



उपायुक्त –सह– जिला दण्डाधिकारी का कार्यालय, रामगढ़।

(खनन शाखा)

पत्रांक 242 / खनन, रामगढ़; दिनांक 10/03/23

प्रेषक,

उपायुक्त  
रामगढ़।

सेवा में,

सदस्य सचिव,  
State Environment Impact Assessment Authority (SEIAA)  
झारखण्ड, राँची।

विषय :-

रामगढ़ जिलान्तर्गत तैयार बालू खनिज का District Survey Report (DSR) के संबंध में।

महाशय,

उपर्युक्त विषयक रामगढ़ जिलान्तर्गत तैयार बालू खनिज का District Survey Report (DSR) की प्रति इस पत्र के साथ संलग्न कर आवश्यक कार्रवाई हेतु उपलब्ध करायी जा रही है।

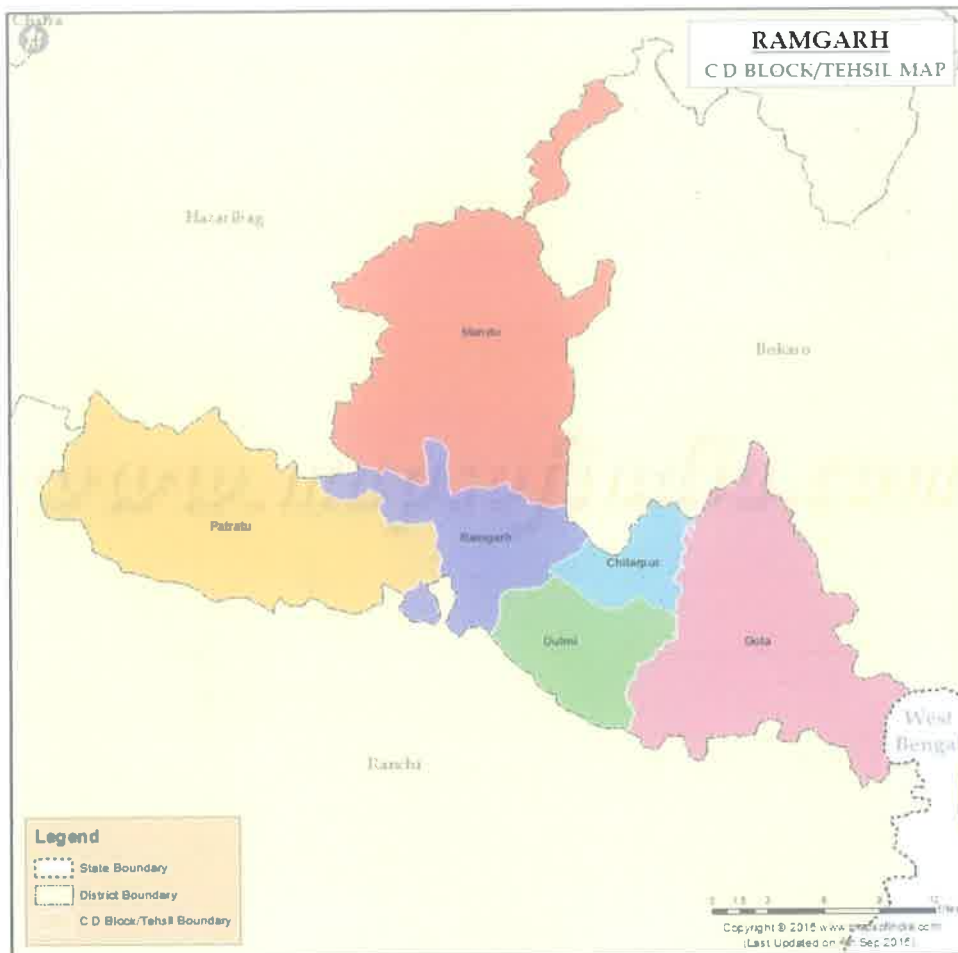
विश्वासभाजन

शाधवीप्रिया  
10-03-2023  
उपायुक्त,  
रामगढ़।



# DISTRICT SURVEY REPORT (DSR) FOR SAND MINERAL OF RAMGARH DISTRICT, JHARKHAND

(As per Notification No. S.O.3611 (E) dated 25th July 2018,  
Sustainable Sand Mining Management Guidelines, 2016 and  
Enforcement & Monitoring Guidelines for Sand Mining (EMGSM)  
January 2020, issued by Ministry of Environment, Forest and Climate  
Change)









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**Valid till 10.03.2024)**



The Deputy Commissioner through its letter 1121/Khanan, Ramgarh, dated 19-11-2022 had constituted the sub-divisional committee to prepare the District Survey Report. List of the members of the sub-divisional Committee is shown below:  
Subdivision Committee Ramgarh:

SL. No #	Member	Signature
I.	Divisional Forest Officer, Ramgarh	
II.	Sub-Divisional Officer, Ramgarh	
III.	District Mining officer, Ramgarh	
IV.	Assistant Director, Geology, District Geological Office, Hazaribagh	
V.	Executive Engineer, Minor Irrigation Division, Ramgarh	
VI.	Regional Officer, JSPCB, Hazaribagh	

  
12/04/2023  
Member

State Level Environment Impact Assessment Authority, Jharkhand

  
12/04/2023  
Member Secretary

State Level Environment Impact Assessment Authority, Jharkhand

  
12/04/2023  
Chairman

State Level Environment Impact Assessment Authority, Jharkhand

  
उपायुक्त  
रामगढ़



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## **1 Preface**

The need for District Survey Report (DSR) has been necessitated by Ministry of Environment, Forest and Climate Change (MoEF & CC) vide. their Notification No. 125 (Extraordinary, Part II Section 3, Sub-section ii), S.O. 141 (E), dated 15<sup>th</sup> January 2016. The notification was addressed to bring certain amendments with respect to the EIA notification 2006 and in order to have a better control over the legislation. District level committees have been introduced in the system. As a part of this notification, preparation of District Survey Reports has been introduced. Subsequently, Ministry of Environment, Forest and Climate Change has published Notification No. 3611 (E), dt. 25<sup>th</sup> July, 2018 regarding inclusion of the “Minerals Other than Sand” and format for preparation of the DSR has been specified. Enforcement & Monitoring Guidelines for Sand Mining (EMGSM) January 2020, Issued by Ministry of Environment, Forest and Climate Change 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.

District Survey Report of River Bed Sand Mining in the Ramgarh district is prepared under;

- ❖ MoEF & CC, GoI notification S.O. 141 (E) dated 15/01/2016
- ❖ Sustainable Sand Mining Guidelines, 2016
- ❖ Sand Policy of Govt. of Jharkhand, 2017
- ❖ MoEF & CC, GoI notification S.O. 3611 (E) dated 25/07/2018
- ❖ Enforcement and Monitoring Guidelines for Sand Mining 2020
- ❖ Jharkhand Minor Mineral Concession (Amendment) Rules 2020.

The DSR of Ramgarh District also describes the general geographical profile of the district, distribution of natural resources, livelihood, climatic condition and sources of revenue generation.



## **2 Introduction**

The District Survey Report of Ramgarh District has been prepared as per the guide line of Ministry of Environment, Forests & Climate Change (MoEF & CC), Government of India vide. Notification S.O.-1533(E) dated 14th Sept, 2006 and subsequent MoEF & CC Notification S.O. 141(E) dated 15th Jan, 2016. This report shall guide systematic and scientific utilization of natural resources, so that present and future generation may be benefitted at large. Further, MoEF & CC published a notification S.O. 3611(E) Dated 25th July, 2018 and recommended the format for District Survey Report. The District Survey Report is in conformity with the Sustainable Sand Mining Guidelines, 2016 & Enforcement & Monitoring Guidelines for Sand Mining (EMGSM) 2020 issued by MOEF&CC.

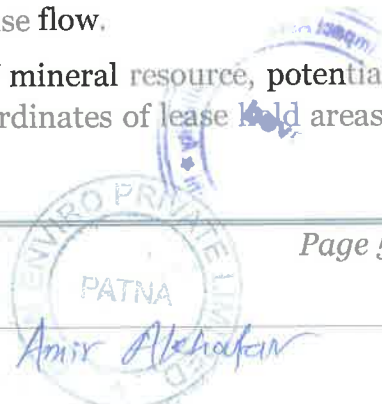
The main objective of DSR is to identify the areas of aggradations or deposition where mining can be allowed; and identification of areas of erosion and proximity to infrastructural structures and installations where mining should be prohibited and estimation of annual rate of replenishment and allowing time for replenishment after mining in that area. The DSR would also help to calculate the annual rate of replenishment wherever applicable and allow time for replenishment. Besides the sand mining, the DSR also include the potential development scope of in-situ minor minerals.

The objectives of the District Survey Report are as following:

1. To identify and quantify minor mineral resources for its optimal utilization.
2. To regulate sand and gravel mining, identification of site-specific end-use consumers and reduction in demand and supply gaps.
3. To facilitate use information technology (IT) for surveillance of the sand mining at each step.
4. To enable environmental clearance for cluster of sand and gravel mines.
5. To restrict illegal mining.
6. To reduce occurrences of flood in the area.
7. To maintain the aquatic habitats.
8. To protect ground water in the area by limiting extraction of material in riverbeds to an elevation above the base flow.
9. To maintain data records viz. details of mineral resource, potential area, lease, approved mining plan, co-ordinates of lease hold areas, and revenue generation.



*AMW*



10. To design a scientific mining plan and estimate ultimate pit limit.  
To frame a comprehensive guideline for mining of sand and other minor minerals.

The District Survey report (DSR) is comprised of secondary data published and endorsed by various departments and websites about geology of the area, mineral resources, climate, topography, land form, forest, rivers, soil, agriculture, road, transportation, irrigation etc. Data on lease and mining activities in the district, revenue etc. is collected and collated from concern district Head Quarter.

The Deputy Commissioner through its letter 1121/Khanan, Ramgarh, dated 19-11-2022 had constituted the sub-divisional committee to prepare the District Survey Report. List of the members of the sub-divisional Committee is shown below:

- a) Divisional Forest Officer, Ramgarh
- b) Sub- Divisional Officer, Ramgarh
- c) District Mining officer, Ramgarh
- d) Assistant Director, Geology, District Geological Office, Hazaribagh
- e) Executive Engineer, Minor Irrigation Division, Ramgarh
- f) Regional Officer, JSPCB, Hazaribagh

## **2.1 Statutory Framework:**

### **a. Evolution of the Environmental Regulatory Framework:**

Requirement of District Survey Report & its year wise modification of Guidelines are furnished in Table No 2.1.

**Table 2-1 : Requirement of District Survey Report & its year wise modification of Guidelines**

<b>Year</b>	<b>Particulars</b>
<b>1994</b>	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.
<b>2006</b>	In order to cover the minor minerals also into the preview of EIA, the MoEF&CC issued EIA Notification SO 1533 (E), dated 14th September 2006, made mandatory to obtain environmental clearance for both Major & Minor Mineral more than 5 Ha.
<b>2012</b>	Further, Hon'ble Supreme Court wide order 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., ordered that "leases of minor minerals including their



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Year	Particulars
	renewal for an area of less than five hectares be granted by the States/Union Territories only after getting environmental clearance from MoEF"; and Hon'ble National Green Tribunal, order dated the 13th January, 2015 in the matter regarding sand mining has directed for making a policy on environmental clearance for mining leases in cluster for minor Minerals.
2016	The MoEF & CC in compliance of above Hon'ble Supreme Court's and NGT'S order has prepared "Sustainable Sand Mining Guidelines (SSMG), 2016" in consultation with State governments, detailing the provisions on environmental clearance (EC) for cluster, creation of District Environment Impact Assessment Authority, preparation of District survey report and proper monitoring of minor mineral. There by issued Notification dated 15.01.2016 for making certain amendments in the EIA Notification, 2006, and made mandatory to obtain EC for all minor minerals. Provisions have been made for the preparation of District survey report (DSR) of River bed mining and other minor minerals.
2017	<p>Jharkhand Minerals (Concession, Prevention of Illegal Mining, Transportation and Storage) Rules, 2017. The notification stated about the prevention of Illegal mining, transportation and storage of sand and guidelines for mining activity, safety barriers, mining depth and lease.</p> <p>The main objective of Jharkhand State Sand Mining Policy, 2017 to ensure that sand mining is done in an environmentally sustainable and socially responsible manner, Preparation of District Survey Report, and to ensure Categorization of Streams/Rivers, Management of Sand Deposition.</p>
2018	<p>MoEF &amp; CC published a notification S.O. 3611(E) Dated 25th July, 2018 and recommended the format for District Survey Report. The notification stated about the objective of DSR i.e. "Identification of areas of aggradations or deposition where mining can be allowed; and identification of areas of erosion and proximity to infrastructural structures and installations where mining should be prohibited and calculation of annual rate of replenishment and allowing time for replenishment after mining in that area".</p>



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<b>Year</b>	<b>Particulars</b>
<b>2020</b>	Enforcement & Monitoring Guidelines for Sand Mining (EMGSM) 2020 has been published modifying Sustainable sand Mining Guidelines, 2016 by MoEF & CC for effective enforcement of regulatory provisions and their monitoring. The EMGSM 2020 directed the states to carry out river audits, put detailed survey reports of all mining areas online and in the public domain, conduct replenishment studies of river beds, constantly monitor mining with drones, aerial surveys, ground surveys and set up dedicated task forces at district levels. The guidelines also push for online sales and purchase of sand and other riverbed materials to make the process transparent. They propose night surveillance of mining activity through night-vision drones.

## **2.2 Methodology of DSR Preparation**

The steps followed during the preparation of District Survey Report are given in Figure 2.1. The individual steps are discussed in following paragraphs.



**Figure 2-1 : Steps followed in preparation of DSR**

### **2.2.1 Data source Identification:**

District Survey Report has been prepared based on the Primary data base and secondary data base collated from different sources. This is very critical to identify authentic data sources before collating the data set. The secondary data sources which are used in DSR are mostly Government published data based or the published report in reputed journal. District profile has been prepared based on the District Statistical handbook published by Jharkhand Government as well as District Census 2011. Potential mineral resources have been described based on GSI or any other govt. agencies work done. Mining lease details and the revenue generated from minor minerals has been prepared based on available data from DL&LRO offices of the



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district. Satellite image has been used for map preparation related to physiography and land utilization pattern of the district.





**2.2.2 Data Analysis and Map preparation:**

Dataset which are captured during the report preparation, are gone through detail analysis work. District Survey Report involves the analytical implication of captured dataset to prepare relevant maps. Methodology adopted for preparation of relevant maps is explained below.

Land Use and Land Cover Map: Land Use and Land Cover classification is a complex process and requires consideration of many factors. The major steps of image classification may include determination of a suitable classification system via Visual Image Interpretation, selection of training samples, Satellite image (FCC-False Colour Composite) pre-processing, selection of suitable classification approaches, post-classification processing, and accuracy assessment.

Here LISS-III satellite Imagery has been taken for Supervised Classification as supervised classification can be much more accurate than unsupervised classification, but depends heavily on the training sites, the skill of the individual processing the image, and the spectral distinctness of the classes in broader scale.

According to the Visual Image Interpretation (Tone, Texture, Colour etc.) training set of the pixel has been taken.

	
<b>Agricultural Land</b> - Based on their Geometrical shape, Red and Pink colour tone, Agricultural Land has been identified.	<b>Vegetation Covered Area</b> - Based on their continuous Red colour tone, Vegetation Covered Area has been identified.
	
<b>Agricultural Fallow Land</b> - Based on their Geometrical shape, Light and dark cyan with light pink colour tone, Agricultural Land has been identified.	<b>Bad Land Topography</b> - Light Yellowish mixed with cyan colour has been identified as Bad Land Topography.



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<p><b>Settlement</b> – Area with Cyan Colour including geometrical shape has been recognised as Settlement Area.</p>	<p><b>Water Bodies</b> – Dark blue colour has been classified as Water Bodies.</p>

Figure 2-2 : Pictorial description of Land Use Classification methods

Geomorphological Map:

The major steps of preparing Geomorphological Map is identifying features like – Alluvial Fan, Alluvial Plain, Hilly Region etc. from Satellite Imagery (FCC-False Colour Composite) via Visual Image Interpretation and then digitization has been taken into the consideration to prepare map including all the Geomorphological features according to their location.



	
<p><b>Alluvial Plain</b>- In satellite Imagery the flat land has been identified as Alluvial Plain just below the Alluvial Fan.</p>	<p><b>Alluvial Fan</b> – A fan-based deposition formed by stream where the velocity is abruptly decreased. In satellite Imagery this has been identified just below the hilly region.</p>

Figure 2-3 : Pictorial description of Geomorphological Units Classification methods

Physiographical Map:

The major step of preparing Physiographical Map is generating contour at a specific interval to show the elevation of the area using Cartosat DEM.

Block Map:

- Raw Data collected from **National Informatics Centre (NIC Website)**.
- Data has been geo-referenced using GIS software.
- Digitization of block boundary, district boundary, state boundary and district headquarter, sub-district headquarter, places, road, railway, river, nala etc.



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- Road name, River name, Railway name has been filled in attribute table of the Layers
- Final layout has been prepared by giving scale, legend, north arrow, etc.

**Transportation Map:**

- Raw Data collected from **National Informatics Centre (NIC Website)**.
- Data has been geo-referenced using GIS software.
- Digitization of block boundary, district boundary, state boundary and district headquarter, sub –district headquarter, places, road, railway, river, nala etc.
- Road name, River name, Railway name has been filled in attribute table of the Layers
- Final layout has been prepared by giving scale, legend, north arrow, etc.

**Drainage Map:**

- Raw Data collected from **National Informatics Centre (NIC Website)**.
- Data has been geo-referenced using GIS software.
- Digitization of block boundary, district boundary, state boundary and district headquarter, sub –district headquarter, places, road, railway, river, nala etc.
- Road name, River name, Railway name has been filled in attribute table of the Layers
- Final layout has been prepared by giving scale, legend, north arrow, etc.

**Seismic Map:**

- Raw data collected from **Ministry of Earth Science**.
- Data has been geo-referenced using GIS software.
- Digitization of Earthquake zone and superimposed it over Block Boundary.
- Zone name has been filled in attribute table of the Layers
- Final layout has been prepared by giving scale, legend, north arrow, etc.

**Soil Map:**

- Raw data collected from **National Bureau of Soil Survey and Land Use Planning**.
- Data has been geo-referenced using GIS software.
- Digitization of Soil classification zone and superimposed it over District Boundary.
- Soil classification has been filled in attribute table of the Layers.
- Final layout has been prepared by giving scale, legend, north arrow, etc.

**Wildlife Sanctuary and National Park location Map:**

- Raw data collected from **ENVIS Centre on Wildlife & Protected Areas**.
- Data has been geo-referenced using GIS software.
- Digitization of Wildlife Sanctuary & National Park and superimposed it over Block Boundary.



- Wildlife Sanctuary & National Park name has been filled in attribute table of the Layers

Final layout has been prepared by giving scale, legend, north arrow, etc.

### **2.2.3 Primary Data Collection:**

To prepare DSR, capturing primary data or field data has also been carried out in the district. Field study involves assessment of the mineral resources of the district by means of pitting / trenching in specific interval. This provides clear picture of mineral matters characterization and their distribution over the area. Pre-monsoon data provided by District Mining office Ramgarh is annexed as annexure K.

### **2.2.4 Report Preparation:**

The district survey report portrays general profile, geomorphology, land use pattern and geology of the district. The report then describes the availability and distribution of riverbed sands and other minor minerals in the district. Apart from delineation the potential mining blocks, the report also includes inventorization of the minerals, recent trends of production of minor minerals and revenue generation there from. Annual replenishment of the riverbed sand has been estimated using field observation, satellite imagery and empirical formula. The road network connecting arterial road to potential mining blocks has been identified. Potential environmental impacts of mining of these minerals, their mitigation measures along with risk assessment and disaster management plan have also been discussed. Finally, the reclamation strategy for already mined out areas is also chalked out.

## **2.3 Demand and Supply of Sand**

Sand is a multi-purpose topographical material. It is known as one of the three fundamental ingredients in concrete. The composition of sand is diverse.

The robustness of sand has played a significant role in everyday life. We use sand practically every other day.

Sand extraction from river beds are the main mining activities in the district. With a spurt in construction of real estate sectors and various govt. sponsored projects, the demand for sand has increased manifold.

In the real world, there are a lot of situations where we can find uses/demand of sand. Followings are the common sand uses.

1. While bunting metal, we can mix sand with clay binder for frameworks used in the foundries.
2. Sand can be used for cleaning up oil leak or any spill by dredging sand on that spill. The material will form clumps by soaking up, and we can quickly clean the mess.
3. Sand can be used as a road base which is a protective layer underneath all roads
4. **Industrial sand is used to make glass, as foundry sand and as abrasive sand.**



5. One creative usage of sand is serving as a candle holder. We can try putting some sand before pouring tea light or any candle in a glass. It holds the candle still and refrains the candle from rolling by giving it an excellent decoration.
6. Adds texture and aesthetic appeal to space.
7. Sand is mostly pure to handle, promptly available and economically wise.
8. We use sand in aquariums, fabricating artificial fringing reefs, and in human-made beaches
9. Sandy soils are ideal for growing crops, fruits and vegetables like watermelon, peaches, peanuts, etc.
10. Sand can light a path by filling mason jars with sand and tea light which is another inexpensive way to make a walkway glow.
11. Sand helps to improve resistance (and thus traffic safety) in icy or snowy conditions.
12. We need sand in the beaches where tides, storms or any form of preconceived changes to the shoreline crumble the first sand.
13. Sand containing silica is used for making glass in the automobile and food industry- even household products for the kitchen.
14. Sand is a strong strand which is used for plaster, mortar, concrete, and asphalt.

**Table 2.2: - Details of Dispatch and Revenue**

Year	Dispatch (in CFT)	Revenue (in Rs Lakh)
2017-18	5638927	2.15
2018-19	2379607	3.60
2019-20	101000	-
<b>Total</b>	<b>8119534</b>	<b>5.75</b>

Source: - District Mining Office Ramgarh

The table no 2.2 shows the Dispatch and Revenue data of sand mine 2017- 2020. From FY 2020-21 till now there was no sand mining in the district. So, all the sand demand of the district is currently met by inter district supply. The demand is increasing gradually, due to ongoing infrastructure development activities in the district. As per this DSR it is estimated that the proposed mine can generate 2594225.7 CFT & average demand of last year is 2706511 CFT.

The proposed ghats will approximately meet the district demand as EMGSM 2020.



### 3 General Profile of the district

#### 3.1 General Information

The Ramgarh district carved out from erstwhile district Hazaribagh and is one of the 24 districts of Jharkhand. The Ramgarh district is situated on National Highway 33 & 46 km away from state's capital, Ranchi on northern side & 52 km away from Hazaribagh on southern side. The Geographical area of Ramgarh District is 1360.08 sq. km. The climate is generally dry with average rainfall 1344 mm. The temperature varies between 18° to 33°. However due to global warming, the temperature goes high up to 40°-44°. The fertile land comprises of red and yellow soil with some amount of sand. But most of the terrains are rocky covered with pebbles. This acts as check on fertility of soil.

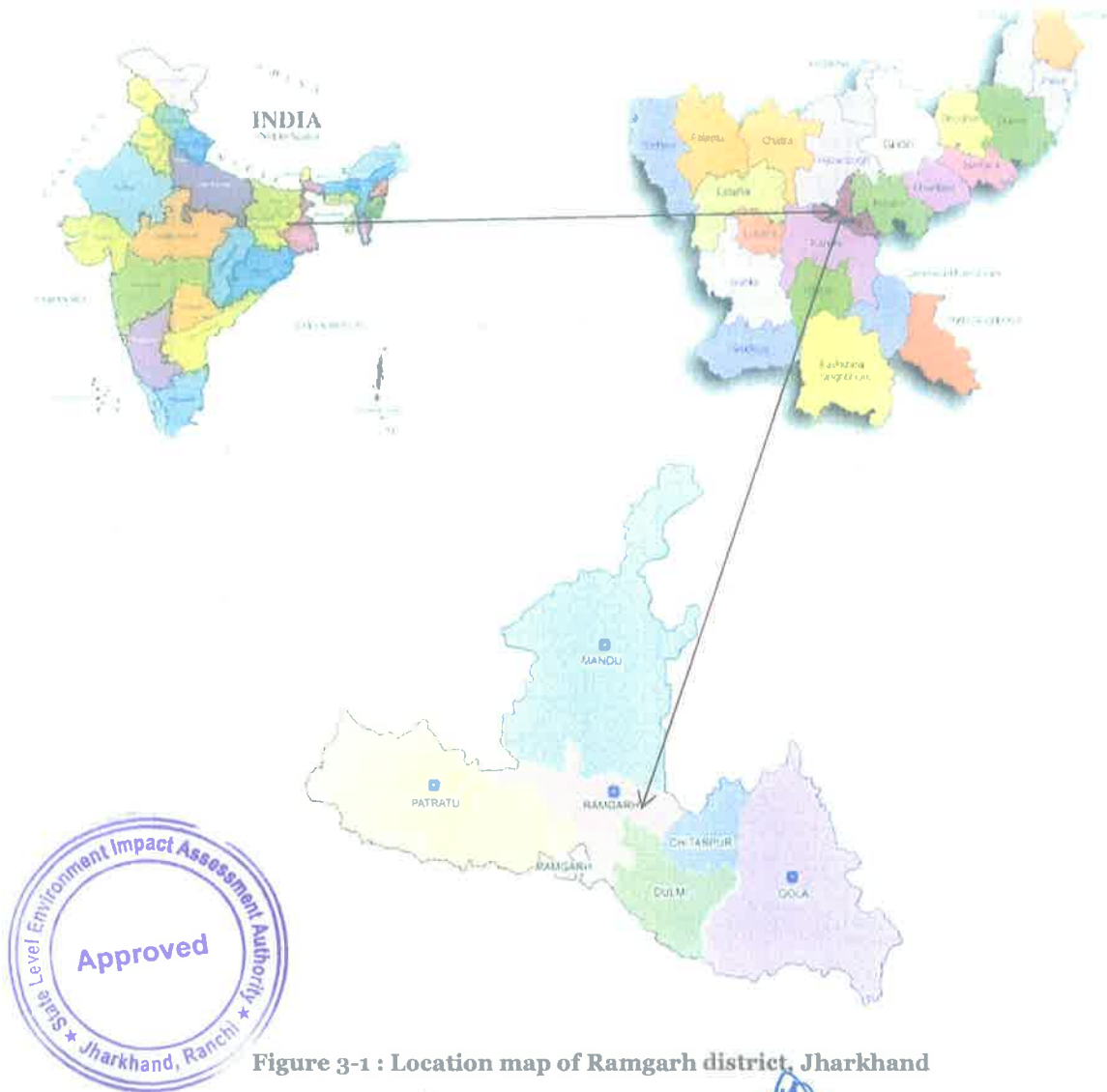


Figure 3-1 : Location map of Ramgarh district, Jharkhand



### 3.2 Administrative Setup of District

Ramgarh district has one Sub-division namely Ramgarh. The district comprises of 6 no. of blocks namely Chitarpur, Dulmi, Gola, Ramgarh, Mandu & Patratu. Ramgarh district is surrounded by North- Hazaribagh district, South- Ranchi district, East- Bokaro district, West- Ranchi district & Purulia district of West Bengal State. There are 315 villages in the district and 257 are Gram Panchayats in this district.

A Block map of Ramgarh District is furnished as Figure No.3.2.



Figure 3-2: Block map of Ramgarh District, Jharkhand

(Source: Central Ground Water Board, Ramgarh)

Detail of Blocks of Ramgarh District is furnished in Table No.3.1.

Table 3-1 : Details of Block of Ramgarh District

Sl. No.	Block Name	Area in sq.km.
1	Chitarpur	58
2	Dulmi	110
3	Gola	321
4	Ramgarh	134
5	Mandu	410
6	Patratu	308

(Source: <https://villageinfo.in/jharkhand/Ramgarh.html>)



### 3.2.1 Climate Condition

The area lies in the sub-humid region of Chotanagpur Plateau and enjoys semi-extreme type of climate. The day temperature rises around 40°C during the summers and drops down to around 10°C during the winter. The average annual rainfall of the district is 1365 mm. More than 80% of the precipitation is received during the monsoon months.

The rainfall of the district is given below in Table No.3.2.

**Table 3-2 : Details of rainfall data of five years (from 2016 to 2020)**

YEAR	2016	2017	2018	2019	2020	Average
JAN	2.8			3.6	36.4	14.2667
FEB	0			27.5	9.9	12.4667
MAR	13.4			25.2	81	39.8667
APR	0		49	19	63.1	32.775
MAY	60.6	26.8	133.1	56.5	57.7	66.94
JUN	139.5	210.8	134.3	73.4	226.2	156.84
JUL	227.6	863.4	233.8	219.1	348.2	378.42
AUG	383.2	243.7	365.1	285.3	385.6	332.58
SEPT	288	160	184.4	390.7	223.2	249.26
OCT	101.2	94.6	29.1	198.5	81.2	100.92
NOV			0	0.2	16.6	5.6
DEC			39.8	13.8	0.6	18.0667
<b>Total</b>	<b>1216.3</b>	<b>1599.3</b>	<b>1168.6</b>	<b>1312.8</b>	<b>1529.7</b>	<b>1365.34</b>

(Source: <https://hydro.imd.gov.in>)

### 3.2.2 Demography

Ramgarh district of Jharkhand has total population of 949,443 as per the Census 2011. Out of which 494,230 are males while 455,213 are females. In 2011 there were total 179,375 families residing in Ramgarh district. The Average Sex Ratio of Ramgarh district is 921.

As per Census 2011 out of total population, 44.1% people lives in Urban areas while 55.9% lives in the Rural areas. The average literacy rate in urban areas is 81% while that in the rural areas is 66.8%. Also the Sex Ratio of Urban areas in Ramgarh district is 887 while that of Rural areas is 949.

The population of Children of age 0-6 years in Ramgarh district is 134226 which is 14% of the total population. There are 69661 male children and 64565 female children between the age 0-6 years. Thus, as per the Census 2011 the Child Sex Ratio of Ramgarh is 927 which is greater than Average Sex Ratio (921) of Ramgarh district.

The total literacy rate of Ramgarh district is 73.17%. The male literacy rate is 70.82% and the female literacy rate is 54.14% in Ramgarh district.



### 3.2.3 Cropping pattern

Rice is the most important crop of the district. Paddy covers maximum of the gross cropped area. Among commercial crops, Cabbage, cauliflower and potato are major vegetables crops mostly in Gola block. Major cropping patterns include paddy-fallow, maize – potato, paddy – vegetable, sweet potato-vegetable. Gola and Chitarpur have maximum cropping intensity up to 260% but Dulmi is around up to 140%. Another block like Ramgarh, Patratu and mandu up to 85%.

### 3.2.4 Topography & Terrain

The Latitude and Longitude of district is 23°-38° and 85°-34° respectively. The average altitude of Ramgarh is 337 meters above the sea level.

The physiographic characteristics of the district are rich. It has waterfalls, hills, and land with avalanches. Ramgarh is surrounded by green forest.

### 3.2.5 Hydrogeology

The district is having varied hydrogeological characteristics due to which ground water potential differs from one region to another. It is underlain by Chotanagpur granite gneiss of pre-Cambrian age in three-fourth of the district.

**Aquifer systems-** Two types of aquifers are found. Weathered aquifer and fractured aquifers. Thickness of weathered aquifers varies from 10-20 m in granite terrain and 30-60m in lateritic terrain. In weathered aquifer ground water occurs in unconfined condition while in fractured aquifer ground water occurs in semi confined to confined condition.

**Depth to water level:** Central Ground Water Board has established network of observation wells for monitoring of groundwater level to know the behavior of ground water regime in the district. There are seven monitoring stations which are monitored every year in January, May, August & November.

During pre-monsoon season the minimum and maximum water level were observed as 2.25 mbgl at Barwatola and 11.19 mbgl at Bhurkunda respectively. The water level during the post-monsoon season of the district ranges from 1.6 to 5.9 mbgl.

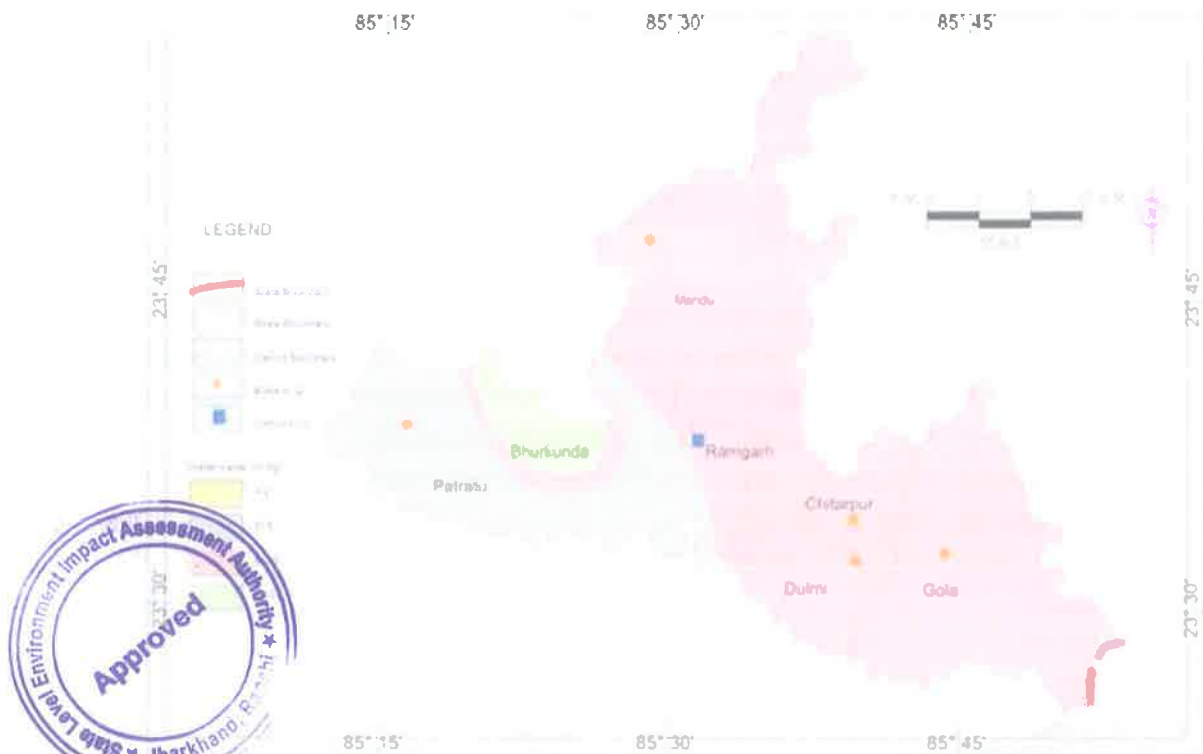
Differences pre and post monsoon in minimum and maximum water level were observed as 0.65 mbgl and 5.29 mbgl.





**Figure 3-3 : Hydrogeological map of Ramgarh district**

**(Source: Central Ground Water Board, Ramgarh)**



**Figure 3-4 : Pre- Monsoon depth to water level (2012) map of Ramgarh district**

**(Source: Central Ground Water Board, Ramgarh)**





Figure 3-5 : post-Monsoon depth to water level (2012) map of Ramgarh district

(Source: Central Ground Water Board, Ramgarh)

**3.2.6 Ground Water Development:**

In the rural areas the entire water supply is dependent on ground water. Ground water development is mainly carried out in the district through dug wells and Hand pumps. Dug wells are in general of 2 m diameter and between 8 to 15 m depth, depending on the thickness of the weathered zone, tapping the shallow ground water in the weathered zone and uppermost slice of the basement. Large number of dug wells used for drinking water is under private ownership for which there is no reliable data. Over the years Mark II/ Mark III hand pumps are being drilled in large numbers for ground water development. These hand pumps have the following two major advantages i) are less susceptible to contamination from surface sources and ii) they tap fractures between 20-60m depth which have been found to be less affected by seasonal water level fluctuation and thus have lesser chances of failure even during extreme summer. In rural areas of Ramgarh district the number of hand pumps drilled by PHED is 8743 of which 7310 are under working condition as on April 2012. There are 4290 dug wells, 8 shallow tube wells as per minor irrigation census 2006-07. In the urban areas ground water plays a supplementary role in water supply, the major supply being made through dams, reservoirs or weirs across rivers or streams. No authentic data is available on the number of ground water structures catering the urban water supply.



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**Table 3-3 : Stage of ground water development of Ramgarh District as on 2009**

Sl. No	Assessment Unit/ District	Net Annual Ground Water Availability	Existing Gross Ground Water Draft for Irrigation	Existing Gross Ground Water Draft for Domestic and Industrial Water Supply	Existing Gross Ground Water Draft For all Uses	Allocation for Domestic and Industrial Requirement supply (ha-m)	Net Ground Water Availability for future irrigation development	Stage of Ground Water Development (%)
1	Gola	2571.55	882.06	211.55	1093.61	316.86	1372.62	42.53
2	Mandu	3179.08	627.10	311.01	938.11	433.85	2118.13	29.51
3	Patratu	2693.69	453.56	268.76	722.32	402.56	1837.57	26.82
4	Ramgarh	1913.57	945.63	343.18	1804.34	480.10	487.83	94.29
	<b>Total</b>	<b>10357.88</b>	<b>2908.35</b>	<b>1134.51</b>	<b>4042.86</b>	<b>1633.37</b>	<b>5816.16</b>	<b>39.03</b>

**(Source: Central Ground Water Board, Ramgarh)**

**Ground Water Quality:** Ground water in the phreatic aquifers in Ramgarh district is alkaline in nature as pH ranges between 7.11 – 7.97 in five samples out of six samples. The specific electrical conductance of ground water in phreatic zone during May 2011 was in the range of 604 - 1238  $\mu\text{S}/\text{cm}$  at 25°C.

**a) Drainage System**

Damodar is the main river of the district and it also forms a major river basin. Important tributaries of Damodar River are Nalkari, Bhairavi and Bokaro river. Small Rivers such as Hurhuri, Gomti, Barki, Kurum, Kochi, Sherbhuki, Dhobdhab also flowing through the district. Subarnarekha River is flowing south eastern part of district. Tributaries of Subarnarekha are Kadamgara, Khatgara etc.

A Drainage map of Ramgarh District is provided by JSAC.



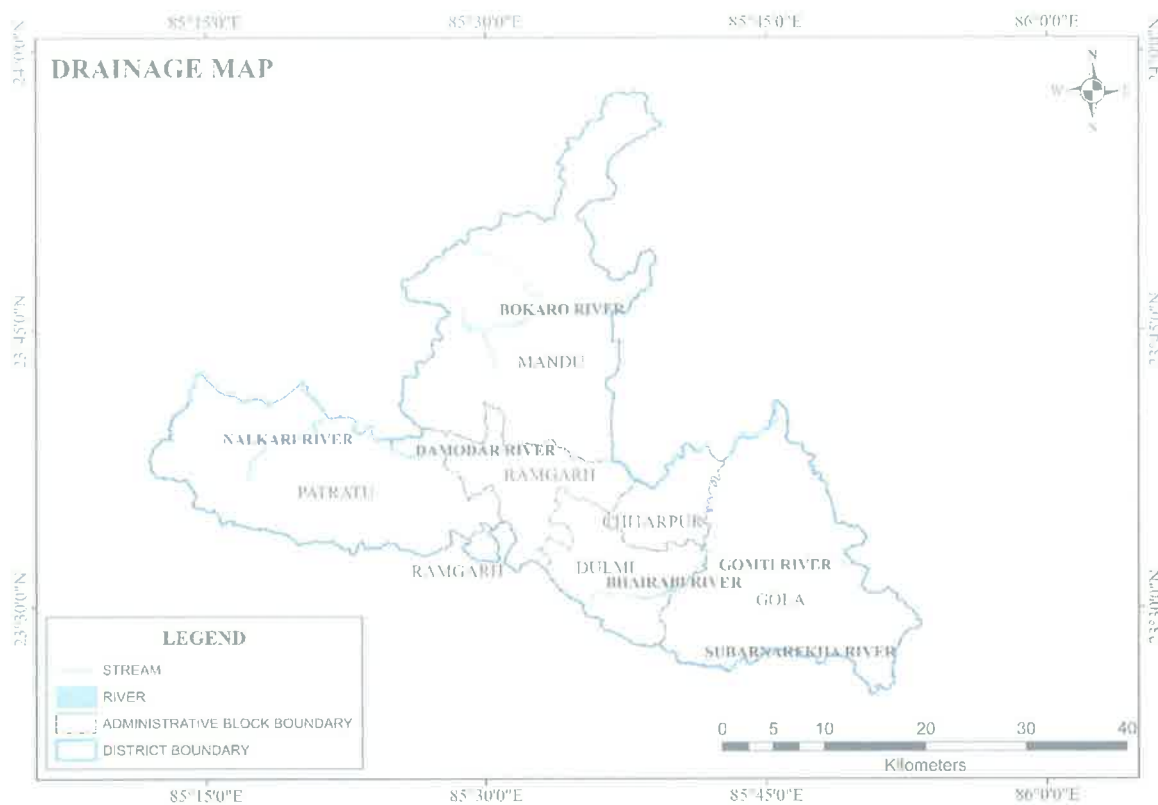
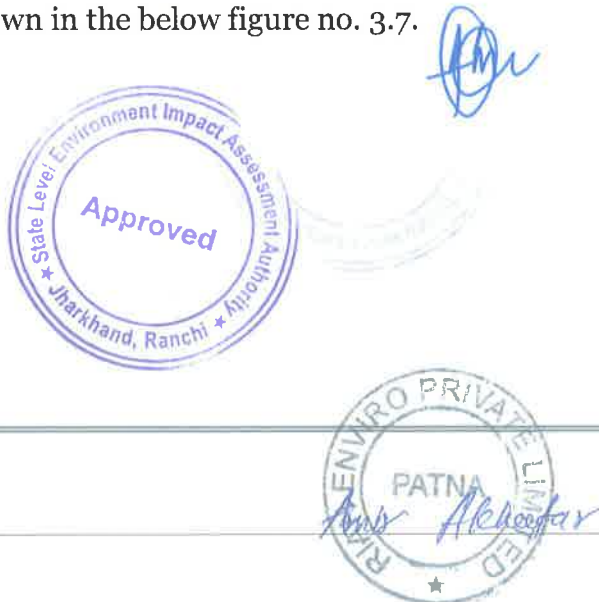


Figure 3-6 : Drainage map of Ramgarh district  
 (Source: National Informatics Centre)

• **Floods in district Ramgarh:**

The state of Jharkhand is predominantly a hilly state where the problem of flooding was rare till sometime back. However, the erosion of embankments spread of population and general disturbance in ecology and inability of identifying the catchment areas, the incidence of Flash floods has become frequent. The floods have occurred in the following 11 districts of the state, Dumka, Godda, Deogarh, Sahebganj, Pakur, Dhanbad, East and West Singhbhum, Saraikela-Karsawan, Gumla and Hazaribagh during the years 2000-2004.

Distribution of the vulnerable and less vulnerable flood prone districts are shown in the below figure no. 3.7.



Map 1.1: Multi hazard prone Area in Jharkhand

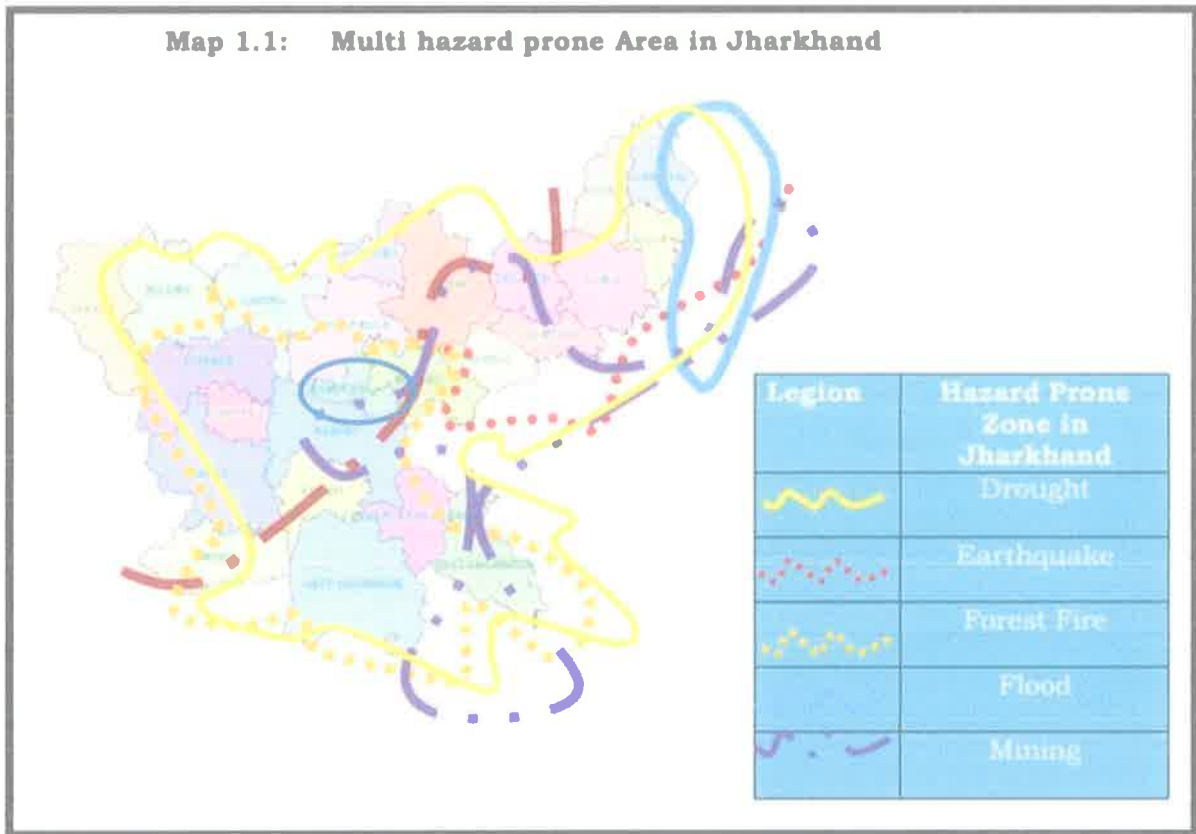


Figure 3-7 : Multi hazard prone area in Jharkhand

(Source: <https://selfstudy365.com/qa/how-many-districts-of-jharkhand-come-under-the-earthquake-hazard-zone-fiedabao>)

From the above information, it is being observed that, Ramgarh is non-flood prone district of Jharkhand.

**b) Seismicity**

As per Seismicity Zonation map, 3 types of Zones have been observed in Jharkhand. Rangarh comes under India's seismic zone-II.



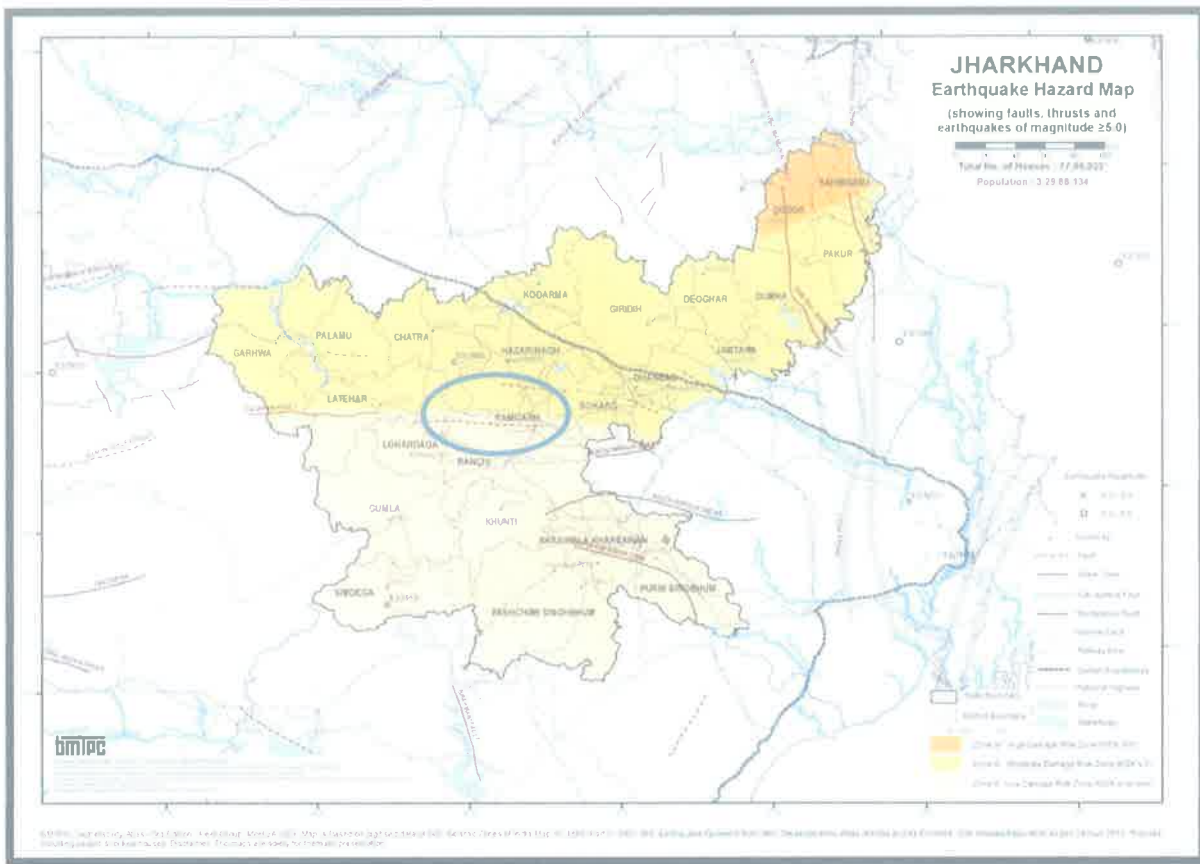


Figure 3-8 : Jharkhand Earthquake Map

(Source: <https://bmtpc.org/DataFiles/CMS/file/VAI2019/eq-jh.html>)

**c) Flora**

Ramgarh District is well endowed with forest in an area of 487.93 Sq.km. Ramgarh district is rich plant diversity. The common trees are Shisham, Babool Khair, Jarul, Vilayati Babool, Kakar etc.

**d) Fauna**

A map showing Wildlife Protect areas in Jharkhand state figure no 3.9 which depicts there is no Wildlife Protect area in Ramgarh District.



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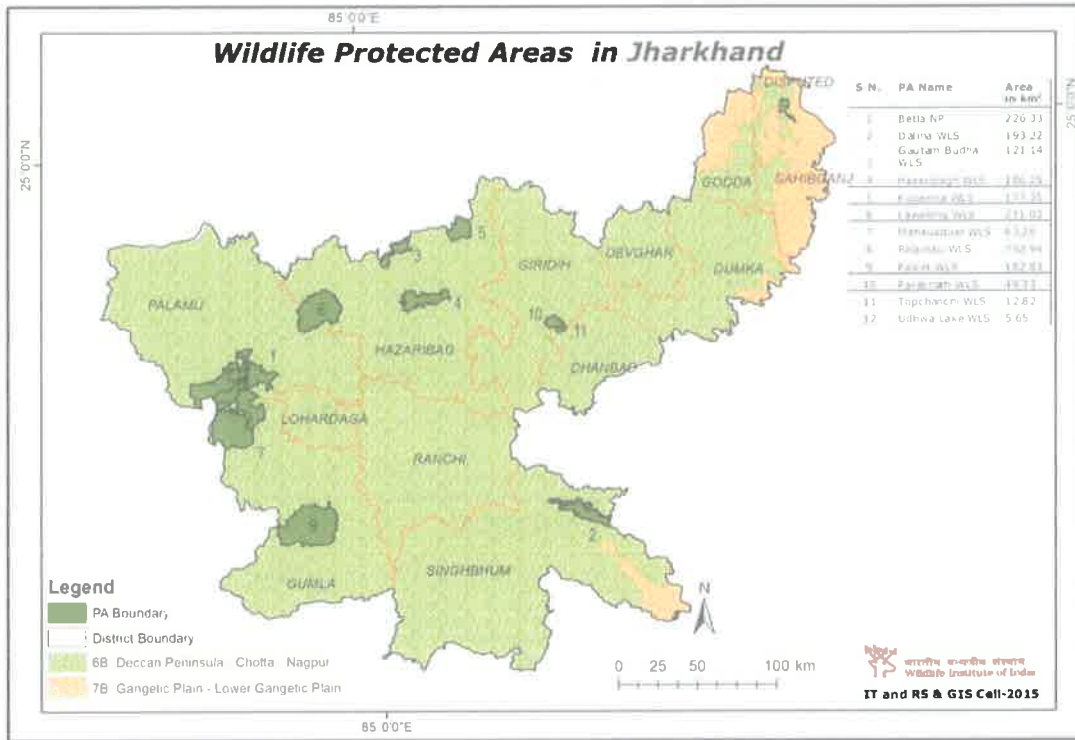


Figure 3-9 : Wildlife Protected area in Jharkhand District  
 (Source: [http://wiienvis.nic.in/Database/Maps\\_PAs\\_1267.aspx](http://wiienvis.nic.in/Database/Maps_PAs_1267.aspx))

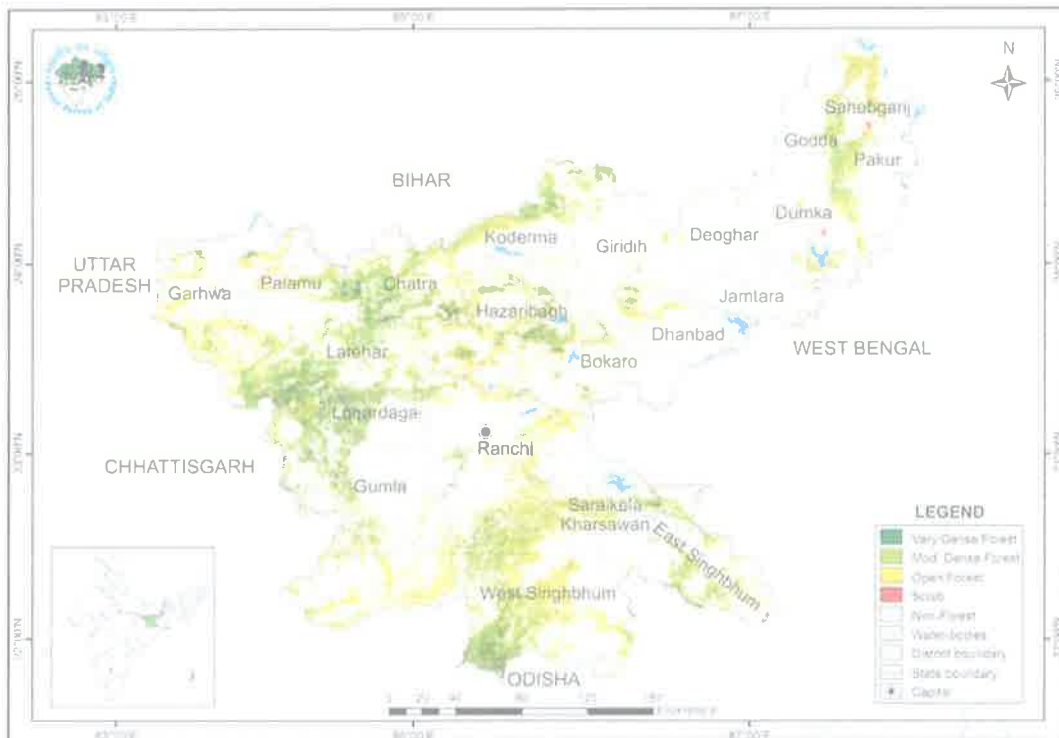


Figure 3-10 : Forest Cover Map of Jharkhand  
 (Source: [https://forest.jharkhand.gov.in/Reports\\_2017/forestcovermap.aspx](https://forest.jharkhand.gov.in/Reports_2017/forestcovermap.aspx))

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 PATNA  
 Anil Akhater

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Approved  
 Jharkhand, Ranchi

## 4 Physiography of the district

### 4.1.1 General Landforms

Physiographically, Ramgarh district forms part of the North Chhotanagpur plateau. It forms the lower plateau lying below in upper plateau of Hazaribag. Important physiographic feature of the district is the Damodar Trough/Basin/Rift zone. This E-W trending rift zone of Damodar valley, presently filled by Gondwana sediments, dissects the Chotanagpur Plateau into two parts – Ranchi and Hazaribag Plateau.

The lowest elevation is 260 m near Purabbandtoli village and highest altitude is recorded near village Indrabandtoli. By and large, north east and part of eastern terrain is somewhat hilly and gradually drops down to areas around river Damodar. Nearly 15.6% of the area is hilly, 43.1% area is undulating to rolling and 39.8% belongs to very gentle to gentle slope category. General slope direction is towards the main rivers. The river Damodar and its tributaries drains the major part of Ramgarh district.

### 4.1.2 Soil and rock pattern

Broadly, soils of this district are formed over granite gneiss, sandstone, laterite, micascist and phyllite under the sub humid climate and are conditioned by relief. Influence of physiography have been discussed earlier. High rainfall and high temperature induced deeper chemical weathering, leaching of bases, resulting into acidic surface soils becoming neutral to mildly alkaline in the subsurface. Occasionally, in some soils moderately alkaline and calcareous subsoils are met with. These processes have been active in the North Chhotanagpur plateau area resulting into red and yellow soils.

According to Soil Resources and Agro-Climatic zones of Jharkhand, the Ramgarh district of Jharkhand falls under J3 C3 Agro Ecological Region. Broadly two type of soil found -Red Soil and Sandy loam. Three soil orders namely Entisols, Inceptisols and Alfisols were observed in the district. The fertile land comprises of red and yellow soil with some amount of sand. But most of the terrains are rocky covered with pebbles. This acts as check on fertility of soil.

As per soil mapping made by studies on soil texture, soil depth, soil colour and soil fertility, 47 soil series have been identified for Ramgarh district. Of these series, 20 soil series on granite gneiss, sandstone – 12, Laterite – 1, Phyllitemicascist – 10 and 4 on alluvium. According to USDA soil taxonomy, 47 soil series belongs to three soil orders namely: Alfisols – 19, Entisols – 16 and Inceptisols – 12 soil series.



Maximum area (31.22%) is occupied by fine loamy soils followed by loamy skeletal (13.72%), fine (6.33%), clayey (5.41%) and coarse loamy (1.56%) in decreasing order of extent. (Source: Report on Soil Resources of Ramgarh District, JSAC, Ranchi)

**a) Different geomorphologic units**

The Ramgarh district is hilly as such, have undulating to gently sloping macro relief and presents a upland- valley micro relief which dictates the cropping pattern. In physiography, five land type terms from valley to hills are recognized in Revenue lands classification. These terms and their meaning as per revenue department are described below:

1. Doyin land: These are 1st class rice lands. They are situated in depressions. Fine, late variety of paddy are grown in these lands.
2. Chaur land: They are used for paddy cultivation and are situated just above Doyin land. Its quality and production is next to Doyin land.
3. Taria land: These are leveled up lands just above Chaur land and its productivity potential for rice is lessor that Chaur land.
4. Tand land: These lands are situated near the habitation or homestead. They are usually used for coarse millets or vegetables depending upon the soil depth.
5. Tangril Pahar: These are hilly and rocky lands supporting mainly forest vegetation of different species.

**Khasra Forest:** These forests are located on gently to moderately sloping lands 3-10%. At places, intercrops between widely spaced sal trees are taken.

Some of the Doyin lands in Jharkhand are equivalent to Bahara type of lands in Chhattisgarh state. They are located at lowest local base level and remain moist, occasionally water flows in them. At places, its use is restricted to only paddy. Of late, shallow cement ring are fixed in such land to open small wells to be used for irrigation.

(Source: Report on Soil Resources of Ramgarh District, JSAC, Ranchi)



## 5 Land use pattern of the district:

Ramgarh District is well endowed with forest in an area of 487.93 Sq. km, which is 28.25% of total area. 3.86% of the total geographical area and 14.5% of the net cropped area is being irrigated. 75% of the agricultural land holding belongs to small and marginal farmers which have contributed to poor level of mechanized farm operations. The total area is 137602 ha in which net cultivated area of the district is 20667.32 ha. (Source: <https://ramgarh.kvk4.in/district-profile.php>)

Table 5-1 : Land use pattern of Ramgarh District, Jharkhand

Name of Block	Geographical Area (Acre)	Agricultural Land (Acre)	Irrigated Land (Acre)	Un-irrigated Land (Acre)	Barren Land (Acre)	Forest Land (Acre)
Ramgarh	72567.53	21360.66	3638.80	17721.86	842.98	8160.46
Gola	82981.76	40197.57	5201.57	34996.00	377.37	18650.00
Mandu	109224.62	10073.70	1032.37	9041.33	1858.55	45086.85
Patratu	80059.30	11737.09	1062.52	10674.57	5393.78	25524.78
<b>Total</b>	<b>344833.21</b>	<b>83369.02</b>	<b>10935.26</b>	<b>72433.76</b>	<b>8472.68</b>	<b>97422.09</b>

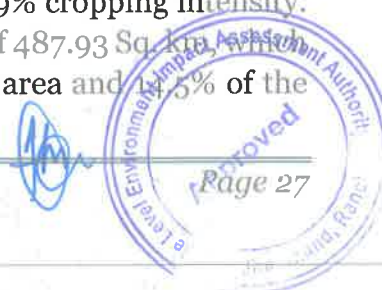
(Source: Previous DSR, Ramgarh)

### 5.1.1 Forest detail of the area

Ramgarh District is well endowed with forest in an area of 487.93 Sq.km, which is 28.25% out of total area. Forests are an important natural resource for an area. They have a moderating influence against floods and rain and thus they protect the soil against erosion. They also provide basic raw material to a number of important industries, namely furniture, match box, paper, rayon construction, railway slippers, wooden poles, etc. Moreover, the environmental benefits of the forests are not far to seek.

### 5.1.2 Agriculture & Irrigation

Agriculture is the main occupation of the people in the district. Ramgarh district is fortunate in terms of development in both industry and agriculture sector. On an average about 58 percent of the total population belongs to the agricultural population while the non-agricultural sector accounts for the remaining 42 percent. On an average this district has 119% cropping intensity. Ramgarh District is well endowed with forest in an area of 487.93 Sq. km, which is 28.25% of total area. 3.86% of the total geographical area and 14.5% of the



next cropped area is being irrigated. 75% of the agricultural land holding belongs to small and marginal farmers which have contributed to poor level of mechanized farm operations. The total area is 137602 ha in which net cultivated area of the district is 20667.32 ha. (Source: <https://ramgarh.kvk4.in/district-profile.php>).

### **5.1.3 Mining**

The district holds a strong position on the mineral map of the country. The district is endowed with a large and rich deposit of Coal and Coal Bed Methane (CBM) and also possesses various other minerals like Limestone: Isolated patches of limestone occur along a belt extending east and west parallel with the coal-fields, Fire Clay, Iron ore: In the Ramgarh and Bokaro Coalfields, nodules and lenticles of iron ore are found. At one time these were used by indigenous smelters etc. Besides, district also possesses Building material, (Stone Aggregate), Ordinary sand.

The coalfields of the Ramgarh district lie in the Damodar Valley. The important geological formations of the district are Gondwana System and the rocks of the Damuda Group of Lower Gondwana age comprise the most important coal seams. The coal deposit of the district mainly found in South Karanpura, West Bokaro and Ramgarh coalfields.



## 6 Geology:

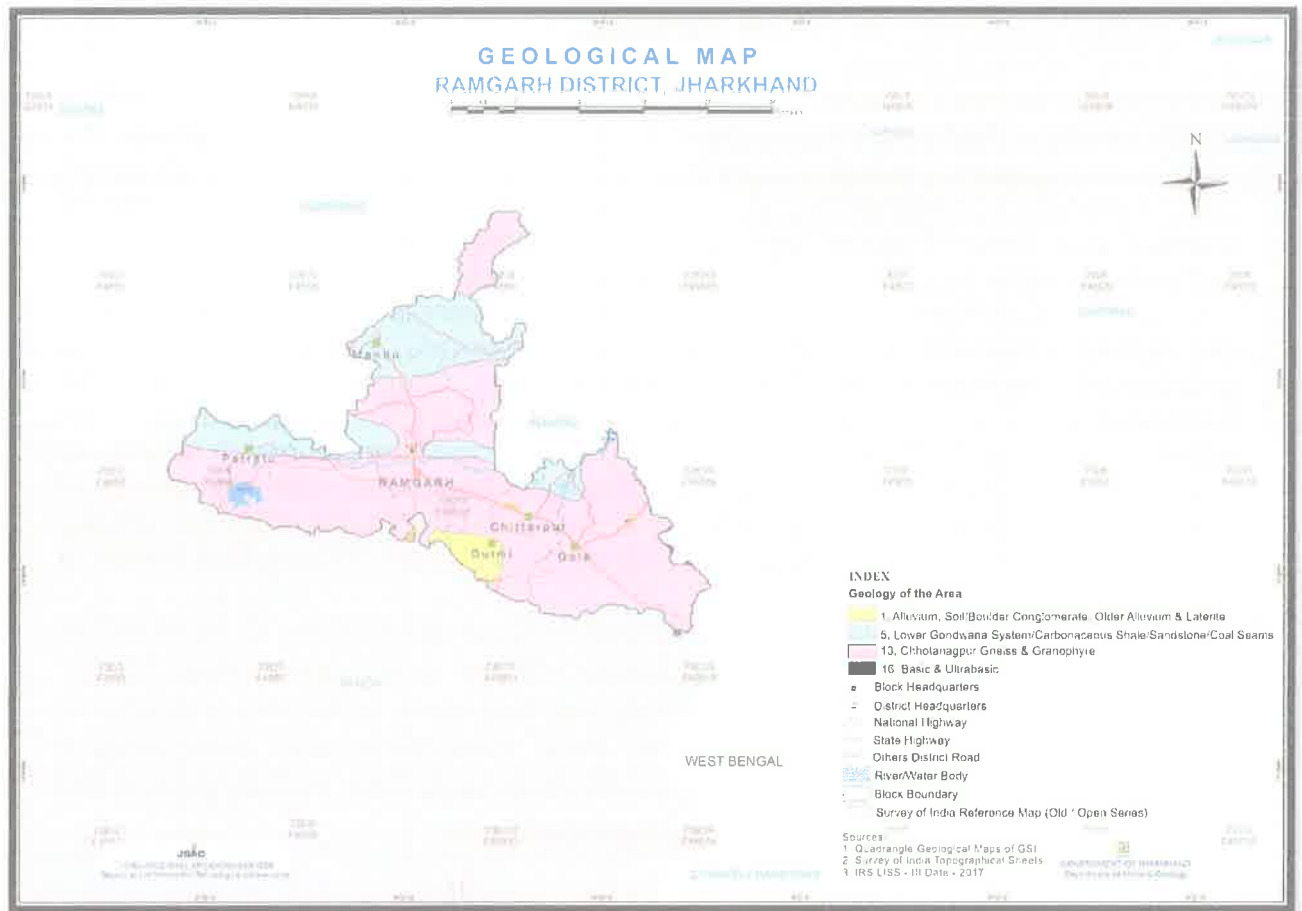
Geologically, Ramgarh district comprises of Chotanagpur Granite Gneissic Complex (CGGC) rocks of Archaean-Proterozoic Age and rocks of Gondwana Supergroup. The CGGC terrain exposing complex assemblage of diversified rocks which have witnessed several periods of magmatism, tectonism, sedimentation, metamorphism, partial melting and mineralization that have altered pre-existing volcanic, plutonic, sedimentary rocks to a Gneiss-Granulite-Granite association.

Two Formations of Damuda Group of Lower Gondwanas are exposed in the district - Barakar Formation and Barren Measures. Barakar Formation is prominently developed in Damodar valley basin comprising Conglomerate, Sandstone, Shale and thick measures of Coal seams showing fining upward sequence, which is succeeded by Barren Measures comprising Iron Stone Shale with or without Carbonaceous matter, Micaceous/Carbonaceous grey Shale, Heterolithic Sequence of Sandstone and Mudstone often depicting coarsening and thickening sequence. Among fossils imprints of *Glossopteris*, *Gangomopteris*, *Schizoneura*, *Ptilophyllum* occurs in Lower Gondwana.

Structurally, CGGC bears imprints of three generations of deformation producing distinctive Folds and related fabrics whereas Gondwana exhibits Gravity Normal Faults along with a various Primary and Secondary Sedimentary structures like Cross Stratification, Ripple marks, Pene Contemporaneous Deformational structures, Hummocky Cross Stratification etc. Dudhi nala area, Mandu Block of the district is regarded as museum of sedimentary structures.



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**Figure 6-1 : Geological Map of Ramgarh**

(Source: [https://geology.jharkhand.gov.in/documents/geological\\_map/Ramgarh.pdf](https://geology.jharkhand.gov.in/documents/geological_map/Ramgarh.pdf))



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## 7 Mineral wealth

The district holds a strong position on the mineral map of the country. The district is endowed with a large and rich deposit of Coal and Coal Bed Methane (CBM) and also possesses various other minerals like Limestone: Isolated patches of limestone occur along a belt extending east and west parallel with the coal-fields, Fire Clay, Iron ore: In the Ramgarh and Bokaro Coalfields, nodules and lenticles of iron ore are found. At one time these were used by indigenous smelters etc. Besides, district also possesses Building material, (Stone Aggregate) ordinary sand.

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The mineral resources of Ramgarh district playing massive role in industrial, social and economic development of the district. Available mineral resources in the district area:

- Coal
- Lime stone
- Quartzite
- Sand
- Stone
- Morram
- Brick Earth

Sand mining activities are playing a significant role industrial, social and economic development of the district. The sand mining carried out throughout the district mainly in stretch of Damodar River.

### 7.1 Overview of mineral resources

The mineral resources of the district whose categorization and estimation have been done are furnished in this section.

### 7.2 Details of Resources

#### 7.2.1 Sand and other riverbed minerals:

##### i) Drainage System

RIVERS-



Damodar is the main river of the district and it also forms a major river basin of the district. Subarnarekha River is another important river following along south eastern part of the district.

River Damodar rises from the Karampat hill in Palamau and flows for 75 km in this district. It is joined by Garhi or Tandwa river near its entrance into the district, where its bed is 407 m above the mean sea level.

Important tributaries of Damodar River are Bokaro, Bhairavi and Nalkari River. Bokaro nadi drains the north east part of Ramgarh district through its tributaries namely Dudhi and Chotha on the right bank and Chatra nadi on the left bank. A major part is drained by river Damodar, as such, physiographically this district is referred as upper part of the Damodar valley.

**Table 7-1 : Drainage System with description of Main River**

<b>S. No.</b>	<b>Name of the River</b>	<b>Area drained (Sq. Km)</b>	<b>% Area drained in the district</b>
1	Subarnarekha	3.34	0.238
2	Bhairavi	2.25	0.161
3	Nalkari	0.60	0.043
4	Bokaro	4.81	0.343
5	Damodar	19.47	1.387
6	Gomti	0.18	0.21

**Table 7-2 : Salient Features of Important River & Stream**

<b>S. No.</b>	<b>Name of the River or Stream</b>	<b>Total Length in the District (in km)</b>	<b>Place of Origin</b>	<b>Altitude at Origin</b>
1	Subarnarekha	26.90	Piska near Ranchi	610m
2	Bhairavi	35.67	Chitarpur	400m
3	Naikari	13.34	---	---
4	Bokaro	28.75	Hazaribag Plateau	610m



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5	Damodar	73.32	Chandwa (Latehar)	420m
6	Gomti	19.06	--	--

## ii) Annual deposition of riverbed minerals

Annual deposition of riverbed minerals is dependent on various factors which are explained below.

### A. Geomorphological studies

Geomorphological characteristic of a river is foremost factor for annual deposition of sedimentary load. The study includes following parameter:

#### I. Place of Origin

Details of origin of rivers of Ramgarh District is furnished below.

Table 7-3 : Place of Origin of important rivers and streams

Name of the River or Stream	Place of origin
Damodar	Chandwa (Latehar)
Bokaro	Hazaribag Plateau
Bhairavi	Chitarpur
Subarnarekha	Piska near Ranchi

#### II. Catchment Area

The Ramgarh district is mainly drained by the Damodar River and its tributary rivers which are forming the main catchment area of the district.

