



DISTRICT SURVEY REPORT

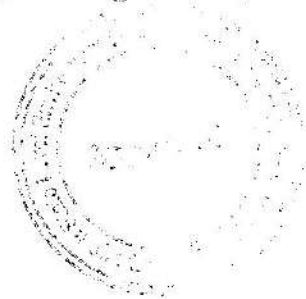
FOR

'SAND MINING OR RIVER-BED MINING'

IN

BOKARO DISTRICT OF JHARKHAND

As per Gazette Notification No. - S.O. - 3611 (E), 25th July 2018 by MoEF & CC
& Enforcement & Monitoring Guidelines for Sand Mining 2020 by MoEF & CC



PREPARED BY:



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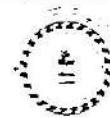
DISTRICT SURVEY REPORT FOR
SAND MINING OR RIVER-BED MINING IN
BOKARO DISTRICT OF JHARKHAND



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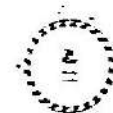
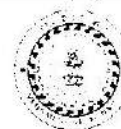


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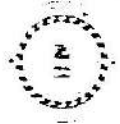


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2	BO_Z5_DAM_4	2.40
3	BO_Z6_DAM_5	8.49
4	BO_Z7_DAM_6	0.78
5	BO_Z8_DAM_7	2.73
6	BO_Z25_BOK_8	2.10
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4	BO_Z7_DAM_6	B4
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4	BO_Z7_DAM_6	C4
5	BO_Z8_DAM_7	C5
6	BO_Z25_BOK_8	C6
7	BO_Z26_BOK_9	C7
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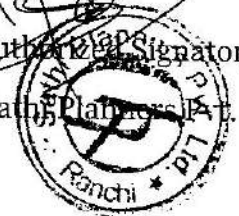
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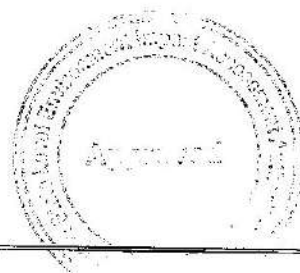
The District Survey Report (DSR) for Sand Mining or River-bed Mining in Bokaro District of Jharkhand State has been prepared by Sathi Planners Private Limited a QCI (NABET) accredited consultancy firm (Certificate No.: NABET/EIA/2225/RA0264).

District Survey Report Sand Mining or River-bed Mining in Bokaro District is prepared under;

- ✓ MoEF & CC, GoI Notification No. - S.O. 141 (E) dated 15/01/2016
- ✓ Sustainable Sand Mining Management Guidelines, 2016
- ✓ Sand Mining Policy of Government of Jharkhand, 2017
- ✓ MoEF & CC, GoI Notification No. - S.O. 3611 (E) dated 25/07/2018
- ✓ Enforcement and Monitoring Guidelines for Sand Mining, 2020
- ✓ Jharkhand Minor Mineral Concession Rule, 2021

The information mentioned in the District Survey Report for Sand Mining or River-bed Mining in Bokaro District of Jharkhand State are correct to the best of our knowledge.


Authorized Signatory
M/s Sathi Planners Pvt. Ltd.






Recommended by Sub-Divisional Committee and Deputy Commissioner, Bokaro

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Bokaro

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District Mining Officer
Bokaro

for *[Signature]*
Executive Engineer, Irrigation
Bokaro

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Bermo (Tenughat)

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Chas

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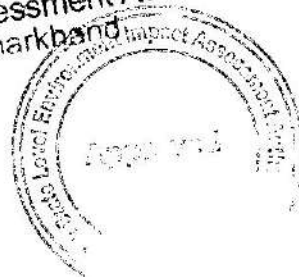
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Deputy Commissioner

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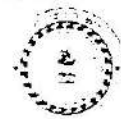
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District Mining Officer
Bokaro

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1. PREFACE

MoEF & CC has published Notification No. - 3611 (E), dated 25th July 2018 regarding inclusion of the "Minerals Other than Sand" and format for preparation of the District Survey Report (DSR) for Sand mining or River-bed mining 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. This DSR has been prepared in conformity with the S.O. - 3611 (E) and other Sand mining guidelines published by MoEF & CC time to time as well as the requirement specified in Jharkhand State Sand Mining Policy 2017.

The purpose of DSR is to identify the mineral potential areas where mining can be allowed; and also to distinguish areas where mining will not be allowed due to proximity to infrastructural structures and installations, areas of erosion. The DSR would also help to estimate the annual rate of replenishment wherever applicable.

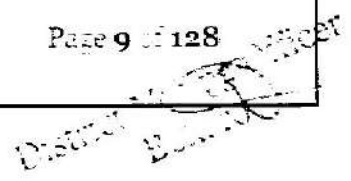
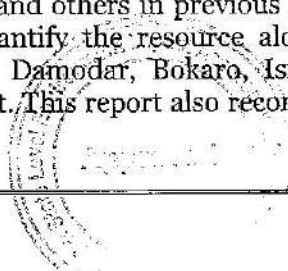
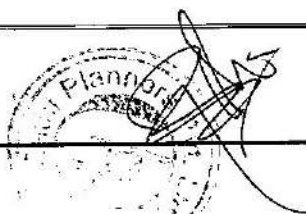
Field data collection is an integral part of DSR preparation. This report has been prepared with the holistic approach and data provided by the District Mining Office and study of Satellite imageries. The field data collection has been carried out post-monsoon season and a DSR with all updated data has been prepared.

Bokaro district is one among 24 districts of Jharkhand State. Bokaro District administrative head quarter is Bokaro Steel City. It is located 112 km west towards State Capital Ranchi. Bokaro district population is 2061918. It is 5th largest district in the State by population. It is located at Latitude 23° 24'27" N to 23° 57'24" N and Longitude 85° 34'30" E to 86° 29'10" E. It falls under Survey of India toposheet Nos. - 73 E/9, E/10, E/13, E/14, 73 I/1, I/2, I/5 and I/6. Bokaro district is sharing border with Dhanbad district to the East, Ramgarh district to the West, Purulia district to the South. It is sharing border with West Bengal State to the East. Bokaro district occupies an area of approximately 2861 km². It lies between the '273 meters to 158 meters' elevation range. This district belongs to Hindi belt of India. Hindi is the local language here. Also people speaks Santhali. Bokaro district is divided into 9 Blocks, 252 Panchayats, 1409 Villages. Kasmar block is the smallest Block by population with 76221 population. Chas block is the biggest block by population with 698625 populations. Bokaro district's total population is 2061918. According to Census 2011, males are 1076158 and females are 985760. Literate people are 1364165 among total. Its total area is 2861 km². It is the 5th largest district in the state by population, but 13th largest district in the State by area, 221st largest district in the Country by population, 5th highest district in the State by literacy rate, 305th highest district in the Country by literacy rate. Its literacy rate is 73.48.

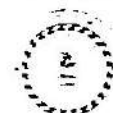
The Damodar River is the most important River in the district which flows from West to East in the Central part of the district. The major tributaries of Damodar are Konar and Jamuniya. The minor tributaries of the Damodar River are Isri, Gobai, Tasharkuan, Kadwa, Khanju etc.

District headquarter Bokaro Steel City is well connected by road. Bokaro Steel City, Phusro, Chandrapura, Gumia, Tenu Dam-cum-Kathhara are the cities in this district having road connectivity to major towns and remote villages. Bokaro Steel City is about 112 km by road to Ranchi (Capital of Jharkhand). Some of the Railway Stations in district are Bokaro Steel City, Chandrapura Junction, Pundag, Phusro, Radhagaon, Bokaro Thermal, Bhandaridah, Gumia etc. which connects most of the towns and villages in the district.

The occurrence of River-bed Sand and Gravel in the district has been established by Department of Mines and Geology, Government of Jharkhand and others in previous instances. It requires further systematic and scientific approach to quantify the resource along with their grade assessment. Sand mining is mainly practiced in Damodar, Bokaro, Isri, Gobai, Jamuniya, Tasharkuan, Konar, Khusa Rivers of Bokaro district. This report also recommends to undertake



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detail exploration program to assess the mineral occurrences in the major rivers of the district and should have a proper development and production plan for the specified minerals.

Compliance of "Enforcement & Monitoring Guidelines for Sand Mining, January 2020 by MoEF & CC":

Clause No.	Particulars	Status/Compliance
a	District Survey Report for Sand mining shall be prepared before the auction/e-auction/grant of the mining lease/Letter of Intent (LoI) by Mining Department or Department dealing the mining activity in respective States.	Noted.
b	In order to make the inventory of River-bed material, a detailed survey of the district needs to be carried out, to identify the source of River-bed material and alternative source of Sand (M-Sand). The source will include Rivers, de-siltation of reservoir/dams, Patta Land/Khatedari Land, M-Sand etc.	Complied with and explained in filled Annexure I, II & V of EMGSM 2020.
c	District Survey Report is to be prepared in such a way that it not only identifies the mineral-bearing area but also define the mining and no mining zones considering various environmental and social factors.	Complied while making the ghats.
d	Identification of the source of Sand & M-Sand. The sources may be from Rivers, Lakes, Ponds, Dams, De-silting locations, Patta land/Khatedari land. The details in case of Rivers such as [name, length of River, type (Perennial or Non-Perennial), Villages, Tehsil, District], in case of Lakes, Ponds, Dams, De-silting locations [Name, owned/maintained by (State Govt./PSU), area, Villages, Tehsil, District] in case of Patta land/Khatedari land [Owner Name, Sy. No., Area, Agricultural/Non-Agricultural, Villages, Tehsil, District], in case of M-Sand Plant [Owner Name, Sy. No., Area, Quantity/Annum, Villages, Tehsil, District], needs to be recorded.	No M-Sand source are available in the district. All the required details of Rivers are mentioned in desired format in Chapter 12 and filled Annexure I,II & V of EMGSM 2020.
e	Defining the sources of Sand/M-Sand in the district is the next step for identification of the potential area of deposition/aggradation wherein mining lease could be granted. Detailed survey needs to be carried out for quantification of minerals. The purpose of mining in the river bed is for channelization of rivers so as to avoid the possibility of flooding and to maintain the flow of the Rivers. For this, the entire River stretch needs to be surveyed and original ground level (OGL) to be recorded and area of aggradation/deposition needs to be ascertained by comparing the level difference	Detailed Survey for capturing OGL has been done using UAV Drone/DGPS. Area of deposition has been identified accordingly. All Sand ghats boundaries has been fixed after leaving the 1/4 th of the River width for bank's safety. Tonnage factor of sand has been calculated by analyzing sand samples from NABL accredited Laboratory.

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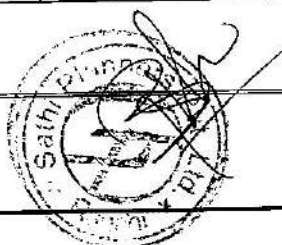
	between the outside River-bed OGL and water level. Once the area of aggradation/deposition are identified, then the quantity of River-bed material available needs to be calculated. The next step is channelization of the River-bed and for this central 3/4 th part of the River, width needs to be identified on a map. Out of the 3/4 th part area, where there is a deposition/aggradation of the material needs to be identified. The remaining 1/4 th area needs to be kept as no mining zone for the protection of banks. The specific gravity of the material also needs to be ascertained by analyzing the sample from a NABL accredited lab. Thus, the quantity of material available in metric ton needs to be calculated for mining and no mining zone.	
f	The permanent boundary pillars need to be erected after identification of an area of aggradation and deposition outside the bank of the river at a safe location for future surveying. The distance between boundary pillars on each side of the bank shall not be more than 100 meters.	Boundary pillars will be fixed while fixation of the mining lease boundary subsequent to district level verification.
g	Identifying the mining and no mining zone shall follow with defining the area of sensitivity by ascertaining the distance of the mining area from the protected area, forest, bridges, important structures, habitation etc. and based on the sensitivity, the area needs to be defined in sensitive and non-sensitive area.	No mining zone has been identified by measuring distance from bridges and permanent structures. Also, NOC from the concerned DFO & CO has been obtained for the potential area as per statutory norms. Enclosed as Annexures.
h	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 5 years also needs to be considered.	Complied.
i	It is suggested that as far as possible the sensitive areas should be avoided for mining, unless local safety condition arises. Such deviation shall be temporary & shall not be a permanent feature.	Agreed.
j	The final area selected for the mining should be then divided into mining lease as per the requirement of State Government. It is suggested the mining lease area should be so selected as to cover the entire deposition area. Dividing a large area of deposition/aggradation into smaller mining leases should be avoided as it leads to loss of mineral and indirectly promote illegal mining.	Entire deposit area has been marked on map as Zones instead of small parts. Sand ghat has been so prepared after leaving statutory distance & covering the entire deposit area within zone.



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k	Cluster situation shall be examined. A cluster is formed when one mining lease of homogenous mineral is within 500 meters of the other mining lease. In order to reduce the cluster formation mining lease size should be defined in such a way that distance between any two clusters preferably should not be less than 2.5 km. Mining lease should be defined in such a way that the total area of the mining leases in a cluster should not be more than 10 Ha.	Since, the sand deposit area has been divided into zones, formation of contiguous cluster has been reduced. Zone boundaries are fixed in such a way that it discontinues wherever there is bridge or no sand deposition or confluence. Also, individual sand ghat area has been kept as large as possible in order to reduce the formation of cluster through artificial break of large area.
l	The number of a contiguous cluster needs to be ascertained. Contiguous cluster is formed when one cluster is at a distance of 2.5 km from the other cluster.	Due to formation of Sand deposit zone, no contiguous cluster formed.
m	The mining outside the River-bed on Patta land/Khatedari land be granted when there is possibility of replenishment of material. In case, there is no replenishment then mining lease shall only be granted when there is no River-bed mining possibility within 5 KM of the Patta land/Khatedari land. For government projects, mining could be allowed on Patta land/Khatedari land but the mining should only be done by the Government agency and material should not be used for sale in the open market. Cluster situation as mentioned in para k above is also applicable for the mining in Patta land/Khatedari land.	Sand deposit area has been identified within River-bed only with proof of replenishment. No Patta/Khatedari land has been proposed for mining.
n	The State Government should define the transportation route from the mining lease considering the maximum production from the mines as at this stage the size of mining leases, their location, the quantity of mineral that can be mined safely etc. is available with the State Government. It is suggested that the transportation route should be selected in such a way that the movement of trucks/tippers/tractors from the villages having habitation should be avoided. The transportation route so selected should be verified by the State Government for its carrying capacity.	Transportation Route Map has been prepared for each Sand Ghat considering these factors and duly approved by competent authority. Attached as Map No. - D1 to D7.
o	Potential site for mining having its impact on the forest, protected area, habitation, bridges etc., shall be avoided. For this, a sub-divisional committee may be formed which after the site visit shall decide its suitability for mining.	Sub-Divisional Committee has been visited the Sand Ghats and recommended the same. (Photographs with details are enclosed)

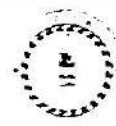


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p	<p>Public consultation - The Comments of the various stakeholders may be sought on the list of mining lease to be auctioned. The State Government shall give an advertisement in the local and national newspaper for seeking comments of the general public on the list of mining lease included in the DSR. The DSR should be placed in the public domain for at least one month from the date of publication of the advertisement for obtaining comments of the general public. The comments so received shall be placed before the sub-divisional committee for active consideration. The final list of sand mining areas [leases to be granted on riverbed & Patta land/Khatedari land, desiltation location (ponds/lakes/dams), M-Sand Plants (alternate source of sand)] after the public hearing needs to be defined in the final DSR.</p>	<p>The DSR has been kept in public domain for one month after publication of advertisement in local newspapers. Attached as Annexure.</p>
q	<p>The LOI should not be granted for mining area falling on both riverbed and outside riverbed. Therefore, in the same lease, both types of area should not be included.</p>	<p>Shall be considered while issuing the LOI.</p>

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2. INTRODUCTION

The District Survey Report of Bokaro district has been prepared as per the guidelines of Ministry of Environment Forest & Climate Change (MoEF & CC), Government of India vide Notification S.O. - 1533(E) dated 14th Sept. 2006 and subsequent MoEF & CC Gazette Notification regarding Enforcement and Monitoring Guidelines for Sand Mining in January 2020. This report shall guide systematic and scientific utilization of natural resources, so that present and future generation may be benefitted at large. Prior to this, MoEF & CC had published Gazette Notification No. - S.O. 3611(E), dated 25th July 2018 and recommended the format for District Survey Report of Sand mining or River-bed mining.

The main objective of DSR is 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. The DSR would also help to calculate the annual rate of replenishment wherever applicable and allow time for replenishment.

The Objectives of the District Survey Report are as following:

1. Identification and Quantification of mineral resource and its optimal utilization.
2. To regulate the Sand & Gravel mining in the Country, identification of site specific end-use consumers and reduction in demand & supply gaps.
3. Use of information technology (IT) & latest scientific method of mining for surveillance of the Sand mining at each step.
4. District Survey Report shall enable Environmental Clearance for cluster of Sand & Gravel mining. It shall assist concerned Department during post Environmental Clearance Monitoring.
5. To control the instance of illegal mining.
6. To control the flood in the area.
7. To maintain the livelihood of aquatic habitat.
8. To protect the incursion of ground water in the area. Limiting extraction of material in floodplains to an elevation above the water table generally disturbs more surface area than allowing extraction of material below the water table.
9. To keep accumulated data records viz. Details of mineral resource, potential area, lease, approved mining plan, co-ordinates of a district at one place.
10. To maintain the records of revenue generation.
11. In-stream extraction of gravel from below the water level of a stream generally causes more changes to the natural hydrologic processes than limiting extraction to a reference point above the water level.
12. In-stream extraction of gravel below the deepest part of the channel generally causes more changes to the natural hydrologic processes than limiting extraction to a reference point above the thalweg.
13. Excavating Sand and Gravel from a small straight channel with a narrow floodplain generally will have a greater impact on the natural hydrologic processes than excavations on a braided channel with a wide floodplain.
14. Extracting Sand and Gravel from a large River or Stream will generally create less impact than extracting the same amount of material from a smaller River or Stream.
15. A concise guideline can be framed considering the point discussed in the DSR for Sand mining or River-bed mining in the district.

The District Survey Report (DSR) is comprised of 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. are collected from District Mining Office.



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2.1 Statutory Framework:

The below table has mentioned the requirement of District Survey Report and its year wise modification;

Table 2.1: Requirement of District Survey Report & its year-wise modification

Year	Particulars
1994	The Ministry of Environment, Forest & Climate Change (MoEF & CC) published Environmental Impact Assessment Notification 1994 which is only applicable for the Major minerals having mining lease area more than 5 Ha.
2006	In order to cover the Minor minerals also into the preview of EIA, the MoEF & CC issued EIA Notification S.O. - 1533 (E), dated 14 th September 2006, made mandatory to obtain Environmental Clearance for both Major & Minor mineral having mining lease area more than 5 Ha.
2012	Further, Hon'ble Supreme Court wide order dated 27 th 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 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 13 th 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.
2018	MoEF & CC published Gazette Notification - S.O. 3611(E), dated 25 th July 2018 and recommended the format for District Survey Report for Sand mining or River-bed mining. 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".
2020	Enforcement & Monitoring Guidelines for Sand Mining (EMGSM) 2020 has been published with modifying the 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.

➤ Enforcement & Monitoring Guidelines for Sand Mining 2020 by MoEF&CC:

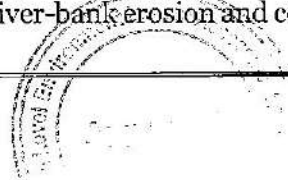
The main objective of the Guideline is to ensure sustainable Sand mining and environment friendly management practices in order to restore and maintain the ecology of River and other Sand sources.

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

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- d) Abandoned stream channels on terrace and inactive flood plains be preferred rather than active channels and their deltas and flood plains. Stream should not be diverted to form inactive channel.
- e) Layers of Sand and Gravel which could be removed from the River-bed shall depend on the width of the River and replenishment rate of the River.
- f) Sand and Gravel shall not be allowed to be extracted where erosion may occur, such as at the concave bank.
- g) Segments of Braided River System should be used preferably falling within the lateral migration area of the River regime that enhances the feasibility of sediment replenishment.
- h) Sand and Gravel shall not be extracted up to a distance of 1 kilometre (1 km) from major bridges and highways on both sides, or five times (5x) of the span (x) of a bridge/public civil structure (including water intake points) on up-stream side and ten times (10x) the span of such bridge on down-stream side, subjected to a minimum of 250 meters on the upstream side and 500 meters on the downstream side.
- i) The sediment sampling should include the bed material and bed material load before, during and after the extraction period. Develop a sediment rating curve at the upstream end of the potential reach using the surveyed cross-section. Using the historical or gauged flow rating curve, determine the suitable period of high flow that can replenish the extracted volume. Calculate the extraction volume based on the sediment rating curve and high flow period after determining the allowable mining depth.
- j) Sand and Gravel could be extracted from the downstream of the Sand bar at River bends. Retaining the upstream one to two-thirds of the bar and riparian vegetation is accepted as a method to promote channel stability.
- k) The flood discharge capacity of the River could be maintained in areas where there is a significant flood hazard to existing structures or infrastructure. Sand and Gravel mining may be allowed to maintain the natural flow capacity based on surveyed cross-section history. Alternatively, off-channel or floodplain extraction is recommended to allow Rivers to replenish the quantity taken out during mining.
- l) The Piedmont Zone (Bhabhar area) particularly in the Himalayan foothills, where River-bed material is mined, this Sandy-gravelly track constitutes excellent conduits and holds the greater potential for groundwater recharge. Mining in such areas should be preferred in locations selected away from the channel bank stretches.
- m) Mining depth should be restricted to 3 meters and distance from the bank should be $\frac{1}{4}$ th of river width and should not be less than 7.5 meters.
- n) The borrow area should preferably be located on the riverside of the proposed embankment because they get silted in the course of time. For low embankment, less than 6m in height, borrow area should not be selected within 25m from the toe/heel of the embankment. In the case of the higher embankment, the distance should not be less than 50m. In order to obviate the development of flow parallels to the embankment, crossbars of width eight times the depth of borrow pits spaced 50 to 60-meter center-to-center should be left in the borrow pits.
- o) Demarcation of mining area with pillars and geo-referencing should be done prior to the start of mining.
- p) A buffer distance/un-mined block of 50 meters after every block of 1000 meters over which mining is undertaken or at such distance as may be the directed/prescribed by the regulatory authority shall be maintained.
- q) A buffer distance/unmined block of 50 meters after every block of 1000 meters over which mining is undertaken or at such distance as may be the directed/prescribed by the regulatory authority shall be maintained.
- r) River-bed Sand mining shall be restricted within the central $\frac{3}{4}$ th width of the River/rivulet or 7.5 meters (inward) from River banks but up to 10% of the width of the River, as the case may be and decided by regulatory authority while granting environmental clearance in consultation with irrigation department. Regulating authority while regulating the zone of River-bed mining shall ensure that the objective to minimize the effects of River-bank erosion and consequential channel



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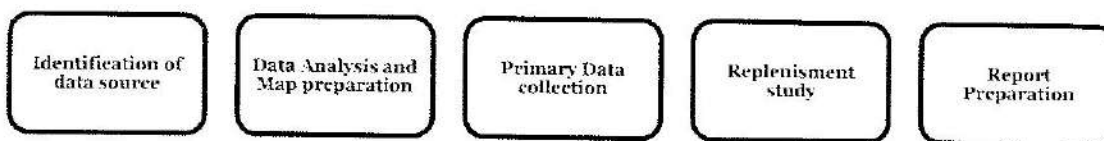
migration are achieved to the extent possible. In general, the area for removal of minerals shall not exceed 60% of the mine lease area, and any deviation or relaxation in this regard shall be adequately supported by the scientific report.

s) Mining Plan for the mining leases(non-government) on agricultural fields/Patta land shall only be approved if there is a possibility of replenishment of the mineral or when there is no River-bed mining possibility within 5 KM of the Patta land/Khatedari land. For government projects mining could be allowed on Patta land/Khatedari land but the mining should only be done by the Government agency and material should not be used for sale in the open market. The minerals reserve for River-bed area is calculated on the basis of maximum depth of 3 meters and margins, width and other dimensions as mentioned in para(s) above. The area multiplied by depth gives the volume and volume multiplied with bulk density gives the quantity in Metric Ton. In case of River-bed, mineable material per hectare area available for actual mining shall not exceed the maximum quantity of 60,000 MT per annum.

➤ The Ministry of Environment Forest & Climate Change formulated the Sustainable Sand Management Guidelines 2016 which focuses on the management of Sand mining in the country. But in the recent past, it has been observed that apart from management and systematic mining practices there is an urgent need to have a guideline for effective enforcement of regulatory provision and their monitoring. Section 23 C of MMDR 1957 empowered the State Government to make rules for preventing illegal mining, transportation and storage of minerals. But in the recent past, it has been observed that there was large number of illegal mining cases in the Country and in some cases, many of the officers lost their lives while executing their duties for curbing illegal mining incidence. The illegal and uncontrolled illegal mining leads to loss of revenue to the State and degradation of the environment.

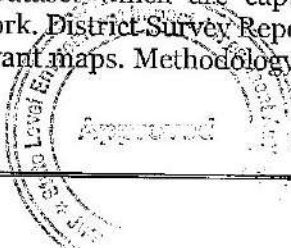
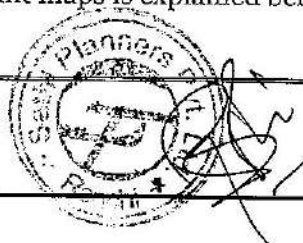
2.2 Methodology of DSR Preparation:

The data related to district profile, geology, mineralization, mining activity are sketchy and disjointed. There are multiple data sources, which are in the public domain, as well as in Government website. To prepare District Survey Report, need to collate all the available databases on these regards. A comprehensive and a meaningful interpretable database created, which would be necessary to demonstrate the district overview. Workflow for the DSR job is as follows.



Data source Identification: District Survey Report has been prepared based on the Primary data base collected from different sources. The data sources which are used in DSR are mostly Government published data or the published report in reputed journal. District profile has been prepared based on the District Census 2011. Mining lease details and the revenue generated from Minor minerals has been prepared based on available data from District Mining Office of the district. Satellite image has been used for map preparation related to physiography and land utilization pattern of the district.

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.



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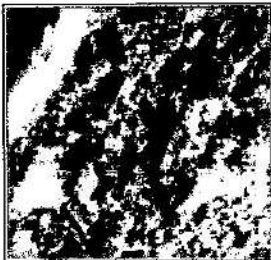
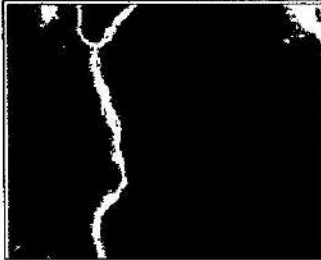



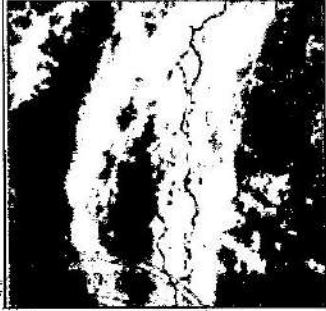
Land Use and Land Cover Map:

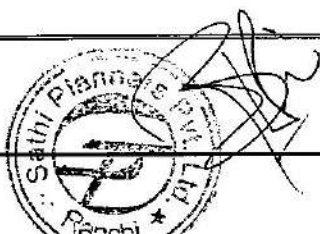
Land Use and Land Cover classification is a complex process and requires consideration of many factors. The major steps of image classification may include determination of a suitable classification system via Visual Image Interpretation, selection of training samples, Satellite image (FCC - False Colour Composition) 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.

Table 2.2: Pictorial Descriptions of Physiographic Classification

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



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Settlement – Area with Cyan colour including geometrical shape has been recognised as Settlement Area.

Water Bodies – Dark Blue colour has been classified as Water Bodies.

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 Composition) 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.

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)** during March 2022 and October 2022.
- Data has been geo-referenced using GIS software.
- Digitization of Block boundary, District Boundary, State Boundary, International 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.

Transportation Map:

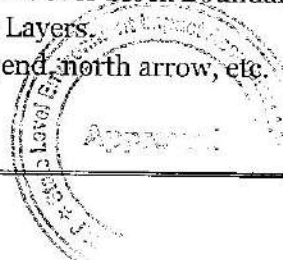
- Raw Data collected from **National Informatics Centre (NIC Website)** during March 2022 and October 2022.
- Data has been geo-referenced using GIS software.
- Digitization of Block boundary, District Boundary, State Boundary, International Boundary, and District Headquarter, sub-district Headquarter, 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)** during March 2022 and October 2022.
- Data has been geo-referenced using GIS software.
- Block Boundary, District Boundary, State Boundary, International Boundary & 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.

Earthquake 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.



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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** during August 2022.
- 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.

Primary Data Collection: Field data collection is an integral part of DSR preparation. This report has been prepared with the holistic approach and data provided by the District Mining Office and study of Satellite imageries. The field data collection has been carried out post-monsoon season and a DSR with all updated data has been prepared.

Replenishment Study: One of the principal causes of environmental impacts from in-stream mining is the removal of more sediment than the system can replenish. It is therefore need of replenishment study for River-bed Sand in order to nullify the adverse impacts arising due to excessing sand extraction. The annual rate of replenishment carried out on every River of the district to have proper assessment of the sand reserve for mining purposes.

Four times Physical survey is to be carried out by DGPS/Total Station to define the topography, contours and offsets of the River-bed. The surveys should clearly depict the important attributes of the stretch of the river and its nearby important civil and other feature of importance. This information will provide the eligible spatial area for mining. However, this DSR has been prepared on a very short period of time. Primary data to be taken into use in subsequent phases.

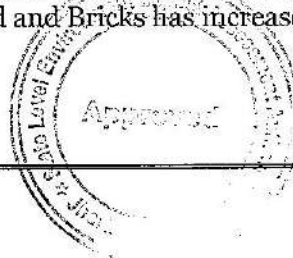
Report Preparation: District Survey Report has been prepared to fulfill the purpose of identification of mining area for both major and minor mineral and their impact on environment. Report provides details of the Major and Minor mineral potential zones. Assessing mining prospect with respect to Minor mineral (Sand), replenishment study details includes in the report. Report also provides the socio environmental study for establishing mines of Minor minerals in the district.

Demand and Utilization of Sand:

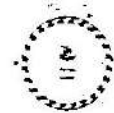
Sand is a multi-purpose construction material. It is known as one of the three fundamental ingredients in concrete. The composition of Sand is diverse. Mostly Sand is made of Silica which is a common element. It can also come from another source of minerals like Quartz, Limestone, or Gypsum.

From beds to flood plains to coastlines, we can find the Sand at almost everywhere. The robustness of Sand has played a significant role in everyday life. We use Sand practically every other day.

Sand extraction from River-beds and Brick Earth mining for making raw bricks 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 both Sand and Bricks has increased manifold.



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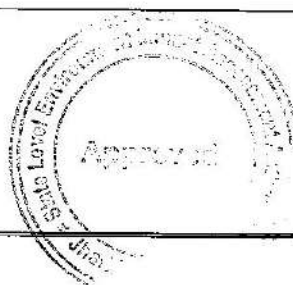
The extraction of Sand is carried out either manually or through semi-mechanized method of mining. The depth of mining for both River-bed Sand and Brick Earth is restricted due to statutory provision in the regulations pertaining to conservation and development of minor minerals.

River Sand mining is a common practice as habitation concentrates along the Rivers and the mining locations are preferred near the markets or along the transportation route, for reducing the transportation cost. In the real world, there are a lot of activities where we can find uses of Sand. Followings are the common Sand uses -

1. While bunging 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 refrain 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.
10. Sand can light a path by filling mason jars with Sand and tea light which is another in expensive 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.
15. The usual bricks formulated of clay only is way weaker and lesser in weight than blocks made of clay mixed with Sand.

▪ **Chronology:**

Sl. No.	Time Period	Activity
1	January 2022	Pre Monsoon study of Sand deposit has been carried out by the District Mining Office.
2	October 2022	Work for Preparation of DSR has been allotted to the concerned NABET accredited Consultants.
3	October 2022	Post-Monsoon survey as well as study of Satellite imageries has been conducted.
4	November 2022	Softcopy of Draft DSR has been uploaded to the NIC portal for review.
5	January 2023	Incorporating all the suggestions received and field verification by the Sub-Divisional Committee, DSR has been finalized.
6	April 2023	DSR has been placed in front of the Hon'ble SEAC Jharkhand for approval.





3. GENERAL PROFILE OF THE DISTRICT

3.1 General Information:

The district Bokaro was created on 1st April 1991 by taking out Chas and Chandankiyari C.D. Blocks of Dhanbad District and the entire Bermo Sub-division of Giridih District and then merging them to form a new district. Bokaro district is bounded on the east by Dhanbad district and some portion of West Bengal State, on the west by Ramgarh district, on the south by Purulia district of West Bengal and on the north by parts of Giridih, Hazaribag and Dhanbad districts. The district extends between Latitude 23° 24'27" N to 23° 57'24" N and Longitude 85° 34'30" E to 86° 29'10" E. It is accessible through National Highway NH-143 & NH-18. Bokaro town is located about 100 km from Ranchi. The district is located at an elevation range of 200-546 m from mean sea level. It is covered by Survey of India Toposheet Nos. 73 E/9, 73 E/10, 73 E/13, 73 E/14, 73 I/1, 73 I/2, 73 I/5 and 73 I/6.

It has two Sub-divisions i.e. Chas and Bermo Sub-division. Further, the Sub-division is divided into nine blocks namely - Chas, Bermo, Gomia, Peterwar, Kasmar, Nawadi, Jaringdih, Chandankiyari and Chandrapura.

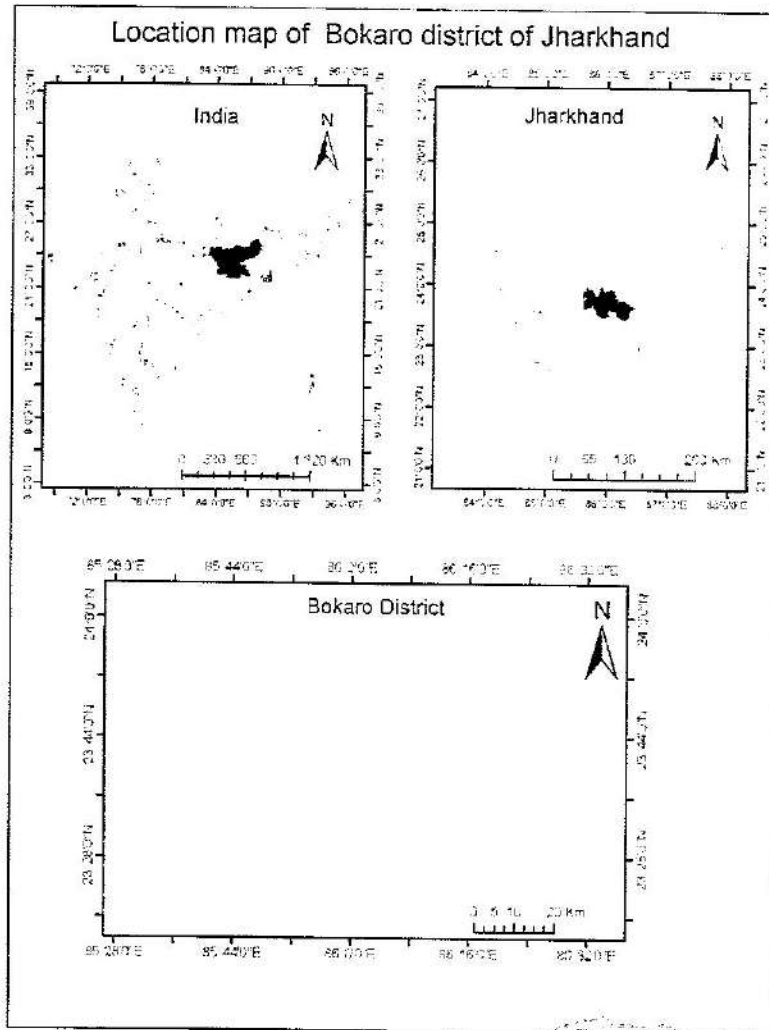
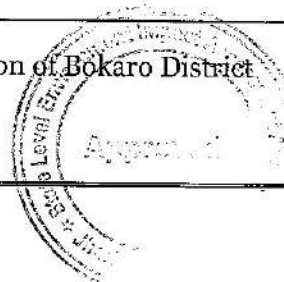
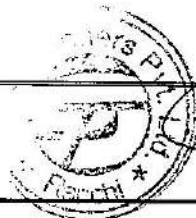


Fig. 3.1: Representative Location of Bokaro District



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Table 3.1 - Sub-division of Block area and population wise details of Bokaro District

Sl. No.	Subdivision	Area (Km ²)	Rural Population	Urban Population	Total Population	Male (2011)	Female (2011)
1.	Chas	573.61	249083	564319	813402	427453	385949
2.	Bermo	165.71	4222	185555	189777	99086	90691
3.	Gomia	670.55	130898	100287	231185	118918	112267
4.	Peterwar	305.71	127617	4533	132150	68127	64023
5.	Kasmar	195.28	89974	0	89974	45947	44027
6.	Nawadih	371.77	133848	4606	138454	70344	68110
7.	Jaridih	207.53	75671	29317	104988	54445	50543
8.	Chandankiyari	370.67	218597	11641	230238	119606	110632
9.	Chandrapura (Newly created block)	N.A.	48776	83386	132162	68881	63281

(Source - Census-2011)

Block	Panchayat	Nos. of village
Chas	54	128
Bermo	19	16
Gomia	28	127
Peterwar	23	65
Kasmar	15	68
Nawadih	24	70
Jaridih	17	42
Chandankiyari	38	130
Chandrapura (Newly created block)	23	30

DISTRICT PROFILE	
Particulars	Details
District Formation	1991
Nos. of Parliamentary Constituency	2
Nos. of Assembly Constituency	5
Nos. of Sub Division	2
Nos. of Block	9
Nos. of Gram Panchayat	249

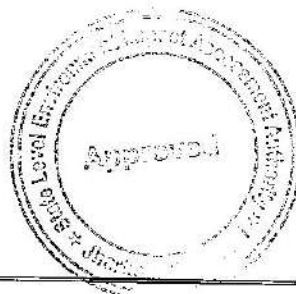


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DISTRICT PROFILE	
Particulars	Details
Nos. of Revenue Village	635
Municipal Corporation	1
Municipal Council	1
Total Geographical area (km ²)	2883
Total Population	20,62,330
Urban Population	10,78,686
Rural Population	9,83,644
Schedule Castes	236,472
Schedule Tribes	218,600
Backward Classes	715 per km ²
Density of Population	72.01
% of Literacy	72.01%
Male	1,072,802
Female	989,523
Sex Ratio	922

(Source: bokaro.nic.in)



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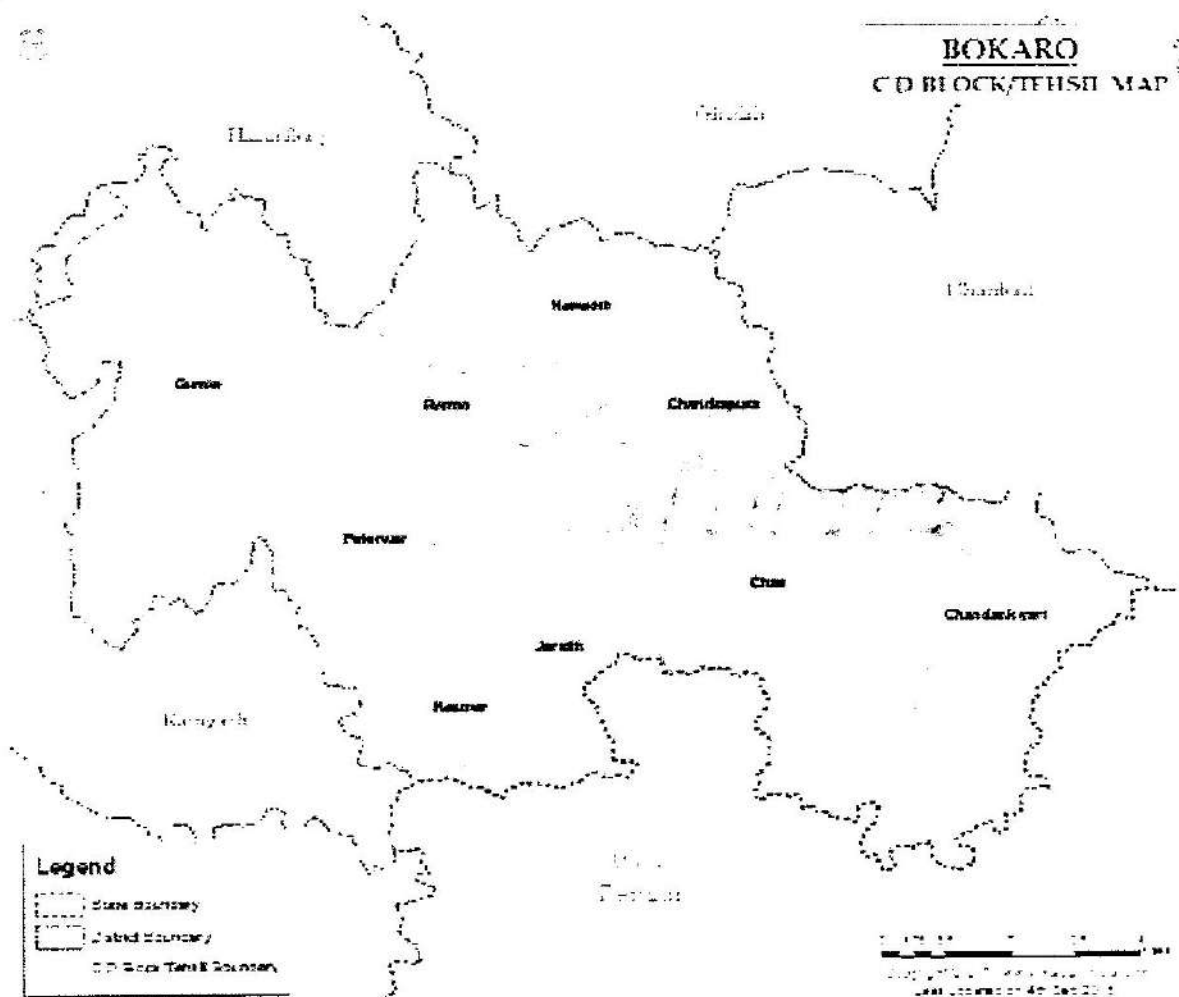


Figure 3.2: Block Map of Bokaro District

(Source: National Informatics Center)

3.2 Climatic Condition:

The climate of Bokaro district is humid and sub-tropical. It is characterized by hot and dry summer from March to October and Cold winter from November to February. Humidity is high from July to September. The mean annual humidity is nearly 60%.

- **WINTERS**

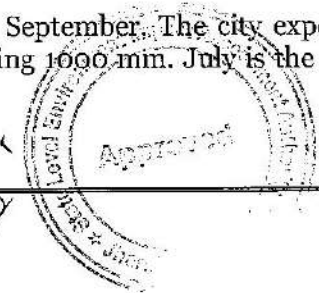
Winter in the city begins in December and continues till February. The average day temperature during the season hovers around 25°C, while the minimum settles close to 8°C. Winter is the best month to visit the place.

- **SUMMERS**

March to June is the summer season for Bokaro. During this period the weather in the city is hot with day temperatures touching 40°C at times. On an average the maximum hovers around 37 degrees Celsius.

- **MONSOONS**

Monsoon in Bokaro is observed from June to September. The city experiences heavy rainfall during the season, with average rainfall recording 1000 mm. July is the rainiest month for the city, with monthly average rainfall of 334 mm.



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3.2.1 Temperature

The summer season starts from the month of March with hot and humid conditions and ends in June. The maximum highest temperature varies from 46°C in the month of May and June while minimum temperature varies from 4°C to 7°C during December and January. Below table mentions the temperature variation throughout the year-

Table 3.2: Monthly average temperature distribution of Bokaro District: (in °C & °F)

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature °C (°F)	16.8 °C (62.2) °F	20.8 °C (69.5) °F	25.9 °C (78.6) °F	30.1 °C (86.2) °F	31.5 °C (88.7) °F	30 °C (86) °F	27.4 °C (81.3) °F	27.1 °C (80.7) °F	26.7 °C (80) °F	24.8 °C (76.7) °F	21.2 °C (70.2) °F	17.5 °C (63.5) °F
Min. Temperature °C (°F)	9.7 °C (49.4) °F	13.4 °C (56.1) °F	17.8 °C (64) °F	22.4 °C (72.4) °F	25.3 °C (77.6) °F	26.2 °C (79.2) °F	25.1 °C (77.2) °F	24.7 °C (76.4) °F	23.9 °C (75) °F	20.4 °C (68.7) °F	15.2 °C (59.3) °F	10.9 °C (51.6) °F
Max. Temperature °C (°F)	23.9 °C (75.1) °F	28.1 °C (82.6) °F	35.0 °C (93) °F	38.1 °C (100.6) °F	38.3 °C (100.9) °F	39.7 °C (103.5) °F	39.3 °C (102.7) °F	39.4 °C (102.9) °F	39.5 °C (103) °F	39.5 °C (103.1) °F	37.4 °C (99.3) °F	34.4 °C (93.9) °F
Precipitation / Rainfall mm (in)	13 (0)	19 (0)	18 (0)	18 (0)	63 (2)	219 (8)	299 (11)	273 (10)	219 (8)	70 (2)	10 (0)	9 (0)
Humidity(%)	62%	54%	41%	36%	50%	68%	84%	85%	84%	77%	66%	65%
Rainy days (d)	2	2	2	4	8	14	20	20	18	6	1	1
avg. Sun hours (hours)	9.1	9.7	10.6	10.9	10.7	9.6	7.7	7.2	7.4	8.7	9.2	8.9

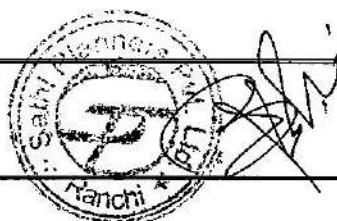
(Source: <https://en.climate-data.org/asia/india/jharkhand/bokaro-969182/>)

3.3 Rainfall & Humidity:

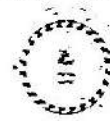
Rainfall: Bokaro area receives more rainfall which attracts clouds and brings rainfall to the area. Rainfall is the principal method of groundwater recharge to ground water. South-west monsoon brings rainfall to this area during the months of June to October mainly. Normal data of the Bokaro IMD observatory indicates average 1363.57 mm of rainfall and maximum rain fall is 1669.58 mm.

The average rainfall which was observed in Bokaro in year 2016-2018 is presented below in the form of Table 3.3:

Month	Jan 2016	Feb 2016	March 2016	April 2016	May 2016	June 2016
Average Rainfall	3.60	1.33	5.04	38.60	31.19	95.24
Month	July 2016	Aug 2016	Sept 2016	Oct 2016	Nov 2016	Dec 2016
Average Rainfall	201.31	329.3	206.70	17.97	0.0	0.0
Month	Jan 2017	Feb 2017	March 2017	April 2017	May 2017	June 2017
Average Rainfall	12.9	0.00	6.00	3.00	25.00	44.5
Month	July 2017	Aug 2017	Sept 2017	Oct 2017	Nov 2017	Dec 2017



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Average Rainfall	534.4	267.8	213.6	175.8	8.1	0.00
Month	Jan 2018	Feb 2018	March 2018	April 2018	May 2018	June 2018
Average Rainfall	0.00	9.3	2.9	100.1	47.1	163.5
Month	July 2018	Aug 2018	Sept 2018	Oct 2018	Nov 2018	Dec 2018
Average Rainfall	284.5	474.9	238.4	20.6	0.7	66.8

(Source: District Statistical Office, Bokaro)

3.3.1 Relative Humidity, Wind Speed & Wind Direction

Relative humidity is generally lower in the afternoons than in the morning, except in the monsoon months when there are little differences. The winter months are the driest with humidity as low as 10 to 20% in the afternoon. The mean annual humidity is nearby 60 %.

Winds are light to moderate during the winter and summer months, the speed being higher in the afternoons. In association with thunder storms during March to May and during the monsoon season when depressions pass west word across the central parts of the country, the area experiences strong gusty winds. The directions from which winds blow are variable especially during the monsoon season. Predominant wind direction is from south-west.

3.4 Topography & Terrain:

Topographically, it is a lower plateau having relatively little undulations. The district consists of two district physical units. Northern area is hilly with forest while southern area provides appearance of plain. The average altitude of the land is 210 m from mean sea level. The general slope is from North-west to South-east. Geologically, the area is comprised with Archaean Granites and Gneisses. In Southern part, Gondwana rock formation occurs in patches. The important Rivers, flowing in the district are Damodar, Bokaro, Gobai, Jamuniya, Kunar, Ishri, Tasharkuan & Khusa River.

3.5 Water Courses and Hydrogeology:

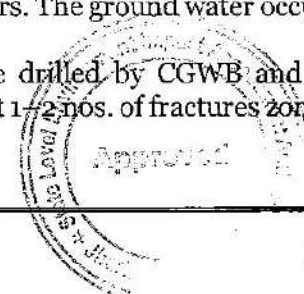
Ground water in the district is mainly replenished by the atmospheric precipitation. Influent seepages from canal, streams and other surface water bodies also contributes to the Ground water in the district. The hydrogeological condition of the district is very complicated due to vide variability of geology, topography, drainage and mining activity.

The district of Bokaro can be sub divided broadly into two hydrogeological units: -

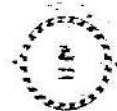
- a) Fissured Formation
- b) Porus Formation or Unconsolidated Formation

Based on the degree of consolidation the fissured formation can be further sub divided into two namely:

- (i) Consolidated Formation: Ground water occurs in the area under confined to semi-confined conditions. The fractured lineaments are found to be an effective factor in facilitating Ground Water movement and storage.
- (ii) Semi Consolidated Formation: Ground water occur in this formation under confined to Semi-confined condition. These are found in the central part of the district.
- (iii) Unconsolidated Formation: It occupies the low laying area covered with recent alluvium deposited mainly by Damodar, Konar and Jamunia rivers. The ground water occurs in these areas under water table condition.
- (iv) Exploratory Wells: - 19 exploratory wells were drilled by CGWB and 5 EWs through outsourcing in the district the available data revelas that 1-2 nos. of fractures zone up to the depth



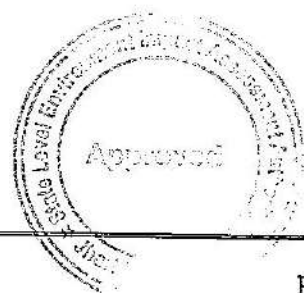
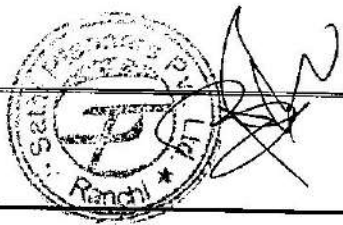
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of 150.00 mbgl. The static water level in the borewells varies from 1.25 to 19.07 mbgl. The discharge varies from meager to 415 lps.

