स्टील अथॉरिटी ऑफ इण्डिया लिमिटेड
STEEL AUTHORITY OF INDIA LIMITED
रॉ मेटिरियल्स डिवीजन
RAW MATERIALS DIVISION
गुआ अयस्क खान
GUA ORE MINES

Ref. No. : GUA/E&I/Duarg.-EC Compl./2021-22/ 9,77 Date: 27.11.2021

To,

The Addl. PCCF (C)
Ministry of Environment, Forest and Climate Change
Regional Office (ECZ)
Bungalow No. A – 2, Shyamali Colony
Doranda, Ranchi – 834 002

Sub: Compliance Report of Environmental Clearance accorded by MoEF&CC to the project: Integrated Duarguiburu Iron Ore Mining, Beneficiation and Pelletisation Project of SAIL, located in Ghatkuri Reserve Forest, Tehsil Gua, West Singhbhum Dist., Jharkhand

Ref.: 1. Ministry's Environment Clearance Letter No. J-11015/453/2008-IA. II(M) dated 25.03.2013
2. EC amendment vide Letter No. J-11015/453/2008-IA.II(M) dated 02.02.2015
3. EC amendment vide Letter No. J-11015/453/2008-IA.II(M) dated 06.11.2020

Sir,

As per the provisions of the condition no. (x) of above stated Environmental Clearance order granted to the Integrated Duarguiburu Iron Ore Mining Project, the six monthly compliance report on the conditions stipulated in the Environmental Clearance for the period from ***April, 2021*** to ***September, 2021*** is enclosed herewith for kind perusal please.

Thanking you.

For & on behalf of
SAIL-BSL, Gua Ore Mines

27/11/21
(S.P. Das)
General Manager (Mines) and E&L

Encl: As stated above

Copy to:
1. Director, IA, MoEF&CC, GOI, Indira Paryavaran Bhavan, Aliganj, Jor Bagh Road, New Delhi - 110 003.
2. Member Secretary, JSPCB, HEC, Dhurwa, Ranchi – 834 004.
3. In-charge, Eastern Zone, CPCB, Southern Conclave, Block 502, 5th & 6th Floors, 1582 Rajdanga Main Road, Kolkata - 700 107 (W. B.)
4. The Regional Office, JSPCB, Jamshedpur

O/C

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Singhbhum (West), Jharkhand-833213, Phone : (O) 06596 - 263713, Fax : 06596-263714,
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Compliances for conditions of Environmental Clearance and its amendments (vide order no. J-11015/453/2008-I.A.II (M), dated 25.03.2013, No. J-11015/453/2008-IA.II (M), dt.02.02.2015 & F. No. J-11015/453/2008-IA.II(M) dated 06.11.2020) of Duarguiburu Iron Ore Mining Lease of Gua Ore Mines, Bokaro Steel Plant, Steel Authority of India Ltd.

(Period: April, 2021 – September, 2021)

S.No.	CONDITION	COMPLIANCES
Specific Conditions:		
(i)	No mining activities will be allowed in forest area for which the Forest Clearance is not available.	Being complied with. Mining operations are being carried out in the existing broken area of 274.691 ha, for which Stage-II Forest Clearance (Final Approval) obtained from MOEFCC Vide Letter No. F. No. 8-251/1986-FC (Pt) dated 22.08.2014. Further, MoEF&CC accorded Stage-II FC for diversion of additional area of 361.295 ha vide Letter No. F. No. 8-251/1986FC dated 07.12.2020. However, release of diverted forest land for mining purposes is under consideration with Govt. of Jharkhand. Presently, the mining operations are confined within the approved diverted forest area within the Mining Lease area only for which forest clearance exists.
(ii)	The project proponent will seek and obtain approval under the FC Act, 1980 for diversion of the entire forest land located within the mining lease within a period of two years from 01.02.2013 i.e. the date of issue of guidelines by FC vide their letter F No. 11-362/2012-FC, failing which the mining lease area will be deduced to the non-forest area plus the forest area for which the project proponent has been able to obtain the FC at the end of this time period. In the case of reduction in mine lease area, the project proponent will need to get a revised mining plan approved from the competent authority for reduced area and enter into a new mining lease as per reduced lease area. The EC will be construed to be available for the mining lease area as per the revised mining lease deed.	MoEF&CC guideline with respect to Forest Diversion Proposals vide their letter F. No. 11-362/2012-FC, dated 01.02.2013 has been suppressed with a new guideline vide F.No.11-599/2014-FC, dated 01.04.2015 which is being complied with. There is no change in lease deed area as per the existing mining lease deed executed on 24.09.2019 under the provisions of Mineral (Mining by Government Company) Rules, 2015 with validity of lease period till 21.02.2029 over an area of 1443.756 ha.

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S.No.	CONDITION	COMPLIANCES
(iii)	Need to submit a proposal for faster utilization of entire dumps of fines within a period of one year. The new condition is stated as: "The Project Proponent informed the Committee that the Plan envisages faster utilization of the fines from the fines dump by increasing operating hours of the fines beneficiation unit gradually from 5000 hrs.to 6200 hrs. per annum within a span of 3 years, which will increase the rate of reclamation of fines from the fine dump from 2.50 MTPA to 3.1 MTPA and by reducing the mined out beneficiated ore feed to the beneficiation plant in order to increase reclaimed & beneficiated fines from the fines dump to the tune of 0.5 MTPA from 4th year onwards. The complete consumption of fines from the fine dump shall take about 9 years' time instead of 13 years envisaged earlier. The Committee accepted the Plan and recommended for utilization of fines as proposed by M/s SAIL within 9 years instead of 13-14 years. During this period, all pollution mitigation measures at the dump site shall be implemented and augmented with additional measures on the basis of any Specific Studies conducted through Reputed Institutions to prevent/ minimize environmental impacts from the Fines Dumps. Detailed Action Plans in regard to Faster Reclamation of fines after Beneficiation and Pellet are commissioned and stabilized and Revised Proposal for faster liquidation of the fines (as is proposed now) may be submitted to the Regional Office of the Ministry, as also periodic Progress Reports."	• Request made to MoEF&CC on 24.03.2014 that the proposal for faster utilization of the fines from the fines dump shall be submitted later once the Beneficiation & Pellet Plant is commissioned. • The matter was discussed at the 25thEAC meeting held on 13.11.2014 and the EAC directed to submit the plan for faster utilization of the fines. • Accordingly, the proposal for faster utilization of fines from the fines dump at Gua Ore Mines was submitted to the MoEF&CC on 14thNovember, 2014. On the basis of submission of information and data by SAIL, Ministry amended the condition vide its letter No. J-11015/453/2008-IA.II(M), dt.02.02.2015. Further, in order to maintain the availability of iron ore in the open market after 31.03.2020, the Central Government, Ministry of Mines, GoI, in exercise of the power conferred under Section 20A of MMDR Act, 1957 (Amended in 2015), allowed SAIL to sell iron ore in a year up to a quantity equivalent to maximum 25% of total mineral production in the previous year and to sell low grade/sub-grade iron ore fines lying at the mine pit heads of captive mines of SAIL in open market. This provides opportunity to Gua Ore Mines to dispose sub-grade iron ore fines, so that environmental hazards can be removed, space is created and other users can suitably utilize the ore. After obtaining permission from the State Govt. and other statutory approvals, Gua Ore Mines will sell sub-grade iron ore fines in open market. To explore the opportunity, Amendment of EC under para-7 (ii) of EIA Notification 2006 has been wanted from Ministry. Subsequently, as per the information submitted by SAIL, the MoEF&CC amended the EC of Duarguiburu Mining Lease of Gua Ore Mines vide its letter no. F.No.J-11015/453/2008-IA.II(M) dated 06.11.2020, for change in excavation and dispatch pattern increasing the excavation and dispatch of 3.1 MTPA iron ore fines keeping the total production from the mines within the approved EC capacity of 12.5 MTPA.

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S.No.	CONDITION	COMPLIANCES
General Conditions:		
(i)	The project proponent shall obtain Consent to Establish and Consent to operate from the Jharkhand State Pollution Control Board and effectively implement all the conditions stipulated therein.	Consent to Establish (NOC) was obtained from Jharkhand State Pollution Control Board (JSPCB), Ranchi vide letter No. G- 1299, dated 06.04.2013. The CTE was for Iron Ore (ROM)capacity of 10 MTPA, Iron Ore fines from the fines dump (2.5 MTPA), Beneficiation Plant for 12.5 Million TPA & Pellet Plant of 4 Million TPA. Thereafter, regular Consent to Operate (Air & Water) was obtained from JSPCB. The existing CTO has been renewed by JSPCB for the period from 31.12.2020 to 31.12.2021 vide Ref. No. JSPCB/HO/RNC/CTO-8783815/2020/2015, dated 31.12.2020. Further, CTO renewal application has already been submitted to JSPCB for further period of 5 years. All the conditions stipulated in the CTE (NoC) & CTO (Air & Water) are being effectively implemented & complied and compliance report submitted to Jharkhand State Pollution Control Board.
(ii)	Environmental clearance is subject to final order of the Hon'ble Supreme Court of India In the matter of Goa Foundation Vs. Union of India in Writ petition (Civil) No. 460 of 2004, as may be applicable to this project.	Noted.
(iii)	Environmental clearance is subject to obtaining clearance under the Wildlife(Protection) Act,1972 from the competent authority, as may be applicable to this project	The condition is not applicable as there is no designated wildlife protected area/wildlife sanctuary within 10 km radius to the project site. The entire mining lease area is located in Ghatkuri Reserve Forest and do not fall under the purview of Wildlife Protected Area. All precautions are under taken to not disturb the flora and fauna in and around the mining lease area. Necessary facilities are being extended to local forest department for their inspection and monitoring of forest area.
(iv)	Coordinated efforts shall be made along with other operating mines in the area and action plan drawn for control of pollution load in the area. The action plan so prepared shall be effectively implemented. The air	Coordinated efforts are ensured in preparation of Catchment Area Treatment (CAT) Plan covering entire Saranda Forest Division to control surface runoff from the mines as well as protection of Koina and Karo River

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	and water quality shall be monitored by involving the State Pollution Control Board and results submitted within 6 months.	system. For preparation of a Comprehensive Catchment Area Treatment (CAT) Plan, SAIL had taken initiatives with IIT Kharagpur, a world renowned premier mining institute of the country, was engaged for preparation of the CAT Plan. IIT Kharagpur, by using GIS Frame work and Remote Sensing Technology, as well as field survey, has prepared the CAT Plan. The CAT Plan covers an approx. area of 11,500 Km^2 bounded by the west bank of river Koina in the west up to the east bank of river Karo in the east. The Plan has focused on the Catchment scenario of the region, river system, source of water pollution and their prevention, terrain description, soil conservation and its integration with CSR activities, mining activities in the area etc. CAT Plan has been submitted to State Forest Department for approval of the same. Implementation of provisions made in CAT Plan will support to reduce pollution load on water bodies of Saranda Forest Area. Also, based on study commissioned by taking the services of IIT KGP, measures have also been implemented at the mines for effective environmental management in the area. Some of these include: • Series of 05 no. of earthen dams at the foothill of the Fines Heap followed by series of 04 no. Trap Pits have been provided for arresting eroded soil by providing enough retention time for the soil to settle down during monsoons. Regular desiltation of earthen dams and pits prior to onset of monsoons is carried out every year. • Further, the slope of the Zero Point Nalla has been planted with vetiver grass to provide stability to the slope. • Boulder Retaining walls at the foot of waste dumps and check dams to check the flow of fines during monsoons. • Bunds along the haul roads and outer periphery of the pits to ensure

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		that no sediment laden storm water get discharged from the mined out area. • Garland drains have been provided around the mine pits, haul roads and diverted surface runoff from the mining and other areas to mine pit, where it is allowed to settle and percolate into the ground water. To control the fugitive dust emissions from the crusher, screening & loading areas, dust suppression system have been installed which are working effectively. Regular water sprinkling is being done by permanent road sprinklers and by mobile water tanker at the mines as well as township for dust suppression. Latest environmental quality report generated by NABL accredited lab through JSPCB is placed in **Annexure- 1**.
(v)	The Forest Right Act shall be implemented.	The Clearance required under Forest Rights Act, 2006 has already been obtained and necessary certificate has been issued by the Collector, Singhbhum (West) vide order no. 1277 A/88, dt.23.05.2011. Copy of necessary certificate issued by the Collector, Singhbhum (West) has already been submitted with previous compliance report.
(vi)	The mining operations shall be restricted to above ground water table and it should not intersect the groundwater table. In case of working below the ground water table, prior approval of the Ministry of Environment and Forest and the Central Ground Water Authority shall be obtained, for which a detailed hydrogeological study shall be carried out.	The Ground Water Table in the Lease area is from 394 - 400 m AMSL whereas the present working depth and ultimate pit depth at the mines are 695m AMSL and 550m AMSL respectively. So there will be no intersecting of ground water table during mining operations at the mine. As the mine pits are located at the hill top, all the surface runoff from the mining areas have been diverted to mine sumps, from where it seeps in to the lower internal mining lease area . Check bunds, Garland drains and siltation pond has been constructed at different suggested locations to control surface runoff. At present, the runoff water within the mining lease area of Gua Mines has been collected/channelize towards the settling pond to prevent surface runoff. At the cost of SAIL, all the activities are being taken care by

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S.No.	CONDITION	COMPLIANCES
		providing technical civil structure at different RL around the Mines.
(vii)	The project proponent shall ensure that no natural watercourse and/or water resources shall be obstructed due to any mining operations. The first order streams and the seasonal nallahs originating from the mining lease area shall be protected.	There is no significant natural water course originating / present in the mining lease. In case any natural flow during rainy season will take due precautions to ensure that no natural watercourse / water resources obstructed due to any mining operations. We have regularly inspected the nearby areas/ water bodies ensuring the protection. These things are being monitored physically as well as through satellite imagery processing techniques prescribed in Rule -35 (Sustainable Mining) of MCDR, 2017 & amended thereto.
(viii)	The top soil shall temporarily be stored at earmarked site(s) only and it should not be kept unutilized for long. The topsoil shall be used for land reclamation and plantation.	The mining operation was started since early 30's at Gua Ore Mines over 274.691 ha. The generated valuable top soils are utilized for different soil conservation practices like nursery development & OB dump stabilization work. At present, no top soil is encountered as we are operating the mine within the existing broken area (274.691ha) since the beginning of mining operations in the lease area of 1443.756 ha. However, whenever top soil is encountered in future while working in virgin areas, the top soil will be removed & stacked separately as per the IBM guidelines and will be used for reclamation and rehabilitation purpose as declared in Approved Mining Plan & PMCP. We will strictly adhere to the instructions of CPCB & SPCB, MoEF&CC and IBM guidelines for top soil management as envisaged in mining plan/scheme and EIA/EMP Report.
(ix)	The over burden generated during the mining operation shall be stacked at ear marked dump site(s) only and it should not be kept active for a long period of time and its phase-wise stabilization shall be carried out. There shall be four external overburden dumps. Proper terracing of the OB dumps shall be carried out so that the overall slope of the dump shall be maintained to 28^0. The over burden dump shall be scientifically vegetated with suitable native species to prevent erosion and surface run	There are two active dumps, one at Ranichua turning and one at northern sides of OT Hill area, which are being maintained by appropriate grading and benching/top terracing maintaining less than 28^0slope. Native species of plants, hedges and local grass have been planted at overburden dump slope to prevent erosion and surface run off. Photographs of plantation are enclosed in **Annexure-6.** Other old dumps are scientifically reclaimed and