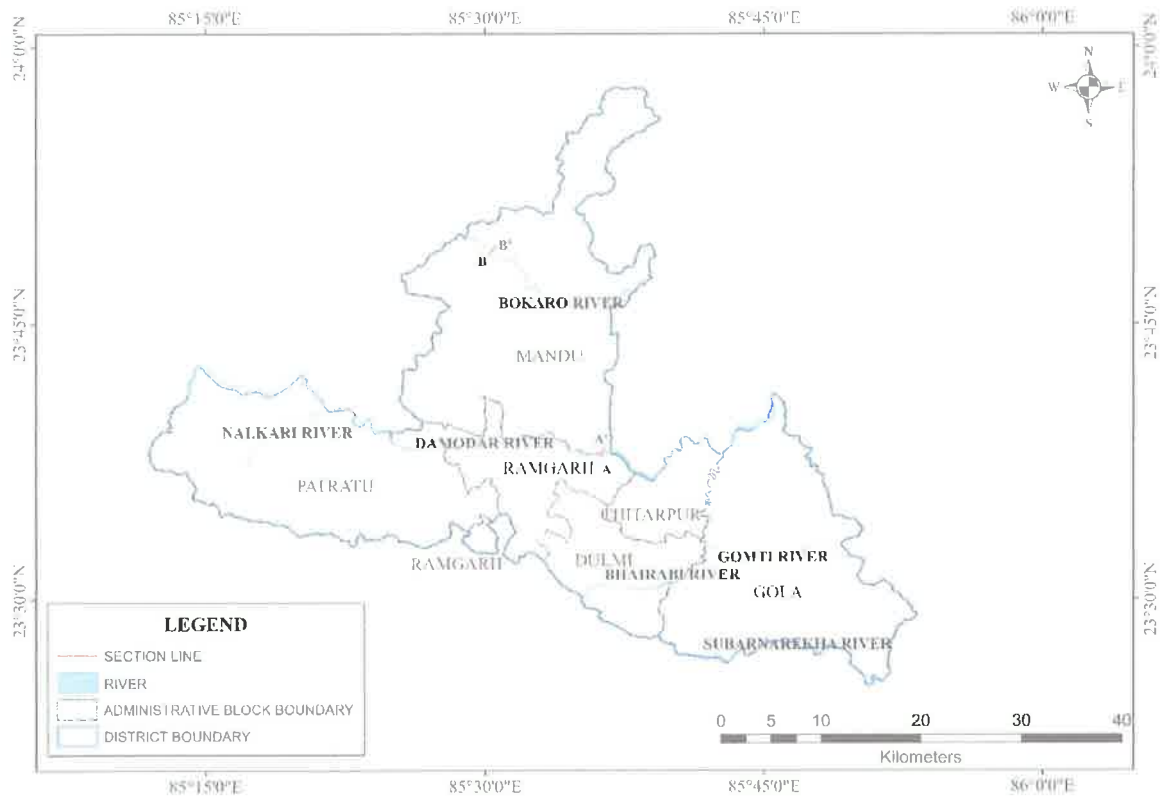
#### III. General profile of river stream

River profile has been studied along the cross-section lines which was chosen based on the drastic variation of the river widths, proximity of the operating sand Ghats and the position of the sand bars.

Relative disposition of rivers in Ramgarh district along with the distribution of the section lines are shown in figure 7.1.



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**Figure 7-1 : Plan showing the major rivers along with the distribution of Section Lines, Ramgarh District, Jharkhand**



**Figure 7-2 : Cross Section along A-A' on river Damodar**



**Figure 7-3 : Profile section along river Damodar**

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Figure 7-4 : Cross section of Bokaro River along B-B'



Figure 7-5 : Profile section along Bokaro River

### i) Annual deposition factor

Annual deposition of riverbed materials depends on various factors, such as process of deposition, mode of sediment transport, sediment transport rate and sediment yield of the river.

#### 1. Process of deposition

Deposition is the processes where material being transported by a river is deposited. Deposition occurs when the forces responsible for sediment transportation are no longer sufficient to overcome the forces of gravity and friction, creating a resistance to motion; this is known as the null-point hypothesis. This can be when a river enters a shallow area or towards its mouth where it meets another body of water.

The principle underlying the null point theory is due to the gravitational force; finer sediments remain in the water column for longer durations allowing transportation outside the surf zone to deposit under calmer conditions. The gravitational effect or settling velocity determines the location of deposition for finer sediments, whereas a grain's internal angle of friction determines the deposition of larger grains on a shore profile.

Deposition of non-cohesive sediments: Large-grain sediments transported by either bedload or suspended load. In case of bedload, when there is insufficient bed shear stress and fluid turbulence are insufficient to keep the sediment moving, the grain cease horizontal movement and rapidly come to rest. In case of suspended load, the grain settles longer distance vertically through the fluid before coming to rest.

Deposition of cohesive sediments: The cohesion of sediment occurs with the small grain sizes associated with silts and clays, or particles smaller than  $4\Phi$  or  $0.075\text{mm}$ .



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these fine particles remain dispersed in the water column, Stokes law applies to the settling velocity of the individual grains. The face of a clay platelet has a slight negative charge where the edge has a slight positive charge when two platelets come into close proximity with each other the face of one particle and the edge of the other are electrostatically attracted, and then have a higher combined mass which leads to quicker deposition through a higher fall velocity.

## **2. Mode of sediment transport in rivers**

Sediment transport in rivers provides a dynamic linkage between flow and channel form. Mainly there are three processes by which sediment load is transported and these are (i) rolling or traction, in which the particle moves along a sedimentary bed but is too heavy to be lifted from it; (ii) saltation; and (iii) suspension, in which particles remain permanently above the bed, sustained there by the turbulent flow of the water.

Another name for sediment transport is sediment load. The total load includes all particles moving as bedload, suspended load, and wash load.

**Bed load:** Bedload is the portion of sediment transport that rolls, slides or bounces along the bottom of a waterway. This sediment is not truly suspended, as it sustains intermittent contact with the streambed, and the movement is neither uniform nor continuous. Bedload occurs when the force of the water flow is strong enough to overcome the weight and cohesion of the sediment. While the particles are pushed along, they typically do not move as fast as the water around them, as the flow rate is not great enough to fully suspend them. Bedload transport can occur during low flows (smaller particles) or at high flows (for larger particles). Approximately 5-20% of total sediment transport is bedload. In situations where the flow rate is strong enough, some of the smaller bedload particles can be pushed up into the water column and become suspended.

**Suspended load:** While there is often overlap, the suspended load and suspended sediment are not the same thing. Suspended sediment are any particles found in the water column, whether the water is flowing or not. The suspended load, on the other hand, is the amount of sediment carried downstream within the water column by the water flow. Suspended loads require moving water, as the water flow creates small upward currents (turbulence) that keep the particles above the bed. The size of the particles that can be carried as suspended load is dependent on the flow rate. Larger particles are more likely to fall through the upward currents to the bottom, unless the flow rate increases, increasing the turbulence at the streambed. In addition, suspended sediment will not necessarily remain suspended if the flow rate slows.



Wash load: The wash load is a subset of the suspended load. This load is comprised of the finest suspended sediment (typically less than 0.00195 mm in diameter). The wash load is differentiated from the suspended load because it will not settle to the bottom of a waterway during a low or no flow period. Instead, these particles remain in permanent suspension as they are small enough to bounce off water molecules and stay afloat. However, during flow periods, the wash load and suspended load are indistinguishable.

### 3. Sediment Transport Rate

The rate at which sediment is moved past a cross section of the flow is called either the sediment transport rate or the sediment discharge. It's related to the sediment load, but it's different, just because different fractions of the sediment load are transported at different rates. It can be measured in mass per unit time, or in weight per unit time, or in volume per unit time. The sediment transport rate is commonly denoted by  $Q_s$ .

### 4. Estimation of Sedimentation

There are two approaches to obtaining values describing sediment loads in streams. One is based on direct measurement of the quantities of interest, and the other on relations developed between hydraulic parameters and sediment transport potential.

The total bed material load is equal to the sum of the bedload and the bed material part of the suspended load; in terms of volume transport per unit width,  $q_t = q_b + q_s$ . Here wash load, i.e. that part of the suspended load that is too fine to be contained in measurable quantities in the river bed, is excluded from  $q_s$ .

There are number of equations to compute the total sediment load. Most of these equations have some theoretical and empirical bases.

In 1973, Ackers and White developed a general theory for sediment transport which was calibrated against the flume-transport data then available. Their functions have been widely accepted as one of the best available procedures for estimating the total bed over the full width of the flow section.

Dendy Bolton formula is often used to calculate the sedimentation yield. But use of these equations to predict sediment yield for a specific location would be unwise because of the wide variability caused by local factors not considered in the equation's development. However, they may provide a quick, rough approximation of mean sediment yields on a regional basis. Computed sediment yields normally would be low for highly erosive areas and high for well stabilized drainage basins with high plant density because the equations are derived from average values. The equations express the general relationships between sediment yield, runoff and drainage area.



## 5. Sediment Yield

The water that reaches a stream and its tributaries carries sediment eroded from the entire area drained by it. The total amount of erosion debris exported from such a drainage basin is its sediment load or sediment discharge and the sediment yield is the sediment discharge divided by the total drainage area of the river upstream of the cross section at which the sediment discharge is measured or estimated. Sediment yield is generally expressed as a volume or weight per unit area of drainage basin—e.g., as tons per square kilometer. Further, sediment yield is usually measured during a period of years, and the results are thus expressed as an annual average.

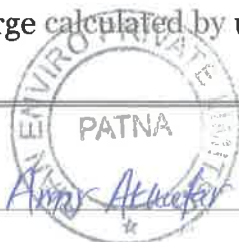
### ii) Replenishment Study (As per EMGSM guidelines, 2020):

Replenishment study for a river solely depends on estimation of sediment load for any river system and the estimation is a time consuming and should be done over a period. The process in general is very slow and hardly measurable on season-to-season basis except otherwise the effect of flood is induced which is again a cyclic phenomenon. Usually, replenishment or sediment deposition quantities can be estimated in the following ways as given below:

- A. Replenishment study based on satellite imagery involves demarcation of sand bars potential for riverbed mining. Both pre and post monsoon images need to be analysed to established potential sand bars. Volume estimation of sand is done by multiplying Depth and Area of the sand bar. The sand bars are interpreted with the help of satellite imagery. Ground truthing has been done for 100% of the total identified sand bars. During ground truthing, width and length of each segment were physically measured. It has also been observed that in few cases, sand bars have attained more than 3 meters height from the average top level of the river beds. Considerations of sand resources have been restricted within 3 meters from the average top surface of the river bed.
- B. Direct field measurement of the existing leases involving estimation of the volume difference of sand during pre- and post-monsoon period. With systematic data acquisition, a model has developed for calculation of sediment yield and annual replenishment with variable components.
- C. The replenishment estimation based on a theoretical empirical formula with the estimation of bed-load transport comprising of analytical models to calculate the replenishment estimation.

### A. Replenishment estimation

Sedimentation in any river is dependent on sediment yield and sediment yield depends on soil erosion in river's catchment area. Catchment yield is computed using Strange's Monsoon runoff tables for runoff coefficient against rainfall return period. Peak flood discharge 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.

**Methodology Adopted:** To delineate replenishment percentage in the river bed of the district, below mentioned steps have been followed.

- **Field data collation:**

Field data collations were done during pre-monsoon period, post monsoon period & end period for the river ghats on continuous basis. However, the nonoperational areas were covered through traverses. In both the cases, relative elevation levels were captured through DGPS/ Electronic Total Station. Thickness of the sand bars was measured through sectional profiles. In few instances, sieve analysis of the sands was carried out to derive the size frequency analysis.

Physical benchmark also established using DGPS at the river site.



Figure 7-6 : Site View of River Damodar

- **Selection of Study profiles:**

Study profiles are selected based on the occurrence of the sand bars in the channel profiles. Aerial extents of each of the profiles are mapped from satellite imagery. Frequency distribution did while selection of the ground truthing of the blocks.

- **Data Compilation:**

Following data were compiled for generation of this annual replenishment report:

- Elevation levels of the different sand Ghats and Sand Bar's as measured at site.
- Extents of the sand bars are measured from the pre monsoon satellite imagery.
- Sand production data of the district.



• **Assessment of sediment load in the river:**

Assessment of sediment load in a river is subjective to study of the whole catchment area, weathering index of the various rock types which acts as a source of sediments in the specific river bed, rainfall data over a period not less than 20 years, and finally the detail monitoring of the river bed upliftment with time axis. Again, the sediment load estimation is not a dependent variable of the district boundary, but it largely depends upon the aerial extents of the catchment areas, which crossed the district and state boundaries.

• **Estimation of annual sand deposition:**

The major sand producing rivers of the Ramgarh district are Bokaro and Damodar River. Planning has been done for systematic sand mining in the rivers.

Altogether **29** sand bars have been identified during pre-monsoon period. Out of the total **29** Ghats, 16 are falling in Bokaro River and 13 ghats are falling in Dadodar River. During post-monsoon period, total **52** sand ghats identified. Among this 30 ghats are falling on Bokaro River and 22 sand ghats are falling on Damodar River.

While calculation of the areas of sand bar, a classification system has been adopted with three categories of land identified within the channel areas which is as follows:

- a. The untapped Sand Bars.
- b. The Sand bars worked in the pre-monsoon period.
- c. Main channel course within the channel.

Details of each sand bars along with their sand resources in pre monsoon and post monsoon period are provided in below table no 7.4.





Table 7-4 : Estimation of Sand Resources in Pre monsoon period & Post monsoon period in sand bars

Pre monsoon		Post monsoon										
Sand Bar_Code	RL (m)	Area in sq.m.	Sand Thickness in m.	Sand Volume in M. Cum	S L No	Sand Bar_Code	RL (m)	Area in sq.m.	Sand Thickness in m.	Sand Volume in M. Cum	Difference (Mcum)	
Estimation of Sand Resources in Pre monsoon period & Post monsoon period of Bokaro River												
1	PR_RM_MN_BK_1	367	1348.28	2.5	0.003	1	PO_RM_MN_BK_1A	367	412.405	2	0.001	-0.002
2	PR_RM_MN_BK_2	349	757.701	2.5	0.002	2	PO_RM_MN_BK_2	349	348.126	2	0.001	-0.001
3	PR_RM_MN_BK_3	348	1850.09	2.5	0.005	3	PO_RM_MN_BK_3	348				-0.005
4	PR_RM_MN_BK_4	348	2390.22	2.5	0.006	4	PO_RM_MN_BK_4	348	1427.73	2	0.003	-0.003
5	PR_RM_MN_BK_5	349	2473.6	2.5	0.006	5	PO_RM_MN_BK_5	349	1667.49	2	0.003	-0.003
6	PR_RM_MN_BK_6	345	438.236	2.5	0.001	6	PO_RM_MN_BK_6	345				-0.001
7	PR_RM_MN_BK_7	344	6614.29	2.5	0.017	7	PO_RM_MN_BK_7	344	2145.13	2	0.004	-0.01
8	PR_RM_MN_BK_8	339	4065.6	2.5	0.01	8	PO_RM_MN_BK_7A	342	1291.77	2	0.003	
9	PR_RM_MN_BK_9	338	1417.81	2.5	0.004	9	PO_RM_MN_BK_8	339	3790.25	2	0.008	-0.005
10	PR_RM_MN_BK_10	336	610.551	2.5	0.002	10	PO_RM_MN_BK_8_9	338	347.741	2	0.001	
11	PR_RM_MN_BK_11	335	3963.6	2.5	0.01	11	PO_RM_MN_BK_10	336				-0.002
12	PR_RM_MN_BK_12	332	1970.26	2.5	0.005	12	PO_RM_MN_BK_11_12	335	5739.12	2	0.011	0.006
13	PR_RM_MN_BK_13	320	1777.42	2.5	0.004	13	PO_RM_MN_BK_12A	332	1914.34	2	0.004	
						14	PO_RM_MN_BK_12B	331	2863.48	2	0.006	
						15	PO_RM_MN_BK_13	324	1603.15	2	0.003	0.004
						16	PO_RM_MN_BK_13A	318	588.709	2	0.001	

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14	PR_RM_MN_BK_14	314	2046.98	2.5	0.005	463.163	318	2	0.001	
15	PR_RM_MN_BK_15	312	2888.75	2.5	0.007	443.363	315	2	0.001	
16	PR_RM_MN_BK_16	299	7457.88	2.5	0.019	881.363	316	2	0.002	
17	PO_RM_MN_BK_13B					969.992	314	2	0.002	
18	PO_RM_MN_BK_13C					2857.32	315	2	0.006	
19	PO_RM_MN_BK_13D					1717.82	313	2	0.003	
20	PO_RM_MN_BK_14					2923.26	312	2	0.006	
21	PO_RM_MN_BK_15					5055.67	311	2	0.01	
22	PO_RM_MN_BK_15A					2769.97	310	2	0.006	
23	PO_RM_MN_BK_15B					1301.7	300	2	0.003	
24	PO_RM_MN_BK_16					3383.47	299	2	0.007	
25	PO_RM_MN_BK_16A					13141.7	298	2	0.026	
26	PO_RM_MN_BK_16B					5324.58	298	2	0.011	
27	PO_RM_MN_BK_16C					5881.88	296	2	0.012	
28	PO_RM_MN_BK_16D									
29	PO_RM_MN_BK_16E									
30	PO_RM_MN_BK_16F									
<b>Estimation of Sand Resources in Pre monsoon period &amp; Post monsoon period of Damodar River</b>										
1	PR_RM_PT_DA_1	350	65094.6	2.5	0.163	65991.4	350	2	0.132	
2	PR_RM_PT_DA_2	350	7778.8	2.5	0.019	8044.72	350	2	0.016	
3	PR_RM_PT_DA_3	348	21654	2.5	0.054	20668.7	348	2	0.041	
4	PR_RM_PT_DA_4	337	14979.3	2.5	0.037	14946	337	2	0.03	
5	PR_RM_PT_DA_5	345	21254.7	2.5	0.053					
6	PR_RM_PT_DA_6	345	31529.2	2.5	0.079	64557	345	2	0.129	
7	PR_RM_PT_DA_7	343	16925.2	2.5	0.042	13238.3	345	2	0.026	
8	PR_RM_PT_DA_8	338	3878.37	2.5	0.01	6537.99	344	2	0.013	
9						2629.1	343	2	0.005	
10						1971.71	342	2	0.004	
11						8460.24	340	2	0.017	
12						3906.67	338	2	0.008	
						25781.6	335	2	0.052	
									0.05	



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9	PR_RM_PT_DA_9	334	10552.9	2.5	0.026	13	PO_RM_PT_DA_9	334	6621.52	2	0.013	0.033
10	PR_RM_PT_DA_10	327	5865.66	2.5	0.015	14	PO_RM_PT_DA_9A	334	14453.9	2	0.029	
11	PR_RM_PT_DA_11	345	1521.64	2.5	0.004	15	PO_RM_PT_DA_9B	332	8277.13	2	0.017	
12	PR_RM_MN_DA_12	293	22619.2	2.5	0.057	16	PO_RM_PT_DA_10	327	6222.96	2	0.012	-0.003
13	PR_RM_MN_DA_13	263	134868	2.0	0.269	17	PO_RM_RM_DA_11A	319	27638.2	2	0.055	
						18	PO_RM_MN_DA_11B	305	9248.56	2	0.018	0.141
						19	PO_RM_MN_DA_11C	304	10202.7	2	0.02	
						20	PO_RM_MN_DA_11D	302	25834.4	2	0.052	
						21	PO_RM_MN_DA_12	293	7350.18	2	0.015	-0.042
						22	PO_RM_MN_DA_13	263	134868	2	0.269	-0.00

Maps showing distribution of sand bars on rivers of the Ramgarh district during Pre and Post monsoon are depicted in attached Plate-A1-A13 & B1-B13 respectively.




**Table 7-5 : Sediment Load comparison between Pre & Post Monsoon periods for different rivers of Ramgarh district**

River Name	Pre-Monsoon no of sand bar	Post-Monsoon no of sand bar	Pre-Monsoon Sediment Load (Mcum)	Post-Monsoon Sediment Load (Mcum)	Difference (Mcum)	Difference %
Bokaror River	16	30	0.11	0.14	0.04	35%
Damodar River	13	22	0.56	0.71	0.15	26%
<b>Total</b>	<b>29</b>	<b>52</b>	<b>0.664312</b>	<b>0.8476753</b>	<b>0.183363</b>	<b>28%</b>

Thus, in Ramgarh district, about 0.18 million cum of sand has been found as an incremental volume the river of the district when compared between pre and post monsoon sand reserve data. An average aggradation and replenishment rate for the year of Ramgarh district comes to about 128%.

**B. Replenishment estimation based on an empirical formula:**

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. The replenishment estimation based on a theoretical empirical formula comprising of analytical models to calculate.

Sediment load deposition in a river is depend on catchment area, weathering index of the various rock types of the catchment area, land-use pattern of the area, rainfall data and grain size distribution of the sediments. Again, the sediment load estimation is not a dependent variable of the district boundary, but it largely depends upon the aerial extents of the catchment areas, which crossed the district and state boundaries.

**i. Methodology of the 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. Sedimentation in riverbed depends on catchment yield, peak flood discharge due to rainfall, bed load transport rates and sediment yield characteristic of the river. Some of the common methods used for Replenishment study are explained below.

**Catchment Yield Calculation:**



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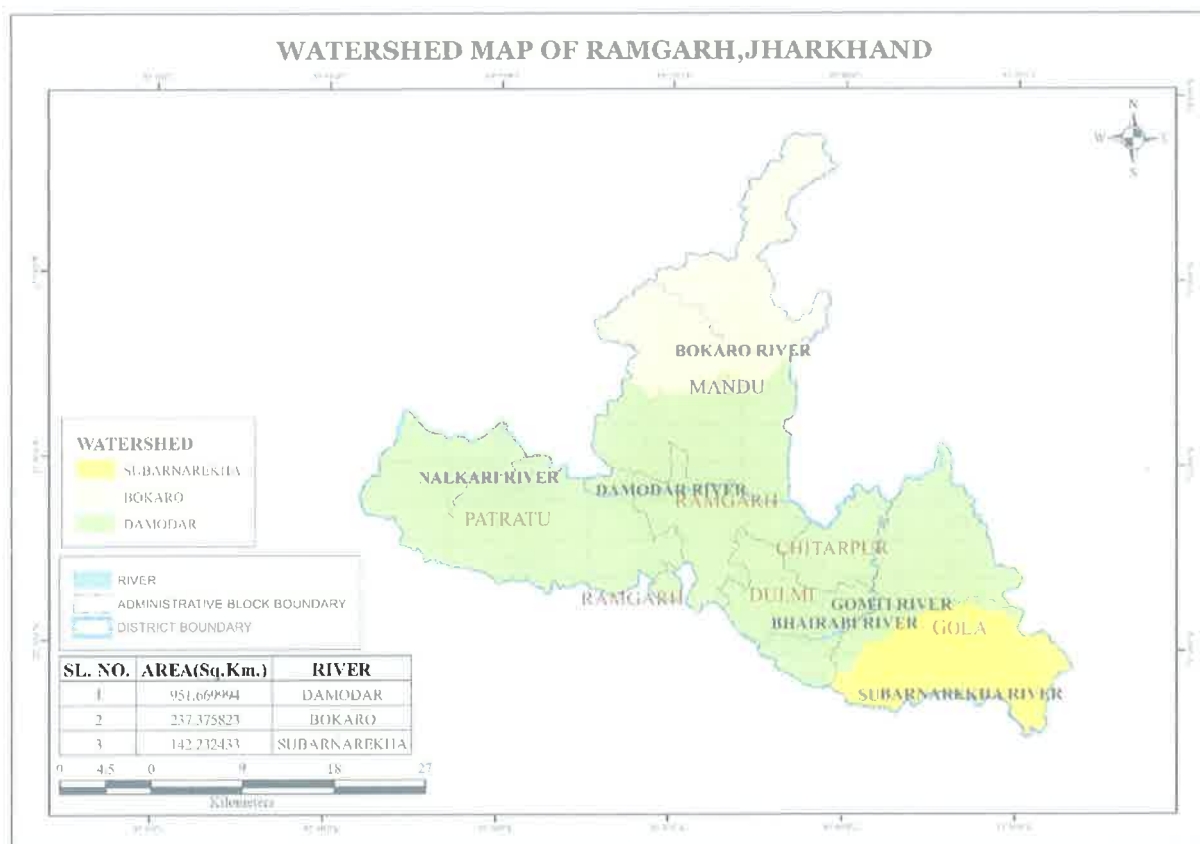


The total quantity of surface water that can be expected in a given period from a stream at the outlet of its catchment is known as yield of the catchment in that period. The annual yield from a catchment is the end product of various processes such as precipitation, infiltration and evapo-transpiration operating on the catchment.

Catchment Yield can be estimated using following formula:

$$\text{Catchment Yield (m}^3\text{)} = \text{Catchment area (m}^2\text{)} * \text{Runoff coefficient (\%)} * \text{Rainfall (m)}$$

The runoff generated from the watershed is analyzed using Strange's Tables method to get the reliable yield results. Runoff from a catchment is dependent upon annual rainfall as well as catchment characteristics such as soil types and the type of groundcover / land usage. Remote sensing was used for demarcation of catchment area relevant to the drainage system. Runoff coefficient of the catchment has been established based on Strange's Table.



**Figure 7-7: Watershed map of Ramgarh District**

Strange (1892) studied the available rainfall and runoff and obtained yield ratios as functions of indicators representing catchment characteristics. Catchments are classified as good, average and bad according to the relative magnitudes of yield



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they give. For example, catchment with good forest cover and having soils of high permeability would be classified as bad, while catchment having soils of low permeability and having little or no vegetal cover is termed good. Based on the study Strange established runoff coefficient table as given below:

**Table 7-6 : Runoff coefficient of the catchment based on Strange's Table**

Total monsoon rainfall (mm)	Runoff coefficient (%)			Total monsoon rainfall (mm)	Runoff coefficient (%)		
	Good catchment	Average catchment	Bad catchment		Good catchment	Average catchment	Bad catchment
25.4	0.1	0.1	0.1	787.4	27.4	20.5	13.7
50.8	0.2	0.2	0.1	812.8	28.5	21.3	14.2
76.2	0.4	0.3	0.2	838.2	29.6	22.2	14.8
101.6	0.7	0.5	0.3	863.6	30.8	23.1	15.4
127	1	0.7	0.5	889	31.9	23.9	15.9
152.4	1.5	1.1	0.7	914.4	33	24.7	16.5
177.8	2.1	1.5	1	939.8	34.1	25.5	17
203.2	2.8	2.1	1.4	965.2	35.3	26.4	17.6
228.6	3.5	2.6	1.7	990.6	36.4	27.3	18.2
254	4.3	3.2	2.1	1016	37.5	28.1	18.7
279.4	5.2	3.9	2.6	1041.4	38.6	28.9	19.3
304.8	6.2	4.6	3.1	1066.8	39.8	29.8	19.9
330.2	7.2	5.4	3.6	1092.2	40.9	30.6	20.4
355.6	8.3	6.2	4.1	1117.6	42	31.5	21
381	9.4	7	4.7	1143	43.1	32.3	21.5
406.4	10.5	7.8	5.2	1168.4	44.3	33.2	22.1
431.8	11.6	8.7	5.8	1193.8	45.4	34	22.7
457.2	12.8	9.6	6.4	1219.2	46.5	34.8	23.2
482.6	13.9	10.4	6.9	1244.6	47.6	35.7	23.8
508	15	11.3	7.5	1270	48.8	36.6	24.4
533.4	16.1	12	8	1295.4	49.9	37.4	24.9
558.8	17.3	12.9	8.6	1320.8	51	38.2	25.5
584.2	18.4	13.8	9.2	1346.2	52.1	39	26
609.6	19.5	14.6	9.7	1371.6	53.3	39.9	26.6
635	20.6	15.4	10.3	1397	54.4	40.8	27.2
660.4	21.8	16.3	10.9	1422.4	55.5	41.6	27.7
685.8	22.9	17.1	11.4	1447.8	56.6	42.4	28.3
711.2	24	18	12	1473.2	57.8	43.3	28.9
736.6	25.1	18.8	12.5	1498.6	58.9	44.4	29.4
762	26.3	19.7	13.1	1524	60	45	30

Rainfall returns period for 25, 50 and 100 years calculated as below:

**As per Weibull's Formula,**

**Return period/Recurrence interval = (n+1)/m**

Where: n number of years on record;

m is the rank of observed occurrences when arranged in descending order.



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**a. Peak Flood Discharge Calculation:**

The term “peak discharge” stands for the highest concentration of runoff from the basin area. The accurate estimation of flood discharge remains one of the major challenges as it depends upon physical characteristic of the catchment area and the flood intensity, duration and distribution pattern. There have been many different approaches for determining the peak runoff from an area. As a result, many different models (equations) for peak discharge estimation have been developed. Formulas used for Peak Discharge calculation are as below:

**As per Dicken’s formula,**

$$Q = CA^{3/4}$$

Where: Q is Maximum flood discharge (m<sup>3</sup>/sec) in a river

A is Area of catchment in Sq. Km

C is Constant whose value varies widely between 2.8 to 5.6 for catchments in plains and 14 to 28 for catchments in hills

**As per Jarvis formula,**

$$Q = CA^{1/2}$$

Where: Q is Maximum flood discharge (m<sup>3</sup>/sec) in a river

A is Area of catchment in Sq. Km

C is Constant whose value varies between 1.77 as minimum and 177 as maximum. Limiting or 100 percent chance floods are given by the value of C of 177

**As per Rational formula,**

$$Q = CIA$$

Where: Q is Maximum flood discharge (m<sup>3</sup>/sec) in a river

A is Area of catchment in Sq. Km

C is Runoff coefficient which depends on the characteristics of the catchment area. It is a ratio of runoff: rainfall

I is Intensity of rainfall (in m/sec)

**b. Bed Load Transport Calculation:**

The most important problems in river engineering are to predict bed load transport rates in torrential floods flowing from mountainous streams. Three modes of transport namely; rolling, sliding and saltation may occur simultaneously in bed load transport. The different modes of transportation are closely related and it is difficult, if not impossible, to separate them completely. There are number of equations to compute the total sediment load. Most of these equations have some theoretical and empirical bases.



### Ackers and White Equation:

Ackers and White (1973) used dimensional analysis based on flow power concept and their proposed formula is as follows.

$$C_t = C_s G_s (d_{50}/h) (V/U_*)^{n'} [(F_{gr}/A_1) - 1]^m$$

The dimensionless particle  $d_{gr}$  is calculated by:

$$d_{gr} = d_{50} (g(G_s - 1)/v^2)^{1/3}$$

The particle mobility factor  $F_{gr}$  is calculated by:

$$F_{gr} = (U_*^{n'} / (G_s - 1)g d_{50})^{1/2} * (V / (5.66 \log(10h / d_{50})))^{1-n'}$$

Where,

- $A_1$  = Critical particle mobility factor  
 $C_s$  = Concentration coefficient in the sediment transport function  
 $C_t$  = Total sediment concentration  
 $d_{50}$  = Median grain size  
 $d_{gr}$  = Dimensionless particle diameter  
 $F_{gr}$  = Particle mobility parameter  
 $g$  = Acceleration of gravity  
 $D_s, S_g$  = Specific gravity  
 $h$  = Water depth  
 $m$  = Exponent in the sediment transport function  
 $n'$  = Manning roughness coefficient  
 $U_*$  = Shear velocity  
 $V$  = Mean flow velocity  
 $v$  = Kinematic viscosity

### Meyer – Peter’s equation:

Meyer-Peter’s equation is based on experimental work carried out at Federal Institute of Technology, Zurich. Mayer-Peter gave a dimensionless equation based, for the first time, on rational laws. Mayer- Peter equations giving an empirical correlation of bed load transport rates in flumes and natural rivers. The simplified Meyer-Peter’s equation is given below:

$$g_b = 0.417[\tau_0 (\eta' / \eta)^{1.5} - \tau_c]^{1.5}$$

Where,  $g_b$  = Rate of bed load transport (by weight) in N per m width of channel per second.

$\eta'$  = Manning’s coefficient pertaining to grain size on an unrippled bed and Strickler formula i.e.  $\eta' = (1/24) \times d^{1/6}$  where  $d$  is the median size ( $d_{50}$ ) of the bed sediment in m.



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$\eta$  = The actual observed value of the rugosity coefficient on rippled channels. Its value is generally taken as 0.020 for discharges of more than 11cumecs, and 0.0225 for lower discharges.

$\tau_c$  = Critical shear stress required to move the grain in N/m<sup>2</sup> and given by equation  $\tau_c = 0.687da$ , where 'da' is mean or average size of the sediment in mm. This arithmetic average size is usually found to vary between  $d_{50}$  and  $d_{60}$ .

$\tau_0$  = Unit tractive force produced by flowing water i.e.  $\gamma_wRS$ . Truly speaking, its value should be taken as the unit tractive force produced by the flowing water on bed =  $0.97\gamma_wRS$ . R is the hydraulic mean depth of the channel (depth of flow for wider channel) and S is the bed slope.

### c. Sediment Yield Estimation:

Sedimentation occurred as the velocity decreases along with its ability to carry sediment. Coarse sediments deposit first, then interfere with the channel conveyance, and may cause additional river meanders and distributaries. The area of the flowing water expands, the depth decreases, the velocity is reduced, and eventually even fine sediments begin to deposit. As a result, deltas may be formed in the upper portion of reservoirs. The deposited material may later be moved to deeper portions of the reservoir by hydraulic processes within the water body.

There are many sediment transport equations which are suitable for use in the prediction of the rate of replenishment of river. Some of the famous sediment equations are:

1. Dendy – Bolton Equation
2. Yang Equations
3. Engelund-Hansen Equation
4. Modified Universal Soil Loss Equation (MUSLE) developed by Williams and Berndt (1977)

### Dendy – Bolton Equation:

Dendy – Bolton formula is often used to calculate the sediment yield because:

- The formula uses catchment area and mean annual runoff as key determinants.
- It does not differentiate in basin wide smaller streams and their characteristics.
- Dendy and Bolton equation calculates all types of sediment yield i.e. Sheet and rill Erosion gully Erosion, Channel Bed and bank erosion and mass movement etc.



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Dendy-Bolton determined the combined influence of runoff and drainage area on sediment yield to compute the sediment yield. They developed two equations i.e. for run off less than 2 inch and for run off more than 2 inch, which are given below:

**For run off less than 2 inch:**

$$(Q < 2 \text{ in}) S = 1289 * (Q)^{0.46} * [1.43 - 0.26 \text{ Log } (A)]$$

**For run off more than 2 inches:**

$$(Q > 2 \text{ in}): S = 1958 * (e^{-0.055 * Q}) * [1.43 - 0.26 \text{ Log } (A)]$$

Where: S = Sediment yield (tons/sq miles/yr)

Q = Mean Annual runoff (inch)

A = Net drainage area in sq mile

Dendy Bolton formula is often used to calculate the sediment yield. But use of these equations to predict sediment yield for a specific location would be unwise because of the wide variability caused by local factors not considered in the equation's development. However, they may provide a quick, rough approximation of mean sediment yields on a regional basis for preliminary watershed planning. Computed sediment yields normally would be low for highly erosive areas and high for well stabilized drainage basins with high plant density because the equations are derived from average values. The equations express the general relationships between sediment yield, runoff, and drainage area. Many variables influence sediment yield from a drainage basin. They include climate, drainage area, soils, geology, topography, vegetation and land use. The effect of any of these variables may vary greatly from one geographic location to another, and the relative importance of controlling factors often varies within a given land resource area. Studies revealed that sediment yield per unit area generally decreases as drainage area increases. As drainage area increases, average land slopes usually decrease; and there is less probability of an intense rainstorm over the entire basin. Both phenomena tend to decrease sediment yield per unit area.

**Modified Universal Soil Loss Equation (MUSLE):**

Modified universal soil loss equation (MUSLE) for estimation of sediment yield is also used widely. MUSLE is a modification of the Universal Soil Loss Equation (USLE). USLE is an estimate of sheet and rill soil movement down a uniform slope using rain- fall energy as the erosive force acting on the soil (Wischmeier and Smith 1978). Depending on soil characteristics (texture, structure, organic matter, and permeability), some soils erode easily while others are inherently more resistant to the erosive action of rain- fall.



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MUSLE is similar to USLE except for the energy component. USLE depends strictly upon rainfall as the source of erosive energy. MUSLE uses storm-based runoff volumes and runoff peak flows to simulate erosion and sediment yield (Williams 1995). The use of runoff variables rather than rainfall erosivity as the driving force enables MUSLE to estimate sediment yields for individual storm events. The generalized formula of MUSLE is as below:

$$Y=11.8*(Q*qP).56 *K*Ls*C*P$$

Where,

- Y = sediment yield of stream (t/yr/km<sup>2</sup>),
- Q = average annual runoff (m<sup>3</sup>),
- K = soil erodibility factor,
- qP = Highest discharge recorded (m<sup>3</sup>/s),
- Ls = gradient/slope length,
- C = cover management factor,
- P = erosion control practice

## ii. Estimation of Replenishment:

For replenishment study, following assumption/calculation taken in to consideration:

- Catchment area (Watershed area) against each river has been calculated based on remote sensing data.
- Rainfall runoff coefficient as per Strange's table for the catchment area is consider 53%, as the rainfall in the district is 1365mm and the characteristic of the catchment of the district is good in nature.
- Peak flood discharge of the river of the district calculated based on Dicken's formula which is more applicable to north Indian and central Indian catchment. Here Dicken constant C is taken as 12 in present study as per published literature by Saha (2002).
- Bed load transport has not been computed in the regional aspect of the district, as the values are highly dependent on local factors such as particle mobility factor, roughness coefficient, Shear velocity, Mean flow velocity, Kinematic viscosity etc.
- Sedimentation yield calculated as per Dendy Bolton formula as the equations express the general relationships between sediment yield, runoff, and drainage area.
- Computed sediment yields by Dendy-Bolton formula normally would be low for highly erosive areas and high for well stabilized drainage basins with high plant density because the equations are derived from average values.

The data estimated for each river in the district are tabulated below.



Table 7-7 : Replenishment parameter estimated for each river in the district

Estimation parameter	Bokaro	Damodar	Subarnarekha
Catchment Area (m <sup>2</sup> )	237380000	951670000	142230000
Annual Rainfall (m) (in 2020)	1.53	1.53	1.53
Strange Runoff coefficient (%) (Considering good catchment)	53%	53%	53%
Annual Run-off (m) (in 2020)	0.3366	0.3366	0.3366
Catchment Yield (m <sup>3</sup> )	192491442	771709203	115334307
Peak Flood Discharge (m <sup>3</sup> /sec)	22949030.34	65019860.04	15628764.73
Flow depth d (m)	0.8	0.6	0.5
Channel width b (m)	200	1500	150
Mean velocity v (m/s)	0.004	0.1	0.03
Channel slope S <sub>o</sub> (m/m)	0.0002	0.0004	0.0002
Sediment Yield (Tons/year, in 2020)	5477.17	18215.2	36266.27
Estimated Annual Replenishment (in million m <sup>3</sup> , in 2020)	0.10257	0.34111	0.67914

Year-wise sedimentation rate for last 5 years of each river has been calculated as below. Sedimentation rate of a river is dependent on the annual rainfall of the district.

Table 7-8 : Year-wise sedimentation rate (tons/km<sup>2</sup>/yr) for last 5 years of each river

Year	Bokaro	Damodar	Subarnarekha	Annual Rainfall
2016	45.48	37.73	48.34	1216.3
2017	19.85	16.46	21.09	1599.3
2018	50.43	41.83	53.6	1168.6
2019	36.9	30.61	39.23	1312.8
2020	23.07	19.14	24.52	1529.7

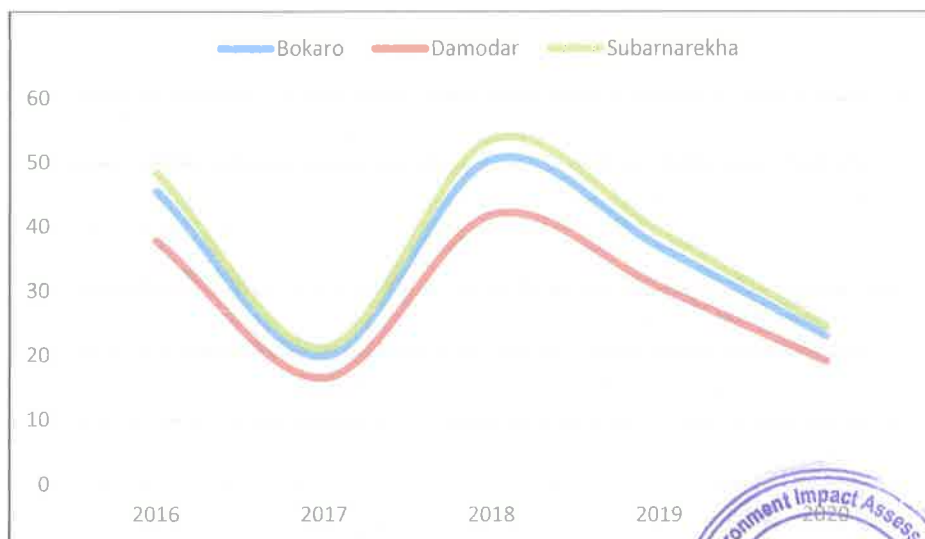


Figure 7-8: Graphical representation of year-wise sedimentation rate

**iii) Total potential of minor mineral in the river bed**

The major sand producing rivers of the district are Damodar and Bokaro. Total potential sand resource of the district is 0.33 Mcum.

**B. Geological studies**

**i) Lithology of the catchment area**

Geologically, Ramgarh district comprises of Chhotanagpur Granite Gneissic Complex (CGGC) rocks of Archaean-Proterozoic Age and rocks of Gondwana Supergroup.

Two Formations of Damuda Group of Lower Gondwanas are exposed in the district - Barakar Formation and Barren Measures. Barakar Formation is prominently developed in Damodar valley basin comprising Conglomerate, Sandstone, Shale and thick measures of Coal seams showing fining upward sequence, which is succeeded by Barren Measures comprising Iron Stone Shale with or without Carbonaceous matter, Micaceous/Carbonaceous grey Shale.

**ii) Tectonics and structural behavior of rocks**

Structurally, CGGC bears imprints of three generations of deformation producing distinctive Folds and related fabrics whereas Gondwana exhibits Gravity Normal Faults along with a various Primary and Secondary Sedimentary structures like Cross Stratification, Ripple marks, Pene-Contemporaneous Deformational structures, Hummocky Cross Stratification etc. Dudhi nala area, Mandu Block of the district is regarded as museum of sedimentary structures.

**C. Climate Factors**

**i) Intensity of rainfall**

The average annual rainfall of the district is 1365.3 mm. The rainfall during the monsoon season – June to September – constitutes 80% of the annual rainfall; July and August are the rainiest months. The district receives a mean annual rainfall varying from 1168 mm. to 1599 mm.

**ii) Climate zone**

The climate of the district marginally tropical and is quite cold but somewhat hot in summer. The year can be divided into three seasons. The cold season starts from November and continues till middle to end of February while December and January are the coolest month in association with cold wave which occasionally pass through the area in the wake of western disturbances. Severe cold waves have been reported during the month of December and January.



### iii) Temperature variation

The area lies in the sub-humid region of Chhotanagpur Plateau and enjoys semi-extreme type of climate. The day temperature rises around 40°C during the summers and drops down to around 10°C during the winter.

### Annual Deposition:

Annual deposition of riverbed minerals has been calculated on post-monsoon sand volume. The pre-monsoon sand volume of the river is the depleted resources and is replenished by the monsoon rainfall.

Sand bar area recommended for mineral concession in the table is calculated as per the Enforcement and Monitoring Guidelines for Sand Mining (EMGSM) 2020. As per guidelines, mining depth restricted to 3 meters depth and distance from the bank is ¼th of river width and not less than 7.5 meters. Also, mining is prohibited up to a distance of 1 kilometer (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.

For the purpose of estimating mineable mineral potential, the thickness of the sand bar considered extractable based on base flow level. The annual minable mineral potential is given in Table 7.9.

Table 7-9 : Annual deposition of Riverbed minerals

S.No	River or Stream	Portion of the river stream recommended for mineral concession (%)	Length of area recommended for mineral concession (in meters)	Average width of area recommended for mineral concession (in meters)	Area recommended for mineral concession (in sq. meter)	Considered mining thickness (m)	Mineable mineral potential (in million cubic meter) (60% of total mineral potential)
1	Bokaro River	5%	3211.85	103.1166667	40206.515	2.5	0.01
2	Damodar River	2%	18404.31	438.2889602	214576.1622	2.5	0.32
<b>Total Mineable volume</b>							<b>0.33</b>

### iii) Riverbed Mineral Potential

Huge quantities of quality sands are found to occur in part of rivers. Smaller patches are also available locally in the other smaller rivers as well.



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Table 7-10 : Resources of Potential Riverbed Mineral

Boulder (Mcum)	Pebbles/Gravel (Mcum)	Sand/White sand (Mcum)	Total Mineable, Mineral Potential (Mcum)
		0.33	0.33

iv) Riverbed Mineral Potential Zones



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Table 7-11 : Potential Zone of Riverbed Mineral

RSL No	Rivers or Streams	Location of potential zones					Length In meter	Width In meter	Potential Area In sq.m
		Administrative Block	Mouza	JL No.	Zone	Co-ordinates Latitude Longitude			
1	BOKARO RIVER	MANDU		1	23° 48' 22.403" N 23° 48' 21.544" N	85° 31' 17.438" E 85° 31' 22.237" E	146.62	87.13	342.1974793
		MANDU		2	23° 47' 55.504" N 23° 47' 48.129" N	85° 31' 41.139" E 85° 32' 2.829" E	653.73	159.6	2875.36151
		MANDU		3	23° 47' 25.256" N 23° 47' 21.913" N	85° 32' 6.477" E 85° 32' 5.927" E	123	96.16	1964.366815
		MANDU		4	23° 45' 54.459" N 23° 45' 52.689" N	85° 32' 31.464" E 85° 32' 36.563" E	176.51	85.43	841.3584383
		MANDU		5	23° 46' 4.493" N 23° 45' 58.430" N	85° 34' 17.109" E 85° 34' 44.151" E	870.26	57.02	5977.424382
		MANDU		6	23° 45' 57.741" N 23° 45' 54.494" N	85° 35' 14.866" E 85° 35' 17.711" E	128.79	88.57	2394.084123
		MANDU		7	23° 46' 16.765" N 23° 46' 16.929" N	85° 36' 25.238" E 85° 36' 29.885" E	154.19	65.59	950.030144
		MANDU	LAIYO	8	23° 46' 15.078" N 23° 46' 30.589" N	85° 36' 53.896" E 85° 37' 8.055" E	713.91	180.03	20111.7356
		MANDU	LAIYO	9	23° 46' 38.628" N 23° 46' 45.091" N	85° 37' 31.149" E 85° 37' 36.328" E	244.84	108.52	4749.956189



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PATRATU	DEOGARH	1	23° 41' 4.153" N	85° 13' 54.334" E	5,756.45	579.22	136,950.37
PATRATU	URIMARI	2	23° 41' 52.069" N	85° 15' 39.030" E	4,879.31	709.11	37,092.06
PATRATU	BHULIQUARTER	3	23° 39' 48.344" N	85° 23' 41.318" E	6433.9	332.8	27994.67989
MANDU	RAUTA	4	23° 38' 8.070" N	85° 26' 19.686" E	1002.5	285.82	7843.767326
MANDU	SARAIYA	5	23° 37' 55.975" N	85° 36' 19.518" E	332.12	284.5	4695.282526

2 DAMODAR RIVER



**NO MINING ZONE:**

As per the Enforcement & Monitoring Guidelines for Sand Mining (EMGSM) 2020 the restricted zone for mining is a distance from the bank is 1/4th of river width and not be less than 7.5 meters. Also, there is a no mining zone 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.

No mining zone has been marked for an area up to a width of 100 meters from the active edge of embankments. Also, the concave side of the river is marked as no mining zone, as mining in this area will affect the course of river in future and will erode the river bank. A representative map of no mining zone shown on River Bokaro of Ramgarh district is given in Figure 7-9.

Table 7-12 : Restricted Zone of Riverbed Mineral

Sl.No	Rivers or Streams	Location of potential zones	Prohibited zone for mining (in sq.m)
		Administrative Block	
1	BOKARO RIVER	MANDU	70.20729169
		MANDU	567.991074
		MANDU	180.7585335
		MANDU	761.7899497
		MANDU	450.432856
		MANDU	375.883925
		MANDU	351.672018
		MANDU	1737.996872
		MANDU	1131.919902
2	DAMODAR RIVER	PATRATU	57033.78613
		PATRATU	21948.71025
		PATRATU	5852.407211
		MANDU	3950.276562
		MANDU	2654.899383



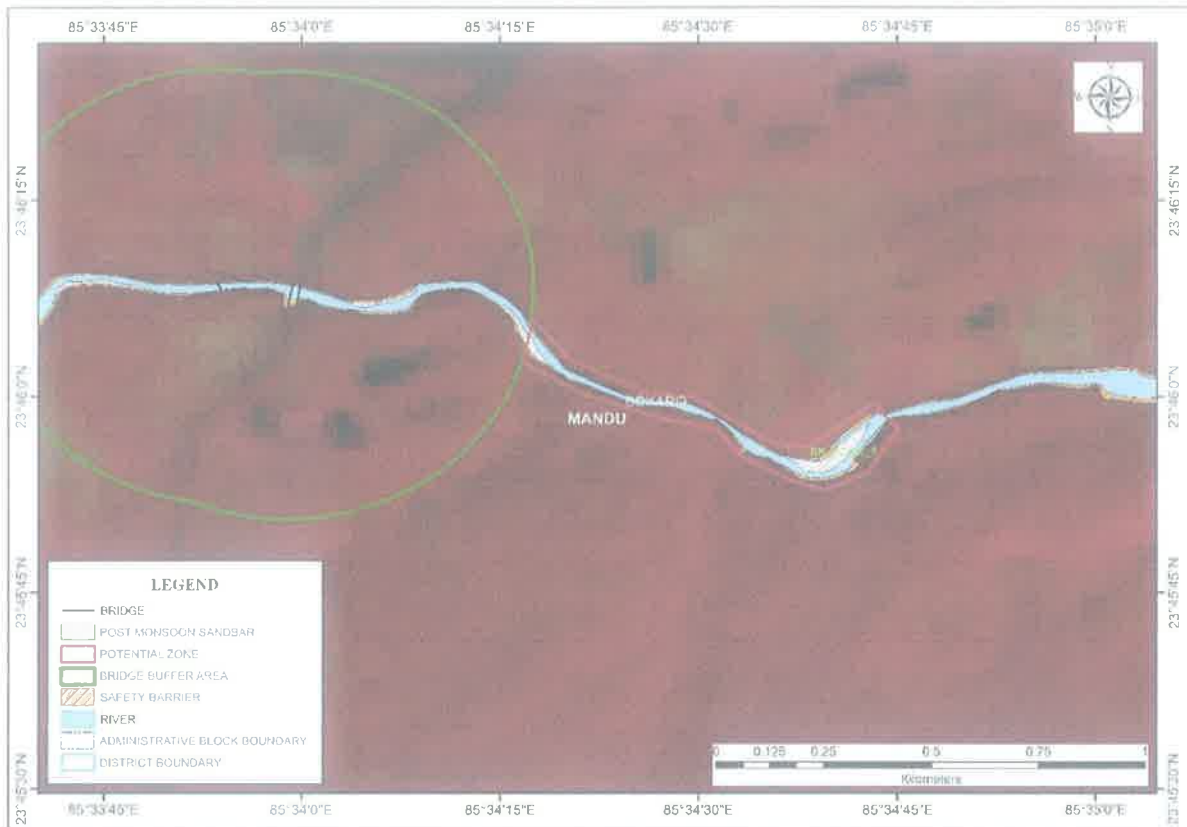


Figure 7-9: A representative map showing no-mining zone demarcated on Bokaro River



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## 8 Overview of mining activity in the district:

### 8.1 General overview:

Sand is the basic raw material for its utilization in any development activity throughout the world. Sand is primarily produced from mining operations on the surface of the earth, near the river beds and the sand quarrying below the surface of earth. In the earlier time the mud houses/buildings were constructed with the use of mud. However, with the passage of time, new technique of development activities was started. As such the demand of Minor Mineral started on an increasing trend. In order to meet the requirement of raw material for construction, the extraction of sand carried out manually / semi-mechanized process from the river beds. The production of aggregate area is a function of the availability of natural resources, the size of population, the economy of the area and various developmental and infrastructural works being undertaken in the area like road construction, hydroelectric projects etc. Further, being a low- value, high-volume mineral commodity, the prices are dramatically affected by transportation distances. If the distance increases, the transportation cost may increase much more than the cost of the aggregates.

### 8.2 List of existed/proposed mining leases of the districts

Table 8-1 : Details of Exited Sand mining leases of the districts (source previous DSR)

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.)	Existed / Proposed
Damodar	<b>Churi Tungir Sand Ghat</b> Mouza- Churi Tungri, Panchyat-K.K Sayal Block- Patratu, Dist-Ramgarh, Jharkhand	4.04	-	-	No	1,25,911.27	Sand	Existed
Damodar	Dundua sand Ghat Village- Dundua, Thana-Patratu, Dist- Ramgarh, Jharkhand	1.62	-	-	No	65,919.15	Sand	Existed
Damodar	Kaitha Sand Ghat Mouza- Gobardaha & Kaitha, Panchyat-Kaitha, Dist- Ramgarh, Jharkhand	4.05	-	-	No	1,15,927.38	Sand	Existed



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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.)	Existed / Proposed
Damodar	Lodhma Sand Ghat Mouza- Lodhma, Anchal+Dist-Ramgarh	2.02	-	-	No	99,732.75	Sand	Existed
Damodar	Mahuatola Sand Ghat Mouza- Tokisud, Panchyat- Palu, Thana-Patratu, Dist-Ramgarh, Jharkhand	4.45	-	-	No	2,04,850.20	Sand	Existed
Damodar	Mayal Sand Ghat Village+Panchyat-Mayal, P.O- Chittarpur, P.S.- Rajrappa, Dist-Ramgarh, Jharkhand	1.01	-	-	No	55,584	Sand	Existed
Damodar	Naisarai Sand Ghat Village-Naisarai, Anchal+Dist-Ramgarh	2.02	-	-	No	73,764.60	Sand	Existed
Damodar	Paunki Sand Ghat Mouza-Paunki, P.o-Marar, Anchal-Mandu, Panchyat-Digwar, Dist-Ramgarh, Jharkhand	1.413	-	-	No	49,243.95	Sand	Existed
Damodar	Parsadih Sand Ghat Village - Parsadih, Anchal - Gola, Panchayat- Hesapora, Dist-Ramgarh, Jharkhand	3.64	-	-	No	1,27,248.76	Sand	Existed
Damodar	Ramgarh Sand Ghat Village - Ramgarh, Anchal+Dist-Ramgarh, Jharkhand	2.02	-	-	No	74,968.92	Sand	Existed
Damodar	Rauta Sand Ghat Village - Rauta, Panchayat- Sewta, Post - Sewta, Dist-Ramgarh, Jharkhand	1.42	-	-	No	84,956.67	Sand	Existed
Damodar	Saraiya Sand Ghat Mouza - Saraiya, Panchayat- Kundrukala Dist-Ramgarh, Jharkhand	2.02	-	-	No	70,869.60	Sand	Existed



(Source: Old DSR)



Table 8-2: Details of Proposed Sand mining leases of the districts

River Details	Sandbar Code	Mauza	Block	Area (Ha)	Distance (in KM) from PA/BR/WC/	Distance from Forest Area (in KM)	Forest Name	Minimum leases within 500 meter (if yes cluster area)	Total excavation in cum /Annum considering digging depth max as 1 meter	Total excavation in Tonnes /Annum considering digging depth max as 1 meter	Total excavation in Tonnes /Annum (Considering 60% as per EMGSM, 2020)	Mine to be mined (Sand/ Bajri / RBM etc.)	Existing / Proposed
	PO_RM_MN_B K_1A Bokaro Ghat 1_ 0.03 ha	Pundi	Mandu	0.03	NA	0	Tapin	No	300	456	273.6	Sand	Proposed
	PO_RM_MN_B K_2 Bokaro Ghat 2_ 0.02 Ha	Pundi	Mandu	0.02	NA	0	Pundi		200	304	182.4	Sand	Proposed
	PO_RM_MN_B K_4 Bokaro Ghat 3_ 0.10 ha	Pundi	Mandu	0.1	NA	0	Pundi	Area: 0.32 Ha.	1000	1520	912	Sand	Proposed
	PO_RM_MN_B K_5 Bokaro Ghat 4_ 0.13 ha	Pundi	Mandu	0.13	NA	0	Pundi		1300	1976	1185.6	Sand	Proposed
	PO_RM_MN_B K_7 Bokaro Ghat 5_ 0.17 ha	Pundi	Mandu	0.17	NA	0	Barughutu	NO	1700	2584	1550.4	Sand	Proposed
	PO_RM_MN_B K_13 Bokaro Ghat 6_ 0.07 ha	Duni	Mandu	0.07	NA	0.2	Saruber	NO	700	1064	638.4	Sand	Proposed



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Sandbar Code	Mauz	Block	Area (Ha)	Distance (in KM) from PA/BR/WC/	Distance from Forest Area (in KM)	Forest Name	Mining leases within 500 meters (if yes cluster)	Total excavation cum /Annum consider digging depth	Total excavation in Tonnes /Annum consider digging depth	Total excavation in Tonnes /Annum (Considering 60% as per)	Mine be mined (Sand/Bajri)	Proposed
PO_RM_MN_B K_15B Bokaro Ghat 7_0.09 ha	Parsabera	Mandu	0.09	NA	0	Sirka	NO	900	1368	820.8	Sand	Proposed
PO_RM_MN_B K_16 Bokaro Ghat 8_0.42 ha	Parsabera	Mandu	0.42	NA	0	Sirka	NO	4200	6384	3830.4	Sand	Proposed
PO_RM_MN_B K_16A Bokaro Ghat 9_0.20 ha	Laiyo	Mandu	0.2	NA	0	Laiyo	NO	2000	3040	1824	Sand	Proposed
PO_RM_MN_B K_16B Bokaro Ghat 10_0.08 ha	Laiyo	Mandu	0.08	NA	0.4	Bhuyadih	NO	800	1216	729.6	Sand	Proposed
PO_RM_MN_B K_16C Bokaro Ghat 11_0.23 ha	Laiyo	Mandu	0.23	NA	0	Badgaon	NO	2300	3496	2097.6	Sand	Proposed
PO_RM_MN_B K_16D Bokaro Ghat 12_1.0 ha	Laiyo	Mandu	1	NA	0	Laiyo	Area: 1.87 Ha.	10000	15200	9120	Sand	Proposed
PO_RM_MN_B K_16E Bokaro Ghat 13_0.41 ha	Laiyo	Mandu	0.41	NA	0	Laiyo	NO	4100	6232	3739.2	Sand	Proposed
PO_RM_MN_B K_16F Bokaro Ghat 14_0.41 ha	Laiyo	Mandu	0.41	NA	0.18	Laiyo	NO	4100	6232	3739.2	Sand	Proposed
<b>River Detail</b>	<b>Mauza</b>	<b>Block</b>	<b>Area (Ha)</b>	<b>Distance (in KM) from PA/BR/WC/</b>	<b>Distance from Forest Area (in KM)</b>	<b>Forest Name</b>	<b>Mining leases within 500 meters (if yes cluster)</b>	<b>Total excavation cum /Annum consider digging depth</b>	<b>Total excavation in Tonnes /Annum consider digging depth</b>	<b>Total excavation in Tonnes /Annum (Considering 60% as per)</b>	<b>Mine be mined (Sand/Bajri)</b>	<b>Existing / Proposed</b>

ANVIRO PRIVATE LIMITED  
PATNA  
Ranchi

*(Signature)*

Approved  
State Level Environment Impact Assessment  
Jharkhand, Ranchi



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PO_RM_PT_D A_8 Damodar Ghat 8_0.19 ha	Sankul	Patratu	0.19	NA	0	Sayal	NO	2850	4389	2633.4	Sand	Proposed
PO_RM_PT_D A_8A Damodar Ghat 9_1.59 ha	Sayal	Patratu	1.59	NA	0	Sayal	Yes, Area:1 .77 Ha	23850	36729	22037.4	Sand	Proposed
PO_RM_PT_D A_9 Damodar Ghat 10_0.18 ha	Sayal	Patratu	0.18	NA	0	Sayal		2700	4158	2494.8	Sand	Proposed
PO_RM_PT_D A_9B Damodar Ghat 11_0.59 ha	Sayal	Patratu	0.59	NA	0.1	Sayal	NO	8850	13629	8177.4	Sand	Proposed
PO_RM_RM_D A_11A Damodar Ghat 12_2.46 ha	Sirka	Ramgarh	2.46	NA	1.35	Saraiya	NO	36900	56826	34095.6	Sand	Proposed
PO_RM_MN_D A_11B Damodar Ghat 13_0.62 ha	Painki	Mandu	0.62	NA	0.256	Panki	NO	9300	14322	8593.2	Sand	Proposed
PO_RM_MN_D A_12 Damodar Ghat 14_0.47 ha	Rauta	Mandu	0.47	NA	0.15	Badkundi	NO	7050	10857	6514.2	Sand	Proposed
PO_RM_MN_D A_13 Damodar Ghat 15_1.82 ha	Hesapoda	Gola	1.82	NA	0.26	Gandon ia and Lipia	NO	27300	42042	25225.2	Sand	Proposed



*(Handwritten signature)*



District Survey Report  
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Below sand-ghats are proposed based considering prevailing statutory guidelines and also based on approval of CO and DFO's.  
Table 8-3: Final List of Potential Mining Leases proposed

River Details	Sandbar Code	Mauza	Block	Area (Ha)	Distance (in KM) from PA/BR/WC/	Distance from Forest Area (in KM)	Forest Name	Mini leases within 500 meters (if yes cluster area)	Total excavation /Annum considering digging depth max as 1 meter	Total excavation in Tonnes /Annum considering digging depth max as 1 meter	Total excavation in Tonnes /Annum (Considering 60% as per EMGSM, 2020)	Mine related mine (Sand / Bajri/ RBM etc.)	Existing / Proposed
Bokaro	PO_RM_MN_B K_16B Bokaro Ghat 10_0.08 ha	Laiyo	Mandu	0.08	NA	0.4	Bhuyadih	NO	800	1216	729.6	Sand	Proposed
		Mauza	Block	Area (Ha)	Distance (in KM) from PA/BR/WC/	Distance from Forest Area (in KM)	Forest Name	Mini leases within 500 meters (if yes cluster area)	Total excavation in Tonnes /Annum considering digging depth max as 1.5 meter	Total excavation in Tonnes /Annum considering digging depth max as 1.5 meter	Total excavation in Tonnes /Annum (Considering 60% as per EMGSM, 2020)	Mine related mine (Sand / Bajri/ RBM etc.)	Existing / Proposed



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PO_RM_PT_DA 4 Damodar Ghat 4_ 0.93 ha	Tokisu d	Patrat u	0.9 3	NA	0.255	Tokisu d	No	13950	21483	12890	Sand	Propos ed
PO_RM_PT_DA 5_6 Damodar Ghat 5_ 2.28 ha	Tokisu d	Patrat u	2.2 8	NA	0.255	Tokisu d	NO	34200	52668	31601	Sand	Propos ed
PO_RM_RM_D A_11A Damodar Ghat 12_ 2.46 ha	Sirka	Rang arh	2.4 6	NA	1.35	Saraiy a	NO	36900	56826	34096	Sand	Propos ed
PO_RM_MN_D A_11B Damodar Ghat 13_ 0.62 ha	Panki	Mand u	0.6 2	NA	0.256	Panki	NO	9300	14322	8593.2	Sand	Propos ed
PO_RM_MN_D A_13 Damodar Ghat 15_ 1.82 ha	Hesap oda	Gola	1.8 2	NA	0.26	Gando nia and Lipia	NO	27300	42042	25225	Sand	Propos ed

Damo  
dar




### 8.3 Detail of production of sand and other minerals during last years

Details of production of last years are furnished below.

Table 8-4 : Detail of production of sand and other minerals during last years

Year	Dispatch (in CFT)
2017-18	5638927
2018-19	2379607
2019-20	101000
2020-21	-
2021-22	-
2022-23	-
<b>Total</b>	<b>8119534</b>

(Source: District Mining Office, Ramgarh)



## 9 Details of revenue generated from mineral sector during last years:

Revenue generation of last years is furnished below.

Table 9-1: District revenue generation from mineral sector in Rs.

Year	Revenue (in Rs Lakh)
2017-18	2.15
2018-19	3.60
2019-20	-
2020-21	-
2021-22	-
2022-23	-
<b>Total</b>	<b>5.75</b>

(Source: District Mining Office, Ramgarh)



## 10 Transport (Railway, road):

Ramgarh district is surrounded by North- Hazaribagh district, South- Ranchi district, East- Bokaro district, West- Ranchi district & Purulia district of West Bengal State. The district of Ramgarh is well served by a network of roads. Road & Railway communication is the main mode of transportation in this district. The roads are classified as the National Highways, State Highways, Major district roads and other district roads. It is situated on National Highway-33, 46 km away from state's capital, Ranchi on Northern side and 52 km away from Hazaribagh on southern side.

There are 6 direct train(s) from Ranchi to Ramgarh. These train(s) is/are Rnc Bsb Express (18611), Jharkhand S J Ex (12873), Rou Muri Jat Exp (18109), Bsb Rnc Express (18612), Sbp Bsb Express (18311) etc. The minimum time a train takes to reach Ramgarh from Ranchi is 2h 03m. The cheapest way to reach Ramgarh from Ranchi takes you 2h 15m, which is to take Rnc Bsb Express from Ranchi to Ramgarh.

The nearest domestic airport is Birsa Munda Airport in Ranchi which is 45 km from Ramgarh.

A transportation map of Ramgarh district is furnished as Figure 10.1 & 10.2

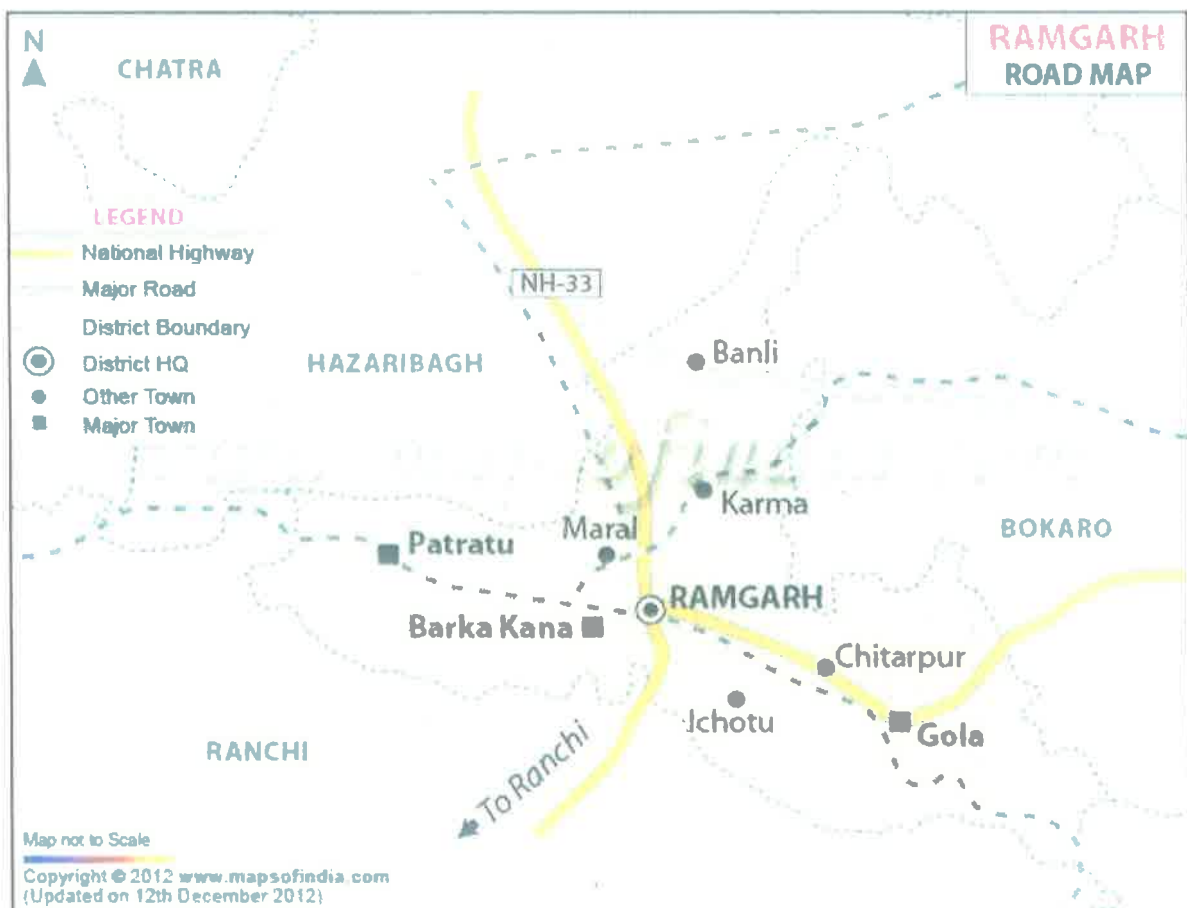


Figure 10-1 : Road map of Ramgarh District

(Source: <https://www.mapsofindia.com/maps/jharkhand/roads/Ramgarh.htm>)

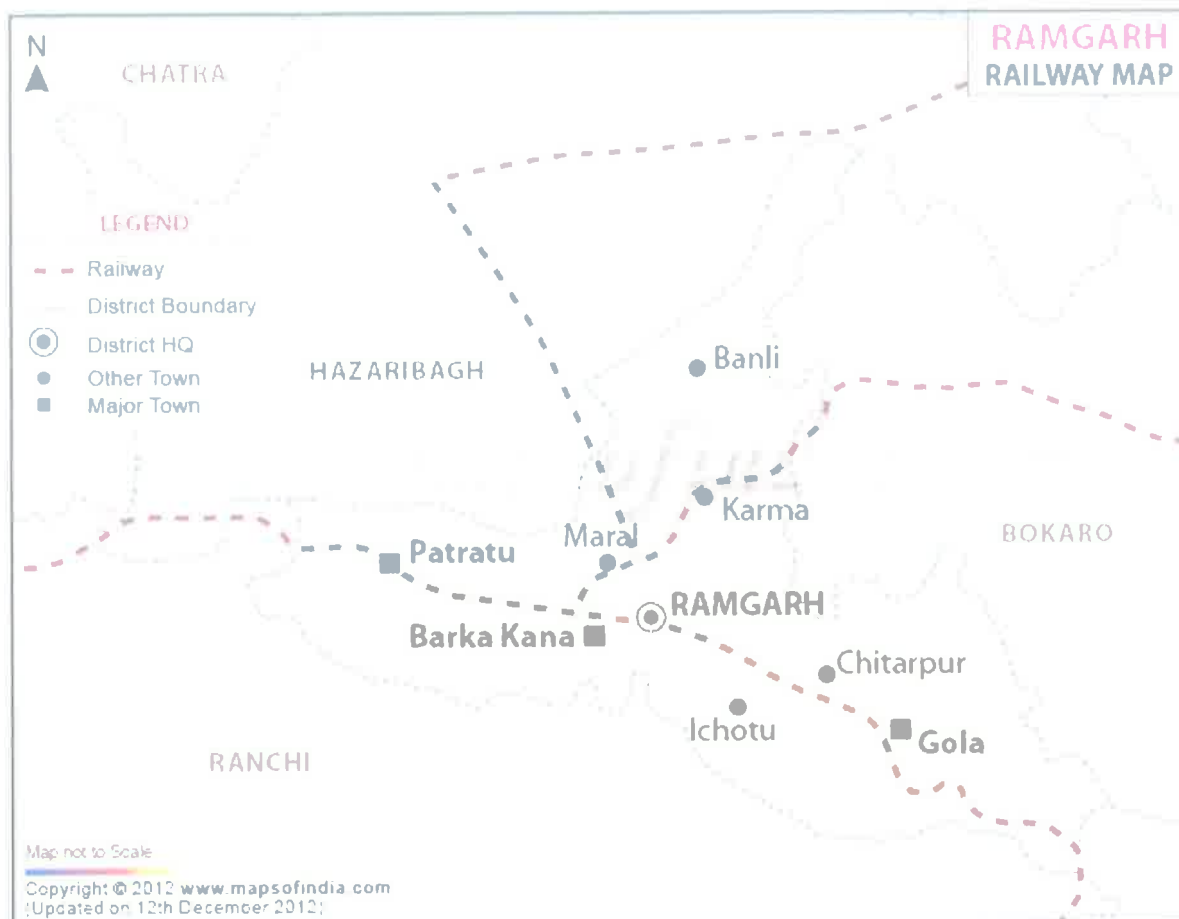


Figure 10-2 : Railway map of Ramgarh District

(Source: <https://www.mapsofindia.com/maps/jharkhand/railways/Ramgarh.htm>)



## **11 Environmental Sensitivity**

The Ramgarh area represents a unique geo- environmental setup. As human population expands, forests are being depleted for the extension of agricultural lands, introduction of new settlements, roadways etc. The growing changes is coming in the wake of urbanization and industrialization leave deep impression on ecosystem.

Due to unprecedented growth of population during the last few, nature has started reacting sharply to the accumulated human guilt. Soil erosion and its conservation play an important role.

The adverse effect of unscientific mining is realized in the form of landslide, removal of soil cover, siltation of river beds leading to frequent floods, endangering the lives and properties of local inhabitants.

### **11.1 Sand mining Impact**

Another serious environmental problem around the globe in recent years is of Sand mining. Sand mining is a process of extraction of sand from an open pit, river bed, sea beaches, ocean floor, river banks, deltas and island dunes. The extracted sand could be utilized for various types of manufacturing, such as concrete used in the construction of building and other structures. The sand can also be used as an abrasive. The demand for sand increase as population grows also urbanization with time. The high level of demands has offer led to the use of unsustainable sand mining process for speedy urbanization resulted in illegal mining.

Although most jurisdictions have legal limit on the location and volume of sand that can be mined, illegal sand extraction is taking place in many parts of the country due to rapid urbanization and industrialization.

Removal or extraction of too much sand from rivers leads to erosion of river banks. Deltas can recede due to sand mining. These destructive effects of sand mining ultimately result in loss of fertile land and property. It also destabilizes the ground and causes failure of engineering structures.

In-stream mining directly alters the channel geometry and bed elevation. By removing sediment from the channel, disrupts the preexisting balance between sediment supply and transporting capacity, typically inducing incision upstream and downstream of the extraction site. The resultant incision alters the frequency of floodplain inundation along the river courses, lowers valley floor water tables and frequently leads to destruction of bridges and channelization structures.

Sand Mining in beaches disturbs the ecosystem of different fauna of the beaches. The sand mining from natural barriers, made up of sand, causes flooding of the natural habitat. The sand mining activity destroys the aesthetic beauty of beaches and river bank and makes



the ecosystem unstable. If there are popular tourist destination, tourism potential of such areas will lose.