Table 3.4 Exploratory Wells drilled by CGWB of Bokaro district as on 31.12.12

Location	Depth (m bgl)	SWL (m bgl)	Fracture (m bgl)	Discharge (lpm)
SDO compound	200.85	19.07	80.95, 111.45	135
Mahila Polytechnic-1	200.00	4.98	21, 25, 149	108
Mahila Polytechnic-2	190.90	4.50	17.5-19.00, 105 - 106.50	108
Khutri	191.00	1.25	not encountered	meagre
Azadnagar-1	136.00	3.91	62.80	25
Azadnagar-2	50.45	-	-	meagre
Azadnagar-3	193.1	4.12	-	108
Azadnagar-4	26.2	-	-	meagre
Chandankiary-1	200.00	16.9	108.5, 139.00	150
Chandankiary-2	-	17.02	147.95-148.5	43.86
HS Baramasia-1	172.35	2.1	147.95-150	415
HS Baramasia-2	154.05	2.3	144-145.5	415
HS Baramasia-3	43.35	2.26	not encountered	72
Chandra Inter College-1	55.90	2.45	30.00-30.50	72.6
Chandra Inter College-2	123.00	2.43	96.00-98.00	72.6
Mamarkudar, EW1	153.5	-	not encountered	Low discharge
Mamarkudar, EW2	199.05	-	not encountered	Low discharge
Idgadih, EW	184	-	not encountered	Low discharge
Pindrajora, EW	180	-	not encountered	Low discharge



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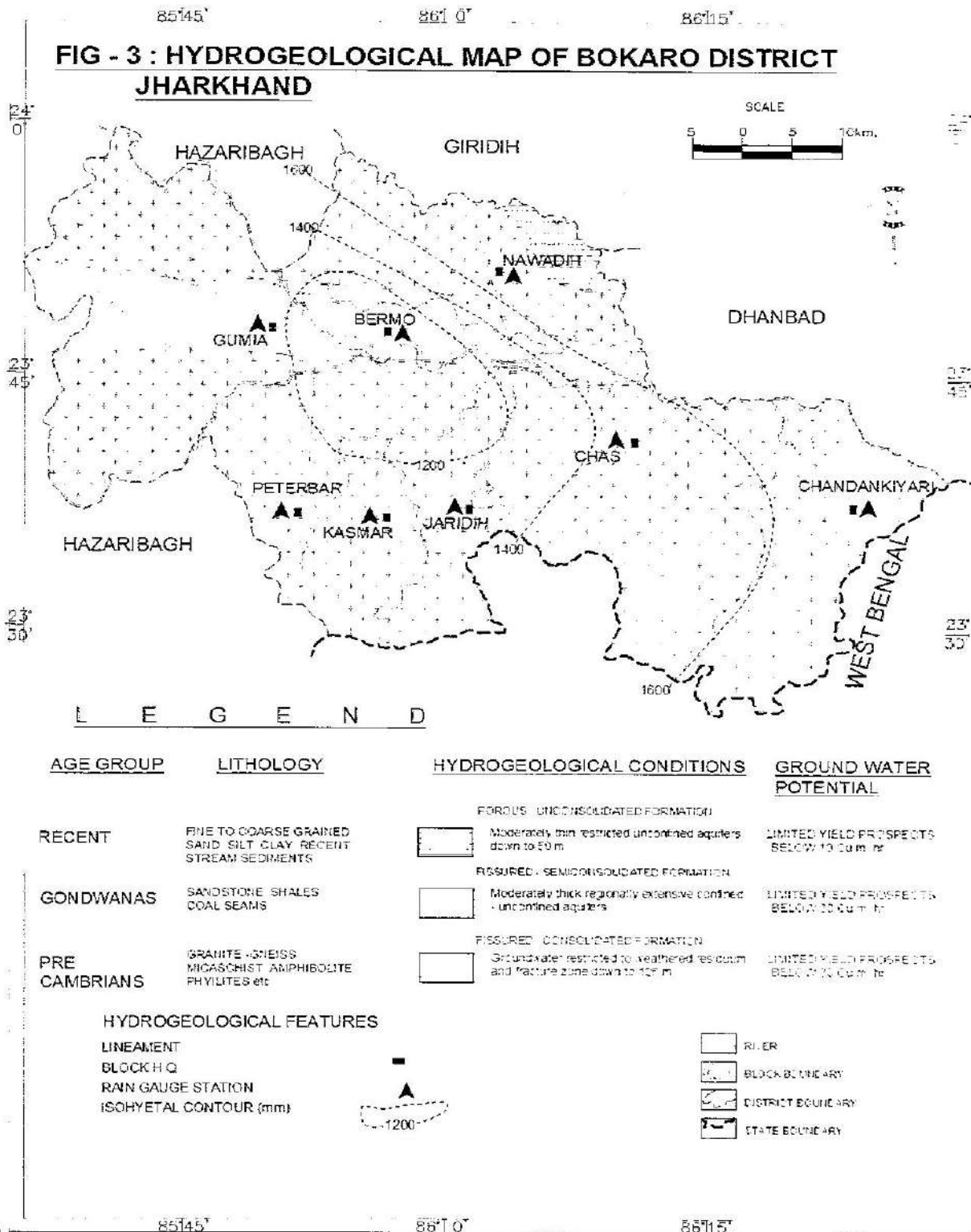
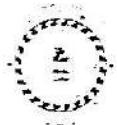
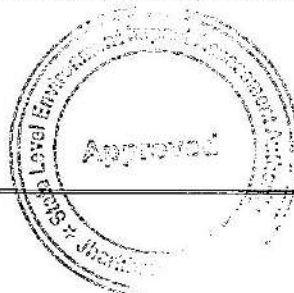


Fig. 3.3: Hydrogeological Map of Bokaro District, Jharkhand



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Table 3.5: Exploratory Wells Drilled Through Outsourcing (Accelerated Drilling Programme) during AAP (2004-05)

Location	Depth (m bgl)	SWL (m bgl)	Fracture (m bgl)	Discharge (lpm)
Paddudih	150	6.30	33.48 – 39.06	Low
Galudih	150	5.89	91.11 – 96.73	Low
Naudiha	150	4.01	28.10 – 33.72 39.34 – 44.96	2.11
Chandankiyari	150	4.33	15.50 – 18.50 74.25 – 79.87	2.11
Nailanchal Ashram	150	3.18	90.92 – 96.54	< 1

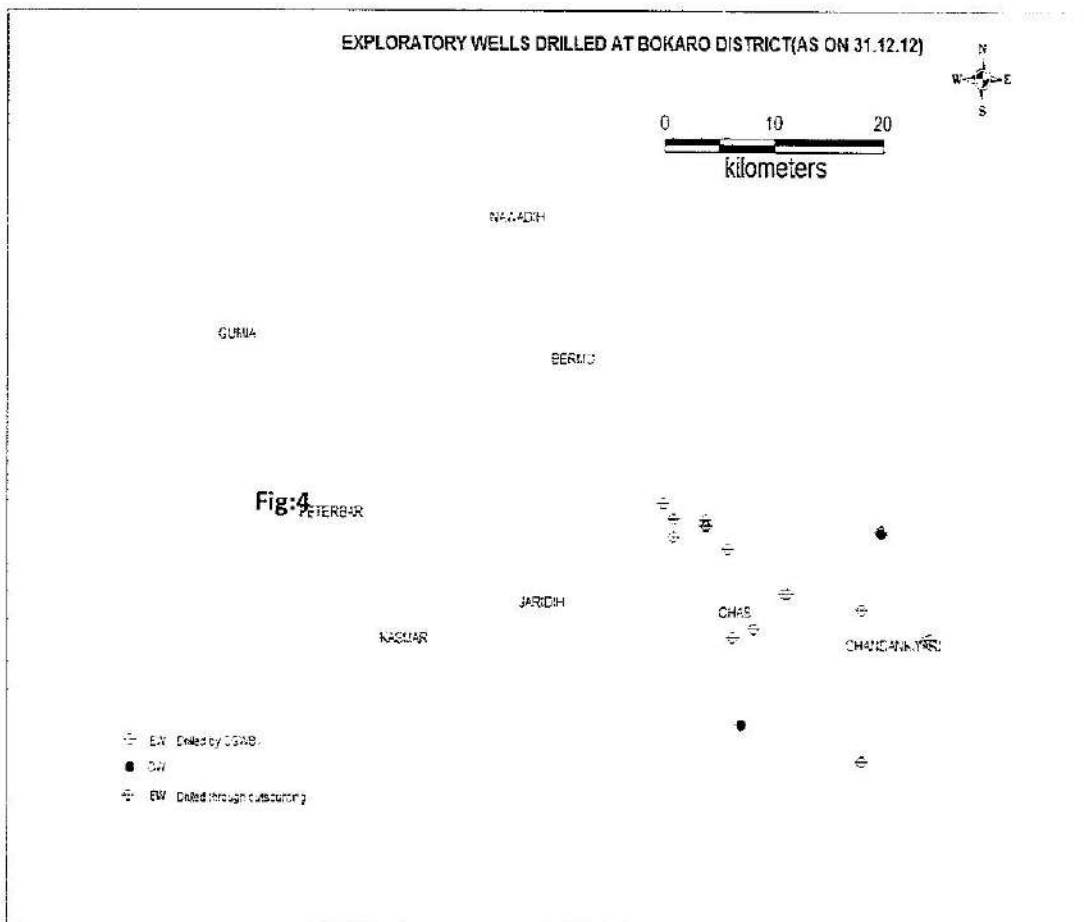
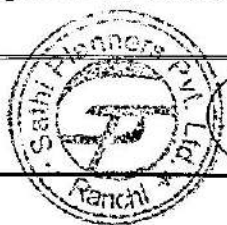


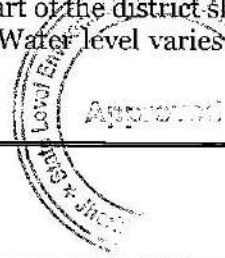
Fig. 3.4: Exploratory Wells drilled at Bokaro District, Jharkhand

Depth to Water Level: -

CGWB has established 12 nos. of network of observation wells for monitoring of ground water level to know the behaviour of ground water regime in the district. These wells are monitored every year in January, May, August and November. During Pre-monsoon season in the district the minimum and maximum water level were observed as 5.3 mbgl (Pindrajoria) and 15.0 mbgl (Mahuda) respectively. The water level in northern part of the district shows more than 10 mbgl. The water level in Chas area is more than 10 mbgl. Water level varies from 5 to 8 mbgl in the central and eastern part of the district.



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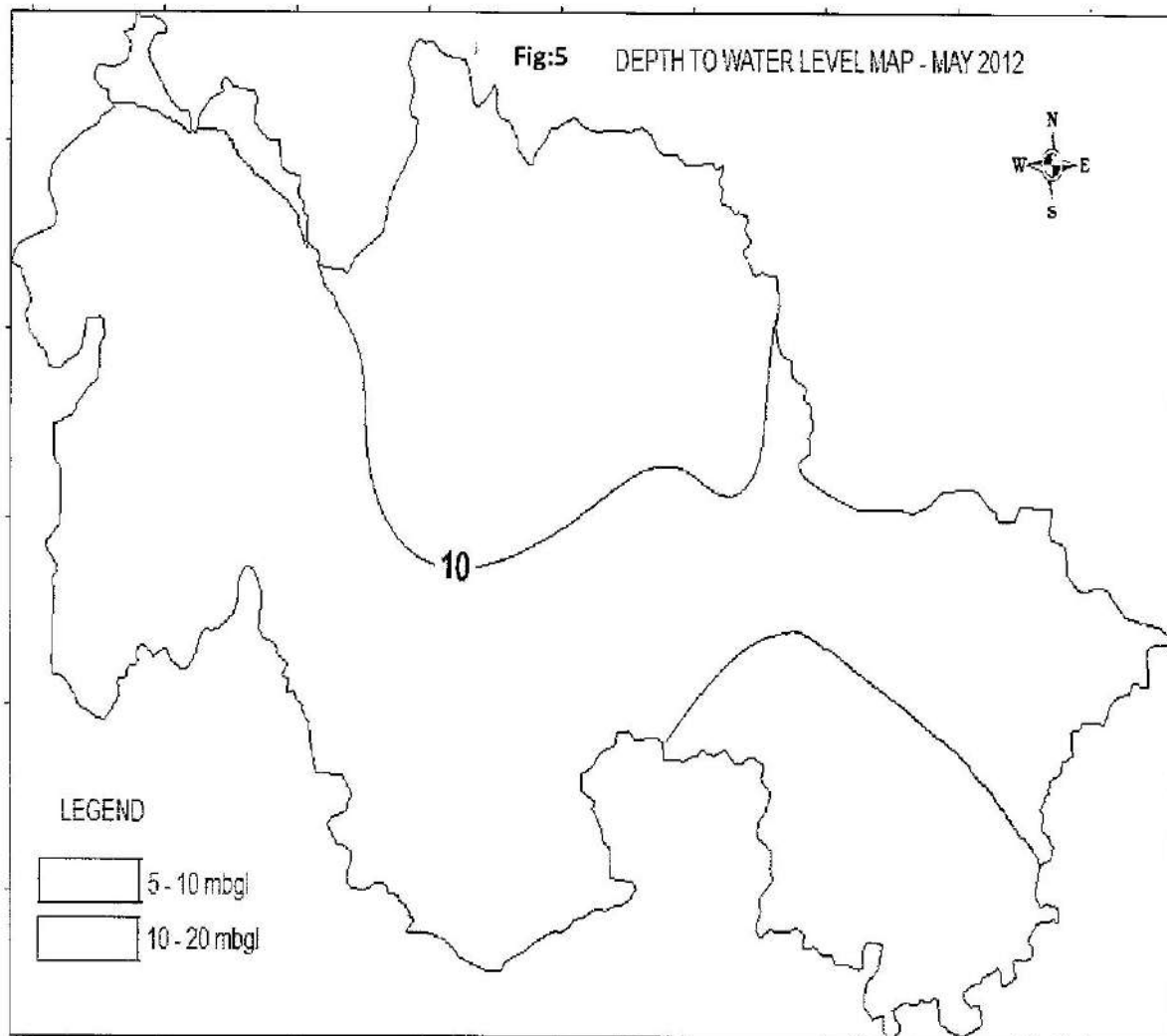
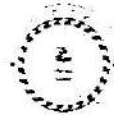


Fig. 3.5: Depth to Water Level Map (Pre-monsoon) of Bokaro District, Jharkhand

The water level during the Post-monsoon season of the district ranges 1.70 to 8.0 mbgl. The water level in northern, western and eastern part is within 5.0 mbgl. The water level in Chas area is 8 mbgl. Water level in the central and southern part of the district varies between 5 to 10 mbgl.

Approved

Bokaro Level Environment Impact Assessment

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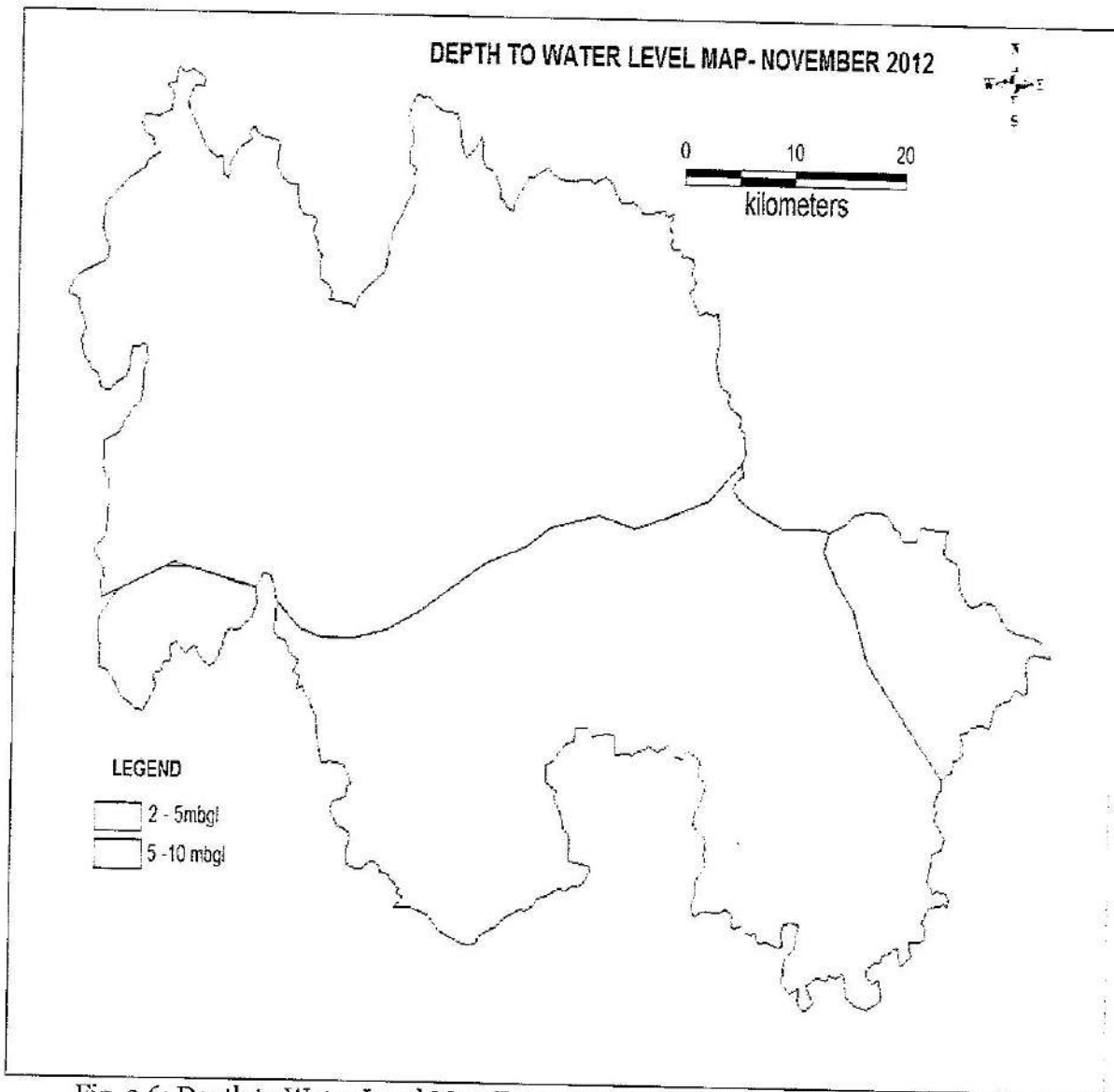
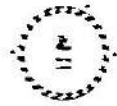
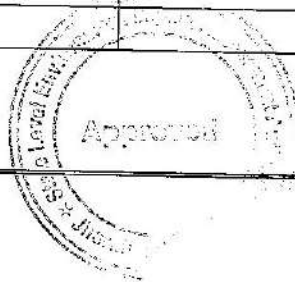
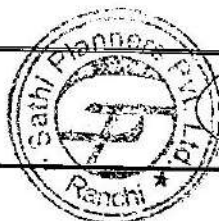


Fig. 3.6: Depth to Water Level Map (Post-monsoon) of Bokaro District, Jharkhand

Table 3.6: Pre and Post Monsoon Water Level Data of Bokaro district in 2012

Location	Pre Monsoon (in mbgl)	Post Monsoon (in mbgl)
Chas	12.65	8.00
Pindrajora	5.3	1.75
Chandrapura	5.14	1.70
Gomia	10.60	3.11
Petarbar	10.40	6.00
Jaina more	12.00	6.82
Tenughat	6.50	3.09
Nawadih	6.12	3.99



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Water Level Trend:

Rainy season is only recharge period in the Bokaro district. The maximum observations wells show rising trend in the district. These are the localized rising patches in the area. The pre and post monsoon observations at Jaina More, Chas is showing falling trend > 0.2m/yr. The trend of Ground Water Level is tabulated in table below:

Table 3.7: Trend of Ground Water Level during Period 2002-2011

Location	Rise (Meter/Yr.)	Fall (Meter/Yr.)	Rise (Meter/Yr.)	Fall (Meter/Yr.)
	Pre-monsoon		Post-monsoon	
Chandrapura	0.2	-	0.028	-
Phusro/Bermo	0.483	-		
Pindarjora	0.283	-	-	0.12
Chas	-	0.261	-	0.446
Jaina More	-	0.262	-	0.432
Gomia	-	0.179	-	0.233
Tenughat	0.15	-	0.035	-
Nawadih	0.246	-	0.231	-
Petarbar	0.113	-	0.108	-

Ground Water Resources:

Ground Water Resources assessment has been carried out based on the recommendations of Central Water Estimation Committee Report 1997 (GEF, 1997). The assessment has been evaluated for all the blocks. All blocks of the districts falling under "Safe" Category except Chas which falls under semi critical category. The stage of Ground water development varies from 13.56% to 75.52 %.

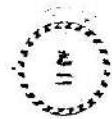
Table 3.8: Block wise Ground Water Resources of Bokaro District as on 31st March 2009

Assessment Unit	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 upto next 25 years	Net Ground Water Availability for future irrigation development	Stage of Ground Water Development (12/9)*100 (%)
Bermo	994.42	132.704	238.9	371.6	357.84	503.88	37.37
Chandan Kyari	2827.75	235.248	315.5	550.8	472.62	2119.88	19.48
Chas	5227.44	1631.424	1188.3	3947.68	1779.92	1816.09	75.52
Gomia	7328.04	713.632	279.8	993.4	419.05	6195.36	13.56
Jaridih	1481.31	401.824	142.9	544.7	213.01	866.48	36.77
Kasmar	1595.20	606.68	128.5	735.2	192.48	796.05	46.09
Nawadih	3495.12	608.768	266.5	875.3	399.22	2487.14	25.04
Petarwar	2459.13	873.712	191.6	1065.3	286.96	1298.46	43.32
TOTAL (ham)	25408.41	5203.99	2752.11	7956.10	4121.09	16083.33	31.31

3.6 Status of Ground Water Development:

There is sufficient scope for shallow as well as deep borewells in the district. Jharkhand State

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Government has constructed number of borewells to minimize the scarcity of drinking water problem. Central Ground Water Board has been drilled five borewells up to 150 mbgl in the district. The discharge of borewells ranges from less than 1 lps to 2.1 lps. The casing length varies from 6.07m to 19.40 mbgl. The static water level at Paddudih is maximum 6.30 mbgl.

Govt. of Jharkhand					
Drinking Water & Sanitation Department					
Status of T/Wells as on 01.04.2012					
District	Division	No. of T/wells as on 01.04.2012	Total Defunct. T/Well	No of Running T/wells	% Running Tube Well
Bokaro	Chas	10845	1541	9304	85.79
	Tenughat	7457	1060	6397	85.79

Groundwater Resources:

As per the latest resource estimation carried out following GEC 97 methodology, the overall stage of ground water development in Bokaro district is 27% indicating sufficient scope of development. All blocks are under safe category. The reconciled figure is as under:

DYNAMIC GROUND WATER RESOURCES (2009) in mcm.	
Annual Replenishable Ground Water Resources	25408.41
Net Annual Ground Water Draft	7956.10
Projected Demand for Domestic and Industrial uses up to 2025	4121.09
Stage of Ground Water Development	31 %

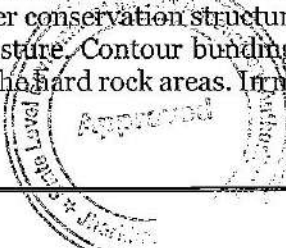
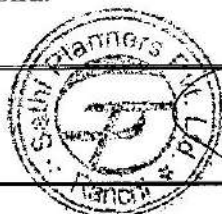
Groundwater Management Strategy: -

Ground Water Development: - The shallow and medium dugwells are suitable for extraction structures in the district. It is necessary for drinking as well as irrigation purpose. The stage of ground water development in the district is 31.31% only. Thus, there is sufficient scope for development through dugwell, shallow and medium borewells. Construction of dug cum borewells structure is also suitable for enhance the yield of dug well in respect of cost beneficial and economical. The Ground Water development varies in different places depending on the availability of favourable locations.

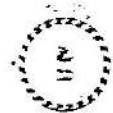
Potential availability for the Ground Water Development considering the Ground Water draft has been worked out as per norms of Ground Water Estimation Committee 1997 (GEC - 1997). The details of Ground Water recharge, estimation of annual Ground water availability, annual draft on net Ground water balance and stage of Ground water development has been evaluated. The total Ground water draft for irrigation in the district is 5203.99 ham. The net annual Ground water availability and the existing ground water draft for all uses is 25408.41 ham and 7956.10 ham respectively.

Water Conservation and Artificial Recharge: -

The total irrigation potential created is 10039 hectare and potential utilized 6526 Ha. only as per 4th MI census. During rainy season most of the rain water goes as runoff. At many places shortage of water observed in the district. Construction of water conservation structures will help to arrest run off, recharge the aquifer and retain the soil moisture. Contour bunding, check dam, gully plug and percolation tanks are suitable structures in the hard rock areas. In mines area, water can be stored in the pond.



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A master plan for artificial recharge has been prepared by CGWB. The identification of the area suitable for artificial recharge has been done on the basis of depth of mean post-monsoon water level. The areas where the average water level of last 10 years is more than 5 mbgl in post-monsoon period (November) has been considered suitable for artificial recharge. The basin-wise surface water availability with 60% dependability has been taken from the existing field condition. The surface water required at 60% efficiency for artificial recharge is 62.2743 MCM. Total volume of water required for artificial recharge up to the depth of 3 mbgl is 37.29 MCM. Total surplus runoff available after the recharging of the required volume of water is 37.9257 MCM. The distribution of surplus surface water resource generated within the district is given below. Table 3.10:

Requirement of Surface Water Resources for Artificial Recharge to Ground Water

Name of District	Area identified for Artificial Recharge (km ²)	Volume of unsaturated zone available for recharge	Total Volume of water that can be recharged (MCM)	Surface Water required for recharge at 60% efficiency (MCM)	Total surface water available (MCM)	Total surplus runoff available (MCM)
Bokaro	339	1006.83	37.29	62.2743	100.2	37.9257

Table 3.11: Number of Structures for Artificial Recharge

District	Volume of water required at 60% efficiency (mcm)	Resource to be harnessed by				Estimated cost of structures in rupees (2011) (Lakhs)	
		Percolation tank		Nala Bund		Percolation Tank @ Rs 27.75 lakhs	Nala Bund@ Rs 3.07 lakhs
		Vol MCM	Nos.	Vol MCM	Nos.		
Bokaro	62.2743	31.14	165	31.14	992	4578.750	3045.440

The volume of surface water considered for planning the artificial recharge is based on the surplus runoff availability and the space available for recharge. Based on the field situation, it has been considered that 50% storage will be through percolation tanks and 50% through Nala bunding in hard rock areas. For the percolation tank single filling capacity is 94 TCM. Considering 100% of double filling, the gross storage is 188 TCM. For Nala Bunding single filling capacity of 12 TCM, the actual storage will be 30 TCM based on 250% of multiple filling.

Groundwater Related Issues & Problems: -

During Summer season, the dug well dried away. The deeper ground water level has been observed in Bokaro District (Jharkhand). The ground water is contaminated with fluoride in two blocks. Iron is also found above desirable limit. Trace elements like Mn & Zn is found above permissible limit around industrial area.

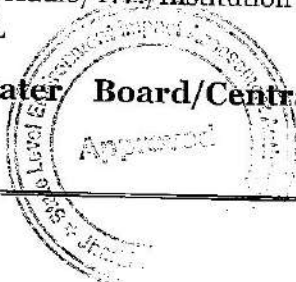
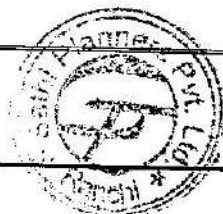
Mass Awareness & Training Activity: -

Mass Awareness Programs and Water Management Training Programs by Central Ground Water Board: NIL

Participation in exhibition fair: NIL

Presentation & Lectures delivered in Public Forum/Audio/T.V./Institution of Repute/ Grassroots Associations/NGO/Academic Institutions etc.: NIL

Area Notified by Central Groundwater Board/Central Groundwater Authority: -



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As per the ground water resource assessment evaluated all blocks of the district falling under the safe category. Thus, the authority has not been notified any blocks.

Land Use: - A large area about 25% of the district are under forest. The Cultivable land are divided into two categories - Low lands and uplands. Block-wise statistical data reveals that only 29% of the total geographical area is cultivable. The highest percentage of cultivable area is found in Chandankiyari and lowest being in Gomia block. The gross irrigated area is 14543 Ha.

(Source - cgwb-2013)

3.7 Drainage System:

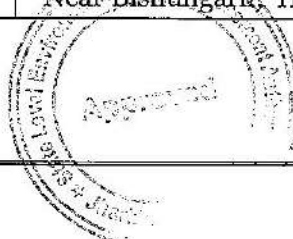
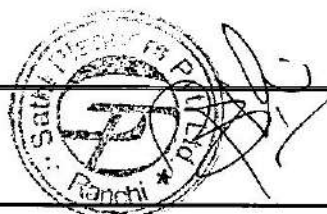
The Damodar River is the most important River in the district which flows from West to East in the Central part of the district. The major tributaries of Damodar are Konar and Jamuniya. The minor tributaries of the Damodar River are Isri, Gobai, Tasharkuan, Kadwa, Khanju etc. The drainage system is mainly confined to weak zones viz. joints, fractures and faults.

Table 3.12: Drainage System with description of main Rivers

Sl. No.	Name of the River	Area drained (Km ²)	% Area drained in the District
1	Tasharkuan River	0.89	0.031
2	Garga River	1.41	0.049
3	Gobai River	2.53	0.088
4	Godda Nala	0.73	0.026
5	Ishri River	2.69	0.093
6	Gantiko River	0.79	0.028
7	Konar River	24.91	0.866
8	Damodar River	24.91	0.866
9	Chirua Nala	0.26	0.009
10	Khalsa Nala	0.45	0.016
11	Bokaro River	4.81	0.167
12	Jamuniya River	7.33	0.255

Table 3.13: Salient features of important River & Streams

Sl. No.	Name of the River	Total Length in the District	Place of Origin
		(in km)	
1	Tasharkuan River	15.00	
2	Garga River	46.51	Kasmar, Bokaro District
3	Gobai River	37.78	
4	Godda Nala	14.73	
5	Ishri River	51.29	
6	Gantiko River	15.17	
7	Konar River	43.58	Sultana village, Hazaribag
8	Damodar River	178.77	Near Chandwa village in Bokaro
9	Chirua Nala	4.60	
10	Khalsa Nala	9.38	
11	Bokaro River	31.85	South of Hazaribag, Hazaribag Plateau
12	Jamuniya River	35.45	Near Bishungarh, Hazaribag



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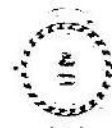


Table 3.14: Order of main Rivers of Bokaro District

Sl. No.	River Name	Order
1	Damodar River	8 th
2	Gobai River	5 th
3	Ishri River	4 th
4	Garga River	5 th
5	Jamunia River	4 th
6	Konar River	6 th
7	Bokaro River	7 th
8	Tasharkuan River	2 nd
9	Gantiko River	5 th
10	Godda Nala	4 th
11	Chirua Nala	5 th
12	Khalsa Nala	3 rd

• **Damodar River**

Damodar River begins near Chandwa village in Palamau district, on the Chotanagpur Plateau of Jharkhand. It has a number of tributaries and sub tributaries, such as Barakar, Konar, Bokaro, Jamuniya, Ghee, Khudia, Katri etc. Damodar river runs for about 178.77 km within the district. The Barakar is the main tributary of the Damodar.

• **Jamuniya River**

The Jamuniya River is a tributary of the Damodar River. The Jamunia River rises on the Hazaribagh plateau, near Bishungarh. It runs near the Grand Trunk Road from around Bagodar to past Dumri and then turns south, forms the border between Dhanbad and Bokaro districts. It runs for about 35.45 Kms. within the district.

• **Gobai River**

Gobai River is a tributary of Damodar river. It flows through Chandankiyari area and runs for about 37.78 Kms within Bokaro district.

• **Ishri River**

Ishri River is a tributary of Gobai river which runs for about 51.29 Kms within Bokaro district.

• **Garga River**

Garga River is a tributary of Damodar river which flows in Bokaro district. It runs for about 46.51 Kms within Bokaro district.

• **Konar River**

The Konar River is a tributary of Damodar River in Bokaro and Hazaribagh districts of Jharkhand. It originates near Sultana village on the Hazaribagh-Chatra Road. Thereafter, the Konar with its tributary Siwani drains a greater portion of the Hazaribagh plateau, and then descending through the barren wastes of scrub and jungle passes Gomia to receive the waters of the Bokaro River, shortly before it joins the Damodar River near Jaridih Bazar in Bokaro district. It runs for about 43.58 Kms within Bokaro district.

• **Bokaro River**

The Bokaro River flows through the Hazaribagh and Bokaro districts in the Indian State of Jharkhand. The Bokaro River rises on the Hazaribagh plateau, south of Hazaribagh, but quickly skirts the southern face to pass in a narrow and beautiful valley between Jilinga and Langu Hills. It passes through the West Bokaro and East Bokaro Coalfields. It flows into the Konar River shortly before the latter flows into the Damodar River. It runs for about 31.85 Kms within Bokaro

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district.

- **Tasharkuan River**

Tasharkuan River is a small River which flows in Bokaro district of Jharkhand. It runs for about 15.00 Kms in the district.

- **Gantiko River**

Gantiko River is also a small River which flows in Bokaro district of Jharkhand. It runs for about 15.17 Kms in the district.

- **Godda Nala**

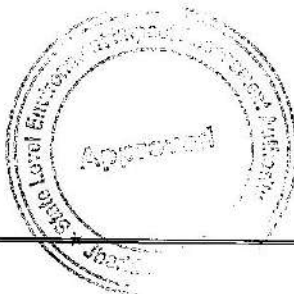
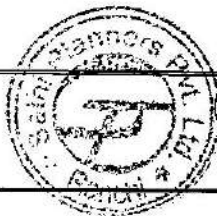
Godda Nala is a small stream which flows in Bokaro district of Jharkhand. It runs for about 14.73 Kms in the district.

- **Chirua Nala**

Chirua Nala is a small stream (nala) which flows in Bokaro district of Jharkhand. It runs for about 4.60 Kms in the district.

- **Khalsa Nala**

Khalsa Nala is a small stream (nala) which flows in Bokaro district of Jharkhand. It runs for about 9.38 Kms in the district.



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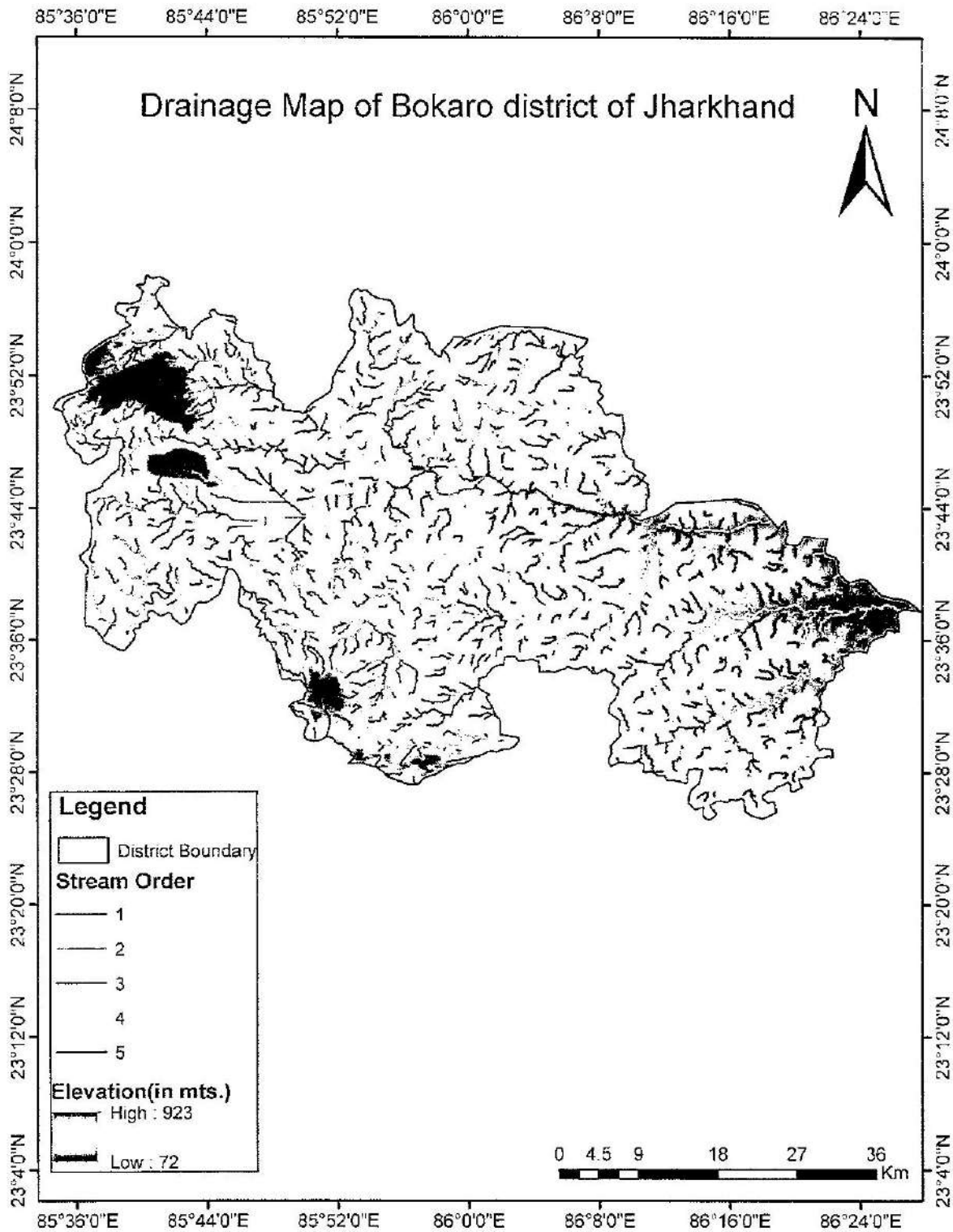
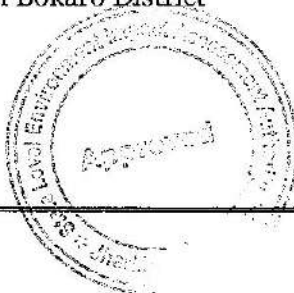
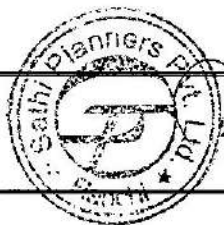


Fig 3.6: Drainage Map of Bokaro District



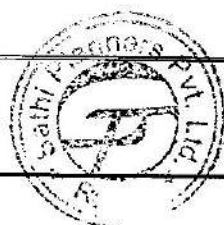
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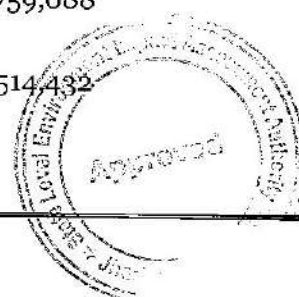
3.8 Demography:

In 2011, Bokaro had population of 2,062,330 of which male and female were 1,072,807 and 989,523 respectively. In 2001 census, Bokaro had a population of 1,777,662 of which males were 938,436 and remaining 839,226 were females. Bokaro district population constituted 6.25 percent of total Maharashtra population. In 2001 Census, this figure for Bokaro District was at 6.60 percent of Maharashtra population. There was change of 16.01 percent in the population compared to population as per 2001. In the previous census of India 2001, Bokaro District recorded increase of 22.22 percent to its population compared to 1991.

Description	2011	2001
Population	20.62 Lakhs	17.78 Lakhs
Actual Population	2,062,330	1,777,662
Male	1,072,807	938,436
Female	989,523	839,226
Population Growth	16.01%	22.22%
Area Km ²	2,883	2,883
Density/km ²	715	617
Proportion to Jharkhand Population	6.25%	6.60%
Sex Ratio (Per 1000)	922	894
Child Sex Ratio (0-6 Age)	923	950
Average Literacy	72.01	62.10
Male Literacy	82.51	76.04
Female Literacy	60.63	46.33
Total Child Population (0-6 Age)	293,786	291,148
Male Population (0-6 Age)	152,803	149,326
Female Population (0-6 Age)	140,983	141,822
Literates	1,273,520	923,150
Male Literates	759,088	600,048
Female Literates	514,432	323,102



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Description	Male	Female
Child Proportion (0-6 Age)	14.25%	16.38%
Boys Proportion (0-6 Age)	14.24%	15.91%
Girls Proportion (0-6 Age)	14.25%	16.90%

Source - census2011.co.in

3.9 Connectivity in Bokaro District:

Bokaro district is situated in the eastern part of the State of Jharkhand. Bokaro district is bounded on the east by Dhanbad district and some portion of West Bengal State, on the west by Ramgarh district, on the south by Purulia district of West Bengal and on the north by parts of Giridih, Hazaribag and Dhanbad districts. Bokaro district is well connected by road, rail and air communication system from other parts of the country.

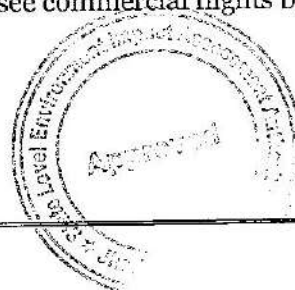
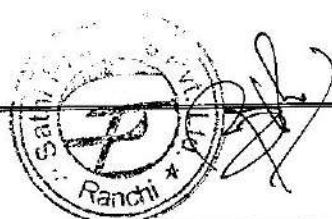
(i) Railway Station: Bokaro Steel City is a Railway Station. Chandrapura is another important station in Bokoro district. Bokaro is well connected by Train/Rail route also. The Bokaro Steel city is connected to Grand cord line at Gomo Railway station. Important Trains like Shatabdi Express between Bokaro and Howrah, Hatia Patna Express, Alleppy Express and Jharkhand Swarn Jayanti Express between Hatia to Delhi (Bi-weekly) run through this station. For other places trains can be boarded at Dhanbad Railway Station, which is at a distance of only 45 km from Bokaro and grand cord line passing through it.

(ii) Road: With regular bus services, travelers can directly reach the city of Bokaro, as various State government operated and private buses help in making the journey comfortable for the tourists. A bus ride can leave a person amazed as the natural beauty of the region is worth exploring. Passenger buses and Non Stop buses run regularly from Ranchi, Dhanbad, Ramgarh, Purlia (WB), Patna (Bihar) etc.

Table 3.15: Distance of Bokaro from some Important Places

Name of Place	Distance in Kilometres
Ramgarh	80
Ranchi(Via Ramgarh)	130
Ranchi(via Jhalda)	165
Dhanbad	45
Giridih	110
Jamshedpur	135
Patna(Via Ramgarh)	370
Peterwar	35

Airways : The nearest commercial Airport is at Ranchi, named Birsa Munda Airport, at a distance of 120 km. Bokaro Airport is an unserved airport with no scheduled commercial flights. However, the Government of India has planned to connect Bokaro to the regional hub of Patna and an International Airport in Kolkata through the UDAN Regional Airport Development Scheme, opening the airport up could see commercial flights by 2022.



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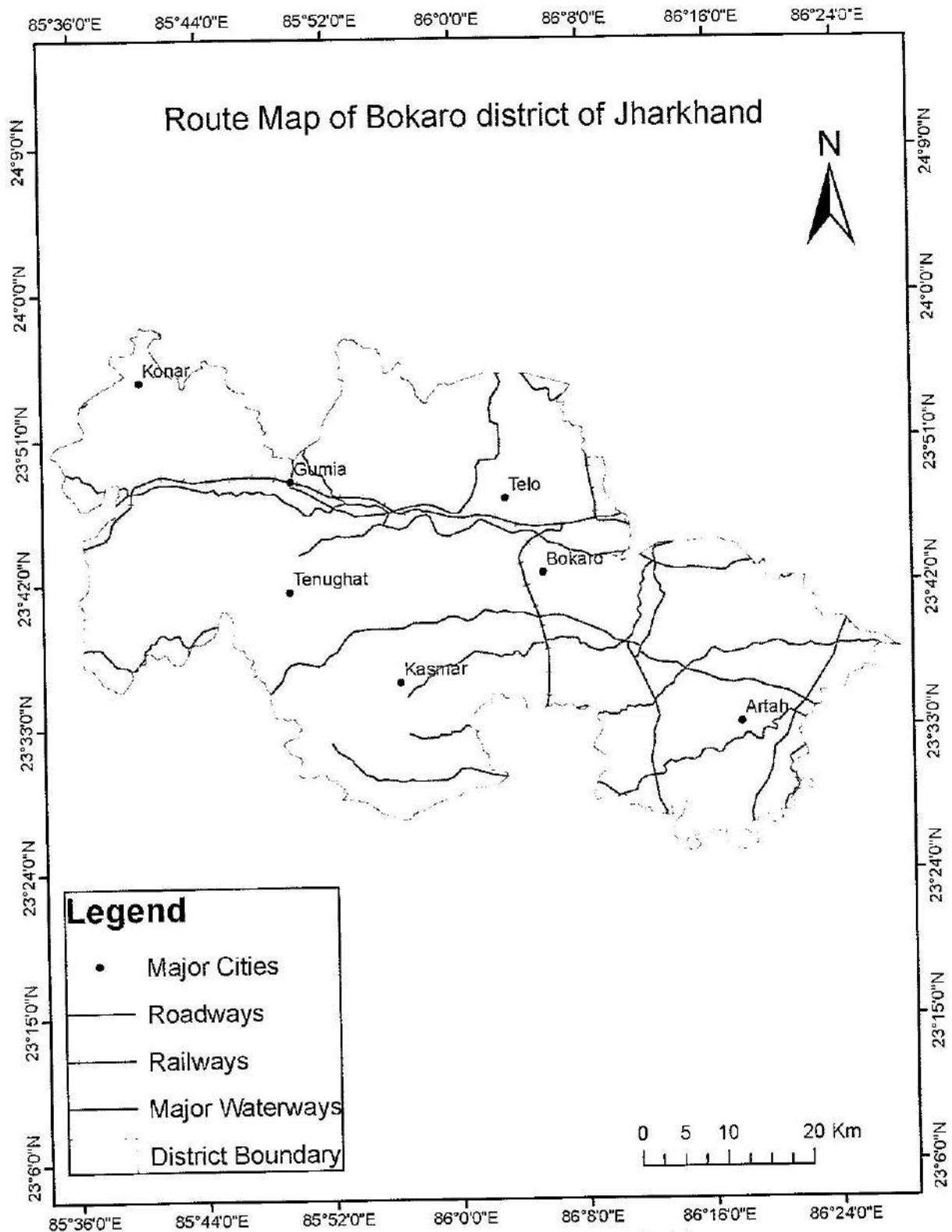
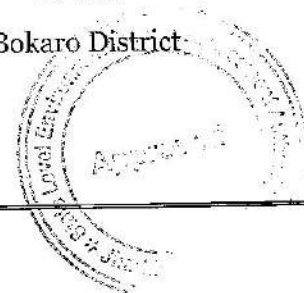
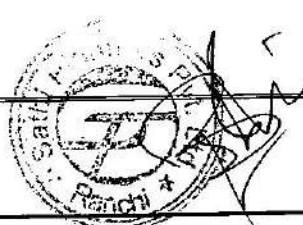


Figure 3.7: Route Map of Bokaro District





3.10 Flora & Fauna:

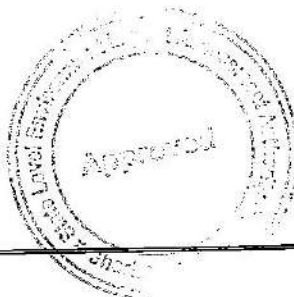
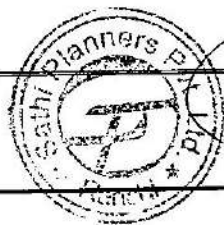
Flora of the District:

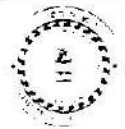
There is no rare or endangered species found in core and buffer zones of the area. The district has different tree species, namely, Sal (*Shorea Robusta*), Khair (*Acacia Catechu*), Asan (*terminalia Tomentosa*), Karam (*adina Cordifolia*), Sidha (*lagerstroemia Parviflora*), Gamhar (*gmelina Arborea*), Semal (*bombax Malabaricum*), Medh (*litsaea Semifera*). Bel (*aegle Marmelos*), Kedar (*garuga Pinnata*), Galgal (*cochlospetmum Gosaypium*), Kend (*diospyros Tomentosa*), Kusum (*cchlfighiera Trijuga*), Seessam (*dalbergia Latifolia*), Siris (*boswellia Serrata*), Bamboo (*dendrocalamus Strictus*) etc.

Fauna of the District:

Animals and birds found within the district are of very general type reported in the locality consisting of rabbits, wild pigs, monkeys and jackals. Birds include pigeons, parrots, wild fowls and owls etc. There is no rare and endangered species found in core and buffer zone.

(Source - DSR -Stone-2018)





4. PHYSIOGRAPHY OF THE DISTRICT

4.1 General Landforms:

Bokaro uplands (in the western part), Bokaro-Chas uplands (middle part), Damodar-Barakar Basin (eastern part), are the physical divisions of which Bokaro-Chas uplands is the major physical division in the district. The region forms the south-western portion of the district. It extends from the north to the south. River Damodar forms its northern boundary. The region is bounded by the State of West Bengal in the south, Damodar-Barakar Basin in the east and by Giridih district in the west. It comprises the major portion of Chas and small portion of Chandankiyari C.D. Blocks. The entire region has undulating surface. The height varies between 200m to 282m. The general slope of the region is from the west to the east. Damodar is the main river which flows along with its tributaries like Garga and Parga in this tract. Minor rivers which flow in the district are Bokaro, Kunar, Khusa and Uri. The other River of the district is Gobai, which flows through Chandankiyari block area and Konar in Gomia block. Scattered patches of forest are found all over the region. Its geology is related to Chhotanagpur Gneiss. Soil is Ustalfs-Aqualfs-Ochrepts. The average annual rainfall is 1,291.2 mm. Paddy, millets and pulses are the main crops of the region. The district is located at an elevation of 200-546 m from mean sea level. The highest peak in Lugu pahar is 1070m. It is situated in the western part of the district. Ravines are found in the western part of the district having rugged topography. Major portion of the district is comprised of Chhotanagpur Gneiss and small patches of Gondwana formations with thick layers of Coal.

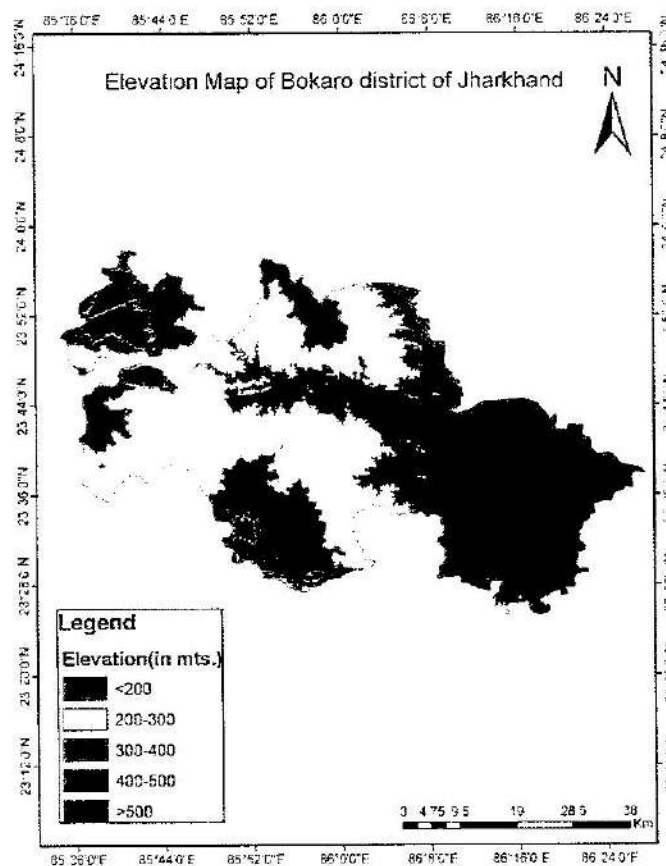
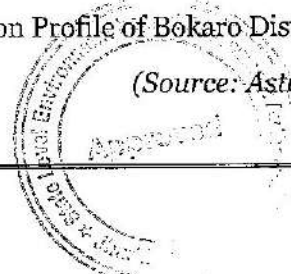
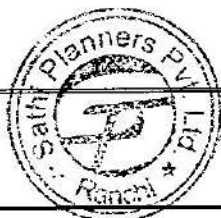
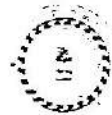


Fig. 4.1: Map Showing Elevation Profile of Bokaro District

(Source: Aster DEM Imagery Data)



District Survey Office
Bokaro



4.2 Soil:

The soils of Bokaro district can be broadly grouped into the soil developed in different formation like Granite or Granite Gneiss of Archaean Age, Sandstone and Shales of Gondwana Formation and Alluvial Plain.

Texturally, the Soils of Bokaro district have been classified into four classes as: -

a) Stony and Gravelly: These are low grade soils having a large admixture of cobbles, pebbles and gravels generally found at the base of the hills.

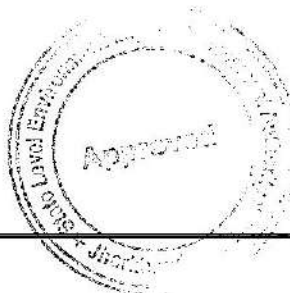
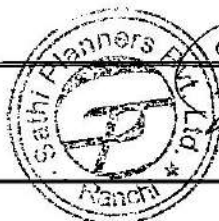
b) Sandy Soils: It is found near the stream beds containing 60% sand and are easily drained. These are poor in respect of fertility and requires heavy manuring.

c) Loamy Soils: These consists mostly of detritus of decomposed rocks and vegetables matter. It is suitable for cultivation. Normally, these are found in valleys near the hills.

d) Clayey Soils: These soils are found near tank beds. It is sticky soils. Their water bearing capacity is very high. The area is very fertile but yielding capacity improved with addition of Sand, Lime and Organic manures etc.

4.3 Geomorphology:

The Bokaro district is part of Chhotanagpur Plateau. It is highly undulating and hilly all over the district. The regional slope of the district is towards east and controlled by the alignment of the tributaries of Damodar River. The hill ranges trending WNW-ESE. The average elevation of the undulating pediplain ranges from 200-350m above MSL. The highest hill prominent block is Gomia. The northern and western part of the district are having hilly ranges. Chas and Chandankiyari are low upland where cultivation is practiced.



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Jharkhand



5. LAND UTILIZATION PATTERN OF THE DISTRICT

5.1 Forest:

Out of total geographical area of 3651.59 km², forest area covers nearly 2403.04 km². The tribal economy revolves around using forest products, by products and minor products. Kendu leaves, Bamboo and its manufactured products, Mahua, fruits, leaves lac etc. play a role in the economic activity of the people. People also hunt animals for food and 'Jani Shikar' festival is related to this hunting habit.

