Steel Limited

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CIN : L27102MH1994PLC152925
Phone : +91 22 4286 1000
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No. JSW/S/CO/2023/302

Date: 30/05/2023

To,

The Deputy Director General of Forests (C), Ministry of Environment, Forest and Climate Change, Regional Office (Eastern Zone), A/3, Chandersekharpur, Bhubaneswar – 751023	The Member Secretary, State Level Environment Impact Assessment Authority, 5RF-2/1,Acharya Vihar,Unit – IX, OPTCL Colony, Anand Bazar, Bhoi Nagar, Bhubaneswar, Odisha 751022

Sub: - Submission of Six-monthly EC compliance report for the **Gonua Iron Ore Mine of M/s JSW Steel Ltd for the period October 2022 to March 2023**.

Ref: - 1. Vesting Order dated 30th May 2020 issued by GoO, Steel and Mines Department.
2. Environment Clearance Letter dated 21.12.2019 issued by SEIAA, Odisha.

Dear Sir,

We are submitting herewith six-monthly EC compliance report of Gonua Iron Ore Mine, M/s JSW Steel Ltd. for the period October 2022 to March 2023 as per EIA notification 2006.The same is also attached in Soft copy to your good office on e-mail to seiaaorissa@gmail.com; and roez.bsr-mef@nic.in; for your ready reference.

We trust that the measures taken towards environmental safeguards comply with the stipulated conditions. We look forward to your guidance which shall certainly help us in our endeavor for improving upon our environmental management practices.

Seeking your co-operation as always.

Thanking you,

Yours Faithfully
For JSW Steel Ltd

MrutyunjayaMahapatra
(Authorized Signatory)

Encl: As above

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Copy to:

1. The Member Secretary, Central Ground Water Authority, Government of India, Ministry of Jal Shakti, Department of Water Resources, River Development and Ganga Rejuvenation, Bhujal Bhawan, CGO Complex, NH-IV, Faridabad- 121 001.
2. Zonal Office Kolkata, Central Pollution Control Board, South end Conclave, Block 502, 5th and 6th Floors, 1582 Razidanga Main Road, Kolkata, West Bengal 700107.
3. The Regional Director, Central Ground Water Board, South Eastern Region, Bhujal Bhawan, Khandagiri Square, NH-5, Bhubaneswar, Odisha, Pin- 751001
4. The Member Secretary, State Pollution Control Board, A/118, Nilakantha Nagar, Bhubaneswar, Odisha-751012.
5. The Regional Officer, Regional Office, Rourkela Office of the State Pollution Control Board Rourkela Town Engineering Office Premises, Sector – 5, Rourkela – 769 002, Odisha

ENVIRONMENT CLEARANCE COMPLIANCE STATUS –GONUA MINE

Six Monthly Compliance report of Environmental Clearance for Gonua Iron Ore Mine, JSW Steel Ltd. for the period from- October 2022 to March 2023.

Reference letter from SEIAA, Odisha- SEIAA File No. 38069/03-MIN-V/09/2019/7685/ SEIAA, Dated 21.12.2019.

Capacity- 1.20 MTPA of Iron ore.

Sl. No.	Environment Clearance Conditions	Self - Declaration	Compliance Remarks
A.	**Specific Conditions**		
1	This Environmental clearance is granted subject to final outcome of Hon'ble Supreme Court of India, Hon'ble High Court of Odisha, Hon'ble NGT and any other Court of Law, if any, as may be applicable to this project.	Being complied	Noted and abided with the conditions given by court of Law. The report for the same is attached as **Annexure XVII**.
2	This Environmental Clearance will not be operational till such time the Project proponent complies with all the statutory requirements and Judgment of Hon'ble Supreme Court dated the 2nd August 2017 in Writ Petition (Civil) No. 114 of 2014 in the matter of Common Cause versus Union of India and Others applicable to this project	Agreed to comply	We shall abide with the condition given as per the statutory requirements and Judgment of the Hon'ble Supreme Court datedthe 2nd August 2017.
3	The Department of Mines and Geology, Government of Odisha shall ensure that mining operation shall not commence till the entire compensation levied, if any, for illegal mining paid by the Project Proponent through their respective Department of Mining & Geology in strict compliance of judgmentof Hon'ble Supreme Court dated the 2nd August 2017 in writ Petition (Civil) No. 114 of 2014 in the matter of Common Cause versus Union of India and Others.	Agreed to comply	We shall ensure as per the statutory requirements and Judgment of Hon'ble Supreme Court dated the 2nd August 2017 in writ Petition (Civil) No. 114 of 2014 in the matter of Common Cause versus Union of India and Others.
4	The proponent shall comply all the specific conditions as recommended by CSIR- NEERI on carrying capacity study (as applicable) in time bound manner as proposed.	Being complied	NEERI recommendations such as quantification of air emission load, mobile water sprinklers on haul roads, dry fog type dust suppression system material handling plants (crushing and screen) have been adopted. Monitoring of ambient air and fugitive emission data has been implemented and report for the same is attached as **Annexure I.** Ambient air quality is being monitored at buffer zone. PUC check is being conducted for the

			vehicles. Noise level monitoring is being carried out. Flow rate measurement of perennial nala is being done. Oil and grease trap has been provided at the vehicle washing bay. Environmental sustainability report has also been attached with the NEERI report as **AnnexureXII**. Mechanized wheel washing has been installed. Photos for the same is attached as **Annexure XIV**
5	The project proponent shall mandatorily implement the remediation plan as well asNatural and Community Resource Augmentation Plan as submitted in the Final EIA/EMP Report in Chapter -10. The status of implementation shall be submitted to the Regional Office, MoEF & CC, SPCB and SEIAA, Odisha along with six monthly compliance reports.	Being Complied	Will be complied within timeline. EIA/EMP report is under progress for project expansion
6	The Project Proponent shall obtain Consent to Operate from the State Pollution Control Board, Odisha and effectively implement all the conditions stipulated therein.	Being Complied	CTO has been vested to JSW Steel Ltd for 2 years. New CTE vide letter no 6019/IND-II-CTE-6462 dated 13.04.2021 and CTO vide letter no 4907/IND-I-CON- 1539 dated 29.03.2022 have been obtained from OSPCB.
7	The Project Proponent shall carryout sustainable and scientific mining in conformity with the approved mining plan and accordingly, strict monitoring shall be carried out by the Regional Office, MoEF & CC, Govt. of India, Bhubaneswar, Odisha State Pollution Control Board and Department of Mines and Steel, Government of Odisha.	Being Complied	Sustainable and scientific mining in conformity with the approved mining plan being carried out.
8	The Project Proponent shall carryout monitoring of air quality parameters covered under NAAQS notification, 2009 and Fugitive dust emission monitoring as per the action plan submitted to the Ministry. The frequency of monitoring shall be governed by MoEF & CC, Govt. of India circular dated 27.05.2009 and Consent to Operate issued by Odisha State Pollution Control Board for ambient air and fugitive dust emission respectively.	Complied	Regular Ambient air quality monitoring and fugitive dust emission monitoringbeing carried out and data is well within the limit prescribed. And the monitoring report is submitted to the board within the timeline. AAQ Monitoring reports are attached as **Annexure I**

9	No mining activities will be allowed in forest area for which the Forest Clearance is not available.	Being Complied	The present mining operation is restricted within vested Forest area only as per FC F. No. 8-47/93-FC, Dtd. 07/09.08.1996 over 54.40 ha. Fresh forest clearance under FC Act, 1980 for diversion of 82.724 ha of forest land has also been applied vide Proposal No. FP/OR/MIN/51003/2020 dated 15.10.2020 and same is under evaluation. Advance NPV has already been paid. Further, as per MMDR Amendment Act 2021, the Forest clearances and other permissions continue to be valid even after expiry or permission of lease till the minerals exhausted. Hence, the Forest Clearance for 54.40 ha will be valid till life of the mine
10	The Environmental Clearance is subject to obtaining requisite NBWL Clearance, if any, from the Standing Committee of National Board for Wildlife for Mining project.	Complied	No Wild Life Sanctuary/Tiger Reserve/National Park/ Elephant corridor within the core as well as within the buffer zone of the project. New EC (TOR) has been issued and EIA report is under progress and will obtain if required. SSWLCP approval letter has been attached as **Annexure VIII**
11	Project Proponent should plant only native species for green belt development. Plantation of local species should be carried out during the Monsoon Season.	Complied	3500 saplings were planted in FY 2021-22, and 3750 saplings were planted in FY 22-23. Gap plantation are being carried out in the safety zone. Photos for the same is attached as **Annexure III**
12	The Proponent shall install online Ambient Air Quality Monitoring System and there should be system for display of digital AAQ data within 03 months at least at three locations as per wind direction. Online provisions of pH and turbidity meters at discharge points of STP and ETP and also at water storage ponds in the mining area may be made. Project Proponent should display the result digitally in front of the main Gate of the mine site.	Complied	Regular Ambient air quality monitoring and fugitive dust emission monitoring being carried out and data is well within the limit prescribed. AAQ Monitoring reports are attached as **Annexure I**. Electronic Digital Display Board has already been installed near Gate No 2 area for displaying of ambient air quality monitoring data noise monitoring data, water/wastewater quality monitoring data etc. Photos for the same is attached as **Annexure XVI**
13	Project Proponent shall obtain the necessary prior permission from the Central Ground Water Authority (CGWA) in case of intersecting the Ground water table. The intersecting ground water table can only be commencing after conducting detailed hydrogeological studyand necessary permission from the CGWA/MoEF&CC. The Report	Complied	NOC from CGWA for 75 m3/day is already vested to JSW for 2 years. New application for the NOC has been granted vide letter No. CGWA/NOC/MIN/ORIG/2022/15411 And valid up to 09/05/2024. Ground water NOC with approved letter is attached as **Annexure XV** Regular monitoring of ground water level and quality being carried out and monitoring reports are attached as **Annexure I.**

	on six monthly basis on changes in Ground water level and quality shall be submitted to the Regional Office of the Ministry, CGWA and State Pollution Control Board.		
14	The project should also implement community Development and Welfare programme in the area of Health, Education andEnvironmental Protection.	Complied	Gonua Mining operation was started from 1st July 2020 and various community development initiatives are under implementation for community up-liftment. Need based assessment survey has been completed and action plan is under implementation for the compliance. Peripheral Activities like SHG trainings, Health camps are being conducted **Annexure VI**
15	Proponent shall appoint an Occupational Health Specialist for Regular and Periodical medical examination of the workers engaged in the Project and maintain records accordingly; also, Occupational health check-ups for workers having some ailments like BP, diabetes, habitual smoking, etc. shall be undertaken once in six months and necessary remedial/preventive measures taken accordingly. The Recommendations of National Institute for ensuring good occupational environment for mine workers shall be implemented; The prevention measure for burns, malaria and provision of anti-snake venom including all other paramedical safeguards may be ensured before initiating the mining activities.	Complied	Workers engaged in Operations are provided with PPE's. Besides this, acoustic enclosures are provided for all machines operating within the mines. The noise level is being monitored by Noise Level Meter; the results reveal that the parameter is well within the prescribed norms. Initial Medical Examination & Periodical Medical Examination of the workers engaged in the project are being carried periodically and records are maintained.A medical dispensary with full time. Doctor has been appointed at mine area for the health check-up of employees and also the locals. Photos for the same has been attached as **Annexure VI**
16	Project Proponent shall run an awareness campaign on sanitation for women and utilization of Sanitary Napkin and also to distribute the Sanitary Napkin/pads to the women and provide the training for proper disposal	Complied	Awareness campaign on sanitation for women and utilization of Sanitary Napkin and hygiene awareness is being conducted. Photos for the same has been attached as **Annexure VI**
17	The Regular monitoring of ground water table to be carried out by establishing a network of existing wells and constructing new piezometers. The reports shall be submitted at interval of six months to the Regional Office of the MoEF & CC, Govt. of India, Bhubaneswar and Odisha State	Complied	Regular monitoring of ground water level and quality being carried out in both core zone and buffer and monitoring reportsare attached as **Annexure I**

	Pollution Control Board.		
18	The water balance/ water auditing shall be carried out and measures for reducing the consumption of water shall be taken up and reported to the Regional Office of the MoEF & CC, Govt. of India, Bhubaneswar and Odisha State Pollution Control Board	Complied	Total water requirement for Gonua Iron Ore mines is 75 KLD. Rain water collected in pits are being utilizing for dust suppression in the mining operations. Fixed water sprinklers, pressurized mobile water tankers get utilized for dust suppression arrangement for reducing water requirement. Complete water balance diagram is attached as **Annexure II**
19	The Regular monitoring of water quality upstream and downstream of water bodies shall be carried out and record of monitoring data should be maintained and submitted to the at interval of six months to the Regional Office of the MoEF & CC, Govt. of India, Bhubaneswar and Odisha State Pollution Control Board	Complied	Regular monitoring of water quality of upstream and downstream being carried out and monitoring reports are attached as **Annexure I.** Vendor is a recognized NABET, MoEF&CC accredited laboratory
20	The Plantation/Green belt at the periphery of the water body, particularly on eastern and western boundaries, shall be maintained in the mined-out area in order to reduce the loss of surface water.	Complied	3500 saplings were planted in FY 2021-22, and 3750 saplings were planted in FY 22-23. Gap plantation are being carried out in the safety zone. Photos for the same is attached as **Annexure III**
B.	**General Conditions**		
1	A Final Mine Closure Plan along with details of Corpus Fund shall be submitted to the Ministry of Environment, Forest and Climate Change (MoEF & CC), Govt. of India as well as SEIAA, Odisha 3 years in advance of final mine closure for a approval.	Complied	A progressive mine closure plan approved by IBM is in place. The final mine closure plan along with details of Corpus fund will be submitted to the Ministry of Environment & Forests and SEIAA.
2	No change in mining technology and scope of working should be made without p r i or approval of the SEIAA, Odisha.	Agreed to comply	There will not be any change in mining technologyand scope of working, without pri or approval ofthe SEIAA, Odisha.
3	No change in the calendar plan including excavation, quantum of minerals and waste should be made.	Being complied	All the excavation, production and waste generation is as per approved mine plan
4	The project proponent shall obtain necessary prior permission of the competent authority for drawl of requisite quantity of water (surface water and ground water) for the project.	Complied	NOC from CGWA for 75 m3/day is already vested to JSW for 2 years. New application for the NOC has been granted vide Letter No. CGWA/NOC/MIN/ORIG/2022/15411 And valid up to 09/05/2024.
5	Mining shall be carried out as per the provisions outlined in mining	Complied	Environmental quality parameter such as ambient air quality, Fugitive emission,

	plan approved by Indian Bureau of Mines (IBM) as well as by abiding to the guidelines of Directorate General Mines Safety (DGMS)		Noise level, Surface water quality, Ground water quality etc. are being monitored by ECOMEN. Compliances are being monitored by IBM and MoEF&CC through various site visits and inspections. Report for the same has been attached as **Annexure I**
6	The project proponent shall carry out scientific investigation in respect of Blast induced ground vibration, fly rock & air blast. Based on this study, Project Proponent should design an effective blast design to curb blast induced menace and public annoyance. The Report shall be submitted to the SEIAA, Odisha as well as the Regional Office of the Ministry.	Being Complied	Vibration study is carried out on a monthly basis to study the blast induced ground vibration, fly rock & air blast. The Report is submitted to the SEIAA, Odisha as well as the Regional Office of the Ministry. Report for the same has been attached as **Annexure I**
7	The lands which are not owned by Proponent, mining will be carried out only after obtaining the consents from all the concerned (and owners as per the provisions of the Mineral Concession Rules, 1960 and MMDR Act,1957.	Being Complied	Paved road has been provided for transportation of ore through the NH. Natural Plantation along the road has been carried out. 1 road sweeping along with dedicated 18 KL water tanker has been deployed for controlling the dust on the transportation road. Photos for the same has been attached as **Annexure VII**
8	Digital processing of the entire lease area using remote sensing technique shall be carried out regularly once in three years for monitoring land use pattern and report submitted to the SEIAA, Odisha as well as to the Ministry of Environment, Forest and Climate Change and its Regional Office..	Complied	DGPS Surveyed Mining lease boundary superimposed on High Resolution Satellite image of Gonua Iron Ore Mine duly vetted by M/s ORSAC has been attached as **Annexure IX**
9	The critical parameters of ambient air quality as per the Notification 2009 such as PM10, PM2.5, NO2 and SO2 etc. 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 [(TDS, DO, PH and Total Suspended Solids (TSS)] The monitored data shallbe uploaded on the website of the company as well as displayed on a display board at the project site at	Complied	Regular Ambient air quality monitoring and Water quality monitoring being carried out and monitoring reports are attached as **Annexure I**. Vendor is a recognized NABET, MoEF&CC accredited laboratory.

	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, Forest and Climate Change shall also be referred in this regard for its compliance		
10	Effective safeguard measures such as regular water sprinkling shall be carried out in critical areas prone to air pollution and having high levels of PM10 and PM2.5 such as haulroad, loading and unloading point and transfer points. Fugitive dust emissions from all the sources shall be controlled regularly. It shall be ensured that the Ambient AirQuality parameters conform to the norms prescribed by the Central Pollution Control Board in this regard Monitoring of Ambient AirQuality to be carried out based on the Notification 2009, as amendedfrom time to time by the Central Pollution Control Board.	Complied	Regular water sprinkling through mobile water sprinkler tankers being carried out on haul roads and nearby mineral dispatch roads to avoid generation of dust during movement of vehicles. **Annexure VII** Fixed auto sprinklers on both sides of major haul road and approach roads of the mine is in commissioning phase. However, as an interim arrangement frequency of the Mobile water tankers sprinkling has been increased to suppress the dust emission generated due to transportation of vehicles. Regular maintenance of Haul roads is being carried out to avoid generation of dust during movement of vehicles.Regular monitoring of ambient air quality parameters being carried out through and data is well within the limit prescribed. AAQ Monitoring reports are attached as **Annexure I**
11	Regular monitoring of ground water level and quality shall be carried out in and around the mine lease by establishing a network of existing wells and constructingnew piezometers during the mining operation. The project proponent shall ensure that no natural water course and/or water resources shall be obstructed due to any mining operations. The monitoring shall be carried out four times in a year pre-monsoon (April- May), monsoon (August), post-monsoon (November) and winter (January) and the data thus collected may be sent regularly to the SEIAA, Odisha as well as Ministry of Environment, Forest and Climate Change and its Regional Office, Central Ground Water Authority and Regional Director, Central Ground Water Board.	Complied	Regular monitoring of ground water level and quality being carried out and Monitoring Reports of post monsoon (November 2022) and Winter season (January 2023) are attached as **Annexure I**. Vendor is a recognized NABET, MoEF & CC accredited laboratory.
12	Regular monitoring of the flow rate of the springs and perennial	Complied	Regular monitoring of flow rate of the springs and perennial nallahs being carried

	nallahs flowing in and around the mine lease shall be carried out and records maintain. The natural water bodies and or streams which are flowing in an around thevillage, should not be disturbed. The Water Table should benurtured so as not to go down below the pre-mining period. In case of any water scarcity in the area, the Project Proponent has to provide water to the villagers for their use. A provision for regular monitoring of water table in open dug wall located in village should be incorporated to ascertain the impact of mining over ground water table..		out around the mine lease and monitoring reports are attached as **Annexure I**
13	Regular monitoring of water quality upstream and downstream of water bodies shall be carried out and record of monitoring data should be maintained andsubmitted to the SEIAA, Odishaas well as Ministry of Environment, Forest and Climate Change and its Regional Office, Central Ground Water Authority, Regional Director, Central Ground Water Board, State Pollution Control Board and Central Pollution Control Board.	Complied	Regular monitoring of water quality of upstream and downstream being carried out and monitoring reports are attached as **Annexure I**. Vendor is a recognized NABET, MoEF&CC accredited laboratory.
14	Transportation of the minerals by road passing through the village shall not be allowed. A 'bypass' road should be constructed (say, leaving a gap of at least 200 meters) for the purpose of transportation of the minerals so that the impact of sound, dust and accidents could be mitigated. The project proponent shall bear the cost towards the widening and strengthening of existing public road network in case the same is proposed to be used for the Project. No road movement should be allowed on existing village road network without appropriately increasing the carrying capacity of such roads.	Complied	Transportation of the minerals being carried out through the bypass road which is away from the habitation. Regular maintenance including widening of the road is being carried out for maintaining/increasing the carryingcapacity of the road.
15	The illumination and sound atnight at project sites disturb the villages in respect of both human and animal population.	Complied	Mining is being carried out in the already broken up area as per approved mine plan. Illumination and sound is restricted intocore zone only. No project sites disturb the

	Consequent sleeping disorders and stress may affect the health in the villages located close to mining operations. Habitations have a right for darkness and minimal noise levels at night. PPs must ensure that the biological clock of the villages is not disturbed; by orienting the floodlights/ masks away from the villagers and keeping the noise levels well within the prescribed limits for day light/night hours.		villages in respect of both human and animal population. Ambient Noise level monitoring are being carried out at 4 different locations in core zone as well as 4 locations in buffer zone. Along with this Source noise monitoring are carried out at 15 different locations and Noise monitoring report attached as **Annexure I**
16	Main haulage road in the mine should be provided with permanent water sprinklers and other roads should be regularly wetted with water tankers fitted with sprinklers. The material transfer points should invariably be provided with Bag filters and or dry logging system. In case of Belt-conveyors facilities the system should be fully covered to avoid air borne dust; Use of effective sprinkler system to suppress fugitive dust on haul roads and other transport roads shall be ensured.	Complied	Regular water sprinkling through mobile water sprinkler tankers being carried out on haul roads and nearby mineral dispatch roads to avoid generation of dust during movement of vehicles. Fixedauto sprinklers on both sides of major haul road and approach roads of the mineare operational. However, as an interim arrangement frequency of the Mobile water tankers sprinkling has been increased to suppress the dust emission generated due to transportation of vehicles. Regular maintenance of Haul roads is being carried out to avoid generation of dust during movement of vehicles. Photos of the same has been attached as **Annexure VII**
17	Sufficient number of Gullies to be provided for better management of water. Regular Monitoring of pH shall be included in the monitoring plan and report shall be submitted to the Ministry of Environment, Forest and Climate Change and its Regional Office on six monthly basis.	Complied	Regular monitoring of water quality being carried out and monitoring reports are attached as **Annexure I**. Existing series of settling ponds being maintained for surface water management.
18	There shall be planning, developing and implementing facility of rainwater harvesting measures on long term basis and implementation of conservation measures to augment ground water resources in the area in consultation with Central Ground Water Board.	Complied	Maximum rain water has already been channelized to Mine Pits and same is being utilized in dust suppression and other mining activities. Existing surface run-off Retention wall, Garland drains and setting pits being maintained. Detailed Hydrology study is prepared, recommendations of the study and consultation with CGWB, additional rain water harvestingmeasures/structures will be implemented for rainwater harvesting. Report has been attached as **Annexure II**

19	The Project Proponent has to take care of gullies formed on slopes. Dump mass should be consolidated with proper filling/levelling with the help of dozer/compactors.	Complied	Over burden being stacked at earmarked site and after maturity same will be stabilized with plantation.
20	The reclamation at waste dump sites shall be ecologically sustainable. Scientific reclamation shall be followed. The local species may be encouraged and species are so chosen that the slope, bottom of the dumps and top of the dumps are able to sustain these species. The aspect of the dump is also a factor which regulates some climatic parameters and allows only species adopted to that micro climate	Being Complied	Backfilling and reclamation will be carried out as per approved mine plan. Plantation will be carried out after maturity of the same.
21	The top soil, if any, 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 over burden (OB) generated during the mining operations shall be stacked at earmarked dump site(s) only and it should not be kept active for a long period of time. The maximum height of the dumps shall not exceed 8m and width 20 m and overall slope of the dumps shall be maintained to 45° The OB dumps should be scientifically vegetated with suitable native species to prevent erosion and surface runoff. In critical areas, use of geo textiles shall be undertaken for stabilization of the dump. The entire excavated area shall be backfilled and afforested. Monitoring and management of rehabilitated areas should continue until the vegetation becomes self-sustaining. Compliance status shall be submitted to the Ministry of Environment, Forest and Climate Change and its Regional Office on six monthly basis.	Being complied	There is no Top soil dump within the mine lease area, once it generated it will be stored at earmarked location. The over burden (OB) generated during the mining operations is stacked at earmarked dump site(s) only. Plantation of the native species is being carried out on the dump; coir matting is done on the dump for stabilization. Regular monitoring and management of the rehabilitated area is being carried out. Hazardous waste authorization was granted vide authorization number IND-IV-HW-1347/8177 dated 23-05-2023 for waste oil, lubricants, etc. which are being disposed of through authorized recycler. Form IV, HWA and manifesto has been attached as **Annexure XIII**
22	Catch drains and siltation ponds of appropriate size shall beconstructed around the mine working, mineral and OB dumps to prevent run off of water and flow of sediments directly into the river and other water bodies. The water so collected should be utilized for watering the minearea, roads, green belt development etc.	Being complied	Garland drain of around 500m and retaining wall of 250m is being constructed and the existing siltation pond is being maintained to prevent run off of water and flow of sediments directly into the river and other water bodies. The collected water is being used for dust suppression and for

	The drains shallbe development etc. The drains shallbe regularly desilted particularlyafter monsoon and maintainedproperly. The drains, settlingtanks and check dams of appropriate size, gradient andlength shall be constructed both around the mine pit and over burden dumps to prevent run offof water and flow of sedimentsdirectly into the river and otherwater bodies and sump capacity should be designed keeping 50% safety margin overand above peak sudden rainfall (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 desilated at regular interval.		greenbelt development. Desiltation of the existing garland drain and settling pond has been carried out before monsoon. Photos of the same has been attached as **Annexure V**
23	Plantation shall be raised in a 7.5m wide green belt in the safety zone around the mining lease, backfilled and reclaimed area, around water body, along the roads etc. by planting the nativespecies in consultation with the local DFO/AgricultureDepartment and as per CPCBGuidelines. The density of the trees should be around 2500 plantsper ha. Greenbelt shall be developed all along the mine lease area in a phased manner and shall be completed within first five years.	Complied	3500 saplings were planted in FY 2021-22, and 3750 saplings were planted in FY 22-23. Gap plantation are being carried out in the safety zone. Photos of the same has been attached as **Annexure III**
24	Project Proponent shall follow the mitigation measures provided in Office Memorandum No. Z-11013/57/2014- IA.II (M), dated 29th October, 2014, titled "Impact of mining activities on Habitations-Issues related to the mining Projects wherein Habitations and villages are the part of mine lease areas or Habitations and villages are surrounded by the mine lease area", if any, applicable to the project.	Complied.	As per the Office Memorandum No. Z-11013/57/2014-IA. II (M), dated 29th October, 2014, titled "Impact of mining activities on Habitations-Issues of MoEFCC's, mitigative measures are being taken care of. This includes construction of garland drains, check dams, retaining walls and settling ponds. OM also states about the regular monitoring of natural stream, illumination survey and others which are being carried out.
25	The Project Proponent shall make necessary alternative arrangements, where required, in consultation with the State Government to provide alternate areas for livestock grazing, if any.	Complied	No such grazing land available inside mine lease area.

