'35.5", Latitude 21°34'10.5" TO 21°35'14.1"
C8	SUNAI	AJODHYA SAND BED	M/S BRIJ GOPAL CONSTRUCTION COMPANY(P) LIMITED	AT-DAHISADA, PO/PS-SORO, BALASORE	Letter no- 517/04-03-2022	12.35 acre./5. 00Ha	30/03/20 22	29/03/2 027	30/03/2 022	Non-Working	YES SIA/OR/MIN/2682 47/2022 & 04-05-2022	MOUZA: AJODHYA KHATA NO 814 PLOT:1412 (AREA 12.35 AC), KISSAM: NADI, Longitude 86°45'32.36" TO 86°45'39.90", Latitude 21°34'05.20" TO 21°34'20.22"
D. Name of the Tahasil:-Jaleswar												
D1	SUBARNA REKHA	SIKHARPUR SAND SOURCE	The Orissa Chrome Export & Mining Company Limited A/R Manas R.Mohapatra	At- jagannathpur. Po- Janhia(Manatri) , PS- Soro, Dist.- Balasore, odisha. Pin- 756045	Letter no- 506/15-03-2024	11.99Ac / 4.856 Ha	12-Jun-24	11-Jun-29	12-Jun-24	Working	YES EC24C0107OR56 83073T / SIA/OR/MIN/4681 79/2024 & 09-Apr-2024	MOUZA: SHIKHARPUR KHATA NO 496 PLOT: 1910, 1900 (AREA 10.62 AC), KISSAM: NADI, Longitude 87°12'21.30" TO 87°12'38.00", Latitude 21°47'50.9" TO 21°48'03.1"
D2	SUBARNA REKHA	RAJNAGAR SAND SOURCE	LAXMIPRIYA PRUSTY	AT/PO- BALARAMPRAS AD PS- MOTUNGA DIST- DHENKANAL, STATE-ODISHA	Letter no- 2207/05 -07-2019	13.55 acre./5. 48 Ha	13/07/20 23	07-12-2028	13/07/2 023	Working	YES SIA/OR/MIN/5463 4/2020 & 16-12-2020 OR EC23B001OR110 281 & 23/06/2023	MOUZA: RAJNAGAR KHATA NO 377, PLOT: 1295/1300 (AREA 13.55 AC), KISSAM: NADI, Longitude 87°12'43.2" TO 87°12'52.2", Latitude 21°48'20.9" TO 21°48'30.9"

D3	SUBARNA REKHA	GOBARDH ANPUR SAND SOURCE				12.00 acre/ 4.85Ha				Non-Working	YES SEIAA-1791/08-2021 & 07-10-2021	MOUZA: GABARDHANPUR KHATA NO 358, PLOT: 1094 (AREA 12.00 AC), KISSAM: NADI, Longitude 87°12'6.5" E TO 87°12'17.5" E, Latitude 21°43'2.2" N TO 21°43'14.6"N
D4	SUBARNA REKHA	SEKH SARAI SAND SOURCE(KA)				14.00 acre/ 5.66Ha				Non-Working	YES SIA/OR/MIN/6576 1/2021 & 07-09-2021	MOUZA: SEKHSARAI KHATA NO 142, PLOT: 2 (AREA 14.00 AC), KISSAM: NADI, Longitude 87°10'17.8" E TO 87°10'20.9" E, Latitude 21°45'26.1" N TO 21°45'29.5"N
D5	SUBARNA REKHA	CHALANTI SAND SOURCE				14.00 acre/ 5.66Ha				Non-Working	YES SEIAA-63714/1823-NCM/04-2017 & 19.08.2021	MOUZA: CHALANTI KHATA NO 384, PLOT: 738 (AREA 14.00 AC), KISSAM: NADI, Longitude 87°09'58" TO 87°10'10.2", Latitude 21°46'53" TO 21°47'2.8"
D6	SUBARNA REKHA	BALIKBAD SAND SOURCE				14.85 acre/ 6.009Ha				Non-Working		MOUZA: BALIKBAD KHATA NO 399, PLOT: 49 (AREA 14.85 AC), KISSAM: NADI, Longitude 87°13'26.2" TO 87°13'40", Latitude 21°42'39" TO 21°42'49"
D7	SUBARNA REKHA	BALIAPAL SAND SOURCE				12.00 acre/ 4.856 Ha				Non-Working		MOUZA: BALIAPAL KHATA NO 578, PLOT: 2949 (AREA 12.00 AC), KISSAM: NADI, LAT- 21.704, LONG – 87.23
D8	SUBARNA REKHA	SEKH SARAI SAND SOURCE(Kha)				15.00 acre/ 6.07 Ha				Non-Working		MOUZA: SEKHSARAI KHATA NO 142, PLOT:2 (AREA 15.00 AC), KISSAM: NADI, Lat- 21° 46' 55.41738" to 21° 47 '10.17105" , Long- 87° 09' 48.89645" to 87 °10' 00.83122"
D9	SUBARNA REKHA	RIVER BLOCK - KHA				13.00 acre/ 5.26 Ha				Non-Working	YES SIA/OR/MIN/2208 19/2021&SIA/OR/MIN/221007/2021 & 08-09-2021	MOUZA: RIVER BLOCK -KHA KHATA NO 175, PLOT: 1 (AREA 13.00 AC), KISSAM: NADI, Longitude 87°12'56.5" TO 87°13'6.1", Latitude 21°48'51.5" TO 21°49'1.9"
D10	SUBARNA REKHA	PRAHARAJ PUR (KA)				13.00 acre/ 5.26 Ha				Non-Working		MOUZA: PRAHARAJ PUR KHATA NO 466, PLOT: 1923 (AREA 13.00 AC), KISSAM: NADI, Longitude 87°15'9.7" TO 87°15'15.2", Latitude 21°52'17.5" TO 21°52'33.2",
D11	SUBARNA REKHA	MANKIDIA SAND SOURCE (GA)				35 acre/ 14.16Ha				Non-Working		MOUZA: MANKIDIA KHATA NO 618, PLOT:1677 (AREA 35.00 AC), KISSAM: NADI, Lat- 21 55 44.92255 to 21 55 59.74183, Long- 87 14 35.04486 to 87 14 49.84273

D12	SUBARNA REKHA	CHORMARA (CHANDI BASTI)	KANHNU CHARAN PRAMANIK	AT/PO-BADASIMULIA,PS - BALIAPAL,BALASORE	Letter no-4868/13-12-2021	10.00 acre/4.05 Ha				Non-Working	YES SIA/OR/MIN/3000 38/2023 & 28-07-2023	MOUZA: CHORMARA KHATA NO 692, PLOT: 182 (AREA 10.00 AC), KISSAM: NADI, Longitude 87°12'25.8"E, TO 87°12'.40.4"E, Latitude 21°42'53.5"N TO 21°42'59.9"N
D13	SUBARNA REKHA	MANKIDIA SAND SOURCE (KHA)				40 acre/16.187Ha				Non-Working		MOUZA: MANKIDIA KHATA NO 618, PLOT:1677(AREA 40.00 AC), KISSAM: NADI, Lat- 21° 55' 58.36270" to 21° 56' 09.73843", Long- 87 °14' 25.21103" to 87 °14' 36.75807"
D14	SUBARNA REKHA	MAKRAMPUR SAND SOURCE				15.00 acre/6.07 Ha				Non-Working		MOUZA: MAKRAMPUR KHATA NO 1, PLOT: 6 (AREA 15.00 AC), KISSAM: NADI, Longitude 87°14'31.16"E, TO 87°14'.43.90"E, Latitude 21°51'22.21"N TO 21°51'32.12"N
D15	SUBARNA REKHA	GOBARGHATA SAND SOURCE				17.50 acre/7.08Ha				Non-Working		MOUZA: GOBARGHATA KHATA NO 1414, PLOT: 3236 (AREA 17.50 AC), KISSAM: NADI, Longitude 87°10'.17.8"E, TO 87°10'.20.9"E, Latitude 21°45'26.1"N TO 21°45'29.5"N
D16	SUBARNA REKHA	PRAHARAJPUR SAND SOURCE (KHA)				15 acre/6.07Ha				Non-Working		MOUZA: PRAHARAJPUR KHATA NO 466, PLOT: 1923 (AREA 15.00 AC), KISSAM: NADI, LAT- 21.876, LONG- 87.251
D17	SUBARNA REKHA	MANKIDIA-KA				20.00 acre/8.09 Ha				Non-Working	YES SIA/OR/MIN/4562 07/2023 & 03/04/2024	MOUZA: MAKIDIA KHATA NO 818, PLOT: 1 (AREA 20.00AC), KISSAM: NADI, Longitude 87°14'13.8"E, TO 87°14'28.4"E, Latitude 21°56'21"N TO 21°56'32.2"N
D 18	SUBARNA REKHA	RIVER BLOCK-KA				14.00 acre / 5.665 Ha				Non-Working	YES LETTER NUMBER SEIAA/2681 & 08.09.2021	MOUZA: RIVER BLOCK KHATA NO 175, PLOT: 01 (AREA 14.00 AC), KISSAM: NADI, Longitude 87°13'.3.8"E, TO 87°13'.14.8"E, Latitude 21°48'32.9"N TO 21°48'41.8"N
D19	SUBARNA REKHA	BILASHPUR SAND SOURCE				80.20 acre/32.456 Ha				Non-Working		MOUZA: BILASHPUR KHATA NO 53, PLOT: 120 (AREA 80.20 AC), KISSAM: NADI, LAT- 21.958, LONG- 87.229
NEW SOURCE												
D20	SUBARNA REKHA	MALIPAL SAND BED				12.355a cre/ 5.0 Ha						Mouza-Malipal, Khata- 501, Plot-2277, Area- 5Ha Out Of 38.82 Ha, LAT-21.854, LONG-87.220

D21	SUBARNA REKHA	RAYMCHA NDRAPUR SAND BED				12.355a cre/ 5.0 Ha						Mouza-Ektali, Khata- 463, Plot- 1922, Area- 5Ha Out Of 41.67 Ha, LAT- 21.752648, LONG-84.197339
E. Name of the Tahasil:-Baliapal												
E1	SUBARNA REKHA	PALABEGU NIA SAND BED	SAWMYADIP CHAKRABART Y	AT:- KHAGADAPAL, P.O.:- BADASIMULIA, P.S.:- BALIAPAL, DIST. BALASORE	Letter no- 4258/26 -11-2021	8.88 acre/ 3.59 Ha				Non- Working	YES SIA/OR/MIN/3000 88/2023 & 28-07- 2023	MOUZA: PALABEGUNIA KHATA NO 470, PLOT: 270,377,378,786,793,799 (AREA 8.88 AC), KISSAM: NADI, Longitude 87°14'22.62"E, TO 87°14'.33.34"E, Latitude 21°41'13.87"N TO 21°41'41.91"N
E2	SUBARNA REKHA	BADHAPAL SAND BED				8.36acr e/ 3.38Ha				Non- Working	YES SIA/OR/MIN/3003 59/2023 & 28-07- 2023	MOUZA: BEDHAPAL KHATA NO 717,718, PLOT: 973,973/2548,989,955,956,969,990,11 93,1194,1198,1199,1200,1201,1205,14 98 (AREA 8.36 AC), KISSAM: NADI, Longitude 87°17'50.5"E, TO 87°18'.02.2"E, Latitude 21°41'13.7"N TO 21°41'25.5"N
F. Name of the Tahasil:-Balasore												
F1	BUDHABA LANGA	KASABA - DAHAPADA SAND SOURCE				101.35 acre/ 41.015H a				Non- Working		MOUZA: KASABA-DAHAPADA KHATA NO 653,143, PLOT: 209,210,1429,1483,124,837 (AREA 101.35 AC), KISSAM: NADI, Longitude 86°55'23.1"E, TO 86°56'26.2"E, Latitude 21°31'55.9"N TO 21°32'48.2"N

*NB: in the above table omitted Columns are,
Column-12 Use (Captive/ Non-Captive) - All Non-Captive
Column- 15 Method of Mining (Opencast/Underground) - All Open cast*

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

Sl. No.	Name of the Tahasil	Name of Source	Revenue Collected for last three years (in Rs)		
			2021-22	2022-23	2023-24
A1	BASTA	AMBAKURUCHI SAND SOURCE	30,66,572.33	NA	1,75,331.48
A2		DEVOG SAND SOURCE	43,96,771.61	NA	8,17,711.68
A3		DHITPURA SAND SOURCE	79,82,451.00	NA	2,49,246.00
A4		KADARAYAN SAND SOURCE	44,07,612.50	NA	NA
A5		MATHANI & PUNSI	NA	NA	NA
A6		BENAPURA -II SAND SOURCE	77,60,445		
A7		BENAPURA-I SAND SOURCE	NA	NA	NA
B1	REMUNA	PURUKHI SAND SOURCE			8,79,530.00
B2		SAHUPADA & DUMUDA SAND SOURCE	NA	NA	NA
B3		AMBULKUDA SAND SOURCE			5,33,935.00
B4		Hatiagand Mukundapur Patripal sand sairat	NA	NA	NA
B5		Udambar sand sairat source	NA	NA	NA
B6		Makanda sand sairat source	NA	NA	NA
B7		GAMBHARIA RUDRAGOPALPUR SAMIL NAHARPATANA	NA	NA	NA
B8		BAITABANKA SAND SOURCE	NA	NA	NA
B9		KATHASANGADA SAND SOURCE-2	12,60,760		
B10		KATHASANGADA SAND SOURCE-1	NA	NA	NA
C1	NILGIRI	PUNDAL-1 SAND BED	48,76,722.00		5,08,878.00
C2		PUNDAL-2 SAND BED	22,37,550	NA	NA
C3		DUMAGANDIRA-LAICHHANPUR SAND BED	26,88,133.70		2,16,810.90
C4		BAINCHANARANPUR-I SAND BED	NA	4459500	14,87,700.00
C5		BALIPAL SAND BED	NA		
C6		PRATAPPUR SAND BED	31,77,648.00	NA	9,66,769.20
C7		BAINCHANARANPUR-3 SAND BED	NA	NA	NA
C8		AJODHYA SAND BED		5,98,136	
D1	JALESWAR	SIKHARPUR SAND SOURCE	NA	NA	NA
D2		RAJNAGAR SAND SOURCE			9,16,781.50
D3		GOBARDHANPUR SAND SOURCE	NA	NA	NA
D4		SEKH SARAI SAND SOURCE(KA)	NA	NA	NA
D5		CHALANTI SAND SOURCE	16,48,126	31,64,400	
D6		BALIKBAD SAND SOURCE			
D7		BALIAPAL SAND SOURCE	NA	NA	NA
D8		SEKH SARAI SAND SOURCE(Kha)			
D9		RIVER BLOCK -KHA			
D10		PRAHARAJPUR (KA)	NA	NA	NA
D11		MANKIDIA SAND SOURCE (GA)	NA	NA	NA
D12		CHORMARA (CHANDI BASTI)	NA	NA	NA
D13		MANKIDIA SAND SOURCE (KHA)	NA	NA	NA
D14		MAKRAMPUR SAND SOURCE	NA	NA	NA
D15		GOBARGHATA SAND SOURCE	NA	NA	NA
D16		PRAHARAJPUR SAND SOURCE (KHA)	NA	NA	NA
D17		MANKIDIA-KA	NA	NA	NA

D18		RIVER BLOCK-KA			
D19		BILASHPUR SAND SOURCE	NA	NA	NA
E1	BALIAPAL	BADHAPAL SAND BED	NA	NA	NA
E2		PALABEGUNIA SAND BED	NA	NA	NA
F1	BALASORE	KASABA - DAHAPADA SAND SOURCE	2119256	2119256	

05. DETAIL OF PRODUCTION OF SAND IN LAST THREE YEARS.

Sl. No.	Name of the Tahasil	Name of Source & Location	Production for last three years(in Cum)		
			2021-22 MGQ	2022-23 MGQ	2023-24 MGQ
1	BASTA	AMBAKURUCHI SAND SOURCE	15,000.00	NA	784
2		DEVOG SAND SOURCE	26,667.99	NA	5,160.00
3		DHITPURA SAND SOURCE	18,000.00	NA	500
4		KADARAYAN SAND SOURCE	17,500.00	NA	NA
5		MATHANI & PUNSITA	NA	NA	NA
6		BENAPURA -II SAND SOURCE	1,44,450		
7		BENAPURA-I SAND SOURCE	NA	NA	NA
8	REMUNA	PURUKHI SAND SOURCE			1,875.00
9		SAHUPADA & DUMUDA SAND SOURCE	NA	NA	NA
10		AMBULKUDA SAND SOURCE			1,500.00
11		Hatiagand Mukundapur Patripal sand sairat	NA	NA	NA
12		Udambar sand sairat source	NA	NA	NA
13		Makanda sand sairat source	NA	NA	NA
14		GAMBHARIA RUDRAGOPALPUR SAMIL NAHARPATANA	NA	NA	NA
15		BAITABANKA SAND SOURCE	NA	NA	NA
16		KATHASANGADA SAND SOURCE-2	2,000		
17		KATHASANGADA SAND SOURCE-1	NA	NA	NA
18	NILGIRI	PUNDAL-1 SAND BED	20,833.00		2,167.00
19		PUNDAL-2 SAND BED	10,000	10,000	10,000
20		DUMAGANDIRA-LAICHHANPUR SAND BED	13,333.00		1,081.00
21		BAINCHANARANPUR-I SAND BED	NA	6,000.00	2,000.00
22		BALIPAL SAND BED	NA		
23		PRATAPPUR SAND BED	15,600.00	NA	4,740.00
24		BAINCHANARANPUR-3 SAND BED	NA	NA	NA
25		AJODHYA SAND BED		1,000	
26	JALESWAR	SIKHARPUR SAND SOURCE	NA	NA	NA
27		RAJNAGAR SAND SOURCE			2,175.00
28		GOBARDHANPUR SAND SOURCE	NA	NA	NA
29		SEKH SARAI SAND SOURCE(KA)	NA	NA	NA
30		CHALANTI SAND SOURCE	15,000	15,000	
31		BALIKBAD SAND SOURCE	2,520		
32		BALIAPAL SAND SOURCE	NA	NA	NA
33		SEKH SARAI SAND SOURCE(Kha)			
34		RIVER BLOCK -KHA	20,000	20,000	
35		PRAHARAJPUR (KA)	NA	NA	NA

36		MANKIDIA SAND SOURCE (GA)	NA	NA	NA
37		CHORMARA (CHANDI BASTI)	NA	NA	NA
38		MANKIDIA SAND SOURCE (KHA)	NA	NA	NA
39		MAKRAMPUR SAND SOURCE	NA	NA	NA
40		GOBARGHATA SAND SOURCE	NA	NA	NA
41		PRAHARAJPUR SAND SOURCE (KHA)	NA	NA	NA
42		MANKIDIA-KA	NA	NA	NA
43		RIVER BLOCK-KA	20,000	20,000	
44		BILASHPUR SAND SOURCE	NA	NA	NA
45	BALIAPAL	PALABEGUNIA SAND BED	NA	NA	NA
46		BADHAPAL SAND BED	NA	NA	NA
47	BALASORE	KASABA - DAHAPADA SAND SOURCE	37400	37712	

06. PROCESS OF DEPOSITION OF SEDIMENTS IN THE RIVERS OF THE DISTRICT.

Balasore District is enriched with several rivers, which play a vital role in the region's agriculture, culture, and economy. The major rivers flowing through Balasore are:

a. Subarnarekha River:

The deposition of sediments in the Subarnarekha River within Balasore District is a complex process influenced by natural forces, seasonal variations, and human activities. Here's an outline of how sediment deposition occurs in this river:

- **Upstream Erosion:** The Subarnarekha River originates in the Chota Nagpur Plateau in Jharkhand, where erosion of rocky terrain and soil releases sediments, including silt, sand, clay, and organic matter, into the river. Rainfall and natural wear from the flow of water loosen and carry these materials downstream.
- **Human Activities:** Mining activities in Jharkhand and West Bengal contribute to sedimentation by releasing waste materials into the river. Additionally, deforestation and agricultural runoff from these areas add sediments, especially during the rainy season.
- **Monsoon Season:** Heavy rainfall during the monsoon increases the river's flow rate, enhancing its capacity to carry larger amounts of sediments downstream. However, when the river reaches flatter terrain in Balasore

District, the flow slows, and the river can no longer hold as much sediment, leading to deposition.

- **Dry Season:** During the dry season, water levels and flow rates decrease, which further encourages sediment deposition along the riverbanks and in shallow areas.
 - **Meanders and Floodplains:** As the Subarnarekha meanders through Balasore, sediments are deposited along the inner curves of bends (meanders) where the water flow slows. Floodplains, which are areas adjacent to the river that flood periodically, also accumulate large amounts of sediment during high-flow events.
 - **Delta Formation:** Near its mouth at the Bay of Bengal, the river's flow rate slows dramatically, resulting in the deposition of finer sediments like silt and clay. This creates a delta, gradually extending the land into the sea.
 - **Tidal Influence:** In the coastal areas of Balasore, tidal actions from the Bay of Bengal push back the river's flow, especially during high tides. This backflow causes the suspended sediments to settle, leading to deposition near the river mouth.
 - **Backflow During Cyclones:** Storm surges and cyclones also influence sediment deposition, as they increase backflow, which deposits additional sediments in the coastal and delta areas.
- b. Budhabalanga River:** The Budhabalanga River, flowing through Balasore District, undergoes a natural process of sediment deposition influenced by the river's journey from the hills, seasonal changes, and human activities. Here's an outline of how sediment deposition occurs in the Budhabalanga River:
- **Upstream Erosion:** The steep gradient and rocky terrain lead to significant erosion, causing sediments such as sand, silt, gravel, and clay to enter the river. These materials are carried downstream as the river flows towards Balasore.
 - **Runoff from Slopes:** As the river descends from the hills, rainwater runoff adds more sediment. This runoff picks up soil particles, minerals, and organic matter, increasing the river's sediment load.

- **Monsoon Season:** During the monsoon, heavy rains increase the river's flow rate and its sediment-carrying capacity. Fast-flowing water picks up more sediment from the hills and surrounding areas, transporting it downstream toward Balasore. As the river flow slows in the flatter areas, these sediments begin to settle and deposit.
 - **Dry Season:** When the water levels drop in the dry season, the river's flow weakens, causing finer sediments like silt and clay to settle on the riverbed and banks. The lower flow rate encourages deposition, especially in bends, shallow areas, and floodplains.
 - **Meanders and Floodplains:** As the Budhabalanga meanders through the district, sediments accumulate on the inner curves of bends where water flow is slower. Floodplains, which are periodically flooded areas along the river, receive deposits of finer sediments during floods, enriching the soil with nutrients.
 - **Sandbar and Island Formation:** Slower flow in the river's lower course sometimes leads to sandbars or small islands forming in the middle of the river, creating natural obstacles that further slow the flow and promote additional sediment deposition.
 - **Tidal Influence:** As Budhabalanga approaches the Bay of Bengal, tidal movements influence the river flow. During high tide, seawater pushes back into the river, causing suspended sediments to settle in the river mouth area. This backflow promotes the formation of silt and clay deposits near the estuary, creating a delta-like effect.
 - **Cyclones and Storm Surges:** Cyclonic storms and high tides associated with them can intensify backflow, depositing additional sediments along the riverbanks and in coastal areas, sometimes reshaping the river mouth and nearby floodplains.
- c. **Jalaka River:** The Jalaka River, a tributary of the Budhabalanga River, experiences sediment deposition processes influenced by seasonal changes, local geography, and human activities. Here's an outline of how sediment deposition occurs in the Jalaka River within Balasore District:

- **Local Erosion and Runoff:** The Jalaka River originates in the foothills and plains of Odisha, and receives sediment mainly through local soil erosion and agricultural runoff. The river collects fine sediments such as clay, silt, and sand from its surrounding banks, especially during heavy rains.
 - **Agricultural Runoff:** Agricultural activities along the Jalaka's banks contribute significantly to sediment load. During rainfall, soil from fields, along with fertilizers and organic matter, is washed into the river, adding to the sediment volume, especially during the monsoon season.
 - **Monsoon Season:** During the monsoon, heavy rains increase water flow in the Jalaka, allowing it to carry more sediment downstream. However, the river's capacity to transport sediment decreases as it flows through flatter regions in Balasore, leading to a significant buildup of sediment.
 - **Frequent Flooding:** The Jalaka is known for flooding during the monsoon, which causes overflow into nearby agricultural lands. When the floodwaters recede, they leave behind layers of fine sediment (silt and clay) on the floodplains, enriching the soil in these areas.
 - **Tidal Influence from Budhabalanga:** Though less significant than in larger rivers, minor tidal influence from the nearby Budhabalanga River (which the Jalaka joins) can cause some sediment deposition near the confluence. Backflow during high tides causes sediment to settle at the mouth of the Jalaka, especially fine particles like silt and clay.
 - **Floodplain Deposition:** During high-flow events, the Jalaka frequently spills over into the surrounding floodplains. When the water recedes, sediments are left behind on these plains, creating nutrient-rich soils that support agriculture.
- d. Sono River:** The deposition of sediments in the Sono River, a smaller river in Balasore District, is influenced by local factors such as erosion, seasonal variations, and human activity in the surrounding area. Here is an outline of how sediment deposition occurs in the Sono River:
- **Local Erosion:** The Sono River collects sediments from erosion along its banks and from the surrounding areas. This erosion, especially in the hilly or undulating areas upstream, contributes silt, sand, and clay into the river system.

- **Runoff from Agricultural Lands:** Agricultural lands near the river contribute to the sediment load through runoff, particularly during the rainy season. Soil, fertilizers, and organic material are washed into the river, increasing the sediment content.
- **Monsoon Season:** During the monsoon, heavy rainfall increases the river's flow and sediment-carrying capacity. The fast-flowing water erodes soil and rocks from the riverbanks and transports this sediment downstream. However, as the river moves through flatter areas in Balasore, its flow slows, causing sediments to settle.
- **Decreased Gradient and Flow Rate:** As the Sono River approaches the plains of Balasore, the gradient becomes gentler and the flow slows. The reduced speed causes heavier particles, such as sand and gravel, to settle along the riverbed.
- **Formation of Floodplains:** During periods of high water, the Sono River floods its banks, spilling water and suspended sediments onto adjacent land. When the floodwaters recede, they leave behind nutrient-rich sediments, especially silt, on the floodplains.
- **Tidal Backflow:** Although the Sono River is smaller and less affected by tides than larger rivers, minor tidal effects from nearby rivers or the Bay of Bengal can still influence sedimentation near its mouth. High tides can push back against the river's flow, causing fine sediments to settle in the lower course
- e. **Panchupada River:** The Panchupada River in Balasore District experiences sediment deposition driven by natural processes, seasonal rainfall, and local human activities. Here's an outline of how sediment deposition occurs in the Panchupada River:
 - **Local Erosion:** The Panchupada River collects sediment primarily from soil erosion along its banks and the surrounding catchment areas. Rainfall and natural erosion loosen materials like sand, silt, and clay, which are carried downstream.
 - **Agricultural Runoff:** Farming activities near the river contribute to sedimentation through soil erosion. During the rainy season, agricultural runoff adds loose soil

particles, organic matter, and sometimes fertilizers into the river, especially during heavy rains.

- **Decreased Gradient:** As the Panchupada River moves through flatter terrain in Balasore District, the flow rate decreases, allowing heavier particles such as sand to settle on the riverbed. This reduction in velocity makes it more difficult for the river to carry larger sediment particles.
- **Floodplain Deposition:** During periods of heavy rainfall and high water levels, the Panchupada River overflows its banks, spilling sediment-rich water onto the surrounding floodplains. When floodwaters recede, they leave behind layers of fine sediments, enriching the floodplain soils.
- **Soil Erosion from Agriculture:** Farming along the Panchupada River's banks, without soil conservation practices, leads to increased soil erosion during the rainy season, adding to the sediment load.
- **Tidal Backflow:** Although the Panchupada River is not a major river, it may experience minor tidal influences from larger rivers nearby or the Bay of Bengal. High tides can push back into the river's lower course, causing finer sediments like silt and clay to settle near the river mouth

07. GENERAL PROFILE OF THE DISTRICT.

a) Geographical Location:- Topographically, Balasore district is situated at approximately 20° 48' North to 21° 59' North latitudes and 86°16' to 87°29' East longitudes. It shares boundaries with Mayurbhanj district to the west, Bhadrak to the south, and is bordered by the Bay of Bengal to the east. Two major rivers, the Subarnarekha and Budhabalanga, flow through the region, providing essential water resources that support the district's agricultural activities. The climate in Balasore is tropical, characterized by hot summers, a humid monsoon season, and mild winters, creating a diverse environment for both agriculture and biodiversity.

b) Area & Population :-

Balasore district covers an Geographical area of approximately **3,806 square kilometers** from which **332.21 square kilometers** falling under Forest area. As of the 2011 census, it had a population of around **2.3 million** people. The district has a relatively high population density, reflecting its role as an important agricultural and industrial region within Odisha. Additionally, Balasore has a literacy rate higher than the national average, with a balanced rural and urban population distribution.

c) Climate:-

It's climate is generally hot with high humidity. May is the hottest month and December is the coolest one. Monsoon generally arrives in the district from 14th of June every year. The average rainfall of the District is 1568.4 mm. The rainfall during June to December constitutes at least 75 Percent of the total rainfall that this District experiences and it has an average of 62 rainy days in the year.

d) Administrative units:

Balasore Town is the Administrative Headquarter of Balasore District. It is located at a distance of 194 km from Bhubaneswar, the State capital of Odisha. It is the 2nd largest district in area among the costal districts of Odisha. It has 2952 villages covering 12 Blocks, 12 Tahasils and 2 Sub-Divisions.

Description	Number
No. of Sub-Divisions:	02
No. of Tehsils:	12
No. of Municipalities:	01
No. of N.A.Cs:	03
No. of Blocks:	12
No. of Police Station:	23
No. of Grampanchayat:	289
No. of Inhabited Villages:	2587
No. of Uninhabited Villages:	365
No. of Villages:	2952

The population of the District is 23,17,419 according to the 2011 Census. The District accounts for 5.53% of the State's territory and about 5.50% of State's population. The density of population of the District is 532 per square km as against 610 per square km of the State. As per 2011 Census, the population of Scheduled Caste is 1,84,682 (7.30%), and Scheduled Tribe is 14,79,576 (58.7%). The literacy percentage of the District covers 79.18 against 84.67 of the State.

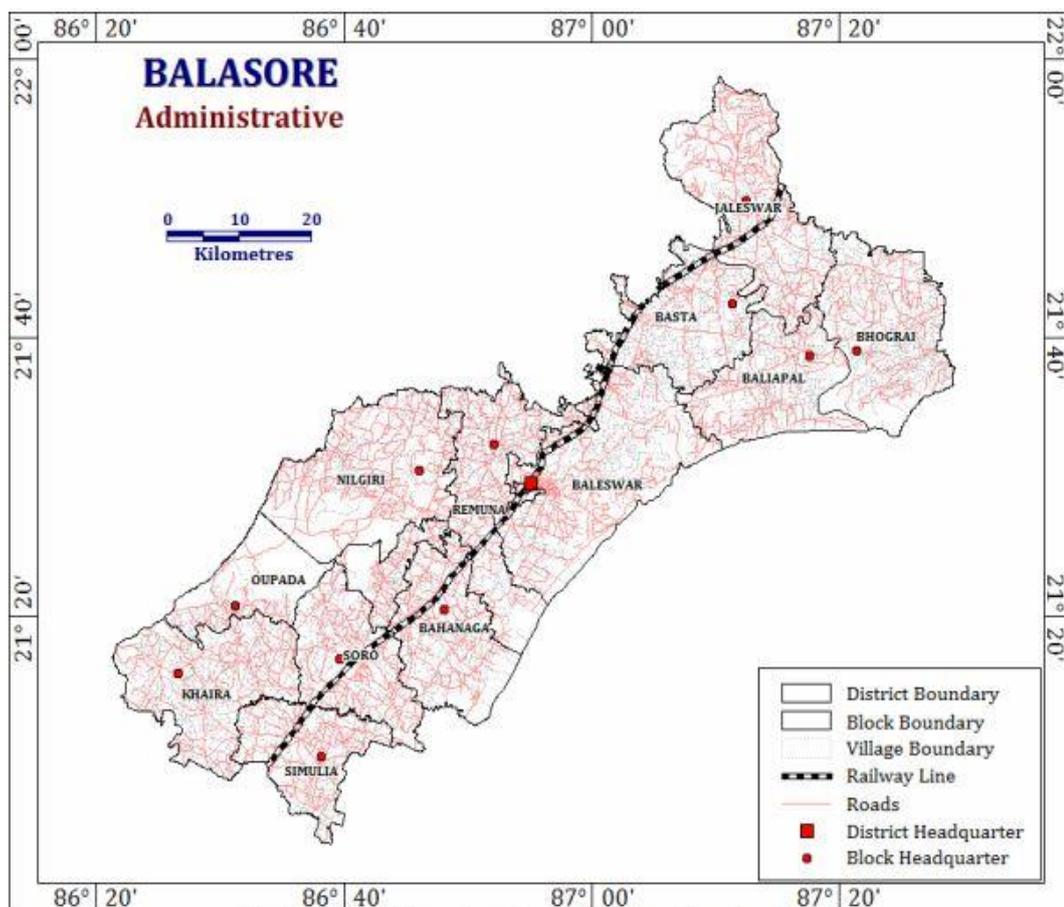
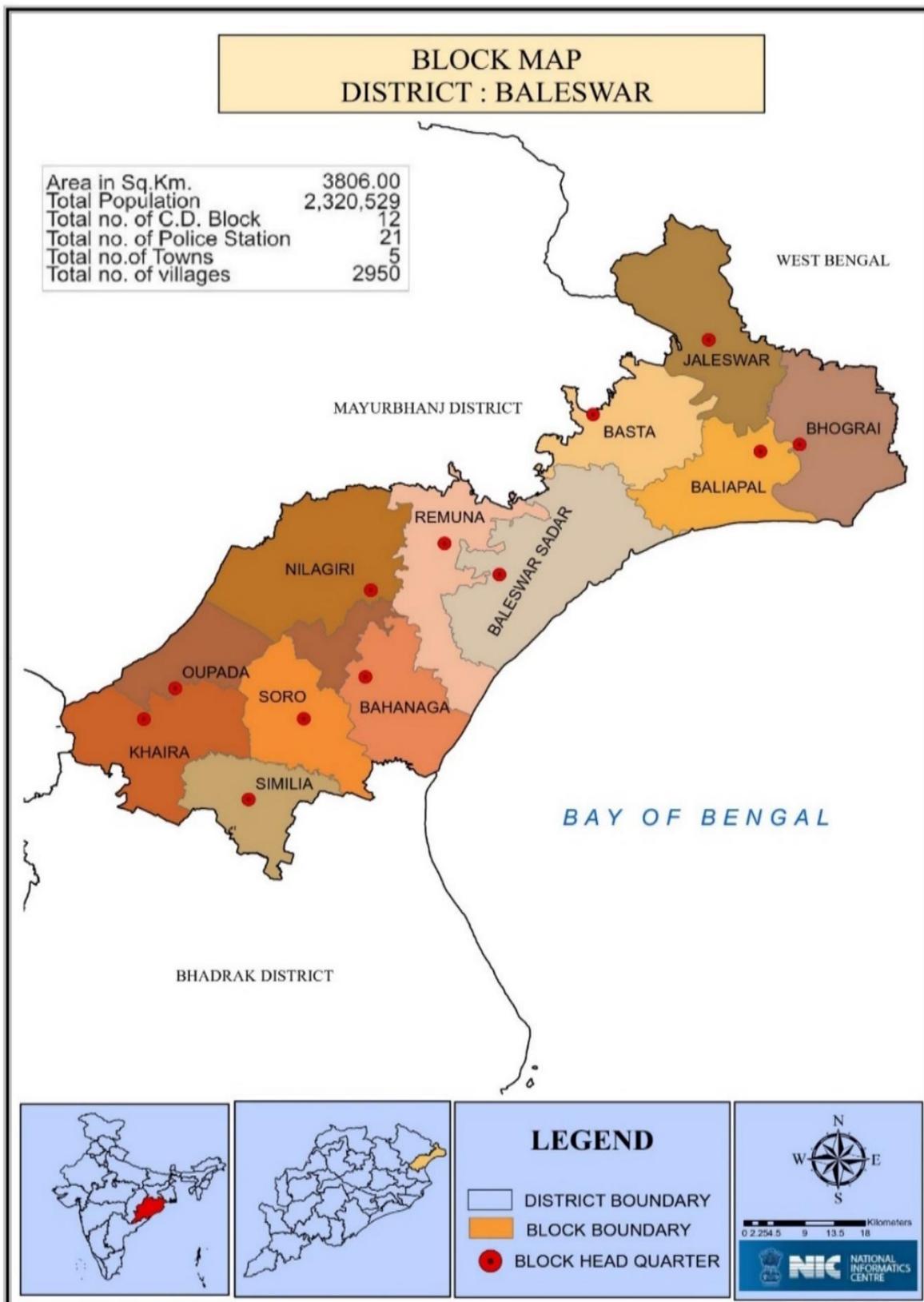


Fig 1.4b : Administrative Map of Balasore District, Odisha



e) Connectivity facilities:-

Road Network

The District is well served by a network of good roads and has been called the motorists paradise. The chief roads NH-16 and NH-60 pass through the District. Balasore Town is about 60 Kms from Baripada, 122 Kms from Kharagpur, 199 Kms from Jamshedpur, 177 Kms from Cuttack, 199 Kms from Bhubaneswar and 361 Kms from Rourkela. It is also connected with other cities such as Sambalpur, Puri, Bolangir, Bhadrak, Jhargram, Angul, Ranchi and Kolkata via road.