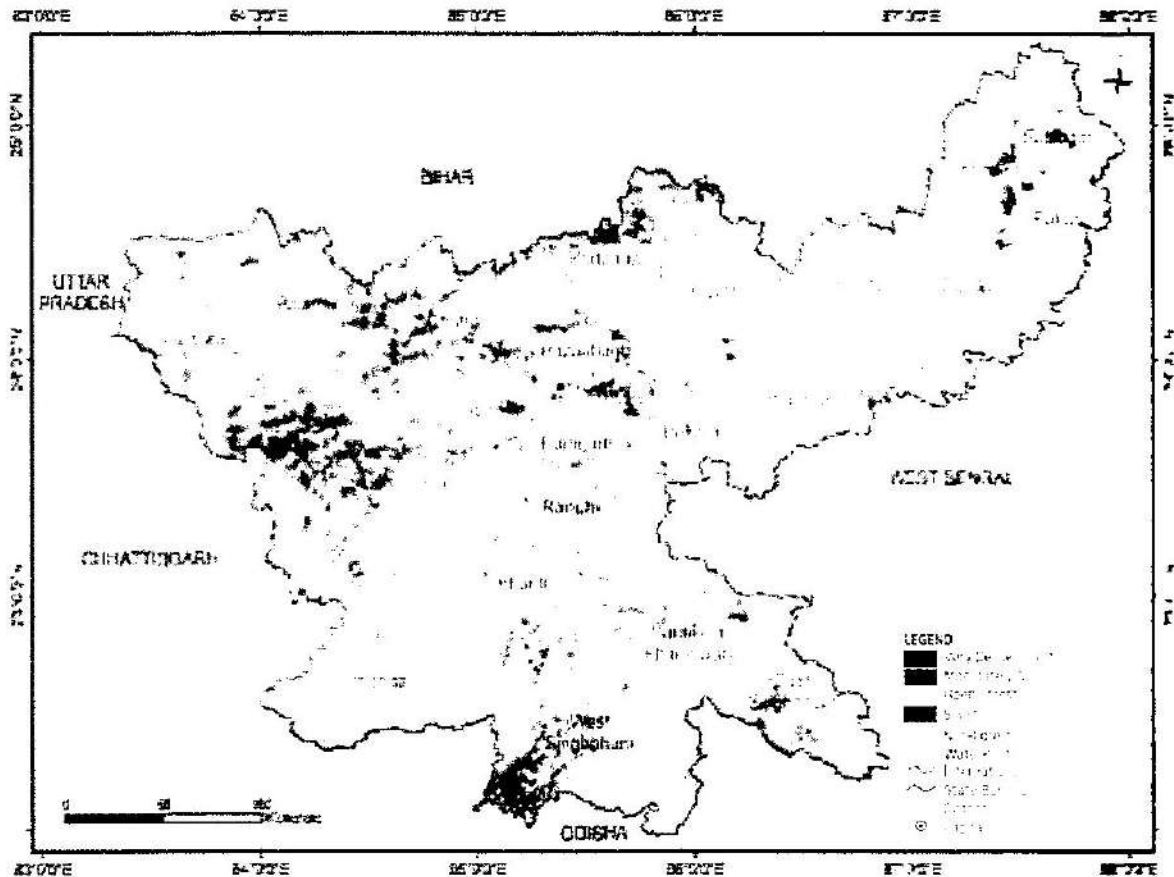
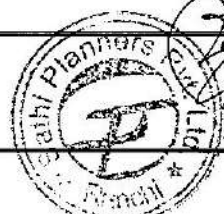
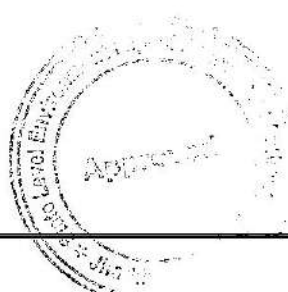


Fig. 5.1: Forest Cover Map of Jharkhand

(Source: India State of Forest Report, 2001)

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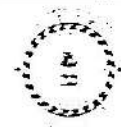


Table 5.1: District wise Forest Cover Area in Jharkhand (Area in Km²)

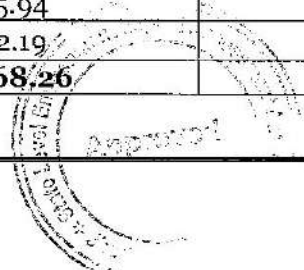
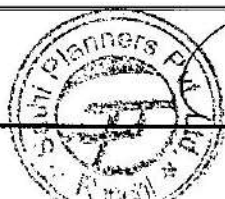
District	Geo-graphical Area (GA)	2021 Assessment				Total	%of GA	Change wrt 2019 assessment	2019
		Very Dense Forest	Mod. Dense Forest	Open Forest					
Bokaro	2,883	60.99	231.94	283.07	576.00	19.98	2.45	573.55	
Chatra	3,718	244.28	871.73	666.08	1,782.09	47.93	4.74	1,777.35	
Deoghar	2,477	0.00	14.30	191.50	205.80	8.31	2.09	203.71	
Dhanbad	2,040	0.00	44.00	174.18	218.18	10.70	4.67	213.51	
Dumka	3,761	0.00	259.40	318.23	577.63	15.36	0.32	577.31	
East Singhbhum	3,562	54.81	591.69	434.19	1,080.69	30.34	1.31	1,079.38	
Gerhwa	4,093	125.74	475.60	890.98	1,431.72	34.98	40.13	1,391.59	
Giridih	4,962	72.16	338.56	490.19	900.91	18.26	4.67	896.24	
Godda	2,266	12.81	271.88	138.66	423.35	18.68	0.00	423.35	
Gumla	5,360	304.69	585.81	552.65	1,443.15	26.92	0.89	1,442.26	
Hazaribagh	3,555	230.11	348.54	784.54	1,363.19	38.35	10.42	1,352.77	
Jamtara	1,811	0.00	20.84	85.18	106.02	5.85	5.38	100.64	
Khunti	2,535	72.97	344.59	496.18	913.74	36.04	8.23	905.51	
Koderma	2,540	80.80	494.43	447.82	1,023.05	40.28	-0.42	1,023.47	
Latehar	4,291	483.36	1,308.93	613.75	2,406.04	56.00	-3.30	2,409.34	
Lohardaga	1,502	174.03	218.40	171.99	504.42	33.58	-0.20	504.62	
Pakur	1,811	2.96	172.40	171.64	287.00	15.85	-0.13	287.13	
Palamu	4,393	52.82	512.73	640.18	1,205.73	27.67	14.95	1,190.78	
Ramgarh	1,341	30.96	109.32	190.98	331.26	24.70	2.26	329.00	
Ranchi	5,097	62.89	363.91	741.98	1,168.78	22.93	4.29	1,164.49	
Sahibganj	2,063	177.4	258.73	297.48	573.61	27.82	1.60	572.01	
Saunkela-Kharsawan	2,657	22.03	213.84	338.73	574.60	21.63	0.56	574.04	
Simdega	3,774	21.97	343.54	877.89	1,243.40	32.95	2.48	1,240.92	
West Singhbhum	7,224	461.53	1,353.80	1,553.11	3,368.44	46.53	2.37	3,366.07	
Grand Total	79,716	2,601.05	9,688.91	11,431.18	23,721.14	29.76	109.73	584.20	

(Source: India State of Forest Report 2021 - Jharkhand)

5.2 Agriculture & Irrigation:

The land of district is mostly mono-cropped and rain-fed. The district is mostly covered by hills and forest. The soil is generally Laterite and sandy. On the other hand, only 39.21% of the total area of the district is presently under agriculture and under horticulture area is about 9.09% of cultivable land.

Class Name	Area (in Km ²)	Percentage
Cloud Cover	83.35	2.90
Dense Vegetation	233.02	8.12
Fallow Land	855.17	29.81
Moderate Vegetation	1548.57	53.98
Settlement	95.94	3.34
Waterbody	52.19	1.81
Total	2868.26	



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Table 5.3: Agricultural Profile of Bokaro district

Agricultural Profile	
Particulars	Data
Main crop	Paddy, Maize, Wheat and Pulses
Important rivers	Damodar, Konark, Jamuniya
Area in hectares	288100 ha
Irrigated Land	28810ha
Forest Land	1,07,016 ha
Sinchith Area	38,340 ha
% of land of farmers having access to irrigation	20.68%
% of farmers using wells	65.56%
% of farmers using lift irrigation,	26.67%
% of farmers using ponds	4.44%
% of farmers using other sources of irrigation.	3.33%
Dams	Tenughat Dam
% of area under irrigation is	28.3%
Cropping intensity	116%
Level of Mechanisation	Moderate

(Source: DSR Stone-2018, Bokaro)

Irrigation is a critical input in agriculture. The need for increased food-grain production in the district relates to development of water resources and its management. Ground water resources are more sustainable even under period of moisture stress and therefore, greater emphasis is being laid on the optimum development and efficient management of these resources on scientific lines. Most importantly, irrigation acts as a buffer under drought conditions, whereby the protective irrigation can prevent crop loss.

Agriculture and forestry are the two main occupations of the local population in the Bokaro district but the land available for the cultivation is limited because of the hilly and rugged topography. The absence of proper and the assured source of the irrigation have impeded the growth of agriculture. Undulating topographic features characterize the district. The agricultural activity of the district is solely dependent upon the monsoon rainfall and the kharif crops mainly paddy is grown extensively.

Irrigational facilities are not adequate in the district. Well is the most common source of irrigation, but this is not very dependable source. The major part of the district being rocky, it is difficult to dig deep dug wells. Where there exists facility for irrigation during Rabi season from the ponds and store water in small nalas, vegetable is the major crop grown in that area. The summer paddy is grown in low lying areas in few places. Paddy and maize are important crops grown in the district.

The most common source of irrigation is the dug well, but this is not a very dependable source of irrigation. The major part of the district being rocky in nature, it is difficult to dig wells. The undulating nature of land makes it possible to store rain water by bunding. Apart from being dependent upon rains, these are by no means adequate. The result is that failure of rains invariably involves failure of crops except in small pockets.



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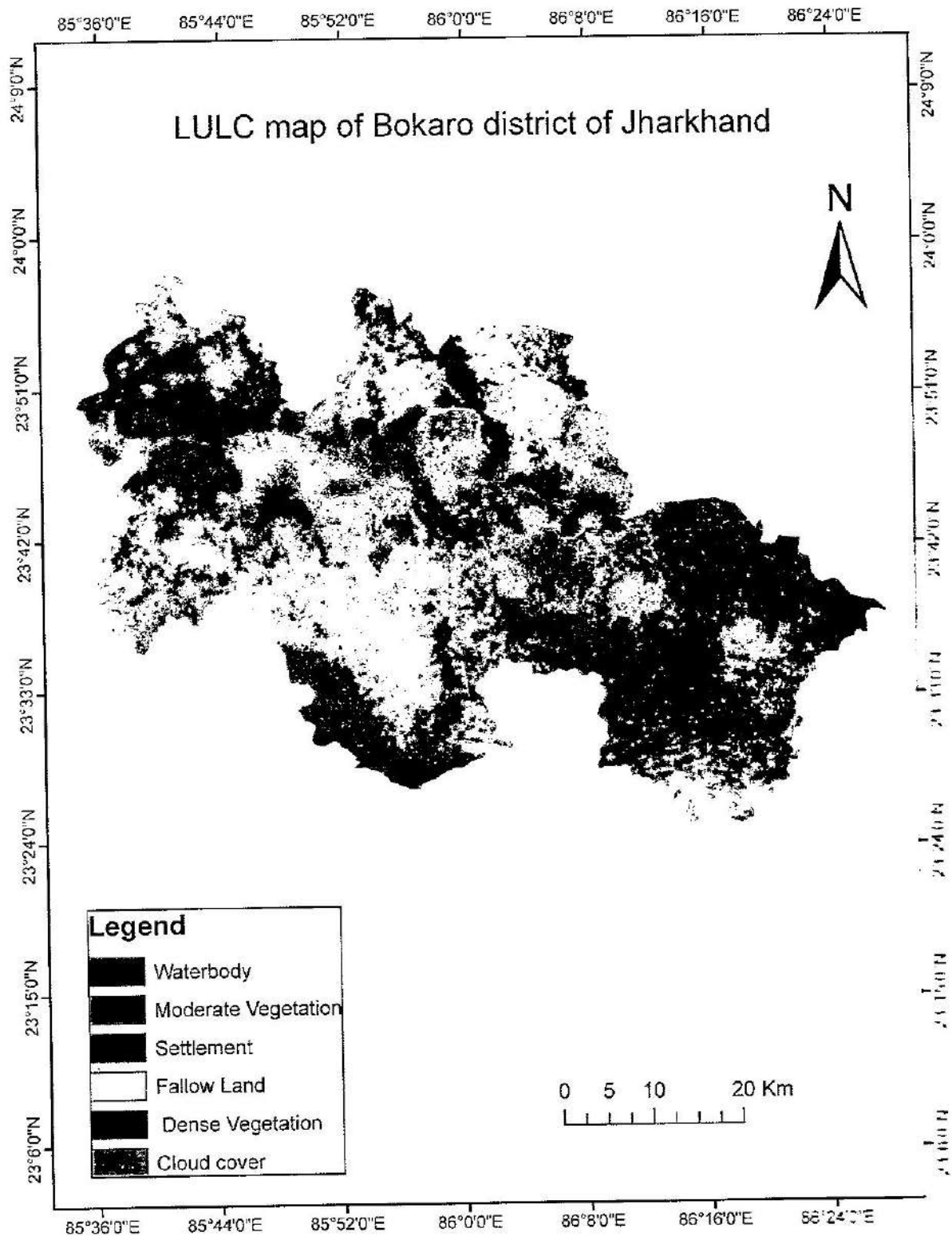
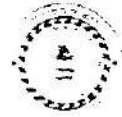


Fig. 5.2: Map Showing Land Use/Land Cover of Bokaro District

(Source: Sentinel-2 Imagery, December 2018)





6. GEOLOGY & MINERAL WEALTH

6.1 Geology:

Major portion of the district is comprised of Chhotanagpur Granite Gneissic Complex and small patches of Gondwana formations with thick layers of Coal. In Bokaro area, the Gondwana sediments rest unconformably on the Precambrian basement rocks comprising of Granites with Pegmatite veins, Amphibolite, Epidiorite, Mica-Schist, Quartzite and porphyritic Gneisses. To the north of the West Bokaro Coalfield, the Precambrian rocks are separated from the Gondwanas by a boundary fault while to the south and west, the Gondwanas generally overlie the Precambrians with a profound unconformity.

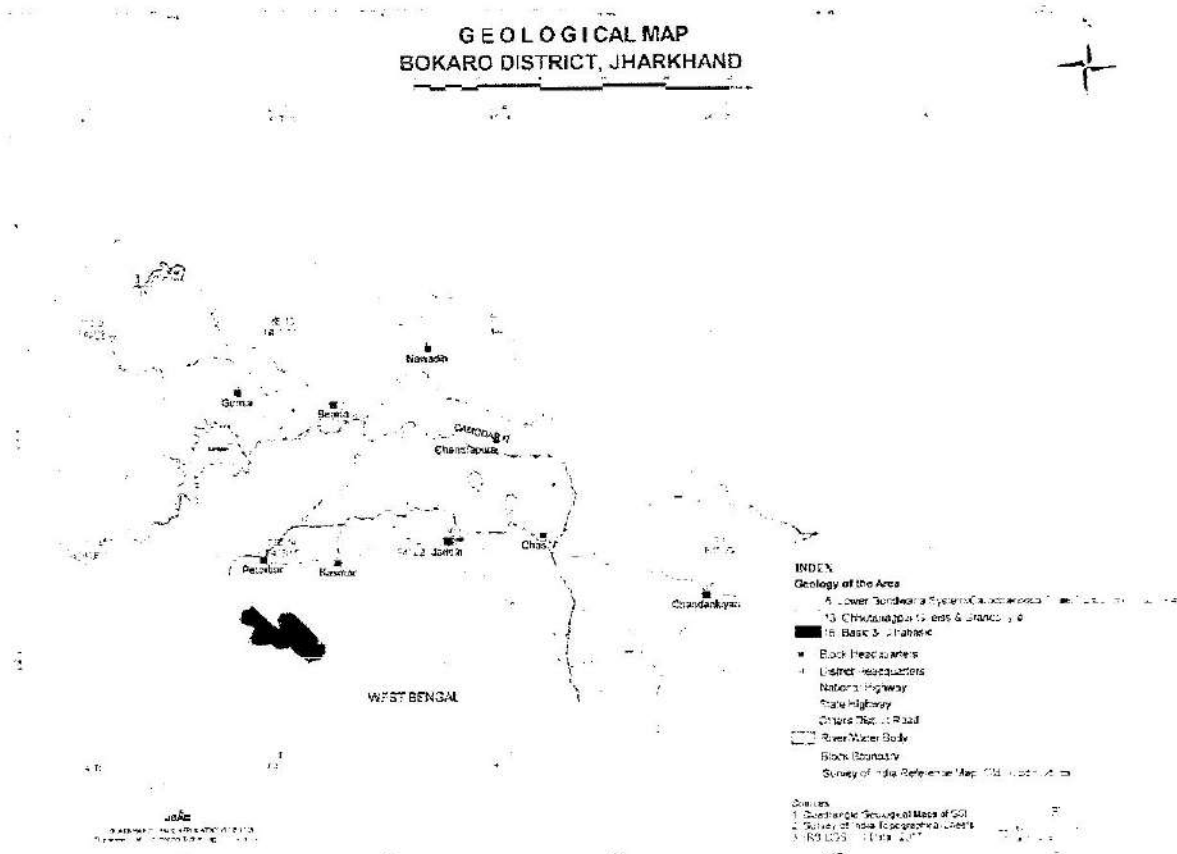
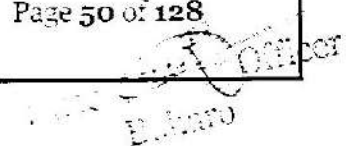
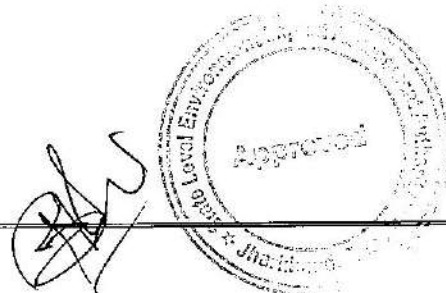


Fig. 6.1: Geological Map of Bokaro District

(Source: JSAC, Deptt. of Mines & Geology, Govt. of Jharkhand)

Mineral Wealth of Bokaro District

Bokaro district is covered by rocks of Gondwana formation in isolated basins within Chhotanagpur Granite Gneissic terrain. Two major Coalfields Viz. East Bokaro & West Bokaro covers the district. The district is thus endowed with good potential of Coal & Fireclay. Apart from Coal, the district also comprises of good deposits of Quartz, Quartzite, Feldspar, China clay, Limestone and General stone (Amphibolite, Dolerite etc.)



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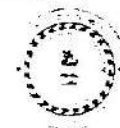


Table 6.1: Generalised Stratigraphy of the Bokaro (Raja Rao, 1987)

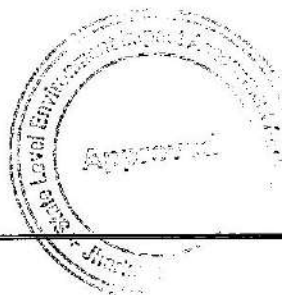
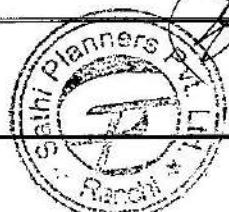
Age	Formation	Lithology	Thickness
Recent Jurassic		Alluvium and Laterite. Basic and ultra-basic dykes and sill
Upper Triassic	Supra Panchet (Mahadevan)	Conglomerate, ferruginous Sandstone and Siltstone.	600m.
Lower Triassic	Panchet	Fine grained Sandstone, green Shale and red and chocolate coloured Shale and Clay.	450m.
Upper Permian	Raniganj	Fine grained Sandstone, Siltstone, carbonaceous and Grey Shale with thin Coal seams.	550m.
Middle Permian	Barren Measures	Carbonaceous Shale, Grey Micaceous Shales with Ironstones.	300m.
Lower Permian	Barakar	Conglomerate, Pebbly Sandstones, very coarse grained to fine grained Sandstones, Grey Shales, Fire Clay and Coal seam.	610m.
	Karharbari	Conglomerates, very coarse grained Sandstone, carbonaceous at places and thin Coal seams.	40-60m.
	Talcher	Diamictite, fine to medium grained greenish and buff coloured Sandstones shales, Rhythmites, Turbidites etc.	160m.
Precambrian		Grainites, Gneisses, Amphibolites, Quartzites, Pegmatites, etc.	

6.2 Overview of Mineral Resources:

Mainly three types of Minor mineral constituents such as Sand, Stone and Bajri are required for any type of construction apart from other material like Cement and Steel. In the earlier time, the mud houses/buildings were constructed with the use of mud. However, with the passage of time, new techniques of development activities were 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 local residents used to lift sand etc. from the River-beds to meet out their bonafide requirement. However, after coming into being "The Jharkhand Minor Mineral Concession Rules 2017", the mining is regulated in accordance with the rules. In Bokaro district, number of minerals are extracted which include mainly Coal, Quartzite, Stone and Sand. Bokaro is well known for Coal deposits.

(Source - DSR-Sand 2015)



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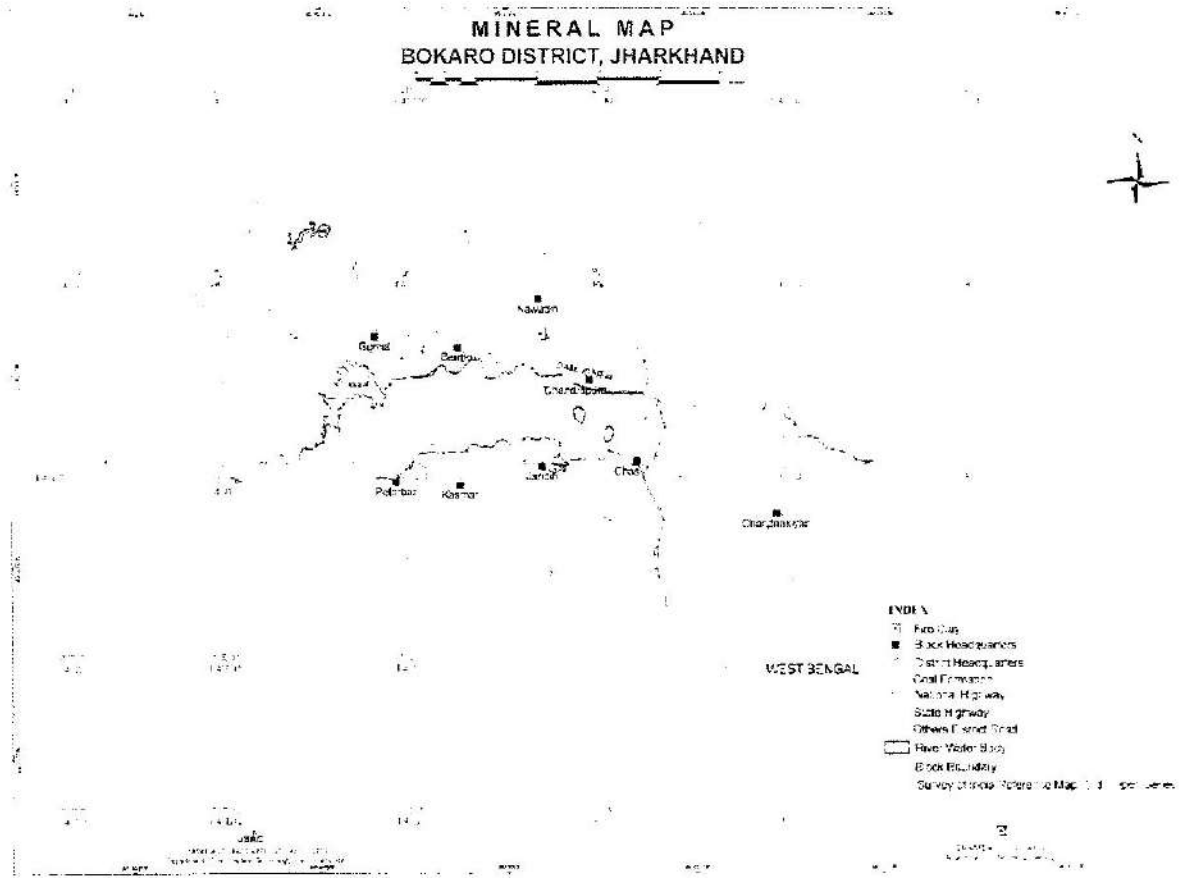
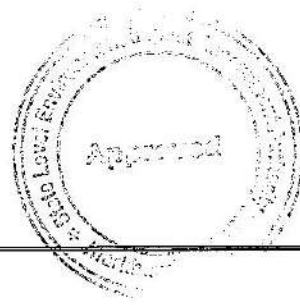
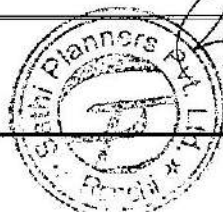
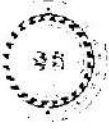


Fig. 6.2: Mineral Map of Bokaro District

(Source: JSAC, Deptt. of Mines & Geology, Govt. of Jharkhand)



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7. OVERVIEW OF MINING ACTIVITY IN THE DISTRICT

7.1 List of Mining Lease in the District with location, area and period of validity:

Table 7.1 - List of Sand Ghats in the Bokaro District

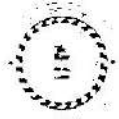
Sl. No.	River/Sand Ghat	Panchayat	Area (Hectare)	Mouza	Remarks
1	Nil	Nil	Nil	Nil	Nil



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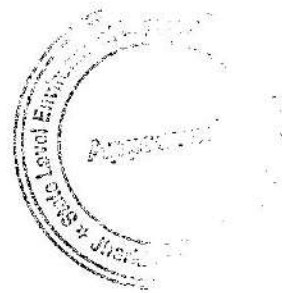
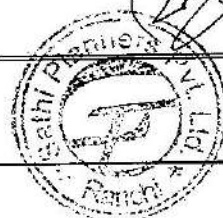


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District Survey Officer



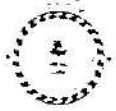
8. DETAILS OF ROYALTY OR REVENUE RECEIVED IN LAST THREE YEARS

Sl. No	Financial Year	Royalty (in Rupees)
1	2019-20	-
2	2020-21	-
3	2021-22	-



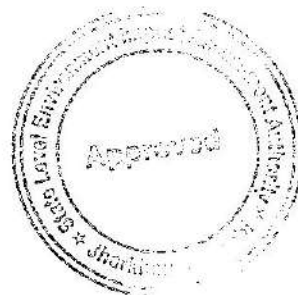
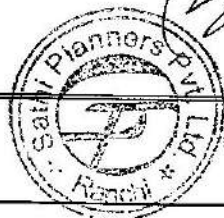
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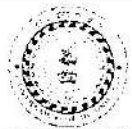
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**9. DETAILS OF PRODUCTION OF SAND OR BAJRI OR
MINOR MINERALS IN LAST THREE YEARS**

Sl. No.	Year	Production (in Ft ³)
1	2019-2020	-
2	2020-2021	-
3	2021-2022	-





10. DEMAND & SUPPLY OF THE MINERAL IN THE DISTRICT

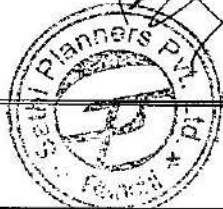
The demand for Sand is ever growing with the growth of the infrastructure sector in our country. The mineral is used mainly in the construction activities like buildings, bridges etc. The requirement for the mineral is always high in the cities and towns. Therefore, there is always a good demand of the mineral in the domestic market.

A study by the Indian Institute of Technology-Bombay (IIT-B) has estimated that the annual demand for Sand in urban India is 60 million metric tonnes. To put the amount in perspective, the national demand for Sand stands at an average of 1kg per person per day in urban India, according to IIT-B.

From construction to cosmetics, society uses Sand in unexpected ways, and quite literally, is built on it. India's Sand demands pose a difficult market to target. The unbridled demand for Sand leaves India devastated by extensive and unsustainable mining practices and promotes illegal operations in other districts and countries. Expected shortages of sand only spike the need for illegal mining activities. Although no official data shares the amount of Sand mined illegally, the amount sufficiently thwarts State and District-level bodies attempts to reduce unlawful mining operations. Most countries, including India, regulate sand mining through environmental and national regulation, entrusting States to enforce laws and regulation. India is a union of States; there is a demarcation of power between Union and State legislatures. The Mines and Minerals Act 1957 and the Mines Act 1952 are the major national statutes steering India's mining sector. These acts provide power to State legislatures to frame legal outlines for the mining of Minor minerals like that of Sand.

(Source: <https://www.hidustantimes.com>)

The demand of Sand in Bokaro district is already high as no Sand mining has been carried out since 2018. Although, demand of Sand becomes three times more with respect to supply within district. Therefore, 07 nos. of potential Sand Ghats have been identified and incorporated in this DSR which could meet the requirement and reduce the demand-supply gap of Sand in future.





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

11.1 Classifying Rivers - Three Stages of River Development:

These categories are: Youthful, Mature and Old age. A Rejuvenated River, one with a gradient that is raised by the earth's movement, can be an old age river that returns to a Youthful State, and which repeats the cycle of stages once again.

11.1.1 Characteristics found in the 3 Stages of River Development:

YOUTHFUL RIVER:

Perhaps the most dynamic of all rivers is a *Youthful River*. Characteristically, youthful Rivers are found at higher elevations, in mountainous areas, where the slope of the land is steeper. Water that flows over such a landscape will flow very fast. Youthful Rivers can be a tributary of a larger and older River, hundreds of miles away and, in fact, they may be close to the headwaters (the beginning) of that larger River.

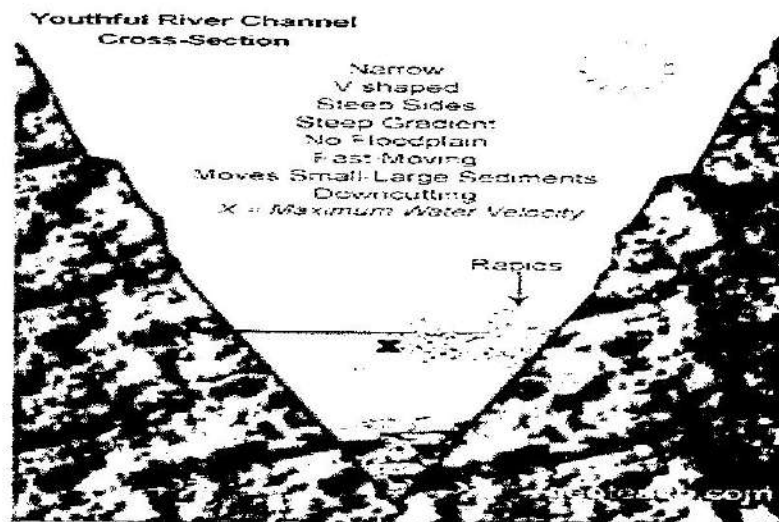
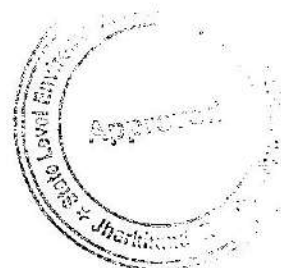


Fig. 11.1: Cross-section of Youthful River Channel

MATURE RIVER:

The Mature River is an in-between stage. The river still down cuts though to a much lesser degree than the Youthful River does but it also erodes laterally, though not as extensively, when compared to the Old Age River. The landscape over which it passes is steep enough that the River's slope enables a velocity capable of moving not only the finer sediments, but also the larger pebbles and cobbles by way of rolling, bouncing and saltation along the River-bed. The area through which the River flows may be mountainous but they will not be as high as the Young River's locale. A "hilly" landscape would be a better description for the surrounding area. Rapids are absent and so is the V-shaped channel. The channel of a Mature River is U-shaped but deeper than and not as wide as the Old Age River's channel.



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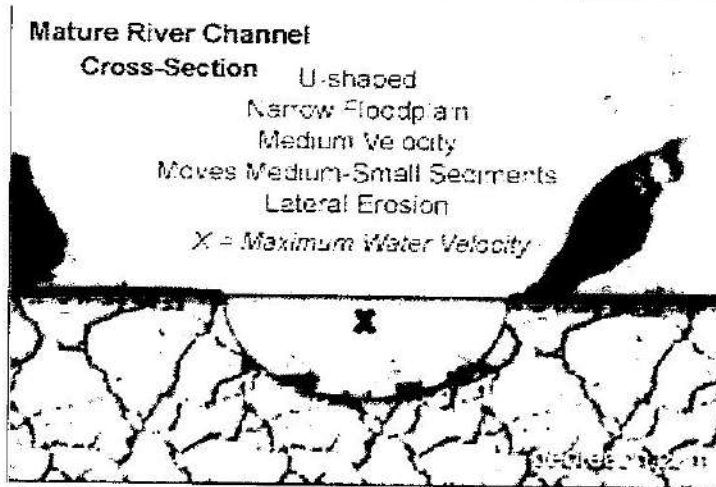
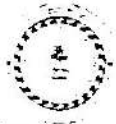


Fig. 11.2: Cross-section of Mature River Channel

OLD AGE RIVER:

Old Rivers flow slowest and their rate of erosion is encounter acted by the degree of sediment they deposit. Their course is no longer straight and widened floodplains are a common characteristic. An old River rests in an almost flat valley as a result of the many years of erosion that have taken place.

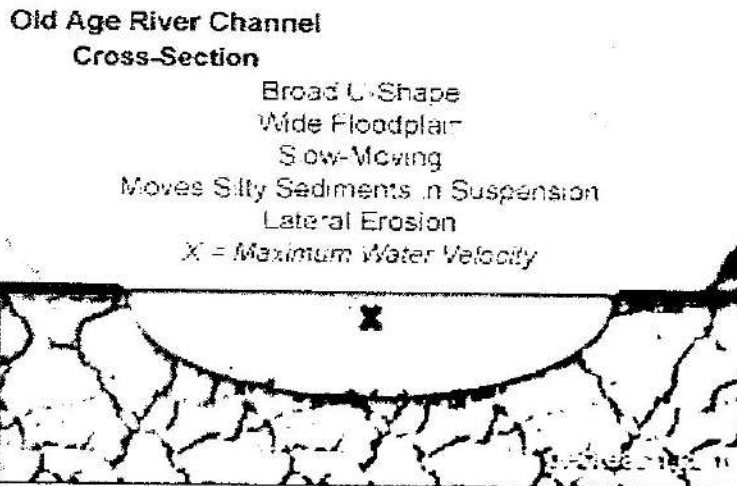
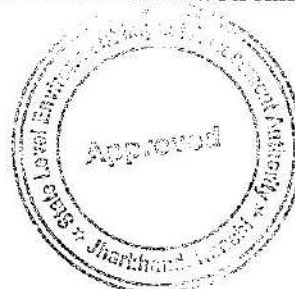


Fig. 11.3: Cross-section of Old Age River Channel

11.2 Stream Erosion and Deposition:

Flowing water is a very important mechanism for both erosion and deposition. Water flow in a stream is primarily related to the stream's gradient, but it is also controlled by the geometry of the stream channel. As shown in Figure 11.4, water flow velocity is decreased by friction along the stream bed, so it is slowest at the bottom and edges and fastest near the surface and in the middle. In fact, the velocity just below the surface is typically a little higher than right at the surface because of friction between the water and the air. On a curved section of a stream, flow is fastest on the outside and slowest on the inside.



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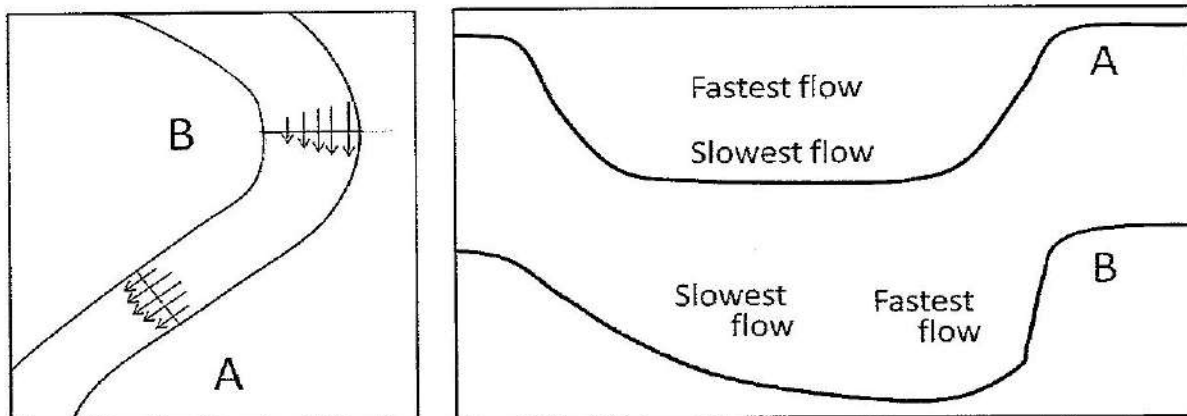
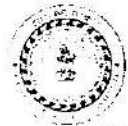


Fig 11.4 - The relative velocity of stream flow depending on whether the stream channel is straight or curved (left), and with respect to the water depth (right)

Other factors that affect stream-water velocity are the size of sediments on the Stream-bed — because large particles tend to slow the flow more than small ones — and the discharge or volume of water passing a point in a unit of time (e.g., m³/second). During a flood, the water level always rises, so there is more cross-sectional area for the water to flow in; however, as long as a River remains confined to its channel, the velocity of the water flow also increases.

Figure 11.2 - shows the nature of sediment transportation in a stream. Large particles rest on the bottom — bed load — and may only be moved during rapid flows under flood conditions. They can be moved by saltation (bouncing) and by traction (being pushed along by the force of the flow).

Smaller particles may rest on the bottom some of the time, where they can be moved by saltation and traction, but they can also be held in suspension in the flowing water, especially at higher velocities. As you know from intuition and from experience, streams that flow fast tend to be turbulent (flow paths are chaotic and the water surface appears rough) and the water may be muddy, while those that flow more slowly tend to have laminar flow (straight-line flow and a smooth water surface) and clear water. Turbulent flow is more effective than laminar flow at keeping sediments in suspension.

Stream water also has a dissolved load, which represents (on average) about 15% of the mass of material transported, and includes ions such as calcium (Ca⁺²) and chloride (Cl⁻) in solution. The solubility of these ions is not affected by flow velocity.

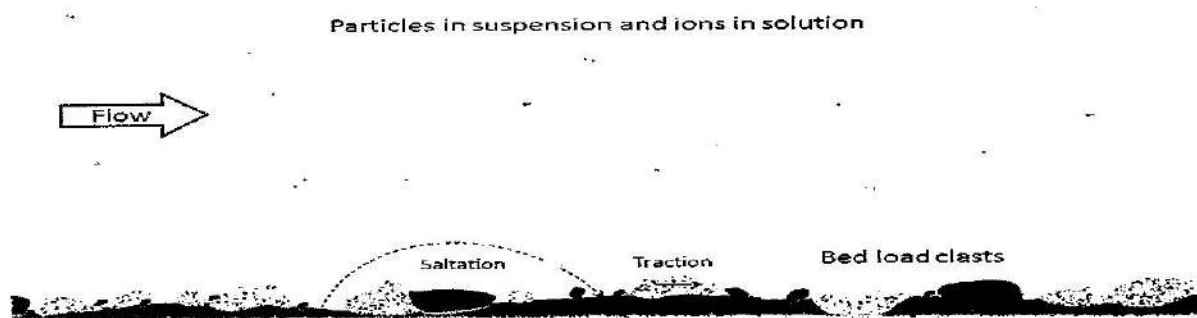
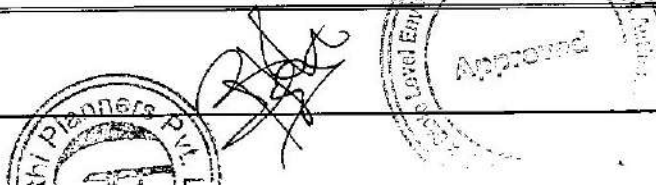


Figure 11.5: Modes of transportation of sediments and dissolved ions (represented by red dots with + and - signs) in a stream. [SE]

The faster the water is flowing, the larger the particles that can be kept in suspension and transported within the flowing water. However, as Swedish geographer Filip Hjulström discovered in the 1940's, the relationship between grain size and the likelihood of a grain being eroded, transported, or deposited is not as simple as one might imagine. Consider, for example, a



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1 mm grain of sand. If it is resting on the bottom, it will remain there until the velocity is high enough to erode it, around 20 cm/s. But once it is in suspension, that same 1 mm particle will remain in suspension as long as the velocity doesn't drop below 10 cm/s. For a 10 mm gravel grain, the velocity is 105 cm/s to be eroded from the bed but only 80 cm/s to remain in suspension.

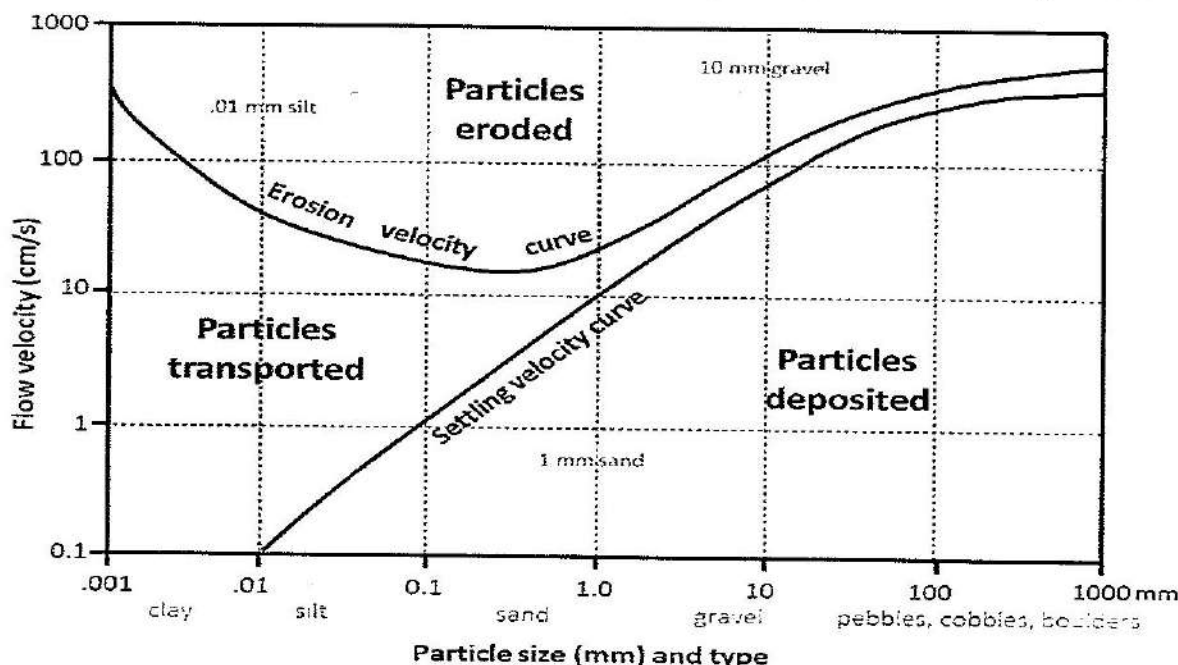


Figure 11.6: The Hjulström-Sundborg Diagram showing the relationships between particle size and the tendency to be eroded, transported, or deposited at different current velocities

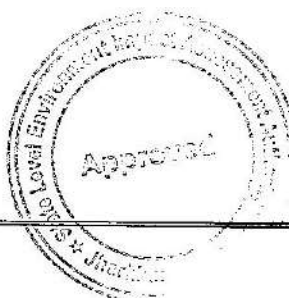
On the other hand, a 0.01 mm silt particle only needs a velocity of 0.1 cm/s to remain in suspension, but requires 60 cm/s to be eroded. In other words, a tiny silt grain requires a greater velocity to be eroded than a grain of sand that is 100 times larger. For clay-sized particles, the discrepancy is even greater. In a stream, the most easily eroded particles are small sand grains between 0.2 mm. and 0.5 mm. Anything smaller or larger requires a higher water velocity to be eroded and entrained in the flow. The main reason for this is that small particles and especially the tiny grains of clay have a strong tendency to stick together and so are difficult to erode from the stream bed.

It is important to be aware that a stream can both erode and deposit sediments at the same time. At 100 cm/s, for example, silt, sand, and medium gravel will be eroded from the stream bed and transported in suspension, coarse gravel will be held in suspension, pebbles will be both transported and deposited, and cobbles and boulders will remain stationary on the stream bed.

A stream typically reaches its greatest velocity when it is close to flooding over its banks. This is known as the bank-full stage, as shown in Figure 11.7. As soon as the flooding stream overtops its banks and occupies the wide area of its flood plain, the water has a much larger area to flow through and the velocity drops significantly. At this point, sediment that was being carried by the high-velocity water is deposited near the edge of the channel, forming a natural bank or *levée*.



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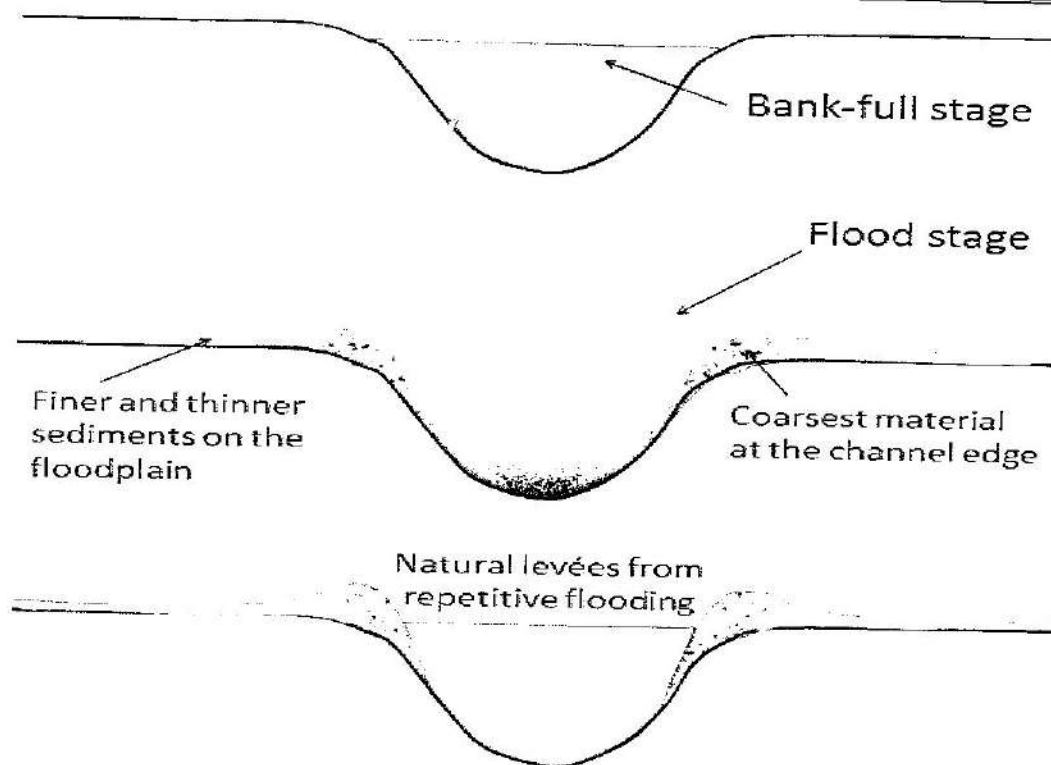
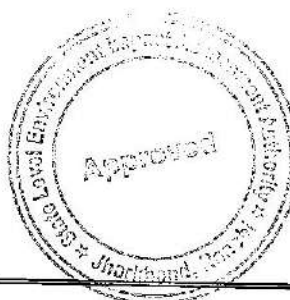
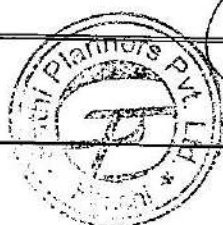


Figure 11.7: The development of natural levees during flooding of a stream. The sediments of the levée become increasingly fine away from the stream channel, and even finer sediments — clay, silt, and fine sand are deposited across most of the flood plain. [SE]

11.3 Flood Plain:

Flood-plain is an area of land adjacent to a stream or river which stretches from the banks of its channel to the base of the enclosing valley walls, and which experiences flooding during periods of high discharge. The soils usually consist of Clay, Silt, and Sand deposited during floods.

Floodplains are formed when a meander erodes sideways as it travels downstream. When a River breaks its banks, it leaves behind layers of alluvium (silt). These gradually build up to create the floor of the plain. Floodplains generally contain unconsolidated sediments, often extending below the bed of the Stream. These are accumulations of Sand, Gravel, Loam, Silt, and/or Clay are often important aquifers, the water drawn from them being pre-filtered compared to the water in the river.



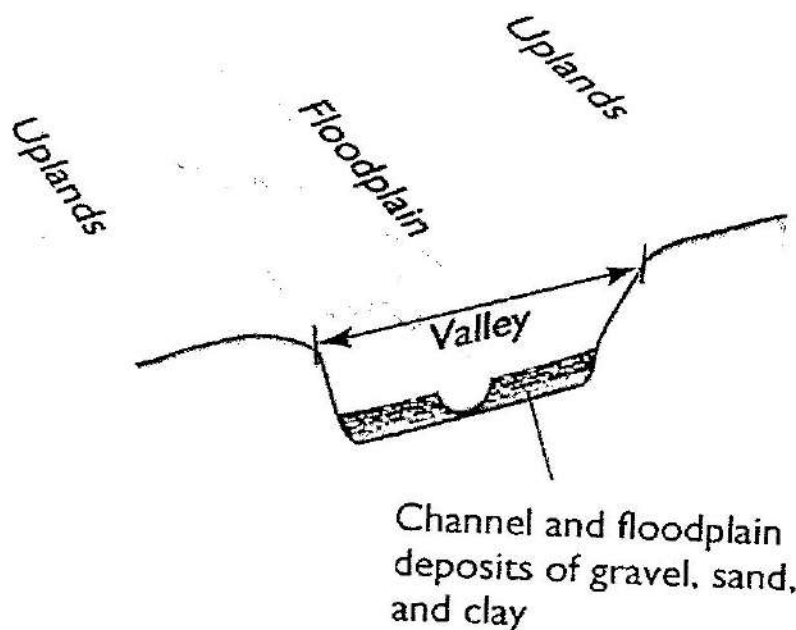


Figure 11.8: Flood Plain

11.4 Replenishment of Sand:

The deposition in a River-bed is more pronounced during rainy season although the quantum of deposition varies from stream to stream depending upon numbers of factors such as catchment, lithology, discharge, River profile and geomorphology of the River course where annual deposition is one meters, but it is noticed that during flood season whole of the pit so excavated is completely filled up and as such the excavated area is replenished with new harvest of minerals.

In order to calculate the mineral deposits in the Stream beds, the mineral constituents have been categorized as Clay, Silt, Sand, Bajri and Boulder. However, during present calculation, the waste material i.e. Silt which vary from 10 to 20% in different streams has also been included in the total production. Further the Survey of India Topo-Sheets are used as base map to know the extent of River course. The mineral reserves have been calculated only up to 1.00-meter depth although there are some portions in the river beds such as channel bars, point bars and central islands where the annual deposition is raising the level of River-bed thus causing shifting of the rivers towards banks resulting in to cutting of banks and at such locations, removal of this material up to the bed level is essential to control the River flow in its central part to check the bank cutting. While calculating the mineral potentials, the mineral deposits lying in the sub-tributaries of that particular Stream/River has not been taken into consideration. Since these mineral deposits are adding annually.

11.5 Surface Runoff:

Also known as overland flow is the flow that occurs when excess storm water, melt water, or other sources flows over the Earth's surface. This might occur because soil is saturated to full capacity, because rain arrives more quickly than soil can absorb it, or because impervious areas (roofs and pavement) send their runoff to surrounding soil that cannot absorb all of it. Surface runoff is a major component of the water cycle. It is the primary agent in soil erosion by water.

Runoff that occurs on the ground surface before reaching a channel is also called a non-point source. If a non-point source contains man-made contaminants, or natural forms of pollution (such as rotting leaves) the runoff is called nonpoint source pollution. A land area which produces runoff that drains to a common point is called a drainage basin. When runoff flows along the





ground, it can pick up soil contaminants including petroleum, pesticides or fertilizers that become discharge or non-point source pollution.

In addition to causing water erosion and pollution, surface runoff in urban areas is a primary cause of urban flooding which can result in property damage, damp and mold in basements, and street flooding.

▪ Effects of Surface Runoff:

Erosion and deposition:

Surface runoff can cause erosion of the Earth's surface; eroded material may be deposited a considerable distance away.

There are four main types of Soil erosion by water:

- Splash Erosion,
- Sheet Erosion,
- Rill Erosion,
- Gully Erosion.

Splash erosion is the result of mechanical collision of raindrops with the soil surface: soil particles which are dislodged by the impact then move with the surface runoff.

Sheet erosion is the overland transport of sediment by runoff without a well-defined channel.

Soil surface roughness causes may cause runoff to become concentrated into narrower flow paths: as these incise, the small but well-defined channels which are formed are known as **rills**. These channels can be as small as one-centimetre-wide or as large as several meters.

If runoff continue to incise and enlarge rills, they may eventually grow to become **gullies**.

Gully erosion can transport large amounts of eroded material in a small time period.

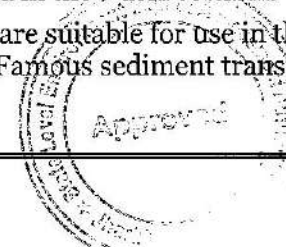


Figure 11.9: Soil erosion by water on intensively-tilled farmland.

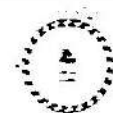
Reduced crop productivity usually results from erosion, and these effects are studied in the field of soil conservation. The soil particles carried in runoff vary in size from about 0.001 millimetre to 1.0 millimetre in diameter. Larger particles settle over short transport distances, whereas small particles can be carried over long distances suspended in the water column.

There are many sediment transport equations which are suitable for use in the prediction of the replenishment rate of River/watershed. Some of the Famous sediment transport equations are: -

1. Dandy-Bolton Equation



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2. Yang Equations
3. Engelund-Hansen Equation
4. Modified Universal Soil Loss Equation (MUSLE)

• **Dandy-Bolton Equation**

Dandy-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 equations development. However, they may provide a quick, rough approximation of mean sediment yields on a regional basis for preliminary watershed planning. They include climate, drainage area, soils, geology, topography, vegetation and land use. 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. In arid regions, sparse precipitation and low run-off are the limiting factors. As precipitation increases, density of vegetation also increases, resulting in less erosion. In areas with adequate and evenly distributed precipitation, vegetation thus becomes the limiting factor. The accuracy of the sedimentation surveys varied, ranging from reconnaissance type measurements of sediment deposits to detailed surveys consisting of closely spaced cross-sections or contours. Runoff data are translated to inches per year per unit area and sediment deposition data to tons per year per square mile of net drainage area. Net drainage area is defined as the sediment-contributing area and normally excluded areas above upstream reservoirs or other structures that were effective sediment traps. Actual sediment yields undoubtedly were slightly higher because most reservoirs do not trap inflowing sediment.

Sediment Yield vs. Drainage Area: - On an average, sediment yield is inversely proportional to the 0.16 power of drainage area between 1 and 30,000 miles².

Sediment Yield vs. Runoff: - Sediment yield increased sharply to about 1,860 tons per mile² per year as run-off increased from 0 to about 2 inches. As runoff increased from 2 to about 50 inches, sediment yield decreased exponentially. Because sediment yield must approach zero as runoff approaches zero, a curve through the plotted points must begin at the origin. The abrupt change in slope of a curve through the data points at Q equals 2 inches precluded the development of a continuous function that would adequately define this relationship. Thus, there are two equations derived for when Q was less than 2 inches and when Q was greater than 2 inches.

• **Combined Effect of Drainage area and Surface Run off on Sediment Yield**

Dandy- 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: -

Where: S = Sediment yield (tons/miles²/yr.)

Q = Mean Annual runoff (inch)

A = Net drainage are in sq mile

For run off less than 2 inches.

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

For runoff more than 2 inches.

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

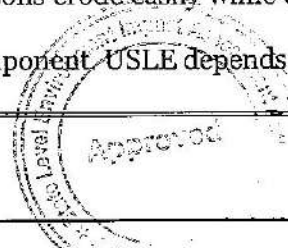
• **Universal Soil Loss Equation:**

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 rainfall.