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	off. In critical areas, use of geo textiles shall be undertaken for stabilization of the dump. Monitoring and management of rehabilitated areas shall continue until the vegetation becomes self-sustaining.	native species are planted to stabilize the dump as per suggestion of local forest department. The photographs are enclosed as **Annexure-3**.
(x)	Compliance status shall be submitted to the Ministry of Environment & Forests and its Regional Office located at Bhubaneswar on six monthly basis.	Six monthly compliance status of EC conditions are being submitted regularly to the Ministry of Environment, Forest & Climate Change and Integrated Regional Office located at Ranchi.
(xi)	Catch drains and siltation ponds of appropriate size shall be constructed around the mine working, mineral and over burden dumps to prevent run off of water and flow of sediments directly into the Karo River, the Koina River, the Sarako River and other water bodies. The water so collected should be utilized for watering the mine area, roads, green belt development etc. The drains shall be regularly desilted particularly after the monsoon and maintained properly. Garland drains, settling tanks and check dams of appropriate size, gradient and length shall be constructed around the mine pit, mineral and over burden dumps to prevent run off of water and flow of sediment directly into the Karo River, the Koina River, the Sarako River and other water bodies and sump capacity should be designed keeping 50% safety margin over and above peak sudden rain fall (based on 50 years data) and maximum discharge in the area adjoining the mine site. Sump capacity should also provide adequate retention period to allow proper settling of silt material. Sedimentation pits shall be constructed at the corners of the garland drains and desilted at regular intervals.	Based on a study conducted through IIT Kharagpur for identifying places vulnerable to erosion, checking surface runoff and other mitigative measures recommended have been undertaken such as provision of garland drains, settling pits, boulder retaining walls and check dams of appropriate size have been constructed. Catch drains and siltation ponds of appropriate size has been constructed around the working mines and over burden dumps to prevent run off of water and flow of sediments directly into the water bodies. Water harvested through water storage pits constructed in mines is utilized for green belt development. The settling pits / sedimentation pits and check dams are de-silted periodically prior to onset of monsoons and post monsoons to provide enough retention capacity. The photographs are enclosed as **Annexure-4.**
(xii)	Dimension of the retaining wall at the toe of the over burden dumps and the OB benches within the mine to check run-off and siltation shall be based on the rain fall data.	A study carried out through IIT KGP, mitigative measures recommended are based on rainfall data of past 50 years. While designing the retaining walls for OB Dumps, maximum rainfall measured at the site as well as erosion potential of dumped material are taken into consideration. Boulder

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		retention wall has been constructed at the foot of both active waste dumps i.e. OT Hill and Ranichua waste dumps. Construction of additional boulder wall at the foot of Ranichua Waste Dump is in progress. The construction of additional concrete check dam near Zero Point Nalla is completed.
(xiii)	The water recovery & spill way system shall be so designed that the natural water resources are not affected & that no spill water goes into the nearby Karo River, Koina River, Sarako River & other bodies.	At present, Gua Ore Mines is being operating the plants for dry operations as there is no facility of washing/ beneficiation, hence no industrial effluent is generated and discharged. Besides this, measures have been taken to prevent water pollution of Karo River flowing across the township. Some of these include: Also, based on study commissioned by taking the services of IIT KGP, measures have also been implemented at the mines for effective environmental management in the area. Some of these include: • Series of 05 no. of earthen dams at the foothill of the Fines Heap followed by series of 04 no. Trap Pits have been provided for arresting eroded soil by providing enough retention time for the soil to settle down during monsoons. Regular desiltation of earthen dams and pits prior to onset of monsoons is carried out every year. • Further, the slopes of the Zero Point Nalla have been planted with vetiver grass to provide stability to the slope. • Boulder Retaining walls at the foot of waste dumps and check dams to check the flow of fines during monsoons. • Bunds along the haul roads and outer periphery of the pits to ensure that no sediment laden storm water get discharged from the mined out area. • Garland drains have been provided around the mine pits, haul roads and diverted surface runoff from the mining and other areas to mine pit, where it is allowed to settle and percolate into the ground water.

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(xiv)	The project proponent shall carry out conditioning of the ore with the water to mitigate fugitive dust emission, without affecting flow of ore in the ore processing & handling areas.	To minimize fugitive dust emissions water spraying on haul roads, loading and unloading and at transfer points are being done regularly. Water spraying arrangements on haul roads, loading and unloading and at transfer points are properly maintained. Provision of water mist spraying at hopper and screening areas at the Ore Crushing Plant has been provided for dust suppression and to prevent fugitive dust emission in the downstream ore processing and handling areas. The photographs are enclosed as **Annexure-5**.
(xv)	The effluent from the ore beneficiation plant & pelletization plant shall be treated to conform to the prescribed standards & tailings slurry shall be transported through a closed pipeline to the tailing dam.	At present, there is no additional beneficiation plant & pelletization plant in operation as proposed in EC. Necessary provisions in respect of the same have been made in the proposed expansion project comprising of ore beneficiation plant & pelletization plant at Gua Ore Mines.
(xvi)	The tailing dam shall be lined on all the sides as well as in the bottom with thick HDPE lining.	At present, there is no Tailing Dam exist at Gua Ore Mines because only dry operation is continuing through crushing & screening. No washing circuits are exists for up-gradation of mineral through beneficiation process. Provision of tailing dams has been envisaged in the proposed expansion project comprising of ore beneficiation plant & pelletization plant. All the stipulated conditions related to the Tailing Ponds shall be complied with the upcoming expansion project.
(xvii)	The project proponent shall take necessary safeguard measures to ensure that there is no leaching from the tailing pond.	
(xviii)	The decanted water from the tailing pond shall be re-circulated & there should be zero discharge from tailing ponds.	
(xix)	Appropriate technology shall be used for maximum recovery of ore in order to reduce slurry discharge & to increase the life of the tailing dam.	
(xx)	The project proponent shall constitute on emergency management team under the control of project in charge to deal with the emergency situation pertaining to the tailing dam for the timely & effective control of emergency situation. It shall be ensured that training programme&	

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	mock drill shall be organized for the employees.	
(xxi)	Plantation shall be raised in an area of 469.838 ha including a 7.5 m wide green belt in the safety zone around the mining lease, over burden dumps, around beneficiation plant, mine benches, around tailing ponds, pelletization plant, roads etc. by planting the native species in consultation with local DFO/ Agriculture Department. The density of the trees should be around 2500 trees per ha.	Gua Ore Mines is highly dedicated towards plantation activities in and around the mining leases. The plantation activity has been carried out in consultation with local Forest Department. Out of the safety zone area of 19.61 ha all along the 7.5 m strip, about 92 % of the safety zone is virgin dense forest. The remaining 8% of the safety zone area is being regenerated with the original & existing forest species as per suggestion of local Forest Department. During 2020-21, 2400 nos. of saplings of native species like Mango, Jamun, Gulmohar, Kaju, Karanj, Sheesham, Neem, Sal, Leechi, Kathal etc. and 2000 nos. of bamboo saplings were planted in mines and townships area. Besides this approximate 3200 kg hedges and local grasses were planted in the mines slopes, waste dump slopes and slopes of dams. In addition to this plantation activity was also carried out during events such as MEMC Week, Safety Week, Earth Day and World Environment Day etc. for increasing awareness among the employees and locals. During 2021-22, 3000 nos. of saplings of native species like Mango, Jamun, Gulmohar, Kaju, Karanj, Sheesham, Neem, Sal, Amvla, Imli, Gamar etc. have been planted in mines and townships area. Besides this approximate 2000 kg hedges and local grasses have also been planted in the mines slopes, waste dump slopes and slopes of dams. In addition to this plantation activity is always carried out during events such as MEMC Week, Wildlife Week, Safety Week, Earth Day and World Environment Day etc. for increasing awareness among the employees and locals. The photographs of plantation activity carried out are given as **Annexure-6.**
(xxii)	The green belt shall be developed all around the mine lease within the	The green belt has already been developed all around the mine lease area. However, efforts are being made to cover all the reaming patches with

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<table>
<tr><th>S.No.</th><th>CONDITION</th><th>COMPLIANCES</th></tr>
<tr><td></td><td>initial 3 years from issue of clearance.</td><td>native saplings.

Details of plantation carried out during F.Y 2021-22 are as following:
<table>
<tr><th>Sl. No.</th><th>Location</th><th>Plantation during 2021-22</th></tr>
<tr><td>1.</td><td>Ranichua Waste Dump</td><td>• Approximately 100 kg hedge has been planted on the slope of Ranichua Waste Dump to minimize soil erosion during the monsoons.
• Plantation of 80 Saplings</td></tr>
<tr><td>2.</td><td>OT Hill Waste Dump</td><td>• Approximately 630 kg hedges and local grass has been planted on the bottom slope of OT Hill Waste Dump to minimize soil erosion during the monsoons.
• Plantation of 350 Saplings.</td></tr>
<tr><td>3.</td><td>OT Hill Slope</td><td>• Approximately 600 kg of hedges and local grass has been planted at OT Hill slope.
• Plantation of 500 Saplings</td></tr>
<tr><td>4.</td><td>HD Buru Road Side</td><td>• Approximately 20 kg of hedges and local grass has been planted at HD Buru road side.</td></tr>
<tr><td>5.</td><td>Bai Hill Barren Slope</td><td>• Approximately 650 kg of hedges and local grass has been planted at Bai Hill Barren Slope.
• Plantation of 1300 Saplings</td></tr>
<tr><td>6.</td><td>Jhillingburu Leases</td><td>• Plantation of 700 saplings</td></tr>
<tr><td>7.</td><td>Hirzi Hutting area</td><td>• Plantation of 70 saplings</td></tr>
<tr><td colspan="2">Summary of proposed plantation of local grasses, hedge and saplings</td><td>Plantation of Hedge and local grasses- approx. 2000 kg

Plantation of saplings – 3000 nos.</td></tr>
</table></td></tr>
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S.No.	CONDITION	COMPLIANCES
(xxiii)	Effective safeguard measures such as regular water sprinkling shall be carried out in critical areas prone to air pollution & having high levels of particulate matter such as around crushing & screening Plant, loading, and unloading point and transfer points. Extensive water sprinkling shall be carried out on haul roads. It should be ensured that the Ambient Air Quality parameters conform to the norms prescribed by the Central Pollution Control board in this regard.	High pressure mobile water sprinklers (28 KL) have been deployed for regular water sprinkling on Haul Roads and other dust prone areas. In addition to this, permanent water pipeline sprinklers (1.75 km)have been installed along the main approach haul roads near crushing plant to OT Hill area and other critical areas. Spray nozzles have also been provided at the hopper as well as screening & transfer points at Ore Processing Plant. All the Drilling Machines in the mines are equipped with the dust extractors / wet drilling facility to control dust from the drilling operations. Dry fog system has been installed at critical locations. Dust extraction system has been provided covering primary crushing & screening areas. As per the monitoring and analysis of Ambient Air quality,PM_{10} ranges from 29.1–63.8 $\mu g/m^3$, $PM_{2.5}$ ranges from 14.7– 36.8 $\mu g/m^3$,SO_2 ranges from 5.1- 18.8 $\mu g/m^3$ and NO_2 ranges from 6.5-25.06 $\mu g/m^3$, the detailed report is enclosed as **Annexure-1 & Annexure-2.** The photographs of air pollution control measures are enclosed as **Annexure-5.**
(xxiv)	Regular monitoring of the flow rate of the springs & perennial nallahs flowing in and around the mine lease shall be carried out & records maintained.	There are no perennial nallahs and springs in the vicinity or passing through the mining lease area. Only seasonal nallahs flow during the rainy season and since Gua Ore Mines operates on dry process, there is no interruption or addition of effluent in these seasonal natural flows.
(xxv)	The project authority should implement suitable conservation measures to augment the ground water resource in the area in consultation with Regional Director, Central Ground Water Board.	A comprehensive Remote Sensing & GIS based survey has been carried for Environment Management at Gua Ore Mines through the expertise services of IIT Kharagpur who has prepared a Digital Elevation Model (DEM) and drainage pattern & slope information from satellite imagery. Hydrologically area shows dendritic drainage pattern that looks like a branch of tree with dense connectivity of first and second order drainages. Study area follows first to sixth ordered streams in Gua mines region. As per drainage pattern of the mining lease area and watershed, the rain

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		water from the mining lease drains towards western side into catchment of Koina River and accordingly to arrest flow of sediments during rainy season and to maintain zero discharge from working mines, settling pits have been developed at OT Hill Area (Capacity -2100 m^3), 2nd Level Area (Capacity-120000 m^3), Bai Hill and HD Buru Area (Capacity-75000 m^3).Storm Water is directed towards these pits by developing bunds and garland drains. The retention capacity of the pits and the nature of soil allow the water to percolate and thus help in augmenting the ground water resource. The collected water is also used for other allied purpose such as water sprinkling and plantation in mines. Thus, these measures help in conserving water at Gua Ore Mines. The photographs of the rain water conservation pits are enclosed as **Annexure-4**.
(xxvi)	Regular monitoring of ground water level & quality shall be carried out in & around the project area (Mine lease, beneficiation plant, pelletization plant & tailing ponds) by establishing a network of existing wells & installing new piezometers during the operation. The periodic monitoring [(At least 4 times in a year- pre monsoon (April-May), monsoon (August), post monsoon (November) & Winter (January), once in each season)] shall be carried out in consultation with State Ground Water Board/ Central Ground Water Authority & data thus collected may be sent regularly to the Ministry of Environment & Forest and its regional office, Bhubaneswar, The Central Ground Water Authority & the Regional Director, Central Ground Water Board. If at any stage, it is observed that the ground water table is getting depleted due to Mining activity, necessary corrective measures shall be carried out.	Ground Water Study is being carried out through in-house study for each quarter. Four open wells have been selected all around the Gua Ore Mines viz, (i) Guasai – Forest Bungalow, (ii) Ghatkuri Village, (iii) ChhotaNagra/ Baihatu Village & (iv) Baraiburu Near Pool, for regular monitoring of ground water levels & quality. The photographs of groundwater level measurement and its sampling for the above mentioned locations along with test report of groundwater quality for the period of April, 2021 to September, 2021 are given in the **Annexure** – 7.
(xxvii)	The ground water & surface water in & around the Mines including the	Analysis of required water quality parameters including analysis of heavy