Rail Network

Balasore District is well connected by Rail link to different places. Balasore Railway Station is a busy station on the Howrah-Chennai main line of the South Eastern Railway. The distance to Kolkata is approximately 232 km, while the distance to Bhubaneswar is about 206 km; the city of Balasore is well connected to many places in India like Baripada, Bhubaneswar, Kolkata, Jamshedpur and Cuttack

Air Network

At present, Balasore has no connection by Airway. The site selection for Aerodrome is presently under process. The nearest Airport is Biju Patnaik International Airport, Bhubaneswar which is situated 200 Kms far from Balasore. Netaji Subhas Chandra Bose International Airport in Kolkata is 232 kms far from Balasore.

Other:- The district's coastal location also offers proximity to Dhamra and Paradip ports, facilitating trade for local industries. Communication infrastructure is well-developed, with extensive mobile network coverage from major telecom providers offering 4G & 5G services, along with high-speed internet and fiber-optic options in urban areas. Postal services are comprehensive, with numerous post offices across the district, ensuring mail and courier access even in remote locations. Public transport facilities like bus terminals in key towns, along with local transport options such as auto-rickshaws and limited app-based cab services, make commuting convenient.

With its strategic location, Balasore's robust transportation and communication facilities support economic growth, daily commutes, and tourism in the district.



f) Industry & Mining:-

Balasore district has a diverse industrial and mining landscape, contributing significantly to Odisha's economy. The district's industrial sector includes small and medium-scale industries like rice mills, cashew processing units, and fish processing plants, which support the agricultural backbone of the region. Additionally, Balasore is home to Balasore Alloys, a significant industrial player in the production of ferroalloys, particularly in manufacturing high-carbon ferrochrome, which is essential for steel production.

The district's strategic location and proximity to the Bay of Bengal also support a growing marine and seafood processing industry, which exports

products both domestically and internationally. Balasore has developed an industrial belt, particularly in areas around Balasore town, and hosts several industrial estates that cater to manufacturing, logistics, and engineering services.

In terms of mining, Balasore has limited mineral resources compared to some other districts in Odisha. However, sand and stone quarries are present in certain areas, providing raw materials for construction and local infrastructure projects. Additionally, the district's rivers, such as the Subarnarekha, contribute to small-scale sand mining activities, though this is often regulated due to environmental concerns.

The presence of the Integrated Test Range (ITR) at Chandipur also adds strategic value to Balasore's industrial landscape, supporting defense research and testing activities that indirectly contribute to the local economy by attracting auxiliary industries and services. Balasore's industrial and mining activities collectively bolster the local economy, providing employment and promoting economic growth in the region.

g) Tourist Places:-

Balasore district is home to a variety of tourist attractions, including scenic beaches, historic temples, and nature spots that attract visitors year-round. Here are some popular tourist places in Balasore:

- **Chandipur Beach**

Known for its unique phenomenon where the sea recedes up to 5 km during low tide, Chandipur Beach is a major tourist attraction. Visitors can walk on the seabed, observe marine life, and enjoy beautiful sunsets. The calm environment and distinct tidal behavior make it one of Odisha's most unusual beaches.

- **Khirachora Gopinath Temple, Remuna**

This 13th-century temple dedicated to Lord Krishna (Gopinath) is a revered pilgrimage site. Known for its spiritual atmosphere, the temple offers visitors "khira" (a type of sweetened condensed milk) as prasad, which adds to its cultural significance.

- **Panchalingeshwar Temple**

Located on a hilltop amidst lush greenery, Panchalingeshwar Temple is dedicated to Lord Shiva. The temple has five Shiva lingams submerged in a small stream, which visitors touch by feeling under the water. The scenic location, along with the serene atmosphere, makes it a popular destination for nature lovers and devotees alike.

- **Talsari Beach**

Situated near the Odisha-West Bengal border, Talsari Beach is a tranquil spot known for its palm-lined shores and scenic beauty. The beach is ideal for those seeking peace and solitude and offers breathtaking sunrise and sunset views.

- **Devkund Waterfall**

Located within the Simlipal Biosphere, Devkund Waterfall is a hidden gem surrounded by dense forests. The trek to the waterfall takes visitors through lush greenery and diverse wildlife, making it an ideal destination for nature enthusiasts and trekkers.

- **Nilgiri**

The town of Nilgiri houses the historic Nilgiri Palace, which belonged to the Nilgiri royal family. Nearby, the Jagannath Temple in Nilgiri is another popular religious site. The area is known for its scenic beauty, temples, and heritage structures.

- **Kuldiha Wildlife Sanctuary**

This sanctuary is a haven for wildlife enthusiasts, offering sightings of animals like elephants, leopards, and various bird species. Kuldiha is part of the larger Simlipal Biosphere, and it features rich biodiversity, making it a popular destination for safaris and nature walks.

- **Bichitrapur Mangrove Forest**

Located near the coast, this mangrove forest offers boat rides through dense mangrove trees and a chance to explore a unique ecosystem. It's an excellent spot for bird-watching, with migratory and native birds commonly seen in the area.

- **Chandaneswar Temple**

Close to Talsari Beach, Chandaneswar Temple is an ancient temple dedicated to Lord Shiva. It is particularly popular during the annual Maha Vishuva Sankranti festival, attracting thousands of devotees from Odisha and neighboring West Bengal.

- **Kasaphal Beach**

Another relatively unexplored beach, Kasaphal Beach is known for its serene environment and is an ideal spot for a quiet, undisturbed day by the sea. This beach is popular with locals and a growing number of tourists looking to avoid the crowds.

- **Integrated Test Range (ITR), Chandipur**

Although entry is restricted for security reasons, the ITR at Chandipur is one of India's key missile testing sites. Visitors often visit Chandipur Beach nearby, from where glimpses of missile launches are sometimes visible, making it an interesting stop for those curious about India's defence technology.

h) Health:-

Balasore district has a range of healthcare facilities providing medical services to its urban and rural population. The primary healthcare provider is the **District Headquarters Hospital (DHH) in Balasore town**, a government-run facility that offers a range of healthcare services, including emergency care, maternity and child care, surgery, and specialist consultations. The DHH is equipped with diagnostic tools like X-ray and ultrasound machines, as well as an intensive care unit (ICU) and emergency facilities, catering to both local residents and patients from nearby regions.

In addition to the DHH, Balasore has a network of **Community Health Centers (CHCs)**, **Primary Health Centers (PHCs)**, and **Sub-Centers** spread across its rural areas. These centers offer basic healthcare services, immunization, maternal and child health services, and support for disease control programs. The government also provides mobile health units to serve remote villages, ensuring healthcare access in rural parts of the district.

Balasore district is also home to several private hospitals, nursing homes, and clinics that complement public healthcare services. These private facilities offer specialized services, including gynecology, pediatrics, orthopedics, and dental care, making healthcare more accessible for residents. For emergency cases, the **108 ambulance service** operates across the district, providing timely medical assistance and transport to hospitals. Additionally, Balasore has a growing number of diagnostic centers and pharmacies that offer essential healthcare support, with modern diagnostics, pathology labs, and 24-hour medical stores.

The district also emphasizes public health programs, including regular health camps, awareness campaigns, and preventive healthcare initiatives run by the Odisha Health Department, which focus on issues like tuberculosis, malaria, maternal health, and nutrition. These combined efforts contribute to a steadily improving healthcare landscape in Balasore, offering a range of services to meet the needs of its population.

i) Economy

Balasore District is one of the economically strong District in Odisha, which is privileged in both agriculture and industry. In spite of being an agrarian economy, agriculture is the main stay of the people of Balasore. The District lies in the coastal part of Odisha and is blessed with hot and humid climate with alluvium soil and intersected by the perennial rivres, which collectively provides conducive infrastructure for the growth of agriculture in this region. In the recent years, the utilization of the wasteland for ensuring the economic development of Balasore District has been taken into consideration and it is being used for the production of coconut and betel. The local economy of Balasore District largely depends on the cultivation of paddy and wheat.

Industries, Agriculture, Fishing and Tourism are the four major revenue sources of Balasore District. Birla Tyres, Balasore Alloys Limited, Emami Paper Mills Limited and Polar Pharma India Limited are some of the large-scale industries functioning in this district.

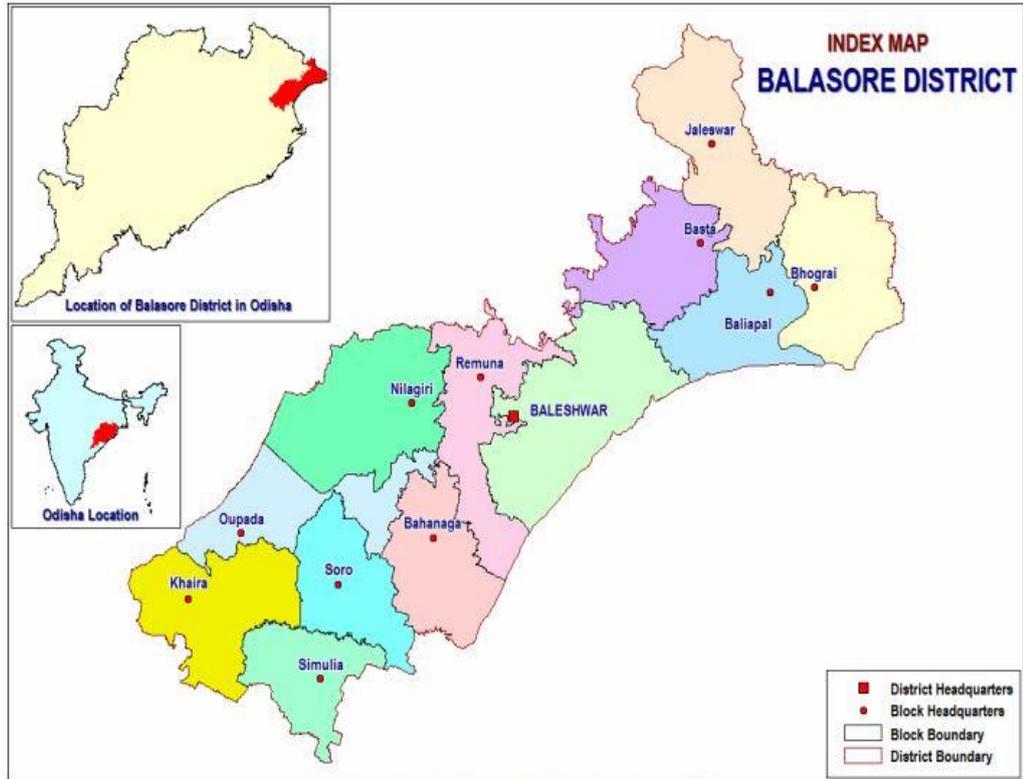


Figure 1.4a : Index Map of Balasore District, Odisha



8. LAND UTILIZATION PATTERN IN THE DISTRICT: FOREST, AGRICULTURE, HORTICULTURE, MINING ETC.

Forest:

The forest of Balasore District is full of varieties of medicinal plant. Kendu leaves, Bamboo, Sal, Teak, other timber species and a wide range of carnivorous & herbivorous wild animals live in the forest. The District has one Wildlife Sanctuary known as Kuldiha Wildlife Sanctuary, which even hosts elephants. The area of the sanctuary is 26886 hectares. In the Sanctuary, the principal animals that are found are Elephant, Bear, Nilgai, Sambhar, Peacock, Wild Boar and Deer, together with variety of snakes and birds.

District-wise Forest Cover Area in Odisha (Area in Km²)

District	Geographical Area (GA)	2019 Assessment				% of GA	Change wrt 2017 assessment	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Anugul	6,375	371.01	1,380.00	1,031.62	2,782.63	43.65	27.63	84.18
Balangir	6,575	70.00	224.00	841.26	1,135.26	36.64	4.26	143.16
Baleshwar [†]	3,806	23.00	133.38	226.18	382.56	5.82	2.56	46.59
Bargarh	5,837	175.01	374.14	501.31	1,050.46	27.60	19.46	40.57
Baudh	3,098	262.91	562.04	465.99	1,290.94	51.53	1.94	57.39
Bhadrak	2,505	0.00	8.70	69.30	78.00	1.34	3.00	0.00
Cuttack	3,932	53.00	226.00	525.38	804.38	20.46	8.38	67.80
Debagarh	2,940	191.00	667.41	618.75	1,477.16	50.23	5.16	14.08
Dhenkanal	4,452	173.99	420.38	851.24	1,445.61	32.47	28.61	83.88
Gajapati [†]	4,325	84.16	1,490.09	947.12	2,521.37	58.30	1.37	262.88
Ganjam	8,206	164.39	1,074.32	866.69	2,105.40	25.66	2.40	655.00
Jagatsinghapur	1,668	0.00	4.64	131.64	136.28	8.17	0.28	0.00
Jajapur	2,899	6.00	71.99	228.09	306.08	10.56	3.08	49.78
Jharsuguda	2,114	3.00	173.82	155.82	332.64	15.74	10.64	29.21
Kalahandi [†]	7,920	361.64	734.19	1,323.97	2,419.80	30.55	1.80	371.69
Kandhamal [†]	8,021	660.95	2,593.23	2,143.53	5,397.71	65.01	5.71	385.51
Kendrapara	2,644	83.40	88.54	139.36	311.30	3.88	6.30	1.99
Kendujhar [†]	8,303	288.78	1,420.07	1,513.31	3,222.16	121.87	10.16	53.24
Khordha	2,813	21.00	186.00	260.09	467.09	16.60	10.09	90.47
Koraput [†]	8,807	94.48	740.41	1,263.38	2,098.27	23.83	9.27	947.86
Malkangiri [†]	5,791	158.00	712.76	1,465.41	2,336.17	40.34	-5.83	45.90
Mayurbhanj [†]	10,418	1,334.95	1,717.24	1,041.98	4,094.17	39.30	14.17	37.57

District	Geographical Area (GA)	2019 Assessment				% of GA	Change wrt 2017 assessment	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Nabarangapur ^T	5,291	172.63	447.04	527.08	1,146.75	29.48	43.75	48.62
Nayagarh	3,890	189.00	965.00	559.75	1,713.75	44.49	3.75	171.36
Nuapada	3,852	86.01	481.69	706.76	1,274.46	24.09	1.46	108.82
Puri	3,479	0.00	59.73	165.36	225.09	6.47	11.09	10.79
Rayagada ^T	7,073	419.54	853.42	1,873.55	3,146.51	44.49	20.51	359.91
Sambalpur ^T	6,624	498.99	1,696.32	1,096.98	3,292.29	49.70	12.29	40.55
Subarnapur	2,337	2.00	187.00	161.85	350.85	15.01	0.85	29.22
Sundargarh ^T	9,712	1,020.87	1,858.38	1,394.12	4,273.37	44.00	9.37	88.89
Grand Total	1,55,707	6,969.71	21,551.93	23,096.87	51,618.51	33.15	273.51	4,326.91

(Source: India State of forest report 2017-Odisha)

The major portion of the District is covered by forest (5.82 % of TGA) and has scattered settlement pattern. The forest is full of variety of medicinal plants, kendu leaves, bamboo, Sal, teak and other timber species. The District has considerably flat land, which provides suitable site for agricultural use. The hilly areas are mostly under forest with patches of cultivation on scarp areas. Major crops grown in the District are rice and pulses. Only 12.50 percent area of agricultural use are net irrigated and major source of irrigations are wells and tube wells.

Agriculture Land:

The primary objective of Agriculture Department is to increase the production as well as productivity of major crops like Paddy, Groundnut, Mustard, Mung, Biri & vegetables which is widely cultivated in this District in both Kharif & Rabi season. Another key objective is to bring all round development among farming community of the District. The Chief District Agriculture officer is the head of office so far as agriculture is concerned. Under him there are 5 District Agriculture Officers & the block under them. As it has already been pointed out that agriculture is the main livelihood of the people in Balasore District, it is therefore designated as the food bowl of Odisha. Rice is the principal crop grown in this District, followed by other cereals, pulses, oilseeds, vegetables,

spices and sugarcane. The agricultural statistics for the District is shown in tables below:

Crop Coverage Area of Balasore District, Odisha

Crop	Khariff		Rabi		Annual	TOTAL	
	Area (ha)	(%of Cropped Area)	Area (ha)	% of Cropped Area	Area (ha)	Gross Cropped Area (ha)	% of Gross Cropped Area
Rice	206.1	91.62	33.47	34.38	-	239.61	72.03
Cereals	0.31	0.14	0.79	0.82	-	1.10	0.33
Pulses	0.48	0.21	21.64	22.55	-	22.12	6.65
Oilseeds	0.13	0.06	14.38	20.20	-	19.51	5.87
Vegetables	13.04	5.80	16.14	16.82	-	29.18	8.77
Fibres	2.20	0.98	-	-	-	2.20	0.66
Spices	2.69	1.19	4.25	4.25	-	6.77	2.04
Sugarcane	-	-	0.46	0.48	-	0.46	0.14
Tobacco	-	-	-	-	-	-	-
Fruits	-	-	-	-	11.68	11.68	3.51
TOTAL	224.99	100	95.96	100	11.68	332.63	100

Horticulture Land:

The primary objective of Horticulture Department is to increase of production as well as productivity of major fruits like Mango, Guava, Citrus etc., which is widely covered in the District. Another key objective is the all-round development of the farming community of the District. The horticulture statistics for the District is shown in subsequent tables below:

Horticulture crop	Total Area (hectares)
Mango	4.39
Citrus	0.80
Papaya	0.06
Pineapple	0.04
Guava	0.32
Sapota	0.07

Mining:

Balasore District has transitional landform features between coastal plain and hilly region. Most of the mineralized area coming under Eco-Sensitive Zone (Kuldiha Wildlife Sanctuary). Thus mining activities are confined only to the areas outside of Eco-Sensitive Zone. The mining activity in the District is restricted only to Minor Mineral i.e. of sand, road metal, decorative stone and brick clays. These are being given to various user agencies as lease agreement governed and regulated by Revenue Department under the legal provision stated under Odisha Minor Mineral Concession Rules, 2016. There is no lease of Major Mineral in the District. At present Leases of stone, sand and bricks making units are operational in the District. Stone chips, ordinary sand constitute the principal mining activity of Soro, Khaira, Jaleswar, Nilgiri area etc. of Balasore District. Huge granite stone deposits as road metal are available in Khaira, Nilgiri, Soro area and major sand sources having good potential are available in Jaleswar, Remuna and Nilagiri area of the District. These sources have been providing tremendous scope for development of few more Industries based on these Resources.

9. PHYSIOGRAPHY OF THE DISTRICT.

The physiography of Balasore district, Odisha is characterized by a varied topography, including a mountain range, plains, and small hill ranges:

- **Nilgiri Mountain:** The central part of the district is dominated by the Nilgiri Mountain, which is made up of highlands, plateaus, and valleys.
- **Tertiary Plain:** The eastern part of the district is made up of the Tertiary Plain.
- **Alluvial Plain:** Another physiographic unit in the district is the Alluvial Plain.
- **Small hill ranges:** There are some small hill ranges in the southwest of the district. One of these is Tiger Hill, which has an open area at the top.
- **Subarnarekha River:** The main river in the district is the Subarnarekha, which empties into the Bay of Bengal.

The district's soil is mostly alluvial laterite, but the central region is mostly clay, clay loam, and sandy loam, which is fertile for farming. The major rock types in the district include Nilgiri Granite Gneiss, Quartzite, Orthoquartzite, Arkose, Shale, Phyllite, Gabbro, and Px-granite. The district's major mineral resource is vanadiferous/magnetite.

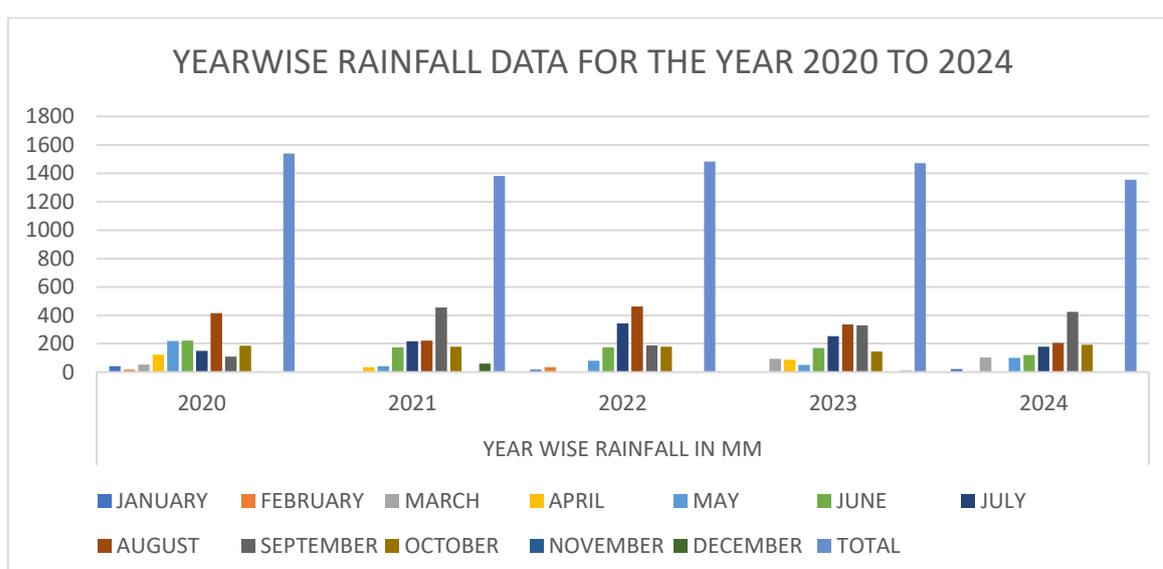
Balasore is a coastal district located in the northeast of Odisha. It's bordered by the Bay of Bengal to the east, Bhadrak district to the south, and Mayurbhanj and Keonjhar districts to the west.

10. RAINFALL: MONTH-WISE.

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° -8°C during peak winter.

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

YEARWISE RAINFALL DATA FOR THE YEAR 2020 TO 2024					
MONTH	YEAR WISE RAINFALL IN MM				
	2020	2021	2022	2023	2024
JANUARY	41.71	0	17.67	0	20.5
FEBRUARY	16.48	0	35.92	0.25	6.33
MARCH	52	0	0	92.43	102.09
APRIL	123.25	34.75	3.37	87.1	2.58
MAY	218.73	41.38	80.53	50.84	100.1
JUNE	221.9	175.22	173.32	169.75	121.07
JULY	149.18	216.24	342.52	251.9	178.4
AUGUST	414.25	220.58	462.68	335.5	205.68
SEPTEMBER	109.43	456.05	187.33	328.82	424.15
OCTOBER	185.24	177.94	179.43	145.92	192.35
NOVEMBER	6	0.92	0	0.75	
DECEMBER	0	58.46	0	8.59	
TOTAL	1538.17	1381.54	1482.77	1471.85	1353.25



11. GEOLOGY AND MINERAL WEALTH.

Geology of the Balasore district:

The geology of Balasore district in Odisha is shaped by its position on the coastal plains of eastern India, with features like alluvial deposits, coastal sands, and occasional lateritic formations. Below is a detailed look at Balasore's geological makeup:

□ **Alluvial Deposits**

- Balasore's landscape is primarily formed by Quaternary alluvial deposits, supplied by rivers such as the Subarnarekha, Budhabalanga, and Jalaka, which carry sediments from the Chotanagpur Plateau and surrounding areas.
- These alluvial soils, rich in silt, clay, and sand, are highly fertile and support extensive agricultural activities. The deposits are deep, providing ideal conditions for crop cultivation across the district.

□ **Coastal Sands and Marine Deposits**

- A prominent feature along Balasore's Bay of Bengal coastline is the presence of coastal sands and marine deposits. These formations result from marine and wind-driven (aeolian) processes that have shaped the district's beaches and coastal dunes.
- Composed mainly of silicate minerals, the coastal sands display layering and patterns from tidal action. These unique formations are especially notable at Chandipur beach, where tidal variations expose large stretches of sand during low tide.

□ **Lateritic Deposits**

- Patches of laterite are found, particularly in the upland areas of the district. Laterite forms from the intense weathering and leaching of rocks in tropical and subtropical climates, resulting in a high concentration of iron and aluminum oxides.
- These lateritic soils, though less fertile than alluvial soils, are commonly used as a building material due to their strength and durability when cut and dried.

□ **Subsurface Rock Formations**

- While recent alluvial layers cover most of Balasore, deeper drilling and subsurface studies have revealed ancient rock formations, including gneiss and schist, especially toward the west near the Chotanagpur Plateau.
- The presence of crystalline bedrock at greater depths points to an ancient geological foundation beneath the district, overlain by younger sedimentary deposits.

□ **Riverine and Deltaic Formations**

- The district's river systems contribute to the formation of deltaic deposits, where sediment accumulates as rivers approach the coast. These deltaic regions, enriched by periodic flood deposits, consist of silt and clay layers that renew the soil's fertility.
- This dynamic riverine activity helps shape Balasore's landscape and supports the district's wetlands and agricultural zones within the floodplain areas.

Summary

Balasore's geology is dominated by recent alluvial and coastal deposits, with lateritic soil patches and deeper crystalline rock formations. This geological diversity supports Balasore's agricultural economy and influences the distinct coastal and riverine landscapes that define the district.

Stratigraphy:

Holocene: Sand dune, newer alluvium Older alluvium

Laterite Quaternary: Recent to sub Recent Laterites and lateritic gravels

~~~~~ Unconformity ~~~~~

Tertiary: Mio Pliocene Brown, yellowish and grey sand, gravel and clays, gritty sandstones.

Miocene: Grey Clays, sand, Lime stones with molluscan shells

~~~~~ Unconformity ~~~~~

Archaean to Proterozoic: Associated intrusives, Nilgiri granites, Quartzite and phyllite, amphibolites, unclassified gneisses.

Mineral Resources: -

Minerals like soft stones, limestone, stone chips are available in the District, which are mainly used in industrial units in the District. The huge deposits of granite stones at Nilgiri, Khaira, Soro area which provides tremendous scope for development of few more industries based on these resources. Except these, no minerals in large quantity which can be explored for commercial purpose found in the District.

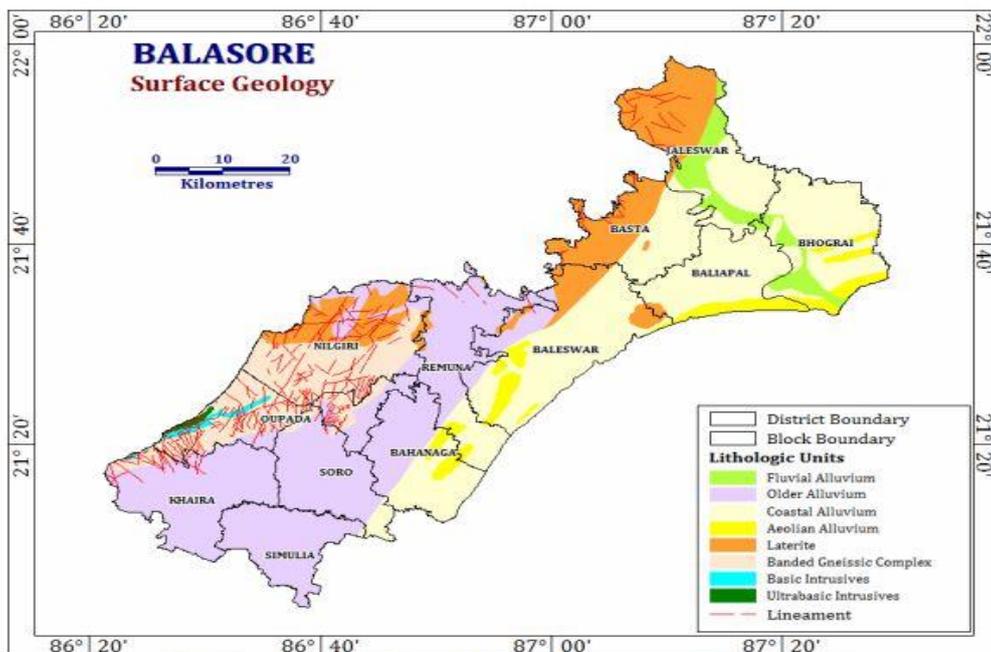
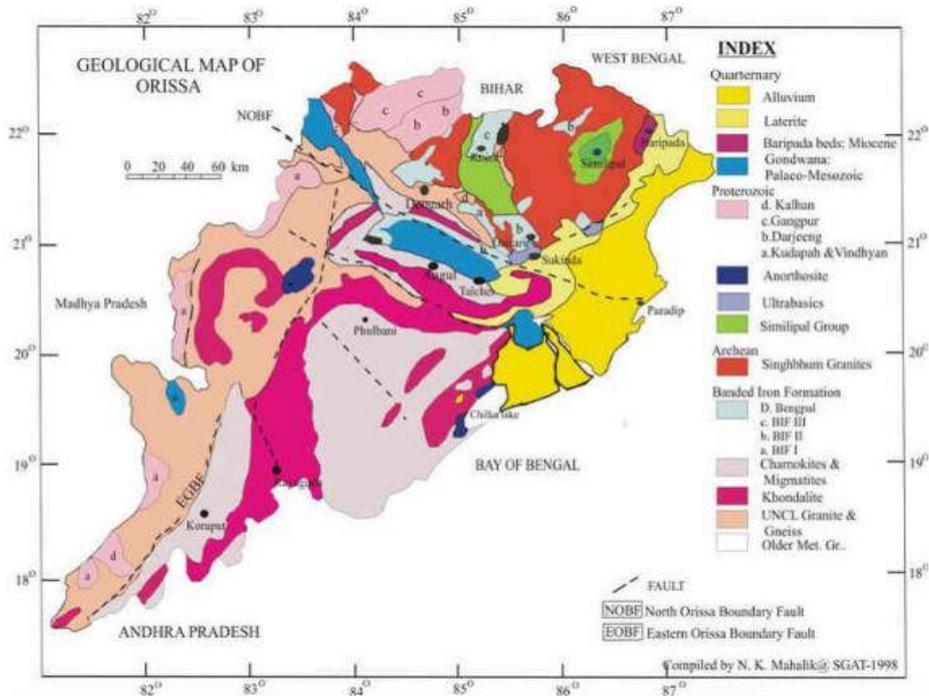


Figure - 4.1 : Lithological Map of Balasore District, Odisha

Mineral wealth of the Balasore district:

Balasore district in Odisha is not known for extensive mineral resources compared to other parts of the state; however, it does have some valuable mineral deposits and natural resources that contribute to the local economy. Here's an overview of the mineral wealth of Balasore:

Sand and Silica Resources:- Balasore has abundant coastal sand deposits, which are rich in silica. Silica sand is an important industrial material used in glass-making, construction, ceramics, and foundry industries.

Some parts of the district have silica-rich sands suitable for processing, and their proximity to the coastline makes extraction and transportation relatively convenient.

Laterite:- Laterite deposits are found in upland areas of Balasore. Laterite is a source of iron and aluminum oxides, though in limited quantities. These deposits are often used locally in construction for bricks and other building materials due to their strength and durability.

The lateritic soils also hold potential for small-scale mining of iron, though this is not widely commercialized in Balasore.

Clay Deposits:- The alluvial and riverine plains of Balasore have clay-rich soils, which are utilized locally in pottery, brick-making, and other small-scale industries. The clay deposits contribute to the local handicraft industry and construction materials sector.

Minor Minerals:- In addition to sand and clay, Balasore has minor minerals like gravel and pebbles, often extracted from riverbeds for use in construction, particularly in road building and concrete production.

Groundwater Resources:-

While not a mineral in the conventional sense, groundwater is a crucial natural resource for Balasore. The district's alluvial soils and riverine deposits create favorable conditions for groundwater storage, which supports irrigation and drinking water supplies.