MUSLE is similar to USLE except for the energy component. USLE depends strictly upon rainfall



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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 water erosion model uses an equation of the form:

$$Y = X \times EK \times CVF \times PE \times SL \times ROKF$$

where:

- Y = sediment yield in tons per hectare
- EK = soil erodibility factor
- CVF = crop management factor that captures the relative effectiveness of soil and crop management systems in preventing soil loss
- PE = erosion control practice factor (including management practices such as terraces, contour farming, and strip cropping)
- SL = slope length and steepness factor
- ROKF = coarse fragment factor

For estimating MUSLE, the energy factor, X, is represented by

$$X = 1.586 \times (Q \times q)^{0.56} \times WSA^{0.12}$$

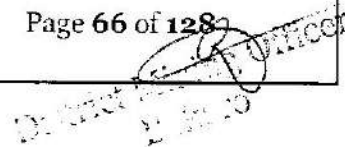
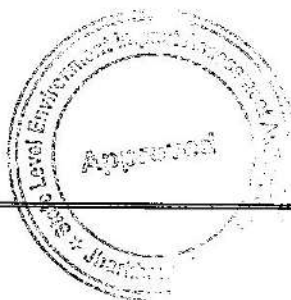
where:

- Q = runoff volume in millimeters
 - qp = peak runoff rate in millimeters per hour
 - WSA = watershed area in hectares
- Runoff volume is estimated using the SCS curve number method. Peak flow was estimated using a modification of the rational method which relates rainfall to peak flow on a proportional basis. The rational equation is:

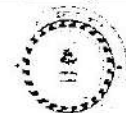
$$Q = C \times i \times A$$

where:

- q = peak flow rate
- C = runoff coefficient representing watershed characteristics
- i = rainfall intensity for the watershed's time of concentration
- A = watershed area



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12. ADDITIONAL INFORMATION

12.1 Drainage System with description of main River:

S. No.	Name of the River	Area drained (Km ²)	% Area drained in the District
1	Tasharkuan River	0.89	0.031
2	Garga River	1.41	0.049
3	Gobai River	2.53	0.088
4	Godda Nala	0.73	0.026
5	Ishri River	2.69	0.093
6	Gantiko River	0.79	0.028
7	Konar River	24.91	0.866
8	Damodar River	24.91	0.866
9	Chirua Nala	0.26	0.009
10	Khalsa Nala	0.45	0.016
11	Bokaro River	4.81	0.167
12	Jamuniya River	7.33	0.255

12.2 Salient features of Important Rivers and Streams:

Sl. No.	Name of the River or Stream	Total Length in the District (in km)	Place of Origin
1	Tasharkuan River	15.00	
2	Garga River	46.51	Kasmar, Bokaro District
3	Gobai River	37.78	
4	Godda Nala	14.73	
5	Ishri River	51.29	
6	Gantiko River	15.17	
7	Konar River	43.58	Sultana village, Hazaribag
8	Damodar River	178.77	Near Chandwa village in Latehar
9	Chirua Nala	4.60	
10	Khalsa Nala	9.38	
11	Bokaro River	31.85	South of Hazaribag, Hazaribag Plateau
12	Jamuniya River	35.45	Near Bishungarh, Hazaribag

12.3 Replenishment Study of Sand Deposit (Category 2):

REPLENISHMENT OF SAND ASSESSED BY "AFTER THE MONSOON" SURVEY (THIRD) CARRIED OUT DURING NOVEMBER 2022									
Pre-Monsoon [March - May 2022]				Post-Monsoon [October - December 2022]					
Sl. No.	Sand Deposit Code	Surface RL	Surface Area	Surface RL	Thickness Replenished	Volume Replenished	Depth of Sand Deposit	Volume of Sand Deposit	Rate of Replenishment
		in m	in m ²	in m	in m	in m ³	in m	in m ³	in %
1	BO_Z4_DAM_3	141.4	47200	142.2	0.8	37760	1.5	70800	50.0
2	BO_Z5_DAM_4	146.9	82200	147.5	0.6	49320	1.5	123300	40.0
3	BO_Z6_DAM_5	150.0	146700	150.8	0.8	117360	1.2	175040	50.0
4	BO_Z7_DAM_6	153.3	261400	154.0	0.7	182980	1.4	365760	50.0
5	BO_Z8_DAM_7	160.7	524000	161.4	0.7	366800	1.5	750000	45.0
6	BO_Z25_BOK_8	183.0	108600	183.6	0.6	65160	1.3	141180	45.2
7	BO_Z26_BOK_9	184.3	231100	185.0	0.7	161770	1.3	300480	53.8
TOTAL						681150		1963710	50.0

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Note:

To estimate the replenishment of Sand, the pre-monsoon (First & Second Survey) data has been assessed through study of Satellite imageries and data provided by District Mining Office to establish the initial level of mining lease before the monsoon.

Keeping in view the 'Generic Structure of Replenishment Study' (as per EMGSM 2020); Third Survey after the monsoon has been carried out to estimate the quantum of material deposited/replenished in the mining lease.

The Fourth Survey shall be carry out at the end of March in coming year to know the quantity of material excavated during the financial year.

The results of year-wise surveys help the State Government to establish the replenishment rate of the River. Based on the replenishment rate, future auction may be planned.

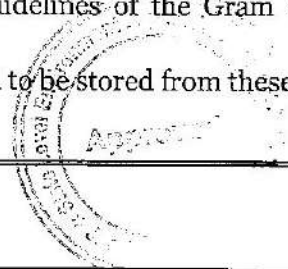
12.4 Jharkhand State Sand Mining Policy 2017:

▪ **Categorization of Streams/Rivers:**

- a. Identification of the Sand available in different order of streams such as 1st, 2nd, 3rd, 4th, 5th order or more shall be carried out by the District Survey Committee based on its size and capacity.
- b. Based on District Survey Report the Survey Committee shall categorize the River in 1st order and 2nd order stream/river as Category-1 and 3rd order and above as Category-2.
- c. However, based on recommendation of District Survey Committee and depending upon local conditions/requirements, the State may review and change the positioning of a particular order of Stream/River into a particular category of Category-1 or Category-2.

▪ **Management of Sand Deposits of Category-1 Streams/Rivers:**

- a. The Sand deposits of Category-1 Stream/Rivers will be kept fully free from domain of grant of mining lease.
- b. The Sand from this category can be used only for non-commercial purposes such as domestic purpose, Community purposes, Government Sponsored Schemes etc. or as defined in Appendix-IX of Part-II-Section-3-Sub Section-(ii) of Extraordinary Gazette of MoEF & CC, Government of India New Delhi dated 15th January 2016.
- c. Gram Panchayat/Local Self Government shall be responsible for supervision of sand collection from such area.
- d. There shall be no transfer or subletting of the sand deposits from these Streams/Rivers.
- e. The Sand from these Streams/Rivers shall be free from any taxes, royalty or levy.
- f. For the purpose of maintenance of the approach road, management, supervision etc. a nominal Maintenance Charge shall be levied by Gram Panchayat/Local Self Government per unit volume of sand lifted/collected/dispatched, as per the rate decided by Department of Industries, Mines and Geology, Government of Jharkhand.
- g. It shall be responsibility of Gram Panchayat/Local Self Government to ensure that Sand from these deposits is not used for any commercial purposes and to regulate the same, a receipt-cum dispatch challan will be issued by the Gram Panchayat/Local Self Government in the format as prescribed by the State.
- h. The maintenance charge so collected shall be deposited in the account of Gram Panchayat/Local Self Government.
- i. The book keeping of this account shall be maintained by Gram Panchayat Local Self Government according to prevailing rules and guidelines of the Gram Panchayat Local Self Government.
- j. Under no circumstances the sand shall be allowed to be stored from these Streams Rivers.



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k. As mentioned in para 7-(i) - (B) of Part-II-Section-3-Sub Section-(ii) of Extraordinary Gazette of MoEF & CC, Government of India, New Delhi dated 15th January, 2016 such usage of Sand shall be exempted from environmental clearance.

l. This shall be the responsibility of the Gram Panchayat/Local Self-Government to restrict Sand mining in prohibited areas as directed by the Department.

m. Under no circumstances mechanized lifting of Sand shall be allowed from these category of Streams/Rivers.

n. The Deputy Commissioner shall put in place proper administrative/enforcement mechanism to ensure no commercial/illegal extraction of Sand from these orders of Streams/Rivers.

▪ **Management of Sand Deposits of Category-2 Streams/Rivers: -**

a. The Sand deposits of Category-2 shall be managed by State Government through Jharkhand State Mineral Development Corporation Limited (JSMDC).

b. All the Sand deposits in Category-2 shall be allocated to JSMDC for a minimum period of 5 years or more as decided by the Government.

c. Sand shall be sold by the JSMDC on commercial basis.

d. The sale price of Sand shall be decided by JSMDC in consultation with the Government.

e. JSMDC shall obtain all clearances such as Environmental Clearance, Mining Plan or any other statutory requirements for Sand mining, storage and sale.

f. JSMDC shall ensure compliance of all applicable rules, regulations, guidelines, directives of honourable courts etc.

g. JSMDC shall ensure that no Sand mining is carried out in any such zone or depth as prohibited under MoEF & CC Guidelines.

h. JSMDC shall adopt scientific and sustainable mining practices and shall ensure a transparent, fair and effective delivery system.

i. JSMDC shall adopt appropriate technology such as RFID/GPS tracking of vehicles, CCTV surveillance, central monitoring, cashless online sale etc. to prevent illegal mining and transportation of Sand.

j. State shall reimburse the entire expenditure incurred by JSMDC for operation and maintenance of Sand Ghats and also pay suitable agency commission as fixed by the Government.

The Government may review the Sand Mining Policy in future as and when required and issue Guidelines or Amendments accordingly.

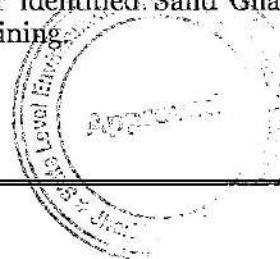
Sand deposit zones has been identified through field survey and study of Satellite imageries over the entire stretch of the River within the district. After physical verification of those deposition zones, only Sand potential areas are considered for Sand Ghats. After leaving safe distance from all physical structures, forest, habitation etc. as per statute, limiting coordinates of each Sand Ghat has been fixed.

In order to reduce the cluster formation, size of a Sand Ghat has been kept as large as possible, covering the entire Sand bar inside single Sand Ghat after leaving statutory distances.

Apparently, all the Sand Ghats which are located on 1st and 2nd order of Stream, are considered as *Category-1* Sand Ghats. Apart from this, all such Sand Ghats, which don't comply with the statutory norms in terms of distance from habitation and forest to obtain Environment Clearance for commercial mining are also considered as *Category-1* Sand Ghats, which shall be consumed by local villagers for their domestic use. All other identified Sand Ghats are considered as *Category-2* Sand Ghats, proposed for commercial mining.



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12.5 Details of Sand Ghats – Category 1:

Sl. No.	Name of Sand Ghat	River	Block	Mouza	Khata No.	Plot No.	Area [Ha.]
1	Pindra_Tulbul_Sand Ghat	Bokaro	Gumia	Pindra Tulbul		35, 16, 34, 753, 769, 1, 819 819, 1	16.92
2	Bokaro Steel City Sand Ghat	Damodar	Chas	Bokaro Steel City		308, 1, 45	10.31
3	Barkipunu Sand Ghat	Damodar	Gumia	Barkipunu		3678, 4033, 3677	14.96
4	Chakuya Sand Ghat	Ishri	Chas	Chakuya	217	2446, 884	6.47
5	Khatka Sand Ghat	Garga	Chas	Khatka	114	169	7.61
6	Sarjori_Harayak_Udwa_Sand Ghat	Ishri	Chandankiyari	Sarjori, Harayak, Udwa			8.6

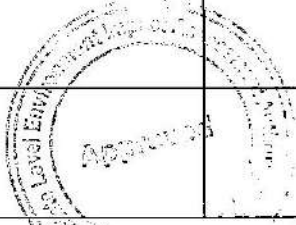
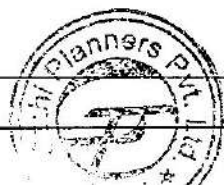
12.6 Details of Sand Ghats – Category 2:

Sl. No.	Zone	River	Sand Ghat Code	Circle	Mouza	Plot No.	Area [Ha.]	Labels	Latitude	Longitude
1	Zone-4	Damodar	BO_Z4_DAM_3	Peterwar	Pichhri-2	1	4.72	A B C D E F G H I J K	23° 45' 24.793" N 23° 45' 24.730" N 23° 45' 24.216" N 23° 45' 21.153" N 23° 45' 19.316" N 23° 45' 16.959" N 23° 45' 14.676" N 23° 45' 11.836" N 23° 45' 15.164" N 23° 45' 16.987" N 23° 45' 21.148" N	86° 00' 30.085" E 86° 00' 31.311" E 86° 00' 33.380" E 86° 00' 32.540" E 86° 00' 31.571" E 86° 00' 30.354" E 86° 00' 28.833" E 86° 00' 24.668" E 86° 00' 22.569" E 86° 00' 25.554" E 86° 00' 28.692" E
2	Zone-5	Damodar	BO_Z5_DAM_4	Peterwar	Chalkari	938	8.22	A B C	23° 45' 09.573" N 23° 45' 10.685" N 23° 45' 5.435" N	85° 58' 01.262" E 85° 58' 05.872" E 85° 58' 06.799" E

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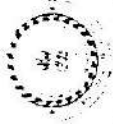


K	23°45'03.188"N	85°53'49.262"E							
L	23°45'00.000"N	85°53'43.935"E							
M	23°44'57.674"N	85°53'38.751"E							
N	23°44'56.025"N	85°53'32.951"E							
O	23°44'54.220"N	85°53'28.437"E							
P	23°44'52.350"N	85°53'21.288"E							
Q	23°44'52.298"N	85°53'13.682"E							
R	23°44'52.115"N	85°53'07.885"E							
S	23°44'51.992"N	85°53'02.636"E							
T	23°44'52.053"N	85°53'00.195"E							
U	23°44'52.952"N	85°52'59.162"E							
V	23°44'54.123"N	85°52'58.955"E							
W	23°44'55.435"N	85°53'02.764"E							
X	23°44'57.190"N	85°53'09.073"E							
Y	23°44'57.470"N	85°53'15.003"E							
Z	23°44'58.504"N	85°53'24.674"E							
A1	23°45'06.923"N	85°53'40.359"E							
B1	23°45'13.658"N	85°53'45.051"E							
C1	23°45'25.558"N	85°54'02.322"E							
D1	23°45'29.647"N	85°54'08.425"E							
A	23°46'23.036"N	85°49'58.707"E							
B	23°46'22.443"N	85°49'57.190"E							
C	23°46'22.487"N	85°49'56.131"E							
D	23°46'23.159"N	85°49'55.939"E							
E	23°46'23.968"N	85°49'55.651"E							
F	23°46'24.763"N	85°49'55.802"E							
G	23°46'26.550"N	85°49'56.105"E	10.86	5381, 5567	Hosir	Gomia	BO 25, BOK 8	Bokaro	Zone 25

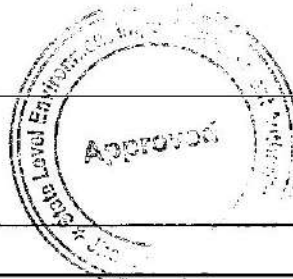
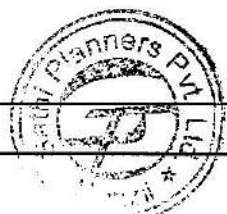


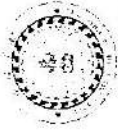
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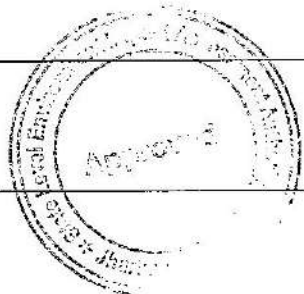
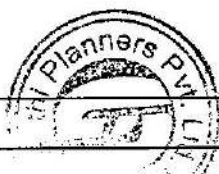
H	23°46' 27.805" N	85°49' 55.459" E
I	23°46' 28.765" N	85°49' 54.897" E
J	23°46' 30.944" N	85°49' 53.691" E
K	23°46' 32.585" N	85°49' 51.262" E
L	23°46' 33.887" N	85°49' 49.103" E
M	23°46' 34.864" N	85°49' 47.047" E
N	23°46' 35.446" N	85°49' 45.745" E
O	23°46' 36.286" N	85°49' 43.998" E
P	23°46' 36.714" N	85°49' 42.833" E
Q	23°46' 37.317" N	85°49' 41.372" E
R	23°46' 38.082" N	85°49' 39.900" E
S	23°46' 38.627" N	85°49' 38.688" E
T	23°46' 39.566" N	85°49' 37.510" E
U	23°46' 40.940" N	85°49' 34.923" E
V	23°46' 41.571" N	85°49' 33.809" E
W	23°46' 42.619" N	85°49' 32.214" E
X	23°46' 43.606" N	85°49' 30.760" E
Y	23°46' 44.471" N	85°49' 29.213" E
Z	23°46' 45.746" N	85°49' 26.891" E
A1	23°46' 46.369" N	85°49' 24.966" E
B1	23°46' 47.131" N	85°49' 23.400" E
C1	23°46' 48.027" N	85°49' 21.642" E
D1	23°46' 48.671" N	85°49' 19.937" E
E1	23°46' 48.597" N	85°49' 18.634" E
F1	23°46' 49.373" N	85°49' 17.242" E
G1	23°46' 50.365" N	85°49' 15.328" E
H1	23°46' 52.536" N	85°49' 16.474" E
I1	23°46' 51.095" N	85°49' 19.007" E



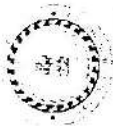


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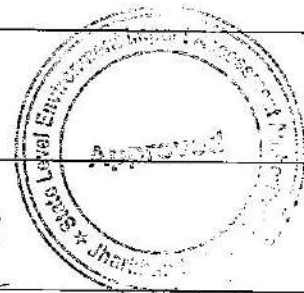
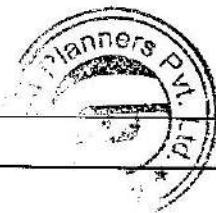
J	23°47' 17.747" N	85°48' 36.542" E
K	23°47' 19.118" N	85°48' 35.254" E
L	23°47' 22.764" N	85°48' 30.895" E
M	23°47' 24.183" N	85°48' 28.847" E
N	23°47' 24.800" N	85°48' 26.997" E
O	23°47' 25.704" N	85°48' 24.365" E
P	23°47' 26.855" N	85°48' 22.392" E
Q	23°47' 28.171" N	85°48' 20.788" E
R	23°47' 29.835" N	85°48' 19.515" E
S	23°47' 31.528" N	85°48' 19.651" E
T	23°47' 32.556" N	85°48' 19.741" E
U	23°47' 34.022" N	85°48' 19.061" E
V	23°47' 38.438" N	85°48' 18.857" E
W	23°47' 39.815" N	85°48' 18.096" E
X	23°47' 41.069" N	85°48' 16.472" E
Y	23°47' 42.261" N	85°48' 14.334" E
Z	23°47' 43.269" N	85°48' 12.381" E
A	23°47' 43.583" N	85°48' 10.889" E
B	23°47' 43.480" N	85°48' 07.566" E
C	23°47' 42.195" N	85°48' 05.133" E
D	23°47' 41.459" N	85°48' 02.717" E
E	23°47' 40.431" N	85°48' 00.936" E
F	23°47' 38.752" N	85°47' 59.668" E
G	23°47' 37.381" N	85°47' 58.537" E
H	23°47' 35.428" N	85°47' 57.201" E
I	23°47' 33.072" N	85°47' 55.673" E
J	23°47' 31.893" N	85°47' 54.939" E
K	23°47' 30.656" N	85°47' 54.103" E

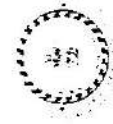


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L	23°47' 29.132" N	85°47' 52.555" E
M	23°47' 27.556" N	85°47' 51.082" E
N	23°47' 26.836" N	85°47' 50.431" E
O	23°47' 25.637" N	85°47' 49.060" E
P	23°47' 24.643" N	85°47' 46.970" E
Q	23°47' 24.053" N	85°47' 45.044" E
R	23°47' 24.173" N	85°47' 43.330" E
S	23°47' 24.566" N	85°47' 41.877" E
T	23°47' 24.953" N	85°47' 39.847" E
U	23°47' 25.705" N	85°47' 38.107" E
V	23°47' 26.768" N	85°47' 36.314" E
W	23°47' 27.864" N	85°47' 34.738" E
X	23°47' 29.338" N	85°47' 32.339" E
Y	23°47' 30.160" N	85°47' 30.729" E
Z	23°47' 31.325" N	85°47' 28.742" E
A1	23°47' 32.730" N	85°47' 26.377" E
B1	23°47' 34.169" N	85°47' 23.910" E
C1	23°47' 35.745" N	85°47' 22.094" E
D1	23°47' 36.757" N	85°47' 21.433" E
E1	23°47' 38.178" N	85°47' 22.848" E
F1	23°47' 35.642" N	85°47' 28.125" E
G1	23°47' 34.066" N	85°47' 30.969" E
H1	23°47' 32.593" N	85°47' 33.539" E
I1	23°47' 30.571" N	85°47' 36.211" E
J1	23°47' 28.961" N	85°47' 38.644" E
K1	23°47' 26.254" N	85°47' 43.167" E
L1	23°47' 25.907" N	85°47' 44.587" E
M1	23°47' 25.406" N	85°47' 46.106" E



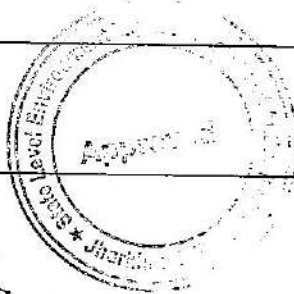


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N1	23°47' 25.329" N	85°47' 47.244" E
O1	23°47' 26.082" N	85°47' 48.443" E
P1	23°47' 28.301" N	85°47' 50.314" E
Q1	23°47' 29.706" N	85°47' 51.307" E
R1	23°47' 31.522" N	85°47' 52.712" E
S1	23°47' 34.400" N	85°47' 54.563" E
T1	23°47' 37.347" N	85°47' 56.481" E
U1	23°47' 39.437" N	85°47' 58.023" E
V1	23°47' 40.739" N	85°47' 58.914" E
W1	23°47' 41.875" N	85°47' 59.590" E
X1	23°47' 42.521" N	85°48' 01.655" E
Y1	23°47' 42.384" N	85°48' 03.386" E
Z1	23°47' 42.641" N	85°48' 05.476" E
A2	23°47' 43.209" N	85°48' 06.108" E
B2	23°47' 44.078" N	85°48' 07.970" E
C2	23°47' 45.029" N	85°48' 10.315" E
D2	23°47' 42.299" N	85°48' 16.856" E
E2	23°47' 39.852" N	85°48' 20.187" E
F2	23°47' 36.559" N	85°48' 21.117" E
G2	23°47' 35.079" N	85°48' 22.104" E
H2	23°47' 33.352" N	85°48' 22.885" E
I2	23°47' 32.489" N	85°48' 23.913" E
J2	23°47' 31.091" N	85°48' 24.489" E
K2	23°47' 30.659" N	85°48' 25.983" E
L2	23°47' 29.816" N	85°48' 27.038" E
M2	23°47' 29.158" N	85°48' 28.970" E
N2	23°47' 27.966" N	85°48' 30.122" E
O2	23°47' 26.198" N	85°48' 31.520" E

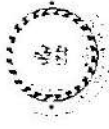


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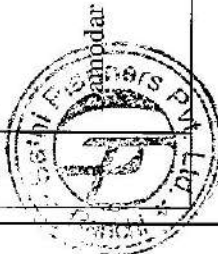
DISTRICT SURVEY REPORT FOR
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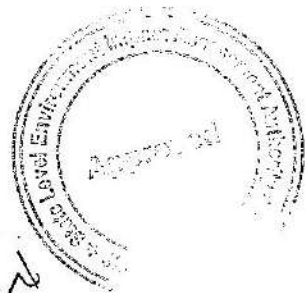
12.7 Details of Captive Sand Ghats of Tata Steel Ltd. (Jharia Division); Category 2:

Sand used for Stowing of Underground Coal (Major mineral) Mines.

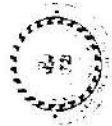
Sl. No.	River	River	Mouza	Khata No.	Plot No.	Area [in Acres]	Contract	
							Valid from	Valid Up to
1	Damodar	Chandankiyari	Laghla (249)	103	212	27.00	09.09.2016	08.09.2036
			Mahal (225)	1250	6838			
2	Damodar	Chandankiyari	Mahal (225)	1250	6774, 6409, 6774/6992	43.00	09.09.2016	08.09.2036
			Shaharjori (260)	253	1			
			Bogula (258)	2	588			
	Damodar		Damodarpur (240)		436, 426, 427, 428, 429, 262, 430/450 & 262/430	123.92	Renewal Pending due to non-grant of EC	
			Polkiri (241)		1, 2580, 2581 & 3253			
			Chhatatanr (238)		1257, 300, 127/1258 & 127/1269			
			Bhojudih (239)		1240 & 1245			
		Narkarai (247)		1				



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DISTRICT SURVEY REPORT FOR
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12.8 Details of Sand Deposit Zones:

12.8.1 Details of Sand Deposit Zones in Bokaro District of Jharkhand:

Sl. No.	Zone No.	Zone Boundary Coordinates	Reference Point Coordinates	Elevation (in m)	No. of Sand Ghats	Total Area
1	Zone-1	No Sand Ghat identified due to very low Sand deposit.				
2	Zone-2	No Sand Ghat identified due to very low Sand deposit.				
3	Zone-3	Identified as Category 1 due to Proximity to Forest Land (<250 m)				
4	Zone-4	85°59'20.530"E, 23°44'49.088"N to 86°00'40.710"E, 23°45'32.495"N	86° 0'52.67"E, 23°45'38.36"N	219	1	4.72 Ha.
5	Zone-5	85°58'02.579"E, 23°45'43.732"N to 85°58'50.164"E, 23°44'46.629"N	85°58'08.45"E, 23°45'31.13"N	226	1	8.22 Ha.
6	Zone-6	85°56'47.485"E, 23°45'57.769"N to 85°57'28.776"E, 23°46'13.627"N	85°56'25.94"E, 23°45'45.12"N	227	1	14.67 Ha.
7	Zone-7	85°57'28.776"E, 23°46'13.627"N to 85°57'28.776"E, 23°46'13.627"N	85°56'25.38"E, 23°45'43.59"N	228	1	26.14 Ha.
8	Zone-8	85°52'58.763"E, 23°44'44.590"N to 85°54'25.069"E, 23°45'24.916"N	85°54'25.05"E, 23°45'31.86"N	229	1	52.40 Ha.
9	Zone-9	No Sand Ghat identified due to very low Sand deposit.				
10	Zone-10	No Sand Ghat identified due to very low Sand deposit.				
11	Zone-11	No Sand Ghat identified due to very low Sand deposit.				
12	Zone-12	No Sand Ghat identified due to very low Sand deposit.				
13	Zone-13	No Sand Ghat identified due to very low Sand deposit.				
14	Zone-14	No Sand Ghat identified due to very low Sand deposit.				
15	Zone-15	No Sand Ghat identified due to very low Sand deposit.				
16	Zone-16	No Sand Ghat identified due to very low Sand deposit.				
17	Zone-17	No Sand Ghat identified due to very low Sand deposit.				
18	Zone-18	No Sand Ghat identified due to very low Sand deposit.				
19	Zone-19	No Sand Ghat identified due to very low Sand deposit.				
20	Zone-20	No Sand Ghat identified due to very low Sand deposit.				
21	Zone-21	No Sand Ghat identified due to very low Sand deposit.				
22	Zone-22	No Sand Ghat identified due to very low Sand deposit.				
23	Zone-23	No Sand Ghat identified due to very low Sand deposit.				

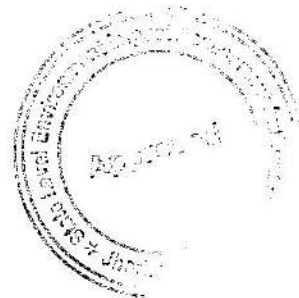
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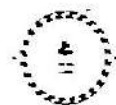
Zone	Coordinates	Description	Area (Ha)
24	Zone- 24	No Sand Ghat identified due to very low Sand deposit.	
25	Zone- 25	85°49'13.688"E 23°46'53.084"N, 85°49'58.589"E 23°46'22.280"N, 85°49'56.19"E, 23°46'12.29"N	249
26	Zone- 26	85°47'16.736"E 23°47'40.517"N, 85°48'51.261"E 23°47'02.621"N, 85°47'02.26"E, 23°47'33.56"N	264
27	Zone- 27	Identified as Category 1 due to Proximity to Forest Land (<250 m)	1
28	Zone- 28	Identified as Category 1 due to Proximity to Forest Land (<250 m)	1



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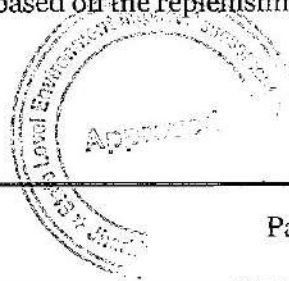
12.8.2 Details of Sand Deposit Zones in Rivers of Bokaro District:

River/Zone	Area in Ha.
Bokaro River (Total Area)	61.75
Zone-25	10.44
Zone-26	28.68
Zone-27	22.63
Damodar River (Total Area)	395.50
Zone-1	38.67
Zone-2	40.16
Zone-28	22.28
Zone-3	45.33
Zone-4	38.09
Zone-5	35.13
Zone-6	13.99
Zone-7	65.18
Zone-8	96.68
Garga River (Total Area)	27.24
Zone-17	27.24
Gobai River (Total Area)	59.15
Zone-19	17.50
Zone-20	3.38
Zone-22	37.79
Zone-23	0.47
Ishri River (Total Area)	3.63
Zone-21	0.43
Zone-24	3.20
Jamuniya River (Total Area)	8.50
Zone-10	5.51
Zone-11	0.93
Zone-9	2.07
Kadma River (Total Area)	16.43
Zone-12	8.71
Zone-13	2.54
Zone-14	5.18
Khanjo River (Total Area)	2.06
Zone-15	1.38
Zone-16	0.68
Tasharkuan River (Total Area)	12.02
Zone-18	12.02
Grand Total	586.28

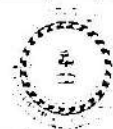
Note: Deposition of Sand may vary in subsequent years based on the replenishment.



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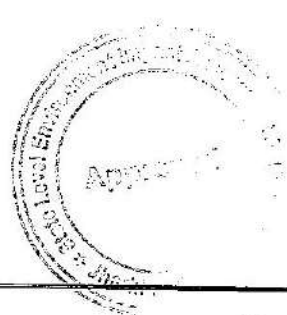
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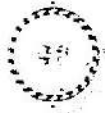
12.8.3 Central Coordinates of Sand Deposit Zones:

Zone Id	River Name	Latitude	Longitude
Zone-1	Damodar	23° 43' 38.771" N	86° 09' 39.363" E
Zone-2	Damodar	23° 43' 43.436" N	86° 07' 53.732" E
Zone-3	Damodar	23° 44' 11.938" N	86° 05' 48.976" E
Zone-4	Damodar	23° 45' 08.103" N	85° 59' 58.418" E
Zone-5	Damodar	23° 45' 07.820" N	85° 58' 19.302" E
Zone-6	Damodar	23° 46' 05.419" N	85° 57' 07.684" E
Zone-7	Damodar	23° 45' 25.663" N	85° 55' 35.569" E
Zone-8	Damodar	23° 45' 05.106" N	85° 53' 41.674" E
Zone-9	Jamuniya	23° 53' 14.622" N	86° 06' 25.292" E
Zone-10	Jamuniya	23° 52' 50.683" N	86° 07' 00.036" E
Zone-11	Jamuniya	23° 48' 04.217" N	86° 09' 36.276" E
Zone-12	Kadma	23° 36' 16.393" N	85° 54' 55.394" E
Zone-13	Kadma	23° 37' 03.651" N	85° 54' 36.427" E
Zone-14	Kadma	23° 38' 14.258" N	85° 55' 07.405" E
Zone-15	Khanjo	23° 39' 22.449" N	85° 55' 33.984" E
Zone-16	Khanjo	23° 41' 05.763" N	85° 57' 10.079" E
Zone-17	Garga	23° 37' 17.565" N	86° 02' 18.847" E
Zone-18	Tasharkuan	23° 29' 59.114" N	86° 20' 36.263" E
Zone-19	Gobai	23° 34' 38.747" N	86° 23' 44.092" E
Zone-20	Gobai	23° 33' 39.265" N	86° 23' 12.892" E
Zone-21	Ishri	23° 37' 55.310" N	86° 24' 03.012" E
Zone-22	Gobai	23° 32' 52.919" N	86° 19' 20.258" E
Zone-23	Gobai	23° 30' 46.005" N	86° 13' 44.853" E
Zone-24	Ishri	23° 34' 05.534" N	86° 06' 35.634" E
Zone-25	Bokaro	23° 46' 37.679" N	85° 49' 39.472" E
Zone-26	Bokaro	23° 47' 31.008" N	85° 48' 04.195" E
Zone-27	Bokaro	23° 47' 40.426" N	85° 44' 45.878" E
Zone-28	Damodar	23° 39' 23.334" N	85° 44' 24.657" E

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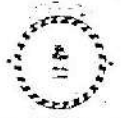
12.9 Distance from Bridges for each Sand Ghat:

Table No. - 12.9: Distance from Bridges for each Sand Ghat in Bokaro District of Jharkhand State

Sl. No.	Sand Ghat Code	(1X) Span of Bridge		Distance to be maintain		Actual Aerial Distance from nearest Bridge	Upstream/ Downstream	Name of Bridge	Whether on NH or SH
		m	m	(5X) Span of Bridge in Downstream					
				m	m				
1	BO_Z4_DAM_3	60.0	300.0	N.A.	N.A.	300.0	Upstream	Hindustan Bridge	No
2	BO_Z5_DAM_4	25.0	125.0	N.A.	N.A.	340.0	Upstream	Angwali Phusro Bridge	No
3	BO_Z6_DAM_5	22.7	113.6	N.A.	N.A.	262.0	Upstream	Rajendra Setu	No
4	BO_Z7_DAM_6	32.6	162.9	N.A.	N.A.	816.0	Upstream	Damodar River Bridge	No
5	BO_Z8_DAM_7	16.5	82.5	N.A.	N.A.	507.0	Upstream	Khetko Bridge	No
6	BO_Z25_BOK_8	19.6	98.1	N.A.	N.A.	276.0	Upstream	Saram Bridge	No
	BO_Z26_BOK_9	3.6	18.0	N.A.	N.A.	519.0	Upstream	Lalpania Bridge	No



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12.10 Replenishment Study of Sand Deposits (Category 2): [Verified & Approved]

REPLENISHMENT OF SAND ASSESSED BY "AFTER THE MONSOON" SURVEY (THIRD) CARRIED OUT DURING NOVEMBER 2022									
Pre-Monsoon [March - May 2022]				Post-Monsoon [October - December 2022]					
Sl. No.	Sand Deposit Code	Surface RL	Surface Area	Surface RL	Thickness Replenished	Volume Replenished	Depth of Sand Deposit	Volume of Sand Deposit	Rate of Replenishment
		in m	in m ²	in m	in m	in m ³	in m	in m ³	in %
1	BO_Z4_DAM_3	141.4	47200	142.2	0.8	37760	1.5	70800	53.3
2	BO_Z5_DAM_4	146.9	82200	147.5	0.6	49320	1.5	123300	40.0
3	BO_Z6_DAM_5	150.0	146700	150.8	0.8	117360	1.2	176040	65.7
4	BO_Z7_DAM_6	153.3	261400	154.0	0.7	182980	1.4	365960	50.0
5	BO_Z8_DAM_7	160.7	524000	161.4	0.7	366800	1.5	786000	26.7
6	BO_Z25_BOK_8	183.0	108600	183.6	0.6	65160	1.3	141180	45.2
7	BO_Z26_BOK_9	184.3	231100	185.0	0.7	161770	1.3	300430	53.5
TOTAL						981150		1963710	50.0

Note:

To estimate the replenishment of Sand, the pre-monsoon (First & Second Survey) data has been assessed through study of Satellite imageries and data provided by District Mining Office to establish the initial level of mining lease before the monsoon.

Keeping in view the 'Generic Structure of Replenishment Study' (as per EMGSM 2020); Third Survey after the monsoon has been carried out to estimate the quantum of material deposited/replenished in the mining lease.

The Fourth Survey shall be carry out at the end of March in coming year to know the quantity of material excavated during the financial year.

The results of year-wise surveys help the State Government to establish the replenishment rate of the River. Based on the replenishment rate, future auction may be planned.

12.11 Photographs showing Sand Ghats Visit by Sub-Divisional Committee, Bokaro:



Latitude: 23.75904
Longitude: 86.003241
Elevation: 214.33±28 m
Accuracy: 8.5 m
Time: 08-04-2023 17:50
Note: pichri sand ghat, peter

Photograph showing Pichri Sand Ghat



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Latitude: 23.759052
Longitude: 86.008218
Elevation: 214.23±34 m
Accuracy: 12.3 m
Time: 08-04-2023 17:50
Note: pichri sand ghat ,pete

Photograph showing Pichhri Sand Ghat



Latitude: 23.772312
Longitude: 85.958435
Elevation: 252.03±6 m
Accuracy: 20.1 m
Time: 08-04-2023 18:07
Note: .Mauja -Chalkari, plot

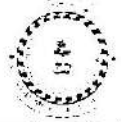
Photograph showing Chalkari Sand Ghat



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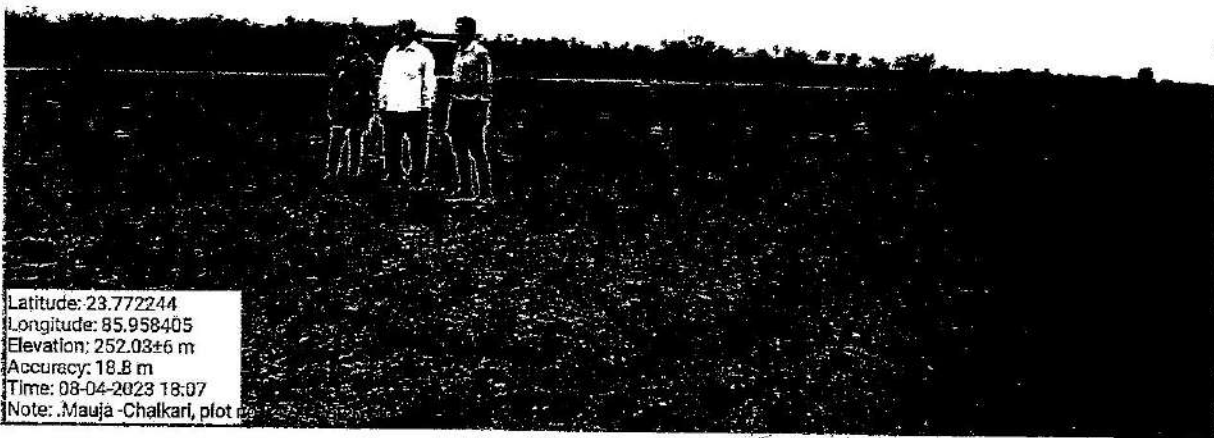


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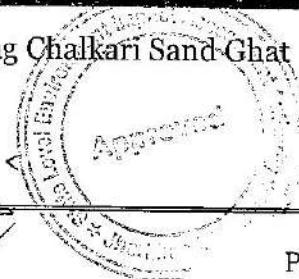
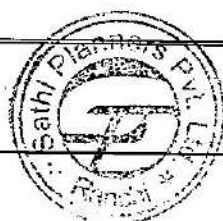
Latitude: 23.772182
Longitude: 85.958352
Elevation: 252.03±6 m
Accuracy: 14.1 m
Time: 08-04-2023 18:07
Note: .Mauja -Chalkari, plot no.

Photograph showing Chalkari Sand Ghat



Latitude: 23.772244
Longitude: 85.958405
Elevation: 252.03±6 m
Accuracy: 18.8 m
Time: 08-04-2023 18:07
Note: .Mauja -Chalkari, plot no.

Photograph showing Chalkari Sand Ghat

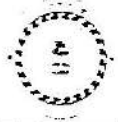




13. DETAILS OF ECO-SENSITIVE AREA IN THE DISTRICT

As per Notification issued by MoEF & CC, there is no any Eco-Sensitive area fall in Bokaro district.





14. IMPACT ON THE ENVIRONMENT DUE TO MINING

13.1 For Sand Mining:

The environmental components that are likely to be influenced or modified by the continuation of mining activities are: Air, Water, Noise, Soil, Hydrology, Ecology & Bio-diversity, Socio-economic status etc.

Major activities involve in the operation phase are -

- Excavation,
- Loading of material on truck by excavator
- Movement of vehicle on 'kuccha' road of villages

✓ Air Pollution

In mining activity, the only source of air pollution is excavation, transportation, loading and handling of minerals etc. The proposed mining operations are not anticipated to raise the concentration of pollutants beyond prescribed limits. However, the measures are suggested to mitigate the negative impact of the proposed mining activity to control the pollutants by plantation of trees along haul roads, specially near settlements, to help to reduce the impact of dust on the nearby villages; planning transportation routes of mined-out material so as to reach the nearest paved roads by shortest route (minimize transportation over unpaved road); regular water sprinkling on unpaved roads to avoid dust generation during transportation etc.

Emission of PM₁₀

The major sources of PM₁₀ emission in case of sand mining project are the loading activity at mine site (loading of material over trucks/trucks by excavators) and the movement of vehicles on unpaved haul roads.

Loading of Material

The excavated materials will be loaded on dumpers using excavators.

Emission of PM₁₀ due to Transportation

The hauling of minerals from the mine lease area to the end users via haul road (unpaved road) will cause emission of particulate matters. This emission will be limited to the extent of unpaved haul road starting from mining pit to nearest paved road connectivity.

Emission of CO from Vehicles

The excavated minerals will be transported outside the mining area for end use. The ARAI emission factors for CO emitting from heavy vehicles (diesel) is 3.92 gm/km or 6.32 g/mile.

Air Emissions

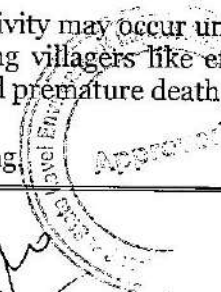
- Dust and air emission particularly due to the excavation, construction and movement of vehicles resulting in air pollution.
- No. of PCU/Hr. will increase due to mining in existing traffic scenario lead to air pollution which can cause adverse effect on human health of neighboring villagers like effect on breathing and respiratory system, damage to lung tissue, cancer and premature death, influenza or asthma.

✓ Noise Pollution

- Noise Impact due to mining activities.
- Human Noise from the machinery can cause hypertension, high stress level, hearing loss, sleep disturbance etc. due to prolonged exposure.
- Increase in the existing traffic due to this mining activity may occur unwanted sound and can also cause impact on human health of neighbouring villagers like effect on breathing and respiratory system, damage to lung tissue, cancer and premature death, influenza or asthma.

✓ Water Pollution

- Flow pattern might be changed due to river bed mining



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- Mining activities depth will be increased, which may result in increase of flow velocity.
- Change in surface water quality and ground water quality.
- Impact on ground water recharge potential as the thickness of the natural filter materials (sediments) is reduce causing less infiltration.
- Waste water discharge.

✓ **Soil Environment**

- Mining activity may increase the soil erosion and soil degradation which have adverse impact on soil fertility.
- Top soil extraction from outside riverbed may also affect the soil fertility and productivity.
- During the flood, the soil erosion may occur.

✓ **Solid Waste Generation/Management**

- Flow pattern might be changed due to river bed mining.
- Mining activities depth will be increased, which may result in increase of flow velocity.
- Waste water discharge.

✓ **Land Use**

- The mining activity in the outside riverbed will be converted into the pit, which may cause soil erosion, soil degradation etc.
- Mining in the riverbed may change complete land use pattern including channel geometry, bed elevation, sediment transportation capacity which can reduce flow of the river and downstream erosion.

✓ **Hydrology**

- The mining in the riverbed area may cause the ground water contamination due to intersection of the water table.
- Change the topography will divert the river flow.
- Change in topography can change the river flow and flood may occur.
- Slope of mining area will change which can create soil erosion and divert rain water run off channel.

✓ **Topography, Drainage and Ground Water Contamination**

- Spillage of oil from construction/transportation vehicles and equipment.

✓ **Biological Environment**

- Transportation of sand in the trucks/dumper will disturb the movement of wild animals like jungle cat, jackal, and other reptiles. Fugitive emission from vehicle movement will form a layer in leaves thus reducing the gaseous exchange process. This ultimately affects the growth of plants. Chances of vehicle collisions with wildlife attempting to cross roads are possible.
- Any human settlement in the mining area will disturb the vegetation cover and reptiles.
- Indiscriminate mining from active channels of rivers causes many adverse effects on the benthic fauna, which inhabits the bottom sandy substratum. Excessive sand extraction from rivers affects the eco-biology of many terrestrial insects whose initial life history begins in aquatic environments.
- Stomatal index may be minimized due to dust deposit on leaf.

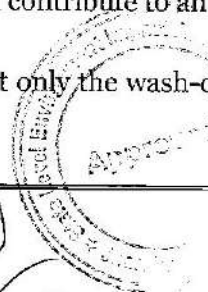
✓ **Socio-economic**

- Such shops along the roads will generate solid waste and waste water which will have adverse impact on human health.
- Further, the deep pits created in the channel also can contribute to an increase in accidents in the working environment.

Adequate control measures will be adopted to check not only the wash-off from soil erosion but also uncontrolled flow of mine water.



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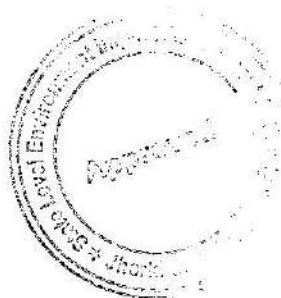


✓ **Noise Pollution**

Mining operations involve deployment of mining machineries, drilling, blasting, excavation and transportation of stone. Noise may be generated by the impact from drill bits and mechanical vibration from drill casings, as well as impulse noise from exhaust and ancillary equipment such as fans and blowers for mine ventilation.

✓ **Land Environment**

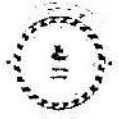
The creation of landscape blots like open pits and piles of waste rocks due to mining operations can lead to the physical destruction of the land at the mining site. Such disruptions can contribute to the deterioration of the area's flora and fauna. There is also a huge possibility that many of the surface features that were present before mining activities cannot be replaced after the process has ended. The removal of soil layers and deep underground digging can destabilize the ground which threatens the future of roads and buildings in the area.



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DIRECTOR



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15. REMEDIAL MEASURES TO MITIGATE THE IMPACT OF MINING ON THE ENVIRONMENT

15.1 Remedial Measures for Sand Mining:

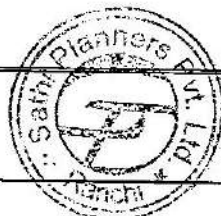
✓ Air Environment:

During mining activity, the only source of air pollution is excavation, transportation, loading and handling of minerals etc. However, the measures are suggested to mitigate the negative impact of the proposed mining activity to control the pollutants by plantation of trees along haul roads, specially near settlements, to help to reduce the impact of dust on the nearby villages; planning transportation routes of mined material so as to reach the nearest paved roads by shortest route (minimize transportation over unpaved road); regular water sprinkling on unpaved roads to avoid dust generation during transportation etc.

Impact	Mitigation Measures
<p>Air Emissions</p> <ul style="list-style-type: none"> Dust and air emission particularly due to the excavation, construction and movement of vehicles resulting in air pollution. 	<ul style="list-style-type: none"> Provision of spraying water to reduce dust emission on roads and particularly near existing settlements. Excavated topsoil to be preserved and reused for landscaping. The amount of exposed ground and stockpiles will be minimized so that re-suspension due to wind and subsequent dust fall is prevented. Heights of stock piles should control dust fall in nearby areas. Arrangement of the soil will be such that existing drainage pattern, though altered, will still ensure that runoff does not carry away topsoil but reaches the water bodies with which it is linked. <p>Ensuring all vehicles, generators and compressors are well maintained and regularly serviced.</p>

The following measures are suggested to mitigate any negative impacts of mining:

- Planned multiple transportation routes in different direction to minimize the dust generation.
- Planned paved roads outside mine lease area to minimize the dust generation. Alternatively, planning transportation routes so as to reach the nearest paved roads by shortest route. (Minimize transportation over unpaved road).
- Frequent water sprinkling on unpaved roads ($>2L/m^2$).
- Plantation of trees along haul roads, especially near settlements, to reduce the impact of dust on the nearby villages.
- Dust mask shall be provided to the workers engaged at dust generation points like excavations and loading points.
- Transportation of material shall be carried out during day time only.
- The speed of trucks plying on the haul road should be limited to 20 km/hour to avoid generation of dust.
- Covering of material by tarpaulin during transportation on trucks to prevent spillage of materials from the trucks.
- Overloading shall be avoided.



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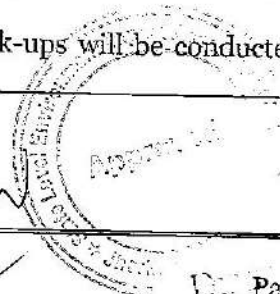
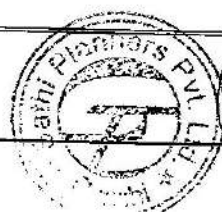
Movement of Traffic:

Impact	Mitigation Measures
<ul style="list-style-type: none"> No. of PCU/Hr. will increase due to mining in existing traffic scenario lead to air pollution which can cause adverse effect on human health of neighboring villagers like effect on breathing and respiratory system, damage to lung tissue, cancer and premature death, influenza or asthma. 	<ul style="list-style-type: none"> Vehicles with PUC Certificate will be hired. Regular maintenance of vehicles will be done to ensure smooth running of vehicle. It is proposed to plant local species trees per year with consultation of Forest department with some fruit bearing and medicinal trees, along the haul roads, outer periphery within the lease area to prevent the impact of dust in the nearby village. Regular Health checkup camps will be organized.
<ul style="list-style-type: none"> No. of PCU/Hr. will increase in the existing traffic due to this mining activity hence vehicle collision may occur unwanted sound and can also cause impact on human health. 	<ul style="list-style-type: none"> In addition, truck drivers will be instructed to make minimum use of horns in the village area and sensitive zones. It is proposed to plant local species trees per year with consultation of Forest department with some fruit bearing and medicinal trees, along the haul roads, outer periphery within the lease area to reduce the impact of noise in the study area. Regular Health checkup camps will be organized.
<ul style="list-style-type: none"> Accidents may be occurring due to fast movement of vehicles. 	<ul style="list-style-type: none"> To avoid accidents, the speed of vehicles will be low near habitation areas.

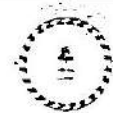
✓ **Noise Pollution:**

It can be stated that the impact on the present noise levels due to mining operations will be minimal and shall be restricted to transportation route only. There is no drilling and blasting envisaged in the sand mining so there is no impact of vibration.

Impact	Mitigation Measures
<ul style="list-style-type: none"> Noise Impact due to mining activities. Human Noise from the machinery can cause hypertension, high stress level, hearing loss, sleep disturbance etc. due to prolonged exposure. Increase in the existing traffic due to the mining activity may occur unwanted sound and can also cause impact on human health of neighboring villagers like effect on breathing and respiratory system, damage to lung tissue, cancer and premature death, influenza or asthma. 	<ul style="list-style-type: none"> Noise generated by this equipment will be intermittent and does not cause much adverse impact. The noise measurement data indicated that present noise levels in the study area is within the permissible limits of National Ambient Noise Quality Standards. Periodical monitoring of noise will be done. No other equipment except the transportation vehicles and excavator for loading will be allowed. Proper maintenance of all equipment/machines will be carried out which help in reducing noise during operations. In addition, truck drivers will be instructed to make minimum use of horns in the village area and sensitive zones. Plantation will be taken up along the approach roads and vicinity of river bank. The plantation minimizes propagation of noise and also arrests dust. Ear muffs will be provided while working on mining equipment. Regular health check-ups will be conducted for any such health implications.



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✓ **Water Environment:**

Impact	Mitigation Measures
<ul style="list-style-type: none"> Flow pattern might be changed due to River-bed mining. Mining activities depth will be increased, which may result in increase of flow velocity. 	<ul style="list-style-type: none"> No diversion is anticipated. There will not be any adverse impact on flow pattern, surface hydrology and ground water regime. Mining activities will be restricted to maximum 3 m depth, which will not cause much change in flow pattern of the River.
<ul style="list-style-type: none"> Change in surface water quality and ground water quality. 	<ul style="list-style-type: none"> The mining will not be allowed below the water table. Regular monitoring of water samples will be done as precautionary measures.
<ul style="list-style-type: none"> Impact on ground water recharge potential as the thickness of the natural filter materials (sediments) is reduce causing less infiltration. 	<ul style="list-style-type: none"> Mining will be done as per approved Mine Plan and applicable Rules & Regulation, so that there is no damage on ground water recharge potential due to sand mining.
<ul style="list-style-type: none"> Waste water discharge. 	<ul style="list-style-type: none"> Portable Bio-toilets will be used; hence no sewage liquid effluent will be generated and contamination is also not expected due to percolation.

✓ **Soil Environment:**

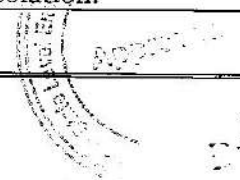
Impact	Mitigation Measures
<ul style="list-style-type: none"> Mining activity may increase the soil erosion and soil degradation which have adverse impact on soil fertility. 	<ul style="list-style-type: none"> It is already proposed to plant local species trees per year with consultation of Forest department with some fruit bearing and medicinal trees, along the haul roads, outer periphery within the mining area which enhances the binding property of the soil to check the erosion. Water will be sprinkled on unpaved roads to avoid dust generation and soil erosion.
<ul style="list-style-type: none"> Top soil extraction from outside riverbed may also affect the soil fertility and productivity. 	<ul style="list-style-type: none"> In case of riverbed, no top soil will be generated during the mining activity.
<ul style="list-style-type: none"> During the flood, the soil erosion may occur. 	<ul style="list-style-type: none"> Mine lease area has been proposed leaving a safety distance from the bank inwards which will protect the banks. Check dams have been constructed at various places for protection of banks against direct attack of the rivers and avoid bank cutting.

✓ **Solid Waste Generation/Management:**

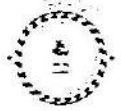
Impact	Mitigation Measures
<ul style="list-style-type: none"> Flow pattern might be changed due to river bed mining. Mining activities depth will be increased, which may result in increase of flow velocity. 	<ul style="list-style-type: none"> No diversion is proposed. There will not be any adverse impact on flow pattern, surface hydrology and ground water regime. Mining activities will be restricted to maximum 3 m depth, which will not cause much change in flow pattern of the river.
<ul style="list-style-type: none"> Waste water discharge. 	<ul style="list-style-type: none"> Portable Bio-toilets will be used; hence no sewage liquid effluent will be generated and contamination is also not expected due to percolation.