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	tailing ponds shall be regularly monitored at strategic location for heavy metals. The monitoring station shall be established in consultation with The Regional director, Central Ground Water Board & the State Pollution control board.	metals is being carried out through JSPCB recognized lab. Water quality analysis reports are enclosed in **Annexure-1.**
(xxviii)	Appropriate mitigative measures shall be taken to prevent pollution of the Karo River, Koina River & the Sarako River in consultation with the State Pollution Control Board.	Detailed study has been conducted through IIT Kharagpur for identifying places vulnerable to erosion and suggesting mitigative measures to minimize soil erosion and control surface runoff from the mines. Most of the recommendations made by IIT KGP in the report like provision of silt traps, check dams, settling pits / sedimentation ponds, plantation on the slopes have been made at various strategic locations and the same are under continuous implementation at other sites as and when required.
(xxix)	Vehicular emission shall be kept under control & regularly monitored. Measures shall be taken for maintenance of vehicle used in mining operation & in transportation of Minerals. The vehicle shall be covered with a tarpaulin & shall not be overloaded.	Transport of iron ore is being carried out through dumpers from mine face to ore crushing plant using haul roads inside leasehold area. All these vehicles are being maintained in good condition to control vehicular emissions. However, after crushing & processing, the ore is brought down by covered conveyors and dispatched by railway to steel plants.
(xxx)	No Blasting shall be carried out after the sunset. Blasting operation shall, be carried out during the day time. Control Blasting shall be practiced. The mitigative measures for control of ground vibration & to arrest fly rocks & boulders should be implemented.	Blasting operation is carried out during the day time only between 1 pm to 3 pm. To control ground vibration, Non Electric Detonator with suitable delays is being used.
(xxxi)	Drills shall either be operated with dust extractors or equipped with water injection system.	All the Drilling Machines at the mines are equipped with the dust extractors / wet drilling facility to control dust from the drilling operations.
(xxxii)	Digital processing of entire lease area using remote sensing technique should be done regularly once in three year for monitoring land use pattern & report shall be submitted to the Ministry of Environment &	Digital processing of entire lease area using remote sensing technique is being done at regular interval for monitoring land use pattern. Report is also being submitted to the Ministry of Environment & Forest and its Regional Office. LULC study for the year 2019-20 has been carried out through IIT

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S.No.	CONDITION	COMPLIANCES
	Forest and its Regional Office located at Bhubaneswar.	(ISM), Dhanbad. The copy of the report is enclosed as **Annexure-8.**
(xxxiii)	Mineral handling area shall be provided with adequate no of high efficiency Dust Extractor System. Loading & unloading areas including all the transfer points should also have efficient dust control arrangements. This should be properly maintained & operated.	Dust Extractor system has been installed at Ore Processing Plant. In addition to this, sprinklers are used for dust suppression at transfer points and loading areas. Dry Fogging System is in place at ore unloading area of Ore Processing Plant. All these units are being maintained and operated on regular basis. The photographs of these facilities are enclosed as **Annexure-5.**
(xxxiv)	Sewage treatment plant shall be installed for the colony. ETP shall also be provided for the workshop and the generated during mining operation.	Septic Tanks followed by soaking pits have been provided for the quarters in cluster. Also, major domestic drains of Gua Township and Market area have been streamlined and converged into a single drain followed by 02 nos. of settling pits to provide enough retention time for the domestic effluent to settle down and oxidize the water. New township including provisions for construction of STP was proposed along-with upcoming project of Beneficiation and Pellet Plant at Gua Ore Mines. But due to delay in grant of Stage-II Forest Clearance for diversion of additional 361.295 ha area of Duarguiburu lease, the same could not be finalized. Therefore, a fresh proposal for composite study along-with designing, installation and maintenance of Sewage Treatment Plant covering the existing township and market of Gua Ore Mines has been initiated for early compliance. Installation of oil and grease trap along with vehicle washing ramp, maintenance bay and covered storage yard for proper handling of hazardous waste for the workshop effluents has been provided which is operated and maintained on regular basis. A similar facility has been provided in the Motor Garage Department to check the flow of hazardous waste in the drain.
(xxxv)	Pre-placement medical examination and periodical medical examination of the workers engaged in the project shall be carried out	Pre-placement medical examination and periodical medical examination of the workers engaged in the project are carried out and records are

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S.No.	CONDITION	COMPLIANCES
	and records maintained. For the purpose, schedule of health examination of the workers should be drawn and followed accordingly.	maintained. Schedule of health examination of the workers is also drawn and followed accordingly.
(xxxvi)	The project proponent shall take all precautionary measures during mining operation for conservation and protection of endangered fauna namely Elephant, Sloth Bear, Plan civet, Panther, Mouse deer etc. spotted in the study area. Action plan for conservation of flora and fauna prepared shall be implemented in consultation with State Forest and Wildlife Department. All the safeguard measures brought out in the Wildlife Conservation Plan prepared specific to this project site shall be effectively implemented. Necessary allocation of funds so allocated shall be included in the project cost. A copy of action plan shall be submitted to the regional office of the Ministry Of Environment and Forests, Bhubaneswar.	Government of Jharkhand has prepared Comprehensive Integrated Wildlife Management Plan (IWMP) for the West Singhbhum District, by an Expert Committee constituted by Govt. of Jharkhand under the aegis of SAIL. The IWMP has been finalized by the Govt. of Jharkhand and is under review by MoEF&CC, New Delhi for implementation. On the instance of State Govt. and MoEF&CC, SAIL Mines has submitted undertakings for proportionate contribution for implementation of the Conservation Plan. However, conservation plans prepared as part of EIA / EMP reports for the leases is being implemented on regular basis. It has been submitted that SAIL will submit the approved IWLMP report to the Office of IRO, MoEFCC, Ranchi when received from Govt. of Jharkhand.
(xxxvii)	The entire mining lease area to be fenced by erecting solar powered electric fencing all around it. The fencing so erected shall be maintained properly and the cost towards erection and maintenance of all solar powered electric fencing shall be borne by the project proponent out of the project cost.	As directed by the Forest Department, once the Integrated Wildlife Management Plan is finalized and approved, we will take up the job as per the recommendation of the IWMP. It has been submitted that SAIL will submit the approved IWLMP report to the Office of IRO, MoEFCC, Ranchi when received from Govt. of Jharkhand.
(xxviii)	No road transportation of ore outside the mine lease area shall be carried out after the sunset.	Entire iron ore from the mine is being dispatched through rail to SAIL's Steel Plants. Hence, no road transportation of ore outside the mine lease area is carried at Gua Ore Mines at this juncture.
(xxxix)	Provision shall be made for the housing of construction labour within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, crèche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.	Most of the construction labour is hired from the local villages. Labours when hired from outside the vicinity of the mines are provided full-fledged accommodation in the company along with necessary infrastructure at the existing colony of the mines.

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(xl)	The critical parameters such as RSPM (Particulate matter with size less than 10micron i.e. PM10) and NOx in the ambient air within the impact zone, peak particle velocity at 300m distance or within the nearest habitation, whichever is closer shall be monitored periodically. Further, quality of discharged water shall also be monitored {(TOS, DO, PH and Total Suspended Solids (TSS)]. The monitored data shall be uploaded on the website of the company as well as displayed on a display board at the project site at a suitable location near the main gate of the company in public domain. The Circular No.- J-20012 /1 / 2006 - IA.II(M) dated 27.05.2009 issued by Ministry of Environment and Forests, which is available on the website of the Ministry www.envfor.nic.in shall also be referred in this regard for its compliance.	Environmental Quality Monitoring covering air, water and noise quality at Gua Ore Mines is monitored regularly through JSPCB, Environment Management Division of SAIL and through in-house facilities. The data is digitally displayed in public domain near the main gate of the administrative office. Gua Ore Mines has installed a Continuous Ambient Air Quality Monitoring System (CAAQMS) for real time monitoring of Ambient Air Quality within the leasehold area. The data is digitally displayed in public domain at the Gua club site within the township. As per the monitoring and analysis of Ambient Air quality, PM_{10} ranges from 29.1 – 63.8 $\mu g/m^3$, $PM_{2.5}$ ranges from 14.7 – 36.8 $\mu g/m^3$, SO_2 ranges from 5.1- 18.8 $\mu g/m^3$ and NO_2 ranges from 6.5-25.06 $\mu g/m^3$.Similarly, water and treated waste water parameters are in the range, pH ranges from 7.39-7.9, BOD ranges from 0.6-18 mg/l, COD ranges from 6-54 mg/l. The noise level the ranges from 38.6-73.3 dB (A). The detailed report is enclosed as **Annexure-1 and Annexure-2.**
(xli)	A Final Mine Closure Plan along with details of Corpus Fund shall be submitted to the Ministry of Environment & Forests 5 years in advance of final mine closure for approval.	Noted for compliance. Gua Ore Mines will submit a Final Mine Closure Plan along with details of Corpus Fund to the Ministry of Environment, Forests& Climate Change 5 years in advance of final mine closure for approval.
(xlii)	Steps to control flow of fines in to the river stream shall be taken.	Based on a study conducted through IIT Kharagpur for identifying places vulnerable to erosion, checking surface runoff and other mitigative measures recommended have been undertaken. Following constructive measures have been undertaken which has resulted in increased retention and quality of effluent discharged from the mines thereby preventing water pollution of Karo River flowing across the township. • Settling Pits for eroded soil and earthen and concrete check dams have been constructed to arrest the flow of fines.

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		• The bank of the Zero Point Nallah has been planted with vetiver grass to provide stability to the slope. • Constructed boulder retaining walls at the foot of waste dumps and check dams to check the flow of fines during monsoons. • Bunds along the haul roads and outer periphery of the pits to ensure that no sediment laden storm water get discharged from the mined out area. Additionally, following structures have been provided for preventing water pollution: a) A trench of length 150 m, depth 3 m and width 4.5 m has been created in front of the Dam no 1 at a distance of 5m. b) Two trenches of following dimensions have been created in front of the Dam No. 2 with a gap of 20 m between the trenches: a. Length 250 m of depth 3.5 m and width 6m, distance from the dam 5m. b. Length 220 m of depth 3.5 m and width 6m, distance from the dam 5m. c) 2 trenches have been created between dam no 2 and dam no 3 with the following dimensions: a. Near to dam no 3 of length 300 m, depth 3.5 m and width 6 m at a distance of 5m from the Dam no. 3. b. Near to dam no 2 of length 200 m, depth 3.5 m and width 6 m at a distance of 10 m from the Dam no 2. d) De-siltation pit (200 m x100 m x6 m) has been created in front of the Dam no. 4 by removing 120000 m^3 of fines. Major part of the excavated silts was placed near dam no. 5 for embankment to protect flash flood from the zero point nallah and partly dispatched to steel plant after

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		blending with fresh blue dust from mines. The photographs are enclosed as **Annexure-9.**
(xliii)	A time bound action plan for consumption of accumulated fines as per approved Mine Plan/ EIA /EMP report shall be executed in the beneficiation and Pelletization Plant.	A proposal for faster utilization of fines from the fines dump at Gua Ore Mines was submitted to the MoEF&CC and EAC on 14thNov, 2014 which will be complied in view of expansion project envisaging Beneficiation and Pelletisation Plant at Gua Ore Mines.
(xliv)	In order to strengthen the management system staggered trenches shall be provided in all the earthen dams to accommodate maximum silt flow to reduce any pressure in the downstream.	The following five nos. of trenches have been provided in the earthen dams to accommodate maximum silt as well as to reduce the pressure on the dams. A) A trench of length 150 m of depth 3 m and width 4.5 m has been provided in front of the Dam no 1 at a distance of 5m. B) Two trench of following dimensions have been provided in front of the Dam No 2 with a gap of 20 m between the trenches: ➢ Length 250 m, depth 3.5 m and width 6 m, distance from the dam 5m. ➢ Length 220 m, depth 3.5 m and width 6 m, distance from the dam 5m. C) Two trenches have been provided between dam no 2 and dam no 3 with the following dimensions ➢ Length 300 m, depth 3.5 m and width 6 m at a distance of 5m from the Dam no. 3. ➢ Length 200 m, depth 3.5 m and width 6 m has been provided at a distance of 10 m from the Dam no 2. In addition to the above, a pit (200mx100mx6m) has been provided in front of the Dam no. 4 by removing 120000 m^3 of fines. Major part of the excavated silts were placed near dam no 5 for embankment to protect flash

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		flood from the zero point nalla and part of the fines were dispatched to steel plant after blending with fresh blue dust from mines.
(xlv)	The silt collected along the nallas should be removed completely before the onset of next monsoon and should be a regular practice of the mine.	Regular de-silting of all the check dams/ nallas is being carried out prior to onset and post monsoon every year. All the 5 earthen dams and 4 nos. settling pits at the foot of Fines Dump and all the sedimentation cum rainwater harvesting pits at working mines are de-silted to retain retention capacity.
(xlvi)	The slopes of the Earthen Dams should be provided with vegetative cover suitably with native species, thorny bushes and vetiver grasses as a part of biological measures of dump management.	The slopes of earthen dams have been stabilized through plantation of Vetiver. About 10,000 sq. m area of earthen dam/ silt traps slopes (Dam No 1, Dam No 3, Dam No 4 and at traps no. 1,2,3,4) has been covered through plantation of Vetiver. The photographs are enclosed as **Annexure-10**.
(xlvii)	Monitoring of all water quality parameters as per the discharge standards shall be ensure by the project management.	Water quality is being monitored regularly and reports are being submitted to Jharkhand State Pollution Control Board, Jamshedpur. The water and treated waste water parameters are in the range, pH ranges from 7.39-7.9, BOD ranges from 0.6-18 mg/l, COD ranges from 6-54 mg/l. The detailed report is enclosed as **Annexure-1 and Annexure-2.**
(xlviii)	No change in mining technology and scope of working should be made without prior approval of the Ministry of Environment & Forest.	Noted for compliance.
(xlix)	No further expansion or modifications in the beneficiation and pelletization plants shall be carried out without prior approval of the Ministry of Environment and Forest.	Noted for compliance. No further expansion or modifications in the beneficiation and pelletization plants will be carried out without prior approval of the MoEF&CC.
(l)	No change in the calendar plan including excavation, quantum of mineral iron ore and waste should be made.	There will be no change in the calendar plan including excavation, quantum of mineral iron ore and waste. ROM production at Duarguiburu Iron Ore Mine is maintained within permitted capacity in the approved EC and Mining Plan.