	In this context, Project Proponent should implement the directions of the Hon'ble Supreme Court with regard to acquiring grazing land The sparse trees on such grazing ground, which provide mid-day shelter from the scorching sun, should be scrupulously guarded against felling and plantation of such trees should be promoted		
26	The project proponent shall takeall precautionary measures during mining operation for conservation and protection of endangered fauna, if any, spotted in the study area. Action plan for conservation of flora and fauna shall be prepared and implemented in consultation with the State Forest and Wildlife Department. A copy of action plan shall be submitted to the Ministry of Environment, Forest and Climate Change and its Regional Office.	Being complied	No Wild Life Sanctuary/Tiger Reserve/National Park/ Elephant corridor within the core as well as within the buffer zone of the project. New EC has been applied and EIA report is under progress and action plan for conservation of flora and fauna will be prepared if required. The Site-Specific Wildlife Conservation Plan has been duly approved by PCCF, vide Letter No. 990/CWLW-FDWC-FD 0125-2021, Bhubaneshwar dated 31/01/2022. Report for the same is attached as **Annexure VIII**
27	Project proponent has to complied the Corporate Environment Responsibility (CER) as per the provisions mentioned in the OM of Ministry no 22-65/2017. IA-III dated 1 May, 2018 based on local needs and action plan with financial and physical breakup/details shall be prepared and submitted to the Ministry's Regional Office located at Bhubaneswar. Implementation of such program shall be ensured accordingly in a time bound manner.	Being complied	Expenditure Plan as per Ex-Lease commitment has been implemented. Project Proponent has complied the Corporate Environment Responsibility (CER).
28	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.	Not applicable	Facilities such as safe drinking water, dispensary, mobile toilets, soak pits etc are provided.
29	Measures should be taken for control of noise levels below 85 dBA in the work environment. Workers engaged in operations of HEMM, etc. should be provided with ear plugs / mulls	Complied	As per the observation from noise monitoring regularly carried out, noise level is observed to be below 85dBA in the work zone area. Noise producing equipment's are covered as far as practicable. Workers engaged in Operations are provided with ear

			plugs / muffs. Besides this, acoustic enclosures are provided for all machines operating within the mines. Controlled blasting is in place. Regular Noise Monitoring being carried out and Monitoring reports are attached as **Annexure I**.
30	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 of workshop effluents.	Complied	No industrial waste water generated from the mine. Workshop equipped with waste water treatment facilities followed by Oil& Grease trap system and then recycled for captive utilization for HEMM washing. Regular Monitoring of water quality parameters being carried out by NABET Accredited laboratory. Report for the same is attached as **Annexure I.**
31	Personnel working in dusty areas should wear protective respiratory device sand they should also be provided with adequate training and information on safety and health aspects.	Complied	Total 482 number of PPEs like safety shoes, reflective jacket, safety glass, ear plugs, helmets etc. have been distributed. Personnel working in dusty areas wear protective respiratory devices and Total number of 406 Vocational trainings has been carried out. Dust Suppression System (Dry fog system) being provided at all appropriate places of mineral handling plants (crusher & screening plant) and other areas. Same are being maintained for proper dust control. Pre-placement medical examination and periodical examination of the workers engaged are being conducted & record maintained. Photos of the same has been attached to the **Annexure X**
32	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	Complied	A dedicated Environment Management Cell under the leadership of AVP Environment has been formed and reporting to Mine Senior Management i.e., Head of Operations (VP). Reports for the same attached as **Annexure XI.**
33	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 and its Regional Office.	Being Complied	We are in process for implementation of various measures undertaken for environment management plan since the operation started in July 2020. Details of environmental protection measures expenditure (head wise breakup) was submitted along with last half yearly EC compliance. report vide

			letter dated 30/11/2022.
34	The project authorities should inform to the Regional Office regarding date of financial closures and final approval of the project by the concerned authorities and the date of start of land development work.	Agreed to comply	The project authority will inform to the regional officer regarding the date of final closure of the project.
35	The project proponent shall submit six monthly reports on the status of the implementation of the stipulated environmental safeguards to the Ministry of Environment, Forest and Climate Change, its Regional Office, Central Pollution Control Board and State Pollution Control Board.	Complied	Being complied. Last six-monthly compliance report along with monitoring data vide letter no JSW/S/O/2022/841 dated 30/11/2022 was submitted to Regional Office, MOEF&CC, Bhubaneswar, SEIAA, Bhubaneswar, Zonal Office, CPCB, Kolkata, MS and RO Offices SPCB, Odisha.
36	The Regional Office of this Ministry 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.	Agreed to comply	We will extend full co-operation to the officers of the Regional Office during their visit and furnish the required data, information and monitoring reports.
37	A copy of clearance letter will be marked to concerned Panchayat / local NGO, if any, from whom suggestion / representation has been received while processing the proposal.	Complied	A copy of EC letter is marked to concerned Panchayat.
38	State Pollution Control Board should display a copy of the clearance letter at the regional office. District Industry Centre and collector's office / Tehsildar's Office for 30 days.	Complied	State Pollution Control Board/Committee has displayed EC letter at its Regional office, District Industries Centre and Collector 's office/ Tehsildar's Office.
39	The project authorities should advertise at least in two local newspapers 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, Forest and Climate Change at www.environmentclearanee.nic.in and a copy of the same should be forwarded to the Regional Office.	Complied	It was Published in the Newspaper informing that the project has been accorded environmental clearance. Photo of the same has been attached as **Annexure XVI.**
40	The SEIAA, Odisha or any other	Noted	Noted

	competent authority may alter/modify the above conditions or stipulate any further condition in the interest of environment protection		
41	Concealing factual data or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may result in withdrawal of this clearance and attract action under the provisions of Environment (Protection) Act, 1986.	Agreed to comply	Noted
42	The above conditions will be enforced inter-alia, under the provisions of the Water (Prevention & Control of Pollution) Act, 1974, the Air (Prevention & Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986 and the Public Liability Insurance Act, 1991 along with their amendments and rules made there under and also any other orders passed by the Hon'ble Supreme Court of India/ High Courtof Odisha and any other Court of Law relating to the subject matter.	Noted	Noted
43	Any appeal against this environmental clearance shall lie with the National Green Tribunal, if preferred, within a period of 30 days as prescribed under Section 16 of the National Green Tribunal Act, 2010	Noted	There is no such appeal against EC given.

ANNEXURE I

SUMMARY

OF

ENVIRONMENTAL MONITORING REPORT

(OCTOBER 2022 TO MARCH 2023)

FOR

GONUA IRON ORE MINE

DISTRICT—KEONJHAR, ODISHA

OF

M/SJSW STEEL LIMITED, ODISHA

ENV MONITORING CARRIED OUT

BY

ECOMEN LABORATORIES PVT.LTD

Ecomen Laboratories Pvt. Ltd.

(An approved Laboratory from MoEF & CC & NABL) B-1/8, Sector-H, Aliganj, Lucknow 226 024 (U.P.) Phone No.: (91-522) 2746282; Fax No.: (91-522) 2745726

E-mail: contactus@ecomen.in

Environmental Monitoring Report- Gonua Iron Ore Mines of M/s JSW Steel Limited, Odisha during the period

(April 2022 to September 2022)

1. Ambient Air Quality Lease Area

Si. No.	Location	Month	Concentration	PM_{10} µg/m^3	$PM_{2.5}$ lug/m^3	SO_2 lug/m^3	NO_2 lug/m^3	CO mg/m^3
1.	Near Mines Office	October ’22	Maximum	45.3	15.7	15.9	18	0.58
			Minimum	39.1	12.1	13.1	14.2	0.47
			Average	42.6	13.9	14.3	16.1	0.5
		November ’22	Maximum	42.8	17.3	14.9	17.9	0.49
			Minimum	35.4	13.1	12.1	14.2	0.41
			Average	39.3	14.9	13.6	16.1	0.4
		December ’22	Maximum	44	18	13	17.9	0.6
			Minimum	39.3	15.1	10.1	13	0.51
			Average	41.7	16.8	11.5	16.0	0.6
		January’23	Maximum	57.8	19	16.9	17.7	0.5
			Minimum	50.1	14.1	14.2	15	0.41
			Average	54.0	16.6	15.7	16.3	0.5
		February ’23	Maximum	70.5	21.1	16.8	17.9	0.5
			Minimum	64.4	14.7	14.1	15.2	0.4
			Average	67.5	17.4	15.5	16.5	0.5
		March ’23	Maximum	70.5	20.7	16.3	15.9	0.5
			Minimum	63.1	16.2	15.1	14.7	0.4
			Average	67.4	17.3	16.7	15.8	0.52
		October ’22	Maximum	44.9	16.6	16.7	17.9	0.57
			Minimum	39.1	12.1	13.2	14.1	0.47
			Average	42.6	14.3	14.6	16.3	0.5

Si. No.	Location	Month	Concentration	PM10 µg/m³	PM2.5 lug/m³	SO2 lug/m³	NO2 lug/m³	CO mg/m³
2.	Near Pillar No 22 & 23	November ’22	Maximum	42.8	16.9	14.9	17.7	0.5
			Minimum	35.1	13.1	12.2	14.1	0.41
			Average	38.5	15.1	13.3	15.9	0.5
		December ’22	Maximum	43.9	17.8	12.9	18	0.6
			Minimum	39	15	10.3	13.2	0.51
			Average	41.5	16.5	11.4	15.5	0.6
		January’23	Maximum	57.8	18.9	16.9	17.8	0.5
			Minimum	50.5	14	14.2	15.1	0.41
			Average	54.2	16.4	15.5	16.6	0.5
		February ’23	Maximum	70.9	21.7	17.3	17.9	0.5
			Minimum	65.1	14.2	14.1	15.1	0.41
			Average	67.7	17.0	15.7	16.5	0.5
		March ’23	Maximum	46.3	16.7	15.3	18.6	0.55
			Minimum	39.7	12.3	14.1	16.2	0.46
			Average	43.6	12.9	15.3	17.1	0.51
3.	Near Dispensary (Hutting Area)	October ’22	Maximum	44.9	15.9	15.9	17.8	0.58
			Minimum	39.5	12.2	13.1	14.2	0.47
			Average	42.5	14.0	14.6	16.2	0.5
		November ’22	Maximum	42.9	17.4	14.9	17.9	0.5
			Minimum	35.4	13.1	12.2	14.1	0.41
			Average	39.2	14.9	13.6	15.8	0.5
		December ’22	Maximum	43.5	17.9	12.8	17.8	0.6
			Minimum	39.5	15.1	10.2	13.1	0.51
			Average	41.6	16.6	11.4	15.6	0.6
		January’23	Maximum	58	18.9	16.8	17.8	0.49
			Minimum	50.2	14.1	14.2	15.1	0.41
			Average	53.4	16.6	15.4	16.4	0.5

Sl. No.	Location	Month	Concentration	PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3	SO_2 µg/m^3	NO_2 µg/m^3	CO mg/m^3
		February ’23	Maximum	70.7	18.6	16.9	17.9	0.5
			Minimum	65.4	14.5	14.1	15.1	0.41
			Average	67.7	16.3	15.8	16.6	0.5
		March ’23	Maximum	44.9	16.8	14.9	17	0.56
			Minimum	39.10	15	10.3	13.2	0.51
			Average	41.5	16.5	11.4	15.5	0.6
4.	Entry And Exit Gate (Gate No-2)	October ’22	Maximum	76.4	38.4	18.3	29.6	0.68
			Minimum	53.4	17.5	8.9	14.6	0.29
			Average	67.1	28.9	12.6	22.9	0.46
		November ’22	Maximum	74.3	29.4	17.1	24.5	0.6
			Minimum	60.5	18.5	9.8	15.6	0.32
			Average	68.0	23.9	12.6	21.4	0.45
		December ’22	Maximum	74.7	29.8	16.3	21.6	0.62
			Minimum	62.4	20.7	10.7	10.4	0.38
			Average	68.6	25.3	12.9	16.2	0.50
		January’23	Maximum	52.5	20.3	15.3	19.8	0.55
			Minimum	46.4	15.2	10.4	9.4	0.39
			Average	50.2	17.9	12.6	14.9	0.48
		February ’23	Maximum	48.6	17.7	14.3	18.2	0.49
			Minimum	40.2	13.4	10.2	11.6	0.40
			Average	44.4	15.4	12.3	14.8	0.45
		March ’23	Maximum	55.2	19.6	16.2	16.6	0.59
			Minimum	50.6	13.1	12.0	12.6	0.43
			Average	52.9	16.3	13.8	14.1	0.51
CPCB Standard			**24 Hrly**	**100**	**60**	**80**	**80**	**4 (1Hrly)**
			Annual Average	**60**	**40**	**40**	**50**	**--**

2. Ambient Air Quality Buffer Area

Si. No.	Location	Month	Concentration	PM_{10} µg/m^3	$PM_{2.5}$ lug/m^3	SO_2 lug/m^3	NO_2 lug/m^3	CO mg/m^3
1.	Palssa Village	October ’22	Maximum	47.8	17.9	14	18.7	0.61
			Minimum	42.5	14.1	12.5	16	0.52
			Average	45.0	16.2	13.3	17.2	0.6
		November ’22	Maximum	47.8	17.9	14.3	18.7	0.61
			Minimum	43.6	14.1	12.5	16.3	0.52
			Average	45.1	16.2	13.3	17.2	0.6
		December ’22	Maximum	51	17.7	13.7	19	0.59
			Minimum	46.2	14.1	12.2	15.4	0.48
			Average	48.7	15.3	12.9	17.4	0.5
		January’23	Maximum	60.6	19.2	16.7	18.9	0.61
			Minimum	55.3	16	15.1	15.9	0.49
			Average	57.9	17.8	16.0	17.0	0.6
		February ’23	Maximum	70	21.8	17.3	18.4	0.61
			Minimum	65.2	16.1	15.1	15.6	0.48
			Average	68.0	19.0	16.3	16.8	0.60
		March ’23	Maximum	71.9	20.7	15.3	16.4	0.53
			Minimum	66.1	14.5	12.1	13.7	0.40
			Average	67.5	17.2	13.7	14.5	0.54
		October ’22	Maximum	47.9	17.1	14	18.9	0.59
			Minimum	43.4	14.5	12.3	15.4	0.48
			Average	45.8	15.8	13.2	17.3	0.5

Si. No.	Location	Month	Concentration	PIlio µg/m³	PM2.5 lug/m³	SO2 lug/m³	NO2 lug/m³	CO mg/m³
2.	Khandbandh Village	November ’22	Maximum	46.7	17.1	14.1	18.9	0.59
			Minimum	41.9	14.5	12.3	15.4	0.48
			Average	45.3	15.8	13.2	17.3	0.5
		December ’22	Maximum	51.4	17.9	14	18.7	0.6
			Minimum	46.3	14.5	12	15.9	0.49
			Average	48.2	16.1	12.8	17.2	0.5
		January’23	Maximum	60.5	19.8	16.8	18.9	0.59
			Minimum	55.7	16.3	15.1	15.1	0.49
			Average	58.6	17.5	16.1	16.6	0.55
		February ’23	Maximum	70.9	21.9	16.9	17.9	0.58
			Minimum	65.5	15.3	14.2	15.4	0.48
			Average	67.8	18.5	15.6	16.6	0.5
		March ’23	Maximum	71.7	18.2	16.7	17.6	0.5
			Minimum	66.4	14.3	14.5	15.2	0.40
			Average	67.2	16.1	15.0	16.5	0.52
3.	Sargighar Village	October ’22	Maximum	47.2	17.3	14	18.8	0.6
			Minimum	42	14.1	12.2	16	0.49
			Average	43.9	15.9	13.1	17.4	0.5
		November ’22	Maximum	47.2	17.3	14.5	18.8	0.53
			Minimum	42.4	14.1	12.2	16.2	0.49
			Average	44.1	15.9	13.1	17.5	0.5
		December ’22	Maximum	50.9	17.9	13.8	18.8	0.57
			Minimum	47	14.2	12.3	15.1	0.48
			Average	48.8	16.3	12.9	17.4	0.5
		January’23	Maximum	60.1	19.7	16.8	18.6	0.58
			Minimum	56.2	16	15	15.4	0.5
			Average	58.4	18.1	15.9	16.9	0.6

Sl. No.	Location	Month	Concentration	PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3	SO_2 µg/m^3	NO_2 µg/m^3	CO mg/m^3
		February ’23	Maximum	70.8	20.1	16.6	18.8	0.59
			Minimum	65.7	15.8	14.3	15.2	0.51
			Average	68.3	18.1	15.3	17.0	0.6
		March ’23	Maximum	69.2	22.6	16.4	18.3	0.61
			Minimum	65.7	15.3	14.0	16.1	0.48
			Average	67.0	17.6	15.1	17.3	0.52
4.	Malda Village	October ’22	Maximum	47	17.7	13.9	18.9	0.6
			Minimum	43	15.2	12.2	15.3	0.48
			Average	44.9	16.9	13.3	17.0	0.5
		November ’22	Maximum	45.9	17.7	13.9	18.1	0.59
			Minimum	40.8	15.2	12.2	15.3	0.48
			Average	44.3	16.9	13.3	16.7	0.5
		December ’22	Maximum	51.1	17.5	13.9	18.2	0.6
			Minimum	46.1	14.3	12.1	15.2	0.51
			Average	48.4	16.6	12.9	16.4	0.5
		January’23	Maximum	60.8	19.5	16.8	18.5	0.6
			Minimum	55.1	16	15.2	15.1	0.49
			Average	58.2	17.7	16.1	16.8	0.5
		February ’23	Maximum	70.1	21.6	16.7	18.3	0.61
			Minimum	65.1	15.7	14.2	16.1	0.48
			Average	68.0	18.6	15.4	17.4	0.6
		March ’23	Maximum	71.2	20.5	16.0	18.1	0.56
			Minimum	66.5	15.3	14.1	15.3	0.50
			Average	67.4	18.7	15.4	17.5	0.53
CPCB Standard			**24 Hrly**	**100**	**60**	**80**	**80**	**4 (1Hrly)**
			Annual Average	**60**	**40**	**40**	**50**	**--**

3. Fugitive Emission Monitoring (µg/m³)

Sl. No.	Month	Crusher Plant		Mines Haulage Road		Screen Plant	
		Max	Min	Max	Min	Max	Min
1.	October'22	547.1	454.7	549.4	452.2	543.4	452.4
2.	November'22	553.7	458.1	563.2	451.2	545.6	452.1
3.	December '22	596.4	502.9	597.3	504.3	599.6	504.5
4.	January'23	648.5	552.5	648.3	551.5	648.2	550.8
5.	February'23	793.2	647.3	787.2	640	788.2	625.7
6.	March'23	923.3	658.3	966	680	958	620
Six Month Average		677.0	545.6	685.2	546.5	680.5	534.3

Sl. No.	Month	Mines face Bench		Ore storage & Loading Point		Waste Dump	
		Max	Min	Max	Min	Max	Min
1.	October'22	546.5	450.2	548.1	456.2	548.8	451.1
2.	November'22	540.8	450.3	548	451.8	547.7	454.3

3.	December ’22	600	500.8	598.6	500.3	599.5	507
4.	January’23	649.6	550.3	645.8	558.9	649.2	552.2
5.	February’23	782.8	617.7	791	616.5	768.2	628.3
6.	March’23	938	665	929	651	938	652
Six Month Average		676.3	539.1	676.8	539.1	675.2	540.8

4. ILLUMINATION MONITORING (Lux)

	October 22		November 22		December 22	
LOCATION	**Horizontal**	**Vertical**	**Horizontal**	**Vertical**	**Horizontal**	**Vertical**
Workshop Area	43	82	40	60	57.2	82.8
Screen Plant	16	34	No power	No power	20.9	25.6
Haul Road	37	42	20	27	70.3	67.8
Loading Point	10	37	98	110	129.5	200
Crusher Plant	61	112	No power	No power	150.2	252.3
Parking Yard	95	125	35	25	40.8	70.8
Permanent Path	15	24	20	19	110	280
Electric Substation	23	30	25	32	22.2	25.5
Rest Shelter	27	32	No power	No power	61.6	128.5
Mines Bench Foot Path	20	45	80	102	39.2	50.4
	January 23		**February 23**		**March 23**	
LOCATION	**Horizontal**	**Vertical**	**Horizontal**	**Vertical**	**Horizontal**	**Vertical**
Workshop Area	155	68	152	68	185	95
Screen Plant	40	15	98	110	144	110
Haul Road	66	74	48	53	65	55
Loading Point	42	50	74	140	120	60
Crusher Plant	50	130	67	56	160	125
Parking Yard	34	68	58	34	105	70
Permanent Path	80	150	98	194	55	35
Electric Substation	120	69	128	61	145	95
Rest Shelter	45	21	51	70	68	45
Mines Bench Foot Path	40	44	72	63	45	30

5. Noise Level {dB(A)}

A. Ambient Noise Monitoring

Location	October 22		November 22		December 22		Standards	
	Leq Day	Leq Night	Leq Day	Leq Night	Leq Day	Leq Night	Leq Day	Leq Night
EAST BOUNDARY	45.3	41.2	48.6	42.9	49.2	41.5	55 dB(A)	45 dB(A)
WEST BOUNDARY	52.7	41.9	53.7	43.8	55.4	46.9	55 dB(A)	45 dB(A)
NORTH BOUNDARY	51.8	42.7	50.7	40.5	52.6	41.2	55 dB(A)	45 dB(A)
SOUTH BOUNDARY	50.9	41.6	53.4	43.2	52.1	41.3	55 dB(A)	45 dB(A)
Location	**January 23**		**February 23**		**March 23**		**Standards**	
	Leq Day	**Leq Night**	**Leq Day**	**Leq Night**	**Leq Day**	**Leq Night**	**Leq Day**	**Leq Night**
EAST BOUNDARY	50.9	40.4	49.5	41.8	50.3	41.1	55 dB(A)	45 dB(A)
WEST BOUNDARY	54.3	44.2	53.5	43.1	50.4	42.9	55 dB(A)	45 dB(A)
NORTH BOUNDARY	51.7	43.6	51.7	43.6	52.3	42.4	55 dB(A)	45 dB(A)
SOUTH BOUNDARY	53.8	44.6	52.2	43.5	50.3	41.5	55 dB(A)	45 dB(A)

B. Source Noise Monitoring

CORE ZONE	October 22				November 22			
	Week-1	Week-2	Week-3	Week-4	Week-1	Week-2	Week-3	Week-4
	Leq				Leq			
Near Ore Crushing Plant	70.7	70.3	71.4	72.8	69.4	70.4	72.9	68.6
Near Weigh Bridge	71.6	70.7	71.5	71.5	68.9	71.8	68.2	68.1
Near Workshop	70.9	71.4	70.7	71.9	67.9	72.5	71.5	68.2
Near Mines Office	69.5	69.9	68.2	73.2	70.7	69.4	70.4	70.8

CORE ZONE	December 22				January 23			
	Week-1	Week-2	Week-3	Week-4	Week-1	Week-2	Week-3	Week-4
	Leq				Leq			
Near Ore Crushing Plant	70.8	69.2	70.4	68.7	71.5	71.6	71.5	69.4
Near Weigh Bridge	68.6	69.5	73	69.7	66.9	68.1	72.1	68.6
Near Workshop	68.9	72.8	74.9	72	67.4	70.5	71.7	71.5
Near Mines Office	71.5	68.3	72.4	69.5	69.7	69.3	70	70.3
CORE ZONE	**February 23**				**March 23**			
	Week-1	Week-2	Week-3	Week-4	Week-1	Week-2	Week-3	Week-4
	Leq				Leq			
Near Ore Crushing Plant	72.1	72.3	70	68.7	60.82	70.3	70.1	69.0
Near Weigh Bridge	67.6	69.4	71.8	67.4	64.65	68.6	69.3	68.2
Near Workshop	66.3	70.9	72.5	70.3	62.03	70.3	67.7	66.6
Near Mines Office	68.5	69.5	71.2	71.6	65.81	70.58	68.17	67.08

6. Surface Water Quality

GONUA IRON ORE MINE								
Gonua nala UpStream								
Parameter	**Units**	**October 22**	**November 22**	**December 22**	**January 23**	**February 23**	**March 23**	**Limits for Stream Water Standards**
PH	-	6.94	6.88	6.92	6.94	6.88	6.79	6.5-8.5
Total Dissolved Solids	**mg/l**	188	171	188	188	194	138	1500
Chlorides	**mg/l**	12	14	12	12	14	16	600
Iron	**mg/l**	0.12	0.11	0.12	0.12	0.12	0.12	50
Fluorides	**mg/l**	0.22	0.2	0.22	0.22	0.22	0.17	1.5
BOD	**mg/l**	BDL	BDL	BDL	1.8	2.2	2.7	3
DO	**mg/l**	6.3	6.1	6.3	6.3	6.2	5.7	4
Gonua Nala DownStream								
Parameter	**Units**	**October 22**	**November 22**	**December 22**	**January 23**	**February 23**	**March 23**	**Limits for Stream Water Standards**
PH	-	6.83	6.73	6.83	6.79	6.65	6.85	6.5-8.5
Total Dissolved Solids	**mg/l**	212	234	212	239	254	145	1500
Chlorides	**mg/l**	14	18	14	22	18	28	600
Iron	**mg/l**	0.1	0.12	0.1	0.11	0.17	0.14	50
Fluorides	**mg/l**	0.24	0.22	0.24	0.2	0.16	0.21	1.5
BOD	**mg/l**	2.2	2.8	2.2	2.7	3.2	3.8	3
DO	**mg/l**	6	5.6	6	5.4	5.2	5.3	4

Kakarpani Nala Upstream								
Parameter	**Units**	**October 22**	**November22**	**December 22**	**January 23**	**February 23**	**March 23**	**Limits for Stream Water Standards**
PH	**-**	7.42	7.29	7.27	7.18	7.23	6.97	6.5-8.5
Total Dissolved Solids	**mg/l**	166	160	166	134	140	157	1500
Chlorides	**mg/l**	20	16	26	12	14	20	600
Iron	**mg/l**	0.1	0.12	0.1	0.1	0.12	0.11	50
Fluorides	**mg/l**	0.18	0.15	0.18	0.13	0.11	0.13	1.5
BOD	**mg/l**	5.5	5	5	4.2	4	1.4	3
DO	**mg/l**	6.4	6.2	6	6.1	6.2	6	4
Kakarpani Nala Downstream								
Parameter	**Units**	**October 22**	**November22**	**December 22**	**January 23**	**February 23**	**March 23**	**Limits for Stream Water Standards**
PH	**-**	7.19	7.09	7.27	7.29	7.17	6.9	6.5-8.5
Total Dissolved Solids	**mg/l**	209	216	166	232	248	166	1500
Chlorides	**mg/l**	20	22	26	18	14	28	600
Iron	**mg/l**	0.16	0.13	0.1	0.1	0.15	0.1	50
Fluorides	**mg/l**	0.2	0.17	0.18	0.13	0.14	0.16	1.5
BOD	**mg/l**	9	10	5	9	8	4.3	3
DO	**mg/l**	6.2	6	6	5.8	5.4	5.5	4

7. Surface Water Flow Rate

LOCATION NAME	October 22	November 22	December 22	January 23	February 23	March 23
Gonua nala	1.01	0.41	1	0.41	0.26	0.37
Kakarpani nala	0.99	0.52	0.68	0.55	0.27	0.58

8. Ground Water Quality

Location		Gonua Village	Canabeda Village	Minjoda Village	Doughar Village
Parameter	**Units**	**November-22**			
pH	-	6.65	6.94	6.89	6.84
Total Dissolved Solids as TDS	mg/l	98.6	123	119	98
Total Hardness as CaCO3	mg/l	48	60	64	52
Sulfate as SO4	mg/l	7.23	15.3	19.1	15.4
Chloride as Cl	mg/l	14	16	12	12
Fluorides as F	mg/l	0.11	0.32	0.23	0.13
Iron as Fe	mg/l	BDL	0.11	0.16	0.02
Location		**Gonua Village**	**Canabeda Village**	**Minjoda Village**	**Doughar Village**
Parameter	**Units**	**January-23**			
pH	-	6.85	7.04	6.91	6.62
Total Dissolved Solids as TDS	mg/l	105.6	121.0	122.0	102.0
Total Hardness as CaCO3	mg/l	44.0	58.0	64.0	55.0
Sulfate as SO4	mg/l	7.11	14.8	18.3	16.2
Chloride as Cl	mg/l	15.0	17.2	14.2	13.3
Fluorides as F	mg/l	0.15	0.38	0.28	0.18
Iron as Fe	mg/l	BDL	0.12	0.19	0.06

9. Drinking Water Quality

Parameter	Units	October 22	November 22	December 22	January 23	February 23	March 23	Acceptable Limits	Permissible Limits
pH	-	7.16	7.12	7.08	7.09	7.12	6.69	**6.5-8.5**	**No Relaxation**
Total Dissolved Solids as TDS	**mg/l**	216	202	191	188	182	174	**200**	**600**
Total Hardness as CaCO3	**mg/l**	80	72	72	68	72	70	**1**	**No Relaxation**
Sulfate as SO4	**mg/l**	13.2	15.2	12.6	13.2	12.6	14.4	**250**	**1000**
Chloride as Cl	**mg/l**	10	12	8	14	12	10	**500**	**2000**
Fluorides as F	**mg/l**	0.18	0.16	0.20	0.12	0.12	0.20	**200**	**400**
Iron as Fe	**mg/l**	0.07	0.09	0.09	0.06	0.05	0.04	**1**	**1.5**

10. ETP

Parameter	Units	October 22	November 22	December 22	January 23	February 23	March 23	Acceptable Limits
ETP Inlet								
pH	-	6.68	6.62	6.87	6.56	6.42	7.12	6.5-9.0
Total Suspended Solid as TSS	mg/l	59.6	55.1	56.2	59.4	56.2	32.3	100.0
Total Dissolved Solids as TDS	mg/l	556	568	588.2	598	590	545	-
Biochemical Oxygen Demand as BOD 3days at 27^0C	mg/l	15	17	19	20	19	18	30.0
Chemical Oxygen Demand as COD	mg/l	268	278	288	270	258	245	250.0
Oil & Grease as O & G	mg/l	8.7	8.3	8.3	8.1	6.8	5.1	10.0
Parameter	**Units**	**October 22**	**November 22**	**December 22**	**January 23**	**February 23**	**March 23**	**Acceptable Limits**
ETP Outlet								
pH	-	7.45	7.43	7.4	7.51	7.63	6.93	6.5-9.0
Total Suspended Solid as TSS	mg/l	16.2	17.5	24.2	13.1	13.6	28.5	100.0
Total Dissolved Solids as TDS	mg/l	610	627	611	608	614	624	-
Biochemical Oxygen Demand as BOD 3days at 27^0C	mg/l	19	16	15	14	12	24	30.0
Chemical Oxygen Demand as COD	mg/l	148	132	128	140	132	178	250.0
Oil & Grease as O & G	mg/l	BDL	BDL	BDL	BDL	BDL	BDL	10.0

11. Soil Monitoring

Parameters	Unit	Patabeda	Khandbandh	Safety Zone Plantation Area	Forest Area Point Adjacent To View
pH	-	5.8	5.25	7.06	5.86
Electrical Conductivity	µmhos/cm	114	54.8	125	45
Total Soluble Solid	mg/kg	156	137	165	107
Nitrogen (N)	mg/kg	198	154.6	176	144
Av. Phosphorous (P_2O_5)	kg/ha	23.4	32.1	22	29.2
Av. Potassium (K_2O)	mg/kg	112	152	78	112
Av. Sodium (Na_2O)	mg/kg	231	282	172	191
Av. Calcium as Ca	mg/kg	804	1204	920	788
Av .Magnesium as Mg	mg/kg	244	344	412	204
Chloride (Cl)	mg/kg	32	40	28	28
Copper (Cu)	mg/kg	1.02	2.58	0.58	0.12
Zinc (Zn)	mg/kg	1.5	1.44	9.28	1.38
Iron (Fe)	mg/kg	34.81	70.93	21.4	4.65
Manganese (Mn)	mg/kg	79.47	54.27	0.12	4.26
Organic Carbon	%	0.34	0.46	0.34	0.21
Sodium Absorption ratio (SAR)	-	0.68	0.67	0.43	0.58
Grain Size Distribution					
Textural Class	-	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam
Sand	%	48	53	56	58
Silt	%	34	30	34	30
Clay	%	18	17	10	12