Salient Features of Important Rivers & Streams:

| Sl. No. | Name of the River or Stream | Total length in the District(in Km) | Place of origin | Altitude at Origin | Portion of the River or Stream Recommended for Mineral Concession | Length of area recommended for mineral concession(in Km) | Average width of area recommended for mineral concession(in Km) | Area recommended for mineral concession(in Sq. M) | Mineable mineral potential (in Cum) (60% of total mineral potential) |
|---------|-----------------------------|-------------------------------------|---|--------------------|---|--|---|---|--|
| A1 | SUBARNAREKHA | 79 | NAGRI VILLAGE IN RANCHI DISTRICT OF JHARKHAND | 718 | AMBAKURUCHI SAND SOURCE | 0.28 | 0.1 | 29947 | 14,029 |
| A2 | SUBARNAREKHA | 79 | NAGRI VILLAGE IN RANCHI DISTRICT OF JHARKHAND | 718 | DEVOG SAND SOURCE | 0.37 | 0.14 | 49979 | 99,657 |
| A3 | SUBARNAREKHA | 79 | NAGRI VILLAGE IN RANCHI DISTRICT OF JHARKHAND | 718 | DHITPURA SAND SOURCE | 0.31 | 0.14 | 49979 | 1,06,875 |
| A4 | SUBARNAREKHA | 79 | NAGRI VILLAGE IN RANCHI DISTRICT OF JHARKHAND | 718 | KADARAYAN SAND SOURCE | 0.31 | 0.18 | 49979 | 84,510 |
| A5 | SUBARNAREKHA | 79 | NAGRI VILLAGE IN RANCHI DISTRICT OF JHARKHAND | 718 | MATHANI & PUNSIITA | 0.61 | 0.02 | 12464 | 4,630 |
| A6 | SUBARNAREKHA | 79 | NAGRI VILLAGE IN RANCHI DISTRICT OF JHARKHAND | 718 | BENAPURA -II SAND SOURCE | 0.35 | 0.15 | 58760 | 35,256 |
| A7 | SUBARNAREKHA | 79 | NAGRI VILLAGE IN RANCHI DISTRICT OF JHARKHAND | 718 | BENAPURA-I SAND SOURCE | 0.26 | 0.04 | 50400 | 30,240 |

| | | | | | | | | | |
|-----|--------------|--------|--|-----|--|-------|-------|--------|----------|
| A8 | SUBARNAREKHA | 79 | NAGRI VILLAGE
IN RANCHI
DISTRICT OF
JHARKHAND | 718 | GOPINATHPUR SAND SOURCE | 0.26 | 0.19 | 50000 | 30,000 |
| B1 | SUNAI | 40 | UDALA
MAYURBHANJ
DISTRICT | 160 | PURUKHI SAND SOURCE | 0.62 | 0.08 | 49776 | 38,248 |
| B2 | BUDHABALANGA | 198.75 | SIMILIPAL IN THE
MAYURBHANJ
DISTRICT | 776 | SAHUPADA & DUMUDA SAND SOURCE | 0.548 | 0.091 | 49979 | 44,177 |
| B3 | BUDHABALANGA | 198.75 | SIMILIPAL IN THE
MAYURBHANJ
DISTRICT | 776 | AMBULKUDA SAND SOURCE | 0.36 | 0.11 | 49776 | 36,065 |
| B4 | SUNAI | 40 | UDALA
MAYURBHANJ
DISTRICT | 160 | HATIAGAND MUKUNDAPUR PATRIPAL
SAND SAIRAT | 0.21 | 0.07 | 49979 | 15,700 |
| B5 | SUNAI | 40 | UDALA
MAYURBHANJ
DISTRICT | 160 | UDAMBAR SAND SAIRAT SOURCE | 0.46 | 0.072 | 33184 | 27,324 |
| B6 | BUDHABALANGA | 198.75 | SIMILIPAL IN THE
MAYURBHANJ
DISTRICT | 776 | MAKANDA SAND SAIRAT SOURCE | 0.64 | 0.078 | 49453 | 23,736 |
| B7 | BUDHABALANGA | 198.75 | SIMILIPAL IN THE
MAYURBHANJ
DISTRICT | 776 | GAMBHARIA RUDRAGOPALPUR SAMIL
NAHARPATANA | 0.32 | 0.11 | 384411 | 2,30,647 |
| B8 | SUNAI | 40 | UDALA
MAYURBHANJ
DISTRICT | 160 | BAITABANKA SAND SOURCE | 0.451 | 0.109 | 49372 | 28,216 |
| B9 | BUDHABALANGA | 198.75 | SIMILIPAL IN THE
MAYURBHANJ
DISTRICT | 776 | KATHASANGADA SAND SOURCE-2 | 0.45 | 0.023 | 10522 | 7,840 |
| B10 | BUDHABALANGA | 198.75 | SIMILIPAL IN THE
MAYURBHANJ
DISTRICT | 776 | KATHASANGADA SAND SOURCE-1 | 0.44 | 0.086 | 39457 | 24,074 |
| C1 | SUNAI | 40 | UDALA
MAYURBHANJ
DISTRICT | 160 | PUNDAL-1 SAND BED | 0.25 | 0.198 | 49979 | 39,591 |
| C2 | SUNAI | 40 | UDALA
MAYURBHANJ
DISTRICT | 160 | PUNDAL-2 SAND BED | 0.35 | 0.14 | 49979 | 15,370 |

| | | | | | | | | | |
|----|--------------|----|--|-----|----------------------------------|-------|-------|-------|--------|
| C3 | SUNAI | 40 | UDALA
MAYURBHANJ
DISTRICT | 160 | DUMAGANDIRA-LAICHHANPUR SAND BED | 0.398 | 0.125 | 49979 | 5,088 |
| C4 | SUNAI | 40 | UDALA
MAYURBHANJ
DISTRICT | 160 | BAINCHANARANPUR-I SAND BED | 0.57 | 0.13 | 49979 | 51,975 |
| C5 | SUNAI | 40 | UDALA
MAYURBHANJ
DISTRICT | 160 | BALIPAL SAND BED | 0.52 | 0.06 | 49776 | 29,866 |
| C6 | SUNAI | 40 | UDALA
MAYURBHANJ
DISTRICT | 160 | PRATAPPUR SAND BED | 0.61 | 0.09 | 49574 | 12,343 |
| C7 | SUNAI | 40 | UDALA
MAYURBHANJ
DISTRICT | 160 | BAINCHANARANPUR-3 SAND BED | 0.39 | 0.09 | 35200 | 15,845 |
| C8 | SUNAI | 40 | UDALA
MAYURBHANJ
DISTRICT | 160 | AJODHYA SAND BED | 452 | 110 | 49979 | 33,581 |
| D1 | SUBARNAREKHA | 79 | NAGRI VILLAGE
IN RANCHI
DISTRICT OF
JHARKHAND | 718 | SIKHARPUR SAND SOURCE | 0.55 | 0.12 | 42978 | 35,666 |
| D2 | SUBARNAREKHA | 79 | NAGRI VILLAGE
IN RANCHI
DISTRICT OF
JHARKHAND | 718 | RAJNAGAR SAND SOURCE | 0.28 | 0.19 | 54835 | 19,353 |
| D3 | SUBARNAREKHA | 79 | NAGRI VILLAGE
IN RANCHI
DISTRICT OF
JHARKHAND | 718 | GOBARDHANPUR SAND SOURCE | 0.19 | 0.3 | 48562 | 81,848 |
| D4 | SUBARNAREKHA | 79 | NAGRI VILLAGE
IN RANCHI
DISTRICT OF
JHARKHAND | 718 | SEKH SARAI SAND SOURCE(KA) | 0.28 | 0.18 | 56656 | 37,874 |
| D5 | SUBARNAREKHA | 79 | NAGRI VILLAGE
IN RANCHI
DISTRICT OF
JHARKHAND | 718 | CHALANTI SAND SOURCE | 0.3 | 0.18 | 56656 | 15,000 |

| | | | | | | | | | |
|-----|--------------|----|--|-----|-----------------------------|------|-------|--------|----------|
| D6 | SUBARNAREKHA | 79 | NAGRI VILLAGE
IN RANCHI
DISTRICT OF
JHARKHAND | 718 | BALIKBAD SAND SOURCE | 0.28 | 0.19 | 60096 | 1,08,680 |
| D7 | SUBARNAREKHA | 79 | NAGRI VILLAGE
IN RANCHI
DISTRICT OF
JHARKHAND | 718 | BALIAPAL SAND SOURCE | 0.29 | 0.16 | 48562 | 29,137 |
| D8 | SUBARNAREKHA | 79 | NAGRI VILLAGE
IN RANCHI
DISTRICT OF
JHARKHAND | 718 | SEKH SARAI SAND SOURCE(KHA) | 0.36 | 0.12 | 60703 | 36,422 |
| D9 | SUBARNAREKHA | 79 | NAGRI VILLAGE
IN RANCHI
DISTRICT OF
JHARKHAND | 718 | RIVER BLOCK -KHA | 0.32 | 0.16 | 52609 | 20,000 |
| D10 | SUBARNAREKHA | 79 | NAGRI VILLAGE
IN RANCHI
DISTRICT OF
JHARKHAND | 718 | PRAHARAJPUR (KA) | 0.38 | 0.12 | 52609 | 48,740 |
| D11 | SUBARNAREKHA | 79 | NAGRI VILLAGE
IN RANCHI
DISTRICT OF
JHARKHAND | 718 | MANKIDIA SAND SOURCE (GA) | 0.29 | 0.17 | 141640 | 84,984 |
| D12 | SUBARNAREKHA | 79 | NAGRI VILLAGE
IN RANCHI
DISTRICT OF
JHARKHAND | 718 | CHORMARA (CHANDI BASTI) | 0.38 | 0.12 | 40469 | 66,380 |
| D13 | SUBARNAREKHA | 79 | NAGRI VILLAGE
IN RANCHI
DISTRICT OF
JHARKHAND | 718 | MANKIDIA SAND SOURCE (KHA) | 0.39 | 0.22 | 161874 | 97,124 |
| D14 | SUBARNAREKHA | 79 | NAGRI VILLAGE
IN RANCHI
DISTRICT OF
JHARKHAND | 718 | MAKRAMPUR SAND SOURCE | 0.33 | 0.17 | 60703 | 52,743 |
| D15 | SUBARNAREKHA | 79 | NAGRI VILLAGE
IN RANCHI
DISTRICT OF
JHARKHAND | 718 | GOBARGHATA SAND SOURCE | 0.23 | 0.305 | 70820 | 20,00 |

| | | | | | | | | | |
|-----|--------------|--------|--|-----|-------------------------------|-------|-------|--------|----------|
| D16 | SUBARNAREKHA | 79 | NAGRI VILLAGE
IN RANCHI
DISTRICT OF
JHARKHAND | 718 | PRAHARAJPUR SAND SOURCE (KHA) | 0.66 | 0.17 | 60703 | 36,422 |
| D17 | SUBARNAREKHA | 79 | NAGRI VILLAGE
IN RANCHI
DISTRICT OF
JHARKHAND | 718 | MANKIDIA-KA | 0.51 | 0.13 | 80938 | 1,78,528 |
| D18 | SUBARNAREKHA | 79 | NAGRI VILLAGE
IN RANCHI
DISTRICT OF
JHARKHAND | 718 | RIVER BLOCK-KA | 0.34 | 0.18 | 56656 | 20,000 |
| D19 | SUBARNAREKHA | 79 | NAGRI VILLAGE
IN RANCHI
DISTRICT OF
JHARKHAND | 718 | BILASHPUR SAND SOURCE | 0.78 | 0.35 | 324558 | 1,94,735 |
| D20 | SUBARNAREKHA | 79 | NAGRI VILLAGE
IN RANCHI
DISTRICT OF
JHARKHAND | 718 | MALIPAL SAND BED | 0.26 | 0.19 | 50000 | 30,000 |
| D21 | SUBARNAREKHA | 79 | NAGRI VILLAGE
IN RANCHI
DISTRICT OF
JHARKHAND | 718 | EKTALI SAND BED | 0.26 | 0.19 | 50000 | 30,000 |
| E1 | SUBARNAREKHA | 79 | NAGRI VILLAGE
IN RANCHI
DISTRICT OF
JHARKHAND | 718 | PALABEGUNIA SAND BED | 0.62 | 0.058 | 35936 | 59,808 |
| E2 | SUBARNAREKHA | 79 | NAGRI VILLAGE
IN RANCHI
DISTRICT OF
JHARKHAND | 718 | BADHAPAL SAND BED | 0.226 | 0.15 | 33832 | 41,902 |
| F1 | BUDHABALANGA | 198.75 | SIMILIPAL IN THE
MAYURBHANJ
DISTRICT | 776 | KASABA - DAHAPADA SAND SOURCE | 3.698 | 0.103 | 410149 | 77,912 |

Mineral Potential:

| Boulder(MT) | Bajari(MT) | Total Mineable Mineral Potential(cum) | Annual Deposition |
|-------------|------------|---------------------------------------|-------------------|
| NA | NA | 454356.7 | - |

| SI No. | River or Stream | Portion of the river or stream recommended for mineral concession | Length of area recommended for mineral concession(in km) | Average width of area recommended for mineral concession(in mt.) | Area recommended for mineral concession(in sq. m) | Mineable mineral potential (in CuM) (60% of total mineral potential) |
|--------|-----------------|---|--|--|---|--|
| A1 | SUBARNAREKHA | AMBAKURUCHI SAND SOURCE | 0.28 | 0.1 | 29946.7 | 14029 |
| A2 | SUBARNAREKHA | DEVOG SAND SOURCE | 0.37 | 0.14 | 49978.7 | 99657 |
| A3 | SUBARNAREKHA | DHITPURA SAND SOURCE | 0.31 | 0.14 | 49978.7 | 106875 |
| A4 | SUBARNAREKHA | KADARAYAN SAND SOURCE | 0.31 | 0.18 | 49978.7 | 84510 |
| A5 | SUBARNAREKHA | MATHANI & PUNSIITA | 0.61 | 0.02 | 12464.3 | 4630 |
| A6 | SUBARNAREKHA | BENAPURA -II SAND SOURCE | 0.35 | 0.15 | 58760.4 | 35256 |
| A7 | SUBARNAREKHA | BENAPURA-I SAND SOURCE | 0.26 | 0.04 | 50400.0 | 30240 |
| A8 | SUBARNAREKHA | GOPINATHPUR SAND SOURCE | 0.26 | 0.19 | 50000.0 | 30000 |
| B1 | SUNAI | PURUKHI SAND SOURCE | 0.62 | 0.08 | 49776.3 | 38248 |
| B2 | BUDHABALANGA | SAHUPADA & DUMUDA SAND SOURCE | 0.548 | 0.091 | 49978.7 | 44177 |
| B3 | BUDHABALANGA | AMBULKUDA SAND SOURCE | 0.36 | 0.11 | 49776.3 | 36065 |
| B4 | SUNAI | HATIAGAND MUKUNDAPUR PATRIPAL SAND SAIRAT | 0.21 | 0.07 | 49978.7 | 15700 |
| B5 | SUNAI | UDAMBAR SAND SAIRAT SOURCE | 0.46 | 0.072 | 33184.2 | 27324 |
| B6 | BUDHABALANGA | MAKANDA SAND SAIRAT SOURCE | 0.64 | 0.078 | 49452.6 | 23736 |
| B7 | BUDHABALANGA | GAMBHARIA RUDRAGOPALPUR SAMIL NAHARPATANA | 0.32 | 0.11 | 384410.9 | 230647 |
| B8 | SUNAI | BAITABANKA SAND SOURCE | 0.451 | 0.109 | 49371.7 | 28216 |
| B9 | BUDHABALANGA | KATHASANGADA SAND SOURCE-2 | 0.45 | 0.023 | 10521.8 | 7840 |
| B10 | BUDHABALANGA | KATHASANGADA SAND SOURCE-1 | 0.44 | 0.086 | 39456.9 | 24074 |
| C1 | SUNAI | PUNDAL-1 SAND BED | 0.25 | 0.198 | 49978.7 | 39591 |
| C2 | SUNAI | PUNDAL-2 SAND BED | 0.35 | 0.14 | 49978.7 | 15370 |

| | | | | | | |
|-----|--------------|----------------------------------|-------|-------|----------|----------|
| C3 | SUNAI | DUMAGANDIRA-LAICHHANPUR SAND BED | 0.398 | 0.125 | 49978.7 | 5088 |
| C4 | SUNAI | BAINCHANARANPUR-I SAND BED | 0.57 | 0.13 | 49978.7 | 51975 |
| C5 | SUNAI | BALIPAL SAND BED | 0.52 | 0.06 | 49776.3 | 29866 |
| C6 | SUNAI | PRATAPPUR SAND BED | 0.61 | 0.09 | 49574.0 | 12343 |
| C7 | SUNAI | BAINCHANARANPUR-3 SAND BED | 0.39 | 0.09 | 35200.0 | 15845 |
| C8 | SUNAI | AJODHYA SAND BED | 452 | 110 | 49978.7 | 33581 |
| D1 | SUBARNAREKHA | SIKHARPUR SAND SOURCE | 0.55 | 0.12 | 42977.6 | 35666 |
| D2 | SUBARNAREKHA | RAJNAGAR SAND SOURCE | 0.28 | 0.19 | 54834.9 | 19353 |
| D3 | SUBARNAREKHA | GOBARDHANPUR SAND SOURCE | 0.19 | 0.3 | 48562.3 | 81848 |
| D4 | SUBARNAREKHA | SEKH SARAI SAND SOURCE(KA) | 0.28 | 0.18 | 56656.0 | 37874 |
| D5 | SUBARNAREKHA | CHALANTI SAND SOURCE | 0.3 | 0.18 | 56656.0 | 15000 |
| D6 | SUBARNAREKHA | BALIKBAD SAND SOURCE | 0.28 | 0.19 | 60095.8 | 1,08,680 |
| D7 | SUBARNAREKHA | BALIAPAL SAND SOURCE | 0.29 | 0.16 | 48562.3 | 29137.4 |
| D8 | SUBARNAREKHA | SEKH SARAI SAND SOURCE(KHA) | 0.36 | 0.12 | 60702.8 | 36421.7 |
| D9 | SUBARNAREKHA | RIVER BLOCK -KHA | 0.32 | 0.16 | 52609.1 | 20000 |
| D10 | SUBARNAREKHA | PRAHARAJPUR (KA) | 0.38 | 0.12 | 52609.1 | 48740 |
| D11 | SUBARNAREKHA | MANKIDIA SAND SOURCE (GA) | 0.29 | 0.17 | 141640.0 | 84984 |
| D12 | SUBARNAREKHA | CHORMARA (CHANDI BASTI) | 0.38 | 0.12 | 40468.6 | 66380 |
| D13 | SUBARNAREKHA | MANKIDIA SAND SOURCE (KHA) | 0.39 | 0.22 | 161874.0 | 97124.4 |
| D14 | SUBARNAREKHA | MAKRAMPUR SAND SOURCE | 0.33 | 0.17 | 60702.8 | 52743 |
| D15 | SUBARNAREKHA | GOBARGHATA SAND SOURCE | 0.23 | 0.305 | 70820.0 | 20,00 |
| D16 | SUBARNAREKHA | PRAHARAJPUR SAND SOURCE (KHA) | 0.66 | 0.17 | 60702.8 | 36421.7 |
| D17 | SUBARNAREKHA | MANKIDIA-KA | 0.51 | 0.13 | 80900.0 | 1,78,528 |
| D18 | SUBARNAREKHA | RIVER BLOCK-KA | 0.34 | 0.18 | 56656.0 | 20000 |
| D19 | SUBARNAREKHA | BILASHPUR SAND SOURCE | 0.78 | 0.35 | 324557.9 | 194734.7 |
| D20 | SUBARNAREKHA | MALIPAL SAND BED | 0.26 | 0.19 | 50000.0 | 30000 |
| D21 | SUBARNAREKHA | EKTALI SAND BED | 0.26 | 0.19 | 50000.0 | 30000 |
| E1 | SUBARNAREKHA | PALABEGUNIA SAND BED | 0.62 | 0.058 | 35936.1 | 59808 |
| E2 | SUBARNAREKHA | BADHAPAL SAND BED | 0.226 | 0.15 | 33831.7 | 41902 |
| F1 | BUDHABALANGA | KASABA - DAHAPADA SAND SOURCE | 3.698 | 0.103 | 410148.9 | 77912 |

Details of Sand/M-Sand Sources

a) Rivers:

| River Name/M-sand Plant | Total Sterch of River (in K.M) | Type of River (Perennial/Non-perennial) |
|-------------------------|--------------------------------|---|
| Budhabalanga | 300 K.M | Perennial |
| Subarnarekha | 1075K.M | Perennial |
| Jalaka | 330 K.M | Perennial |
| Sona | 255 K.M | Perennial |
| Kansabansa | 721 K.M | Perennial |

b) De-Siltation Location: (Lakes/Ponds/Dams etc.)

| name of Reservoir/
Dams | Maitain/ Controlled by
State Govt./PSU etc. | Location | District | Tahasil | Village | Size (Ha.) |
|----------------------------|--|-----------|----------|----------|-----------|------------|
| RISSIA DAM | Govt. | Kuldiha | Balasore | Nilagiri | Kuldiha | 97.9 |
| KHUMKUT DAM | Govt. | Gudi Sahi | Balasore | Oupada | Gudi Sahi | 8.1 |
| SINDHU DAM | Govt. | Sindhua | Balasore | Oupada | Sindhua | 11.9 |

c) Patta Lands/Khatedari Land:

| Owner | Sy. No. | Area (Ha.) | District | Tahasil | Village | Agricultural Land (Yes/No.) |
|-------|---------|------------|----------|---------|---------|-----------------------------|
| | | | | | | |

Not applicable for Balasore District

d) M-Sand Plants:

| Plant name | Owner | District | Tahasil | Village | Geo-location | Quantity
Tonnes/Annum |
|------------|-------|----------|---------|---------|--------------|--------------------------|
| | | | | | | |

Not applicable for Balasore District

List of Potential Mining Leases (existing & proposed)

Rivers:

| Lease No. | River Details | Lease Details | Area (in Ac/Ha) | Distance (in KM) from PA/BR/WC/ | Distance from Forest Area (in KM) | Mining leases within 500 meters (if yes cluster area) | Total excavation in cum /Annum considering digging depth max as 3 meters | Mineral to be mined (Sand/Bajri/RBM etc.) | Existing/ Proposed |
|-----------|---------------|---|--------------------|---------------------------------|-----------------------------------|---|--|---|--------------------|
| A1 | Subarnarekha | Ambakuruchi Sand Source, MOUZA AMBAKURUCHI KHATA NO :304, PLOT: 1450, (AREA 7.400 AC),KISSAM :NADI, Longitude 87°12'05.4" TO 87°12'16.5",Latitude 21°43'54.7" TO 21°43'46.6" | 7.40 acre/2.69Ha | PA/WC-56.65/BR-7.61 | 56.65 | YES | 784 | sand | Existing |
| A2 | Subarnarekha | Devog Sand Source, MOUZA DEVOG KHATA NO :392, PLOT: 1178, (AREA 12.350 AC),KISSAM :NADI,Longitude 87°12'30.00" TO 87°12'42.8",Latitude 21°44'05.1" TO 21°44'16.3" | 12.35 acre/4.5 Ha | PA/WC-57.38/BR-6.6 | 57.38 | YES | 5160 | sand | Existing |
| A3 | Subarnarekha | Dhitpura Sand Source, MOUZA DHITPURA, KHATA NO :97, PLOT: 214, (AREA 12.350 AC),KISSAM :NADI, Longitude 87°11'01.5" TO 87°11'14.3",Latitude 21°45'05.1" TO 21°45'9.7" | 12.35 acre./4.5Ha | PA/WC-55.62/BR-0.56 | 55.62 | | 500 | sand | Existing |
| A4 | Subarnarekha | Kadarayan Sand Source, MOUZA KADRAYAN, KHATA NO :257, PLOT: 1, (AREA 12.350 AC),KISSAM :NADI,Longitude87°12'29.76" TO87°12'43.22",Latitude 21°44'52.57" TO 21°45'02.43" | 12.350 acre./4.5Ha | PA/WC-58.28/BR-5.09 | 58.28 | | | sand | Existing |
| A5 | Subarnarekha | Mathani Punsita Sand Source, MOUZA MATHANI & PUNSITA, KHATA NO :143,227, PLOT: 37,25, (AREA 3.08 AC),KISSAM :NADI,Longitude87°03'53.2" TO 87°04'01.9",Latitude 21°40'08.2" TO 21°40'25.8" | 3.08 acre./1.246Ha | PA/WC-22.21/BR-0.19 | 22.21 | | | sand | Existing |
| A6 | Subarnarekha | Benapura-II Sand Quarry, MOUZA BENAPUR, KHATA NO:152, PLOT: 285, (AREA 14.52 AC), KISSAM: NADI, lat- 21° 45' 26.53910" to 21° 45' | 14.52 acre/5.876Ha | PA/WC-56.02/BR-0.15 | 56.02 | YES | | sand | Existing |

| | | | | | | | | | |
|----|--------------|---|---------------------|---------------------|-------|--|------|------|----------|
| | | 39.04554", long- 87° 10' 03.41272" to 87° 10' 16.94709" | | | | | | | |
| A7 | Subarnarekha | Benapura-I Sand Source, MOUZA-BENAPUR, KHATA-150, PLOT-142, KISSAM-NAYANJARI, LAT-21.772, LONG- 87.163 | 5.00 Ha | PA/WC-56.25/BR-2.56 | 56.25 | | | sand | Existing |
| A8 | SUBARNAREKHA | GOPINATHPUR SAND SOURCE, Mouza-Gopinathpur, Khata- 153, Plot- 340, Area-5Ha Out Of 22.743Ha | 12.355acre/ 5.0 Ha | PA/WC-32.57/BR-6.1 | 32.57 | | | sand | PROPOSED |
| B1 | SUNAI | Purukhi Sand Quarry, Mouza. Purukhi, Khata No. 420, Plot No. 1340 Area Ac 12.30 dec
Latitude 21°34' 15.1" N to 21° 34' 20.5"N,
Longitude 86° 47' 37.9"E to 86° 48' 2.0"E | 12.300 acre/4.997Ha | PA/WC- 13.4/BR-2.11 | 13.4 | | 1875 | sand | Existing |
| B2 | Budhabalanga | Sahupada & Dumuda Sand Quarry, MOUZA SAHUPADA & DUMUDA, KHATA NO:223,281, PLOT: 237,238,239,240,15, (AREA 12.35 acers KISSAM:NADI, Longitude-86°54'51.6" TO 86°55'13.2", Latitude -21°33'51.6" TO 21°33'56.2" | 12.35 acre/5.00Ha | PA/WC-21.89/BR-1.5 | 21.89 | | | sand | Existing |
| B3 | Budhabalanga | Ambulakuda Sand Source, Mouza-Ambulakuda Khata No. 133, Plot No. 531 Area Ac 12.30 dec
Latitude 21°35' 4.1" N to 21° 35' 18.5"N,
Longitude 86° 54' 11.2"E to 86° 54' 16.8"E | 12.300 acre/4.997Ha | PA/WC-22.21/BR-3 | 22.27 | | 1500 | sand | Existing |
| B4 | SUNAI | Hatigand Sand Quarry, Mouza-Hatiaganda Khata No-313 Plot No 223, 1121 Kisam Nadi, Mukundapur Khata No-197 PlotNo-3 Kisam Nadi, Patripal Khata No-69 Plot No-1 Kisam Nadi
Latitude 21°32' 57.4" N to 21° 33' 2.7"N,
Longitude 86° 51' 38.9"E to 86° 51' 58.8"E | 12.35 acre/4.99Ha | PA/WC-16.03/BR-0.44 | 16.03 | | | sand | Existing |
| B5 | SUNAI | Udambar Sand Quarry, Mouza. Udambar Khata No. 211, Plot No. 1 Area Ac 8.20 dec
Latitude 21°33' 17.1" N to 21° 33' 22.6"N,
Longitude 86° 53' 35.5"E to 86° 53' 57.1"E | 8.20 acre/3.318Ha | PA/WC-19.68/BR-2.71 | 19.68 | | | sand | Existing |
| B6 | Budhabalanga | Makanda Sand Quarry, Mouza- Makanda Khata No. 337, Plot No. 691 Area Ac 8.40 dec & Plot No. 692 Latitude 21°34' 47.5" N to 21° 34'54.9"N, Longitude 86°54' 32.8"E to 86° 54' 57.9"E | 12.22 acre/4.945Ha | PA/WC-22.27/BR-2.4 | 22.27 | | | sand | Existing |

| | | | | | | | | | |
|-----|--------------|---|--------------------|----------------------|-------|-----|-------|------|----------|
| B7 | Budhabalanga | Gambharia Sand Quarry, Mouza-Gambharia Khata No-430 Plot No-574, 722 Kisam Nadi, Rudragopalpur Samil Naharpatna Khata No 236 Plot No-1 & 510 Kisam Nadi
Latitude 21°32' 14.0" N to 21° 33' 01"N,
Longitude 86° 54' 55"E to 86° 55' 16"E | 94.99 acre/38.44Ha | PA/WC- 20.7/BR-0.42 | 20.7 | | | sand | Existing |
| B8 | SUNAI | Boitabanka Sand Quarry, Mouza-. Ghungi Khata No. 261, Plot No. 338 Area Ac 5.00 dec , Plot No. 440 Area Latitude 21°33' 31.9" N to 21° 33' 48.8"N, Longitude 86°49' 21.0"E to 86° 49' 43.7"E | 12.20 acre/4.937Ha | PA/WC- 15.11/BR-0.19 | 15.11 | | | sand | Existing |
| B9 | Budhabalanga | Kathasangada-II Sand Quarry , Mouza-. Kathasangada, Khata No. 286, Plot No. 106 Area Ac 2.60 dec
Latitude 21°33' 29" N to 21° 33' 43.8"N,
Longitude 86° 54' 35.8"E to 86°54' 42.3"E | 2.60 acre/1.052Ha | PA/WC- 21.06/BR-1.29 | 21.06 | YES | | sand | Existing |
| B10 | Budhabalanga | Kathasangada-I Sand Quarry, Mouza-Kathasangada, Khata No. 286, Plot No. 123 Area Ac 0.30 dec, Plot No. 145, Area Ac. 1.52 dec & Mz. Haladia, Khata No. 458, Plot No. 1456 area Ac 6.00 dec, Plot No. 1952 area Ac 7.93
Latitude 21°33' 18.4" N to 21° 33' 34.3"N,
Longitude 86°54' 42.4"E to 86° 54' 49.7"E | 9.75 acre/3.945Ha | PA/WC- 21.02/BR-0.89 | 21.02 | YES | | sand | Existing |
| C1 | SUNAI | Pundal-1 Sand bed , MOUZA: PUNDAL, KHATA NO 556, PLOT:1347/1 (AREA 12.350 acre), KISSAM: NADI, Longitude-86°46'24.40" TO 86°46'35.00", Latitude - 21°34'40.70" TO 21°34'48.70" | 12.350 acre/5.00Ha | PA/WC- 12.94/BR-1.04 | 12.94 | | 2167 | sand | Existing |
| C2 | SUNAI | Pundal-2 Sand bed, MOUZA: PUNDAL, KHATA NO 556, PLOT:1347 (AREA 3.40 acre), KISSAM: NADI, Longitude -86°46'47.5" TO 86°46'52.3", Latitude 21°34'35.6" TO 21°34'41.6" | 3.40Ac/1.37Ha | PA/WC- 12.98/BR-1.63 | 12.98 | | 10000 | sand | Existing |
| C3 | SUNAI | Dumagandira Sand bed, MOUZA: DUMAGANDIRA, LAICHHANPUR KHATA NO 157, 155 PLOT:385,36 (AREA 12.350 acre), KISSAM: NADI, Longitude -86°48'50.80" TO 86°49'04.50", Latitude 21°34'21.40" TO 21°34'27.50" | 12.350 acre/5.00Ha | PA/WC- 15.4/BR-1.41 | 15.4 | | 1081 | sand | Existing |

| | | | | | | | | | |
|----|--------------|--|---------------------|---------------------|-------|-----|------|------|----------|
| C4 | SUNAI | Bainchanaranpur-1 Sand bed, MOUZA: BAINCHANARANPUR KHATA NO 266 PLOT:383 ,384(AREA12.35acre), KISSAM: NADI, Longitude 86°42'51.90" TO 86°43'01.50", Latitude 21°34'57.10" TO 21°35'11.50" | 12.35 acre/4.99Ha | PA/WC-12.71/BR-0.34 | 12.71 | | 2000 | sand | Existing |
| C5 | SUNAI | Balipal Sand bed, MOUZA: BALIPAL KHATA NO 156,156 PLOT:7,495(AREA 12.350 acre AC), KISSAM: NADI, Longitude 86°44'34.00" TO 86°44'34.20", Latitude 21°34'30.60" TO 21°34'32.00" | 12.300 acre./4.97Ha | PA/WC- 12.5/BR-0.22 | 12.5 | | | sand | Existing |
| C6 | SUNAI | Pratappur Sand bed, MOUZA: AJODHYA(PRATAPPUR) KHATA NO 814, PLOT:388(AREA 12.25 AC), KISSAM: NADI, Longitude -86°44'53.4" TO 86°45'12.9", Latitude 21°34'19.9" TO 21°35'27.8" | 12.250 acre/4.95Ha. | PA/WC-12.37/BR-1.34 | 12.37 | | 4740 | sand | Existing |
| C7 | SUNAI | Bainchanaranpur-3 Sand bed, MOUZA: BAINCHANARANPUR KHATA NO 266 PLOT: 516 (AREA 8.700 AC), KISSAM: NADI, Longitude 86°42'20.2" TO 86°42'35.5", Latitude 21°34'10.5" TO 21°35'14.1" | 8.70Ac/3.520Ha | PA/WC-12.61/BR-1.19 | 12.61 | | | sand | Existing |
| C8 | SUNAI | Ajodhya Sand bed, MOUZA: AJODHYA KHATA NO 814 PLOT:1412 (AREA 12.35 AC), KISSAM: NADI, Longitude 86°45'32.36" TO 86°45'39.90", Latitude 21°34'05.20" TO 21°34'20.22" | 12.35 acre./5.00Ha | PA/WC-11.36/BR-2.66 | 11.36 | | | sand | Existing |
| D1 | Subarnarekha | Sikharpur Sand Source Mouza-Sikharpur, Khata No- 496 Plot No- 1910, 1900 Kissam- Nadi, Latitude 21°47' 44.4" N to 21° 47' 58.2"N, Longitude 87° 12' 20"E to 87° 12' 38.9"E | 11.99Ac/ 4.856 Ha | PA/WC-61.23/BR-0.89 | 61.23 | YES | | sand | Existing |
| D2 | Subarnarekha | Rajnagar Sand Bed, Mouza-Rajnagar, Khata No- 377 Plot No- 1295/1300 Latitude-21°48' 20.9" N to 21°48' 30.9"N Longitude-87°12' 43.2" E to 87°12' 52.2"E | 13.55 acre./5.48 Ha | PA/WC-62.13/BR-1.86 | 62.13 | YES | 2175 | sand | Existing |
| D3 | Subarnarekha | Gobardhanpur Sand Sairat Source Mouza-Gobardhanpur, Khata No- 358 Plot No-1094, Area Ac. 12.00 dec out of Ac. 88.25 dec, Latitude- 21°43'2.2" N to 21° 43'14.6" N, Longitude- 87°12'6.5" E to 87°12'17.5"E | 12.00 acre/ 4.85Ha | PA/WC-55.81/BR-9.04 | 55.81 | | | sand | Existing |

| | | | | | | | | | |
|-----|--------------|--|----------------------|----------------------|-------|-----|--|------|----------|
| D4 | Subarnarekha | Sekhsarai Ka Sand Source Mouza-Sekhsarai, Khata No-142 Plot No-02 Kissam Nadi, Latitute 21° 45' 26.1" N to 21° 45' 29.5"N, Longitude 87° 10' 17.8"E to 87° 10' 20.9"E | 14.00 acre/ 5.66Ha | PA/WC-56.80/BR-1.46 | 56.8 | YES | | sand | Existing |
| D5 | Subarnarekha | Chalanti Sand Source Mouza-Chalanti, Latitute 21° 46' 53" N to 21° 47' 2.8"N, Longitude 87° 09' 58"E to 87° 10' 10.2"E Khata No-384 Plot No-738 kissam Nadi | 14.00 acre/ 5.66Ha | PA/WC-55.75/BR-1.11 | 55.75 | | | sand | Existing |
| D6 | Subarnarekha | Balikbad Sand Source , Mouza-Balikbadk, Khata No- 399 Plot No- 49 Kissam Nadi, Latitute 21° 42' 39" N to 21° 42' 49"N, Longitude 87° 13' 26.2"E to 87° 13' 40"E | 14.85 acre/ 6.009Ha | PA/WC-57.71/BR-11.83 | 57.71 | | | sand | Existing |
| D7 | Subarnarekha | BALIAPAL SAND SOURCE , Mouza-Baliapal, Khata No- 578 Plot No- 2949, Area Ac. 03.00 dec out of Ac. 33.28 dec , | 12.00 acre/ 4.856 Ha | PA/WC-57.48/BR-12.98 | 57.48 | | | sand | Existing |
| D8 | Subarnarekha | Sekhsarai Kha Sand Source Mouza-Sekhsarai, Khata No- 142 Plot No- 2Kissam Nadi, Latitute 21° 46' 38.9" N to 21° 46' 56.3"N, Longitude 87° 09' 45"E to 87° 09' 58.3"E | 15.00 acre/ 6.07 Ha | PA/WC-57.33/BR-1.98 | 57.33 | YES | | sand | Existing |
| D9 | Subarnarekha | River Block Kha Sand Source Mouza-River Block, Khata No- 175 Plot No- 1 Kissam - Nadi, Latitute 21° 48' 51.5" N to 21° 49' 1.9"N, Longitude 87° 12' 56.5"E to 87° 13' 6.1"E | 13.00 acre/ 5.26 Ha | PA/WC-63.26/BR-2.82 | 63.26 | YES | | sand | Existing |
| D10 | Subarnarekha | Praharajpur Ka Sand Source, Latitute 21° 52' 17.5" N to 21° 52' 33.2"N, Longitude 87° 15' 9.7"E to 87° 15' 15.2"E Mouza-Praharajpur, Khata No- 466 Plot No- 1923 Kissam Nadi | 13.00 acre/ 5.26 Ha | PA/WC-70.79/BR-5.83 | 70.79 | YES | | sand | Existing |
| D11 | Subarnarekha | Mankidia Sand Source "Ga" Mouza-Mankidia, Khata No- 618 Plot No- 1677 Lat- 21° 55' 44.92255 to 21° 55' 59.74183, Long- 87° 14' 35.04486 to 87° 14' 49.84273 | 35 acre/ 14.16Ha | PA/WC-74.91/BR-14.20 | 74.91 | YES | | sand | Existing |
| D12 | Subarnarekha | Chandibasti Sand Source Mouza-Chormara, Khata No- 692 Plot No- 182, Area Ac. 10.00 dec out of Ac. 47.50 dec Latitude- 21° 42' 53.5"N to 21° 42' 59.9"N, Longitude 87° 12' 25.8"E to 87° 12' 40.4"E | 10.00 acre/ 4.05 Ha | PA/WC-56.33/BR-10.09 | 56.33 | | | sand | Existing |
| D13 | Subarnarekha | Mankidia Sand Source "Kha" Mouza-Mankidia, Khata No- 618 Plot No- 1677 | 40 acre/ 16.187Ha | PA/WC-74.84/BR-14.79 | 74.84 | YES | | sand | Existing |

| | | | | | | | | | |
|-----|--------------|--|-----------------------|----------------------|-------|-----|--|------|----------|
| D14 | Subarnarekha | Makrampur Sand Source , Mouza-Makrampur, Khata No- 01 Plot No- 06 Kissam Nadi, Latitute 21°51' 22.21" N to 21° 51' 32.12"N, Longitude 87° 14' 31.16"E to 87° 14' 43.90"E | 15.00 acre/ 6.07 Ha | PA/WC-68.62/BR-3.97 | 68.62 | | | sand | Existing |
| D15 | Subarnarekha | Gobarghata Sand Source Mouza-Gobarghata, Khata No- 1414 Plot No- 3236 Kissam Nadi, Latitute 21°51' 10.5" N to 21° 51' 23.8"N, Longitude 87° 14' 17.7"E to 87° 14' 29.5"E | 17.50 acre/ 7.08Ha | PA/WC-67.75/BR-3.04 | 67.75 | | | sand | Existing |
| D16 | Subarnarekha | Praharajpur Kha Sand Source, Mouza-Praharajpur, Khata No- 466, Plot No- 1923, LAT- 21.876, LONG- 87.251 | 15 acre/ 6.07Ha | PA/WC-71.14/BR-6.30 | 71.14 | YES | | sand | Existing |
| D17 | Subarnarekha | Mankidia Sand Source "Ka", Mouza-Mankidia, Khata No-818 Plot No- 01, Longitude 87° 14' 13.8"E to 87° 14' 28.4"E 21° 56' 21" N to 21° 56' 32.2"N, | 20.00 acre/ 8.09 Ha | PA/WC-74.97/BR-13.59 | 74.97 | YES | | sand | Existing |
| D18 | Subarnarekha | River Block Ka sand source Mouza-River Block, Khata No- 175 Plot No- 01, Kissam Nadi, Latitute 21°48'32.9" N to 21° 48' 41.8"N, Longitude 87° 13' 3.8"E to 87° 13' 14.8"E | 14.00 acre / 5.665 Ha | PA/WC-63.09/BR-3.27 | 63.09 | YES | | sand | Existing |
| D19 | Subarnarekha | Bilaspur Sand Source Mouza-Bilaspur, Khata No- 53 , Plot No- 120 | 80.20 acre/ 32.456 Ha | PA/WC-75.82/BR-11.27 | 75.82 | | | sand | Existing |
| D20 | SUBARNAREKHA | Malipal SAND BED, Mouza-Malipal, Khata- 501, Plot- 2277, Area- 5Ha Out Of 38.82 Ha, LAT-21.854, LONG-87.220 | 12.355acre/ 5.0 Ha | PA/WC-30.61/BR-1.6 | 30.61 | | | sand | PROPOSED |
| D21 | SUBARNAREKHA | EKTALI SAND BED, Mouza-Ektali, Khata- 463, Plot- 1922, Area- 5Ha Out Of 41.67 Ha, LAT- 21.752648, LONG-84.197339 | 12.355acre/ 5.0 Ha | PA/WC-30.98/BR-3.64 | 30.98 | | | sand | PROPOSED |
| E1 | Subarnarekha | Palbegunia Sand Source, MOUZA: PALABEGUNIA KHATA NO 470, PLOT: 270,377,378,786,793,799 (AREA 8.88 AC), KISSAM: NADI, Longitude 87°14'22.62"E, TO 87°14'.33.34"E, Latitude 21°41'13.87"N TO 21°41'41.91"N | 8.88 acre/ 3.59 Ha | PA/WC-58.49/BR-4 | 58.49 | | | sand | Existing |
| E2 | Subarnarekha | Badhapal Sand Source, MOUZA: BEDHAPAL KHATA NO 717,718, PLOT: 973,973/2548,989,955,956,969,990,1193,1194,1198,1199,1200,1201,1205,1498 (AREA 8.36 | 8.36acre/ 3.38Ha | PA/WC-63.06/BR-1 | 63.06 | | | sand | Existing |

| | | | | | | | | | |
|----|------------------|--|--------------------------|------------------------|-------|--|--|------|----------|
| | | AC), KISSAM: NADI, Longitude 87°17'50.5"E, TO 87°18'.02.2"E, Latitude 21°41'13.7"N TO 21°41'25.5"N | | | | | | | |
| F1 | Budhabalan
ga | Kasaba Dahapada Sand Source, MOUZA: KASABA-DAHAPADA KHATA NO 653,143, PLOT: 209,210,1429,1483,124,837 (AREA 101.35 AC), KISSAM: NADI, Longitude 86°55'23.1"E, TO 86°56'26.2"E, Latitude 21°31'55.9"N TO 21°32'48.2"N | 101.35 acre/
41.015Ha | PA/WC-
22.37/BR-1.1 | 22.37 | | | sand | Existing |