It could be concluding that there has been little in-depth research in to the environmental and social also political effect of land use practice and calls for urgent redressed by the competent authority.

## **11.2 Remedial measure**

### **11.2.1 Sustainable Mining Practices:**

- The depth of mining in riverbed shall not exceed 3 meter or base flow level whichever is less, provided that where the Joint Inspection Committee certifies about excessive deposit or over accumulation of mineral in certain reaches requiring channelization, it can go above 3 meters.
- Mining shall be done in layers of 1 meter depth to avoid ponding effect and after first layer is excavated, the process will be repeated for the next layers.
- No stream should be diverted for the purpose of sand mining. No natural water course and/ or water resources are obstructed due to mining operations.
- No blasting shall be resorted to in river mining and without permission at any other place.

### **11.2.2 Monitoring the Mining of Mineral and its Transportation:**

- For each mining lease site the access should be controlled in a way that vehicles carrying mineral from that area are tracked and accounted for.
- There should be regular monitoring of the mining activities in the State to ensure effective compliance of stipulated EC conditions and of the provisions under the Minor Mineral Concessions Rules framed by the State Government.

### **11.2.3 Noise Management:**

- Noise arising out of mining and processing shall be abated and controlled at source to keep within permissible limit.
- Restricted sand mining operation has to be carried out between 6 am to 7 pm.

### **11.2.4 Air Pollution and Dust Management:**

- The pollution due to transportation load on the environment will be effectively controlled and water sprinkling will also be done regularly.



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- Air pollution due to dust, exhaust emission or fumes during mining and processing phase should be controlled and kept in permissible limits specified under environmental laws.
- The mineral transportation shall be carried out through covered trucks only and the vehicles carrying the mineral shall not be overloaded. Wheel washing facility should be installed and used.

**11.2.5 Bio-Diversity Protection:**

- Restoration of flora affected by mining should be done immediately. Five times the number of trees destroyed by mining to be planted preferably of indigenous species. Each EC holder shall have to undertake plantation of trees over at least 20% of the total area of lease in the same plot or plots utilised for such working.
- No mining lease shall be granted in the forest area without forest clearance in accordance with the provisions of the Forest Conservation Act, 1980 and the rules made there under.
- Protection of natural home of any wild animal shall have to be ensured.
- No felling of tree near quarry is allowed. For mining lease within 10km of the National Park / Sanctuary or in Eco-Sensitive Zone of the Protected Area, recommendation of Standing Committee of National Board of Wild Life (NBWL) have to be obtained as per the Hon'ble Supreme Court order in I.A. No. 460 of 2004.
- Spring sources should not be affected due to mining activities. Necessary protection measures are to be incorporated.

**11.2.6 Management of Instability and Erosion:**

- Removal, stacking and utilization of top soil should be ensured during mining. Where top soil cannot be used concurrently, it shall be stored separately for future use keeping in view that the bacterial organism should not die and should be spread nearby area.
- The EC should stipulate conditions for adequate steps to check soil erosion and control debris flow etc. by constructing engineering structures
- Use of oversize material to control erosion and movement of sediments
- No overhangs shall be allowed to be formed due to mining and mining shall not be allowed in area where subsidence of rocks is likely to occur due to steep angle of slope.
- No extraction of stone / boulder / sand in landslide prone areas.
- Controlled clearance of riparian vegetation to be undertaken.



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#### 11.2.7 Waste Management:

- Site clearance and tidiness is very much needed to have less visual impact of mining.
- Dumping of waste shall be done in earmarked places as approved in Mining Plan.
- Rubbish burial shall not be done in the rivers.

#### 11.2.8 Pollution Prevention:

- Take all possible precautions for the protection of environment and control of pollution.
- Effluent discharge should be kept to the minimum and it should meet the standards prescribed.

#### 11.2.9 Protection of Infrastructure:

- Mining activities shall not be done for mine lease where mining can cause danger to site of flood protection works, places of cultural, religious, historical, and archeological importance.
- For carrying out mining in proximity to any bridge or embankment, appropriate safety zone should be worked out on case-to-case basis, taking into account the structural parameters, location aspects and flow rate, and no mining should be carried out in the safety zone so worked out.

### 11.3 Suggested reclamation plan for already mined out areas

As per statute all mines/quarries are to be properly reclaimed before final closure of the mine. Reclamation plans should include:

- a) A baseline survey of river cross section. The study of cross section is basis for delineating channel form. Cross-sections must be surveyed between two monumented endpoints set on the river banks, and elevations should be referenced based on benchmark set in the area;
- b) The proposed mining cross-section data should be plotted over the baseline data to illustrate the vertical extent of the proposed excavation;
- c) The cross-section of the replenished bar should be the same as the baseline data. This illustrates that the bar elevation after the bar is replenished will be the same as the bar before extraction;



- d) A planimetric map showing the aerial extent of the excavation and extent of the riparian buffers;
- e) A planting plan developed by a plant ecologist familiar with the flora of the river for any areas such as roads that need to be restored;
- f) Each EC holder shall have to undertake plantation of trees over at least 20% of the total area of the plot or plots of land as subject to such working in accordance with a plan approved by the concerned Divisional Forest Officer holding jurisdiction, provided further the competent authority i.e., The Divisional Forest Officer may fix up norms for plantation of trees in a particular area regarding choice of species, spacing, nos of trees and maintenance etc.;
- g) A monitoring plan has been established.



## **12 Risk assessment and disaster management plan**

Risk analysis is the systematic study of risks encountered during various stages of mining operation. Risk analysis seek to identify the risks involved in mining operations, to understand how and when they arise, and estimate the impact (financial or otherwise) of adverse outcomes. The sand mining operation in the district is mainly done manually.

### **12.1 Identification of risk due to river sand mining**

There is no land degradation due to mining activities as mining is done only on river bed dry surface. There will be no OB or waste generation as the sand is exposed in the river bed and is completely saleable. There will be neither any stacking of soil nor creation of OB dumps. The mining activity will carry out up to a maximum depth of 3m below the surface level. So, there is no chance of slope failure, bench failure in the mines. However, there are some identified risk in the mining activity which are as below:

1. Accident during sand loading and transportation
2. Inundation/ Flooding
3. Quick Sand Condition

### **12.2 Mitigation measures**

#### **12.2.1 Measures to prevent accidents during loading and transportation:**

- During the loading truck should be brought to a lower level so that the loading operation suits to the ergonomic condition of the workers.
- The workers will be provided with gloves and safety shoes during loading.
- Opening of the side covers of the truck should be done carefully and with warning to prevent injury to the loaders.
- Mining operations will be takes place during daylight only.
- The truck will be covered with tarpaulin and maintained to prevent any spillage.
- To avoid danger while reversing the trackless vehicles especially at the embankment and tipping points, all areas for reversing of lorries should be made man free as far as possible.
- All transportation within the main working will be carried out directly under the supervision and control of the management.
- Overloading should not be permitted and the maximum permissible speed limit should be ensured.
- There will be regular maintenance of the trucks and the drivers will have valid driving license.



### 12.2.2 Measures to prevent incidents during Inundation/ Flooding:

To minimize the risk of flooding/ inundation following measures will be under taken:

- Mining will be completely closed during the monsoon months.
- Proper weather information particularly on rain should be kept during the operational period of mines so that precautionary measures will be undertaken.

### 12.2.3 Measures for mitigation to quick sand condition:

- Quick sand zone and deep-water zone will be clearly demarcated and all the mines' workers will made aware of the location.
- Mining will be done strictly as per the approved mining plan.

## 12.3 Disaster management plan

As the depth of mining will be maximum of 3m below the surface level considering local condition, the risk related to mining activity is much less. The mining operation will be carried out under the supervision experienced and qualified Mines Manager having Certificate of Competency to manage the mines granted by DGMS. All the provisions of Mines Act 1952, MMR 1961 and Mines Rules 1955 and other laws applicable to mine will strictly be complied. During heavy rainfall and during the monsoon season the mining activities will be closed. Proper coordination with Irrigation Department should be maintained so that at the time of releasing water, if any, from the dam suitable warning/information is given in advance. Special attention and requisite precautions shall be taken while working in areas of geological weakness like existence of slip, fault etc. The mining site will be supplied with first-aid facilities and the entire mines worker will have access to that.



### **13 Conclusion:**

- I. It has been observed during the preparation of district survey report that Ramgarh district do not have any in-situ minor mineral occurrences as per the till date studies being carried out by various authorities and agencies.
- II. The replenishment study has been carried out during the preparation of this DSR after analyzing datasets of consecutive calendar years.
- III. Both field-based surveys coupled with satellite imagery study and empirical study was carried out to determine the rate of replenishment in each river of the district.
- IV. The determined values of various methods as adopted for replenishment study gives a comparable value and in all cases the values are found to be much more as compared to the capping limit (60%) as suggested in the Enforcement & Monitoring Guidelines for Sand Mining (EMGSM) January 2020, Issued by Ministry of Environment, Forest and Climate Change (MoEF & CC) 2020.
- V. It is suggested to have a periodical review along with field data acquisition during pre and post monsoon periods to record the seasonal variance of the sedimentation rate on annual basis and update this DSR in case of any abnormal findings.



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Annexure K	Pre-Monsoon Data from DMO
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Plate G	Composite Map of Ramgarh district



**ANNEXURE- 1**  
**(Compliance Report)**



Sl. No	Observation by SEAC	Reply
1	The DSR submitted was at a draft stage. The final DSR after approval by Sub divisional Committee, Deputy Commissioner and incorporation of the public comments is to be submitted for appraisal by SEAC.	The observation by sub-divisional committee and public comments are incorporated with this version of DSR.
2	The final DSR should be signed by all members of the Sub divisional Committee and the Consultants involved in the preparation of the same. All pages of the DSR should be signed by the authorized officer of the DC/ Sub divisional Committee.	Complied and attached with the report
3	The draft DSR submitted is based only on part survey. In the submitted draft DSR the complete area of the river / rivers has not been surveyed, only some selected Ghats / leases have been surveyed. The complete potential area should be demarcated before proposing the sand leases / Ghats as per EMGSM guideline 2020.	All the rivers have been surveyed and their potential sand ghats is submitted with the DSR report in Table 7.4, showing the complete potential of the sand lease as per EMGSM guideline 2020.
4	The field survey of pre-monsoon period is to be included in final DSR.	Pre-monsoon data has been provided by DMO is attached as annexure K.
5	The DSR should be placed in the public domain for at least 01 (One) month from the date of publication of the advertisement for obtaining comments of the public. The comments received shall be placed before the concerned Sub divisional Committee for consideration. The final DSR should be submitted to SEIAA, after incorporation of all replies of the comments received from the public.	The DSR was placed on public portal for one month the screenshot and the paper cutting is attached for reference as annexure G
6	Demand and supply of the river bed material through market survey needs to be carried out. In addition to this, future demand for the next five years also needs to be considered to justify the number & area of the Sand Ghat to be included in the final DSR	The demand and supply gap of the sand in the district is reflected in chapter 2 point no 2.3 of DSR.
7	The sand Ghats / leases have not to be proposed on the confluence / meanders / concavities / active channels of the river.	The confluence / meanders / concavities / active channels of the river is not proposed as these locations are environmentally sensitive.
8	The Khata & Khasra (class / nature of land including "Jungle Jhari") of the lease area should be certified by the concerned Circle Officer (CO) and to be incorporated in the final DSR	The Khata & Khasra (class / nature of land including "Jungle Jhari") of the lease area was certified and CO Report of the same is attached as annexure F.



9	The distance sand leases / Ghats from the Forest / Wildlife Protected area / Birds Sanctuary / Wildlife Sanctuary / National Park / Eco Sensitive Zone should be verified and certified by the concerned DFO's of the respective Territorial and Wildlife division.	DFO Report, attached as annexure F.																		
10	The undertaking regarding presence of aquatic animal in the river in proximity of the proposed sand ghats should be verified and certified by concerned Govt. Departments like Zoological survey of India.	Attached as annexure J.																		
11	The proposed leases / ghats should meet all the siting criteria of State Pollution Control Board / SEIAA.	As per the siting criteria of JSPCB notification no. B-21, Ranchi dated 16/08/13 and also, as per 58th-MOM-of-SEIAA Jharkhand following sitting criteria has been complied which is as below: <table border="1"> <thead> <tr> <th>Minimum distance from</th> <th>Distance (in meter)</th> </tr> </thead> <tbody> <tr> <td>NH</td> <td>100</td> </tr> <tr> <td>SH</td> <td>100</td> </tr> <tr> <td>Distance metal road</td> <td>50</td> </tr> <tr> <td>Railway line</td> <td>100</td> </tr> <tr> <td>River</td> <td>100</td> </tr> <tr> <td>Any other river</td> <td>100</td> </tr> <tr> <td>Habitation</td> <td>200</td> </tr> <tr> <td>Forest/ Forest land</td> <td>400*</td> </tr> </tbody> </table> <p>*As per SEIAA, Jharkhand MoM minimum distance from forest is 250 m only, which is considered for the DSR.</p>	Minimum distance from	Distance (in meter)	NH	100	SH	100	Distance metal road	50	Railway line	100	River	100	Any other river	100	Habitation	200	Forest/ Forest land	400*
Minimum distance from	Distance (in meter)																			
NH	100																			
SH	100																			
Distance metal road	50																			
Railway line	100																			
River	100																			
Any other river	100																			
Habitation	200																			
Forest/ Forest land	400*																			
12	Clear and high-resolution color satellite images of the proposed potential sand mining area should be submitted with final DSR including the date of photographs / Geocoded location. Details of all such satellite imageries should be including in the final DSR.	We have provided ESRI BASE MAP (Pre-Monsoon) having resolution 5 M & FCC-USGS LANDSET 8 (Post-Monsoon) having resolution 30 M in the DSR.																		
13	The table of estimation of sand resources after pre-monsoon and post-monsoon survey should be including in the final DSR.	Complied., please refer table no – 7.4																		
14	All primary & secondary data should be supported with relevant references and documentary evidences in the final DSR.	Complied																		
15	Bulk density and specific gravity of the sand should be certified by NABL accredited laboratory.	Attached as annexure D.																		
16	Concave side of the river should be avoided for identification of sand leases / ghats.	No any sand leases / ghats has been proposed on concave side of the river.																		



17	KML files of Existing leases / ghats and proposed leases / ghats should be provided.	Complied
18	Cluster and contiguous cluster formation should be followed as per EMGSM guidelines, 2020.	Complied
19	Average length and width of the river should be including and mining should be restricted to 3/4th of the river width and mining should be restricted within 60% of the mineable reserve.	Complied, please refer annexure H
20	Transportation routes should be defined for the proposed mining sites and duly certified from the competent Authorities.	Transportation routes maps attached as annexure I
21	All the annexures given in the EMGSM guidelines, 2020 should be filled and including in the final DSR.	All the annexures given in the EMGSM guidelines, 2020 attached as annexure H.
22	Point no. 9.3 of the EMGSM guidelines, 2020 regarding monitoring of mining near inter-district or inter-state boundary should be addressed in the final DSR, if applicable.	Complied, undertaking attached as annexure L.
23	In addition to above any other applicable criteria as required under SSMG, 2016 & EMGSM guidelines, 2020 should be including in the final DSR.	Complied
24	The presentation of the final DSR at the time of appraisal by SEAC should cover all the points of SSMG, 2016 & EMGSM guidelines, 2020.	Complied



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**ANNEXURE- A**  
**Details of Existing Sand Ghats (As per OLD**  
**DSR)**



Details of existing sand ghats (As per Old DSR)

Sl. No	Block/ Circle	Details of Sand Ghats	Panchayat	River	Stream Order
1	Chitarpur	Khata No.-600 Plot no.-653/6503 Area-2.50 acre	Mayal	Damodar	6 <sup>th</sup>
2	Ramgarh	Khata No.-111 Plot no.-01 Area-05 acre	Lodhma	Damodar	6 <sup>th</sup>
3	Ramgarh	Khata No.-84 Plot no.-2263 Area-05 acre	Kaitha	Damodar	6 <sup>th</sup>
		Khata No.-40 Plot no.-01 Area-05 acre	Kaitha	Damodar	6 <sup>th</sup>
4	Ramgarh	Khata No.-01 Plot no.-216 Area-05 acre	Naisarai	Damodar	6 <sup>th</sup>
5	Ramgarh	Khata No.-77 Plot no.-01 Area-05 acre	Saraiya	Damodar	6 <sup>th</sup>
6	Mandu	Khata No.-01 Plot no.-275 Area-3.5 acre	Digwar	Damodar	6 <sup>th</sup>
7	Gola	Khata No.-55 Plot no.-01 Area-15.31 acre	Hesa poda	Damodar	6 <sup>th</sup>
8	Patratu	Khata No.-86 Plot no.-45 Area-14.80 acre	Kk sayal	Damodar	6 <sup>th</sup>
9	Patratu	Khata No.-12 Plot no.-66 Area-26.80 acre	Budh Bazar	Damodar	6 <sup>th</sup>
10	Mandu	Khata No.-29 Plot no. 403,337 Area-3.50 acre	Secta	Damodar	6 <sup>th</sup>
11	Ramgarh	Khata No.-02 Plot no.-01 Area-5.00 acre	Ramgarh Chawani	Damodar	6 <sup>th</sup>
12	Patratu	Khata No.-64 Plot no.-159 Area-34.80 acre	Palu	Damodar	6 <sup>th</sup>
13	Patratu	Khata No.-26 Plot no.-20 Area- 18.90 acre	Chordhara	Damodar	6 <sup>th</sup>



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**ANNEXURE- B**  
**(Committee Involved in DSR)**



उपायुक्त सह जिला दण्डाधिकारी का कार्यालय, रामगढ़।

(खनन शाखा)

कार्यालय आदेश

माननीय उच्चतम न्यायालय, नई दिल्ली द्वारा Civil Appeal No. 3661-3662/2020 State of Bihar & Others Vrs Pawan Kumar & Others के मामले में पारित आदेश दिनांक 10.11.2021, Sustainable Sand Mining Guidelines, 2016, पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय, भारत सरकार के अधिसूचना सं० 3611 (अ) दिनांक 25.07.2018 तथा Enforcement and Monitoring Guidelines for Sand Mining, 2020 के तहत NABET से मान्यता प्राप्त Consultant द्वारा बालू खनिज का DSR तैयार किया जाना है।

2. रामगढ़ जिला हेतु बालू का DSR खान एवं भूतत्व विभाग, झारखण्ड, राँची से प्राप्त कार्यदेश के आलोक में M/s Rian Enviro Private Ltd., Patna द्वारा तैयार कर Email के द्वारा भेजा गया है। उक्त DSR को उपरोक्त Guidelines के तहत जिले के अधिकारिक वेबसाइट पर निर्धारित अवधि के लिये Upload भी किया गया है।

3. उल्लेखनीय है कि उक्त DSR को SEIAA, Ranchi को अनुमोदनार्थ प्रेषित किये जाने से पूर्व जिला स्तर पर समिति द्वारा DSR की Vetting की जानी है। अतएव अग्रेतर आवश्यक कार्रवाई किये जाने हेतु अद्योहस्ताक्षरी की अध्यक्षता में निम्नवत समिति का गठन किया जाता है—

- i. वन प्रमण्डल पदाधिकारी, रामगढ़।
- ii. अनुमण्डल पदाधिकारी, रामगढ़।
- iii. जिला खनन पदाधिकारी, रामगढ़।
- iv. सहायक निदेशक, भूतत्व, जिला भूतात्विक कार्यालय, हजारीबाग।
- v. कार्यपालक अभियंता, लघु सिंचाई प्रमण्डल, रामगढ़।
- vi. क्षेत्रीय पदाधिकारी, झारखण्ड राज्य प्रदूषण नियंत्रण पर्षद, हजारीबाग।

4. अतएव इस आदेश पत्र के साथ DSR संलग्न करते हुये निदेश दिया जाता है कि उक्त के निमित्त आवश्यक सुझाव/मंतव्य/संशोधन से समिति को अवगत करायेंगे ताकि DSR को अंतिम रूप दे कर SEIAA, Ranchi को अनुमोदनार्थ भेजी जा सके।



शाध्वी निषा  
18.11.2022  
उपायुक्त,  
रामगढ़।



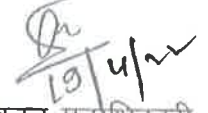


**जिला खनन कार्यालय, रामगढ़।**

ज्ञापांक ...1.1.22.../खनन, रामगढ़; दिनांक...19/04/22...

प्रतिलिपि :- वन प्रमण्डल पदाधिकारी, रामगढ़/अनुमण्डल पदाधिकारी, रामगढ़/जिला खनन पदाधिकारी, रामगढ़/सहायक निदेशक, भूतत्व, जिला भूतात्विक कार्यालय, हजारीबाग/कार्यपालक अभियंता, लघु सिंचाई प्रमण्डल, रामगढ़/क्षेत्रीय पदाधिकारी, झारखण्ड राज्य प्रदूषण नियंत्रण पर्वद, हजारीबाग को सूचनार्थ एवं आवश्यक कार्रवाई हेतु प्रेषित।



  
19/4/22  
जिला खनन पदाधिकारी,  
रामगढ़।



**ANNEXURE- C**  
**(Photographs of the site Survey)**





Amir Akhtar



*[Handwritten signature]*



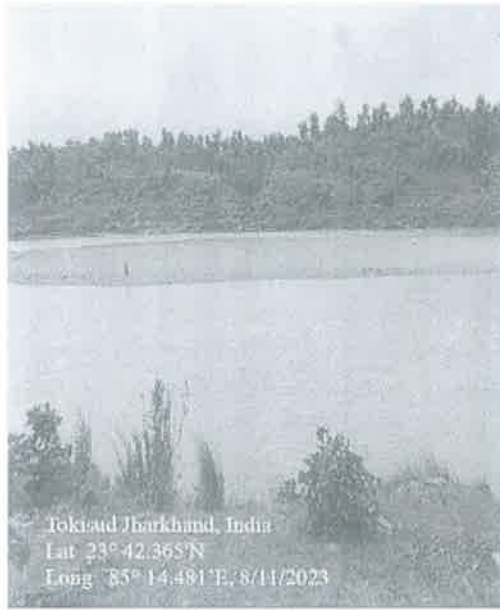


Latitude: 23° 39' - 43"  
 Longitude: 85° 45' - 10"  
 Elevation: 263.86±3 m  
 Accuracy: ±200.0 m  
 Azimuth: 33° (NE)  
 Pitch: -22.7° (0.9°)  
 Time: 11-30-2022 16:06  
 Note: Ramgarh Damodar (MPC)



Latitude: 23° 39' - 43"  
 Longitude: 85° 45' - 10"  
 Elevation: 263.86±3 m  
 Accuracy: ±200.0 m  
 Azimuth: 33° (NE)  
 Pitch: -22.7° (0.9°)  
 Time: 11-30-2022 16:06  
 Note: Ramgarh Damodar (MPC)





*(Handwritten signature)*



**ANNEXURE- D**  
**(Sp. Gravity & Bulk Density data of sand from  
NABL lab)**





# RAPPID TEST LAB PVT. LTD.

Our Dream is Quality only....



Block-A, Raut City, Commercial Complex, Garikhana, Khagaul, Near Radiant International School, Patna - 801105 (Bihar)

## TEST REPORT

To, District Mining Officer, Ramgarh		ULR No.: TC1021422000000136F	
		Date of Receipt: 29.11.2022	
		Date of Testing: 30.11.2022-01.12.2022	
		Date of Report: 01.12.2022	
Description of Sample: Sandi Soil			
Location: Vill- Parsabera, Tehsil-Mandu, Bokaro river			
Ref No: Nil Dated: 29.11.2022			
SL. No.	TEST PARAMETERS	TEST METHOD	Results
1	Specific Gravity	IS 2720 (P-3)	2.62
2	Bulk density, kg/l	IS 2386 (P-3)	1.52

\*End of Test Report\*



Authorized Signatory

Satis K...



### Terms & Conditions:

1. This report shall not be reproduced except in full without the approval of the Rappid Test Lab Pvt. Ltd. This report will not be valid for judicial Purpose.
2. The above results are related only to the test performed on the sample, Endorsement of the product is neither inferred nor implied.
3. Total liability of our Test Lab is limited to the invoiced amount.,
4. Report refers to the sample received by Rappid Test Lab Pvt. Ltd. unless mentioned otherwise.
5. Report refers to the sample received by Rappid Test Lab Pvt. Ltd. unless mentioned otherwise.



# RAPPID TEST LAB PVT. LTD.

Our Dream is Quality only....



Block-A, Raut City, Commercial Complex, Garikhana, Khagaul, Near Radiant International School, Patna - 801105 (Bihar)

## TEST REPORT

<b>To,</b>  <b>District Mining Officer, Ramgarh</b>	<b>ULR No.:</b> TC1021422000000135F		
	<b>Date of Receipt:</b> 29.11.2022		
	<b>Date of Testing:</b> 30.11.2022-01.12.2022		
	<b>Date of Report:</b> 01.12.2022		
<b>Description of Sample:</b> Sandi Soil			
<b>Location:</b> Vill-Salul, Tehsil-Patratu, Damodar River			
<b>Ref No:</b> Nil <b>Dated:</b> 29.11.2022			
SL. No.	TEST PARAMETERS	TEST METHOD	Results
1	Specific Gravity	IS 2720 (P-3)	2.64
2	Bulk density, kg/l	IS 2386 (P-3)	1.54

\*End of Test Report\*



Authorized Signatory

Satish Kumar



### Terms & Conditions:

1. This report shall not be reproduced except in full without the approval of the Rappid Test Lab Pvt. Ltd. This report will not be valid for judicial Purpose.
3. The above results are related only to the test performed on the sample, Endorsement of the product is neither inferred nor implied,
4. Total liability of our Test Lab is limited to the invoiced amount.,
- 5 Report refers to the sample received by Rappid Test Lab Pvt. Ltd. unless mentioned otherwise.

**ANNEXURE- E**  
**(Proposed Ghat Coordinate)**



List Of Category II Sand Ghat Bokaro River

Sl No.	SandBar Code	Latitude	Longitude	Mauza	Block	Khata No.	Plot No.
1	PO_RM_MN_BK_1A Bokaro Ghat 1_ 0.03 ha	23.80601468	85.521895	Pundi	Mandu	92	1
		23.805954	85.521902				
		23.80592408	85.521954				
		23.80586311	85.522033				
		23.80586069	85.52209				
		23.80588208	85.522138				
		23.8059285	85.522172				
		23.80598305	85.522204				
		23.80597397	85.522168				
		23.80599409	85.522005				
	23.80601468	85.521895					
2	PO_RM_MN_BK_2 Bokaro Ghat 2_ 0.02 Ha	23.79865777	85.52853	Pundi	Mandu	92	42
		23.7986509	85.528608				
		23.79861447	85.528685				
		23.79858536	85.528745				
		23.79854153	85.52882				
		23.79850487	85.528854				
		23.79846672	85.528861				
		23.7985495	85.528699				
		23.79865777	85.52853				
3	PO_RM_MN_BK_4 Bokaro Ghat 3_ 0.10 ha	23.7979484	85.530564	Pundi	Mandu	92	42
		23.79798262	85.530628				
		23.79797485	85.530802				
		23.79804866	85.530845				
		23.79801813	85.531078				
		23.7979773	85.531097				
		23.79787946	85.531511				
		23.79785232	85.531488				
		23.7978396	85.531232				
			23.7979484				



4	PO_RM_MN_BK_5 Bokaro Ghat 4_ 0.13 ha	23.79720948	85.532948	Pundi	Mandu	92	42						
		23.79715562	85.53315										
		23.79700037	85.533449										
		23.79691343	85.533716										
		23.79687955	85.533907										
		23.79702101	85.533697										
		23.79713353	85.533419										
		23.79726888	85.533164										
		23.79739399	85.533014										
		23.79736899	85.532842										
		23.79720948	85.532948										
		5	PO_RM_MN_BK_7 Bokaro Ghat 5_ 0.17 ha					23.79006808	85.534923	Pundi	Mandu	92	790
								23.78987269	85.534929				
23.7897841	85.534989												
23.78954469	85.53515												
23.7897887	85.535165												
23.78998751	85.535304												
23.79010889	85.535316												
23.79018848	85.535195												
23.7901789	85.53501												
23.79006808	85.534923												
6	PO_RM_MN_BK_13 Bokaro Ghat 6_ 0.07 ha			23.76498393	85.542229	Duni	Mandu	1	112				
				23.7647927	85.542231								
				23.76467672	85.542287								
		23.76460524	85.542468										
		23.76456823	85.542661										
		23.76456425	85.542897										
		23.76461542	85.542998										
		23.764619	85.542709										
		23.76469482	85.542487										
		23.76480446	85.542339										
		23.76498393	85.542229										






10	 PO_RM_MN_BK_16B Bokaro Ghat 10_0.08 ha	23.77135819	85.607255	Laiyo	Mandu	129	3421
		23.77146587	85.607394				
		23.77151801	85.607559				
		23.7715106	85.607763				
		23.7714778	85.60791				
		23.77134917	85.608126				
		23.77139815	85.60811				
		23.77147189	85.608008				
		23.77157658	85.607817				
		23.77162034	85.607669				
		23.77160527	85.607528				
		23.7715647	85.607388				
		23.77146117	85.60726				
		23.77134834	85.607216				
23.77135819	85.607255						
11	 PO_RM_MN_BK_16C Bokaro Ghat 11_0.23 ha	23.77105072	85.615207	Laiyo	Mandu	129	3199
		23.77116696	85.615363				
		23.77148703	85.615584				
		23.77211486	85.615787				
		23.77255973	85.615795				
		23.7725747	85.615782				
		23.77139177	85.615409				
		23.77107403	85.615005				
		23.77105072	85.615207				
		23.77353933	85.616647				
		23.77387609	85.616923				
		23.77448191	85.617181				
		23.77490692	85.617767				
		23.77514411	85.618046				
23.77510629	85.617308						
23.77478818	85.616955						
23.77463487	85.616711						
23.77425841	85.616566						
12	 PO_RM_MN_BK_16D Bokaro Ghat 12_1.0 ha	23.77353933	85.616647	Laiyo	Mandu	129	3199
		23.77387609	85.616923				
		23.77448191	85.617181				
		23.77490692	85.617767				
		23.77514411	85.618046				
		23.77510629	85.617308				
		23.77478818	85.616955				
		23.77463487	85.616711				
		23.77425841	85.616566				

13	PO_RM_MN_BK_16E Bokaro Ghat 13_0.41 ha	23.77400642	85.616427	Laiyo	Mandu	129	3199
		23.77343756	85.616325				
		23.77353933	85.616647				
		23.77523416	85.617624				
		23.77524556	85.617883				
		23.77533851	85.6182				
		23.77534635	85.618588				
		23.77547172	85.618626				
		23.77562277	85.618385				
		23.77570239	85.618114				
		23.7756291	85.617687				
		23.77543607	85.617434				
		23.77523416	85.617624				
14	PO_RM_MN_BK_16F Bokaro Ghat 14_0.41 ha	23.77775287	85.625792	Laiyo	Mandu	129	3199
		23.77760258	85.625767				
		23.77791647	85.625925				
		23.77831292	85.626268				
		23.77893449	85.62673				
		23.77878884	85.626229				
		23.7782913	85.625865				
		23.77784064	85.625702				
		23.77775287	85.625792				




**List Of Category II Sand Ghat Damodar River**

Sl No.	SandBar Code	Latitude	Longitude	Mauza	Block	Khata No.	Plot No.
1	PO_RM_MN_DA_13 Damodar Ghat 15_ 1.82 ha	23.672136	85.75859093	Hesapoda	Gola	95	1,118
		23.672152	85.75923288				
		23.669612	85.75907739				
		23.668814	85.75884979				
		23.668884	85.75839767				
		23.669674	85.75870833				
		23.672136	85.75859093				
		23.672136	85.75859093				
2	PO_RM_MN_DA_12 Damodar Ghat 14_ 0.47 ha	23.63191	85.60598659	Rauta	Mandu	29	403 337
		23.632073	85.60711023				
		23.632293	85.60794181				
		23.632353	85.60795869				
		23.632513	85.60792259				
		23.632437	85.60745786				
		23.632013	85.6060156				
		23.63191	85.60598659				
3	PO_RM_MN_DA_11B Damodar Ghat 13_ 0.62 ha	23.646186	85.54264637	Painki	Mandu	38	275 257
		23.645913	85.54282464				
		23.645848	85.54307007				
		23.645917	85.54330547				
		23.645886	85.54375068				
		23.645976	85.54403563				
		23.646001	85.54437984				
		23.645984	85.54500184				
		23.646108	85.54543803				
		23.646143	85.54562287				
		23.64626	85.5455682				
		23.646127	85.54411952				
23.646089	85.54331563						
23.646186	85.54264637						
23.635724	85.43528958						




4	PO_RM_RM_DA_11A Damodar Ghat 12_ 2.46 ha	23.635355	85.43757371	Sirka	Ramgarh	42	243
		23.635499	85.43830109				
		23.63557	85.43883762				
		23.635831	85.43850169				
		23.636127	85.43782609				
		23.636229	85.43628583				
		23.636108	85.43477045				
		23.635724	85.43528958				
		23.685095	85.34877897				
		23.68475	85.34914174				
5	PO_RM_PT_DA_9B Damodar Ghat 11_ 0.59 ha	23.684507	85.34960125	Sayal	Patratu	86	102
		23.684451	85.34989679				
		23.684311	85.350365				
		23.685571	85.34871934				
		23.685095	85.34877897				
		23.695985	85.33614735				
		23.695402	85.33613559				
		23.695164	85.33627703				
		23.696065	85.33634964				
		23.696319	85.33625205				
6	PO_RM_PT_DA_9 Damodar Ghat 10_ 0.18 ha	23.695985	85.33614735	Sayal	Patratu	86	45
		23.702238	85.33737713				
		23.701631	85.33760643				
		23.700742	85.33769246				
		23.699506	85.3375077				
		23.698482	85.33716333				
		23.698195	85.33704848				
		23.698392	85.33733185				
		23.698912	85.33774772				
		23.699192	85.33783427				
7	PO_RM_PT_DA_8A Damodar Ghat 9_ 1.59 ha	23.699681	85.33803381	Sayal	Patratu	86	9
		23.700274	85.33810823				
		23.700947	85.33780736				
		23.702042	85.33787645				



8	PO_RM_PT_DA_8 Damodar Ghat 8_0.19 ha	23.702167	85.33762897	Sankul	Patratu	351	2003		
		23.702715	85.33714125						
		23.702774	85.33702989						
		23.702238	85.33737713						
		23.691932	85.32135765						
		23.692361	85.32224626						
		23.692478	85.32214399						
		23.692412	85.32180634						
		23.691852	85.32118471						
		23.691932	85.32135765						
		23.699278	85.25836287						
		23.699058	85.25868416						
23.698929	85.25877319	Sankul	Patratu	351	1				
23.698525	85.25934514								
23.698745	85.25934636								
23.700017	85.25816655								
23.700048	85.25798905								
23.699539	85.25811804								
23.699278	85.25836287								
23.702477	85.2555717					Kirigara	Patratu	76	1
23.700944	85.25690092								
23.699862	85.25779254								
23.700062	85.25777715								
23.700281	85.25763052								
23.700835	85.25740712								
23.701303	85.25700353								
23.70218	85.25606273								
23.702476	85.25574463								
23.702477	85.2555717								
23.711278	85.24580261								
23.711646	85.24582424								
23.711491	85.24648115								




11	PO_RM_PT_DA_5_6 Damodar Ghat 5_ 2.28 ha	23.711144	85.24682738	Tokisud	Patratu	64	1
		23.710845	85.24732144				
		23.710577	85.24786151				
		23.710347	85.24863335				
		23.709869	85.24901367				
		23.709594	85.24935718				
		23.708662	85.24995672				
		23.708303	85.25021746				
		23.70817	85.24991701				
		23.70915	85.24902551				
		23.709967	85.24830296				
23.710437	85.24787826						
23.710715	85.24702405						
23.710973	85.24649563						
23.711199	85.24603663						
23.711278	85.24580261						
12	PO_RM_PT_DA_4 Damodar Ghat 4_ 0.93 ha	23.706211	85.24072226	Tokisud	Patratu	64	160
		23.705508	85.24072903				
		23.704823	85.24090912				
		23.706025	85.24117963				
		23.7076	85.24108905				
		23.707412	85.24087779				
		23.706211	85.24072226				
		23.698594	85.23708981				
		23.698495	85.2373583				
		23.699383	85.23848129				
		23.699482	85.23839664				
23.699512	85.23823907						
23.698594	85.23708981						
23.687714	85.2354217						
23.687711	85.23561845						
23.687815	85.23581967						
23.688039	85.23604366						
23.688324	85.23617321						
13	PO_RM_PT_DA_3 Damodar Ghat 3_ 0.41 ha	23.698594	85.23708981	Tokisud	Patratu	64	159
		23.698495	85.2373583				
		23.699383	85.23848129				
		23.699482	85.23839664				
		23.699512	85.23823907				
		23.698594	85.23708981				
		23.687714	85.2354217				
		23.687711	85.23561845				
		23.687815	85.23581967				
		23.688039	85.23604366				
		23.688324	85.23617321				
14	PO_RM_PT_DA_2 Damodar Ghat 2_ 0.77 ha	23.698594	85.23708981	Tokisud	Patratu	64	137
		23.698495	85.2373583				
		23.699383	85.23848129				
		23.699482	85.23839664				
		23.699512	85.23823907				
		23.698594	85.23708981				
		23.687714	85.2354217				
		23.687711	85.23561845				
		23.687815	85.23581967				
		23.688039	85.23604366				
		23.688324	85.23617321				



15	PO_RM_PT_DA_1 Damodar Ghat 1_ 0.96 ha	23.688806	85.2362456	Tokisud	Patratu	64	1
		23.688712	85.23591897				
		23.688588	85.23567937				
		23.688342	85.23542199				
		23.687852	85.23510139				
		23.687714	85.2354217				
		23.685906	85.23286198				
		23.68545	85.23276296				
		23.685526	85.23301285				
		23.685743	85.23333609				
		23.685905	85.23363038				
		23.686015	85.23375986				
		23.686427	85.23401074				
		23.686637	85.23403918				
		23.686996	85.23416867				
23.687418	85.23453642						
23.68699	85.23394428						
23.685906	85.23286198						



ANNEXURE- F  
(DFO & CO Letter)





कार्यालय:- वन प्रमंडल पदाधिकारी, रामगढ़ वन प्रमंडल, रामगढ़।

(रांची रोड नियर बी.आर.एल. गेट, पो०-मरार, जिला-रामगढ़ पिन-829117)

Email id - [dfo-ramgarh@gov.in](mailto:dfo-ramgarh@gov.in)

Mobile No-8987790306

पत्रांक:- 355

दिनांक:- 25/02/23

सेवा में,

जिला खनन पदाधिकारी,  
रामगढ़।

विषय :- बालू घाटो की वन भूमि से दूरी के संबंध में

प्रसंग:- 1) आपका पत्रांक-212 दिनांक 23.02.2023  
2) इस कार्यालय का पत्रांक-2360 दिनांक 09.12.2022

महाशय,

उपर्युक्त विषयक प्रसंगाधीन पत्र के संबंध में सूचित करना है कि रामगढ़ वन प्रमंडल अन्तर्गत चिन्हित बालू घाटो के उपलब्ध कराये गए Co-ordinates के अनुसार वन भूमि से दूरी से प्रसंगाधीन पत्र-2 द्वारा भेजी गयी थी, जिसमें कुछ बालू घाटो के Co-ordinates में परिवर्तन कर संशोधित वन भूमि से दूरी की मांग की गई है।

प्रतिवेदन तैयार कर इस पत्र के साथ संलग्न कर भेजी जा रही है।

अनुलग्नक:- यथोक्त।

आपका विश्वासी,

*Hatish*  
25/2/23  
वन प्रमंडल पदाधिकारी,  
रामगढ़।



*Amir Akhbar*

**Ramgarh District**

Sl. No	River	Sandbar Code	Area in Ha	Distance From Forest (Metre)	Forest Name	Range	Block
1	Damodar River	PO_RM_MN_DA_13 Damodar_15	1.82	260	Hesapoda	Gola	Gola
2	Damodar River	PO_RM_PT_DA_5_6 Damodar_5	2.28	255	Tokisud	Patratu	Patratu
3	Damodar River	PO_RM_PT_DA_4 Damodar_4	0.93	255	Tokisud	Patratu	Patratu


  
 State Level Environment Impact Assessment Authority  
 Jharkhand, Raipur




  
 Approved


  
 Divisional Forest Officer  
 Ramgarh



कार्यालय:- वन प्रमंडल पदाधिकारी, रामगढ़ वन प्रमंडल, रामगढ़।

(रांची रोड नियर बी.आर.एल. गेट, पो-मरार, जिला-रामगढ़ पिन-829117)

Email id - [dfo-ramgarh@gov.in](mailto:dfo-ramgarh@gov.in)

पत्रांक:- 2360

दिनांक:- 9/12/22

सेवा में,

जिला खनन पदाधिकारी,  
रामगढ़।

विषय :- बालू घाटो की वन भूमि से दूरी के संबंध में

प्रसंग:- आपका कार्यालय पत्रांक- 1152 दिनांक 28.11.2022

महाशय,

उपर्युक्त विषयक प्रसंगाधीन पत्र के संबंध में सूचित करना है कि रामगढ़ वन प्रमंडल अन्तर्गत चिन्हित बालू घाटो के उपलब्ध कराये गए Co-ordinates के अनुसार वन भूमि से दूरी से संबंधित प्रतिवेदन विहित प्रपत्र में तैयार कर इस पत्र के साथ संलग्न कर भेजी जा रही है।

अनुलग्नक:- यथोक्त।

आपका विश्वासी,

  
वन प्रमंडल पदाधिकारी,  
रामगढ़।  
9/12/22





**Ramgarh District**

Sl No	River	Ghat Name	Area in Ha	Pillars	Latitude	Longitude	Distance From Forest	Forest Name	Block
1	Bokaro River	Bokaro Ghat 1	0.0361	A	23°48'21.68"N	85°31'18.83"E	0 m	Tapin	Mandu
				B	23°48'21.62"N	85°31'19.95"E			
				C	23°48'21.11"N	85°31'19.61"E			
				D	23°48'21.42"N	85°31'18.85"E			
2	Bokaro River	Bokaro Ghat 2	0.0318	A	23°47'55.12"N	85°31'42.69"E	0 m	Pundi	Mandu
				B	23°47'55.21"N	85°31'42.91"E			
				C	23°47'54.64"N	85°31'43.90"E			
				D	23°47'54.42"N	85°31'43.89"E			
3	Bokaro River	Bokaro Ghat 3	0.1378	A	23°47'52.57"N	85°31'49.86"E	0 m	Pundi	Mandu
				B	23°47'52.95"N	85°31'51.02"E			
				C	23°47'52.28"N	85°31'53.61"E			
				D	23°47'52.07"N	85°31'52.42"E			
4	Bokaro River	Bokaro Ghat 4	0.1486	A	23°47'50.50"N	85°31'58.24"E	0 m	Pundi	Mandu
				B	23°47'50.65"N	85°31'59.20"E			
				C	23°47'49.30"N	85°32'1.33"E			
				D	23°47'48.72"N	85°32'2.09"E			
5	Bokaro River	Bokaro Ghat 5	0.2022	A	23°47'24.73"N	85°32'6.04"E	0 m	Barughutu	Mandu
				B	23°47'24.49"N	85°32'7.24"E			
				C	23°47'22.26"N	85°32'6.61"E			
				D	23°47'23.50"N	85°32'5.70"E			
6	Bokaro River	Bokaro Ghat 6	0.1504	A	23°45'53.09"N	85°32'32.04"E	200 m	Saruberia	Mandu
				B	23°45'54.03"N	85°32'32.12"E			
				C	23°45'52.81"N	85°32'35.70"E			
				D	23°45'52.43"N	85°32'34.59"E			
7	Bokaro River	Bokaro Ghat 7	0.1207	A	23°46'3.69"N	85°34'16.95"E	0 m	Sirka	Mandu
				B	23°46'4.58"N	85°34'17.15"E			
				C	23°46'1.86"N	85°34'19.27"E			
				D	23°46'3.06"N	85°34'17.29"E			



No	River	Ghat Name	Area in Ha	Pillars	Latitude	Longitude	Distance From Forest	Forest Name	Block
8	Bokaro River	Bokaro Ghat 8	0.4664	A	23°45'54.31"N	85°34'38.17"E	0 m	Sirka	Mandu
				B	23°45'55.45"N	85°34'36.62"E			
				C	23°45'57.88"N	85°34'42.80"E			
				D	23°45'56.71"N	85°34'42.30"E			
9	Bokaro River	Bokaro Ghat 9	0.2576	A	23°45'56.23"N	85°35'15.44"E	0 m	Laiyo	Mandu
				B	23°45'57.25"N	85°35'15.43"E			
				C	23°45'55.04"N	85°35'17.23"E			
				D	23°45'54.73"N	85°35'16.49"E			
10	Bokaro River	Bokaro Ghat 10	0.1194	A	23°46'16.83"N	85°36'26.31"E	400 m	Bhuyadih	Mandu
				B	23°46'16.73"N	85°36'25.95"E			
				C	23°46'16.91"N	85°36'29.26"E			
				D	23°46'16.68"N	85°36'29.23"E			
11	Bokaro River	Bokaro Ghat 11	0.3437	A	23°46'21.25"N	85°36'56.68"E	0 m	Badgaon	Mandu
				B	23°46'19.59"N	85°36'56.84"E			
				C	23°46'15.79"N	85°36'54.74"E			
				D	23°46'15.90"N	85°36'53.72"E			
12	Bokaro River	Bokaro Ghat 12	1.0817	A	23°46'30.33"N	85°37'2.60"E	0 m	Laiyo	Mandu
				B	23°46'30.50"N	85°37'4.90"E			
				C	23°46'24.43"N	85°36'59.73"E			
				D	23°46'24.35"N	85°36'58.77"E			
13	Bokaro River	Bokaro Ghat 13	0.4443	A	23°46'31.05"N	85°37'3.23"E	0 m	Laiyo	Mandu
				B	23°46'31.54"N	85°37'2.76"E			
				C	23°46'32.46"N	85°37'6.48"E			
				D	23°46'31.33"N	85°37'7.00"E			
14	Bokaro River	Bokaro Ghat 14	0.5176	A	23°46'43.84"N	85°37'34.48"E	180 m	Laiyo	Mandu
				B	23°46'44.25"N	85°37'36.52"E			
				C	23°46'38.87"N	85°37'32.72"E			
				D	23°46'40.22"N	85°37'32.50"E			



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Sl. No	River	Ghat Name	Area in Ha	Pillars	Latitude	Longitude	Distance From Forest	Forest Name	Block
15	Damodar River	Damodar Ghat 1	2.15	A	23°41'5.93"N	85°13'48.87"E	152 m	Tokisud	Patratu
				B	23°41'6.76"N	85°13'48.51"E			
				C	23°41'13.33"N	85°14'2.89"E			
				D	23°41'10.45"N	85°14'2.31"E			
16	Damodar River	Damodar Ghat 2	0.74	A	23°41'19.36"N	85°14'9.12"E	64 m	Tokisud	Patratu
				B	23°41'19.57"N	85°14'10.42"E			
				C	23°41'15.73"N	85°14'8.14"E			
				D	23°41'16.24"N	85°14'6.48"E			
18	Damodar River	Damodar Ghat 4	1.41	A	23°41'54.49"N	85°14'13.03"E	250	Tokisud	Patratu
				B	23°41'58.35"N	85°14'17.72"E			
				C	23°41'57.47"N	85°14'18.69"E			
				D	23°41'54.02"N	85°14'14.50"E			
17	Damodar River	Damodar Ghat 3	0.66	A	23°42'26.67"N	23°42'26.67"N	0 m	Tokisud	Patratu
				B	23°42'27.64"N	85°14'28.22"E			
				C	23°42'16.47"N	85°14'27.57"E			
				D	23°42'19.77"N	85°14'26.40"E			
19	Damodar River	Damodar Ghat 5	6.16	A	23°42'40.40"N	85°14'36.65"E	240 m	Tokisud	Patratu
				B	23°42'41.85"N	85°14'39.30"E			
				C	23°42'19.08"N	85°15'9.45"E			
				D	23°42'20.06"N	85°15'6.90"E			
20	Damodar River	Damodar Ghat 6	1.2	A	23°42'9.05"N	85°15'19.89"E	0 m	Tokisud	Patratu
				B	23°42'8.92"N	85°15'20.53"E			
				C	23°42'0.09"N	85°15'27.96"E			
				D	23°41'58.68"N	85°15'28.04"E			



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No	River	Ghat Name	Area in Ha	Pillars	Latitude	Longitude	Distance From Forest	Forest Name	Block
21	Damodar River	Damodar Ghat 7	0.67	A	23°41'58.31"N	85°15'29.19"E	0 m	Tokisud	Patratu
				B	23°42'0.08"N	85°15'28.89"E			
				C	23°41'55.40"N	85°15'33.75"E			
				D	23°41'54.72"N	85°15'33.65"E			
				E	23°41'55.14"N	85°15'32.19"E			
22	Damodar River	Damodar Ghat 8	0.37	A	23°41'32.69"N	85°19'18.57"E	0 m	Sayal	Patratu
				B	23°41'32.87"N	85°19'19.70"E			
				C	23°41'32.06"N	85°19'20.37"E			
				D	23°41'29.60"N	85°19'15.10"E			
23	Damodar River	Damodar Ghat 9	0.0963	A	23°42'10.77"N	85°20'2.99"E	0 m	Sayal	Patratu
				B	23°42'11.78"N	85°20'3.74"E			
				C	23°42'12.16"N	85°20'5.46"E			
				D	23°42'12.00"N	85°20'6.25"E			
24	Damodar River	Damodar Ghat 10	2.41	A	23°42'10.65"N	85°20'12.04"E	0 m	Sayal	Patratu
				B	23°42'7.22"N	85°20'16.50"E			
				C	23°41'56.09"N	85°20'15.92"E			
				D	23°41'53.39"N	85°20'12.58"E			
25	Damodar River	Damodar Ghat 11	0.65	A	23°41'47.90"N	85°20'10.03"E	0 m	Sayal	Patratu
				B	23°41'45.81"N	85°20'10.86"E			
				C	23°41'40.51"N	85°20'10.94"E			
				D	23°41'43.48"N	85°20'9.06"E			
26	Damodar River	Damodar Ghat 12	1.44	A	23°41'41.63"N	85°20'17.50"E	0 m	Sayal	Patratu
				B	23°41'37.75"N	85°20'27.29"E			
				C	23°41'37.50"N	85°20'21.84"E			
				D	23°41'40.86"N	85°20'17.52"E			
27	Damodar River	Damodar Ghat 13	0.83	A	23°41'16.44"N	85°20'55.52"E	100 m	Sayal	Patratu
				B	23°41'8.57"N	85°20'55.31"E			
				C	23°41'3.62"N	85°21'1.26"E			
				D	23°41'4.29"N	85°20'58.37"E			



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Sl No	River	Ghat Name	Area in Ha	Pillars	Latitude	Longitude	Distance From Forest	Forest Name	Block
28	Damodar River	Damodar Ghat 14	0.59	A	23°39'46.95"N	85°23'44.98"E	0 m	Chordhara	Patratu
				B	23°39'47.74"N	85°23'46.05"E			
				C	23°39'44.89"N	85°23'52.67"E			
				D	23°39'42.89"N	85°23'53.19"E			
29	Damodar River	Damodar Ghat 15	2.45	A	23°38'9.92"N	85°26'5.08"E	1350	Saraiya	Ramgarh
				B	23°38'10.28"N	85°26'16.01"E			
				C	23°38'8.08"N	85°26'19.76"E			
				D	23°38'8.51"N	85°26'7.15"E			
30	Damodar River	Damodar Ghat 16	0.78	A	23°38'46.47"N	85°32'33.32"E	356 m	Panki	Mandu
				B	23°38'46.88"N	85°32'43.72"E			
				C	23°38'46.21"N	85°32'44.21"E			
				D	23°38'45.30"N	85°32'34.25"E			
31	Damodar River	Damodar Ghat 17	0.25	A	23°38'53.48"N	85°33'4.37"E	318 m	Budhakhap	Mandu
				B	23°38'52.43"N	85°33'5.11"E			
				C	23°38'51.21"N	85°33'2.08"E			
				D	23°38'51.25"N	85°33'1.28"E			
32	Damodar River	Damodar Ghat 18	0.67	A	23°37'54.25"N	85°36'21.24"E	150 m	Badkidundi	Mandu
				B	23°37'55.18"N	85°36'21.67"E			
				C	23°37'56.96"N	85°36'28.43"E			
				D	23°37'55.86"N	85°36'28.48"E			
33	Damodar River	Damodar Ghat 19	18.5	A	23°40'37.43"N	85°45'27.45"E	250 m	Gandonia and Lipia	Gola
				B	23°40'38.22"N	85°45'29.22"E			
				C	23°39'48.14"N	85°45'17.87"E			
				D	23°39'57.80"N	85°45'16.11"E			



Divisional Forest Officer  
Ramgadh Forest Division



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# कार्यालय अंचल अधिकारी, माण्डू (रामगढ़)

प्रपत्र

क्र० सं०	मौजा	घाट सं०	खाता	लॉट	रकबा	किस्म	अक्षांश	देशांतर	वायु की उपलब्धता
1	गुण्डी	घाट 01	92	1	5.99 ए०	नदी	23°48'21.68"N	85°31'18.83"E	-
							23°48'21.62"N	85°31'19.95"E	
							23°48'21.14"N	85°31'19.61"E	
							23°48'21.42"N	85°31'18.85"E	
2	गुण्डी	घाट 02	92	42	8.61 ए०	नदी	23°47'55.12"N	85°31'42.69"E	-
							23°47'55.21"N	85°31'42.91"E	
							23°47'54.64"N	85°31'43.90"E	
							23°47'57.42"N	85°31'43.89"E	
3	गुण्डी	घाट 03	92	42	8.61 ए०	नदी	23°47'52.57"N	85°31'49.86"E	-
							23°47'52.95"N	85°31'51.02"E	
							23°47'52.28"N	85°31'53.61"E	
							23°47'52.07"N	85°31'52.42"E	
4	गुण्डी	घाट 04	92	42	8.61 ए०	नदी	23°47'50.50"N	85°31'58.24"E	-
							23°47'50.65"N	85°31'59.20"E	
							23°47'49.30"N	85°32'1.33"E	
							23°47'48.72"N	85°32'2.09"E	
5	गुण्डी	घाट 05	92	790	18.97 ए०	नदी	23°47'24.73"N	85°32'6.04"E	-
							23°47'24.49"N	85°32'7.24"E	
							23°47'22.26"N	85°32'6.61"E	
							23°47'23.50"N	85°32'5.70"E	
6	दुनी	घाट 06	1	112	30.52 ए०	नदी	23°45'53.09"N	85°32'32.04"E	-
							23°45'54.03"N	85°32'32.12"E	
							23°45'52.81"N	85°32'35.70"E	
							23°45'52.43"N	85°32'34.59"E	



*(Handwritten signature)*

7	परसावेडा	घाट 07	1	112 / 361	4.40 ₹0	नदी	23°46'03.69"N	85°34'16.95"E	
							23°46'04.58"N	85°34'17.15"E	
8	परसावेडा	घाट 08	1	315	5.70 ₹0	नदी	23°46'01.86"N	85°34'19.27"E	
							23°46'03.03"N	85°34'12.29"E	
							23°45'54.31"N	85°34'38.17"E	
9	लईयो	घाट 09	129	3419 / 3456	3.60 ₹0	नदी	23°45'55.45"N	85°34'36.62"E	
							23°45'57.88"N	85°34'42.80"E	
							23°45'56.71"N	85°34'42.30"E	
							23°45'56.23"N	85°35'15.44"E	
							23°45'57.25"N	85°35'15.43"E	
10	लईयो	घाट 10	129	3421	10.33 ₹0	नदी	23°45'55.04"N	85°35'17.23"E	
							23°45'54.73"N	85°35'16.49"E	
							23°46'16.83"N	85°36'26.31"E	
							23°46'16.73"N	85°36'25.95"E	
							23°46'16.91"N	85°36'29.26"E	
11	लईयो	घाट 11	129	3199	22.41 ₹0	नदी	23°46'16.68"N	85°36'29.23"E	
							23°46'21.25"N	85°36'56.68"E	
							23°46'19.59"N	85°36'56.84"E	
							23°46'15.79"N	85°36'54.74"E	
							23°46'15.90"N	85°36'53.72"E	
12	लईयो	घाट 12	129	3199	22.41 ₹0	नदी	23°46'30.33"N	85°37'02.60"E	
							23°46'30.50"N	85°37'04.90"E	
							23°46'24.43"N	85°36'59.73"E	
							23°46'24.35"N	85°36'58.77"E	
							23°46'31.05"N	85°37'03.23"E	
13	लईयो	घाट 13	129	3199	22.41 ₹0	नदी	23°46'31.54"N	85°37'02.76"E	
							23°46'32.46"N	85°37'06.48"E	
							23°46'31.33"N	85°37'07.00"E	



*[Handwritten signature]*

14	तर्इयो	घाट 14	129	3199	22.41 ए०	नदी	23°46'43.84"N	85°37'34.48"E	-
							23°46'44.25"N	85°37'36.52"E	
15	-	घाट 15	-	-	-	-	23°46'40.22"N	85°37'32.50"E	रामगढ़ अंचल से संबंधित है।
							23°38'46.47"N	85°32'33.32"E	
							23°38'46.88"N	85°32'43.72"E	
16	-	घाट 16	-	-	-	-	23°38'46.21"N	85°32'44.21"E	रामगढ़ अंचल से संबंधित है।
							23°38'45.30"N	85°32'34.25"E	
							23°38'53.48"N	85°33'04.37"E	
							23°38'52.43"N	85°33'05.11"E	
17	युदाखाम	घाट 17	1	348	20.42 ए०	नदी	23°38'51.21"N	85°33'02.08"E	-
							23°38'51.25"N	85°33'01.28"E	
							23°37'54.25"N	85°36'21.24"E	
18	रउता	-	29	403, 337	1.50 ए० 2.50 ए०	नदी	23°37'55.18"N	85°36'21.67"E	-
							23°37'56.96"N	85°36'28.43"E	
							23°37'55.86"N	85°36'28.18"E	
19	पैकी	-	38	275, 257	2.00 ए० 1.50 ए०	नदी	-	-	-

उपरोक्त वर्णित घाटो का जॉय प्रतियेदन निम्नवत् है:-

1. चिह्नित क्षेत्र का खाता प्लॉट एवं रकबा उपर वर्णित है।
2. चिह्नित क्षेत्र सर्वे खतियान के अनुसार गैरमजबूआ खास एवं किसम नदी है।
3. 500 मीटर की दुरी के अन्दर कोई मानव बसाहट नहीं है।
4. 500 मीटर की दुरी के अन्दर कोई जलीय निकाय नहीं है।
5. 500 मीटर की दुरी के अन्दर कोई शैक्षणिक संस्थान स्थित नहीं है।
6. 500 मीटर की दुरी के अन्दर कोई चिकित्सालय नहीं है।



7. 500 मीटर के पुरी व. अन्दर कोई राष्ट्रीय धरोहर/पुरातत्वीय महत्व के स्थल स्थित नहीं है।  
8. 10 कि०मी० की परीधी में कोई अन्तर्राज्यीय सीमा नहीं है।

राजस्व उप-निरीक्षक  
माण्डू।

अंचल निरीक्षक  
माण्डू।

अंचल अधिकारी  
माण्डू।

ज्ञापांक 2113 दिनांक 13.11.22

प्रतिलिपि:- जिला खनन पदाधिकारी, रामगढ़ के उनके पत्रांक 1167/खनन, रामगढ़ दिनांक 30.11.2022 के आलोक में  
चिन्हित बालुघाट के भूमि संबंधि प्रतिवेदन सूचनार्थ एवं आवश्यक कार्रवाई हेतु समर्पित।

अंचल अधिकारी  
माण्डू।



# कार्यालय अंचल अधिकारी, गोला (रामगढ़)।

पत्रांक 1876

प्रेषक,

अंचल अधिकारी,  
गोला, (रामगढ़)

सेवा में

जिला खनन पदाधिकारी,  
रामगढ़।

अतिरिक्त

14/11/22

गोला, दिनांक 10/11/2022

विषय :- चिन्हित बालू घाट के भूमि संबंधी प्रतिवेदन के संबंध में।

प्रसंग :- भवदीय पत्रांक-1188/खनन, रामगढ़ दिनांक 30.11.2022

महाशय,

उपर्युक्त विषयक प्रासंगिक पत्र से प्राप्त आवेदन की जाँच राजस्व उपनिरीक्षक/अमीन/अंचल निरीक्षक से कराया गया। राजस्व उपनिरीक्षक/अमीन/अंचल निरीक्षक के जाँच प्रतिवेदन में निम्नवत प्रतिवेदित है:-

1. चिन्हित क्षेत्र का खाता संख्या, प्लॉट संख्या तथा रकवा?

मौजा	खाता संख्या	प्लॉट संख्या	रकवा	किस्म प्रकार
हेसापोड़ा	95	1	20.60 एकड़	गैरमजरूआ खास किस्म नदी
हेसापोड़ा	95	118	22.20 एकड़	गैरमजरूआ खास किस्म जंगल
		कुल	42.80 एकड़	

2. चिन्हित क्षेत्र गैरमजरूआ है अथवा रैयती?

➤ उक्त भूमि गैरमजरूआ खास खाते की है।

3. क्या 500 मीटर की दूरी के अन्दर कोई मानव बसाहट (Habitation 200 आदमी 40 मकान स्थित है?

➤ 500 मीटर की दूरी के अन्दर कोई मानव बसाहट (Habitation 200 आदमी 40 मकान स्थित नहीं है।

4. क्या 500 मीटर की दूरी के अन्दर कोई जलीय निकाय (Dam/Reservoir) स्थित है?

➤ 500 मीटर की दूरी के अन्दर कोई जलीय निकाय (Dam/Reservoir) नहीं है।

5. क्या 500 मीटर की दूरी के अन्दर कोई शैक्षणिक संस्थान (Educational Institute) स्थित है?

➤ 500 मीटर की दूरी के अन्दर कोई शैक्षणिक संस्थान (Educational Institute) नहीं है।

6. क्या 500 मीटर की दूरी के अन्दर कोई चिकित्सालय (Hospital) स्थित है?

➤ 500 मीटर की दूरी के अन्दर कोई चिकित्सालय (Hospital) स्थित नहीं है।

7. क्या 500 मीटर की दूरी के अन्दर कोई राष्ट्रीय धरोहर/पुरातत्वीय (Monuments Archeological) महत्व के स्थल स्थित है?

➤ 500 मीटर की दूरी के अन्दर कोई राष्ट्रीय धरोहर/पुरातत्वीय (Monuments Archeological) महत्व के स्थल स्थित नहीं है।

8. क्या 10 किमी की परिधि में कोई अन्तराज्यीय (Interstate) सीमा है?

➤ 10 किमी की परिधि में कोई अन्तराज्यीय (Interstate) सीमा नहीं है।

भत: जाँच प्रतिवेदन सूचनार्थ एवं आवश्यक कार्रवाई हेतु समर्पित।

विश्वासभाजन

अंचल अधिकारी,  
गोला, (रामगढ़)।



Amr

# कार्यालय अंचल अधिकारी, गोजा (राजवाड़)।

## प्रपत्र

क्र०	सौजा का नाम	जमाबन्दी सं०	खारा सं०	प्लॉट सं०	रकबा	जमीन का किस्म	अक्षांश	देशांतर	बालू की उपलब्धता
1	2	3	4	5	6	7	8	9	10
2				1	20.60 एकड़	गैरमजल्सा खार किस्म नदी	23.660376 N	85.749928 E	बालू उपलब्ध है
3	हेसापेडा	-	95				23.660057 N	85.75011 E	
4				118	22.20 एकड़	गैरमजल्सा खार किस्म जंगल	23.660243 N	85.749706 E	
5							23.660248 N	85.749708 E	

अंचल अधिकारी,  
गोजा, (राजवाड़)।

10/12/22



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कार्यालय अंचल अधिकारी, गौला (राजवाड़ा)।

Ramgarh District														
Sr.no	River	Ghat Name	Area In Ha	Pillars	Latitude	Longitude	Distance From Forest	Forest Name	Mauza	Block	Ps	Thana no	Khata no.	Khesra no
1	Damodar River	Danodar ghat	17.32 Ha	A	23.660376 N	85.749928 E	More than 500 Meter	-	Hesapoda	Gola	Gola	1	95	1
2				B	23.660057 N	85.75011 E								
3				C	23.660243 N	85.749706 E								
4				D	23.660248 N	85.749708 E								

अंचल अधिकारी,  
गौला, (राजवाड़ा)।  
10/11/20



*(Handwritten signature)*

Mail  
09/12/22



# अंचल अधिकारी का कार्यालय, रामगढ़ ।

(Email Id- cosadar-ramgarh@jarkhandmail.gov.in)

पत्रांक ....2034.....

प्रेषक,

अंचल अधिकारी,  
रामगढ़ ।

सेवा में,

जिला खनन पदाधिकारी,  
रामगढ़ ।

रामगढ़, दिनांक 09/12/2022

विषय :-

चिन्हित बालू घाट के भूमि संबंधी जांच प्रतिवेदन का प्रेषण ।

प्रसंग:-

भवदीय पत्रांक 1165/खनन दिनांक 30.11.2022

महाशय,

उपर्युक्त विषयक प्रासंगिक पत्र के आलोक में राजस्व उपनिरीक्षक एवं अंचल निरीक्षक के द्वारा चिन्हित बालू घाट का भूमि संबंधी प्रतिवेदन समर्पित किया गया है, जो निम्नवत् है:-

1.	चिन्हित क्षेत्र का खाता सं०, प्लॉट सं० तथा रकबा ।	मौजा सिरका थाना सं० 138 खाता सं० 42 प्लॉट सं० 243 रकबा 32.50ए० किस्म भूमि दामोदर नदी है ।
2.	चिन्हित क्षेत्र गैरमजरूआ है अथवा रैयती ।	मौजा सिरका के खाता सं० 42 गैरमजरूवा खास खाते की भूमि है ।
3.	क्या 500 मीटर की दूरी के अन्दर कोई मानव बसाहट (Habitation 200 आदमी 40 मकान) स्थित है?	नहीं
4.	क्या 500 मीटर की दूरी के अन्दर कोई जलीय निकाय (Dam/ Reservoir) स्थित है?	नहीं
5.	क्या 500 मीटर की दूरी के अन्दर कोई शैक्षणिक संस्थान (Educational Institute) स्थित है?	नहीं
6.	क्या 500 मीटर की दूरी के अन्दर कोई चिकित्सालय (Hospital) स्थित है?	नहीं
7.	क्या 500 मीटर की दूरी के अन्दर कोई राष्ट्रीय धरोहर/पुरातत्वीय (Monuments Archcological) महत्व के स्थल स्थित है?	नहीं
8.	क्या 10 किमी की परिधि में कोई अन्तर्राज्यीय (Interstate) सीमा है?	नहीं

प्रतिवेदन सूचनार्थ प्रेषित ।

विश्वासभाजन

अंचल अधिकारी,

रामगढ़ ।  
9.12.22



*(Handwritten signature)*



Mail  
12/22

अंचल अधिकारी का कार्यालय, चितरपुर (राभगढ़)

Email id: co\_chitarpu@rediffmail.com

पत्रांक: 892

प्रेषक,

अंचल अधिकारी,  
चितरपुर।

सेवा में,

जिला खनन पदाधिकारी,  
राभगढ़।

चितरपुर, दिनांक: 05/12/2022।

विषय:— राभगढ़ जिला अन्तर्गत रजरप्पा थाना क्षेत्र के मौजा बोरोबिंग में दामोदर नदी स्थित वालूघाट के संचालन के संबंध में।

प्रसंग:— भवदीय पत्रांक-539/खनन दिनांक-21/06/2022।

महाशय,

उपर्युक्त विषयक प्रासंगिक पत्र के के आलोक में संबंध में कहना है कि बोरोबिंग वालूघाट, जिसका Toposheet no.-T.N-73/10, co-ordinates-23°36'29.65"-85°39'5.31" to 23°36'54.10"-85°38'12.36" से संबंधित राजस्व उप निरीक्षक/अंचल निरीक्षक से प्राप्त प्रतिवेदन के आधार पर बिन्दुवार प्रतिवेदन निम्नवत् है:-

- (1) ग्राम बोरोबिंग के खाता सं०-56 प्लॉट सं०-257 रकबा-11.08 एकड़ भूमि किस्म दामोदर नदी दर्ज है।
  - (2) 500 मीटर के अन्दर कोई मानव बसाहट नहीं है।
  - (3) 500 मीटर के अन्दर एक पानी टंकी अवस्थित है।
  - (4) 500 मीटर के अन्दर कोई शैक्षणिक संस्थान स्थित नहीं है।
  - (5) 500 मीटर के अन्दर कोई चिकित्सालय स्थित नहीं है।
  - (6) 500 मीटर के अन्दर कोई राष्ट्रीय धरोहर/पुरातत्त्वीय महत्त्व के स्थल स्थित नहीं है।
  - (7) 10 किलो मीटर की परिधि में कोई अन्तर्राज्यीय सीमा नहीं है।
  - (8) आवेदित भूमि की कोटि यथा सर्वे खतियान, रजिस्टर II में जंगल झाड़ी के रूप में दर्ज नहीं है।
- प्रतिवेदन सादर सूचनार्थ समर्पित।

विश्वासभाजन

अंचल अधिकारी,  
चितरपुर।



# कार्यालय अंचल अधिकारी, पतरातू।

पत्रांक 4678.....

प्रेषक

अंचल अधिकारी,  
पतरातू।

सेवा में

जिला खनन पदाधिकारी,  
रामगढ़।

संयुक्त में  
14/12/22

पतरातू दिनांक 12.12.2022 / 2022

विषय:- पतरातू अंचल अंतर्गत चिन्हित बालू घाटो की सूची भेजने के संबंध में।

महाशय,

निदेशानुसार उपर्युक्त विषय के संबंध में कहना है कि पतरातू अंचल अंतर्गत चिन्हित बालू घाटो की सूची इस पत्र के साथ संलग्न कर विधिक अग्रेत्तर आवश्यक कार्रवाई हेतु भेजा जा रहा है।

अनुलग्नक- यथोक्त।

D-225  
13/12/22  
13/12/22

विश्वासभाजन  
12.12.22  
अंचल अधिकारी  
पतरातू।



Handwritten signature in blue ink.