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✓ **Land Use:**

Impact	Mitigation Measures
<ul style="list-style-type: none"> The mining activity in the outside River-bed will be converted into the pit which may cause soil erosion, soil degradation etc. 	<ul style="list-style-type: none"> It is proposed to plant of local species trees per year with consultation of Forest department with some fruit bearing and medicinal trees, along the haul roads, outer periphery within the mining area which enhances the binding property of the soil.
<ul style="list-style-type: none"> Mining in the River-bed may change complete land use pattern including channel geometry, bed elevation, sediment transportation capacity which can reduce flow of the River and downstream erosion. 	<ul style="list-style-type: none"> The mining is planned in non-monsoon seasons only so that the excavated area will be replenished naturally during the subsequent rainy season for the River-bed mining block. Mine lease area has been proposed leaving a safety distance from the bank inwards which will protect the banks so channel geometry will not be disturbed. Check dams have been constructed at various places for protection of banks against direct attack of the Rivers and avoid bank cutting. Pre and post monsoon survey for sedimentation in the River-bed will be done regularly

✓ **Hydrogeology:**

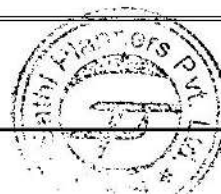
Impact	Mitigation Measures
<ul style="list-style-type: none"> The mining in the Riverbed area may cause the ground water contamination due to intersection of the water table. 	<ul style="list-style-type: none"> The water table will not be intersected during mining in the riverbed as ultimate depth is limited Proper analysis/Monitoring will be done to check the ground and surface water
<ul style="list-style-type: none"> Change the topography will divert the River flow. 	<ul style="list-style-type: none"> There is no proposal of any stream modification/diversion due to this mining activity hence there will be no any impact on flow of the River.
<ul style="list-style-type: none"> Change in topography can change the river flow and flood may occur. 	<ul style="list-style-type: none"> Mining will be prohibited in monsoon season.
<ul style="list-style-type: none"> Slope of mining area will change which can create soil erosion and divert rain water runoff channel. 	<ul style="list-style-type: none"> The maximum depth of mining in the River-bed will not exceed 3 meters and the maximum depth of mining in outside River-bed will not exceed.

✓ **Topography, Drainage and Ground Water Contamination:**

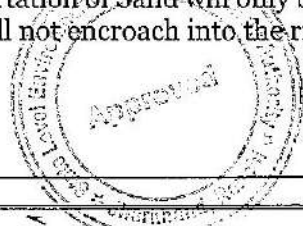
Impact	Mitigation Measures
<ul style="list-style-type: none"> Spillage of oil from construction/transportation vehicles and equipment. 	<ul style="list-style-type: none"> Spillage of oil from construction vehicles and equipment will be avoided. These should be inspected by supervisor for any leakage of oil. Collection of water in pits will be avoided. Contamination of soil will be avoided by suitable soil conservation measures.

✓ **Biological Environment:**

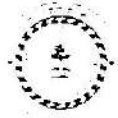
Impact	Mitigation Measures
<ul style="list-style-type: none"> Transportation of Sand in the trucks/dumper will disturb the movement of wild animals like jungle cat, jackal, and other reptiles. Fugitive emission from vehicle movement will form a layer in leaves 	<ul style="list-style-type: none"> Transportation of Sand will only be day time. Access roads will not encroach into the riparian zones.



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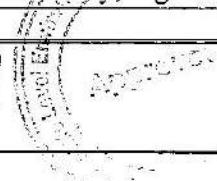
Impact	Mitigation Measures
thus reducing the gaseous exchange process. This ultimately affects the growth of plants. Chances of vehicle collisions with wildlife attempting to cross roads are possible.	
<ul style="list-style-type: none"> Any human settlement in the mining area will disturb the vegetation cover and reptiles 	<ul style="list-style-type: none"> No human settlement will be permitted in the lease mining or nearby area. No mining will be carried out during the rainy season to minimize impact on aquatic life.
<ul style="list-style-type: none"> Indiscriminate mining from active channels of rivers causes many adverse effects on the benthic fauna, which inhabits the bottom sandy substratum. Excessive sand extraction from rivers affects the eco-biology of many terrestrial insects whose initial life history begins in aquatic environments. 	<ul style="list-style-type: none"> Mining will be done only in riverbed and outside riverbed as per provided by DMG so there will be no impact on benthic fauna in riverbed hence no mitigation will be required.
<ul style="list-style-type: none"> Stomatal index may be minimized due to dust deposit on leaf. 	<ul style="list-style-type: none"> Water will be sprinkled on unpaved roads to avoid dust generation.

✓ **Socio-economics:**

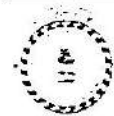
Impact	Mitigation Measures
<ul style="list-style-type: none"> Due to mining and transportation of Sand will generate the small shops, dhabas, garage, restaurant, vegetable shops etc. along the road and generate direct employment. 	<ul style="list-style-type: none"> Positive Impact
<ul style="list-style-type: none"> Mining activity will generate direct employment which will be employed locally and preference will be given to local people. 	<ul style="list-style-type: none"> Positive Impact
<ul style="list-style-type: none"> Such shops along the roads will generate solid waste and waste water which will have adverse impact on human health. 	<ul style="list-style-type: none"> Garbage bins will be provided for proper disposal of solid waste.
<ul style="list-style-type: none"> Further, the deep pits created in the channel also can contribute to an increase in accidents in the working environment. This creates serious threat to residents in the area who depend on river water for their domestic purposes. 	<ul style="list-style-type: none"> The mined-out area outside river bed block will be reclaimed and any stored water will be pumped out. The mining is planned in non-monsoon seasons only so that the excavated area will be replenished naturally during the subsequent rainy season for the River-bed mining block.
<ul style="list-style-type: none"> The major source of socio-health impacts of transportation will generate from truck, dust etc. Increase in accidents as a result of rash driving of dumpers carrying mineral through the roads may be possible. 	<ul style="list-style-type: none"> It is proposed to plant of local species per year with consultation of Forest department with some fruit bearing and medicinal trees, along the haul roads, outer periphery within the mining area to control the dust. Planning transportation routes of mined material so as to reach the nearest paved roads by shortest route. (minimize transportation over unpaved road). Alternatively, gravelled road may be



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Impact	Mitigation Measures
	constructed between mine lease area and nearest paved road connectivity; The speed of trucks plying on the haul road should be limited to avoid generation of dust; and Covering of material during transportation on trucks to prevent spillage of sand from the trucks. The trucks will be covered by tarpaulin. Overloading will be avoided. <ul style="list-style-type: none"> Regular water sprinkling on unpaved roads to avoid dust generation during transportation.

15.2 Remedial Measures for other than Sand Mining:

▪ Remedial Measures for Air Pollution:

- All machineries and transport vehicles will be properly maintained and pollution check will be done once in a year to keep the emissions from machineries and vehicle under control.
- Water sprinkling will be done on haul road to control emission of dust while transporting minerals and waste. Provision for water spray by tankers on 'kaccha' road shall be done.
- Water sprinkling at loading area.
- Tree plantation along the haul roads & approach road will be done. Plantation along the mine boundary shall be done with tree density of 2000 trees per Hectare as per the norms of MoEF&CC, to control dust & noise.
- Use of personal protective equipment like dust mask.
- Ambient air pollution monitoring will be carried out.

▪ Remedial Measures for Water Pollution:

- Mining is proposed to plan above the ground water table. Therefore, pumping of ground water from mine pit does not arise in this mine. The rain water during rainy season is proposed to settle in a pit and shall be used for dust suppression and plantation. Excess water, if any shall be discharged in natural stream after settling of suspended particles in the pit. Pump having required capacity will be installed to lift accumulated rain water from working pit and pumped to the settling tank.
- Garland drain shall be made around the Waste dump and the rain water shall be collected in garland drain and allowed to settle in a small pit for settling suspended particles before allowing discharge to natural drainage system.
- For domestic waste water Septic Tank with Soak Pit shall be provided, discharge from Soak Pit, if any shall be used for plantation.

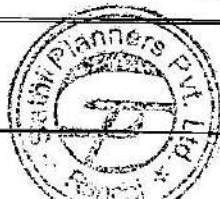
▪ Remedial Measures for Noise Pollution:

- Diesel powered machineries, which is major source of noise in open cast mining shall be properly maintained. Attention shall be paid towards rigorous maintenance of the silencer of the diesel engines.
- Protective devices shall be provided for use of persons employed in the vicinity of high noise areas.
- With the adoption of controlled blasting techniques, the ground vibrations will be minimized.
- Plantation around the lease boundary will cut the noise levels.

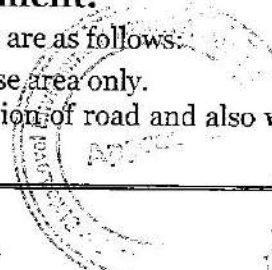
▪ Remedial Measures for Land Environment:

Some of the measures followed to minimize the impacts are as follows:

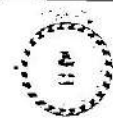
- The mining activities will be restricted within the lease area only.
- The waste material will be utilized for the construction of road and also will be used by the local people for construction work.



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- The surface run off from the lease area will be retain within the lease and used for plantation, dust suppression and block cutting. So, there will be no soil erosion from the lease area and its surrounding due to mining activity.
- The dump will have inward slope with catch drains at inward side of the terrace and the catch drain of the individual terrace will be connected to the garland drain outside the periphery of the dump. Retaining wall and garland drain will be constructed around the dumps and the surface runoff water pass through the garland drain and finally settled in a settling pit before released outside.
- Retaining wall and garland drains for the proposed waste dump will be constructed to arrest wash offs from the dump.
- Maintenance/repair of vehicles and machineries will not be inside the mining area. However, steel trays will be used for any emergency repair and sudden leakage of oil.

▪ **Remedial Measures for Waste Management:**

The solid waste shall be dumped systematically with proper repose angle and stabilization as follows:

- Gradation of dump shall be done automatically as coarser materials go to the bottom and finer at the top and therefore drain of rain water flow freely to the bottom without endangering the stability of dump.
- Stabilization of dump with top soil and tree plantation shall make the dump more stable on long. Dump should be terraced for every 5 m height and stabilized
- 1m height parapet shall be constructed for dumps more than 6m height along the toe to prevent and control wash out from dumps entering into natural system through rain water
- Garland drainage around dump shall prevent under wash of dump by hydrostatic pressure to be developed by surface water and control wash outs and collapse.

▪ **Remedial Measures for Flora and Fauna:**

Extensive plantation comprising of pollutant resistant trees will be undertaken, which will serve not only as pollution sink but also as a noise barrier. It is proposed to include azadirachta Indica, and ficus Religiosa in the plantation program as they serve as sinks for gaseous emissions.

The impact on the fauna due to the mining activity will be insignificant. The progressive plantation over a period of time will reduce the impact, if any, on the fauna.





16. RISK ASSESSMENT & DISASTER MANAGEMENT PLAN

16.1 Risk Assessment for Sand Mining:

Since Sand Mining Operation does not attract Mine Act 1952, it does not require any statutory personals, however the entire operation must be under the supervision of experience qualified person who can handle the labor employment effectively. The person must have knowledge of transportation activities with traffic rule & safety. It is always advisable to appoint such person who can understand the language of Mine plan & implement the same.

1. As such in case of sand mining activities does not have any short of risk in operational activity except prior to start the monsoon period all the manpower & equipment's to be withdrawn to safe location.
2. In case of temporary discontinuation of operation due to natural calamity or labour strike & Risk management plan to be developed based in the local condition.

• Accidents due to Transportation and Movement of Mining Machineries

Risks:

Most of the accidents occur during transportation by tippers/trucks and movement of Mining machineries.

Mitigation Measures:

- This can be prevented by regular training of all vehicle/machinery drivers/operators, regular maintenance of equipment and ensuring safe operations.
- All safety precautions and provision of MMR 1961 shall be strictly followed during all mining operations.
- Regular maintenance and testing of all mining equipment as per manufacturer's guidelines.
- All transportation within the main working area should be carried out under the direct supervision and control of the management;
- The vehicles must be maintained in good repairs and checked thoroughly at least once a week by a competent person authorized for this purpose by the management;
- Broad signs should be provided at each and every turning point especially for the guidance of the drivers of vehicles.
- To avoid dangers while reversing the trackless vehicles, especially at the embankment and tripping points, all areas for reversing of lorries should, as far as possible, be made man free. and there should be a light and sound device to indicate reversing of trucks; and
- A statutory provision of the fence, constant education, training etc. will go a long way in reducing the incidence of such accidents.

▪ **Risk Assessment:**

Hazard Identification & Risk Assessment (Hira)

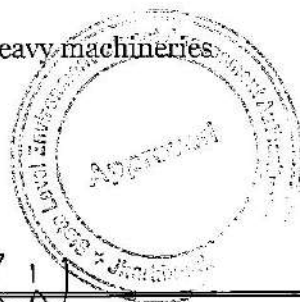
The entire mining operation will be done under the supervision of the Mines Engineer, Mines manager having second class mines manager's certificate of competency and supported by a team of competent persons. Nevertheless, the following natural/industrial problems may be encountered during the mining operation:

- Accident due to Transportation or movement of heavy machineries.
- Operation of mining equipment
- Accident due to storage of Fuel
- Filling of Mine due to excessive rain

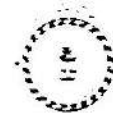
Risk and Mitigation Measures:



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Over Burden

Risks:

The overburden dumps may cause landslides. High overburden dumps created at the quarry edge may cause sliding of the overburden dump or may cause failure of the pit slope due to excessive loading, thereby causing loss of life and property. Siltation of surface water may also cause run-off from overburden dumps.

Mitigation Measures:

- To prevent the failure of overburden slopes, especially during the rainy season, proper garland drain & bund are constructed around the dump.
- To prevent this, height of overburden dumps will be restricted. Further, no stone or loose rock or loose tree will be allowed to remain within 3 meters of the edge of the quarry. To prevent siltation of surface water, retaining wall will be constructed on the down side of each OB dump.

Accidents Due to Transportation and Movement of Mining Machineries

Risks:

Most of the accidents occur during transportation by tippers/trucks and movement of Mining machineries.

- Operations of jack hammers are often attributable to mechanical failures and human errors.

Mitigation Measures:

- This can be prevented by regular training of all vehicle/machinery drivers/operators, regular maintenance of equipment and ensuring safe operations.
- All safety precautions and provision of MMR 1961 shall be strictly followed during all mining operations.
- Regular maintenance and testing of all mining equipment as per manufacturer's guidelines.
- All transportation within the main working area should be carried out under the direct supervision and control of the management;
- The vehicles must be maintained in good repairs and checked thoroughly at least once a week by a competent person authorized for this purpose by the management;
- Broad signs should be provided at each and every turning point specially for the guidance of the drivers of vehicles.
- To avoid dangers while reversing the trackless vehicles, especially at the embankment and tripping points, all areas for reversing of lorries should, as far as possible, be made man free. and there should be a light and sound device to indicate reversing of trucks; and
- A statutory provision of the fence, constant education, training etc. will go a long way in reducing the incidence of such accidents.

Fuel Storage:

- No major storage of fuel envisaged in the mining lease area.

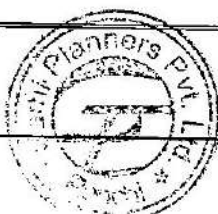
Water Logging:

Risks:

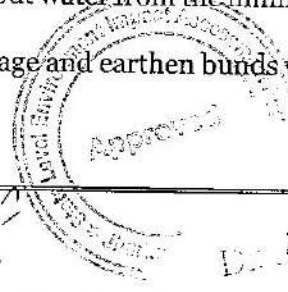
Filling of mine pit with excessive rain.

Mitigation Measures:

- Provision of adequate capacity pumps for pumping out water from the mining pit with standby arrangements.
- Checking and regular maintenance of garland drainage and earthen bunds to avoid any inflow of surface water into the mine pit.



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- Proper drainage will be maintained to eliminate inundation of working pits during rains from run-off water. Suitable garland drain will be provided around pit along with sedimentation pits on each side.
- There is no danger of flood or inundation as the ground level is well below the plateau top, where mining will be carried out.

Safety Measures at Mine:

- The gradient of the haul road inside the pit, access trench and on the dumps will not be steeper than 1 in 16.
- The quarries will be protected by garland drains around the periphery for storm water drainage;

Care and Maintenance during Temporary Discontinuance:

In case of emergency arise as situation of temporary discontinuance due to court order or due to statutory requirements or any other unforeseen circumstances pit will be fenced and locked properly so as no one can enter in pit. All plantation will be protected with all due care for their survival. Maintenance and monitoring of discontinued mining operations i.e. maintenance of haul roads, will be done in view of re-open in near future.

15.2 Disaster Management Plan:

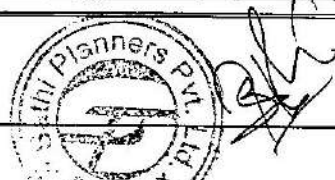
High risk incidents like land slide subsidence, flood, inundation, in the mine, fire, tailing damp failures etc. may occur for which an emergency plan for individual mine to ebb proposed for quick evacuation of men & machinery.

15.3 Vulnerability of the State:

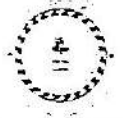
Almost all the 24 districts are affected by different kind of Disaster. There is great need to strengthen the capacity of State, District, Block and newly formed Panchayat level of departments, institutions and functionaries to respond to the Disaster at their own level in participation of community. Jharkhand is vulnerable to following kind of Hazards: -

- Drought,
- Mining Accidents,
- Chemical and Industrial Hazards,
- Lightning,
- Bird Flu,
- Flood,
- Earthquake,
- Fire/Forest Fire,
- Elephant Attacks,
- Climate Change, Biodiversity loss,
- Naxalism/Landmine Blasts etc.

Major Hazards affected districts	Name of Hazards	No. of districts affected	Name of the district
1.	Drought	All the 24 Districts (2010)	All districts affected
2.	Flood	01	(Sahibganj)
3.	Flash Flood	03	(Jamshedpur, Saraikela, Ranchi)
4.	Forest Fire	09	(Garhwa, Palamau, Latehar, Chatra, Hazaribag, E. & W. Singhbhum, Simdega, Gumla)



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5.	Lightening	09	(Palamau, Chatra, Latehar, Koderma, Ranchi, Giridih)
6.	Mining Hazards	09	(Hazaribag, Lohardaga, Dumka) Latehar, Ramgarh, Dhanbad, Lohardaga, Giridih E & W Singhbhum & Koderma
7.	Earthquake Hazard-Zone - IV	02	(Godda & Sahibganj - Partially)
	Zone - III	15	(Godda, Sahibganj, Garhwa, Palamu, Chatra, Hazaribagh, Koderma, Giridih, Bokaro, Dhanbad, Deoghar, Dumka, Godda, Pakur, Jamtara)
	Zone - II	07	(Lohardaga, Ranchi, Ramgarh, Khunti, Gumla, E & W Singhbhum)

References:

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REPORT FROM CIRCLE OFFICERS

(6) मौजा- पिछरी, के खाता सं०-237, प्लॉट सं०-1, कुल रकबा-136.60 ए० भूमि गैरमजरूआ खास खाते की भूमि है। जिसका भूमि किस्म नदी दर्ज है।

खाता सं० 59 प्लॉट सं० 3228, रैयती खाते की भूमि है। जो दामोदर नदी से 1 कि०मी० दूरी पर है।

बिन्दुवार प्रतिवेदन निम्नलिखित है:-

क्र०	विवरण	प्रतिवेदन
1	2	3
1	चिन्हित क्षेत्र का खाता संख्या, प्लॉट सं० तथा रकबा।	खाता सं०-237, प्लॉट सं०-1, कुल रकबा-136.60 ए०, खाता सं० 59, प्लॉट सं० 3228
2	चिन्हित क्षेत्र गैरमजरूआ है अथवा रैयती।	खाता सं० 237, प्लॉट सं० 1, गैरमजरूआ खास खाते की भूमि है। खाता सं० 59, प्लॉट सं० 3228 रैयती खाते की भूमि है।
3	क्या 500 मीटर की दूरी के अन्दर कोई मानव बसाइट (Habitation) स्थित है?	नहीं है।
4	क्या 500 मीटर की दूरी के अन्दर कोई जलीय निकाय (Dam/Reservoir) स्थित है?	नहीं है।
5	क्या 500 मीटर की दूरी के अन्दर कोई शैक्षणिक संस्थान (Educational Institute) स्थित है?	नहीं है।
6	क्या 500 मीटर की दूरी के अन्दर कोई चिकित्सालय (Hospital) स्थित है?	नहीं है।
7	क्या 500 मीटर की दूरी के अन्दर कोई राष्ट्रीय धराहर/पुशातवीय (Monuments Archaeological) महत्व के स्थल स्थित है?	नहीं है।
8	क्या 10 किमी की परिधि में कोई अन्तर्राज्यीय (Intersatate) सीमा है?	नहीं है।

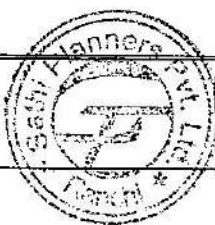
अतः भवदीय को जांच प्रतिवेदन सादर समर्पित।

विश्वासभाजन

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अंचल अधिकारी,
पट्टीवार।



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(3) मौजा- बलकरी, खाता सं०-225, प्लॉट सं०-814 रकबा- 12.05 ए०, प्लॉट सं० 938 रकबा- 60.50 ए० एवं प्लॉट सं० 4149, रकबा- 117.35 ए० भूमि गैरमजकूआ खास खाते की भूमि है जिसका भूमि किस्म सर्वे खतियान में नदी दर्ज है।

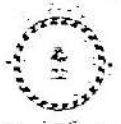
खाता सं० 279, प्लॉट सं० 1, रकबा- 9.98 ए० भूमि गैरमजकूआ खास खाते की है जिसका भूमि का किस्म नदी दर्ज है।

खाता सं०- 82, प्लॉट सं० 1371, रकबा 0.23 ए० रैयती खाते की भूमि है। जिसका भूमि किस्म दोन II दर्ज है।

क्र०	विवरण	प्रतिबंदन
1	चिन्हित क्षेत्र का खाता संख्या, प्लॉट सं० तथा रकबा।	3
1	चिन्हित क्षेत्र का खाता संख्या, प्लॉट सं० तथा रकबा।	खाता सं०-225, प्लॉट सं०-814 रकबा- 12.05 ए० प्लॉट सं० 938, रकबा 60.50 ए० एवं प्लॉट सं० 4149, रकबा- 117.35 ए० खाता सं० - 279, प्लॉट सं० 1, रकबा 9.98 ए० खाता सं०- 82, प्लॉट सं० 1371, रकबा 0.23 ए०
2	चिन्हित क्षेत्र गैरमजकूआ है अथवा रैयती।	खाता सं० 225, प्लॉट सं० 814, 938, एवं प्लॉट सं० 4149, खाता सं० - 279 प्लॉट सं० 1, गैरमजकूआ खास खाते की भूमि है। खाता सं० 82, प्लॉट सं० 1371 रैयती खाते की भूमि है।
3	क्या 500 मीटर की दूरी के अन्दर कोई मानव बसाहट (Habitation) स्थित है?	नहीं है।
4	क्या 500 मीटर की दूरी के अन्दर कोई जलयोजन निकाय (Dam/Reservoir) स्थित है?	नहीं है।
5	क्या 500 मीटर की दूरी के अन्दर कोई शैक्षणिक संस्थान (Educational Institute) स्थित है?	नहीं है।
6	क्या 500 मीटर की दूरी के अन्दर कोई चिकित्सालय (Hospital) स्थित है?	नहीं है।
7	क्या 500 मीटर की दूरी के अन्दर कोई राष्ट्रीय धरोहर/पुरातात्विक (Monuments Archaeological) महत्त्व के स्थल स्थित है?	नहीं है।
8	क्या 10 किमी की परिधि में कोई अन्तर्राज्यीय (Intersate) सीमा है?	नहीं है।



(Signature)
District Survey Officer, Bokaro, Jharkhand



कार्यालय अंचल अधिकारी, पेटरवार।

पत्रांक :- 297.....

प्रेषक,

अंचल अधिकारी
पेटरवार।

सेवा में,

जिला खनन पदाधिकारी,
बोकारो।

पेटरवार/दिनांक :- 25/03/2023

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

प्रसंग :- उपायुक्त, बोकारो के पत्रांक-2319/खनन, दिनांक-28.12.2022 एवं मवदीय पत्रांक- 669/खनन, दिनांक- 21.03.2023

महाशय,

उपर्युक्त विषयक एवं प्रासंगिक पत्र के आलोक में राजस्व उपनिरीक्षक के द्वारा जांच कराया गया। जांच प्रतिवेदन के आधार पर मौजा-चलकरी, खाता सं०-225, प्लॉट सं०-474, कुल रकबा-48.85 ए० भूमि गैरमजरुआ खास खाते की है। भूमि का किस्म सर्वे खतियान में दामोदर नदी दर्ज है। जिसका बिनद्वार प्रतिवेदन निम्नलिखित है-

क्र०	विवरण	प्रतिवेदन
1	2	3
1	चिन्हित क्षेत्र का खाता संख्या, प्लॉट सं० तथा रकबा।	खाता सं० 225, प्लॉट सं० 474, कुल रकबा- 48.85 ए०
2	चिन्हित क्षेत्र गैरमजरुआ है अथवा रैयती।	गैरमजरुआ खास खाते की है।
3	क्या 500 मीटर की दूरी के अन्दर कोई मानव बसाहट (Habitation) स्थित है?	नहीं है।
4	क्या 500 मीटर की दूरी के अन्दर कोई जलीय निकाय (Dam/Reservoir) स्थित है?	नहीं है।
5	क्या 500 मीटर की दूरी के अन्दर कोई शैक्षणिक संस्थान (Educational Institute) स्थित है?	नहीं है।
6	क्या 500 मीटर की दूरी के अन्दर कोई चिकित्सालय (Hospital) स्थित है?	नहीं है।
7	क्या 500 मीटर की दूरी के अन्दर कोई राष्ट्रीय धरोहर/पुरातत्वीय (Monuments Archaeological) महत्त्व के स्थल स्थित है?	नहीं है।
8	क्या 10 किमी की परिधि में कोई अन्तर्राज्यीय (Intersatate) सीमा है?	नहीं है।

अतः जांच प्रतिवेदन अग्रेतर कार्रवाई हेतु प्रेषित।

अनुलग्नक :- यथोक्त।



विश्वासभाजन

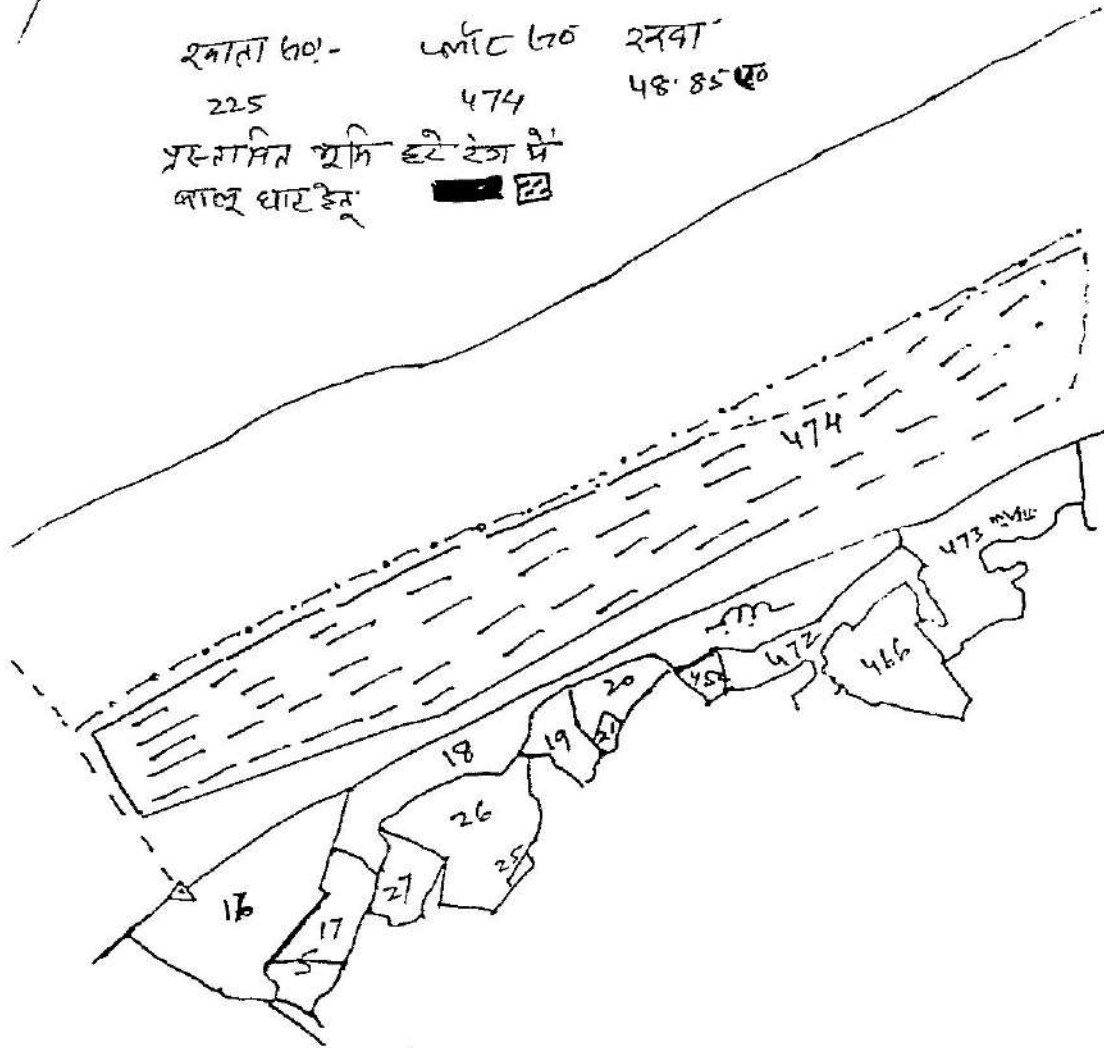
अंचल अधिकारी
पेटरवार।

DISTRICT SURVEY REPORT FOR
SAND MINING OR RIVER-BED MINING IN
BOKARO DISTRICT OF JHARKHAND

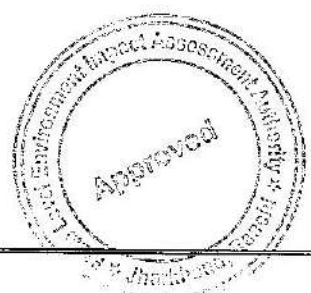


गाहूर नाम:- चलाकरी
410-01
थाना 401- 46
थाना- जेहलवार (9/8/20)
पैसात = 16 ईप = 1 प्रील

शकाला 60- 225
लॉक 670 474
शकाला 48.85 एडो
प्रस्तावित शक्ति इलेक्ट्रिक प्रै
बालू धार डैम्



मो. 2017
दि. 20/10
20/10
संयोजक अधिकारी -
पेडागाँव



District Survey Report

**DISTRICT SURVEY REPORT FOR
SAND MINING OR RIVER-BED MINING IN
BOKARO DISTRICT OF JHARKHAND**



(2) मौजा-खेतको, थना सं० 45, के खाता सं०-120, प्लॉट सं०-689, सर्वे रकवा-25.25 ए० भूमि गैरमजरूआ खास खाते की है। जिसका भूमि किस्म सर्वे खतियान में नदी दर्ज है।

खाता सं०- 120, प्लॉट सं० 1045, सर्वे रकवा 0.37 ए० गैरमजरूआ खास खाते की भूमि है। जिसका किस्म सर्वे खतियान में जंगल दर्ज है।

खाता सं- 120, प्लॉट सं० 2470, सर्वे रकवा- 23.50 ए० भूमि गैरमजरूआ खास खाते की भूमि है। जिसका भूमि किस्म खतियान में नदी दर्ज है।

बिन्दुवार प्रतिवेदन निम्नलिखित है-

क्र०	विवरण	प्रतिवेदन
1	2	3
1	विहित क्षेत्र का खाता संख्या, प्लॉट सं० तथा रकवा।	खाता सं० 120, प्लॉट सं० 689, सर्वे रकवा- 95.35 ए०, प्लॉट सं० 1045, सर्वे रकवा- 0.37 ए०, एवं प्लॉट सं० 2470, रकवा 23.50 ए०।
2	विहित क्षेत्र गैरमजरूआ है अथवा रैयती।	खाता सं० 120, प्लॉट सं० 689, 1045 एवं प्लॉट सं० 2470, गैरमजरूआ खास खाते की भूमि है।
3	क्या 500 मीटर की दूरी के अन्दर कोई मानव बसावट (Habitation) स्थित है?	नहीं है।
4	क्या 500 मीटर की दूरी के अन्दर कोई जलीय निकास (Dam/Reservoir) स्थित है?	नहीं है। दामोदर नदी स्थित है।
5	क्या 500 मीटर की दूरी के अन्दर कोई शैक्षणिक संस्थान (Educational Institute) स्थित है?	नहीं है।
6	क्या 500 मीटर की दूरी के अन्दर कोई चिकित्सालय (Hospital) स्थित है?	नहीं है।
7	क्या 500 मीटर की दूरी के अन्दर कोई राष्ट्रीय धरोहर/पुरातत्वीय (Monuments Archaeological) महत्व के स्थल स्थित है?	नहीं है।
8	क्या 10 किमी की परिधि में कोई अन्तर्राष्ट्रीय (Intersatate) सीमा है?	नहीं है।



P.T.O Page No. 2 of 5

District Survey Office
Bokaro



कार्यालय अंचल अधिकारी, पेटरवार।

पत्रांक :- 15

प्रेषक,

अंचल अधिकारी
पेटरवार।

सेवा में,

उपायुक्त,
बोकारो।

पेटरवार/दिनांक :- 09/01/2023

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

प्रसंग :- भवदीय पत्रांक-2319/खनन, दिनांक-28.12.2022

महाशय,

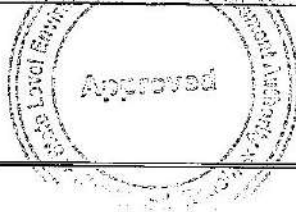
उपर्युक्त विषयक एवं प्रासंगिक पत्र के आलोक में आपके द्वारा चिन्हित बालू घाट की नूतन उपलब्ध कराया गया है, जो राजस्व उपनिरीक्षक से जांच कराया गया। जांच के आधार पर (1) मौजा-धानी थाना संख्या-43, के खाता सं०-86, प्लॉट सं०-01, सर्वे रकबा-120.15 ए० भूमि गैरमजरूआ खास खाते की भूमि है। जिसका भूमि किस्म सर्वे खतियान में नदी दर्ज है।

खाता सं० 24, प्लॉट सं० 821, सर्वे रकबा- 0.55 ए० रैयती खाते की भूमि है। जिसका भूमि का किस्म टांड II दर्ज है। *

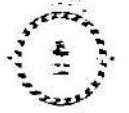
बिन्दूवार प्रतिवेदन निम्नलिखित है-

क्र०	विवरण	प्रतिवेदन
1	2	3
1	चिन्हित क्षेत्र का खाता संख्या, प्लॉट सं० तथा रकबा।	खाता सं० 86, प्लॉट सं० 01 कुल रकबा-- 120.15 ए० खाता सं० 24, प्लॉट सं० 821 रकबा- 0.55 ए०
2	चिन्हित क्षेत्र गैरमजरूआ है अथवा रैयती।	खाता सं० 86, प्लॉट सं० 01 गैरमजरूआ खास खाते की भूमि है। खाता सं० 24, प्लॉट सं० 821, रैयती खाते की भूमि है
3	क्या 500 मीटर की दूरी के अन्दर कोई मानव बसाइत (Habitation) स्थित है?	नहीं है।
4	क्या 500 मीटर की दूरी के अन्दर कोई जलीय निकाय (Dam/Reservoir) स्थित है?	नहीं है। दामोदर नदी निकल है।
5	क्या 500 मीटर की दूरी के अन्दर कोई शैक्षणिक संस्थान (Educational Institute) स्थित है?	नहीं है।
6	क्या 500 मीटर की दूरी के अन्दर कोई चिकित्सालय (Hospital) स्थित है?	नहीं है।
7	क्या 500 मीटर की दूरी के अन्दर कोई राष्ट्रीय धरोहर/पुस्तनीय (Monuments Archaeological) महत्व के स्थल स्थित है?	नहीं है।
8	क्या 10 किमी की परिधि में कोई अन्तर्राष्ट्रीय (Intersatate) सीमा है?	नहीं है।

P.T.O Page No 1 of 6



DISTRICT SURVEY REPORT FOR
SAND MINING OR RIVER-BED MINING IN
BOKARO DISTRICT OF JHARKHAND



कार्यालय अंचल अधिकारी, गोमिया (बोकारो)

Email ID: cogomist@rediffmail.com

पत्रांक 4478 / रा०,

प्रेषक,

अंचल अधिकारी
गोमिया।

सेवा में,

जिला खनन पदाधिकारी
बोकारो

विषय:-
महाशय,

गोमिया, दिनांक 22/08/2023
गोमियाँ अंचल अन्तर्गत अवस्थित बालू घाटों से संबंधित प्रतिवेदन का प्रेषण।

उपर्युक्त विषय के संबंध में कहना है कि गोमियाँ अंचल अन्तर्गत अवस्थित बालू घाटों से संबंधित विवरणी निम्नवत् है:-

क्र०सं०	मोजा का नाम	थाना सं०	खाता सं०	प्लॉट सं०	रकबा	किस्म	अभ्युक्ति
1	होस्तिर	123	458	5381	0.68	परली कदीम नदी	(i) उक्त प्लॉट के निकट अवस्थित आवासों की सं०- 05 (ii) उक्त प्लॉट के निकट अवस्थित ओ०एन०जी०सी० प्लॉट सं०- 01
2				5567	5.10		
3				609	46.30	नदी	
4	ढेंडे	124	111	1451	27.02	नदी	खाता सं० -25, प्लॉट सं० - 1450, रकबा- 0.75ए० भूमि की जनावन्दी गणपत गोप के नाम से दर्ज है। उक्त भूमि रैयती खाते की है।

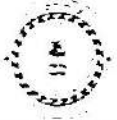
अतः प्रतिवेदन श्रीमान् को सादर सूचनार्थ समर्पित।

विश्वसामाजन

अंचल अधिकारी
गोमिया।



**DISTRICT SURVEY REPORT FOR
SAND MINING OR RIVER-BED MINING IN
BOKARO DISTRICT OF JHARKHAND**



कार्यालय, अंचल अधिकारी, गोमिया

पत्रांक S.....

प्रेषक,
अंचल अधिकारी,
गोमिया।
सेवा में,
उपायुक्त,
बोकारो।

दिनांक 03/01/2023

विषय:- चिन्हित बालू घाट के भूमि संबंधी प्रतिवेदन का प्रेषण
प्रसंग :- भवदीय कार्यालय पत्रांक-2319/खनन, दिनांक-28.12.2022

महाराज

उपरोक्त विषयक प्रशासिक पत्र के शेष में बताया है कि गोमिया अंचल अन्तर्गत बालू घाट से संबंधित प्रतिवेदन की मांग भवदीय द्वारा की गई है। उक्त के अलावा मैं राज्य उप निरीक्षक एवं प्रमुख सड़क निरीक्षक द्वारा बालू घाट के भूमि से संबंधित जांच प्रतिवेदन प्राप्त है। निरंतर विवरण निम्नवत है -

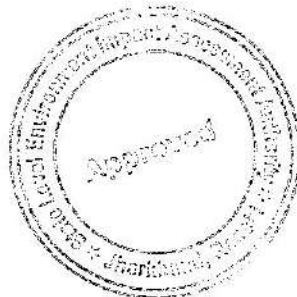
क्र. सं.	ब्लॉक	थाना - सं.	खाला सं.	प्लॉट सं.	एकड़ (ए० म०)	भूमि का किरम	भूमि का प्रकार
1	हामिर	123	458	609	46.3070	गृह. क्षेत्र	भू. म.
2				344, 1523, 617, 616, 615, 612, 613, 611			
3				चूरी में अंकित प्लॉट सं-5609, 5617, 5616, 5615, 5612, 5613, 5611			भू. म.

- चिन्हित भूमि गैरमजलदा खारा खाने की भूमि है।
- आवेदित क्षेत्र के 500 मीटर की दूरी के अन्दर प्लॉट सं. 609 पर भारत सरकार (Habitation) स्थित है।
- आवेदित क्षेत्र के 500 मीटर की दूरी के अन्दर कोई जलयोज भंडार (Dam Reservoir) स्थित नहीं है।
- आवेदित क्षेत्र के 500 मीटर की दूरी के अन्दर कोई शैक्षणिक संस्थान (Educational Institute) स्थित नहीं है।
- आवेदित क्षेत्र के 500 मीटर की दूरी के अन्दर कोई चिकित्सालय (Hospital) स्थित नहीं है।
- आवेदित क्षेत्र के 500 मीटर की दूरी के अन्दर कोई राष्ट्रीय धरोहर/सुमार (Monuments/Archaeological) महत्व के स्थल स्थित नहीं है।
- आवेदित क्षेत्र के 10 कि०मी० की परिधि में कोई अन्तर्राज्यीय (Inter-state) सीमा नहीं है।

अतः प्रतिवेदन इस पत्र के साथ संलग्न कर आवश्यक कार्रवाई हेतु भवदीय को भेजा जा रहा है।
कृपया प्राप्ति स्वीकार की जाए।

अनु०- यथास्त।

विरमलभावन
अंचल अधिकारी



Letter Ash 2021

**DISTRICT SURVEY REPORT FOR
SAND MINING OR RIVER-BED MINING IN
BOKARO DISTRICT OF JHARKHAND**



कार्यालय, अंचल अधिकारी, गोमिया

पत्रांक 10

प्रेषक,
अंचल अधिकारी,
गोमिया।

सेवा में,
उपसुबड,
गोमिया।

दिनांक 03/01/2023

विषय:- चिन्हित बालू घाट के भूमि सक्ती प्रतिवेदन का प्रथम
प्रसंग :- भवदीय कार्यालय पत्रांक-2319/खनन, दिनांक-28.12.2022

सहायक,
उपर्युक्त विषयक प्रारंभिक पत्र के साथ में कल्पना है कि गोमिया अंचल अंतर्गत बालू घाट में
संबंधित प्रतिवेदन की मांग भवदीय द्वारा की गई है। उक्त के आलेख में स्पष्ट रूप निर्दिष्ट एवं प्रस्तावित क्षेत्र
निरीक्षक द्वारा बालू घाट के भूमि से संबंधित जांच प्रतिवेदन प्राप्त है जिसका विवरण निम्नवत है

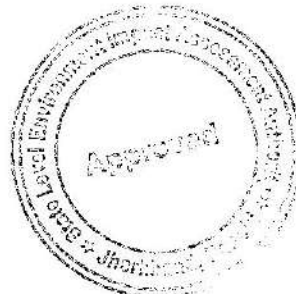
क्र. सं.	ब्लॉक	खाना सं.	खेता सं.	प्लॉट सं.	रकबा (एकड़ में)	भूमि का विवरण	भूमि का प्रयोजन
1	टेन्डे	124	111	1451	27	गैरमजकूआ खेत	नदी
2			111	1457/1553	144एकड़	गैरमजकूआ खेत	नदी
3			1*	1452	361एकड़	गैरमजकूआ खेत	नदी
4				1015 एप	-	खेत	इस भूमि के संबंध में कोई भी जानकारी नहीं है।
				1334			

- 2 चिन्हित भूमि गैरमजकूआ खेत खेतों की भूमि है।
- 3 आवेदित क्षेत्र के 500 मीटर की दूरी के अन्दर कोई मानव बसवट (Habitation) 200 आदमी से कम में स्थित नहीं है।
- 4 आवेदित क्षेत्र के 500 मीटर की दूरी के अन्दर कोई जलीय निक्षेप (Dam Reservoir) स्थित नहीं है।
- 5 आवेदित क्षेत्र के 500 मीटर की दूरी के अन्दर कोई शैक्षणिक संस्थान (Educational Institute) स्थित नहीं है।
- 6 आवेदित क्षेत्र के 500 मीटर की दूरी के अन्दर कोई चिकित्सालय (Hospital) स्थित नहीं है।
- 7 आवेदित क्षेत्र के 500 मीटर की दूरी के अन्दर कोई राष्ट्रीय धरोहर (Monuments/Archaeological) महत्व के स्थल स्थित नहीं है।
- 8 आवेदित क्षेत्र के 10 कि०मी० की परिधि में कोई अन्तर्राज्यीय (Inter-state) सीमा नहीं है।

अतः प्रतिवेदन इस पत्र के साथ संलग्न कर आवश्यक कार्रवाई हेतु भवदीय को भेजा जा रहा है।
कृपया प्राप्ति स्वीकार की जाए।

अनु०- यथावत।

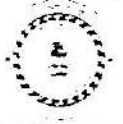
निरीक्षक,
अंचल अधिकारी,
गोमिया



Letter-Ash 2021

District Survey Officer
Bokaro

DISTRICT SURVEY REPORT FOR
SAND MINING OR RIVER-BED MINING IN
BOKARO DISTRICT OF JHARKHAND



REPORT FROM DIVISIONAL FOREST OFFICER, BOKARO



कार्यालय :- वन प्रमण्डल पदाधिकारी, बोकारो वन प्रमण्डल, बोकारो।

BLOCK-A, VAN BHAWAN, PURULIA ROAD, CHAS, BOKARO-827013

E-mail : dfo-bokaro@gov.in & bokarodfo@gmail.com

Phone/Fax No. : +91-6542-265142

पत्रांक :- 654

दिनांक :- 10.03.2023

सेवा में,

जिला खनन पदाधिकारी,
बोकारो।

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

प्रस्ताव :- आपका पत्रांक-452/खनन दिनांक-03.03.2023 एवं इस कार्यालय का पत्रांक-521 दिनांक-24.02.2023

महाराज,

उपर्युक्त विषयक प्रासंगिक पत्र के संबंध में कहना है कि आपके पत्रांक-272 दिनांक-07.02.2023 के साथ सलग्न बालू घाटों का प्रस्तावित सूची कॉलम स0-6 सम्प्रति P.S. Number with Mouza (JSAC) में प्लॉट न0 एव मौजा अंकित था, की जाँच कर इस कार्यालय में पत्रांक-521 दिनांक-24.02.2023 द्वारा पूर्ण सूचना आपको उपलब्ध करायी गयी है। पुनः आपके द्वारा अपने पत्रांक-452/खनन दिनांक-03.03.2023 से कुछ बालू घाटों में एरिया का संशोधन करके नक्शे उपलब्ध कराया गया है। उक्त पत्रांक-452/खनन दिनांक-03.03.2023 के साथ सलग्न सूची अनुसार जिन बालू घाटों का वर्णन किया गया है। उन बालू घाटों का वनभूमि से दूरी निम्नवत है -

क्र0 सं0	मौजा का नाम	थाना नं0	जोन नं0	प्लॉट नं0	वनभूमि की न्यूनतम दूरी (मी0 में)
1	शौबूटांड	3 168	3	1	36 मीटर
2	पिछरी	49	4	1	168 मीटर
3	पिछरी	49	4	1	280 मीटर
4	चलकरी	46	5	938	640 मीटर
5	झुझकी	48	5	450	120 मीटर
6	अगवाली	51	5	1, 3535	94 मीटर
7	चलकरी	46	6	1, 474	600 मीटर
8	चलकरी	46	6	474	600 मीटर
9	खेतका	45	7	2470	1200 मीटर
10	चलकरी	46	7	4149	960 मीटर
11	बापी	43	8	1	620 मीटर
12	खेतका	45	8	689	640 मीटर
13	हांसिर	123	25	5381, 5567	3600 मीटर
14	धन्ध	124	26	1451	980 मीटर
15	धन्ध	124	26	1451, 1450, 1452	600 मीटर से अधिक
16	हांसिर	123	26	609	2880 मीटर

नोट- उपरोक्त मामले में आपके द्वारा उपलब्ध कराये गये नक्शे में चिन्हित बाउण्ड्री के अनुसार वनभूमि की दूरी दी गई है, जो रकबा पर आधारित नहीं है।

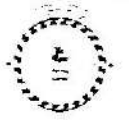


दिखासभाजन,
(Signature)

वन प्रमण्डल पदाधिकारी
बोकारो वन प्रमण्डल, बोकारो

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DISTRICT SURVEY REPORT FOR
SAND MINING OR RIVER-BED MINING IN
BOKARO DISTRICT OF JHARKHAND



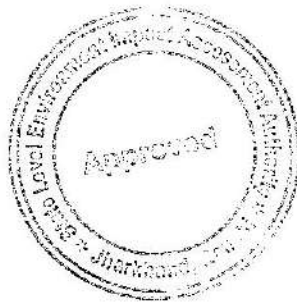
ज्ञापांक

दिनांक

प्रतिलिपि :- उपायुक्त, बोकारो को सूचनाार्थ एवं आवश्यक कार्रवाई हेतु प्रेषित।

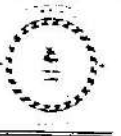
वन प्रमण्डल पदाधिकारी,
बोकारो वन प्रमण्डल, बोकारो।

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District Forest Officer, Bokaro

**DISTRICT SURVEY REPORT FOR
SAND MINING OR RIVER-BED MINING IN
BOKARO DISTRICT OF JHARKHAND**



कार्यालय :- वन प्रमण्डल पदाधिकारी, बोकारो वन प्रमण्डल, बोकारो।
BLOCK-A, VAN BHAWAN, PURULIA ROAD, CHAS, BOKARO-827013
 E-mail : dfo-bokaro@gov.in & bokaradfo@gmail.com
 Phone/Fax No : +91-6542-265142

पत्रांक :- 836 दिनांक :- 27/03/23
 सेवा में,
 जिला खनन पदाधिकारी,
 बोकारो।
 विषय :- बालू घाटों की वन भूमि से दूरी के संबंध में।
 प्रसंग :- आपका पत्रांक-452/खनन दिनांक-03.03.2023 एवं पत्रांक-656/खनन दिनांक-2-
 03.2023 तथा इस कार्यालय का पत्रांक-654 दिनांक-10.03.2023
 महाशय,

उपर्युक्त विषयक प्रासंगिक पत्र के संबंध में सूचित करना है कि आपके पत्रांक-452 दिनांक-03.03.2023 द्वारा उपलब्ध कराए गए नक्शे के अनुसार संबंधित बालू घाटों का वन भूमि की दूरी की पूर्ण सूचना इस कार्यालय के पत्रांक-654 दिनांक-10.03.2023 द्वारा आपको उपलब्ध कराई गयी है। पुनः आपके द्वारा अपने पत्रांक-656 दिनांक-21.03.2023 के साथ मौजा-धेन्हे, थान- नं०-124, प्लॉट नं०-1451, 1550 एवं 1452 का संशोधित प्लॉट/नक्शा समर्पित करते हुए वाछित प्रतिवेदन उपलब्ध कराने हेतु अनुरोध किया गया है।

अतः उपरोक्त मामले में वन भूमि की दूरी निम्नवत है :-

क्र० सं०	मौजा का नाम	थाना नं०	जोन नं०	प्लॉट नं०	वनभूमि की न्यूनतम दूरी (मी० में)
1	धेन्हे	124	26	1451, 1550, 1452	600 मीटर से अधिक

नोट:- उपरोक्त मामले में आपके द्वारा उपलब्ध कराये गये नक्शे में चिन्हित बाउण्ड्री के अनुसार ही वनभूमि की दूरी दी गई है, जो रकवा पर आधारित नहीं है।

विश्वासभाजन,
 वन प्रमण्डल पदाधिकारी,
 बोकारो वन प्रमण्डल, बोकारो।
 27-3-23



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पलामू

द्विगत की दो पुरी का वादय सहायता ने कराया विद्यालय में नामांकन

पलामू जिले के दो पुरी के वादय सहायता ने कराया विद्यालय में नामांकन...

शारद देवी वनी महिला सेवकों के प्रथम अध्यक्ष और निर्माता खविंद

शारद देवी वनी महिला सेवकों के प्रथम अध्यक्ष और निर्माता खविंद...

शिक्षक की माता की मनी प्रथम पुर्या तिथि

शिक्षक की माता की मनी प्रथम पुर्या तिथि...

रक्त के जरूरतमंद मरीजों के परिजन भी करें रक्तदान - बीरज मिश्रा

रक्त के जरूरतमंद मरीजों के परिजन भी करें रक्तदान - बीरज मिश्रा...

विद्यार्थी परिषद ने सनवीचू के कुलपति का किया धरात

विद्यार्थी परिषद ने सनवीचू के कुलपति का किया धरात...

न्याय मार्च सह आक्रोश पूर्ण प्रदर्शन आज



कांग्रेस पार्टी के कार्यकर्ताओं ने भारत जोड़ो यात्रा निकाली

कांग्रेस पार्टी के कार्यकर्ताओं ने भारत जोड़ो यात्रा निकाली...

परदायन सेना प्राधिकर खडखटात से दो वृद्धों की उद्धारिण अभिने

परदायन सेना प्राधिकर खडखटात से दो वृद्धों की उद्धारिण अभिने...

लोहिया विद्यालय में पर्यावरणविद् ने हिमाचल का कपूर एवं भूटान के सिंदूर का लगाया पौधा

लोहिया विद्यालय में पर्यावरणविद् ने हिमाचल का कपूर एवं भूटान के सिंदूर का लगाया पौधा...

आजाद सिपाही

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पीड़ित परिवार को उचित न्याय मिले नहीं तो सेना आंदोलन : भैरव सिंह

पीड़ित परिवार को उचित न्याय मिले नहीं तो सेना आंदोलन : भैरव सिंह...

दिव्यांगों ने एसडीआई को चौथा ह्रापन जय शिविर में भेटदान का लगाया प्रारंभ

दिव्यांगों ने एसडीआई को चौथा ह्रापन जय शिविर में भेटदान का लगाया प्रारंभ...

एनएसएस का स्थापना दिवस समारोह

एनएसएस का स्थापना दिवस समारोह...

कनिल खजय सिंह बनारस गये भाजपा वैनिक प्रकोष्ठ के प्रदेश संयोजक

कनिल खजय सिंह बनारस गये भाजपा वैनिक प्रकोष्ठ के प्रदेश संयोजक...

उद्योगिक क्षेत्र कायाल, कोडरमा (पुनर्) कल्याण (राज्य)

उद्योगिक क्षेत्र कायाल, कोडरमा (पुनर्) कल्याण (राज्य)...

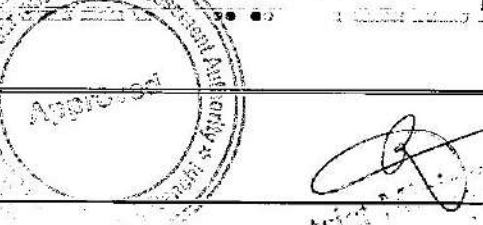
खोसदस

अंतर महाविद्यालय वॉलीबॉल प्रतियोगिता में गोस्सनर कॉलेज चैंपियन

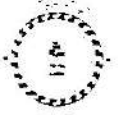


समाहृत-सह-विना दक्षिणकरी के कल्याण, बीकानेर

समाहृत-सह-विना दक्षिणकरी के कल्याण, बीकानेर...