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(li)	Four ambient air quality-monitoring station should be established in the core zone as well as in the buffer zone for RSPM (Particulate matter with size less than 10µm i.e. PM10 and NOx monitoring. Location of the stations should be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive targets and frequency of monitoring should be undertaken in consultation with the State Pollution Control Board.	Four ambient air quality-monitoring stations are established in the core zone as well as in the buffer zone for RSPM in consultation with JSPCB. Ambient Air quality monitoring at four locations is being carried out regularly through accredited agency (JSPCB) and also through in house facility. The reports are being submitted to Jharkhand State Pollution Control Board periodically. Additionally, Gua Ore Mines has installed a Continuous Ambient Air Quality Monitoring System (CAAQMS) for real time monitoring of Ambient Air Quality within the leasehold area.
(lii)	Data on ambient air quality RSPM (Particulate matter with size less than 10µm i.e. PM_{10}) & NOx should be regularly submitted to the Ministry of Environment and Forests including its Regional Office located at Bhubaneswar and the State Pollution Control Board/ Central Pollution Control Board once in six months.	Ambient air quality monitoring data is being submitted to MoEF&CC, New Delhi and Regional Office, Ranchi along with the compliance reports. As per the monitoring and analysis of Ambient Air qualityPM_{10} ranges from 29.1 – 63.8 µg/m^3, $PM_{2.5}$ ranges from 14.7 – 36.8 µg/m^3, SO_2 ranges from 5.1- 18.8 µg/m^3 and NO_x ranges from 6.5-25.06 µg/m^3. Detailed Air Quality report for the period April, 2021 to September, 2021 is placed as **Annexure – 1 and Annexure-2**. Air quality data is also being submitted to Jharkhand State Pollution Control Board and Central Pollution Control Board.
(liii)	Fugitive dust emissions from all the sources should be controlled regularly. Water spraying arrangement of haul roads, loading and unloading and at transfer points should be provided and properly maintained.	Dust Extractor System & Dust Suppression System has been installed at ore processing areas including loading and unloading areas to control the fugitive dusts. High pressure Water Sprinklers (28 KL) have been deployed for regular water sprinkling of Haul Roads and dust prone areas. In addition to this, permanent sprinklers along the main approach haul roads at crushing plant and other crucial areas have been installed. All these units are being maintained and operated.
(liv)	Measures should be taken for control of noise levels below 85 dB (A)in the work environment. Workers engaged in operations of HEMM, etc should be provided with ear plugs / muffs.	Measures for control of noise levels are being taken regularly to maintain the noise levels below 85 dB (A). Workers engaged in operations of HEMM, Ore Crushing & Screening areas, are provided with ear plugs / muffs and are motivated from time to time to use the safety equipments for

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		the whole period of their engagement in work.
(lv)	Industrial waste water (workshop and waste water from the mine) should be properly collected, treated so as to conform to the standards prescribed under GSR 422 (E) dated 19th May, 1993 and 31st December, 1993 or as amended from time to time. Oil and grease trap should be installed before discharge or workshop effluents.	Necessary provisions for treatment & recycling of effluents from the proposed beneficiation plant will be taken during the commissioning of Beneficiation Plant. Oil and grease trap along with vehicle washing ramp, maintenance bay and covered storage yard for proper handling of hazardous waste for the workshop effluents has already been installed and the same is in operation. A similar facility has been provided in the Motor Garage Department to check the flow of hazardous waste in the drain.
(lvi)	Personnel working in dusty areas should wear protective respiratory devices and they should also be provided with adequate training and information on safety and health aspects. Occupational health surveillance program of the workers should be undertaken periodically to observe any contractions due to exposure to dust and take corrective measures, if needed.	Personal Protective Equipment (PPE) i.e. Dust masks, Helmet, Fluorescent Jacket, Safety Shoes, Goggles etc. are provided to all the workers engaged in the dust prone areas i.e. excavation & loading areas, ore handling plants, stacking & loading areas etc. Suitable training on safety and health aspects and Occupational health surveillance program are conducted regularly. A refresher training programme (MVT) fulfilling the same is carried out on monthly basis for any contractions due to exposure to dust and corrective measures are undertaken accordingly.

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(lvii)	A separate environmental management cell with suitable qualified personnel should be set-up under the control of a Senior Executive, who will report directly to the Head of the Organization.	Environmental Management Cell including laboratory has already been established at the mines. The qualified personnel have taken up the job of strengthening the Environmental Management Cell. **Hierarchy of Environment & Lease Department of Gua Ore Mines** 
(lviii)	The funds earmarked for environmental protection measures should be kept in separate account and should not be diverted for other purpose. Year wise expenditure should be reported to the Ministry of Environment and Forests and its Regional Office located at Bhubaneswar.	Funds earmarked for environmental protection measures at the mine are booked separately and not being diverted for other purpose.
(lix)	The project authorities should inform to the Regional Office located at Bhubaneswar regarding date of financial closures and final approval of the project by the concerned authorities and the date of start of land	Noted for compliance. The Duarguiburu Iron Ore Mine under Gua Ore Mines is working mine operating since 1958. Installation of various facilities under the 12.5 MTPA

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	development work.	expansions will be informed in due time after installation of the facilities.
(lx)	The Regional Office of this Ministry located at Bhubaneswar shall monitor compliance of the stipulated conditions. The project authorities should extend full cooperation to the officer (s) of the Regional Office by furnishing the requisite data / information / monitoring reports.	Full co-operation is being extended to the officers of the Regional Office, MoEF&CC, Ranchi, by furnishing the requisite data/ information / monitoring reports.
(lxi)	The project proponent shall submit six monthly reports on the status of compliance of the stipulated environmental clearance conditions including results of monitored data (both in hard copies as well as by email) to the Ministry of Environment and Forests, its Regional Office, Bhubaneswar, the respective Zonal Office of Central Pollution Control Board the State Pollution Control Board. The proponent shall upload the status of compliance of the environmental clearance conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of the Ministry of Environment and Forests, Bhubaneswar, the respective Zonal Office of Central Pollution Control Board and the State Pollution Control Board.	Six monthly compliance reports on the status of implementation of environmental safeguards are being submitted to MoEF&CC, New Delhi, Regional Office – MoEF&CC, Ranchi, Central Pollution Control Board and State Pollution Control Board. Copy of the compliance report including environmental quality data is uploaded to the SAIL web site i.e. **www.sail.co.in**.
(lxii)	A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, Zila Parishad / Municipal Corporation, Urban Local Body and the Local NGO, if any, from whom suggestions / representations, if any, were received while processing the proposal. The clearance letter shall also be put on the website of the Company by the proponent.	Copies of the Environmental Clearance were sent to local Member of Panchayat & Zila Parishad at the time of Grant. The clearance letter is displayed on the Company website i.e. **www.sail.co.in**.
(lxiii)	The State Pollution Control Board should display a copy of the clearance letter at the Regional Office, District Industry Centre and the	Copies of the Environmental Clearance were sent to JSPCB and its regional office at Jamshedpur at the time of Grant.

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S.No.	CONDITION	COMPLIANCES
	Collector's Office/ Tehsildar's Office for 30days.	
(lxiv)	The environmental statement for each financial year ending 31s March in Form V as is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of environmental clearance conditions and shall also be sent to the Regional Office of the Ministry of Environment and Forests, Bhubaneswar by e-mail.	Environmental Statement for each financial year ending 31stMarch in Form V is submitted annually. Environment Statement for the financial year 2020-21was submitted to the Jharkhand State Pollution Control Board (JSPCB) vide letter no. GUA/E&L/ES/2021-22/138dated 02.08.2021.
(lxv)	The project authorities should advertise at least in two local newspapers of the District or State in which the project is located and widely circulated, one of which shall be in the vernacular language of the locality concerned, within 7 days of the issue of the clearance letter informing that the project has been accorded environmental clearance and a copy of the clearance letter is available with the State Pollution Control Board and also at web site of the Ministry of Environment and Forests at http://envfor.nic.in and a copy of the same should be forwarded to the Regional Office of this Ministry located at Bhubaneswar.	Advertisement was published in two daily newspapers on 30.03.2013. (Dainik Bhaskar Daily, Jamshedpur edition on 30.03.2013 and Dainik Jagran Daily edition on 30.03.2013). Also Local Zila Parishad Members, Gram Panchayat Members, Manky & Mundas etc were intimated about the issuance of environment clearance. Copy of the same already been submitted with previous compliance report.
Compliance of additional specific conditions for amendment in EC vide order no. J-11015/453/2008-IA.II(M) dated 06.11.2020. :		
17 (I)	Fines from the fines dump shall not be excavated during the monsoon period as well as heavy rain days.	Noted for compliance. Fines excavation from dump fines will be started only after grant of CTE/CTO for sale of fines which is in progress with JSPCB, Jharkhand. The fines from the fines dump will not be excavated during the monsoon period as well as heavy rain days.
17 (II)	Recommendations of IIT, Kharagpur for safe excavation of fines from	The recommendations of IIT, Kharagpur will be implemented for safe

(Sankar Prasad Das)
G.M. (Mines) & E&L
Gua Ore Mines, SAIL - RSP

S.No.	CONDITION	COMPLIANCES
	the fines dump, slope condition assessment, runoff management, etc., shall be implemented and same to be intimated to Regional Office, MoEF&CC along with six monthly EC compliance reports. The project proponent shall also obtain other statutory permissions required for dump mining and adhered to.	excavation of fines from the fines dump, slope condition assessment, run off management, etc. Six monthly compliance reports on the status of implementation of environmental safeguards are being submitted to MoEF&CC, New Delhi, Regional Office – MoEF&CC. All the statutory permission required for dump mining will be obtained and adhered to.
17 (III)	Mitigative measures proposed for excavation and transportation of mineral shall be complied with including moist and covered.	All the mitigative measures proposed for excavation and transportation of mineral will be implemented
17 (IV)	The project proponent shall monitor the dust levels along the transportation route to Barajamda and shall deploy adequate mobile road water sprinklers to control dust emissions along the ore transport routes.	Noted for compliance.

27/11/24

(S. P. Das)
General Manager (Mines) and E&L
GUA ORE MINES
STEEL AUTHORITY OF INDIA LIMITED (SAIL)
BOKARO STEEL PLANT

(Sankar Prasad Das)
G.M. (Mines) & E&L
Gua Ore Mines, SAIL - BSL

(Sankar Prasad Das)
G.M. (Mines) & E&L
Gua Ore Mines, SAIL - BSL

JHARKHAND STATE POLLUTION CONTROL BOARD

REGIONAL OFFICE-CUM-LABORATORY, MB/15 NEW HOUSING COLONY
ADITYAPUR, JAMSHEDPUR.
Web Site- jspcb.org/ Phone– 0657-2383241/ Fax- 0657-2383905

Lab. Ref. No:- 758/2021 *Dated- .....*

Analysis Report of Physico Chemical Examination of Sewage/Trade

1. Name and Address of the Unit :- M/S Gua Ore Mines, Gua, Dist.- East Singhbhum.
2. Point of Collection :-Final outlet Mines water near Kali mandir.
3. Date and Time of Collection :- 07.08.2021 at 10.30 AM
4. Collected by :- Regional office-cum-Laboratory.
5. Sample Source :-I/E

Sl. No.	Particulars	Limit	Value Obtained
1.	Temp. A/W	> 40° c	34.1/31.7
2.	PH	5.5 to 9.0	7.7
3.	BOD3 mg/lt.	30.0	6.0
4.	COD mg/lt.	250.0	48.0
5.	T.S mg/lt.	-	468.0
6.	T.S.S mg/lt.	100.00	218.0
7.	T.D.S.mg/lt.	-	250.0

Remarks :- The value of TSS was observed beyond the limit prescribed.

17.08.2021
A.S.O.
Jamshedpur

17/08/2021.
C.E
Jamshedpur

17.08.2021
Regional Officer
Jamshedpur

24/08/2021
Board Analyst

(Sankar Prasad Dutt)
G.M. (Mines) & CEL
Gua Ore Mines, SAIL - BSL

JHARKHAND STATE POLLUTION CONTROL BOARD

REGIONAL OFFICE-CUM-LABORATORY, MB/15 NEW HOUSING COLONY
ADITYAPUR, JAMSHEDPUR.
Web Site- Jspcb.org/ Phone– 0657-2383241/ Fax- 0657-2383905

Lab. Ref. No:- 759/2021 *Dated- .....*

Analysis Report of Physico Chemical Examination of Sewage/Trade

1.Name and Address of the Unit :- M/S Gua Ore Mines, Gua, Dist.- East Singhbhum.

2. Point of Collection :-Final outlet Near Railway Bridge

3. Date and Time of Collection :- 07.08.2021 at 11.20 AM

4. Collected by :- Regional office-cum-Laboratory.

5. Sample Source :-D/E

Sl. No.	Particulars	Limit	Value Obtainied
1.	Temp. A/W	-	34.3/31.5
2.	PH	-	7.9
3.	BOD3 mg/lt.	20.0	18.0
4.	COD mg/lt.	-	54.0
5.	T.S mg/lt.	-	554.0
6.	T.S.S mg/lt.	30.00	166.0
7.	T.D.S.mg/lt.	-	388.0

Remarks :- The value of TSS was observed beyond the limit prescribed.

17.08.2021
A.S.O.
Jamshedpur

18/08/2021
C.E
Jamshedpur

17.08.2021
Regional Officer
Jamshedpur

7/8/2021
Board Analyst

(Sankar Prasad Das)
G.M. (Mines) & F&L
Gua Ore Mines, SAIL - BSL

JHARKHAND STATE POLLUTION CONTROL BOARD

REGIONAL OFFICE-CUM-LABORATORY, MB/15 NEW HOUSING COLONY
ADITYAPUR, JAMSHEDPUR.
Web Site- jspcb.org/ Phone– 0657-2383241/ Fax- 0657-2383905

Lab. Ref. No:- 760/2021 *Dated- .....*

Analysis Report of Physico Chemical Examination of Sewage/Trade Effluent

1. Name of Sampling point : **M/s Gua Iron Ore Mines, At- Gua, Dist- West Singhbhum.**
2. Point of Collection : U/S Karo River
3. Date and time of Collection : 07.08.2021 at 10.40 AM
4. Collected By : Regional Office Cum- Laboratory, Jamshedpur
5. Sample Source : River

Sl. No.	Particulars	Value obtained
1.	Temp A/W	33.4/29.2
2.	pH	7.5
3.	BOD_3 mg/lt	0.6
4	COD mg/lt	6.0
5.	T.S. mg/lt	414.0
6.	T.S.S. mg/lt	106.0
7.	T.D.S mg/lt	308.0
8.	Total hardness mg/lt	108.0
9.	Calcium mg/lt	27.2
10.	Magnesium mg/lt	09.76
11.	Alkalinity mg/lt	92.0
12.	Chloride mg/lt	26.0

17.08.2021
A.S.O.
Jamshedpur

17/08/2021
C.E
Jamshedpur

17.08.2021
Regional Officer
Jamshedpur

24/08/2021
Board Analyst

(Sankar Prasad Das)
G.M. (Mines) & EIC
Gua Ore Mines, SAIL - BSL

JHARKHAND STATE POLLUTION CONTROL BOARD

REGIONAL OFFICE-CUM-LABORATORY, MB/15 NEW HOUSING COLONY
ADITYAPUR, JAMSHEDPUR.
Web Site- jspcb.org/ Phone– 0657-2383241/ Fax- 0657-2383905

Lab. Ref. No:- 761/2021 *Dated- .....*

Analysis Report of Physico Chemical Examination of Sewage/Trade Effluent

1. Name of Sampling point : **M/s Gua Iron Ore Mines, At- Gua, Dist- West Singhbhum.**
2. Point of Collection : D/S Karo River
3. Date and time of Collection : 07.08.2021 at 11.50 AM
4. Collected By : Regional Office Cum- Laboratory, Jamshedpur
5. Sample Source : River

Sl. No.	Particulars	Value obtained
1.	Temp A/W	35.2/32.5
2.	pH	7.6
3.	BOD_3 mg/lt	1.2
4.	COD mg/lt	14.0
5.	T.S. mg/lt	476.0
6.	T.S.S. mg/lt	122.0
7.	T.D.S mg/lt	354.0
8.	Total hardness mg/lt	128.0
9.	Calcium mg/lt	31.2
10.	Magnesium mg/lt	12.2
11.	Alkalinity mg/lt	104.0
12.	Chloride mg/lt	34.0

17.08.2021
A.S.O.
Jamshedpur

17/08/2021
C.E
Jamshedpur

12.08.2021
Regional Officer
Jamshedpur

24/08/2021
Board Analyst

(Sankar Prasad Das)
G.M. (Mines) & E&L
Gua Ore Mines, SAIL - BSL

JHARKHAND STATE POLLUTION CONTROL BOARD
ADITYAPUR, JAMSHEDPUR

AMBIENT AIR QUALITY REPORT (R&D)

Lab. Ref. No- 26/2021

Name of the Industry :- **M/s Gua Ore Mines,**
Gua, Dist- West Singhbhum.