सेवा में,

अंचल अधिकारी  
पतरातू।

विषय:- पतरातू अंचल अंतर्गत चिन्हित बालू घाटों के संबंध में।

महाशय,

उपर्युक्त विषयक भवदीय आदेशानुसार पतरातू अंचल अंतर्गत दामोदर नदी के किनारे आने वाले बालू घाटों की सूची निम्नवत है।

क्र	हल्का	मीजा का नाम	जमाबंदी सं०	खाता सं०	प्लॉट सं०	रकबा	जमीन का किस्म	अक्षांश	देशांतर	बालू की उपलब्धता
1	हल्का 1	टोकिसूद		64	1	52.55 ए०	नदी	From 23°41'5.93"N To 23°41'10.45"N	From 85°13'48.87"E To 85°14'2.31"E	
2	हल्का 1	टोकिसूद		64	137	31.05 ए०	नदी	From 23°41'19.36"N To 23°41'16.24"N	From 85°14'9.12"E To 85°14'6.48"E	
3	हल्का 1	टोकिसूद		64	159	34.80 ए०	नदी	From 23°41'54.49"N To 23°41'54.02"N	From 85°14'13.03"E To 85°14'14.50"E	
4	हल्का 1	टोकिसूद		64	160	1.53 ए०	नदी	From 23°42'26.67"N To 23°42'19.77"N	From 23°41'26.67"E To 85°14'26.40"E	
5	हल्का 1	टोकिसूद		64	1	31.50 ए०	नदी	From 23°42'26.67"N To 23°42'19.77"N	From 23°41'26.67"E To 85°14'26.40"E	
6	हल्का 1	किरीगडा		76	1	31.50 ए०	नदी	From 23°42'40.40"N To 23°42'20.06"N	From 85°14'36.65"E To 85°15'6.04"E	
7	हल्का 2	सांकुल		351	1	33.00 ए०	नदी	From 23°41'58.31"N To 23°41'56.14"N	From 85°15'29.19"E To 85°15'32.19"E	
8	हल्का 2	सांकुल		351	2003	43.70 ए०	नदी	From 23°41'32.59"N To 23°41'29.60"N	From 85°19'18.57"E To 85°19'15.10"E	
9	हल्का 2	सयाल		86	1	10.50 ए०	नदी	From 23°42'10.77"N To 23°42'12.00"N	From 85°20'2.99"E To 85°20'6.25"E	
10	हल्का 2	सयाल		86	9	20.27 ए०	नदी	From 23°42'10.65"N To 23°41'53.39"N	From 85°20'12.04"E To 85°20'12.58"E	
11	हल्का 2	सयाल		86	45	14.80 ए०	नदी	From 23°41'47.90"N To 23°41'43.48"N	From 85°20'10.03"E To 85°20'9.06"E	
12	हल्का 2	सयाल		86	101	35.30 ए०	नदी	From 23°41'41.63"N To 23°41'40.86"N	From 85°20'17.50"E To 85°20'17.52"E	
13	हल्का 2	सयाल		86	102	4.60 ए०	नदी	From 23°41'6.44"N To 23°41'4.29"N	From 85°20'55.52"E To 85°20'58.37"E	
14	हल्का 2	सीन्दा		139	1	3.13 ए०	नदी	From 23°39'46.95"N To 23°39'42.89"N	From 85°23'44.98"E To 85°23'53.19"E	



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15	हल्का 2	सीन्दा	139	4	12.56 ए०	नदी		
16	हल्का 2	सीन्दा	139	8	6.98 ए०	नदी		
17	हल्का 2	सीन्दा	139	9	4.25 ए०	नदी		
18	हल्का 5	दुन्दुवा	12	1	20.40 ए०	नदी		
19	हल्का 5	दुन्दुवा	12	66	26.80 ए०	नदी		
20	हल्का 5	दुन्दुवा	12	197	8.32 ए०	नदी		
21	हल्का 5	घोरघारा	26	1	27.90 ए०	नदी		
22	हल्का 5	घोरघारा	26	20	18.90 ए०	नदी		
23	हल्का 5	घोरघारा	26	25	19.50 ए०	नदी		

विश्वासभाजन

12.12.17



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River Details	Sandbar Code	Area (Ha)	Distance From Forest	Forest Name	Mauza	Block	Khata No	Khesra No
Damodar	PO_RM_MN_BK_1A Bokaro Ghat 1_ 0.03 ha	0.03	0 m	Tapin	Pundi	Mandu	92	1
	PO_RM_MN_BK_2 Bokaro Ghat 2_ 0.02 Ha	0.02	0 m	Pundi	Pundi	Mandu	92	42
	PO_RM_MN_BK_4 Bokaro Ghat 3_ 0.10 ha	0.1	0 m	Pundi	Pundi	Mandu	92	42
	PO_RM_MN_BK_5 Bokaro Ghat 4_ 0.13 ha	0.13	0 m	Pundi	Pundi	Mandu	92	42
	PO_RM_MN_BK_7 Bokaro Ghat 5_ 0.17 ha	0.17	0 m	Barughutu	Pundi	Mandu	92	790
	PO_RM_MN_BK_13 Bokaro Ghat 6_ 0.07 ha	0.07	200 m	Sarubera	Duni	Mandu	1	112
	PO_RM_MN_BK_15B Bokaro Ghat 7_ 0.09 ha	0.09	0 m	Sirka	Parsabera	Mandu	1	112/361
	PO_RM_MN_BK_16 Bokaro Ghat 8_ 0.42 ha	0.42	0 m	Sirka	Parsabera	Mandu	1	315
	PO_RM_MN_BK_16A Bokaro Ghat 9_ 0.20 ha	0.2	0 m	Laiyo	Laiyo	Mandu	129	3419/3456
	PO_RM_MN_BK_16B Bokaro Ghat 10_ 0.08 ha	0.08	400 m	Bhuyadiah	Laiyo	Mandu	129	3421
	PO_RM_MN_BK_16C Bokaro Ghat 11_ 0.23 ha	0.23	0 m	Badgaon	Laiyo	Mandu	129	3199
	PO_RM_MN_BK_16D Bokaro Ghat 12_ 1.0 ha	1	0 m	Laiyo	Laiyo	Mandu	129	3199
	PO_RM_MN_BK_16E Bokaro Ghat 13_ 0.41 ha	0.41	0 m	Laiyo	Laiyo	Mandu	129	3199
	PO_RM_MN_BK_16F Bokaro Ghat 14_ 0.41 ha	0.41	180 m	Laiyo	Laiyo	Mandu	129	3199
	PO_RM_PT_DA_1 Damodar Ghat 1_ 0.96 ha	0.96	152 m	Tokisud	Tokisud	Patratu	64	1
PO_RM_PT_DA_2 Damodar Ghat 2_ 0.77 ha	0.77	64 m	Tokisud	Tokisud	Patratu	64	137	
PO_RM_PT_DA_3 Damodar Ghat 3_ 0.41 ha	0.41	0 m	Tokisud	Tokisud	Patratu	64	159	
PO_RM_PT_DA_4 Damodar Ghat 4_ 0.93 ha	0.93	255 m	Tokisud	Tokisud	Patratu	64	160	
PO_RM_PT_DA_5_6 Damodar Ghat 5_ 2.28 ha	2.28	255 m	Tokisud	Tokisud	Patratu	64	1	
PO_RM_PT_DA_7(I) Damodar Ghat 6_ 0.73 ha	0.73	0 m	Tokisud	Kirigara	Patratu	76	1	
PO_RM_PT_DA_7(II) Damodar Ghat 7_ 0.60 ha	0.6	0 m	Tokisud	Sankul	Patratu	351	1	
PO_RM_PT_DA_8 Damodar Ghat 8_ 0.19 ha	0.19	0 m	Sayal	Sankul	Patratu	351	2003	
PO_RM_PT_DA_8A Damodar Ghat 9_ 1.59 ha	1.59	0 m	Sayal	Sayal	Patratu	86	9	
PO_RM_PT_DA_9 Damodar Ghat 10_ 0.18 ha	0.18	0 m	Sayal	Sayal	Patratu	86	45	
PO_RM_PT_DA_9B Damodar Ghat 11_ 0.59 ha	0.59	100 m	Sayal	Sayal	Patratu	86	102	
PO_RM_RM_DA_11A Damodar Ghat 12_ 2.46 ha	2.46	1350 m	Saraiya	Sirka	Ramgarh	42	243	
PO_RM_MN_DA_11B Damodar Ghat 13_ 0.62 ha	0.62	256 m	Painki	Painki	Mandu	38	275 257	
PO_RM_MN_DA_12 Damodar Ghat 14_ 0.47 ha	0.47	150 m	Badkidund	Rauta	Mandu	29	403 337	
PO_RM_MN_DA_13 Damodar Ghat 15_ 1.82 ha	1.82	260 m	Grandonia and Ljipia	Hesapoda	Gola	95	1,118	

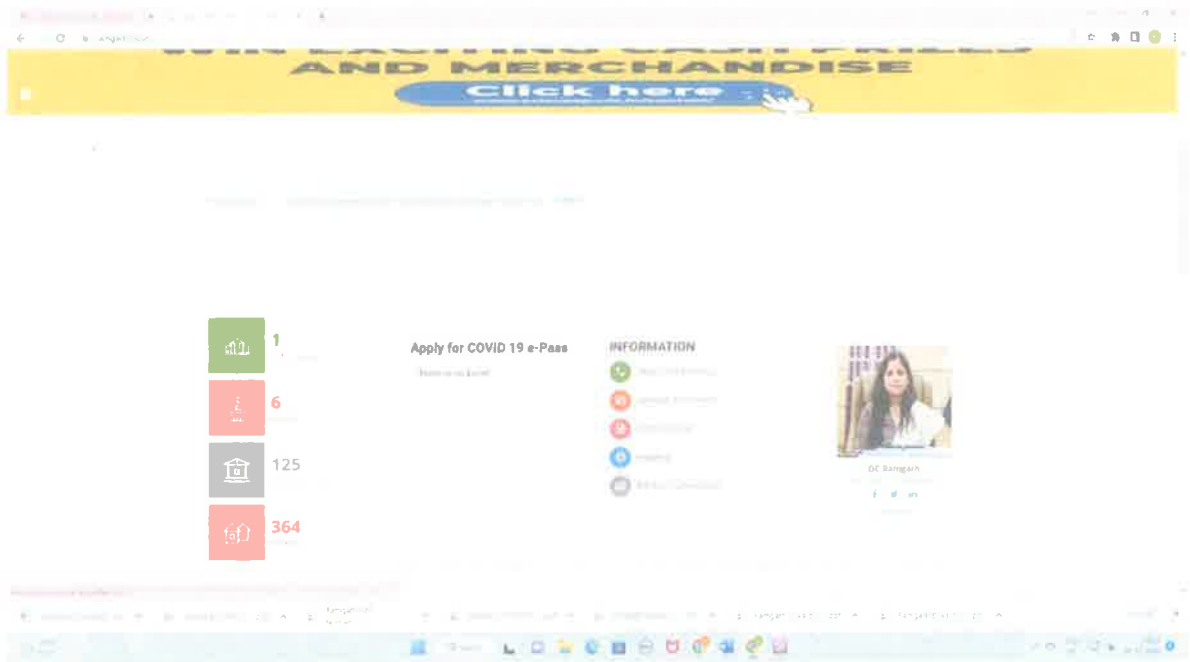


**ANNEXURE- G**  
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27.09.2022

- To,
1. The Collector, Ramgarh
  2. The District Mining Officer  
Ramgarh

**Sub: Objection to District Survey Report of Sand of Ramgarh district published for public consultation on 23.09.2022 vide PR No. 278321 Mines and Geology (22-23):D**

Sir,

1. Public response to District Survey Report of Sand of Ramgarh district has been invited on or about 23.09.2022 which is admittedly in the midst of monsoon. Hence admittedly it does not contain replenishment study of sand and is devoid of post monsoon data.
2. In absence of actual physical visit of sand ghat post monsoon, the area, reserve of sand is not based on primary field visit data and is an exercise of copy paste, hence fit to be rejected.
3. DSR is not in compliance of NGT Order dated 05.09.2022 passed in OA No. 54/2022/EZ and also not in compliance of Para 4.1.1 of Enforcement and Monitoring Guidelines for Sand Mining 2020 read with Sustainable Sand Mining Management Guidelines 2016.
4. Similar DSR of sand of East Singhbhum district has not been accepted by SEIAA vide meeting dated 17.09.2022 which should be an eye opener.
5. You are requested to withdraw this DSR and prepare it once again in compliance to NGT Order dated 05.09.2022 and thereafter upload the same for public consultation.

Yours faithfully

*Subham Kumar*



*[Handwritten signature]*

24/12/21  
12/10/2022

*[Handwritten signature]*  
12.11.22



27.09.2022

- To,
1. The Collector, Ramgarh
  2. The District Mining Officer  
Ramgarh

**Sub: Objection to District Survey Report of Sand of Ramgarh district published for public consultation on 23.09.2022 vide PR No. 278321 Mines and Geology (22-23):D**

Sir,

1. Public response to District Survey Report of Sand of Ramgarh district has been invited on or about 23.09.2022 which is admittedly in the midst of monsoon. Hence admittedly it does not contain replenishment study of sand and is devoid of post monsoon data.
2. In absence of actual physical visit of sand ghat post monsoon, the area, reserve of sand is not based on primary field visit data and is an exercise of copy paste, hence fit to be rejected.
3. DSR is not in compliance of NGT Order dated 05.09.2022 passed in OA No. 54/2022/EZ and also not in compliance of Para 4.1.1 of Enforcement and Monitoring Guidelines for Sand Mining 2020 read with Sustainable Sand Mining Management Guidelines 2016.
4. Similar DSR of sand of East Singhbhum district has not been accepted by SEIAA vide meeting dated 17.09.2022 which should be an eye opener.
5. You are requested to withdraw this DSR and prepare it once again in compliance to NGT Order dated 05.09.2022 and thereafter upload the same for public consultation.

Yours faithfully

*Subham Kumar*



*[Handwritten signature]*

Public comments on dated 27.09.2022

Sl. No	Comments	Reply
1	Public response to district survey report of sand of Ramgarh district has been invited on or about 23.09.2022 which is admittedly in the midst of monsoon. Hence admittedly it does not contain replenishment study of sand and is devoid of post monsoon data.	The fresh uploaded DSR on November 22 includes the post monsoon data too, so the replenishment study is updated in the DSR report. Advt. copy is attached as annexure G.
2	In absence of actual physical visit of sand ghat post monsoon, the area, reserve of sand is not based on primary field visit data and is an exercise of copy paste, hence fit to be rejected.	Physical visit photographs are attached as annexure C of DSR.
3	DSR is not in compliance of NGT order dated 05.09.2022 passed in OA No. 54/2022/EZ and also not in compliance of para 4.1.1 of enforcement and monitoring guidelines for sand mining 2020 read with sustainable sand mining management guidelines 2016.	Complied, we follow all the points of para 4.1.1 of enforcement and monitoring guidelines for sand mining 2020 read with sustainable sand mining management guidelines 2016.
4	Similar DSR of sand of East Singhbhum district has not been accepted by SEIAA vide meeting dated 17.09.2022 which should be an eye opener.	The updated DSR includes the past observations of SEIAA.
5	You are requested to withdraw this DSR and prepare it once again in compliance to NGT order dated 05.09.2022 and thereafter upload the same for public consultation.	The updated DSR is uploaded in November 22 includes all the compliances.



**ANNEXURE- H**  
**(Annexure as prescribed in the EMGSM, 2020)**



**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)
Bokaro	28.75	Perennial
Damodar	73.32	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)
Nil	Nil	Nil	Nil	Nil	Nil	Nil

**c) Patta Lands/Khatedari Land:**

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

**d) M-Sand Plants:**

Plant Name	Owner	District	Tehsil	Village	Geo-location	Quantity Tonnes/Annunum
Nil	Nil	Nil	Nil	Nil	Nil	Nil

**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 &amp; proposed) Rivers

River Details	Sandbar Code	Mauza	Block	Area (Ha)	Distance (in KM) from PA/BR/WC/	Distance from Forest Area (in KM)	Forest Name	Minings within 500 meter squares clusters (area)	Total excavation in cum /Annum considering digging depth max as 1 meter	Total excavation in Tonnes /Annum considering digging depth max as 1 meter	Total excavation in Tonnes /Annum (Considering 60% as per EMGSM, 2020)	Mine to be mined (Sand/ Bajri / RBM etc.)	Existing / Proposed
Bokaro	PO_RM_MN_B K_1A Bokaro Ghat 1_ 0.03 ha	Pundi	Mandu	0.03	NA	0	Tapin	No	300	456	273.6	Sand	Proposed
	PO_RM_MN_B K_2 Bokaro Ghat 2_ 0.02 Ha	Pundi	Mandu	0.02	NA	0	Pundi	Area: 0.32 Ha.	200	304	182.4	Sand	Proposed
	PO_RM_MN_B K_4 Bokaro Ghat 3_ 0.10 ha	Pundi	Mandu	0.1	NA	0	Pundi		1000	1520	912	Sand	Proposed
	PO_RM_MN_B K_5 Bokaro Ghat 4_ 0.13 ha	Pundi	Mandu	0.13	NA	0	Pundi		1300	1976	1185.6	Sand	Proposed
	PO_RM_MN_B K_7 Bokaro Ghat 5_ 0.17 ha	Pundi	Mandu	0.17	NA	0	Barughutu	NO	1700	2584	1550.4	Sand	Proposed
	PO_RM_MN_B K_13 Bokaro Ghat 6_ 0.07 ha	Duni	Mandu	0.07	NA	0.2	Saruber	NO	700	1064	638.4	Sand	Proposed
	PO_RM_MN_B K_15B Bokaro Ghat 7_ 0.09 ha	Parsabera	Mandu	0.09	NA	0	Sirka	NO	900	1368	820.8	Sand	Proposed
	PO_RM_MN_B K_16 Bokaro Ghat 8_ 0.42 ha	Parsabera	Mandu	0.42	NA	0	Sirka	NO	4200	6384	3830.4	Sand	Proposed



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PO_RM_MN_B K_16A Bokaro Ghat 9_0.20 ha	Laiyo	Mandu	0.2	NA	0	Laiyo	NO	2000	3040	1824	Sand	Proposed
PO_RM_MN_B K_16B Bokaro Ghat 10_0.08 ha	Laiyo	Mandu	0.08	NA	0.4	Bhuyadh	NO	800	1216	729.6	Sand	Proposed
PO_RM_MN_B K_16C Bokaro Ghat 11_0.23 ha	Laiyo	Mandu	0.23	NA	0	Badgaon	Area: 1.87 Ha.	2300	3496	2097.6	Sand	Proposed
PO_RM_MN_B K_16D Bokaro Ghat 12_1.0 ha	Laiyo	Mandu	1	NA	0	Laiyo		10000	15200	9120	Sand	Proposed
PO_RM_MN_B K_16E Bokaro Ghat 13_0.41 ha	Laiyo	Mandu	0.41	NA	0	Laiyo		4100	6232	3739.2	Sand	Proposed
PO_RM_MN_B K_16F Bokaro Ghat 14_0.41 ha	Laiyo	Mandu	0.41	NA	0.18	Laiyo	NO	4100	6232	3739.2	Sand	Proposed
Sandbar Code	Mauza	Block	Area (Ha)	Distance (in KM) from PA/BR/WC/	Distance from Forest Area (in KM)	Forest Name	Mining leases within 500 meters (if yes cluster area)	Total excavation /Annum considering digging depth max as 1.5 meter	Total excavation in Tonnes /Annum considering digging depth max as 1.5 meter	Total excavation in Tonnes /Annum (Considering 60% as per EMGSM, 2020)	Mine related to be mined (Sand/ Bajri / RBM etc.)	Existing / Proposed
PO_RM_PT_D A_1 Damodar Ghat 1_0.96 ha	Tokisud	Patratu	0.96	NA	0.152	Tokisud	Yes, Area: 1.73 Ha.	14400	22176	13305.6	Sand	Proposed
PO_RM_PT_D A_2 Damodar Ghat 2_0.77 ha	Tokisud	Patratu	0.77	NA	0.064	Tokisud		11550	17787	10672.2	Sand	Proposed
PO_RM_PT_D A_3 Damodar Ghat 3_0.41 ha	Tokisud	Patratu	0.41	NA	0	Tokisud	NO	6150	9471	5682.6	Sand	Proposed



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Enforcement & Monitoring Guidelines for Sand Mining

PO_RM_PT_D A_4 Damodar Ghat 4_0.93 ha	Tokisud	Patratu	0.93	NA	0.255	Tokisud	No	13950	21483	12889.8	Sand	Proposed
PO_RM_PT_D A_5_6 Damodar Ghat 5_2.28 ha	Tokisud	Patratu	2.28	NA	0.255	Tokisud	NO	34200	52668	31600.8	Sand	Proposed
PO_RM_PT_D A_7(I) Damodar Ghat 6_0.73 ha	Kirigara	Patratu	0.73	NA	0	Tokisud	Yes, Area: 1.33 Ha.	10950	16863	10117.8	Sand	Proposed
PO_RM_PT_D A_7(II) Damodar Ghat 7_0.60 ha	Sankul	Patratu	0.6	NA	0	Tokisud		9000	13860	8316	Sand	Proposed
PO_RM_PT_D A_8 Damodar Ghat 8_0.19 ha	Sankul	Patratu	0.19	NA	0	Sayal	NO	2850	4389	2633.4	Sand	Proposed
PO_RM_PT_D A_8A Damodar Ghat 9_1.59 ha	Sayal	Patratu	1.59	NA	0	Sayal		23850	36729	22037.4	Sand	Proposed
PO_RM_PT_D A_9 Damodar Ghat 10_0.18 ha	Sayal	Patratu	0.18	NA	0	Sayal	Yes, Area:1 .77 Ha	2700	4158	2494.8	Sand	Proposed
PO_RM_PT_D A_9B Damodar Ghat 11_0.59 ha	Sayal	Patratu	0.59	NA	0.1	Sayal	NO	8850	13629	8177.4	Sand	Proposed
PO_RM_RM_D A_11A Damodar Ghat 12_2.46 ha	Sirka	Ramgarh	2.46	NA	1.35	Saraiya	NO	36900	56826	34095.6	Sand	Proposed
PO_RM_MN_ DA_11B Damodar Ghat 13_0.62 ha	Panki	Mandu	0.62	NA	0.256	Painki	NO	9300	14322	8593.2	Sand	Proposed
PO_RM_MN_ DA_12 Damodar Ghat 14_0.47 ha	Rauta	Mandu	0.47	NA	0.15	Badkundi	NO	7050	10857	6514.2	Sand	Proposed




PO_RM_MN_	Hesap	Gola	1.8	NA	0.26	Gandon	NO	27300	42042	25225.2	Sand	Proposed
DA_13	oda		2			Lipia						
Damodar Ghat												
15_1.82 ha												

**Patta Lands/Khatedari Land: (existing & proposed)**

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

**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 (Hectare)	Quantity (MT / Year)	Existing /Proposed
Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

**M-Sand Plants :( existing & proposed)**

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



## Annexure-III

Cluster & Contiguous Cluster  
detailsClusters:

River Name	Cluster No.	Lease No	Location (Riverbed / Patta Land)	Village	Area (in Ha)	Total Excavation (Ton)	Total Mineral Excavation (Ton)
Bokaro	1	PO_RM_MN_BK_2 Bokaro Ghat 2, PO_RM_MN_BK_4 Bokaro Ghat 3 & PO_RM_MN_BK_5 Bokaro Ghat 4	Riverbed	Pundi	0.32	3800	2280
	2	PO_RM_MN_BK_1 6C Bokaro Ghat 11, PO_RM_MN_BK_1 6D Bokaro Ghat 12& PO_RM_MN_BK_1 6E Bokaro Ghat 13	Riverbed	Laiyo	1.87	24928	14956.8
Damodar	1	PO_RM_P T_DA_1 Damodar Ghat 1 & PO_RM_P T_DA_2 Damodar Ghat 2	Riverbed	Tokisud	1.73	39963	23,977.8
	2	PO_RM_P T_DA_7(I) Damodar Ghat 6 & PO_RM_P T_DA_7(II)	Riverbed	Kirigara & Sankul	1.33	30723	18433.8




Enforcement & Monitoring Guidelines for Sand Mining

		) Damodar Ghat 7					
	3	PO_RM_P T_DA_8A Damodar Ghat 9 & PO_RM_P T_DA_9 Damodar Ghat 10	Riverbed	Sayal	1.77	40887	24,532.2

**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)
Bokaro	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Damodar	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL



**Annexure-IV****Transportation Routes for individual leases and leases in Cluster**

Lease No	Transportation Route No/ Name	Number of tipper s /day of lease	Number of tipper s /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
PO_RM_MN_BK_1A Bokaro Ghat 1_ 0.03 ha	Road towards Kekobasaudi	1	NA	0.65	Unpaved	Unpaved	Lease Owner	Route Map Attached
PO_RM_MN_BK_2 Bokaro Ghat 2_ 0.02 Ha	Road towards Kekobasaudi	1	NA	0.35	Unpaved	Unpaved	Lease Owner	Route Map Attached
PO_RM_MN_BK_4 Bokaro Ghat 3_ 0.10 ha	Road towards Kekobasaudi	1	NA	0.14	Unpaved	Unpaved	Lease Owner	Route Map Attached
PO_RM_MN_BK_5 Bokaro Ghat 4_ 0.13 ha	Road towards Kekobasaudi	1	NA	0.05	Unpaved	Unpaved	Lease Owner	Route Map Attached
PO_RM_MN_BK_7 Bokaro Ghat 5_ 0.17 ha	Road towards Kekobasaudi	1	NA	0.17	Unpaved	Unpaved	Lease Owner	Route Map Attached
PO_RM_MN_BK_13 Bokaro Ghat 6_ 0.07 ha	Road towards Dumberbela	1	NA	0.30	Unpaved	Unpaved	Lease Owner	Route Map Attached
PO_RM_MN_BK_15B Bokaro Ghat 7_ 0.09 ha	Road towards Ghototand & Ara	1	NA	0.64	Unpaved	Unpaved	Lease Owner	Route Map Attached
PO_RM_MN_BK_16 Bokaro Ghat 8_ 0.42 ha	Road towards Ghototand &	2	NA	0.55	Unpaved	Unpaved	Lease Owner	Route Map Attached




Enforcement & Monitoring Guidelines for Sand Mining

	Ara							d
PO_RM_MN BK_16A Bokaro Ghat 9_0.20 ha	Road towards Ghototand & Ara	1	NA	1.20	Unpaved	Unpaved	Lease Owner	Route Map Attache d
PO_RM_MN BK_16B Bokaro Ghat 10_0.08 ha	Road towards Kedla & Laiyo Basti	1	NA	0.50	Unpaved	Unpaved	Lease Owner	Route Map Attache d
PO_RM_MN BK_16C Bokaro Ghat 11_0.23 ha	Road towards Kedla & Laiyo Basti	1	NA	0.65	Unpaved	Unpaved	Lease Owner	Route Map Attache d
PO_RM_MN BK_16D Bokaro Ghat 12_1.0 ha	Road towards Kedla & Laiyo Basti	4	NA	0.10	Unpaved	Unpaved	Lease Owner	Route Map Attache d
PO_RM_MN BK_16E Bokaro Ghat 13_0.41 ha	Road towards Kedla & Laiyo Basti	2	NA	0.90	Unpaved	Unpaved	Lease Owner	Route Map Attache d
PO_RM_MN BK_16F Bokaro Ghat 14_0.41 ha	Road towards Kedla & Laiyo Basti	2	NA	0.75	Unpaved	Unpaved	Lease Owner	Route Map Attache d
PO_RM_PT DA_1 Damodar Ghat 1_0.96 ha	Road towards Terpa	6	NA	0.59	Unpaved	Unpaved	Lease Owner	Route Map Attache d
PO_RM_PT DA_2 Damodar Ghat 2_0.77 ha	Road towards Terpa	4	NA	0.40	Unpaved	Unpaved	Lease Owner	Route Map Attache d
PO_RM_PT DA_3 Damodar Ghat 3_0.41 ha	Road towards Terpa	2	NA	0.28	Unpaved	Unpaved	Lease Owner	Route Map Attache d
PO_RM_PT DA_4 Damodar Ghat 4_0.93 ha	Road towards Terpa	5	NA	0.78	Unpaved	Unpaved	Lease Owner	Route Map Attache d
PO_RM_PT DA_5_6 Damodar Ghat 5_2.28 ha	Road towards Terpa	13	NA	1.0	Unpaved	Unpaved	Lease Owner	Route Map Attache d



Enforcement & Monitoring Guidelines for Sand Mining

PO_RM_PT DA_7(I) Damodar Ghat 6_ 0.73 ha	Road towards Terpa	4	NA	0.37	Unpaved	Unpaved	Lease Owner	Route Map Attache d
PO_RM_PT DA_7(II) Damodar Ghat 7_ 0.60 ha	Road towards Terpa	3	NA	0.90	Unpaved	Unpaved	Lease Owner	Route Map Attache d
PO_RM_PT DA_8 Damodar Ghat 8_ 0.19 ha	Road towards Sayal	1	NA	0.42	Unpaved	Unpaved	Lease Owner	Route Map Attache d
PO_RM_PT DA_8A Damodar Ghat 9_ 1.59 ha	Road towards Sayal	9	NA	0.44	Unpaved	Unpaved	Lease Owner	Route Map Attache d
PO_RM_PT DA_9 Damodar Ghat 10_ 0.18 ha	Road towards Sayal	1	NA	0.16	Unpaved	Unpaved	Lease Owner	Route Map Attache d
PO_RM_PT DA_9B Damodar Ghat 11_ 0.59 ha	Road towards Sayal	3	NA	0.23	Unpaved	Unpaved	Lease Owner	Route Map Attache d
PO_RM_RM DA_11A Damodar Ghat 12_ 2.46 ha	Ranchi Patratu Ramgarh Road	14	NA	0.65	Unpaved	Unpaved	Lease Owner	Route Map Attache d
PO_RM_MN DA_11B Damodar Ghat 13_ 0.62 ha	Hazaribagh- Ranchi Expressway	4	NA	0.50	Unpaved	Unpaved	Lease Owner	Route Map Attache d
PO_RM_MN DA_12 Damodar Ghat 14_ 0.47 ha	Road towards Kundru Kalan	3	NA	0.24	Unpaved	Unpaved	Lease Owner	Route Map Attache d
PO_RM_MN DA_13 Damodar Ghat 15_ 1.82 ha	Road towards Mahuatand	11	NA	1.10	Unpaved	Unpaved	Lease Owner	Route Map Attache d



Enforcement & Monitoring Guidelines for Sand Mining

Cluster No	Transportation Route No/Name	Number of tipper s /day of cluster	Number of tipper s /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
PO_RM_MN_BK_2 Bokaro Ghat 2, PO_RM_MN_BK_4 Bokaro Ghat 3 & PO_RM_MN_BK_5 Bokaro Ghat 4	Road towards Kekobasaudi	3	NA	0.54	Unpaved	Unpaved	Lease Owner	Route Map Attached
PO_RM_MN_BK_1 6C Bokaro Ghat 11, PO_RM_MN_BK_1 6D Bokaro Ghat 12& PO_RM_MN_BK_1 6E Bokaro Ghat 13	Road towards Kedla & Laiyo Basti	7	NA	1.65	Unpaved	Unpaved	Lease Owner	Route Map Attached
PO_RM_PT_DA_1 Damodar Ghat 1 & PO_RM_PT_DA_2 Damodar Ghat 2	Road towards Terpa	10	NA	0.99	Unpaved	Unpaved	Lease Owner	Route Map Attached
PO_RM_PT_DA_7(I) Damodar Ghat 6 & PO_RM_PT	Road towards Terpa	07	NA	1.27	Unpaved	Unpaved	Lease Owner	Route Map Attached



Enforcement & Monitoring Guidelines for Sand Mining

T_DA_7(II) ) Damodar Ghat 7								
PO_RM_P T_DA_8A Damodar Ghat 9 & PO_RM_P T_DA_9 Damodar Ghat 10	Road towards Sayal	10	NA	0.6	Unpaved	Unpaved	Lease Owner	Route Map Attache d



## Annexure V

### Final List of Potential Mining Leases (existing & proposed)

River

River Details	Sandbar Code	Ma uza	Blo ck	A re a ( H a)	Dist a nce (in KM) from PA/B R/WC /	Dist a nce from Forest Area (in KM )	For est Name	Min ing leases within 50 0 meters (if yes clu ste r area)	Total excav ation in cum /Ann um considerin g diggi ng depth max as 1 mete r	Total excav ation in Tonnes /Ann um considerin g diggi ng depth max as 1 mete r	Total excav ation in Tonnes /Annu m (Consi dering 60% as per EMGS M, 2020)	Min eral to be min ed (Sa nd/ Baj ri/ RB M etc. )	Exis ting / Pro pose d
Bok aro	PO_RM_MN_BK_1 6B Bokaro Ghat 10_0.08 ha	Laiyo	Man du	0.08	NA	0.4	Bhu yadi h	NO	800	1216	729.6	Sa nd	Prop osed
Rive r Details	Sandbar Code	Ma uza	Blo ck	A re a ( H a)	Dist a nce (in KM) from PA/B R/WC /	Dist a nce from Forest Area (in KM )	For est Name	Min ing leases within 50 0 meters (if yes clu ste r area)	Total excav ation in cum /Ann um considerin g diggi ng depth max as 1.5 mete r	Total excav ation in Tonnes /Ann um considerin g diggi ng depth max as 1.5 mete r	Total excav ation in Tonnes /Annu m (Consi dering 60% as per EMGS M, 2020)	Min eral to be min ed (Sa nd/ Baj ri/ RB M etc. )	Exis ting / Pro pose d
Da mod ar	PO_RM_P T_DA_4 Damodar Ghat 4_0.93 ha	Toki sud	Patr atu	0.93	NA	0.255	Toki sud	No	13950	21483	12890	Sa nd	Prop osed



Enforcement & Monitoring Guidelines for Sand Mining

PO_RM_P T_DA_5_6 Damodar Ghat 5_ 2.28 ha	Toki sud	Patr atu	2. 2 8	NA	0.25 5	Toki sud	NO	3420 0	5266 8	31601	San d	Prop osed
PO_RM_R M_DA_11 A Damodar Ghat 12_ 2.46 ha	Sirk a	Ra mga rh	2. 4 6	NA	1.35	Sara iya	NO	3690 0	5682 6	34096	San d	Prop osed
PO_RM_ MN_DA_1 1B Damodar Ghat 13_ 0.62 ha	Pan ki	Man du	0. 6 2	NA	0.25 6	Pain ki	NO	9300	14322	8593.2	San d	Prop osed
PO_RM_ MN_DA_1 3 Damodar Ghat 15_ 1.82 ha	Hes apod a	Gol a	1. 8 2	NA	0.26	Gan doni a and Lipi a	NO	2730 0	4204 2	25225	San d	Prop osed

**Patta Lands/Khatedari Land: (existing & proposed)**

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

**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 )	Quantit y MT /Year	Existing /Proposed
Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

**M-Sand Plants :( existing & proposed)**

Plant Name	Owner	Distri ct	Tehsil	Village	Geo- location	Quantity Tonnes/Annum	Existing/Proposed
Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil



*(Handwritten signature)*



## Annexure VI

## Final List of Cluster &amp; Contiguous Cluster:

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

## 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)
Bokaro	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Damodar	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL



## Annexure VII

## Final Transportation Routes for individual leases and leases in Cluster

Lease No	Transportation Route No/ Name	Number of tipper s /day of lease	Number of tipper s /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
PO_RM_MN_BK_16B Bokaro Ghat 10_0.08 ha	Road towards Kedla & Laiyo Basti	1	NA	0.50	Unpaved	Unpaved	Lease Owner	Route Map Attached
PO_RM_PT_DA_4 Damodar Ghat 4_0.93 ha	Road towards Terpa	5	NA	0.78	Unpaved	Unpaved	Lease Owner	Route Map Attached
PO_RM_PT_DA_5_6 Damodar Ghat 5_2.28 ha	Road towards Terpa	13	NA	1.0	Unpaved	Unpaved	Lease Owner	Route Map Attached
PO_RM_RM_DA_11A Damodar Ghat 12_2.46 ha	Ranchi Patratu Ramgarh Road	14	NA	0.65	Unpaved	Unpaved	Lease Owner	Route Map Attached
PO_RM_MN_DA_11B Damodar Ghat 13_0.62 ha	Hazaribagh-Ranchi Expressway	4	NA	0.50	Unpaved	Unpaved	Lease Owner	Route Map Attached
PO_RM_MN_DA_13 Damodar Ghat 15_1.82 ha	Road towards Mahuatand	11	NA	1.10	Unpaved	Unpaved	Lease Owner	Route Map Attached




Enforcement & Monitoring Guidelines for Sand Mining

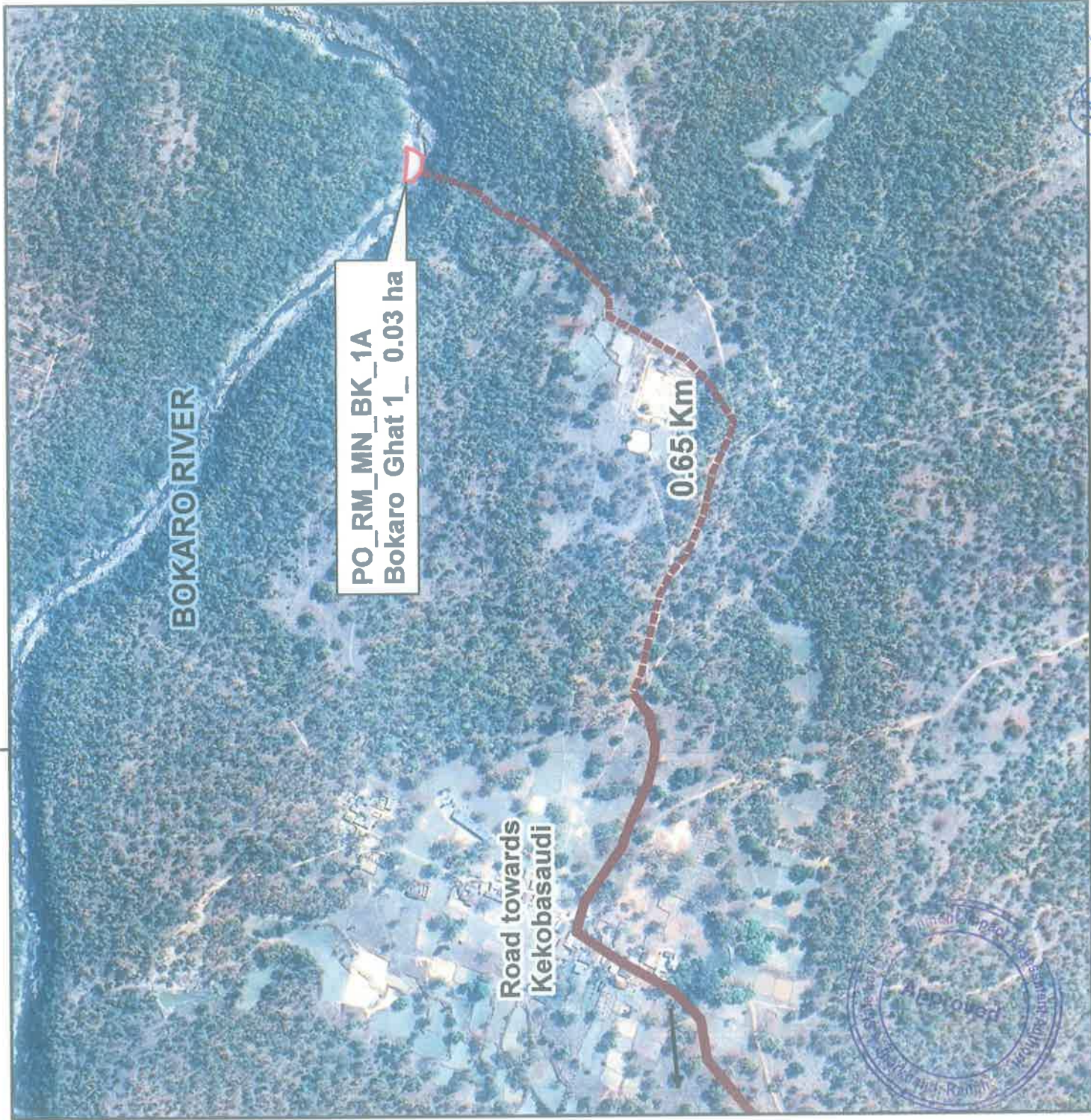
Cluster No	Transportation Route No	Number of tipper s /day of cluster	Number of tipper s /day of all the clusters on route	Length of Route in KM	Type of Road (Black Topped/ unpaved)	Recommendation for Road (Black Topped/ unpaved)	The road will be Constructed by Govt/Lease Owner	Route Map & Location
NIL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



**ANNEXURE- I**  
**(Haul Road Map)**



85°3'0"E



85°31'0"E

**HAUL ROAD MAP  
OF THE PROJECT SITE**

**Legend**



**Project Site**



**Haul Road**



**Metalled Road**



**Highway**



**PO\_RM\_MN\_BK\_1A Bokaro  
Ghat 1\_ 0.03 ha  
District- Ramgarh, Jharkhand**

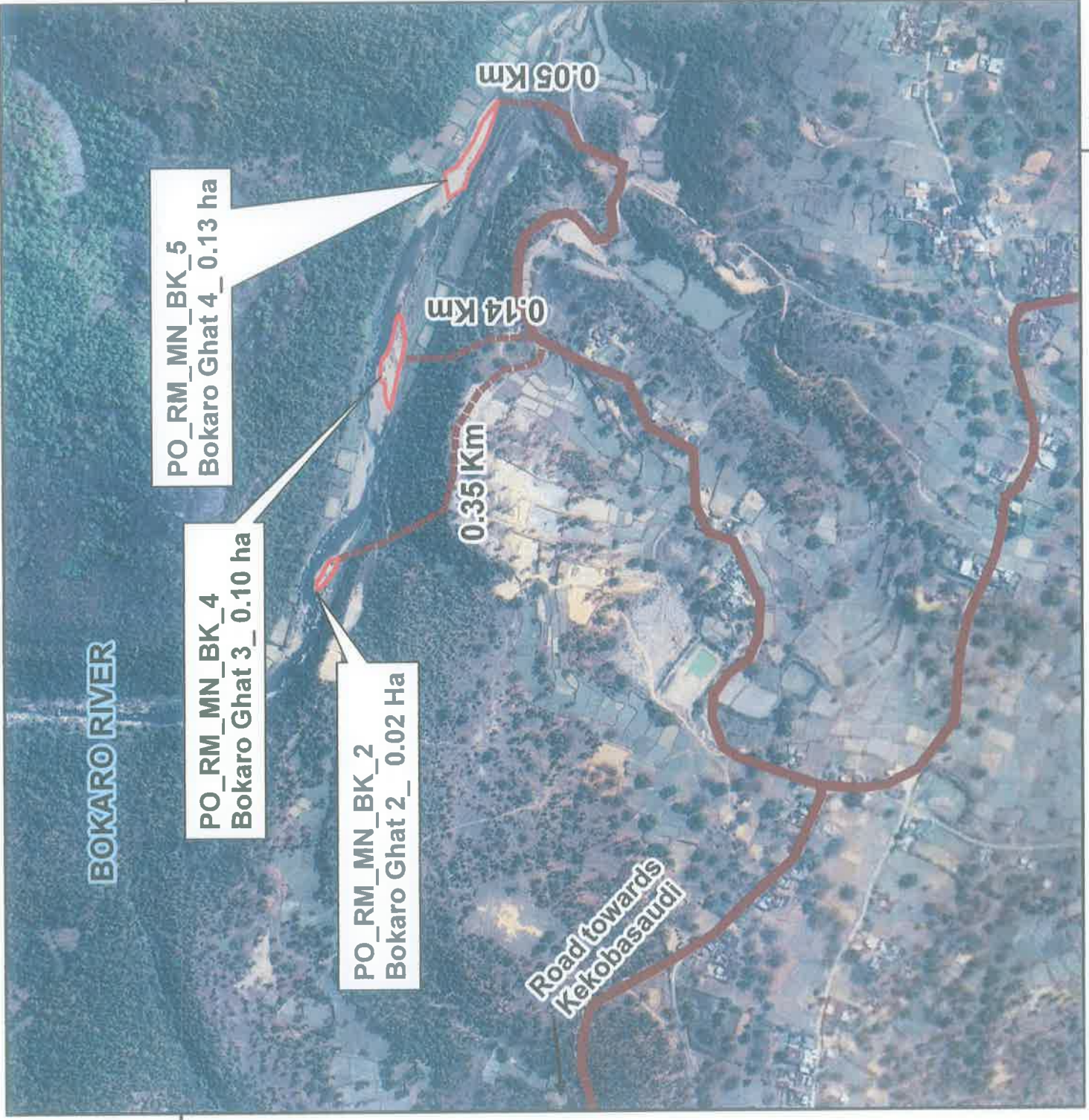
**Source: Google Earth Image**

**Graphical Scale:**



85°32'0" E

23°48'0"N



BOKARO RIVER

PO\_RM\_MN\_BK\_5  
Bokaro Ghat 4\_ 0.13 ha

PO\_RM\_MN\_BK\_4  
Bokaro Ghat 3\_ 0.10 ha

PO\_RM\_MN\_BK\_2  
Bokaro Ghat 2\_ 0.02 Ha

0.14 Km

0.35 Km

0.05 Km

Road towards  
Kekobasaudi

85°32'0"E

23°48'0"N

# HAUL ROAD MAP OF THE PROJECT SITE

Legend

- Project Site
- Haul Road
- Metalled Road
- Highway



PO\_RM\_MN\_BK\_2 Bokaro  
Ghat 2\_ 0.02 Ha  
PO\_RM\_MN\_BK\_4 Bokaro  
Ghat 3\_ 0.10 ha  
PO\_RM\_MN\_BK\_5 Bokaro  
Ghat 4\_ 0.13 ha  
District-Ramgarh, Jharkhand

Source: Google Earth Image

Graphical Scale:



23°48'0"N

85°32'0"E



23°48'0"N

85°32'0"E



**HAUL ROAD MAP  
OF THE PROJECT SITE**



**Legend**



**Project Site**



**Haul Road**



**Metalled Road**



**Highway**

**PO\_RM\_MN\_BK\_7  
Bokaro Ghat 5\_ 0.17 ha  
District-Ramgarh, Jharkhand**

**Source: Google Earth Image**

**Graphical Scale:**



*Amir Akbar*

23°48'0"N

85°32'0"E



# HAUL ROAD MAP OF THE PROJECT SITE



Legend



Project Site



Haul Road



Metalled Road



Highway

**PO\_RM\_MN\_BK\_13**  
**Bokaro Ghat 6\_0.07 ha**  
**District- Ramgarh, Jharkhand**

Source: Google Earth Image



**BOKARO RIVER**

**PO\_RM\_MN\_BK\_13**  
**Bokaro Ghat 6\_0.07 ha**

**0.30 Km**

**Road towards  
Dumerbela**



# HAUL ROAD MAP OF THE PROJECT SITE



Legend



Project Site



Haul Road



Metalled Road

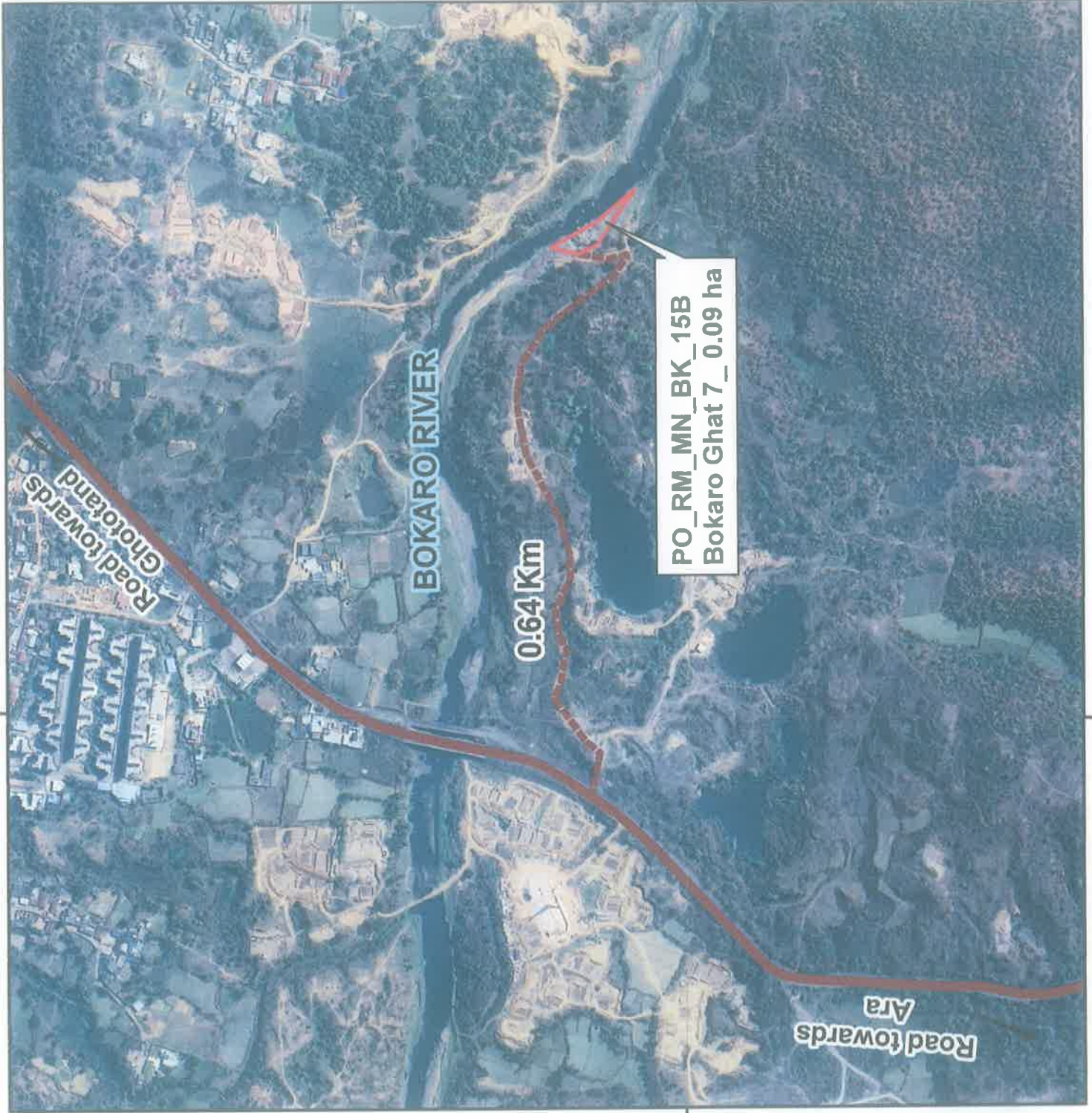
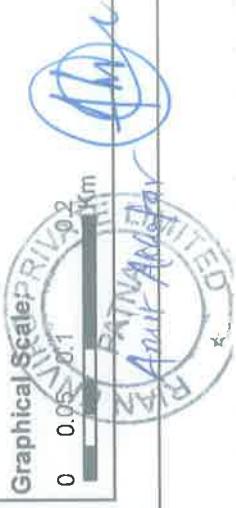


Highway

PO\_RM\_MN\_BK\_15B  
Bokaro Ghat 7\_0.09 ha  
District-Ramgarh, Jharkhand

Source: Google Earth Image

Graphical Scale: 1:10000  
0 0.05 0.1 0.2 0.4 0.8 km



23°46'0"N

23°46'0"N

85°34'0"E

85°34'0"E



23°46'0"N

23°46'0"N

**HAUL ROAD MAP  
OF THE PROJECT SITE**



**Legend**

- Project Site
- Haul Road
- Metalled Road
- Highway

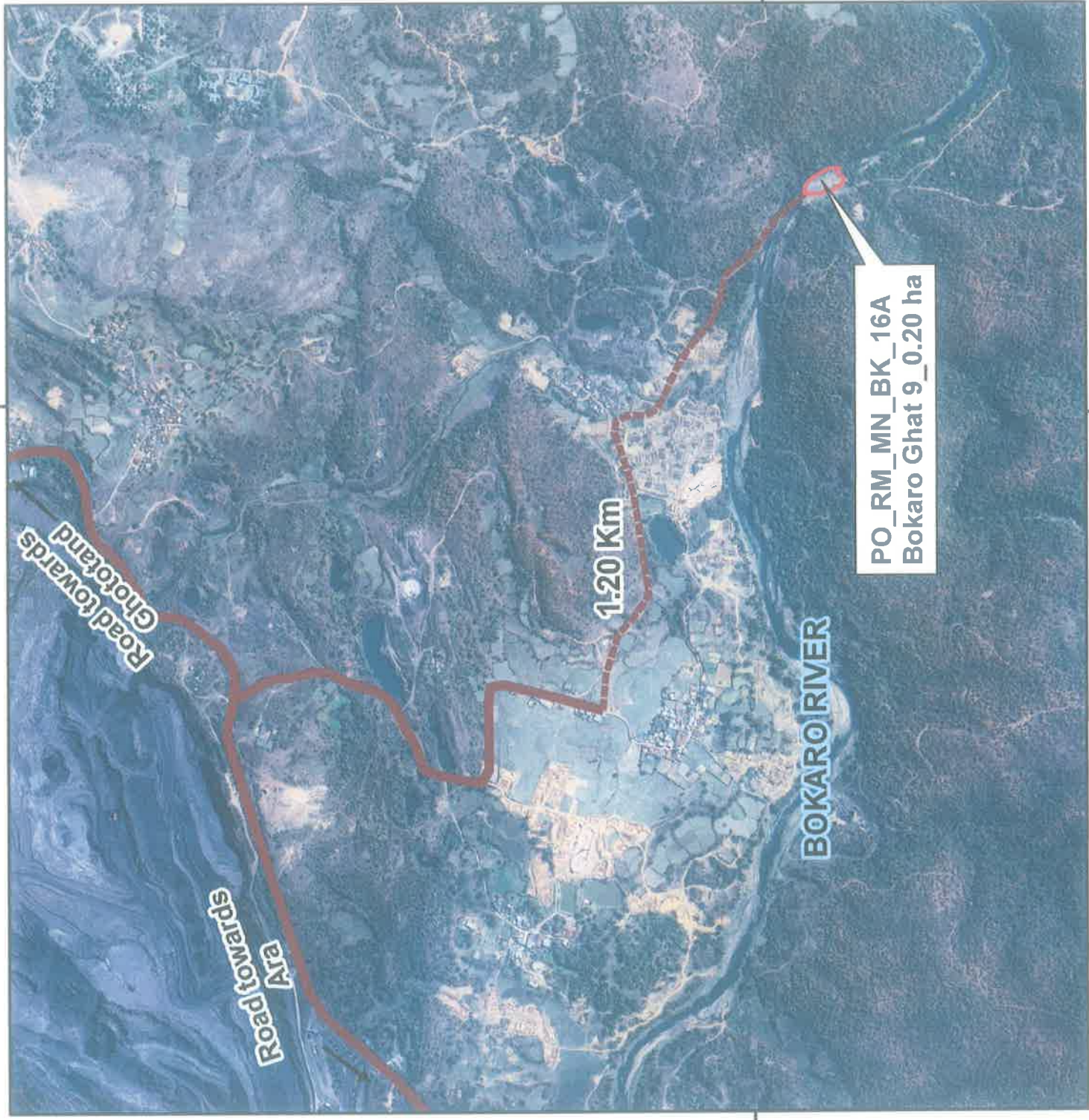
**PO\_RM\_MN\_BK\_16**  
**Bokaro Ghat 8\_0.42 ha**  
**District-Ramgarh, Jharkhand**

Source: Google Earth Image

Graphical Scale:



85°34'0"E



23°46'0"N

23°46'0"N

**HAUL ROAD MAP  
OF THE PROJECT SITE**



- Legend**
- Project Site
  - Haul Road
  - Metalled Road
  - Highway

**PO\_RM\_MN\_BK\_16A  
Bokaro Ghat 9\_0.20 ha  
District-Ramgarh, Jharkhand**

**Source: Google Earth Image**

**Graphical Scale:**  
0 0.125 0.25 0.5 Km

85°35'0"E

85°35'0"E



23°47'0"N

23°47'0"N

85°37'0"E

85°36'0"E

85°36'0"E

85°37'0"E

**HAUL ROAD MAP  
OF THE PROJECT SITE**



**Legend**

- Project Site
- Haul Road
- Metalled Road
- Highway

**PO\_RM\_MN\_BK\_16B**  
**Bokaro Ghat 10\_0.08 ha**  
**District-Ramgarh, Jharkhand**

**Source: Google Earth Image**

**Graphical Scale:**

0 0.125 0.25 0.5 Km

*(Handwritten Signature)*



# HAUL ROAD MAP OF THE PROJECT SITE

**Legend**

- Project Site
- Haul Road
- Metalled Road
- Highway

PO\_RM\_MN\_BK\_16C  
Bokaro Ghat 11\_ 0.23 ha

PO\_RM\_MN\_BK\_16D  
Bokaro Ghat 12\_ 1.0 ha

PO\_RM\_MN\_BK\_16E  
Bokaro Ghat 13\_ 0.41 ha

District-Ramgarh, Jharkhand

Source: Google Earth Image

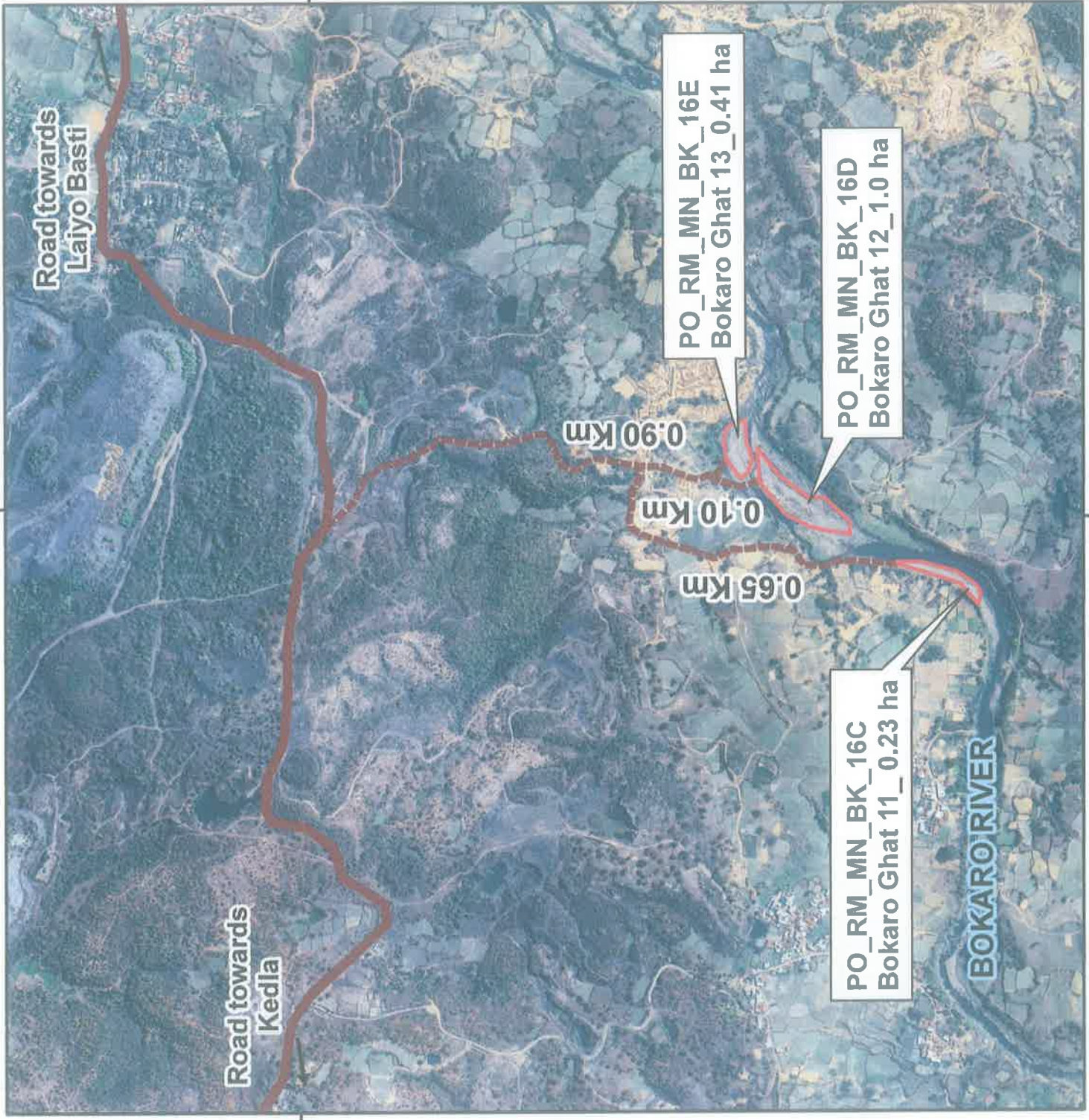
Graphical Scale:

0 0.125 0.25 0.5 Km

*Amir Akbar*

Patna Private Limited

23°47'0"N



85°37'0"E

Road towards  
Kedia

Road towards  
Laiyo Basti

**BOKARO RIVER**

85°37'0"E

23°47'0"N

85°37'0"E



23°47'0"N

# HAUL ROAD MAP OF THE PROJECT SITE



Legend



Project Site



Haul Road



Metalled Road



Highway

**PO\_RM\_MN\_BK\_16F**  
Bokaro Ghat 14\_0.41 ha  
District-Ramgarh, Jharkhand

Source: Google Earth Image

Graphical Scale:



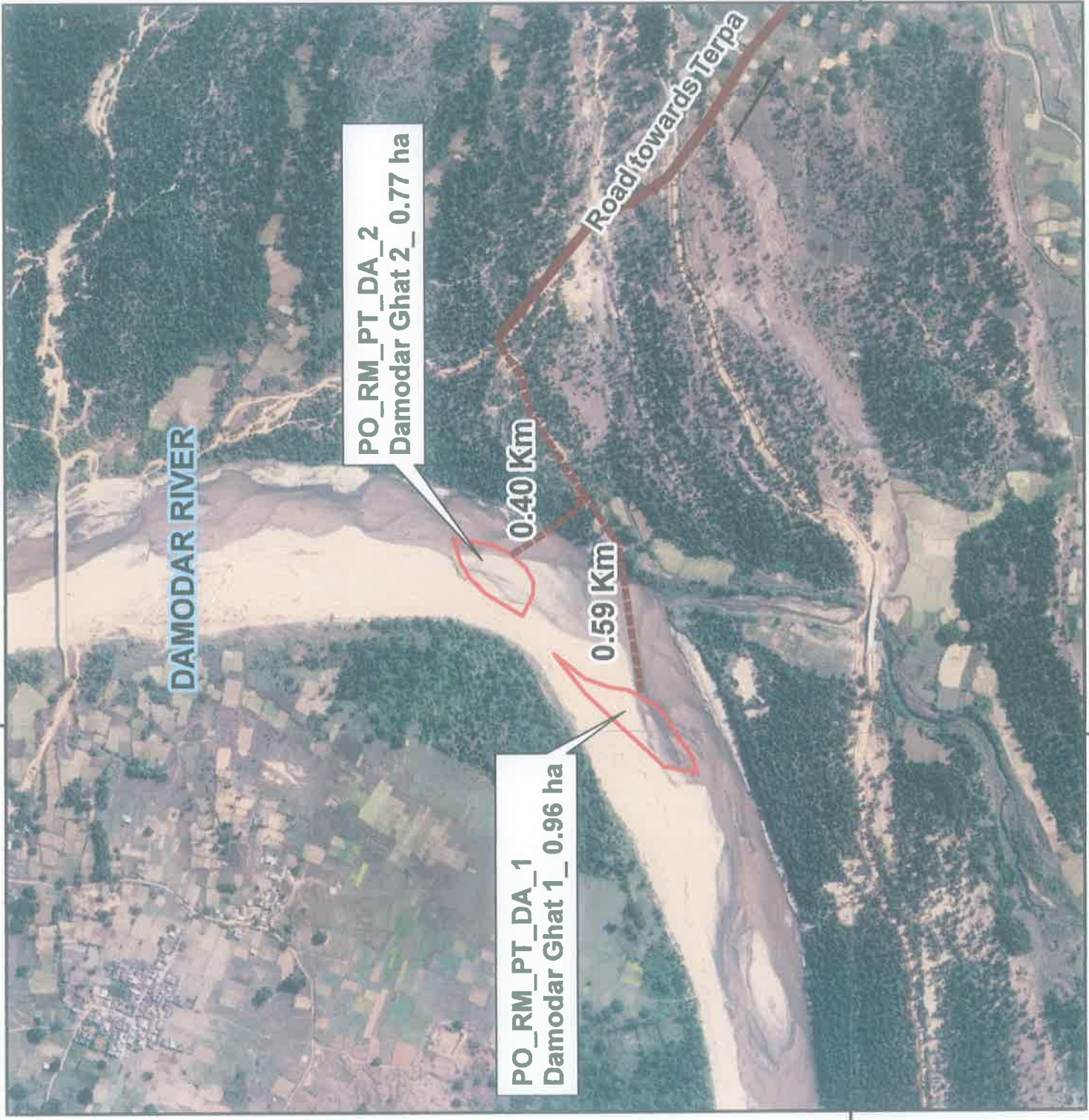
*[Handwritten Signature]*



23°47'0"N

85°37'0"E

83° 14' 0" E



23° 41' 0" N

85° 14' 0" E

# HAUL ROAD MAP OF THE PROJECT SITE



- Legend**
- Project Site
  - Haul Road
  - Metalled Road
  - Highway

PO\_RM\_PT\_DA\_1  
 Damodar Ghat 1\_ 0.96 ha  
 PO\_RM\_PT\_DA\_2  
 Damodar Ghat 2\_ 0.77 ha  
 District- Ramgarh, Jharkhand

Source: Google Earth Image

Graphical Scale:




23° 41' 0" N

# HAUL ROAD MAP OF THE PROJECT SITE



- Legend**
- Project Site
  - Haul Road
  - Metalled Road
  - Highway

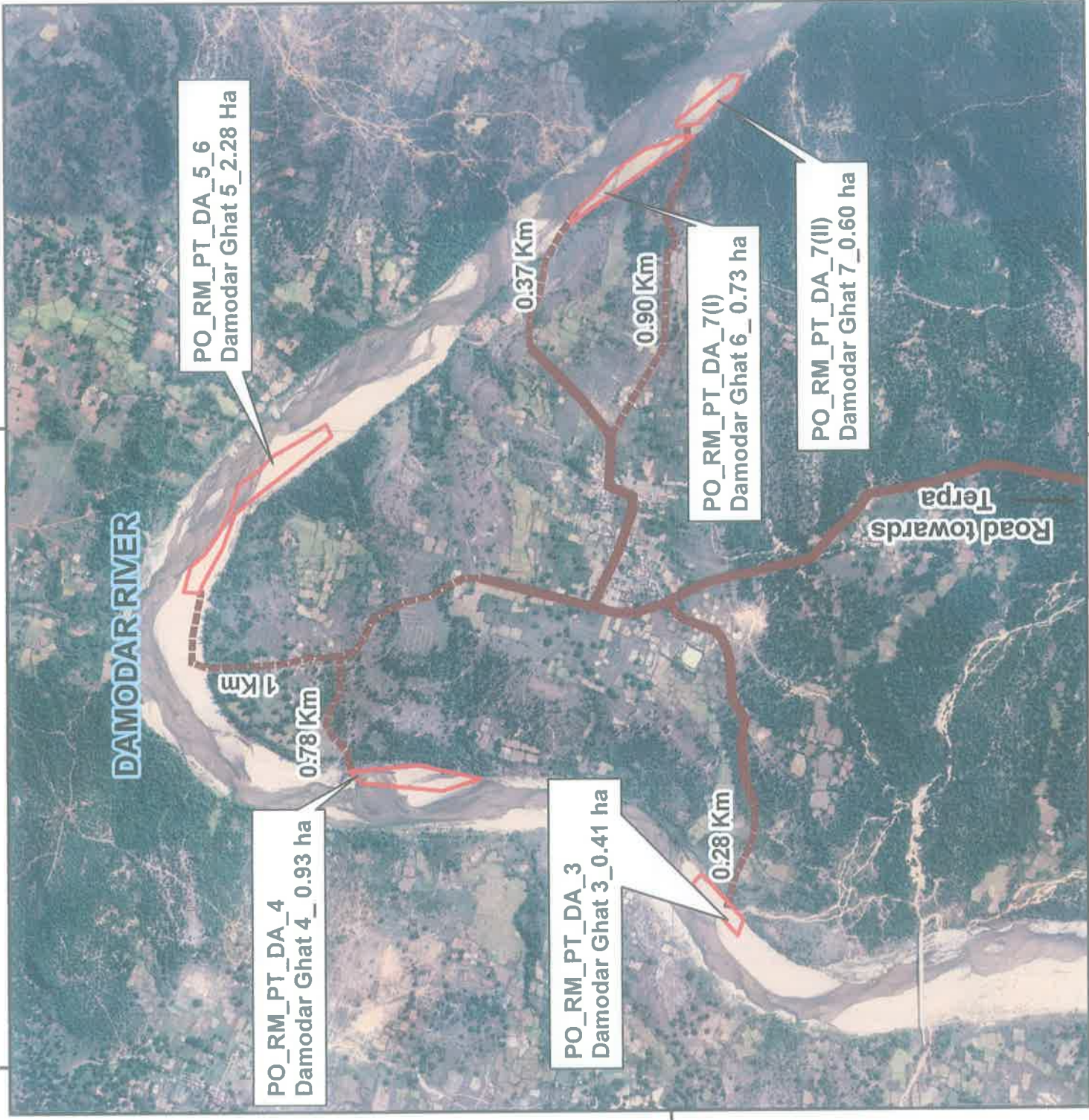
- PO\_RM\_PT\_DA\_3  
Damodar Ghat 3 0.41 ha
  - PO\_RM\_PT\_DA\_4  
Damodar Ghat 4 0.93 ha
  - PO\_RM\_PT\_DA\_5\_6  
Damodar Ghat 5 2.28 Ha
  - PO\_RM\_PT\_DA\_7(I)  
Damodar Ghat 6 0.73 ha
  - PO\_RM\_PT\_DA\_7(II)  
Damodar Ghat 7 0.60 ha
- District-Ramgarh, Jharkhand

Source: Google Earth Image

Graphical Scale:

0 0.15 0.3 0.6 km

*(Signature)*  
PATNA



85° 15' E

85° 14' 0" E

23° 42' 0" N

23° 42' 0" N

85° 14' 0" E

85° 15' 0" E



# HAUL ROAD MAP OF THE PROJECT SITE

Legend



Project Site



Haul Road



Metalled Road



Highway



PO\_RM\_PT\_DA\_8  
Damodar Ghat 8\_ 0.19 ha  
District-Ramgarh, Jharkhand

Source: Google Earth Image

Graphical Scale:

0 0.045 0.09 0.18 Km



**DAMODAR RIVER**

PO\_RM\_PT\_DA\_8  
Damodar Ghat 8\_ 0.19 ha

0.42 Km

Road towards  
Sayal



23°42'0"N

23°42'0"N

**HAUL ROAD MAP  
OF THE PROJECT SITE**



Legend

- Project Site
- Haul Road
- Metalled Road
- Highway



**PO\_RM\_PT\_DA\_8A**  
**Damodar Ghat 9\_ 1.59 ha**  
**PO\_RM\_PT\_DA\_9**  
**Damodar Ghat 10\_ 0.18 ha**  
**District- Ramgarh, Jharkhand**

Source: Google Earth Image

Graphical Scale:



85° 2' 0"E

85° 20' 0"E



# HAUL ROAD MAP OF THE PROJECT SITE

Legend



Project Site



Haul Road



Metalled Road



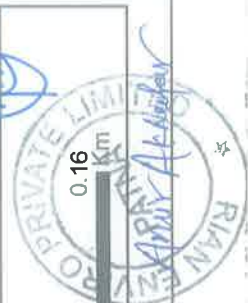
Highway



PO\_RM\_PT\_DA\_9B  
Damodar Ghat 11\_0.59 ha  
District- Ramgarh, Jharkhand

Source: Google Earth Image

Graphical Scale:





23°38'0"N

23°38'0"N

**HAUL ROAD MAP  
OF THE PROJECT SITE**



**Legend**

- Project Site
- Haul Road
- Metalled Road
- Highway

**PO\_RM\_RM\_DA\_11A**  
**Damodar Ghat 12\_ 2.46 ha**  
**District- Ramgarh, Jharkhand**

**Source: Google Earth Image**

**Graphical Scale:**

0 0.125 0.25 0.5 Km





# HAUL ROAD MAP OF THE PROJECT SITE



Legend



Project Site



Haul Road



Metalled Road



Highway

PO\_RM\_MN\_DA\_11B  
Damodar Ghat 13\_ 0.62 ha  
District- Ramgarh, Jharkhand

Source: Google Earth Image

Graphical Scale:



23°39'0"N

Hazaribagh-Ranchi Expressway

DAMODAR RIVER

0.50 Km

PO\_RM\_MN\_DA\_11B  
Damodar Ghat 13\_ 0.62 ha

85°33'0"E

85°33'0"E

23°39'0"N



# HAUL ROAD MAP OF THE PROJECT SITE



## Legend



Project Site



Haul Road



Metalled Road



Highway

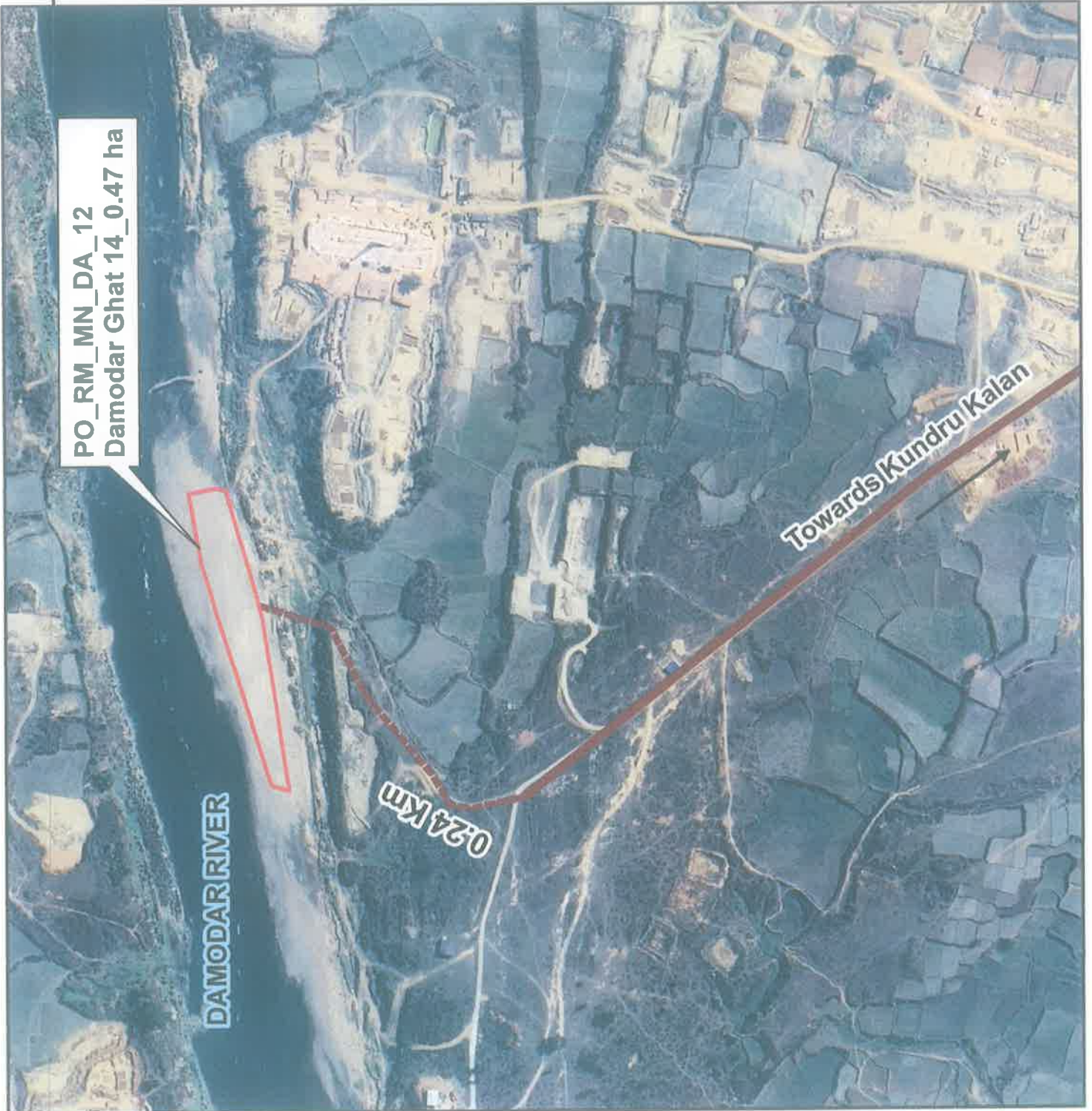
PO\_RM\_MN\_DA\_12  
Damodar Ghat 14\_0.47 ha  
District- Ramgarh, Jharkhand

Source: Google Earth Image

Graphical Scale:



23°38'0"N



PO\_RM\_MN\_DA\_12  
Damodar Ghat 14\_0.47 ha

DAMODAR RIVER

0.24 Km

Towards Kundru Kalan

23°38'0"N



# HAUL ROAD MAP OF THE PROJECT SITE



Legend



Project Site



Haul Road



Metalled Road



Highway

PO\_RM\_MN\_DA\_13  
Damodar Ghat 15\_ 1.82 ha  
District- Ramgarh, Jharkhand

Source: Google Earth Image

Graphical Scale:



0.4 Km



23°40'0"N

23°40'0"N

85°50'E

85°45'0"E

## ANNEXURE- J

(Undertaking regarding presence of aquatic animal certified by concerned Govt. Departments like Zoological survey of India.)