12. Vibration Monitoring

Sl no.	Station Name	Instrument location	Season (Summer/Winter/Monsoon/post monsoon	Peak particle velocity	Air Over pressure	Frequency	Remark
1	Bottom Bench	Near WB-1 (200m away from blasting location)	Summer	1.3 mm/s	127.9 dBL @ 42.6Hz / .0495kPa	11.4 Hz	Within Permissible limits
2	8th No Bench Pit Area	Near Rest Shelter (150m away from blasting location)	Monsoon	2.21 mm/s	88.0 dBL @ 0 Hz at 0.0005 kPA	0.2 Hz	Within Permissible limits
				1.69 mm/s	88.0 dBL @ 0 Hz at 0.0005 Kpa	0.2 Hz	
3	6th And 7Th Bench from Top	Near Rest Shelter (150m away from blasting location)	Monsoon	3.06 mm/s	88.0 dBL @ 0 Hz at 0.0005 kPA	4.6 Hz	Within Permissible limits
4	RL-653, RL-644	Opposite of Garage area (150m away from blasting location)	Monsoon	1.21 mm/s	125.1 dBL @ 9.3Hz / .036kPa	1.8 Hz	Within Permissible limits
				1.32 mm/s	103.5 dBL @ 4Hz / .003kPa	0.7 Hz	
5	5th And 7Th Bench	Garage area (150m away from blasting location)	Monsoon	5.19 mm/s	123.9 dBL @ 9.6Hz / .0315kPa	7.4 Hz	Within Permissible limits

Verified By
Technical Manager

----End of Report----

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An approved Laboratory from Ministry of Environment, Forest and Climate Change, Govt. of India, New Delhi

TEST REPORT

FORMAT NO. ECO/QS/FORMAT/09

NAME& ADDRESS OF CUSTOMER:	**Gunua Iron Ore Mines of M/s JSW Steel Ltd.**	**Test Report No.**	**ECOLAB/GW/0928/8143/01/2023**
		Issue Date of Test Report	**21.01.2023**
Type of Sample	Ground Water		
Sample Registration No.	928	**Name of Location**	Minjoda Village
Sampling Method	As per Reference Method	**Sample Collected By**	Ecomen Lab Team
Date of Sample Collection	13.01.2023	**Time of Sample Collection**	-
Date of Sample Received	15.01.2023	**Time of Sample Received**	12:45 PM
Start Date of Analysis	15.01.2023	**End Date of Analysis**	20.01.2023
Laboratory Environmental Condition	Temperature: 25 ± 2 °C	**Sample Quantity**	As per Requirement
	Humidity: 63 %	**Sample ID Code**	ECO/LAB/8143/01/2023

Sl. No.	TESTS	Unit	PROTOCOL	RESULT	Detection Range	INDIAN STANDARDS as per IS 10500:2012(Reaff:2018)	
						Desirable	Permissible
1.	Colour	Hazen	APHA, 23rd Ed. 2017, 2120 B	<5.0	5-100	5.00	15.0
2.	Odour	-	APHA, 23rd Ed. 2017, 2150 B	Agreeable	Qualitative	Agreeable	Agreeable
3.	Taste	-	APHA, 23rd Ed. 2017, A+B	Agreeable	Qualitative	Agreeable	Agreeable
4.	Turbidity as	NTU	APHA, 23rd Ed. 2017, 2130-A+B	BDL	1 - 100	1.0	5.0
5.	pH	-	APHA, 23rd Ed. 2017, 4500H+ A+B	6.91	2.0 -12	6.5-8.5	No Relax.
6.	Total Suspended Solids as TSS	mg/l	APHA, 23rd Ed. 2017, 2540-C	BDL	5 - 5000	-	-
7.	Total Dissolved Solids as TDS	mg/l	APHA, 23rd Ed. 2017, 2540-C	122.0	5 - 5000	500	2000
8.	Total Alkalinity	mg/l	APHA, 23rd Ed. 2017, 2320 A+ B	56.0	5-1500	200	600
9.	Total Hardness as $CaCO_3$	mg/l	APHA, 23rd Ed. 2017, 2340 A+C	64.0	5-1500	200.0	600.0
10.	Calcium as Ca	mg/l	APHA, 23rd Ed. 2017, 3500 Ca A+B	16.2	5 – 1000	75.0	200.0
11.	Magnesium as Mg	mg/l	APHA, 23rd Ed. 2017, 3500 Mg A+B	7.60	5-1000	30.0	100.0
12.	Sulfate as SO_4	mg/l	[4] 2- E	18.3	1.0-250	200.0	400.0
13.	NitrateNitrogen as NO_3	mg/l	[5] - B	8.6	5.0 -100	45.0	No Relax.
14.	Chloride as Cl	mg/l	APHA, 23rd Ed. 2017, 4500 Cl A+B	14.2	5-1000	250.0	1000.0
15.	Fluorides as F	mg/l	APHA, 23rd Ed. 2017, 4500-C	0.28	0.05-10	1.0	1.5
16.	Copper as Cu	mg/l	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-5	0.05	1.5
17.	Iron as Fe	mg/l	APHA, 23rd Ed. 2017, 3500 Fe B	0.19	0.02-50	0.3	No Relax.
18.	Manganese as Mn	mg/l	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.1-5	0.10	0.30
19.	Arsenic as As	mg/l	APHA, 23rd Ed. 2017, 3114 C	BDL	0.01-2	0.01	0.05
20.	Zinc as Zn	mg/l	APHA, 23rd Ed. 2017, 3111 A+B	0.07	0.02-50	5.0	15
21.	Total Chromium as Cr	mg/l	APHA, 23rd Ed. 2017, 3111A+B	BDL	0.05-20	0.05	No Relax.
22.	Phenolic Compounds as C_6H_5OH	mg/l	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-10	0.593	0.002
23.	Free Residual Chlorine	mg/l	APHA, 23rd Ed. 2017, 4500-Cl B	BDL	0.5-10	0.20	1.0
24.	Selenium as Se	mg/l	APHA, 23rd Ed. : 2017, 3500 Se A+C	BDL	0.02-10	0.01	No Relax
25.	Aluminum as Al	mg/l	APHA, 23rd Ed. : 2017, 3500 Al A+B	BDL	0.2-100	0.03	0.2
26.	Mercury as Hg	mg/l	APHA, 23rd Ed. : 2017, 3112 A+B	BDL	0.593-1	0.593	No Relax
27.	Lead as Pb	mg/l	APHA, 23rd Ed. : 2017, 3111 A+B	BDL	0.01-1	0.01	No Relax
28.	Cadmium as Cd	mg/l	APHA, 23rd Ed. : 2017, 3111 A+B	BDL	0.002-2	0.003	No Relax
29.	Boron as B	mg/l	APHA, 23rd Ed. : 2017, 4500 B A+C	BDL	0.2-10	0.5	1.0
30.	Cyanide as CN	mg/l	APHA,23rd Ed.2017, 4500 ,CN A+D	BDL	0.005-5	0.05	No Relax
31.	Mineral Oil	mg/l	IS 3025 (Part 39) Class -6	BDL	0.01-10	0.5	No Relax.
32.	Anionic detergent as MABS	mg/l	APHA, 23rd Ed. 2017, 5540 A+C	BDL	0.01-5	0.2	1.0
33.	Polynuclear aromatic hydrocarbon as PAH	mg/l	APHA, 23rd Ed. 2017, 6440 A+B	BDL	0.0593-2	0.0593	No Relax.
34.	E. Coli	cfu/100 ml	APHA, 23rd Ed. : 2017, 9221 A+E	Absent	1.8	Absent	Absent

Statement of Conformity: The above tested parameters confirm as per IS-10500-2012 (Reaff.-2018) limits for above tested parameters and the results are related to the sample tested.**Note: -** BDL- Below Detection Limit

Verified By
Technical Manager

----End of Report----

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An approved Laboratory from Ministry of Environment, Forest and Climate Change, Govt. of India, New Delhi

TEST REPORT

FORMAT NO. ECO/QS/FORMAT/09

NAME& ADDRESS OF CUSTOMER:	**Gunua Iron Ore Mines of M/s JSW Steel Ltd.**	**Test Report No.**	**ECOLAB/GW/0928/8144/01/2023**
		Issue Date of Test Report	**21.01.2023**

Type of Sample	Ground Water		
Sample Registration No.	593	**Name of Location**	Gonua Village
Sampling Method	As per Reference Method	**Sample Collected By**	Ecomen Lab Team
Date of Sample Collection	09.08.2022	**Time of Sample Collection**	-
Date of Sample Received	15.08.2022	**Time of Sample Received**	12:45 PM
Start Date of Analysis	16.08.2022	**End Date of Analysis**	20.01.2023
Laboratory Environmental Condition	Temperature: 25 ± 2 °C	**Sample Quantity**	As per Requirement
	Humidity: 63 %	**Sample ID Code**	ECO/LAB/8143/01/2023

Sl. No.	TESTS	Unit	PROTOCOL	RESULT	Detection Range	INDIAN STANDARDS as per IS 10500:2012(Reaff:2018)	
						Desirable	Permissible
1.	Colour	Hazen	APHA, 23rd Ed. 2017, 2120 B	<5.0	5-100	5.00	15.0
2.	Odour	-	APHA, 23rd Ed. 2017, 2150 B	Agreeable	Qualitative	Agreeable	Agreeable
3.	Taste	-	APHA, 23rd Ed. 2017, A+B	Agreeable	Qualitative	Agreeable	Agreeable
4.	Turbidity as	NTU	APHA, 23rd Ed. 2017, 2130-A+B	BDL	1 -100	1.0	5.0
5.	pH	-	APHA, 23rd Ed. 2017, 4500H+ A+B	6.85	2.0 -12	6.5-8.5	No Relax.
6.	Total Suspended Solids as TSS	mg/l	APHA, 23rd Ed. 2017, 2540-C	BDL	5 -5000	-	-
7.	Total Dissolved Solids as TDS	mg/l	APHA, 23rd Ed. 2017, 2540-C	105.6	5 -5000	500	2000
8.	Total Alkalinity	mg/l	APHA, 23rd Ed. 2017, 2320 A+ B	36.0	5-1500	200	600
9.	Total Hardness as $CaCO_3$	mg/l	APHA, 23rd Ed. 2017, 2340 A+C	44.0	5-1500	200.0	600.0
10.	Calcium as Ca	mg/l	APHA, 23rd Ed. 2017, 3500 Ca A+B	9.0	5 – 1000	75.0	200.0
11.	Magnesium as Mg	mg/l	APHA, 23rd Ed. 2017, 3500 Mg A+B	6.43	5-1000	30.0	100.0
12.	Sulfate as SO_4	mg/l	^{4} $^{2-}$ E	7.11	1.0-250	200.0	400.0
13.	NitrateNitrogen as NO_3	mg/l	^{3} - B	7.15	5.0 -100	45.0	No Relax.
14.	Chloride as Cl	mg/l	APHA, 23rd Ed. 2017, 4500 Cl A+B	15.0	5-1000	250.0	1000.0
15.	Fluorides as F	mg/l	APHA, 23rd Ed. 2017, 4500-C	0.15	0.05-10	1.0	1.5
16.	Copper as Cu	mg/l	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-5	0.05	1.5
17.	Iron as Fe	mg/l	APHA, 23rd Ed. 2017, 3500 Fe B	BDL	0.02-50	0.3	No Relax.
18.	Manganese as Mn	mg/l	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.1-5	0.10	0.30
19.	Arsenic as As	mg/l	APHA, 23rd Ed. 2017, 3114 C	BDL	0.01-2	0.01	0.05
20.	Zinc as Zn	mg/l	APHA, 23rd Ed. 2017, 3111 A+B	0.08	0.02-50	5.0	15
21.	Total Chromium as Cr	mg/l	APHA, 23rd Ed. 2017, 3111A+B	BDL	0.05-20	0.05	No Relax.
22.	Phenolic Compounds as C_6H_5OH	mg/l	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-10	0.593	0.002
23.	Free Residual Chlorine	mg/l	APHA, 23rd Ed. 2017, 4500-Cl B	BDL	0.5-10	0.20	1.0
24.	Selenium as Se	mg/l	APHA, 23rd Ed. : 2017, 3500 Se A+C	BDL	0.02-10	0.01	No Relax
25.	Aluminum as Al	mg/l	APHA, 23rd Ed. : 2017, 3500 Al A+B	BDL	0.2-100	0.03	0.2
26.	Mercury as Hg	mg/l	APHA, 23rd Ed. : 2017, 3112 A+B	BDL	0.593-1	0.593	No Relax
27.	Lead as Pb	mg/l	APHA, 23rd Ed. : 2017, 3111 A+B	BDL	0.01-1	0.01	No Relax
28.	Cadmium as Cd	mg/l	APHA, 23rd Ed. : 2017, 3111 A+B	BDL	0.002-2	0.003	No Relax
29.	Boron as B	mg/l	APHA, 23rd Ed. : 2017, 4500 B A+C	0.15	0.2-10	0.5	1.0
30.	Cyanide as CN	mg/l	APHA,23rd Ed.2017, 4500 ,CN A+D	BDL	0.005-5	0.05	No Relax
31.	Mineral Oil	mg/l	IS 3025 (Part 39) Class -6	BDL	0.01-10	0.5	No Relax.
32.	Anionic detergent as MABS	mg/l	APHA, 23rd Ed. 2017, 5540 A+C	BDL	0.01-5	0.2	1.0
33.	Polynuclear aromatic hydrocarbon as PAH	mg/l	APHA, 23rd Ed. 2017, 6440 A+B	BDL	0.0593-2	0.0593	No Relax.
34.	E. Coli	cfu/100 ml	APHA, 23rd Ed. : 2017, 9221 A+E	Absent	1.8	Absent	Absent

Statement of Conformity: The above tested parameters confirm as per IS-10500-2012 (Reaff.-2018) limits for above tested parameters and the results are related to the sample tested.**Note: -** BDL- Below Detection Limit

Verified By
Technical Manager

----End of Report----

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TEST REPORT

FORMAT NO. ECO/QS/FORMAT/09

NAME& ADDRESS OF CUSTOMER:	**Gunua Iron Ore Mines of M/s JSW Steel Ltd.**	**Test Report No.**	**ECOLAB/GW/0928/8145/01/2023**
		Issue Date of Test Report	**21.01.2023**
Type of Sample	Ground Water		
Sample Registration No.	928	**Name of Location**	Canabeda Village
Sampling Method	As per Reference Method	**Sample Collected By**	Ecomen Lab Team
Date of Sample Collection	13.01.2023	**Time of Sample Collection**	-
Date of Sample Received	15.01.2023	**Time of Sample Received**	12:45 PM
Start Date of Analysis	15.01.2023	**End Date of Analysis**	20.01.2023
Laboratory Environmental Condition	Temperature: 25 ± 2 °C	**Sample Quantity**	As per Requirement
	Humidity: 63 %	**Sample ID Code**	ECO/LAB/8143/01/2023

Sl. No.	TESTS	Unit	PROTOCOL	RESULT	Detection Range	INDIAN STANDARDS as per IS 10500:2012(Reaff:2018)	
						Desirable	Permissible
1.	Colour	Hazen	APHA, 23rd Ed. 2017, 2120 B	<5.0	5-100	5.00	15.0
2.	Odour	-	APHA, 23rd Ed. 2017, 2150 B	Agreeable	Qualitative	Agreeable	Agreeable
3.	Taste	-	APHA, 23rd Ed. 2017, A+B	Agreeable	Qualitative	Agreeable	Agreeable
4.	Turbidity as	NTU	APHA, 23rd Ed. 2017, 2130-A+B	BDL	1 - 100	1.0	5.0
5.	pH	-	APHA, 23rd Ed. 2017, 4500H+ A+B	7.04	2.0 -12	6.5-8.5	No Relax.
6.	Total Suspended Solids as TSS	mg/l	APHA, 23rd Ed. 2017, 2540-C	BDL	5 - 5000	-	-
7.	Total Dissolved Solids as TDS	mg/l	APHA, 23rd Ed. 2017, 2540-C	121.0	5 - 5000	500	2000
8.	Total Alkalinity	mg/l	APHA, 23rd Ed. 2017, 2320 A+ B	47.0	5-1500	200	600
9.	Total Hardness as $CaCO_3$	mg/l	APHA, 23rd Ed. 2017, 2340 A+C	58.0	5-1500	200.0	600.0
10.	Calcium as Ca	mg/l	APHA, 23rd Ed. 2017, 3500 Ca A+B	15.4	5 – 1000	75.0	200.0
11.	Magnesium as Mg	mg/l	APHA, 23rd Ed. 2017, 3500 Mg A+B	6.23	5-1000	30.0	100.0
12.	Sulfate as SO_4	mg/l	[4] 2- E	14.8	1.0 -250	200.0	400.0
13.	NitrateNitrogen as NO_3	mg/l	[3] - B	6.12	5.0 - 100	45.0	No Relax.
14.	Chloride as Cl	mg/l	APHA, 23rd Ed. 2017, 4500 Cl A+B	17.2	5-1000	250.0	1000.0
15.	Fluorides as F	mg/l	APHA, 23rd Ed. 2017, 4500-C	0.38	0.05-10	1.0	1.5
16.	Copper as Cu	mg/l	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-5	0.05	1.5
17.	Iron as Fe	mg/l	APHA, 23rd Ed. 2017, 3500 Fe B	0.12	0.02-50	0.3	No Relax.
18.	Manganese as Mn	mg/l	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.1-5	0.10	0.30
19.	Arsenic as As	mg/l	APHA, 23rd Ed. 2017, 3114 C	BDL	0.01-2	0.01	0.05
20.	Zinc as Zn	mg/l	APHA, 23rd Ed. 2017, 3111 A+B	0.07	0.02-50	5.0	15
21.	Total Chromium as Cr	mg/l	APHA, 23rd Ed. 2017, 3111A+B	BDL	0.05-20	0.05	No Relax.
22.	Phenolic Compounds as C_6H_5OH	mg/l	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-10	0.593	0.002
23.	Free Residual Chlorine	mg/l	APHA, 23rd Ed. 2017, 4500-Cl B	BDL	0.5-10	0.20	1.0
24.	Selenium as Se	mg/l	APHA, 23rd Ed. : 2017, 3500 Se A+C	BDL	0.02-10	0.01	No Relax
25.	Aluminum as Al	mg/l	APHA, 23rd Ed. : 2017, 3500 Al A+B	BDL	0.2-100	0.03	0.2
26.	Mercury as Hg	mg/l	APHA, 23rd Ed. : 2017, 3112 A+B	BDL	0.593-1	0.593	No Relax
27.	Lead as Pb	mg/l	APHA, 23rd Ed. : 2017, 3111 A+B	BDL	0.01-1	0.01	No Relax
28.	Cadmium as Cd	mg/l	APHA, 23rd Ed. : 2017, 3111 A+B	BDL	0.002-2	0.003	No Relax
29.	Boron as B	mg/l	APHA, 23rd Ed. : 2017, 4500 B A+C	0.23	0.2-10	0.5	1.0
30.	Cyanide as CN	mg/l	APHA,23rd Ed.2017, 4500 ,CN A+D	BDL	0.005-5	0.05	No Relax
31.	Mineral Oil	mg/l	IS 3025 (Part 39) Class -6	BDL	0.01-10	0.5	No Relax.
32.	Anionic detergent as MABS	mg/l	APHA, 23rd Ed. 2017, 5540 A+C	BDL	0.01-5	0.2	1.0
33.	Polynuclear aromatic hydrocarbon as PAH	mg/l	APHA, 23rd Ed. 2017, 6440 A+B	BDL	0.0593-2	0.0593	No Relax.
34.	E. Coli	cfu/100 ml	APHA, 23rd Ed. : 2017, 9221 A+E	Absent	1.8	Absent	Absent

Statement of Conformity: The above tested parameters confirm as per IS-10500-2012 (Reaff.-2018) limits for above tested parameters and the results are related to the sample tested. **Note: -** BDL- Below Detection Limit

Verified By
Technical Manager

---End of Report----

Authorized By
Quality Manager
Ecomen Laboratories Pvt. Ltd.
Second Floor Hall, House No. B-1/8,
Sector-H, Aliganj, Lucknow-226024

ECOMEN LABORATORIES PVT. LTD.
Second Floor Hall, House No. B-1/8, Sector-H, Aliganj, Lucknow - 226 024
Phone No. : 0522 - 4079201/2746282
E-mail: contactus@ecomen.in, Website: www.ecomen.in, CIN - U74210UP1989PTC010601,GSTIN : 09AAACE6076H1ZI
An approved Laboratory from Ministry of Environment, Forest and Climate Change, Govt. of India, New Delhi

TEST REPORT

NAME & ADDRESS OFCUSTOMER:	**Gunua Iron Ore Mines of M/s JSW Steel Ltd.**	**Test Report No.** FORMAT	**ECOLAB/GW/0928/8146/01/2023** NO. ECO/QS/FORMAT/09
		Issue Date of Test Report	**21.01.2023**
Type of Sample	Ground Water		
Sample Registration No.	928	**Name of Location**	Doughar Village
Sampling Method	As per Reference Method	**Sample Collected By**	Ecomen Lab Team
Date of Sample Collection	13.01.2023	**Time of Sample Collection**	-
Date of Sample Received	15.01.2023	**Time of Sample Received**	12:45 PM
Start Date of Analysis	15.01.2023	**End Date of Analysis**	20.01.2023

Sl. No.	TESTS	Unit	PROTOCOL	RESULT	Detection Range	INDIAN STANDARDS as 10500:2012(Reaff:2018)	
						Desirable	Permissible
1.	Colour	Hazen	APHA, 23rd Ed. 2017, 2120 B	<5.0	5-100	5.00	15.0
2.	Odour	-	APHA, 23rd Ed. 2017, 2150 B	Agreeable	Qualitative	Agreeable	Agreeable
3.	Taste	-	APHA, 23rd Ed. 2017, A+B	Agreeable	Qualitative	Agreeable	Agreeable
4.	Turbidity as	NTU	APHA, 23rd Ed. 2017, 2130-A+B	BDL	1 -100	1.0	5.0
5.	pH	-	APHA, 23rd Ed. 2017, 4500H+ A+B	6.62	2.0 -12	6.5-8.5	No Relax.
6.	Total Suspended Solids as TSS	mg/l	APHA, 23rd Ed. 2017, 2540-C	BDL	5 -5000	-	-
7.	Total Dissolved Solids as TDS	mg/l	APHA, 23rd Ed. 2017, 2540-C	102.0	5 -5000	500	2000
8.	Total Alkalinity	mg/l	APHA, 23rd Ed. 2017, 2320 A+ B	42.0	5-1500	200	600
9.	Total Hardness as $CaCO_3$	mg/l	APHA, 23rd Ed. 2017, 2340 A+C	55.0	5-1500	200.0	600.0
10.	Calcium as Ca	mg/l	APHA, 23rd Ed. 2017, 3500 Ca A+B	9.0	5 – 1000	75.0	200.0
11.	Magnesium as Mg	mg/l	APHA, 23rd Ed. 2017, 3500 Mg A+B	6.57	5-1000	30.0	100.0
12.	Sulfate as SO_4	mg/l	$^{2-}$ E ^{4}	16.2	1.0-250	200.0	400.0
13.	Nitrate Nitrogen as NO_3	mg/l	$^{-}$ B ^{5}	6.5	5.0 -100	45.0	No Relax
14.	Chloride as Cl	mg/l	APHA, 23rd Ed. 2017, 4500 Cl A+B	13.3	5-1000	250.0	1000.0
15.	Fluorides as F	mg/l	APHA, 23rd Ed. 2017, 4500-C	0.18	0.05-10	1.0	1.5
16.	Copper as Cu	mg/l	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-5	0.05	1.5
17.	Iron as Fe	mg/l	APHA, 23rd Ed. 2017, 3500 Fe B	0.06	0.02-50	0.3	No Relax
18.	Manganese as Mn	mg/l	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.1-5	0.10	0.30
19.	Arsenic as As	mg/l	APHA, 23rd Ed. 2017, 3114 C	BDL	0.01-2	0.01	0.05
20.	Zinc as Zn	mg/l	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.02-50	5.0	15
21.	Total Chromium as Cr	mg/l	APHA, 23rd Ed. 2017, 3111A+B	BDL	0.05-20	0.05	No Relax
22.	Phenolic Compounds as C_6H_5OH	mg/l	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-10	0.593	0.002
23.	Free Residual Chlorine	mg/l	APHA, 23rd Ed. 2017, 4500-Cl B	BDL	0.5-10	0.20	1.0
24.	Selenium as Se	mg/l	APHA, 23rd Ed. : 2017, 3500 Se A+C	BDL	0.02-10	0.01	No Relax
25.	Aluminum as Al	mg/l	APHA, 23rd Ed. : 2017, 3500 Al A+B	BDL	0.2-100	0.03	0.2
26.	Mercury as Hg	mg/l	APHA, 23rd Ed. : 2017, 3112 A+B	BDL	0.593-1	0.593	No Relax
27.	Lead as Pb	mg/l	APHA, 23rd Ed. : 2017, 3111 A+B	BDL	0.01-1	0.01	No Relax
28.	Cadmium as Cd	mg/l	APHA, 23rd Ed. : 2017, 3111 A+B	BDL	0.002-2	0.003	No Relax
29.	Boron as B	mg/l	APHA, 23rd Ed. : 2017, 4500 B A+C	BDL	0.2-10	0.5	1.0
30.	Cyanide as CN	mg/l	APHA,23rd Ed.2017, 4500 ,CN A+D	BDL	0.005-5	0.05	No Relax
31.	Mineral Oil	mg/l	IS 3025 (Part 39) Class -6	BDL	0.01-10	0.5	No Relax
32.	Anionic detergent as MABS	mg/l	APHA, 23rd Ed. 2017, 5540 A+C	BDL	0.01-5	0.2	1.0
33.	Polynuclear aromatic hydrocarbonas PAH	mg/l	APHA, 23rd Ed. 2017, 6440 A+B	BDL	0.0593-2	0.0593	No Relax
34.	E. Coli	cfu/100 ml	APHA, 23rd Ed. : 2017, 9221 A+E	Absent	1.8	Absent	Absent

Statement of Conformity: The above tested parameters confirm as per IS-10500-2012 (Reaff.-2018) limits for above testedparameters and the results are related to the sample tested.**Note: -** BDL-Below Detection limit

Verified By
Technical Manager

----End of Report----

Authorized By
Quality Manager
Ecomen Laboratories Pvt. Ltd.
Second Floor Hall, House No. B-1/8,
Sector-H, Aliganj, Lucknow-226024

ANNEXURE II

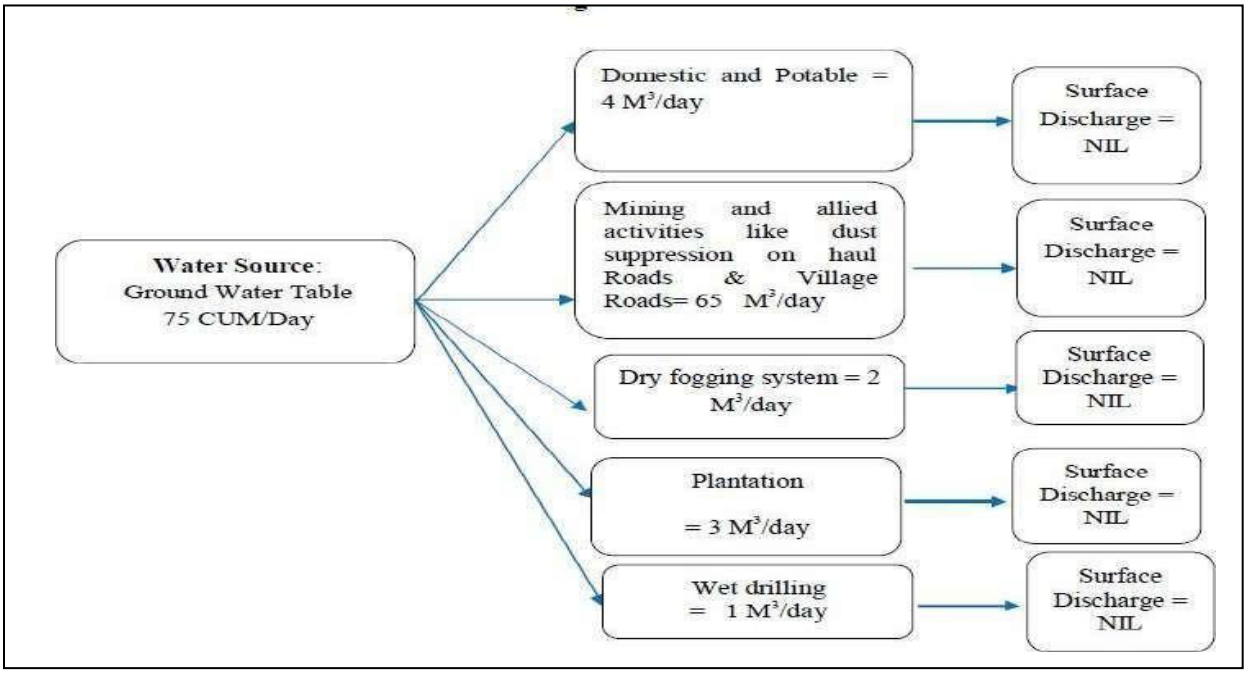
TOTAL WATER BALANCE CHART SHOWING THE USAGE OF WATER FOR VARIOUS PROCESSES

The mine requires 75 m^3/day water for drinking & domestic uses, dust suppression, green belt development and dry fogging. The mine meets its groundwater requirement from one (1) borewell. Water requirement for the project site is tabulated in **Table.**

Table: Water requirements.