Patta Lands/Khatedari Land: (existing & proposed)

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

De-Siltation Location: (Lakes/Ponds/Dams etc.) (Existing & proposed)

| Name of Reservoir/Dams | Maintain /Controlled by State Govt./PSU etc. | Location | District | Tehsil | Village | Size (Ha) | Quantity MT/Year | Existing /Proposed |
|------------------------|--|----------|----------|--------|---------|------------|------------------|--------------------|
| NA | NA | NA | NA | NA | NA | NA | NA | NA |

M-Sand Plants:(existing & proposed)

| Plant Name | Owner | District | Tehsil | Village | Geo- location | Quantity Tonnes/Annum | Existing/Proposed |
|------------|-------|----------|--------|---------|---------------|-----------------------|-------------------|
| NA | NA | NA | NA | NA | NA | NA | NA |

Cluster & Contiguous Cluster details

Clusters:

| River Name | Cluster No. | Lease No | Location (Riverbed / Patta Land) | Village | Area (in Ha) | Total Excavation (Cum) | Total Mineral Excavation (Cum) |
|--------------|-------------|----------|---|-------------------------|--------------|------------------------|--------------------------------|
| Subarnarekha | 1 | A1 | Ambakuruchi Sand Source, MOUZA AMBAKURUCHI KHATA NO :304, PLOT: 1450, (AREA 7.400 AC),KISSAM :NADI, Longitude 87°12'05.4" TO 87°12'16.5",Latitude 21°43'54.7" TO 21°43'46.6" | MOUZA- AMBAKURUCHI | 2.69Ha | 18499 | 14029 |
| | | A2 | Devog Sand Source, MOUZA DEVOG KHATA NO :392, PLOT: 1178, (AREA 12.350 AC),KISSAM :NADI,Longitude 87°12'30.00" TO 87°12'42.8",Latitude 21°44'05.1" TO 21°44'16.3" | MOUZA-DEVOG | 4.5 Ha | 124188 | 99657 |
| Subarnarekha | 2 | A6 | Benapura-II Sand Quarry, MOUZA BENAPUR, KHATA NO:152, PLOT: 285, (AREA 14.52 AC), KISSAM: NADI, | MOUZA -BENAPUR | 5.876Ha | 58760 | 35256 |
| | | D5 | Chalanti Sand Source Mouza-Chalanti, Latitute 21°46' 53" N to 21° 47' 2.8"N, Longitude 87° 09' 58"E to 87° 10' 10.2"E° Khata No-384 Plot No-738 kissam Nadi | MOUZA-CHALANTI | 5.66Ha | 18130 | 15000 |
| Budhabalanga | 3 | B2 | SAHUPADA & DUMUDA SAND SOURCE , MOUZA SAHUPADA & DUMUDA, KHATA NO:223,281, PLOT: 237,238,239,240,15, (AREA 12.35 acers KISSAM:NADI, Longitude-86°54'51.6" TO 86°55'13.2", Latitute -21°33'51.6" TO 21°33'56.2" | MOUZA SAHUPADA & DUMUDA | 5.00Ha | 51821 | 44177 |
| | | B10 | Kathasangada-I Sand Quarry, Mouza- Kathasangada, Khata No. 286, Plot No. 123 Area Ac 0.30 dec, Plot No. 145, Area Ac. 1.52 dec & Mz. Haladia, Khata No. 458, Plot No. 1456 area Ac 6.00 dec, Plot No. 1952 area Ac 7.93 Latitute 21°33' 18.4" N to 21° 33' 34.3"N, Longitude 86°54' 42.4"E to 86° 54' 49.7"E° | MOUZA-. KATHASANGADA | 5.26 Ha | 27875 | 24074 |

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|--------------|---|-----|--|-------------------|----------|--------|-------|
| Subarnarekha | 4 | D1 | Sikharpur Sand Source Mouza-Sikharpur, Khata No- 496
Plot No- 1910, 1900 Kissam- Nadi, Latitute 21°47' 44.4" N to 21° 47' 58.2"N, Longitude 87° 12' 20"E to 87° 12' 38.9"E | MOUZA-SIKHARPUR | 4.856 Ha | 46040 | 35666 |
| | | D2 | Rajnagar Sand Bed, Mouza-Rajnagar, Khata No- 377 Plot No- 1295/1300
Latitude- 21°48' 20.9" N to 21°48' 30.9"N
Longitude-87°12' 43.2" E to 87°12' 52.2"E | MOUZA-RAJNAGAR | 5.48 Ha | 27122 | 19353 |
| Subarnarekha | 5 | D4 | Sekhsarai Ka Sand Source Mouza-Sekhsarai, Khata No-142
Plot No-02 Kissam Nadi, Latitute 21°45' 26.1" N to 21° 45' 29.5"N, Longitude 87° 10' 17.8"E to 87° 10' 20.9"E | MOUZA-SEKHSARAI | 5.66Ha | 42487 | 37874 |
| | | D8 | Sekhsarai Kha Sand Source Mouza-Sekhsarai, Khata No- 142
Plot No- 2 Kissam Nadi, Latitute 21°46' 38.9" N to 21° 46' 56.3"N, Longitude 87° 09' 45"E to 87° 09' 58.3"E | MOUZA-SEKHSARAI | 6.07 Ha | 60703 | 36422 |
| Subarnarekha | 6 | D9 | River Block Kha Sand Source Mouza-River Block, Khata No- 175
Plot No- 1 Kissam -Nadi, Latitute 21°48' 51.5" N to 21° 49' 1.9"N, Longitude 87° 12' 56.5"E to 87° 13' 6.1"E | MOUZA-RIVER BLOCK | 5.26 Ha | 23763 | 20000 |
| | | D18 | River Block Ka sand source Mouza-River Block, Khata No- 175
Plot No- 01, Kissam Nadi, Latitute 21°48'32.9" N to 21° 48' 41.8"N, Longitude 87° 13' 3.8"E to 87° 13' 14.8"E | MOUZA-RIVER BLOCK | 5.665 Ha | 23525 | 20000 |
| Subarnarekha | 7 | D10 | Praharajpur Ka Sand Source, Latitute 21°52' 17.5" N to 21° 52' 33.2"N, Longitude 87° 15' 9.7"E to 87° 15' 15.2"E Mouza-Praharajpur, Khata No- 466
Plot No- 1923 Kissam Nadi | MOUZA-PRAHARAJPUR | 5.26 Ha | 55440 | 48740 |
| | | D16 | Praharajpur Kha Sand Source, Mouza-Praharajpur, Khata No- 466,
Plot No- 1923 | MOUZA-PRAHARAJPUR | 6.07Ha | 60703 | 36422 |
| Subarnarekha | 8 | D11 | Mankidia Sand Source "Ga" Mouza-Mankidia, Khata No- 618
Plot No- 1677 | MOUZA-MANKIDIA | 14.16Ha | 141640 | 84984 |

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| | | D13 | Mankidia Sand Source "Kha" Mouza-Mankidia, Khata No- 618
Plot No- 1677 | MOUZA-MANKIDIA | 16.187Ha | 161874 | 97124 |
| | | D17 | Mankidia Sand Source "Ka", Mouza-Mankidia, Khata No-818 Plot No-01, Longitude 87° 14' 13.8"E to 87° 14' 28.4"E 21° 56' 21" N to 21° 56' 32.2"N, | MOUZA-MANKIDIA | 8.09 Ha | 2,02,325 | 1,78,528 |

Contiguous Clusters:

| River Name | Contiguous Cluster No. | Cluster No | Number of leases in the cluster | Location (Riverbed/ Patta Land) | Distance between clusters | Village | Area of Cluster (Ha) | Total Mineral Excavation. (Ton) |
|------------|------------------------|------------|---------------------------------|---------------------------------|---------------------------|---------|----------------------|---------------------------------|
| NA | NA | NA | NA | NA | NA | NA | NA | NA |

Transportation Routes for individual leases and leases in Cluster

| Lease No. | Transportation Route No. | Number of tippers/day of lease | Number of tippers/day of all the lease on route | Length of route in KM | Type of road(Black Topped/unpaved) | Recommendation for road (Black Topped/unpaved) | The road will be Constructed by Govt/Lease Owner | Route Map & Location | |
|-----------|---|--------------------------------|---|-----------------------|------------------------------------|--|--|----------------------|--------------------------------|
| A1 | Ambakuruchi Sand Source, MOUZA AMBAKURUCHI KHATA NO :304, PLOT: 1450, (AREA 7.400 AC),KISSAM :NADI, Longitude 87°12'05.4" TO 87°12'16.5",Latitude 21°43'54.7" TO 21°43'46.6" | NH-16 | 1 | 4 | 10.2 | Black Topped | Black Topped | Govt | MOUZA AMBAKURUCHI, NH-16 |
| A2 | Devog Sand Source, MOUZA DEVOG KHATA NO :392, PLOT: 1178, (AREA 12.350 AC),KISSAM :NADI,Longitude 87°12'30.00" TO 87°12'42.8",Latitude 21°44'05.1" TO 21°44'16.3" | NH-16 | 2 | | 8.9 | Black Topped | Black Topped | Govt | MOUZA DEVOG, NH-16 |
| A3 | Dhitpura Sand Source, MOUZA DHITPURA, KHATA NO :97, PLOT: 214, (AREA 12.350 AC),KISSAM :NADI, Longitude 87°11'01.5" TO 87°11'14.3",Latitude 21°45'05.1" TO 21°45'9.7" | NH-16 | 1 | | 0.71 | Black Topped | Black Topped | Govt | MOUZA DHITPURA, NH-16 |
| A4 | Kadarayan Sand Source, MOUZA KADRAYAN, KHATA NO :257, PLOT: 1, (AREA 12.350 AC),KISSAM :NADI,Longitude87°12'29.76" TO87°12'43.22",Latitude 21°44'52.57" TO 21°45'02.43" | NH-16 | | | 7.3 | Black Topped | Black Topped | Govt | MOUZA KADRAYAN, NH-16 |
| A5 | Mathani Punsita Sand Source, MOUZA MATHANI & PUNSITA, KHATA NO :143,227, PLOT: 37,25, (AREA 3.08 AC),KISSAM :NADI,Longitude87°03'53.2" TO 87°04'01.9",Latitude 21°40'08.2" TO 21°40'25.8" | NH-16 | | | | Black Topped | Black Topped | Govt | MOUZA MATHANI & PUNSITA, NH-16 |
| A6 | Benapura-II Sand Quarry, MOUZA BENAPUR, KHATA NO:152, PLOT: 285, (AREA 14.52 AC), KISSAM: NADI, | NH-16 | | | 2.8 | Black Topped | Black Topped | Govt | MOUZA BENAPUR, NH-16 |
| A7 | Benapura-I Sand Source,MOUZA-BENAPUR, KHATA-150, PLOT-142, KISSAM-NAYANJARI, LAT-21.772, LONG- 87.163 | NH-16 | | | 3.2 | Black Topped | Black Topped | Govt | MOUZA BENAPUR, NH-16 |
| A8 | GOPINATHPUR SAND SOURCE, Mouza-Gopinathpur, Khata- 153, Plot- 340, Area- 5Ha Out Of 22.743Ha | NH- 16 | | | | Black Topped | Black Topped | Govt | Mouza-Gopinathpur |
| B1 | Purukhi Sand Quarry, Mouza. Purukhi, Khata No. 420, Plot No. 1340 Area Ac 12.30 dec | SH-NH16 | 1 | 1 | 15.15 | Black Topped | Black Topped | Govt | Mouza. Purukhi,NH-16 |

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|----|--|----------|---|---|------|--------------|--------------|------|-----------------------------|
| | Latitude 21°34' 15.1" N to 21° 34' 20.5"N, Longitude 86° 47' 37.9"E to 86° 48' 2.0"E | | | | | | | | |
| B2 | Sahupada & Dumuda Sand Quarry, MOUZA SAHUPADA & DUMUDA, KHATA NO:223,281, PLOT: 237,238,239,240,15, (AREA 12.35 acers KISSAM:NADI, Longitude-86°54'51.6" TO 86°55'13.2", Latitude - 21°33'51.6" TO 21°33'56.2" | NH-18 | | | 3.2 | Black Topped | Black Topped | Govt | Mouza-Sahupada, NH-18 |
| B3 | Ambulakuda Sand Source, Mouza- Ambulakuda Khata No. 133, Plot No. 531 Area Ac 12.30 dec Latitude 21°35' 4.1" N to 21° 35' 18.5"N, Longitude 86° 54' 11.2"E to 86° 54' 16.8"E | NH-18 | 1 | 1 | 5.2 | Black Topped | Black Topped | Govt | Mouza- Ambulakuda, NH-18 |
| B4 | Hatigand Sand Quarry, Mouza-Hatiaganda Khata No-313 Plot No 223, 1121 Kisam Nadi, Mukundapur Khata No-197 PlotNo-3 Kisam Nadi,Patripal Khata No-69 Plot No-1 Kisam Nadi Latitude 21°32' 57.4" N to 21° 33' 2.7"N, Longitude 86° 51' 38.9"E to 86° 51' 58.8"E | NH-16 | | | 10.2 | Black Topped | Black Topped | Govt | Mouza- Hatiaganda, NH-16 |
| B5 | Udambar Sand Quarry, Mouza. Udambar Khata No. 211, Plot No. 1 Area Ac 8.20 dec Latitude 21°33' 17.1" N to 21° 33' 22.6"N, Longitude 86° 53' 35.5"E to 86° 53' 57.1"E | NH-16 | | | 3.68 | Black Topped | Black Topped | Govt | Mouza. Udambar, NH-16 |
| B6 | Makanda Sand Quarry, Mouza- Makanda Khata No. 337, Plot No. 691 Area Ac 8.40 dec & Plot No. 692 Area Latitude 21°34' 47.5" N to 21° 34'54.9"N, Longitude 86°54' 32.8"E to 86° 54' 57.9"E | NH-18 | | | 4.1 | Black Topped | Black Topped | Govt | Mouza- Makanda, NH-18 |
| B7 | Gambharia Sand Quarry, Mouza-Gambharia Khata No-430 Plot No-574, 722 Kisam Nadi, Rudragopalpur Samil Naharpatna Khata No 236 Plot No-1 &510 Kisam Nadi Latitude 21°32' 14.0" N to 21° 33' 01"N, Longitude 86° 54' 55"E to 86° 55' 16"E | NH-16 | | | 1.2 | Black Topped | Black Topped | Govt | Mouza- Gambharia, NH-16 |
| B8 | Boitabanka Sand Quarry, Mouza-. Ghungi Khata No. 261, Plot No. 338 Area Ac 5.00 dec , Plot No. 440 Area Latitude 21°33' 31.9" N to 21° 33' 48.8"N, Longitude 86°49' 21.0"E to 86° 49' 43.7"E | SN-NH 16 | | | 12.5 | Black Topped | Black Topped | Govt | Mouza-. Ghungi , NH-16 |
| B9 | Kathasangada-II Sand Quarry , Mouza-. Kathasangada, Khata No. 286, Plot No. 106 Area Ac 2.60 dec Latitude 21°33' 29" N to 21° 33' 43.8"N, Longitude 86° 54' 35.8"E to 86°54' 42.3"E | NH-16 | | | 1.97 | Black Topped | Black Topped | Govt | Mouza-. Kathasangada, NH-16 |

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|-----|--|----------|---|---|-------|--------------|--------------|------|----------------------------------|
| B10 | Kathasangada-I Sand Quarry, Mouza-Kathasangada, Khata No. 286, Plot No. 123 Area Ac 0.30 dec, Plot No. 145, Area Ac. 1.52 dec & Mz. Haladia, Khata No. 458, Plot No. 1456 area Ac 6.00 dec, Plot No. 1952 Latitude 21°33' 18.4" N to 21° 33' 34.3"N, Longitude 86°54' 42.4"E to 86° 54' 49.7"E | NH-16 | | | 1.53 | Black Topped | Black Topped | Govt | Mouza-Kathasangada, NH-16 |
| C1 | Pundal-1 Sand bed , MOUZA: PUNDAL, KHATA NO 556, PLOT:1347/1 (AREA 12.350 acre), KISSAM: NADI, Longitude-86°46'24.40" TO 86°46'35.00", Latitude - 21°34'40.70"TO21°34'48.70" | SH-NH 16 | 1 | 4 | 19.7 | Black Topped | Black Topped | Govt | MOUZA: PUNDAL, NH-16 |
| C2 | Pundal-2 Sand bed, MOUZA: PUNDAL, KHATA NO 556, PLOT:1347(AREA 3.40 acre), KISSAM: NADI, Longitude - 86°46'47.5" TO 86°46'52.3", Latitude 21°34'35.6" TO 21°34'41.6" | SH-NH16 | 1 | | 18.38 | Black Topped | Black Topped | Govt | MOUZA: PUNDAL,NH-16 |
| C3 | Dumagandira Sand bed, MOUZA: DUMAGANDIRA,LAICHHANPUR KHATA NO 157,155 PLOT:385,36 (AREA 12.350 acre), KISSAM: NADI, Longitude -86°48'50.80" TO 86°49'04.50", Latitude 21°34'21.40" TO 21°34'27.50" | SH-NH16 | 1 | | 19.8 | Black Topped | Black Topped | Govt | MOUZA: DUMAGANDIRA,NH-16 |
| C4 | Bainchanaranpur-1 Sand bed, MOUZA: BAINCHANARANPUR KHATA NO 266 PLOT:383 ,384(AREA12.35acre), KISSAM: NADI, Longitude 86°42'51.90" TO 86°43'01.50", Latitude 21°34'57.10" TO 21°35'11.50" | SH-NH16 | 1 | | 22.87 | Black Topped | Black Topped | Govt | MOUZA: BAINCHANARANPUR, NH-16 |
| C5 | Balipal Sand bed, MOUZA: BALIPAL KHATA NO 156,156 PLOT:7,495(AREA 12.350 acre AC), KISSAM: NADI, Longitude 86°44'34.00" TO 86°44'34.20", Latitude 21°34'30.60"TO 21°34'32.00" | SH-NH16 | | | 21.68 | Black Topped | Black Topped | Govt | MOUZA: BALIPAL, NH-16 |
| C6 | Pratappur Sand bed, MOUZA: AJODHYA(PRATAPPUR) KHATA NO 814, PLOT:388(AREA 12.25 AC), KISSAM: NADI, Longitude -86°44'53.4" TO 86°45'12.9", Latitude 21°34'19.9" TO 21°35'27.8" | SH-NH16 | 1 | 1 | 18.81 | Black Topped | Black Topped | Govt | MOUZA: AJODHYA(PRATAPPUR), NH-16 |
| C7 | Bainchanaranpur-3 Sand bed, MOUZA: BAINCHANARANPUR KHATA NO 266 PLOT: 516 (AREA 8.700 AC), KISSAM: NADI, Longitude 86°42'20.2" TO 86°42'35.5", Latitude 21°34'10.5" TO 21°35'14.1" | SH-NH16 | | | 22.94 | Black Topped | Black Topped | Govt | MOUZA: BAINCHANARANPUR,NH-16 |
| C8 | Ajodhya Sand bed, MOUZA: AJODHYA KHATA NO 814 PLOT:1412 (AREA 12.35 AC), KISSAM: NADI, Longitude 86°45'32.36" TO 86°45'39.90", Latitude 21°34'05.20" TO 21°34'20.22" | SH-NH-16 | | | 19.26 | Black Topped | Black Topped | Govt | MOUZA: AJODHYA,NH-16 |

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|-----|---|-------|---|---|------|--------------|--------------|------|---------------------------|
| D1 | Sikharpur Sand Source Mouza-Sikharpur, Khata No-496 Plot No- 1910, 1900 Kissam- Nadi, Latitute 21°47' 44.4" N to 21° 47' 58.2"N, Longitude 87° 12' 20"E to 87° 12' 38.9"E | NH-16 | | | 3.2 | Black Topped | Black Topped | Govt | Mouza-Sikharpur,NH-16 |
| D2 | Rajnagar Sand Bed, Mouza-Rajnagar, Khata No- 377 Plot No- 1295/1300 Latitude- 21°48' 20.9" N to 21°48' 30.9"N Longotude-87°12' 43.2" E to 87°12' 52.2"E | NH-16 | 1 | 1 | 3.9 | Black Topped | Black Topped | Govt | Mouza-Rajnagar,NH-16 |
| D3 | Gobardhanpur Sand Sairat Source Mouza-Gobardhanpur, Khata No- 358 Plot No- 1094, Area Ac. 12.00 dec out of Ac. 88.25 dec, Latitude- 21°43'2.2" N to 21° 43'14.6" N, Longitude- 87°12'6.5" E to 87°12'17.5"E | NH-16 | | | 8.8 | Black Topped | Black Topped | Govt | Mouza-Gobardhanpur, NH-16 |
| D4 | Sekhsarai Ka Sand Source Mouza-Sekhsarai, Khata No-142 Plot No-02 Kissam Nadi, Latitute 21°45' 26.1" N to 21° 45' 29.5"N, Longitude 87° 10' 17.8"E to 87° 10' 20.9"E | NH-16 | | | 4.9 | Black Topped | Black Topped | Govt | Mouza-Sekhsarai, NH-16 |
| D5 | Chalanti Sand Source Mouza-Chalanti, Latitute 21°46' 53" N to 21° 47' 2.8"N, Longitude 87° 09' 58"E to 87° 10' 10.2"E Khata No-384 Plot No-738 kissam Nadi | NH-16 | | | 1.3 | Black Topped | Black Topped | Govt | Mouza-Chalanti, NH-16 |
| D6 | Balikbad Sand Source , Mouza-Balikbadk, Khata No- 399 Plot No- 49 Kissam Nadi, Latitute 21°42' 39" N to 21° 42' 49"N, Longitude 87° 13' 26.2"E to 87° 13' 40"E | NH-16 | | | 9.9 | Black Topped | Black Topped | Govt | Mouza-Balikbadk, NH-16 |
| D7 | BALIAPAL SAND SOURCE , Mouza-Baliapal, Khata No-578 Plot No- 2949, Area Ac. 03.00 dec out of Ac. 33.28 dec , | NH-16 | | | 15.3 | Black Topped | Black Topped | Govt | Mouza-Baliapal, NH-16 |
| D8 | Sekhsarai Kha Sand Source ,Mouza-Sekhsarai, Khata No- 142 , Plot No- 2 Kissam Nadi, Latitute 21°46' 38.9" N to 21° 46' 56.3"N, Longitude 87° 09' 45"E to 87° 09' 58.3"E | NH-16 | | | 5.2 | Black Topped | Black Topped | Govt | Mouza-Sekhsarai, NH-16 |
| D9 | River Block Kha Sand Source Mouza-River Block, Khata No- 175 Plot No- 1 Kissam -Nadi, Latitute 21°48' 51.5" N to 21° 49' 1.9"N, Longitude 87° 12' 56.5"E to 87° 13' 6.1"E | NH-16 | | | 5.7 | Black Topped | Black Topped | Govt | Mouza-River Block, NH-16 |
| D10 | Praharajpur Ka Sand Source, Latitute 21°52' 17.5" N to 21° 52' 33.2"N, Longitude 87° 15' 9.7"E to 87° 15' 15.2"E Mouza-Praharajpur, Khata No- 466 Plot No-1923 Kissam Nadi | NH-16 | | | 1.5 | Black Topped | Black Topped | Govt | Mouza-Praharajpur, NH-16 |

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| D1
1 | Mankidia Sand Source "Ga" Mouza-Mankidia, Khata No- 618 Plot No- 1677 | NH-16 | | | 8.7 | Black Topped | Black Topped | Govt | Mouza-Mankidia, NH-16 |
| D1
2 | Chandibasti Sand Source, Mouza-Chormara, Khata No- 692 ,Plot No- 182, Area Ac. 10.00 dec out of Ac. 47.50 dec Latitude- 21°42'53.5"N to 21°42'59.9"N, Longitude 87°12'25.8"E to 87°12'40.4"E | NH-16 | | | 11.2 | Black Topped | Black Topped | Govt | Mouza-Chormara, NH-16 |
| D1
3 | Mankidia Sand Source "Kha" Mouza-Mankidia, Khata No- 618 Plot No- 1677 | NH-16 | | | 9.1 | Black Topped | Black Topped | Govt | Mouza-Mankidia, NH-16 |
| D1
4 | Makrampur Sand Source , Mouza-Makrampur, Khata No- 01 Plot No- 06 Kissam Nadi, Latitute 21°51' 22.21" N to 21° 51' 32.12"N, Longitude 87° 14' 31.16"E to 87° 14' 43.90"E | NH-16 | | | 2.9 | Black Topped | Black Topped | Govt | Mouza-Makrampur, NH-16 |
| D1
5 | Gobarghata Sand Source Mouza-Gobarghata, Khata No- 1414 Plot No- 3236 Kissam Nadi, Latitute 21°51' 10.5" N to 21° 51' 23.8"N, Longitude 87° 14' 17.7"E to 87° 14' 29.5"E | NH-16 | | | 4.5 | Black Topped | Black Topped | Govt | Mouza-Gobarghata, NH-16 |
| D1
6 | Praharajpur Kha Sand Source, Mouza-Praharajpur, Khata No- 466, Plot No- 1923 | NH-16 | | | 1.5 | Black Topped | Black Topped | Govt | Mouza-Praharajpur, NH-16 |
| D1
7 | Mankidia Sand Source "Ka", Mouza-Mankidia, Khata No-818 Plot No-01, Longitude 87° 14' 13.8"E to 87° 14' 28.4"E 21°56' 21" N to 21° 56' 32.2"N, | NH-16 | | | 8.1 | Black Topped | Black Topped | Govt | Mouza-Mankidia, NH-16 |
| D1
8 | River Block Ka sand source Mouza-River Block, Khata No- 175 Plot No- 01, Kissam Nadi, Latitute 21°48'32.9" N to 21° 48' 41.8"N, Longitude 87° 13' 3.8"E to 87° 13' 14.8"E | NH-16 | | | 5.1 | Black Topped | Black Topped | Govt | Mouza-River Block, NH-16 |
| D1
9 | Bilaspur Sand Source Mouza-Bilaspur, Khata No- 53 , Plot No- 120 | NH-16 | | | 4.2 | Black Topped | Black Topped | Govt | Mouza-Bilaspur |
| D2
0 | MALIPAL SAND BED, Mouza-Malipal, Khata- 501, Plot- 2277, Area- 5Ha Out Of 38.82 Ha | NH-16 | | | 3.69 | Black Topped | Black Topped | Govt | Mouza-Malipal |
| D2
1 | EKTALI SAND BED, GP- Raymchandrapur, Mouza-Ektali, Khata- 463, Plot- 1922, Area- 5Ha Out Of 41.67 Ha | NH-16 | | | 2.56 | Black Topped | Black Topped | Govt | Mouza-Ektali |
| E1 | Palbegunia Sand Source, MOUZA:PALABEGUNIA KHATA NO 470, PLOT: 270,377,378,786,793,799 (AREA 8.88 AC), | NH-16 | | | 16.1 | Black Topped | Black Topped | Govt | MOUZA:PALABEGUNIA, NH-16 |

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|----|---|-------|--|--|------|--------------|--------------|------|-------------------------------|
| | KISSAM: NADI, Longitude 87°14'22.62"E, TO 87°14'.33.34"E, Latitude 21°41'13.87"N TO 21°41'41.91"N | | | | | | | | |
| E2 | Badhapal Sand Source, MOUZA:BEDHAPAL KHATA NO 717,718, PLOT: 973,973/2548,989,955,956,969,990,1193,1194,1198,1199,1200,1201,1205,1498 (AREA 8.36 AC), KISSAM: NADI, Longitude 87°17'50.5"E, TO 87°18'.02.2"E, Latitude 21°41'13.7"N TO 21°41'25.5"N | NH-16 | | | 10.3 | Black Topped | Black Topped | Govt | MOUZA:BEDHAPAL , NH-16 |
| F1 | Kasaba Dahapada Sand Source, MOUZA: KASABA-DAHAPADA KHATA NO 653,143, PLOT: 209,210,1429,1483,124,837 (AREA 101.35 AC), KISSAM: NADI, Longitude 86°55'23.1"E, TO 86°56'26.2"E, Latitude 21°31'55.9"N TO 21°32'48.2"N | NH-16 | | | 1.6 | Black Topped | Black Topped | Govt | MOUZA: KASABA-DAHAPADA, NH-16 |

| Cluster No. | Transportation Route No. | Number of tippers/day of cluster | Number of tippers/ day of all the cluster on route | Length of route in KM | Type of road (Black Topped/unpaved) | Recommendation for road (Black Topped/unpaved) | The road will be Constructed by Govt/Lease Owner | Route Map & Location |
|-------------|--------------------------|----------------------------------|--|-----------------------|-------------------------------------|--|--|-----------------------------|
| 1 | NH-16 | 1 | 2 | 10.2 | Black Topped | Black Topped | Govt | MOUZA AMBAKURUCHI, NH-16 |
| | NH-16 | 2 | | 8.9 | Black Topped | Black Topped | Govt | MOUZA DEVOG, NH-16 |
| 2 | NH-16 | | | 2.8 | Black Topped | Black Topped | Govt | MOUZA BENAPUR, NH-16 |
| | NH-16 | | | 9.9 | Black Topped | Black Topped | Govt | Mouza-Chalanti, NH-16 |
| 3 | NH-16 | | | 3.2 | Black Topped | Black Topped | Govt | Mouza-Sahupada, NH-18 |
| | NH-16 | | | 1.53 | Black Topped | Black Topped | Govt | Mouza-. Kathasangada, NH-16 |
| 4 | NH-16 | | | 3.2 | Black Topped | Black Topped | Govt | Mouza-Sikharpur, NH-16 |

| | | | | | | | | |
|---|-------|---|---|-----|--------------|--------------|------|--------------------------|
| | NH-16 | 1 | 1 | 3.9 | Black Topped | Black Topped | Govt | Mouza-Rajnagar,NH-16 |
| 5 | NH-16 | | | 4.9 | Black Topped | Black Topped | Govt | Mouza-Sekh sarai, NH-16 |
| | NH-16 | | | 5.2 | Black Topped | Black Topped | Govt | Mouza-Sekh sarai, NH-16 |
| 6 | NH-16 | | | 5.7 | Black Topped | Black Topped | Govt | Mouza-River Block, NH-16 |
| | NH-16 | | | 5.1 | Black Topped | Black Topped | Govt | Mouza-River Block, NH-16 |
| 7 | NH-16 | | | 1.5 | Black Topped | Black Topped | Govt | Mouza-Praharajpur, NH-16 |
| | NH-16 | | | 1.5 | Black Topped | Black Topped | Govt | Mouza-Praharajpur, NH-16 |
| 8 | NH-16 | | | 8.7 | Black Topped | Black Topped | Govt | Mouza-Mankidia,NH-16 |
| | NH-16 | | | 9.1 | Black Topped | Black Topped | Govt | Mouza-Mankidia, NH-16 |
| | NH-16 | | | 8.1 | Black Topped | Black Topped | Govt | Mouza-Mankidia, NH-16 |

Final List of Potential Mining Leases (existing & proposed)