**District Mining Office, Ramgarh**

Email id : dmo-ramgarh@jharkhandmail.gov.in

Letter .1285...../Mining, Ramgarh; Dated 29/12/2022

From,

District Mining, Officer,  
Ramgarh

To,

The Director,  
Gangetic Plains Regional Centre,  
Zoological Survey of India.  
Bahadurpur Housing Colony,  
Sec-8, Patna- 800026, Bihar,

**Subject :- Request to provide details regarding the presence of aquatic animal in the river Damodar and Bokaro in proximity of the proposed sand ghats in Ramgarh district Jharkhand.**

Dear Sir,

With reference to the above-mentioned subject, we would like to bring to your notice that, the work for the preparation of district survey report for Sand Mineral of Ramgarh is in progress.

A per direction given by SEAC, Jharkhand we require to submit the undertaking regarding presence of aquatic animal in the river in proximity of the proposed sand ghats should be verified and certified by concerned Govt. Departments like Zoological survey of India.

It is therefore requested to provide the details of presence of aquatic animal in the river in proximity of the proposed sand ghats in DSR.

We are closing details of proposed sand ghat along with Geo-coordinates for your reference.

Thanking You.

Yours faithfully

  
District Mining Officer,  
Ramgarh

Letter .1285...../Mining, Ramgarh; Dated 29/12/2022  
Copy to :- Director, Mines, Mines and Geology Department, Jharkhand, Ranchi for kind information and necessary action please.





United Nations Decade on Biodiversity

*Occasional Paper No. 361*

**FAUNAL RESOURCES AND ASSESSMENT OF THE  
IMPACT OF MINING ACTIVITIES ON FAUNA OF  
CHHOTONAGPUR COALFIELD AREAS  
JHARKHAND, INDIA**

**A.K. SANYAL, S.K. CHATTAPADHYAY  
T.K. PAL AND A.K. KARMAKAR**

**ZOOLOGICAL SURVEY OF INDIA**





*Occasional Paper No., 361*

**Records of the  
Zoological Survey of India  
Faunal Resources and assessment of the  
Impact of Mining Activities on Fauna of  
Chhotonagpur Coalfield Areas  
Jharkhand, India**

**A.K. Sanyal, S.K. Chattapadhyay  
T.K. Pal and A.K. Karmakar**

*Zoological Survey of India, M-Block, New Alipore, Kolkata*

*Edited by the Director, Zoological Survey of India, Kolkata*



**Zoological Survey of India  
Kolkata**



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## Records of the Zoological Survey of India

361

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## INTRODUCTION

The studies on the possible impact of habitat changes on the biodiversity assemblage in a fragile ecosystem or in an area of ecological importance essentially need baseline data of recent past, which in most of the cases are lacking. Considering the fact and immense importance of data to the future workers, the results of the study which was completed in 1994 and not yet published are analysed and the present report is prepared for publication.

The present study of terrestrial, avi and aqua fauna commonly found in Chhotonagpur region in Central Coalfields Limited Command areas was undertaken by the scientists of Zoological Survey of India during January to June, 1994. The study was entrusted to the Zoological Survey of India by the Central Mine Planning and Design Institute Limited, Regional Institute - III, Central Coalfield Limited, Ranchi, Bihar, as desired by the Ministry of Environment and Forests, Government of India. The Director, Zoological Survey of India agreed to undertake the work and assigned the job to Dr. A. K. Sanyal, Scientist- E (Leader), Shri Srikumar Chattapadhyay, Scientist- E, Dr. T. K. Pal, Scientist- E and Dr. A. K. Karmakar, Assistant Zoologist.

The objective of the study was to provide base line data on the faunal composition, assemblage and probable impact of mining projects on fauna. An attempt was also made to provide recommendations for reclamation along with better management of the ecological process and wildlife conservation in the study areas. Before the present study was done, no such study to prepare faunal inventories of Chhotonagpur coal field areas was undertaken. The present work is supposed to be the first consolidated faunal inventory of the areas. The publications like Roychaudhury (1957-1966), Ahmad (1965), Anonymous (1992-2001 and 2004) were consulted for the study.

## MATERIAL AND METHODS

For preparation of an inventory of 'species of terrestrial' and 'aqua fauna' commonly found in Chhotonagpur region of Jharkhand State in CCL Command areas, the scientists of Zoological Survey of India, Kolkata undertook two extensive faunistic surveys, each of 12 days duration during January and June, 1994. The party collected/observed various groups of animals from/in almost all possible habitats available in both terrestrial and aquatic biotopes. Special emphasis was made to record wild animals in forest areas during night.

The entire study area comprising three blocks *viz.*, North and South Karanpura Block, East and West Bokaro Block and Ramgarh Block, each block measuring approximately 50 sq. km. is spread in Ranchi, Hazaribagh, Chatra, Bokaro and Ramgarh districts.



Standard operational procedures (S.O.P.) were followed for recording of fauna either by physical observations of wildlife from dusk to dawn and even in the night in all the sites mentioned above or by collecting materials. Likewise birds were observed visually with the help of telescope and binocular, for critical identification specimens were collected by using mist net and released them after identification. The small mammals which were not included in the list of Scheduled animals were collected by using traps. Insects and other terrestrial animals were collected by using insect-net, hand picking method and by light traps. Aquatic animals were collected by using water-net, caste-net and plankton-net. Soil and litter inhabiting animals were extracted by using modified tullgren funnels in the laboratory.

During the course of the surveys, a total of 35 different localities were ear-marked. The block-wise list of the localities is given below:

#### LIST OF LOCALITIES SURVEYED

##### Block - I (North and South Karanpura areas : Map - 1)

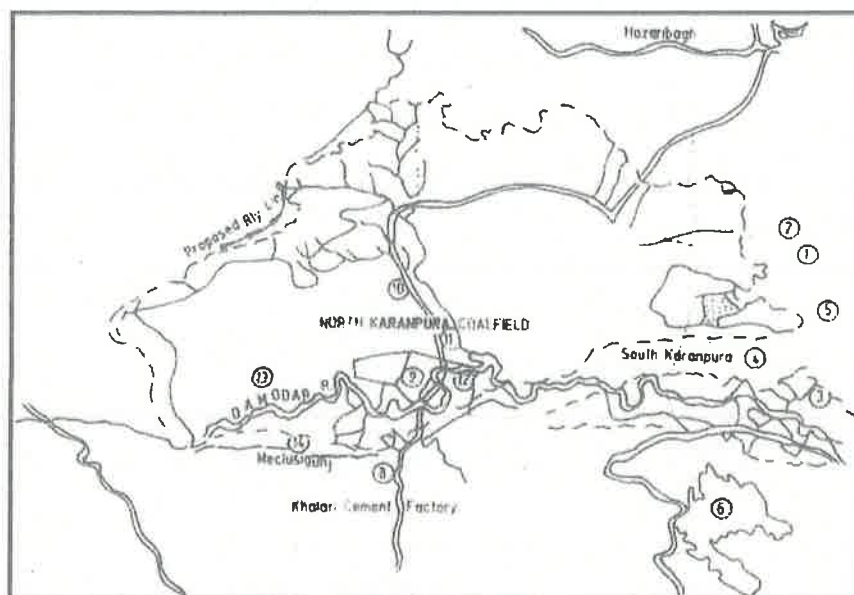
1. Gidi-CCL Rest House Campus, Hazaribagh district - 13.i.1994
2. Gidi-1/2 km south west of CCL Rest House Campus, Hazaribagh district - 13.i.1994
3. Argada Reservoir Site, Hazaribagh district - 14.i.1994
4. Gidi-Damodar River surroundings, Hazaribagh district - 14.i.1994
5. Gidi-Pit No.4 and surroundings, Hazaribagh district - 15.i.1994
6. Nalkari Dam-Patratu Reservoir and surroundings - 16.i.1994
7. Dakra, North Karanpura Transit House surroundings - 18.i.1994
8. Kheari, Near Railway Station, Palamou District - 18.i.1994
9. Mangardaha-Piparwa Pilot Mine surroundings, Hazaribagh district - 19.i.1994
10. Laranga Village, Sadabaha Nadi, 15 kms. North of Bachra - 19.i.1994
11. Tandwa Village, Chatra District - 19.i.1994
12. Bachara - 11 kms. West of Bachara, Chatra District - 20.i.1994
13. Mandar - 24 kms. West of Bachara, Chatra District - 20.i.1994
14. Deka Deki River, 25 kms., form Bachra, Palamau Dist. - 20.i.1994

##### Block - II (East and West Bokaro areas : Map - 2)

1. Kargali, Bokaro District - 7.i.1994
2. Karo, special Phase II, 12 kms. East of Kargali, Bokaro Dist. - 8.vi.1994
3. Khasmabal, surroundings of Bokaro Thermal Power Station; East of Kargali, Bokaro District. - 8.iv.1994



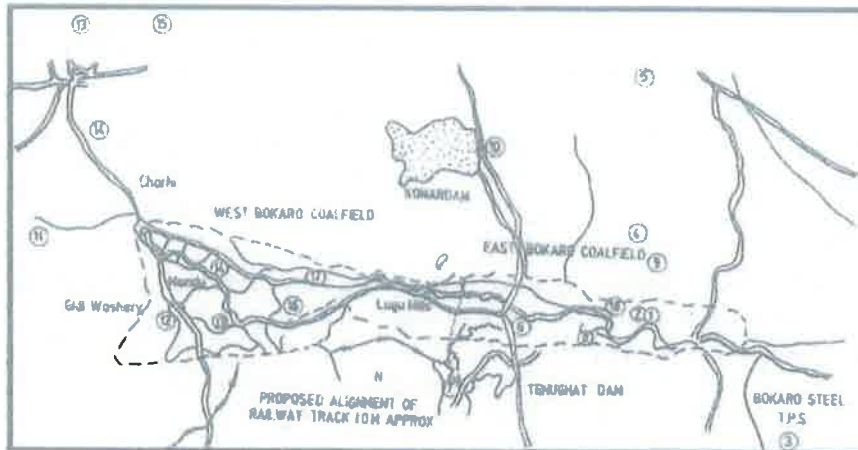
4. Palamou Village, 15 kms. North of Kargali, Bokaro district - 9.vi.1994
5. Nawadi Village, surroundings of Joria River, 30 kms. North of Kargali, Bokaro district - 9.vi.1994
6. Kathara Village, 12 kms. South of Kargali, Bokaro district - 10.vi.1994
7. Tenughat Dam site, 22 kms. South of Kargali, Bokaro district - 10.vi.1994
8. Gaddu Nala, 2 kms. West of Kargali, Bokaro district - 10.vi.1994
9. Fusro, 3 kms North of Kargali on the way to Nawadi Village (Night collection) Bokaro district - 10.vi.1994
10. Konar Dam site, 45 kms. North of Kargali, Bokaro district - 11.vi.1994
11. Jorakat Village, 12 kms. West of Charhi, Hazaribagh district - 12.vi.1994
12. Mandu Forest, 15 kms. South of Charhi, Hazaribagh district t - 12.vi.1994
13. Chamti forest, Hazaribagh district - 13.vi.1994
14. Konar Nala surrounding forest, 12 kms. North of Charhi towards Hazaribagh district - 13.vi.1994
15. Hazaribagh Lake surroundings, Hazaribagh district - 13.vi.1994
16. Bokaro Coalfield (TISCO) surroundings, 24 kms. East Charhi, Hazaribagh district - 14.vi.1994
17. Laiyo Coalfields, 32 kms. East of Charhi, Hazaribagh district - 14.vi.1994
18. Karo Village, Hazaribagh district - 19.vi.1994



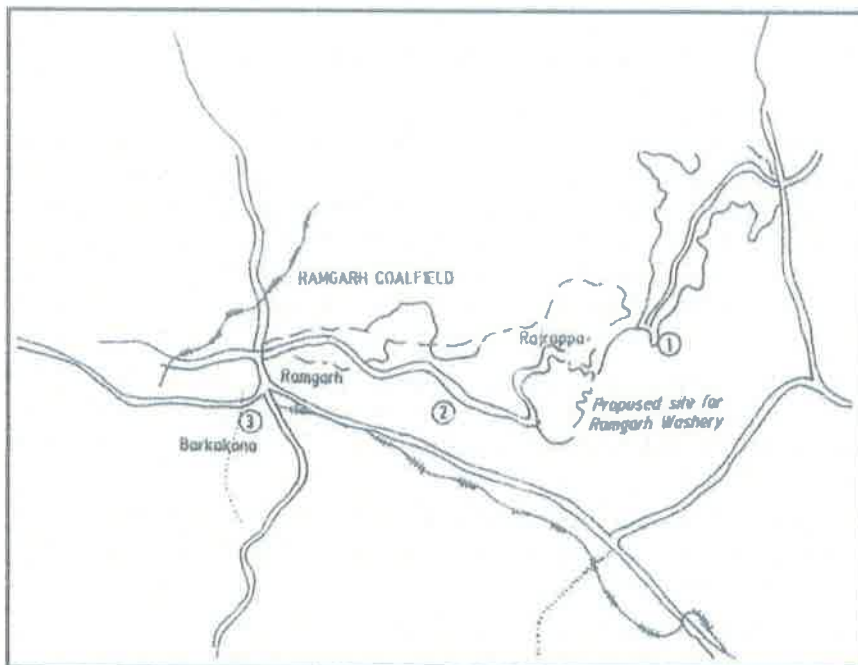
Map. 1 : Collection sites at South & North Karanpura Coalfields



*(Handwritten signature)*



**Map. 2 :** Collection sites at East & West Bokaro Coalfields



**Map. 3 :** Collection sites at Ramgarh Coalfield  
Block - III (Ramgarh Coalfield areas : Map - 3)

1. Rajruppa forest, 3-8 kms. East of Rajruppa CCL office, Hazaribagh district -16.vi.1994
2. Kothar Villalge 19 kms. West of Rajruppa CCL, Office, Hazaribagh district - 6.vi.1994
3. Barkakhana Wetland and its surroundings, Hazaribagh district - 15.vi.1994



All the collection sites were extensively surveyed and random collection and observation of fauna were made in compliance with the Wildlife (Protection) Act, 1972 and its subsequent amendments till 1992. The collection of animals was restricted to certain species/groups only.

The inventory and locality lists of mammals, birds, reptiles and amphibia were prepared on the basis of field sighting and identification in the field itself. In all the sites attempts were made to collect/observe the specimens from the places of all direction as well as from all possible ecological niche available.

The fauna collected during the above surveys was brought to the laboratory and was duly studied and identified by various specialists in Zoological Survey of India. These species are marked as 'S' (sighted) in the list. The list is further supplemented by information on the occurrence of animal groups in the Chhotonagpur Coalfield areas from the published records. These animals are recorded in the list as 'R' (recorded).

The maps indicating the major collection sites in the study area have been enclosed (Maps 1 - 3). In addition, the faunal analysis for all the groups studied has been made.

#### PHYSIOGRAPHY OF THE STUDY AREAS

The Chhotonagpur Coalfield areas surveyed in the present study fall under Chhotonagpur plateau. The plateau is composed of Precambrian rocks (more than 570,000,000 years old). Chhotonagpur is the collective name for the Ranchi, Hazaribagh and Kodarma plateaus, which have an area of 65,509 sq. km. Its largest division is the Ranchi plateau which has an average elevation of 2,300 feet. The northern side of the plateau lies between the basins of the Ganges and Son Rivers; the south is bounded by Mahanadi River and through its center, from west to east, runs the coal-bearing, Damodar Valley.

The areas surveyed come within the tropical monsoon climate. The temperature gradient is in extreme with very cold winter and very hot summer. The mean daily maximum and minimum temperature range from 97° - 99° F in May and 45° - 50° F in December respectively.

The mean annual rainfall in the study areas is 53 inches. Rains generally start during June and last till the middle of September. Occasional winter rains between November and middle of February are noticed.

The soil in the areas is rocky producing lateritic soils. Some soils near the river beds are alluvial. The lateritic tracts are usually acidic and poor in mineral nutrients and have a low silica/sesquioxide ratio. Due to grazing of live stocks and wanton destruction of plant cover, the valley was subject to varying degree of soil erosion resulting in numerous deep trenches and gulleys, which are more profound at bases of hills. Such gulleys are often bordered with *Lantana camara* and other bushes.

**Floral Resources :** According to revised classification of Champion and Seth (1968) the forest type in the valley is principally dry deciduous scrub. While mixed dry deciduous forest is prevalent in hills and hill slopes. The most predominant species of trees in the



areas are, Sal (*Shorea robusta*), Bamboo (*Dendrocalanus strietus*), Khair (*Acacia catechu*), Salai (*Boswellia serrata*), Simul (*Salmalia malabarica*), Mahua (*Madhuca indica*), Palas (*Butes frondosa*), Kusum (*Schleichera trijnga*), Kend (*Diosyros malanoxylon*), Asan (*Terminalia alata*), Piar (*Buchanania lanzan*), Bhelwa (*Semecarpus anacardiuni*), Jangli Khajur (*Phaenix acaulis*) and Bar (*Ficus bengalensis*).

### FAUNAL RESOURCES OF THE AREA

Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
Phylum : CHORDATA Class : MAMMALIA				
Order : SCANDENTIA Family : TUPAIIDAE 1. <i>Anathana ellioti</i> (Waterhouse)	+	+	+	Common
Order : INSECTIVORA Family : SORICIDAE 2. <i>Suncus murinus</i> (Linnaeus)	+	+	+	Most Common
Order : CHIROPTERA Family : PTEROPODIDAE 3. <i>Pteropus giganteus</i> (Briinnich)	+	+	+	Common
4. <i>Rousethus leschenaulti</i> (Desmarest)	+	+	+	Common
5. <i>Cynopterus sphinx</i> (Bahl)	+	+	+	Most Common
Family : RHINOPOMATIDAE 6. <i>Rhinopoma microphyllus</i> (Briinnich)	+	+	+	Common
7. <i>Rhinopoma hardwickei</i> (Gray)	+	+	+	Common
Family : EMBALLONURIDAE 8. <i>Taphozous longimanus</i> Hardwicke	+	+	+	Common
9. <i>T. melanopogon</i> Temmink	+	+	+	Common
Family : MEGADERMATIDAE 10. <i>Rmegaderma lyra</i> (Geoffroy)	+	+	+	Common
Family : RHINOLOPHIDAE 11. <i>Rhinolophus lepidus</i> (Blyth)	+	+	+	Common
12. <i>Hipposideros fulvous</i> (Gray)	+	+	+	Common



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
Family : VESPERITILIONIDAE				
13. <i>Pipistrellus mimus</i> Wroughton	+	+	+	Common
14. <i>Pipistrellus coromandra</i> (Gray)	+	+	+	Common
15. <i>Scotozous dormeri</i> Dobson	+	+	+	Common
16. <i>Scotozous kuhli</i> Leach	+	+	+	Common
17. <i>Scotozous heathi</i> (Horsfield)	+	+	+	Common
Order : PRIMATES				
Family : CEROCOPITHECIDAE				
18. <i>Macaca mulatta</i> (Zimmernmann)	+	+	+	Common
19. <i>Presbytis entellus</i> (Dufresne)	+	+	+	Common
Order : PHOLIDOTA				
Family : MANIDAE				
20. <i>Manis crassicaudata</i> Gray	+	+	+	Vulnerable
Order : CARNIVORA				
Family : CANIDAE				
21. <i>Canis lupus</i> Linnaeus	+	+	+	Insufficiently known
22. <i>Canis aureus</i> Linnaeus	+	+	+	Vulnerable
23. <i>Vulpes bengalensis</i> (Shaw)	+	+	+	Vulnerable
24. <i>Cuon alpinus</i> (Pallas)	+	+	+	Vulnerable
Family : URSIDAE				
25. <i>Melursus ursinus</i> (Shaw)	+	+	+	Vulnerable
Family : MUSTELIDAE				
26. <i>Lutra perspicillata</i> Geoffroy	+	+	+	Vulnerable
27. <i>Mellivora capensis</i> (Schreber)	+	+	+	Vulnerable
Family : VIVERRIDAE				
28. <i>Viverricula indica</i> (Desmarest)	+	+	+	Common
29. <i>Viverra zibetha</i> Linnaeus	+	+	+	Moderately Common
30. <i>Herpestes auropunctatus</i> (Hodgson)	+	+	+	Common
31. <i>Herpestes edwardsi</i> (Geoffroy)	+	+	+	Common



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
Family : HYAENIDAE				
32. <i>Hyaena hyaena</i> (Linnaeus)	+	+	+	Vulnerable
Family : FELIDAE				
33. <i>Felis chaus</i> Gildenstaedt	+	+	+	Vulnerable
34. <i>Felis bengalensis</i> Kerr	+	+	+	Vulnerable
35. <i>Panthera pardus</i> (Linnaeus)	+	+	+	Vulnerable
36. <i>Panthera tigris</i> (Linnaeus)	+	+	+	Vulnerable
Order : PROBOSCIDAE				
Family : ELEPHANTIDAE				
37. <i>Elephas maximus</i> (Linnaeus)	+	+	+	Vulnerable
Order : ARTIODACTYLA				
Family : SUIDAE				
38. <i>Sus scrofa</i> Linnaeus	+	+	+	Vulnerable
Family : CERVIDAE				
39. <i>Muntiacus muntjak</i> (Zimmermann)	+	+	+	Common
40. <i>Cervus unicolor</i> Kerr	+	+	+	Vulnerable
41. <i>Axis axis</i> (Erleben)	+	+	+	Common
Family : TRAGULIDAE				
42. <i>Tragulus meminna</i> (Erleben)	+	+	+	Vulnerable
Family : BOVIDAE				
43. <i>Boselaphus tragocamelus</i> (Pallas)	+	+	+	
44. <i>Gazella dorcas</i> (Linnaeus)	+	+	+	Vulnerable
45. <i>Tetracerus quadricornis</i> (Blainville)	+	+	+	
46. <i>Bos gaurus</i> Smith	+	+	+	Vulnerable
Order : LAGOMORPHA				
Family : LEPORIDAE				
47. <i>Lepus nigricollis</i> Cuvier	+	+	+	Common
48. <i>Funambulus palmarum</i> (Linnaeus)	+	+	+	Common
49. <i>Funambulus pennanti</i> Wroughton	+	+	+	Most Common
Family : MURIDAE				
50. <i>Millardia meltada</i> (Gray)	+	+	+	Common



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
51. <i>Rattus blanfordi</i> (Thomas)	+	+	+	Most Common
52. <i>Rattus rattus</i> (Linnaeus)	+	+	+	Most Common
53. <i>Mus musculuta</i> (Linnaeus)	+	+	+	Most Common
54. <i>Mus booduga</i> (Gray)	+	+	+	Most Common
55. <i>Mus platythrix</i> Bennett	+	+	+	Most Common
56. <i>Diomys crumpi</i> (Thomas)	+	+	+	Most Common
57. <i>Bandicoota bengalensis</i> (Gray)	+	+	+	Most Common
58. <i>Bandicoota indica</i> (Bechstein)	+	+	+	Common
59. <i>Vandeleuria oleracea</i> (Bennett)	+	+	+	Common
60. <i>Golunda ellioti</i> Gray	+	+	+	Common
61. <i>Tatera indica</i> (Hardwicke)	+	+	+	Most Common
Family : HYSTRICIDAE				
62. <i>Hystrix indica</i> Kerr	+	+	+	Vulnerable

## Class : AVES

Order : PODICIPEDIFORMES Family : PODICIPEDIDAE				
1. <i>Podiceps cristatus cristatus</i>	+	+	+	Rare
2. <i>Podiceps ruficollis capensis</i>	+	+	+	Common
Order : PELECANIFORMES Family : PHALACROCORACIDAE				
3. <i>Phalacrocorax fuscicollis</i>	+	+	+	Common
4. <i>Phalacrocorax niger</i>	+	+	+	Common
5. <i>Anhinga rufa melanogaster</i>	+	+	+	Uncommon
Order : CICONIIFORMES Family : ARDEIDAE				
6. <i>Ardea cinerea</i>	+	+	+	Stragler
7. <i>Ardea purpurea manilensi</i>	+	+	+	Uncommon
8. <i>Ardea alba</i>	+	+	+	Common
9. <i>Ardeola grayii</i>	+	+	+	Very Common
10. <i>Bubulcus ibis coromandus</i>	+	+	+	Common
11. <i>Egretta intermedia</i>	+	+	+	Common



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
12. <i>Egretta garzetta garzetta</i>	+	+	+	Common
13. <i>Nycticorax nycticorax nycticorax</i>	+	+	+	Common
14. <i>Ixobrychus cinnamomeus</i> (Gmelin)	+	+	+	Common Sch. IV
15. <i>Ixobrychus sinensis</i> (Gmelin)	+	+	+	Common "
16. <i>Ixobrychus flavicollis</i> Latham	+	+	+	Rare "
Family : CICONIIDAE				
17. <i>Xenorhynchus asiaticus asiaticus</i> (Latham)	+	-	+	Uncommon "
Family : THRESKIORNITHIDAE				
18. <i>Pseudibis papillosa</i> (Temminck) Glossy Ibis	-	+	+	Common "
Order : ANSERIFORMES				
Family : ANATIDAE				
19. <i>Dendrocygna javanica</i> (Horsifeld) Lesser Whistling Teal	+	-	+	Common "
20. <i>Tadorna ferruginea</i> (Pallas) Ruddy Shelduck	+	-	+	Rare "
21. <i>Anas acuta</i> (Pallas) Pintail	+	+	+	Common "
22. <i>Anas crecca</i> Linnaeus Common Teal	-	+	+	Common "
23. <i>Anas poecilorhyncha</i> J.R.Foster Spotbill Duck	+	+	+	Common "
24. <i>Anas strepera</i> Linnaeus Gadwall	+	+	+	Common "
25. <i>Anas formosa</i> Georgi	-	-	+	Very rare "
26. <i>Anas penelope</i> Georgi Wigeon	+	+	+	Very Common "
27. <i>Anas querquedula</i> Linnaeus Garganey	+	+	+	Common "
28. <i>Anas acuta</i> (Pallas) Shoveler	+	+	+	Common "
29. <i>Netta rufina</i> (Pallas) Red crested Pochard	+	-	+	Common "
30. <i>Aythya ferina</i> (Linnaeus) Common Pochard	+	+	+	Common "
31. <i>Aythya nyroca</i> (Guldensladt) White-eyed Pochard	+	+	+	Very Common "



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
32. <i>Aythya fuligula</i> (Linnaeus) Tufted Duck	+	+	+	Common
33. <i>Nettapus coromandelianus</i> (Gmelin) Cotton Teal	+	+	+	Very Common
Order : FALCONIFORMES Family : ACCIPITRIDAE				
34. <i>Elanus caeruleus vociferus</i> (Latham) Blackwinged Kite	+	+	+	Common
35. <i>Milvus migrans</i> (Boddaert) Black Kite	+	+	+	Common
36. <i>Haliaster indus Indus</i> (Boddaert) Brahminy Kite	+	+	+	Common
37. <i>Accipitar badius dussumeri</i> (Temminck) Shikra	+	+	+	Common
38. <i>Accipitar nissus</i> (Linnaeus) Sparrow Hawk	+	+	+	Common
39. <i>Gyps bengalensis</i> (Gmelin) White backed Vulture	+	+	+	Common
40. <i>Neophron paronpterus</i> (Linnaeus) Scavenger Vulture	+	+	+	Common
41. <i>Circus aerugionsus</i> (Linnaeus) Marsh Harrier	+	+	+	Common
42. <i>Circus gyanifis</i> (Linnaeus) Hen Harrier	+	-	+	Common
Family : FALCONIDAE				
43. <i>Falco tinnunculus</i> (Linnaeus)	-	-	+	Common
Order : GALLIFORMES Family : PHASIANIDAE				
44. <i>Pavo cristatus</i> Linnaeus Common Pea-fowl	+	+	+	Common Sch. I
Order : GSRUIFORMES				
45. <i>Turnix suscitator</i> (Gmelin) Common Bustard-Quail	+	-	+	Common Sch. IV
Family : RALLIDAE				
46. <i>Porzana pusilla</i> (Pallas) Baillon's Crane	+	-	+	Common



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
47. <i>Amaurornis phoenicurus</i> (Pennant) White breasted Waterhen	+	+	+	Common "
48. <i>Gallinula chloropus</i> (Linnaeus) Moorhen	+	+	+	Common "
49. <i>Porphyrio porphyrio</i> (Linnaeus) Purple Moorhen	-	+	+	Common "
50. <i>Fulica atra atra</i> Linnaeus Coot	+	+	+	Common "
Order : CHARADRIIFORMES Family : JACANIDAE				
51. <i>Hydrophasianus chirurgus</i> (Seopoli) Pheasant tailed Jacana	+	-	+	Common "
52. <i>Metopidius indicus</i> (Latham) Bronzewinged Jacana	+	+	+	Common "
Family : CHARADRIIDAE				
53. <i>Vanellus indicus indicus</i> (Boddaert) Redwattled Lapwing	+	+	+	Common "
54. <i>Vanellus malabaricus</i> (Bddaert) Yellow-wattled Lapwing	+	+	+	Common "
55. <i>Fulica atra atra</i> Linnaeus Coot	+	+	+	Common "
56. <i>Charadrius dubius</i> Scopoli Little Ringed Plover	+	+	+	Common "
57. <i>Tringa totanus</i> (Linnaeus) Red shank	-	+	+	Common "
58. <i>Tringa ochropus</i> Linnaeus Green Sandpiper	-	+	+	Common "
59. <i>Tringa glareola</i> Linnaeus Wood Sandpiper	+	-	+	Common "
60. <i>Tringa hypoleucos</i> Linnaeus Common Sandpiper	+	+	+	Common "
61. <i>Gallinago stenura</i> (Bonaparte) Pintail Snipe	+	-	-	Uncommon "
62. <i>Calidris temminckii</i> (Leister) Temminck's Stint	-	+	+	Common "



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
Family : ROSTRATULIDAE				
63. <i>Rostratula benghalensis benghalensis</i> (Linnaeus)	-	+	+	Uncommon "
Family : LARIDAE				
64. <i>Chlidonias hybrida indica</i> (Stephens) Whiskered Tern.	+	-	+	Very Common "
65. <i>Sterna aurantia</i> Gray Indian River Tern.	-	-	+	Common "
Family : COLUMBIDAE				
66. <i>Streptopelia decaocto decaocto</i> (Scopoli) Collared Dove	+	+	+	Very Common "
66. <i>Streptopelia orientalis</i> (Latham) Indian Ring Dove	+	+	+	Very Common "
Family : PSITTACIDAE				
68. <i>Psittacula krameri</i> (Scopoli) Roseringed Parakeet	+	+	+	Very Common "
69. <i>Psittacula cyanocephala</i> (Linnaeus) Blossomheaded Parakeet	+	+	+	Very Common "
Family : CUCULIDAE				
70. <i>Cuculus varius</i> Vhal. Common Hawk-Cuckoo	+	+	-	Very Common "
71. <i>Cacomantis merulinus</i> (Scopoli) Rutousbellied Plaintive Cuckoo	+	+	+	Very Common "
72. <i>Eudynamys scolopacea</i> (Linnaeus)	+	+	+	Very Common "
73. <i>Taccocua leschenaultii fuscata</i> (Blyth) Sirkeer Cuckoo	+	+	+	Very Common "
Order : STRIGIFORMES				
Family : STRIGIDAE				
74. <i>Athene brama</i> (Temmnick) Spotted Owlet	+	+	+	Very Common "
75. <i>Ninox scutulata</i> Brown Hawk-Owl	+	+	+	Very Common "



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
Order : CAPRIMULGIFORMES Family : CAPRIMULGIDAE				
76. <i>Caprimulgus indicus</i> Latham Indian Jungle Nightjar	+	+	+	Very Common "
77. <i>Caprimulgus macrourus albonotus</i> Tickell Longtailed Nightjar	+	+	+	Very Common "
Order : APODIFORMES Family : APODIDAE				
78. <i>Cypsiurus parvus</i> (Lichtenstein) Palm Swift	+	+	+	Very Common "
Order : CORACIFORMES Family : ALCEDENIDAE				
79. <i>Ceryl rudis</i> (Linnaeus) Lesser Pied Kingfisher	+	+	+	Very Common "
80. <i>Alcedo atthis</i> (Linnaeus) Common Kingfisher	+	+	+	Very Common "
81. <i>Pelargopsis capensis</i> (Linnaeus) Storkbilled Kingfisher	+	-	+	Common "
82. <i>Halcyon symrnessis</i> (Linnaeus) White breasted Kingfisher	+	-	+	Common "
Family : MEROPIDAE				
83. <i>Merops orientalis</i> (Latham) Green Bee-eater	+	-	+	Common "
Family : CORACIIDAE				
84. <i>Coracias benghensis</i> (Linnaeus) Indian Roller	+	-	+	Common "
Family : UPUPIDAE				
85. <i>Upupa epops</i> Linnaeus Hoopoe	+	-	+	Common "
Order : PICIFORMES Family : CAPILONIDAE				
86. <i>Megalaima zeylanica</i> Large Green Barbet	+	-	+	Common "
87. <i>Megalaima asiatica</i> Blue throated Barbet	+	+	+	Very Common "



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
88. <i>Megalaima haemacephala</i> (P.L.S. Muller) Coppersmith Barbet Family : PICIDAE	+	-	+	Common
89. <i>Dinopium benghalense</i> (Linnaeus) Lesser Golden backed Woodpecker	+	+	+	Common
90. <i>Dendrocopos maltrattensis</i> (Latham) Order : PASSERIFORMES Family : ALAUDIDAE	-	+	-	Common
91. <i>Mirafra assamica assamica</i> Horsfield Bush Lark	+	-	+	Common
92. <i>Mirafra erythroptera</i> Blyth Redwinged Bush Lark	+	-	+	Very Common
93. <i>Eremopterix grisea</i> (Scopoli) Ashycrowned Finch-Lark	+	+	-	Very Common
94. <i>Alauda gulgula gulgula</i> Franklin Family : HIRUNDINIDAE	+	-	+	Very Common
95. <i>Hirundo rustica</i> Linnaeus Common Swallow	+	+	+	Common
96. <i>Hirundo daurica</i> (Linnaeus) Redrumped Swallow Family : LANIDAE	+	-	+	Common
97. <i>Lanius cristatus</i> Linnaeus Brown Shrike	+	+	+	Common
98. <i>Lanius scach tricolor</i> (Hodgson) Rufous backed Shrike Family : ORIOLIDAE	-	-	+	Common
99. <i>Oriolus oriolus kundoo</i> Sykes Golden Oriole	+	+	+	Common
100. <i>Oriolus xanthornus</i> (Linnaeus) Blackheaded Oriole Family : DIRCURIDAE	+	+	+	Common
101. <i>Dicrurus adsimilis</i> (Bechstein) Black Drongo	+	-	+	Common



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
102. <i>Dicrurus caerulescens</i> (Linnaeus)	+	-	+	Common "
103. <i>Dicrurus hottentotus</i> (Linnaeus)	-	+	-	Rare "
104. <i>Dicrurus paradiseus</i> (Linnaeus)	-	-	+	Rare "
Family : ARTAMIDAE				
105. <i>Artamus fuscus</i> (Vicillot)	+	+	+	Common "
Family : STURNIDAE				
106. <i>Sturnus malabaricus</i> (Gmelin)	+	+	+	Very Common "
107. <i>Sturnus pagoderum</i> (Gmelin)	+	+	+	Very Common "
108. <i>Sturns contra</i> Linnaeus	+	+	+	Very Common "
109. <i>Acridotheris tristis</i> (Linnaeus)	+	+	+	Very Common "
110. <i>Acridotheris ginginianus</i> (Latham)	+	+	+	Very Common "
Family : CORVIDAE				
111. <i>Dendrocitta vagabunda</i> (Latham)	+	+	+	Very Common "
112. <i>Corvus splendens</i> Vicillot	+	+	+	Very Common "
113. <i>Corvus macrorhynchos</i> Wagler	+	+	+	Common "
Family : CAMPEPHAGIDAE				
114. <i>Pericrocotus cinnamomeus</i> (Linnaeus)	+	+	+	Common "
115. <i>P. flammaeus</i> (Forster)	+	+	+	Common "
Family : IRENIDAE				
116. <i>Aegithina tiphia</i> (Linnaeus)	+	+	+	Common "
Family : PYCNONOTIDAE				
117. <i>Pycnonotus jocosus</i> (Linnaeus)	+	+	+	Common "
118. <i>Pycnonotus cafer</i> (Linnaeus)	+	+	+	Common "
Family : MUSCICAPIDAE				
119. <i>Turdoides striatus</i> (Dumont)	+	+	+	Common "
120. <i>Muscicapa parva</i> Bechstein	+	+	+	Common "
121. <i>Muscicapa thalassina</i> Swainson	+	+	+	Common "
122. <i>Rhipidura albicollis</i> (Vicillot)	+	+	+	Common "
123. <i>Cisticola juncidis</i> (Rafinesque)	+	+	+	Common "
124. <i>Prinia socialis</i> Sykes	+	+	+	Common "



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
125. <i>Orthotomus sutorius</i> (Pennant)	+	+	+	Common "
126. <i>Locustella certhiola</i> (Pallas)	+	+	+	Common "
127. <i>Acrocephalus stentorius</i> (Hempricu & Ehrenberg)	+	+	+	Common "
128. <i>Acrocephalus dumatorum</i> Blyth	+	+	+	Common "
129. <i>Acrocephalus agricola</i> (Jerdon)	+	+	+	Common "
130. <i>Phylloscopus collybita tristis</i> (Vicillot)	+	+	+	Common "
131. <i>Phylloscopus fuscatus</i> (Blyth)	+	+	+	Common "
132. <i>Phylloscopus inornatus</i> (Blyth)	+	+	+	Common "
133. <i>Phylloscopus trochiloides</i> (Sundevall)	+	+	+	Common "
134. <i>Erithacus svecicus</i> (Linnaeus)	+	+	+	Common "
135. <i>Copsychus saularis</i> (Linnaeus)	+	+	+	Common "
136. <i>Phoenicurus ochrurus</i> (Gmelin)	+	+	+	Common "
137. <i>Saxicola torquata</i> (Linnaeus)	+	+	+	Common "
Family : PARIDAE				
138. <i>Parus major</i> Linnaeus	+	+	+	Common "
Family : SITTIDAE				
139. <i>Sitta castanea</i> Lesson	+	+	+	Common "
Family : MOTACILLIDAE				
140. <i>Anthus hodgsonii</i> Richmond	+	+	+	Common "
141. <i>Anthus novaeseelandiae rufulus</i> Vicillot	+	+	+	Very Common "
142. <i>Anthus novaeseelandiae richardi</i> Vicillot	+	+	+	Very Common "
143. <i>Anthus spilonetta</i>	+	+	+	Common "
144. <i>Motacilla flava</i> Linnaeus	+	+	+	Common "
145. <i>Motacilla citreola</i> Pallas	+	+	+	Common "
146. <i>Motacilla alba</i> Linnaeus	+	+	+	Common "
147. <i>Motacilla madraspatensis</i> Gmelin	+	+	+	Common "
Family : DICAIEIDAE				
148. <i>Dicaeum agile</i> (Tickell)	+	+	+	Common "



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
149. <i>Dicaeum erythrorhynchos</i> (Latham) Family : NECTARINIIDAE	+	+	+	Common -
150. <i>Nectarinia zeylonica sola</i> (Vicillot)	+	+	+	Common "
151. <i>Nectarinia asiatica</i> (Latham) Family : ZOSTEROPIDAE	+	+	+	Common "
152. <i>Zosterops pulpebrosa</i> (Temminck) Family : PLOCEIDAE	+	-	+	Common "
153. <i>Passer domesticus</i> (Linnaeus)	+	+	+	Very Common "
154. <i>Petronia xanthocollis</i> (Burton)	+	+	+	Common "
155. <i>Ploceus philippinus</i> (Linnaeus)	+	+	+	Common "
156. <i>Lonchura malabarica</i> (Linnaeus)	+	+	+	Common "

## Class : REPTILIA

Order : TESTUDINES Suborder : CRYPTODIRA Family : EMYDIDAE				
1. <i>Melanochelys tricarinata</i> Blyth Family : TRIONYCHIDAE	+	+	+	(R)
2. <i>Lissemys punctata punctata</i> (Lacepede)	+	+	+	(R)
Order : SQUAMATA Suborder : SAURIA Family : GEKKONIDAE				
3. <i>Hemidactylus brooki</i> Gray	+	+	+	(S)
4. <i>Hemidactylus leschenaultii</i> (Dum. & Bibr.)	+	+	+	(R)
5. <i>Hemidactylus flaviviridis</i> Gray	+	+	+	(S)
6. <i>Eublepharis hardwickii</i> Gray Family : AGAMIDAE	+	+	+	(R)
7. <i>Calotes versicolor</i> (Daudin)	+	+	+	(S)
8. <i>Psammophilus blanfordanus</i> (Stoliczka)	+	+	+	(R)
9. <i>Sitana ponticeriana</i>	+	+	+	(R)



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
Family : SCINCIDAE				
10. <i>Mabuya carinata</i> (Schneider)	+	+	+	(R)
11. <i>M. macularia</i> Blyth	+	+	+	(R)
12. <i>Riopa albopunctata</i> Gray	+	+	+	(R)
Family : LACERLIDAE				
13. <i>Cabrita leschenaulti</i> (Milne Edwards)	+	+	+	(R)
Order : SQUAMATA				
Suborder : SERPENTES				
Family : TYPHLOPIDAE				
14. <i>Ramphotyphlops braminus</i> (Daudin)	+	+	+	(R)
15. <i>Eryx conicus</i> (Schneider)	+	+	+	(R)
Family : COLUBRIDAE				
16. <i>Amphiesma stolata</i> (Linnaeus)	+	+	+	(R)
17. <i>Boiga gokool</i> (Gray)	+	+	+	(R)
18. <i>B. trigonata</i> (Schneider)	+	+	+	(R)
19. <i>Dendrelaphis tristis</i> (Daudin)	+	+	+	(R)
20. <i>Xenochrophis piscator</i> (Schneider)	+	+	+	(R)
21. <i>Oligodon taeniolatus</i> (Jerdon)	+	+	+	(R)
Family : ELAPIDAE				
22. <i>Naja naja</i> (Linnaeus)	+	+	+	(S)

## Class : AMPHIBIA

Order : AUNRA				
Family : BUFONIDAE				
1. <i>Duttaphrynus melanostictus</i> Schneider Common India Toad	+	+	+	(R)
2. <i>Duttaphrynus stomaticus</i> Lutken Marbled Toad	+	+	+	(S)
Family : MICROHYLIDAE				
3. <i>Uperodon globulosus</i> Gunther) Baloon Frog	+	+	+	(R) Very rare species recorded for the first time from Chhotonagpur areas.



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
4. <i>U. systoma</i> (Schneider) Marbled Baloon Toad	+	+	+	(S)
5. <i>Microhyla ornata</i> (Dumeril & Bileron) Family : RANIDAE	+	+	+	(S)
6. <i>Hoplobatrachus crassa</i> Jerdon Jerdon's Bull Frog	+	+	+	(S)
7. <i>Euphlyctis cyanophlyctis</i> Schneider Skipper Frog	+	+	+	(S)
8. <i>Fejervarya limnocharis</i> Boie Poddy-field Frog	+	+	+	(S)
9. <i>Hoplobatrachus tigerina</i> Daudin Indian Bull Frog	+	+	+	(S)
10. <i>Sphaerotheca breviceps</i> (Schneider) Burrowing Frog Family : RHACOPHORIDAE	+	+	+	(S)
11. <i>Polypedates maculatus</i> (Gray) Tree Frog	+	+	+	(S)

## Class : PISCES

Subclass : TELEOSTOMI Order : OSTEOGLOSSIFORMES Family : NOTOPTERIDAE				
1. <i>Notopterus notopterus</i> Pallas	+	+	+	(S) Economically important
Order : CYPRINIFORMES Family : CYPRINIDAE				
2. <i>Amblypharyngodon mola</i> (Hamilton)	+	+	+	(S) Economically important
3. <i>Barilius bendelisis</i> (Hamilton)	+	+	+	(S)
4. <i>Catla catla</i> (Hamilton)	+	+	+	(S) Major carps, economically very important
5. <i>Cirrhinus mrigala</i> (Hamilton)	+	+	+	(S) -do-



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
6. <i>C. reba</i> (Hamilton)	+	+	+	(S) Minor carp, economically important
7. <i>Crossochilus latius latius</i> Hamilton	+	+	+	(S)
8. <i>Danio dangila</i> (Hamilton)	+	+	+	(S)
9. <i>D. rerio</i> (Hamilton)	+	+	+	(S)
10. <i>Esomus danricus</i> (Hamilton)	+	+	+	(S)
11. <i>Garra annandalei</i> Hora	+	+	+	(S)
12. <i>G. gotyla</i> (Gray)	+	+	+	(S)
13. <i>G. mullya</i> (Sykes)	+	+	+	(S)
14. <i>G. satyendranathi</i> Ganguly & Datta	+	+	+	(S)
15. <i>Labeo rohita</i> (Hamilton)	+	+	+	(S) Major carp, economically very important
16. <i>L. boggut</i> (Hamilton)	+	+	+	(S) Economically important
17. <i>L. calbasu</i> (Hamilton)	+	+	+	(S) Major carp, economically very important
18. <i>Osteobrama cotio cotio</i> (Hamilton)	+	+	+	(S)
19. <i>Puntius chola</i> (Hamilton)	+	+	+	(S)
20. <i>P. conchoniis</i> (Hamilton)	+	+	+	(S) Economically less important
21. <i>P. guganio</i> (Hamilton)	+	+	+	(S)
22. <i>P. sophare</i> (Hamilton)	+	+	+	(S) Economically important
23. <i>P. ticto</i> (Hamilton)	+	+	+	(S) Economically important
24. <i>Rasbora daniconius</i> (Hamilton)	+	+	+	(R)
25. <i>R. Megarasbora elanga</i> (Hamilton)	+	+	+	(S)
26. <i>Salmophasia acinaces</i> (Valenciennes)	+	+	+	(S)
27. <i>Salmophasia bacaila</i> (Hamilton)	+	+	+	(S) Economically less important



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
28. <i>Tor tor</i> (Hamilton)	+	+	+	(S) Economically less important
Family : COBITIDAE				
29. <i>Lepidocephalichthys guntea</i> (Hamilton)	+	+	+	(S)
Family : NEMACHEILIDAE				
30. <i>Acanthocobitis botia</i> (Hamilton)	-	-	+	(S) Small hill stream fishes usually found in rapid running water.
31. <i>Schistura dayi</i> Hora	-	-	+	(R) -do-
32. <i>S. denisonii</i> Day	-	-	+	(R) -do-
33. <i>S. savona</i> (Hamilton)	-	-	+	(R) -do-
34. <i>Nemacheilus subfusca</i> (McClelland)	-	-	+	(S) -do-
35. <i>Schistura zonata</i> (McClelland)	-	-	+	(R) -do-
Order : SILURIFORMES				
Family : BAGRIDAE				
36. <i>Spesata aor</i> (Hamilton)	-	-	+	(S) Economically important
37. <i>Mystus cavasius</i> (Hamilton)	-	-	+	(R) Economically important
Family : SCHILBEIDAE				
38. <i>Pseudeutropius atherinoides</i>	+	-	-	(S)
Family : AMBLYCIPITIDAE				
39. <i>Amblyceps mangois</i> (Hamilton)	+	-	-	(R)
Family : Sisoridae				
40. <i>Gogata cenia</i> (Hamilton)	-	-	+	(R)
41. <i>G. sexualis</i> Tilak	+	-	-	(R)
42. <i>Glyptothorax coheni</i> Ganguli, Datta & Sen	-	-	+	(S)



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
Family : CLARIIDAE				
43. <i>Clarias magur</i> (Hamilton)	+	-	+	(S) Economically very important. These are highly esteemed for Their nourishing properties.
Family : HETEROPNEUSTIDAE				
44. <i>Heteropneustes fossilis</i> (Bloch)	+	-	-	(S) -do-
Order : CHANNIFORMES				
Family : CHANNIDAE				
45. <i>Channa marulius</i> (Hamilton)	-	-	+	(S) Economically important
46. <i>C. punctatus</i> (Hamilton)	-	+	-	(S) Economically important
47. <i>C. gachua</i> (Hamilton)	-	-	+	(S)
48. <i>C. striatus</i> (Bloch)	-	-	+	(S) Economically important
Order : PERCIFORMES				
Family : CHANDIDAE				
49. <i>Parambassis baculis</i> Hamilton	+	-	-	(S) Economically important
50. <i>Chanda nama</i> Hamilton	+	-	-	(S)
51. <i>Parambassis ranga</i> Hamilton	+	-	-	(S)
Family : NANDIDAE				
52. <i>Nandus nandus</i> (Hamilton)	-	-	+	(R) Economically important
Family : CICHLIDAE				
53. <i>Oreochromis mossambica</i> (Peters)	+	-	-	(S) Economically important exotic variety
Family : MUGILIDAE				
54. <i>Sicamugil cascasia</i> (Hamilton)	+	+	+	(S)



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
Family : GOBIIDAE 55. <i>Glossogobius giuris</i> (Hamilton)	+	+	+	(S) Economically important
Family : ANABANTIDAE 56. <i>Anabas testudineus</i> (Bloch)	+	+	+	(S) Economically important, hardy & highly esteemed for its restorative value & prolonged freshness.
Family : BELONTIDAE 57. <i>Trichogaster fasciata</i> (Schneider)	+	-	-	(S)
Order : MASTACEMBELIFORMES Family : MASTACEMBELIDAE 58. <i>Mastacembelus armatus</i> (Lacepede)	+	-	+	(S) Economically important
59. <i>Macrognathus panchalus</i> (Hamilton)	+	-	+	(S) Economically less important

Phylum : ARTHROPODA

Class : INSECTA

Order : COLLEMBOLA Family : ISOTOMIDAE 1. <i>Isotomina thermophila</i>	+	+	+	(S)
2. <i>Isotomiella minor</i>	+	+	+	(S)
Family : SMINTHURIDAE 3. <i>Sminthurinus</i> sp.	+	+	+	(S)
Family : HYPOGASTRURIDAE 4. <i>Hypogastura</i> sp.	+	+	+	(S)
5. <i>Xenylla</i> sp.	+	+	+	(S)
Family : ENTOMOBRYIDAE 6. <i>Lepidocyrtus</i> sp.	+	+	+	(S)



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
Order : THYSANURA Family : LEPISMATIDAE				
1. <i>Stylifera</i> sp.	+	+	+	(S)
Order : HEMIPTERA Family : PENTATOMIDAE				
1. <i>Nazara viridula</i> (Linn.)	+	+	+	(S)
2. <i>Halys dentatus</i> (Fabr.)	+	+	+	(S)
3. <i>Eysarcoris ventralis</i> (Westw.)	+	+	+	(S)
4. <i>Placosternum</i> sp.	+	+	+	(S)
5. <i>Agonoscelis nubila</i> (Fabr.)	+	+	+	(S)
6. <i>Mendia</i> sp.	+	+	+	(S)
7. <i>Carpocoris</i> sp.	+	+	+	(S)
Family : SCUTELLERIDAE				
8. <i>Chrysocoris stollii</i> (Wolff.)	+	+	+	(S)
Family : CICADELLIDAE				
9. <i>Cicadella spectra</i> (Dist.)	+	+	+	(S)
10. <i>Exitianus indicus</i> (Dist.)	+	+	+	(S)
11. <i>Parabolocratius albomaculatus</i> (Dist.)	+	+	+	(S)
12. <i>Nephotettix nigropictus</i> Stal	+	+	+	(S)
Family : COREIDAE				
13. <i>Leptocorisa acuta</i> (Thunb.)	+	+	+	(S)
Family : TINGIDAE				
14. <i>Paracopium cingulatus</i> (Walk.)	+	+	+	(S)
Family : MEMBRACIDAE				
15. <i>Tricentrus gibbosulus</i> (Walk.)	+	+	+	(S)
16. <i>Otinotus oneratus</i> (Walk.)	+	-	-	(S)
Family : BELOSTOMATIDAE				
17. <i>Lethocerus indicus</i> (Lep. & Serv.)	-	-	+	(S)
18. <i>Sphaerodema annulatum</i> (Fabr.)	+	-	+	(S)
19. <i>Diplonychus annulatus</i> (Fabr.)	-	-	+	(S)
20. <i>D. molestus</i> (Dufour)	+	+	+	(S)



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
21. <i>Diplonychus</i> sp. Family : NEPIDAE	+	+	+	(S)
22. <i>Ranatra filiformis</i> Fabr.	+	+	+	(S)
23. <i>Ranatra elongata</i> Fabr.				
24. <i>Ranatra sordidula</i> Dohrn	+	+	+	(S)
25. <i>Ranatra varipes</i> Stal	-	+	+	(S)
26. <i>Ranatra</i> sp.1	-	+	+	(S)
27. <i>Ranatra</i> sp.2 Family : CYDNIDAE	-	+	+	(S)
28. <i>Laccotrephes griseus</i> (Guer)	-	+	+	(S)
29. <i>L. ruber</i> (Linn.)	-	+	+	(S)
30. <i>Geotomus</i> sp. Family : NOTONECTIDAE	-	+	+	(S)
31. <i>Anisops breddini</i> Kirkaldy	-	+	+	(S)
32. <i>Anisops</i> sp. Family : PYRRHOCORIDAE	+	-	-	(S)
33. <i>Dysdercus koenigii</i> (Fabr.) Family : CORIXIDAE	+	-	-	(S)
34. <i>Micronecta (Dichaetonecta) haliploides</i> Harvath. Family : PLEIDAE	-	+	-	(S)
35. <i>Plea frontalis</i> (Fieber) Family : CORIXIDAE	-	+	-	(S)
36. <i>Corixa (Tropocorixa) distora</i> Distant Family : GERRIDAE	-	+	-	(S)
39. <i>Limnogonus (Limnogonus) fossarum</i> (Fabr.) Order : ODONATA Suborder : ZYGOPTERA Family : COENAGRIONIDAE	+	-	-	(S)
1. <i>Pseudagrion malabaricum</i> Fraser	+	+	+	(R)



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
2. <i>Pseudagrion spencei</i> Fraser	-	+	+	(R)
3. <i>Pseudagrion hypermelas</i> Selys	-	+	+	(R)
4. <i>Pseudagrion rubriceps</i> Selys	+	+	+	(R)
5. <i>Ceriagrion coromandelianum</i> (Fabr.)	-	+	+	(S)
6. <i>Ischnura senegalensis</i> (Ramb.)	+	-	+	(S)
7. <i>Ischnura aurora</i> (Brauer)	+	+	+	(S)
8. <i>Agriocnemis splendidissima</i> Laidlaw	-	-	+	(R)
9. <i>Agriocnemis pygmaea</i> (Rambur)	+	+	-	(R)
10. <i>Agriocnemis lacteola</i> (Selys)	-	+	-	(R)
11. <i>Cercion calamoru</i> Ris	+	+	-	(R)
12. <i>Enallagma parvum</i> (Selys)	+	+	+	(S) New record from Chhotonagpur area
13. <i>Coenagrionid</i> sp. Family : LESTIDAE	+	+	+	(S) -do-
14. <i>Lestes viridulus</i> Rambur Suborder : ANISOPTERA Family : GOMPHIDAE	+	-	-	(S)
15. <i>Anisogomphus bivittatus</i> (Selys)	-	+	+	(S) Recorded from the First time from Chhotonagpur areas.
16. <i>Neogomphus modestus</i> (Selys)	+	-	-	(R)
17. <i>Gomphid</i> sp. Family : LIBELLULIDAE	+	-	-	(R)
18. <i>Potamarcha congener</i> (Ramb.)	+	-	+	(S)
19. <i>Orthetrum sabina</i> (Drury)	+	+	+	(S)
20. <i>Orthetrum prunosum neglectum</i> (Ramb.)	+	-	+	(S)
21. <i>Orthetrum taeniolatum</i> (Schn.)	+	-	+	(S)
22. <i>Orthetrum chandrabali</i> Mehrotra	-	+	+	(S)



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
23. <i>Orthetrum ganeshi</i> Mehrotra	+	+	+	(S)
24. <i>Palpopleura sexmaculata</i> (Fabr.)	+	+	+	(S)
25. <i>Acisoma panorpoides</i> (Ramb.)	+	+	+	(S)
26. <i>Crocothemis servilia</i> (Drury)	+	+	+	(S)
27. <i>Brachythemis contaminata</i> (Fabr.)	+	+	+	(S)
28. <i>Diplacodes trivialis</i> (Ramb.)	+	+	+	(S)
29. <i>Trithemis festiva</i> (Ramb.)	+	+	+	(S)
30. <i>Trithemis pallidinervis</i> (Kirby)	-	+	+	(S)
31. <i>Pantala flavescens</i> (Fabr.)	-	+	+	(S)
32. <i>Lathrecista asiatica</i> (Fabr.)	+	+	+	(S) New record from Chhotonagpur areas.
33. <i>Brachydiplax sobrina</i> (Ramb.)	-	+	+	(S) -do-
34. <i>Rhyothemis variegata</i> (Linn.)	-	+	+	(S) -do-
35. <i>Libellula</i> sp.	-	+	+	(S) -do-
Family : AESHNIDAE				
36. <i>Aeshna</i> sp.	-	+	+	(S) -do-
Order : HYMENOPTERA				
Family : APIDAE				
1. <i>Xylocopa latipes</i> (Drury)	-	+	+	(S)
2. <i>Xylocopa tenuiscapa</i> Westwood	-	-	+	(S)
3. <i>Apis dorsata</i> (Fabr.)	+	+	-	(S)
4. <i>Apis indica</i> Fabr.	+	+	-	(S)
5. <i>Megachile disjuncta</i> (Fabr.)	+	+	+	(R)
Family : FORMICIDAE				
6. <i>Camponotus compressus</i> (Fabr.)	+	+	+	(R)
7. <i>Oecophylla smaragdina</i> (Fabr.)	+	+	+	(S)
8. <i>Myrmicaria brunnea</i> Saunders	+	+	+	(S)
9. <i>Prenolepis longicornis</i> (Latreille)	+	+	+	(S)



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
Family : MUTILLIDAE				
10. <i>Trogaspidia sexmaculata</i> (Swederus)	-	+	-	(S)
Family: ICHNEUMONIDAE				
11. <i>Dusona tikari</i> Gupta & Gupta	+	+	+	(R)
12. <i>Dusona similis</i> Gupta & Gupta	+	+	+	(R)
13. <i>Diplazon orientalis</i> (Cameron)	-	-	+	(S)
14. <i>Echthromorpha notulatoria</i> (Fabr.)	+	+	+	(S)
15. <i>Netelia (Netelia) corrugate</i> Kaur & Jonathan	+	+	+	(S)
16. <i>N. (N.) orientalis</i> Cameron	+	+	+	(S)
17. <i>N. (Totochiloides) latro</i> Holm.	+	+	+	(R)
Family: BRACONIDAE				
18. <i>Chelonus heliope</i> Gupta	+	+	+	(S)
19. <i>Diaeretiella rapae</i> (McIntosh)	+	-	-	(S)
20. <i>Bracon</i> sp.	+	+	+	(S)
Family: ENCYRTIDAE				
21. <i>Homalotylus flaminus</i> (Dalman)	+	-	+	(S)
Order : ISOPTERA				
Family: TERMITIDAE				
1. <i>Odontotermes brunneus</i> (Hagen)	+	+	+	(S)
2. <i>Odontotermes feae</i> (Wasmann)	+	+	+	(S)
3. <i>Odontotermes redemanni</i> (Wasmann)	+	+	+	(S)
4. <i>Odontotermes roonwali</i> Bose	+	+	+	(S)
5. <i>Odontotermes obesus</i> (Rambur)	-	+	-	(S)
6. <i>Odontotermes</i> sp	+	+	+	(S)
7. <i>Microtermes</i> sp.	-	+	-	(S)
Order : ORTHOPTERA				
Family: ACRIDIDAE				
1. <i>Trilophida annulata</i> (Thunb.)	+	+	+	(S)
2. <i>Oedaleus abruptus</i> (Thunb.)	+	+	+	(S)
3. <i>Oedaleus senegalensis</i> Krauss	+	+	+	(R)
4. <i>Gastrimargus africanus africanus</i> (Sauss.)	+	+	-	(S)



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
5. <i>Gastrimargus africanus</i> var. <i>orientalis</i> Sjostedt.	-	-	+	(R)
6. <i>Acrida exaltata</i> (Walk.)	+	+	+	(S)
7. <i>Acrida</i> sp.	+	+	+	(S)
8. <i>Leva cruciata</i> (Bol.)	-	-	+	(R)
9. <i>Leva indica</i> (Bol.)	+	+	-	(S)
10. <i>Aiolopus thalassinus tamulus</i> (Fabr.)	+	+	+	(S)
11. <i>Acrotylus humbertianus</i> Sauss.	+	+	-	(S)
12. <i>Acrotylus</i> sp.	+	+	+	(S)
13. <i>Dittopternis venusta</i> (Walk.)	-	+	-	(S)
14. <i>Spathosternum prasiniferum prasiniferum</i> (Walk.)	+	+	+	(S)
15. <i>Oxya hyla hyla</i> Serville	+	+	+	(S)
16. <i>Oxya fuscovittata</i> (Marschall)	+	-	-	(S)
17. <i>Hieroglyphus oryzivorus</i> Carl	-	-	+	(S)
18. <i>Eyprepocnemis alacris</i> (Serv.)	+	+	+	(S)
19. <i>Acorypha glaucopsis</i> (Walk.)	-	-	+	(R)
20. <i>Catantops pinguis innotabilis</i> (Walk.)	+	-	+	(R)
21. <i>Anacridium flavescens</i> (Fabr.)	+	+	+	(S)
22. <i>Cyrtacanthacris tatarica</i> (Linn.)	+	+	+	(S)
23. <i>Morphacris citrina</i> Kirby	-	-	+	(R)
24. <i>Pternoscirta bimaculatus</i> Thunberg	+	-	+	(S)
25. <i>Truxalis indica</i> Bolivar	+	-	-	(R)
Family : PYRGOMORPHIDAE				
26. <i>Atractomorpha crenulata</i> (Fabr.)	+	+	+	(S)
27. <i>Chrotogonus trachypterus trachypterus</i> (Blanch.)	+	+	+	(S)
28. <i>Chrotogonus oxypterus</i> (Blanch.)	+	+	+	(S)
29. <i>Poekilocerus pictus</i> (Fabr.)	+	+	+	(S)
Family : GRILLIDAE				
30. <i>Plebeiogryllus guttiventril</i> Walk.	+	+	+	(S)



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
31. <i>Modicogryllus confirmatus</i> (Walk.)	+	+	+	(S)
32. <i>Turanogryllus</i> sp.	+	+	+	(S)
Family : GRYLLOTALPIDAE				
33. <i>Gryllotalpa</i> sp.	+	+	+	(S)
Family : TETRIGIDAE				
34. <i>Ergatettix dorsifera</i> (Walk.)	+	+	-	(S)
35. <i>Ergatettix guentheri</i> Steinmann	+	+	+	(S)
36. <i>Euparatettix</i> sp.	+	-	+	(S)
37. <i>Hedotettix gracilis</i> (Haan)	+	+	+	(S)
Family : TRIDACTYLIDAE				
38. <i>Xya</i> sp.	+	+	+	(S)
Family : TETTIGONIIDAE				
39. <i>Conocephalus maculatus</i> (Le Guillou)	+	+	+	(S)
Order : DIPTERA				
Family : BIBIONIDAE				
1. <i>Penthetria japonica</i> Wied.	+	+	+	(S)
Family : STRATIOMYIDAE				
2. <i>Oplodontha rubrithorax</i> (Macq.)	+	+	+	(S)
3. <i>Microchrysa calopa</i> Brun.	+	+	+	(S)
Family : SYRPHIDAE				
4. <i>Melanostoma</i> sp.	+	+	+	(S)
5. <i>Melanostoma univittatum</i> (Wied.)	+	+	+	(S)
6. <i>Paragus (Pandasyophthalmus) rufiventris</i> Brun.	+	+	+	(S)
7. <i>Episyrphus balteatus</i> (De Geer)	+	+	+	(R)
8. <i>Metasyrphus confrater</i> (Wied.)	+	+	+	(R)
9. <i>Ischiodon scutellaris</i> (Fabr.)	+	+	+	(R)
10. <i>Sphaerophoria indiana</i> Bigot	+	+	+	(SR)
11. <i>Eristalinus arvorum</i> (Fabr.)	+	+	+	(R)
12. <i>Phytomia (P.) errans</i> (Fabr.)	+	+	+	(R)



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
13. <i>Phytomyia (P.) argyrocephala</i> (Macquart) Family : ASILIDAE	+	+	+	(S)
14. <i>Philodicus femoralis</i> Ric. Family : THEREVIDAE	+	+	+	(S)
15. <i>Psilocephala sequa</i> (Walker) Family : OTITIDAE	-	+	-	(S)
16. <i>Physiphora aenea</i> (Fabr.) Family : MUSCIDAE	-	+	-	(S)
17. <i>Orthellia lauta</i> (Wied.)	-	+	-	(S)
18. <i>Orthellia coerulea</i> (Wied.)	-	+	-	(R)
19. <i>Musca (Musca) domestica</i> Linn.	-	+	-	(R)
20. <i>Musca (Byomya) ventrosa</i> Wied.	-	+	-	(S)
21. <i>Musca (Byomya) sorbens</i> Wied.	-	+	-	(S)
22. <i>Musca (Byomya) conducens</i> Walker	-	+	-	(S)
23. <i>Musca (Byomya) pattoni</i> Austen	-	+	-	(R)
24. <i>Musca (Philaematomyia) crassirostris</i> Stein	-	+	-	(R)
25. <i>Musca (Viviparomusca) bezzi</i> Patton & Cragg	-	+	-	(S)
26. <i>Stomoxys calcitrans</i> (Linn.)	-	+	-	(S)
27. <i>Gymnodia tonitru</i> (Weid.) Family : CALLIPHORIDAE	-	+	-	(R)
28. <i>Stomorhina discolor</i> Fabr.	-	+	-	(S)
29. <i>Chrysomya megacephala</i> (Fabr.)	-	+	-	(R)
30. <i>Chrysomya rufifacies</i> (Macq.)	-	+	-	(S)
31. <i>Chrysomya nigripes</i> Aubertin	-	+	-	(S)
32. <i>Isomyia fulvicornis</i> (Bigot)	-	+	-	(R)
33. <i>Idiella mandarina</i> (Wied.)	-	+	-	(R)
34. <i>Rhinia luteigaster</i> (Meijere) Family : TIPULIDAE	-	+	-	(R)
35. <i>Conosia irrorata</i> (Wied.)	-	+	-	(S)



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
Family : CERATOPOGONIDAE				
36. <i>Calyptopogon albitarsis</i> Kieffer	+	+	+	(S)
37. <i>Sphaeromias distincta</i> (Haliday)	+	-	-	(R)
Family : CULICIDAE				
38. <i>Anopheles (Cellia) philippinensis</i> Ludlow	-	+	-	(R)
Family : BOMBYLIIDAE				
39. <i>Petrorossia albofulva</i> (Walker)	-	+	-	(S)
Family : PIPUNCULIDAE				
40. <i>Tomosvaryella limpidipennis</i> (Brunetti)	-	+	-	(R)
Family : EMPIDIDAE				
41. <i>Cheliopoda (Cheliopoda) flavida</i> Brun.	-	+	-	(S)
Family : TEPHRITIDAE				
42. <i>Dacus (Zeugodacus) tau</i> Walker	-	+	-	(R)
43. <i>Platensina acrostacta</i> (Wied.)	-	+	-	(S)
44. <i>Dioxya sororcula</i> Wied.:	-	+	-	(R)
45. <i>Scedella spilopectera</i> (Bezzi)	-	+	-	(R)
Family : SEPSIDAE				
46. <i>Sepsis himalayensis</i> Brun.	-	+	-	(S)
47. <i>Sepsis rufa</i> Macq.	+	+	-	(S)
Family : SCIOMYZIDAE				
48. <i>Sepedon sphegea</i> (Fabr.)	+	-	-	(R)
49. <i>Sepedon plumbella</i> (Wied.)	+	+	+	(S)
50. <i>Sepedon ferruginosa</i> Wied.	-	+	-	(S)
Family : SARCOPHAGIDAE				
51. <i>Iranihindia futilia</i> (Sr. White)	+	-	-	(R)
52. <i>Sarcophaga martellata</i> (Sr. White)	-	+	-	(S)
53. <i>Parasarcophaga (Parasarcophaga) albiceps</i> Meigen	-	+	-	(S)
54. <i>Parasarcophaga (Parasarcophaga) orchidea</i> (Bottcher)	-	+	-	(R)



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
55. <i>Parasarcophaga (Liopygin) ruficornis</i> (Fabr.)	-	+	-	(R)
56. <i>Parasarcophaga (Liosarcophaga) misera</i> (Walker)	-	+	-	(R)
57. <i>Sarcophaga flavinervis</i> (Sr. White)	-	+	-	(S)
58. <i>Sarcosolomonina crinita</i> (Parker)	-	+	-	(R)
59. <i>Seniorwhitea annandali</i> (Sr. White)	-	+	-	(R)
60. <i>Seniorwhitea krameri</i> (Bottcher)	-	+	-	(R)
61. <i>Sarcophaga walayari</i> (Sr. White)	-	+	-	(S)
Family : HIPPOBOSCIDAE				
62. <i>Hippobosca longipennis</i> Fabr.	-	+	+	(R)
Order : COLEOPTERA				
Family : DYTISCIDAE				
1. <i>Hydaticus vittatus</i> (Fabr.)	-	+	-	(S)
2. <i>Cybister tripunctatus asiaticus</i> Sharp	-	+	-	(R)
3. <i>C. confuses</i> Sharp	-	+	-	(R)
4. <i>C. limbatus</i> (Fabr.)	-	+	-	(S)
5. <i>Eretes sticticus</i> Linn.	-	+	-	(S)
6. <i>Canthydrus laetabilis</i> (Walker)	-	+	-	(R)
7. <i>Laccophilus anticatus</i> Sharp	+	-	+	(S)
8. <i>Laccophilus sharpi</i> Regimbart	-	-	+	(S)
9. <i>Hydrovatus acuminatus</i> Motschulsky	+	-	+	(R)
Family : GYRINIDAE				
10. <i>Dineutus indicus</i> Aube	-	+	-	(S)
11. <i>Orectochilus (Patrus) discifer</i> (Walker)	+	-	+	(R)
Family : HYDROPHILIDAE				
12. <i>Sternolophus rufipes</i> (Fabr.)	-	+	-	(S)
13. <i>Regimbertia attenuate</i> Fabr.	-	+	-	(S)
14. <i>Laccobius simulans</i> d' Orchymont	+	-	-	(R)
Family : SCARABAEIDAE				
15. <i>Gymnopleurus gemmatus</i> Horold	-	+	-	(S)



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
16. <i>G. cyaneus</i> Fabr.	-	+	-	(S)
17. <i>Orthophagus</i> sp.	-	+	-	(S)
Family : CURCULIONIDAE				
18. <i>Apion</i> sp.	-	+	-	(S)
Family : TENEBRIONIDAE				
19. <i>Gonocephalum</i> sp.	-	+	-	(S)
Family : STAPHYLINIDAE				
20. <i>Leptochirus (Strongylochirus) laevis</i> Castelnau	-	+	-	(S)
21. <i>Borolinus minutes</i> (Castelnau)	+	+	-	(S)
22. <i>Priochirus (Cephalomerus) sanguinosus</i> Motsch.	+	+	-	(S)
23. <i>Megathrus birmanus</i> Fauvel	-	-	+	(S)
24. <i>Oxytelopsis pseudopsina</i> Fauvel	+	-	+	(S)
25. <i>Oxytelus (Caccoporus) varipennis</i> Kraatz	+	-	-	(S)
26. <i>Bledius (Pucerus) niloticus</i> Erichson	-	+	-	(S)
Family : CARABIDAE				
27. <i>Gnathophanus lacovistriatus</i> (Strum.)	+	+	-	(S)
28. <i>amprophonus lucens</i> Bates	-	+	+	(S)
29. <i>Harpalus</i> (s.str.) <i>indcola</i> Bates	+	+	-	(S)
30. <i>Dioryche torta</i> Macl.	-	+	-	(S)
31. <i>Ophoniscus iridulus</i> Bates	+	+	-	(S)
32. <i>Platymetopus flavitabris</i> (Fabr.)	+	+	-	(S)
33. <i>Stenolophus (Egadroma) smaragdulus</i> (Fabr.)	+	-	-	(S)
Family : MELOIDAE				
34. <i>Epicauta hirtipes</i> Waterhouse	+	+	-	(S)
35. <i>Psalydolytta wellmani</i> Kaszab	-	+	-	(S)
36. <i>Mylabris thunbergi</i> Billbarg	+	-	-	(S)
37. <i>Lytta cardonii</i> (Fairmaire)	-	+	-	(S)
38. <i>Cyaneolytta acteon</i> (Laporte)	+	-	+	(S)



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
Family : CHRYSOMELIDAE				
39. <i>Oulema downesi</i> (Baly)	+	-	+	(S)
40. <i>Lema coromandelina</i> (Fabr.)	-	-	+	(S)
41. <i>Lema suturella</i> Baly	+	-	-	(S)
42. <i>Lilioceris malabarica</i> (Jacoby)	+	-	+	(S)
43. <i>Aspidolopha egregia</i> (Boheman)	-	-	+	(S)
44. <i>Diapromorpha turcica</i> (Fabr.)	-	-	+	(S)
45. <i>Smaragdina divisa</i> (Jacoby)	+	-	+	(S)
46. <i>Cryptocephalus dificiens</i> Suffrina	+	+	-	(S)
47. <i>Pagria signata</i> (Mostchulsky)	-	-	+	(S)
48. <i>Basilepta variabile</i> (Duvivier)	-	-	+	(S)
Family : COCCINELLIDAE				
49. <i>Chilocorus nigritus</i> (Fabr.)	+	+	-	(S)
50. <i>Cryptogonus bimaculatus</i> Kapur	-	+	-	(S)
51. <i>Cryptogonus quadriguttatus</i> (Weise)	+	-	-	(S)
52. <i>Pseudaspidimerus circumflexa</i> var. <i>testceus</i> (Weise)	+	-	-	(S)
53. <i>Rodolia fumida</i> Mulsant	-	+	-	(S)
54. <i>Coccinella septempunctata</i> Linn.	-	+	+	(S)
55. <i>Coelophora sexareata</i> Mulsant	+	+	+	(S)
56. <i>Oenopia luteopustulata</i> Mulsant	-	+	-	(S)

Besides these families, specimens of few other families viz., Buprestidae, Elateridae, Melyridae and Bruchidae were collected, but could not be identified due to lack of expertise.