No. of Sampling Point-03
Sampling Position:

1. Near Club
2. Near Env. Laboratory
3. Near Mines Canteen

Date of Sampling :- 06/08/2021
Weather Condition :- Cloudy/Rainy.

Time	SO_2	NOx	RSPM
			Norms in ug/m3 SO2 - 80 NOx - 80 RSPM -100
Point - 1			
12.30 PM TO 04.30PM	16.99	19.42	111.83
04.30 PM TO 08.30 PM	15.35	18.17	
08.30 PM TO 12.30 AM	12.61	21.30	69.77
12.30 AM TO 04.30 AM	13.70	23.81	
04.30 AM TO 08.30 AM	12.06	22.55	80.50
08.30 AM TO 12.30 PM	09.32	15.66	
Maximum	16.99	23.81	111.83
Average	13.34	20.15	87.36
Point-2			
12.50 PM TO 04.50 PM	15.35	25.06	86.30
04.50 PM TO 08.50 PM	11.51	18.79	
08.50 PM TO 12.50 AM	13.15	21.93	67.16
12.50 AM TO 04.50 AM	10.96	16.91	
04.50 AM TO 08.50 AM	08.77	15.03	72.74
08.50 AM TO 12.50 PM	09.86	13.78	
Maximum	15.35	25.06	86.30
Average	11.60	18.78	75.40
Point- 3			
01.20 PM TO 05.20 PM	08.22	23.78	74.59
05.20 PM TO 09.20 PM	10.41	17.54	
09.20 PM TO 01.20 AM	12.61	20.67	56.83
01.20 AM TO 05.20 AM	08.77	16.29	
05.20 AM TO 09.20 AM	07.67	11.90	68.66
09.20 AM TO 01.20 PM	06.57	13.78	
Maximum	12.61	23.18	74.59
Average	09.04	17.23	66.69

Note :- All value are expressed in micro gram/ cubic meter
Remarks :- The value of all parameters were observed within the limit prescribed.

17.08.2021
ASO

17.08.2021
Regional Officer

24/08/2021
Board Analyst

(Dey Prasad Das)
G.M. (Mines) & EGL
Gua Ore Mines, SAIL - BSL

JHARKHAND STATE POLLUTION CONTROL BOARD

REGIONAL OFFICE-CUM-LABORATORY, MB/15, NEW HOUSING COLONY,
ADITYAPUR, JAMSHEDPUR.

Lab. Ref. No. – 27/2021

NOISE LEVEL

The Equivalent Noise Level dB(A) at various location inside the premises of **M/S Gua Ore Mines, Gua, Dist.- West Singhbhum taken on 07 /08/2021 from 11.30 AM to 12.30 PM.**

Sl. No.	Location	Status of operation of plant	Prescribed limit in day time	Noise level dB(A)
1.	Near Gua Club	Operation	75 dB (A)	59.7
2.	Near Quality Control and Env. Lab.	-do-	75 dB (A)	73.3
3.	Near Mines Canteen	-do-	75 dB (A)	55.6

Remarks :- The value of Noise level at all the point were observed within the limit prescribed.

17.08.2021
A S O
Jamshedpur.

17.08.2021
Regional Officer
Jamshedpur.

24/08/2021
Board Analyst

(Sankar Prasad Das)
G.M. (Mines) & EAL
Gua Ore Mines, SAIL - BSL

Annexure-2

Gua Ore Mines
Environment Management Cell

Ambient Air Quality Monitoring Report

Period: April, 2021 to Septembet, 2021

	PM_{10} (µg/m³)		
Location	**Min**	**Max**	**Average**
Near Hospital	29.1	41.4	34.9
Near Environment & QC Lab	50.8	58.8	53.8
Near Gua Club	43.1	55.1	49.0
Near Time Office	51.6	63.8	57.5
Standard as per NAAQS			***100***
	$PM_{2.5}$ (µg/m³)		
Location	**Min**	**Max**	**Average**
Near Hospital	14.7	22.3	18.1
Near Environment & QC Lab	23.4	30.3	26.6
Near Gua Club	21.4	25.7	23.1
Near Time Office	25.3	36.8	30.2
Standard as per NAAQS			***60***
	SO_2 (µg/m³)		
Location	**Min**	**Max**	**Average**
Near Hospital	5.1	7.9	6.3
Near Environment & QC Lab	7.8	10.3	9.1
Near Gua Club	8.3	11.3	10.0
Near Time Office	12.3	18.8	15.3
Standard as per NAAQS			***80***
	NO_x (µg/m³)		
Location	**Min**	**Max**	**Average**
Near Hospital	6.5	8.6	7.3
Near Environment & QC Lab	8.9	11.5	10.0
Near Gua Club	12.1	15.3	13.8
Near Time Office	14.9	22.1	17.7
Standard as per NAAQS			***80***

27-11-2021

(Dharmendra Sethia)
MTT (Environment)

27/11/2021

(Alok Kumar Yadav)
Manager (F&E)

(Sankar Prasad Das)
G.M. (Mines) & E&L
Gua Ore Mines, SAIL - JSL

Annexure-2

Noise Level Monitoring Report

Period: April, 2021 to September, 2021

Location	Observed Noise Level dB(A)		
	Min	Max	Average
Near Hospital	38.6	42.3	40.9
Near Environment & QC Lab	63.9	65.8	65.0
Near General Office	54.0	57.3	55.6
Near Time Office	62.3	67.3	64.4
Near workshop	65.9	70.3	68.9
Near Mines canteen	55.1	56.4	55.9
Prescribed Day Limit dB (A)	75		

Mines Effluent Analysis Report

Period: April, 2021 to September, 2021

Parameters	Unit	Observed Value		
		Min	Max	Average
pH	-	7.39	7.55	7.48
Turbidity	NTU	3.3	10.1	7.05
Hardness	mg/l	54.8	68	61.90
TSS	mg/l	28.9	54.3	43.72
COD	mg/l	28	45	35.33

27-11-2021

(Dharmendra Sethia)
MTT (Environment)

9/11/2021

(Alok Kumar Yadav)
Manager (F&E)

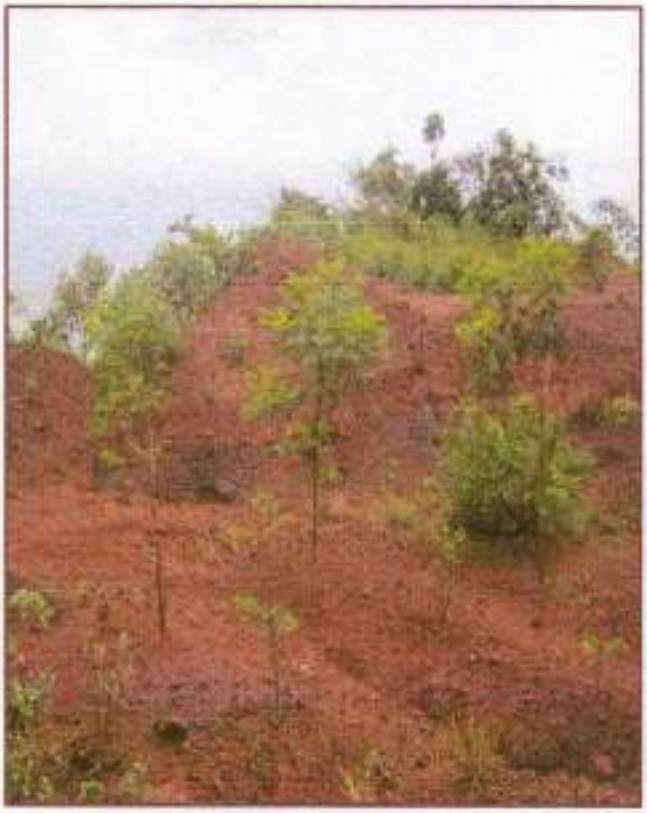
(Sankar Prasad Das)
G.M. (Mines) & E&I
Gua Ore Mines, SAIL - BSL

Annexure-3

Photographs showing measures undertaken for management of Waste Dump

Photo: Stabilized Old Waste Dump

Photo: Partially Stabilized Portion of Existing Dump



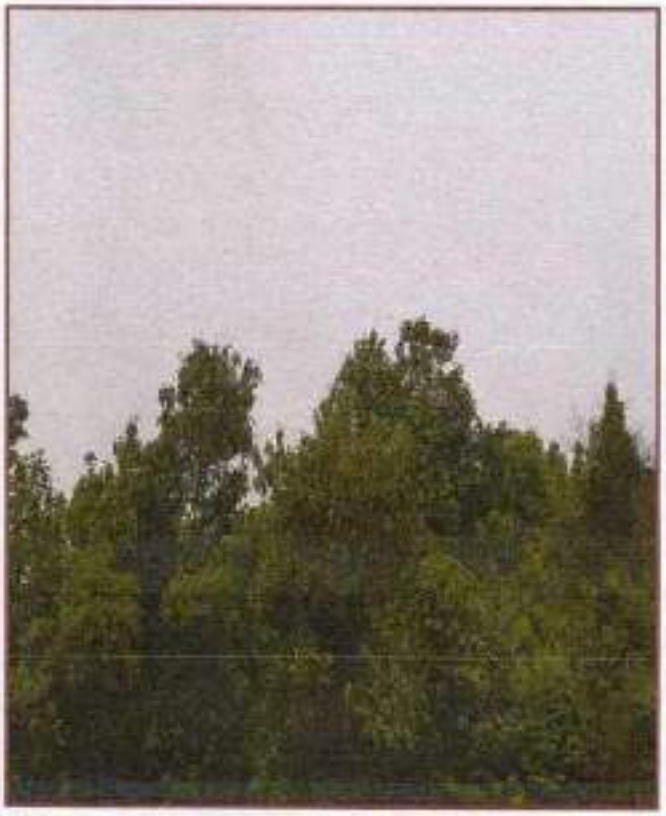


Photo: Stabilized Old Waste Dump

(Sanko[illegible] Das)
G.M. (Mines) & E&L
Gua Ore Mines, SAIL - BSL

Annexure-4

Photographs showing Earthen & Concrete Check Dams at Gua Ore Mines

Photo: Earthen Dams and Sedimentation Traps at the slope of Fines Heap

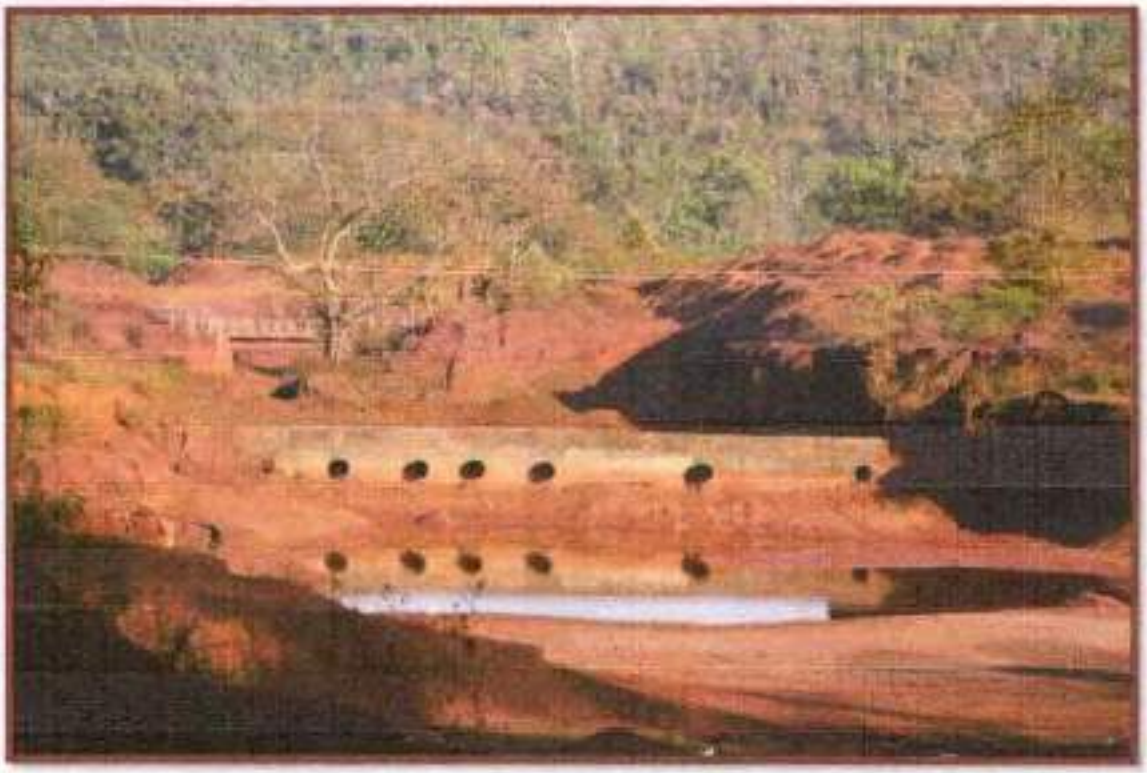


Photo: Concrete Check dam at Dam No.-5 towards zero point nallah

(Sankar Prasad Das)
G.M. (Mines) & I&L
Gua Ore Mines, SAIL - BSL

Photo: Settling cum Harvesting Pits along-with vetiver plantation near Zero Point Nalla