DISTRICT SURVEY REPORT FOR
SAND MINING OR RIVER-BED MINING IN
BOKARO DISTRICT OF JHARKHAND



जिला खनन कार्यालय, बोकारो।

पत्रांक 197 / खनन

बोकारो

दिनांक 30/01/2022

प्रेषक,

जिला खनन पदाधिकारी,
बोकारो।

सेवा में,

जिला सूचना विज्ञान पदाधिकारी,
बोकारो।

विषय :- बोकारो जिला हेतु तैयार Draft DSR (बालू खनिज) को बोकारो जिले के NIC Portal पर प्रकाशित करने के संबंध में।

महाशय,

उपर्युक्त विषय के संबंध में सूचित करना है कि बोकारो जिला हेतु Draft DSR (बालू खनिज) जो NABEI Accredited Agency द्वारा तैयार किया गया है, जिसे दिनांक 30/09/2022 को NIC Portal पर Public Viewing एवं Comments हेतु Upload किया गया है। जिलान्तर्गत बालू घाटों का DGPS Survey का कार्य Agency एवं Sub-divisional समिति द्वारा पूर्ण कर बालू घाटों को चिह्नित किया गया है तथा Draft DSR में समाविष्ट किया गया है।

अतः अनुरोध है कि बोकारो जिला हेतु तैयार Draft DSR (बालू खनिज) को जिला के NIC Portal पर Public Viewing एवं Comments हेतु Upload करने की कृपा की जाय।

अनुलग्नक :- यथोक्त।

विश्वासभाजन,

जिला खनन पदाधिकारी,
बोकारो।

ज्ञापक 197 / खनन

बोकारो

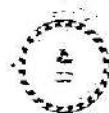
दिनांक 30/01/2022

प्रतिलिपि :- उपायुक्त, बोकारो को सादर सूचनार्थ प्रेषित।

जिला खनन पदाधिकारी,
बोकारो।



DISTRICT SURVEY REPORT FOR
SAND MINING OR RIVER-BED MINING IN
BOKARO DISTRICT OF JHARKHAND



SITE VISIT PHOTOGRAPHS OF SAND GHATS IN BOKARO DISTRICT



GPS Map Camera

Chalkari, Jharkhand, India
 Unnamed Road, Chalkari, Jharkhand 829114,
 India
 Lat 23.766402°
 Long 85.949603°
 18/11/22 India Standard Time

Google



GPS Map Camera

Chalkari, Jharkhand, India
 At -aonradih p.o.-sangarampur p.s gola distik, Aonradih,
 QW4P+96F, Chalkari, Jharkhand 829114, India
 Lat 23.755288°
 Long 85.933877°
 20/11/22 India Standard Time

Google

Photographs showing Chalkari Sand Ghat



GPS Map Camera

Chalkari, Jharkhand, India
 At -aonradih p.o.-sangarampur p.s gola distik, Aonradih,
 QW4P+96F, Chalkari, Jharkhand 829114, India
 Lat 23.755312°
 Long 85.933899°
 20/11/22 India Standard Time

Google



GPS Map Camera

Chalkari, Jharkhand, India
 Unnamed Road, Chalkari, Jharkhand 829114,
 India
 Lat 23.75297°
 Long 85.948817°
 19/11/22 India Standard Time

Google



District Survey Officer
Bokaro

DISTRICT SURVEY REPORT FOR
SAND MINING OR RIVER-BED MINING IN
BOKARO DISTRICT OF JHARKHAND



GPS Map Camera



Champi, Jharkhand, India

Champi, Jharkhand, India

Lat 23.75068°

Long 85.897595°

20/11/22 India Standard Time

Google

Photographs showing Champi Sand Ghat



GPS Map Camera



Khetko, Jharkhand, India

Khetko, Jharkhand, India

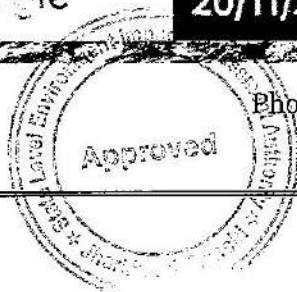
Lat 23.752177°

Long 85.898183°

20/11/22 India Standard Time

Google

Photographs showing Khetko Sand Ghat

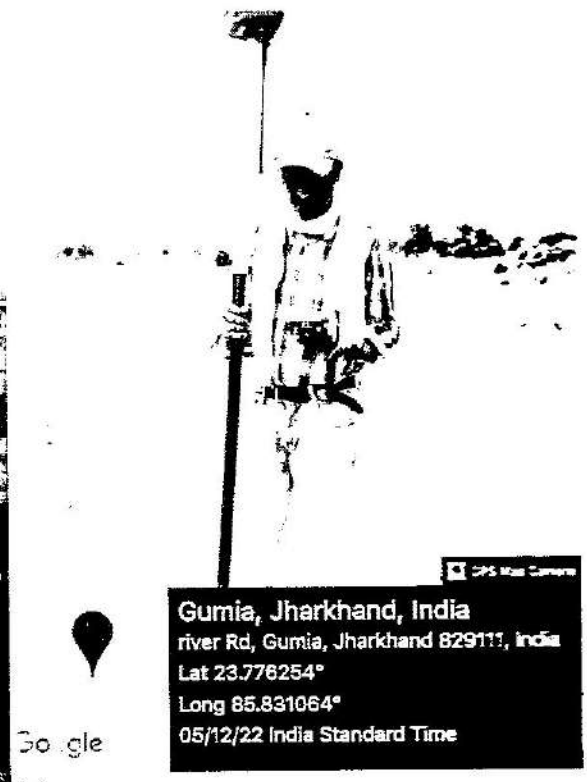
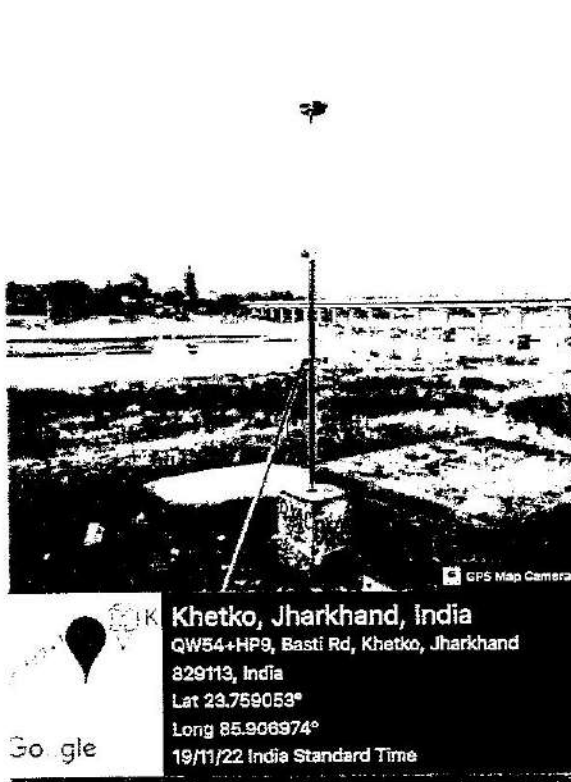


District Survey Office, Bokaro, Jharkhand

DISTRICT SURVEY REPORT FOR
SAND MINING OR RIVER-BED MINING IN
BOKARO DISTRICT OF JHARKHAND



Photographs showing Khetko Sand Ghat

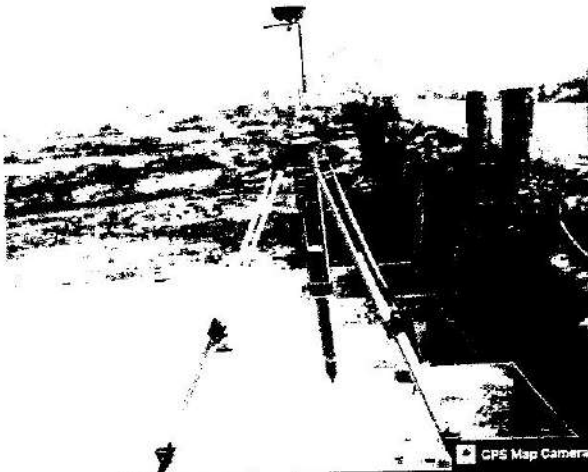


Photographs showing Khetko Sand Ghat and Gumia Sand Ghat



[Handwritten signature]
District Surveyor

DISTRICT SURVEY REPORT FOR
SAND MINING OR RIVER-BED MINING IN
BOKARO DISTRICT OF JHARKHAND



Hosir, Jharkhand, India
QRJ7+JMQ, Hosir, Jharkhand 829111, India
Lat 23.781441°
Long 85.815082°
04/12/22 India Standard Time



Hosir, Jharkhand, India
Unnamed Road, Hosir, Jharkhand 829111, India
Lat 23.77948°
Long 85.824811°
05/12/22 India Standard Time

Photographs showing Hosir Sand Ghat



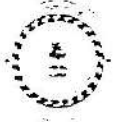
Hosir, Jharkhand, India
Unnamed Road, Hosir, Jharkhand 829111, India
Lat 23.786749°
Long 85.810847°
04/12/22 India Standard Time



Hosir, Jharkhand, India
QRJ7+JMQ, Hosir, Jharkhand 829111, India
Lat 23.781441°
Long 85.815082°
04/12/22 India Standard Time



DISTRICT SURVEY REPORT FOR
SAND MINING OR RIVER-BED MINING IN
BOKARO DISTRICT OF JHARKHAND



CERTIFICATE FROM DISTRICT FISHERY DEPARTMENT, BOKARO

कार्यालय :- जिला मत्स्य पदाधिकारी-सह-मुख्य कार्यपालक पदाधिकारी, बोकारो।
पत्रांक198...../मत्स्य

प्रेषक,

जिला मत्स्य पदाधिकारी
सह- मुख्य कार्यपालक पदाधिकारी
बोकारो।

सेवा में,

जिला भूतात्विक पदाधिकारी,
बोकारो।

मत्स्य/बोकारो/दिनांक...21.2.23

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

प्रसंग:- जिला भूतात्विक कार्यालय,बोकारो का पत्रांक-77 दिनांक-31/01/2023

महाराज,

उपर्युक्त विषयक एवं प्रसंगाधीन पत्र के द्वारा मॉगी गई सूचना इस पत्र के साथ
सलगन कर भेजी जा रही है।

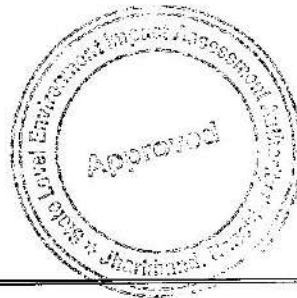
अनु०-यथोक्त

विश्वासभाजन

जिला मत्स्य पदाधिकारी-
सह मुख्य कार्यपालक पदाधिकारी

बोकारो।

21.2.23



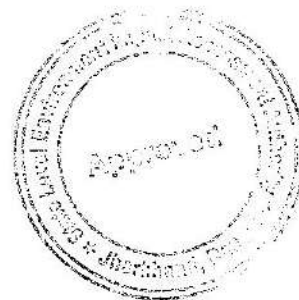
DISTRICT SURVEY REPORT FOR
SAND MINING OR RIVER-BED MINING IN
BOKARO DISTRICT OF JHARKHAND



Commonly found aquatic animals in Garga River and other small rivers of Bokaro Dis!

Sl.No	Common Names
1	Rohu
2	Catla
3	Mrigal
4	Silver carp
5	Grass carp
6	Common carp(pahadi)
7	Singhi
8	Garai
9	Pothia
10	kanta pothi
11	Mangur
12	Tengra
13	boan
14	Pangas
15	Chanda pothi
16	Telopia(desi)
17	Telopia Niloticus(nyloon tikia)
18	Kana
19	Banspatta
20	Geta
21	Beda
22	Sole
23	Kuncha
24	Tur
25	Pangas
26	Kana
27	chingri
28	Crab
29	snail
30	water snake
31	Frog
32	Toad
33	unio
34	pila
35	Tortoise

M
21.7.23



DISTRICT SURVEY REPORT FOR
SAND MINING OR RIVER-BED MINING IN
BOKARO DISTRICT OF JHARKHAND



Annexure – I

Details of Sand Sources:

Sl. No.	River Name	Total Stretch of River (in Km)	Type of River (Perennial/Non-Perennial)
1	Tasharkuan River	15.00	Non-Perennial
2	Garga River	46.51	Non-Perennial
3	Gobai River	37.78	Non-Perennial
4	Godda Nala	14.73	Non-Perennial
5	Ishri River	51.29	Non-Perennial
6	Gantiko River	15.17	Non-Perennial
7	Konar River	43.58	Non-Perennial
8	Damodar River	178.77	Non-Perennial
9	Chirua Nala	4.60	Non-Perennial
10	Khalsa Nala	9.38	Non-Perennial
11	Bokaro River	31.85	Non-Perennial
12	Jamuniya River	35.45	Non-Perennial

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

Sl. No.	Name of Reservoir/Dams	Maintain/Controlled by State Govt./PSU etc.	Location	District	Tehsil	Village	Size (Ha.)
1	Nil	Nil	Nil	Nil	Nil	Nil	Nil

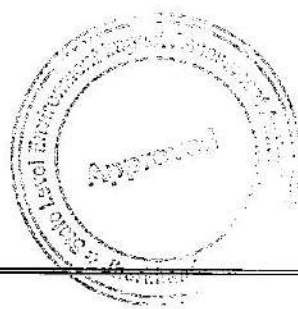
b) Patta Lands/Khatedari Land:

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

c) M-Sand Plants:

Sl. No.	Plant Name	Owner	District	Tehsil	Village	Geo-location	Quantity Tonnes Annum
1	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 & proposed):

Sl. No.	River Details	Lease Details	Area (in Ha.)	Distance from PA/BR/WC (in KM)	Distance from Forest Area (in KM)	Mining Leases within 500m (if yes, Cluster area)	Total excavation (Mine depth max as 3 m) in (m ³ /Yr.)	Bulk Density Tonne/m ³	Total excavation (Tonne/Yr.)	Mineral to be mined (Sand/Bajri/RBM etc.)	Existing /Proposed
1	Damodar	Pichhari-2	4.72	>0.25 Km	>0.25 Km	No	70800	1.76	124608.0	Sand	Proposed
2	Damodar	Chalkari	8.22	>0.25 Km	>0.25 Km	No	123300	1.74	214542.0	Sand	Proposed
3	Damodar	Chalkari	14.67	>0.25 Km	>0.25 Km	No	176040	1.72	302788.8	Sand	Proposed
4	Damodar	Khetko Chalkari	26.14	>0.25 Km	>0.25 Km	No	363960	1.74	636770.4	Sand	Proposed
5	Damodar	Champi Khetko	52.40	>0.25 Km	>0.25 Km	No	786000	1.70	1336200.0	Sand	Proposed
6	Bokaro	Hosir	10.86	>0.25 Km	>0.25 Km	No	141180	1.73	244241.40	Sand	Proposed
7	Bokaro	Dhendhe	23.11	>0.25 Km	>0.25 Km	No	300430	1.74	522748.2	Sand	Proposed

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

Sl. No.	Name of Reservoir /Dams	Maintained/Controlled by State Govt./PSU etc.	Location	District	Tehsil	Village	Size (Ha.)	Quantity MT/Year	Existing /Proposed
1	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

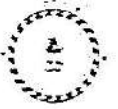
b) Patta Lands/Khatedari Land:

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

c) M-Sand Plants:

Sl. No.	Plant Name	Owner	District	Tehsil	Village	Geo-location	Quantity Tonnes/Annum	Existing/Proposed
1	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

DISTRICT SURVEY REPORT FOR
SAND MINING OR RIVER-BED MINING IN
BOKARO DISTRICT OF JHARKHAND



Annexure - III

Cluster & Contiguous Cluster details:

Clusters:

Sl. No.	River Name	Cluster No.	Lease No.	Location (River-bed /Patta Land)	Village	Area (in Ha.)	Total Excavation (Ton)	Total Mineral Excavation (Ton)
1	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.

Contiguous Clusters:

Sl. No.	River Name	Contiguous Cluster No.	Cluster No.	Number of leases in the Cluster	Location (River-bed /Patta Land)	Distance between Clusters	Village	Area of Cluster (Ha.)	Total Mineral Excavation (Ton)
1	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.



DISTRICT SURVEY REPORT FOR
SAND MINING OR RIVER-BED MINING IN
BOKARO DISTRICT OF JHARKHAND



Annexure – IV

Transportation Routes for individual leases and leases in Cluster:

Sl. No.	Lease No.	Transportation Route No.	Number of tippers/day of lease	Number of tippers/day of all the lease on route	Length of Route in KM	Type of Road (Black Topped/unpaved)	Recommendation for road (Black Topped/unpaved)	The road will be Constructed by Govt./Lease Owner	Route Map & Location
1	1	1	@16 Tonne/Tipper (Avg.)	@16 Tonne/Tipper (Avg.)	1.08	Unpaved	Black Topped	Lease Owner	Attached as Map No. D1
2	2	2.60			Unpaved	Black Topped	Lease Owner	D2	
3	3	0.21			Unpaved	Black Topped	Lease Owner	D3	
4	4	1.14			Unpaved	Black Topped	Lease Owner	D4	
5	5	1.42			Unpaved	Black Topped	Lease Owner	D5	
6	6	2.48			Unpaved	Black Topped	Lease Owner	D6	
7	7	0.92			Unpaved	Black Topped	Lease Owner	D7	

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



DISTRICT SURVEY REPORT FOR
SAND MINING OR RIVER-BED MINING IN
BOKARO DISTRICT OF JHARKHAND



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

Annexure - V

Sl. No.	River Details	Lease Details	Area (in Ha.)	Distance from PA/BR/WC (in KM)	Distance from Forest Area (in KM)	Mining Leases within 500m (if yes, Cluster area)	Total excavation (Mine depth max as 3 m) in (m ³ /Yr.)	Bulk Density Tonne/m ³	Total excavation (Tonne/Yr.)	Mineral to be mined (Sand/Bajri/RBM etc.)	Existing /Proposed
1	Damodar	Pichhri-2	4.72	>0.25 Km	>0.25 Km	No	70800	1.76	124608.0	Sand	Proposed
2	Damodar	Chalkari	8.22	>0.25 Km	>0.25 Km	No	123300	1.74	214542.0	Sand	Proposed
3	Damodar	Chalkari	14.67	>0.25 Km	>0.25 Km	No	170040	1.72	302788.8	Sand	Proposed
4	Damodar	Khetko	26.14	>0.25 Km	>0.25 Km	No	365960	1.74	63670.4	Sand	Proposed
5	Damodar	Champi Khetko	52.40	>0.25 Km	>0.25 Km	No	786000	1.70	1336200.0	Sand	Proposed
6	Bokaro	Hosir	10.86	>0.25 Km	>0.25 Km	No	141180	1.73	244241.4.0	Sand	Proposed
7	Bokaro	Dhendhe	23.11	>0.25 Km	>0.25 Km	No	300430	1.74	522748.2	Sand	Proposed

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

Sl. No.	Name of Reservoir /Dams	Maintained/Controlled by State Govt./PSU etc.	Location	District	Tehsil	Village	Size (Ha.)	Quantity MT/Year	Existing /Proposed
1	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

b) Patta Lands/Khatedari Land:

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

c) M-Sand Plants:

Sl. No.	Plant Name	Owner	District	Tehsil	Village	Geo-location	Quantity Tonnes/Annum	Existing/Proposed
1	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

DISTRICT SURVEY REPORT FOR
SAND MINING OR RIVER-BED MINING IN
BOKARO DISTRICT OF JHARKHAND



Annexure – VI

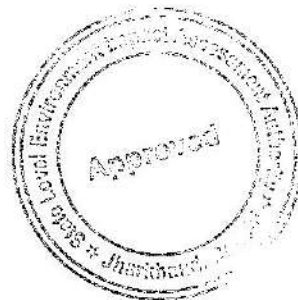
Final List of Cluster & Contiguous Cluster:

Clusters:

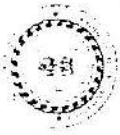
Sl. No.	River Name	Cluster No.	Lease No.	Location (River-bed /Patta Land)	Village	Area (in Ha.)	Total Excavation (Ton)	Total Mineral Excavation (Ton)
1	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.

Contiguous Clusters:

Sl. No.	River Name	Contiguous Cluster No.	Cluster No.	Number of leases in the Cluster	Location (River-bed /Patta Land)	Distance between Clusters	Village	Area of Cluster (Ha.)	Total Mineral Excavation (Ton)
1	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.



District Survey Officer
Bokaro



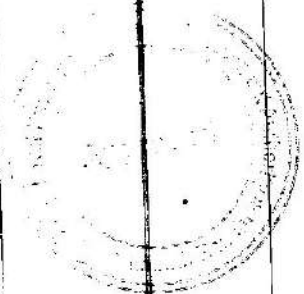
DISTRICT SURVEY REPORT FOR
SAND MINING OR RIVER-BED MINING IN
BOKARO DISTRICT OF JHARKHAND

Annexure - VII

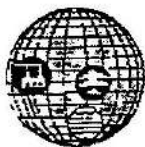
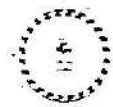
Final Transportation Routes for individual leases and leases in Cluster:

Sl. No.	Lease No.	Transportation Route No.	Number of tippers/day of lease	Number of tippers/day of all the lease on route	Length of Route in KM	Type of Road (Black Topped/unpaved)	Recommendation for road (Black Topped/unpaved)	The road will be Constructed by Govt./Lease Owner	Route Map & Location Attached as Map No. D1
1	1	1			1.08	Unpaved	Black Topped	Lease Owner	D2
2	2	2			2.60	Unpaved	Black Topped	Lease Owner	D3
3	3	3			0.21	Unpaved	Black Topped	Lease Owner	D4
4	4	4			1.14	Unpaved	Black Topped	Lease Owner	D5
5	5	5			1.42	Unpaved	Black Topped	Lease Owner	D6
6	6	6			2.48	Unpaved	Black Topped	Lease Owner	D7
7	7	7			0.92	Unpaved	Black Topped	Lease Owner	
			@16 Tonne/Tipper (Avg.)	@16 Tonne/Tipper (Avg.)					

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



**DISTRICT SURVEY REPORT FOR
SAND MINING OR RIVER-BED MINING IN
BOKARO DISTRICT OF JHARKHAND**



EcoCare

Phone : (0341) 2252011

Fax : (0341) 2252011

Email ecocareasansol@rediffmail.com

Manoj Talkies Basement, Kumarapur

Asansol - 713304

Paschim Bardhaman (W.B)

Specialised House on Environmental Monitoring, Analysis, Assessment & Management

ISO 9001:2015 Certified, OHSAS 45001:2018 Certified

ULR No. TC510922000000512P

Date of Print: 07.12.2022

Sand Texture Analysis Report

Client Name: Sathi Planners Private Limited

Client Address: Lake Avenue, Kanke Road, Ranchi,
Jharkhand, PIN - 834008

Sample Type: Riverbed Sand

Period of Sampling: 21. 11. 2022 to 28.11.2022

Sampling Density: Two per Hectare

Source: Multiple Rivers in Bokaro District

Period of Analysis: 30.11.2022 to 06.12.2022

Sample Condition: Sealed

Sand Ghat ID	Area (Ha)	Length (m)	No. of Samples	Sand Sample Collected for texture analysis						Bulk Density (Ton/m ³)
				4.75mm to 2.00 mm		2.00mm to 425 micron		425 to 75 micron		
				Nos.	%	Nos.	%	Nos.	%	
BO_Z4_DAM_3	4.72	473.27	10	1	10	6	60	3	30	1.76
BO_Z5_DAM_4	8.22	650.73	17	3	17.65	11	64.71	3	17.65	1.74
BO_Z6_DAM_5	14.67	1234.81	30	6	20	18	60	6	20	1.72
BO_Z7_DAM_6	26.14	2028.35	53	9	16.98	27	50.94	17	32.08	1.74
BO_Z8_DAM_7	52.40	2496.29	105	23	21.9	62	59.05	20	19.05	1.70
BO_Z25_BOK_8	10.86	1533.10	22	3	13.64	13	59.09	6	27.27	1.73
BO_Z26_BOK_9	23.11	3345.41	47	7	14.89	29	61.7	11	23.4	1.74

1. Test values are reported based on the samples received.
2. Samples will be destroyed after 7 days from the date of issues of the Test Report, subject to nature of preservation sample will be preserved as per the standard method.
3. The Test report shall not be reproduced without the written approval of the laboratory.

mPal

Authorised Signatory

Dr. Mousumi Pal
Ph.D. Environmental Scientist
Authorised Signatory



DISTRICT SURVEY REPORT FOR
SAND MINING OR RIVER-BED MINING IN
BOKARO DISTRICT OF JHARKHAND



जिला खनन कार्यालय, बोकारो।

E-mail ID - dmo-bokaro@jharkhandmail.gov.in

पत्रांक 687 / खनन,

बोकारो

दिनांक 31.03.2018

प्रेषक,

जिला खनन पदाधिकारी,
बोकारो।

सेवा में,

M/s Sathi Planners Private Limited,
QCI-NABET Accredited And ISO 9001:2015 Certified Company,
Address - Lake Avenue, Kanke Road,
Ranchi-834008, Jharkhand.

विषय :- बोकारो जिलान्तर्गत मौजा-लागला, महाल के रकबा-27.00 एकड़ एवं मौजा महाल, सहारजोरी एवं बोमला के रकबा-43.00 एकड़ तथा मौजा-दामोदरपुर, पालकिरी, छाताटांड, भोजुडीह एवं नरकेरा के रकबा-123.92 एकड़ क्षेत्र पर धारित बालू क्षेप्याभरण खनन पट्टा क्षेत्र को DSR में शामिल करने के संबंध में।

महाशय,

उपर्युक्त विषय के संबंध में सूचित करना है कि सर्वश्री टाटा स्टील लि०, झरिया पूर्ण जामाडोवा, जिला-धनबाद के द्वारा बोकारो जिलान्तर्गत निम्नांकित बालू क्षेप्याभरण खनन पट्टा धारण किया जाता है, जिसे DSR में शामिल किये जाने हेतु अनुरोध पत्र दाखिल किया गया है (छाया प्रति संलग्न)।

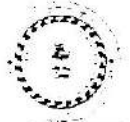
:- पट्टा सविद के अनुसार विवरणी निम्न प्रकार है:-

क्र०	बालू घाटों की विवरणी	अंचल का नाम	रकबा (एकड़ में)	अभ्युक्ति
1	मौजा-लागला न०-249, खाता न०-103, प्लॉट न०-212 एवं मौजा-महाल न०-225, खाता न०-1250, प्लॉट न०-6838	चन्दनकियारी	27.00	सविद निष्पादन तिथि दिनांक 09/09/2016 से 20 वर्षों के लिए स्वीकृत
2	मौजा-महाल न०-225, खाता न०-1250, 1253, प्लॉट न०-6774, 6403, 6774/6992, मौजा-सहारजोरी न०-260, खाता न०-253, प्लॉट न०-01 एवं बोमला न०-258, खाता न०-02, प्लॉट न०-588	चन्दनकियारी	43.00	सविद निष्पादन तिथि दिनांक 09/09/2016 से 20 वर्षों के लिए स्वीकृत
3	मौजा-दामोदरपुर न०-240, प्लॉट न०-436, 426, 427, 428, 429, 262, 430, / 450 एवं 262/430, मौजा-पालकिरी न०-241, प्लॉट न०-01	चन्दनकियारी	123.92	दिनांक 29/11/83 से 20 वर्षों के लिए खनन पट्टा स्वीकृत पत्र



District Survey Officer
Bokaro

DISTRICT SURVEY REPORT FOR
SAND MINING OR RIVER-BED MINING IN
BOKARO DISTRICT OF JHARKHAND

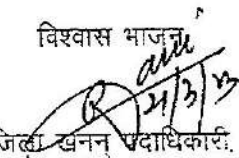


2580, 2581 एवं 3253 तथा मौजा छाताटांड नं०-238, प्लॉट नं०-1257, 300, 127/1258 एवं 127/1269, मौजा-भोजुडीह नं०-239, प्लॉट नं०-1240 एवं 1245 एवं मौजा-नरफेरा नं०-247, प्लॉट नं०-01	तदनुसार उरुक नवीकरण/अवधि विस्तार हेतु आवेदन पत्र दाखिल, जो पर्यावरणीय सहमति के अभाव में लम्बित है।
--	--

अतः अनुरोध है कि सर्वश्री टाटा स्टील लि०, झरिया पूर्वी, जामाडोवा, जिला-धनबाद द्वारा बोकारो जिलान्तर्गत धारित उपरोक्त बालू क्षेत्राभरण खनन पट्टा क्षेत्र को DSR में शामिल करने की कृपा की जाय।

अनुलग्नक :- यथावत्।

विश्वास भाजन

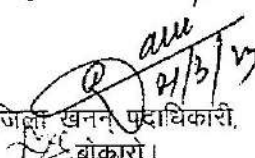

 जिला खनन पदाधिकारी,
 बोकारो।

ज्ञापक 687 / खनन,

बोकारो

दिनांक 21/3/2013

प्रतिलिपि :- सहायक निदेशक, भूतत्व, जिला भूतात्विक कार्यालय, बोकारो को अनुलग्नक सहित सूचनार्थ एवं आवश्यक कार्रवाई हेतु प्रेषित।

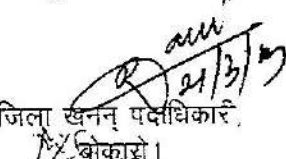

 जिला खनन पदाधिकारी,
 बोकारो।

ज्ञापक 687 / खनन,


बोकारो

दिनांक 21/3/2013

प्रतिलिपि :- सर्वश्री टाटा स्टील लि०, झरिया पूर्वी, जामाडोवा, जिला-धनबाद सूचनार्थ एवं आवश्यक कार्रवाई हेतु प्रेषित।


 जिला खनन पदाधिकारी,
 बोकारो।




 District Mining Officer
 Bokaro

DISTRICT SURVEY REPORT FOR
SAND MINING OR RIVER-BED MINING IN
BOKARO DISTRICT OF JHARKHAND



*copy to sathi
planners, NIBET
Agency empowered
for Bokaro District
copy to Asst.
Planner, Geology,
Bokaro
Rani
17/3/23*

To
District Mining Officer
Bokaro, Jharkhand

Ref: JMB/261/ 000108

Date: 15 MAR 2023

Sub.: Regarding inclusion of three stowing sand leases of Tata Steel Limited under District
Bokaro, in District Survey Report

Dear Sir,

This is with reference to our letter number JMB/244/000008 dated 12th Jan'23 regarding request to include our sand leases in District Survey Report (DSR) of Bokaro for sand mineral prepared in accordance with guideline issued by the Ministry of Environment, Forest & Climate Change (MoEF&CC), Government of India vide the notification S.O. 141(E) Dated 15th January 2016 and the amended notification S.O. 3611(E) Dated 25th July, 2018.

As DSR for sand mineral is a compendium of available mineral resources and forms the basis for application for environmental clearance, preparation of reports and appraisal of projects, this is to inform that following sand leases of Tata Steel Limited owning since 1983 & 2016 and are used for captive sand mining for stowing of underground coal mines (major mineral) are not included in recent draft DSR of Bokaro district:

1. Lagla Mahal Sand Lease
2. Mahal Saharjuri Sand Lease
3. Damodarpur Palkiri Sand Lease

We have applied for grant of Terms of Reference (TOR) for Damodarpur Palkiri Sand Lease and our case was appraised by EAC (non-coal) on 2nd March'23. It was mentioned by EAC that DSR needs to be submitted in MOEFCC and same has been included in point number xvii on page 108 of Minutes of 11th EAC (non-coal mining) meeting held during 2nd March'23 (copy attached).

Hence, we would request to take necessary action to include mentioned sand leases of Tata Steel Limited in final DSR. This is extremely important for us.

15/3/23

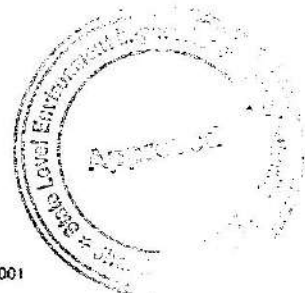
Thanking You,
For Tata Steel Limited.

Raj Ankur
Raj Ankur
Head Planning (Jharia Division)

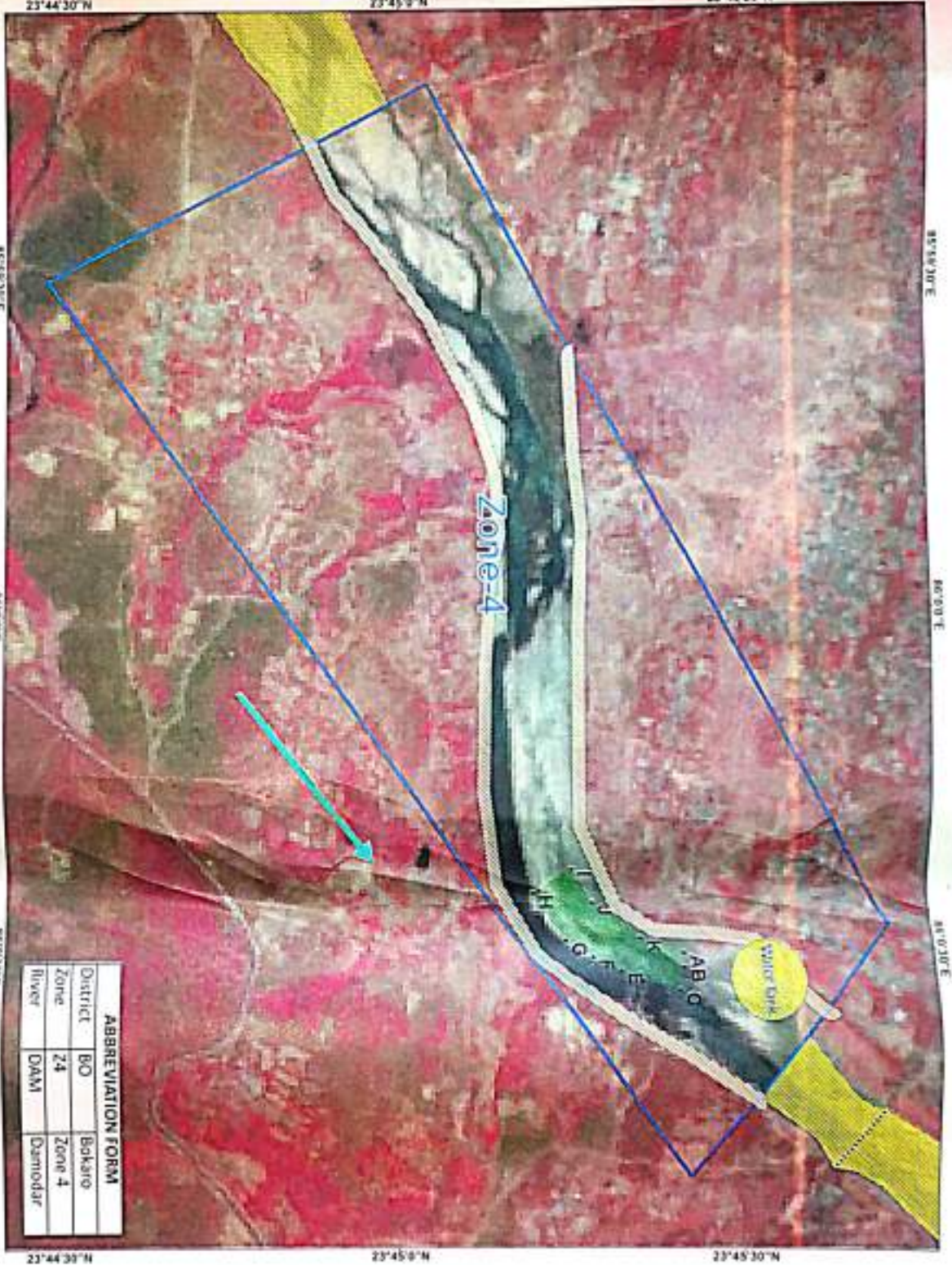
TATA STEEL LIMITED

Jharia Collieries Jamadoba 828 112 Dhanbad India
Tel 91 326 2320263/2320265/2320267 Fax 91 326 2320268
Regd. Office Bombay House 24 Homi Mody Street Fort Mumbai 400 001
Tel 91 22 66658282 Fax 91 22 66651124

Corporate Identity Number U27100MH11907PLC000260 Website www.tatasteel.com



Distribution Map of Sand Bars on Rivers During Post-Monsoon Period of Bokaro District, Jharkhand



Legend

- Natural District Boundary
- Zone
- River Flow Direction
- Bridge
- Sand/Clay Bar
- No Alluvial Zone
- Sand Clay
- Silty Silt
- Sand/Clay Bar

Sand Ghat Code	Area (in Ha)
BO_Z4_DAM_3	4.72

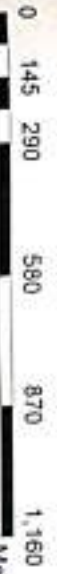
Limiting Coordinates of Zone 4	
Starting Point	86°0'38.349"E 23°45'34.656"N
Ending point	85°59'20.785"E 23°44'48.152"N

ABBREVIATION FORM	
District	BO Bokaro
Zone	Z4 Zone 4
River	DAM Damodar

Geo-Tagged Site Photographs



River - Damodar Nadi
 Sentinel 2 Satellite Imagery
 Date of Capture: November, 2022 (Post-Monsoon)
 Spatial Resolution: 10m



Meters-Minimum
 District Officer
 Bokaro

Distribution Map of Sand Bars on Rivers During Post-Monsoon Period of Bokaro District, Jharkhand



ABBREVIATION FORM			
District	BO	Bokaro	
Zone	Z6	Zone 6	
River	DAM	Damodar	

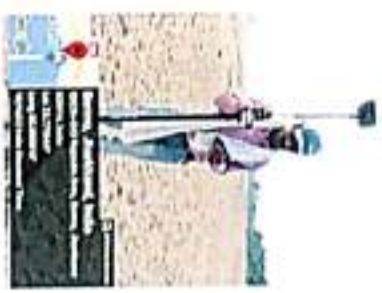
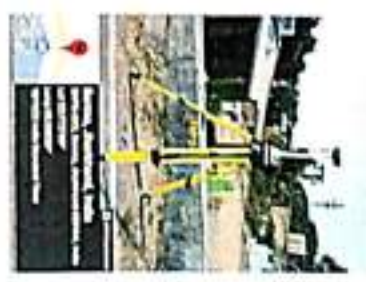
Legend

- Blue Dotted Boundary
- Boundary
- Bridge
- Sand Deposit Zone
- Sand Zone
- Large Dam
- Small Dam

Sand Ghat Code	Area (in Ha)
BO_Z6_DAM_5	14.67

Limiting Coordinates of Zone 6	
Starting Point	85°57'28.908"E 23°46'12.872"N
Ending point	85°56'47.624"E 23°45'57.536"N

Geo-Tagged Site Photograph



River - Damodar Nadi
 Sentinel 2 Satellite Imagery
 Date of Capture: November, 2022 (Post-Monsoon)
 Spatial Resolution: 10m



Metres
 District Surveying Officer
 Patna

Distribution Map of Sand Bars on Rivers During Post-Monsoon Period of Bokaro District, Jharkhand



Legend

- River Channel Boundary
- Canal
- Bridge
- Sand Bar
- Sand Deposition
- No. Along Line
- Canal/Line
- Sand Bar
- River Flow Direction

Sand Ghat Code	Area (in Ha)
BO_Z8_DAM_7	52.4

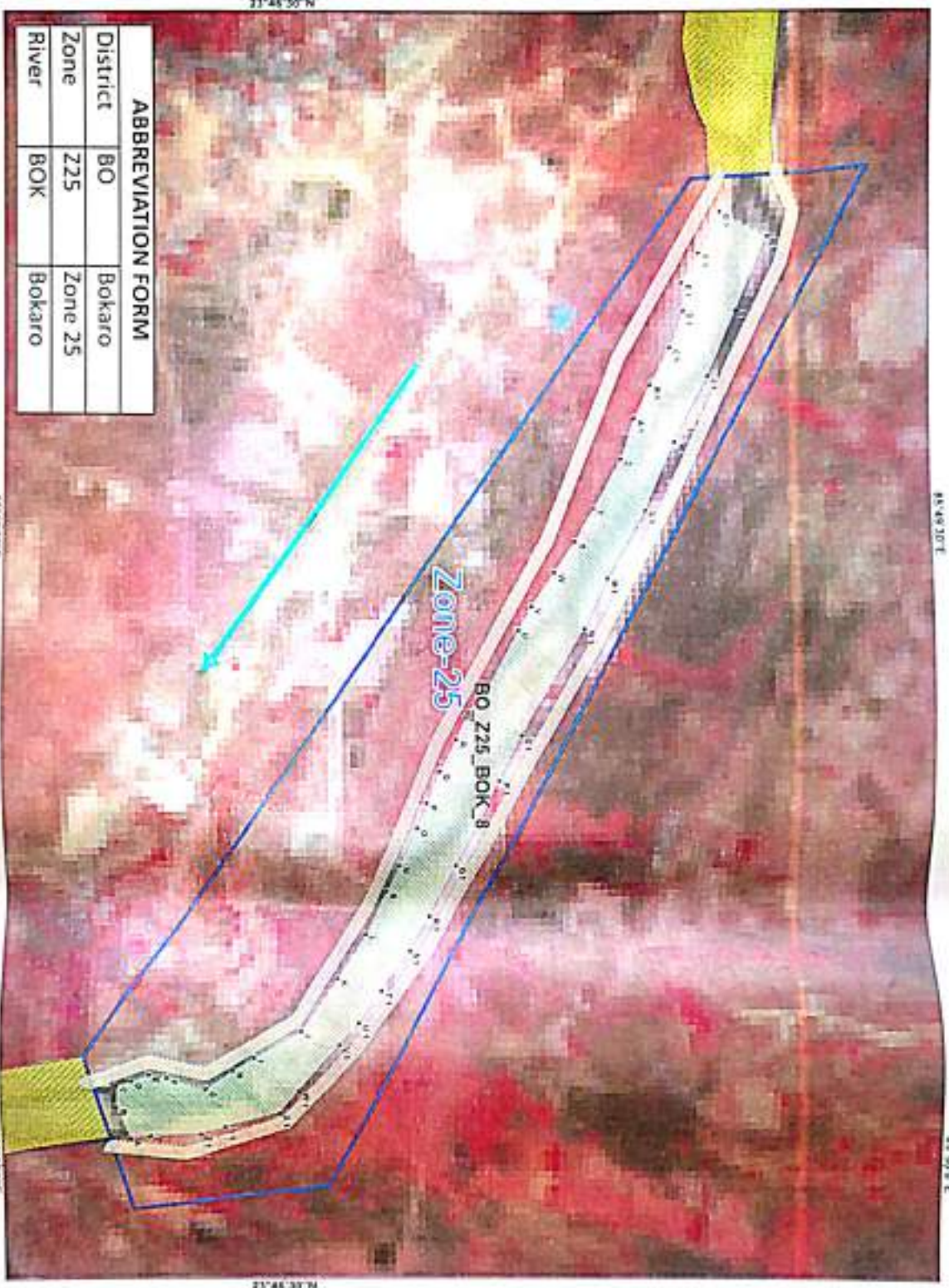
Limiting Coordinates of Zone 8	
Starting Point	85°56'47.596"E 23°45'57.855"N
Ending point	85°57'28.771"E 23°46'13.212"N

ABBREVIATION FORM			
District	BO	Bokaro	
Zone	Z8	Zone 8	
River	DAM	Damodar	

River - Damodar Nadi
 Sentinel 2 Satellite Imagery
 Date of Capture: November, 2022 (Post-Monsoon)
 Spatial Resolution: 10m



Distribution Map of Sand Bars on Rivers During Post-Monsoon Period of Bokaro District, Jharkhand



ABBREVIATION FORM			
District	BO	Bokaro	
Zone	Z25	Zone 25	
River	BOK	Bokaro	

Legend	
	Bar Sand Zone
	Sand Zone
	Water Zone
	River
	Field
	Road
	Open Space

Sand Ghat Code	Area (in Ha)
BO_Z25_BOK_8	10.85

Limiting Coordinates of Zone 25	
Starting Point	85°49'13.716"E 23°46'53.372"N
Ending point	85°49'59.665"E 23°46'22.637"N



River - Bokaro Nadi
 Sentinel 2 Satellite Imagery
 Date of Capture: November, 2022 (Post-Monsoon)
 Spatial Resolution: 10m



Geo-Tagged Site Photograph

Meters District Survey Office, Bokaro, Jharkhand

Distribution Map of Sand Bars on Rivers During Post-Monsoon Period of Bokaro District, Jharkhand



ABBREVIATION FORM

District	BO	Bokaro
Zone	Z26	Zone 26
River	BOK	Bokaro

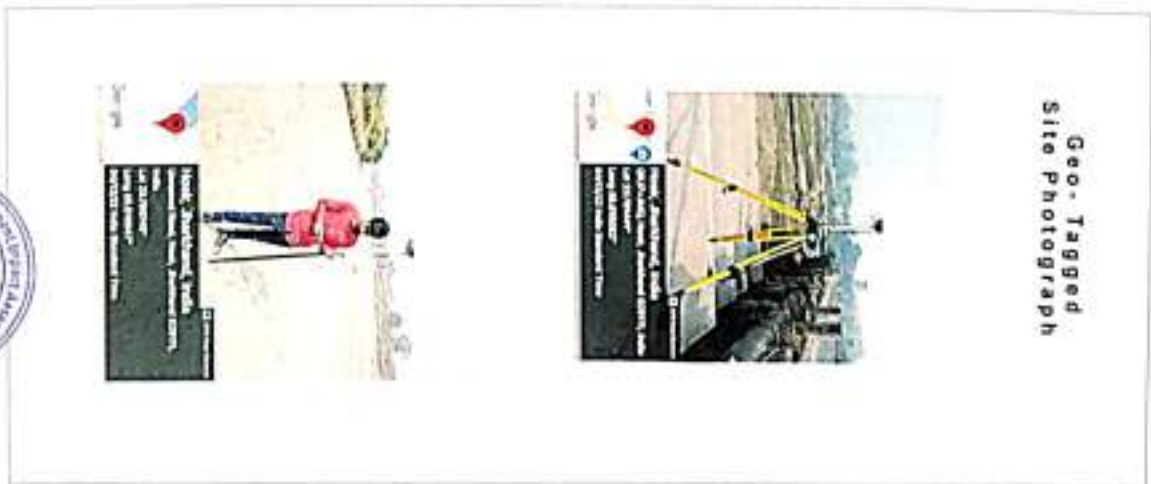
Legend

- Water Course Boundary
- Channel
- Bridge
- Highway Zone
- Sand Bar
- Sand Island
- Water Flow Direction

Sand Ghat Code	Area (in Ha)
BO_Z26_BOK_9	23.11

Limiting Coordinates of Zone 26

Starting Point	85°48'51.555"E 23°47'3.093"N
Ending Point	85°47'16.404"E 23°47'41.368"N



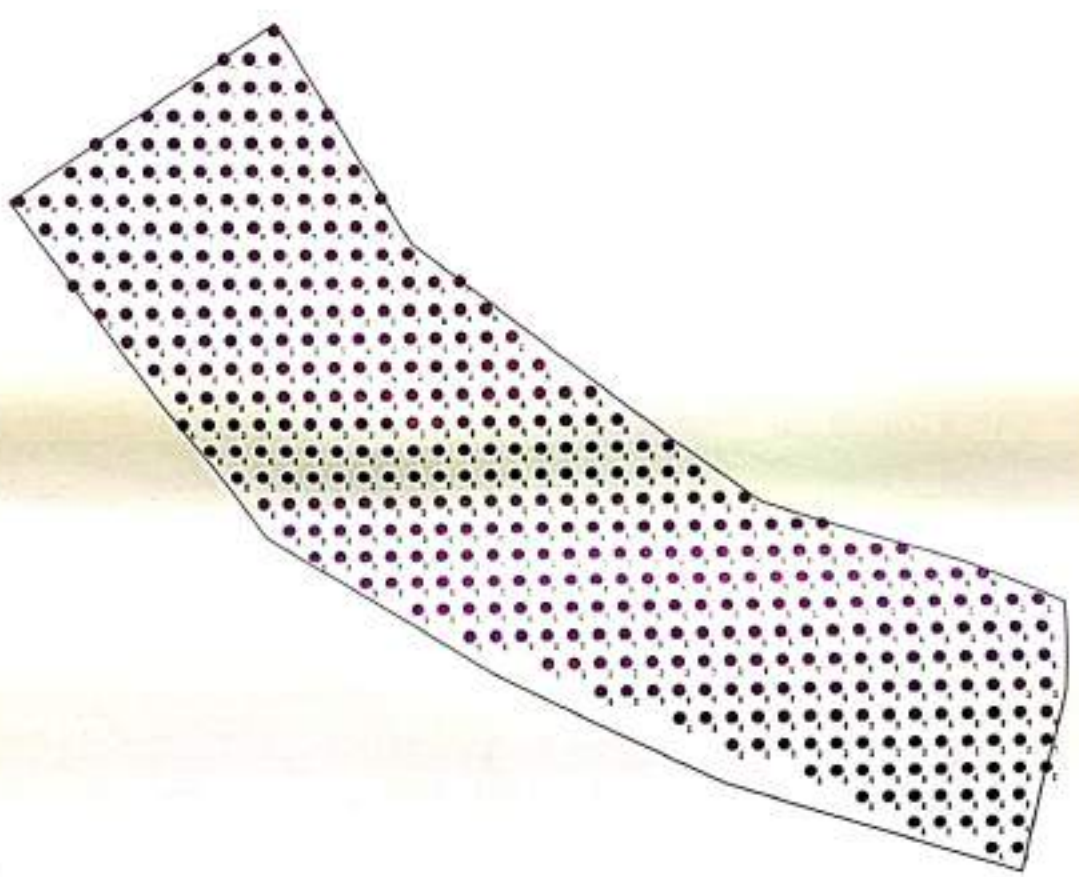
River - Bokaro Nadi
 Sentinel 2 Satellite Imagery
 Date of Capture: November, 2022 (Post-Monsoon)
 Spatial Resolution: 10m

Approved
 District Level Environmental Impact Assessment Agency
 Bokaro



Metric District Mapping Officer
 Bokaro

Map showing 10m x 10m Grid Points Inside Sand Ghat In Damodar River In Bokaro District



Legend

- Grid Points
- Sand Ghat Boundary

Sand Ghat Code	Area (in Ha)
BO_Z4_DAM_3	4.72

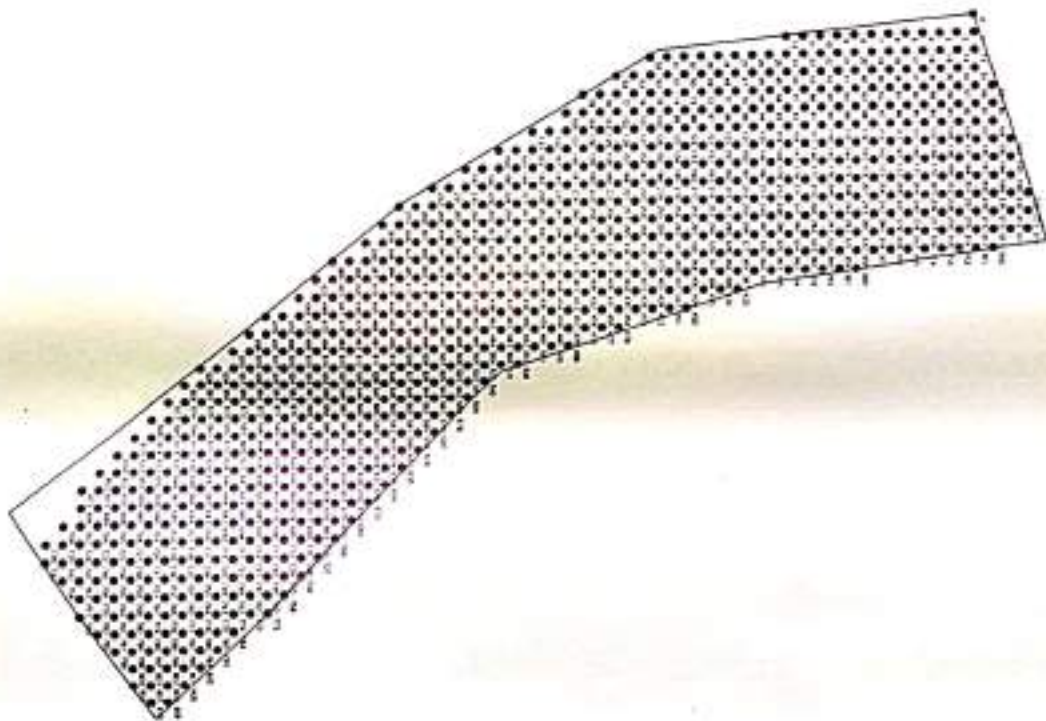
ABBREVIATION FORM			
District	BO	Bokaro	
Zone	Z4	Zone 4	
River	DAM	Damodar	



0 25 50 100 150 200
Meters
Date: _____
Signature: _____

Map showing 10m x 10m Grid Points Inside Sand Ghat In Damodar River In Bokaro District

67°58'0"E



23°45'0"N

23°45'0"N

83°58'0"E

ABBREVIATION FORM			
District	BO	Bokaro	
Zone	Z5	Zone 5	
River	DAM	Damodar	

Legend

● Grid Points

□ Sand Ghat Boundary

Sand Ghat Code

BO_Z5_DAM_4

Area (in Ha)