Rivers:

| Lease No. | River Details | Lease Details | Area (in Ac/Ha) | Distance (in KM) from PA/BR/WC/ | Distance from Forest Area (in KM) | Mining leases within 500 meters (if yes cluster area) | Total excavation in cum /Annum considering digging depth max as 3 meters | Mineral to be mined (Sand/Bajri/RBM etc.) | Existing/ Proposed |
|-----------|---------------|---|--------------------|---------------------------------|-----------------------------------|---|--|---|--------------------|
| A1 | Subarnarekha | Ambakuruchi Sand Source, MOUZA AMBAKURUCHI KHATA NO :304, PLOT: 1450, (AREA 7.400 AC),KISSAM :NADI, Longitude 87°12'05.4" TO 87°12'16.5",Latitude 21°43'54.7" TO 21°43'46.6" | 7.40 acre/2.69Ha | PA/WC-56.65/BR-7.61 | 56.65 | YES | 784 | sand | Existing |
| A2 | Subarnarekha | Devog Sand Source, MOUZA DEVOG KHATA NO :392, PLOT: 1178, (AREA 12.350 AC),KISSAM :NADI,Longitude 87°12'30.00" TO 87°12'42.8",Latitude 21°44'05.1" TO 21°44'16.3" | 12.35 acre/4.5 Ha | PA/WC-57.38/BR-6.6 | 57.38 | YES | 5160 | sand | Existing |
| A3 | Subarnarekha | Dhitpura Sand Source, MOUZA DHITPURA, KHATA NO :97, PLOT: 214, (AREA 12.350 AC),KISSAM :NADI, Longitude 87°11'01.5" TO 87°11'14.3",Latitude 21°45'05.1" TO 21°45'9.7" | 12.35 acre./4.5Ha | PA/WC-55.62/BR-0.56 | 55.62 | | 500 | sand | Existing |
| A4 | Subarnarekha | Kadarayan Sand Source, MOUZA KADRAYAN, KHATA NO :257, PLOT: 1, (AREA 12.350 AC),KISSAM :NADI,Longitude87°12'29.76" TO87°12'43.22",Latitude 21°44'52.57" TO 21°45'02.43" | 12.350 acre./4.5Ha | PA/WC-58.28/BR-5.09 | 58.28 | | | sand | Existing |
| A5 | Subarnarekha | Mathani Punsita Sand Source, MOUZA MATHANI & PUNSITA, KHATA NO :143,227, PLOT: 37,25, (AREA 3.08 AC),KISSAM :NADI,Longitude87°03'53.2" TO 87°04'01.9",Latitude 21°40'08.2" TO 21°40'25.8" | 3.08 acre./1.246Ha | PA/WC-22.21/BR-0.19 | 22.21 | | | sand | Existing |
| A6 | Subarnarekha | Benapura-II Sand Quarry, MOUZA BENAPUR, KHATA NO:152, PLOT: 285, (AREA 14.52 AC), KISSAM: NADI, lat- 21° 45' 26.53910" to 21° 45' | 14.52 acre/5.876Ha | PA/WC-56.02/BR-0.15 | 56.02 | YES | | sand | Existing |

| | | | | | | | | | |
|----|--------------|---|---------------------|---------------------|-------|--|------|------|----------|
| | | 39.04554", long- 87° 10' 03.41272" to 87° 10' 16.94709" | | | | | | | |
| A7 | Subarnarekha | Benapura-I Sand Source, MOUZA-BENAPUR, KHATA-150, PLOT-142, KISSAM-NAYANJARI, LAT-21.772, LONG- 87.163 | 5.00 Ha | PA/WC-56.25/BR-2.56 | 56.25 | | | sand | Existing |
| A8 | SUBARNAREKHA | GOPINATHPUR SAND SOURCE, Mouza-Gopinathpur, Khata- 153, Plot- 340, Area-5Ha Out Of 22.743Ha | 12.355acre/ 5.0 Ha | PA/WC-32.57/BR-6.1 | 32.57 | | | sand | PROPOSED |
| B1 | SUNAI | Purukhi Sand Quarry, Mouza. Purukhi, Khata No. 420, Plot No. 1340 Area Ac 12.30 dec
Latitude 21°34' 15.1" N to 21° 34' 20.5"N,
Longitude 86° 47' 37.9"E to 86° 48' 2.0"E | 12.300 acre/4.997Ha | PA/WC- 13.4/BR-2.11 | 13.4 | | 1875 | sand | Existing |
| B2 | Budhabalanga | Sahupada & Dumuda Sand Quarry, MOUZA SAHUPADA & DUMUDA, KHATA NO:223,281, PLOT: 237,238,239,240,15, (AREA 12.35 acers KISSAM:NADI, Longitude-86°54'51.6" TO 86°55'13.2", Latitude -21°33'51.6" TO 21°33'56.2" | 12.35 acre/5.00Ha | PA/WC-21.89/BR-1.5 | 21.89 | | | sand | Existing |
| B3 | Budhabalanga | Ambulakuda Sand Source, Mouza-Ambulakuda Khata No. 133, Plot No. 531 Area Ac 12.30 dec
Latitude 21°35' 4.1" N to 21° 35' 18.5"N,
Longitude 86° 54' 11.2"E to 86° 54' 16.8"E | 12.300 acre/4.997Ha | PA/WC-22.21/BR-3 | 22.27 | | 1500 | sand | Existing |
| B4 | SUNAI | Hatigand Sand Quarry, Mouza-Hatiaganda Khata No-313 Plot No 223, 1121 Kisam Nadi, Mukundapur Khata No-197 PlotNo-3 Kisam Nadi, Patripal Khata No-69 Plot No-1 Kisam Nadi
Latitude 21°32' 57.4" N to 21° 33' 2.7"N,
Longitude 86° 51' 38.9"E to 86° 51' 58.8"E | 12.35 acre/4.99Ha | PA/WC-16.03/BR-0.44 | 16.03 | | | sand | Existing |
| B5 | SUNAI | Udambar Sand Quarry, Mouza. Udambar Khata No. 211, Plot No. 1 Area Ac 8.20 dec
Latitude 21°33' 17.1" N to 21° 33' 22.6"N,
Longitude 86° 53' 35.5"E to 86° 53' 57.1"E | 8.20 acre/3.318Ha | PA/WC-19.68/BR-2.71 | 19.68 | | | sand | Existing |
| B6 | Budhabalanga | Makanda Sand Quarry, Mouza- Makanda Khata No. 337, Plot No. 691 Area Ac 8.40 dec & Plot No. 692 Latitude 21°34' 47.5" N to 21° 34'54.9"N, Longitude 86°54' 32.8"E to 86° 54' 57.9"E | 12.22 acre/4.945Ha | PA/WC-22.27/BR-2.4 | 22.27 | | | sand | Existing |

| | | | | | | | | | |
|-----|------------------|---|--------------------|-------------------------|-------|-----|-------|------|----------|
| B7 | Budhabalan
ga | Gambharia Sand Quarry, Mouza-Gambharia
Khata No-430 Plot No-574, 722 Kisam Nadi,
Rudragopalpur Samil Naharpatna Khata No
236 Plot No-1 & 510 Kisam Nadi
Latitude 21°32' 14.0" N to 21° 33' 01"N,
Longitude 86° 54' 55"E to 86° 55' 16"E | 94.99 acre/38.44Ha | PA/WC- 20.7/BR-
0.42 | 20.7 | | | sand | Existing |
| B8 | SUNAI | Boitabanka Sand Quarry, Mouza-. Ghungi
Khata No. 261, Plot No. 338 Area Ac 5.00 dec
, Plot No. 440 Area Latitude 21°33' 31.9" N to
21° 33' 48.8"N, Longitude 86°49' 21.0"E to 86°
49' 43.7"E | 12.20 acre/4.937Ha | PA/WC-
15.11/BR-0.19 | 15.11 | | | sand | Existing |
| B9 | Budhabalan
ga | Kathasangada-II Sand Quarry , Mouza-.
Kathasangada, Khata No. 286, Plot No. 106
Area Ac 2.60 dec
Latitude 21°33' 29" N to 21° 33' 43.8"N,
Longitude 86° 54' 35.8"E to 86°54' 42.3"E | 2.60 acre/1.052Ha | PA/WC-
21.06/BR-1.29 | 21.06 | YES | | sand | Existing |
| B10 | Budhabalan
ga | Kathasangada-I Sand Quarry, Mouza-
Kathasangada, Khata No. 286, Plot No. 123
Area Ac 0.30 dec, Plot No. 145, Area Ac. 1.52
dec & Mz. Haladia, Khata No. 458, Plot No.
1456 area Ac 6.00 dec, Plot No. 1952 area
Ac 7.93
Latitude 21°33' 18.4" N to 21° 33' 34.3"N,
Longitude 86°54' 42.4"E to 86° 54' 49.7"E | 9.75 acre/3.945Ha | PA/WC-
21.02/BR-0.89 | 21.02 | YES | | sand | Existing |
| C1 | SUNAI | Pundal-1 Sand bed , MOUZA: PUNDAL,
KHATA NO 556, PLOT:1347/1 (AREA 12.350
acre), KISSAM: NADI, Longitude-86°46'24.40"
TO 86°46'35.00", Latitude -
21°34'40.70"TO21°34'48.70" | 12.350 acre/5.00Ha | PA/WC-
12.94/BR-1.04 | 12.94 | | 2167 | sand | Existing |
| C2 | SUNAI | Pundal-2 Sand bed, MOUZA: PUNDAL, KHATA
NO 556, PLOT:1347 (AREA 3.40 acre), KISSAM:
NADI, Longitude -86°46'47.5" TO 86°46'52.3",
Latitude 21°34'35.6" TO 21°34'41.6" | 3.40Ac/1.37Ha | PA/WC-
12.98/BR-1.63 | 12.98 | | 10000 | sand | Existing |
| C3 | SUNAI | Dumagandira Sand bed, MOUZA:
DUMAGANDIRA, LAICHHANPUR KHATA NO
157, 155 PLOT:385,36 (AREA 12.350 acre),
KISSAM: NADI, Longitude -86°48'50.80" TO
86°49'04.50", Latitude 21°34'21.40" TO
21°34'27.50" | 12.350 acre/5.00Ha | PA/WC- 15.4/BR-
1.41 | 15.4 | | 1081 | sand | Existing |

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|----|--------------|--|---------------------|---------------------|-------|-----|------|------|----------|
| C4 | SUNAI | Bainchanaranpur-1 Sand bed, MOUZA: BAINCHANARANPUR KHATA NO 266 PLOT:383 ,384(AREA12.35acre), KISSAM: NADI, Longitude 86°42'51.90" TO 86°43'01.50", Latitude 21°34'57.10" TO 21°35'11.50" | 12.35 acre/4.99Ha | PA/WC-12.71/BR-0.34 | 12.71 | | 2000 | sand | Existing |
| C5 | SUNAI | Balipal Sand bed, MOUZA: BALIPAL KHATA NO 156,156 PLOT:7,495(AREA 12.350 acre AC), KISSAM: NADI, Longitude 86°44'34.00" TO 86°44'34.20", Latitude 21°34'30.60" TO 21°34'32.00" | 12.300 acre./4.97Ha | PA/WC- 12.5/BR-0.22 | 12.5 | | | sand | Existing |
| C6 | SUNAI | Pratappur Sand bed, MOUZA: AJODHYA(PRATAPPUR) KHATA NO 814, PLOT:388(AREA 12.25 AC), KISSAM: NADI, Longitude -86°44'53.4" TO 86°45'12.9", Latitude 21°34'19.9" TO 21°35'27.8" | 12.250 acre/4.95Ha. | PA/WC-12.37/BR-1.34 | 12.37 | | 4740 | sand | Existing |
| C7 | SUNAI | Bainchanaranpur-3 Sand bed, MOUZA: BAINCHANARANPUR KHATA NO 266 PLOT: 516 (AREA 8.700 AC), KISSAM: NADI, Longitude 86°42'20.2" TO 86°42'35.5", Latitude 21°34'10.5" TO 21°35'14.1" | 8.70Ac/3.520Ha | PA/WC-12.61/BR-1.19 | 12.61 | | | sand | Existing |
| C8 | SUNAI | Ajodhya Sand bed, MOUZA: AJODHYA KHATA NO 814 PLOT:1412 (AREA 12.35 AC), KISSAM: NADI, Longitude 86°45'32.36" TO 86°45'39.90", Latitude 21°34'05.20" TO 21°34'20.22" | 12.35 acre./5.00Ha | PA/WC-11.36/BR-2.66 | 11.36 | | | sand | Existing |
| D1 | Subarnarekha | Sikharpur Sand Source Mouza-Sikharpur, Khata No- 496 Plot No- 1910, 1900 Kissam- Nadi, Latitude 21°47' 44.4" N to 21° 47' 58.2"N, Longitude 87° 12' 20"E to 87° 12' 38.9"E | 11.99Ac/ 4.856 Ha | PA/WC-61.23/BR-0.89 | 61.23 | YES | | sand | Existing |
| D2 | Subarnarekha | Rajnagar Sand Bed, Mouza-Rajnagar, Khata No- 377 Plot No- 1295/1300 Latitude-21°48' 20.9" N to 21°48' 30.9"N Longitude-87°12' 43.2" E to 87°12' 52.2"E | 13.55 acre./5.48 Ha | PA/WC-62.13/BR-1.86 | 62.13 | YES | 2175 | sand | Existing |
| D3 | Subarnarekha | Gobardhanpur Sand Sairat Source Mouza-Gobardhanpur, Khata No- 358 Plot No-1094, Area Ac. 12.00 dec out of Ac. 88.25 dec, Latitude- 21°43'2.2" N to 21° 43'14.6" N, Longitude- 87°12'6.5" E to 87°12'17.5"E | 12.00 acre/ 4.85Ha | PA/WC-55.81/BR-9.04 | 55.81 | | | sand | Existing |

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|-----|--------------|--|----------------------|----------------------|-------|-----|--|------|----------|
| D4 | Subarnarekha | Sekhsarai Ka Sand Source Mouza-Sekhsarai, Khata No-142 Plot No-02 Kissam Nadi, Latitute 21° 45' 26.1" N to 21° 45' 29.5"N, Longitude 87° 10' 17.8"E to 87° 10' 20.9"E | 14.00 acre/ 5.66Ha | PA/WC-56.80/BR-1.46 | 56.8 | YES | | sand | Existing |
| D5 | Subarnarekha | Chalanti Sand Source Mouza-Chalanti, Latitute 21° 46' 53" N to 21° 47' 2.8"N, Longitude 87° 09' 58"E to 87° 10' 10.2"E Khata No-384 Plot No-738 kissam Nadi | 14.00 acre/ 5.66Ha | PA/WC-55.75/BR-1.11 | 55.75 | | | sand | Existing |
| D6 | Subarnarekha | Balikbad Sand Source , Mouza-Balikbadk, Khata No- 399 Plot No- 49 Kissam Nadi, Latitute 21° 42' 39" N to 21° 42' 49"N, Longitude 87° 13' 26.2"E to 87° 13' 40"E | 14.85 acre/ 6.009Ha | PA/WC-57.71/BR-11.83 | 57.71 | | | sand | Existing |
| D7 | Subarnarekha | BALIAPAL SAND SOURCE , Mouza-Baliapal, Khata No- 578 Plot No- 2949, Area Ac. 03.00 dec out of Ac. 33.28 dec , | 12.00 acre/ 4.856 Ha | PA/WC-57.48/BR-12.98 | 57.48 | | | sand | Existing |
| D8 | Subarnarekha | Sekhsarai Kha Sand Source Mouza-Sekhsarai, Khata No- 142 Plot No- 2Kissam Nadi, Latitute 21° 46' 38.9" N to 21° 46' 56.3"N, Longitude 87° 09' 45"E to 87° 09' 58.3"E | 15.00 acre/ 6.07 Ha | PA/WC-57.33/BR-1.98 | 57.33 | YES | | sand | Existing |
| D9 | Subarnarekha | River Block Kha Sand Source Mouza-River Block, Khata No- 175 Plot No- 1 Kissam - Nadi, Latitute 21° 48' 51.5" N to 21° 49' 1.9"N, Longitude 87° 12' 56.5"E to 87° 13' 6.1"E | 13.00 acre/ 5.26 Ha | PA/WC-63.26/BR-2.82 | 63.26 | YES | | sand | Existing |
| D10 | Subarnarekha | Praharajpur Ka Sand Source, Latitute 21° 52' 17.5" N to 21° 52' 33.2"N, Longitude 87° 15' 9.7"E to 87° 15' 15.2"E Mouza-Praharajpur, Khata No- 466 Plot No- 1923 Kissam Nadi | 13.00 acre/ 5.26 Ha | PA/WC-70.79/BR-5.83 | 70.79 | YES | | sand | Existing |
| D11 | Subarnarekha | Mankidia Sand Source "Ga" Mouza-Mankidia, Khata No- 618 Plot No- 1677 Lat- 21° 55' 44.92255 to 21° 55' 59.74183, Long- 87° 14' 35.04486 to 87° 14' 49.84273 | 35 acre/ 14.16Ha | PA/WC-74.91/BR-14.20 | 74.91 | YES | | sand | Existing |
| D12 | Subarnarekha | Chandibasti Sand Source Mouza-Chormara, Khata No- 692 Plot No- 182, Area Ac. 10.00 dec out of Ac. 47.50 dec Latitude- 21° 42' 53.5"N to 21° 42' 59.9"N, Longitude 87° 12' 25.8"E to 87° 12' 40.4"E | 10.00 acre/ 4.05 Ha | PA/WC-56.33/BR-10.09 | 56.33 | | | sand | Existing |
| D13 | Subarnarekha | Mankidia Sand Source "Kha" Mouza-Mankidia, Khata No- 618 Plot No- 1677 | 40 acre/ 16.187Ha | PA/WC-74.84/BR-14.79 | 74.84 | YES | | sand | Existing |

| | | | | | | | | | |
|-----|--------------|--|-----------------------|----------------------|-------|-----|--|------|----------|
| D14 | Subarnarekha | Makrampur Sand Source , Mouza-Makrampur, Khata No- 01 Plot No- 06 Kissam Nadi, Latitute 21°51' 22.21" N to 21° 51' 32.12"N, Longitude 87° 14' 31.16"E to 87° 14' 43.90"E | 15.00 acre/ 6.07 Ha | PA/WC-68.62/BR-3.97 | 68.62 | | | sand | Existing |
| D15 | Subarnarekha | Gobarghata Sand Source Mouza-Gobarghata, Khata No- 1414 Plot No- 3236 Kissam Nadi, Latitute 21°51' 10.5" N to 21° 51' 23.8"N, Longitude 87° 14' 17.7"E to 87° 14' 29.5"E | 17.50 acre/ 7.08Ha | PA/WC-67.75/BR-3.04 | 67.75 | | | sand | Existing |
| D16 | Subarnarekha | Praharajpur Kha Sand Source, Mouza-Praharajpur, Khata No- 466, Plot No- 1923, LAT- 21.876, LONG- 87.251 | 15 acre/ 6.07Ha | PA/WC-71.14/BR-6.30 | 71.14 | YES | | sand | Existing |
| D17 | Subarnarekha | Mankidia Sand Source "Ka", Mouza-Mankidia, Khata No-818 Plot No- 01, Longitude 87° 14' 13.8"E to 87° 14' 28.4"E 21° 56' 21" N to 21° 56' 32.2"N, | 20.00 acre/ 8.09 Ha | PA/WC-74.97/BR-13.59 | 74.97 | YES | | sand | Existing |
| D18 | Subarnarekha | River Block Ka sand source Mouza-River Block, Khata No- 175 Plot No- 01, Kissam Nadi, Latitute 21°48'32.9" N to 21° 48' 41.8"N, Longitude 87° 13' 3.8"E to 87° 13' 14.8"E | 14.00 acre / 5.665 Ha | PA/WC-63.09/BR-3.27 | 63.09 | YES | | sand | Existing |
| D19 | Subarnarekha | Bilaspur Sand Source Mouza-Bilaspur, Khata No- 53 , Plot No- 120 | 80.20 acre/ 32.456 Ha | PA/WC-75.82/BR-11.27 | 75.82 | | | sand | Existing |
| D20 | SUBARNAREKHA | Malipal SAND BED, Mouza-Malipal, Khata- 501, Plot- 2277, Area- 5Ha Out Of 38.82 Ha, LAT-21.854, LONG-87.220 | 12.355acre/ 5.0 Ha | PA/WC-30.61/BR-1.6 | 30.61 | | | sand | PROPOSED |
| D21 | SUBARNAREKHA | EKTALI SAND BED, Mouza-Ektali, Khata- 463, Plot- 1922, Area- 5Ha Out Of 41.67 Ha, LAT- 21.752648, LONG-84.197339 | 12.355acre/ 5.0 Ha | PA/WC-30.98/BR-3.64 | 30.98 | | | sand | PROPOSED |
| E1 | Subarnarekha | Palbegunia Sand Source, MOUZA: PALABEGUNIA KHATA NO 470, PLOT: 270,377,378,786,793,799 (AREA 8.88 AC), KISSAM: NADI, Longitude 87°14'22.62"E, TO 87°14'.33.34"E, Latitude 21°41'13.87"N TO 21°41'41.91"N | 8.88 acre/ 3.59 Ha | PA/WC-58.49/BR-4 | 58.49 | | | sand | Existing |
| E2 | Subarnarekha | Badhupal Sand Source, MOUZA: BEDHAPAL KHATA NO 717,718, PLOT: 973,973/2548,989,955,956,969,990,1193,1194,1198,1199,1200,1201,1205,1498 (AREA 8.36 | 8.36acre/ 3.38Ha | PA/WC-63.06/BR-1 | 63.06 | | | sand | Existing |

| | | | | | | | | | |
|----|------------------|--|--------------------------|------------------------|-------|--|--|------|----------|
| | | AC), KISSAM: NADI, Longitude 87°17'50.5"E, TO 87°18'.02.2"E, Latitude 21°41'13.7"N TO 21°41'25.5"N | | | | | | | |
| F1 | Budhabalan
ga | Kasaba Dahapada Sand Source, MOUZA: KASABA-DAHAPADA KHATA NO 653,143, PLOT: 209,210,1429,1483,124,837 (AREA 101.35 AC), KISSAM: NADI, Longitude 86°55'23.1"E, TO 86°56'26.2"E, Latitude 21°31'55.9"N TO 21°32'48.2"N | 101.35 acre/
41.015Ha | PA/WC-
22.37/BR-1.1 | 22.37 | | | sand | Existing |

Patta Lands/Khatedari Land: (existing & proposed)

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

De-Siltation Location: (Lakes/Ponds/Dams etc.) (Existing & proposed)

| Name of Reservoir/Dams | Maintain /Controlled by State Govt./PSU etc. | Location | District | Tehsil | Village | Size (Ha) | Quantity MT/Year | Existing /Proposed |
|------------------------|--|----------|----------|--------|---------|------------|------------------|--------------------|
| NA | NA | NA | NA | NA | NA | NA | NA | NA |

M-Sand Plants:(existing & proposed)

| Plant Name | Owner | District | Tehsil | Village | Geo- location | Quantity Tonnes/Annum | Existing/Proposed |
|------------|-------|----------|--------|---------|---------------|-----------------------|-------------------|
| NA | NA | NA | NA | NA | NA | NA | NA |

Final Cluster & Contiguous Cluster details

Clusters:

| River Name | Cluster No. | Lease No | Location (Riverbed / Patta Land) | Village | Area (in Ha) | Total Excavation (Cum) | Total Mineral Excavation (Cum) |
|--------------|-------------|----------|---|-------------------------|--------------|------------------------|--------------------------------|
| Subarnarekha | 1 | A1 | Ambakuruchi Sand Source, MOUZA AMBAKURUCHI KHATA NO :304, PLOT: 1450, (AREA 7.400 AC),KISSAM :NADI, Longitude 87°12'05.4" TO 87°12'16.5",Latitude 21°43'54.7" TO 21°43'46.6" | MOUZA- AMBAKURUCHI | 2.69Ha | 18499 | 14029 |
| | | A2 | Devog Sand Source, MOUZA DEVOG KHATA NO :392, PLOT: 1178, (AREA 12.350 AC),KISSAM :NADI,Longitude 87°12'30.00" TO 87°12'42.8",Latitude 21°44'05.1" TO 21°44'16.3" | MOUZA-DEVOG | 4.5 Ha | 124188 | 99657 |
| Subarnarekha | 2 | A6 | Benapura-II Sand Quarry, MOUZA BENAPUR, KHATA NO:152, PLOT: 285, (AREA 14.52 AC), KISSAM: NADI, | MOUZA -BENAPUR | 5.876Ha | 58760 | 35256 |
| | | D5 | Chalanti Sand Source Mouza-Chalanti, Latitute 21°46' 53" N to 21° 47' 2.8"N, Longitude 87° 09' 58"E to 87° 10' 10.2"E° Khata No-384 Plot No-738 kissam Nadi | MOUZA-CHALANTI | 5.66Ha | 18130 | 15000 |
| Budhabalanga | 3 | B2 | SAHUPADA & DUMUDA SAND SOURCE , MOUZA SAHUPADA & DUMUDA, KHATA NO:223,281, PLOT: 237,238,239,240,15, (AREA 12.35 acers KISSAM:NADI, Longitude-86°54'51.6" TO 86°55'13.2", Latitute -21°33'51.6" TO 21°33'56.2" | MOUZA SAHUPADA & DUMUDA | 5.00Ha | 51821 | 44177 |
| | | B10 | Kathasangada-I Sand Quarry, Mouza- Kathasangada, Khata No. 286, Plot No. 123 Area Ac 0.30 dec, Plot No. 145, Area Ac. 1.52 dec & Mz. Haladia, Khata No. 458, Plot No. 1456 area Ac 6.00 dec, Plot No. 1952 area Ac 7.93 Latitute 21°33' 18.4" N to 21° 33' 34.3"N, Longitude 86°54' 42.4"E to 86° 54' 49.7"E° | MOUZA-. KATHASANGADA | 5.26 Ha | 27875 | 24074 |

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|--------------|---|-----|--|-------------------|----------|--------|-------|
| Subarnarekha | 4 | D1 | Sikharpur Sand Source Mouza-Sikharpur, Khata No- 496
Plot No- 1910, 1900 Kissam- Nadi, Latitute 21°47' 44.4" N to 21° 47' 58.2"N, Longitude 87° 12' 20"E to 87° 12' 38.9"E | MOUZA-SIKHARPUR | 4.856 Ha | 46040 | 35666 |
| | | D2 | Rajnagar Sand Bed, Mouza-Rajnagar, Khata No- 377 Plot No- 1295/1300
Latitude- 21°48' 20.9" N to 21°48' 30.9"N
Longitude-87°12' 43.2" E to 87°12' 52.2"E | MOUZA-RAJNAGAR | 5.48 Ha | 27122 | 19353 |
| Subarnarekha | 5 | D4 | Sekhsarai Ka Sand Source Mouza-Sekhsarai, Khata No-142
Plot No-02 Kissam Nadi, Latitute 21°45' 26.1" N to 21° 45' 29.5"N, Longitude 87° 10' 17.8"E to 87° 10' 20.9"E | MOUZA-SEKHSARAI | 5.66Ha | 42487 | 37874 |
| | | D8 | Sekhsarai Kha Sand Source Mouza-Sekhsarai, Khata No- 142
Plot No- 2 Kissam Nadi, Latitute 21°46' 38.9" N to 21° 46' 56.3"N, Longitude 87° 09' 45"E to 87° 09' 58.3"E | MOUZA-SEKHSARAI | 6.07 Ha | 60703 | 36422 |
| Subarnarekha | 6 | D9 | River Block Kha Sand Source Mouza-River Block, Khata No- 175
Plot No- 1 Kissam -Nadi, Latitute 21°48' 51.5" N to 21° 49' 1.9"N, Longitude 87° 12' 56.5"E to 87° 13' 6.1"E | MOUZA-RIVER BLOCK | 5.26 Ha | 23763 | 20000 |
| | | D18 | River Block Ka sand source Mouza-River Block, Khata No- 175
Plot No- 01, Kissam Nadi, Latitute 21°48'32.9" N to 21° 48' 41.8"N, Longitude 87° 13' 3.8"E to 87° 13' 14.8"E | MOUZA-RIVER BLOCK | 5.665 Ha | 23525 | 20000 |
| Subarnarekha | 7 | D10 | Praharajpur Ka Sand Source, Latitute 21°52' 17.5" N to 21° 52' 33.2"N, Longitude 87° 15' 9.7"E to 87° 15' 15.2"E Mouza-Praharajpur, Khata No- 466
Plot No- 1923 Kissam Nadi | MOUZA-PRAHARAJPUR | 5.26 Ha | 55440 | 48740 |
| | | D16 | Praharajpur Kha Sand Source, Mouza-Praharajpur, Khata No- 466,
Plot No- 1923 | MOUZA-PRAHARAJPUR | 6.07Ha | 60703 | 36422 |
| Subarnarekha | 8 | D11 | Mankidia Sand Source "Ga" Mouza-Mankidia, Khata No- 618
Plot No- 1677 | MOUZA-MANKIDIA | 14.16Ha | 141640 | 84984 |

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|--|--|-----|---|----------------|----------|----------|----------|
| | | D13 | Mankidia Sand Source "Kha" Mouza-Mankidia, Khata No- 618
Plot No- 1677 | MOUZA-MANKIDIA | 16.187Ha | 161874 | 97124 |
| | | D17 | Mankidia Sand Source "Ka", Mouza-Mankidia, Khata No-818 Plot No-01, Longitude 87° 14' 13.8"E to 87° 14' 28.4"E 21° 56' 21" N to 21° 56' 32.2"N, | MOUZA-MANKIDIA | 8.09 Ha | 2,02,325 | 1,78,528 |

Contiguous Clusters:

| River Name | Contiguous Cluster No. | Cluster No | Number of leases in the cluster | Location (Riverbed/ Patta Land) | Distance between clusters | Village | Area of Cluster (Ha) | Total Mineral Excavation. (Ton) |
|------------|------------------------|------------|---------------------------------|---------------------------------|---------------------------|---------|----------------------|---------------------------------|
| NA | NA | NA | NA | NA | NA | NA | NA | NA |

Final Transportation Routes for individual leases and leases in Cluster

| Lease No. | Transportation Route No. | Number of tippers/day of lease | Number of tippers/day of all the lease on route | Length of route in KM | Type of road(Black Topped/unpaved) | Recommendation for road (Black Topped/unpaved) | The road will be Constructed by Govt/Lease Owner | Route Map & Location | |
|-----------|---|--------------------------------|---|-----------------------|------------------------------------|--|--|----------------------|--------------------------------|
| A1 | Ambakuruchi Sand Source, MOUZA AMBAKURUCHI KHATA NO :304, PLOT: 1450, (AREA 7.400 AC),KISSAM :NADI, Longitude 87°12'05.4" TO 87°12'16.5",Latitude 21°43'54.7" TO 21°43'46.6" | NH-16 | 1 | 4 | 10.2 | Black Topped | Black Topped | Govt | MOUZA AMBAKURUCHI, NH-16 |
| A2 | Devog Sand Source, MOUZA DEVOG KHATA NO :392, PLOT: 1178, (AREA 12.350 AC),KISSAM :NADI,Longitude 87°12'30.00" TO 87°12'42.8",Latitude 21°44'05.1" TO 21°44'16.3" | NH-16 | 2 | | 8.9 | Black Topped | Black Topped | Govt | MOUZA DEVOG, NH-16 |
| A3 | Dhitpura Sand Source, MOUZA DHITPURA, KHATA NO :97, PLOT: 214, (AREA 12.350 AC),KISSAM :NADI, Longitude 87°11'01.5" TO 87°11'14.3",Latitude 21°45'05.1" TO 21°45'9.7" | NH-16 | 1 | | 0.71 | Black Topped | Black Topped | Govt | MOUZA DHITPURA, NH-16 |
| A4 | Kadarayan Sand Source, MOUZA KADRAYAN, KHATA NO :257, PLOT: 1, (AREA 12.350 AC),KISSAM :NADI,Longitude87°12'29.76" TO87°12'43.22",Latitude 21°44'52.57" TO 21°45'02.43" | NH-16 | | | 7.3 | Black Topped | Black Topped | Govt | MOUZA KADRAYAN, NH-16 |
| A5 | Mathani Punsita Sand Source, MOUZA MATHANI & PUNSITA, KHATA NO :143,227, PLOT: 37,25, (AREA 3.08 AC),KISSAM :NADI,Longitude87°03'53.2" TO 87°04'01.9",Latitude 21°40'08.2" TO 21°40'25.8" | NH-16 | | | | Black Topped | Black Topped | Govt | MOUZA MATHANI & PUNSITA, NH-16 |
| A6 | Benapura-II Sand Quarry, MOUZA BENAPUR, KHATA NO:152, PLOT: 285, (AREA 14.52 AC), KISSAM: NADI, | NH-16 | | | 2.8 | Black Topped | Black Topped | Govt | MOUZA BENAPUR, NH-16 |
| A7 | Benapura-I Sand Source,MOUZA-BENAPUR, KHATA-150, PLOT-142, KISSAM-NAYANJARI, LAT-21.772, LONG- 87.163 | NH-16 | | | 3.2 | Black Topped | Black Topped | Govt | MOUZA BENAPUR, NH-16 |
| A8 | GOPINATHPUR SAND SOURCE, Mouza-Gopinathpur, Khata- 153, Plot- 340, Area- 5Ha Out Of 22.743Ha | NH- 16 | | | | Black Topped | Black Topped | Govt | Mouza-Gopinathpur |
| B1 | Purukhi Sand Quarry, Mouza. Purukhi, Khata No. 420, Plot No. 1340 Area Ac 12.30 dec | SH-NH16 | 1 | 1 | 15.15 | Black Topped | Black Topped | Govt | Mouza. Purukhi,NH-16 |

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|----|--|----------|---|---|------|--------------|--------------|------|-----------------------------|
| | Latitude 21°34' 15.1" N to 21° 34' 20.5"N, Longitude 86° 47' 37.9"E to 86° 48' 2.0"E | | | | | | | | |
| B2 | Sahupada & Dumuda Sand Quarry, MOUZA SAHUPADA & DUMUDA, KHATA NO:223,281, PLOT: 237,238,239,240,15, (AREA 12.35 acers KISSAM:NADI, Longitude-86°54'51.6" TO 86°55'13.2", Latitude - 21°33'51.6" TO 21°33'56.2" | NH-18 | | | 3.2 | Black Topped | Black Topped | Govt | Mouza-Sahupada, NH-18 |
| B3 | Ambulakuda Sand Source, Mouza- Ambulakuda Khata No. 133, Plot No. 531 Area Ac 12.30 dec Latitude 21°35' 4.1" N to 21° 35' 18.5"N, Longitude 86° 54' 11.2"E to 86° 54' 16.8"E | NH-18 | 1 | 1 | 5.2 | Black Topped | Black Topped | Govt | Mouza- Ambulakuda, NH-18 |
| B4 | Hatigand Sand Quarry, Mouza-Hatiaganda Khata No-313 Plot No 223, 1121 Kisam Nadi, Mukundapur Khata No-197 PlotNo-3 Kisam Nadi,Patripal Khata No-69 Plot No-1 Kisam Nadi Latitude 21°32' 57.4" N to 21° 33' 2.7"N, Longitude 86° 51' 38.9"E to 86° 51' 58.8"E | NH-16 | | | 10.2 | Black Topped | Black Topped | Govt | Mouza- Hatiaganda, NH-16 |
| B5 | Udambar Sand Quarry, Mouza. Udambar Khata No. 211, Plot No. 1 Area Ac 8.20 dec Latitude 21°33' 17.1" N to 21° 33' 22.6"N, Longitude 86° 53' 35.5"E to 86° 53' 57.1"E | NH-16 | | | 3.68 | Black Topped | Black Topped | Govt | Mouza. Udambar, NH-16 |
| B6 | Makanda Sand Quarry, Mouza- Makanda Khata No. 337, Plot No. 691 Area Ac 8.40 dec & Plot No. 692 Area Latitude 21°34' 47.5" N to 21° 34'54.9"N, Longitude 86°54' 32.8"E to 86° 54' 57.9"E | NH-18 | | | 4.1 | Black Topped | Black Topped | Govt | Mouza- Makanda, NH-18 |
| B7 | Gambharia Sand Quarry, Mouza-Gambharia Khata No-430 Plot No-574, 722 Kisam Nadi, Rudragopalpur Samil Naharpatna Khata No 236 Plot No-1 &510 Kisam Nadi Latitude 21°32' 14.0" N to 21° 33' 01"N, Longitude 86° 54' 55"E to 86° 55' 16"E | NH-16 | | | 1.2 | Black Topped | Black Topped | Govt | Mouza- Gambharia, NH-16 |
| B8 | Boitabanka Sand Quarry, Mouza-. Ghungi Khata No. 261, Plot No. 338 Area Ac 5.00 dec , Plot No. 440 Area Latitude 21°33' 31.9" N to 21° 33' 48.8"N, Longitude 86°49' 21.0"E to 86° 49' 43.7"E | SN-NH 16 | | | 12.5 | Black Topped | Black Topped | Govt | Mouza-. Ghungi , NH-16 |
| B9 | Kathasangada-II Sand Quarry , Mouza-. Kathasangada, Khata No. 286, Plot No. 106 Area Ac 2.60 dec Latitude 21°33' 29" N to 21° 33' 43.8"N, Longitude 86° 54' 35.8"E to 86°54' 42.3"E | NH-16 | | | 1.97 | Black Topped | Black Topped | Govt | Mouza-. Kathasangada, NH-16 |

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|-----|--|----------|---|---|-------|--------------|--------------|------|----------------------------------|
| B10 | Kathasangada-I Sand Quarry, Mouza-Kathasangada, Khata No. 286, Plot No. 123 Area Ac 0.30 dec, Plot No. 145, Area Ac. 1.52 dec & Mz. Haladia, Khata No. 458, Plot No. 1456 area Ac 6.00 dec, Plot No. 1952 Latitude 21°33' 18.4" N to 21° 33' 34.3"N, Longitude 86°54' 42.4"E to 86° 54' 49.7"E | NH-16 | | | 1.53 | Black Topped | Black Topped | Govt | Mouza-Kathasangada, NH-16 |
| C1 | Pundal-1 Sand bed , MOUZA: PUNDAL, KHATA NO 556, PLOT:1347/1 (AREA 12.350 acre), KISSAM: NADI, Longitude-86°46'24.40" TO 86°46'35.00", Latitude - 21°34'40.70"TO21°34'48.70" | SH-NH 16 | 1 | 4 | 19.7 | Black Topped | Black Topped | Govt | MOUZA: PUNDAL, NH-16 |
| C2 | Pundal-2 Sand bed, MOUZA: PUNDAL, KHATA NO 556, PLOT:1347(AREA 3.40 acre), KISSAM: NADI, Longitude - 86°46'47.5" TO 86°46'52.3", Latitude 21°34'35.6" TO 21°34'41.6" | SH-NH16 | 1 | | 18.38 | Black Topped | Black Topped | Govt | MOUZA: PUNDAL,NH-16 |
| C3 | Dumagandira Sand bed, MOUZA: DUMAGANDIRA,LAICHHANPUR KHATA NO 157,155 PLOT:385,36 (AREA 12.350 acre), KISSAM: NADI, Longitude -86°48'50.80" TO 86°49'04.50", Latitude 21°34'21.40" TO 21°34'27.50" | SH-NH16 | 1 | | 19.8 | Black Topped | Black Topped | Govt | MOUZA: DUMAGANDIRA,NH-16 |
| C4 | Bainchanaranpur-1 Sand bed, MOUZA: BAINCHANARANPUR KHATA NO 266 PLOT:383 ,384(AREA12.35acre), KISSAM: NADI, Longitude 86°42'51.90" TO 86°43'01.50", Latitude 21°34'57.10" TO 21°35'11.50" | SH-NH16 | 1 | | 22.87 | Black Topped | Black Topped | Govt | MOUZA: BAINCHANARANPUR, NH-16 |
| C5 | Balipal Sand bed, MOUZA: BALIPAL KHATA NO 156,156 PLOT:7,495(AREA 12.350 acre AC), KISSAM: NADI, Longitude 86°44'34.00" TO 86°44'34.20", Latitude 21°34'30.60"TO 21°34'32.00" | SH-NH16 | | | 21.68 | Black Topped | Black Topped | Govt | MOUZA: BALIPAL, NH-16 |
| C6 | Pratappur Sand bed, MOUZA: AJODHYA(PRATAPPUR) KHATA NO 814, PLOT:388(AREA 12.25 AC), KISSAM: NADI, Longitude -86°44'53.4" TO 86°45'12.9", Latitude 21°34'19.9" TO 21°35'27.8" | SH-NH16 | 1 | 1 | 18.81 | Black Topped | Black Topped | Govt | MOUZA: AJODHYA(PRATAPPUR), NH-16 |
| C7 | Bainchanaranpur-3 Sand bed, MOUZA: BAINCHANARANPUR KHATA NO 266 PLOT: 516 (AREA 8.700 AC), KISSAM: NADI, Longitude 86°42'20.2" TO 86°42'35.5", Latitude 21°34'10.5" TO 21°35'14.1" | SH-NH16 | | | 22.94 | Black Topped | Black Topped | Govt | MOUZA: BAINCHANARANPUR,NH-16 |
| C8 | Ajodhya Sand bed, MOUZA: AJODHYA KHATA NO 814 PLOT:1412 (AREA 12.35 AC), KISSAM: NADI, Longitude 86°45'32.36" TO 86°45'39.90", Latitude 21°34'05.20" TO 21°34'20.22" | SH-NH-16 | | | 19.26 | Black Topped | Black Topped | Govt | MOUZA: AJODHYA,NH-16 |