Photographs showing Rain Water Harvesting Cum Settling Pond at Mines

Photo: Rain Water Harvesting cum Settling Pond at IInd Level Area of Mines

(Sankar Prasad Das)
G.M. (Mines) & S&L
Gua Ore Mines, SAIL - BSL

Photo: Rain Water Harvesting Cum Settling Pond at HD Buru Area of Mines

Photo: Rain Water Harvesting Cum Settling Pond at Bai Hill Area of Mines

(Sankar Prasad Das)
G.M. (Mines) & E&L
Gua Ore Mines, SAIL - BSL

Photo: Desilting of Earthen Dams and Settling Pits

(Sankar Prosad Das)
G.M. (Mines) & E&L
Gua Ore Mines, SAIL - BSL

Photo: Concrete check dam at Zero point area

Photo: Boulder wall constructed at the toe of Ranichua waste dump area

(Sankar Prasad Das)
G.M. (Mines) & EBL
Gua Ore Mines, SAIL - BSL

Photo: Boulder Wall the bottom of OT Hill Waste Dump

Photo: Garland Drain to divert runoff water into the pits

(Sankar Prasad Das)
G.M. (Mines) & S.E.
Gua Ore Mines, SAIL - BSL

Annexure-5

Photographs showing Measures undertaken for Management of Air Pollution

Photograph 1: Haul Road Water Sprinklers

Photograph 2: Permanent Road Sprinklers in Mines

Photograph 3: Permanent Road Sprinklers in Township

Photograph 4: Permanent Sprinklers at OHP

Photograph 5: Dry Fog Dust Suppression System at Hopper

Photograph 6: Dust Extraction System at Crushing Plant

(Sankar Prasad Das)
G.M. (Mines) & E&C
Gua Ore Mines, SAIL - BSL

Annexure- 6

Photographs of Plantation carried out in Gua Ore Mines during FY-2021-22

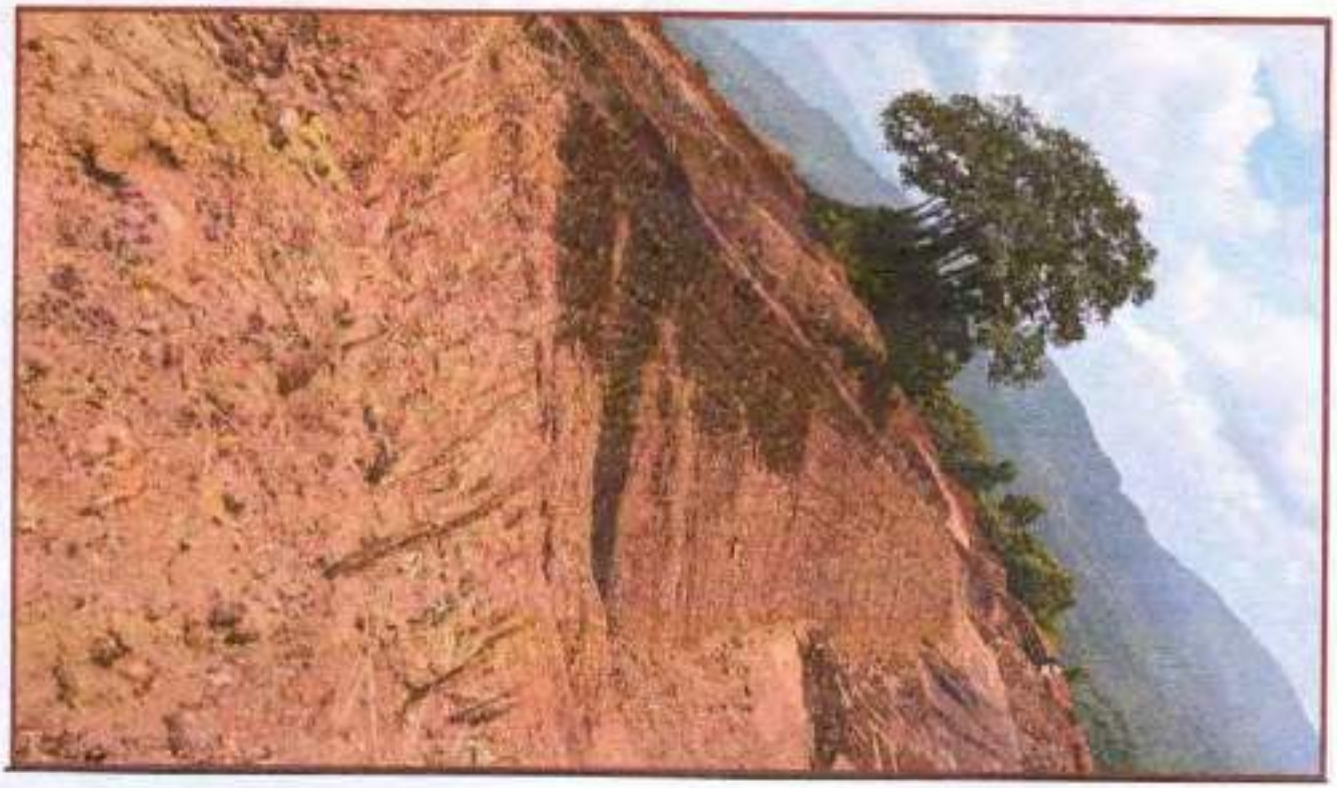


Photo: Saplings and Hedge Plantation at OT Hill Barren Slope Area

Photo: Saplings, Hedge and Grass Plantation at OT Hill Barren Slope Area

Photo: Matured saplings and Hedge planted last year at the slope of newly constructed DB road

(Sankar Prasad Das)
G.M. (Mines) & EBL
Gua Ore Mines, SAIL - BSL

Photo: Saplings and Hedge Plantation at Bai Hill Barren Slope Area

(Sankar Prasad Das)
G.M. (Mines) & E&I
Gua Ore Mines, SAIL - BSL

Photo: Saplings plantation at Jhillingburu Mines area

(Sankar Prasad Das)
G.M. (Mines) & E&L
Gua Ore Mines, SAIL - BSL

Photo: Matured saplings and hedge planted last year at Ranichua Waste Dump Area

Photo: Matured saplings and hedge planted last year at Jhillingburu Mines Area

(Sankar Prasad Das)
G.M. (Mines) & E&L
Gua Ore Mines, SAIL - BSL

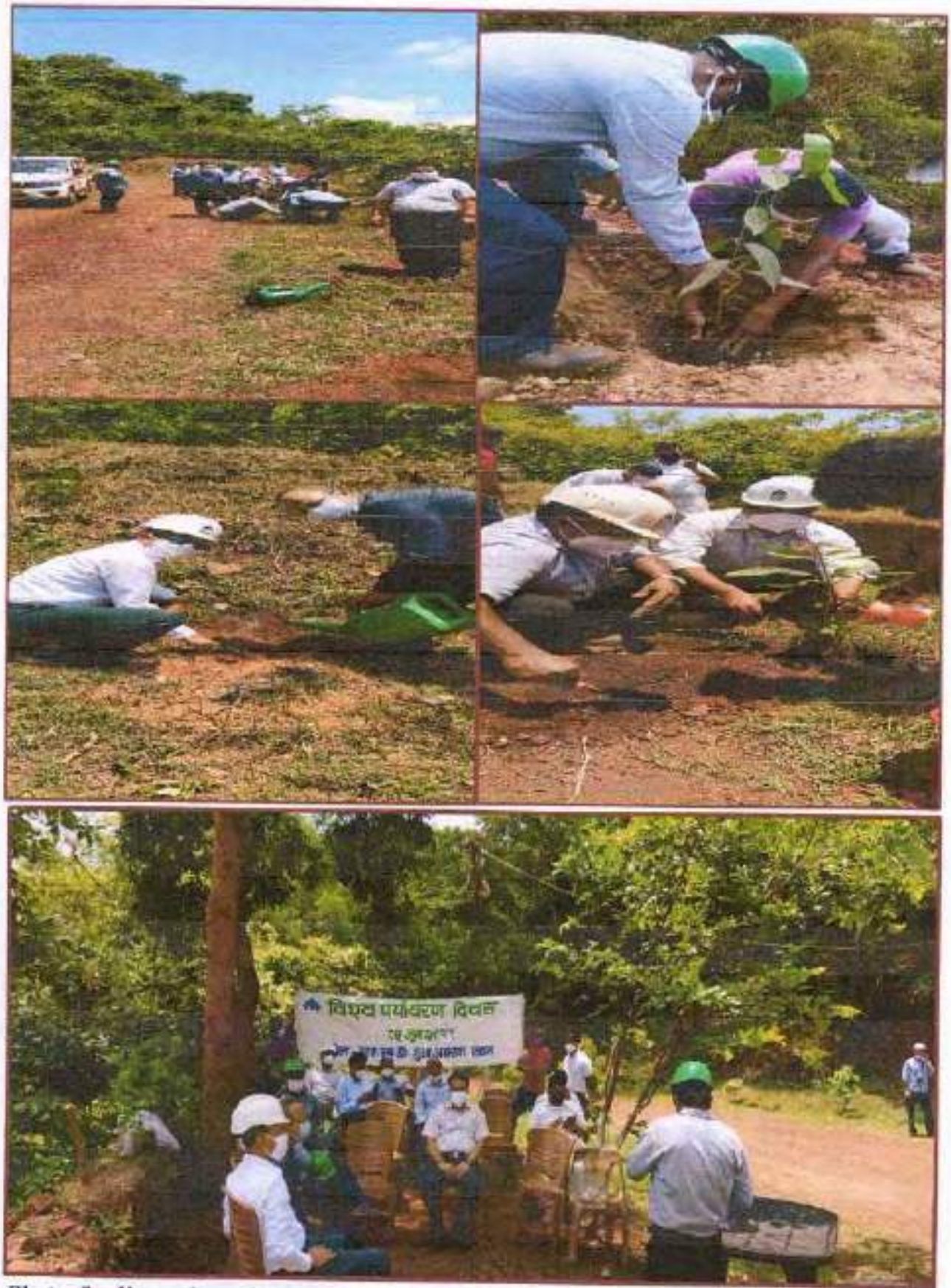


Photo: Saplings plantation and general awareness programme on World Environment Day 2021

[Sankar Prasad Das]
G.M. (Mines) & E&L
Goa Ore Mines, SAIL - BSL

Wildlife Week celebrations at Gua mines

Gua, Oct 5: Wildlife Week celebrations got underway under the aegis of Forest Department at SAIL, Gua Mines. It was launched with tree plantation by officials of the SAIL management. An awareness campaign was organized by the Department of Environment and Lease in the administrative building of SAIL on Tuesday in which Chief General Manager BK Giri and other officers and personnel of SAIL participated. The Chief General Manager B.K. Giri, Alok Yadav, (Manager, Forest and Environment), Dharmendra Sethia, (Assistant Manager, Forest and Environment), and Govind Bhajt, expressed their views and made people aware about wildlife conservation.

वन्य जीवों के संरक्षण में सभी का सहयोग जरूरी : विपिन गिरी

Photo: Saplings plantation and general awareness programme on the occasion of Van-Mahotsav and Wildlife week celebration- 2021

(Sankar Prasad Das)
G.M. (Mines) & E&L
Gua Ore Mines, SAIL - BSL

GROUND WATER LEVELS
GROUND WATER LEVELS & QUALITY

LOCATION : Guasai – Forest Bungalow (Latitude 22°12'40" N and Longitude 85°23'6" E)

Parameter	Unit	Acceptable Limit*	Permissible Limit*	Quarter – 1 (June, 21)	Quarter – 2 (August, 21)
Depth of Water Table below Ground Level	m	-	-	7.3	4.1
Quality					
pH	-	6.5 – 8.5	No relaxation	7.2	7.15
Turbidity	NTU	1	5	0.48	0.6
Dissolved Solids	mg/l	500	2000	230	250
Iron (as Fe)	mg/l	0.3	No relaxation	0.05	0.08
Manganese (as Mn)	mg/l	0.1	0.3	0.03	0.04

LOCATION : Ghatkuri Village (Latitude 22°17'50" N and Longitude 85°23'59 " E)

Parameter	Unit	Acceptable Limit*	Permissible Limit*	Quarter – 1 (June, 21)	Quarter – 2 (August, 21)
Depth of Water Table below Ground Level	M	-	-	6.4	3.9
Quality					
pH	-	6.5 – 8.5	6.5 – 8.5	7.12	7.23
Turbidity	NTU	1	5	0.50	0.58
Dissolved Solids	mg/l	500	2000	242	257
Iron (as Fe)	mg/l	0.3	0.3	0.10	0.18
Manganese (as Mn)	mg/l	0.1	0.3	0.02	0.04

LOCATION : ChotaNagra-Baihatu Village (Latitude 22°14'45" N and Longitude 85°18'31" E)

Parameter	Unit	Acceptable Limit*	Permissible Limit*	Quarter – 1 (June, 21)	Quarter – 2 (August, 21)
Depth of Water Table below Ground Level	m	-	-	6.7	3.9
Quality					
pH	-	6.5 – 8.5	6.5 – 8.5	7.0	7.15
Turbidity	NTU	1	5	0.3	0.5
Dissolved Solids	mg/l	500	2000	205	220
Iron (as Fe)	mg/l	0.3	0.3	0.06	0.08
Manganese (as Mn)	mg/l	0.1	0.3	0.04	0.05

LOCATION : Baraiburu Near Pool (Latitude 22°8'37" N and Longitude 85°20'41" E)

Parameter	Unit	Acceptable Limit*	Permissible Limit*	Quarter – 1 (June, 21)	Quarter – 2 (August, 21)
Depth of Water Table below Ground Level	m	-	-	8.4	6.2
Quality					
pH	-	6.5 – 8.5	6.5 – 8.5	7.3	7.28
Turbidity	NTU	1	5	0.6	0.7
Dissolved Solids	mg/l	500	2000	246	260
Iron (as Fe)	mg/l	0.3	0.3	0.10	0.16
Manganese (as Mn)	mg/l	0.1	0.3	0.04	0.04

*as per Drinking Water Specification IS:10500: 2012

Note: The photographs of groundwater level measurement and its sampling are shown in the next page

27-11-2021

(Dharmendra Sethia)
MTT (Environment)

27/11/2021

(Alok Kumar Yadav)
Manager (F&E)

(Sankar Prasad Das)
G.M. (Mines) & E&I
Gua Ore Mines, SAIL - BSL

Groundwater level measurement and its sampling at 4 locations namely Guasai-Forest Bungalow, Ghatkuri, Chhotanagra-Baihatu, and Baraiburu villages

Location: Baraiburu Village

Location: Ghatkuri -Gangda Village

Location : Ghatkuri- Gangda Village

Location: Ghatkuri-Gangda Village

Location: Forest Bungalow

Location: Chhotanagra- Baihatu

(Sankar Prasad Das)
G.M. (Mines) & F&I
Gua Ore Mines, SAIL - BSL

Annexure-8

LAND USE AND LAND COVER MAPS FOR DUARGUIBURU, JHILLINGBURU I, JHILLINGBURU II, TOPAILORE MINING LEASES AREA OF GUA ORE MINES

Sponsored by

Steel Authority of India Limited

Raw Materials Division

Consultant-in-Charge

Dr. Vasanta Govind Kumar Villuri

Assistant Professor

Department of Mining Engineering

Indian Institute of Technology (Indian School of Mines), Dhanbad

July 2019

(Sanjay Kumar Das)
G.M. (Mines) & I/C
Gua Ore Mines, SAIL - IISCO

Introduction

Land Use Land Cover Land studies are carried out to reveal how much of a region is covered by forests, wetlands, impervious surfaces, agriculture, and other land and water types. The water types include wetlands or open water. The Land Use information describes how people use the landscape. Such uses include developmental use, conservation related use, or mixed uses.

Land use and land cover map of Gua Ore Mines, Jharkhand have been developed from Linear Imaging Self scanning Sensor (LISS) data obtained from Indian Remote Sensing satellite- Resource sat-2, LISS-IV (2019) sensor and Cartosat 2 (2019) . The satellite images so obtained were processed applying supervised classification method have using the Erdas Imagine software. The Land Use Land Cover has been classified in six classes, which are built-up land, open forest, dense forest, agricultural land, wasted land and water body. The areas under each of these classes were estimated on the basis of the pixel grid cell process in Erdas Imagine software following the rules of NRSC/ISRO Land Use and Cover Monitoring. The theme of Gua Ore Mines, Jharkhand LULC is given in the following **Table 1**.

Table-1. Descriptions of land use and land cover classes (Source- NRSC/ISRO)

Sl.	Description-1	Description-2	Remark
1.	Built-up Land	Urban	Residential, Mixed built up, Public / Semi Public, Communication, Public utilities /facility, Commercial, Transportation, Reclaimed land, Vegetated Area, Recreational, Industrial, Industrial / Mine dump, Ash/ Cooling pond.
		Rural	Rural.
		Mining	Mine / Quarry, Abandoned Mine Pit, Land fill area.
2.	Agriculture Land	Crop land	Kharif, Rabi, Zaid, Two cropped, More than two cropped.
		Plantation	Plantation-Agricultural, Horticultural, Agro Horticultural.