Order : LEPIDOPTERA				
Family : DANAIIDAE				
1. <i>Danaus limniace leopardus</i> (Butler)	-	+	-	(S)
2. <i>D. chrysippus</i> (Linn.)	-	+	-	(S)
3. <i>D. genutia</i> Cramer	-	+	-	(S)
4. <i>Euploea core core</i> Cramer	-	+	-	(S)
Family : NYMPHALIDAE				
5. <i>Acraea violae</i> (Fabr.)	-	+	-	(S)



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
6. <i>Precis lemonias</i> (Linn.)	-	+	-	(S)
7. <i>P. orithya swinhoi</i> Butler	-	+	-	(S)
8. <i>P. hierta hierta</i> (Fabr.)	-	+	-	(S)
9. <i>P. almana almana</i> (Linn.)	-	+	-	(S)
10. <i>Euthalia nais</i> Forster	-	+	-	(S)
11. <i>Hypolimas belina belina</i> Linn.	-	+	-	(S)
12. <i>Plimennis procris procris</i> (Cramer)	-	+	-	(S)
13. <i>Neptis hylas astola</i> Moore	-	+	-	(S)
14. <i>Parathyma perius</i> Linn.	-	+	-	(S)
15. <i>Phalanta phalantha phalantha</i> (Drury)	-	+	-	(S)
Family : PAPILIONIDAE				
16. <i>Papilio demoleus demoleus</i> Linn.	-	+	-	(S)
17. <i>P. polytes romulus f. stichius</i> (Hubn.)	-	+	-	(S)
18. <i>Atrophaneura aristolochiae aristolochiae</i> (Fabr.)	-	+	-	(S)
19. <i>Graphium nomius nomius</i> (Esper)	-	+	-	(S)
Family : LYMANTRIDAE				
20. <i>Somena scintillaus</i> (Walker)	-	+	-	(S)
21. <i>Lymantria obsoleta</i> Walker	-	+	-	(S)
Family : ARCTIIDAE				
22. <i>Utetheisa pulchella</i> (Linn.)	-	+	-	(S)
Family : ERYCINIDAE				
23. <i>Abisara echerius suffuse</i> (Moore)	-	+	-	(S)
Family : LYCAENIDAE				
24. <i>Catochrysops strabo strabo</i> (Fabr.)	-	+	-	(S)
25. <i>Amblypodia amantes amantes</i> (Hewitson)	-	+	-	(S)
26. <i>Chaetoprocta odata</i> (Hewitson)	-	+	-	(S)
27. <i>Lampides boeticus</i> (Linn.)	-	+	-	(S)
28. <i>Narathura atrax</i> (Hewitson)	-	+	-	(S)



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
Family : PIERIDAE				
29. <i>Cepora nerissa phryne</i> (Fabr.)	-	+	-	(S)
30. <i>Eurema brigitta rubella</i> (Wallace)	-	+	-	(S)
31. <i>E. hecabe simulata</i> (Moore)	-	+	-	(S)
32. <i>E. laeta laeta</i> (Boisd.)	-	+	-	(S)
33. <i>Leptosia nina nina</i> (Fabr.)	-	+	-	(S)
34. <i>Catopsilia pyranthe pyranthe</i> (Linn.)	-	+	-	(S)
35. <i>Anaphaeis aurota aurota</i> (Fabr.)	-	+	-	(S)
Family : HESPERIIDAE				
36. <i>Suastus minuta aditia</i> Evans	+	-	+	(R)
37. <i>Audaspes folus</i> (Cramer)	-	+	-	(R)
Family : SATYRIDAE				
38. <i>Mycalesis mineus polydecta</i> (Cramer)	+	-	+	(R)
40. <i>Ypthima baldus</i> (Fabr.)	+	-	+	(R)
Family : SPHINGIDAE				
41. <i>Maruba spectabilis</i> (Butler)	+	-	+	(S)
Family : NOTODONTIDAE				
42. <i>Antheus servula</i> (Drwy)	+	-	+	(R)
Family : AGARISTIDAE				
43. <i>Aegocera bimacula</i> Walker	+	-	+	(R)
Family : NOCTUIDAE				
44. <i>Nyctipao macrops</i> (Linn.)	+	-	+	(R)
45. <i>Spodoptera mauritia</i> (Boisduval)	+	-	+	(R)
46. <i>Pandesma quenavadi</i> Guenee	+	-	+	(R)
47. <i>Prodenia litura</i> (Fabr.)	+	-	+	(R)
48. <i>Diachrysa orichalcea</i> (Fabr.)	+	-	+	(R)
49. <i>Agrotis spinifera</i> (Hubner)	+	-	+	(R)
50. <i>Parallelia joviana</i> Stoll	+	-	+	(R)
51. <i>Hypocala deflorata</i> Fabr.	+	-	+	(R)



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
Family : GEOMETRIDAE				
52. <i>Scopula remotata</i> (Guen.)	+	-	+	(R)
Family : PHINGIDAE				
53. <i>Pergesa elpenor rivularis</i> (Boisd.)	+	-	+	(R)
54. <i>Hippotion boerhaviae</i> (Fabr.)	+	-	+	(R)

Phylum : ARTHROPODA

Class : Acarina (TICKS &amp; MITES)

Order : CRYPTOSTIGMATA				
Family : EUPHTHIRACARIDAE				
1. <i>Rhysotritia ardu</i> (Koch)	+	-	+	(R)
Family : NOTHRIDAE				
2. <i>Nothrus gracilis</i> Hammer	+	-	+	(R)
Family : TECTOCEPHEIDAE				
3. <i>Tectocepheus velatus</i> (Michael)	+	-	+	(R)
Family : OTOCEPHEIDAE				
4. <i>Dolicheremaeus</i> sp.	+	-	+	(R)
Family : OPPIIDAE				
5. <i>Oppia yodai</i> Aoki	+	-	+	(R)
Family : CHAUNOPROCTIDAE				
6. <i>Chaunoproctus abalai</i> Bhaduri, Bhattacharya and Chakrabarti	+	-	+	(R)
Family : SCHELORIBATIDAE				
7. <i>Scheloribates albialatus</i> Hammer	+	-	+	(R)
8. <i>Scheloribates parvas</i> Pletzen	+	-	+	(R)
9. <i>Scheloribates natalensis</i> Pletzen	+	-	+	(R)
Family : XYLOBATIDAE				
10. <i>Xylobates</i> sp.	+	-	+	(R)
Family : ORIBATELLIDAE				
11. <i>Lamellobates palustris</i> Hammer	+	-	+	(R)
Family : GALUMNIDAE				
12. <i>Galumna crenata</i> Deb and Ray Chaudhuri	+	-	+	(R)



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
Order : MESOSTIGMATA Family : ASCIDAE				
1. <i>Asca</i> sp.	+	-	+	(R)
2. <i>Lasioseius</i> sp.	+	-	+	(R)
3. <i>Proctolaelaps</i> sp.	+	-	+	(R)
Family : LAELAPIDAE				
4. <i>Hypoaspis</i> sp.	+	-	+	(R)
Order : METASTIGMATA Family : IXODIDAE				
1. <i>Boophilus microplus</i> (Canestrini)	+	-	+	(S)
2. <i>Haemaphysalis bispinosa</i> Neumann	+	-	+	(S)
3. <i>Rhipiephalus haemaphysaloides</i> Supino	+	-	+	(S)

Class : ARACHNIDA  
Order : ARANEAE (Spiders)

Family : LYCOSIDAE				
1. <i>Lycosa kempi</i> Gravely	+	+	+	(S)
2. <i>L. birmanica</i> Thor.	+	+	+	(R)
3. <i>Perdosa</i> sp.	+	-	+	(R)
4. <i>Neoscona</i> sp.	+	-	+	(R)
Family : TETRAGNATHIDAE				
5. <i>Tetragnatha</i> sp.	+	-	+	(R)
Family : OXYOPIDAE				
6. <i>Oxyopes</i> sp.	+	-	+	(R)
Family : THOMISIDAE				
7. <i>Thomisus cherapunjeus</i> Tikader	+	-	+	(R)
8. <i>Thomisus</i> sp.	+	-	+	(R)
9. <i>Xysticus</i> sp.	+	-	+	(R)
10. <i>Tharpyma</i> sp.	+	-	+	(R)
Family : SALTICIDAE				
11. <i>Rhene</i> sp.	+	-	+	(R)



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
12. <i>Zygoballus</i> sp.	+	-	+	(R)
13. <i>Marpissa decorate</i> Tikader	+	-	+	(R)
14. <i>Marpissa</i> sp.	+	-	+	(R)
Family : GNAPHOSIDAE				
15. <i>Gnaphosa</i> sp.	+	-	+	(R)
Family : SPARASSIDAE				
16. <i>Spararsus</i> sp.	+	-	+	(R)
Family : THERIDIIDAE				
17. <i>Theridion</i> sp.	+	-	+	(R)
Family : HERSILIDAE				
18. <i>Hersilia</i> sp.	+	-	+	(R)
Family : ARGIOPIDAE				
19. <i>Cyclosa moonduensis</i> Tikader	+	-	+	(R)
20. <i>Leucauge decotiata</i> (Walckenaer)	+	-	+	(R)
Order : SCORPIONIDA (Scorpiones)				
Family : BUTHIDAE				
1. <i>Mesobuthus tamulus gangeticus</i> (Pocock)	+	-	+	(R)
Besides these, few specimens of Millipede, Centipede and Scutigera were collected but could not be identified due to lack of expertise.				
Subphylum : CRUSTACEA				
Order : DECAPODA				
Family : PALAEMONIDAE (Prawn)				
1. <i>Macrobrachium lamarrei</i> (H.M. Edwards)	+	-	+	(R)
2. <i>Macrobrachium dayanum</i> (Henderson)	+	-	+	(R)
3. <i>Macrobrachium choprai</i> (Tiwari)	+	-	+	(R)
4. <i>Macrobrachium assamensis assamensis</i> (Tiwari)	+	-	+	(R)
5. <i>Macrobrachium hendersoni platyrostris</i> (Tiwari)	+	-	+	(R)
Family : ATYIDAE				
6. <i>Caridina</i> sp.	+	-	+	(R)



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
Family : GECARCINUCIDAE				
7. <i>Barytelphusa cuniculari</i> (Westwood)	+	-	+	(R)
Order : ISOPODA				
Family : SPHAEROMATIDAE				
8. <i>Exosphaeroma parva</i> Chilton	+	-	+	(R)
Order : CTENOPODA				
Family : SIDIDAE				
9. <i>Latanopsis australis</i> (Sars)	+	-	+	(R)
10. <i>Diphanosoma excisum</i> Sars	+	-	+	(R)
Order : ANOMOPODA				
Family : DAPHNIDAE				
11. <i>Daphnia lumholtzi</i> Sars	+	-	+	(R)
12. <i>Ceriodaphnia cornuta</i> Sars	+	-	+	(R)
13. <i>Simocephalus vetulus</i> (O.F. Muller)	+	-	+	(R)
Family : MOINIDAE				
14. <i>Moina micrura</i> Kurz	+	-	+	(R)
Family : Bosminidae				
15. <i>Bosmina longirostris</i> (O. F. Muller)	+	-	+	(R)
16. <i>Bosmina deitersi</i> Richard	+	-	+	(R)
Family : Macrothricidae				
17. <i>Macrothrix triserialis</i> (Brady)	+	-	+	(R)
18. <i>Macrothrix spinosa</i> King	+	-	+	(R)
Family : Chydoridae				
19. <i>Chydorus ventricosus</i> Daday	+	-	+	(R)
20. <i>Chydorus reticulatus</i> Daday	+	-	+	(R)
21. <i>Chydorus sphaericus</i> (O. F. Muller)	+	-	+	(R)
22. <i>Picripleuroxus similes</i> Vavra	+	-	+	(R)
23. <i>Alona rectangular richardi</i> (Stingelin)	+	-	+	(R)
24. <i>Biapertura verrucosa</i> (Sars)	+	-	+	(R)
25. <i>Leydigia acanthocercoides</i> (Fischer)	+	-	+	(R)



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
Order : CALANOIDA				
Family : Diaptomidae				
26. <i>Neodiaptomus schmackeri</i> (Poppe and Richard)	+	-	+	(R)
27. <i>Diaptomus</i> sp.	+	-	+	(R)
Family : Cyclopidae				
28. <i>Mesocyclops hyalinus</i> (Rehberg)	+	-	+	(R)
29. <i>Mesocyclops leuckarti</i> (Claus)	+	-	+	(R)
30. <i>Nauplias</i> larvae	+	-	+	(R)
Order : PODOCOPIDA				
Family : CYPRIDIDAE				
31. <i>Stenocypris</i> sp.	+	-	+	(R)
Phylum : ROTIFERA				
1. <i>Branchionus calciflorus</i> (Pallas)	+	-	+	(R)
2. <i>B. falcatus</i> Koste and Shiel	+	-	+	(R)
3. <i>Branchionus</i> sp.	+	-	+	(R)
4. <i>Asplanchna</i> sp.	+	-	+	(R)
5. <i>Filinia</i> sp.	+	-	+	(R)
Phylum : COELENTERATA				
1. <i>Hydra vulgaris</i> Pallas	+	-	+	(R)

Phylum : MOLLUSCA

Class : GASTROPODA

Order : MESOGASTROPODA				
Family : VIVIPARIDAE				
1. <i>Bellamyia bengalensis f. typica</i> (Lamarck)	+	-	+	(R)
2. <i>B. bengalensis f. anandalei</i> (Kobelt)	+	-	+	(R)
3. <i>B. dissimilis</i> (Mueller)	+	-	+	(R)
Family : BITHYNIIDAE				
4. <i>Gabbia orcula</i> Frauenfeld	+	-	+	(R)
Family : THYRACIDAE				
5. <i>Tarebia lineata</i> (Gray)	+	-	+	(R)



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
6. <i>Melanoides tuberculata</i> (Mueller)	+	-	+	(R)
7. <i>Thiara (Thiara) scabra</i> (Mueller)	+	-	+	(R)

## Subclass : PULMONATA

Order : BASOMMATOPHORA Family : LYMNÆIDAE				
8. <i>Lymnaea (Pseudosuccinea) acuminata</i> Lamarck	+	-	+	(R)
9. <i>L. (P.) acuminata form typica</i> Lamarck	+	-	+	(R)
10. <i>L. (P.) acuminata form rufescens</i> Gray	+	-	+	(R)
11. <i>L. (P.) acuminata form chlamys</i> Benson	+	-	+	(R)
12. <i>L. (P.) acuminata form australis</i> Annandale & Rao	+	-	+	(R)
13. <i>L. (P.) acuminata form succinea</i> Deashayes	+	-	+	(R)
14. <i>L. (P.) luteola</i> Lamarck	+	-	+	(R)
Family : PLANORBIDAE				
15. <i>Gyraulus convexiusculus</i> (Hutton)	+	-	+	(R)
Family : BULLINIDAE				
16. <i>Indoplanorbis exustus</i> (Deshayes)	+	-	+	(R)
Order : STYLOMMATOPHORA Family : ACHATINIDAE				
17. <i>Achatina fulica fulica</i> (Bowdich)	+	-	+	(R)

## Class : BIVALVIA

Order : UNIONOIDA Family : AMBLOMIDAE				
18. <i>Parreysia (Radiatula) caerulea</i> (Lea)	+	-	+	(R)

Phylum : ANNELIDA  
Class : OLIGOCHAETA

Order : HAPLOTAXIDA Family : MEGASCOLECIDAE				
1. <i>Amyntas alexandri</i> (Beddard)	+	-	+	(R)



Name of the species	BLOCKS			Remarks
	I	II	III	
1	2	3	4	5
2. <i>Lampito mauritii</i> (Kingberg)	+	-	+	(R)
3. <i>Perionyx sansibaricus</i> (Perrier)	+	-	+	(S)The species is not common in Jharkhand

## Family : OCTOCHAETIDAE

4. <i>Eutyphoeus orientalis</i> (Beddard)	+	-	+	(R)
5. <i>Lennogaster pusillus</i> (Stephenson)	+	-	+	(R)
6. <i>Octochaetona beatrix</i> (Beddard)	+	-	+	(R)
7. <i>Pellogaster bengalensis</i> (Michaelsen)	+	-	+	(R)The specie is recorded for the first time from Jharkhand

## RESULTS AND DISCUSSION

During the present study, a total of 736 species of animals, including 312 species under 224 genera and 101 families of vertebrates and 424 species under 283 genera and 137 families of invertebrates have been inventorised from the study areas which include 35 localities. The species have been recorded from terrestrial and aquatic habitats and also from soil and litter. However, the current inventory may only be a fragment of the actual fauna that may be occurring in the area.

Any type of mining activity especially related to open cast mining, inevitably resulting in destructive change in surface ecology. During the course of this study wanton ecological destruction was noticed almost everywhere. Even though, a large assemblage of faunal elements was recorded. Special emphases were laid on such major animal groups like Mammals, Aves, Reptiles, Amphibians, Pisces, Molluscs, Annelids and Arthropods. Among vertebrates Aves constitute major part while among invertebrate, Insects are most dominant and omni-present and is represented by 10 orders, 90 families, 204 genera and 321 species. Following is the analysis of such major faunal assemblage which is likely to be affected by the enhanced mining operation in the study areas.

## MAMMALS

In all 62 species belonging to 48 genera, 24 families and 10 orders of mammals have been recorded from the study areas. Of these, 11 species are listed in Schedule I, 5 species in Schedule II, 6 species in Schedule III, 5 species in Schedule IV, and 8 species in Schedule V of Wildlife (Protection) Act, 1972 as amended in 1992. The list also includes 12 species which are included in the Appendix of CITES. None of the species is endemic for the area. Comparatively less number of mammalian species in the area may be attributed to mining activities and massive deforestation for years together.



### AVES

Altogether 158 species belonging to 119 genera and 47 families and 18 orders of birds have been observed and recorded from the areas surveyed. One species of these birds is listed in Schedule I, 150 species under Schedule IV while 2 species are in Schedule V of the IWL. Only one species of bird recorded during the study, the rose ringed Parakeet is included in the Appendix II of the CITES.

The birds recorded from the reclaimed sites are mainly aquatic forms and those are only aquatic ducks. Incidentally the other hitherto known abundant species like cranes and storks and rails were almost absent. The most common passerine winter invader in the area are supposed to be the Starlings viz., *Sturnus vulgaris* and *S. roseus* (Sternidae) and Buntings (Emberizidadae) were not encountered during the course of present study. The probable reason may be postulated to the scarcity of natural wetlands as most of such available habitats prevalent the study area are the water filled quarries which are usually very poor in ecological requisites for establishing the habitat of bird and or for other animals.

### REPTILES

Altogether 22 species of reptiles belonging to 18 genera, 9 families and 2 orders are recorded in the study areas. Two species of turtles *Melanochelys tricarinata* and *Lissemys punctata punctata* are included in the Schedule I of the Indian Wildlife (Protection) Act, 1972. The species *M. tricarinata* is also placed in the Appendix I of CITES. Beside these, the reptilian fauna in the area so far known includes some interesting species which need protection through management of their habitats.

### AMPHIBIANS

The amphibian species recorded from the area are represented by 11 species distributed over 6 genera, 4 families under 1 order. The species like *Duttaphrynus melanostictus*, *D. stomaticus*, *Hoplibatrachus tigrina* and *Sphaerotheca breviceps* are included in the Schedule IV of the Indian Wildlife (Protection) Act, 1972. These species need special care for their conservation. The mining activity plays adverse effects on the amphibian population through habitat destruction.

### PISCES

The fish population of the area is rich both in quantity and quality. The fishes so far known from the coalfield areas under the present study include 59 species belonging to 33 genera, 17 families and 6 orders. There are many fishes which are considered to be economically very important. Besides these, several species are reported here as very rare which need proper management for their survival and propagation. The water bodies are being polluted with effluents from the washeries resulting ill effect of fish population. The urgent need is proper management of the rivers, lakes and water bodies in the context of their pollution caused by the mining activities.

### INSECTS

Among the orders of insects reported here Odonata, Coleopteran, Lepidoptera, Hemiptera and Orthoptera are found to occur in all the study areas and their population is also found



to be rich in some localities. Though no endemic and schedule species of insects were encountered during the survey, the insect denizens are very likely to be affected due to modification of their habitats in future.

The other arthropods represented by zooplanktons and crabs in aquatic habitats are also quite rich in their population. The terrestrial arthropods like arachnids including mites, ticks, spiders, scorpions, millipedes and centipedes are very common in occurrence and are represented by a good number of taxa. These tiny arthropods are not in a state of danger presently. But in near future, the gradual loss of habitat may cause devastating effects on them.

#### MOLLUSCS

Altogether 19 species of molluscs are recorded here as common inhabitants of aquatic habitat. Only one land inhabiting species the giant African Snail is recorded. The population of mollusc is rich and it may be affected if the pollution of water bodies is not checked and properly managed.

#### ANNELIDS

The annelid fauna reported in the report is rich both in quality and quantity. But the increasing trend of soil pollution may cause harmful effect on the annelid and other soil inhabiting forms in general.

#### ACKNOWLEDGEMENTS

Authors gratefully acknowledge the encouragements and suggestions received from the Director, Zoological Survey of India. Thanks are also due to the scientists who have identified different groups of animals collected during the two surveys inspite of their busy schedule and also for their help by providing published informations which are incorporated in the publication.

The programme was financed by CMPDIL for which we duly acknowledge their help and cooperation throughout the study period. We would also like to extend our thanks to Sri Sasi Kumar CE (S), Sri S.K. Jha, Dy. CE and Sri B.M. Das, CE for their helps rendered to us during the surveys. Sincere thanks are also due to Mrs. Bela Sardar, Senior Stenographer, ZSI for typing the report.

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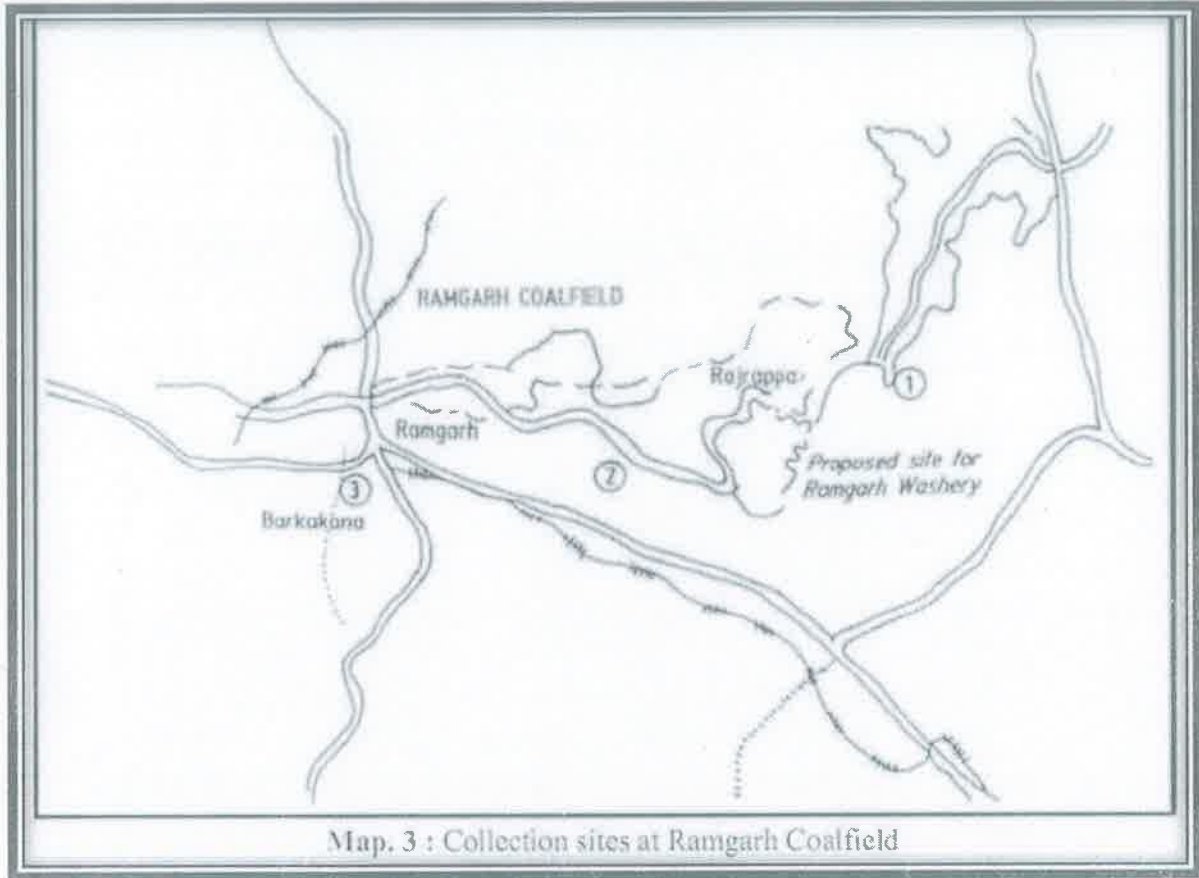


A handwritten signature in blue ink, consisting of stylized initials and a surname.

**Fish species as per report**

The study area was divided in three blocks

- Block – III (Ramgarh Coalfield areas: Map - 3)



FAUNAL RESOURCES OF THE RAMGARH COALFIELD

Class: PISCES

Sl no	Name of the species,	Remarks
1.	Subclass: TELEOSTOMI Order: OSTEOGLOSSIFORMES Family: NOTOPTERIDAE Notopterus notopterus Pallas	(S) Economically important
2.	Order: CYPRINIFORMES Family: CYPRINIDAE Amblypharyngodon mola (Hamilton)	(S) Economically important
3.	<b>Catla catla (Hamilton)</b>	<b>(S) Major carps, economically very important</b>
4.	Cirrhinus mrigala (Hamilton)	(S) Major carps, economically very important
5.	C. reba (Hamilton)	(S) Minor carp, economically



		important
6.	Labeo rohita (Hamilton)	(S) Major carp, economically very important
7.	L. boggut (Hamilton)	(S) Economically important
8.	L. calbasu (Hamilton)	(S) Major carp, economically very important
9.	P. conchoniis (Hamilton)	(S) Economically less important
10.	P. sophare (Hamilton)	(S) Economically important
11.	P. ticto (Hamilton)	(S) Economically important
12.	Salmophasia bacaila (Hamilton)	(S) Economically less important
13.	Tor tor (Hamilton)	(S) Economically less important
14.	Family: NEMACHEILIDAE Acanthocobitis botia (Hamilton)	(S) Small hill stream fishes usually found in rapid running water.
15.	Order: SILURIFORMES Family: BAGRIDAE Spesata aor (Hamilton)	(S) Economically important
16.	Mystus cavasius (Hamilton)	(R) Economically Important
17.	Family: CLARIIDAE 43. Clarias magur (Hamilton)	(S) Economically very important. These are highly esteemed for Their nourishing properties.
18.	Order: CHANNIFORMES Family: CHANNIDAE Channa marulius (Hamilton)	(S) Economically important
19.	C. striatus (Bloch)	(S) Economically important
20.	Family: GOBIIDAE Glossogobius giuris (Hamilton)	(S) Economically important
21.	Family: ANABANTIDAE Anabas testudineus (Bloch)	(S) Economically important, hardy & highly esteemed for its restorative value & prolonged freshness.
22.	Order: MASTACEMBELIFORMES Family: MASTACEMBELIDAE Mastacembelus armatus (Lacepede)	(S) Economically important
23.	Macrognathus panchalus (Hamilton)	(S) Economically less important

## Conclusion

The fish population of the area is rich both in quantity and quality. The fishes so far known from the coalfield areas under the present study include 49 species belonging to 23 general, 13 families and 5 orders. There are many fishes which are considered to be economically very important. Besides these, several species are reported here as very rare which need proper management for their survival and propagation. The water bodies are being polluted with effluents from the washeries resulting ill effect of fish population. The urgent need is proper management of the rivers, lakes and water bodies in the context of their pollution caused by the mining activities.



झारखण्ड सरकार  
खान एवं भूतत्व विभाग  
जिला भूतात्विक कार्यालय, हजारीबाग।  
E-mail - [astdirgeo-hzb@jharkhandmail.gov.in](mailto:astdirgeo-hzb@jharkhandmail.gov.in)

पत्रांक :- जि0भू0का0- 23 हजारीबाग, दिनांक- 02-02-2023

प्रेषक :- सहायक निदेशक, भूतत्व  
जिला भूतात्विक कार्यालय,  
हजारीबाग।

सेवा में, जिला मत्स्य पदाधिकारी  
रामगढ़।

विषय :- रामगढ़ जिला अन्तर्गत नदियों में पाये जाने वाले जलीय जीवों से संबंधित सूचनाओं को उपलब्ध कराने के संबंध में।

प्रसंग :- भूतत्व निदेशालय का पत्रांक-77 दिनांक-31/01/2023

महाशय,  
उपर्युक्त विषयक एवं प्रसंगाधीन पत्र के संबंध में निर्देशानुसार कहना है कि रामगढ़ जिलान्तर्गत बालू खनिज के लिये District Survey Report (DSR) तैयार करने के क्रम में नदियों में पाये जाने वाले जलीय जीवों से संबंधित सूचनाओं की आवश्यकता है।

अतः अनुरोध है कि रामगढ़ जिला में पाये जाने वाले नदियों में जलीय जीवों से संबंधित विस्तृत सूचनाएं उपलब्ध कराने की कृपा की जाय।



विश्वासभाजन

*[Handwritten Signature]*  
02/02/2023

सहायक निदेशक, भूतत्व  
जिला भूतात्विक कार्यालय,  
हजारीबाग।

02/02/2023

*[Handwritten Signature]*

**Annexure K**  
**(Pre-Monsoon Data from DMO)**



SL NO	RIVER NAME	Latitude	Longitude	VILLAGE	Sq m	RL
1		23°49'31.47"	85°29'30.77"	TAPIN	1348.28	367
		23°49'31.68"	85°29'30.99"			
		23°49'28.60"	85°29'30.97"			
		23°49'28.89"	85°29'31.44"			
2		23°47'55.08"	85°31'42.61"	PUNDI	757.701	349
		23°47'55.12"	85°31'42.87"			
		23°47'53.48"	85°31'45.43"			
		23°47'53.67"	85°31'45.39"			
3		23°47'53.84"	85°31'45.92"	PUNDI	1850.09	348
		23°47'54.11"	85°31'45.96"			
		23°47'53.08"	85°31'49.10"			
		23°47'53.49"	85°31'49.29"			
4		23°47'52.76"	85°31'48.86"	PUNDI	2390.22	348
		23°47'53.05"	85°31'49.37"			
		23°47'52.30"	85°31'53.62"			
		23°47'52.36"	85°31'53.50"			
		23°47'52.28"	85°31'53.87"			
		23°47'52.27"	85°31'54.00"			
		23°47'50.82"	85°31'57.14"			
		23°47'50.92"	85°31'57.13"			





9	23°47'8.39"	85°32'15.81"	PUNDI	1417.81	338
	23°47'6.32"	85°32'16.44"			
	23°47'6.15"	85°32'16.85"			
10	23°47'1.01"	85°32'17.47"	PUNDI	610.551	336
	23°47'0.97"	85°32'17.84"			
	23°46'59.84"	85°32'18.07"			
	23°46'59.59"	85°32'18.60"			
	23°46'59.76"	85°32'18.60"			
11	23°46'54.12"	85°32'34.63"	DUNI	3963.6	335
	23°46'53.74"	85°32'34.86"			
	23°46'57.91"	85°32'41.92"			
	23°46'57.71"	85°32'41.95"			
	23°46'53.86"	85°32'35.25"			
12	23°46'53.80"	85°32'35.38"	DUNI	1970.26	332
	23°46'56.72"	85°32'40.30"			
	23°46'56.33"	85°32'40.45"			
	23°45'54.12"	85°32'32.08"			
13	23°45'52.99"	85°32'31.98"	DUNI	1777.42	320
	23°45'52.45"	85°32'34.96"			
	23°45'52.88"	85°32'35.62"			



14	23°46'5.02"	85°33'34.39"	SARUBERA	2046.98	314
	23°46'4.15"	85°33'34.31"			
	23°46'3.52"	85°33'34.83"			
	23°46'3.99"	85°33'37.53"			
15	23°46'7.11"	85°33'41.37"	SARUBERA	2888.75	312
	23°46'7.91"	85°33'41.13"			
	23°46'8.05"	85°33'48.66"			
	23°46'7.88"	85°33'48.77"			
16	23°45'55.52"	85°34'36.23"	LAIYO	7457.88	299
	23°45'54.13"	85°34'37.60"			
	23°45'58.69"	85°34'43.36"			
	23°45'58.59"	85°34'42.84"			

SL NO	RIVER NAME	Latitude	Longitude	VILLAGE	Sq m	RL
		23°41'7.66"	85°13'58.03"	TOKISUD	65094.6	350
		23°41'10.19"	85°14'1.86"			
		23°41'16.88"	85°14'5.89"			
		23°41'9.23"	85°13'58.31"			
		23°41'20.76"	85°14'9.88"			



23°41'36.59"	85°14'9.56"				
23°41'43.11"	85°14'6.02"				
23°41'38.01"	85°14'5.23"				
23°41'15.78"	85°14'7.18"				
23°41'19.05"	85°14'10.42"				
23°41'18.33"	85°14'7.96"				
23°41'16.33"	85°14'9.22"				
23°41'45.46"	85°14'8.58"				
23°41'47.69"	85°14'7.57"				
23°41'58.27"	85°14'17.90"				
23°41'57.16"	85°14'18.89"				
23°42'16.77"	85°14'27.60"				
23°42'19.62"	85°14'26.53"				
23°42'27.45"	85°14'28.34"				

2					
3					
4					

TOKISUD 7778.8 350

TOKISUD 21654 348

TOKISUD 14979.3 337



23°42'27.25"	85°14'27.54"			
23°42'39.89"	85°14'35.88"			
23°42'41.79"	85°14'39.44"			
23°42'37.28"	85°14'50.98"			
23°42'37.99"	85°14'50.98"			
23°42'36.10"	85°14'52.77"			
23°42'35.98"	85°14'53.82"			
23°42'20.19"	85°15'6.92"			
23°42'18.76"	85°15'9.37"			
23°42'19.34"	85°15'9.40"			
23°42'3.32"	85°15'24.23"			
23°42'2.68"	85°15'25.74"			
23°41'53.61"	85°15'34.04"			
23°41'55.09"	85°15'33.98"			

DAMODAR RIVER

5				
6				
7				



345

21254.7

TOKISUD

345

31529.2

TOKISUD

343

16925.2

TOKISUD

8	23°41'29.56"	85°19'15.14"	SAYAL	3878.37	338
	23°41'32.83"	85°19'18.68"			
	23°41'32.09"	85°19'20.47"			
	23°41'30.70"	85°19'17.37"			
9	23°41'49.42"	85°20'10.53"	SAYAL	10552.9	334
	23°41'48.89"	85°20'11.26"			
	23°41'43.45"	85°20'9.10"			
	23°41'40.73"	85°20'10.81"			
10	23°39'46.87"	85°23'44.99"	CHORDHARA	5865.66	327
	23°39'47.74"	85°23'46.07"			
	23°39'43.18"	85°23'52.85"			
	23°39'44.53"	85°23'52.79"			
11	23°39'5.26"	85°24'26.04"	CHORDHARA	1521.64	315
	23°39'5.08"	85°24'28.82"			
	23°39'5.29"	85°24'29.60"			



12		23°39'5.85"	85°24'30.10"	SARAIYA	22619.2	293			
		23°37'53.36"	85°36'15.62"						
		23°37'54.53"	85°36'16.76"						
		23°37'56.60"	85°36'33.63"						
		23°37'57.02"	85°36'34.32"						
13		23°39'48.10"	85°45'17.81"	GANDHAUNIA	134868	263			
		23°39'57.74"	85°45'16.12"						
		23°40'37.35"	85°45'27.44"						
		23°40'38.17"	85°45'29.17"						



  
 जिला स्वयंसेवा विभागाधिकारी  
 रामगढ़

**Annexure L**  
**(Point no. 9.3 of the EMGSM guidelines, 2020)**





जिला खनन कार्यालय, रामगढ़

Letter no -

Camp-1

dt - 21.03.2023

**Undertaking**

**For Point no. 9.3 of the EMGSM guidelines, 2020** regarding monitoring of mining near inter-district or inter-state boundary should be addressed in the final DSR, if applicable.

With reference to the CO report, Mandu, Gola, Ramgarh, Patratu and Chitarpur (attached as annexure f), it is verified that none of the identified ghats in the district Ramgarh is crossing any inter-district or inter-state boundary.

  
District Mining officer  
Ramgarh

  
Assistant Director Geology  
District Geological office, Hazaribagh



**Plate (A1-A13)**  
**(Plate showing sandbars in pre-  
monsoon)**



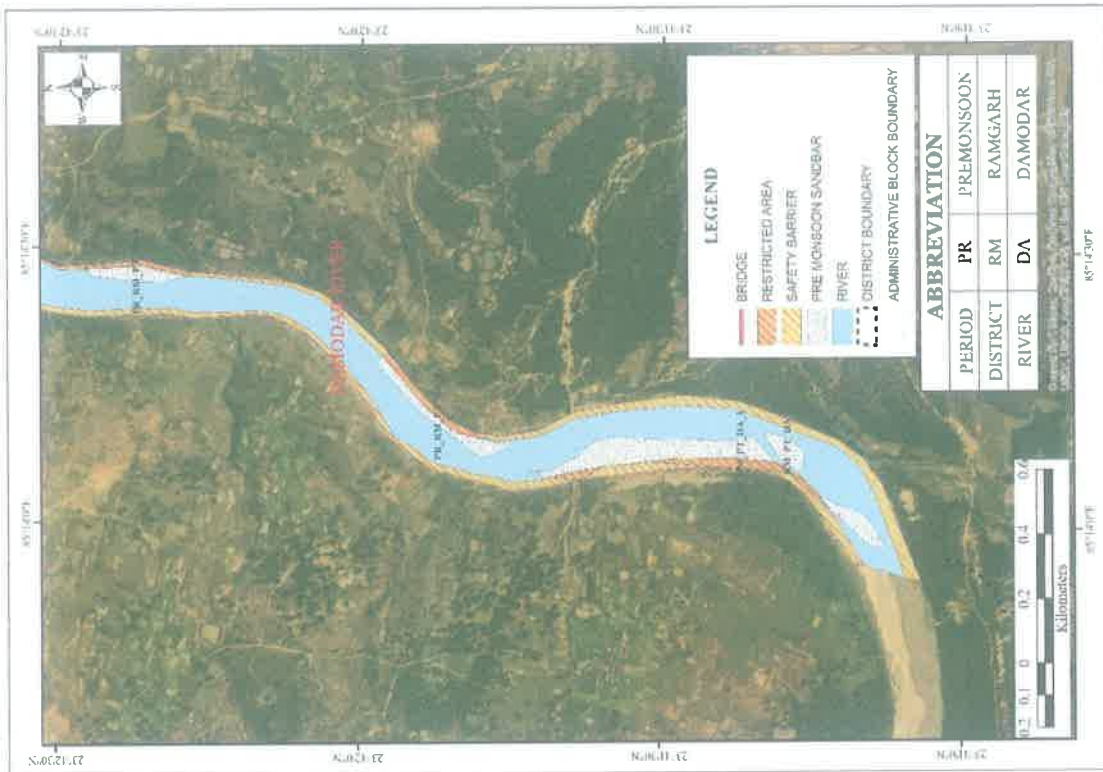


Plate No. A1: Plate showing sandbars in pre-monsoon



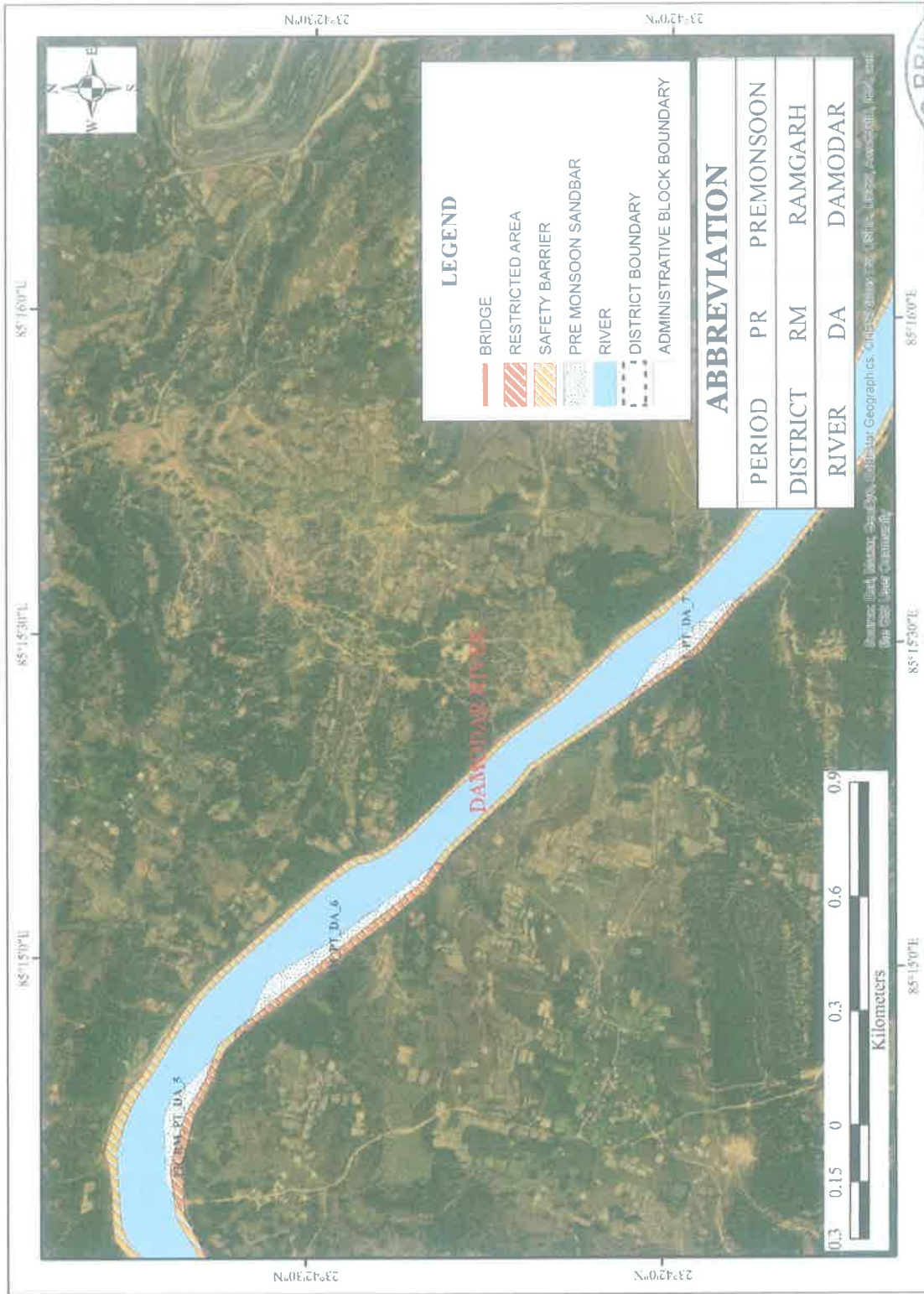


Plate No. A2: Plate showing sandbars in pre-monsoon



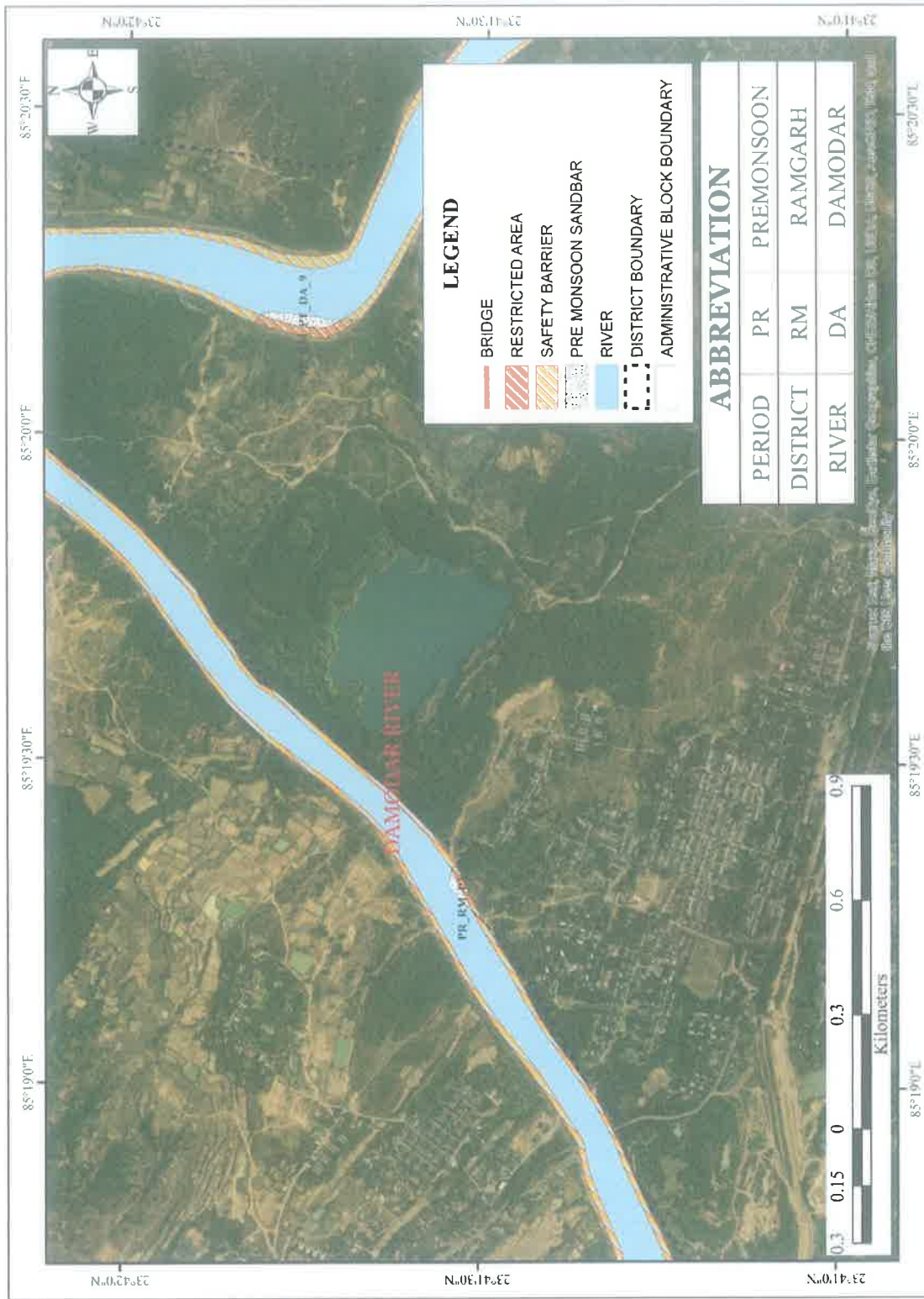


Plate No. A3: Plate showing sandbars in pre-monsoon

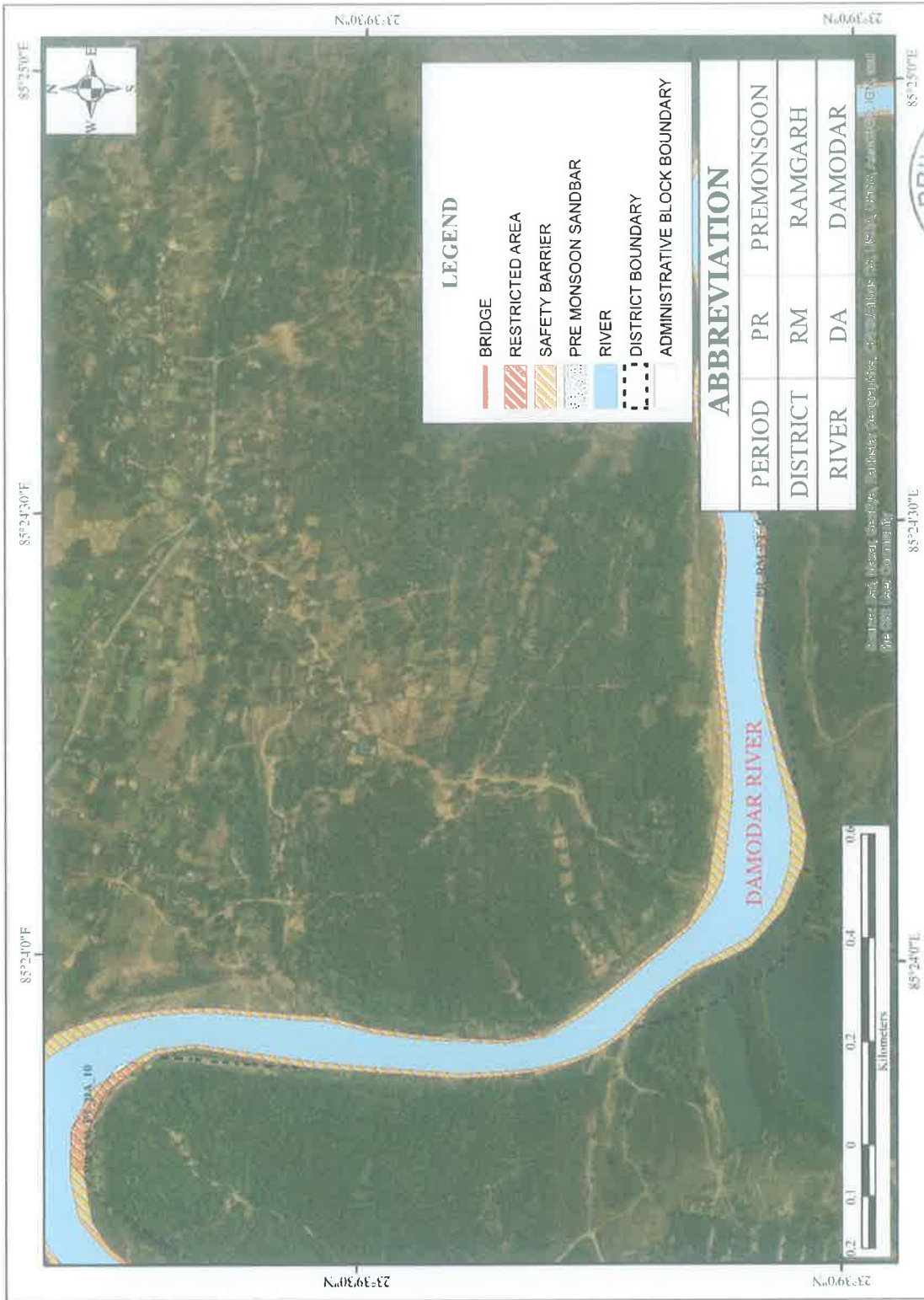


Plate No. A4: Plate showing sandbars in pre-monsoon



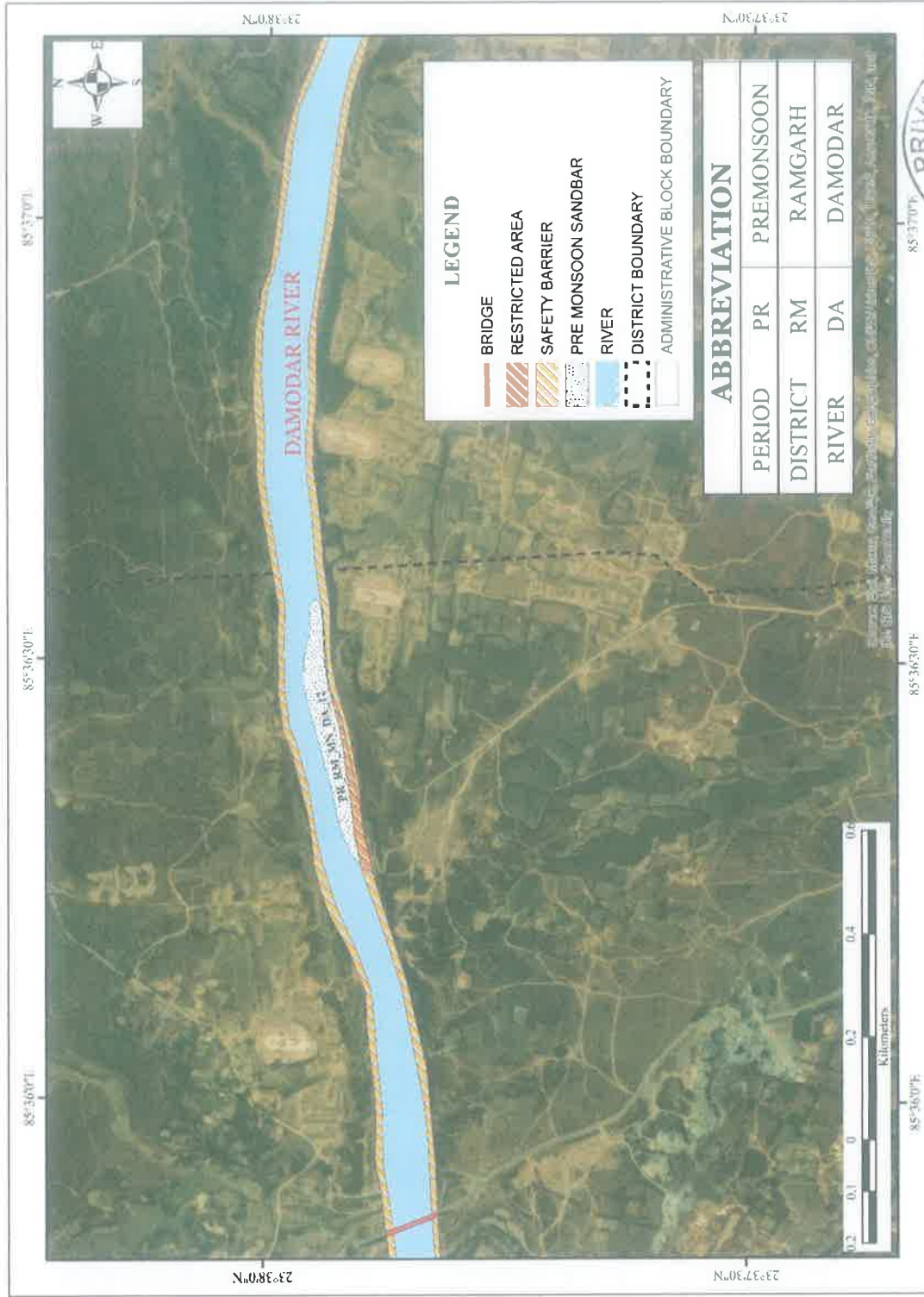


Plate No. A5: Plate showing sandbars in pre-monsoon



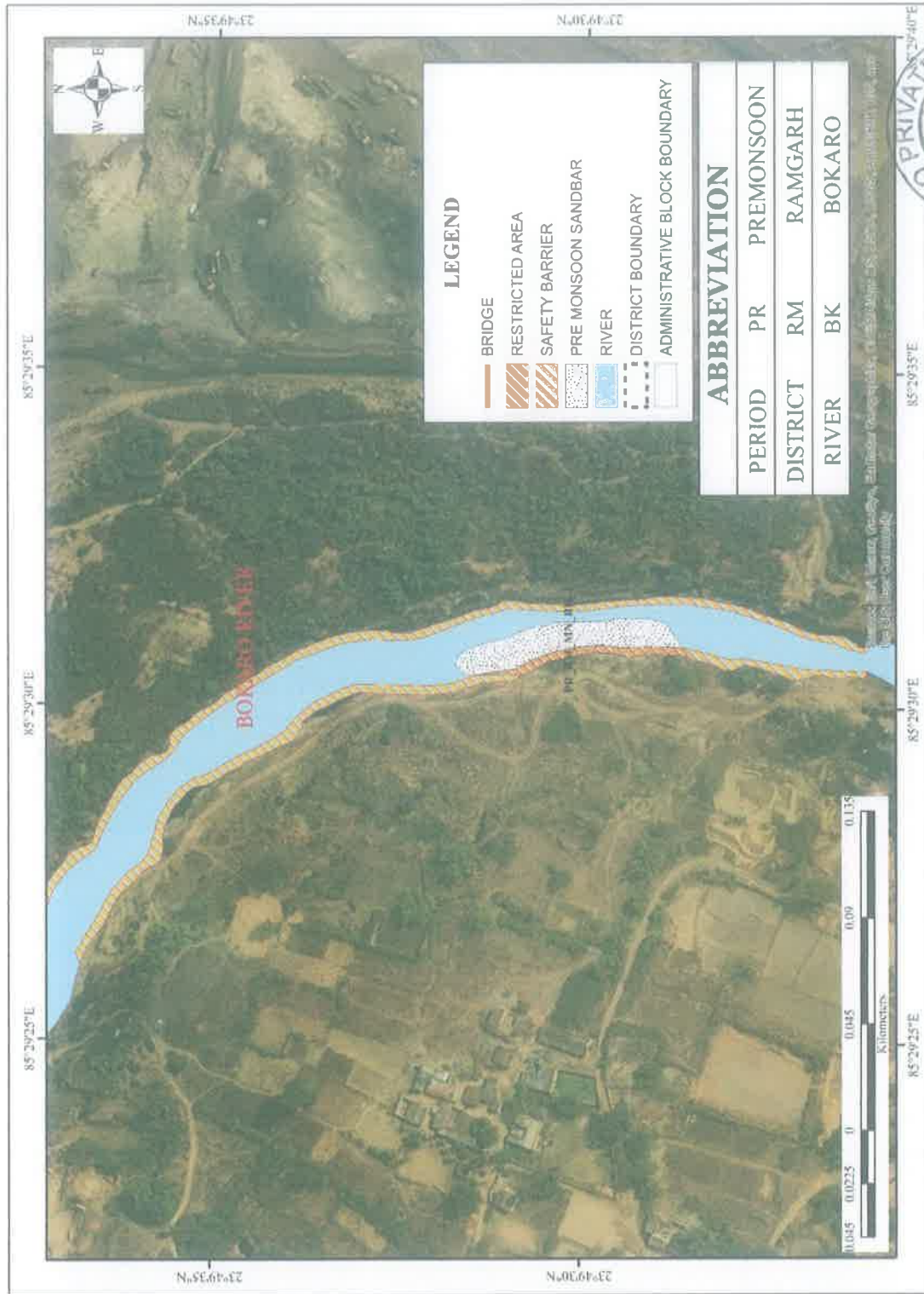


Plate No. A6: Plate showing sandbars in pre-monsoon

  
  
 Page 6

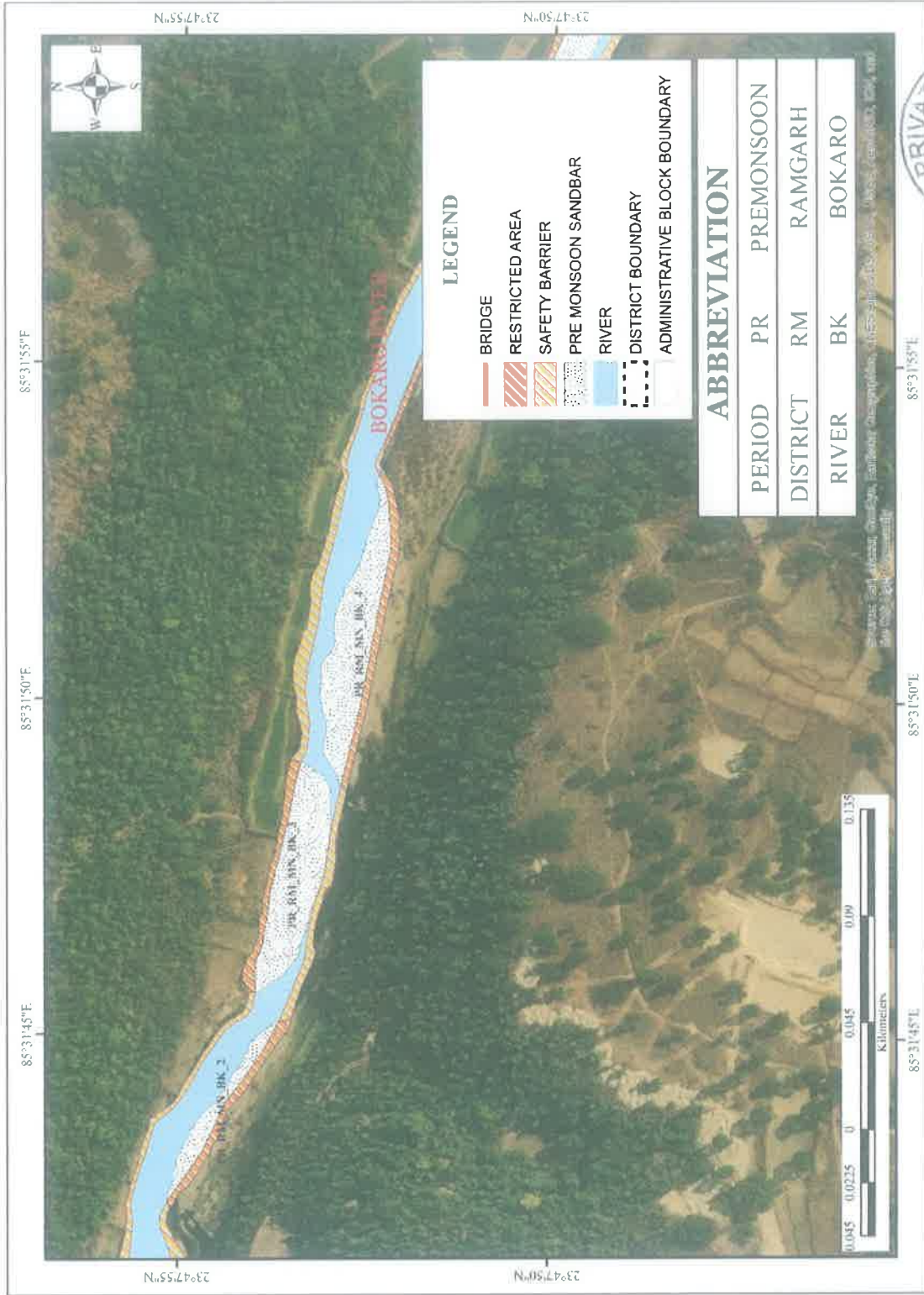


Plate No. A7: Plate showing sandbars in pre-monsoon



Plate No. A8: Plate showing sandbars in pre-monsoon



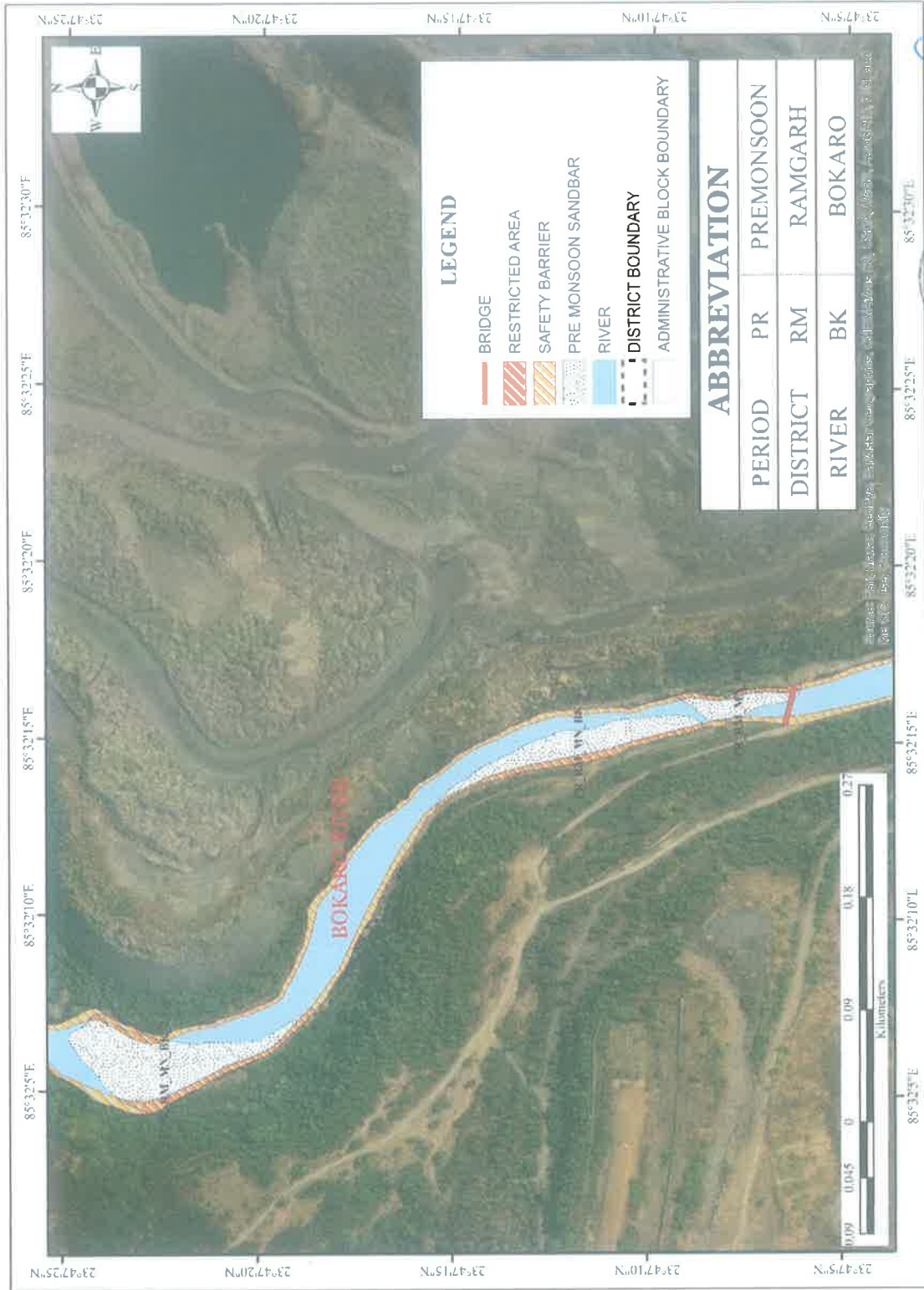


Plate No. A9: Plate showing sandbars in pre-monsoon



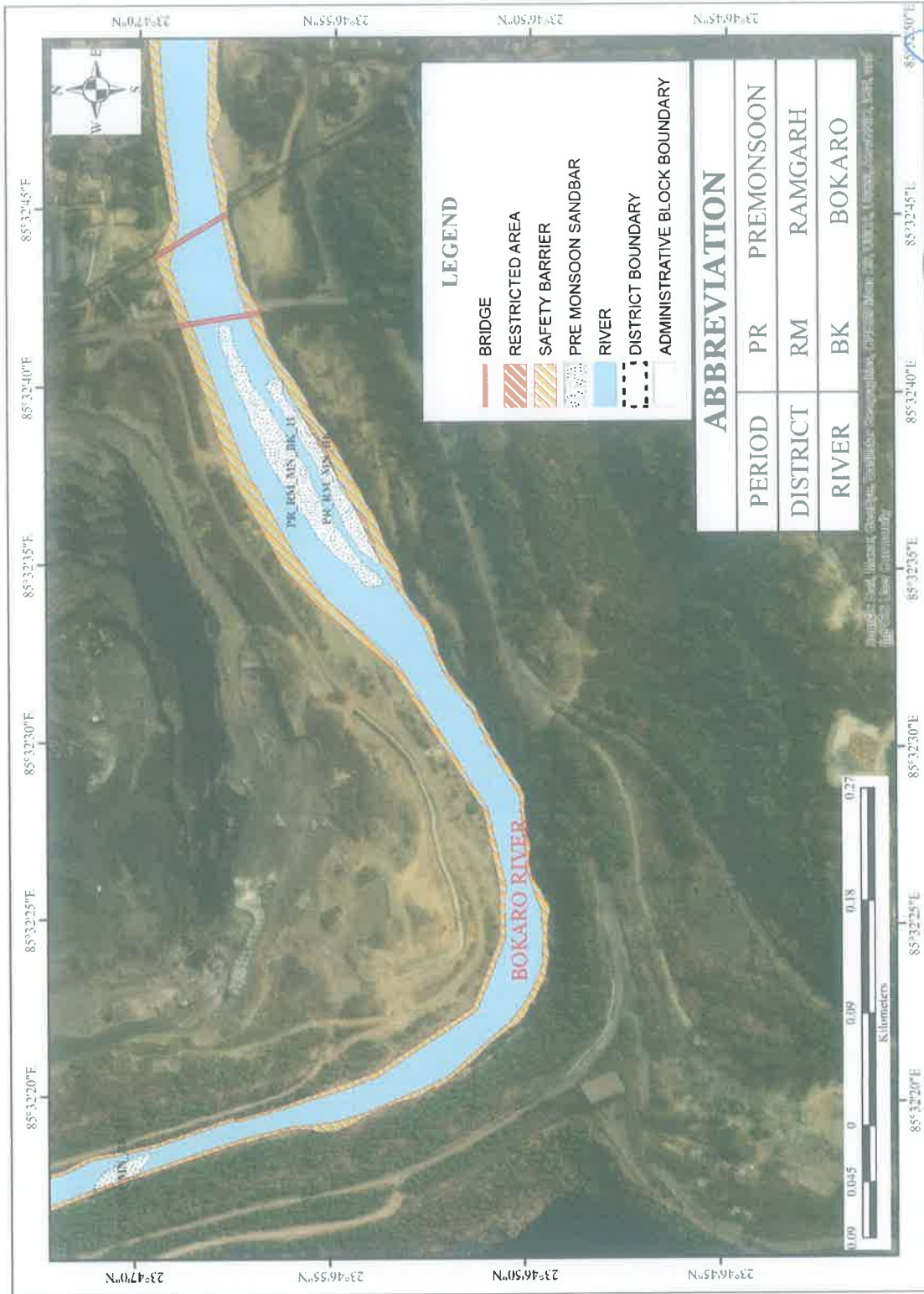


Plate No. A10: Plate showing sandbars in pre-monsoon.