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|-----|---|-------|---|---|------|--------------|--------------|------|---------------------------|
| D1 | Sikharpur Sand Source Mouza-Sikharpur, Khata No-496 Plot No- 1910, 1900 Kissam- Nadi, Latitute 21°47' 44.4" N to 21° 47' 58.2"N, Longitude 87° 12' 20"E to 87° 12' 38.9"E | NH-16 | | | 3.2 | Black Topped | Black Topped | Govt | Mouza-Sikharpur,NH-16 |
| D2 | Rajnagar Sand Bed, Mouza-Rajnagar, Khata No- 377 Plot No- 1295/1300 Latitude- 21°48' 20.9" N to 21°48' 30.9"N Longotude-87°12' 43.2" E to 87°12' 52.2"E | NH-16 | 1 | 1 | 3.9 | Black Topped | Black Topped | Govt | Mouza-Rajnagar,NH-16 |
| D3 | Gobardhanpur Sand Sairat Source Mouza-Gobardhanpur, Khata No- 358 Plot No- 1094, Area Ac. 12.00 dec out of Ac. 88.25 dec, Latitude- 21°43'2.2" N to 21° 43'14.6" N, Longitude- 87°12'6.5" E to 87°12'17.5"E | NH-16 | | | 8.8 | Black Topped | Black Topped | Govt | Mouza-Gobardhanpur, NH-16 |
| D4 | Sekhsarai Ka Sand Source Mouza-Sekhsarai, Khata No-142 Plot No-02 Kissam Nadi, Latitute 21°45' 26.1" N to 21° 45' 29.5"N, Longitude 87° 10' 17.8"E to 87° 10' 20.9"E | NH-16 | | | 4.9 | Black Topped | Black Topped | Govt | Mouza-Sekhsarai, NH-16 |
| D5 | Chalanti Sand Source Mouza-Chalanti, Latitute 21°46' 53" N to 21° 47' 2.8"N, Longitude 87° 09' 58"E to 87° 10' 10.2"E Khata No-384 Plot No-738 kissam Nadi | NH-16 | | | 1.3 | Black Topped | Black Topped | Govt | Mouza-Chalanti, NH-16 |
| D6 | Balikbad Sand Source , Mouza-Balikbadk, Khata No- 399 Plot No- 49 Kissam Nadi, Latitute 21°42' 39" N to 21° 42' 49"N, Longitude 87° 13' 26.2"E to 87° 13' 40"E | NH-16 | | | 9.9 | Black Topped | Black Topped | Govt | Mouza-Balikbadk, NH-16 |
| D7 | BALIAPAL SAND SOURCE , Mouza-Baliapal, Khata No-578 Plot No- 2949, Area Ac. 03.00 dec out of Ac. 33.28 dec , | NH-16 | | | 15.3 | Black Topped | Black Topped | Govt | Mouza-Baliapal, NH-16 |
| D8 | Sekhsarai Kha Sand Source ,Mouza-Sekhsarai, Khata No- 142 , Plot No- 2 Kissam Nadi, Latitute 21°46' 38.9" N to 21° 46' 56.3"N, Longitude 87° 09' 45"E to 87° 09' 58.3"E | NH-16 | | | 5.2 | Black Topped | Black Topped | Govt | Mouza-Sekhsarai, NH-16 |
| D9 | River Block Kha Sand Source Mouza-River Block, Khata No- 175 Plot No- 1 Kissam -Nadi, Latitute 21°48' 51.5" N to 21° 49' 1.9"N, Longitude 87° 12' 56.5"E to 87° 13' 6.1"E | NH-16 | | | 5.7 | Black Topped | Black Topped | Govt | Mouza-River Block, NH-16 |
| D10 | Praharajpur Ka Sand Source, Latitute 21°52' 17.5" N to 21° 52' 33.2"N, Longitude 87° 15' 9.7"E to 87° 15' 15.2"E Mouza-Praharajpur, Khata No- 466 Plot No-1923 Kissam Nadi | NH-16 | | | 1.5 | Black Topped | Black Topped | Govt | Mouza-Praharajpur, NH-16 |

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| D1
1 | Mankidia Sand Source "Ga" Mouza-Mankidia, Khata No- 618 Plot No- 1677 | NH-16 | | | 8.7 | Black Topped | Black Topped | Govt | Mouza-Mankidia, NH-16 |
| D1
2 | Chandibasti Sand Source, Mouza-Chormara, Khata No- 692 ,Plot No- 182, Area Ac. 10.00 dec out of Ac. 47.50 dec Latitude- 21°42'53.5"N to 21°42'59.9"N, Longitude 87°12'25.8"E to 87°12'40.4"E | NH-16 | | | 11.2 | Black Topped | Black Topped | Govt | Mouza-Chormara, NH-16 |
| D1
3 | Mankidia Sand Source "Kha" Mouza-Mankidia, Khata No- 618 Plot No- 1677 | NH-16 | | | 9.1 | Black Topped | Black Topped | Govt | Mouza-Mankidia, NH-16 |
| D1
4 | Makrampur Sand Source , Mouza-Makrampur, Khata No- 01 Plot No- 06 Kissam Nadi, Latitute 21°51' 22.21" N to 21° 51' 32.12"N, Longitude 87° 14' 31.16"E to 87° 14' 43.90"E | NH-16 | | | 2.9 | Black Topped | Black Topped | Govt | Mouza-Makrampur, NH-16 |
| D1
5 | Gobarghata Sand Source Mouza-Gobarghata, Khata No- 1414 Plot No- 3236 Kissam Nadi, Latitute 21°51' 10.5" N to 21° 51' 23.8"N, Longitude 87° 14' 17.7"E to 87° 14' 29.5"E | NH-16 | | | 4.5 | Black Topped | Black Topped | Govt | Mouza-Gobarghata, NH-16 |
| D1
6 | Praharajpur Kha Sand Source, Mouza-Praharajpur, Khata No- 466, Plot No- 1923 | NH-16 | | | 1.5 | Black Topped | Black Topped | Govt | Mouza-Praharajpur, NH-16 |
| D1
7 | Mankidia Sand Source "Ka", Mouza-Mankidia, Khata No-818 Plot No-01, Longitude 87° 14' 13.8"E to 87° 14' 28.4"E 21°56' 21" N to 21° 56' 32.2"N, | NH-16 | | | 8.1 | Black Topped | Black Topped | Govt | Mouza-Mankidia, NH-16 |
| D1
8 | River Block Ka sand source Mouza-River Block, Khata No- 175 Plot No- 01, Kissam Nadi, Latitute 21°48'32.9" N to 21° 48' 41.8"N, Longitude 87° 13' 3.8"E to 87° 13' 14.8"E | NH-16 | | | 5.1 | Black Topped | Black Topped | Govt | Mouza-River Block, NH-16 |
| D1
9 | Bilaspur Sand Source Mouza-Bilaspur, Khata No- 53 , Plot No- 120 | NH-16 | | | 4.2 | Black Topped | Black Topped | Govt | Mouza-Bilaspur |
| D2
0 | MALIPAL SAND BED, Mouza-Malipal, Khata- 501, Plot- 2277, Area- 5Ha Out Of 38.82 Ha | NH-16 | | | 3.69 | Black Topped | Black Topped | Govt | Mouza-Malipal |
| D2
1 | EKTALI SAND BED, GP- Raymchandrapur, Mouza-Ektali, Khata- 463, Plot- 1922, Area- 5Ha Out Of 41.67 Ha | NH-16 | | | 2.56 | Black Topped | Black Topped | Govt | Mouza-Ektali |
| E1 | Palbegunia Sand Source, MOUZA:PALABEGUNIA KHATA NO 470, PLOT: 270,377,378,786,793,799 (AREA 8.88 AC), | NH-16 | | | 16.1 | Black Topped | Black Topped | Govt | MOUZA:PALABEGUNIA, NH-16 |

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|----|---|-------|--|--|------|--------------|--------------|------|-------------------------------|
| | KISSAM: NADI, Longitude 87°14'22.62"E, TO 87°14'.33.34"E, Latitude 21°41'13.87"N TO 21°41'41.91"N | | | | | | | | |
| E2 | Badhapal Sand Source, MOUZA:BEDHAPAL KHATA NO 717,718, PLOT: 973,973/2548,989,955,956,969,990,1193,1194,1198,1199,1200,1201,1205,1498 (AREA 8.36 AC), KISSAM: NADI, Longitude 87°17'50.5"E, TO 87°18'.02.2"E, Latitude 21°41'13.7"N TO 21°41'25.5"N | NH-16 | | | 10.3 | Black Topped | Black Topped | Govt | MOUZA:BEDHAPAL , NH-16 |
| F1 | Kasaba Dahapada Sand Source, MOUZA: KASABA-DAHAPADA KHATA NO 653,143, PLOT: 209,210,1429,1483,124,837 (AREA 101.35 AC), KISSAM: NADI, Longitude 86°55'23.1"E, TO 86°56'26.2"E, Latitude 21°31'55.9"N TO 21°32'48.2"N | NH-16 | | | 1.6 | Black Topped | Black Topped | Govt | MOUZA: KASABA-DAHAPADA, NH-16 |

| Cluster No. | Transportation Route No. | Number of tippers/day of cluster | Number of tippers/ day of all the cluster on route | Length of route in KM | Type of road (Black Topped/unpaved) | Recommendation for road (Black Topped/unpaved) | The road will be Constructed by Govt/Lease Owner | Route Map & Location |
|-------------|--------------------------|----------------------------------|--|-----------------------|-------------------------------------|--|--|-----------------------------|
| 1 | NH-16 | 1 | 2 | 10.2 | Black Topped | Black Topped | Govt | MOUZA AMBAKURUCHI, NH-16 |
| | NH-16 | 2 | | 8.9 | Black Topped | Black Topped | Govt | MOUZA DEVOG, NH-16 |
| 2 | NH-16 | | | 2.8 | Black Topped | Black Topped | Govt | MOUZA BENAPUR, NH-16 |
| | NH-16 | | | 9.9 | Black Topped | Black Topped | Govt | Mouza-Chalanti, NH-16 |
| 3 | NH-16 | | | 3.2 | Black Topped | Black Topped | Govt | Mouza-Sahupada, NH-18 |
| | NH-16 | | | 1.53 | Black Topped | Black Topped | Govt | Mouza-. Kathasangada, NH-16 |
| 4 | NH-16 | | | 3.2 | Black Topped | Black Topped | Govt | Mouza-Sikharpur, NH-16 |

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|---|-------|---|---|-----|--------------|--------------|------|--------------------------|
| | NH-16 | 1 | 1 | 3.9 | Black Topped | Black Topped | Govt | Mouza-Rajnagar,NH-16 |
| 5 | NH-16 | | | 4.9 | Black Topped | Black Topped | Govt | Mouza-Sekhsarai, NH-16 |
| | NH-16 | | | 5.2 | Black Topped | Black Topped | Govt | Mouza-Sekhsarai, NH-16 |
| 6 | NH-16 | | | 5.7 | Black Topped | Black Topped | Govt | Mouza-River Block, NH-16 |
| | NH-16 | | | 5.1 | Black Topped | Black Topped | Govt | Mouza-River Block, NH-16 |
| 7 | NH-16 | | | 1.5 | Black Topped | Black Topped | Govt | Mouza-Praharajpur, NH-16 |
| | NH-16 | | | 1.5 | Black Topped | Black Topped | Govt | Mouza-Praharajpur, NH-16 |
| 8 | NH-16 | | | 8.7 | Black Topped | Black Topped | Govt | Mouza-Mankidia,NH-16 |
| | NH-16 | | | 9.1 | Black Topped | Black Topped | Govt | Mouza-Mankidia, NH-16 |
| | NH-16 | | | 8.1 | Black Topped | Black Topped | Govt | Mouza-Mankidia, NH-16 |

MINING LEASES (SAND) MARKED ON THE DISTRICT SATELLITE-MAP OF BALESWAR

86 326452

86 514018

86 901584

87 189150

87 476716



SCALE:-1:400000

21 918130

21 918130

21 726317

21 726317

21 534504

21 534504

21 342691

21 342691

21 150878

21 150878

86 326452

86 514018

86 901584

87 189150

87 476716

FOR QUARRY DETAILS REFER POINT NO-03

LEGEND

-  EXISTING_SAND_SOURCES
-  NEW_SAND_SOURCES
-  DISTRICT_BOUNDARY

Source: Esri, N



Enforcement & Monitoring Guidelines for Sand Mining



Ministry of Environment, Forest and Climate change

January, 2020

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1.0 INTRODUCTION

The Ministry of Environment Forest & Climate Change formulated the Sustainable Sand Management Guidelines 2016 which focuses on the Management of Sand Mining in the Country. But in the recent past, it has been observed that apart from management and systematic mining practices there is an urgent need to have a guideline for effective enforcement of regulatory provision and their monitoring.

Section 23 C of MMDR, Act 1957 empowered the State Government to make rules for preventing illegal mining, transportation and storage of minerals. But in the recent past, it has been observed that there was large number of illegal mining cases in the Country and in some cases, many of the officers lost their lives while executing their duties for curbing illegal mining incidence. The illegal and uncontrolled illegal mining leads to loss of revenue to the State and degradation of the environment.

India is developing at a faster pace and much technological advancement has already been taken place in the surveillance and remote monitoring in the field of mining. Thus, it is prudent to utilize the technological advancement for the effective monitoring of the mining activities particularly sand mining in the country.

Use of latest remote surveillance and IT services helps in effective monitoring of the sand mining activity in-country and also assist the government in controlling the illegal mining activity in the country. Thus, there is a need for an effective policy for monitoring of sand mining in the Country which can be enforced on the ground. These guidelines focus on the effective monitoring of the sand mining since from the identification of sand mineral sources to its dispatch and end-use by consumers and the general public. Further, the effective monitoring and enforcement require efforts from not only Government agencies but also by consumers and the general public.

It is the responsibility of every citizen of India to protect the environment and effective monitoring can only be possible when all the stakeholders viz. Central Government, State Government, Leaseholders/Mine Owners, Distributors, Dealers, Transporters and Consumers (bulk & retail) will contribute towards sustainable mining, and comply with all the statutory provisions. It is felt necessary to identify the minimum requirements across all geographical region to have a uniform protocol for monitoring and enforcement of regulatory provision prescribed for sustainable sand and gravel mining.

This document will serve as a guideline for collection of critical information for enforcement of the regulatory provision(s) and also highlights the essential infrastructural requirements necessary for effective monitoring for Sustainable Sand Mining.

The document is prepared in consideration of various orders/directions issued by Hon'ble NGT in matters pertaining to illegal sand mining and also based on the reports submitted by expert committees and investigation teams.

Further, this document is supplemental to the existing "Sustainable Sand Mining Management Guideline-2016" (SSMG-2016), and these two guidelines viz. "Enforcement & Monitoring Guidelines for Sand Mining" (EMGSM-2020) and SSMG-2016 shall be read and implemented in sync with each other. In case, any ambiguity or variation between the provision of both these document arises, the provision made in "Enforcement & Monitoring Guidelines for Sand Mining-2020 "shall prevail.

2.0 NEED FOR POLICY GUIDELINES

The Ministry of Environment, Forest & Climate Change (MoEF&CC) published Environmental Impact Assessment Notification 1994 which is only applicable for the Major Minerals more than 5 ha. In order to cover the minor minerals also into the preview of EIA, the MoEF&CC issued EIA Notification 2006 for Major & Minor Mineral more than 5 Ha. The Hon'ble Supreme Court in its Judgment 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. made prior environment clearance mandatory for mining of minor minerals irrespective of the area of mining lease. In order to comply with the judgment of Hon'ble Supreme Court, the Ministry issued S.O.141 (E) dated 15.01.2016. Further, MoEF&CC published Sustainable Sand Mining Management Guidelines 2016 for scientific and sustainable sand mining in the Country. The recommendations for the management of sustainable sand extraction are the key objective of the Guidelines. Special emphasis is given on monitoring of the mined out material, which is key to the success of the environmental management plan. Use of IT and IT-enabled services for effective monitoring of the quantity of mined out material and transportation along with process re-engineering has been made a part of the Guidelines. Guidelines support the fundamental concept, promote environmental protection, limit negative physiological, hydrogeological and social impacts underpinning sustainable economic growth.

The Hon'ble NGT in its order dated 04.09.2018 in O.A. 173/2018 in the matter of Sudarsan Das vs. State of West Bengal & Ors. Inter-alia observed that ***"There can be no two views that an effective institutional monitoring mechanism is required not only at the stage when Environmental Clearance is granted but also at subsequent stages". "The guidelines focus on the preparation of District Survey Report and the Management Plan" ... We are of the view that all the safeguards which are suggested***

in sustainable sand mining guidelines as well as notification dated 15.01.2016 ought to be scrupulously followed.” ...It is a known fact that in spite of the above-suggested guidelines being in existence, on the ground level, illegal mining is still going on. The existing mechanism has not been successful and effective in remedying the situation.” ...” Since there is an utter failure in the current monitoring mechanism followed by the State Boards, SEIAAs and DEIAAs, it is required to be revised for effective monitoring of sand and gravel mining and a dedicated monitoring mechanism be set up.”

The Hon’ble NGT in its order dated 04.09.2018 in O.A. 173/2018 in the matter of Sudarsan Das vs. State of West Bengal & Ors. directed that ***MoEF&CC has issued directions from time to time under Section 3 and 5 of the Environment (Protection) Act, 1986. The MoEF&CC needs to revise its directions keeping in mind the following:***

- *Mining Surveillance System discussed in para 23 above be finalized in consultation with ISRO Hyderabad.*
- *Safeguards suggested in Sustainable Sand Mining Guidelines published by the MoEF&CC in the year 2016.*
- *Suggestions in the High Power Committee Report.*
- *The requirement of demarcation of boundaries being published in respect of different leases in the public domain.*
- *Need to issue SOP laying down mechanism to evaluate loss to the ecology and to recover the cost of restoration of such damage from the legal or illegal miners. Such evaluation must include the cost of mining material as well as the cost of ecological restoration and the net present value of future ecosystem services forgone.*
- *Need to set up a dedicated institutional mechanism for effective monitoring of sand and gravel mining which may also take care of mining done without any Environmental Clearance as well as mining done in violation of Environmental Clearance conditions.*

- *The Mining Department may make a provision for keeping apart at least 25% of the value of mined material for the restoration of the area affected by the mining and also for compensating the inhabitants affected by the mining.*
- *One of the conditions of every lease of mine or minerals would be that there will be independent environmental audit at least once in a year by reputed third party entity and report of such audit be placed in the public domain.*
- *In the course of such an environmental audit, a three-member committee of the local inhabitants will also be associated. Composition of three members committee may preferably include ex-servicemen, a former teacher and former civil servant. The Committee will be nominated by the District Magistrate.*

The Hon'ble NGT in its order dated 05.09.2018 in O.A. 44/2016 in the matter of Mushtakeem Vs. MoEF & CC & Ors. Inter-alia observed the following:

"Para 20. In Original Application No. 481/2016, the allegation is that there is the connivance of the District Administration with the miners and mining is going in violation of conditions of Environmental Clearance. According to the applicant, an effective mechanism is required to be evolved so that illegal mining does not place."

*"Para 22. We proceed to consider the main question proposed for the consideration stated earlier hereinabove as to **how to ensure the protection of the environment by checking illegal mining.**"*

"Para 23. We have dealt with the identical issue relating to the illegal sand mining in the border districts in the State of West Bengal and Odisha in the order dated 04th September 2018 in Sudarsan Das Vs. State of West Bengal & Ors., Original Application No. 173 of 2018. We have directed the MoEF&CC to revise the guidelines on the subject for an effective mechanism for sand mining, relevant portions of which are reproduced below: -..."

The Hon'ble NGT in its order dated 10.09.2018 in O.A. 304/2015 in the matter of Jai Singh & Anr.Vs. Union of India Ors. inter-alia observed the following:

*"Para 6. After disposal of the above matters, a disturbing event widely reported in media which took place on 07th September 2018 has been brought to our notice. **A Deputy Ranger who tried to stop illegal mining was killed by mining mafia at Morena in the State of M.P.***

"Para 7. The above disturbing event may also be kept in mind by the MoEF, while considering the issuance of revised guidelines in light of the judgment dated 05th September 2018 (Supra)."

The Hon'ble NGT in its order dated 05.04.2019 in O.A. 360/2015 in the matter of National Green Tribunal Bar Association & Anr.Vs. Union of India & Ors. inter-alia observed the following:

"The 2016 Guidelines need revision in the light of the report of High Powered Committee in September 2016, failure of Monitoring mechanism followed by State Boards, SEIAs, DEIAs and MSS system developed by Ministry of Mines & IBM with the assistance of BISAG and MAITY and other observations quoted in paras 12 to 15 above.

50. As noted earlier in paras 17, 23, 27, 31 and 35, States of West Bengal, Odisha, Gujarat, Karnataka, Maharashtra, Punjab, Haryana and Uttar

Pradesh are required to follow SSMG, 2016 as may be revised by MoEF&CC and even other States where illegal sand mining is taking place.

The States may review the monitoring mechanism in terms of several directions of the Tribunal and guidelines of MoEF&CC.

The international conservation concern regarding natural wealth is a universal demand. Article 51(a) subsection (G) of the constitution requires every citizen of India to protect and improve the natural environment including forest, lakes, rivers, wildlife and to have compassion for the living creature.

The Hon'ble Supreme Court in the case of M.C. Mehta Vs. Kamal Nath (1997) 1 SCC 388 held that under Article of Indian Constitution incorporates the "Public Trust Doctrine" and as such extents to the protection of all-natural resources which includes the protection of flora and fauna.

The Hon'ble Supreme Court in the case of Vellore Citizens Welfare Forum Vs. Union of India & Ors (1996) held that the precautionary principle is part of the Environmental Law in India. It further stated that onus of proof is on the actor of the developer/industrialize to show that its actions are environmentally benign."

3.0 OBJECTIVE OF GUIDLINES

- Identification and Quantification of Mineral Resource and its optimal utilization.
- To regulate the Sand & Gravel Mining in the Country since its identification to its final end-use by the consumers and the general public.
- Use of IT-enabled services & latest technologies for surveillance of the sand mining at each step.
- Reduction in demand & supply gaps.
- Setting up the procedure for replenishment study of Sand.
- Post Environmental Clearance Monitoring.
- Procedure for Environmental Audit.
- To control the instance of illegal mining.

4.0 REQUIREMENTS FOR MONITORING & ENFORCEMENT

Sustainable Sand Mining Management Guidelines (SSMMG) 2016 and past experience suggest that the source of sand in India are through

- a) River (riverbed and flood plain),
- b) Lakes and reservoirs,
- c) Agricultural fields,
- d) Coastal / marine sand,
- e) Palaeo-channels and
- f) Manufactured Sand (M-Sand).

The SSMMG-2016 highlights the identification of the sand mining sources, replenishment of the River Bed Material (Sand, Boulder, Gravel, Cobble etc.), preparation of Districts Survey Report, and Standard Environmental Conditions suitable for sand mining projects.

The necessary requirements to comply with the direction of Hon'ble NGT and to facilitate effective monitoring and enforcement of regulatory provision for sand mining in the country are as follows:

- i) Identification of sand mining sources, its quantification and feasibility for mining considering various environmental (proximity of protected area, wetlands, creeks, forest etc.) and other factors such as important structures, places of archaeological importance, habitation, prohibited area etc.
- ii) The mining lease auctioned by State government as per their Minor Mineral Concession Rules are granted of Letter of Intent (LoI), but it has been observed that many of the sites are not suitable w.r.t environmental aspects. In most of the cases, the unplanned grant of mining lease leads to formation of cluster and/or contiguous cluster

of small mining leases which sometimes is difficult to regulate and monitor. In order to address such issues, more emphasis is required on the preparation of District Survey Report and its format for reporting,

- iii) Mining Plan is an important document to assist the mine owner to operate the mine in a scientific manner. States have their own format for preparation of mining plan and it is observed that recording of the initial level of mining lease at shorter interval say 25m X 25 m grid interval is not present.
- iv) There is no practice for regular replenishment study to ascertain the rate of depositing, plan and section needs to be prepared based on the restrictions provided in letter of intent and provisions of Sustainable Sand Mining Management Guidelines 2016.
- v) Environmental Clearance is a process wherein the regulatory authorities after considering the potential environment impact of mining clearance is granted with a set of specific & standard conditions to carry out mining operations, but often it is observed that letter of intent is granted for a location which has less potential for mining and not feasible for environment-friendly mining. This leads to an unnecessary financial burden on the mine owners and litigations. Thus, LoI should be preferably granted for those locations which have the least possibility of an impact on the environment and nearby habitation.
- vi) It is the responsibility of the mine owner to obtain all the statutory clearance and comply with the conditions stipulated in the clearance letter. Mining should be carried out within the mining lease area as per

approved mining plan or mining plan concurred by other regulatory authorities.

- vii) Mining operation also involves transportation of mineral from the mining area to end-user and its necessary that movement of the mineral needs to be monitored.

The State Government already have power under section 23c of MMDR, Act 1957 to make rules for preventing illegal mining, transportation and storage of minerals. However, there are instances of illegal mining which shows that there is a need for strengthening the system of mineral dispatch and its monitoring. This document provides good practices already under implementation by various states for regulating the mineral sale, dispatch, storage, transportation and use.

- viii) The river reaches with sand provide the resource and thus it is necessary to ascertain the rate of replenishment of the mineral. Regular replenishment study needs to be carried out to keep a balance between deposition and extraction. This document provides the procedure to be followed for conducting replenishment study.
- ix) Even after all the regulatory procedure and policy being in place, there are instances where illegal mining is taking place. There is a need for regular surveillance of the sand mining reaches. The monitoring agencies can monitor the sites remotely by using Unmanned Artificial Vehicles (UAVs)/Drone which is now a viable option. The drone can also be used for reserves estimation, quantity estimation, land use monitoring. This document highlights possible use of IT/Satellite/Drone technology for effective monitoring of sand mining.

4.1 Identification of possible sand mining sources and preparation of District Survey Report (DSR)

4.1.1 Preparation of District Survey Report.

“Sustainable Sand Mining Guidelines, 2016” issued by MoEF&CC requires preparation of District Survey Report (DSR), which is an important initial step before grant of mining lease/Lol. The guidelines emphasize detailed procedure to be followed for the purpose of identification of areas of aggradation/ deposition where mining can be allowed and identification of areas of erosion and proximity to infrastructural structures and installation where mining should be prohibited. Calculation of annual rate of replenishment, allowing time for replenishment after mining, identification of ways of scientific and systematic mining; identifying measures for protection of environment and ecology and determining measures for protection of bank erosion, benchmark (BM) with respect to mean Sea Level (MSL) should be made essential in mining channel reaches (MCR) below which no mining shall be allowed.

The Hon’ble NGT in its Judgment dated 08.12.2017 in the matter of Anjani Kumar vs State of Uttar Pradesh & Ors. inter-alia mentioned the following regarding sand mining in the Uttar Pradesh.

“It states that the main object of preparation of District Survey Report is to ensure identification of areas of aggradation/deposition where mining can be allowed and identification of areas of erosion and proximity to infrastructural structures and installation where mining should be prohibited and calculation of annual rate of replenishment and allowing time for replenishment after mining area. Thus, the environmental protection requires a strictly regulated mining in terms of area, quantity as well as most importantly replenishment thereof.”

"The data collection and declared for preparation of DSR shall take precedence over other data and would form the foundation for providing mining lease in terms of Appendix- x to the Notification dated 15th January 2016 must be prepared by the statutory authority stated therein i.e. DEIAA prior to awarding of permits for carrying on mining activity in any part of the State of UP."

The Hon'ble High Court of Jharkhand at Ranchi in its orders dated the 11th April 2018 and 19th June 2018 in W.P. (PIL) No. 1806 of 2015, in the matter of Court on its Own Motion Versus the State of Jharkhand & Others with W.P. (PIL) No. 290 of 2013, in the matter of Hemant Kumar Shilkarwar Versus the State of Jharkhand & Others, has inter-alia directed the preparation of District Survey Report for minor minerals other than Sand and Bajri or delegation of the powers for preparation of format of District Survey Report of minor minerals other than sand and Bajri to the State Government and/or District Environment Impact Assessment Authority and District Expert Appraisal Committee. To comply with the direction of Hon'ble High Court the Ministry has issued S.O. 3611(E) dated 25.07.2018, wherein, the procedure of preparation of DSR is mentioned. But it is felt that still there is other information that needs to be reported in DSR to make it a comprehensive DSR.

Therefore, preparation of District Survey Report is a very important step and sustainable sand mining in any part of the country will depends on the quality of District Survey Report.

Considering the importance of district survey report, the Ministry of Environment Forest and climate change, after consultation with experts dealing with mining-related matters, formulated the following guidelines for the preparation of comprehensive District Survey Report for sand mining.

- a) District Survey Report for sand mining shall be prepared before the auction/e-auction/grant of the mining lease/Letter of Intent (LoI) by Mining department or department dealing the mining activity in respective states.
- b) The first step is to develop the inventory of the River Bed Material and Other sand sources in the District. In order to make the inventory of River Bed Material, a detailed survey of the district needs to be carried out, to identify the source of River Bed Material and alternative source of sand (M-Sand). The source will include rivers, de-siltation of reservoir/dams, Patta lands/Khatedari Land, M-sand etc.

The revenue department of Kerala already conducted river mapping and sand auditing of around 20 rivers of Kerala which is a good example wherein the profile of rivers was created at regular intervals and aggradation/deposition was identified along with water level. In the same study, benchmarks were also created at a prominent location at regular interval for future surveying. Such study helps the mining departments to identify the source of sand.

Thus, it is proposed that for preparation of district survey report, the auditing of rivers needs to be carried out. There is already a provision under MMDR Act 2015 for National Mineral Exploration Trust (MET) wherein a 2% of royalty amount to be deposited in the trust. This fund is used for mineral exploration in the country. The Sand Auditing is also a sort of identification of mineral and State Government may request Central Govt. for proving funds for river auditing. The Central Govt. (Ministry of Mines) may also explore the possibilities for providing the funds for river auditing. The other option is that State Govt. may conduct such studies by its own fund and the same may be recovered from the leaseholders to whom the mining lease will be allocated.

- c) District Survey Report is to be prepared in such a way that it not only identifies the mineral-bearing area but also define the mining and no mining zones considering various environmental and social factors.
- d) Identification of the source of Sand & M-Sand. The sources may be from Rivers, Lakes, Ponds, Dams, De-silting locations, Patta land/Khtedari lands. The details in case of Rivers such as [name, length of river, type (Perennial or Non-Perennial), Villages, Tehsil, District], in case of Lakes, Ponds, Dams, De-silting locations [Name, owned/maintained by (State Govt./PSU), area, Villages, Tehsil, District] in case of Patta land/Khtedari lands [Owner Name, Sy No, Area, Agricultural/Non-Agricultural, Villages, Tehsil, District], in case of M-Sand Plant [Owner Name, Sy No, Area, Quantity/Annum, Villages, Tehsil, District], needs to be recorded as per format given in **Annexure-I**.
- e) Defining the sources of Sand/M-Sand in the district is the next step for identification of the potential area of deposition/aggradation wherein mining lease could be granted. Detailed survey needs to be carried out for quantification of minerals. The purpose of mining in the river bed is for channelization of rivers so as to avoid the possibility of flooding and to maintain the flow of the rivers. For this, the entire river stretch needs to be surveyed and original ground level (OGL) to be recorded and area of aggradation/deposition needs to be ascertained by comparing the level difference between the outside riverbed OGL and water level. Once the area of aggradation/deposition are identified, then the quantity of River Bed Material available needs to be calculated. The next step is channelization of the river bed and for this central $\frac{3}{4}$ th part of the river, width needs to be identified on a map. Out of the $\frac{3}{4}$ th part area, where there is a deposition/aggradation of the material needs to be identified. The remaining $\frac{1}{4}$ th area needs to be kept as no mining zone for the

protection of banks. The specific gravity of the material also needs to be ascertained by analyzing the sample from a NABL accredited lab. Thus, the quantity of material available in metric ton needs to be calculated for mining and no mining zone.

Note: As physical survey with conventional method is time-consuming, use of unmanned aerial vehicle (UAV) may be explored to carry out the survey and finalizing the original ground level and for developing a 3D model of the area.

- f) The permanent boundary pillars need to be erected after identification of an area of aggradation and deposition outside the bank of the river at a safe location for future surveying. The distance between boundary pillars on each side of the bank shall not be more than 100 meters.
- g) Identifying the mining and no mining zone shall follow with defining the area of sensitivity by ascertaining the distance of the mining area from the protected area, forest, bridges, important structures, habitation etc. and based on the sensitivity the area needs to be defined in sensitive and non-sensitive area.
- h) Demand and supply of the Riverbed Material through market survey needs to be carried out. In addition to this future demand for the next 5 years also needs to be considered.
- i) It is suggested that as far as possible the sensitive areas should be avoided for mining, unless local safety condition arises. Such deviation shall be temporary & shall not be a permanent feature.
- j) The final area selected for the mining should be then divided into mining lease as per the requirement of State Government. It is suggested the mining lease area should be so selected as to cover the entire deposition area. Dividing a large area of deposition/aggradation into smaller

mining leases should be avoided as it leads to loss of mineral and indirectly promote illegal mining.

- k) Cluster situation shall be examined. A cluster is formed when one mining lease of homogenous mineral is within 500 meters of the other mining lease. In order to reduce the cluster formation mining lease size should be defined in such a way that distance between any two clusters preferably should not be less than 2.5 Km. Mining lease should be defined in such a way that the total area of the mining leases in a cluster should not be more than 10 Ha.
- l) The number of a contiguous cluster needs to be ascertained. Contiguous cluster is formed when one cluster is at a distance of 2.5 Km from the other cluster.
- m) The mining outside the riverbed on Patta land/Khatedari land be granted when there is possibility of replenishment of material. In case, there is no replenishment then mining lease shall only be granted when there is no riverbed mining possibility within 5 KM of the Patta land/Khatedari land. For government projects, mining could be allowed on Patta land/Khatedari land but the mining should only be done by the Government agency and material should not be used for sale in the open market. Cluster situation as mentioned in para k above is also applicable for the mining in Patta land/Khatedari land.
- n) The State Government should define the transportation route from the mining lease considering the maximum production from the mines as at this stage the size of mining leases, their location, the quantity of mineral that can be mined safely etc. is available with the State Government. It is suggested that the transportation route should be selected in such a way that the movement of trucks/tippers/tractors from the villages having habitation should be avoided. The transportation route so

selected should be verified by the State Government for its carrying capacity.

- o) Potential site for mining having its impact on the forest, protected area, habitation, bridges etc, shall be avoided. For this, a sub-divisional committee may be formed which after the site visit shall decide its suitability for mining. The list of mining lease after the recommendation of the Committee needs to be defined in the following format given in as **Annexure-II**. The Sub-Divisional Committee after the site visit shall make a recommendation on the site for its suitability of mining and also records the reason for selecting the mining lease in the Patta land. The details regarding cluster and contiguous cluster needs to be provided as in **Annexure-III**. The details of the transportation need to be provided as in **Annexure IV**.

- p) **Public consultation**-The Comments of the various stakeholders may be sought on the list of mining lease to be auctioned. The State Government shall give an advertisement in the local and national newspaper for seeking comments of the general public on the list of mining lease included in the DSR. The DSR should be placed in the public domain for at least one month from the date of publication of the advertisement for obtaining comments of the general public. The comments so received shall be placed before the sub-divisional committee for active consideration. The final list of sand mining areas [leases to be granted on riverbed & Patta land/Khatedari land, de-siltation location (ponds/lakes/dams), M-Sand Plants (alternate source of sand)] after the public hearing needs to be defined in the final DSR in the format as per **Annexure-V**. The details regarding cluster and contiguous cluster needs to be provided in **Annexure-VI**. The details of the transportation need to be provided in **Annexure-VII**.