Activities	**Avg. demand (m^3/d)**
Mining activities and dust Suspension on haul andvillage roads.	65
Plantation	3
Drinking & Domestic	4
Dry Fogging system	2
Wet drilling	1
Total	**75**

The total water requirement of the project site is 75 m3/day out of which, 4 m^3/day will be used for drinking and domestic purposes, 65 m^3/day will be used for mining activities and dust suspension, 2 m^3/day will be used in dry fogging system, 3 m^3/day for plantation, and 1 m^3/day will be used for wet drilling. The water balance chart is represented in **Figure.**



ANNEXURE III

GONUA IRON ORE MINES PLANTATION

1. DLC Area Plantation

2. Safety Zone, Office front dump area

ANNEXURE IV

OFFICE OF THE PRINCIPAL CHIEF CONSERVATOR OF FORESTS (WILDLIFE) & CHIEF WILDLIFE WARDEN, ODISHA

Government of Odisha, Forest, Environment & Climate Change Department
PRAKRUTI BHAWAN, PLOT NO.1459, SAHEED NAGAR, BHUBANESWAR- 751007
Phone: 0674-2602250, Website: www.wildlife.odisha.gov.in, Email: odishawildlife@gmail.com

No. 990 / CWLW-FDWC-FD-0125-2021
Bhubaneswar, Dated the 31 . January, 2022

To

M/s JSW Steel Limited,
JSW Centre Bandra Kurla Complex,
Bandra West, Mumbai – 400051

Sub: Approval of Site Specific Wildlife Conservation Plan for Gonua Iron Ore mines of M/s JSW Steel Ltd. In Bonai Forest Division of Sundargarh District

Sir,

It is to intimate that you have to implement one Site Specific Wildlife Conservation Plan for the above project in compliance to ToR No.A-19 & B-26 (iii) of Proceeding of the meeting held on 9.4.2021 by SEIAA. The Site Specific Wildlife Conservation Plan in respect of the above project is hereby approved with financial forecast of **₹397.033 lakh** (Rupees three crore ninety-seven lakh three thousand three hundred) only for implementation of activities in project impact area as detailed in the approved plan.

The total cost of ₹397.033 lakh (Rupees three crore ninety-seven lakh three thousand three hundred) only may kindly be deposited in State CAMPA fund for implementation of activities in project impact area by the DFO, Bonai Division and DFO, Keonjhar Division as per jurisdiction. It is further requested to take note of the following conditions for future compliance.

- The Plan may be revisited after 5 years and the User Agency will give undertaking to contribute towards the revised cost of the Conservation Plan till the project period, if any.
- Should there be need for Site Specific Wildlife Conservation Plan after expiry of the present plan period, the User agency shall submit another such plan at least one year before the expiry of the present Conservation Plan and deposit the outlay amount upon its approval. In case of delay, it will be dealt as per law for violations of Forest (Conservation) Act, 1980/ Environment (Protection) Act, 1986.
- The User Agency shall give an undertaking to bear the differential cost in case of enhancement of wage rate during implementation of the Plan.

Yours faithfully

Encl: Copy of approved SSWLCP

Principal CCF (WL) & CWLW, Odisha

Memo No. 991 /dt 31. Jan. 22

Copy forwarded for information and necessary action to the -

1. Special Secretary to Government of Odisha, FE&CC Department, Bhubaneswar
2. Principal Chief Conservator of Forests, Odisha with reference to memo No.57 dt 05.12.2021 of RCCF, Rourkela Circle
3. Regional Chief Conservator of Forests, Rourkela Circle with reference to his memo No.56 dt 05.01.2021
4. DFO, Bonai/ Keonjhar Division alongwith a copy of the approved SSWLCP

Principal CCF (WL) & CWLW, Odisha

SITE SPECIFIC

WILDLIFE CONSERVATION PLAN

For

GONUA IRON ORE MINE

IN VILLAGE GONUA AND PATABEDA UNDER KOIRA TAHASIL

OF BONAI FOREST DIVISION

OF

M/S JSW STEEL LIMITED

BASING ON THE PROCEEDINGS OF THE TOR STANDARD CONDITIONS FOR MINING PROJECT CONDITION NO. 17 & 18

PREPARED BY

DIVISIONAL FOREST OFFICER

BONAI FOREST DIVISION

CONTENTS

ANNEXURES

ANNEXURE NO.	DESCRIPTION
ANNEXURE-I	COPY OF PROCEEDINGS OF THE MEETING OF SEAC DATED. 09.04.2021.
ANNEXURE-II	COST NORM FOR SAL PLANTATION.
ANNEXURE-III	COST NORM FOR SIALI PLANTATION.
ANNEXURE-IV	AUTHENTICATED LIST OF FLORA & FAUNA.

MAPS

PLATE NO.	DESCRIPTION
PLATE-I	MAP SHOWING PROJECT AREA WITH 10 K.M. BUFFER.
PLATE-II	MAP INDICATING ELEPHANT MOVEMENT OF THE AREA.
PLATE-III	MAP INDICATING THE DISTANCE OF PROTECTED AREA TO PROJECT AREA.
PLATE-IV	MAP SHOWING PROJECT AREA WITH 15 K.M. BUFFER.

PREFACE

Pursuant to the Mines and Minerals (Development and Regulation) Act, 1957 and the Mineral (Auction) Rules, 2015, Govt. of Odisha in Steel and Mines Dept. vide their letter No.2279/S&M-IV(Misc.) SM-66/2016 (Pt-I) Dt.02.03.2020 has granted LoI in favour of "Preferred bidder" M/s JSW Steel Ltd. for mining in Gonua Iron Ore Mine in villages Gonua and Patabeda for 50 years. The lease Deed has been executed on 27.06.2020 valid upto 26.06.2070.

This lease area over 88.516 ha includes Forest land over 82.790 ha and non-forest land over 5.726 ha. In the ZoI five R. Fs exist i.e., Baitarani R.F. & Siddhamatha R.F. of Keonjhar Division and Mendhamaruni R.F., Chamakpur. R.F and Khajurdihi R.F. of Bonai Division. In proceedings of the meeting of SEAC dated. 09.04.2021 put a Condition for preparation of Site-specific Wildlife Conservation Plan for Schedule I faun i.e., Elephant, Bear and Python which are noticed in the buffer zone.

We are thankful to management of M/s JSW Steel. Ltd. for providing us documents and accompanying during field visits which has given fruitful inputs to this Plan. We hope if the suggestions prescribed in this plan is implemented to the true letter and spirit the forest density of the buffer zone will increase and the fauna will get ample of food and water which will diminish man-animal interface.

Divisional Forest Officer
Bonai Division

Divisional Forest Officer

(Bonai Forest Division)

EXECUTIVE SUMMARY

1. ***Gonua Iron Ore Mine of M/S JSW Steel Ltd*.** is located in villages Patabeda and Gonua in Koira Tahasil of Bonai Forest Division, Sundergarh Dist.
2. The lease area is 88.516 Ha. (As per DGPS) and 86.886 Ha. (As per RoR) ha (Forest area 82.790 Ha. and non-forest area over 5.726 Ha.) has been granted to M/S JSW Steel Ltd vide letter No.2279/S&M Dt.02.03.2020 and executed on 27.06.2020 for 50 years ending 26.06.2070.
3. M/S JSW Steel Ltd. is having Steel Plant with around 27.0 MTPA capacity at five different locations i.e., at Vizianagaram, Karnataka (12 mtpa), Dolvi, Maharashtra (10 mtpa), Salem Tamil Nadu (1.0 mtpa), Bhusan Steel and Power ltd, Jharsuguda (3.0 mtpa) and Monnet Ispat Pvt. Ltd (1.0 mtpa).
4. The forest area included in the lease is Khesera Forest (50.727 ha) and DLC Forest (32.063 ha).
5. Mining Plan has been approved by Regional Control of Mines Bhubaneswar vide letter No.MP/A/20-ORI/BHU/2020-21-2039 Dt.05.11.2020.
6. All the Statutory clearances were obtained by the previous lessee Sri Pawan Kumar Ahluwalia.
7. Pursuant to the provision contained in Rule 9A (2) of the MMD&R Rules, 2016 order that all the valid rights, clearances, licenses and the like vested in the previous lessee in respect of this mine are deemed to have been vested in favour of JSW Steel Plant for a period of 2 years as per State Govt. in Steel & Mines Dept. as per Order No.4212/SM Dt.30.05.2020. It shall be lawful for JSW Steel Limited to commence and continue mining operation on the land in which mining operations were being carried out by ex-lessee (Sri Pawan Kumar Ahluwalia) from the date of execution i.e., 27.06.2020 for a period of two years as provided in Rule 8B (2) of MMD&R Act 1957.
8. Proposal for forest clearance has been applied by M/s JSW Steel Ltd. to MoEF&CC vide Proposal No. FP/OR/MIN/51003/2020 and presently the proposal is under scrutiny by DFO, Bonai Division for compilation of Part II.
9. Environmental clearance has been granted by State Level Environment Impact Assessment Authority vide letter No.7685/SEIAA Dt.21.12.2019 to previous lessee for the production capacity of 1.2 MTPA which will be enhanced to 2.99 mtpa in near future by M/s JSW Steel Ltd.
10. The EC has been transferred to M/s JSW Steel Limited as on 13/12/2021 vide proposal no. SIA/OR/MIN/38069/2005.
11. Consent to operate has been granted by SPCB, ODISHA vide their **letter No. 5515/ IND-I-CON-1539 Dt. 31.03.2021** for air and water.

12. The end use of Iron Ore of Gonua Block will be used in the Plants at Vizianagaram, Karnataka (12 mtpa), Dolvi, Maharashtra (10 mtpa), Salem Tamil Nadu (1.0 mtpa), Bhusan Steel and Power ltd, Jharsuguda (3.0 mtpa) and Monnet Ispat Pvt. Ltd (1.0 mtpa) for manufacturing of Steel.
13. M/S JSW Steel ltd is also having two more leases i.e., Jajang Iron ore mines and Narayanposi Iron and Manganese ore mines in Bonai Forest Division in Sundergarh Dist. Of Odisha.
14. Surface right was granted over the full lease area 102.89 ha (254.25 acres) to the previous lessee during 1967 by ADM, Sundergarh vide letter No.193 Dt.08.03.1967.
15. The total Mineable reserve of Iron Ore under Proved category is 103.009 million Ton Fe grade is +45-55%. Hence reserve available for conceptual period will be 92.50 million Ton. Annual rate of production is 1.2 million ton and hence the life of mine is 31 years with enhanced production capacity.
16. The lease area is hilly with slopes to west with altitude varying from 585-705m above MSL. There is one nala (valley) named as Kakrpani nala which is dividing the lease in to two parts i.e., Gonua and Patabeda.
17. Deposits form part of SE limb of horse shoe shaped Singhbhum-Bonai-Keonjhar synclinorium of Iron ore group.
18. The forests in ZoI (Baitarani R.F. & Siddhamatha RF of Keonjhar Division and Mendhamaruni R.F., Chamakpur RF & Khajurdihi RF in Bonai Division) consists Moist Deciduous, Dry Deciduous and Semi-evergreen types of forests (3C, 5B and 2 B). Pre-dominant sub-type is moist Peninsular high-level Sal with *Anogeissus latifolia* as major associates. Forests are largely, moderately dense with open and scrub types in the mining areas.
19. The fauna noticed in ZoI includes movement of Elephants, Sloth Bear and Python which are in Schedule I of Wildlife Protection Act, 1972 and considered as endangered.
20. This mine area does not form part of any Protected area.
21. The mining process is fully mechanised. There are mainly three numbers of Iron quarries existing. One is in-situ quarry with float iron ore on eastern to western side (Block A), another in north with small workings areas (Block B) and the third in north-middle with trail pits (Block-C).
22. Bench height and width are kept at 6m and 9 m respectively. Ultimate pit at conceptual period will be two large ones.
23. Two screening plants and one crushing plant has been set up by ex-lessee.
24. The perceived impact of mining in Core Zone are habitat loss due to loss of forests, fire hazard, soil erosion, accidental fall of wildlife in to working pits, dust/noise/light pollution and garbage generation.

25. Similarly, the impact in ZoI is fragmentation of habitat, habitat quality loss, for hazard, biodiversity loss, animal depredation, and water pollution from sediments.

26. With a view to mitigate above impacts in Core Zone interventions like Solar fencing around pits over 2.0 Kms, awareness promotion to mine workers, provision of one 2-wheeler & one Four-wheeler has been suggested.

27. Mitigative measures in ZoI consists of Plantation of Provision for plantation of Siali (5000 nos.) in open patch of Mendhamaruni RF, construction of check dams, engagement of fire fighting squad, anti-depredation squad, awareness promotion and providing signage at sensitive locations of elephant pass etc.

This Management Plan has addressed all the above threats with remedial measures to minimize the adversities as detailed below: -

Within the Project area

- ❖ Photovoltaic fencing around the active Pit over 2.0 K.M.
- ❖ To create awareness among the mine workers.
- ❖ Provision of One Motorcycle for protection work to be used by Foresters along with POL.
- ❖ Provision of One Four-wheeler (Mahindra Bolero) along with driver and POL for DFO, Bonai.

Within the Impact Area/Buffer zone

BONAI DIVISION

- Provision for plantation of Siali (5000 nos.) in gaps of Mendhamaruni RF.
- Construction of series of check dam.
- Engagement of Fire fighting squad during fire season (February to June).
- Provision of elephant squad to watch movement of the Pachyderms and distract their depredation to villages for crop raiding, house damage and human-wildlife interface.
- Provide Solar Street lights in villages prone to elephant movement
- Fixing of glow signages.
- Awareness Publicity.
- Support to VSS members to mitigate HEC by Provision of Grain Bins.
- Purchase of Wildlife Monitoring equipments.
- Intelligence gathering.
- Elephant Proof Trench.

KEONJHAR DIVISION

- ✓ Provision for plantation of Sal (5000 nos.) in open patch of Baitarani RF.
- ✓ Provision for plantation of Siali (5000 nos.) in gaps of Baitarani RF.

- ✓ Soil Moisture Conservation activities.
- ✓ Provision of Solar Street Lights & Provision for a Grain Store House.
- ✓ Fixing of glow signages particularly on Animal Pass.
- ✓ Provision for providing Grain Bins.

28. This Plan has been prepared for 10 years 2021-22 to 2030-31.

29. There shall be a monitoring Committee under the Chairmanship of DFO, Bonai, along with represstentative of Mine Owner, Range Forest Officer, Koira as members. Assistant Conservator of Forests of Bonai Division will be the Member Secretary.

30. This plan has been prepared as per Condition No.17, 18 and 19 of ToR. However, in the Stage-I approval (Forest Clearance) if any condition will be imposed by MoEF&CC for preparation of Wildlife Conservation Plan, then additional plan may be required to be prepared adding additional interventions.

31. As per condition no. 1 of revised guideline issued by PCCF (WL) & CWLW, Odisha vide his memo no. 9094 dt. 17.09.2021, we have taken 10 Km radius from the periphery of the Mining Lease area. Since, this project although located in Bonai Forest Division but in ZoI overlaps to Keonjhar Forest Division also; we have taken another ring of 5 Kms extra. So, in Plate-IV the map is shown for 10 Kms & 15 Kms also.

32. This Site-Specific Wildlife Conservation Plan has been prepared basing on Mining Project Condition No.17, 18 and 19 of Proceedings of the ToR Standard Conditions issued by SEAC (State Level Expert Appraisal Committee) dt. 09.04.21.

33. The total cost of the conservation plan is **Rs.397.033 Lakhs (Rs. 272.797 lakhs for Bonai Forest Division and Rs.124.236 lakhs for Keonjhar Forest Division)** including **escalation cost @ 20%. To accommodate un-foreseen expenditure the entire amount will be deposited by the User Agency in CAMPA excepting infrastructures loke Motor Cycle and Bolero to be procured by the User Agency and delivered to DFO, Bonai Forest Division.**

Divisional Forest Officer
Bonai Division

CHAPTER-1

INTRODUCTION AND METHODOLOGY

INTRODUCTION

Sundergarh district constitutes three forest divisions namely Sundergarh, Bonai and Rourkela. The important minerals found are iron ore, manganese, bauxite and lime stone. Gonua lease rea is in Bonai Forest Division.

1. A) i) Project Description

Gonua Iron Ore Mine of M/s JSW Steel Ltd. is located in villages Patabeda and Gonua in Koira Tahasil, Bonai Forest Division, Sundergarh Dist.

The 88.516 ha (as per DGPS)/ 86.886 ha (as per RoR) ha (Forest area 82.790 ha and non-forest area over 5.726 ha) has been granted to M/s JSW Steel Ltd vide letter No.2279/ S&M Dt.02.03.2020 and executed on 27.06.2020 for 50 years ending 26.06.2070.

1. A) ii) Extent of project area, land schedule and land use pattern:

Govt. of Odisha in Steel & Mines Dept. vide letter No.2279/S&M Dt.02.03.2020 has granted Gonua Iron Ore Block over an area of 86.886 ha (As per RoR) and 88.516 Ha (As per DGPS) in Villages Patabeda and Gonua in Koira Tahasil, Bonai Forest Division, Sundergarh Dist. in Koira Tahasil of Bonai Forest Division in Koira Tahasil of Sundergarh Dist. for a period of 20 years. Pursuant to the Provisions of 9A (2) of the Rules 2016 order that all the valid rights, approvals, clearances, vested with Sri P.K. Ahluwalia (the previous lessee) are deemed to have been vested with M/S JSW Steel Ltd. As per provisions of Section 8B (2) of the MMDR Act, 1957 all the valid rights, approvals, clearances, are vested in favour of M/S JSW Steel Ltd by Govt. of Odisha for a period of 2 years from the date of execution of the lease i.e., 27.06.2020 which is valid upto 26.06.2070.

This lease area is in Koira Forest Range, Koira Section, Koira Beat. The total land schedule has been furnished in the diversion proposal. It is bounded by Latitude $21^0$55'00.52356" to $21^0$55'46.03440" N & Longitude $85^0$22'04.13616" to $85^0$22'36.35616" E in Survey of India Toposheet NO. 73G/5 (F45L5). This is located at a distance of 05 Kms from Koira Township in Bonai Sub-Division. The nearest railhead is Barsuan on South Eastern Railway, located at a distance of 33 K.Ms. Besides, Barbil and Badjamada are also nearer railheads.

Land use of the project area:

The breakup of the land use is as given below:

Sl. No.	Head	Total Area (ha)	Conceptual Land Use (ha)
1	Area under mining	79.197	79.197
2	Storage for top soil	--	--
3	Waste dump site	--	--
4	Mineral storage	6.04	6.04
5	Infrastructure facilities (Weigh bridge, Work shop, Office, CPU etc.) workshop, administrative building etc.	1.472	1.472
6	Road	1.007	1.007
7	Railways	--	--
8	Green belt	--	1.888
9	Others (Water harvesting Pong, Magazine, road for public use)	1.878	1.878
10	Sub-total	44.926	82.963
11	Safety Zone (along the M.L. boundary and village and Dry nala)	5.553	5
12	Untouched	38.037	0
Grand total		**88.516**	**88.516**

1. A) iii) Project Status of Forest Diversion Proposal and Environmental Clearance:

Forest Diversion Proposal:

The total lease area is 86.886 ha which includes 76.882 ha of forest land (Khesera Forest over 49.513 ha and DLC Forest 27.369 ha). MoEF&CC granted Stage-II vide their letter No.8-47/93-FC dated 07/09.08.1996 for diversion of 54.40 ha of forest land. Diversion proposal for 74.603 ha forest land excluding 2.279 ha for Safety Zone was under process by the ex-lessee. Total broken up area is 48.568 ha which includes 29.379 ha of Khesera Forest and 17.760 ha o DLC Forest and 1.429 ha of non-forest land.

Other statutory clearances:

The ex- lessee was granted Environmental Clearance over 0.36 mtpa of Iron Ore vide MoEF letter No. J-11015/201/2005. IA. II(M) Dt.07.10.2005 For enhancement of production to 1.2 million ton per annum production for Iron Ore, the ex-lessee had applied to MoEF for issue of ToR and MoEF ide their letter No. J-11015/211/2010. IA. II(M) 19.08.2010 had issued ToR. vide SEIAA File No.38069/03-Min-V/09-2019 Dt.21.12.2019. State Level Environment Impact Assessment Authority, Odisha vide their letter No. SEIAA:38069/03-MIN-V/09-2019 Dt.21.12.2019 had granted Environmental clearance to the ex-lessee. ***As per Condition No.26 "the Project Proponent shall take all precautionary measures during mining operation for conservation and protection of endangered fauna, if any, spotted in the study area. Action plan for conservation of flora and fauna shall be prepared and implemented in consultation with the State Forest and Wildlife Dept. A copy of the action plan shall be submitted to MoEF&CC and Regional Office. Accordingly, this Plan has been prepared.***

M/S JSW Steel Ltd. Prepared the Mining Plan of Gonua Iron Ore Block along with Progressive Mine Closure Plan over 88.886 ha as per RoR and 88.516 ha as per DGPS Survey, which has been approved by Regional Control of Mines, Orissa, Bhubaneswar vide his letter No.MP/A/20-ORI-BHU/2020-21 / 2039 Dt. 05.11.2020.

The following Forest Blocks exist in the ZoI. Baitarani R.F. & Siddhamatha R.F. of Keonjhar Forest Division and Mendhamaruni R.F., Chamakpur R.F. & Khajurdihi R.F. of Bonai Forest Division exist in ZoI. Both the Forest Blocks have been included in forest type 3cc 2e(i) i.e., Moist Peninsular High-level Sal. The sub type is confined to the upper slopes, ridges and flat tops of Mendhamaruni R.F. The quality of Sal is IV but the crop is somewhat open. Within the Sal belt there are patches of mixed forest with *Anogeissus latifolia* as dominant species. Regeneration of Sal is fairly good but repeated fire every year, influence floristic composition significantly. Indicative species composition is as under: -

Top Canopy *Terminalia alata* (Asan), *Anogeissus latifolia* (Dhaura), *Syzygium cuminii* (Jamun), *Pterocarpus marsupium* (Bija), *Madhuca indica* (Mahul).

Middle Canopy *Careya arborea* (Kumbhi), *Bauhinia purpurea* (Lebha), *Bridelia retusa* (Kasi), *Ougeinia oogeinensis* (Bandhan), *Lannea coromandelica* (Mai).

Under Growth *Indigofera pulchela* (Giliri), *Helecteris isora* (Moda fal), *Flemengia bracteata* (Salparni).

Climbers *Bahunia valii* (Siali), *Smilax macrophylla* (Muturi).

Grasses *Themeda triandra* and *Imperata cyndicral*.

Bamboo is significantly absent.

1. B) VILLAGES LOCATED WITHIN THE STUDY AREA, THEIR DEMOGRAPHIC AND OCCUPATIONAL PROFILE:

There are 26 villages in the project impact area i.e., 10KM radius. There are 4 villages with population more than 1000, 11 villages with population between 501-999 and 11 villages with population less than 500. Total population in the above 26 villages are 18,883 out of which SC population is 87%. The level of literacy is 24%, main workers constitute 37% and non-workers 52%. Cultivators and agriculture labour constitute 10% and marginal workers only 1%.

1. B) i) Existing cropping pattern:

The study area is drought prone with a large extent of unfertile land. People of this area mainly depend on mining for their day-to-day livelihood. In course of time, cultivation has become less important for them. However, paddy is the main crop and people also grow vegetable for their own consumption. From the present survey it reveals that agriculture is not the major source of livelihood for the inhabitants of the ZoI. Climatic condition is also not conducive for agriculture. Even then a good farming community is there in the buffer zone. The following table reals that about 34% respondents are in marginal and small farms category. Thus, these two categories jointly account for about 68% of the total house hold in the study area. There are 24% medium and 8% large farmers. These two categories together account for about 32% of the house hold.

Sl. No.	Holding Size (Acre)	Household (5)
1.	Marginal (, 2.5)	34.2
2.	Small (2.5 to 5.0)	34.2
3.	Medium (5.0 – 10.0)	23.7
4.	Large (. = 10.0)	7.9
	Total	**100.0**

The local people are mostly tribal. They do not have their own wood-lot. The majority of forest blocks of Bonai Forest Division are dominated with plants like Sal and its associates i.e., Asan, Kusum, Char, Mahul, Myrabolans etc. Tribal collect small timber, fire wood, Sal seeds, Sal leaves, Sal resin, char seeds, Kusum seeds, Myrabolans, mahua flower and Karanja seeds, babul seeds, Siali leaf and fibers, Dhatuki flower, Bhuineem, Banahaladi, Bana kulthi, jangli mango, ambada, tamarind, kanta bandhuni, phul bandhuni, bana tulsi, gums and resins etc. Kendu leaf is another important NTFP in Keonjhar Dist. In the leisure period, tribal prefer to go inside the forest in a group for poaching of small game like hare, civet, mongoose, monitor lizard, Quail, etc. Besides, in seasonal nala, tribals also practice fishing by draining the water and share the collection mostly for their house consumption. In

addition, they are in the practice of collecting climbers for basket making (Atundi), rope from murga (Agave sp.) and Siali fiber for house roof thatching. They also collect bamboo twigs for fishing-rod and green bamboo for basket making.

The local inhabitants also depend on forests for grazing their cattle and at places for shifting cultivation. The village cattle herd normally visit the adjoining forest area. The cattle those visit the forest for grazing every morning, at times suffer from seasonal diseases like FYM. This disease possibly may contaminate to Wildlife like Chital, Sambar, Wild boar, etc. (hooved animal).

1. B) ii) Extent of biotic pressure of villages on forest resources:

The extent of biotic pressure of adjoining villagers on forest is heavy. Villagers entirely depend on forest for their firewood, small timber for mud-hut construction and fodder for their cattle. They let loose their cattle every morning in the forest for grazing who return back at their own accord when dusk drops down. At times they set fire to the forest facilitation of collection of Non-Timber Forest Produce especially Kendu leaf, Mahua, Char seeds etc.

1. B) iii) NTFP (Non-Timber Forest Product) Collection (Method of Collection and Impact on Wildlife):

This is a tribal belt. Tribal are the nomadic inhabitants of the forest. The tribal are in habit of collecting fruits and nuts, bamboo, thatching grass, Mahua, Myrabolans, Root tubers (Dioscoreaceae), neem seeds, Char, Bel, Kaitha *(Feronia elephantum*), Babul (*Acacia nilotica*), Bana Bhalia (*Semicarpus anacardium*), *Rohini (Soymida febrifuga),* Medicinal plants, Wax, broomstick, resin, Mango Kernel etc. from the forest. They are also in the practice of collecting tender Sal leaves for plate making. Honey and Jhuna (resin from Sal tree) collection are infrequent in the study area. However, during our survey, we did not find any family entirely dependent on NTFP collection. The leftover family members of the main workforce (old age people and women) are mostly engaged in NTFP collection. They collect their fencing materials and material required for preparing agricultural tools from timber from the adjoining forests.

Tribal are still in the practice of hand-picking of NTFP like Mahua flower, Sal seeds etc. Self–help group formulated in these areas are in practice of preparing pampad, pickle, Juice, incense stick etc. but still more emphasis needs to be given for the commercial collection of NTFP and marketing by ORMAS. The tribal of this area find exposure only during District level Fair, or during the tribal fair held at Bhubaneswar every year from January 26th for a month.

1. B) iv) Method of NTFP collection

Many local villagers depend on adjoining forests areas for collection of Mahua flower, Kendu leaf, Sal Seed etc. For their bonafied consumption and trade. No specific Guideline in this regard is in operation. NTFP like Kendu Leaf, Sal Seeds, Mohua flower, Myrabolans et. Are a major source of income of tribal. The State Forest Dept, Odisha, OFDC, TDCC purchase NTFP to save tribal being mishandled by traders. In the ZoI around 300 families depend on collection of NTFP. Especially for collection of Mahua flower and Sal Seed, the undergrowth available is cleared by Tribal and burn twice in a year for smooth collection of the same. Collection of Mahua flowers, Myrabolans, fruits of Kendu, Char, the tribal deprive the Wildlife like ungulates, bear, birds and rodents from their share of food.

Now Gram Panchayat is empowered to deal with NTFP and they are not aware of its sustainability. A calendar of collection of NTFP and process should be supplied to the Gram Panchayat Office, Range Office and Beat Office. For collecting NTFP from the ground, villagers clean the forest floor by igniting fire, which destroys the ground vegetation, as well as restricts the regeneration of tree species. Repeated use of fire adversely affects the ground nesting mammals, birds and reptile population. Due to the impact of this unscientific cleaning process, the ground becomes completely barren at places to infiltrate the rainwater flow resulting in reduced sub-soil water table and accelerating the process of soil erosion.

1. B) v) Cattle Population and Grazing Habit:

It is ascertained from the local villagers that, they have nearly 5,000 cattle, 3000 goat and 2,000 Pigs not for mulching but for trade. These animals are allowed to graze in the forest freely as stall feeding has not yet been adopted by tribal. Sometimes these cattle become the source of contaminating wildlife for disease like FYM.

1. C) Description of Topography, Natural Drainage Lines

Topography

The lease area is moderately flat, though their area occasional mounds within the area studded with flat topped low ridges, reassembling a relict type of topography controlled by differential harness of rocks. The maximum RL within the area is 684 K.M. to the southern part of the lease area and minimum RL is 621 M at the north east side.

Drainage

There is a dry nala originating from the middle of northern half of M.L. area at 605m, 1.5 Km to the west of lease boundary flows northwards and drains to Kundra nala as well as Karapani nala. Other major drainage channels are Tehrai nala of South West of the M.L., Kundra nala on South West as well as North of the lease and Baitarani River on the east.

Climate

Climate and meteorology of a place play an important role in the implementation of any developmental Project. Meteorology is also the key to understand local air quality as there is essential relationship between meteorology and atmospheric dispersion involving the wind in the broad sense of them.

Temperature

The climate of the study area is characterized by an oppressively hot summer with high humidity. Summer generally commences in the month of March and continue till end of June. Temperature begins to rise rapidly attaining the maximum in the month of May (47.4^0) Celsius. No doubt the weather becomes pleasant on the unset of monsoon in 2^{nd} week of June an continues upto end of October. The temperature in the month of December cools down to 07^0 Celsius.

Relative Humidity:

The air is dry excepting during the South-West monsoon season. The maximum humidity ranges from 55% to 76% with annual average of 64.83% while the minimum humidity range from 26% to 43% with an annual average of 34%.

Rainfall

There is variation of rainfall in the catchment area and around 10 Kms radius of buffer zone of this mine. The average annual rainfall of Bonai sub-division is 1364.66mm as computed from last 10 years data out of which a major portion i.e., 92% occurs from July to September.

Pre-dominant wind direction

This is south-west area which remains calm for nearly 50% of the year.