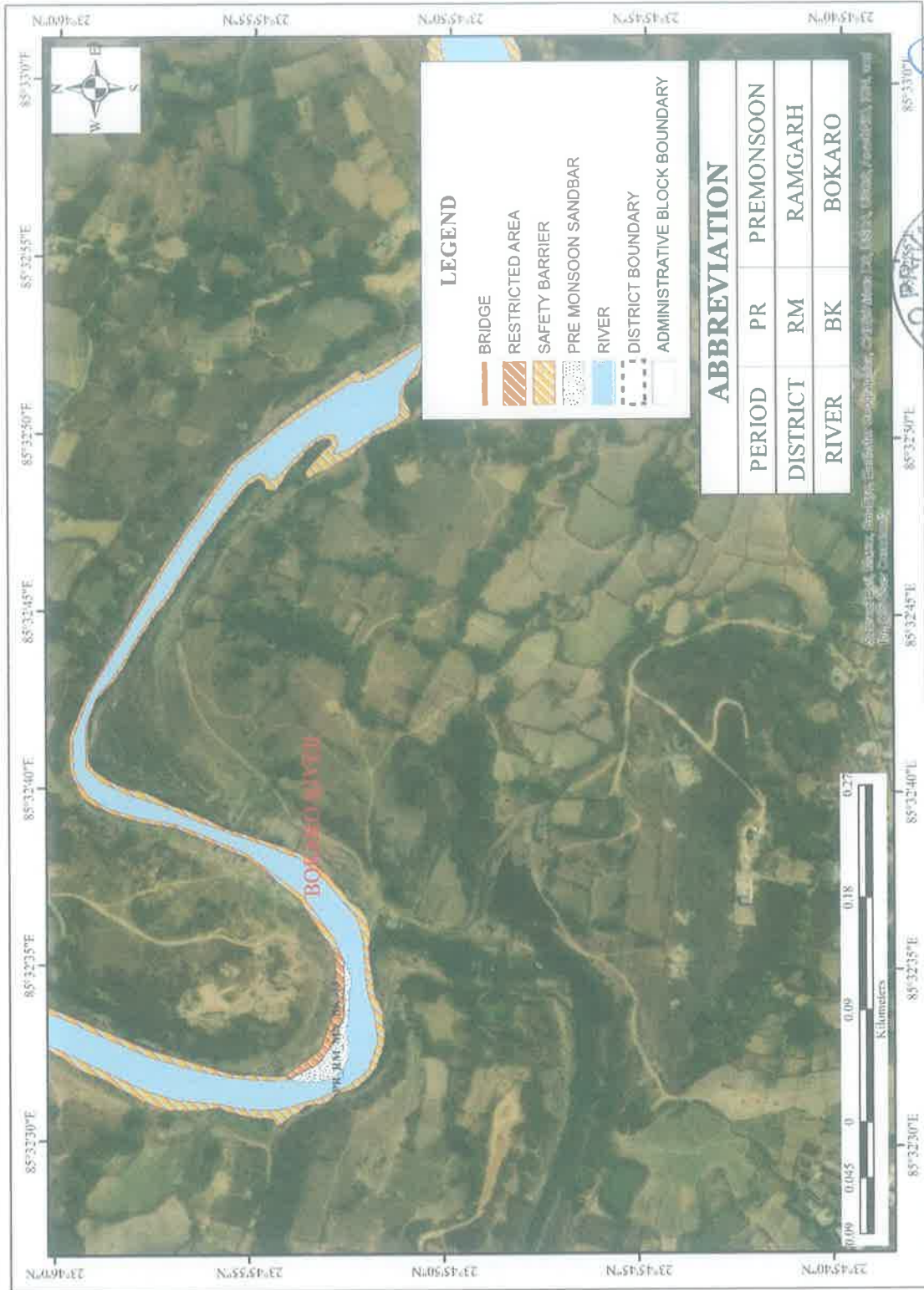


Plate No. A11: Plate showing sandbars in pre-monsoon



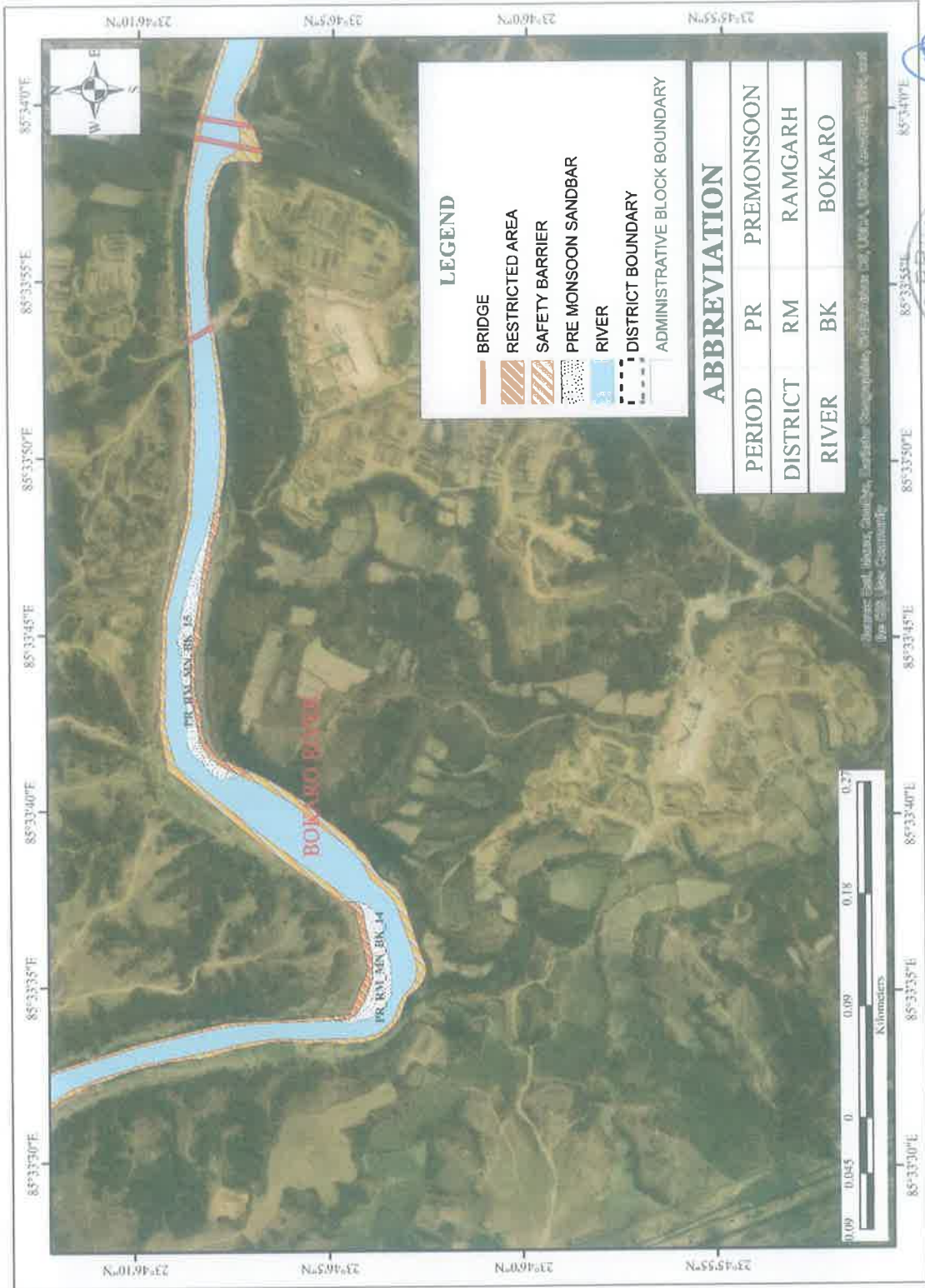


Plate No. A12: Plate showing sandbars in pre-monsoon



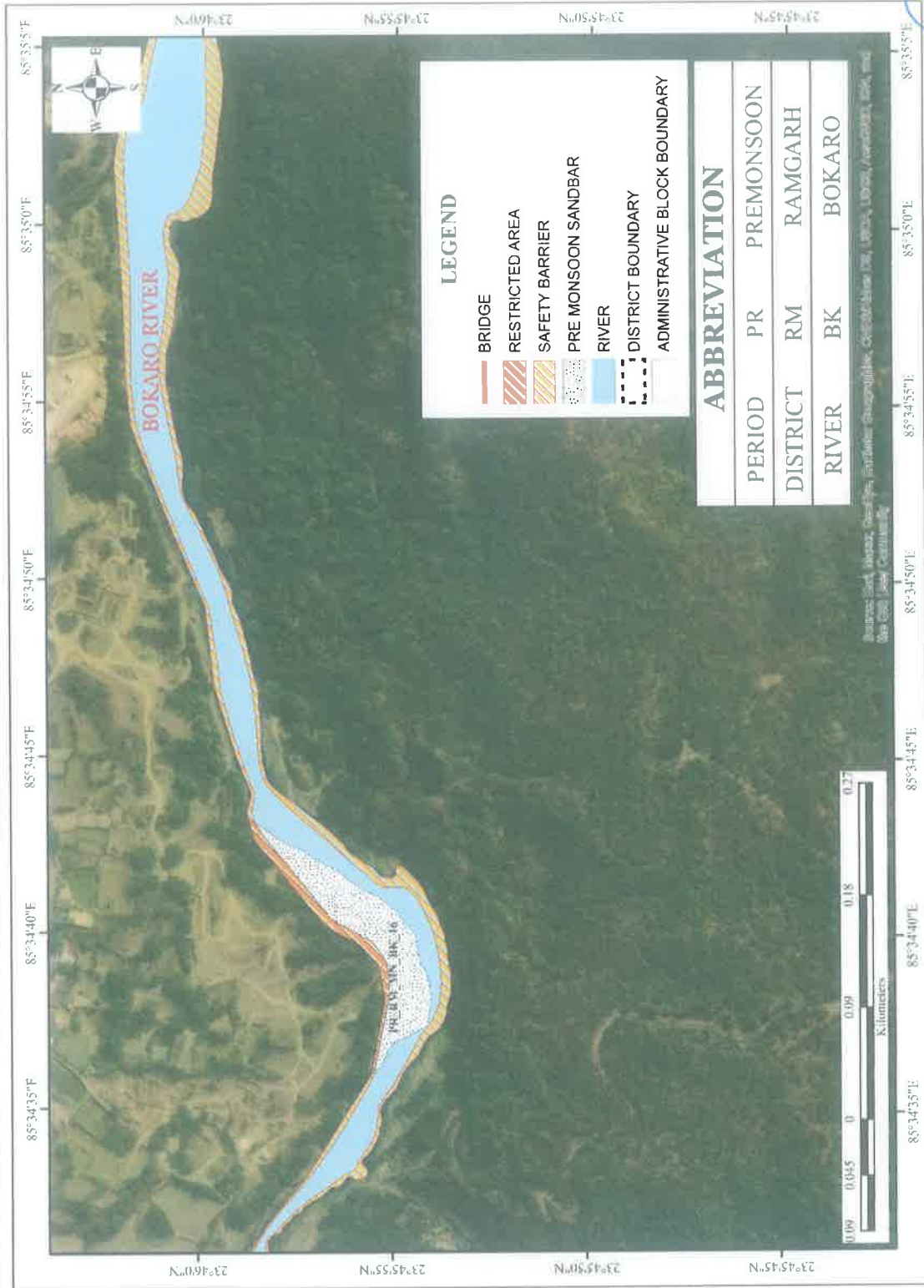


Plate No. A13: Plate showing sandbars in pre-monsoon



**Plate (B1-B22)**  
**(Plate showing potential Zone in post-  
monsoon)**



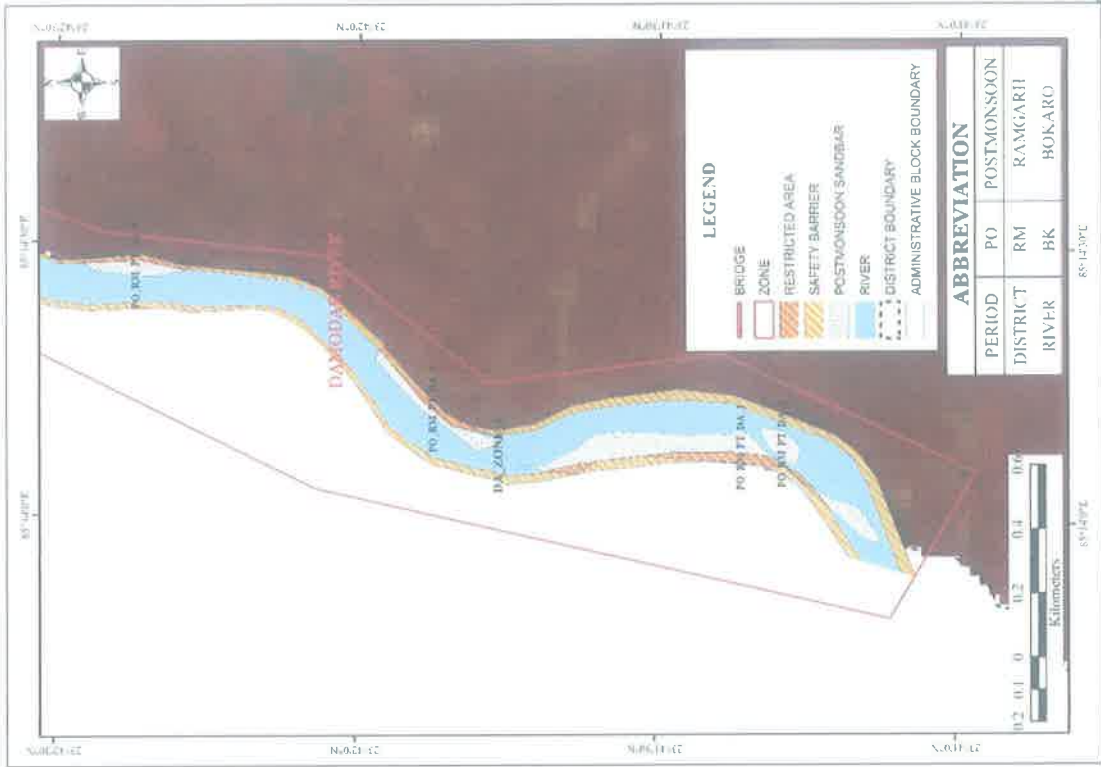


Plate No. B1: Plate showing potential Zone in post-monsoon



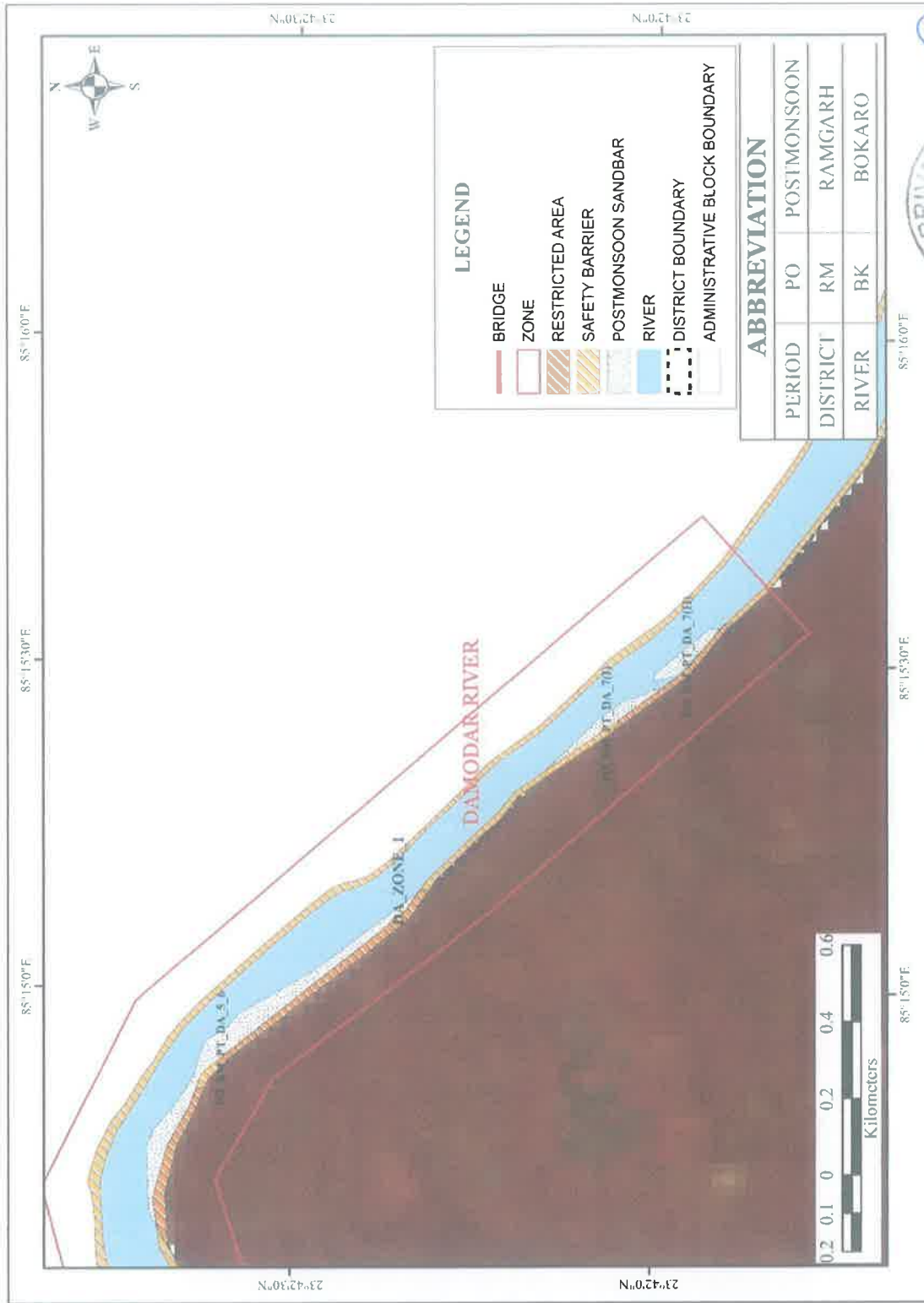


Plate No. B2: Plate showing potential Zone in post-monsoon



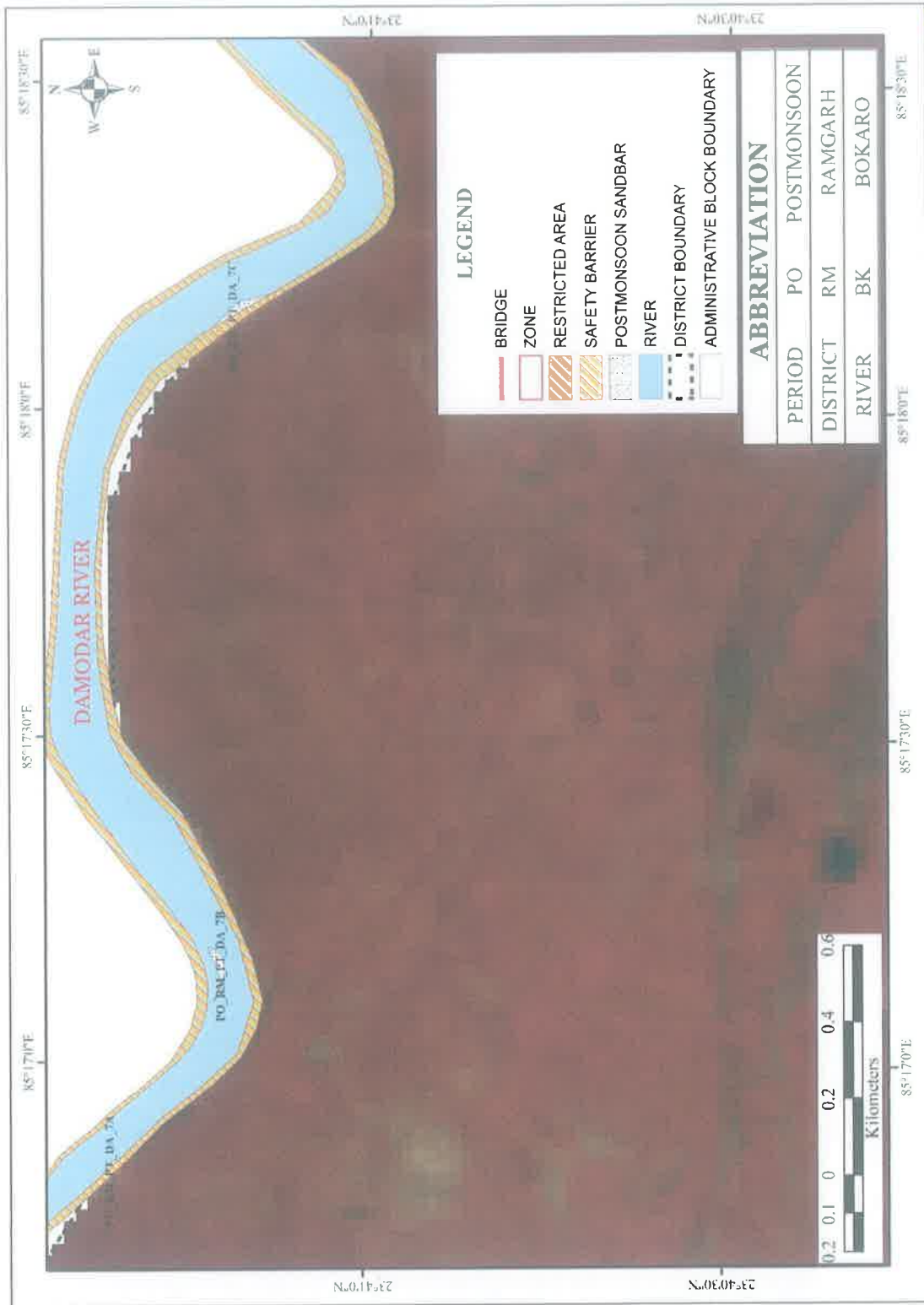


Plate No. B3: Plate showing potential Zone in post-monsoon



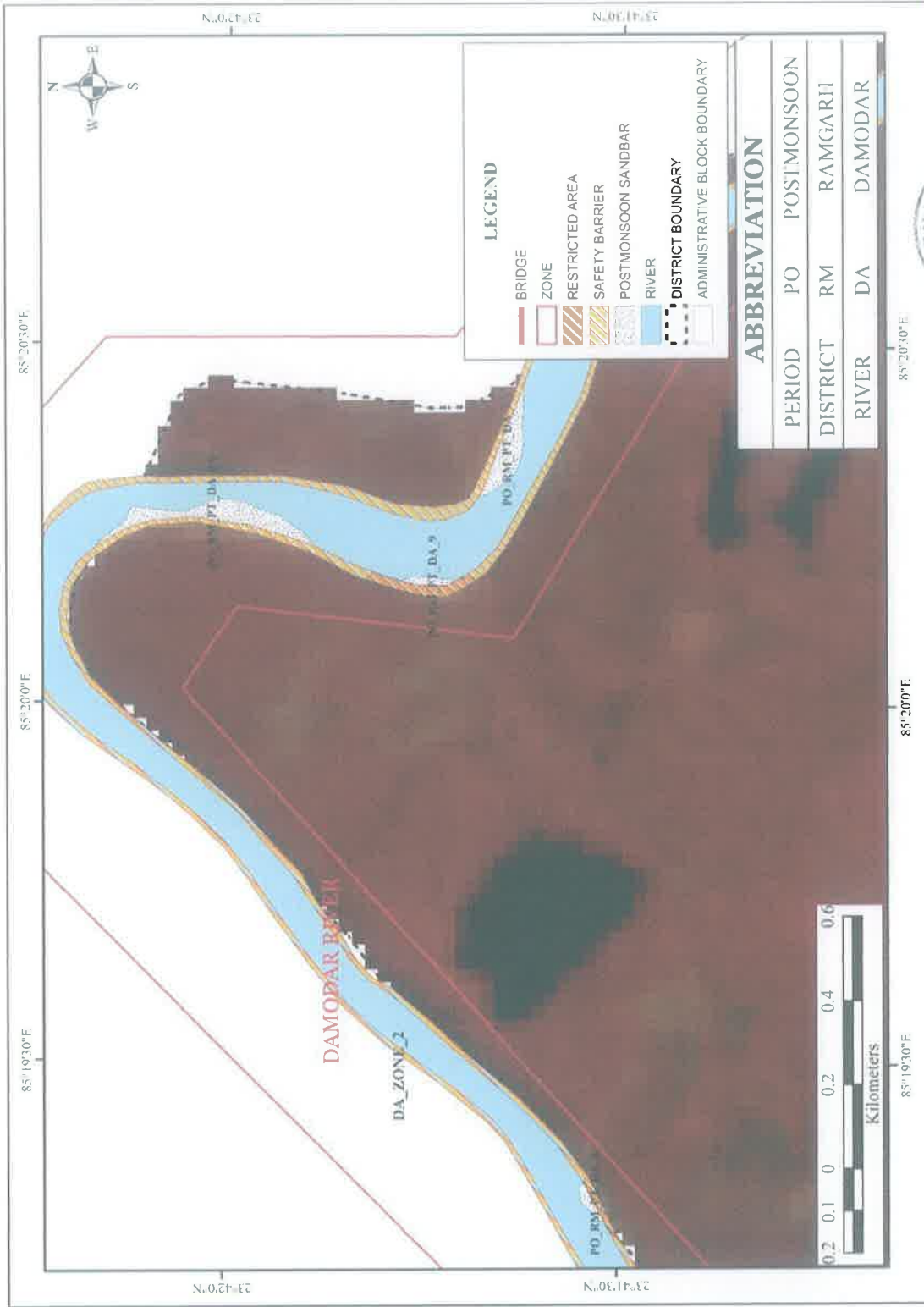


Plate No. B4: Plate showing potential Zone in post-monsoon

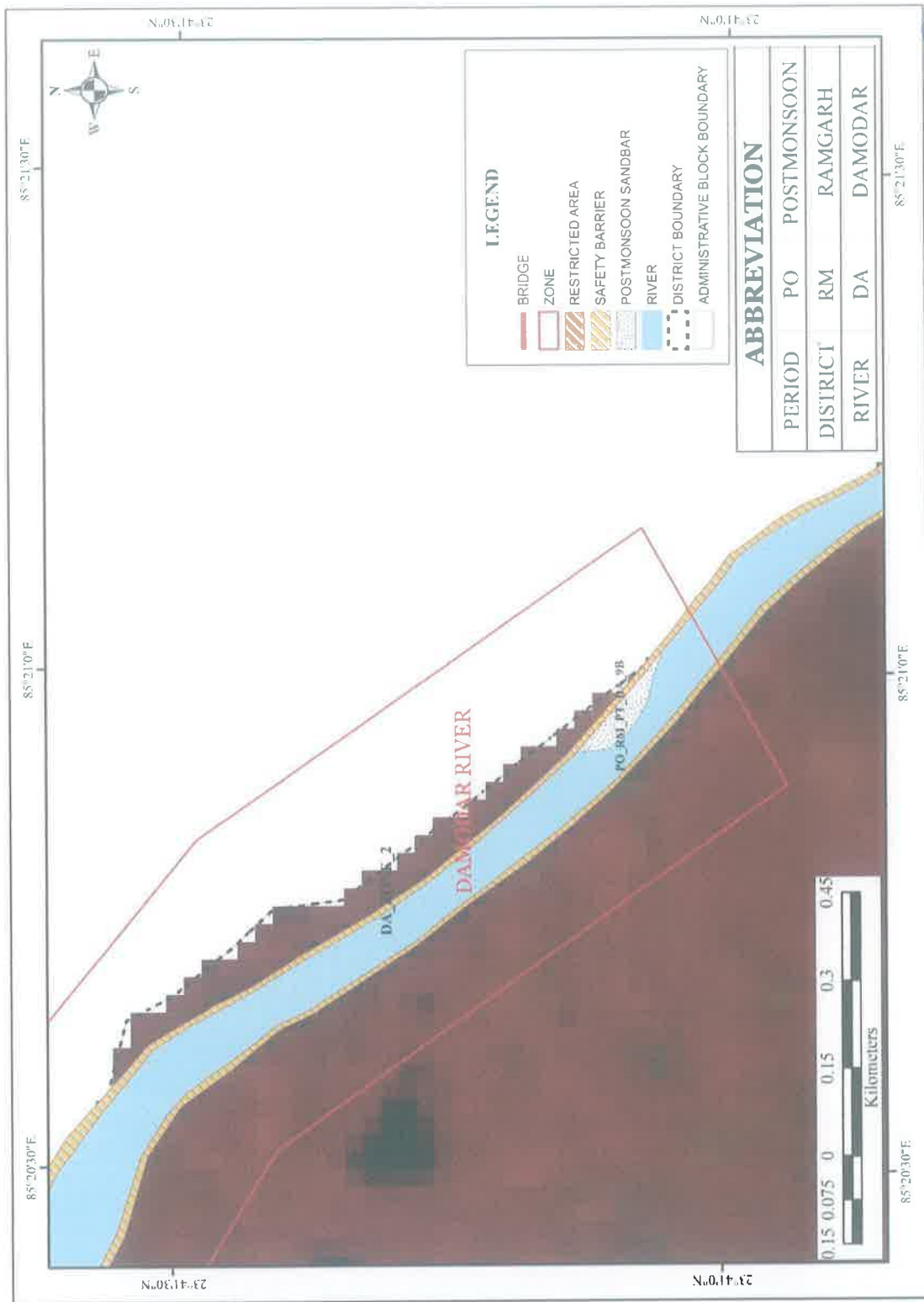


Plate No. B5: Plate showing potential Zone in post-monsoon

*Amit Acharjya*



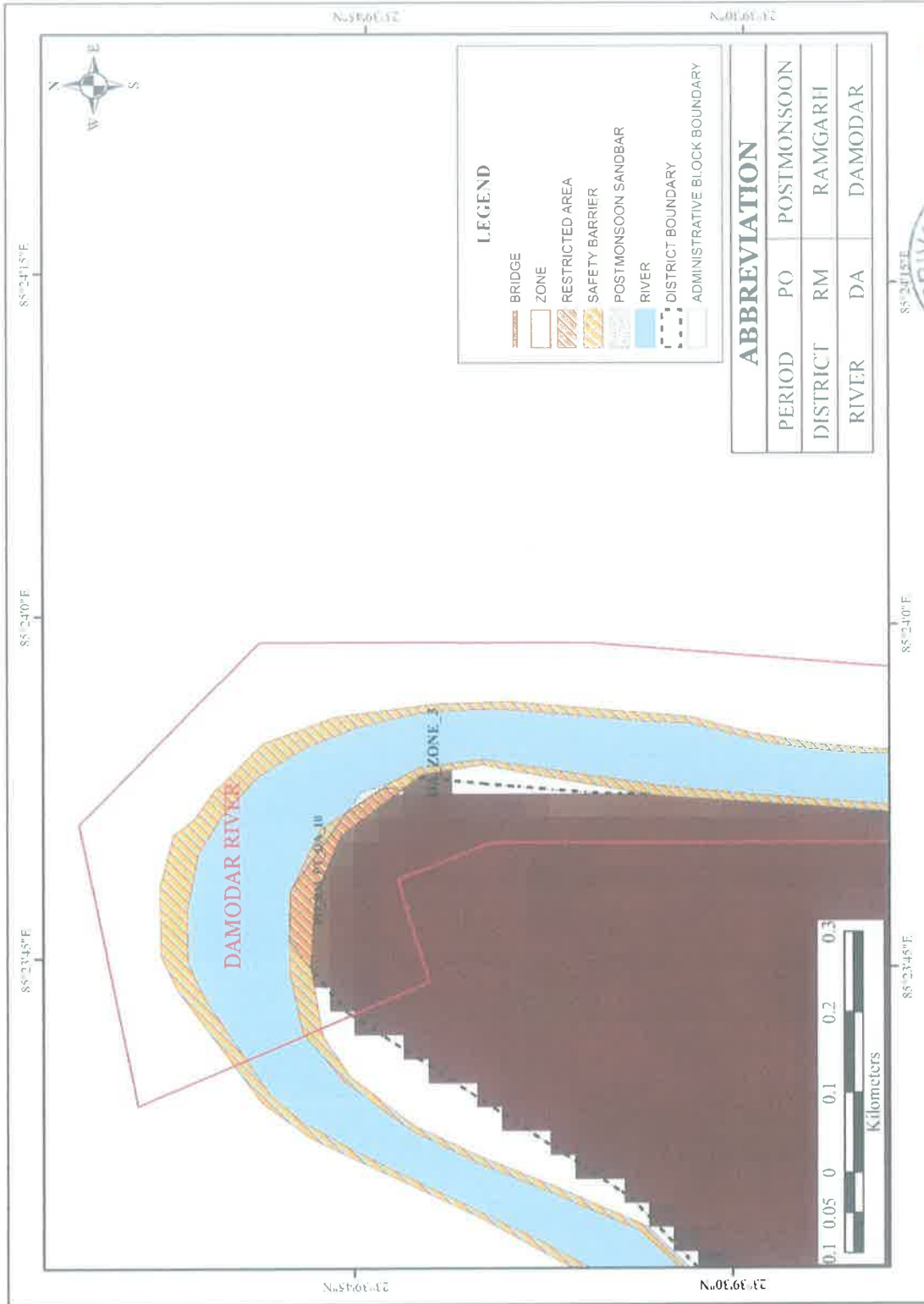


Plate No. B6: Plate showing potential Zone in post-monsoon



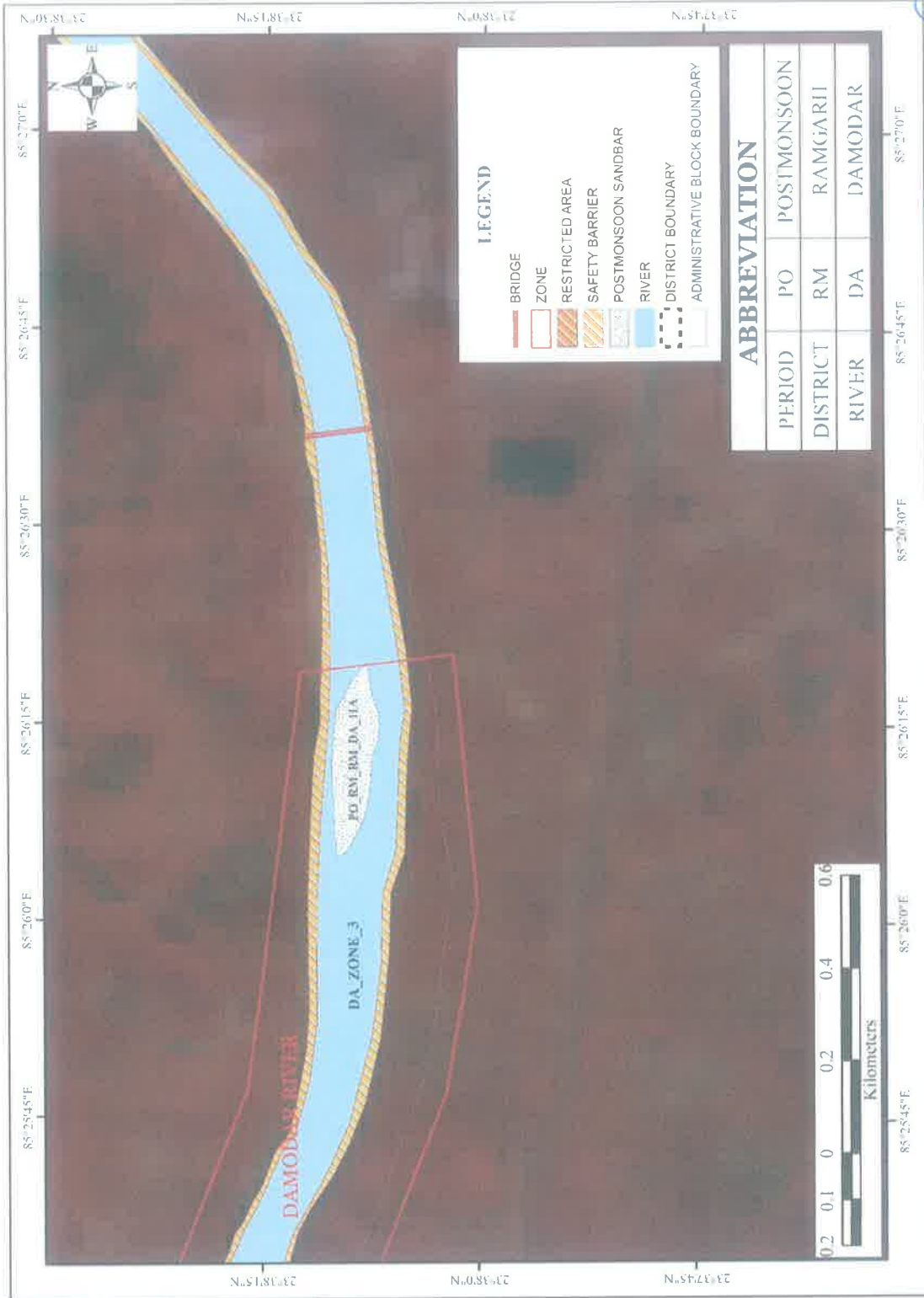


Plate No. B7: Plate showing potential Zone in post-monsoon



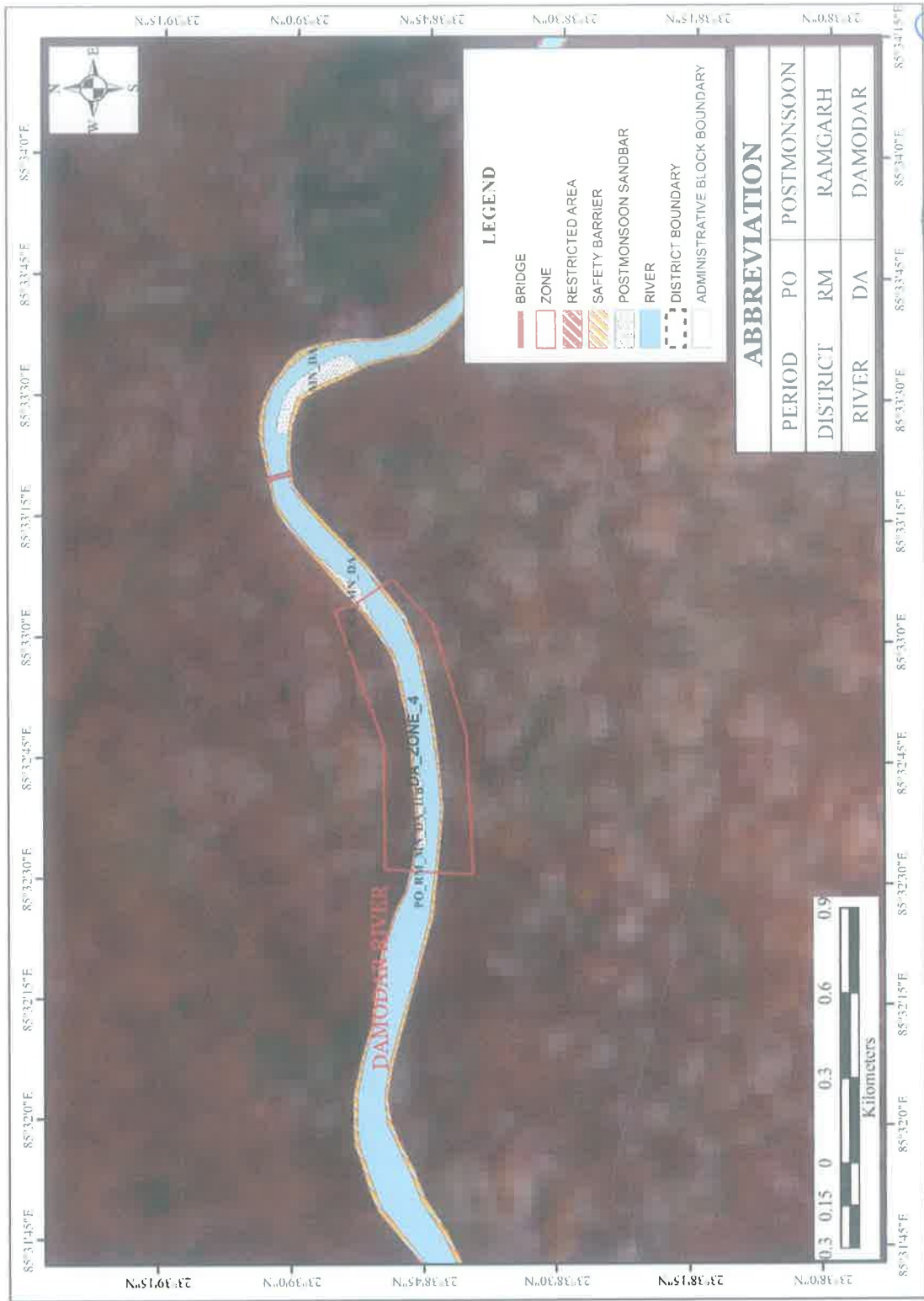


Plate No. B8: Plate showing potential Zone in post-monsoon

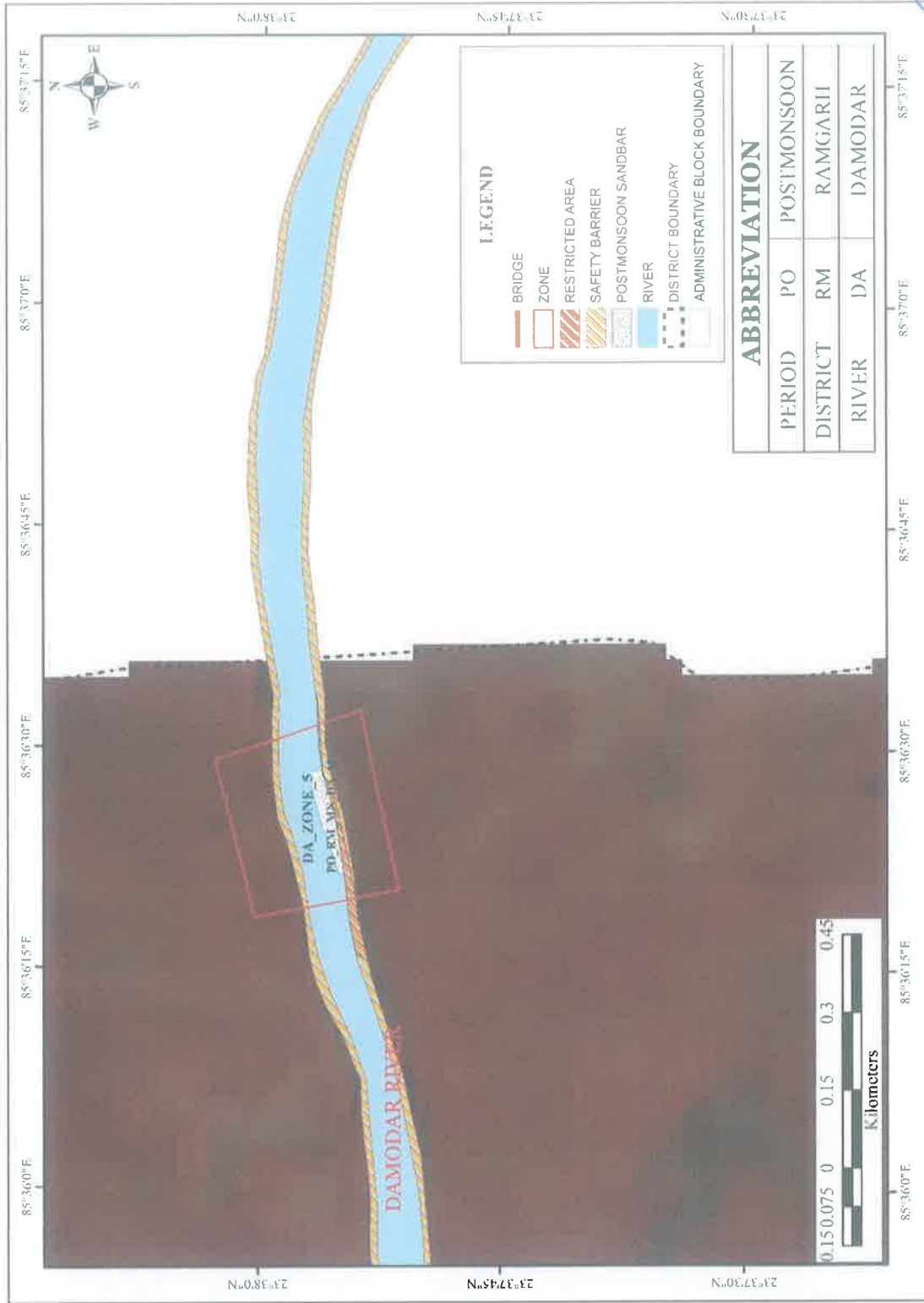


Plate No. B9: Plate showing potential Zone in post-monsoon



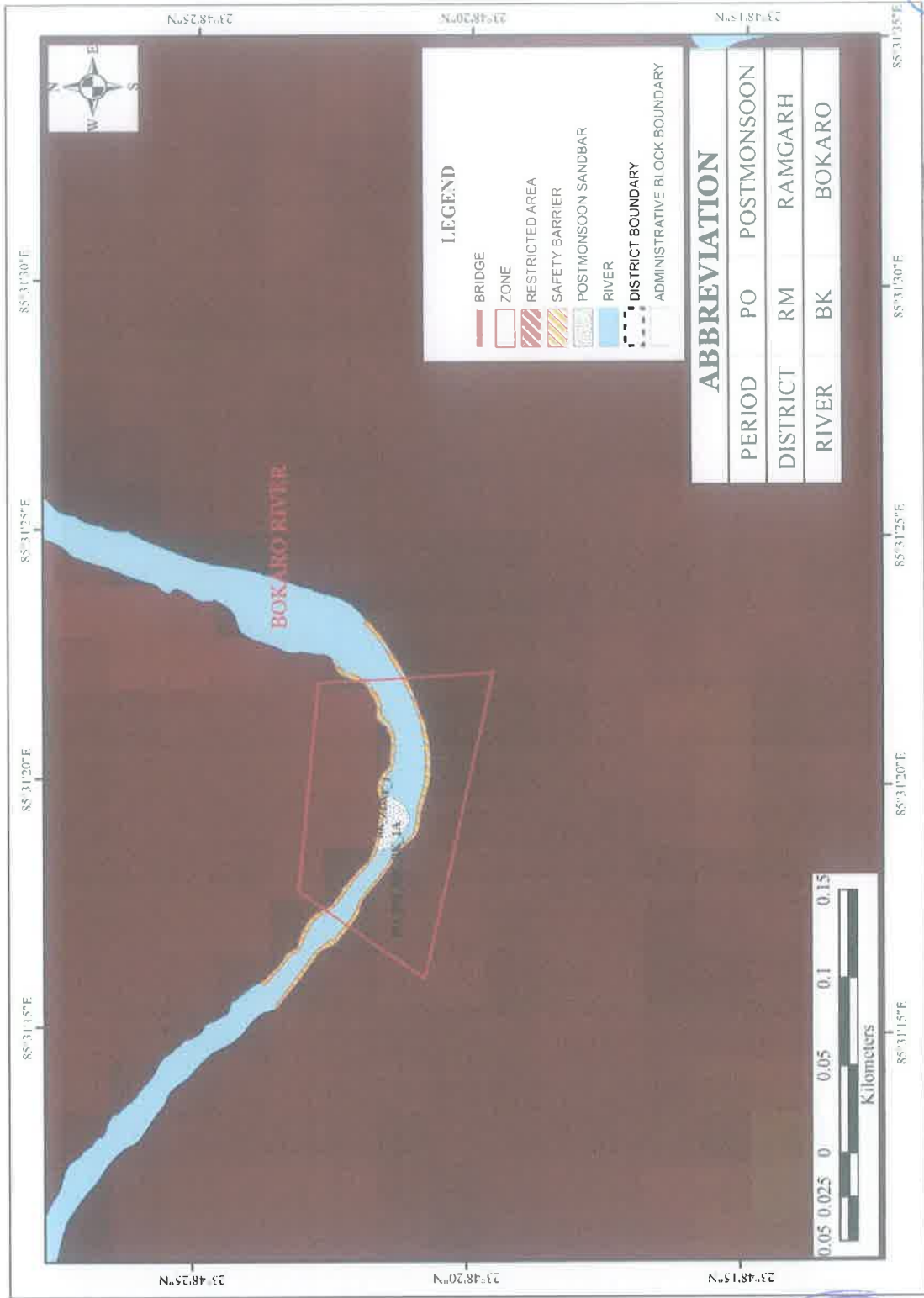


Plate No. B10: Plate showing potential Zone in post-monsoon



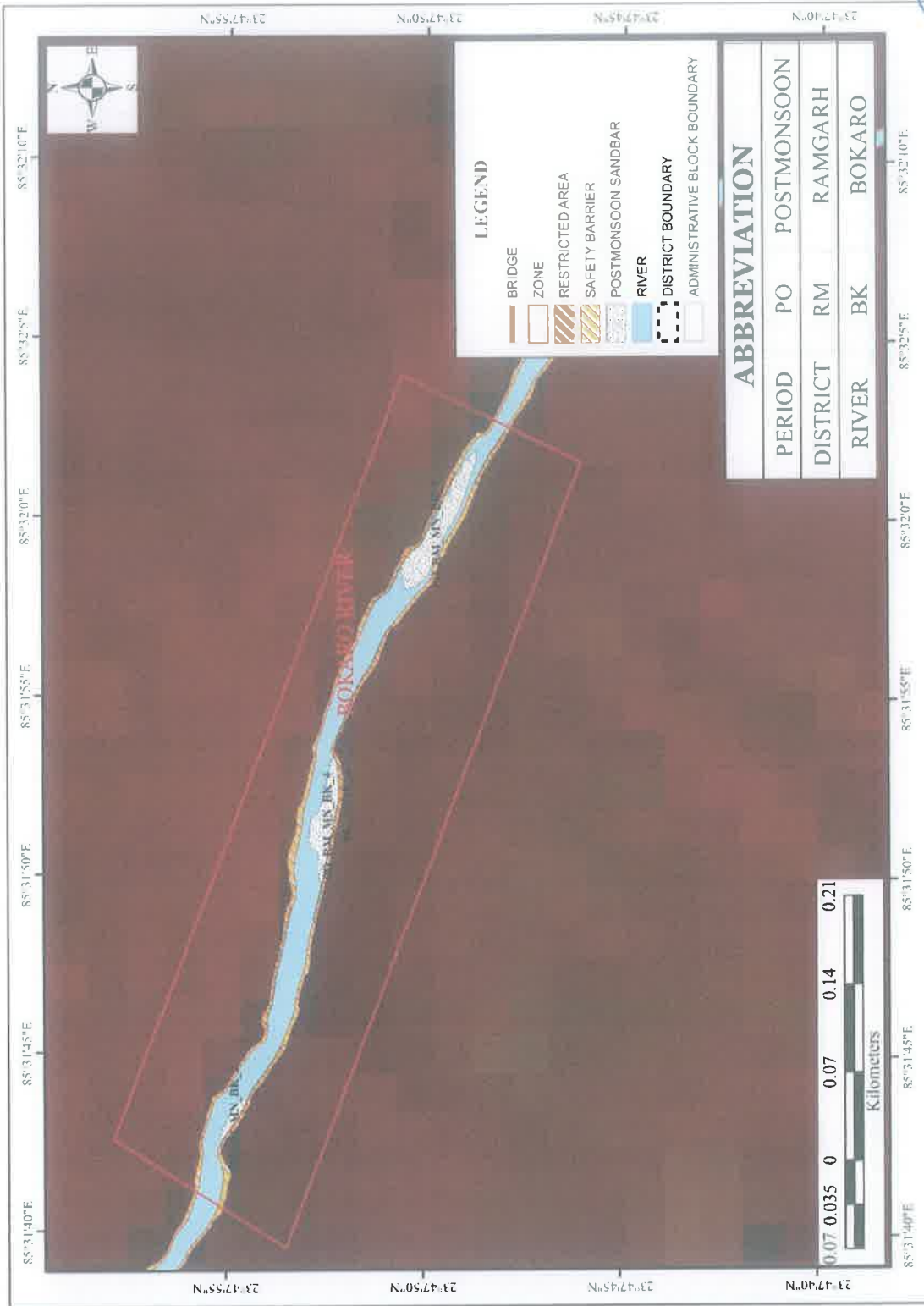


Plate No. B11: Plate showing potential Zone in post-monsoon



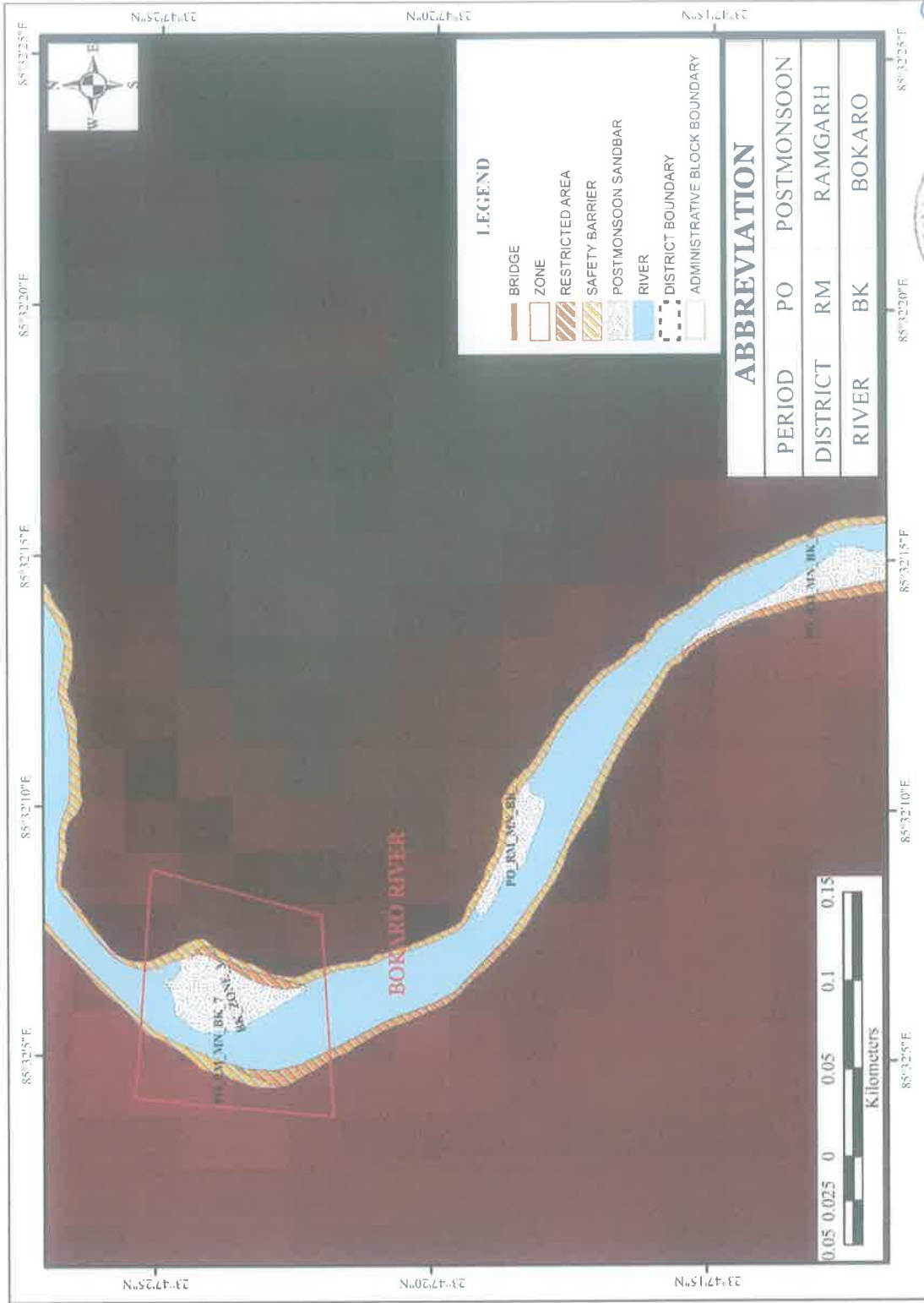
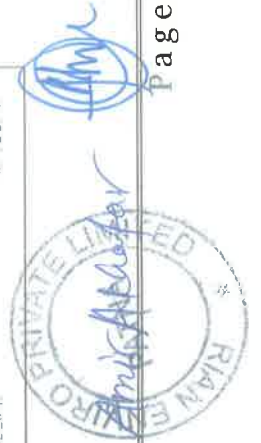


Plate No. B12: Plate showing potential Zone in post-monsoon



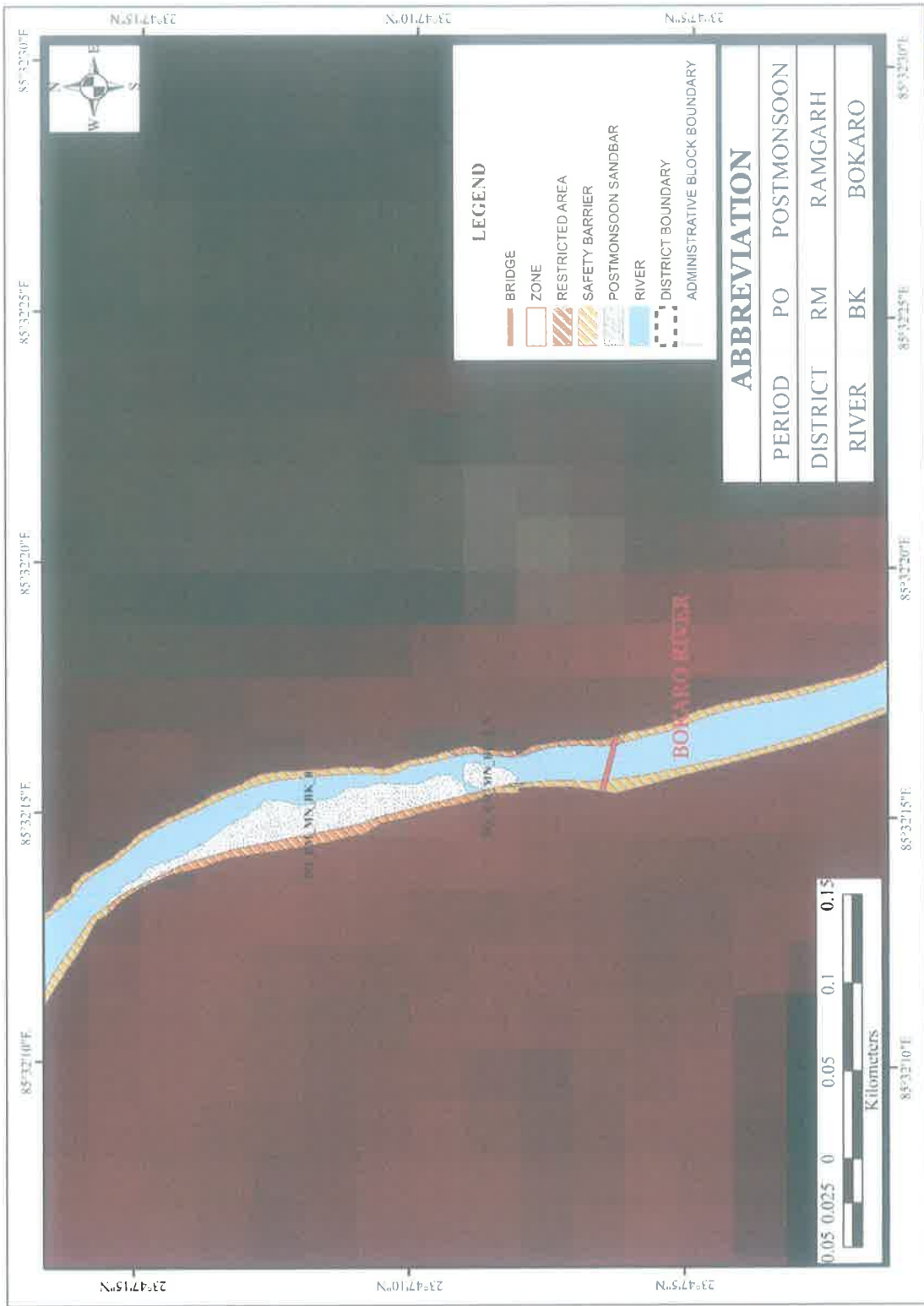


Plate No. B13: Plate showing potential Zone in post-monsoon



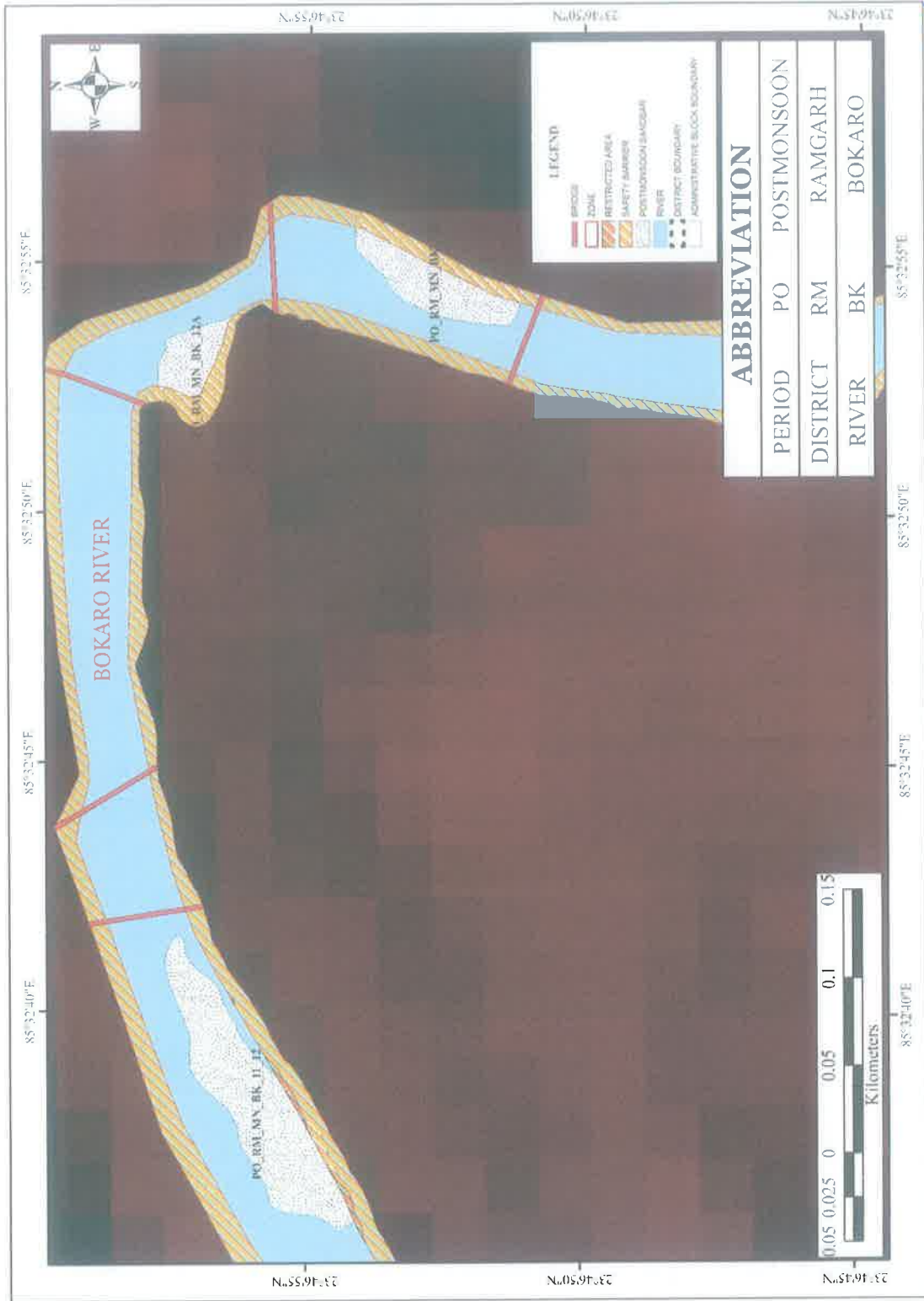


Plate No. B14: Plate showing potential Zone in post-monsoon



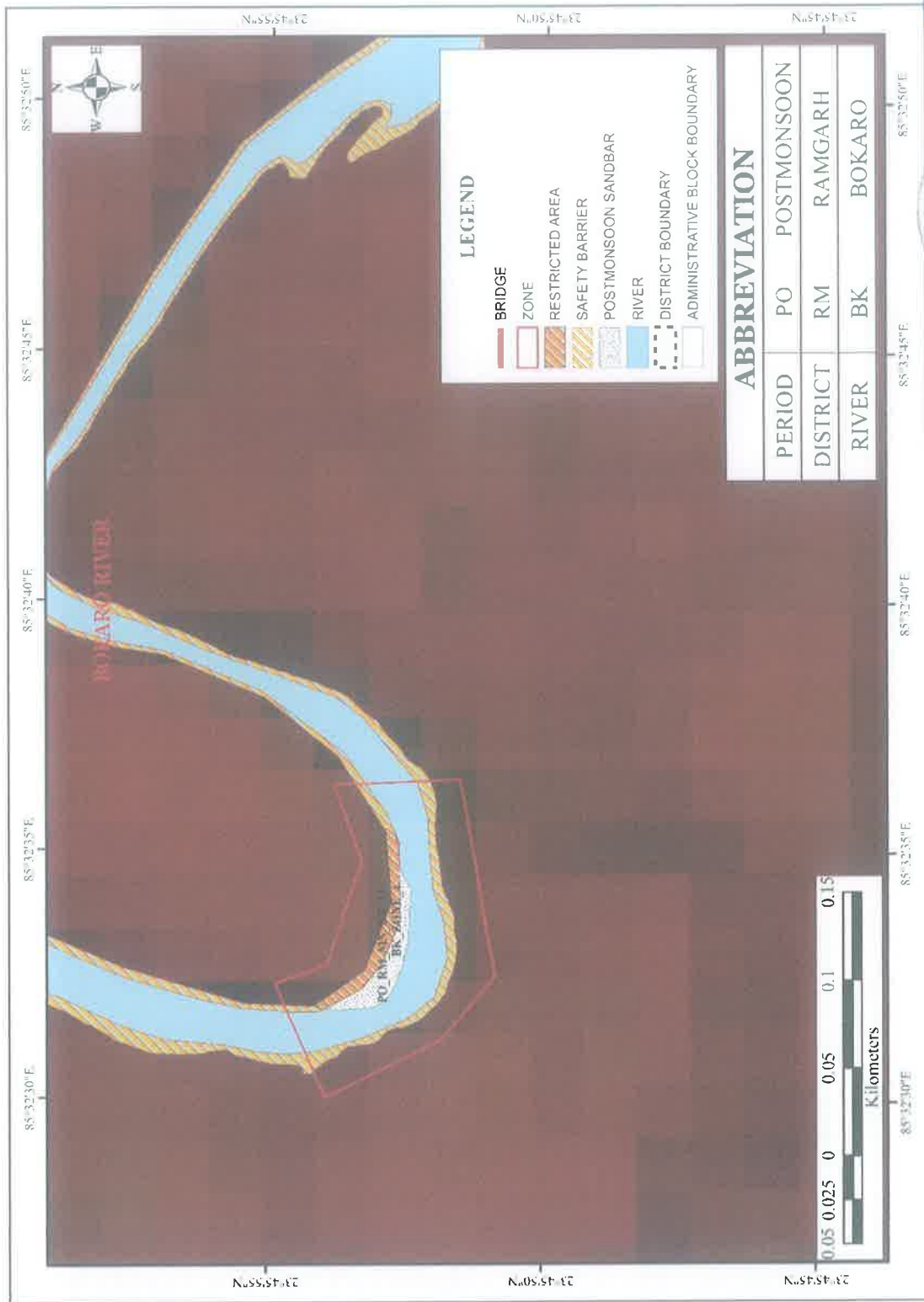


Plate No. B15: Plate showing potential Zone in post-monsoon



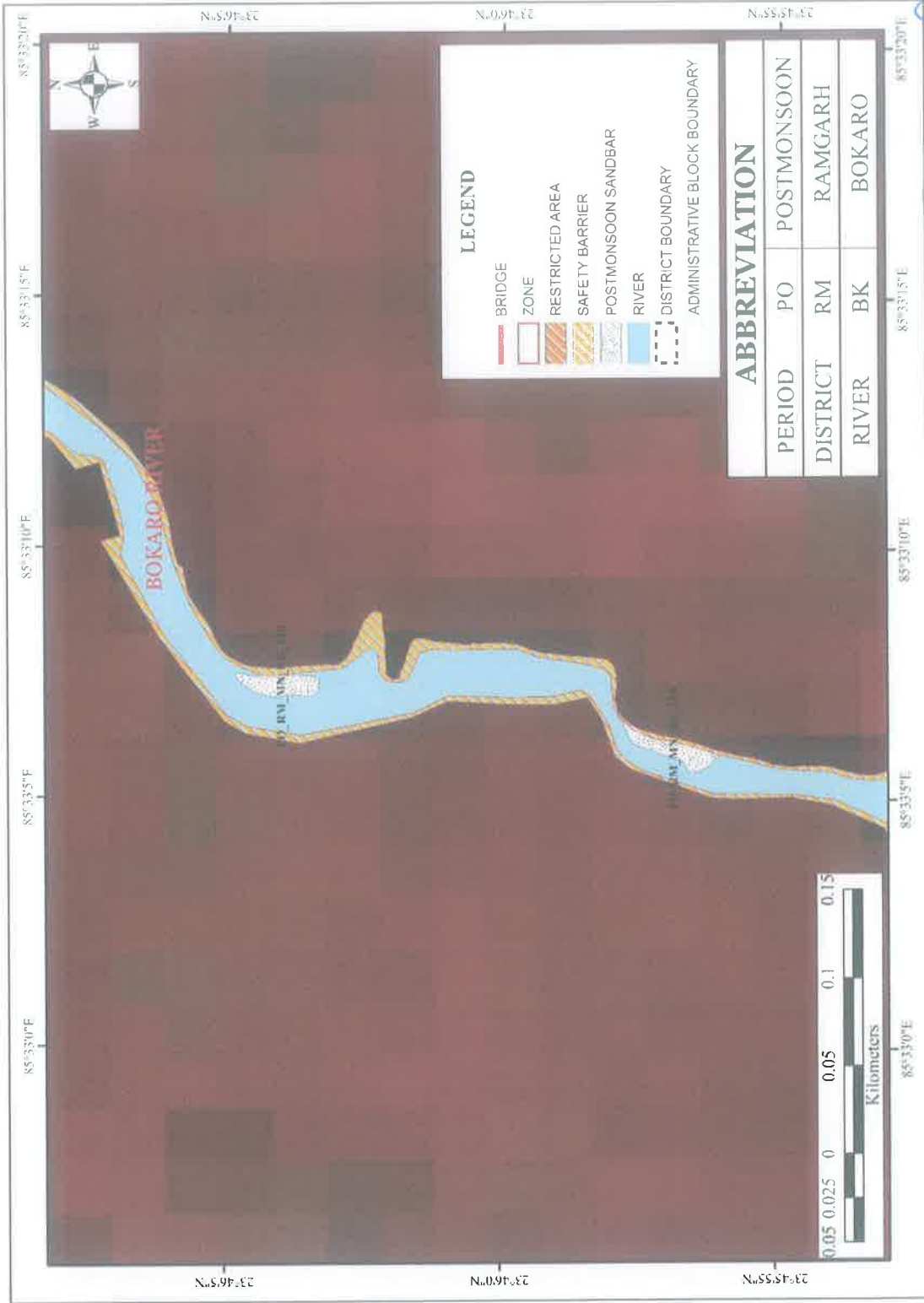
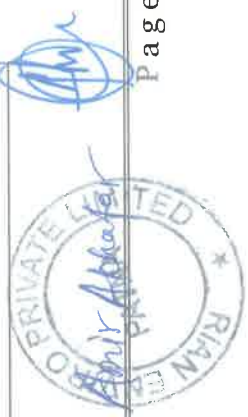