4.2 Grant of Letter of Intent to those mining leases which are falling in potential mining zone

The State Government shall issue letter of intent as per procedure laid down in their Minor Mineral Concession Rules with due consideration of final district survey report. The State Government shall ensure that all the letter of intent shall have complete details of the mining lease including geo-coordinate of the corner points, the involvement of forest land, distance from the forest land, distance from the protected area, distance from other sites of archaeological importance, details of the cluster situation etc. The demarcation of the boundaries of Lol/Lease area shall be placed in public domain along with Lol/lease deed details.

The LOI should not be granted for mining area falling on both riverbed and outside riverbed. Therefore, in the same lease, both types of area should not be included.

The authority responsible for grant of lease for sand mining shall ensure that annual audit of the sand mining process, production and compliance of the imposed conditions by regulatory authority (Environmental clearance or mine plan) shall be one of the essential condition of the lease agreement. The annual audit report shall be submitted to the district administration, which shall be put in public domain through the district website. Any deviation observed shall be appropriately and in accordance with applicable law shall be dealt by the concerned authority and corrective measures shall also be taken to restoration of ecological/environmental damage, if observed.

4.3 Mining Plan

The preparation of Mining Plan is also very important. The mining plan should include the original ground level recorded at an interval not more than 10M x 10M along & across the length of the river. In addition to this-levels, outside the mining lease and bank of the river up to meters needs to be recorded. In the mining plan, there should be 3 plates for each year production & development planning (pre-monsoon, monsoon and post-monsoon). The time period of monsoon should be defined in the DSR. At the time of review of the mining plan, the details of the replenishment study conducted for all the years needs to be included in the mining plan. The Mining Plan should include the certificate from PCCF on forest land, distance from the protected area, past production details for mining leases seeking expansion.

Following considerations shall be kept in mind for sand/gravel mining while approving mining plan

- a) Parts of the river reach that experience deposition or aggradation shall be identified. The Leaseholder/ Environmental Clearance holder may be allowed to extract the sand and gravel deposit in these locations to manage aggradation problem.
- b) The distance between sites for sand and gravel mining shall depend on the replenishment rate of the river. Sediment rating curve for the potential sites shall be developed and checked against the extracted volumes of sand and gravel.
- c) Sand and gravel may be extracted across the entire active channel during the dry season.

- d) Abandoned stream channels on the terrace and inactive floodplains be preferred rather than active channels and their deltas and flood plains. The stream should not be diverted to form the inactive channel.
- e) Layers of sand and gravel which could be removed from the river bed shall depend on the width of the river and replenishment rate of the river.
- f) Sand and gravel shall not be allowed to be extracted where erosion may occur, such as at the concave bank.
- g) Segments of the braided river system should be used preferably falling within the lateral migration area of the river regime that enhances the feasibility of sediment replenishment.
- h) Sand and gravel shall not be extracted up to a distance of 1 kilometre (1 km) from major bridges and highways on both sides, or five times (5x) of the span (x) of a bridge/public civil structure (including water intake points) on up-stream side and ten times (10x) the span of such bridge on down-stream side, subjected to a minimum of 250 meters on the upstream side and 500 meters on the downstream side.
- i) The sediment sampling should include the bed material and bed material load before, during and after the extraction period. Develop a sediment rating curve at the upstream end of the potential reach using the surveyed cross-section. Using the historical or gauged flow rating curve, determine the suitable period of high flow that can replenish the extracted volume. Calculate the extraction volume based on the sediment rating curve and high flow period after determining the allowable mining depth.

- j) Sand and gravel could be extracted from the downstream of the sand bar at river bends. Retaining the upstream one to two-thirds of the bar and riparian vegetation is accepted as a method to promote channel stability.
- k) The flood discharge capacity of the river could be maintained in areas where there is a significant flood hazard to existing structures or infrastructure. Sand and gravel mining may be allowed to maintain the natural flow capacity based on surveyed cross-section history. Alternatively, off-channel or floodplain extraction is recommended to allow rivers to replenish the quantity taken out during mining.
- l) The Piedmont Zone (Bhabhar area) particularly in the Himalayan foothills, where riverbed material is mined, this sandy-gravelly track constitutes excellent conduits and holds the greater potential for groundwater recharge. Mining in such areas should be preferred in locations selected away from the channel bank stretches.
- m) Mining depth should be restricted to 3 meters and distance from the bank should be $\frac{1}{4}$ th or river width and should not be less than 7.5 meters.
- n) The borrow area should preferably be located on the riverside of the proposed embankment because they get silted in the course of time. For low embankment, less than 6 m in height, borrow area should not be selected within 25 m from the toe/heel of the embankment. In the case of the higher embankment, the distance should not be less than 50 m. In order to obviate the development of flow parallels to the embankment, crossbars of width eight times the depth of borrow pits spaced 50 to 60 meter center-to-center should be left in the borrow pits.

- o) Demarcation of mining area with pillars and geo-referencing should be done prior to the start of mining.
- p) A buffer distance /un-mined block of 50 meters after every block of 1000 meters over which mining is undertaken or at such distance as may be the directed/prescribed by the regulatory authority shall be maintained.
- q) A buffer distance /unmined block of 50 meters after every block of 1000 meters over which mining is undertaken or at such distance as may be the directed/prescribed by the regulatory authority shall be maintained.
- r) River bed sand mining shall be restricted within the central 3/4th width of the river/rivulet or 7.5 meters (inward) from river banks but up to 10% of the width of the river, as the case may be and decided by regulatory authority while granting environmental clearance in consultation with irrigation department. Regulating authority while regulating the zone of river bed mining shall ensure that the objective to minimize the effects of riverbank erosion and consequential channel migration are achieved to the extent possible. In general, the area for removal of minerals shall not exceed 60% of the mine lease area, and any deviation or relaxation in this regard shall be adequately supported by the scientific report.
- s) Mining Plan for the mining leases(non-government) on agricultural fields/Patta land shall only be approved if there is a possibility of replenishment of the mineral or when there is no riverbed mining possibility within 5 KM of the Patta land/Khatedari land. For government projects mining could be allowed on Patta land/Khatedari land but the mining should only be done by the Government agency and material should not be used for sale in the open market.

The minerals reserve for river bed area is calculated on the basis of maximum depth of 3 meters and margins, width and other dimensions as mentioned in para (s) above. The area multiplied by depth gives the volume and volume multiplied with bulk density gives the quantity in Metric Ton. In case of river bed, mineable material per hectare area available for actual mining shall not exceed the maximum quantity of 60,000 MT per annum.

4.4 Obtaining Environmental & Other Statutory Clearance

The LOI Holder/Lease Holder to obtain Environmental and Other Statutory Clearances from the concerned authorities as per provision of applicable laws.

4.5 Baseline data before Commencement of Mining Operations

Baseline data in respect of the initial level of mining lease in the interval not more than 25 X 25 meters shall be collected for record by leaseholder. The level of river bed upstream and downstream up to 100 meters also needs to be recorded. The area outside the mining lease/river bank (if lease boundary coincides with mining lease) up to 100 meters from both the banks/mining lease needs to surveyed for initial level.

4.6 Additional measures where project proponent is selected by a bidding

In those states where sand plots are auctioned to the highest bidder, the following is suggested:

It has been observed that bidders try to form a cartel and bids are received for certain plots where legal mining is done, and bids for certain other plots don't elicit any response. Sand from these un-

auctioned plots is then excavated using the same machinery deployed for the excavation of adjacent plot which might have been auctioned off. It is not easily possible for the field machinery to prevent such illegal activities. This may be prevented by having plot of larger size. plots are large in size as possible are identified for auction. Care may be taken to ensure that no continuous stretch of plot in the river bed is divided for auction. A continuous stretch of plot shall be preferred for auction, and the attempt may not be made to auction it off in pieces.

5.0 REPLENISHMENT STUDY

The need for replenishment study for river bed sand is required in order to nullify the adverse impacts arising due to excessing sand extraction. Mining within or near riverbed has a direct impact on the stream's physical characteristics, such as channel geometry, bed elevation, substratum composition and stability, in-stream roughness of the bed, flow velocity, discharge capacity, sediment transport capacity, turbidity, temperature etc. Alteration or modification of the above attributes may cause an impact on the ecological equilibrium of the riverine regime, disturbance in channel configuration and flow-paths. This may also cause an adverse impact on in-stream biota and riparian habitats. It is assumed that the riparian habitat disturbance is minimum if the replenishment is equal to excavation for a given stretch. Therefore, to minimize the adverse impact arising out of sand mining in a given river stretch, it is imperative to have a study of replenishment of material during the defined period.

5.1 Generic Structure of Replenishment Study

Initially replenishment study requires four surveys. The first survey needs to be carried out in the month of April for recording the level of mining lease before the monsoon. The second survey is at the time of closing of mines for monsoon season. This survey will provide the quantity of the material excavated before the offset of monsoon. The third survey needs to be carried out after the monsoon to know the quantum of material deposited/replenished in the mining lease. The fourth survey at the end of March to know the quantity of material excavated during the financial year. For the subsequent years, there will be a requirement of only three surveys. The results of year-wise surveys help the state government to establish the replenishment rate of the river. Based on the replenishment rate future auction may be planned.

The replenishment period may vary on nature of the channel and season of deposition arising due to variation in the flow. Such period and season may vary on the geographical and precipitation characteristic of the region and requires to be defined by the local agencies preferable with the help of the Central Water Commission and Indian Meteorological Department. The excavation will, therefore, be limited to estimated replenishment estimated with consideration of other regulatory provisions.

5.2 Methodology for Replenishment Study

The replenishment estimation is based on a theoretical empirical formula with the estimation of bedload transport comprising of analytical models to calculate the replenishment estimation. The iso-pluvial maps of IMD can be used for estimation of rainfall. Catchment yield is computed using different standard empirical formulas relevant to the geographical and channel attributes. eg. Strange's Monsoon runoff curves for runoff coefficient). Peak flood discharge for the study area can be calculated by using Dickens, Jarvis and Rational formula at 25, 50 and 100 years return period. The estimation of bed load transport using Ackers and White Equation or similar can be made. A simulation model is used with basic data generated from the field in the pre-study and post-study period (preferably pre-monsoon and post-monsoon) to estimate the volume of replenished material. The particle size distribution and bulk density of the deposited material are required to be assessed from a NABL recognized laboratory. Considering the bulk density and the volume, the estimation of replenishment in weight will be calculated after considering safeguards and stability of the slopes and riverine regime. Some of the common methods used for field data acquisition for replenishment study

5.2.1. Physical survey of the field by the conventional method

- i. The conventional survey technical using DGPS and other survey tools are used to define the topography, contours and offsets of the lease area. The survey should clearly depict the important attributes of the stretch of the river and its nearby important civil and other feature of importance. Such information will provide the eligible spatial area for mining. The contour and the elevation benchmarks will provide the baseline data for assessing the pre and post-study period scenario.
- ii. Physical benchmarks are to be fixed at appropriate intervals (preferable 1 in 30 m) and the Reduced Level (RL) shall be validated from a nearby standard RL. These RL should be engraved on a steel plate (Bench Plate) and shall be fixed and placed at locations which are free from any damages and are available in pre and post-study period. The bench plates shall be available for use during the mining period as reference for all mining activity. Reference pillar may also be used in place of Bench Plates with visible and readable demarcation on the ground as common reference points to control the topographic survey and mining activity.
- iii. Baseline data on elevation status for a grid of 10 m x 10 m is preferred to have accuracy in the assessment. It is expected that two consecutive cross-sections in longitudinal and lateral direction should not be more than 10-meter distance apart, however, the regulatory authority may fix these intervals depending on the geographical and site-specific conditions, only and after providing the scientific reason for such deviation.
- iv. The changes observed in the elevation in pre and post scenario at each node should be depicted in graphical forms with an appropriate scale to estimate the area of deposition and erosion. These graphical

presentations should depict the active channel regime and the flow bed elevation with other important features required to be considered for estimation of the mining area. The area of deposition and erosion shall be calculated for each cross-section after giving due regard to the stability and safety of active channel banks, and other features of importance. The elevation level shall be in reference to the nearest bench-plates established for the purpose.

- v The levels (MSL & RL) of the corner point of each grid should be identifiable and safety barriers (Non-Mining) demarcated as restricted in consensus with Mineral Concession Rules of respective State, and the provision mentioned in this Sustainable Sand Mining Management Guidelines.
- vi A clear identification is required to be highlighted between grids under mineable and grids under the non-mineable area. These baseline data (pre and post) be subjected to stimulation with the help of data mine software to derive at the replenishment area and corresponding volume and estimated weight.
- vii The database should be structured in a tabulated form clearly depicting the nomenclature of the section lines, latitude and longitude of the starting point, chain-age and respective levels of all the points taken on that section line.
- viii Net area shall be derived after the summation of the area of deposition minus area of erosion for each cross-section. The volume will be estimated by multiplying the distance between two cross-sections with the average of net area of these two consecutive cross-sections.
- ix One sample per 900 square meters (30 m x 30 m) shall be preferred sample density for assessment of bulk density for estimation of deposition rate. Care should be taken that the sample for assessment

of bulk density is taken from the deposition zone and not from erosion. However, depending on the site condition, river morphology and geographical condition, sample density may be adjusted. Reason for such deviation shall be appropriately highlighted in the report with supporting scientific data.

5.2.2. Use of UAV/Drone and other image data processing techniques

With the development in image data processing tools and its accuracy acceptability, Drone/UAV fitted with the advance camera are used for survey purposes. Such technology has promising potential in the survey of sand mining zones due to its fast and reliable output deliveries. The survey is conducted using a set of instruments and compatible software to utilized the properly referenced data for depicting the topography of the study area. Instrument calibration and software compatibility and its validation with the ground data are an essential requirement for using this technique.

The details of the instruments their limitation and software used shall be demonstrated in the form of the accuracy assessment report, through a chapter in the replenishment study report. Other details to be incorporated in the report with regard to the study using such imaginary techniques shall highlight the followings:

- a) **Flight Planning:** - The lease co-ordinates and the flight plan devised to capture the front and side overlap percentages for in each flight in reference to global coordinates (Kml or SHP file) system. The software used for the purpose and its details along with limitations with basic analytical assumptions.
- b) **Block file generation:** - This operation concerns the selection of the sensor model and the definition of block properties, the addition of

imagery to the block file, marking of GCPs, generation of tie points and refining of the model.

- c) **Interior orientation:** - The interior orientation of the stereo pair rational polynomial coefficients (RPC) used, which should be bundled with the scenes. RPCs are coefficient, which is used by photogrammetric software to represent the ground to-image viewing geometry.
- d) **Exterior orientation:** For exterior orientation, ground control points shall be used, which are collected from the DGPS survey.
- e) **Aero Triangulation:** - A critical phase in photogrammetric mapping is to rectify the satellite imagery at an appropriate tract on the surface of the earth. This is accomplished by collecting horizontal and vertical data [GCP's] to ascertain the spatial location of a number of features that are visible and measurable on the aerial images – this process is often called control bridging, which refers to passing horizontal and vertical information from one aerial image to the next.
- f) **Ortho Generation:** - After running the above steps; the software shall automatically generate orthorectified imagery.
- g) **DTM extraction:** For extraction of DTM, Generated point cloud data classified manually to extract bare earth.

5.2.3 Accuracy Assessment of Aerial Data:

To check the accuracy of DTM generated by Aerial data, few points are selected and compared with on-site by using DGPS instrument for the ground-truthing purpose. It is preferred to do ground-truthing at minimum 5 locations spread evenly across the lease area. The readings from the DGPS instrument are then compared with the Drone data for accuracy assessment

purpose. A comparative chart will be prepared in comparison of Data related to ground-truthing (by DGPS) and from Drone. Such accuracy assessment report shall a chapter of the replenishment study.

5.2.4 Replenishment study shall have the details of

- List of instruments
- List of software
- Establishment of Benchmark by putting No. of pillar points and various Ground Control Points (GCP) at the site.
- Ground Control Points (GCP) Collection: - Various GCPs were observed by using DGPS for Permanent Benchmarks and for control points.
- The summary of the elevation data from each section's profile based on the post-monsoon the survey should have mentioned in the table form.
- The detail of post-monsoon survey data in the tabular form shall be
- The detailed comparison of both pre-monsoon and post-monsoon elevation data shall be attached
- Cross-sectional depiction of deposition and erosion for each section in pre and post-deposition season shall be given supported by relevant field study data and plan.

6.0 ENFORCEMENT

6.1 Mining Operation:

The mining operations should be strictly carried out in accordance with the approved mining plan and after complying with all the conditions stipulated in Environmental & Other Statutory Clearance. Mine owner shall follow the operational procedure (for sale, dispatch, storage, reserve reconciliation and transportation) as may be defined by the concerned state government in its monitoring guidelines. Mine owner should comply with the recommendation and suggestion made by the High Power Committee as applicable.

6.2 Post Environment Cleanace Monitoring:

It's the responsibility of the EC Holder to comply with the Environmental Clearance conditions and upload the six-monthly EC compliance report on the website of the Ministry. For the category, 'A' mines (>100 Ha individual & cluster) Regional Office of the MoEF&CC are entrusted to carry out EC Monitoring and for the Category 'B' Mines by SEIAA. The monitoring shall be carried out as per the procedure/schedule suggested by MoEF&CC from time to time. MOEF&CC vide its notification S.O. 637(E) dated 28.02.2014 has delegated the power to State/Union Territory Environmental Impact Assessment Authority to issue show cause notice to project proponent in case of violation of Conditions of Environmental Clearance issued by the said authority and to issue direction for keeping the said EC in abeyance or withdrawing it. Thus, for category 'B' (0 to 100 Ha) projects SEIAAs are responsible for EC monitoring.

6.3 Environment Audit:

The Hon'ble NGT in its order dated 04.09.2018 in O.A. 173/2018 in the matter of Sudarsan Das vs. State of West Bengal & Ors. Inter-alia directed

that "One of the conditions of every lease of mine or minerals would be that there will be independent environmental audit at least once in a year by reputed third party entity and report of such audit be placed in the public domain. In the course of such an environmental audit, a three-member committee of the local inhabitants will also be associated. Composition of three member's committee may preferably include ex-servicemen, a former teacher and former civil servant. The Committee will be nominated by the District Magistrate.

The gazette notification on environmental audit has been issued by the Ministry of Environment and Forests on March 13, 1992 (amended vide notification GSR 386 (E) dated April 22, 1993). This notification applies to every person carrying on an industry, operation or process requiring consent to operate under Section 25 of the Water (Prevention and Control of Pollution) Act, 1974 (6 of 1974) or under section 21 of the Air (Prevention and Control of Pollution) Act, 1981 (14 of 1981), or both, or authorization under the Hazardous Waste (Management and Handling) Rules, 1989, issued under the Environment (Protection) Act, 1986 (29 of 1986). The notification requires that an Environmental Statement for the financial year ending the 31st March be submitted to the concerned State Pollution Control Board, on or before the 30th September of the same year.

It is suggested that NABET Accredited consultant may be engaged for Environment Audit and during the course of the audit, a three-member committee nominated by District Magistrate shall be associated.

6.4 Monitoring of Sale & Purchase of Sand:

6.4.1 In order to curb illegal mining it is very necessary that the general public is aware of the legal source of sand and RBM suppliers. The Ministry of Mines issued **Sand Mining Framework 2018** wherein it has proposed two mechanisms for the online sale of sand depending on whether there is a free market for sand in the State or the prices are regulated by the Government.

Para 1.2.12.2 Under the market model

In the case of the market model, all the lessees/ certified dealers in the State should register themselves on the online portal/ mobile app. For registering, the lessee/ certified dealer will have to enter the details of its concession/ stockyard, location, the quantity of sand expected on a weekly basis, as per the approved mining plan. Once registered, the online portal/ app will display the name of the reach/ stockyard and sand could be booked by the consumer from those leases/ stockyards and prices up to the delivery level. Further, the lessee/ certified dealer needs to regularly update the sand available in the reach/ stockyard, and they can decide the price at which they want to sell their sand. Anyone who wishes to purchase sand in the State will have the following options for buying:

- 1. Mobile app*
- 2. Online portal*
- 3. Customer care/ telephone call*
- 4. Licensed traders*

The consumer needs to register on the portal and log in using his/her credentials (Aadhar card based only). After logging in, the portal will display the entire list of reaches/ stockyards along with the quantity of sand available in those reaches/ stockyards and the quality and price of

sand. The consumer can filter/ sort the reaches/ stockyards based on such parameters as location, quality and price, and book from the lease/ stockyard he/she wishes to. The consumer should also have the option to purchase the sand by ordering at customer care. Also, stockyards should be made around all the major consumption hubs in the State based on their estimated demand.

Para 1.2.12.3 Controlled market prices

In case the prices are regulated by the State Government, the only difference from the previous model is that the price of sand at the river reach/ stockyard shall be uniform across the State/ district based on the quality and transportation lead. A consumer after logging in may choose the reach/ stockyard from which he/she wishes to purchase the sand. The payment for booking the sand in both the cases should be made on the portal/ app so that proper accounting of the sale of sand can be maintained by the Government. Also, stockyards should be made around all the major consumption hubs in the State based on their estimated demand.

It is suggested that the State Government should develop an online portal for sale and purchase of Sand & RBM. In addition to this State Government shall decide on the model viz. *Under market model or Controlled market prices or both* to be adopted for their respective States. The State Government shall accordingly modify their Minor Mineral Concession Rules within 6 months of publication of these guidelines. It is suggested that the controlled price model is more effective in controlling illegal sand mining. Because if the State Government is the only agency to provide the sand in the State, then price and supply of sand can be controlled more effectively. There will be no confusion in the consumers about legality of the purchase as the only source of sand provider is the State Government through its network of registered stockiest, retailers and transporters. The consumers

can fill the online request, pay the amount, select the transporter and give its feedback after the receipt of the sand. The transportation can also be controlled as the tippers used for transportation is registered tippers with GPS facility, the transportation route is well defined for easy monitoring, control over overloading of tippers, control over spillage of mineral etc. The State Govt. shall also make provision for penalizing the persons/agency buying the sand and RBM from the illegal sources.

6.4.2 The Ministry of Mines in its Sand Mining Framework also mentioned the following different level of monitoring:

Para 1.2.13.1 Level 1- Reach/ Stockyard level monitoring

For monitoring of the active reaches:

- a. *Quantity of sand to be extracted from the reach should be based on the quantity of sand assessed in the reach by the Joint Inspection Team.*
- b. *The lease boundary should be demarcated with geo-coordinates or geo-fenced to ensure that sand extraction is going on only within the permitted area.*
- c. *De-casting from river beds should be monitored on a regular basis to keep a track of excavated quantity.*
- d. *After every two years, a mandatory audit of the quantity extracted and quantity permitted along with the replenishment rate.*
- e. *Mandatory e-pass/ e-permit should be made available at reach level for transportation of any sand by any GPS enabled vehicle with the provision of entering the vehicle number of the sand carrying vehicle and expected delivery address and customer name/ mobile number. Also, provision should be made available for stockyards/ stockiest of sand. In the case of*

nomination based (controlled pricing) business model, the margin of private stockist should be capped over a fixed percentage of notified prices.

- f. At the stockyard, the stock supervisor should verify the authenticity of online payment receipt before issuing the transit pass. The loading of sand should be monitored electronically and all transporting vehicles should pass through an electronically monitored weighbridge. g. Real-time data capture for transportation*

Para 1.2.13.2 Level 2 - Transportation monitoring

To make transportation monitoring effective and useful, all the sand carrying vehicles (tractors/ trucks) should be registered with the department and GPS equipment should be installed in all the sand carrying vehicles. Weighbridges with CCTV should be installed at all the stockyards, active reaches to ascertain the exact quantity of sand being transported in the vehicle. Check posts with CCTV cameras should be established near all major consumption centres to check if all the transporting vehicles are carrying a valid transport permit. The transport permit generated should contain the security features mentioned under section 5.11 so that one permit cannot be re-used by generating photocopies of the permit.

Para 1.2.13.3 Level 3 - End consumer monitoring/ bulk consumer

For end consumer monitoring, a customer grievance redressal center should be established to enquire about the grievances faced by the sand consumers. The telephone number of the call center should be advertised so that it reaches the general public through which anyone in the State can register his/her complain related to the sand, be it in terms of price or any other grievance. Additionally, profiles of customers should be analyzed such as the delivery of sand at the same address, usage pattern and its comparison with the estimated usage, as mentioned in purpose, etc. Further, surprise checking

should be conducted by the district level committee staff as per instructions of the monitoring agency.

Para 1.2.13.4 Level 4 - Indirect monitoring

Indirect monitoring can be done by determining sand consumption through the quantum of cement sales in the State, as the sale of cement is quite organized and data is easily available at the State level and district levels for the same. From district-wise cement consumption, the further trend of sand consumption can be derived. Any anomalies in the sand consumption/demand can be analyzed further.

Note: *The above monitoring mechanism is just a suggestion and the States may visit Andhra Pradesh and Telangana to study the monitoring mechanism in greater detail.*

It is suggested that State Government may consult with concern department of State of Telangana and Tamil Nadu to have better understanding on their experience and knowledge in adopting best sand mining enforcement provisions and monitoring practices and frame their own regulatory regime and monitoring framework. The framework of monitoring should essential include online sale & purchase of River Bed Material/ Auction of leases, Sand from rivers and other sources, online monitoring of excavation, storage and transportation of mineral for control of illegal mining.

The respective State Governments shall develop the online Sale & Purchase System after defining the model viz. Under market model or Controlled market prices model. The level of monitoring needs to be defined and guidelines need to be finalized by the respective State Governments as per their requirement with due consideration of suggestive guideline in this document. These all measure will help in curbing illegal mining.

7.0 Recommendations of High Power Committee:

A high power committee (HPC) was constituted by Hon'ble National Green Tribunal to assess the status of illegal mining the stretch of River Yamuna, under the chairmanship of Secretary, Ministry of Environment Forest & Climate Change. The committee after exhaustive field survey and interaction with stakeholders and having surprise visits submitted a comprehensive report on river sand mining along with certain recommendations on enforcement requirements and monitoring essentials. The same is provided in the following section for consideration of monitoring / regulatory authority to adopt applicable provisions in their monitoring framework and also to ensure that the infrastructural requirements recommended by the HPC are put in use at all locations including the lease area.

7.1 Recommendations of High Power Committee (HPC)

The following recommendation of the High Power Committee shall be considered while framing the monitoring mechanism by the State Government.

- i. Project Proponent must ensure that following security features are included in the Transport Permission/Permits (TP) so that duplicate/fraudulent/forged TPs for transport, not accounted for in the IT-based system, is not possible.:
 - (a) Printed on Indian Bank Association (IBA) approved
 - (b) Magnetic Ink Character Recognition Code (MICR) paper;
 - (c) Unique Barcode;
 - (d) Unique Quick Response Code (QR);
 - (e) Fugitive Ink Background;
 - (f) Invisible Ink Mark;
 - (g) Void Pantograph;
 - (h) Watermark.

- ii. Project Proponent must ensure that CCTV camera, Personal Computer (PC) or laptop, Internet Connection, Power Back up, access control of mine lease site; and arrangement for weight or approximation of weight of mined out mineral on basis of volume of the trailer of vehicle used at mine lease site are available.
- iii. The PP has to enter the destination, distance between plot and destination, vehicle number etc in the system. After scanning, unique bar code number, invoice date time and validity date-time are generated by the software which gets printed individually on each TP Validity of TP is calculated based on the distance between plot and destination. After validity time is over the TP stands invalid.
- iv. The officers involved in monitoring should be provided with mobile application and/or bar code scanners using which the TP can be checked anywhere on road. As soon as the bar or QR code on TP gets scanned through using the mobile application and/or scanner or vehicle number is entered into the application or sent by SMS to a predefined number, all details of TP such as plot details, vehicle details, validity time, etc. should be fetched from the server. This means if anything is re-written on TP and attempt is made to reuse the same, it can be traced immediately. Various reports can be generated using the system showing daily lifting reports and user performance report. This way the vehicles carrying sand can be tracked from source to destination.
- v. The facility to fetch details using mobile app, website and SMS may be made available to the general public as well. However, they shall not be allowed to stop the vehicles to check the transportation. The only option that they should have is to check vehicle numbers of the passing vehicle in the mobile app or SMS for the validity of the pass. The only result that should be available to them should be if the vehicle carrying sand has a

valid permit at the relevant point of time or not. If the citizen finds that the vehicle doesn't have such a permit, as ascertained from mobile app or website or SMS, he should alert local authorities, who shall then take further action as per the law.

- vi. In case, the vehicle break-down, the validity of Transport Permit or Receipt shall be extended by sending SMS by the driver in specific format to report the breakdown of the vehicle. The server will register this information and register the breakdown. The State can also establish a call center, which can register breakdowns of such vehicles and extend the validity period. The subsequent restart of the vehicle also should be similarly reported to the server/call center.
- vii. The route of the vehicle from source to destination shall be tracked through the system using checkpoints, Radio-frequency identification (RFID) tags, and Global Positioning System (GPS) tracking.
- viii. The system shall enable the Authorities to develop a periodic report on different parameters like daily lifting report, vehicle log/ history, lifting against allocation, and total lifting. The system can be used to generate auto mails/SMS. This will enable the District Collector / Magistrate and other authorities to get all the relevant details and will enable the authority to block the scanning facility of any site found to be indulged in irregularity. Whenever any authority intercepts any vehicle transporting illegal sand, it shall get registered on the server and shall be mandatory for the officer to fill in the report on action taken. Every intercepted vehicle should be tracked.
- ix. It is necessary to prevent any truck/vehicle from transporting sand out of the identified plot bypassing the strong IT enabled system. Therefore, at each of the sand plot, the following additional measures should be taken.

- (a) There shall be one entry and exit point provided for trucks/vehicles. The said entry point should have facilities as mentioned above. In case, it is necessary to have more than one entry/exit points, all such points shall have checkpoints with facilities as mentioned above. All other possible ways of entry/exit should be closed using barriers like compound, trench, etc. All provisions shall be made to not make it possible for any vehicle to enter or exit without entry into the computerized system.
- (b) All such points should have 24X7 CCTV coverage, the footage of which should be made available online to the district administration. In cases, where sufficient internet bandwidth is not available, it may be deposited with the district administration on a weekly basis. If possible, the entry/exit points should have boom barriers which will record the vehicles entering and exiting the plot.

8.0 GENERAL APPROACH TO SUSTAINABLE SAND MINING

8.1 Pre-requisite for starting sand mining operation

- i)** All district to prepare a comprehensive mining plan for the district as per the provision of District Survey Report. These reports shall be put on the website of District Administration. No mining shall be allowed in the area which has not been identified in the comprehensive mining plan of the District.
- ii)** Replenishment study should be conducted on regular basis.
- iii)** All potential rivers mining zone/area shall be identified and put for auction with proper geo-tagged details by the auctioning authority concerned.
- iv)** The latitude and longitude of each mining lease shall be clearly mentioned in Letter of Intent issued to the potential mine lease. Such information shall be provided on the website of the district administration.
- v)** The provision of these guidelines shall be considered while identifying the potential stretches /locations and boundaries of the leases for the minable area.
- vi)** The Lol holder shall seek Environmental Clearance as per the provision of EIA Notification, and the regulatory authority shall ensure that the provision suggested in "Sustainable Sand Mining & Management 2016" and in this documents, as applicable are part of the clearance conditions.
- vii)** There shall be no river bed mining operation allowed in monsoon

period. The period as defined by IMD Nagpur for each state shall be adhered with.

- viii) The monitoring infrastructures including weighbridge and adequate fencing of the lease area, CCTV, Transport permits, etc, as suggested in this document shall be ensured in order to reduce unrecorded dispatch.
- ix) Regular monitoring of mined minerals and its transportation and storage shall be ensured and all information shall be captured at centralized database so that easy tracking of illegal material can be done.
- x) Annual audit of each mining lease shall be carried out wherein three independent member of repute, nominated by District administration shall also participate.

8.2 Mining of Sand from Agricultural Fields

This practice is prevalent in Haryana; to ensure that mining from outside doesn't affect rivers, no mining is permitted in an area up to a width of 100 meters from the active edge of embankments or distance prescribed by Irrigation department whichever is critical. The top layer of soil varying between 1 and 2 meters is removed and stacked separately and thereafter the sand deposit which maybe 10-15 meter deep is mined. After removing the sand layer up to a maximum depth of 09 meters or the maximum mineable minerals, as permitted by competent authority. The topsoil stacked is spread out on the field and the same is brought under the cultivation. Though the level of this land (mined out area) is lowered to the depth of the excavation and in initial years of cultivation the productivity is low, but the productivity of the fields improves with continued cultivation and addition of organic manure in the field. In Haryana, some leases are of large area

(ranging from 1000 hectare to 2000 hectare) and agricultural fields and river bed both are included in the same lease for mining.

The following recommendations should be kept in mind for mining in such leases:

1. Mining of sand in such mine leases will require environment clearance.
2. The lease should be of sand mining either from the agricultural field or river. In the same lease, both types of area should not be included.
3. The sand mining from the agricultural field is being done in Haryana for a long time and it can be done in a more sustainable manner without adverse impact on agricultural productivity if proper environmental safeguards are taken.
4. The slope of mining area adjacent to agricultural fields should be proper (preferably 45 degree) and adequate gap (minimum 10 feet) be left from adjacent agricultural field to avoid erosion and scouring.

The provision for sand mining in agricultural field may be permitted, whenever replenishment of sand occurs due to natural phenomena.

Permission may also be granted by competent authority (District administration) for excavation of sand/Soil from agricultural fields, after due diligence of this prevailing condition in order to avoid any unacceptable impact on the environment and nearby livelihood from agriculture provided such objective of such excavation mining of Soil/Sand in limited increase the productivity of sand agricultural field.

9.0 MONITORING MECHANISM

9.1 Illegal Mining

The Hon'ble Supreme Court in its Judgment dated 2.08.2017 in W.P 114 of 2014 in the matter of Common Cause Vs Union of India & Ors, inter-alia passed the following:

Para 128. *The simple reason for not accepting this interpretation is that Rule 2(ii-a) of the MCR was inserted by a notification dated 26th July 2012 while we are concerned with an earlier period. That apart, as mentioned above, the holder of a mining lease is required to adhere to the terms of the mining scheme, the mining plan and the mining lease as well as the statutes such as the EPA, the FCA, the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981. If any mining operation is conducted in violation of any of these requirements, then that mining operation is illegal or unlawful. Any extraction of a mineral through an illegal or unlawful mining operation would become illegally or unlawfully extracted mineral."*

In view of above Judgement, any mining activities which are not governed under the provision of Environment (Protection) Act, 1985, The Water (Prevention & Control of Pollution Act, 1974, The Air (Prevention & Control of Pollution) Act, 1981, Forest Conservation Act-1980, Wildlife Protection Act - 1972, shall be considered as illegal mining within the provision of section 21(5) of Mines and Minerals (Development & Regulation) Act, 1957 (MMDR Act) and the concerned authority shall take necessary action within the provision of MMDR Act.

As per the provision of 23(C) of MMDR Act, the State Government is empowered to make rules for preventing illegal mining, and transportation

& storage of Illegal minerals. All such mining which qualifies under illegal, shall be dealt with in the provision of MMDR Act by the concern authorities.

State Pollution Control Board (SPCB) is the nodal authority in the State for dealing with cases related to pollution or environment management coming under the purview of the Water (Prevention and Control of Pollution) Act, 1974, the Air (Prevention and Control of Pollution) Act, 1981 and the Environment Protection Act 1986. SPCB shall initiate appropriate action under the provision of these acts for non-compliance or violation of the provisions.

9.2 Environmental Damage due to illegal mining

The environmental damages incurred or resulting due to illegal mining shall be assessed by a committee constituted by District Administration having expertise from relevant fields, and also having independent representation of locals and State Pollution Control Board. Guidelines for assessment of ecological damages prescribed by the State Government or Concerned Pollution Control Boards or any other authority shall be applicable and compensation as fixed shall be paid by the project proponent, in light of Hon'ble National Green Tribunal orders.

9.3 Monitoring of Mining near Inter-district or inter-state boundary

There are situations where bifurcated river becomes district boundaries or state boundaries in such situation it is difficult to assess the mining potential, or to have close monitoring and enforcement of the regulatory provision. Such challenges have been identified and dealt with in SSMG-2016. However, in the absence of any standardized procedure, the monitoring has not been effectively practiced. This has been highlighted by the High Power Committee constituted by NGT in the matter pertaining to illegal mining.

The districts/state sharing the boundary shall constitute the combined task force for monitoring of mined materials, mining activity and also should actively participate in the preparation of DSR by providing appropriate inputs. In such cases, the draft DSR so prepared shall be put up for public consultation in both the districts through respective district administration website.

The task force shall meet every quarter to reconcile the data collected during the period and identify any gap/ lapses based on the outcome of such meeting. The respective district shall take action/ corrective measures. Effort shall be made for real-time data sharing between both the district.