1. D) Details of linear infrastructures

Rail: The nearest railhead is at Barbil of S.E. Railways and is 33 km. away. The station is connected to Howrah by a daily Jan Shatabdi Express, Barbil being the nearest loading point.

Road: The mine is approximately 106 km from Chaibasa and 122 km away from Rourkela. It is 9 km from Barbil-Rourkela National Highway No. 215.

River: Baitarani River is existing on the ZoI on the East of the M.L. area.

1. E) Description of Flora and Fauna:

As per the field study, the list of flora and fauna available in the area is as detailed below.

FLORAL DIVERSITY:

Table: Habit-wise status of floristic composition of study area

Sl.No.	Habit	Core Zone	Buffer Zone
1	Trees	15	13
2	Shrubs & Herbs	05	05
3	Climbers	06	06
4	Grasses	02	02
5.	Aquatic Flora	-	10
6.	Agricultural Crops	-	16
TOTAL		**28**	**52**

Core Zone:

In total 28 plant species belong to 15 trees, 06 climbers and 02 grasses, 05 shrubs and herbs were recorded during the field survey. The details list of flora is given in list of Flora is given in Table No. I.

Buffer Zone:

In total 52 plant species belong to 13 trees, 05 shrubs, 06 climbers, 02 grasses, 10 aquatic flora and 16 species of agricultural crops were recorded during the field survey. The details list of flora is given in list of Flora is given in Table No. II.

Table No. I

LIST OF FLORA IN THE CORE ZONE GONUA IRON ORE MINES			
TREES			
Sl.No.	**Local Name**	**Scientific Name**	**Family**
1.	Asan	*Terminalia alata*	Combretaceae
2.	Bahada	*Terminalia belerica*	Combretaceae
3.	Bana Bhalia	*Semicarpus anacardium*	Anacardiaceae
4.	Char	*Buchnania lanzan*	Anacardiaceae
5.	Chhatian	*Alstonia scholaris*	Apocynaceae
6.	Dhaura	*Anogeissus latifolia*	Combretaceae
7.	Harida	*Terminalia belerica*	Combretaceae
8.	Jamun	*Syzygium cuminii*	Myrtaceae
9.	Kendu	*Diospyrus melanoxylon*	Ebenaceae
10.	Kasi	*Bridelia retusa*	Euphorbiaceae

11.	Kumbhi	*Careya arborea*	Myrtaceae
12.	Kusum	*Schleichera oleosa*	Sapindaceae
13.	Kurum	*Adina cordifolica*	Rubiaceae
14.	Mahul	*Madhuca indica*	Sapotaceae
15.	Sal	*Shorea robusta*	Dipterocorpaceae
LIST OF FLORA IN THE CORE ZONE GONUA IRON ORE MINES			
SHRUBS/HERBS			
Sl.No.	**Local Name**	**Scientific Name**	**Family**
1.	Anantamula	*Hemidesmus indicus*	Asclepidaceae
2.	Arakha	*Calotropis gigantia*	Asclepidaceae
3.	Basanga	*Adhatoda vasica*	Acanthaceae
4.	Dhatki	*Woodfordia fruticosa*	Lythraceae
5.	Kurei	*Holarrhena antidysenterica*	Apcynaceae
LIST OF FLORA IN THE CORE ZONE GONUA IRON ORE MINES			
CLIMBERS			
Sl.No.	**Local Name**	**Scientific Name**	**Family**
1.	Atundi	*Combretum decandrum*	Combretaceae
2.	Baidanka	*Mucuna monosperma*	Papilonaceae
3.	Bichhuati	*Urtica dioica*	Euphorbiaceae
4.	Mututri	*Smylax macrophylla*	Liliaceae
5.	Siali	*Bauhinia valii*	Papilonaceae
6.	Satabari	*Asparagus racemosus*	Liliaceae
LIST OF FLORA IN THE CORE ZONE GONUA IRON ORE MINES			
GRASSES			
Sl.No.	**Local Name**	**Scientific Name**	**Family**
1.	Khara grass	*Imperata cylindrical*	Gramineae
2.	Phulabandhuni	*Thysanolaena maxima*	Gramineae

Table No. II

LIST OF FLORA IN THE BUFFER ZONE GONUA IRON ORE MINES			
TREES			
Sl.No.	**Local Name**	**Scientific Name**	**Family**
1.	Bel	*Aegle marmelos*	Rutaceae
2.	Bahada	*Terminalia belerica*	Combretaceae
3.	Bana Bhalia	*Semicarpus anacardium*	Anacardiaceae
4.	Dhaura	*Anogeissus latifolia*	Combretaceae

5.	Dimiri	*Ficus glomerata*	Moraceae
6.	Haldu/Karam	*Adina cordifolia*	Rubaceae
7.	Harida	*Terminalia chebula*	Combretaceae
8.	Jamun	*Syzygium cuminii*	Myrtaceae
9.	Jack fruit	*Artocarpus heterophyllus*	Moraceae
10.	Kendu	*Diospyrus melanoxylon*	Ebenaceae
11.	Kusum	*Schleichera oleosa*	Sapindaceae
12.	Kasi	*Bridelia retusa*	Euphorbiaceae
13.	Tamarind	*Tamarindus indicus*	Ceasalpiniaceae
LIST OF FLORA IN THE BUFFER ZONE GONUA IRON ORE MINES			
SHRUBS/HERBS			
Sl.No.	**Local Name**	**Scientific Name**	**Family**
1.	Anantamula	*Hemidesmus indicus*	Asclepidaceae
2.	Arakha	*Calotropis gigantia*	Asclepidaceae
3.	Basanga	*Adhatoda vasica*	Acanthaceae
4.	Dhatki	*Woodfordiafruticosa*	Lythraceae
5.	Kurei	*Holarrhena antidysenterica*	Apcynaceae
LIST OF FLORA IN THE BUFFER ZONE GONUA IRON ORE MINES			
CLIMBERS			
Sl.No.	**Local Name**	**Scientific Name**	**Family**
1.	Atundi	*Combretum decandrum*	Combretaceae
2.	Baidanka	*Mucuna monosperma*	Papilonaceae
3.	Bichhuati	*Urtica dioica*	Euphorbiaceae
4.	Mututri	*Smylax macrophylla*	Liliaceae
5.	Siali	*Bauhinia valii*	Papilonaceae
6.	Satabari	*Asparagus racemosus*	Liliaceae
LIST OF FLORA IN THE BUFFER ZONE GONUA IRON ORE MINES			
GRASSES			
Sl.No.	**Local Name**	**Scientific Name**	**Family**
1.	Khara grass	*Imperata cylindrical*	Gramineae
2.	Phulabandhuni	*Thysanolaena maxima*	Gramineae
LIST OF FLORA IN THE BUFFER ZONE GONUA IRON ORE MINES			
AQUATIC FLORA			
1.	Padma	*Nilumbo nucifera*	Nymphaeaceae
2.	Dhala Kain	*Nymphaea alba*	Nymphaeaceae
3.	Lal kain	*Nymphaeanouchalli*	Nymphaeaceae
4.	Boro Jhanji	*Pistia stratiotes*	Araceae

5.	Pani siuli	*Nymphoides indiccum*	Nymphaeaceae
6.	Chingudia dala	*Hydrilla verticillata*	Hydrocharitaceae
7.	Kalama Saga	*Ipomoea aquatica*	Convuolvulaceae
8.	Sunsunia saga	*Marsilea minuta*	Marsileaceae
9.	Fern	*Azolla imbricata*	Azollaceae
10.	Fern	*Pteridium aqullinum*	Dennstaedtiaceae
LIST OF FLORA IN THE BUFFER ZONE GONUA IRON ORE MINES			
AGRICULTURAL CROPS			
1.	Mung	*Vigna radiata*	Fabaceae
2.	Horsegram	*Delichos biflorus*	Fabaceae
3.	Groundnut	*Arachis hypogeae*	Fabaceae
4.	Alasi	*Guizotia abyssinica*	Asteraceae
5.	Kandula	*Cjanus cajan*	Fabaceae
6.	Onion	*Allium cepa*	Amaryllidaceae
7.	Garlic	*Allium sativum*	Amaryllidaceae
8.	Mustard	*Brassica campestris*	Brassicaceae
9.	Maize	*Zea mays*	Poaceae
10.	Paddy	*Oryza sativa*	Poaceae
11.	Wheat	*Triticum aestivum*	Poaceae
12.	Brinjal	*Solanum melangena*	Solanaceae
13.	Tomao	*Lycopersicum esculantum*	Solanaceae
14.	Chilly	*Capsicum annum*	Solanaceae
15.	Bitter gourd	*Momordica charantia*	Cucurbitaceae
16.	Cucumber	*Cucurbita sativa*	Cucurbitaceae

FAUNAL DIVERSITY:

The Core site is a mining dominating landscape and therefore not much sightings of animal was possible. The faunal diversity in the core area was limited to squirrels and rats and. The core area has a very poor Avifaunal diversity. Possibility of bigger mammals is very low due to the cumulative disturbance caused by the mine dominated landscape. In the Buffer region due to the presence of Reserve forests, there was a good diversity of Birds.

To study faunal diversity and richness in the area, random sightings were preferred and various methods of observation were practiced. For reptiles, stone lifting was done; rock crevices and wall space of structures in the site were checked. Amphibians were searched near the stagnant water pools and small streams. Insects were observed on underside of leaves, nests, rock crevices, bushes and other places. Birds were studied by undertaking several field trails in and around the site.

The observations made during the study phase in the site are as follows:

Mammal diversity:

No mammals other than common squirrel and domesticated cows or dogs were seen in and around the core site. On random survey and talking with local people, it was learnt that Jackals, elephants and Sloth bear are found in the reserve forest areas in the buffer region. On the basis of direct sightings, questioners and indirect evidences, the presence of faunal species such as Barking deer, Jackals and Chital were validated.

List of Mammals that can be found in the buffer region is attached in the **Table.**

Avian diversity:

In areas falling within the core zone (lease area) and adjoining areas, 08 species of birds were observed during the study. The observation was made based on direct sightings and birdcalls. In the observed list of birds, none of the species were classified as Endangered or rare. All of these birds observed were of least concern classification. It must be noted here that though the bird's species recorded during the survey are of least concern classification, necessary steps must be undertaken to reduce the impact on the reserve forest areas that support majority of the Avian diversity. A list of Bird species observed during the study is shown in Table.

Reptile and Amphibian diversity:

During the survey, 2 species of reptiles was found in areas close to the project site. On expanding the survey to nearby ranges in the Buffer region, 06 Species of reptiles were encountered. The list of Reptiles species is shown in **Table.**

There is no Wild Life Sanctuary or National Park within the study area of 10 km. The detailed faunal species is as follows:

FAUNA WITHIN CORE ZONE:

MAMMALS			
Sl.No.	**English Name**	**Scientific Name**	**Schedule as per WPA**
1.	Indian Palm Squirrel	*Funambulus pennanti*	II
2.	Jungle Cat	*Felis chaus*	II

3.	Rat	*Rattus rattus*	V
4.	Rabbit	*Lepus nigricolis*	IV
REPTILES			
Sl.No.	**English Name**	**Scientific Name**	**Schedule as per WPA**
1.	Chameleon	*Chameleon zeylanicus*	II
2.	Krait	*Bungarus caeruleus*	II
BIRDS			
Sl.No.	**English Name**	**Scientific Name**	**Schedule**
1.	Weaver bird	*Ploccus phillipinus*	IV
2.	Cuckoo	*Eudynamis Scolopaceus*	IV
3.	Crow	*Corvus splendens*	V
4.	Parrot	*Psittacula krameri*	IV
5.	Pigeon	*Columba livia*	IV
6.	Sparrow	*Passer domesticus*	IV

FAUNA WITHIN BUFFER ZONE:

MAMMALS			
Sl.No.	**English Name**	**Scientific Name**	**Schedule**
1.	Indian Elephant	*Elephas maximas*	I
2.	Sloth Bear	*Melursus ursinus*	I
3.	Jackal	*Canis aureus linnaeus*	II
4.	Rhesus Macaque	*Macaca mulata*	II
5.	Hanuman Langur	*Presbytis entellus*	II
6.	Spotted Deer	*Axis axis*	II
7.	Jungle cat	*Felis chaus*	II
8.	Barking deer	*Muntiacu muntjak*	III
9.	Mongoose	*Herpesres edwardis*	IV

10.	Rabbit	*Presbytes entellus*	IV
11.	House Rat	*Rattus rattus*	V
REPTILES			
Sl.No.	**English Name**	**Scientific Name**	**Schedule**
1.	Indian Python	*Python molurus*	I
2.	Rat Snake	*Ptyas mucosus*	II
3.	Cobra	*Naja naja*	II
4.	Russel's viper	*Viper russelli*	II
5.	House gecko	*Hemidactylus flaviviridis*	IV
6.	Indian Chameleon	*Chamaeleo zeylanicus*	IV
BIRDS			
Sl.No.	**English Name**	**Scientific Name**	**Schedule**
1.	Weaver bird	*Ploccu phillipinus*	IV
2.	Cuckoo	*Eudynamis Scolopaceus*	IV
3.	Crow	*Corvus splendens*	V
4.	Parrot	*Psittacula krameri*	IV
5.	Pigeon	*Columba livia*	IV
6.	Sparrow	*Passer domesticus*	IV
7.	Red Jungle fowl	*Gallus gallus*	IV
8.	Blue Jay	*Coracias benghalensis*	IV

FISH DIVERSITY RECORDED IN BUFFER ZONE:

BIRDS		
Sl. No.	**English Name**	**Scientific Name**
1	Bata	*Labeo bata*
2	Labeo kalbasu	*Labeo calbasu*
3	Katla	*Catla catla*
4	Magur	*Clarias batrachus*
5	Mirgal	*Cirrhina mrigala*
6	Rohu	*Labeo rohita*

N.B.- The authenticated list of Flora and Fauna for both the Project area (Core Zone) and the buffer zone has been attached in Annexure-III.

Details of Endemic, threatened and Scheduled Species

No endemic species is noticed either in the Core or Zone of Influence. As far as, threatened fauna is concerned, all Schedule-I species is threatened. **Schedule-I species like Elephant, Sloth Bear, Python** are noticed in ZoI.

1. F) i) Description of Forest and habitat condition

Forest Type:

This lease area is in Koira Range, Malda Section and Gonua beat of Bonai Division. This proposal covers 86.886 ha (as per RoR) and 88.516 Ha (as per DGPS) which is distributed in two Villages i.e. Patabeda over 19.918 ha and Gonua over 66.968 ha. Out of the total lease area, forest land covers 76.882 ha which includes 49.513 ha of Khesera Forest and 27.369 ha of DLC land. Out of the balance area 10.004 ha is non-forest land including private tenanted land of 3.003 ha.

In the ZoI Baitarani R.F. & Siddhamatha R.F. of Keonjhar Divn. Exist and Mendhamaruni R.F. Chamakpur R.F.& Khajurdihi R.F. of Bonai Division. These R.Fs have been classified in Champion and Seth's classification as forest type 3C/C2e(i) Moist Peninsular High level Sal. The sub-type is confined to upper slopes, ridges and flat tops of Mendhamaruni and Karo blocks. The quality of Sal is IV but the crop is somewhat open. Regeneration of Sal is fairly good but repeated fire (every year) influences floristic significantly indicating species composition as mentioned below: - Within the Sal belt there are patches of mixed forest with Dhaura (*Anogeissus latifolia*) as dominant species. Sundergarh Dist. has a Forest Cover of However, Karo RF, Baitarani R.F. and Mendhmaruni R.F. exist in the ZoI. These forests have been included in forest type sub-group 3C-Northern Indian Tropical Moist Deciduous Forest, 5B-Northern Tropical Dry Deciduous Forest, 2B Northern tropical semi-evergreen forest. The quality of Sal is usually IV but the crop is somewhat open. In these areas, the patches of mixed forests with predominance of *Anogesissus latifolia* are also found within the Sal belts. Regeneration of Sal is fairly good but there is risk of repeated annual fire. The area is however free from frost. The common associates of Sal in the top canopy are *Terminalia alata* (Asan), *Anogeissus latifolia* (Dhaura), *Syzygium cuminii* (Jamun), *Lagerstroemia parviflora* (Patuli), *Pterocarpus marsupium* (Bija). The middle storey contains *Careya arborea* (Kumbhi), *Bauhinia purpurea* (Kanchan), *Bridelia retusa* (Kasi), *Ougeinia oogeinensis* (Bandhan). *Wedlandia excelsa*. *Helectoris isora* (Modaphal) and *Indigofera pulchela* are commonly found as undergrowth. The common species of climbers available are *Bauhinia vahlii* (Siali) and *Smylax macrophylla* (Muturi). *Themida* and *Imperata* are the common grasses. Bamboo species like *Dendrocalamus strictus* (Salia) does not occur in this sub-type.

Forest Condition According to FSI Report:

As per FSI Report 2019, Sundergarh Dist has a Geographical area over 9712 Sq.Km. Total Forest Area is 4273.37 ha (44% of Geographical area) which include 1020.87 Sq.K.M. of Very Dense Forest (Canopy Density above 70%), 1858.39 Sq.K.M. of Moderate Dense Forest (Canopy density 40% to 70%), Open Forest 1394.12 Sq.K.M. (Canopy Density 10 to 40%). Within last two years (2017 to 2019) forest in this district has increased over 9.37 Sq.K.M.

1. F) ii) Wildlife habitat and prevailing wildlife scenario:

From the Data Collected from villagers of ZoI and field executives of Forest Dept. it appears the presence of Elephants in the area and from the wildlife-human conflict data, presence of bear is confirmed. Presence of other wildlife is mentioned in the list of fauna**.**

The habit and habitats of particularly Schedule-I species are narrated below-

Elephant (*Elephas maximus*):

Habit: Elephants are social animals and live-in herds, which vary between 3–6. The Elephants are matriarchal and the herd is led by the oldest female. Herd usually breaks into clans and rejoins again. For long-distance movement some time a few herd mixes and form a big group which is coordinated by the oldest female for searching for better habitat – food and water. Several herds maintain contact through sub-sonic vocalization according to findings on work with African Elephants. Adult males remain away from the herd and occasionally join with the herd when females are in oestrous. They are polygamous. Only dominant males have the chance to mate with females. Old males usually lead a solitary life, while sub-adult males some time form an unstable group of 2 to 7 animals. Such a group is known as *Muljuria* group. Elephants are very sensitive to hot and prefer shady moist areas during noontime. The matriarch herds, as well as males, are long-ranging. Their home Range varies between 150 and 1200 sq km, depending on the habitat condition. An Elephant may run at a speed of 45 km per hour for a short distance for two to five minutes. Their average life span is the same as human beings, and around 70 years. In Elephant there is no seasonality in oestrous cycle, and the interbirth interval varies from 3 to 5 years, depending on the habitat quality. The gestation period is 18 to 22 months and the suckling period is around one and a half years. Young calves start taking grass from 6 months onwards. Mother continues to bestow maternal care to their offspring for several years after weaning. The sense of touch and hearing is well developed in Elephant but its eyesight is poor. Most males have prominent tusks, while some time females have tushes which are hardly visible from

outside. Male Elephants sometime have only one tusk (known as *Ganesh*), or even without tusk (known as *Makhna*). They have 6 sets of molar teeth, of which only one set is in use at a given time. With the loss of the last set of molar teeth they are deprived of taking any food and eventually do not survive. The unique identity of Elephant is his trunk with a single finger-like tip at the end and it has versatile utility, used in eating, drinking, smelling, breathing, touching, washing & dusting of the body, fighting, and vocalizing. Mud wallowing is fun for the Elephants, though it protects them from insects and sun.

Habitat: The body size and food requirement of this non-ruminant "mega-herbivore" have made the Elephant a generalist vegetarian to feed on a variety of plant species. Even within one region, they feed on well over a hundred species of plants. They not only depend on leaves, fruits & twigs but also consume barks, roots, stem pith, flowers, grasses and salt with soil. Though, depending on seasons they select distinctly different plant parts depending on their availability. In the dry deciduous Forest region, their dietary habit usually alternates between predominantly grazing during the wet season and browsing during the dry season. In quantitative terms, they prefer grasses, reeds, and sedges (Poaceae and Cyperaceae). Their preferred tree families are Combretaceae, Euphorbiaceae, Moraceae, Malvaceae, and Legumes. They cannot survive entirely as grazers. Thus, browse species are extremely important in the nutrition of Elephant. On average, take 150 kg of vegetation and 100 liters of water per day. The efficiency of digestion is poor (40 to 45%) with the symbiotic bacteria in the stomach. They are in constant motion while feeding and generally cover 15 to 20 km in a day. Elephants are well established in dry deciduous Forests to moist evergreen Forest.

Human activities like agriculture (cultivation of crop, irrigation system); development works (Roads, Railways, Townships, Dams, Industries, and Mines etc.) are fragmenting their habitat and creating obstructions to their movement which they traditionally follow. They are in conflict with human when they move through that fragmented area and also damage various cultivated crops (like paddy, ragi, banana, sugar cane etc.

Sloth Bear (*Melursus ursinus*):

Distributed throughout the Odisha, except a few areas of the coastal Districts and is an endangered species.

Habit: Sloth Bear has a long snout and lips are detached from the gum and are well adapted to the forceful intake and expulsion of air. The absence of a middle pair of incisors in the upper jaw permits the passage of air freely. The tongue is large protractible. Long claws of the forelimbs (longer than hind limbs) are good instruments of digging. The animal produces enough suction force to suck out termites from mounds.

Bears are nocturnal in habit, their sense of smell is well developed than their sight and hearing. During an accidental encounter with a human being, they cause severe damage to the human or even death. When they have cubs, they move with them, otherwise, they are solitary or are in pair with the opposite sex. They have a specific breeding season. Mating takes place in June or July and they give birth to cubs in caves during December and January. Litter varies between 1 and 3 cubs. Parental care lies with mother only. Their average life span is around 40 years.

Habitat: They are in good number in drier and secondary Forests are also found in dense forests. They are omnivorous in nature. They feed on tubers, roots, grubs, various fruits, various insects, honey, termites, flowers (mahua, simul, etc.). It also damages sugar cane crop, maize, etc. Their home Range is limited and restricted. In the quest of food, they may travel several kilometres. It is believed that their gall bladder and bile have medicinal properties and hence they are exposed to poaching, particularly due to the demand of these parts in China and other southeast Asian countries.

Indian Python (*Python molurus*):

Habit: This is a non-venomous snake and can grow up to 4m and weigh 45 kg. The colour is dark brown to yellowish-white in a blotched pattern. They are very good swimmers and take to water when disturbed but on land, they hiss and remain motionless. The species is oviparous and lay up to 100 eggs in a clutch protected and incubated by the female. Being exothermic, python basks in open but can also raise body temperature by muscular contraction.

Habitat: Python occurs in wide Range of habitats viz. rocky foothills, grasslands, marshes, swamps, woodlands, open jungle. At times, they take refuge in mammal burrows, hollow trees etc. It has also been reported close to habitation and crop fields. The snake feeds on small mammals, birds, and reptiles but prefers the first. Chital deer, fawns, hares, mouse deer, jungle fowl are natural food.

It can swallow prey bigger than its size as the jaw bones are not hinged. The prey is constricted to death by muscular movement and swallows headfirst. Once held in the jaw, prey cannot escape because of inward bent teeth.

It is listed as one of the Lower Risk /Near Threatened species according to IUCN Red List.

1. G) Movement of mega Wildlife

Elephant is the flagship species of this area and the only mega herbivore (wildlife) with long ranging movement behaviour, present in the study area. Elephants follow streams but move in valleys and unless hard pressed try to avoid hilly terrain to conserve energy. There was movement of elephant between:

Baitarani - Siddhamath - Karo - Mendhamaruni - Khajuridihi and vice versa.

1. H) Man-animal conflict and Depredation caused by the wild animals:

As per the record available in **Bonai Forest Division** 33 house damage cases have yet been recorded, 12 in 2016-17, 15 in 2017-18 and 06 in 2018-19.

So far human kill is concerned, 01 case have been reported in 2017-18 and01 case in 2018-19. So far human injury is concerned, no case has been reported.

From 2016-17 to 2018-19, 01 elephant and 01 wild boar have died due to Human-Animal conflict i.e., 01in 2016-17 and 01 in 2018-19.

As per the Divisional record found 68.62 acre of crops were damaged by the elephant have yet been recorded,40.30 acre in 2016-17 197.followed by 5.44 acre in 2017-18 and 22.88 acre in 2018-19. In all the cases compensation has been paid to the victims.

House damage by Elephants

Year	No. of Houses damaged
2016-17	12
2017-18	15
2018-19	6

Human Death by Wild Animal

Year	Human Death	Animal causing human death
2016-17	Nil	-
2017-18	One	Elephant
2018-19	One	Elephant

Human Injury by Wild Animal

Year	No. of Human involved	Animal causing injury
2016-17	Nil	-

2017-18	Nil	-
2018-19	Nil	-

Details of death of wild animals

Year	Date	Animal killed	Location	Cause of death
2016-17	12.05.2016	Female Elephant-1	Teherai Khesra Forest, Tehrai Beat. 21o54'33.5" N & 85o17'0.7" E	Natural
2017-18	-	Nil	-	-
2018-19	11.10.2018	Wild Boar - 1	Podadihi Khajuridihi Beat	Poaching

Crop damage by Elephants

Year	Crop area damaged in Ac.	Compensation paid in Rs.
2016-17	40.30	4,03,000
2017-18	5.44	54,400
2018-19	22.88	2,28,800

Cattle kill by Wild Animal

Year	Name of Human Kill	Date & place of occurrence	Location
2016-17	- NIL -		
2017-18	- NIL -		
2018-19	- NIL -		

1. I) Working Plan Prescription

The Project area consists of Revenue Forest and DLC Forest which have not been included in the Working Plan. However, Baitarani Reserve Forest of Keonjhar Forest Division and Mendhamaruni R.F. of Bonai Divn. exists in the ZoI.

Baitarani Reserve Forest was included in Selection Working Circle in the last Working Plan ending 2016-17. Sal conversion and coppice system which had been adopted in the last plan could not achieve the desired objective and therefore it has been included in Selection Working Circle. The special objects of management for this Working Circle are given below:

1. To improve the density and composition of forest crop and to encourage the natural regeneration and establishment of principal species by taking suitable silvicultural operation with due emphasis on soil and water conservation.
2. To resort to artificial regeneration wherever necessary.
3. In consistence with primary objective, removal of mature and silvicultural available trees before they become unsound, on sustained yield basis.
4. Removal of unsound and defective trees under improvement felling so as to improve and increase the stocking of principal species.

Likewise, this M.L. area being revenue forest and DLC Forest may be required to be treated according to the prescriptions for **Rehabilitation Working Circle.** The objects of management of this working circle as per the approved Working Plan **of Bonai Division** are: -

1. To tend and improve the existing growing stock through suitable silvicultural measures.
2. To regenerate the barren and blank patches by planting suitable site exacting hardy species.
3. To rehabilitate and improve the productivity of the depleted and degraded forest through enrichment plantation and other suitable measures.
4. To tend the existing plantation so as to get maximum annual increment.
5. To raise block plantation preferably of economically important species in the large gaps having extent of more than 4 Ha.
6. To improve micro-edaphic conditions, especially in dry and open patches by taking suitable soil and water conservation measures.
7. To provide effective protection against illicit felling, encroachment, shifting cultivation, over grazing and fire hazards so as to check further retrogression of site.
8. To meet the bonafied needs and requirements of local inhabitants in regards of fire wood, small timber and fodder etc.

1. J) Location of other project in the Zone of Impact of the current project

In the buffer zone of this project site, another 15 industries exist. The list of projects is furnished below: -

Sl. No.	Name of Industry
1	Oraghat Iron Ore of M/s Rungta sons (P) Ltd.
2	Sanindpur Iron & Mn. Mines of M/s National Enterprisers
3	Ranisal Mn. Mines of M/s O.M.& M
4	Teherai Iron & Mn. Mines of M/s N.K.Pal
5	Teheral Iron &Mn. Mines of M/s Tarini Minerals
6	Kanther Koira Iron& Mn. Mines of M/s B.S.Mishra
7	Kanther Koira Mn. Mines of M/s Rungta Mines Ltd.
8	Teherai Iron & Mn. Mines of M/s B.I.CO.Ltd.
9	Banjhikusum Mn. Mines of M/s O.M.& M
10	Kasira Iron ore Mines of M/s O.M.C.Ltd.
11	Nadidih Iron & Mn. Mine of M/s Feegrade & Co.Pvt.Ltd.
12	Nadidih Iron & Mn. Mine of M/sB.I.CO. Ltd
13	Kolmong Manganese Mine of M/s Rungta Mines Ltd.
14	Malda Manganese Mine of M/s TISCO Ltd.
15	Patamunda Mines of M/s O.M.& M

1. K) Experts involved in the study

Sl. No.	Name	Expertise
1.	Mr. L. K. Das, IFS (Retd.)	Forest, Biodiversity & Wildlife
2.	Mr. Siba Kumar Mohanty, OFS (Retd.)	Forest & Wildlife
3.	Dr. Bidyut Kumar Patra	Environment
4.	Mr. Debasis Mohanty	Coordination
5.	Miss. Swetagni Mohanty	Wildlife & Biodiversity

The above personnel conducted the study being assisted by local Forest Officers of Bonai forest division. The site was visited during January, 2020, April,2020 and the flora and fauna available in the study area was listed through field observations synchronizing with the list given in the Working Plan. In the course of study, dropping of wild animals, pug marks, burrows, nests, scratching, scat/dung and physical presence on ground, tress bushes were recorded.

METHODOLOGY

- The study is based on Survey of India Topo Maps F45N1, F45N5, F45H8 & F45H4.
- The Village list and demographic composition has been collected from 2011 Census Report.