Plate No. B16: Plate showing potential Zone in post-monsoon



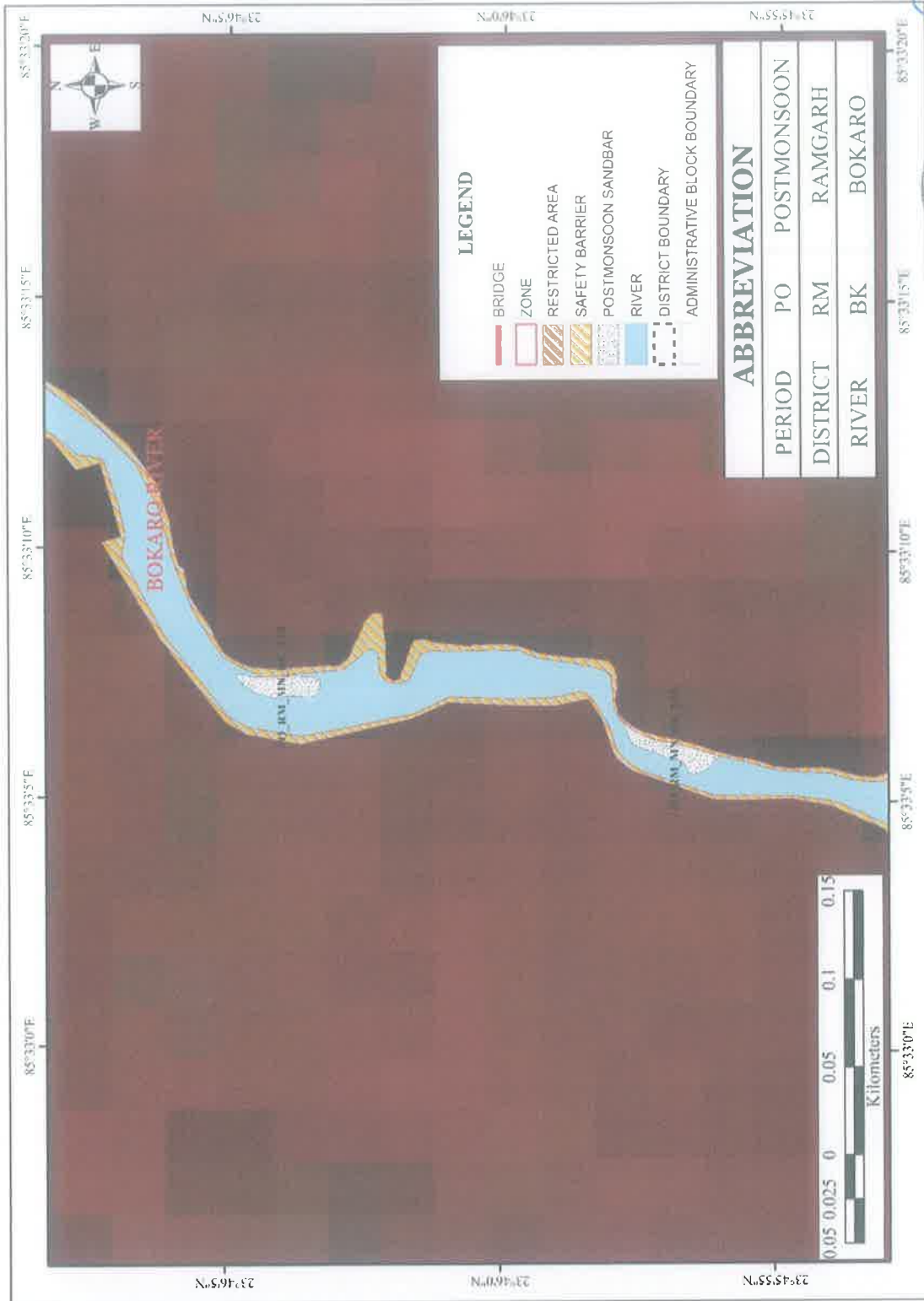


Plate No. 17: Plate showing potential Zone in post-monsoon



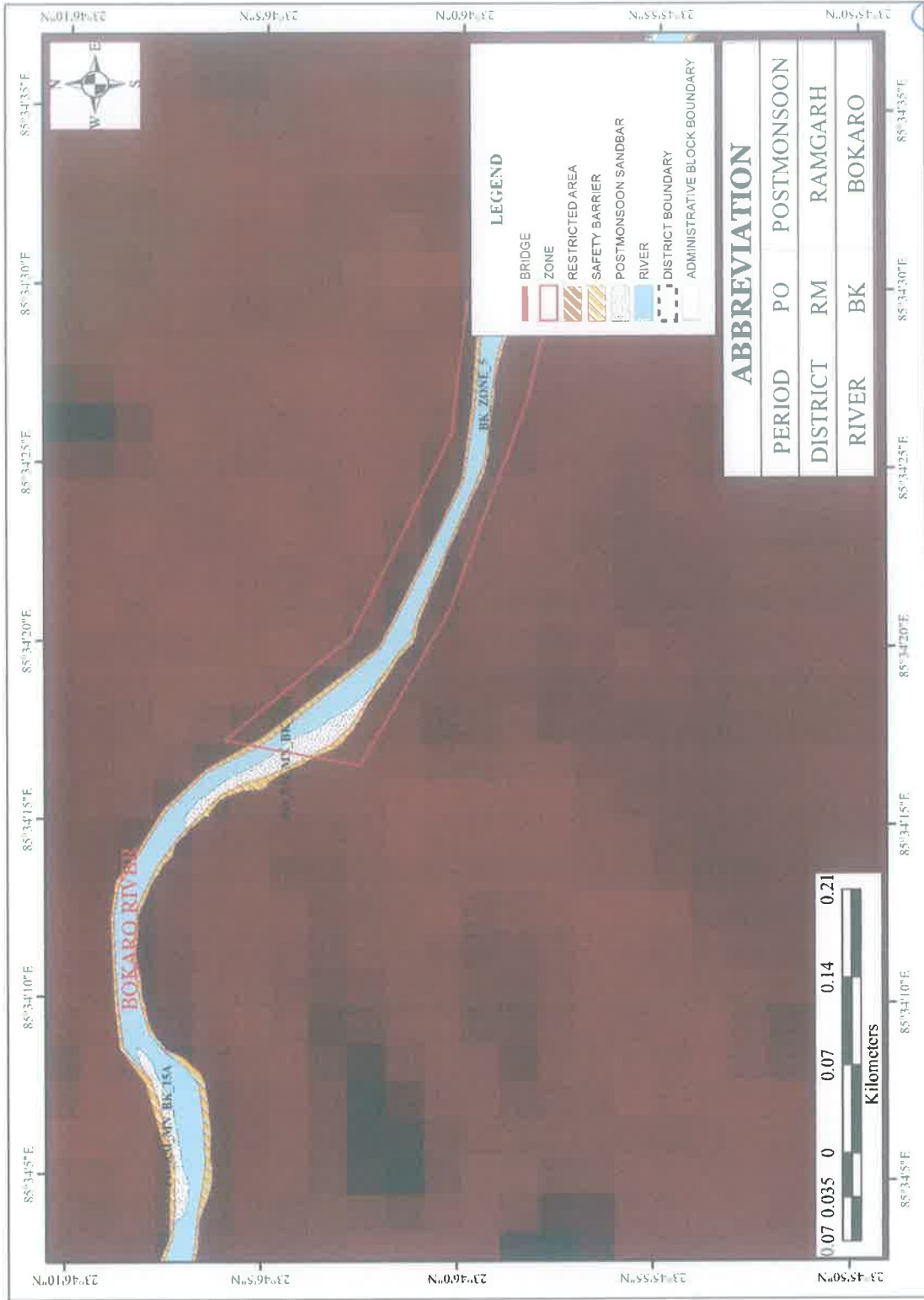


Plate No. B18: Plate showing potential Zone in post-monsoon



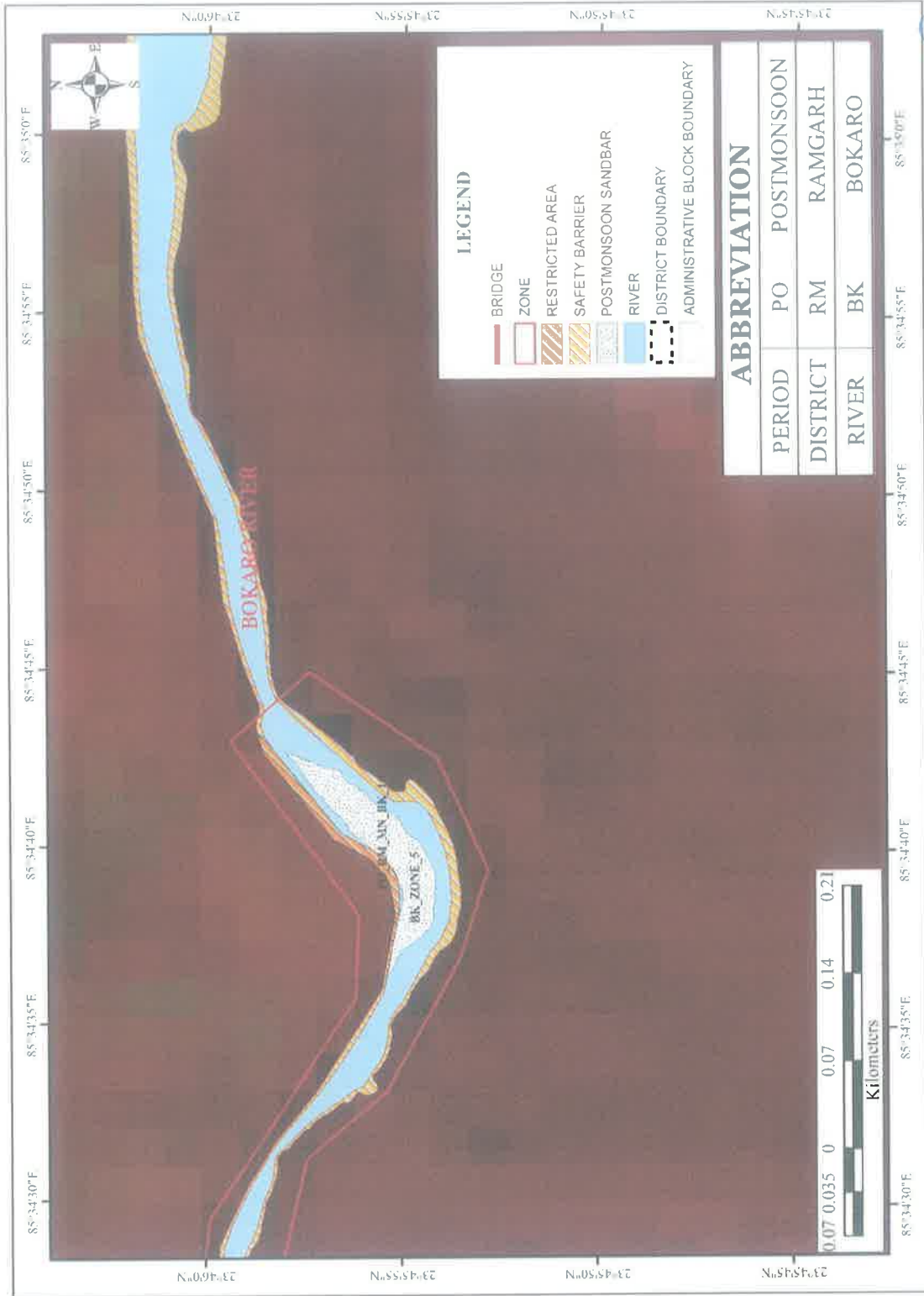


Plate No. B19: Plate showing potential Zone in post-monsoon



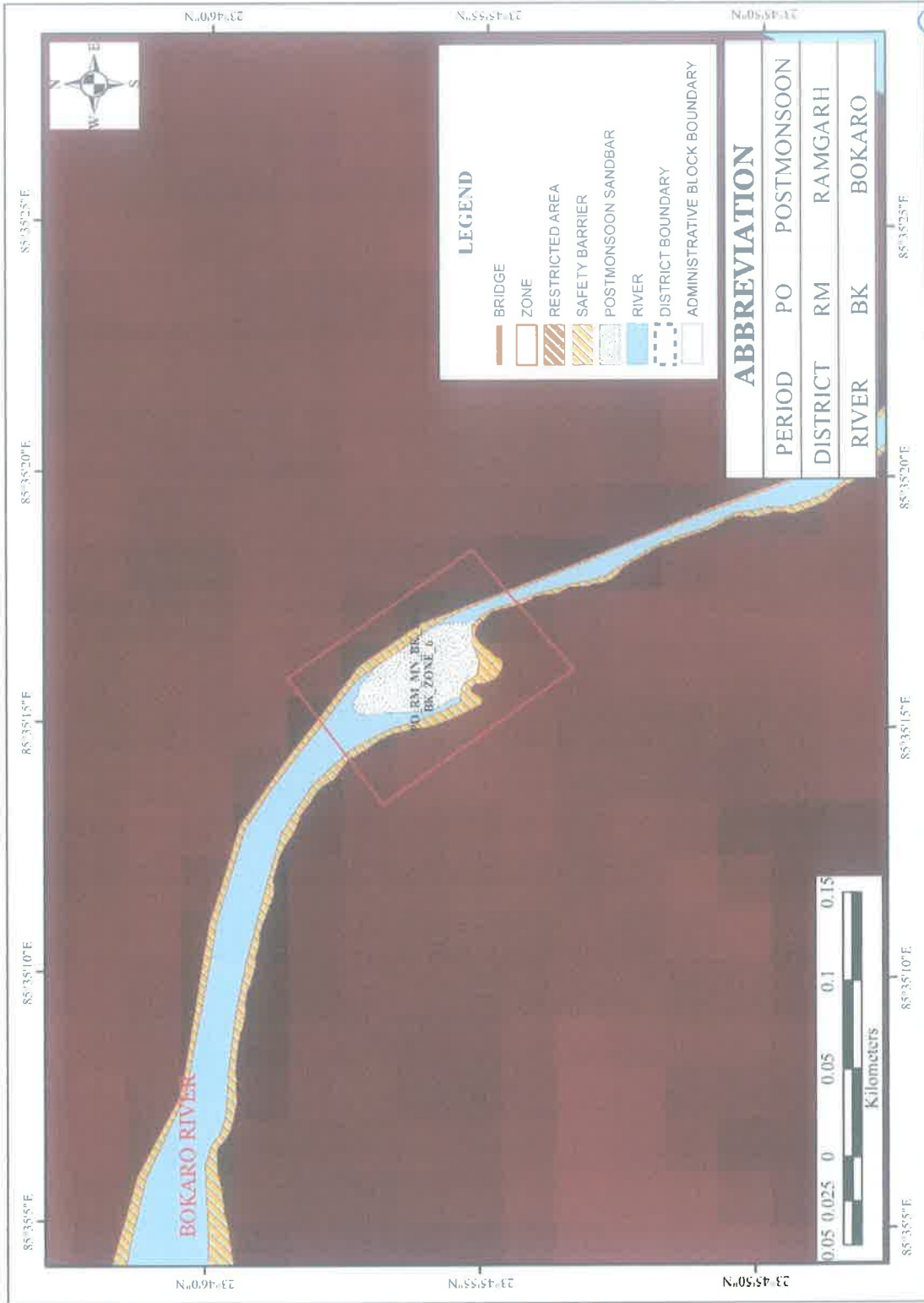


Plate No. B20: Plate showing potential Zone in post-monsoon



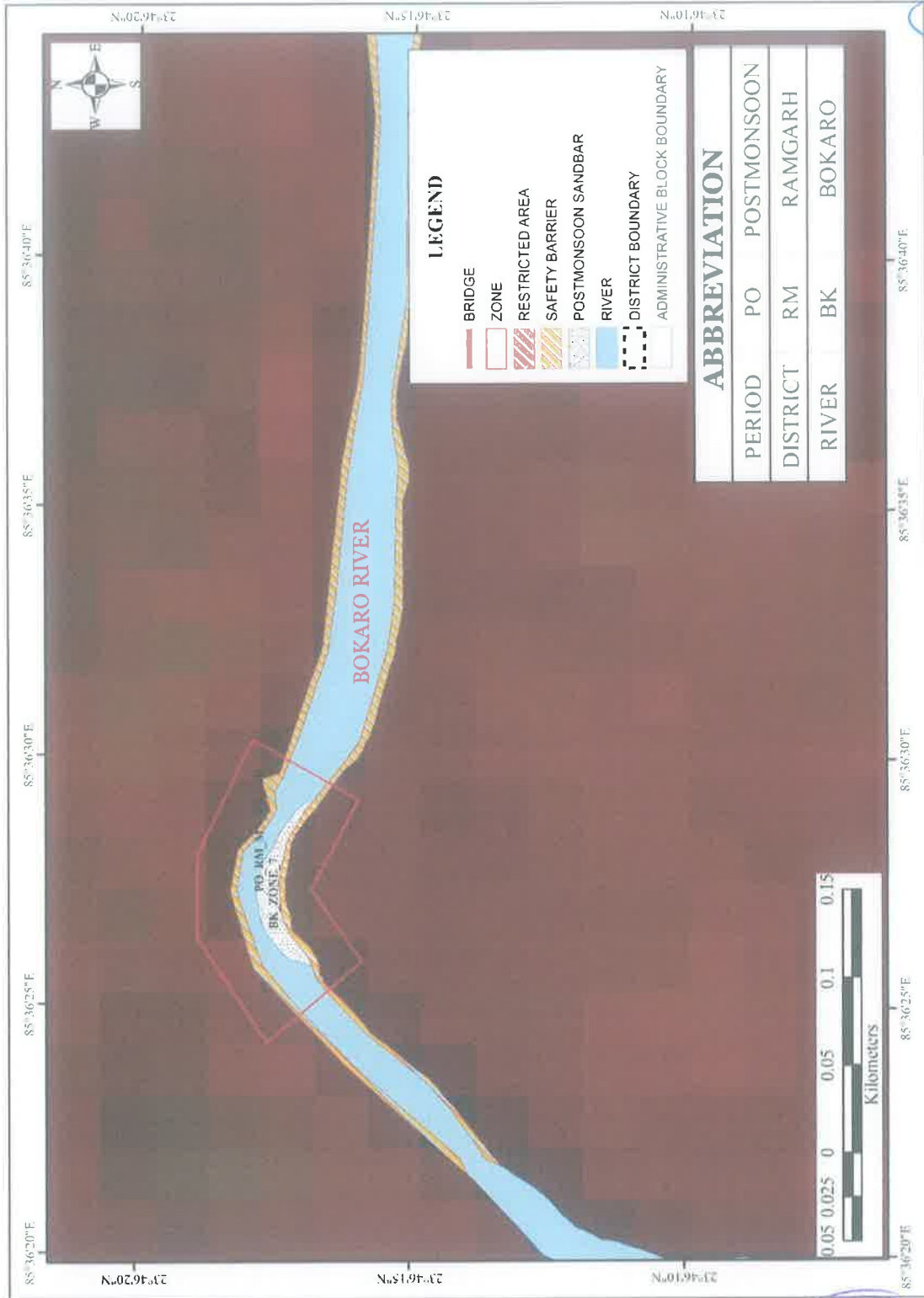


Plate No. B21: Plate showing potential Zone in post-monsoon



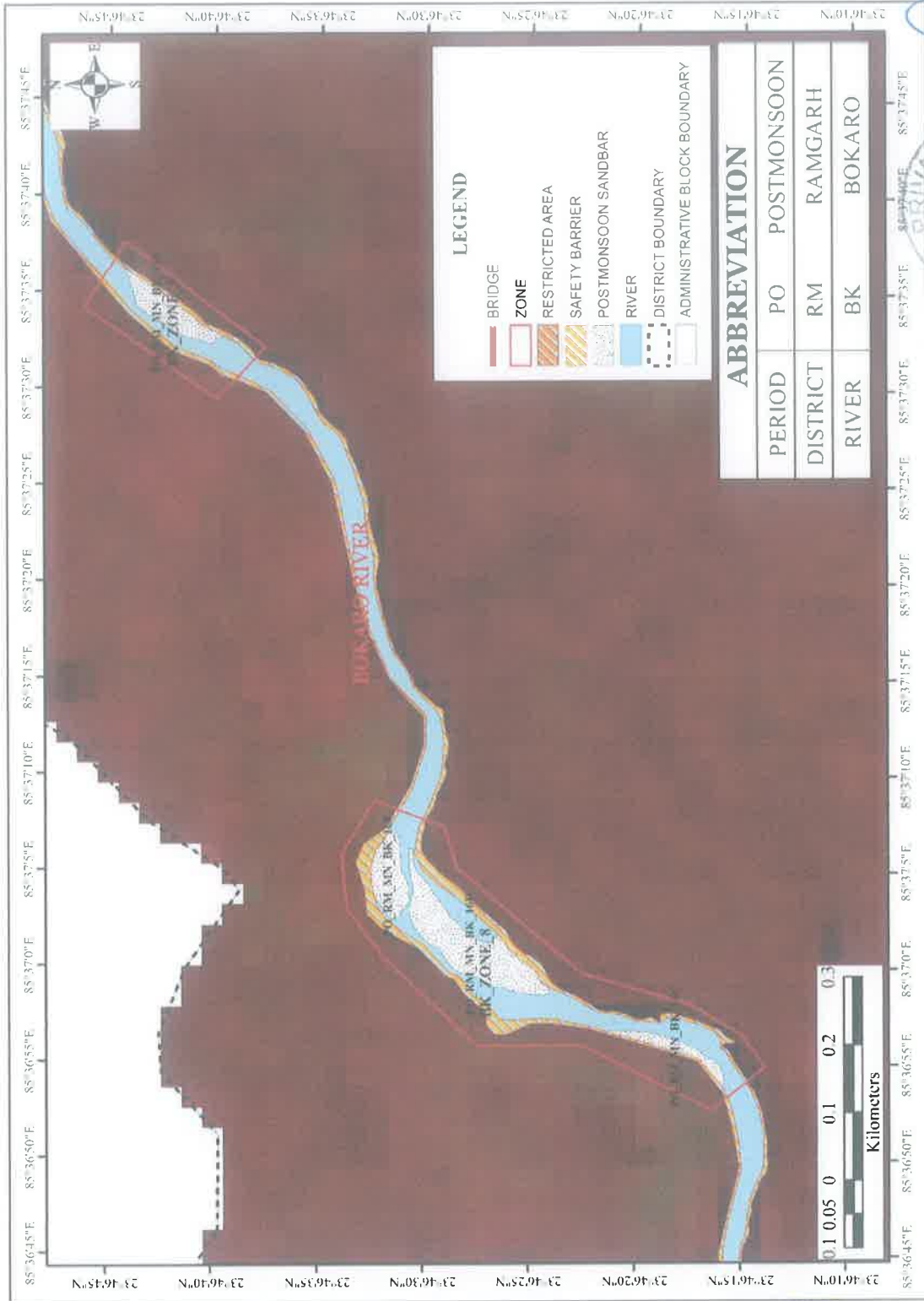


Plate No. B22: Plate showing potential Zone in post-monsoon



**Plate C**  
**(As per JSAC Cadastral Map of Bokaro**  
**River)**



Web AppBuilder for ArcGIS



November 30, 2022

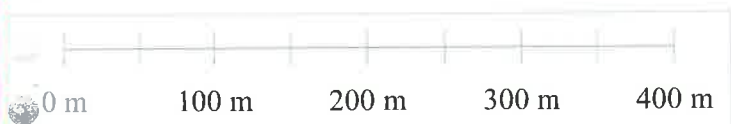
- 1 - polygons1
- Panchayat Boundary
- State Boundary
- Rangarh
- Block Boundary
- Village Boundary
- District Boundary

1:2,257

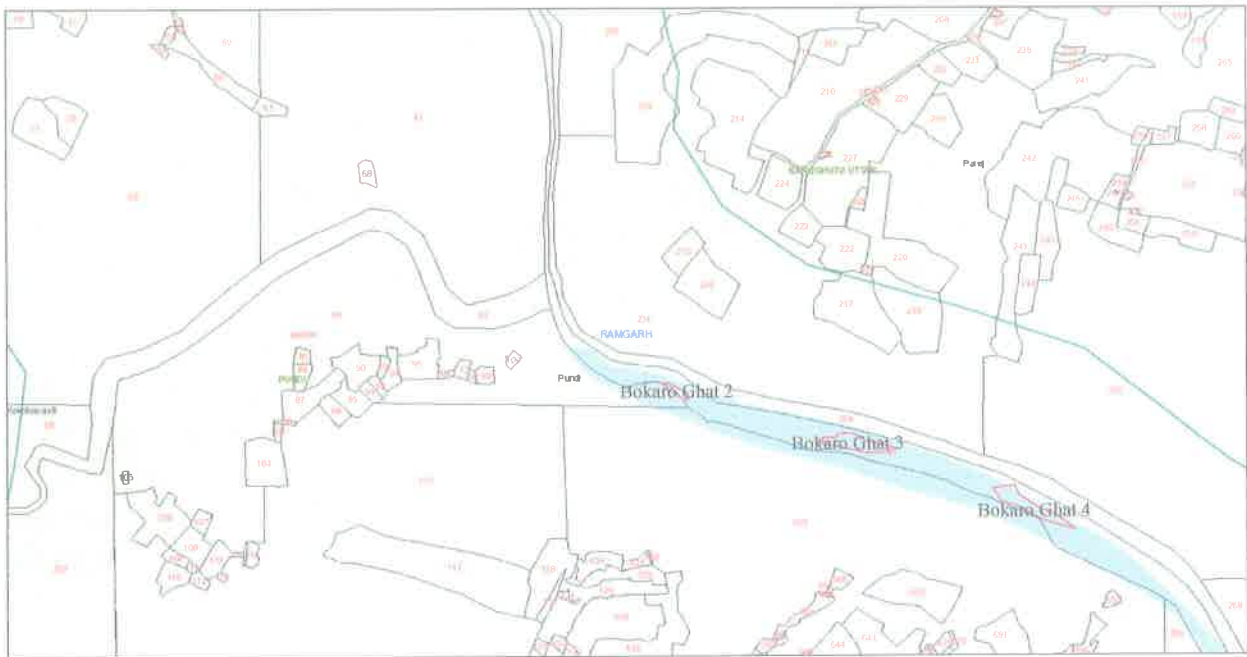


Esri, HERE, Garmin, LDSS, Mapbox, OpenStreetMap contributors, Swatch, and Mapbox

Directorate of Geology, Government of Jharkhand



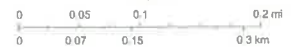
# Web AppBuilder for ArcGIS



November 30, 2022

- Ramgarh
- Panchayat Boundary
- District Boundary
- Village Boundary
- Block Boundary
- State Boundary

1:4,514



Map by ESRI, ArcGIS, USGS, Microsoft Information Systems

Directorate of Geology, Government of Jharkhand

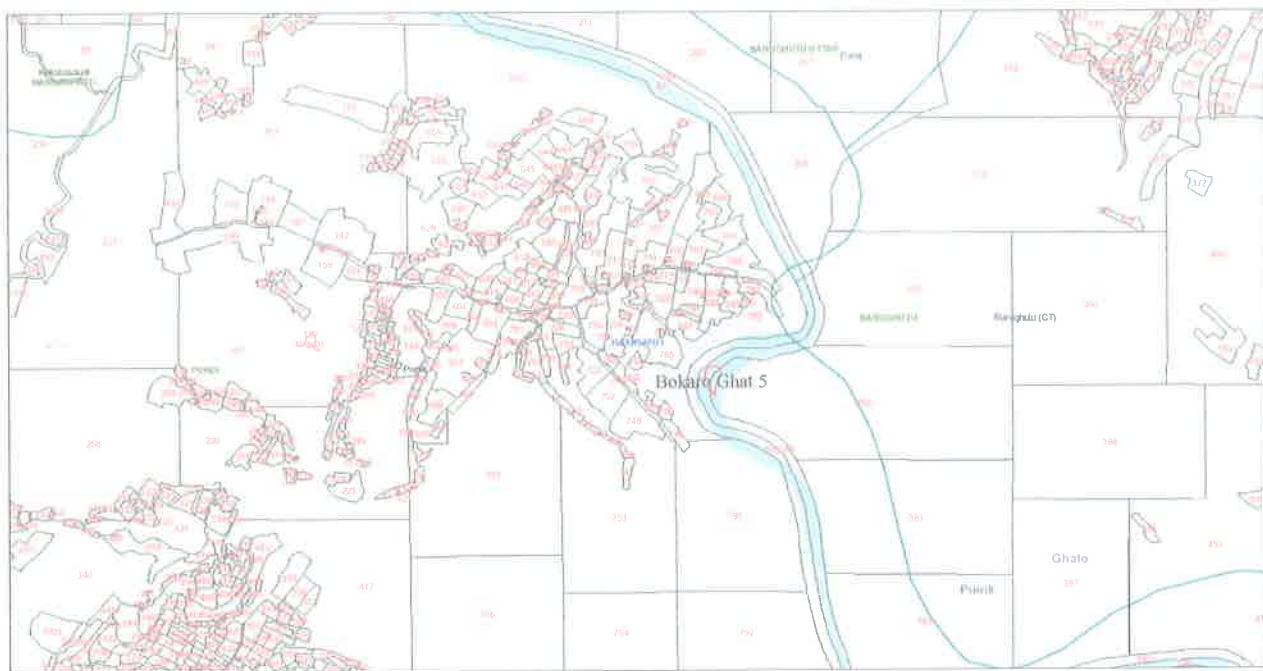


Bokaro Ghat 5



0 m      250 m      500 m      750 m

Web AppBuilder for ArcGIS



November 30, 2022

- Ramgarh
- Panchayat Boundary
- District Boundary
- Village Boundary
- Block Boundary
- State Boundary

1:9,028

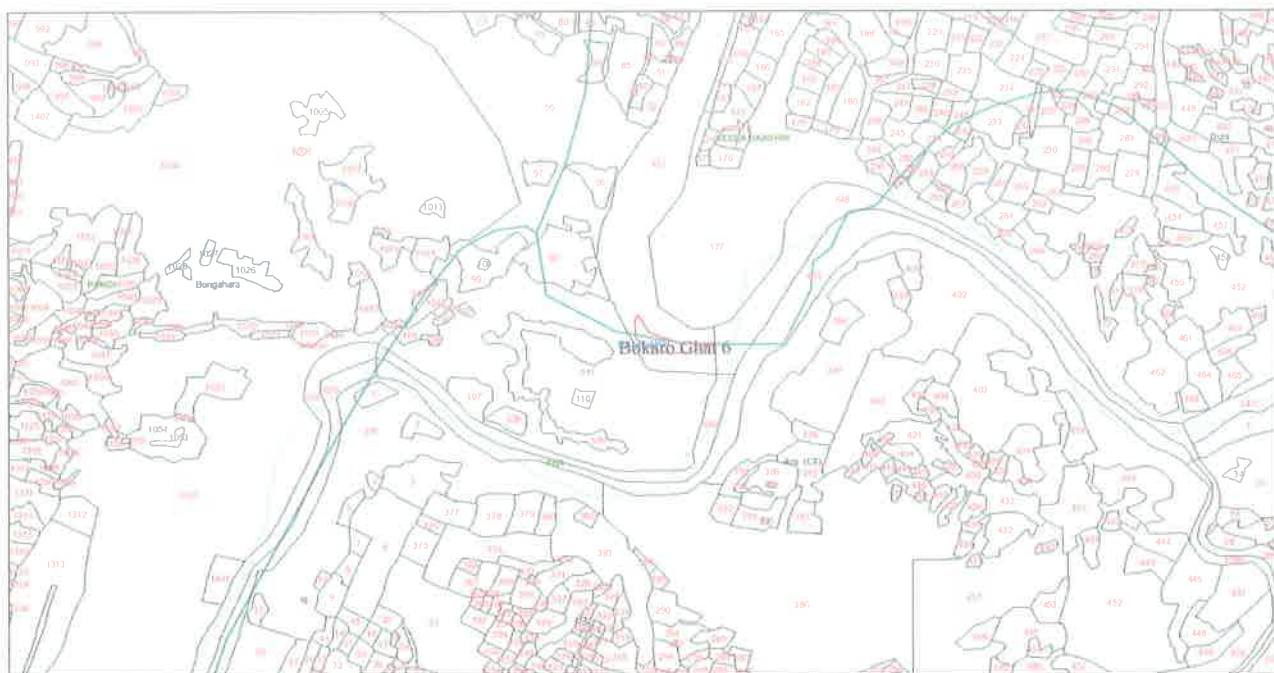


Esri, HERE, Garmin, USGS, METI/NASA, Mineral Information System

Directorate of Geology, Government of Jharkhand



### Web AppBuilder for ArcGIS



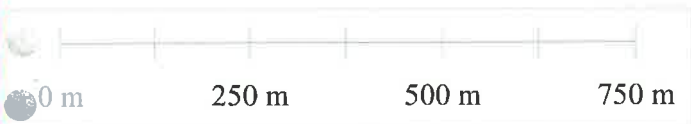
November 30, 2022

- Ramgarh
- Panchayat Boundary
- District Boundary
- Village Boundary
- Block Boundary
- State Boundary

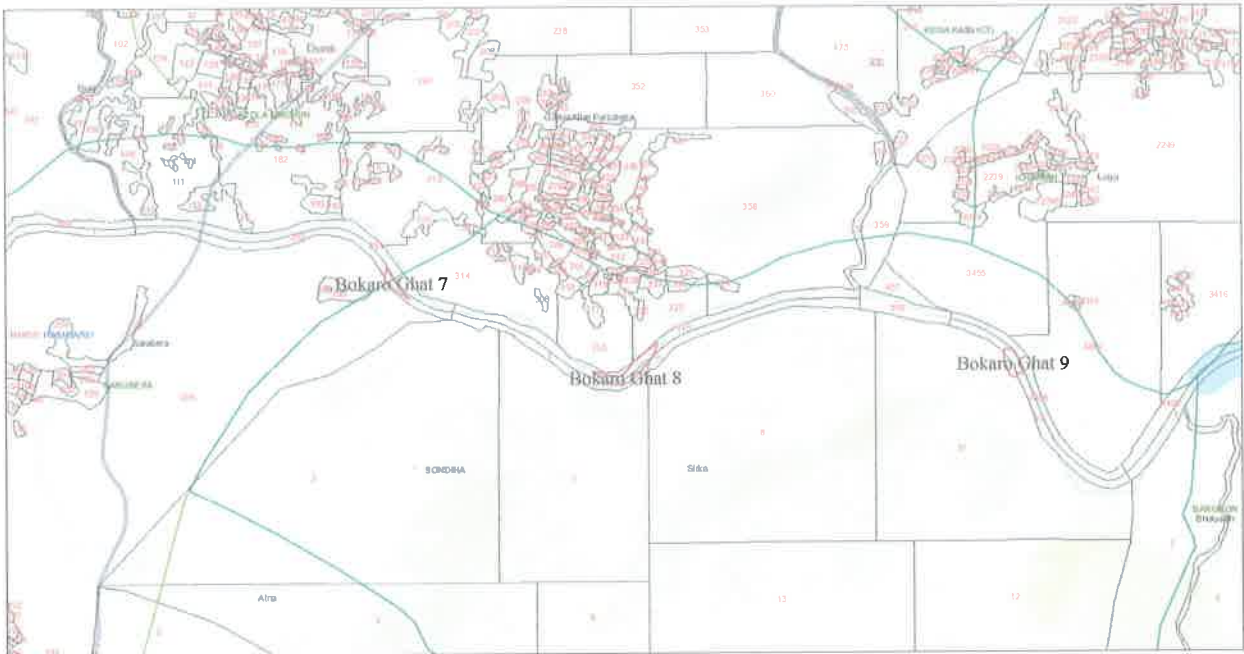


Esri, HERE, Garmin, USGS, Mineral Information System

Discourtesy of Geology, Government of Jharkhand



Web AppBuilder for ArcGIS



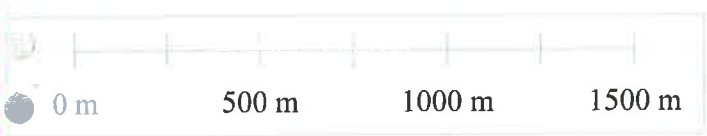
November 30, 2022

- Ramgarh
- Panchayat Boundary
- District Boundary
- Village Boundary
- Block Boundary
- State Boundary



Esri, HERE, Garmin, USGS, METNUSA, Mineral Information System

Directorate of Geology, Government of Jharkhand

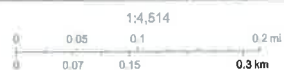


### Web AppBuilder for ArcGIS



November 30, 2022

- Ramgarh
- Panchayat Boundary
- District Boundary
- Village Boundary
- Block Boundary
- State Boundary

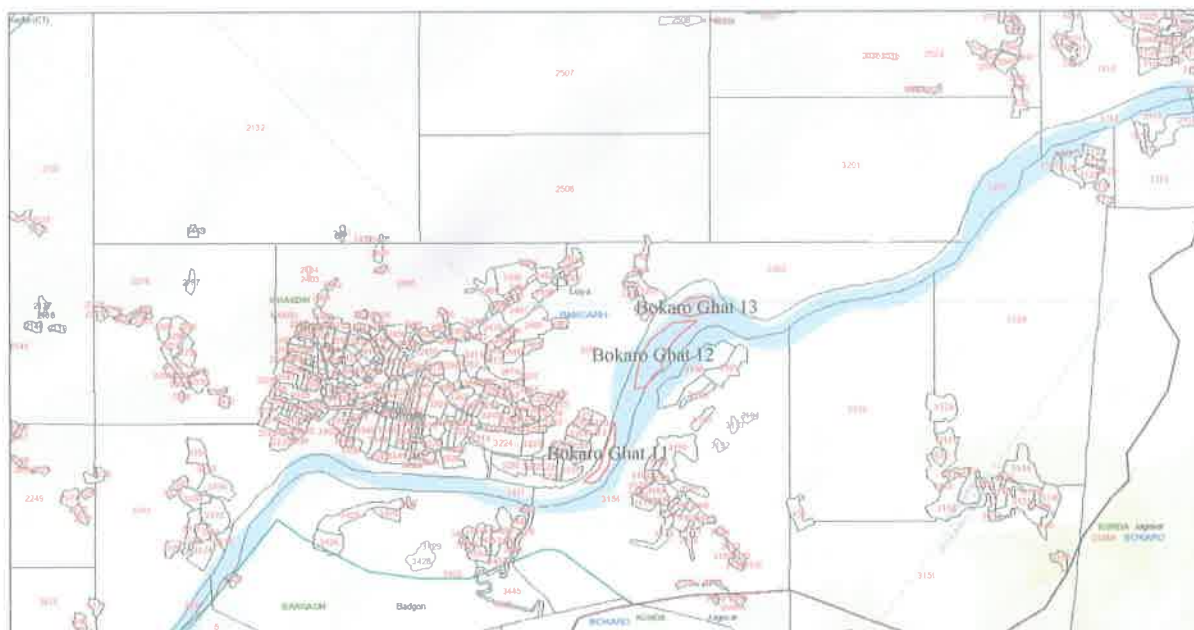


Erl. HERE, Garmin, USGS, Mineral Information System

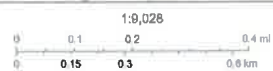
Directorate of Geology, Government of Jharkhand




Web AppBuilder for ArcGIS



November 30, 2022



Esri, HERE, Garmin, URS, METNARA, Intergraph, Imagery  
System

Department of Design, Government of Jharkhand



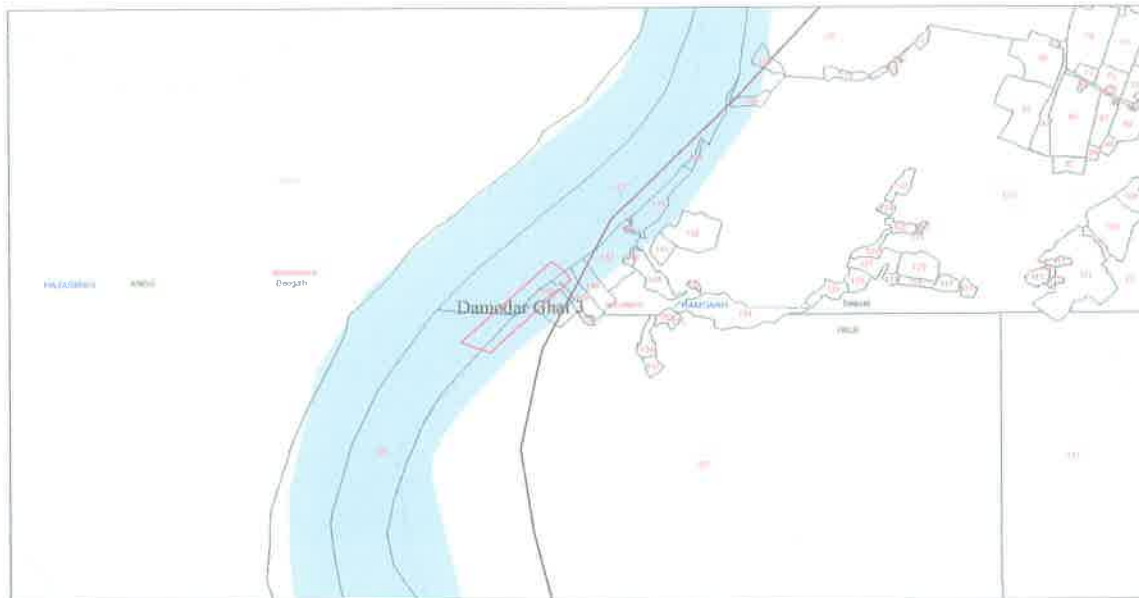


**Plate D**  
**(As per JSAC Cadastral Map of**  
**Damodar River)**





Web AppBuilder for ArcGIS



November 30, 2022

- Ramgarh
- Panchayat Boundary
- District Boundary
- Village Boundary
- Block Boundary
- State Boundary

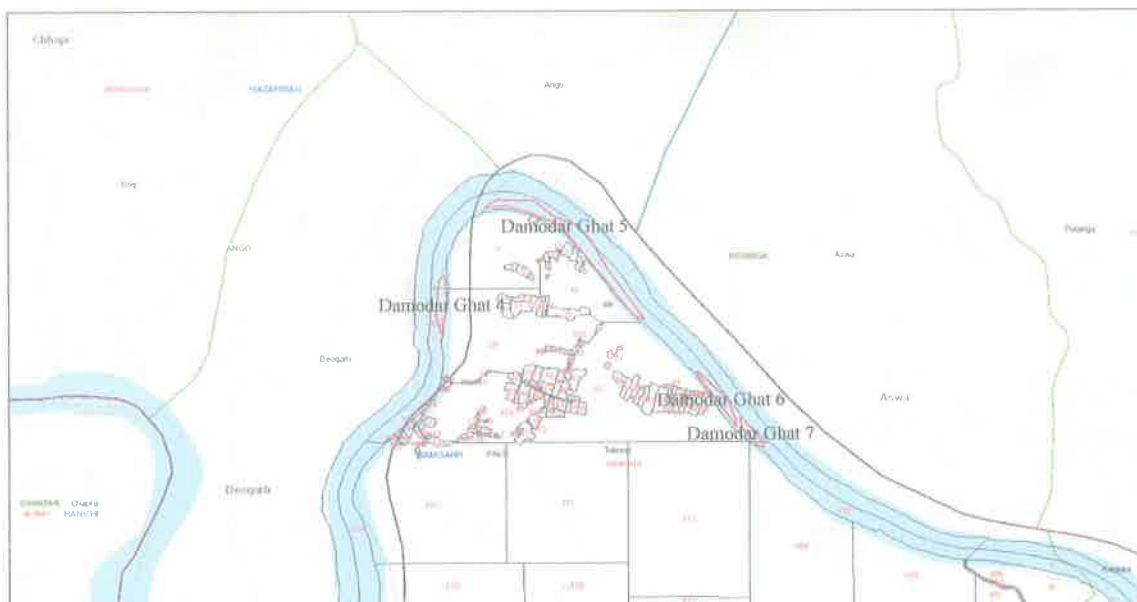


Esri, HERE, DeLorme, USGS, Microsoft, Swiremap

Directorate of Geology, Government of Jharkhand



Web AppBuilder for ArcGIS



November 30, 2022

- Ramgarh
- Panchayat Boundary
- District Boundary
- Village Boundary
- Block Boundary
- State Boundary

1:10,056  
 0 0.2 0.4 0.6 0.8 1.0 mi  
 0 0.33 0.65 1.0 km  
 Esri HERE Garmin USGS METANAGA Interol Information System

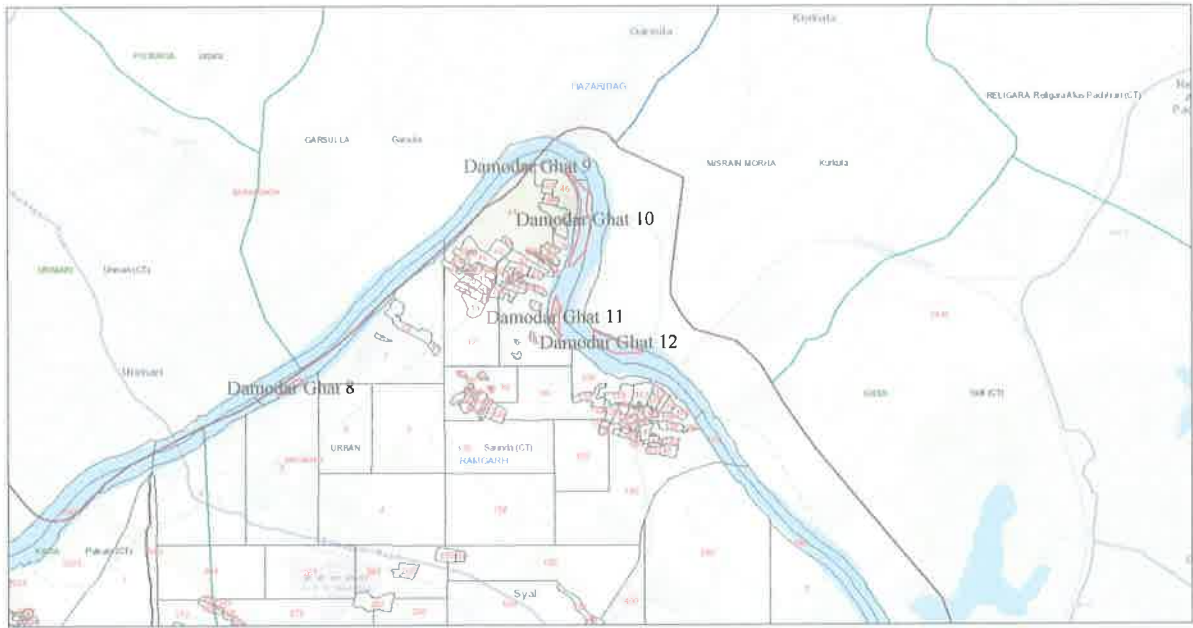
Directorate of Geology, Government of Jharkhand



A handwritten signature in blue ink, likely belonging to the official who approved the assessment.



Web AppBuilder for ArcGIS



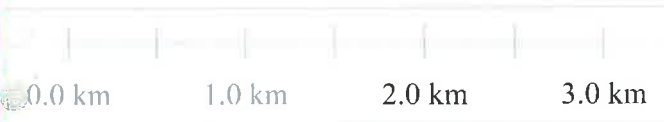
November 30, 2022

Ramgarh     Panchayat Boundary     District Boundary  
 Village Boundary     Block Boundary     State Boundary

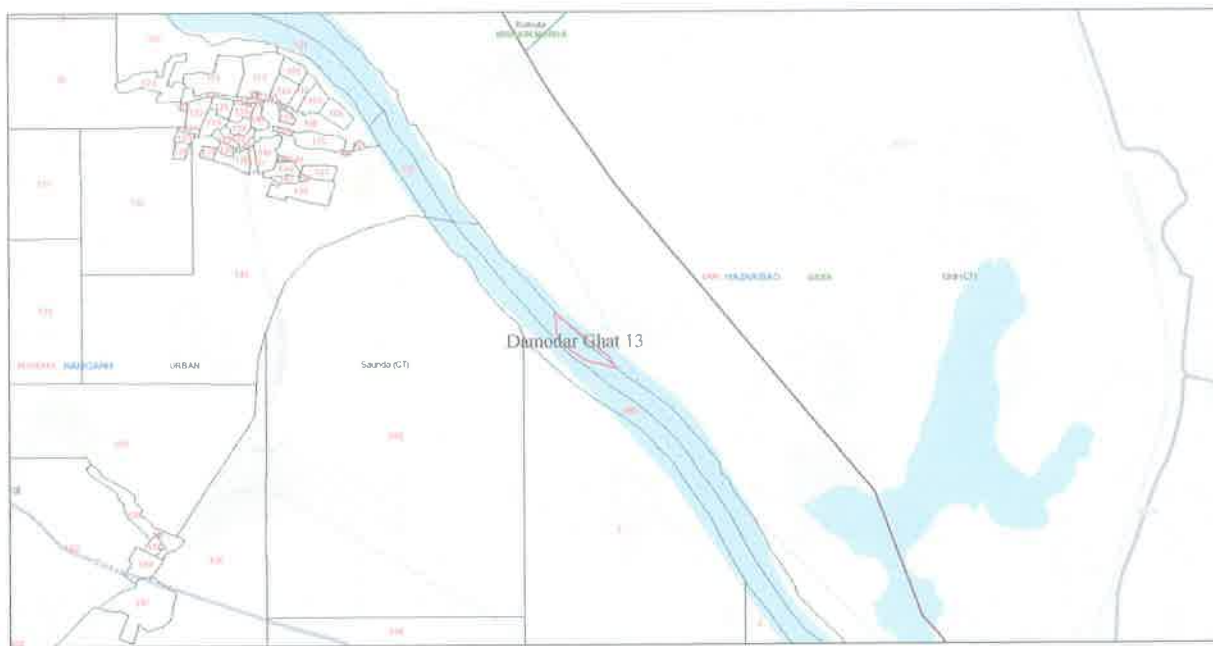


Esri, HERE, Garmin, USGS, METNUSA, Microsoft, Information System

Directorate of Geology, Government of Jharkhand



Web AppBuilder for ArcGIS



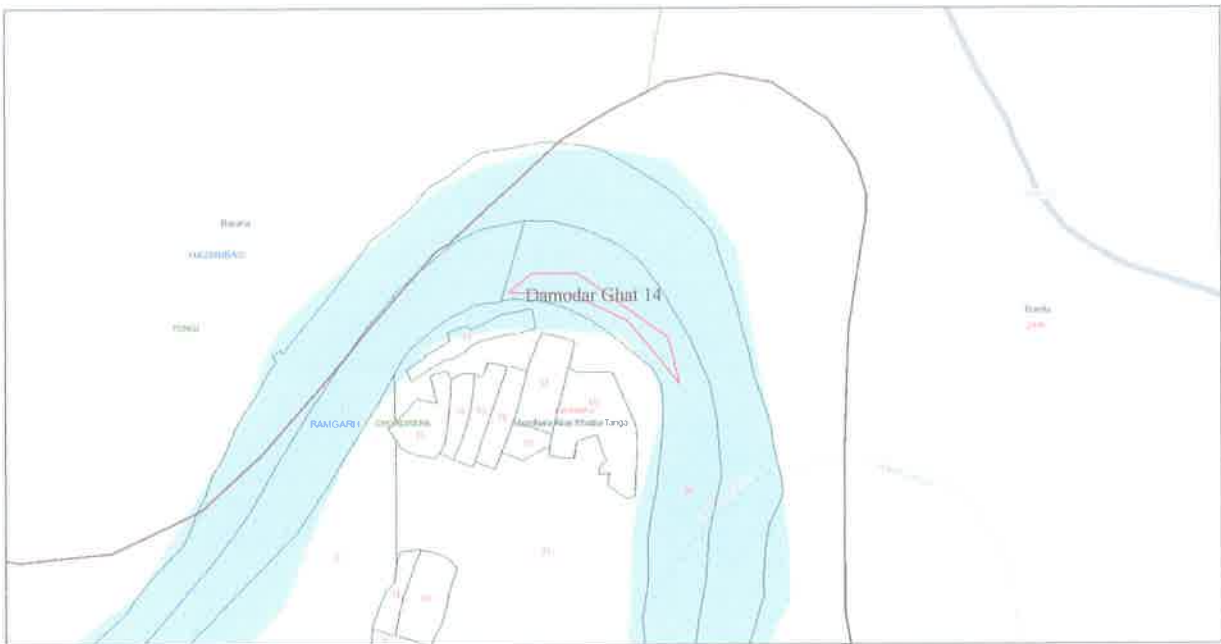
November 30, 2022



Directorate of Geology, Government of Jharkhand



Web AppBuilder for ArcGIS



November 30, 2022

- Ramgarh
- Panchayat Boundary
- District Boundary
- Village Boundary
- Block Boundary
- State Boundary



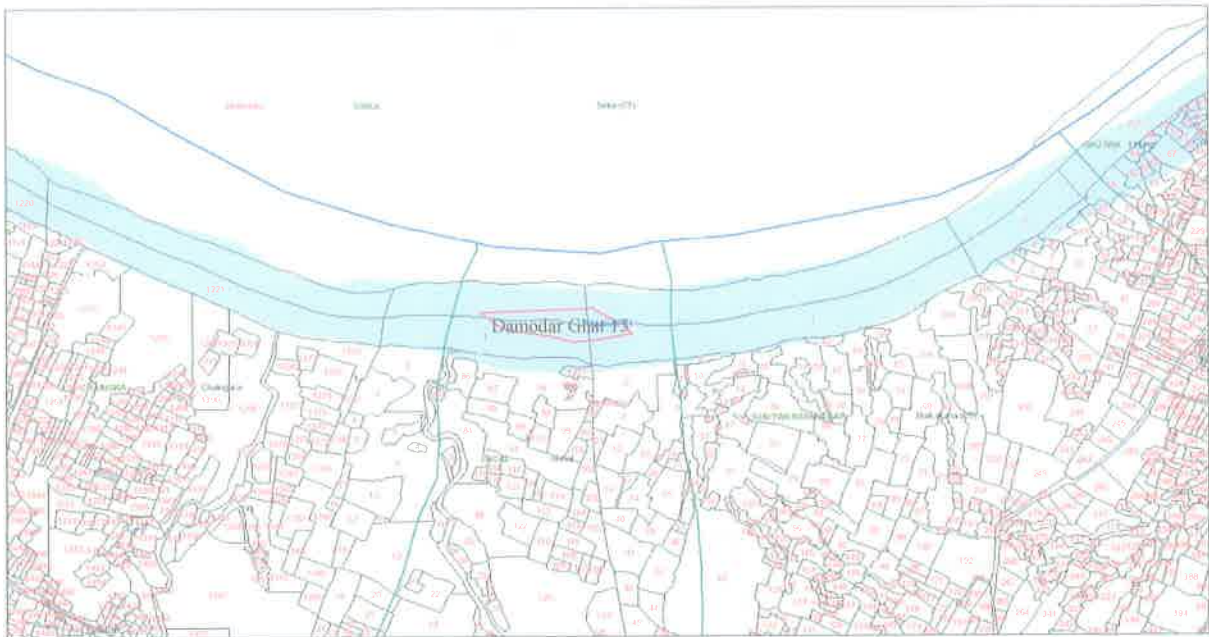
For: HERE, Garmin, USGS, Mineral & Geospatial System

Directorate of Geology, Government of Jharkhand



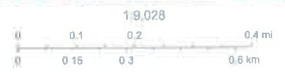
0 m 250 m 500 m 750 m

Web AppBuilder for ArcGIS



November 30, 2022

- Ramgarh
- Panchayat Boundary
- District Boundary
- Village Boundary
- Block Boundary
- Slate Boundary

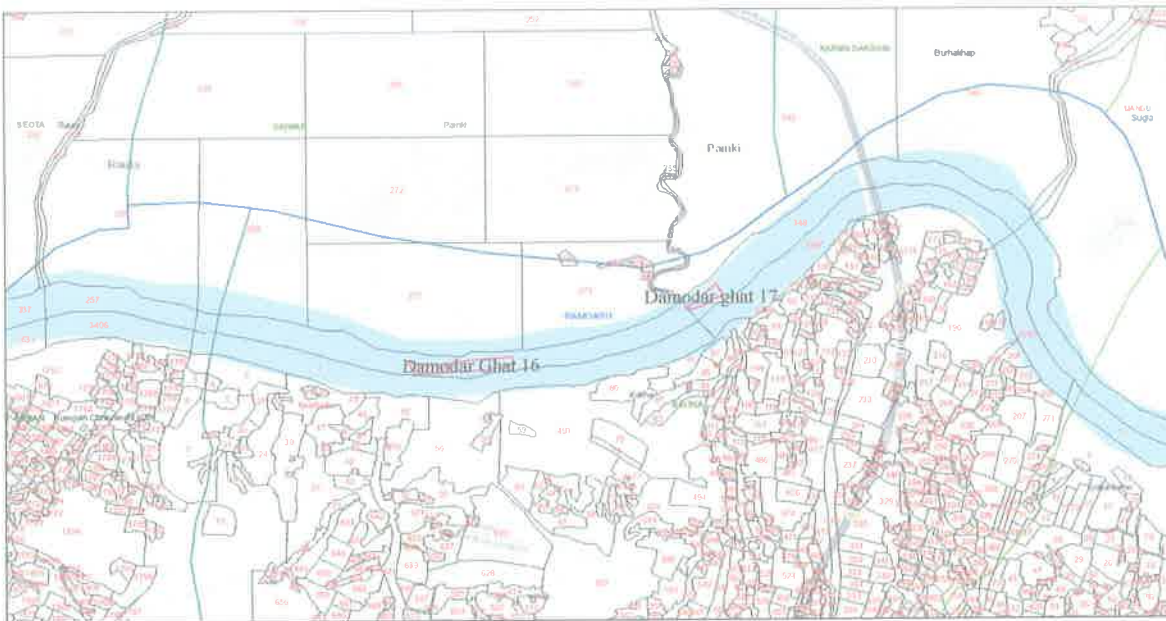


Equal Area, HERE, Garmin, USGS, METI/NASA, Memorial Information System

Directorate of Geology, Government of Jharkhand



### Web AppBuilder for ArcGIS



November 30, 2022

- Ramgarh
- Panchayat Boundary
- District Boundary
- Village Boundary
- Block Boundary
- State Boundary



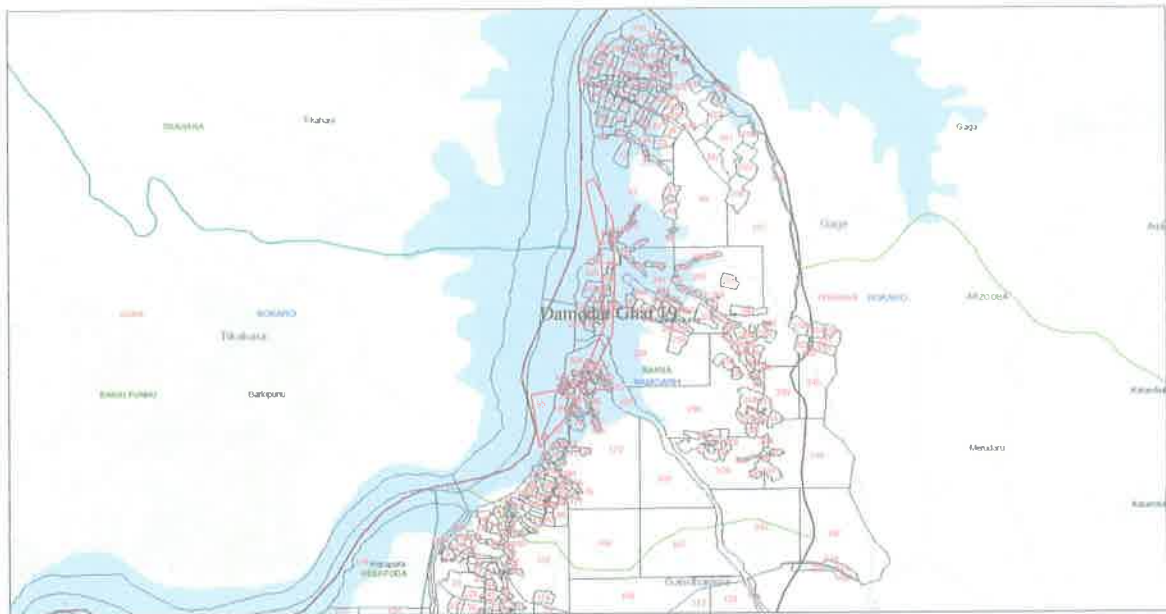
ESRI, HERE, Garmin, USGS, METAWASA, Mapbox, Information System

Directorate of Geology, Government of Jharkhand






Web AppBuilder for ArcGIS



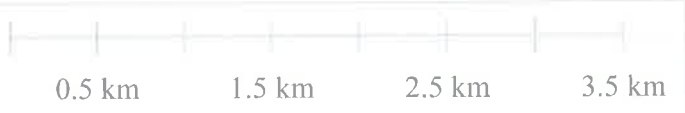
November 30, 2022

- Ramgarh
- Panchayat Boundary
- District Boundary
- Village Boundary
- Block Boundary
- State Boundary



Proj: NAD83, Datum: UTM, CRS: NAD83, Spher: International  
System

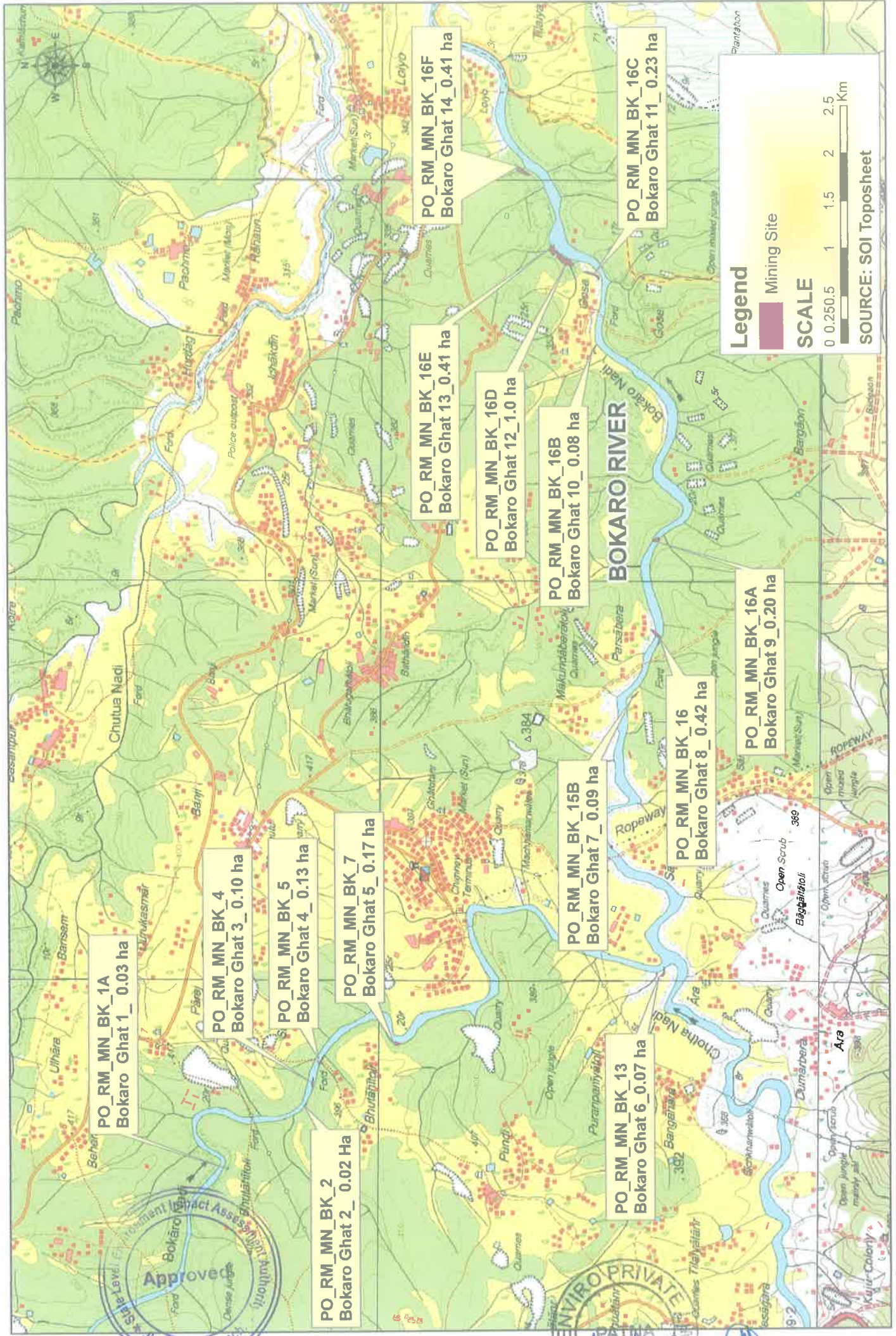
Directorate of Geology, Government of Jharkhand

**Plate E**  
**(Composite Map of Bokaro River)**



# RAMGARH DISTRICT- BOKARO RIVER COMPOSITE MAP



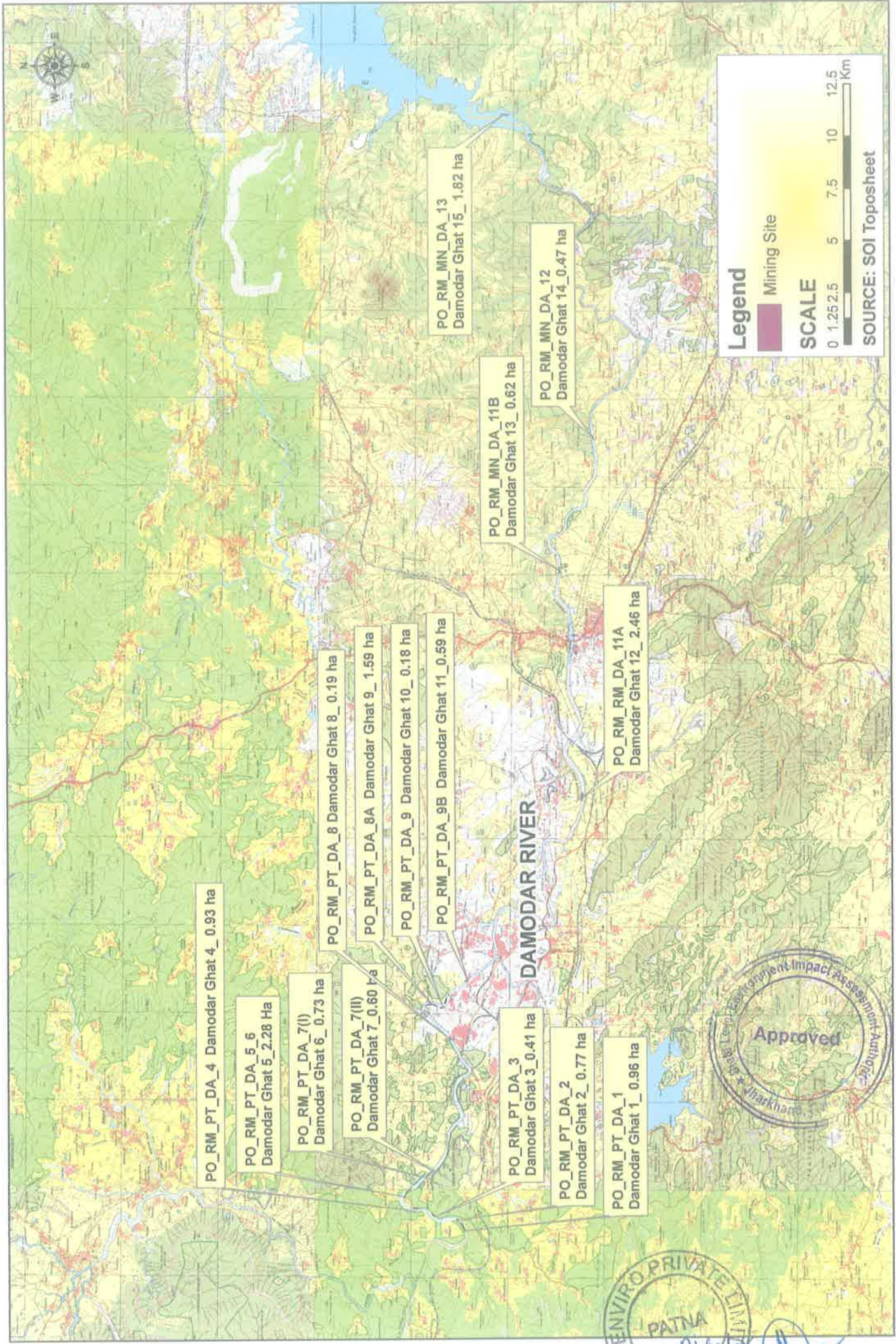
Approved  
Bokaro District Assessment  
Jharkhand, Ramgarh

ENVIRO PRIVATE LIMITED  
Amit Akhtar

**Plate F**  
**(Composite Map of Damodar River)**



# RAMGARH DISTRICT- DAMODAR RIVER COMPOSITE MAP

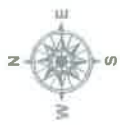


**Plate G**  
**(Composite Map of Ramgarh district)**

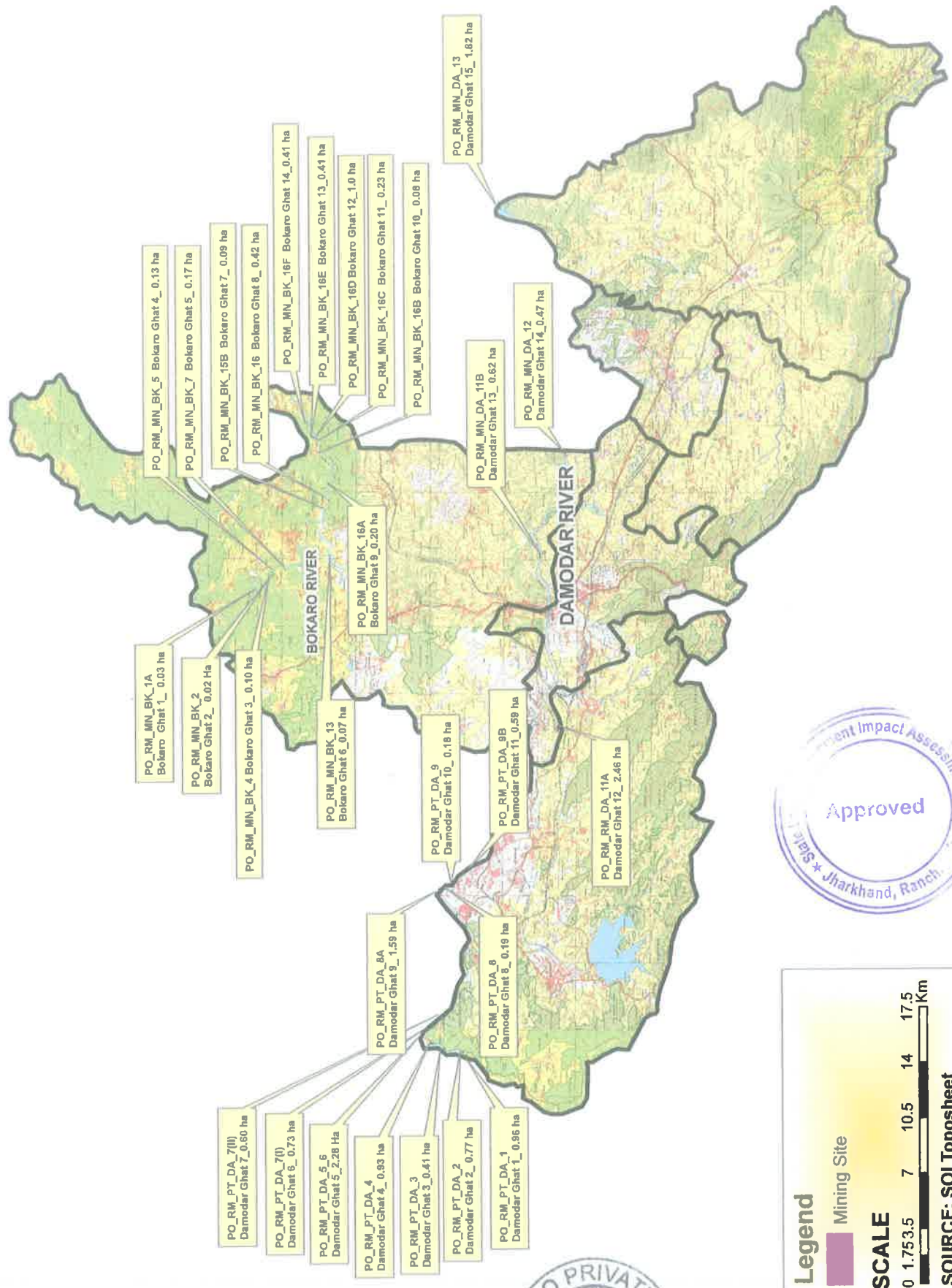


# RAMGARH DISTRICT- COMPOSITE MAP

86°0'0" E



86°0'0" E



**Legend**

- Mining Site

**SCALE**

0 1.753.5 7 10.5 14 17.5 Km

**SOURCE: SOI Toposheet**



## To whom it may concern

This is to certify that all sitting criteria/provisions of JSPCB & SEIAA, JHARKHAND has been complied.

As per JSPCB notification no. B-21, Ranchi dated 16/08/13.

Sl. No	Minimum distance from	Distance (in meter)
1	NH	100
2	SH	100
3	Distance metal road	50
4	Railway line	100
5	River	100
6	Any other river	100
7	Habitation	200
8	Forest/Forest land	400

As per 58th-MOM-of-SEIAA Jharkhand

III. Revised format for PP to get the following information/certification from Circle Officer:

क्रम सं०	निर्धारित बिन्दु	हाँ/नहीं
1.	क्या आवेष्टित भूमि को कोई एवं खनिजायुक्त यथा रजिस्टर-III में जंगल हाऊस के रूप में दर्ज है?	
2.	क्या 500 मीटर की दूरी के अंदर कोई मानव बसावट (Habitation) स्थित है?	
3.	क्या 500 मीटर की दूरी के अंदर कोई जलयोजन निकाय (Dam/Reservoir) स्थित है?	
4.	क्या 500 मीटर की दूरी के अंदर कोई नदी (River) स्थित है?	
5.	क्या 500 मीटर की दूरी के अंदर कोई शैक्षणिक संस्थान (Educational Institute) स्थित है?	
6.	क्या 500 मीटर की दूरी के अंदर कोई हॉस्पिटल (Hospital) स्थित है?	
7.	क्या 10 कि०मी० की पारिधि में कोई अंतरराज्यीय (Interstate) सीमा है?	
8.	क्या 500 मीटर की दूरी के अंदर कोई राष्ट्रीय स्मारक/पुरातात्विक (Monuments/Archaeological) स्थल के स्थल स्थित है?	

As per 67th-MOM-of-SEIAA Jharkhand

IV. Revised format for project proponent to get the following information / certification from Divisional Forest Officer concerned :-

क्रम सं०	निर्धारित बिन्दु	हाँ / नहीं
1.		3.
1.	क्या परियोजना स्थल से अवर्जित वन / संरक्षित वन भूमि की दूरी 250 मी० है?	
2.	क्या परियोजना स्थल No Mining Zone अंतर्गत आता है?	
3.	क्या परियोजना स्थल से 10 किलो मीटर की दूरी के अंदर कोई से जल संचय है?	
4.	क्या परियोजना स्थल से 10 किलो मीटर की दूरी के अंदर कोई संव्यवस्थ एव वन विधिवता क्षेत्र है?	
5.	क्या परियोजना स्थल से 10 किलो मीटर की दूरी के अंदर कोई इको सेंसिटिव जोन (Eco Sensitive Zone) है?	
6.	क्या आवेष्टित परियोजना ESZ के अंतर्गत प्रकीर्ण क्षेत्रों में आता है अथवा नहीं?	



District Mining officer

Ramgarh

**Distance from Bridge from Proposed Ghat of Ramgarh District**

SL No.	River	Name of Proposed Ghat	Area (Ha)	Distance From Bridge
1	Damodar	PO_RM_PT_DA_4 Damodar Ghat 4	0.93	1.26 Km
2		PO_RM_PT_DA_5_6 Damodar Ghat 5	2.28	2.0 Km
3		PO_RM_RM_DA_11A Damodar Ghat 12	2.46	509 m
4		PO_RM_MN_DA_11B Damodar Ghat 13	0.62	1.13 Km
5		PO_RM_MN_DA_13 Damodar Ghat 15	1.82	1.36 Km
6.	Bokaro	PO_RM_MN_BK_16B Bokaro Ghat 10	0.08	There is no bridge within 1 Km radius.

**PO\_RM\_PT\_DA\_4 (Damodar Ghat 4)**

**River: Damodar**



**PO\_RM\_PT\_DA\_5\_6 (Damodar Ghat 5)**

**River: Damodar**



**PO\_RM\_RM\_DA\_11A (Damodar Ghat 12)**

**River: Damodar**



**PO\_RM\_MN\_DA\_11B (Damodar Ghat 13)**

**River: Damodar**



**PO RM MN DA 13 (Damodar Ghat 15)**

**River: Damodar**



**PO\_RM\_MN\_BK\_16B (Bokaro Ghat 10)**

**River: Bokaro**