The task –force shall include essentially the representative of respective districts from the mining department, transport department, regional office of SPCB concerned and a reputed citizen nominated by district administration. The Taskforce shall be headed by officer not less than ADM rank and quarterly outcome shall be submitted to District administration.

In addition to the above, there is a need for strict surveillance, particularly at night. The State of Gujarat has already initiated a program called '*Trinetra*' for night surveillance by using night-vision drones to control illegal mining incidents. This program is giving satisfactory results. Such type of system may also be developed by each State within a reasonable time.

A typical standard operating procedure for assessing illegal mining by the committee constituted shall, but not limited to, include the steps given in the following table. However, the process of assessing can be modified based on site-specific conditions and any deviation shall be recorded in the report with proper justification.

Suggestive standard Practice for assessing illegal mining

| | |
|--------|---|
| Step 1 | The assessment team should collect the information and documents prescribed in the Pre-Requisite section. |
| Step 2 | The assessment team should verify the applicability/validity of statutes under EPA-1986, Air and Water Act, MMDR 1957, State Mines and Mineral Rules, etc. |
| Step 3 | Field visit should be conducted for identification of mining lease area (in hectare) and boundary pillar constructed to indicate the same. |
| Step 4 | With the help of GPS instrument, the team should assess the area where any extraction or mining have been carried out on the day of visit and calculate the mined-out area in a hectare. |
| Step 5 | If available, the team may avail the use of latest satellite images for calculating the total mined out area. |
| Step 6 | The team should verify the Ground / Surface Level (in meter above MSL) of at least 04 highest points in or around the area where mining has been done. The Ground/surface level will then be computed based on averaging of 04 highest points verified by the team. |
| Step 7 | With the help of Depth Measurement kit or any depth measuring instruments, the depth should be measured for at least 04 points in the mined-out area.
For computing, the depth, averaging of the value obtained at 04 points should be done. |
| Step 8 | Verification of compliance conditions of Environmental Clearance and Consent to operate, mining methodology under Mining Plan |
| Step 9 | Identification of vulnerable impacts observed on the field and non-compliance of conditions of Environmental Clearance and Consent to Operate. |

| | |
|---------|---|
| Step 10 | Field Survey for identification, monitoring and verification of ecological species based on the information available and documents mentioned in the Pre-requisite section. |
| Step 11 | Preparation of inventory of machinery used/observed on the field (optional) |
| Step 12 | Preparation of inventory of hydraulic structures observed on the field (optional) |
| Step 13 | Water sampling for assessment of water quality including physical and biological parameters. (optional) |
| Step 14 | Reconciliation collation of data/information and compilation to maintain violation. |
| Step 15 | Identification of restoration plan and computation of cost of the restoration plan. |

9.4 Monitoring Mechanism

A uniform monitoring mechanism is required to assess the regulatory provision in quantitative terms, with robust institutional and legal framework. Based on past experience and suggestions available, the following requirements are suggested for defining a mechanism for monitoring of mining activities which will help in identification of mining which is operating either illegally or are violating the regulatory provisions. Some suggestion will facilitate direct or indirect information to help in such an assessment.

1. All precaution shall be taken to ensure that the water stream flows unhindered and process of Natural river meandering doesn't get affected due to mining activity.
2. River mining from outside shall not affect rivers, no mining shall be permitted in an area up to a width of 100 meters from the active edge of embankments or distance prescribed by the Irrigation department.

3. The mining from the area outside river bed shall be permitted subject to the condition that a safety margin of two meters (2 m) shall be maintained above the groundwater table while undertaking mining and no mining operation shall be permissible below this level unless specific permission is obtained from the Competent Authority. Further, the mining should not exceed nine-meter (9 m) at any point in time.
4. Survey shall be carried out for identifying the stretches having habitation of freshwater turtles or turtle nesting zones. Similarly, stretches shall be identified for other species of significant importance to the river ecosystem. Such stretch with adequate buffer distance shall be declared as no-mining zone and no mining shall be permitted. The regulatory authority as defined for granting Environmental Clearance, while considering the application of issuance of ToR and/or EC for the adjacent block (to non-mining zone) of mining shall take due precaution and impose requisite conditions to safeguard the interest of such species of importance.
5. District administration shall provide detailed information on its website about the sand mines in its district for public information, with an objective to extend all information in public domain so that the citizens are aware of the mining activities and can also report to the district administration on any deviation observed. Appropriate feedback and its redressal mechanism shall also be made operational. The details shall include, but not limited to, lease area, geo-coordinates of lease area and mineable area, transport routes, permitted capacity, regulatory conditions for operation including mining, environmental and social commitments etc.

6. A website needs to be maintain to track the movement of centralised sand mining and a Centralised server system should be made to manage the data related to sand mining across India.
7. The mineral concession holders shall maintain electronic weighbridges at the appropriate location identified by the district mining officer, in order to ensure that all mined minerals from that particular mine are accounted for before the material is dispatched from the mine. The weighing bridge shall have the provision of CCTV camera and all dispatch from the mine shall be accounted for.
8. The mineral movement shall be monitored and controlled through the use of transit permit with security features like printing on IBA approved MICR papers, Unique bar/QR, fugitive ink background, invisible ink mark, void pantographs and watermarks papers or through use of RFID tagged transit permits and IT /IT-enabled services. Such monitoring system shall be created and made operationalised by State Mining department and district level mining officer shall be responsible for ensuring that all legal and operational mines are connected and providing the requisite information on the system. Regular check and associated report shall be submitted to DLTF and uploaded on the website.
9. State Government shall constitute a District Level Task Force (DLTF) under the Chairmanship of Deputy Commissioner/District Magistrate/Collector with Superintendents of Police and other related senior functionaries (District Forest Officer, District transport officer, Regional officer- SPCBs, Senior Officer of Irrigation Department, District Mining Officer) with one/two independent member nominated by the Commissioner concerned. The independent member shall be retired government officials/teacher or ex-serviceman or ex-judiciary member.

The DLTF shall keep regular watch over the mining activities and movement of minerals in the district. The DLTF shall have its regular meeting, preferably every month to reconcile the information from the mining activity, and other observations made during the month and take appropriate corrective and remedial action, which may include a recommendation for revoking mining lease or environmental clearance. The DLTF may constitute an independent committee of the expert to assess the environmental or ecological damage caused due to illegal mining and recommend recovery of environmental compensation from the miner's concern. The recommendation may also include action under the provision of E(P) Act, 1986.

10. The area not identified for mining due to restriction or otherwise are also to be monitored on a regular basis by the DLTF. Any observations of mining activity from the restricted area shall be reported and corrective measures shall be initiated on an urgent basis by the DLTF.
11. The dispatch routes shall be defined in the Environmental Clearance and shall be avoided through densely habituated area and the increase in the number of vehicle movement on the road shall be in agreement with the IRC guidelines / carrying capacity of the road. The alternate and dedicated route shall be explored and preferred for movement of mining to avoid inconvenience to the local habitat. The mining production capacity, by volume/weight, shall be governed by total permissible dispatch calculated based on the carrying capacity of dispatch link roads and accordingly, the production should be regulated.
12. The movement of minerals shall be reconciled with the data collected from the mines and various Naka/check posts. Other measures may also include a general survey of the potential mineable area in the district

which has not been leased/auctioned or permitted for mining due to regulatory or other reasons.

13. The location and number of check post requirement shall be reviewed by DLTF on a regular basis so that appropriate changes in location/number could be made as per the requirement. Such review shall be carried out on a regular basis for the district on inter-state boundary or district providing multiple passages between two districts of different states.
14. The district administration shall compile the information from their district of the permitted and legal mined out minerals and other details and share such information and intelligence with the officials of the adjoining district (Inter or/and Intra State) for reconciliation. The information shall include the area of operation, permissible quantity, mined out minerals (production) the permitted route etc., and other observations, especially where the mine lease boundary is congruent with the district boundary. Such coordination meeting shall be held on a quarterly basis, alternatively in two district headquarters or any other site in two districts decided mutually by the District Magistrate.
15. The mining department shall include submission of an annual environmental audit report as one of the conditions in the mining lease agreement. The annual audit for each river bed mining lease shall be carried out and the audit report shall be uploaded on the website of district administration. The audit shall be carried out by an independent team of 3 members nominated by District Collector/Magistrate/Commissioner comprising of Ex-Serviceman, Ex-Government officials of repute, Professor or Person having experience of mining/environment. The guidelines and method of the audit shall reflect adequately the monitor-able parameters and output and reflect

the compliance status with respect to the conditions imposed by the regulatory authorities including conditions of Environmental clearance.

16. The in-situ and ex-situ environmental mitigative measures stipulated as EMP, CER, CSR and other environmental and safety conditions in mines including the welfare of labours shall properly reflect in the audit report.

9.5 Suggestive additional requirements are

i. The requirement at the Mine Lease Site:

- a. Small Size Plot (Up to 5 hectares): Android Based Smart Phone.
- b. Large Size Plots (More than 5 hectares): CCTV camera, Personal Computer (PC), Internet Connection, Power Back up.
- c. Access control of mine lease site.
- d. Arrangement for weight or approximation of the weight of mined out mineral on the basis of the volume of the trailer of vehicle used.

ii. Scanning of Transport Permit or Receipt and Uploading on Server:

- a. Website: Scanning of receipt on mining site can be done through barcode scanner and computer using the software;
- b. Android Application: Scanning on mining site can be done using Android Application using a smartphone. It will require internet availability on SIM card;
- c. SMS: Transport Permit or Receipt shall be uploaded on the server even by sending SMS through mobile. Once Transport Permit or Receipt get uploaded, a unique invoice code gets generated with its validity period.

iii. Proposed working of the system:

The State Mining Department should print the Transport Permit or Receipt with security features and issue them to the mining leaseholder through the District Collector. Once these Transport Permits or Receipts are issued, they would be uploaded on the server against that mine lease area. Each receipt should be preferable with pre-fixed quantity, so the total quantity gets determined for the receipts issued. When the

Transport Permit or Receipt barcode gets scanned and invoice is generated, that particular barcode gets used and its validity time is recorded on the server. So all the details of transporting of mined out material can be captured on the server and the Transport Permit or Receipt cannot be reused.

iv. Checking On Route:

The staff deployed for the purpose of checking of vehicles carrying mined mineral should be in a position to check the validity of Transport Permit or Receipt by scanning them using the website, Android Application and SMS.

v. Breakdown of Vehicle:

In case the vehicle break-down, the validity of Transport Permit or Receipt shall be extended by sending SMS by the driver in specific format to report the breakdown of the vehicle. The server will register this information and register the breakdown. The State can also establish a call center, which can register breakdowns of such vehicles and extend the validity period. The subsequent restart of the vehicle also should be similarly reported to the server or call center.

vi. Tracking of Vehicles:

The route of the vehicle from source to destination can be tracked through the system using checkpoints, RFID Tags, and GPS tracking.

vii. Alerts or Report Generation and Action Review:

The system will enable the authorities to develop a periodic report on different parameters like daily lifting report, vehicle log or history, lifting against allocation, and total lifting. The system can be used to generate auto mails or SMS. This will enable the District Collector or District Magistrate to get all the relevant details and shall enable the authority to block the scanning facility of any site found to be indulged in irregularity. Whenever any authority intercepts any vehicle transporting illegal sand, it shall get registered on the server and shall be mandatory for the officer to fill in the report on action taken. Every intercepted vehicle shall be tracked.

The monitoring of mined out mineral, environmental clearance conditions and enforcement of Environment Management Plan will be ensured by the regulatory authority and the State Pollution Control Board or Committee. The monitoring arrangements envisaged above shall be put in place. The monitoring of enforcement of environmental clearance conditions shall be done by the Central Pollution Control Board, Ministry of Environment, Forest and Climate Change and the agency nominated by the Ministry for the purpose.

Some of the State has followed the SSMMG-2016 and has also improvised or customized on the provisions given therein, and are successfully in operation. Salient provision adopted at different stages of sand mining in the state of Tamil Nadu is given as **Annexure VIII**.

9.6 Actions against illegal excavation and transport

Solapur district administration in Maharashtra had adopted a multi-pronged strategy to penalize the persons involved in illegal excavation and transport which resulted in a significant increase in revenue earned by the state. Following rules and procedures as mentioned in these guidelines will add to the costs of PP. Those involved in illegal activities are not required to bear these costs and this will make their supply in the market cheaper (though illegal). This will put the players running their business by following rules and procedures laid down by the government to disadvantage as far as the selling price is considered. Therefore, it is necessary to come down heavily on those involved in illegal excavation/transport, so that there is no incentive for players to abide by the rules.

The following action may be taken to achieve this deterrence against illegal business:

1. The action should be taken under all legal options available simultaneously. Thus, after identifying the case of illegal excavation, storage and/or transport of minor minerals (including sand), fine should be levied as per the land revenue laws/code(s) of the state. In addition, FIR should be lodged in the police station under relevant sections of law including sec 379 IPC. In addition, action under the Motor Vehicle Act, 1989 and relevant rules should initiate to cancel/suspend the driving license of the driver and permit of the vehicle. Further, action should be initiated under provisions in the Income Tax Act, 1961 for unaccounted income and under the Central Goods and Services Act, 2017 for non-payment of GST. (Earlier this was done under the state act pertaining to Value Added Tax/Sales Tax). Habitual offenders should also be taken up under local state laws for externment and/or preventive action. It is clarified that as per law, it is possible to take all actions under various laws

simultaneously for one offence. What is prohibited in law is an action under the same law for the same act more than once.

2. The action should be taken against all persons responsible. Often, there is a tendency to penalize only the drivers of the vehicles. The mafia of illegal mining and transport is much bigger and drivers are only one part of the system. It is necessary to identify all those involved in the offence. It is usually not possible to reach the place of excavation without creating a motorable pathway up to the same through land which may be private land. Such role of such landowners needs to be looked into for each offence and proceeded against simultaneously. Further, the role of vehicle owners needs to be probed. Role of the person who allowed his land to be used for illegal excavation and storage should also be examined. Lastly, the person who purchases such sand should also be probed. The legal proceedings stated above needs to be initiated against all of these together. An attempt should be made to fix the financial responsibility in joint and several ways so that recovery is easier.
3. There may be discretion available in law about the extent of the penalty to be levied. If such discretion is very wide, then it is advisable that guidelines may be laid down to reduce such discretion in law for levying penalties. For example, in Maharashtra, Land Revenue Code, fine of any amount of penalty up to thrice the value of the sand can be levied. Solapur district administration had instructed Tahsildars and SDMs not to use discretion and levy the fine of three times the value. Availability of discretion makes junior level functionaries susceptible to pressures and it may also lead to corrupt practices.
4. It is emphasized that actions, as stated above, are most important to ensure that the IT-based system works. If these exemplary actions are not taken against everyone, it shall create a strong disincentive to those

involved in legal excavation and transportation. For IT-based (or any other) legal system to work, it is necessary to ensure that illegal system stops working altogether.

Annexure-I**Details of Sand/M-Sand Sources****a) Rivers:**

| River Name/M-Sand Plant | Total Stretch of River (in KM) | Type of River (Perennial or Non-Perennial) |
|-------------------------|--------------------------------|---|
| | | |

b) De-Siltation Location: (Lakes/Ponds/Dams etc.)

| Name of Reservoir/Dams | Maintain/Controlled by State Govt./PSU etc. | Location | District | Tehsil | Village | Size(Ha) |
|------------------------|---|----------|----------|--------|---------|----------|
| | | | | | | |

c) Patta Lands/Khatedari Land:

| Owner | Sy. No | Area (Ha) | District | Tehsil | Village | Agricultural Land (Yes/No) |
|-------|--------|-----------|----------|--------|---------|----------------------------|
| | | | | | | |

d) M-Sand Plants:

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

Note: For inclusion of M-Sand Plant/Patta Land in DSR the plant/landowners need to submit the request to the Mining Department with complete details. Inclusion in DSR does not give them the right to operate the M-Sand Plant/Sand Mining lease.

Annexure-II

List of Potential Mining Leases (existing & proposed)

Rivers

| River Details | Lease Details | Area (in Ha) | Distance (in KM) from PA/BR/WC/ | Distance from Forest Area (in KM) | Mining leases within 500 meters (if yes cluster area) | Total excavation in Tonnes /Annum considering digging depth max as 3 meters | Mineral to be mined (Sand/ Bajri/ RBM etc.) | Existing / Proposed |
|---------------|---------------|--------------|---------------------------------|-----------------------------------|---|---|---|---------------------|
| | | | | | | | | |

Patta Lands/Khatedari Land: (existing & proposed)

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

De-Siltation Location: (Lakes/Ponds/Dams etc.) (Existing & proposed)

| Name of Reservoir /Dams | Maintain /Controlled by State Govt./PSU etc. | Location | District | Tehsil | Village | Size (Ha) | Quantity MT / Year | Existing /Proposed |
|-------------------------|--|----------|----------|--------|---------|-----------|--------------------|--------------------|
| | | | | | | | | |

M-Sand Plants :(existing & proposed)

| Plant Name | Owner | District | Tehsil | Village | Geo-location | Quantity Tonnes/Annum | Existing/Proposed |
|------------|-------|----------|--------|---------|--------------|-----------------------|-------------------|
| | | | | | | | |

Annexure-III**Cluster & Contiguous Cluster details****Clusters:**

| River Name | Cluster No. | Lease No | Location (Riverbed / Patta Land) | Village | Area (in Ha) | Total Excavation (Ton) | Total Mineral Excavation (Ton) |
|------------|-------------|----------|----------------------------------|---------|--------------|------------------------|--------------------------------|
| | | | | | | | |
| | | | | | | | |

Contiguous Clusters:

| River Name | Contiguous Cluster No. | Cluster No | Number of leases in the cluster | Location (Riverbed / Patta Land) | Distance between clusters | Village | Area of Cluster (Ha) | Total Mineral Excavation (Ton) |
|------------|------------------------|------------|---------------------------------|----------------------------------|---------------------------|---------|-----------------------|--------------------------------|
| | | | | | | | | |
| | | | | | | | | |

Annexure-IV

Transportation Routes for individual leases and leases in Cluster

| Lea
se
No | Transporta
tion Route
No | Numb
er of
tipper
s /day
of
lease | Numb
er of
tipper
s /day
of all
the
lease
on
route | Leng
th of
Rout
e in
KM | Type
of
Road
(Black
Toppe
d/
unpav
ed) | Recommend
ation for road
(Black
Topped/
unpaved) | The road
will be
Construc
ted by
Govt/
Lease
Owner | Route
Map
&
Locati
on |
|-----------------|--------------------------------|--|--|-------------------------------------|---|--|--|-----------------------------------|
| | | | | | | | | |
| | | | | | | | | |

| Clust
er
No | Transporta
tion Route
No | Num
ber of
tipper
s /day
of
cluste
r | Num
ber of
tipper
s /day
of all
the
cluste
rs on
route | Leng
th of
Rout
e in
KM | Type
of
Road
(Black
Toppe
d/
unpav
ed) | Recommend
ation for
road(Black
Topped/
unpaved) | The road
will be
Construc
ted by
Govt/Lea
se
Owner | Route
Map
&
Locati
on |
|-------------------|--------------------------------|--|--|-------------------------------------|---|---|--|-----------------------------------|
| | | | | | | | | |
| | | | | | | | | |

Annexure-V**Final List of Potential Mining Leases (existing & proposed)****Rivers**

| River Details | Lease Details | Area (in Ha) | Distance (in KM) from PA/BR/WC/ | Distance from Forest Area (in KM) | Mining leases within 500 meters (if yes cluster area) | Total excavation in (MT/Yr) (Mine depth max as 3 m) | Mineral to be mined (Sand/Bajri/RBM etc.) | Existing /Proposed |
|---------------|---------------|--------------|---------------------------------|-----------------------------------|---|---|---|--------------------|
| | | | | | | | | |

Patta Lands/Khatedari Land: (existing & proposed)

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

De-Siltation Location: (Lakes/Ponds/Dams etc.) (Existing & proposed)

| Name of Reservoir/ Dams | Maintain/ Controlled by State Govt./PSU etc. | Location | Distt. | Tehsil | Village | Size(Ha) | Quantity MT/Year | Existing/ Proposed |
|-------------------------|--|----------|--------|--------|---------|----------|------------------|--------------------|
| | | | | | | | | |

M-Sand Plants :(existing & proposed)

| Plant Name | Owner | District | Tehsil | Village | Geo-location | Quantity MT/Annum | Existing/Proposed |
|------------|-------|----------|--------|---------|--------------|-------------------|-------------------|
| | | | | | | | |

Annexure-VI**Final List of Cluster & Contiguous Cluster****Clusters:**

| River Name | Cluster No. | Lease No | Location (Riverbed / Patta Land) | Village | Area (in Ha) | Total Excavation (Ton) | Total Mineral Excavation (Ton) |
|------------|-------------|----------|----------------------------------|---------|--------------|------------------------|--------------------------------|
| | | | | | | | |
| | | | | | | | |

Contiguous Clusters:

| River Name | Contiguous Cluster No. | Cluster No | Number of leases in the cluster | Location (Riverbed /Patta Land) | Distance between clusters | Village | Area of Cluster (in Ha) | Total Mineral Excavation (Ton) |
|------------|------------------------|------------|---------------------------------|---------------------------------|---------------------------|---------|-------------------------|--------------------------------|
| | | | | | | | | |
| | | | | | | | | |

Annexure-VII

Final Transportation Routes for individual leases and leases in Cluster

| Lease No | Transportation Route No | Number of tippers /day of lease | Number of tippers /day of all the lease on route | Length of Route in KM | Type of Road (Black Topped/unpaved) | Recommendation for road(Black Topped/unpaved) | The road will be Constructed by Govt/Lease Owner | Route Map & Location |
|----------|-------------------------|---------------------------------|--|-----------------------|-------------------------------------|---|--|----------------------|
| | | | | | | | | |
| | | | | | | | | |

| Cluster No | Transportation Route No | Number of tippers /day of cluster | Number of tippers /day of all the clusters on route | Length of Route in KM | Type of Road (Black Topped/unpaved) | Recommendation for road(Black Topped/unpaved) | The road will be Constructed by Govt/Lease Owner | Route Map & Location |
|------------|-------------------------|-----------------------------------|---|-----------------------|-------------------------------------|---|--|----------------------|
| | | | | | | | | |
| | | | | | | | | |

Annexure VIII**Salient provision for sand mining in the state of Tamil Nadu****STEPS TO BE FOLLOWED BEFORE EXECUTION:**

- The state as a policy should endeavor to have single authority/agency responsible for all river sand mining in the state with an objective to ease the gap in demand and supply and accordingly, take necessary measures including planning, monitoring of mined material and its transport, and to curb illegal mining and sale of materials.
- The prospective site for sand quarry may be identified based on the availability of adequate sand deposits along the river beds, which hinders the free flow of water and results in flooding during monsoon seasons. Emphasis may be given to such quarry sites which is more viable for replenishment.
- A detailed study may be conducted by engaging expert from reputed Institutions to identify prospective sand reaches, assessment of the impact of sand quarrying on the Ground Water Table and water availability, conduct bore log details and study the social and environmental aspects. The generic requirement for replenishment study is to be followed.
- Once the site is identified for prospective sand quarry site based on the detailed replenishment study, the concerned department shall submit the proposal with the geo-tagged boundary of the proposed mining Precise Area Proposal to the District Collector for approval.
- A joint inspection may be carried out by the RDO/Sub-Collector, Assistant/Deputy Director,

- Executive Engineer, TWAD Board and the PWD officials to consider the various factors before giving consent to the proposal.
- The RDO concerned along with Revenue officials may verify the revenue records of the proposed sand quarrying area and give the NOC.
- The AD/DD Mines may verify the presence of permanent structures such as tower line, bridge, monuments if any, in the vicinity of the proposed mining site as per Tamil Nadu Minor Mineral Concession Rules, 1959 (As per Rule 36 " there shall be no quarrying of sand in any river bed or adjoining area or any other area which is located within 500 meter radial distance from the location of any bridge, water supply system, infiltration well or pumping installation of any of the local bodies or Central or State Government Department or the Tamil Nadu Water Supply and Drainage Board head works or any area identified for locating water supply schemes by any of the above mentioned Government Department or other bodies" and " The distance of 50 meter shall be measured in the case of railway, reservoir or canal horizontally from the outer toe of the bank or the outer edge of the cutting, as the case may be "). Also, the availability of minerals may be cross verified with the available DSR.
- The TWAD officials may verify the drinking water schemes located nearby the proposed quarry site and the minimum distance required as per statutory norms.
- Based on the feasibility report of the joint inspection by the Revenue, Tamil Nadu Water Supply and Drainage Board and Mining officials/experts, the District Collector may give consent for the Precise Area proposal.

- After getting Precise Area approval, a detailed Mining Plan and sketch shall be prepared by the Executive Engineer, PWD using the services of a NABET accredited consultant who holds the pivotal role in the preparation of mining plan. Due responsibility will be expected on the concerned consultant in the mining plan preparation taking care of adhering to all mining rules, existing as on date. The mining plan shall contain the details of quantity to be excavated, the period of mining, method of excavation, deployment of required machinery, Environment Management Plan (EMP), proposed number of laborers to be deployed and Conceptual Mining Plan, as per Rule 41 of TNMMC Rules 1959. It is also the duty of the consultant to give the safe distance of 50 m or twice the bank height from the toe of the riverbank, whichever is higher and fixing the Geo coordinates for boundaries using DGPS instruments.
- The concerned Executive Engineer, PWD shall submit the Mining Plan prepared by the NABET accredited consultant to the concerned Assistant/Deputy Director, Department of Geology and Mines for approval, as per Rule 42 of TNMMC 1959. After scrutiny, the Assistant/Deputy Director, Department of Geology will present the Mining plan before the State Level Environment Impact Assessment Authority (SEIAA) for granting Environmental Clearance.
- The Executive Engineer, PWD shall prepare Form I and Pre-feasibility report with the help of the consultant and submit to SEIAA for an area less than 50 Ha. or to the Ministry of Environment and Forest and Climate Change (MoEF&CC) for the area more than 50 Ha.
- The State Expert Appraisal Committee (SEAC) under SEIAA, consisting of experts from renowned fields such as Mines, Environment, Sociology etc. shall conduct a site inspection of the proposed sand quarry site and after intense scrutiny, may recommend the proposal to SEIAA for approval.

- SEIAA shall grant Environmental Clearance for the sand quarry proposal after analyzing all the statutory provisions and based on the recommendation of the SEAC.
- The Environmental Clearance shall be informed to the public with basic details through advertisement in at least two widely circulated local newspapers with at least one in the vernacular language of the locality, within 7 days of the receipt of the clearance.
- On receipt of the Environmental Clearance, the Executive Engineer, PWD shall apply for Consent to Establish (CTE), from the Tamil Nadu Pollution Control Board as per the Air and Water Act, to enter upon the sand quarry site and commence the preliminary works such as construction of temporary sheds, bio-toilets, formation of biodegradable road using sugar cane leaves etc., drilling of bore wells etc. as per the statutory requirements. After all the preliminary works are completed, the Executive Engineer, PWD shall apply for the Consent to Operate (CTO) from the Tamil Nadu Pollution Control Board. Earmarking boundary of the identified land site through the concrete posts along with red flags need to be established.
- On receipt of the CTO, the Executive Engineer, PWD shall request the consent of the District Collector to commence the quarries. The District Collector shall request the Taluk Level Task Force comprising of Tahsildar, Inspector of Police, Officials from the Departments of Geology and Mining, Transport and Forest, Assistant Engineer, PWD and the Village Administrative Officer concerned, to verify the compliance of all preconditions mentioned in the Environmental Clearance and grant necessary permission to start the functioning of new sand quarries.

II. STEPS TO BE FOLLOWED DURING EXECUTION:

- Before the commencement of mining operations, the depth of sand quarrying needs to be measured accurately using Advanced technology and new gadgets like Total Stations, Global Positioning System (GPS) instruments etc. The Total Station and GPS instruments also need to be calibrated before measurement. Both the traditional and modern techniques may be infused in the right blend to get an accurate measure of the depth. A clear contour map (0.25m interval) of the levels within 2Km (one Km U/s and one Km D/s) needs to be prepared and submitted to both the Project Director, Sand Quarrying Operations and all the Monitoring Committee members. The depth of sand quarrying shall be restricted to 1 m from the theoretical/design bed level.
- The mining area must be demarcated at a minimum distance of at least 50 m away from the river embankment on either side. The boundaries of the quarries may be fixed with reference to the existing survey marks from the survey fields adjacent to the river. Sand quarrying lease area shall be demarcated on the ground with pucca stone or concrete pillars to show the present natural bed level and the depth of mining allowed.
- Modern techniques such as drone survey may be adopted to assess the depth and quantity of the mined area. Boundary pillars shall be erected at an interval of 50 m each on all four sides of the sand quarry site with red flags on every pillar and also in site pillars. The levels of shoal height, river bed height and depth to be excavated up to one meter downwards shall be marked in the pillars to avoid any deviation from the approved depth of excavation.
- It shall be ensured that no sand quarrying of any type is undertaken within 50m of the distance mentioned in the proposal (whichever is higher)

from both the banks of the river to control and avoid erosion of river banks.

- Temporary access roads or Katcha roads shall be formed between the banks of the river and the mining area with locally available bio-degradable materials such as sugarcane waste (bagasse), hay, etc.
- Proper entry and exit point for the movement of loading vehicles in and out of the sand quarry site shall be carefully located taking into consideration the habitations/settlements in the area.
- To monitor the groundwater level during sand quarrying operations, a network of existing wells may be established around the sand quarrying area and new piezometers must be installed at all sand quarry sites. Monitoring of Ground Water Quality in the vicinity (one Km radius from the sand quarrying site) shall be carried out once in two months.
- Periodic Monitoring (at least four times in a year – pre-monsoon, Monsoon, Post monsoon and winter) once in each season shall be carried out by PWD and the data thus collected may be sent regularly to SEIAA/TNPCB. If at any stage, it is observed that the groundwater table is getting depleted due to the mining activity; necessary corrective measures shall be carried out, which includes immediate stopping of mining.
- Similar to the Baseline studies for data on water, soil and air etc., that is being done before the sand quarrying operations, the air and water quality may be checked periodically by Tamil Nadu Pollution Control Board to ensure that no pollution is caused due to Sand Quarrying Operations. 10. Safety gadgets such as earplugs, goggles, respiratory

devices, luminescent vests etc. may be provided to the workers at the sand quarry site.

- First aid kit with all essentials shall be kept ready at all quarry/depot site, in case of any emergency.
- To prevent air pollution due to the dust during sand quarrying operations and safeguard the persons in the sand quarry and depot site, constant water sprinkling on the pathways and dust prone areas may be done. The sand loaded vehicles are to be covered with a tarpaulin before moving out of the quarries/depots.
- Suitable depots shall be located in the vicinity of the sand quarry site to facilitate the sale of sand. While selecting the site for depots, it must be ensured that the site is within 25 km from the sand quarry site and has an area of around 10-15 Acres with parking facilities and proper entry and exit for smooth movement of the vehicles. The depot site shall preferably be a Government poramboke land, foreshore area of tank bund etc., near an NH/SH/MDR/ODR. In the absence of any Government land in the vicinity, private Patta land may be leased out and rent fixed as per the approved Government rates applicable therein.
- Permission must be obtained from the Electricity Board for power supply to operate the CCTV cameras at sand quarry site and depots.
- Minimum of two CCTV cameras, one each at the entry and exit point and one PTZ camera may be installed at all quarries/depots to monitor illegality if any taking place in the sand quarry/depot.
- To ensure uninterrupted seamless live streaming of videos from the surveillance cameras, a high-speed Internet Lease Line connection may

be made available at all quarries/depots. Arrangements may also be made for online monitoring of the sand quarrying, Centre for Assessing Real-Time Sand Mining (CARS) that could be located at the office of the Project Director in Chennai.

- The live streaming of the videos shall be monitored at a Centralised control room and the data shall be stored in the Server for future references. A robust Customer Care may also be functional 24 x 7 at the Control Room, to redress the grievance of the public.
- Drop gates shall be installed at the entry and exit points of all quarries/depots.
- Display boards shall be erected in local vernacular language at sand quarry/depot site, in the nearest village by which sand transportation will be carried and at the entrance of the village road from the main road.
- The concerned authority of PWD shall call for e-tender to select the contractors for loading/raising of sand at the quarry site, transporting contractors to transport sand from the quarry site to depots and loading/maintenance contractors at depots.
- Sand shall be loaded in the quarries in the PWD tendered GPS fitted vehicles and online transmit permit shall be issued by the competent authorities in PWD to the transporting vehicles to transport sand from the quarry to depots.
- On the arrival of the sand shunting vehicles from quarry to the depot, an online authentication shall be done to confirm the arrival of the

appropriate quantity of sand mentioned in the transport permit into the depot.

- The loading of sand from the depots shall be carried out by booking through the online portal "www.tnsand.in" as done presently. Online transit passes will also be issued to the loaded vehicles which could be verified by using an Android app "TNSand Investigator".
- During operation of the quarries, the PWD officers shall ensure that at no point in time, the depth of quarry exceeds 1 m depth from the river bed level and quarrying is done in a uniform manner over the entire mining area to avoid overexploitation and formation of pits at fixed places.
- Proper registers may be maintained at the entry and exit points of the sand quarry/depot sites and a Loading Register may be made available during inspection. An Inspection Register and a Complaint Register may be made available at the sand quarry/depot site.
- The functioning time of quarries/depots shall be from 7.00 AM to 6.00 PM. No sand transporting vehicles to be parked inside the quarry/depot site during night time.
- A copy of the approved mining plan may be kept at the quarry site for ready reference.
- Photographs and sketch showing the pit dimensions, depth etc. may be recorded every week and maintained in the sand quarry. The Executive Engineer, PWD may inspect each sand quarry on a weekly basis and ensure that mining activities are taking place within the approved boundaries/depth.

- The sand quarrying activity shall be stopped if the entire quantity is quarried even before the expiry of the sand quarry lease period and the same shall be mentioned by the PWD authorities.
- The Taluk Level Taskforce shall inspect the quarries every fortnight, as per G.O. (Ms) No. 135 of Industries Department, dated 13.11.2009 and record the status of the compliance in the registers maintained at the sand quarry site.
- The Taluk Level Task Force has to submit its inspection report to the District Level Task Force chaired by the District Collector. The District Level Task Force has to be convened every month to discuss cases of illegal quarrying. An Environmentalist from reputed State / Central Institution and a legal expert on environmental matters may be part of the District Level Task Force. The District Level Task Force shall also dispose of the petitions on illegal sand quarrying after due enquiry and scrutiny, and pass orders within a period of two months from the date of receipt of the complaint. If any person is aggrieved with the orders passed by the District Level Task Force, an appeal may be preferred before the Appellate Forum.
- The District Collector shall take necessary steps to strengthen the existing District and Taluk Level Committees and act on the complaints received, if any, on illegal sand quarrying and take strict remedial measures to rectify the same in a time-bound manner. The District Level Task Force may send its monthly report to the Appellate Forum formed as per G.O. (Ms) No. 27 of Industries Dept. dated 17.02.2015.
- The Appellate Forum shall hear the appeals filed against the orders passed by the District Level Task Force. The Appellate Forum comprises

of the Secretaries to Government from Industries Department, Public Works Department, Revenue Department, Environment and Forests Department, Commissioner of Geology and Mining and an Expert from a reputed Government Institution.

- The Appellate Forum may convene once in 2 months to deliberate on the reports from the District Level Task Force and shall dispose of the appeals made by the petitioners aggrieved with the orders passed by the District Level Task Force.
- Periodical Capacity building and sensitization of PWD officials on the environmental and legal aspects of sand quarrying may be made mandatory. Continuous training and awareness programs shall be scheduled and conducted by IIT/Anna University for the PWD staff to keep themselves aware of the best practices in this field. It may be ensured that the enforcement officials from the Departments of Revenue, Police, Geology and Mining and Transport in the districts where quarries are situated are given adequate training and capacity building on their duties and responsibilities with respect to inspection of sand quarries and sand transporting vehicles at specified time intervals.
- No blasting shall be carried out any point in time.
- It is the obligation of the Public Works Department to run the quarry in an environmentally friendly and ecologically sustainable manner.
- The Hon'ble High Court-appointed Monitoring Committee shall inspect the sand quarries periodically and submit a report to the Hon'ble High Court.

- The PWD should explore/take necessary steps to introduce Mining Surveillance System (MSS) in line with MSS evolved by the Indian Bureau of Mines and Bhaskaracharya Institute for Space Applications and Geo-informatics (BISAG).

III. STEPS TO BE FOLLOWED AFTER EXECUTION:

- A Judicious mine closure plan may be formulated once the quarry is closed after exhaustion of the quantity of sand.
- Reclamation works may be factored into the contract agreement and strict monitoring by the PWD officials may be initiated to scrupulously follow up the mine closure plan.
- It may be ensured that the total quantity of sand permitted in the EC shall not be exceeded in any case.
- After the exhaustion of the quantity of sand, the sheds constructed at the quarry site may be removed. All the roads and pathways may be levelled so that there is no obstruction for the normal flow in the river.
- All the records/registers may be carefully maintained by the PWD for future reference.