- A model questionnaire has been prepared with our own developed model for the survey of the surrounding Villages and collection of data.
- Human-animal Conflict data has been collected from the Bonai Forest Division.
- Active search method applied for listing of the flora and fauna. Villagers were shown photographs from a book compiled by Sri N.C. Mohanty, IFS (Retd.) to identify the faunal species for confirmation.
- For Socio-economic study and environmental impact study, random sampling method was followed.

Findings:

In the Project area the Scheduled (I) species like **Asiatic Elephant, Sloth Bear, Indian Rock Python** and scheduled (II) species like Jackal, Jungle cat and common Indian mongoose were observed. Similarly Scheduled III and IV species like Barking Deer, Rabbit and Chital were found besides birds and reptiles.

CHAPTER-2

THE PERCEIVED IMPACTS OF THE PROJECT ON THE ENVIRONMENT

A. Impact of the Project on the environment in general:

Any mining project has its impacts on the biotic, physical and socio-economic environment. Some are beneficial to the society some are not. Evaluating these impacts, all projects are implemented. This project is not left untouched in these aspects. When certain impacts are disasters, it necessitates mitigating such problem with established technology and scientific study. Such negative impacts are discussed here to help in implementing mitigative measures.

The environmental impacts can be categorized as either primary or secondary. Primary impacts are those, which are attributed directly to the project and secondary impacts are those, which are indirectly induced and typically include the associated changed pattern of social and economic activities of surrounding community.

Before any attempt is made to reduce various stresses and to avoid/minimize or mitigate their adverse impacts, it is necessary to identify various factors that have negative influence on the biodiversity (flora and fauna). These are specified below considering the terms of reference for the preparation of Site-Specific Wildlife Conservation Plan.

i) Impact on soil

Impact on soil will arise during operation, it is due to open yard storage of raw materials like iron ore. Further, dumping of solid wastes and storage of lump ore, fines etc. On land would also deteriorate soil quality, if appropriate control and mitigation measures will not be implemented. The top soil and other stored material may erode and thereby affect the soil of the periphery and introduce toxic materials to the soil If not properly stored and will affect to the wildlife like rodents and other burrowing animal present in that area.

Geomorphic changes:

This lease area mainly consists of two parts of separate hills, where iron ore deposits occur at various level. Geographically, the Iron Ore Block over 88.516 ha has been designated as Patabeda quarry, situated in the Since Gonua Block is already in operation by northern part of the lease and Gonua quarry which is in the Southern part of the lease. Keeping in view the production requirement, the mining operation will be carried out in both the blocks. 70% of total RoM production has been planned in Gonua block. Since Gonua block is already in operation by the ex-lessee Sri P.K. Ahluwalia, existence of higher grade and Patabeda block is in development side 15 to 20% of the total production is from this block.

Moisture loss:

There is no perennial stream in the lease area. But there exist one seasonal nala which divides the lease area physically into two parts as northern part in Patabeda village and southern in Gonua village. The gradient of the nala is from east to west. This nala becomes active during rainy season and ultimately drains to Karapani nala which is perennial and flowing at a distance of 1.5 Km west of the lease area. Keeping in view the evapo-transpiration and seepage into sub-surface at 40% water flow within the lease area will be 711,596.4 m^3 which will be drained. Other major drainage channels are Tehrai nala of South West of the M.L., Kundra nala on South West as well as North of the lease and Baitarani River on the east.

There will be soil erosion from the mining area specially from the quarries, Over Burden dump, Road cuttings, till the soil is stabilised through engineering and vegetative methods. This sediment load will go into water course. Turbid water curtails sunlight as a result the submerged plant growth is affected due to the reduced photosynthesis. Fish and other aquatic fauna dependent on such plant and phytoplankton will ultimately be affected. Fishes will also be affected by chocking of their gills by silt. Spillage of diesel and Engine oil from vehicles as well as machineries will ultimately find way to aquatic eco-system and affect invertebrates, fishes and frogs.

Moisture loss will be occurred in both the core and the buffer zone of the Mining Lease due to release of very high temperature from the machineries like crusher plant, screening plant, if adequate measures will not be taken. Operation of heavy vehicle for transportation and loss of vegetation due to the project will also cause moisture loss. Under such circumstances, re-establishment of vegetation is delayed and difficult but constant attention if imparted for establishment of saplings planted on Dump, Safety Zone etc., the growth of plants will not be affected.

ii) Impact on Vegetation

Deforestation without proper reclamation will have an ecological / biodiversity loss at the conceptual stage, if not followed up by a proper conservation management plan. Apart from the loss of forest in the mining, there is infrastructure development for mining, establishment of hutments, Kiosks and the subsequent population pressure certainly put a huge anthropogenic pressure on the flora on the locality directly and indirectly.

Habitat loss:

Habitat destruction is a process, which alters or eliminates conditions needed for animals and plants to survive. Rendered functionally weak by mining activities, the ecosystems' ability to support species is reduced. Reduced carrying capacity of the habitat means decline in population and sudden disappearance of species. Habitat loss is manifested in loss of food

plants and failure of the plant in regenerating itself. So is the case with horizontal cover (loss of undergrowth) and vertical cover (canopy contiguity). Habitat loss impacts nitrogen, phosphorous, sulphur, carbon and hydrological cycles, which affects ecosystem values adversely and culminates in either emigration of species or outright extinction.

iii) Impact on Water Regime

The daily requirement of water for mining and ancillary operation will be collected from Baitarani River.

Water pollution:

Soil erosion leads to carriage of sediment load in water. Proposed haulage roads are earthen roads, with 1: 12 gradients. As there will be accumulation of dust on the slopping surface, the first run off will usually carry silt and the colour of turbid water will be brownish red. Higher the gradient more is the velocity of running water. If the velocity increases two-fold, with change in slope, the erosive power will be considerably increased. Moreover, from the O.B. Dump will also pollute the Suna Nadi flowing within a close proximity of the lease area.

iv) Impact on Air

The mining area and as well as surroundings is affected by the following ways:

Dust pollution:

Mining activity particularly blasting, transport mechanism and dumping generate considerable dust, which will settle on nearby vegetation or on the ground. While the former component will affect the net production of organic matter, the latter will be awaiting to be washed away during rains. Blow of dust, will definitely settle on the smaller animal fur, affects its respiration and push the animal to a zone of stress.

The broad impacts of dust pollution are:

- Reduced photosynthesis leading to reduced growth rates of plants.
- Increased incidences of plant pests and diseases from both fungi and insecticides. Reduced seeding, less viable seeds and hence, lowered or absence of regeneration.

Noise pollution:

Drilling - blasting, loading, dumping, transportation and working activities all will produce noise. One can well imagine the nature of stress from the fact that a mere whisper in tranquil forest is enough to alarm the approaching animal to water hole, who takes to flight at once. Small reptiles manage to adapt in such a noisy environment because their facility of escape by such noise is limited. This is one of the factors contributing to displacement of species, even large ones like deer and elephants.

Hearing impairment:

Signal masking i.e., inability to hear important environmental clues and alarm.
Increased heart rate, respiration and stress reaction. Loss of fecundity or inability to litter or increase in abortion. Decline in bird population due to muffling of mating calls.

Light pollution:

The animals are adapted to natural light. Depending on the intensity of light in which an animal is most active, it is either classified as diurnal, crepuscular or nocturnal. Animals are not accustomed and adapted to artificial light, which usually prevail in mining area in the night shift, from the tippers carrying ore after evening and other fixed lights. All animals in the forest area of either the lease or ZoI area will be affected by the incidence of light as artificial lights are very sensitive to the cornea. So, it causes flight of animal from the ZoI of the mining area. Animals are adapted to constant phase of light, when changes happen, they move to area of their choice. Sudden lighting, off and on after dusk by the moving vehicles is harmful. At times, animals will face accidental death, unable to escape and get distracted from their natural path will lead to depredation to the nearby villages or accidental fall in the deep mining pit. The above activities will increase the stress condition. Animals exposed to light exhibit erratic behaviour pattern (mauling by bear, causing injury by elephant), expressed in their deflected movement and aggressive behaviour.

B. Quantum of pollutants that may be produced by the project and effect on soil, water, air, vegetation and animals.

During mining operation, dust and water pollution is inevitable due to functioning of heavy earth moving machineries (HEMM), movement of loaded tippers, drilling and blasting etc. The monitoring data as observed in the region envisage that SO_2& NO_x concentration are within the permissible limit of AAQ standard of CPCB. It has been mentioned that the pollutants are within the permissible limit. Also, there will be accumulation of garbage/ solid waste due to anthropogenic pressure.

C. Degradation Anticipated on account of the project implementation in quantified terms on appropriate models to be explained. Qualitative change in the wildlife habitat pattern in the study area due to project implementation should also be detailed in the plan.

Direct degradation is observed in the form of loss of forest growth in area of mining. This complete removal of forest growth displaced the wildlife existing in that area due to loss of abode, food, water and tranquillity. The mine workers will collect fuel wood for their bonafied

use from the ZoI which will cause degradation. The consequence of these stress on forest are discussed below:

Habitat fragmentation:

This is the result of clearance of natural vegetation either by mining or by allied development activities like haul road, infrastructure etc. Habitats, once fragmented, the resident wildlife will face insurmountable difficulties. After clearance of existing vegetation, small units of fragmented forest area will be formed exposing animals to non-forest/ village area during movement from one patch to another habitat patch. Food resources and cover types get limited in a small patch. Habitat fragmentation involves some habitat impairment of the isolated forest land as well. Fragmentation involves increase in edge habitats and decrease in interior habitats. Biodiversity of each of the fragmented area get reduced for the above reason. Habitat fragmentations are rarely representative samples of the initial landscape. Species like elephants, deer, move between the fragments and make use of both. Small species like lizards, mongoose, civets, ground nesting birds, snakes etc. having low cruising radii adjust/ adapt to small habitat patches.

Microclimate changes alter ecology of interior and exterior habitats. Species adapted to interior habitats are less likely to survive in an edge habitat of smaller units. Smaller units support smaller population with reduced carrying capacity. Small population face decreased heterozygosity, increase in inbreeding and possibly inbreeding depression. If there is no migration between populations and genetic exchange, genetic drift sets in. This means, directional selection for advantageous alleles can cause certain alleles to become fixed in a population, thereby decreasing variation. Such loss of diversity, however, will not affect elephants, as movement path of elephant changes with available alternatives. But, species with low cruising radius will be affected. However, alternate corridors exist for elephants although it is difficult to conclusively say whether this is traditional or deflected route. Another dimension to fragmentation is the propensity of depredation.

Loss of biodiversity:

Biodiversity is an important component for maintaining natural balance and sustainable ecosystems. Clearly, biodiversity loss is critical for survival of human and wildlife in many ways. Development activities such as mining can significantly alter the biodiversity of an area. Its biggest impact is due to felling of trees for mining purpose and forest fire.

The forests are home to huge number of organisms. Felling of trees for mining purpose leads to loss of habitat of wildlife. This puts the survival of animal species at stake. The cutting down of trees itself is a bigger threat to number of plants, birds and animals growing in the forests.

Deforestation in clusters leads to land cover change in the landscape. Fragmentation of habitat through tree felling, pollution of soil, air and water are direct drivers in loss of biodiversity. Indirect divers include human population growth in mining areas (due to increased opportunity of employment) and their demand on forest resources and improved technology introduced in mining and transport. As the forest canopy is opened up, casualty descends fast on shade bearing plants, they fail to regenerate and with this, the dependent animal community's loose foothold. The area vacated by the native shade bearers is partially compensated by the regeneration of light demanding plants. Similarly, fires which occur annually, favour fire hardy annuals and destroy insect life. Plant biomass is affected as it is related to insect inter relations. Blanks created in forest areas get invaded by alien species of plant which increase in area every year at the cost of indigenous species. With the loss of plant diversity, animal diversity also diminishes. The irony is, diversity is getting lost at a faster rate than it is even assessed and scientifically documented, closing all future options of development.

Habitat destruction by illicit felling:

The mine workers are in habit of collection of fuel wood for their bonafied use. The villagers of the ZoI also collect fuel wood, small timber, NTFP etc. from the adjoining forest. These are designated as illicit felling. Such action will not only create gaps in the forest but also decreases percentage of qualifier species required for wildlife. This results in depredation of wildlife to adjoining villages in search of alternate palatable food substance like paddy, sugarcane, mahua and in search of water to satisfy their thirst.

Habitat destruction by Grazing and transmission of disease:

Tribal households have average 3-5 cattle/ pigs which are not in the practice of stall feeding rather let loose in the forest without any watch and ward. Cattle are reared more for dung in local villages than milching. They return to the village after grazing in evening. Cattle are considered a sign of wealth by tribal. Uncontrolled grazing has created sub-optimal habitats around habitations and has introduced agricultural weeds in forest areas. Wild animals like chital and barking deer are susceptible to pathogens of FMD (Foot and mouth Disease), by grazing cattle.

Forest fire:

Forest fire affects both vegetation and soil. It is also helpful in maintaining diversity and stability of ecosystems. Effect of forest fire and prescribed fire on forest soil is very complex. It affects soil organic matter, macro and micro-nutrients, physical properties of soil like texture, color, pH, Bulk Density as well as soil biota. The impact of fire on forest soil depends on various factors such as intensity of fire, fuel-wood and soil moisture. Fire is beneficial as well as harmful for the forest soil depending on its severity. In low intensity fire, combustion

of litter and soil organic matter increase plant available nutrients, which results in rapid growth of herbaceous plants and a significant increase in plant storage of nutrients. Whereas high intensity fire can result into complete loss of soil organic matter, death of microbes, etc. Intense forest fire results into formation of some organic compounds with hydrophobic properties, which results into high water repellent soils. Forest fire also causes long term effect on forest soil.

D. Nature of threats to the flora and fauna

Habitat loss, habitat fragmentation, fire are the major threats as discussed above, there are other threats also emerges due to degradation of forests and those are mentioned below.

Encroachment:

Increase in human presence occur due to implementation of projects. This also results in development of town and human habitation near the industry area. This plant does not involve any forest land and interestingly the workers are most recruited from local villages.

Litter generation:

Labourers generate much litter in shape of polythene wrappers, carry bags, paper wrappers, leaf plates and left- over food. This is not only is obtrusive to sight but can attract animals like pigs, Hyena. Wolf and jackals. Ingestion of indigestible polythene can lead to blockade of gut and eventual death of these animals. The workshop will produce mobile cans, plastic jars, spent mobile and grease. The canteen and office will also produce various wastes. Litters strewn all over not only destroy aesthetic appeal but are injurious to plant and animal life in many other respects.

E. Probable increase in the vehicular traffic and its impact.

Presently about 2500-3000 vehicles move in and out of the mining belt, creating traffic congestion. This happens due to poor road surface, narrow mine roads, breakdown of vehicles and both to and frow traffic of loaded vehicles going out and empty vehicles coming in. This, for sure, can prevent wild animals from their natural movement, confining them to small unfavourable patches of habitat. Such artificial confinement usually manifests in aggressiveness and deflected movement apart from physiological stress.

F. Noise Pollution, Air and underground pollutions etc. and it's probable impact on flora and fauna:

These are discussed in details in this chapter in Section **(a)** above.

G. Study techniques adopted and Details of Visit

The experts comprising of experienced and retired Forest Officers visited the Core and parts of the ZoI of the mine extending over 10Km radius. They were accompanied by the local Forest Range Officer, Koira and his subordinates besides the local staff of the lessee JSW Steel limited. The team also visited Oraghat Iron Ore Mine of M/s Rungta Sons (P) Ltd, San-Indiur Iron & Manganese Ore Mines of M/s National Enterpruise, Kanther Koida Manganese Mines of M/S Rungta Mines Ltd and Kalmong Manganese Mines of M/s Rungta Mines Ltd. And interacted with local villagers regarding implementation of various interventions.

Duration of Visit: - 25.04.2021 to 28.04.2021

The site was visited during April,2021 and the flora and fauna available in the study area was listed through field observations synchronizing with the list given in the Working Plan. In the course of study, dropping of wild animals, pug marks, burrows, nests, scratching, scat/dung and physical presence on ground, tress bushes were recorded.

Observation of Visit

To maintain ecological balance and check harmful effects due to mining and allied activities, environmental control measures have been integrated on to the process of planning. Many of the areas of EMP requires multi-disciplinary approach as per field requirement, suggestion from experts in relevant fields like forestry, ground water etc. Are to be taken from time to time to meet statutory requirements.

Records Referred:

Details of the reference are given below:

1. Champion H G. and Seth S K. (1968). *A revised survey of forest types of India.* Govt. of India: New Delhi.
2. Flora of Orissa-Bihar, Saxena & Brahman.
3. E.I.A. & E.M.P. Report of Gonua Iron Ore Mines of M/S JSW STEEL Ltd.
4. Right of Passage-elephant corridors of India - Wildlife Trust of India.
5. Sar C. K. and Lahiri-Choudhury D.K. (2009). Project: Elephant – Human Conflict in Asia, Report on Orissa, India (Part-I), State Report. Education Centre, Kolkata.
6. Sar C K & Lahiri-Choudhury D K. (2002). Project**:** Elephant - Human Conflict in Asia, Report on Orissa - India (Pt.-II-e), Keonjhar Forest Division, Keonjhar District (1992-April 2000). Kolkata.
7. State of India's Forest Report (2019). Forest Survey of India. Dehradun.
8. Working Plan of Bonai Division.
9. Wildlife Odisha, 2020

10. Fundamentals of Wildlife Management by Rajesh Gopal, IFS

Sampling method adopted

a) Point sampling method on road side adopted to enlist Flora and fauna.
b) Local forest officials and villagers were taken into confidence about movement of Elephants besides man-animal conflict.
c) Data on elephant depredation/ death report of wild animals.

Justification in extrapolation

As no data is available on the exact impact of the mining on flora and fauna, the perceived impact has been extrapolated based on interaction with local staff, villagers and study teams personal experience.

CHAPTER-3

OBJECTIVE OF MANAGEMENT AND MITIGATION STRATEGIES

A. Objective of Management:

Gonua iron ore mine is surrounded by about 15 mines. Hence, the synergetic adverse impact is felt in the ZoI. However, there being medium dense forests in patches but, more or less interconnected, big animals manage to thrive in the area despite enormous biotic interferences.

As can be seen from the land use pattern hardly half of the lease area i.e., 50.479 ha has so far been used leaving aside 38.037 ha (Page 73 of Mining Plan) untouched which will be used during the lease period. Therefore, the lessee has to be vigilant about the forests standing over 38.037 ha which is now serving as abode for small and large wildlife. Therefore, the management in the M.L. area will focus on creating congenial conditions for restoration of lost cover at the earliest. The management of buffer zone primarily will focus on maintenance of optimal habitats for all varieties of wild animals, small and big, maintenance of biodiversity and migration corridors.

In the ZoI 03 species of Schedule I fauna e.g., Elephants, Beer and Pythons are noticed and care has to be taken for their food, cover and protection, which are narrated below: -

Elephant- Elephants chiefly frequent areas covered with tall forests where the ground is hilly or undulating and where bamboos grow in profusion. Elephants sleep during hot hours of the day being intolerant of the sun, feed early in the morning and evening and come out after nightfall to feed in open forest or to raid crops, retiring to sleep after midnight. Their food consists of various kinds of grasses and leaves and stems and leaves of wild bamboo and plantains, all species of crops and the bark of particular kinds of fibrous trees (moraceae family). A full-grown elephant, consumes 240 kg of green fodder per day. Besides it requires 30 kg of grass and 150 ltrs of water per day. In order to meet this, we have given provision for bamboo ball technology to increase percentage of bamboo in the forest. There is also a provision for 2 water holes to be excavated in slanting manner (1:6) so that in the upper slope big animals can consume water and at the dead end the reptiles can quench their thirst.

Sloth Bear- Sloth bear prefer places where out cropping's of rock and tumbled boulders offer them shelter during the hot weather and the rains. They come out of their cave shortly before sunset, hunt for food throughout the night and retire at the dawn. Their food consists mainly of fruit and insects. Fruit available in our forests is more plentiful during summer like

banyan, wild figs, mangoes, jamun, dates, jack fruit etc. They are also fund of honey (*Apis dorsata* or *Apis indica*). During monsoon insect food is more plentiful and bears find many insects under stone, fallen logs, under bark and in the crevices of trees, but main insect it likes is **termite.**

They also prefer sugar cane, maize and where date palms are tapped, they climb the trees to drink the toddy (neera) from the pots fixed by villagers. In the cold weather ber fruit and between Mach-April, mohua trees bloom and carpet the ground with heavy scented flowers. Therefore, plantation of jamun, mango, bel, date palm etc. has been prescribed. Attempts should be made to protect Termite mounds.

Indian Rock Python– Python is a good swimmer and therefore provision of water holes has been provided. After a long swimming when it feels hungry, go for preying in the adjoining forests. It prefers to swallow fawn of deer group, civets, even calf, goat, sheep and twist around a tree to break the bone of the prey for easy digestion.

They are nocturnal, mostly found on ground or bushes, also found in crevices or tree holes, below rock boulders and active during evening hours. They feed on small insects, lizards and small snakes which are plentily available in the ZoI.

The strategic measures to be taken are: -

- Habitat restoration of the mine pits and O.B. dumps by reclamation concurrently with advancement of mines and abandonment of pits through afforestation for colonization/return of displaced animals.
- Management of safety zone covered with vegetation of mine as a wildlife refuge by provision of habitat essentials as far as practicable.
- Maintenance of biodiversity in the mine surrounds to create optimal conditions for all species of wildlife. Maintain habitat contiguity or corridors for migrant wildlife.

Wildlife management planning has 5 steps viz.

- Wildlife survey and range inventory
- Census/ status survey
- Yield determination, i.e., annual productivity
- Diagnosis, i.e., evaluation of range factors as inventoried in (i) above in relation to wildlife numbers.
- Manipulation of population and range.

Data on (i) has been collected from field inspection, reference to working plan and discussion with local officials. (ii) Census has been omitted due to paucity of time. Step (iii) has not been attempted as this is conservation management without harvest. (iv) Diagnosis has been attempted in Chapter-IV. (v) The W.L. (Protection) Act does not provide for population management except by translocation. Hence, this is not touched. Hence, range manipulation

has been prescribed with a view to improve the habitat conditions rather than making any radical change.

The under mentioned prescriptions are aimed at promoting welfare factors, arresting decimating factors, neutralizing limiting factors by providing the same in the range and control of animal damage.

B. Strategies to mitigate and minimize adverse impacts:

Undertake appropriate remedial measures to minimize the adverse impacts of mining on Wildlife Conservation and protection in the Core and buffer zone of the mine.

Improve ecological status and quality of the Wildlife habitat in and around the mine, through restorative interventions.

Enlist people's participation in conservation initiatives through awareness, motivation and capacity building and through suitable incentives.

Undertake strategic fire protection measures over the entire project/ ZoI by creating suitable fire lines with annual maintenance, engagement of fire watcher, awareness and involvement of VSS in fire fighting measures.

Undertake deployment of anti-depredation squad to overcome elephant menace and crop raiding.

Providing glow signage at sensitive locations of elephant movement to aware the people and avoid man-elephant accident.

I) Strategies for Core Zone:

I.1) Photovoltaic fencing:

Wild Elephants move through forests of Bonai division area regularly. They come to near Villages for crop raiding, house damage and thus starts human elephant conflict and ends at injury or casualty to either of them. To prevent accidental fall of wildlife into mining pit, it is suggested to install Solar Fencing (Photo Voltaic Fencing) over 2 KMs with RCC Pillar with 5 strands with Energiser machine and keep provision for Annual Maintenance contract for a period of 10 years.

I.2) Awareness Promotion:

The User Agency will create awareness among the Mines Executive, staffs and workers and sensitize them to maintain cleanliness of the project premises. They will also be aware to protect any type of wildlife including snakes if noticed in the project area. In such an event instead of killing it being afraid, they should intimate the nearest Forest staff or snake charmer available in every Division Office now-a-days for rescue of the wildlife and safe

release in the nearby forest. They should also be aware not domesticate any wildlife as it goes against the Rule 49 of Wildlife Protection Act, 1972. The Drivers of heave earth moving vehicles will be conveyed to keep the noise levels to the barest minimum, take all precaution against fire, damage to trees etc. Drivers will be cautioned to control speed so as not to run over slow-moving wildlife like snakes, lizards, mongoose, civets etc. Behavioural change will be expected from each worker on the above points and use of garbage bins. Any sick and injured wildlife will have to be rescued and given first aid and water. Such animal is to be subsequently handed over to the nearest forest official and released after healing the wound. No worker shall get involved in crime against poaching & illicit felling or business of wildlife trophies as per Rule 49 B of Wildlife Protection Act, 1972.

I.3) Provision of One 2-wheeler:

One Motorcycle to be procured by the User Agency and delivered to DFO, Bonai for used by the protection squad. There is also a provision of POL to be provided by the User Agency.

I.4) Provision of One Four-wheeler:

One Four-wheeler (Mahindra Bolero) to be procured by the User Agency and delivered to DFO, Bonai for used by protection squad There is also a provision of driver and POL to be provided by the User Agency.

II)Strategies to mitigate and minimize the adverse impact so observed in the Zone of Influence (ZoI).

(IN BONAI DIVISION)

Habitat Improvement

II.1) Plantation of Siali in Open Patch of Mendhamaruni RF:

Siali (*Bauhinia vahlii*- Fabaceae) is a climber having tendency to twine the tree and go to the top canopy. The leaf of this species is bi-lobbed which is suitable for leaf plate making (eco-friendly). Therefore, such plantation will eventually help the SHG group for one of their sustenance. TDCC (Tribal Development Cooperative Cooperation)/ ORMAS (Odisha Rural Management Agricultural Society) are the marketing agency of this product.

II.2) Construction of Check Dam:

There is only one stream i.e., Kakrpani nala which is passing on the western side of Gonua Iron ore Mine, this nala drains to Suna Nadi which is a tributary of Baitarani River. In order to check deposition of silt in Baitarani River, it has been proposed to construct series of check

dams of size 10m x 5m x 5m in Kakrpani nala. The distance between consecutive check dams will be according to site condition.

Protection and Surveillance

II.3) Fire Watchers:

Five fire watchers will be deployed for 5 months in a year during February-June to take up regular patrolling, extinguishing ground fire by using bunch of green branches. They will be informing the local Forest Guard/Forester/ Range Officer regarding location of fire incidence and extent of damage. They will organize fire fighting with the help of VSS/eco-development members in case of emergency situations. They are expected to maintain good rapport with village committees.

II.4) Anti-depredation Squad:

A squad of 5 members will be engaged for anti-depredation activities. Their place of posting will be according to wildlife particularly elephant movement in the ZoI of Gonua Iron Ore Mine. They will be equipped with mobile phone with recharge facility, medicine. Besides they will also be given contingent fund to meet exigencies. They will be engaged throughout the year but particularly during crop harvesting period, pre-harvesting period and storage in mud huts.

II.5) Provision of Solar lighting system:

From the study, it was evident that in the Zone of Influence (ZoI), the main problem is man-animal conflict, particularly with the mega herbivore i.e., elephant. Elephants make their frequent depredation to the nearby villages located in the ZOI of the project area, especially from dusk to dawn. One of the causes of conflict occur in the wee hours when the whole area become darker, due to absence of a regular stretch of lighted areas around the villages, because of lack of electric supply. It results in direct confrontation between the people and the elephant, which usually hide itself in dark and bushy areas.

Hence, taking in to account the whole scenario of conflict, there is a provision to install solar street lights, most preferably at strategic locations around the elephant affected village areas in Bonai Forest Division.

As these lights can work even without electricity, it will help the villagers to get rid of elephant attack. The solar lights will be provided at the required strategic locations in the ZoI of the project area considering the elephant movement.

II.6) Glow Signage (Sign Boards):

To promote coexistence with wildlife and to aware people, good quality sign boards with display of wildlife features should be placed along the Project premises, road etc. Fluorescent Sign Boards with good write ups about movement of wild animals will be provided on in order to make aware the passers-by about occurrence of accident if they confront with wildlife.

II.7) Awareness Publicity:

<u>Public Awareness Programme</u>

Strong awareness will be built up among mine workers and villagers about working ethics in the Project area. They will be appraised to keep the noise levels to the barest minimum, take all precaution against fire, damage to trees etc. Drivers will be convinced to control speed so as not to run over slow-moving creatures. Behavioral change will be expected from each worker on the above points and use of garbage bins. Any sick and injured animal will have to be rescued and given first-aid and water. Such animal is to be subsequently handed over to the nearest forest official and released after healing the wound. No worker shall get involved in poaching and illicit felling.

Documentary

Important events of the division will be documented by engaging some professional wildlifers, so that annually a brochure can be published which will be helpful for Forest Guard (in Odia), Forester and Range Officer in English. It is to be shown in all villages for awareness generation. This document will include important information's of the division.

II.8) Support to VSS members to mitigate HEC by Providing Grain Bins:

VSS have been constituted with the aim to protect forest & wildlife and to support their livelihood they have also been included to maintain eco-tourism sites. On the other hand, whatever paddy, store in bamboo made bins (Doli), after harvesting periods elephants invade into the villages in search of food including paddy. So, they break mud walls of the hutment and damage the bamboo made bins. In order to safeguard their hard-earned food grains, it has been proposed to provide Grain Bins to villagers to prevent loss of paddy.

II.9) Purchase of Wildlife Monitoring equipments:

Purchase of Wildlife Monitoring Equipments like camera traps, etc. will be procured for monitoring wildlife and conducting periodical census.

II.10) Intelligence gathering:

Periodical meetings will be conducted in a place where villagers adjacent 4-5 villages will gather and they will be appraised to provide information to the nearest forest field executives like Forest Guard, Forester and Range Forest Officer about presence of elephants and /or causing damage to crops, so that the villagers will be vigilant and the Forest Officers too. The villagers will also be adviced to communicate information to local Forest Officers about illicit felling, poaching & encroachment.

II.11) Elephant Proof Trench:

In order to prevent elephants coming out of Khajurdihi RF it has been proposed to excavate elephant proof trench over 03 KM of size 3m top, 1m bottom and 2.5m depth and heap the dug-up earth inside the forest. A mixture of grass seeds, leguminous species should be sown over the dug-up earth.