8.22

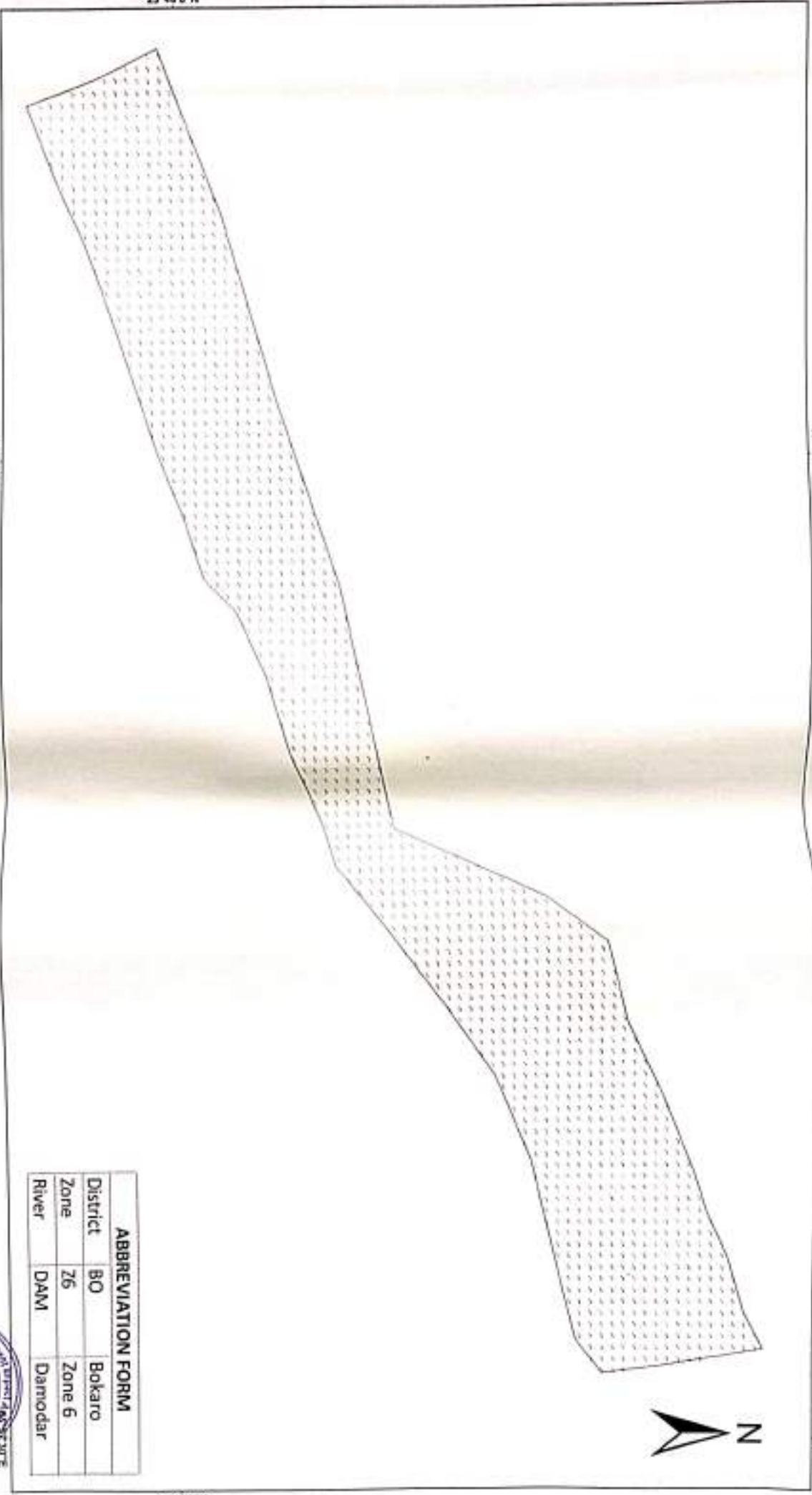


320 Meters

Map showing 10m x 10m Grid Points Inside Sand Ghats In Damodar River In Bokaro District

85°57'0"E

85°57'30"E



23°46'0"N

23°46'0"N

85°57'0"E

85°57'30"E

Legend



Sand Ghat Boundary



Sand Ghat Grid Points

Sand Ghat Code	Area (in Ha)
BO_Z6_DAM_5	14.67

ABBREVIATION FORM			
District	BO	Bokaro	
Zone	Z6	Zone 6	
River	DAM	Damodar	

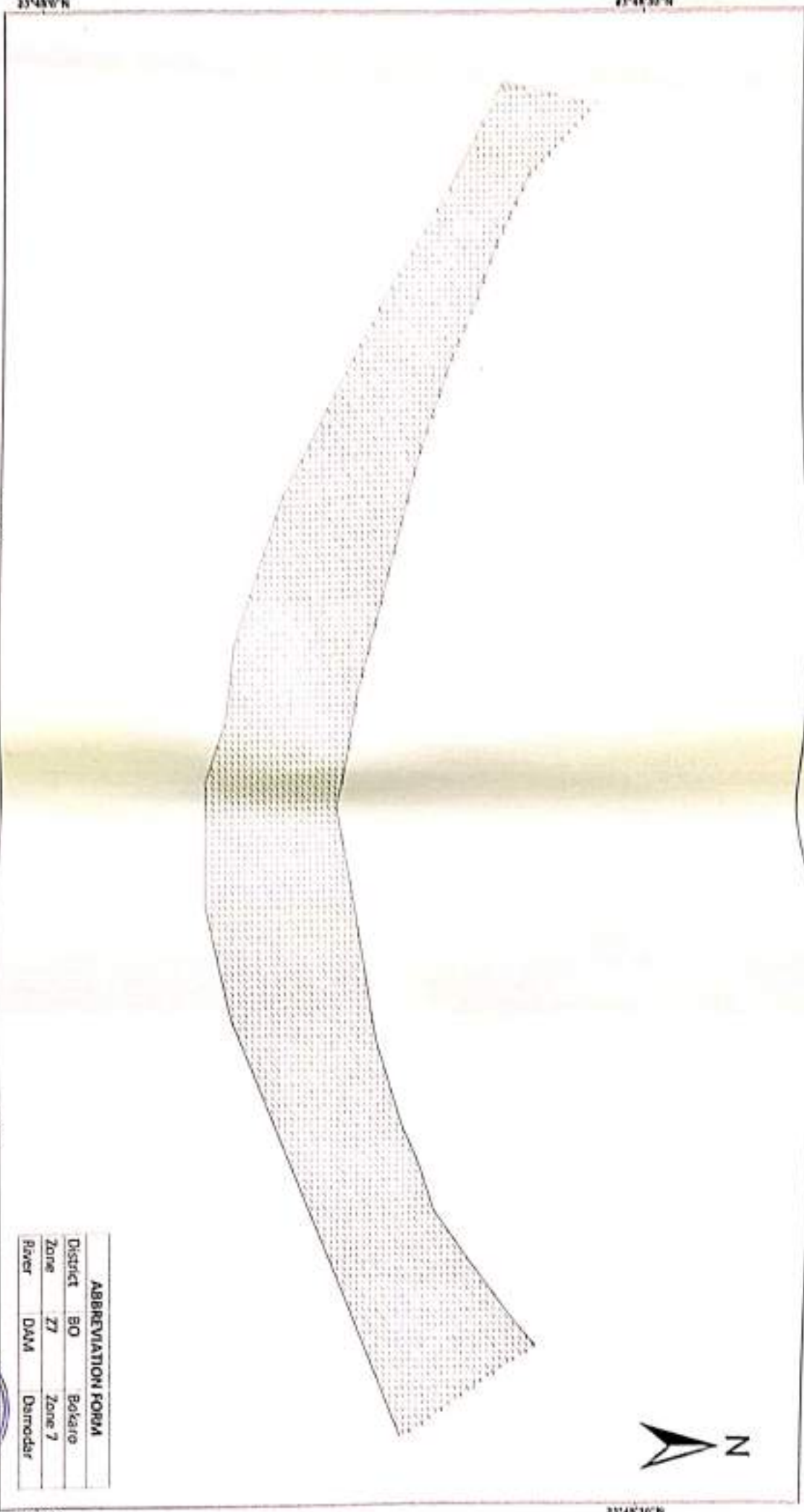


District Engineer
Bokaro

Map showing 10m x 10m Grid Points Inside Sand Ghats In Damodar River In Bokaro District



FIGURE

FIGURE



ABBREVIATION FORM			
District	BO	Bokaro	
Zone	Z7	Zone 7	
River	DAM	Damodar	

Legend

-  Sand Ghat Boundary
-  Sand Ghat Grid Points

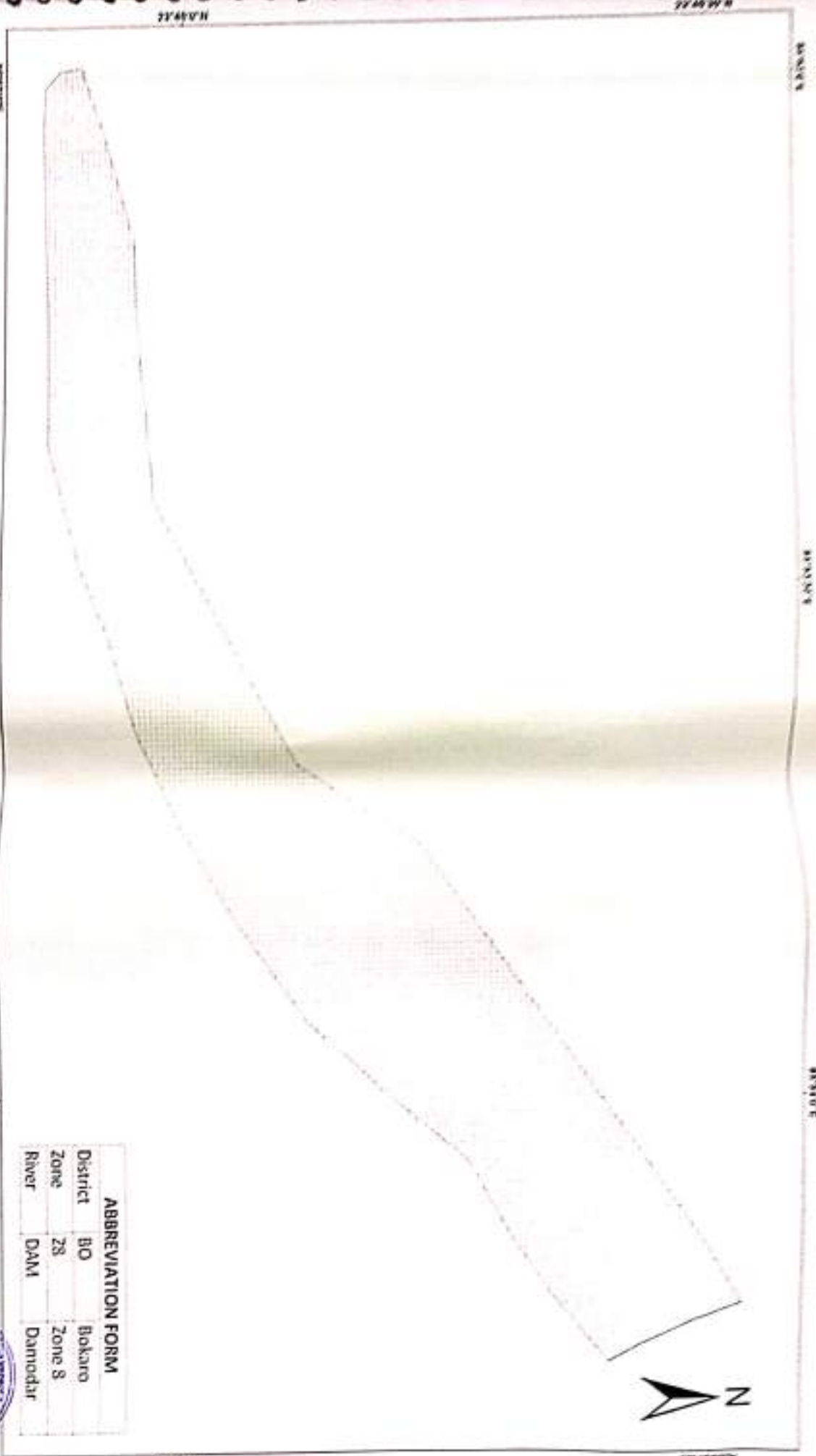
Sand Ghat Code	Area (In Ha)
BO_Z7_DAM_6	26.14



U.S. District Engineer
Bokaro

Signature

Map showing 10m x 10m Grid Points Inside Sand Ghat in Damodar River in Bokaro District



Legend

- Sand Ghat Boundary
- Sand Ghat Grid Points

Sand Ghat Code Area (in Ha)
 BO_ZS_DAM_7 52.4

ABBREVIATION FORM			
District	BO	Bokaro	
Zone	ZS	Zone S	
River	DAM	Damodar	



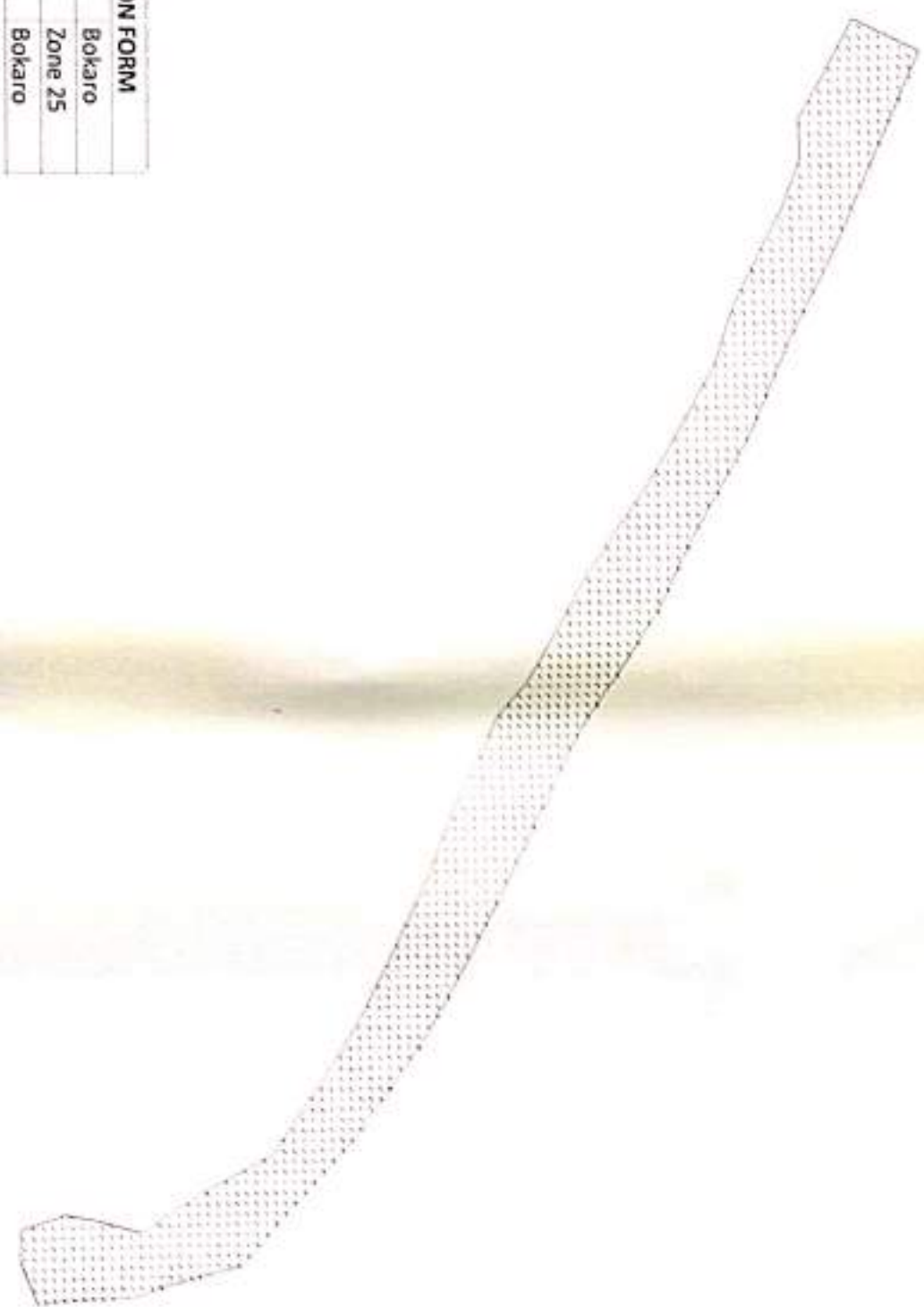
District Survey Officer
 Bokaro

Map showing 10m x 10m Grid Points Inside Sand Ghats In Bokaro River In Bokaro District

85°49'30"E

85°50'00"E

ABBREVIATION FORM			
District	BO	Bokaro	
Zone	Z25	Zone 25	
River	BOK	Bokaro	



N.00.94.12

23°46'30"N

85°49'30"E

85°50'00"E

Legend

- Sand Ghat Boundary
- Sand Ghat Grid Points

Sand Ghat Code Area (in Ha)
 BO_Z25_BOK_8 10.85



District Planning
 Bokaro

Map showing 10m x 10m Grid Points Inside Sand Ghats In Bokaro River In Bokaro District

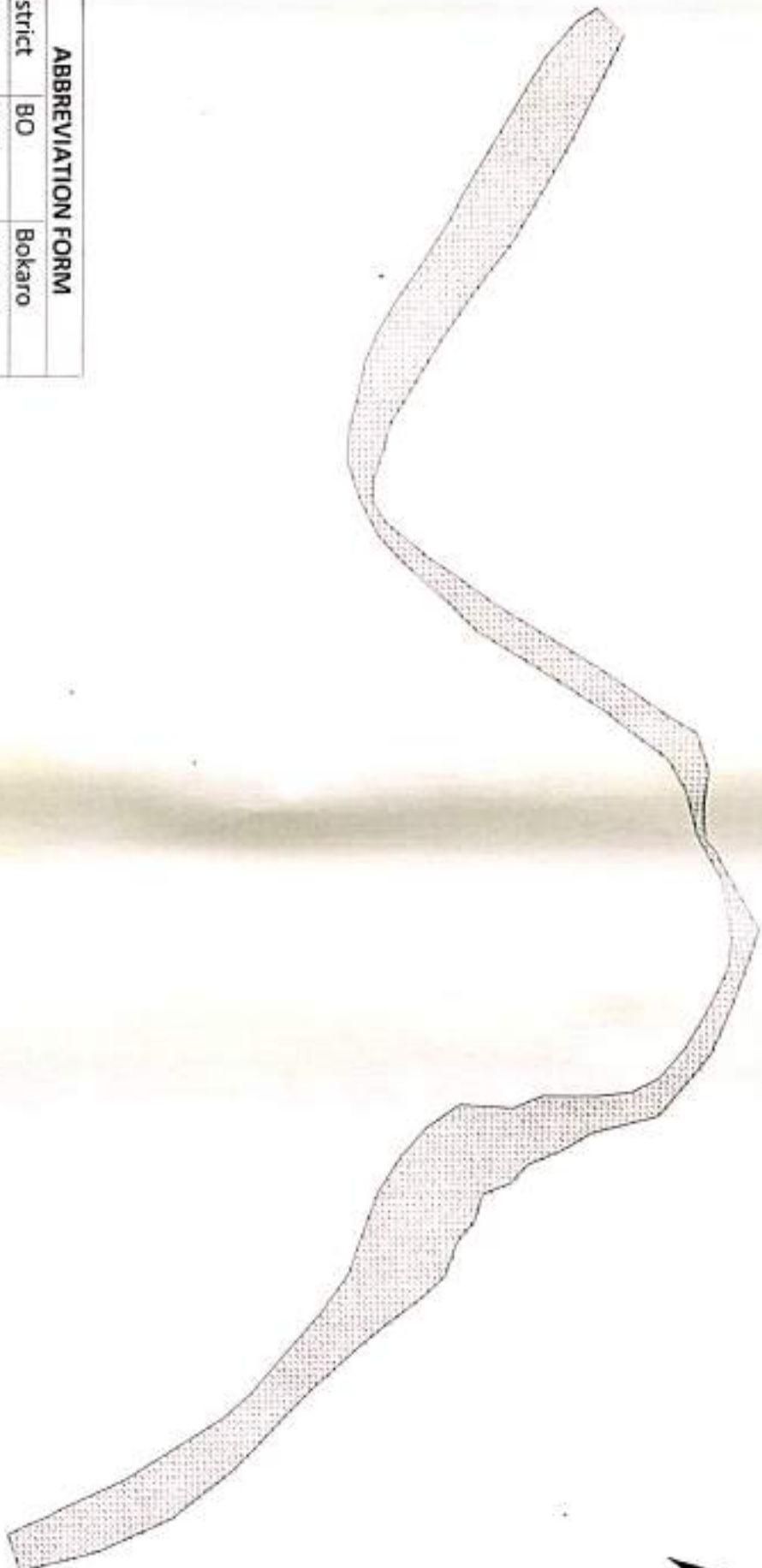
85°47'30"E

85°49'0"E

85°48'30"E

23°47'30"N

23°47'30"N



ABBREVIATION FORM		
District	BO	Bokaro
Zone	Z26	Zone 26
River	BOK	Bokaro

85°47'30"E

85°48'0"E

85°48'30"E

Legend

- Sand Ghat Boundary
- Sand Ghat Grid Points

Sand Ghat Code	Area (in Ha)
BO_Z26_BOK_9	23.11



District Engineer
Bokaro

TABLE REPRESENTING ELEVATION (in m) WITH RESPECT TO 10m X 10m GRID WITHIN POTENTIAL SAND GHATS IN BOKARO DISTRICT OF JHARKHAND STATE

7126	80.26.00AM.2	27.46.59.5177	85.57.18.9477	350.5	7291	80.26.00AM.2	27.46.55.078	85.57.22.701	350.5	7379	80.26.00AM.2	27.46.56.089	85.57.26.822	350.4
7127	80.26.00AM.2	27.46.59.4899	85.57.18.9497	350.5	7292	80.26.00AM.2	27.46.54.970	85.57.22.704	350.5	7320	80.26.00AM.2	27.46.56.010	85.57.26.820	350.4
7128	80.26.00AM.2	27.46.59.3821	85.57.18.9517	350.5	7293	80.26.00AM.2	27.46.54.851	85.57.22.707	350.5	7321	80.26.00AM.2	27.46.55.942	85.57.26.818	350.4
7129	80.26.00AM.2	27.46.59.2743	85.57.18.9537	350.5	7294	80.26.00AM.2	27.46.54.732	85.57.22.710	350.5	7322	80.26.00AM.2	27.46.55.874	85.57.26.816	350.4
7130	80.26.00AM.2	27.46.59.1665	85.57.18.9557	350.5	7295	80.26.00AM.2	27.46.54.613	85.57.22.713	350.5	7323	80.26.00AM.2	27.46.55.806	85.57.26.814	350.4
7131	80.26.00AM.2	27.46.59.0587	85.57.18.9577	350.5	7296	80.26.00AM.2	27.46.54.494	85.57.22.716	350.5	7324	80.26.00AM.2	27.46.55.738	85.57.26.812	350.4
7132	80.26.00AM.2	27.46.58.9509	85.57.18.9597	350.5	7297	80.26.00AM.2	27.46.54.375	85.57.22.719	350.5	7325	80.26.00AM.2	27.46.55.670	85.57.26.810	350.4
7133	80.26.00AM.2	27.46.58.8431	85.57.18.9617	350.5	7298	80.26.00AM.2	27.46.54.256	85.57.22.722	350.5	7326	80.26.00AM.2	27.46.55.602	85.57.26.808	350.4
7134	80.26.00AM.2	27.46.58.7353	85.57.18.9637	350.5	7299	80.26.00AM.2	27.46.54.137	85.57.22.725	350.5	7327	80.26.00AM.2	27.46.55.534	85.57.26.806	350.4
7135	80.26.00AM.2	27.46.58.6275	85.57.18.9657	350.5	7300	80.26.00AM.2	27.46.54.018	85.57.22.728	350.5	7328	80.26.00AM.2	27.46.55.466	85.57.26.804	350.4
7136	80.26.00AM.2	27.46.58.5197	85.57.18.9677	350.5	7301	80.26.00AM.2	27.46.53.899	85.57.22.731	350.5	7329	80.26.00AM.2	27.46.55.398	85.57.26.802	350.4
7137	80.26.00AM.2	27.46.58.4119	85.57.18.9697	350.5	7302	80.26.00AM.2	27.46.53.780	85.57.22.734	350.5	7330	80.26.00AM.2	27.46.55.330	85.57.26.800	350.4
7138	80.26.00AM.2	27.46.58.3041	85.57.18.9717	350.5	7303	80.26.00AM.2	27.46.53.661	85.57.22.737	350.5	7331	80.26.00AM.2	27.46.55.262	85.57.26.798	350.4
7139	80.26.00AM.2	27.46.58.1963	85.57.18.9737	350.5	7304	80.26.00AM.2	27.46.53.542	85.57.22.740	350.5	7332	80.26.00AM.2	27.46.55.194	85.57.26.796	350.4
7140	80.26.00AM.2	27.46.58.0885	85.57.18.9757	350.5	7305	80.26.00AM.2	27.46.53.423	85.57.22.743	350.5	7333	80.26.00AM.2	27.46.55.126	85.57.26.794	350.4
7141	80.26.00AM.2	27.46.57.9807	85.57.18.9777	350.5	7306	80.26.00AM.2	27.46.53.304	85.57.22.746	350.5	7334	80.26.00AM.2	27.46.55.058	85.57.26.792	350.4
7142	80.26.00AM.2	27.46.57.8729	85.57.18.9797	350.5	7307	80.26.00AM.2	27.46.53.185	85.57.22.749	350.5	7335	80.26.00AM.2	27.46.54.990	85.57.26.790	350.4
7143	80.26.00AM.2	27.46.57.7651	85.57.18.9817	350.5	7308	80.26.00AM.2	27.46.53.066	85.57.22.752	350.5	7336	80.26.00AM.2	27.46.54.922	85.57.26.788	350.4
7144	80.26.00AM.2	27.46.57.6573	85.57.18.9837	350.5	7309	80.26.00AM.2	27.46.52.947	85.57.22.755	350.5	7337	80.26.00AM.2	27.46.54.854	85.57.26.786	350.4
7145	80.26.00AM.2	27.46.57.5495	85.57.18.9857	350.5	7310	80.26.00AM.2	27.46.52.828	85.57.22.758	350.5	7338	80.26.00AM.2	27.46.54.786	85.57.26.784	350.4
7146	80.26.00AM.2	27.46.57.4417	85.57.18.9877	350.5	7311	80.26.00AM.2	27.46.52.709	85.57.22.761	350.5	7339	80.26.00AM.2	27.46.54.718	85.57.26.782	350.4
7147	80.26.00AM.2	27.46.57.3339	85.57.18.9897	350.5	7312	80.26.00AM.2	27.46.52.590	85.57.22.764	350.5	7340	80.26.00AM.2	27.46.54.650	85.57.26.780	350.4
7148	80.26.00AM.2	27.46.57.2261	85.57.18.9917	350.5	7313	80.26.00AM.2	27.46.52.471	85.57.22.767	350.5	7341	80.26.00AM.2	27.46.54.582	85.57.26.778	350.4
7149	80.26.00AM.2	27.46.57.1183	85.57.18.9937	350.5	7314	80.26.00AM.2	27.46.52.352	85.57.22.770	350.5	7342	80.26.00AM.2	27.46.54.514	85.57.26.776	350.4
7150	80.26.00AM.2	27.46.57.0105	85.57.18.9957	350.5	7315	80.26.00AM.2	27.46.52.233	85.57.22.773	350.5	7343	80.26.00AM.2	27.46.54.446	85.57.26.774	350.4
7151	80.26.00AM.2	27.46.56.9027	85.57.18.9977	350.5	7316	80.26.00AM.2	27.46.52.114	85.57.22.776	350.5	7344	80.26.00AM.2	27.46.54.378	85.57.26.772	350.4
7152	80.26.00AM.2	27.46.56.7949	85.57.18.9997	350.5	7317	80.26.00AM.2	27.46.51.995	85.57.22.779	350.5	7345	80.26.00AM.2	27.46.54.310	85.57.26.770	350.4
7153	80.26.00AM.2	27.46.56.6871	85.57.19.0017	350.5	7318	80.26.00AM.2	27.46.51.876	85.57.22.782	350.5	7346	80.26.00AM.2	27.46.54.242	85.57.26.768	350.4
7154	80.26.00AM.2	27.46.56.5793	85.57.19.0037	350.5	7319	80.26.00AM.2	27.46.51.757	85.57.22.785	350.5	7347	80.26.00AM.2	27.46.54.174	85.57.26.766	350.4
7155	80.26.00AM.2	27.46.56.4715	85.57.19.0057	350.5	7320	80.26.00AM.2	27.46.51.638	85.57.22.788	350.5	7348	80.26.00AM.2	27.46.54.106	85.57.26.764	350.4
7156	80.26.00AM.2	27.46.56.3637	85.57.19.0077	350.5	7321	80.26.00AM.2	27.46.51.519	85.57.22.791	350.5	7349	80.26.00AM.2	27.46.54.038	85.57.26.762	350.4
7157	80.26.00AM.2	27.46.56.2559	85.57.19.0097	350.5	7322	80.26.00AM.2	27.46.51.400	85.57.22.794	350.5	7350	80.26.00AM.2	27.46.53.970	85.57.26.760	350.4
7158	80.26.00AM.2	27.46.56.1481	85.57.19.0117	350.5	7323	80.26.00AM.2	27.46.51.281	85.57.22.797	350.5	7351	80.26.00AM.2	27.46.53.902	85.57.26.758	350.4
7159	80.26.00AM.2	27.46.56.0403	85.57.19.0137	350.5	7324	80.26.00AM.2	27.46.51.162	85.57.22.800	350.5	7352	80.26.00AM.2	27.46.53.834	85.57.26.756	350.4
7160	80.26.00AM.2	27.46.55.9325	85.57.19.0157	350.5	7325	80.26.00AM.2	27.46.51.043	85.57.22.803	350.5	7353	80.26.00AM.2	27.46.53.766	85.57.26.754	350.4
7161	80.26.00AM.2	27.46.55.8247	85.57.19.0177	350.5	7326	80.26.00AM.2	27.46.50.924	85.57.22.806	350.5	7354	80.26.00AM.2	27.46.53.698	85.57.26.752	350.4
7162	80.26.00AM.2	27.46.55.7169	85.57.19.0197	350.5	7327	80.26.00AM.2	27.46.50.805	85.57.22.809	350.5	7355	80.26.00AM.2	27.46.53.630	85.57.26.750	350.4
7163	80.26.00AM.2	27.46.55.6091	85.57.19.0217	350.5	7328	80.26.00AM.2	27.46.50.686	85.57.22.812	350.5	7356	80.26.00AM.2	27.46.53.562	85.57.26.748	350.4
7164	80.26.00AM.2	27.46.55.5013	85.57.19.0237	350.5	7329	80.26.00AM.2	27.46.50.567	85.57.22.815	350.5	7357	80.26.00AM.2	27.46.53.494	85.57.26.746	350.4
7165	80.26.00AM.2	27.46.55.3935	85.57.19.0257	350.5	7330	80.26.00AM.2	27.46.50.448	85.57.22.818	350.5	7358	80.26.00AM.2	27.46.53.426	85.57.26.744	350.4
7166	80.26.00AM.2	27.46.55.2857	85.57.19.0277	350.5	7331	80.26.00AM.2	27.46.50.329	85.57.22.821	350.5	7359	80.26.00AM.2	27.46.53.358	85.57.26.742	350.4
7167	80.26.00AM.2	27.46.55.1779	85.57.19.0297	350.5	7332	80.26.00AM.2	27.46.50.210	85.57.22.824	350.5	7360	80.26.00AM.2	27.46.53.290	85.57.26.740	350.4
7168	80.26.00AM.2	27.46.55.0701	85.57.19.0317	350.5	7333	80.26.00AM.2	27.46.50.091	85.57.22.827	350.5	7361	80.26.00AM.2	27.46.53.222	85.57.26.738	350.4
7169	80.26.00AM.2	27.46.54.9623	85.57.19.0337	350.5	7334	80.26.00AM.2	27.46.49.972	85.57.22.830	350.5	7362	80.26.00AM.2	27.46.53.154	85.57.26.736	350.4
7170	80.26.00AM.2	27.46.54.8545	85.57.19.0357	350.5	7335	80.26.00AM.2	27.46.49.853	85.57.22.833	350.5	7363	80.26.00AM.2	27.46.53.086	85.57.26.734	350.4
7171	80.26.00AM.2	27.46.54.7467	85.57.19.0377	350.5	7336	80.26.00AM.2	27.46.49.734	85.57.22.836	350.5	7364	80.26.00AM.2	27.46.53.018	85.57.26.732	350.4
7172	80.26.00AM.2	27.46.54.6389	85.57.19.0397	350.5	7337	80.26.00AM.2	27.46.49.615	85.57.22.839	350.5	7365	80.26.00AM.2	27.46.52.950	85.57.26.730	350.4
7173	80.26.00AM.2	27.46.54.5311	85.57.19.0417	350.5	7338	80.26.00AM.2	27.46.49.496	85.57.22.842	350.5	7366	80.26.00AM.2	27.46.52.882	85.57.26.728	350.4
7174	80.26.00AM.2	27.46.54.4233	85.57.19.0437	350.5	7339	80.26.00AM.2	27.46.49.377	85.57.22.845	350.5	7367	80.26.00AM.2	27.46.52.814	85.57.26.726	350.4
7175	80.26.00AM.2	27.46.54.3155	85.57.19.0457	350.5	7340	80.26.00AM.2	27.46.49.258	85.57.22.848	350.5	7368	80.26.00AM.2	27.46.52.746	85.57.26.724	350.4
7176	80.26.00AM.2	27.46.54.2077	85.57.19.0477	350.5	7341	80.26.00AM.2	27.46.49.139	85.57.22.851	350.5	7369	80.26.00AM.2	27.46.52.678	85.57.26.722	350.4
7177	80.26.00AM.2	27.46.54.1000	85.57.19.0497	350.5	7342	80.26.00AM.2	27.46.49.020	85.57.22.854	350.5	7370	80.26.00AM.2	27.46.52.610	85.57.26.720	350.4
7178	80.26.00AM.2	27.46.53.9922	85.57.19.0517	350.5	7343	80.26.00AM.2	27.46.48.901	85.57.22.857	350.5	7371	80.26.00AM.2	27.46.52.542	85.57.26.718	350.4
7179	80.26.00AM.2	27.46.53.8844	85.57.19.0537	350.5	7344	80.26.00AM.2	27.46.48.782	85.57.22.860	350.5	7372	80.26.00AM.2	27.46.52.474	85.57.26.716	350.4
7180	80.26.00AM.2	27.46.53.7766	85.57.19.0557	350.5	7345	80.26.00AM.2	27.46.48.663	85.57.22.863	350.5	7373	80.26.00AM.2	27.46.52.406	85.57.26.714	350.4
7181	80.26.00AM.2	27.46.53.6688	85.57.19.0577	350.5	7346	80.26.00AM.2	27.46.48.544	85.57.22.866	350.5	7374	80.26.00AM.2	27.46.52.338	85.57.26.712	350.4
7182	80.26.00AM.2	27.46.53.5610	85.57.19.0597	350.5	7347	80.26.00AM.2	27.46.48.425	85.57.22.869	350.5	7375	80.26.00AM.2	27.46.52.270	85.57.26.710	350.4
7183	80.26.00AM.2	27.46.53.4532	85.57.19.0617	350.5</										

TABLE REPRESENTING ELEVATION (in m) WITH RESPECT TO 10m X 10m GRID WITHIN POTENTIAL SAND GHATS IN BOKARO DISTRICT OF JHARKHAND STATE

7501	POLY_DAM_7	22 44 54 867 N	85 53 8 207 E	181.8
7502	POLY_DAM_7	22 44 54 200 N	85 53 8 207 E	181.8
7503	POLY_DAM_7	22 44 54 534 N	85 53 8 207 E	181.8
7504	POLY_DAM_7	22 44 54 191 N	85 53 8 207 E	181.8
7505	POLY_DAM_7	22 44 53 894 N	85 53 8 207 E	181.8
7506	POLY_DAM_7	22 44 53 539 N	85 53 8 207 E	181.8
7507	POLY_DAM_7	22 44 53 214 N	85 53 8 207 E	181.8
7508	POLY_DAM_7	22 44 52 859 N	85 53 8 207 E	181.8
7509	POLY_DAM_7	22 44 52 504 N	85 53 8 207 E	181.8
7510	POLY_DAM_7	22 44 52 149 N	85 53 8 207 E	181.8
7511	POLY_DAM_7	22 44 51 794 N	85 53 8 207 E	181.8
7512	POLY_DAM_7	22 44 51 439 N	85 53 8 207 E	181.8
7513	POLY_DAM_7	22 44 51 84 N	85 53 8 207 E	181.8
7514	POLY_DAM_7	22 44 50 489 N	85 53 8 207 E	181.8
7515	POLY_DAM_7	22 44 50 134 N	85 53 8 207 E	181.8
7516	POLY_DAM_7	22 44 49 779 N	85 53 8 207 E	181.8
7517	POLY_DAM_7	22 44 49 424 N	85 53 8 207 E	181.8
7518	POLY_DAM_7	22 44 48 64 N	85 53 8 207 E	181.8
7519	POLY_DAM_7	22 44 47 289 N	85 53 8 207 E	181.8
7520	POLY_DAM_7	22 44 46 934 N	85 53 8 207 E	181.8
7521	POLY_DAM_7	22 44 46 579 N	85 53 8 207 E	181.8
7522	POLY_DAM_7	22 44 45 224 N	85 53 8 207 E	181.8
7523	POLY_DAM_7	22 44 44 869 N	85 53 8 207 E	181.8
7524	POLY_DAM_7	22 44 44 514 N	85 53 8 207 E	181.8
7525	POLY_DAM_7	22 44 43 159 N	85 53 8 207 E	181.8
7526	POLY_DAM_7	22 44 42 804 N	85 53 8 207 E	181.8
7527	POLY_DAM_7	22 44 42 449 N	85 53 8 207 E	181.8
7528	POLY_DAM_7	22 44 41 94 N	85 53 8 207 E	181.8
7529	POLY_DAM_7	22 44 40 589 N	85 53 8 207 E	181.8
7530	POLY_DAM_7	22 44 40 234 N	85 53 8 207 E	181.8
7531	POLY_DAM_7	22 44 38 879 N	85 53 8 207 E	181.8
7532	POLY_DAM_7	22 44 38 524 N	85 53 8 207 E	181.8
7533	POLY_DAM_7	22 44 37 169 N	85 53 8 207 E	181.8
7534	POLY_DAM_7	22 44 36 814 N	85 53 8 207 E	181.8
7535	POLY_DAM_7	22 44 36 459 N	85 53 8 207 E	181.8
7536	POLY_DAM_7	22 44 35 104 N	85 53 8 207 E	181.8
7537	POLY_DAM_7	22 44 34 749 N	85 53 8 207 E	181.8
7538	POLY_DAM_7	22 44 34 394 N	85 53 8 207 E	181.8
7539	POLY_DAM_7	22 44 33 3 N	85 53 8 207 E	181.8
7540	POLY_DAM_7	22 44 32 649 N	85 53 8 207 E	181.8
7541	POLY_DAM_7	22 44 32 294 N	85 53 8 207 E	181.8
7542	POLY_DAM_7	22 44 30 939 N	85 53 8 207 E	181.8
7543	POLY_DAM_7	22 44 30 584 N	85 53 8 207 E	181.8
7544	POLY_DAM_7	22 44 29 229 N	85 53 8 207 E	181.8
7545	POLY_DAM_7	22 44 27 874 N	85 53 8 207 E	181.8
7546	POLY_DAM_7	22 44 27 519 N	85 53 8 207 E	181.8
7547	POLY_DAM_7	22 44 26 164 N	85 53 8 207 E	181.8
7548	POLY_DAM_7	22 44 24 809 N	85 53 8 207 E	181.8
7549	POLY_DAM_7	22 44 24 454 N	85 53 8 207 E	181.8
7550	POLY_DAM_7	22 44 23 94 N	85 53 8 207 E	181.8
7551	POLY_DAM_7	22 44 22 589 N	85 53 8 207 E	181.8
7552	POLY_DAM_7	22 44 22 234 N	85 53 8 207 E	181.8
7553	POLY_DAM_7	22 44 20 879 N	85 53 8 207 E	181.8
7554	POLY_DAM_7	22 44 20 524 N	85 53 8 207 E	181.8
7555	POLY_DAM_7	22 44 19 169 N	85 53 8 207 E	181.8
7556	POLY_DAM_7	22 44 17 814 N	85 53 8 207 E	181.8
7557	POLY_DAM_7	22 44 17 459 N	85 53 8 207 E	181.8
7558	POLY_DAM_7	22 44 16 104 N	85 53 8 207 E	181.8
7559	POLY_DAM_7	22 44 14 749 N	85 53 8 207 E	181.8
7560	POLY_DAM_7	22 44 14 394 N	85 53 8 207 E	181.8
7561	POLY_DAM_7	22 44 13 3 N	85 53 8 207 E	181.8
7562	POLY_DAM_7	22 44 11 649 N	85 53 8 207 E	181.8
7563	POLY_DAM_7	22 44 11 294 N	85 53 8 207 E	181.8
7564	POLY_DAM_7	22 44 9 939 N	85 53 8 207 E	181.8
7565	POLY_DAM_7	22 44 9 584 N	85 53 8 207 E	181.8
7566	POLY_DAM_7	22 44 8 229 N	85 53 8 207 E	181.8
7567	POLY_DAM_7	22 44 6 874 N	85 53 8 207 E	181.8
7568	POLY_DAM_7	22 44 6 519 N	85 53 8 207 E	181.8
7569	POLY_DAM_7	22 44 5 164 N	85 53 8 207 E	181.8
7570	POLY_DAM_7	22 44 3 809 N	85 53 8 207 E	181.8
7571	POLY_DAM_7	22 44 3 454 N	85 53 8 207 E	181.8
7572	POLY_DAM_7	22 44 2 94 N	85 53 8 207 E	181.8
7573	POLY_DAM_7	22 44 1 589 N	85 53 8 207 E	181.8
7574	POLY_DAM_7	22 44 1 234 N	85 53 8 207 E	181.8
7575	POLY_DAM_7	22 43 59 879 N	85 53 8 207 E	181.8
7576	POLY_DAM_7	22 43 59 524 N	85 53 8 207 E	181.8
7577	POLY_DAM_7	22 43 58 169 N	85 53 8 207 E	181.8
7578	POLY_DAM_7	22 43 56 814 N	85 53 8 207 E	181.8
7579	POLY_DAM_7	22 43 56 459 N	85 53 8 207 E	181.8
7580	POLY_DAM_7	22 43 55 104 N	85 53 8 207 E	181.8
7581	POLY_DAM_7	22 43 53 749 N	85 53 8 207 E	181.8
7582	POLY_DAM_7	22 43 53 394 N	85 53 8 207 E	181.8
7583	POLY_DAM_7	22 43 52 3 N	85 53 8 207 E	181.8
7584	POLY_DAM_7	22 43 50 649 N	85 53 8 207 E	181.8
7585	POLY_DAM_7	22 43 50 294 N	85 53 8 207 E	181.8
7586	POLY_DAM_7	22 43 48 939 N	85 53 8 207 E	181.8
7587	POLY_DAM_7	22 43 48 584 N	85 53 8 207 E	181.8
7588	POLY_DAM_7	22 43 47 229 N	85 53 8 207 E	181.8
7589	POLY_DAM_7	22 43 45 874 N	85 53 8 207 E	181.8
7590	POLY_DAM_7	22 43 45 519 N	85 53 8 207 E	181.8
7591	POLY_DAM_7	22 43 44 164 N	85 53 8 207 E	181.8
7592	POLY_DAM_7	22 43 42 809 N	85 53 8 207 E	181.8
7593	POLY_DAM_7	22 43 42 454 N	85 53 8 207 E	181.8
7594	POLY_DAM_7	22 43 41 94 N	85 53 8 207 E	181.8
7595	POLY_DAM_7	22 43 40 589 N	85 53 8 207 E	181.8
7596	POLY_DAM_7	22 43 39 234 N	85 53 8 207 E	181.8
7597	POLY_DAM_7	22 43 37 879 N	85 53 8 207 E	181.8
7598	POLY_DAM_7	22 43 37 524 N	85 53 8 207 E	181.8
7599	POLY_DAM_7	22 43 36 169 N	85 53 8 207 E	181.8
7600	POLY_DAM_7	22 43 34 814 N	85 53 8 207 E	181.8
7601	POLY_DAM_7	22 43 34 459 N	85 53 8 207 E	181.8
7602	POLY_DAM_7	22 43 33 104 N	85 53 8 207 E	181.8
7603	POLY_DAM_7	22 43 31 749 N	85 53 8 207 E	181.8
7604	POLY_DAM_7	22 43 31 394 N	85 53 8 207 E	181.8
7605	POLY_DAM_7	22 43 30 3 N	85 53 8 207 E	181.8
7606	POLY_DAM_7	22 43 28 649 N	85 53 8 207 E	181.8
7607	POLY_DAM_7	22 43 28 294 N	85 53 8 207 E	181.8
7608	POLY_DAM_7	22 43 26 939 N	85 53 8 207 E	181.8
7609	POLY_DAM_7	22 43 26 584 N	85 53 8 207 E	181.8
7610	POLY_DAM_7	22 43 25 229 N	85 53 8 207 E	181.8
7611	POLY_DAM_7	22 43 23 874 N	85 53 8 207 E	181.8
7612	POLY_DAM_7	22 43 23 519 N	85 53 8 207 E	181.8
7613	POLY_DAM_7	22 43 22 164 N	85 53 8 207 E	181.8
7614	POLY_DAM_7	22 43 20 809 N	85 53 8 207 E	181.8
7615	POLY_DAM_7	22 43 20 454 N	85 53 8 207 E	181.8
7616	POLY_DAM_7	22 43 19 94 N	85 53 8 207 E	181.8
7617	POLY_DAM_7	22 43 17 589 N	85 53 8 207 E	181.8
7618	POLY_DAM_7	22 43 17 234 N	85 53 8 207 E	181.8
7619	POLY_DAM_7	22 43 15 879 N	85 53 8 207 E	181.8
7620	POLY_DAM_7	22 43 15 524 N	85 53 8 207 E	181.8
7621	POLY_DAM_7	22 43 14 169 N	85 53 8 207 E	181.8
7622	POLY_DAM_7	22 43 12 814 N	85 53 8 207 E	181.8
7623	POLY_DAM_7	22 43 12 459 N	85 53 8 207 E	181.8
7624	POLY_DAM_7	22 43 11 104 N	85 53 8 207 E	181.8
7625	POLY_DAM_7	22 43 9 749 N	85 53 8 207 E	181.8
7626	POLY_DAM_7	22 43 9 394 N	85 53 8 207 E	181.8
7627	POLY_DAM_7	22 43 8 3 N	85 53 8 207 E	181.8
7628	POLY_DAM_7	22 43 6 649 N	85 53 8 207 E	181.8
7629	POLY_DAM_7	22 43 6 294 N	85 53 8 207 E	181.8
7630	POLY_DAM_7	22 43 4 939 N	85 53 8 207 E	181.8
7631	POLY_DAM_7	22 43 4 584 N	85 53 8 207 E	181.8
7632	POLY_DAM_7	22 43 3 229 N	85 53 8 207 E	181.8
7633	POLY_DAM_7	22 43 1 874 N	85 53 8 207 E	181.8
7634	POLY_DAM_7	22 43 1 519 N	85 53 8 207 E	181.8
7635	POLY_DAM_7	22 42 59 164 N	85 53 8 207 E	181.8
7636	POLY_DAM_7	22 42 58 809 N	85 53 8 207 E	181.8
7637	POLY_DAM_7	22 42 58 454 N	85 53 8 207 E	181.8
7638	POLY_DAM_7	22 42 57 94 N	85 53 8 207 E	181.8
7639	POLY_DAM_7	22 42 55 589 N	85 53 8 207 E	181.8
7640	POLY_DAM_7	22 42 55 234 N	85 53 8 207 E	181.8
7641	POLY_DAM_7	22 42 53 879 N	85 53 8 207 E	181.8
7642	POLY_DAM_7	22 42 53 524 N	85 53 8 207 E	181.8
7643	POLY_DAM_7	22 42 52 169 N	85 53 8 207 E	181.8
7644	POLY_DAM_7	22 42 50 814 N	85 53 8 207 E	181.8
7645	POLY_DAM_7	22 42 50 459 N	85 53 8 207 E	181.8
7646	POLY_DAM_7	22 42 49 104 N	85 53 8 207 E	181.8
7647	POLY_DAM_7	22 42 47 749 N	85 53 8 207 E	181.8
7648	POLY_DAM_7	22 42 47 394 N	85 53 8 207 E	181.8
7649	POLY_DAM_7	22 42 46 3 N	85 53 8 207 E	181.8
7650	POLY_DAM_7	22 42 44 649 N	85 53 8 207 E	181.8
7651	POLY_DAM_7	22 42 44 294 N	85 53 8 207 E	181.8
7652	POLY_DAM_7	22 42 42 939 N	85 53 8 207 E	181.8
7653	POLY_DAM_7	22 42 42 584 N	85 53 8 207 E	181.8
7654	POLY_DAM_7	22 42 41 229 N	85 53 8 207 E	181.8
7655	POLY_DAM_7	22 42 39 874 N	85 53 8 207 E	181.8
7656	POLY_DAM_7	22 42 39 519 N	85 53 8 207 E	181.8
7657	POLY_DAM_7	22 42 38 164 N	85 53 8 207 E	181.8
7658	POLY_DAM_7	22 42 36 809 N	85 53 8 207 E	181.8
7659	POLY_DAM_7	22 42 36 454 N	85 53 8 207 E	181.8
7660	POLY_DAM_7	22 42 35 94 N	85 53 8 207 E	181.8
7661	POLY_DAM_7	22 42 33 589 N	85 53 8 207 E	181.8
7662	POLY_DAM_7	22 42 33 234 N	85 53 8 207 E	181.8
7663	POLY_DAM_7	22 42 31 879 N	85 53 8 207 E	181.8
7664	POLY_DAM_7	22 42 31 524 N	85 53 8 207 E	181.8
7665	POLY_DAM_7	22 42 30 169 N	85 53 8 207 E	181.8
7666	POLY_DAM_7	22 42 28 814 N	85 53 8 207 E	181.8
7667	POLY_DAM_7	22 42 28 459 N	85 53 8 207 E	181.8
7668	POLY_DAM_7	22 42 27 104 N	85 53 8 207 E	181.8
7669	POLY_DAM_7	22 42 25 749 N	85 53 8 207 E	181.8
7670	POLY_DAM_7	22 42 25 394 N	85 53 8 207 E	181.8
7671	POLY_DAM_7	22 42 24 3 N	85 53 8 207 E	181.8
7672	POLY_DAM_7	22 42 22 649 N	85 53 8 207 E	181.8
7673	POLY_DAM_7	22 42 22 294 N	85 53 8 207 E	181.8
7674	POLY_DAM_7	22 42 20 939 N	85 53 8 207 E	181.8
7675	POLY_DAM_7	22 42 20 584 N	85 53 8 207 E	181.8
7676	POLY_DAM_7	22 42 19 229 N	85 53 8 207 E	

TABLE REPRESENTING ELEVATION (in m) WITH RESPECT TO 10m X 10m GRID WITHIN POTENTIAL SAND GIATS IN BOKARO DISTRICT OF JHARKHAND STATE