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		Fallow	Current and Long Fallow.
		Current Shifting cultivation	Current Shifting cultivation.
3.	Forest Land	Evergreen/Semi evergreen	Dense / Closed and Open category of Evergreen / Semi evergreen.
		Deciduous	Dense / Closed and Open category of Deciduous and Tree Clad Area.
		Forest Plantation	Forest Plantation.
		Scrub Forest	Scrub Forest, Forest Blank, Current &Abandoned Shifting Cultivation.
		Swamp/ Mangroves	Dense / Closed & Open Mangrove.
4.	Barren/ uncultivable/ Wastelands	Salt Affected Land	Slight, Moderate & Strong Salt Affected Land.
		Gullied/ Ravinous Land	Gullied, Shallow ravine & Deep ravine area.
		Scrub land	Dense / Closed and Open category of scrub land.
		Sandy area	Desertic, Coastal, Riverine sandy area.
		Barren rocky	Barren rocky.
		Rann	Rann.
5.	Wetlands/Water Bodies	Inland Wetland	Inland Natural and Inland Manmade wetland
		Coastal Wetland	Coastal Natural and Coastal Manmade wetland
		River / Stream / canals	Perennial & Dry River/stream and line & unlined canal/drain
		Water bodies	Perennial, Dry, Kharif, Rabi &Zaid extent of lake/pond and reservoir and tanks

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Built-up land: It is an area of human habitation developed due to non-agricultural use and that has a cover of buildings, transport and communication, utilities in association with water, vegetation and vacant land. LULC map consists of 3 classes under built-up viz., urban, rural and mining. In this region, ore mining town have emerged Gua Ore Mines.

Forest: The term forest is used to refer to land with a tree canopy cover of more than 10 percent and area of more than 0.5 ha. Forests are determined by both the presence of trees and the absence of other predominant land uses. The trees should be able to reach a minimum height of 5 m. The two categories i.e. open forest and dense forest is predominant in Gua Ore Mines.

Wasted land or Wet land: Wasted lands are those areas where the water table is at, near, or above the land surface for a significant part of most years. The hydrologic regime is such that aquatic or hydrophyte vegetation usually is established, although alluvial and tidal flats may be no vegetated. Wastelands frequently are associated and topographic lows, even in mountainous regions.

Water body: This category comprises areas with surface water in the form of ponds, river, lakes, tanks and reservoirs. Rivers/streams are natural course of water flowing on the land surface along a definite channel/slope regularly or intermittently towards a sea in most cases or in to a lake or an inland basin in desert areas or a marsh or another river. Canals are artificial watercourse constructed for irrigation, navigation or to drain out excess water from agricultural lands.

Agricultural land: These are the lands primarily used for farming and for production of food, fiber, and other commercial and horticultural crops. Agricultural Land may be defined broadly as land used primarily for production of food and fiber. These are the areas with standing crop as on the date of Satellite overpass. Cropped areas appear in bright red to red in color with varying shape and size in a contiguous to noncontiguous pattern. They are widely distributed indifferent terrains: prominently appear in the irrigated are as irrespective of the source of irrigation. It includes Kharif, Rabi and Zaid croplands along with areas under double or triple crops.

1. Duarguiburu ore mining lease area land use and land cover:

The Duarguiburu ore mining lease area (1443.756 Ha) was classified for land use and land cover by using supervised classification technique. Five classes are identified over the study area namely dense forest (757.873 Ha), open forest (383.926 Ha), mining (218.069 Ha), barren land/waste land (58.745 Ha) and built-up (25.144 Ha) shown in Figure-1.

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Figure: 1. Land use Land cover map of Duarguiburu ore mining lease area

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2. Jhillingburu I(JH I) ore mining lease area land use and land cover:

JH I ore mining lease area (210.526 Ha) is also classified into the six classes. The distribution of areas is dense forest (75.769 Ha), open forest (93.354 Ha), mining (8.251 Ha), agricultural land and plantation (2.727 Ha), barren land/waste land (20.792 Ha) and built-up (9.633 Ha) shown in Figure-2.

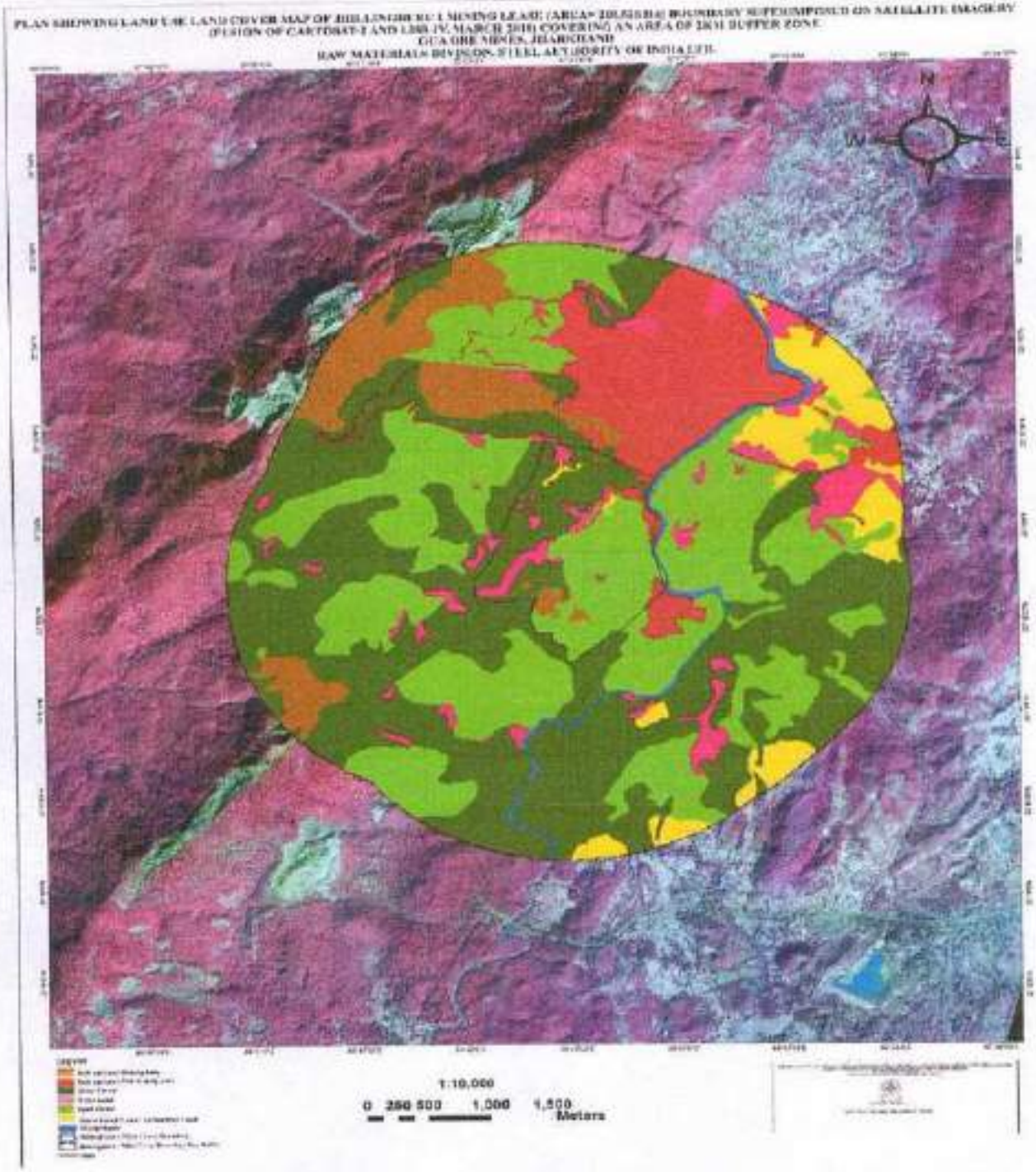

Figure: 2. Land use Land cover map of JH I ore mining lease area

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3. Jhillingburu II (JH II) mining lease area land use and land cover:

The land use and land cover classification of JH II ore mining lease area (30.43 Ha) revealed three classes, namely dense forest (15.478 Ha), open forest (9.206 Ha) and built-up (5.746 Ha) shown in Figure-3.

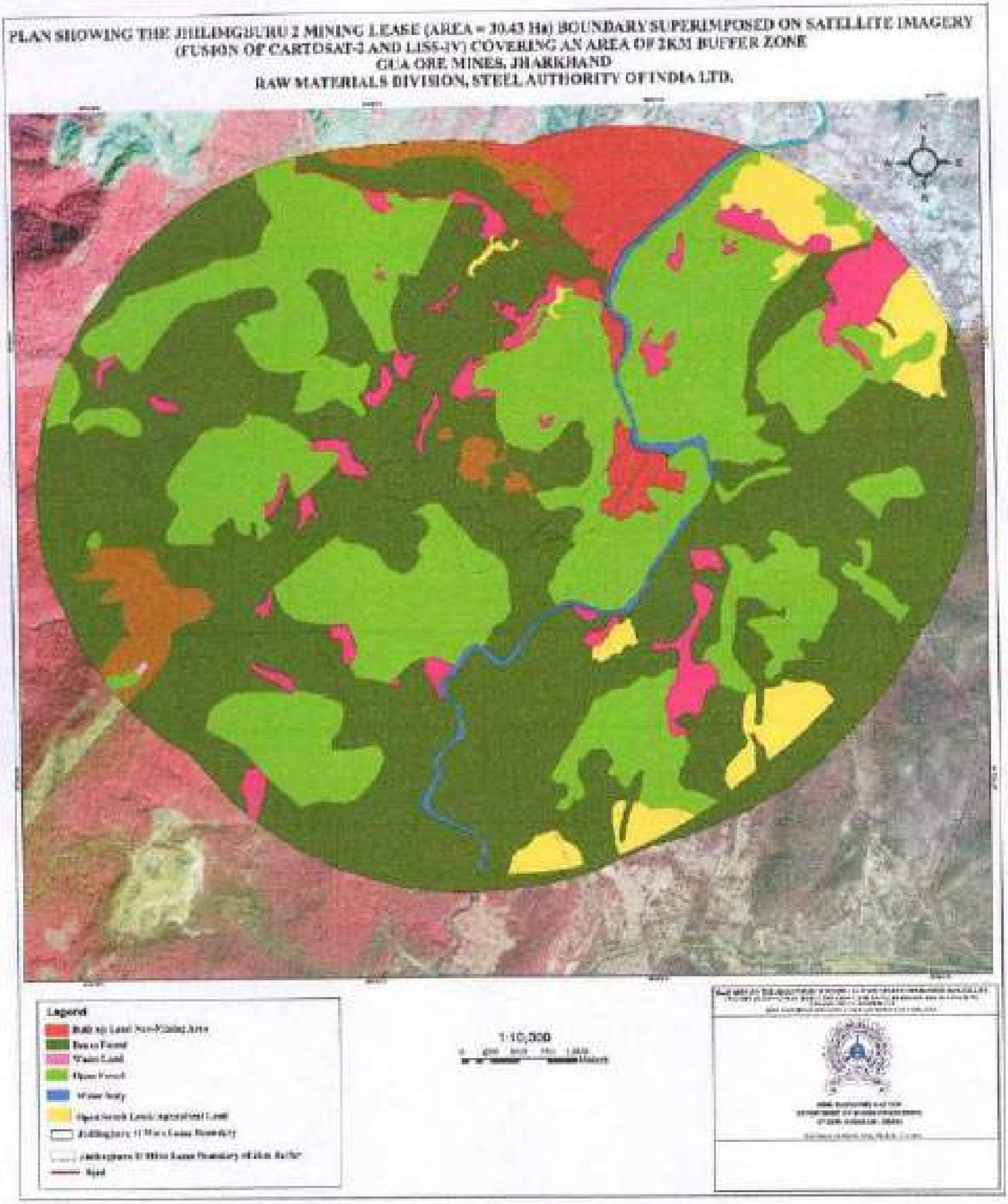

Figure: 3. Land use Land cover map of JH II mining lease area

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4. Topailore ore mining lease area land use and land cover:

The classification of Topailore ore mining lease area (14.16 Ha) revealed that there is dense forest (1.066 Ha) and mining (13.094 Ha) shown in Figure-4.

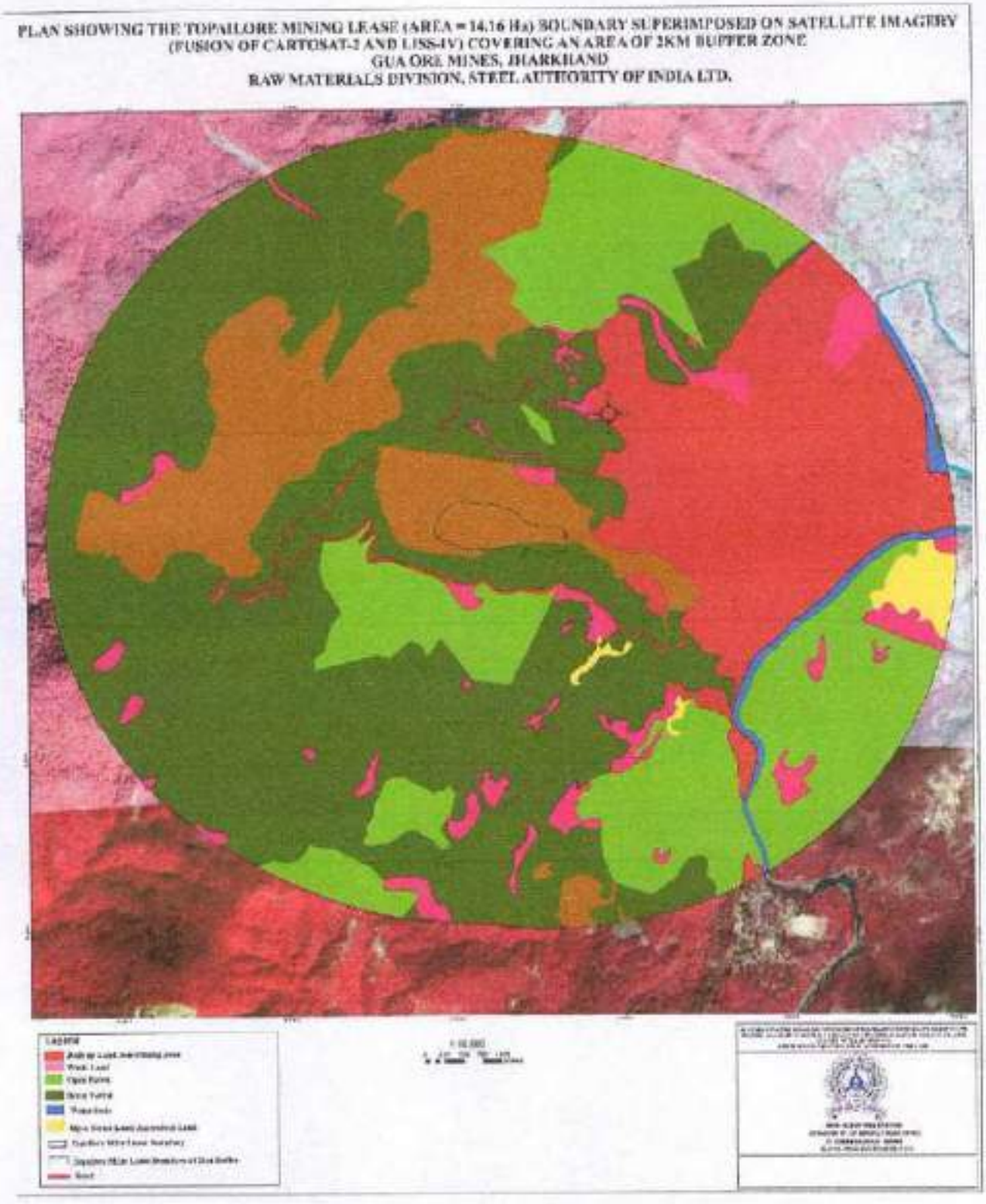

Figure: 4 Land use Land cover map of Topailore ore mining lease area

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Accuracy assessment was carried out using 100 points, from field data, existing maps and land cover map of (Bhuvan ISRO). Then location of the 100 points was chosen using random stratified method to represent different land cover classes of the area. The land cover mapping of the images, ancillary data and the result of visual interpretation was integrated with the classification result using GIS in order to improve the classification accuracy of the classified image.