III) Strategies to mitigate and minimize the adverse impact so observed in the Zone of Influence (ZoI).

(IN KEONJHAR DIVISION)

III.1) Plantation of Sal in Open Patch of Baitarani RF:

Baitarani RF comes under Rehabilitation Working Circle. The average canopy density is below 0.4. The natural regeneration percentage of dominant species of the area like Sal (*Shorea robusta*-Diplocarpaceae) is low in this RF. Therefore, it has been suggested to raise 5000 nos. of Sal seedlings in vacant but permanent gaps (4 Ha.). In order to supplement the percentage of Sal and gradually to cover the open areas. While raising plantations of Sal it should be kept in mind that Sal is a shade bearer. Therefore, no individual seedlings should be planted below any tree.

III.2) Plantation of Siali in Open Patch of Baitarani RF:

Siali (*Bauhinia vahlii*- Fabaceae) is a climber having tendency to twine the tree and go to the top canopy. The leaf of this species is bi-lobbed which is suitable for leaf plate making (eco-friendly). Therefore, such plantation will eventually help the SHG group for one of their sustenance. TDCC (Tribal Development Cooperative Cooperation)/ ORMAS (Odisha Rural Management Agricultural Society) are the marketing agency of this product.

III.3) Soil Moisture Conservation:

Baitarani is the only river passing through Keonjhar district whose main tributaries are Kundra and Suna. If soil conservation measures like Graded Bonds, wire mesh & check dam are undertaken in these two nallas, siltation in Kanhupur Medium Irrigation Project will be reduced considerably.

III.4) a) Provision of Solar lighting system:

From the study, it was evident that in the Zone of Influence (ZoI), the main problem is man-animal conflict, particularly with the mega herbivore i.e., elephant. Elephants make their frequent depredation to the nearby villages located in the ZOI of the project area, especially from dusk to dawn. One of the causes of conflict occur in the wee hours when the whole area become darker, due to absence of a regular stretch of lighted areas around the villages, because of lack of electric supply. It results in direct confrontation between the people and the elephant, which usually hide itself in dark and bushy areas.

Hence, taking into account the whole scenario of conflict, there is a provision to install solar street lights, most preferably at strategic locations around the elephant affected village areas in Keonjhar Forest Division.

As these lights can work even without electricity, it will help the villagers to get rid of elephant attack. The solar lights will be provided at the required strategic locations in the ZoI of the project area considering the elephant movement.

b) Provision for Grain Store House for Villagers:

Villages prone to repeated Elephant Depredation, the farmers apprehend damage to their crop which is stored in individual households with maximum precaution. Still then the megafauna damage the house and consume paddy stored therein. Here it has been proposed to construct community paddy storage house where paddy of the whole village can be stored by giving some marks to identify whose paddy is stored where. And during elephant depredation, the villagers will unitedly expel the elephant group because this is a community stored house. Besides, all precaution will be taken to protect the paddy from damage by insects by adopting biological method i.e., heaping leaf of Begunia (*Vitex negundo*-Verbenaceae).

III.5) Glow Signage (Sign Boards):

To promote coexistence with wildlife and to aware people, good quality sign boards with display of wildlife features should be placed along the Project premises, road etc. Fluorescent Sign Boards with good write ups about movement of wild animals will be provided on in order to make aware the passers-by about occurrence of accident if they confront with wildlife.

III.6) Provision for providing Grain bins:

In remote villages located deep in the forest, people store paddy in bamboo bins or in sacks. Elephants are very intelligent and therefore after harvesting i.e., from February to June they depredate to villages, and damages mud huts in search of paddy. To prevent this, it is proposed to provide Grain Bins to villagers to prevent loss of paddy which has been harvested by extorting hard labour of villagers.

CHAPTER-4

MANAGEMENT STRATEGIES WITHIN THE PROJECT AREA WITH FINANCIAL FORECAST

A. Interventions with Justification:

All measures for protection of bio-diversity of the site as well as wildlife have been discussed in **Chapter-3.** The financial requirement of various interventions suggested in the plan as per current costs of Rs.315/- day is given in the following table for the plan period of 10 years i.e., 2021-22 to 2029-30 and annual cash flow there-of. All activities within the project area will be implemented by the project proponent.

B. Location of the proposed intervention

The map showing the intervention implemented inside the project area by the project authority has been furnished in **Chapter 6** of this plan.

Table 4.1: Financial provision of works in the project area (Wage rate@ Rs.315.00)

Sl.No.	Para Ref.	Management Interventions	Amount in lakh
1.	3.B.I. 1)	Photovoltaic fencing around the active Pit over 2.0 K.M. @Rs.4.0 lac per K.M. + Rs.1.0 lac maintenance cost per year. = **Rs. 17.00 Lakhs**	**Cost will be borne by User Agency**
2.	3.B.I. 2)	To create awareness among the mine workers regarding operation of the overhead piped conveyor belt @Rs. 1.00 lac per year x 10 years = **Rs. 10.00 Lakhs**	
3.	3.B.I. 3)	**a)** Provision of One Motorcycle for protection work to be used by Foresters= **Rs 1.00 Lakhs** **b)** Cost of POL @ 10,000/- PM x 12 months x 10 years = **Rs 12.00 Lakhs**	
4.	3.B.I. 4)	**a)** Cost of one Four-wheeler = **Rs.12.00 Lakhs** **b)** Cost of POL @ 15000/- PM x 12 months x 10 years = **Rs 18.00 Lakhs** **c)** Cost of Driver @ 16,250/-PM x 12 months x 10 years = **Rs 19.50 Lakhs**	
Total			
20% Escalation			
Grand Total			

Plan period preferably for 10 years with suitable provision for interim review and suitable modification

Annual Work Programme:

Details of the flow of funds for different years of the plan for project area are given below: (Rs. in Lakh)

Sl. No.	Para Ref	Type of interventions	y1	y2	y3	y4	y5	y6	y7	y8	y9	y10	Total
1.	**3.B.I. 1)**	Photovoltaic Fencing	-	-	-	-	-	-	-	-	-	-	**Cost will be borne by User Agency**
2.	**3.B.I. 2)**	Awareness Programme	-	-	-	-	-	-	-	-	-	-	
3.	**3.B.I. 3)**	Provision of One 2-wheeler	-	-	-	-	-	-	-	-	-	-	
4.	**3.B.I. 4)**	Provision of One Four-wheeler	-	-	-	-	-	-	-	-	-	-	
Total													
20 % escalation													
Grand Total													

CHAPTER- 5

MANAGEMENT STRATEGIES WITHIN THE ZONE OF INFLUENCE OF THE PROJECT WITH FINANCIAL FORECAST

A. Financial Provision of Works in Zone of Influence (ZoI):

The financial requirement of various interventions suggested in the conservation plan as per current costs is given in following table for a plan period of 10 years and annual cash flow for the buffer zone of the project area. All activities in the buffer zone will be implemented by the respective Divisional Forest Officer.

Financial provision of works in Zone of Influence (Wage rate @ Rs.315.00)

FOR BONAI DIVISION

Sl. No.	Para Ref.	Description of work	Amount in lakh
Wildlife Habitat Improvement			
1.	**3.B. II. 1)**	Cost of Siali plantation (5000 Nos.) with 200 Plants per ha. with 10 years maintenance@Rs.79,274/- for 200 plants. Hence, for 5000 plants @Rs.79,274 x 25=Rs.19,81,850/- or **Rs.19.82 Lakh** in Open Patch of Mendhamaruni RF	**19.82**
2.	**3.B. II. 2)**	Treatment of identified Nallas in the impact area by constructing series of Check dams on L.S. = **Rs. 20.00 Lakhs**	**20.00**
Protection and Surveillance			
3.	**3.B. II. 3)**	a. 05 nos. of **Fire watchers** will be engaged a period of 5 months (February to June) for 10 years @ Rs.9,450/- per month/watcher x 05 nos. x 05 months x 10 years = **Rs. 23.625 Lakhs** **b.** Recharge of Mobile Phone @ Rs.1000/- PM/ per Squad x 05 months x 10 years = **Rs. 0.50 lakhs** **c.** Medicinal Expenses Rs.5,000/- per Squad/ per year x 10 years = **Rs. 0.50 lakh** **d.** Contingencies expenses on L.S. = **Rs 0.50 lakhs**	**25.125**

4.	**3.B. II. 4)**	a. One No. **Elephant Squad** consisting of 05 members Rs.13,950 (Highly skilled@Rs.465.00 Pm)- x 05 members x 12 months x 10 years = **Rs 83.70 lakhs** b. Recharge of Mobile Phone @ Rs.1000/- PM/ per Squad x 12 months x 10 years = **Rs. 1.20 lakhs** c. Medicinal Expenses Rs.10,000/- per Squad per year x 10 years = **Rs. 1.00 lakh** d. Contingencies expenses on L.S. = **Rs. 0.50 lakhs**	**86.40**
5.	**3.B. II. 5)**	**Solar lighting system**. Solar Street Light in villages affected by Elephant depredation @ Rs. 0.3 Lakh/- per light x 50 nos. = **Rs. 15.00 Lakhs** (Locations to be decided by DFO)	**15.00**
6.	**3.B. II. 6)**	Fixing glow elephant signages at strategic location sensitive to elephant pass and to make aware the passer-by to be vigilant.	**5.00**
7.	**3.B. II. 7)**	Awareness Publicity	**10.00**
8.	**3.B. II. 8)**	Support to VSS members to mitigate HEC by Provision of providing Grain Bins 250 nos. @Rs.2000/- each	**5.00**
9.	**3.B. II. 9)**	Purchase of Wildlife Monitoring equipments	**10.00**
10.	**3.B. II. 10)**	Intelligence gathering	**5.00**
11.	**3.B. II. 11)**	Elephant Proof Trench 3 KM of size 3m top width + 1m bottom width x 2m depth @Rs/8.662 Lakh per K.M.	**25.986**
		Total	**227.331**
		20% Escalation	**45.466**
		Grand Total	**272.797**

(Rupees Two Hundred Seventy-Two Lakhs Seventy-Nine Thousand and Seven Hundred Only)

Divisional Forest Officer
Bonai Division

Annual Work Programme:

Details of the flow of funds for different years of the plan for ZoI area are given below (Rs. In Lakh)

Sl. No.	Para Ref	Type of interventions	y1	y2	y3	y4	y5	y6	y7	y8	y9	y10	Total
1.	3.B. II. 1)	Siali plantation in Mendhamaruni RF	7.742	2.001	1.675	1.200	1.200	1.200	1.200	1.200	1.200	1.202	**19.82**
2.	3.B. II. 2)	Construction of Check dams	10.00	10.00	-	-	**-**	**-**	**-**	**-**	**-**	**-**	**20.00**
3.	3.B. II. 3)	Fire watcher	2.5125	2.5125	2.5125	2.5125	2.5125	2.5125	2.5125	2.5125	2.5125	2.5125	**25.125**
4.	3.B. II. 4)	Elephant squad	8.64	8.64	8.64	8.64	8.64	8.64	8.64	8.64	8.64	8.64	**86.40**
5.	3.B. II. 5)	Solar lightning system	15.00	-	-	-	-	-	-	-	-	-	**15.00**
6.	3.B. II. 6)	Fixing Glow Elephant Signages	5.00	-	-	-	-	-	-	-	-	-	**5.00**
7.	3.B. II. 7)	Awareness Publicity	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	**10.00**
8.	3.B. II. 8)	Support to VSS by Provision for providing Grain bins	5.00	-	-	-	-	-	-	-	-	-	**5.00**

9.	3.B. II. 9)	Purchase of Wildlife Monitoring equipments	10.00	-	-	-	-	-	-	-	-	-	**10.00**
10.	3.B. II. 10)	Intelligence gathering	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	**5.00**
11.	3.B. II. 11)	Elephant Proof Trench	25.986	-	-	-	-	-	-	-	-	-	**25.986**
		Total	**91.3805**	**24.6535**	**14.3275**	**13.8525**	**13.8525**	**13.8525**	**13.8525**	**13.8525**	**13.8525**	**13.8545**	**227.331**
												Cost escalation 20%	**45.466**
												Grand total	**272.797**

Divisional Forest Officer
Bonai Division

FOR KEONJHAR DIVISION

Sl. No.	Para Ref.	Description of work	Amount in lakh
Wildlife Habitat Improvement			
1.	**3.B. III. 1)**	Cost of Sal plantation (5000 nos.) with 500 Plants per ha. with 10 years maintenance@Rs.1,17,087/- for 500 plants. Hence, for 5000 plants @Rs.1,17,087 x 10=Rs.11,70,870/- or **Rs.11.71 Lakh** in Open Patch of Baitarani RF	**11.71**
2.	**3.B. III. 2)**	Cost of Siali plantation (5000 Nos.) with 200 Plants per ha. with 10 years maintenance@Rs.79,274/- for 200 plants. Hence, for 5000 plants @Rs.79,274 x 25=Rs.19,81,850/- or **Rs.19.82 Lakh** in Open Patch of Baitarani RF	**19.82**
3.	**3.B. III. 3)**	Soil Moisture Conservation activities	**30.00**
4.	**3.B. III. 4)**	a) Solar Street Light 25 nos. @20,000/-per light=**Rs.5.00 Lakh** b) Provision for a Grain Store House for villagers= **Rs. 25.00 Lakh**	**30.00**
Protection and Surveillance			
5.	**3.B. III. 5)**	Fixing glow Elephant signages at strategic location sensitive to elephant pass and to make aware the passer-by to be vigilant.	**5.00**
6.	**3.B. III. 6)**	Provision for providing Grain bins of 350 nos. @Rs.2000/- each = **Rs.7.00 lakhs**	**7.00**
		Total	**103.53**
		20% Escalation	**20.706**
		Grand Total	**124.236**

(***Rupees One Hundred Twenty-Four Lakhs Twenty-Three Thousand and Six Hundred Only***)

Divisional Forest Officer
Keonjhar Division

Annual Work Programme:

Details of the flow of funds for different years of the plan for ZoI area are given below (Rs. In Lakh)

Sl. No.	Para Ref	Type of interventions	y1	y2	y3	y4	y5	y6	y7	y8	y9	y10	Total
1.	3.B. III. 1)	Sal plantation in Baitarani RF	6.23	1.23	0.89	0.48	0.48	0.48	0.48	0.48	0.48	0.48	**11.71**
2.	3.B. III. 2)	Siali plantation in Baitarani RF	7.742	2.001	1.675	1.200	1.200	1.200	1.200	1.200	1.200	1.202	**19.82**
3.	3.B. III. 3)	Soil Moisture Conservation activities	10.00	10.00	10.00	-	-	-	-	-	-	-	**30.00**
4.	3.B. III. 4)	a) Solar Street Lights b) Provision for Grain Store House	5.00 25.00	- -	- -	- -	- -	- -	- -	- -	- -	- -	**30.00**
5.	3.B. III. 5)	Fixing glow Elephant signages	5.00	-	-	-	-	-	-	-	-	-	**5.00**
6.	3.B. III. 6)	Provision for providing Grain bins	7.00	-	-	-	-	-	-	-	-	-	**7.00**

Total	65.972	13.231	12.565	1.68	1.68	1.68	1.68	1.68	1.68	1.682	103.53
										20% Escalation	20.706
										Grand Total	124.236

Divisional Forest Officer
Keonjhar Division

B. Location of the proposed Interventions

Location of the above-mentioned interventions will be decided by DFO, Bonai Division & DFO, Keonjhar Division according to availability of space and requirement.

C. Monitoring Committee

There shall be a monitoring committee for proper implementation, planning, site selection providing guidance and review of the activities/interventions. The committee will be headed by the DFO Bonai and DFO Keonjhar Forest Division with representative of the Project proponent, Range officers, Foresters as members. ACF (HQ) will be the member Secretary of the committee.

D. Plan period

This plan is for 10-year period from 2021-22 to 2030-31. No revision of plan is anticipated during the period except escalation of cost. However, interim revision may be necessary if there is any drastic change in policy or departure from the present method of mine working or reduced / enhanced rates of production due to slump / escalation in market demand. All deviations will be brought on record with reasons thereof for subsequent plan revision.

E. Cumulative total of Interventions for both Project Area and Zone of Influence: The total cost of the conservation plan is **Rs.397.033 Lakhs (Rs. 272.797 lakhs for Bonai Forest Division and Rs.124.236 lakhs for Keonjhar Forest Division)** including **cost escalation @ 20%**. **The entire amount will be deposited by the User Agency in CAMPA.**

ABSTRACT OF COST

Division	Core	Buffer	Total Amount in lakh(s)
BONAI	-	272.797	272.797
KEONJHAR	-	124.236	124.236
TOTAL AMOUNT IN LAKH(S)	-	397.033	397.033

(Rupees Three Hundred Ninety-Seven Lakhs Three Thousand and Three Hundred Only)

Divisional Forest Officer
Bonai Division

Divisional Forest Officer
Keonjhar Division

Approved

Regional
Chief Conservator of Forests
Rourkela

Principal Chief Conservator Forests (WL)
& Chief Wildlife Warden, Odisha, BBSR

CHAPTER- 6

ANNEXURE AND MAPS

a) MAP INDICATING PROJECT AREA WITH 10 K.M RADIUS. **(PLATE-I)**

b) MAP INDICATING ELEPHANT MOVEMENT OF THE AREA. **(PLATE-II)**

c) MAP INDICATING THE DISTANCE OF PROTECTED AREA TO PROJECT AREA. **(PLATE-III)**

d) MAP INDICATING PROJECT AREA WITH 15 K.M RADIUS. **(PLATE-IV)**

e) COPY OF PROCEEDINGS OF THE MEETING OF SEAC DATED. 09.04.2021 **(ANNEXURE-I)**

f) COPY OF COST NORM OF SAL PLANTATION. **(ANNEXURE-II)**

g) COPY OF COST NORM OF SIALI PLANTATION. **(ANNEXURE-III)**

h) AUTHENTICATED LIST OF FLORA & FAUNA **(ANNEXURE-IV)**

ANNEXURE V

Check Dam

Garland Drains

Retaining Wall

Coir Matting

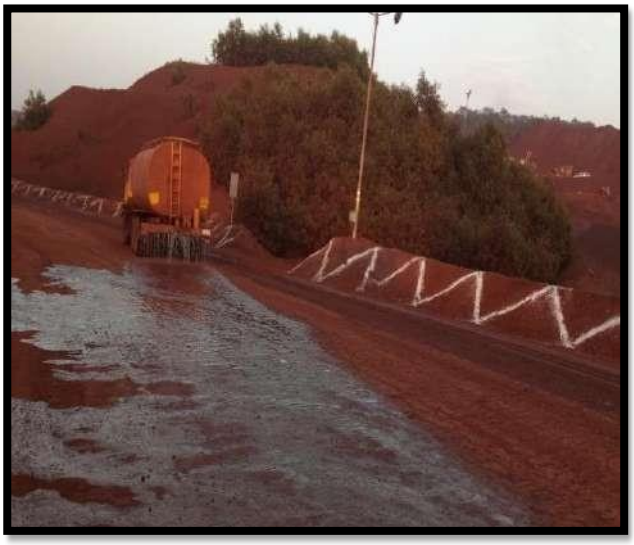
ANNEXURE VI

Medical Examination and Periodical Examination of the Workers

TRAINING AND AWARENESS CAMPAIGN ON SANITATION

ANNEXURE VII

Haul Road sprinkling



(1) Mobile water sprinkler

(2) Fixed water sprinkler

Dry Fog Arrangement at Crushing & Screening Plant

ANNEXURE VIII

OFFICE OF THE PRINCIPAL CHIEF CONSERVATOR OF FORESTS (WILDLIFE) & CHIEF WILDLIFE WARDEN, ODISHA

Government of Odisha, Forest, Environment & Climate Change Department
PRAKRUTI BHAWAN, PLOT NO.1459, SAHEED NAGAR, BHUBANESWAR- 751007
Phone: 0674-2602250, Website: www.wildlife.odisha.gov.in, Email: odishawildlife@gmail.com

No. 990 / CWLW-FDWC-FD-0125-2021
Bhubaneswar, Dated the 31 . January, 2022

To

M/s JSW Steel Limited,
JSW Centre Bandra Kurla Complex,
Bandra West, Mumbai – 400051

Sub: Approval of Site Specific Wildlife Conservation Plan for Gonua Iron Ore mines of M/s JSW Steel Ltd. In Bonai Forest Division of Sundargarh District

Sir,

It is to intimate that you have to implement one Site Specific Wildlife Conservation Plan for the above project in compliance to ToR No.A-19 & B-26 (iii) of Proceeding of the meeting held on 9.4.2021 by SEIAA. The Site Specific Wildlife Conservation Plan in respect of the above project is hereby approved with financial forecast of **₹397.033 lakh** (Rupees three crore ninety-seven lakh three thousand three hundred) only for implementation of activities in project impact area as detailed in the approved plan.

The total cost of ₹397.033 lakh (Rupees three crore ninety-seven lakh three thousand three hundred) only may kindly be deposited in State CAMPA fund for implementation of activities in project impact area by the DFO, Bonai Division and DFO, Keonjhar Division as per jurisdiction. It is further requested to take note of the following conditions for future compliance.

- The Plan may be revisited after 5 years and the User Agency will give undertaking to contribute towards the revised cost of the Conservation Plan till the project period, if any.
- Should there be need for Site Specific Wildlife Conservation Plan after expiry of the present plan period, the User agency shall submit another such plan at least one year before the expiry of the present Conservation Plan and deposit the outlay amount upon its approval. In case of delay, it will be dealt as per law for violations of Forest (Conservation) Act, 1980/ Environment (Protection) Act, 1986.
- The User Agency shall give an undertaking to bear the differential cost in case of enhancement of wage rate during implementation of the Plan.

Yours faithfully

Encl: Copy of approved SSWLCP

Principal CCF (WL) & CWLW, Odisha

Memo No. 991 /dt 31. Jan. 22

Copy forwarded for information and necessary action to the -

1. Special Secretary to Government of Odisha, FE&CC Department, Bhubaneswar
2. Principal Chief Conservator of Forests, Odisha with reference to memo No.57 dt 05.12.2021 of RCCF, Rourkela Circle
3. Regional Chief Conservator of Forests, Rourkela Circle with reference to his memo No.56 dt 05.01.2021
4. DFO, Bonai/ Keonjhar Division alongwith a copy of the approved SSWLCP

Principal CCF (WL) & CWLW, Odisha

SITE SPECIFIC

WILDLIFE CONSERVATION PLAN

For

GONUA IRON ORE MINE

IN VILLAGE GONUA AND PATABEDA UNDER KOIRA TAHASIL

OF BONAI FOREST DIVISION

OF

M/S JSW STEEL LIMITED

BASING ON THE PROCEEDINGS OF THE TOR STANDARD CONDITIONS FOR MINING PROJECT CONDITION NO. 17 & 18

PREPARED BY

DIVISIONAL FOREST OFFICER

BONAI FOREST DIVISION

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ANNEXURES

ANNEXURE NO.	DESCRIPTION
ANNEXURE-I	COPY OF PROCEEDINGS OF THE MEETING OF SEAC DATED. 09.04.2021.
ANNEXURE-II	COST NORM FOR SAL PLANTATION.
ANNEXURE-III	COST NORM FOR SIALI PLANTATION.
ANNEXURE-IV	AUTHENTICATED LIST OF FLORA & FAUNA.

MAPS

PLATE NO.	DESCRIPTION
PLATE-I	MAP SHOWING PROJECT AREA WITH 10 K.M. BUFFER.
PLATE-II	MAP INDICATING ELEPHANT MOVEMENT OF THE AREA.
PLATE-III	MAP INDICATING THE DISTANCE OF PROTECTED AREA TO PROJECT AREA.
PLATE-IV	MAP SHOWING PROJECT AREA WITH 15 K.M. BUFFER.

PREFACE

Pursuant to the Mines and Minerals (Development and Regulation) Act, 1957 and the Mineral (Auction) Rules, 2015, Govt. of Odisha in Steel and Mines Dept. vide their letter No.2279/S&M-IV(Misc.) SM-66/2016 (Pt-I) Dt.02.03.2020 has granted LoI in favour of "Preferred bidder" M/s JSW Steel Ltd. for mining in Gonua Iron Ore Mine in villages Gonua and Patabeda for 50 years. The lease Deed has been executed on 27.06.2020 valid upto 26.06.2070.

This lease area over 88.516 ha includes Forest land over 82.790 ha and non-forest land over 5.726 ha. In the ZoI five R. Fs exist i.e., Baitarani R.F. & Siddhamatha R.F. of Keonjhar Division and Mendhamaruni R.F., Chamakpur. R.F and Khajurdihi R.F. of Bonai Division. In proceedings of the meeting of SEAC dated. 09.04.2021 put a Condition for preparation of Site-specific Wildlife Conservation Plan for Schedule I faun i.e., Elephant, Bear and Python which are noticed in the buffer zone.

We are thankful to management of M/s JSW Steel. Ltd. for providing us documents and accompanying during field visits which has given fruitful inputs to this Plan. We hope if the suggestions prescribed in this plan is implemented to the true letter and spirit the forest density of the buffer zone will increase and the fauna will get ample of food and water which will diminish man-animal interface.

Divisional Forest Officer
Bonai Division

Divisional Forest Officer

(Bonai Forest Division)

EXECUTIVE SUMMARY

1. ***Gonua Iron Ore Mine of M/S JSW Steel Ltd*.** is located in villages Patabeda and Gonua in Koira Tahasil of Bonai Forest Division, Sundergarh Dist.
2. The lease area is 88.516 Ha. (As per DGPS) and 86.886 Ha. (As per RoR) ha (Forest area 82.790 Ha. and non-forest area over 5.726 Ha.) has been granted to M/S JSW Steel Ltd vide letter No.2279/S&M Dt.02.03.2020 and executed on 27.06.2020 for 50 years ending 26.06.2070.
3. M/S JSW Steel Ltd. is having Steel Plant with around 27.0 MTPA capacity at five different locations i.e., at Vizianagaram, Karnataka (12 mtpa), Dolvi, Maharashtra (10 mtpa), Salem Tamil Nadu (1.0 mtpa), Bhusan Steel and Power ltd, Jharsuguda (3.0 mtpa) and Monnet Ispat Pvt. Ltd (1.0 mtpa).
4. The forest area included in the lease is Khesera Forest (50.727 ha) and DLC Forest (32.063 ha).
5. Mining Plan has been approved by Regional Control of Mines Bhubaneswar vide letter No.MP/A/20-ORI/BHU/2020-21-2039 Dt.05.11.2020.
6. All the Statutory clearances were obtained by the previous lessee Sri Pawan Kumar Ahluwalia.
7. Pursuant to the provision contained in Rule 9A (2) of the MMD&R Rules, 2016 order that all the valid rights, clearances, licenses and the like vested in the previous lessee in respect of this mine are deemed to have been vested in favour of JSW Steel Plant for a period of 2 years as per State Govt. in Steel & Mines Dept. as per Order No.4212/SM Dt.30.05.2020. It shall be lawful for JSW Steel Limited to commence and continue mining operation on the land in which mining operations were being carried out by ex-lessee (Sri Pawan Kumar Ahluwalia) from the date of execution i.e., 27.06.2020 for a period of two years as provided in Rule 8B (2) of MMD&R Act 1957.
8. Proposal for forest clearance has been applied by M/s JSW Steel Ltd. to MoEF&CC vide Proposal No. FP/OR/MIN/51003/2020 and presently the proposal is under scrutiny by DFO, Bonai Division for compilation of Part II.
9. Environmental clearance has been granted by State Level Environment Impact Assessment Authority vide letter No.7685/SEIAA Dt.21.12.2019 to previous lessee for the production capacity of 1.2 MTPA which will be enhanced to 2.99 mtpa in near future by M/s JSW Steel Ltd.
10. The EC has been transferred to M/s JSW Steel Limited as on 13/12/2021 vide proposal no. SIA/OR/MIN/38069/2005.
11. Consent to operate has been granted by SPCB, ODISHA vide their **letter No. 5515/ IND-I-CON-1539 Dt. 31.03.2021** for air and water.

12. The end use of Iron Ore of Gonua Block will be used in the Plants at Vizianagaram, Karnataka (12 mtpa), Dolvi, Maharashtra (10 mtpa), Salem Tamil Nadu (1.0 mtpa), Bhusan Steel and Power ltd, Jharsuguda (3.0 mtpa) and Monnet Ispat Pvt. Ltd (1.0 mtpa) for manufacturing of Steel.
13. M/S JSW Steel ltd is also having two more leases i.e., Jajang Iron ore mines and Narayanposi Iron and Manganese ore mines in Bonai Forest Division in Sundergarh Dist. Of Odisha.
14. Surface right was granted over the full lease area 102.89 ha (254.25 acres) to the previous lessee during 1967 by ADM, Sundergarh vide letter No.193 Dt.08.03.1967.
15. The total Mineable reserve of Iron Ore under Proved category is 103.009 million Ton Fe grade is +45-55%. Hence reserve available for conceptual period will be 92.50 million Ton. Annual rate of production is 1.2 million ton and hence the life of mine is 31 years with enhanced production capacity.
16. The lease area is hilly with slopes to west with altitude varying from 585-705m above MSL. There is one nala (valley) named as Kakrpani nala which is dividing the lease in to two parts i.e., Gonua and Patabeda.
17. Deposits form part of SE limb of horse shoe shaped Singhbhum-Bonai-Keonjhar synclinorium of Iron ore group.
18. The forests in ZoI (Baitarani R.F. & Siddhamatha RF of Keonjhar Division and Mendhamaruni R.F., Chamakpur RF & Khajurdihi RF in Bonai Division) consists Moist Deciduous, Dry Deciduous and Semi-evergreen types of forests (3C, 5B and 2 B). Pre-dominant sub-type is moist Peninsular high-level Sal with *Anogeissus latifolia* as major associates. Forests are largely, moderately dense with open and scrub types in the mining areas.
19. The fauna noticed in ZoI includes movement of Elephants, Sloth Bear and Python which are in Schedule I of Wildlife Protection Act, 1972 and considered as endangered.
20. This mine area does not form part of any Protected area.
21. The mining process is fully mechanised. There are mainly three numbers of Iron quarries existing. One is in-situ quarry with float iron ore on eastern to western side (Block A), another in north with small workings areas (Block B) and the third in north-middle with trail pits (Block-C).
22. Bench height and width are kept at 6m and 9 m respectively. Ultimate pit at conceptual period will be two large ones.
23. Two screening plants and one crushing plant has been set up by ex-lessee.
24. The perceived impact of mining in Core Zone are habitat loss due to loss of forests, fire hazard, soil erosion, accidental fall of wildlife in to working pits, dust/noise/light pollution and garbage generation.