Sl. No.	Location	Elevation (m)	Sl. No.	Location	Elevation (m)	Sl. No.	Location	Elevation (m)	Sl. No.	Location	Elevation (m)			
3070	...	22.45.4344 N	85.53.28.053 E	203.0	3091	...	22.45.43.558 N	85.53.45.055 E	151.0	3070	...	22.45.5547 N	85.53.42.052 E	150.0
3071	...	22.45.4349 N	85.53.28.058 E	203.0	3092	...	22.45.5603 N	85.53.45.060 E	151.0	3071	...	22.45.5552 N	85.53.42.057 E	150.0
3072	...	22.45.4354 N	85.53.28.063 E	203.0	3093	...	22.45.5659 N	85.53.45.065 E	151.0	3072	...	22.45.5557 N	85.53.42.062 E	150.0
3073	...	22.45.4359 N	85.53.28.068 E	203.0	3094	...	22.45.5715 N	85.53.45.070 E	151.0	3073	...	22.45.5562 N	85.53.42.067 E	150.0
3074	...	22.45.4364 N	85.53.28.073 E	203.0	3095	...	22.45.5771 N	85.53.45.075 E	151.0	3074	...	22.45.5567 N	85.53.42.072 E	150.0
3075	...	22.45.4369 N	85.53.28.078 E	203.0	3096	...	22.45.5827 N	85.53.45.080 E	151.0	3075	...	22.45.5572 N	85.53.42.077 E	150.0
3076	...	22.45.4374 N	85.53.28.083 E	203.0	3097	...	22.45.5883 N	85.53.45.085 E	151.0	3076	...	22.45.5577 N	85.53.42.082 E	150.0
3077	...	22.45.4379 N	85.53.28.088 E	203.0	3098	...	22.45.5939 N	85.53.45.090 E	151.0	3077	...	22.45.5582 N	85.53.42.087 E	150.0
3078	...	22.45.4384 N	85.53.28.093 E	203.0	3099	...	22.45.5995 N	85.53.45.095 E	151.0	3078	...	22.45.5587 N	85.53.42.092 E	150.0
3079	...	22.45.4389 N	85.53.28.098 E	203.0	3100	...	22.46.0051 N	85.53.45.100 E	151.0	3079	...	22.45.5592 N	85.53.42.097 E	150.0
3080	...	22.45.4394 N	85.53.28.103 E	203.0	3101	...	22.46.0107 N	85.53.45.105 E	151.0	3080	...	22.45.5597 N	85.53.42.102 E	150.0
3081	...	22.45.4399 N	85.53.28.108 E	203.0	3102	...	22.46.0163 N	85.53.45.110 E	151.0	3081	...	22.45.5602 N	85.53.42.107 E	150.0
3082	...	22.45.4404 N	85.53.28.113 E	203.0	3103	...	22.46.0219 N	85.53.45.115 E	151.0	3082	...	22.45.5607 N	85.53.42.112 E	150.0
3083	...	22.45.4409 N	85.53.28.118 E	203.0	3104	...	22.46.0275 N	85.53.45.120 E	151.0	3083	...	22.45.5612 N	85.53.42.117 E	150.0
3084	...	22.45.4414 N	85.53.28.123 E	203.0	3105	...	22.46.0331 N	85.53.45.125 E	151.0	3084	...	22.45.5617 N	85.53.42.122 E	150.0
3085	...	22.45.4419 N	85.53.28.128 E	203.0	3106	...	22.46.0387 N	85.53.45.130 E	151.0	3085	...	22.45.5622 N	85.53.42.127 E	150.0
3086	...	22.45.4424 N	85.53.28.133 E	203.0	3107	...	22.46.0443 N	85.53.45.135 E	151.0	3086	...	22.45.5627 N	85.53.42.132 E	150.0
3087	...	22.45.4429 N	85.53.28.138 E	203.0	3108	...	22.46.0499 N	85.53.45.140 E	151.0	3087	...	22.45.5632 N	85.53.42.137 E	150.0
3088	...	22.45.4434 N	85.53.28.143 E	203.0	3109	...	22.46.0555 N	85.53.45.145 E	151.0	3088	...	22.45.5637 N	85.53.42.142 E	150.0
3089	...	22.45.4439 N	85.53.28.148 E	203.0	3110	...	22.46.0611 N	85.53.45.150 E	151.0	3089	...	22.45.5642 N	85.53.42.147 E	150.0
3090	...	22.45.4444 N	85.53.28.153 E	203.0	3111	...	22.46.0667 N	85.53.45.155 E	151.0	3090	...	22.45.5647 N	85.53.42.152 E	150.0
3091	...	22.45.4449 N	85.53.28.158 E	203.0	3112	...	22.46.0723 N	85.53.45.160 E	151.0	3091	...	22.45.5652 N	85.53.42.157 E	150.0
3092	...	22.45.4454 N	85.53.28.163 E	203.0	3113	...	22.46.0779 N	85.53.45.165 E	151.0	3092	...	22.45.5657 N	85.53.42.162 E	150.0
3093	...	22.45.4459 N	85.53.28.168 E	203.0	3114	...	22.46.0835 N	85.53.45.170 E	151.0	3093	...	22.45.5662 N	85.53.42.167 E	150.0
3094	...	22.45.4464 N	85.53.28.173 E	203.0	3115	...	22.46.0891 N	85.53.45.175 E	151.0	3094	...	22.45.5667 N	85.53.42.172 E	150.0
3095	...	22.45.4469 N	85.53.28.178 E	203.0	3116	...	22.46.0947 N	85.53.45.180 E	151.0	3095	...	22.45.5672 N	85.53.42.177 E	150.0
3096	...	22.45.4474 N	85.53.28.183 E	203.0	3117	...	22.46.1003 N	85.53.45.185 E	151.0	3096	...	22.45.5677 N	85.53.42.182 E	150.0
3097	...	22.45.4479 N	85.53.28.188 E	203.0	3118	...	22.46.1059 N	85.53.45.190 E	151.0	3097	...	22.45.5682 N	85.53.42.187 E	150.0
3098	...	22.45.4484 N	85.53.28.193 E	203.0	3119	...	22.46.1115 N	85.53.45.195 E	151.0	3098	...	22.45.5687 N	85.53.42.192 E	150.0
3099	...	22.45.4489 N	85.53.28.198 E	203.0	3120	...	22.46.1171 N	85.53.45.200 E	151.0	3099	...	22.45.5692 N	85.53.42.197 E	150.0
3100	...	22.45.4494 N	85.53.28.203 E	203.0	3121	...	22.46.1227 N	85.53.45.205 E	151.0	3100	...	22.45.5697 N	85.53.42.202 E	150.0
3101	...	22.45.4499 N	85.53.28.208 E	203.0	3122	...	22.46.1283 N	85.53.45.210 E	151.0	3101	...	22.45.5702 N	85.53.42.207 E	150.0
3102	...	22.45.4504 N	85.53.28.213 E	203.0	3123	...	22.46.1339 N	85.53.45.215 E	151.0	3102	...	22.45.5707 N	85.53.42.212 E	150.0
3103	...	22.45.4509 N	85.53.28.218 E	203.0	3124	...	22.46.1395 N	85.53.45.220 E	151.0	3103	...	22.45.5712 N	85.53.42.217 E	150.0
3104	...	22.45.4514 N	85.53.28.223 E	203.0	3125	...	22.46.1451 N	85.53.45.225 E	151.0	3104	...	22.45.5717 N	85.53.42.222 E	150.0
3105	...	22.45.4519 N	85.53.28.228 E	203.0	3126	...	22.46.1507 N	85.53.45.230 E	151.0	3105	...	22.45.5722 N	85.53.42.227 E	150.0
3106	...	22.45.4524 N	85.53.28.233 E	203.0	3127	...	22.46.1563 N	85.53.45.235 E	151.0	3106	...	22.45.5727 N	85.53.42.232 E	150.0
3107	...	22.45.4529 N	85.53.28.238 E	203.0	3128	...	22.46.1619 N	85.53.45.240 E	151.0	3107	...	22.45.5732 N	85.53.42.237 E	150.0
3108	...	22.45.4534 N	85.53.28.243 E	203.0	3129	...	22.46.1675 N	85.53.45.245 E	151.0	3108	...	22.45.5737 N	85.53.42.242 E	150.0
3109	...	22.45.4539 N	85.53.28.248 E	203.0	3130	...	22.46.1731 N	85.53.45.250 E	151.0	3109	...	22.45.5742 N	85.53.42.247 E	150.0
3110	...	22.45.4544 N	85.53.28.253 E	203.0	3131	...	22.46.1787 N	85.53.45.255 E	151.0	3110	...	22.45.5747 N	85.53.42.252 E	150.0
3111	...	22.45.4549 N	85.53.28.258 E	203.0	3132	...	22.46.1843 N	85.53.45.260 E	151.0	3111	...	22.45.5752 N	85.53.42.257 E	150.0
3112	...	22.45.4554 N	85.53.28.263 E	203.0	3133	...	22.46.1899 N	85.53.45.265 E	151.0	3112	...	22.45.5757 N	85.53.42.262 E	150.0
3113	...	22.45.4559 N	85.53.28.268 E	203.0	3134	...	22.46.1955 N	85.53.45.270 E	151.0	3113	...	22.45.5762 N	85.53.42.267 E	150.0
3114	...	22.45.4564 N	85.53.28.273 E	203.0	3135	...	22.46.2011 N	85.53.45.275 E	151.0	3114	...	22.45.5767 N	85.53.42.272 E	150.0
3115	...	22.45.4569 N	85.53.28.278 E	203.0	3136	...	22.46.2067 N	85.53.45.280 E	151.0	3115	...	22.45.5772 N	85.53.42.277 E	150.0
3116	...	22.45.4574 N	85.53.28.283 E	203.0	3137	...	22.46.2123 N	85.53.45.285 E	151.0	3116	...	22.45.5777 N	85.53.42.282 E	150.0
3117	...	22.45.4579 N	85.53.28.288 E	203.0	3138	...	22.46.2179 N	85.53.45.290 E	151.0	3117	...	22.45.5782 N	85.53.42.287 E	150.0
3118	...	22.45.4584 N	85.53.28.293 E	203.0	3139	...	22.46.2235 N	85.53.45.295 E	151.0	3118	...	22.45.5787 N	85.53.42.292 E	150.0
3119	...	22.45.4589 N	85.53.28.298 E	203.0	3140	...	22.46.2291 N	85.53.45.300 E	151.0	3119	...	22.45.5792 N	85.53.42.297 E	150.0
3120	...	22.45.4594 N	85.53.28.303 E	203.0	3141	...	22.46.2347 N	85.53.45.305 E	151.0	3120	...	22.45.5797 N	85.53.42.302 E	150.0
3121	...	22.45.4599 N	85.53.28.308 E	203.0	3142	...	22.46.2403 N	85.53.45.310 E	151.0	3121	...	22.45.5802 N	85.53.42.307 E	150.0
3122	...	22.45.4604 N	85.53.28.313 E	203.0	3143	...	22.46.2459 N	85.53.45.315 E	151.0	3122	...	22.45.5807 N	85.53.42.312 E	150.0
3123	...	22.45.4609 N	85.53.28.318 E	203.0	3144	...	22.46.2515 N	85.53.45.320 E	151.0	3123	...	22.45.5812 N	85.53.42.317 E	150.0
3124	...	22.45.4614 N	85.53.28.323 E	203.0	3145	...	22.46.2571 N	85.53.45.325 E	151.0	3124	...	22.45.5817 N	85.53.42.322 E	150.0
3125	...	22.45.4619 N	85.53.28.328 E	203.0	3146	...	22.46.2627 N	85.53.45.330 E	151.0	3125	...	22.45.5822 N	85.53.42.327 E	150.0
3126	...	22.45.4624 N	85.53.28.333 E	203.0	3147	...	22.46.2683 N	85.53.45.335 E	151.0	3126	...	22.45.5827 N	85.53.42.332 E	150.0
3127	...	22.45.4629 N	85.53.28.338 E	203.0	3148	...	22.46.2739 N	85.53.45.340 E	151.0	3127	...	22.45.5832 N	85.53.42.337 E	150.0
3128	...	22.45.4634 N	85.53.28.343 E	203.0	3149	...	22.46.2795 N	85.53.45.345 E	151.0	3128	...	22.45.5837 N	85.53.42.342 E	150.0
3129	...	22.45.4639 N	85.53.28.348 E	203.0	3150	...	22.46.2851 N	85.53.45.350 E	151.0	3129	...	22.45.5842 N	85.53.42.347 E	150.0
3130	...	22.45.4644 N	85.53.28.353 E	203.0	3151	...	22.46.2907 N	85.53.45.355 E	151.0	3130	...	22.45.5847 N	85.53.42.352 E	150.0
3131	...	22.45.4649 N	85.53.28.358 E	203.0	3152	...	22.46.2963 N	85.53.45.360 E	151.0	3131	...	22.45.5852 N	85.53.42.357 E	150.0

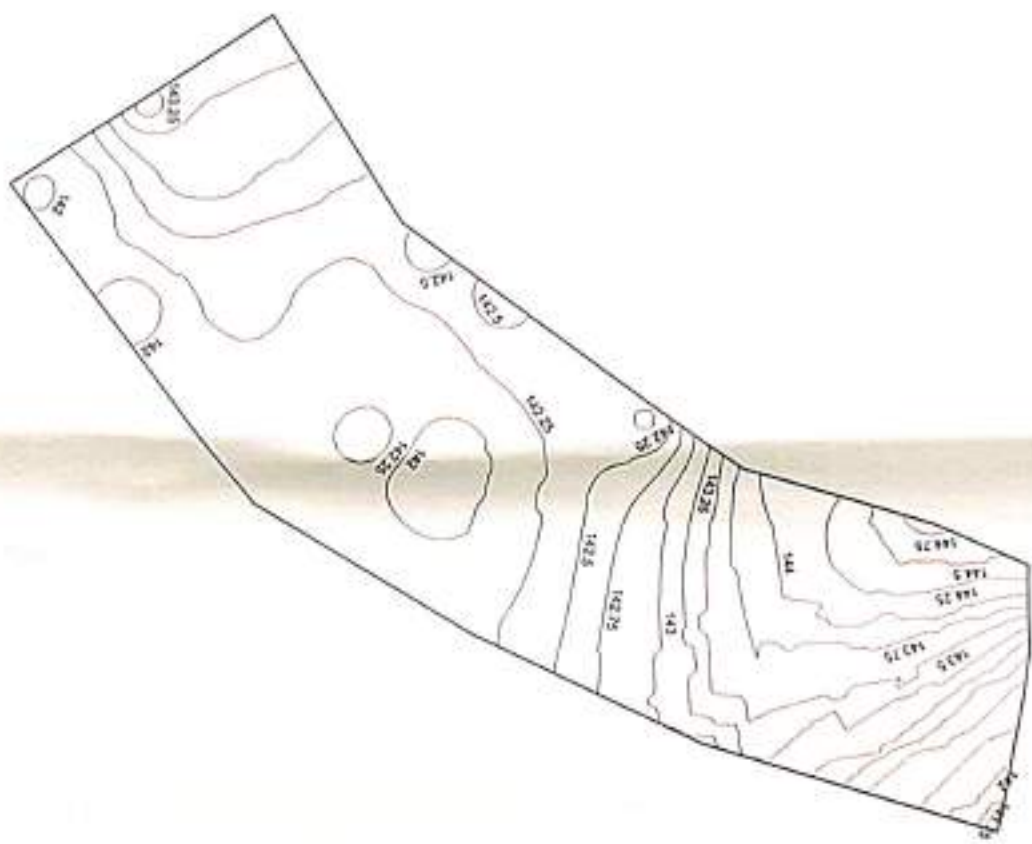
TABLE REPRESENTING ELEVATION (in m) WITH RESPECT TO 10m X 10m GRID WITHIN POTENTIAL SAND GHATS IN BOKARO DISTRICT OF JHARKHAND STATE

NO.	NO. OF DAM	EASTING	NORTHING	ELEVATION (m)	NO.	NO. OF DAM	EASTING	NORTHING	ELEVATION (m)	NO.	NO. OF DAM	EASTING	NORTHING	ELEVATION (m)
1162	80_29_DAM	27 45 22 577 N	85 54 2 000 E	91.9	1171	80_29_DAM	27 45 17 058 N	85 54 1 037 E	91.8	1181	80_29_DAM	27 45 21 294 N	85 54 2 485 E	91.8
1163	80_29_DAM	27 45 22 582 N	85 54 2 000 E	91.9	1172	80_29_DAM	27 45 17 072 N	85 54 1 037 E	91.8	1182	80_29_DAM	27 45 21 309 N	85 54 2 485 E	91.8
1164	80_29_DAM	27 45 21 527 N	85 54 2 000 E	91.9	1173	80_29_DAM	27 45 17 077 N	85 54 1 038 E	91.8	1183	80_29_DAM	27 45 21 324 N	85 54 2 485 E	91.8
1165	80_29_DAM	27 45 21 532 N	85 54 2 000 E	91.9	1174	80_29_DAM	27 45 17 082 N	85 54 1 038 E	91.8	1184	80_29_DAM	27 45 21 339 N	85 54 2 485 E	91.8
1166	80_29_DAM	27 45 21 537 N	85 54 2 000 E	91.9	1175	80_29_DAM	27 45 17 087 N	85 54 1 038 E	91.8	1185	80_29_DAM	27 45 21 354 N	85 54 2 485 E	91.8
1167	80_29_DAM	27 45 21 542 N	85 54 2 000 E	91.9	1176	80_29_DAM	27 45 17 092 N	85 54 1 038 E	91.8	1186	80_29_DAM	27 45 21 369 N	85 54 2 485 E	91.8
1168	80_29_DAM	27 45 21 547 N	85 54 2 000 E	91.9	1177	80_29_DAM	27 45 17 097 N	85 54 1 038 E	91.8	1187	80_29_DAM	27 45 21 384 N	85 54 2 485 E	91.8
1169	80_29_DAM	27 45 21 552 N	85 54 2 000 E	91.9	1178	80_29_DAM	27 45 17 102 N	85 54 1 038 E	91.8	1188	80_29_DAM	27 45 21 399 N	85 54 2 485 E	91.8
1170	80_29_DAM	27 45 21 557 N	85 54 2 000 E	91.9	1179	80_29_DAM	27 45 17 107 N	85 54 1 038 E	91.8	1189	80_29_DAM	27 45 21 414 N	85 54 2 485 E	91.8
1171	80_29_DAM	27 45 21 562 N	85 54 2 000 E	91.9	1180	80_29_DAM	27 45 17 112 N	85 54 1 038 E	91.8	1190	80_29_DAM	27 45 21 429 N	85 54 2 485 E	91.8
1172	80_29_DAM	27 45 21 567 N	85 54 2 000 E	91.9	1181	80_29_DAM	27 45 17 117 N	85 54 1 038 E	91.8	1191	80_29_DAM	27 45 21 444 N	85 54 2 485 E	91.8
1173	80_29_DAM	27 45 21 572 N	85 54 2 000 E	91.9	1182	80_29_DAM	27 45 17 122 N	85 54 1 038 E	91.8	1192	80_29_DAM	27 45 21 459 N	85 54 2 485 E	91.8
1174	80_29_DAM	27 45 21 577 N	85 54 2 000 E	91.9	1183	80_29_DAM	27 45 17 127 N	85 54 1 038 E	91.8	1193	80_29_DAM	27 45 21 474 N	85 54 2 485 E	91.8
1175	80_29_DAM	27 45 21 582 N	85 54 2 000 E	91.9	1184	80_29_DAM	27 45 17 132 N	85 54 1 038 E	91.8	1194	80_29_DAM	27 45 21 489 N	85 54 2 485 E	91.8
1176	80_29_DAM	27 45 21 587 N	85 54 2 000 E	91.9	1185	80_29_DAM	27 45 17 137 N	85 54 1 038 E	91.8	1195	80_29_DAM	27 45 21 504 N	85 54 2 485 E	91.8
1177	80_29_DAM	27 45 21 592 N	85 54 2 000 E	91.9	1186	80_29_DAM	27 45 17 142 N	85 54 1 038 E	91.8	1196	80_29_DAM	27 45 21 519 N	85 54 2 485 E	91.8
1178	80_29_DAM	27 45 21 597 N	85 54 2 000 E	91.9	1187	80_29_DAM	27 45 17 147 N	85 54 1 038 E	91.8	1197	80_29_DAM	27 45 21 534 N	85 54 2 485 E	91.8
1179	80_29_DAM	27 45 21 602 N	85 54 2 000 E	91.9	1188	80_29_DAM	27 45 17 152 N	85 54 1 038 E	91.8	1198	80_29_DAM	27 45 21 549 N	85 54 2 485 E	91.8
1180	80_29_DAM	27 45 21 607 N	85 54 2 000 E	91.9	1189	80_29_DAM	27 45 17 157 N	85 54 1 038 E	91.8	1199	80_29_DAM	27 45 21 564 N	85 54 2 485 E	91.8
1181	80_29_DAM	27 45 21 612 N	85 54 2 000 E	91.9	1190	80_29_DAM	27 45 17 162 N	85 54 1 038 E	91.8	1200	80_29_DAM	27 45 21 579 N	85 54 2 485 E	91.8
1182	80_29_DAM	27 45 21 617 N	85 54 2 000 E	91.9	1191	80_29_DAM	27 45 17 167 N	85 54 1 038 E	91.8					
1183	80_29_DAM	27 45 21 622 N	85 54 2 000 E	91.9	1192	80_29_DAM	27 45 17 172 N	85 54 1 038 E	91.8					
1184	80_29_DAM	27 45 21 627 N	85 54 2 000 E	91.9	1193	80_29_DAM	27 45 17 177 N	85 54 1 038 E	91.8					
1185	80_29_DAM	27 45 21 632 N	85 54 2 000 E	91.9	1194	80_29_DAM	27 45 17 182 N	85 54 1 038 E	91.8					
1186	80_29_DAM	27 45 21 637 N	85 54 2 000 E	91.9	1195	80_29_DAM	27 45 17 187 N	85 54 1 038 E	91.8					
1187	80_29_DAM	27 45 21 642 N	85 54 2 000 E	91.9	1196	80_29_DAM	27 45 17 192 N	85 54 1 038 E	91.8					
1188	80_29_DAM	27 45 21 647 N	85 54 2 000 E	91.9	1197	80_29_DAM	27 45 17 197 N	85 54 1 038 E	91.8					
1189	80_29_DAM	27 45 21 652 N	85 54 2 000 E	91.9	1198	80_29_DAM	27 45 17 202 N	85 54 1 038 E	91.8					
1190	80_29_DAM	27 45 21 657 N	85 54 2 000 E	91.9	1199	80_29_DAM	27 45 17 207 N	85 54 1 038 E	91.8					
1191	80_29_DAM	27 45 21 662 N	85 54 2 000 E	91.9	1200	80_29_DAM	27 45 17 212 N	85 54 1 038 E	91.8					
1192	80_29_DAM	27 45 21 667 N	85 54 2 000 E	91.9										
1193	80_29_DAM	27 45 21 672 N	85 54 2 000 E	91.9										
1194	80_29_DAM	27 45 21 677 N	85 54 2 000 E	91.9										
1195	80_29_DAM	27 45 21 682 N	85 54 2 000 E	91.9										
1196	80_29_DAM	27 45 21 687 N	85 54 2 000 E	91.9										
1197	80_29_DAM	27 45 21 692 N	85 54 2 000 E	91.9										
1198	80_29_DAM	27 45 21 697 N	85 54 2 000 E	91.9										
1199	80_29_DAM	27 45 21 702 N	85 54 2 000 E	91.9										
1200	80_29_DAM	27 45 21 707 N	85 54 2 000 E	91.9										

District Survey Office, Bokaro




Map showing Contours of 0.25 Meter Interval Inside Sand Ghat In Damodar River In Bokaro District



ABBREVIATION FORM	
District	BO Bokaro
Zone	Z4 Zone 4
River	DAM Damodar

Legend

-  Contour Lines
-  Sand Ghat Boundary

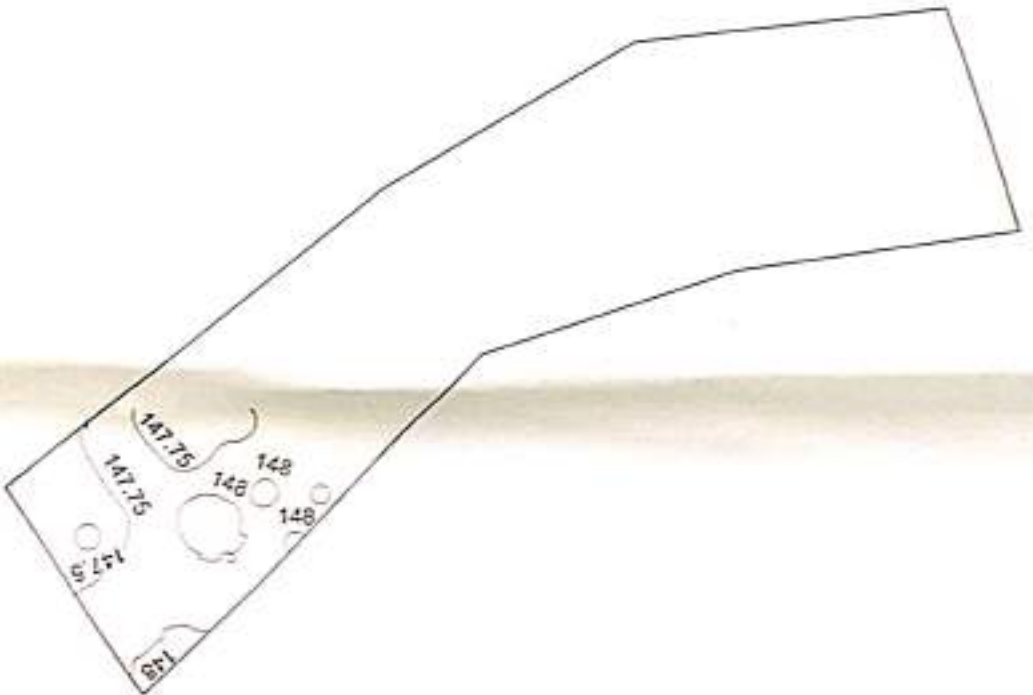
Sand Ghat Code	Area (in Ha)
BO_Z4_DAM_3	4.72



1:20000
Metre/Bokaro

Map showing Contours of 0.25 Meter Interval Inside Sand Ghat In Damodar River In Bokaro District

815807E



ABBREVIATION FORM			
District	BO	Bokaro	
Zone	Z5	Zone 5	
River	DAM	Damodar	

Legend

— Contour Lines

□ Sand Ghat Boundary

Sand Ghat Code
BO_Z5_DAM_4

Area (in Ha)
8.22



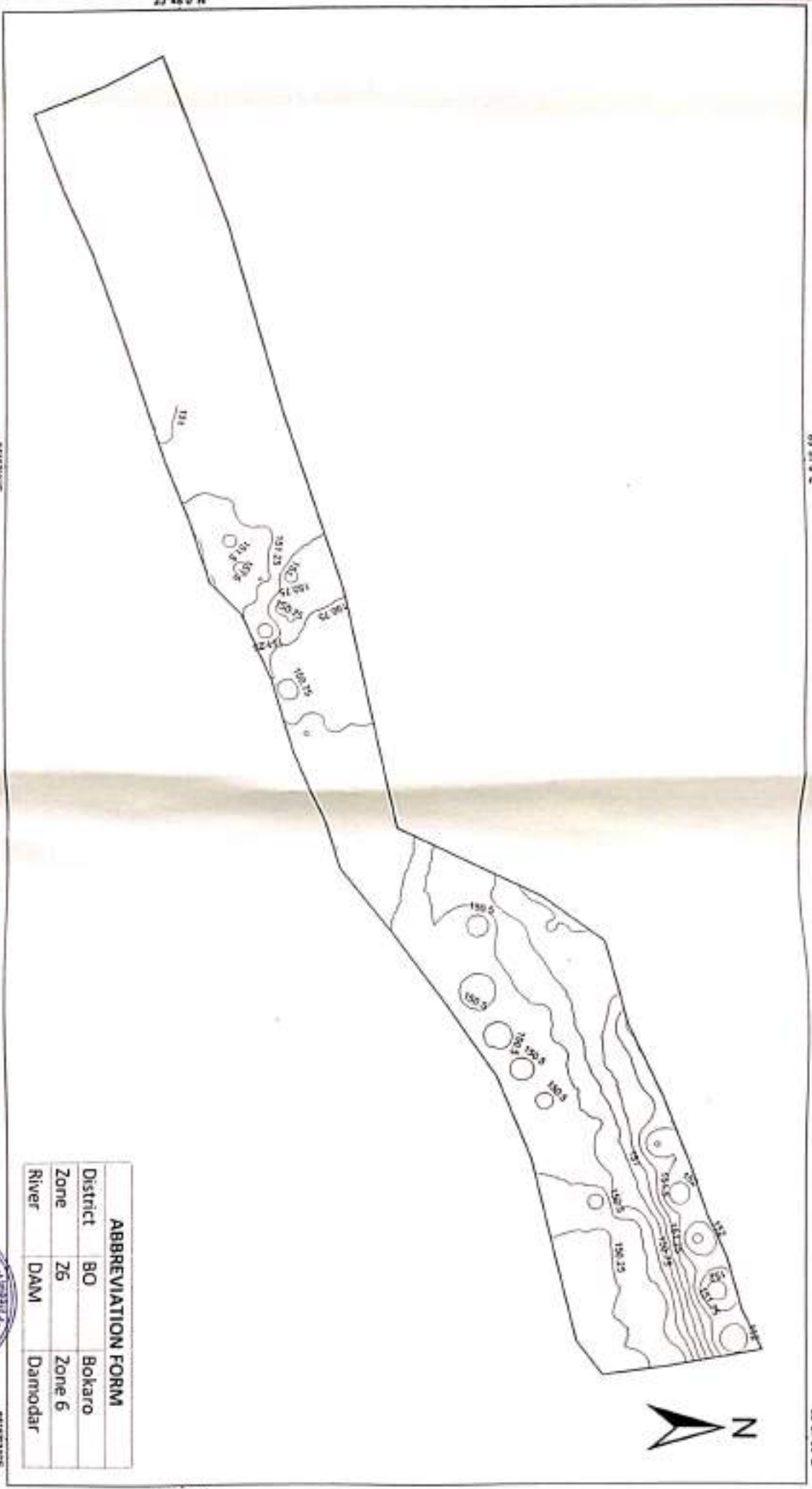
District Engineer
Bokaro



815807E

815807E

Map showing Contours of 0.25 Meter Interval Inside Sand Ghat In Damodar River In Bokaro District



ABBREVIATION FORM			
District	BO	Bokaro	
Zone	Z6	Zone 6	
River	DAM	Damodar	

Legend

- Sand Ghat Boundary
- Contour Line

Sand Ghat Code	Area (in Ha)
BO_Z6_DAM_5	14.67

Deputy District Officer
Bokaro



N.0.94.22

N.0.94.22

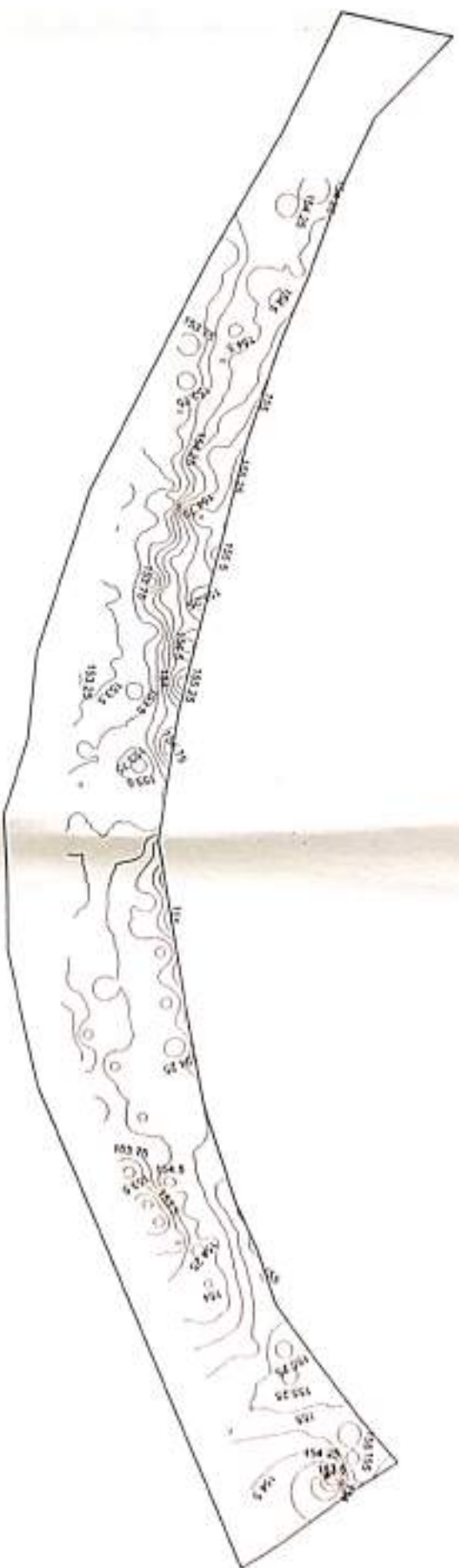
Map showing Contours of 0.25 Meter Interval Inside Sand Ghat In Damodar River In Bokaro District

85°55'30"E

85°56'0"E



23°45'30"N

23°45'0"N



ABBREVIATION FORM	
District	BO Bokaro
Zone	Z7 Zone 7
River	DAM Damodar

Legend

-  Sand Ghat Boundary
-  Contour Line

Sand Ghat Code	Area (in Ha)
BO_Z7_DAM_6	26.14

District Engineer
Bokaro



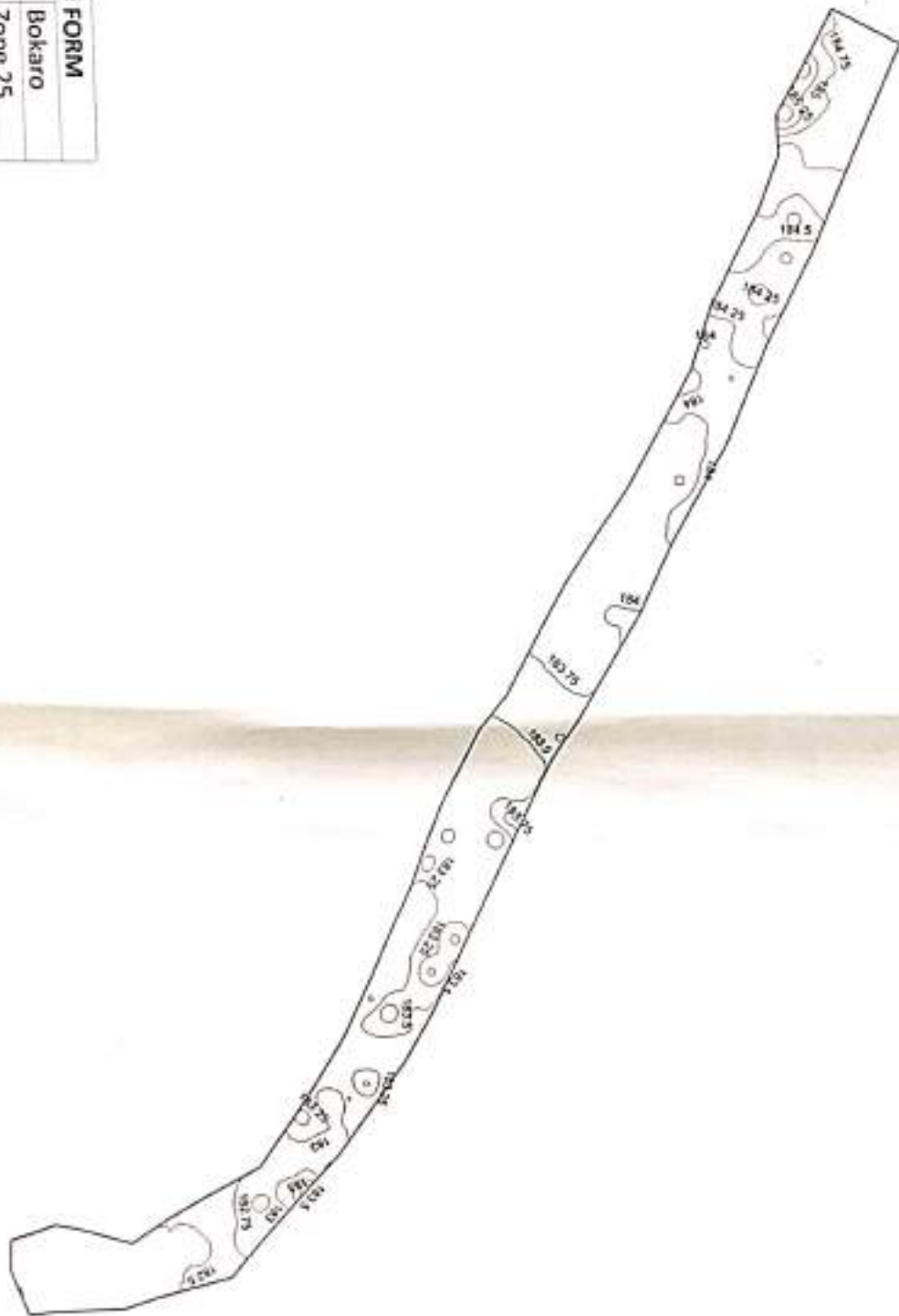
85°55'30"E

85°55'30"E

85°56'0"E

23°45'30"N

Map showing Contours of 0.25 Meter Interval Inside Sand Ghat In Bokaro River In Bokaro District



ABBREVIATION FORM

District	BO	Bokaro
Zone	Z25	Zone 25
River	BOK	Bokaro

Legend

- Sand Ghat Boundary
- Contour Line

Sand Ghat Code
BO_Z25_BOK_8

Area (In Ha)
10.85

District
Bokaro



N.03.94.02

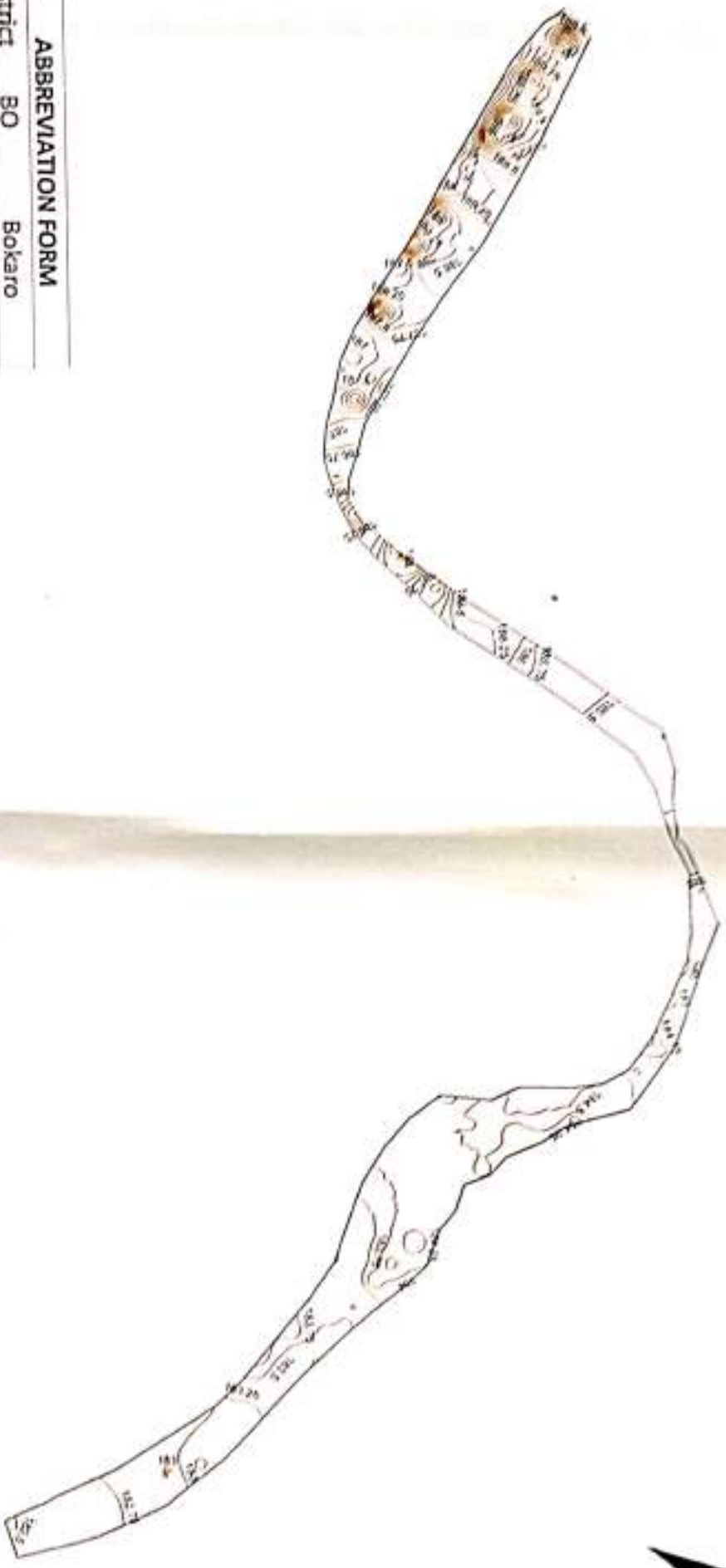
N.03.94.02

85°49'30"E

85°50'0"E



Map showing Contours of 0.25 Meter Interval Inside Sand Ghat In Bokaro River In Bokaro District



ABBREVIATION FORM

District	BO	Bokaro
Zone	Z26	Zone 26
River	BOK	Bokaro

85°47'20"E 85°48'07"E 85°48'30"E

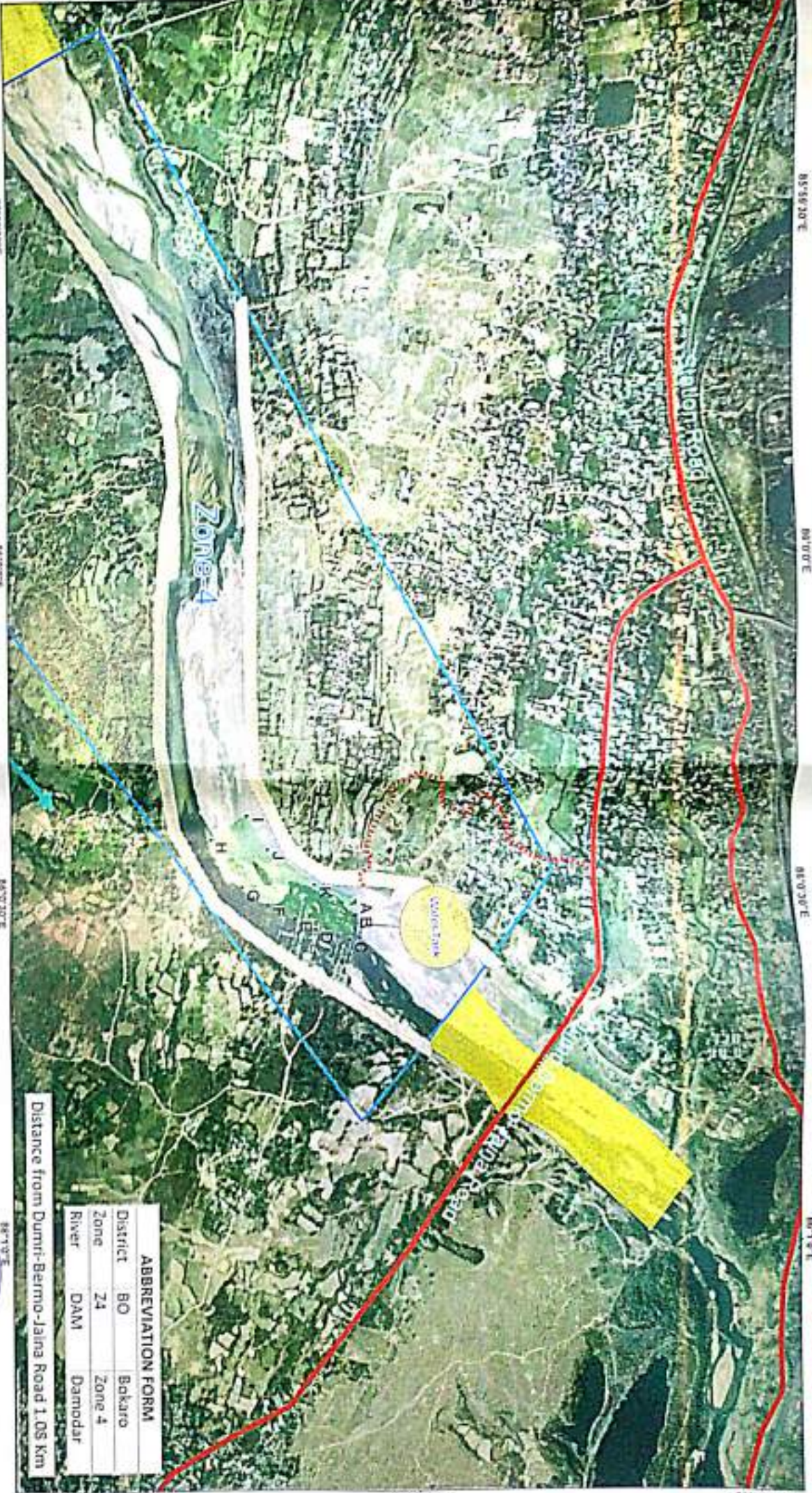
Legend

- Sand Ghat Boundary
- Contour Line

Sand Ghat Code	Area (in Ha)
BO_Z26_BOK_9	23.11



Route Map of Zone 4, Bokaro District, Jharkhand



Distance from Dumri-Bermo-Jaina Road 1.05 Km

ABBREVIATION FORM			
District	BO	Bokaro	
Zone	Z4	Zone 4	
River	DAM	Damodar	

- Legend**
- Block's District Boundary
 - Damodar
 - River Flow Direction
 - Ridge
 - Sand Deposited Zone
 - No Mining Zone
 - Sand DMR
 - Safety Buffer
 - Sand Cover Area

Sand Ghat Code	Area (in Ha)
BO_Z4_DAM_3	4.72

Limiting Coordinates of Zone 4	
Starting Point	86°0'39.330"E 23°45'33.349"N
Ending point	85°59'16.721"E 23°44'56.465"N



Route Map of Zone 6, Bokaro District, Jharkhand



Legend

- Proposed Boundary
- Roads
- Canals
- Water Flow Direction
- Water Bodies
- Approved Areas
- Waterways & Canal
- Station Road
- Sand Deposition Area
- Land Use

Sand Ghat Code BO_Z6_DAM_5

Area (in Ha) 14.67

Linking Coordinates of Zone 2/II

Starting point: 85°57'21.908"E, 23°46'12.872"N

Ending point: 85°56'47.624"E, 23°45'57.536"N

Prepared by: *[Signature]*

Officer

ABBREVIATION FORM

District	BO	Bokaro
Zone	Z6	Zone 6
River	DAM	Damodar

Distance from Station Road 0.21 Km

River - Damodar Nadi

Sentinel 2 Satellite Imagery

Date of Capture: November, 2022 (Post-Monsoon)

Spatial Resolution: 10m

0 90 180 360 540 720 Meters

Approved

Scale Level Environmental Assessment Officer

Route Map of Zone 5, Bokaro District, Jharkhand



Legend

- River Control Boundary
- Railway
- Sand Gravel Channel
- Bridge
- Sand Deposit Zone
- No Shoring Zone
- Sand Core
- Sand Bar
- Sand Channel

Sand Gravel Code	Area (in Ha)
BO_Z5_DMM_4	8.22

Linking Coordinates of Zone 5	
Starting Point	85°58'2.60"E 23°45'43.30"N
Ending point	85°58'20.50"E 23°46'45.35"N

ABBREVIATION FORM			
District	BO	Bokaro	
Zone	Z5	Zone 5	
River	DMM	Damodar	

Distance from Station Road 2.6 Km

0 175 350 700 1,050 1,400 Meters

Route Map of Zone 7, Bokaro District, Jharkhand



Legend

- State District Boundary
- Roadway
- Bridge
- River / In-Division
- Standard Canal
- Approach Canal
- Supplying Zone
- Safety Power
- Sand Canal Zone
- Sand Dam

Sand Ghat Code	Area (in Ha)
BO_Z7_DAM_6	26.14

Limiting Coordinates of Zone 7

Starting Point	85°56'47.596"E 23°45'57.855"N
Ending point	85°57'28.771"E 23°46'13.212"N

ABBREVIATION FORM

District	BO	Bokaro
Zone	Z7	Zone 7
DAM	Damodar	

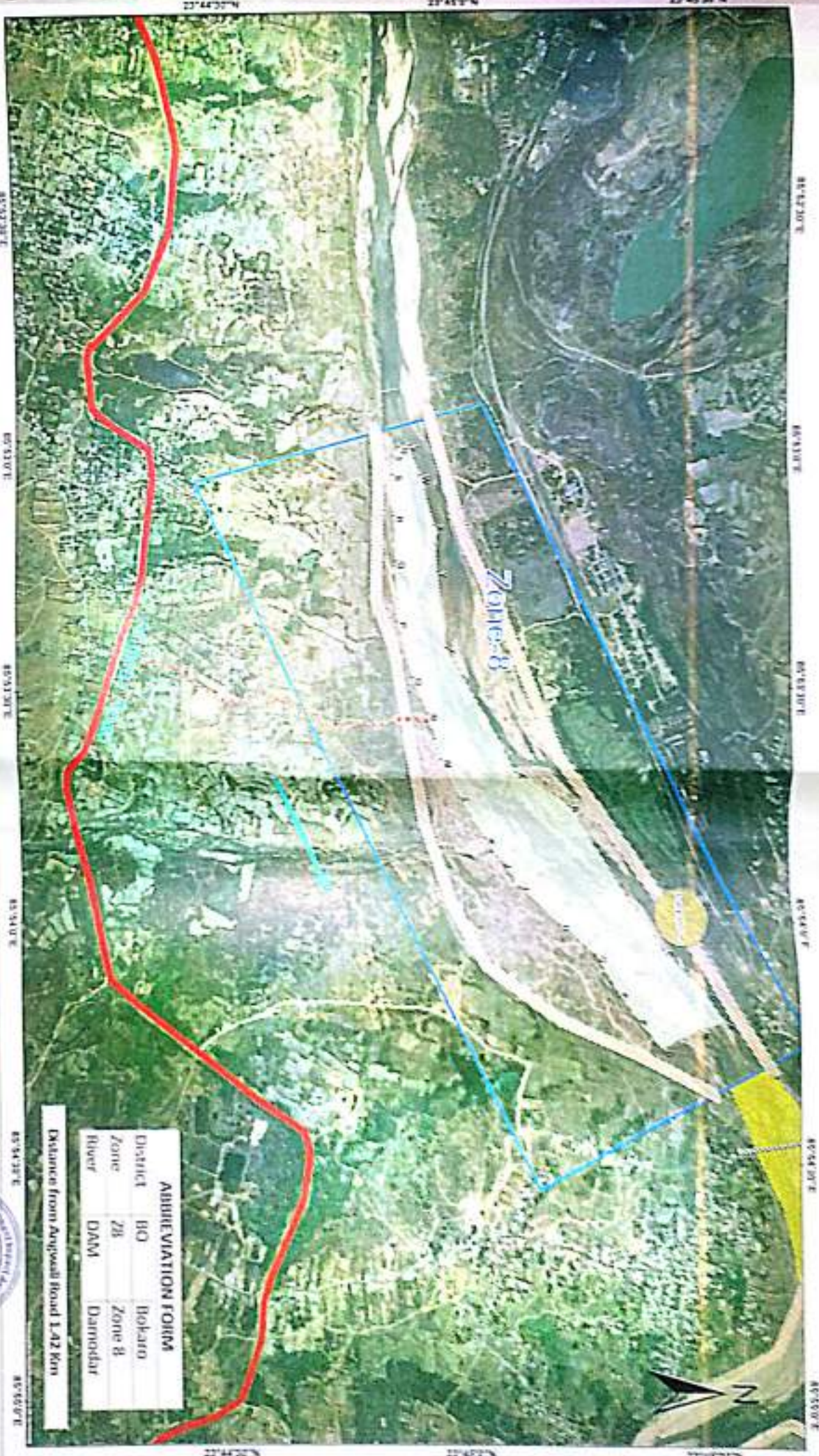
Distance from Aijwadi Road 1.14 Km

Digitized by

 Officer



Route Map of Zone B, Bokaro District, Jharkhand



Sand Ghat Code BO_Z8_DAM_7
Area (in Ha) 52.4

Limiting Coordinates of Zone B
 Starting Point 85°56'47.596"E 23°45'57.855"N
 Ending point 85°57'28.771"E 23°46'13.212"N

ABBREVIATION FORM			
District	BO	Bokaro	
Zone	ZB	Zone B	
River	DAM	Damodar	

Distance from Anyamal Road 1.42 Km

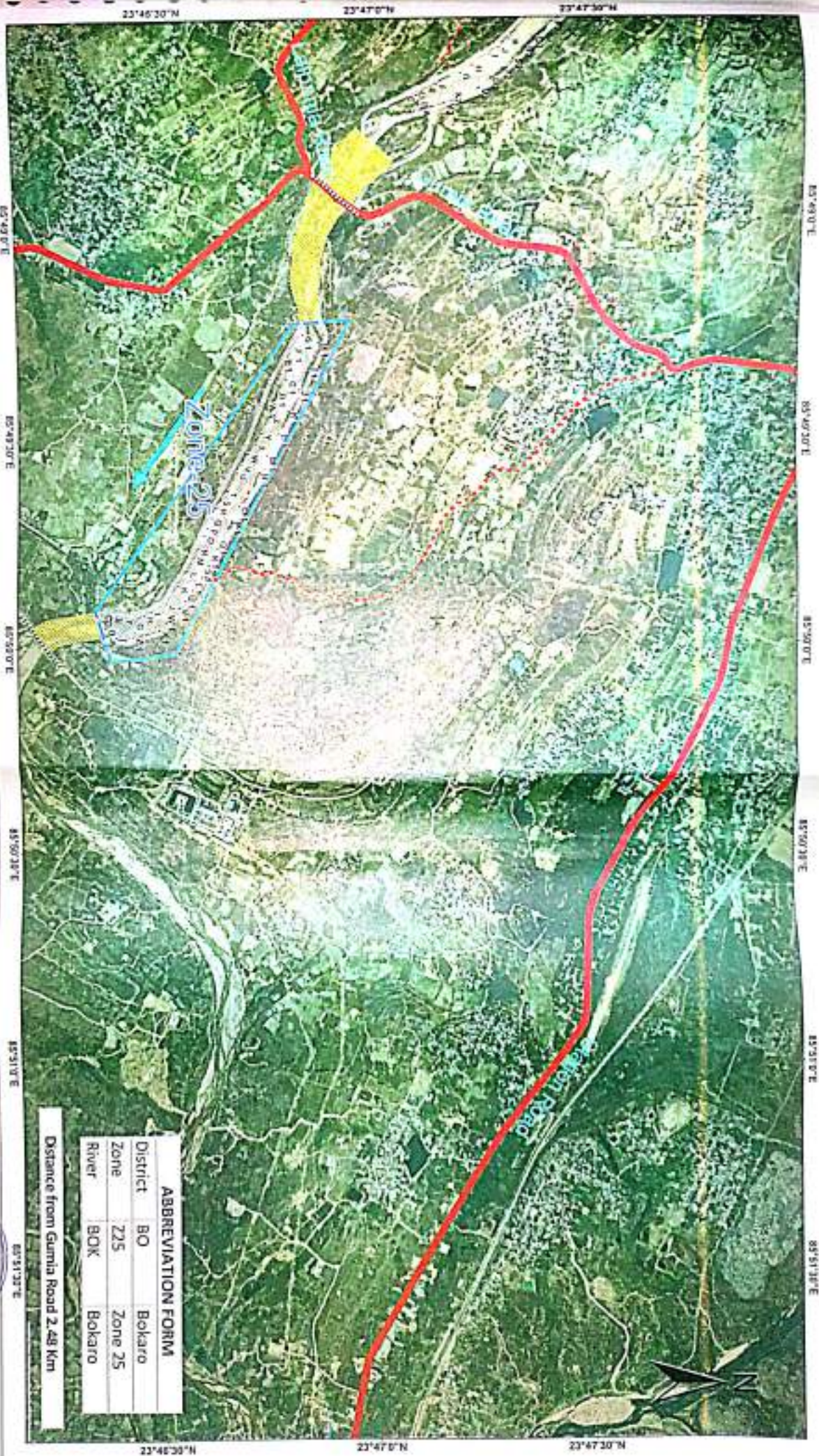
Legend

- Water Body Boundary
- Roadway
- Bridge
- State Line Boundary
- International Boundary
- Approach Road
- No. Along Zone
- Sandy Exposed
- Sand Deposit Zone
- Sand Bar

Digitized by
 District Collector
 Bokaro



Route Map of Zone 25, Bokaro District, Jharkhand



Legend

	Water Canal Boundary		No Mining Zone
	Sewer		Event Basin
	Bridge		Sand Deposit Area
	River Flow Direction		Sand Ghat
	Watercourse		
	Approach Road		

Sand Ghat Code	Area (in Ha)
BO_Z25_BOK_8	10.85

Limiting Coordinates of Zone 25

Starting Point	85°49'13.716"E	23°46'53.372"N
Ending Point	85°49'59.605"E	23°46'22.637"N

ABBREVIATION FORM

District	BO	Bokaro
Zone	Z25	Zone 25
River	BOK	Bokaro

Distance from Gurua Road 2.48 Km

Prepared by

 Surveyor



Route Map of Zone 26, Bokaro District, Jharkhand



ABBREVIATION FORM

District	BO	Bokaro
Zone	Z26	Zone 26
River	BOK	Bokaro

Distance from Lalpasia Road 0.92 Km

Legend

- Sikar's District Boundary
- Boundary
- Bridge
- Zone 26 Boundary
- Standard Route
- Approved Route
- Approved State
- Key Mining Zone
- Safety Barrier
- Sand Deposit Zone
- Sand Ghat

Sand Ghat Code	Area (in Ha)
BO_Z26_BOK_9	23.11

Limiting Coordinates of Zone 26

Starting Point	85°48'51.555"E, 23°47'3.093"N
Ending Point	85°47'16.404"E, 23°47'41.368"N

Digitized by