The summary of the land use land cover classifications is shown in the Table 2. The classification distributions are shown in the Figure 5 to Figure 8.

Table 2: Land use land cover classifications of Gua Mines

LU/LC classes	Duarguiburu Ore mining lease Area (Ha)	JH I Ore mining lease Area (Ha)	JH II ore mining lease Area (Ha)	Topailore Ore mining lease Area (Ha)
Built-up Land	25.144	9.633	5.746	0
Agriculture Land	0	2.727	0	0
Dense forest	757.873	75.769	15.478	1.066
Open Forest	383.926	93.354	9.206	0
Water body	0	0	0	0
Wasted land	58.745	20.792	0	0
Mining	218.069	8.251	0	13.094
Total Area (ha)	**1443.756**	**210.526**	**30.430**	**12.5932**

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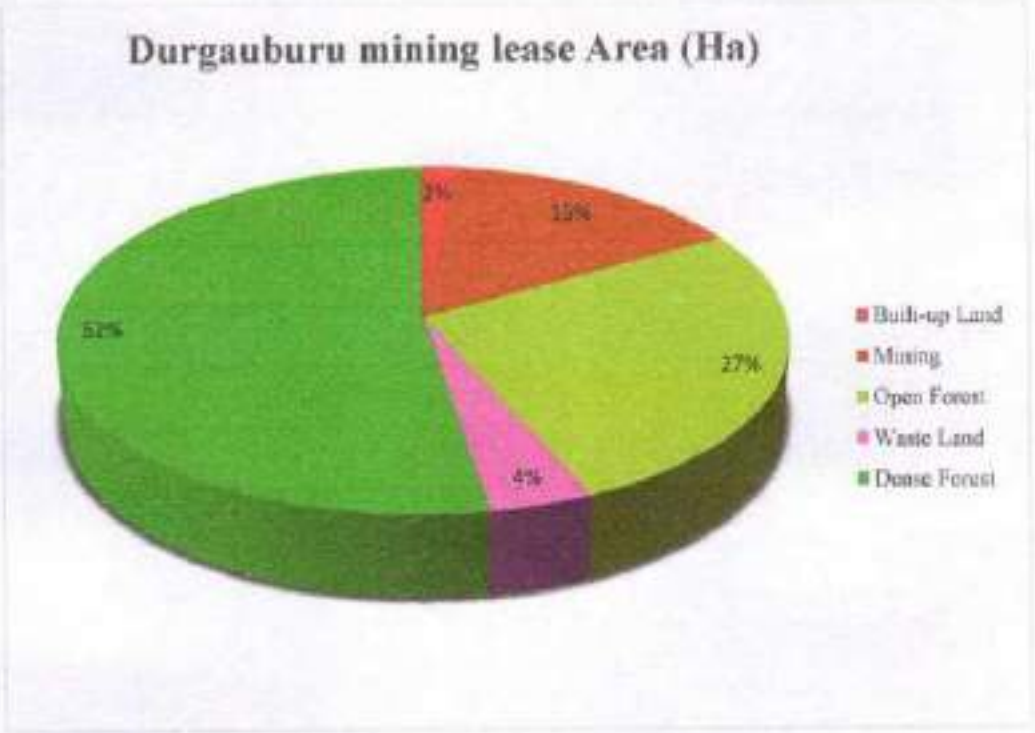

Figure 5: Land use distribution of Duarguiburu lease area

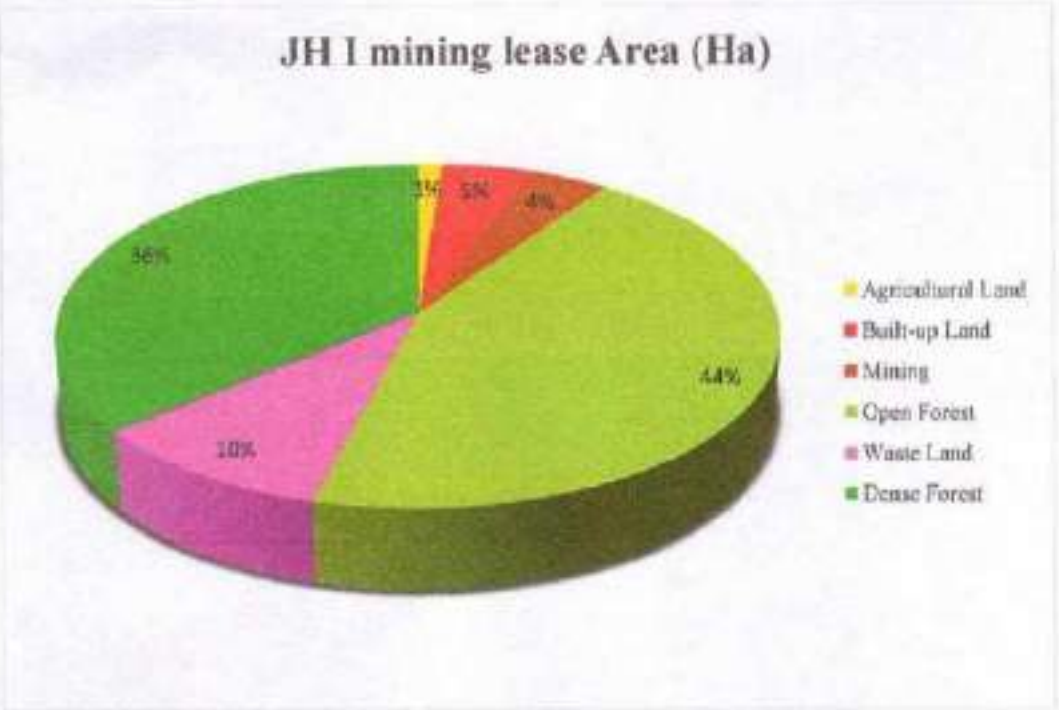

Figure 6: Land use distribution of JH I lease area

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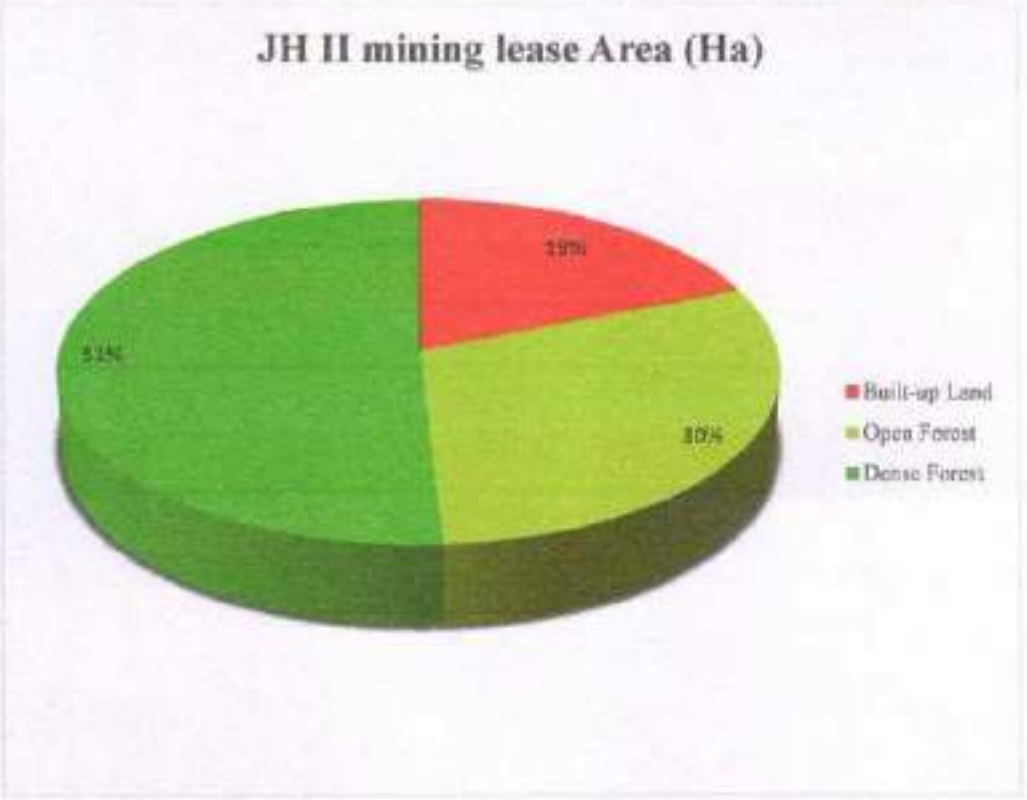

Figure 7: Land use distribution of JH II lease area

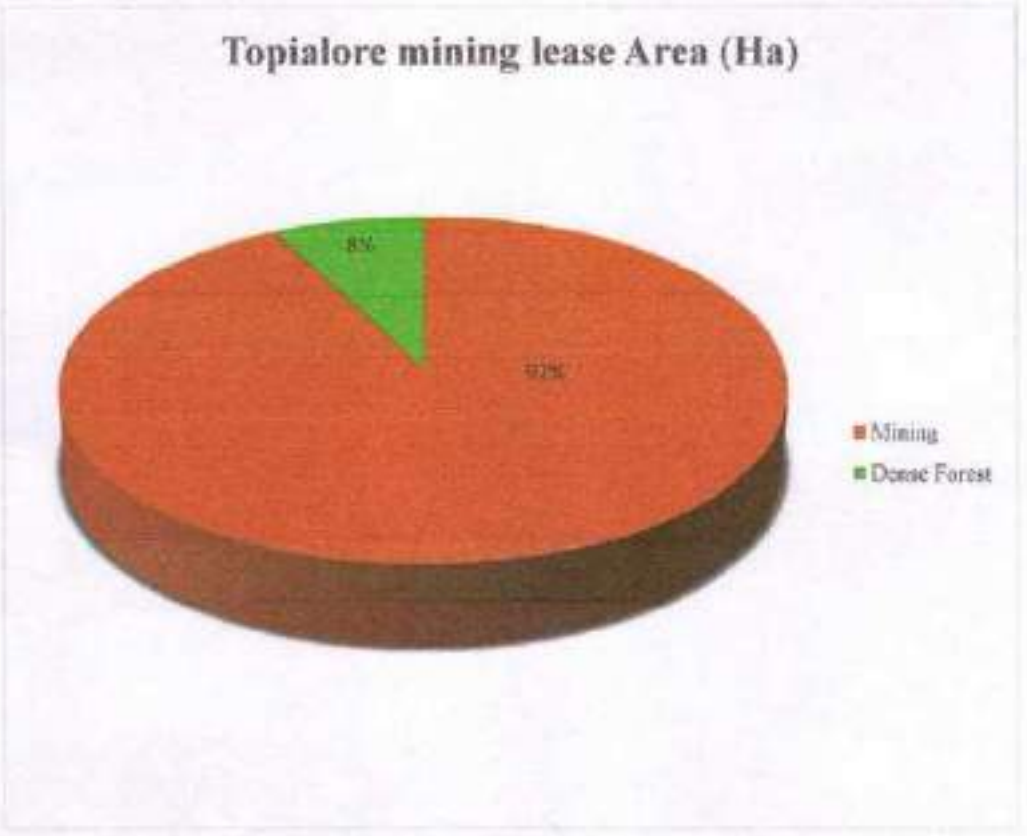

Figure 8: Land use distribution of Topailore lease area

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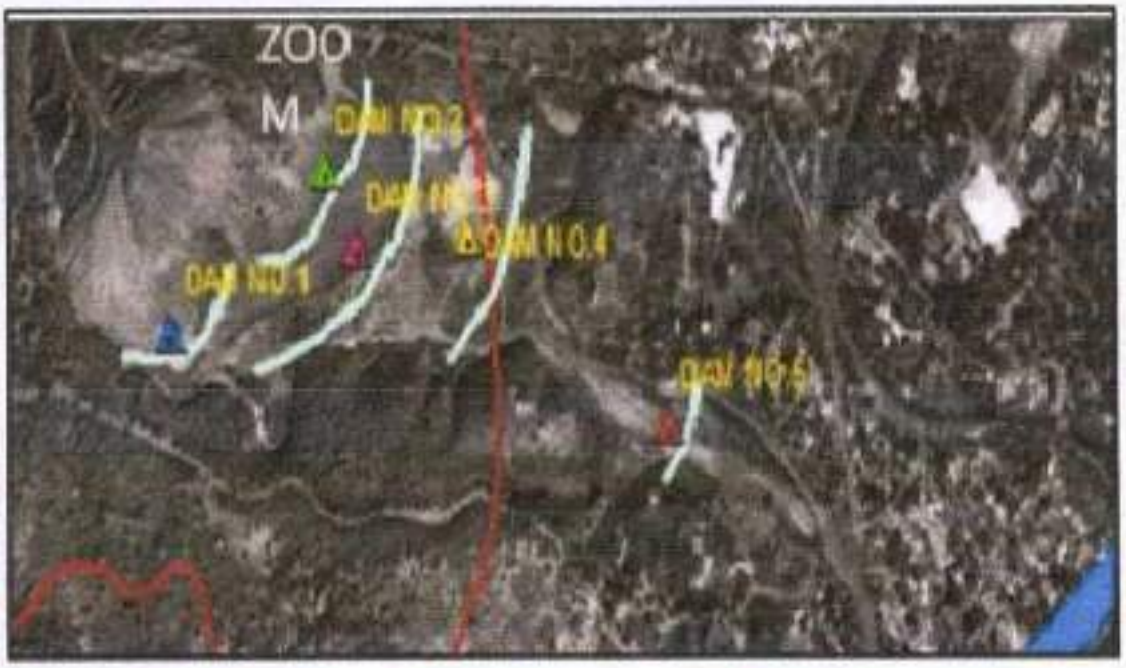
Annexure-9

Photographs showing Measures undertaken for Steps to control flow of fines in to the river stream



Photograph 1: Google Earth Image of Check Dams and Sediment Traps constructed for control fines

Photograph 2: Check Dams and Settling Pits / Sediment Traps constructed to control flow of fines

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Annexure-10

Photographs showing VetivergrassPlantation on the slopes of Sedimentation Traps

Photograph: Vetiver Plantation to bind the Soil at Slope of Sedimentation Traps

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