25. Similarly, the impact in ZoI is fragmentation of habitat, habitat quality loss, for hazard, biodiversity loss, animal depredation, and water pollution from sediments.

26. With a view to mitigate above impacts in Core Zone interventions like Solar fencing around pits over 2.0 Kms, awareness promotion to mine workers, provision of one 2-wheeler & one Four-wheeler has been suggested.

27. Mitigative measures in ZoI consists of Plantation of Provision for plantation of Siali (5000 nos.) in open patch of Mendhamaruni RF, construction of check dams, engagement of fire fighting squad, anti-depredation squad, awareness promotion and providing signage at sensitive locations of elephant pass etc.

This Management Plan has addressed all the above threats with remedial measures to minimize the adversities as detailed below: -

Within the Project area

- ❖ Photovoltaic fencing around the active Pit over 2.0 K.M.
- ❖ To create awareness among the mine workers.
- ❖ Provision of One Motorcycle for protection work to be used by Foresters along with POL.
- ❖ Provision of One Four-wheeler (Mahindra Bolero) along with driver and POL for DFO, Bonai.

Within the Impact Area/Buffer zone

BONAI DIVISION

- Provision for plantation of Siali (5000 nos.) in gaps of Mendhamaruni RF.
- Construction of series of check dam.
- Engagement of Fire fighting squad during fire season (February to June).
- Provision of elephant squad to watch movement of the Pachyderms and distract their depredation to villages for crop raiding, house damage and human-wildlife interface.
- Provide Solar Street lights in villages prone to elephant movement
- Fixing of glow signages.
- Awareness Publicity.
- Support to VSS members to mitigate HEC by Provision of Grain Bins.
- Purchase of Wildlife Monitoring equipments.
- Intelligence gathering.
- Elephant Proof Trench.

KEONJHAR DIVISION

- ✓ Provision for plantation of Sal (5000 nos.) in open patch of Baitarani RF.
- ✓ Provision for plantation of Siali (5000 nos.) in gaps of Baitarani RF.

- ✓ Soil Moisture Conservation activities.
- ✓ Provision of Solar Street Lights & Provision for a Grain Store House.
- ✓ Fixing of glow signages particularly on Animal Pass.
- ✓ Provision for providing Grain Bins.

28. This Plan has been prepared for 10 years 2021-22 to 2030-31.

29. There shall be a monitoring Committee under the Chairmanship of DFO, Bonai, along with represstentative of Mine Owner, Range Forest Officer, Koira as members. Assistant Conservator of Forests of Bonai Division will be the Member Secretary.

30. This plan has been prepared as per Condition No.17, 18 and 19 of ToR. However, in the Stage-I approval (Forest Clearance) if any condition will be imposed by MoEF&CC for preparation of Wildlife Conservation Plan, then additional plan may be required to be prepared adding additional interventions.

31. As per condition no. 1 of revised guideline issued by PCCF (WL) & CWLW, Odisha vide his memo no. 9094 dt. 17.09.2021, we have taken 10 Km radius from the periphery of the Mining Lease area. Since, this project although located in Bonai Forest Division but in ZoI overlaps to Keonjhar Forest Division also; we have taken another ring of 5 Kms extra. So, in Plate-IV the map is shown for 10 Kms & 15 Kms also.

32. This Site-Specific Wildlife Conservation Plan has been prepared basing on Mining Project Condition No.17, 18 and 19 of Proceedings of the ToR Standard Conditions issued by SEAC (State Level Expert Appraisal Committee) dt. 09.04.21.

33. The total cost of the conservation plan is **Rs.397.033 Lakhs (Rs. 272.797 lakhs for Bonai Forest Division and Rs.124.236 lakhs for Keonjhar Forest Division)** including **escalation cost @ 20%. To accommodate un-foreseen expenditure the entire amount will be deposited by the User Agency in CAMPA excepting infrastructures loke Motor Cycle and Bolero to be procured by the User Agency and delivered to DFO, Bonai Forest Division.**

Divisional Forest Officer
Bonai Division

CHAPTER-1

INTRODUCTION AND METHODOLOGY

INTRODUCTION

Sundergarh district constitutes three forest divisions namely Sundergarh, Bonai and Rourkela. The important minerals found are iron ore, manganese, bauxite and lime stone. Gonua lease rea is in Bonai Forest Division.

1. A) i) Project Description

Gonua Iron Ore Mine of M/s JSW Steel Ltd. is located in villages Patabeda and Gonua in Koira Tahasil, Bonai Forest Division, Sundergarh Dist.

The 88.516 ha (as per DGPS)/ 86.886 ha (as per RoR) ha (Forest area 82.790 ha and non-forest area over 5.726 ha) has been granted to M/s JSW Steel Ltd vide letter No.2279/ S&M Dt.02.03.2020 and executed on 27.06.2020 for 50 years ending 26.06.2070.

1. A) ii) Extent of project area, land schedule and land use pattern:

Govt. of Odisha in Steel & Mines Dept. vide letter No.2279/S&M Dt.02.03.2020 has granted Gonua Iron Ore Block over an area of 86.886 ha (As per RoR) and 88.516 Ha (As per DGPS) in Villages Patabeda and Gonua in Koira Tahasil, Bonai Forest Division, Sundergarh Dist. in Koira Tahasil of Bonai Forest Division in Koira Tahasil of Sundergarh Dist. for a period of 20 years. Pursuant to the Provisions of 9A (2) of the Rules 2016 order that all the valid rights, approvals, clearances, vested with Sri P.K. Ahluwalia (the previous lessee) are deemed to have been vested with M/S JSW Steel Ltd. As per provisions of Section 8B (2) of the MMDR Act, 1957 all the valid rights, approvals, clearances, are vested in favour of M/S JSW Steel Ltd by Govt. of Odisha for a period of 2 years from the date of execution of the lease i.e., 27.06.2020 which is valid upto 26.06.2070.

This lease area is in Koira Forest Range, Koira Section, Koira Beat. The total land schedule has been furnished in the diversion proposal. It is bounded by Latitude $21^0$55'00.52356" to $21^0$55'46.03440" N & Longitude $85^0$22'04.13616" to $85^0$22'36.35616" E in Survey of India Toposheet NO. 73G/5 (F45L5). This is located at a distance of 05 Kms from Koira Township in Bonai Sub-Division. The nearest railhead is Barsuan on South Eastern Railway, located at a distance of 33 K.Ms. Besides, Barbil and Badjamada are also nearer railheads.

Land use of the project area:

The breakup of the land use is as given below:

Sl. No.	Head	Total Area (ha)	Conceptual Land Use (ha)
1	Area under mining	79.197	79.197
2	Storage for top soil	--	--
3	Waste dump site	--	--
4	Mineral storage	6.04	6.04
5	Infrastructure facilities (Weigh bridge, Work shop, Office, CPU etc.) workshop, administrative building etc.	1.472	1.472
6	Road	1.007	1.007
7	Railways	--	--
8	Green belt	--	1.888
9	Others (Water harvesting Pong, Magazine, road for public use)	1.878	1.878
10	Sub-total	44.926	82.963
11	Safety Zone (along the M.L. boundary and village and Dry nala)	5.553	5
12	Untouched	38.037	0
Grand total		**88.516**	**88.516**

1. A) iii) Project Status of Forest Diversion Proposal and Environmental Clearance:

Forest Diversion Proposal:

The total lease area is 86.886 ha which includes 76.882 ha of forest land (Khesera Forest over 49.513 ha and DLC Forest 27.369 ha). MoEF&CC granted Stage-II vide their letter No.8-47/93-FC dated 07/09.08.1996 for diversion of 54.40 ha of forest land. Diversion proposal for 74.603 ha forest land excluding 2.279 ha for Safety Zone was under process by the ex-lessee. Total broken up area is 48.568 ha which includes 29.379 ha of Khesera Forest and 17.760 ha o DLC Forest and 1.429 ha of non-forest land.

Other statutory clearances:

The ex- lessee was granted Environmental Clearance over 0.36 mtpa of Iron Ore vide MoEF letter No. J-11015/201/2005. IA. II(M) Dt.07.10.2005 For enhancement of production to 1.2 million ton per annum production for Iron Ore, the ex-lessee had applied to MoEF for issue of ToR and MoEF ide their letter No. J-11015/211/2010. IA. II(M) 19.08.2010 had issued ToR. vide SEIAA File No.38069/03-Min-V/09-2019 Dt.21.12.2019. State Level Environment Impact Assessment Authority, Odisha vide their letter No. SEIAA:38069/03-MIN-V/09-2019 Dt.21.12.2019 had granted Environmental clearance to the ex-lessee. ***As per Condition No.26 "the Project Proponent shall take all precautionary measures during mining operation for conservation and protection of endangered fauna, if any, spotted in the study area. Action plan for conservation of flora and fauna shall be prepared and implemented in consultation with the State Forest and Wildlife Dept. A copy of the action plan shall be submitted to MoEF&CC and Regional Office. Accordingly, this Plan has been prepared.***

M/S JSW Steel Ltd. Prepared the Mining Plan of Gonua Iron Ore Block along with Progressive Mine Closure Plan over 88.886 ha as per RoR and 88.516 ha as per DGPS Survey, which has been approved by Regional Control of Mines, Orissa, Bhubaneswar vide his letter No.MP/A/20-ORI-BHU/2020-21 / 2039 Dt. 05.11.2020.

The following Forest Blocks exist in the ZoI. Baitarani R.F. & Siddhamatha R.F. of Keonjhar Forest Division and Mendhamaruni R.F., Chamakpur R.F. & Khajurdihi R.F. of Bonai Forest Division exist in ZoI. Both the Forest Blocks have been included in forest type 3cc 2e(i) i.e., Moist Peninsular High-level Sal. The sub type is confined to the upper slopes, ridges and flat tops of Mendhamaruni R.F. The quality of Sal is IV but the crop is somewhat open. Within the Sal belt there are patches of mixed forest with *Anogeissus latifolia* as dominant species. Regeneration of Sal is fairly good but repeated fire every year, influence floristic composition significantly. Indicative species composition is as under: -

Top Canopy *Terminalia alata* (Asan), *Anogeissus latifolia* (Dhaura), *Syzygium cuminii* (Jamun), *Pterocarpus marsupium* (Bija), *Madhuca indica* (Mahul).

Middle Canopy *Careya arborea* (Kumbhi), *Bauhinia purpurea* (Lebha), *Bridelia retusa* (Kasi), *Ougeinia oogeinensis* (Bandhan), *Lannea coromandelica* (Mai).

Under Growth *Indigofera pulchela* (Giliri), *Helecteris isora* (Moda fal), *Flemengia bracteata* (Salparni).

Climbers *Bahunia valii* (Siali), *Smilax macrophylla* (Muturi).

Grasses *Themeda triandra* and *Imperata cyndicral*.

Bamboo is significantly absent.

1. B) VILLAGES LOCATED WITHIN THE STUDY AREA, THEIR DEMOGRAPHIC AND OCCUPATIONAL PROFILE:

There are 26 villages in the project impact area i.e., 10KM radius. There are 4 villages with population more than 1000, 11 villages with population between 501-999 and 11 villages with population less than 500. Total population in the above 26 villages are 18,883 out of which SC population is 87%. The level of literacy is 24%, main workers constitute 37% and non-workers 52%. Cultivators and agriculture labour constitute 10% and marginal workers only 1%.

1. B) i) Existing cropping pattern:

The study area is drought prone with a large extent of unfertile land. People of this area mainly depend on mining for their day-to-day livelihood. In course of time, cultivation has become less important for them. However, paddy is the main crop and people also grow vegetable for their own consumption. From the present survey it reveals that agriculture is not the major source of livelihood for the inhabitants of the ZoI. Climatic condition is also not conducive for agriculture. Even then a good farming community is there in the buffer zone. The following table reals that about 34% respondents are in marginal and small farms category. Thus, these two categories jointly account for about 68% of the total house hold in the study area. There are 24% medium and 8% large farmers. These two categories together account for about 32% of the house hold.

Sl. No.	Holding Size (Acre)	Household (5)
1.	Marginal (, 2.5)	34.2
2.	Small (2.5 to 5.0)	34.2
3.	Medium (5.0 – 10.0)	23.7
4.	Large (. = 10.0)	7.9
	Total	**100.0**

The local people are mostly tribal. They do not have their own wood-lot. The majority of forest blocks of Bonai Forest Division are dominated with plants like Sal and its associates i.e., Asan, Kusum, Char, Mahul, Myrabolans etc. Tribal collect small timber, fire wood, Sal seeds, Sal leaves, Sal resin, char seeds, Kusum seeds, Myrabolans, mahua flower and Karanja seeds, babul seeds, Siali leaf and fibers, Dhatuki flower, Bhuineem, Banahaladi, Bana kulthi, jangli mango, ambada, tamarind, kanta bandhuni, phul bandhuni, bana tulsi, gums and resins etc. Kendu leaf is another important NTFP in Keonjhar Dist. In the leisure period, tribal prefer to go inside the forest in a group for poaching of small game like hare, civet, mongoose, monitor lizard, Quail, etc. Besides, in seasonal nala, tribals also practice fishing by draining the water and share the collection mostly for their house consumption. In

addition, they are in the practice of collecting climbers for basket making (Atundi), rope from murga (Agave sp.) and Siali fiber for house roof thatching. They also collect bamboo twigs for fishing-rod and green bamboo for basket making.

The local inhabitants also depend on forests for grazing their cattle and at places for shifting cultivation. The village cattle herd normally visit the adjoining forest area. The cattle those visit the forest for grazing every morning, at times suffer from seasonal diseases like FYM. This disease possibly may contaminate to Wildlife like Chital, Sambar, Wild boar, etc. (hooved animal).

1. B) ii) Extent of biotic pressure of villages on forest resources:

The extent of biotic pressure of adjoining villagers on forest is heavy. Villagers entirely depend on forest for their firewood, small timber for mud-hut construction and fodder for their cattle. They let loose their cattle every morning in the forest for grazing who return back at their own accord when dusk drops down. At times they set fire to the forest facilitation of collection of Non-Timber Forest Produce especially Kendu leaf, Mahua, Char seeds etc.

1. B) iii) NTFP (Non-Timber Forest Product) Collection (Method of Collection and Impact on Wildlife):

This is a tribal belt. Tribal are the nomadic inhabitants of the forest. The tribal are in habit of collecting fruits and nuts, bamboo, thatching grass, Mahua, Myrabolans, Root tubers (Dioscoreaceae), neem seeds, Char, Bel, Kaitha *(Feronia elephantum*), Babul (*Acacia nilotica*), Bana Bhalia (*Semicarpus anacardium*), *Rohini (Soymida febrifuga),* Medicinal plants, Wax, broomstick, resin, Mango Kernel etc. from the forest. They are also in the practice of collecting tender Sal leaves for plate making. Honey and Jhuna (resin from Sal tree) collection are infrequent in the study area. However, during our survey, we did not find any family entirely dependent on NTFP collection. The leftover family members of the main workforce (old age people and women) are mostly engaged in NTFP collection. They collect their fencing materials and material required for preparing agricultural tools from timber from the adjoining forests.

Tribal are still in the practice of hand-picking of NTFP like Mahua flower, Sal seeds etc. Self–help group formulated in these areas are in practice of preparing pampad, pickle, Juice, incense stick etc. but still more emphasis needs to be given for the commercial collection of NTFP and marketing by ORMAS. The tribal of this area find exposure only during District level Fair, or during the tribal fair held at Bhubaneswar every year from January 26th for a month.

1. B) iv) Method of NTFP collection

Many local villagers depend on adjoining forests areas for collection of Mahua flower, Kendu leaf, Sal Seed etc. For their bonafied consumption and trade. No specific Guideline in this regard is in operation. NTFP like Kendu Leaf, Sal Seeds, Mohua flower, Myrabolans et. Are a major source of income of tribal. The State Forest Dept, Odisha, OFDC, TDCC purchase NTFP to save tribal being mishandled by traders. In the ZoI around 300 families depend on collection of NTFP. Especially for collection of Mahua flower and Sal Seed, the undergrowth available is cleared by Tribal and burn twice in a year for smooth collection of the same. Collection of Mahua flowers, Myrabolans, fruits of Kendu, Char, the tribal deprive the Wildlife like ungulates, bear, birds and rodents from their share of food.

Now Gram Panchayat is empowered to deal with NTFP and they are not aware of its sustainability. A calendar of collection of NTFP and process should be supplied to the Gram Panchayat Office, Range Office and Beat Office. For collecting NTFP from the ground, villagers clean the forest floor by igniting fire, which destroys the ground vegetation, as well as restricts the regeneration of tree species. Repeated use of fire adversely affects the ground nesting mammals, birds and reptile population. Due to the impact of this unscientific cleaning process, the ground becomes completely barren at places to infiltrate the rainwater flow resulting in reduced sub-soil water table and accelerating the process of soil erosion.

1. B) v) Cattle Population and Grazing Habit:

It is ascertained from the local villagers that, they have nearly 5,000 cattle, 3000 goat and 2,000 Pigs not for mulching but for trade. These animals are allowed to graze in the forest freely as stall feeding has not yet been adopted by tribal. Sometimes these cattle become the source of contaminating wildlife for disease like FYM.

1. C) Description of Topography, Natural Drainage Lines

Topography

The lease area is moderately flat, though their area occasional mounds within the area studded with flat topped low ridges, reassembling a relict type of topography controlled by differential harness of rocks. The maximum RL within the area is 684 K.M. to the southern part of the lease area and minimum RL is 621 M at the north east side.

Drainage

There is a dry nala originating from the middle of northern half of M.L. area at 605m, 1.5 Km to the west of lease boundary flows northwards and drains to Kundra nala as well as Karapani nala. Other major drainage channels are Tehrai nala of South West of the M.L., Kundra nala on South West as well as North of the lease and Baitarani River on the east.

Climate

Climate and meteorology of a place play an important role in the implementation of any developmental Project. Meteorology is also the key to understand local air quality as there is essential relationship between meteorology and atmospheric dispersion involving the wind in the broad sense of them.

Temperature

The climate of the study area is characterized by an oppressively hot summer with high humidity. Summer generally commences in the month of March and continue till end of June. Temperature begins to rise rapidly attaining the maximum in the month of May (47.4^0) Celsius. No doubt the weather becomes pleasant on the unset of monsoon in 2^{nd} week of June an continues upto end of October. The temperature in the month of December cools down to 07^0 Celsius.

Relative Humidity:

The air is dry excepting during the South-West monsoon season. The maximum humidity ranges from 55% to 76% with annual average of 64.83% while the minimum humidity range from 26% to 43% with an annual average of 34%.

Rainfall

There is variation of rainfall in the catchment area and around 10 Kms radius of buffer zone of this mine. The average annual rainfall of Bonai sub-division is 1364.66mm as computed from last 10 years data out of which a major portion i.e., 92% occurs from July to September.

Pre-dominant wind direction

This is south-west area which remains calm for nearly 50% of the year.

1. D) Details of linear infrastructures

Rail: The nearest railhead is at Barbil of S.E. Railways and is 33 km. away. The station is connected to Howrah by a daily Jan Shatabdi Express, Barbil being the nearest loading point.

Road: The mine is approximately 106 km from Chaibasa and 122 km away from Rourkela. It is 9 km from Barbil-Rourkela National Highway No. 215.

River: Baitarani River is existing on the ZoI on the East of the M.L. area.

1. E) Description of Flora and Fauna:

As per the field study, the list of flora and fauna available in the area is as detailed below.

FLORAL DIVERSITY:

Table: Habit-wise status of floristic composition of study area

Sl.No.	Habit	Core Zone	Buffer Zone
1	Trees	15	13
2	Shrubs & Herbs	05	05
3	Climbers	06	06
4	Grasses	02	02
5.	Aquatic Flora	-	10
6.	Agricultural Crops	-	16
TOTAL		**28**	**52**

Core Zone:

In total 28 plant species belong to 15 trees, 06 climbers and 02 grasses, 05 shrubs and herbs were recorded during the field survey. The details list of flora is given in list of Flora is given in Table No. I.

Buffer Zone:

In total 52 plant species belong to 13 trees, 05 shrubs, 06 climbers, 02 grasses, 10 aquatic flora and 16 species of agricultural crops were recorded during the field survey. The details list of flora is given in list of Flora is given in Table No. II.

Table No. I

LIST OF FLORA IN THE CORE ZONE GONUA IRON ORE MINES			
TREES			
Sl.No.	**Local Name**	**Scientific Name**	**Family**
1.	Asan	*Terminalia alata*	Combretaceae
2.	Bahada	*Terminalia belerica*	Combretaceae
3.	Bana Bhalia	*Semicarpus anacardium*	Anacardiaceae
4.	Char	*Buchnania lanzan*	Anacardiaceae
5.	Chhatian	*Alstonia scholaris*	Apocynaceae
6.	Dhaura	*Anogeissus latifolia*	Combretaceae
7.	Harida	*Terminalia belerica*	Combretaceae
8.	Jamun	*Syzygium cuminii*	Myrtaceae
9.	Kendu	*Diospyrus melanoxylon*	Ebenaceae
10.	Kasi	*Bridelia retusa*	Euphorbiaceae

11.	Kumbhi	*Careya arborea*	Myrtaceae
12.	Kusum	*Schleichera oleosa*	Sapindaceae
13.	Kurum	*Adina cordifolica*	Rubiaceae
14.	Mahul	*Madhuca indica*	Sapotaceae
15.	Sal	*Shorea robusta*	Dipterocorpaceae
LIST OF FLORA IN THE CORE ZONE GONUA IRON ORE MINES			
SHRUBS/HERBS			
Sl.No.	**Local Name**	**Scientific Name**	**Family**
1.	Anantamula	*Hemidesmus indicus*	Asclepidaceae
2.	Arakha	*Calotropis gigantia*	Asclepidaceae
3.	Basanga	*Adhatoda vasica*	Acanthaceae
4.	Dhatki	*Woodfordia fruticosa*	Lythraceae
5.	Kurei	*Holarrhena antidysenterica*	Apcynaceae
LIST OF FLORA IN THE CORE ZONE GONUA IRON ORE MINES			
CLIMBERS			
Sl.No.	**Local Name**	**Scientific Name**	**Family**
1.	Atundi	*Combretum decandrum*	Combretaceae
2.	Baidanka	*Mucuna monosperma*	Papilonaceae
3.	Bichhuati	*Urtica dioica*	Euphorbiaceae
4.	Mututri	*Smylax macrophylla*	Liliaceae
5.	Siali	*Bauhinia valii*	Papilonaceae
6.	Satabari	*Asparagus racemosus*	Liliaceae
LIST OF FLORA IN THE CORE ZONE GONUA IRON ORE MINES			
GRASSES			
Sl.No.	**Local Name**	**Scientific Name**	**Family**
1.	Khara grass	*Imperata cylindrical*	Gramineae
2.	Phulabandhuni	*Thysanolaena maxima*	Gramineae

Table No. II

LIST OF FLORA IN THE BUFFER ZONE GONUA IRON ORE MINES			
TREES			
Sl.No.	**Local Name**	**Scientific Name**	**Family**
1.	Bel	*Aegle marmelos*	Rutaceae
2.	Bahada	*Terminalia belerica*	Combretaceae
3.	Bana Bhalia	*Semicarpus anacardium*	Anacardiaceae
4.	Dhaura	*Anogeissus latifolia*	Combretaceae

5.	Dimiri	*Ficus glomerata*	Moraceae
6.	Haldu/Karam	*Adina cordifolia*	Rubaceae
7.	Harida	*Terminalia chebula*	Combretaceae
8.	Jamun	*Syzygium cuminii*	Myrtaceae
9.	Jack fruit	*Artocarpus heterophyllus*	Moraceae
10.	Kendu	*Diospyrus melanoxylon*	Ebenaceae
11.	Kusum	*Schleichera oleosa*	Sapindaceae
12.	Kasi	*Bridelia retusa*	Euphorbiaceae
13.	Tamarind	*Tamarindus indicus*	Ceasalpiniaceae
LIST OF FLORA IN THE BUFFER ZONE GONUA IRON ORE MINES			
SHRUBS/HERBS			
Sl.No.	**Local Name**	**Scientific Name**	**Family**
1.	Anantamula	*Hemidesmus indicus*	Asclepidaceae
2.	Arakha	*Calotropis gigantia*	Asclepidaceae
3.	Basanga	*Adhatoda vasica*	Acanthaceae
4.	Dhatki	*Woodfordiafruticosa*	Lythraceae
5.	Kurei	*Holarrhena antidysenterica*	Apcynaceae
LIST OF FLORA IN THE BUFFER ZONE GONUA IRON ORE MINES			
CLIMBERS			
Sl.No.	**Local Name**	**Scientific Name**	**Family**
1.	Atundi	*Combretum decandrum*	Combretaceae
2.	Baidanka	*Mucuna monosperma*	Papilonaceae
3.	Bichhuati	*Urtica dioica*	Euphorbiaceae
4.	Mututri	*Smylax macrophylla*	Liliaceae
5.	Siali	*Bauhinia valii*	Papilonaceae
6.	Satabari	*Asparagus racemosus*	Liliaceae
LIST OF FLORA IN THE BUFFER ZONE GONUA IRON ORE MINES			
GRASSES			
Sl.No.	**Local Name**	**Scientific Name**	**Family**
1.	Khara grass	*Imperata cylindrical*	Gramineae
2.	Phulabandhuni	*Thysanolaena maxima*	Gramineae
LIST OF FLORA IN THE BUFFER ZONE GONUA IRON ORE MINES			
AQUATIC FLORA			
1.	Padma	*Nilumbo nucifera*	Nymphaeaceae
2.	Dhala Kain	*Nymphaea alba*	Nymphaeaceae
3.	Lal kain	*Nymphaeanouchalli*	Nymphaeaceae
4.	Boro Jhanji	*Pistia stratiotes*	Araceae

5.	Pani siuli	*Nymphoides indiccum*	Nymphaeaceae
6.	Chingudia dala	*Hydrilla verticillata*	Hydrocharitaceae
7.	Kalama Saga	*Ipomoea aquatica*	Convuolvulaceae
8.	Sunsunia saga	*Marsilea minuta*	Marsileaceae
9.	Fern	*Azolla imbricata*	Azollaceae
10.	Fern	*Pteridium aqullinum*	Dennstaedtiaceae
LIST OF FLORA IN THE BUFFER ZONE GONUA IRON ORE MINES			
AGRICULTURAL CROPS			
1.	Mung	*Vigna radiata*	Fabaceae
2.	Horsegram	*Delichos biflorus*	Fabaceae
3.	Groundnut	*Arachis hypogeae*	Fabaceae
4.	Alasi	*Guizotia abyssinica*	Asteraceae
5.	Kandula	*Cjanus cajan*	Fabaceae
6.	Onion	*Allium cepa*	Amaryllidaceae
7.	Garlic	*Allium sativum*	Amaryllidaceae
8.	Mustard	*Brassica campestris*	Brassicaceae
9.	Maize	*Zea mays*	Poaceae
10.	Paddy	*Oryza sativa*	Poaceae
11.	Wheat	*Triticum aestivum*	Poaceae
12.	Brinjal	*Solanum melangena*	Solanaceae
13.	Tomao	*Lycopersicum esculantum*	Solanaceae
14.	Chilly	*Capsicum annum*	Solanaceae
15.	Bitter gourd	*Momordica charantia*	Cucurbitaceae
16.	Cucumber	*Cucurbita sativa*	Cucurbitaceae

FAUNAL DIVERSITY:

The Core site is a mining dominating landscape and therefore not much sightings of animal was possible. The faunal diversity in the core area was limited to squirrels and rats and. The core area has a very poor Avifaunal diversity. Possibility of bigger mammals is very low due to the cumulative disturbance caused by the mine dominated landscape. In the Buffer region due to the presence of Reserve forests, there was a good diversity of Birds.

To study faunal diversity and richness in the area, random sightings were preferred and various methods of observation were practiced. For reptiles, stone lifting was done; rock crevices and wall space of structures in the site were checked. Amphibians were searched near the stagnant water pools and small streams. Insects were observed on underside of leaves, nests, rock crevices, bushes and other places. Birds were studied by undertaking several field trails in and around the site.

The observations made during the study phase in the site are as follows:

Mammal diversity:

No mammals other than common squirrel and domesticated cows or dogs were seen in and around the core site. On random survey and talking with local people, it was learnt that Jackals, elephants and Sloth bear are found in the reserve forest areas in the buffer region. On the basis of direct sightings, questioners and indirect evidences, the presence of faunal species such as Barking deer, Jackals and Chital were validated.

List of Mammals that can be found in the buffer region is attached in the **Table.**

Avian diversity:

In areas falling within the core zone (lease area) and adjoining areas, 08 species of birds were observed during the study. The observation was made based on direct sightings and birdcalls. In the observed list of birds, none of the species were classified as Endangered or rare. All of these birds observed were of least concern classification. It must be noted here that though the bird's species recorded during the survey are of least concern classification, necessary steps must be undertaken to reduce the impact on the reserve forest areas that support majority of the Avian diversity. A list of Bird species observed during the study is shown in Table.

Reptile and Amphibian diversity:

During the survey, 2 species of reptiles was found in areas close to the project site. On expanding the survey to nearby ranges in the Buffer region, 06 Species of reptiles were encountered. The list of Reptiles species is shown in **Table.**

There is no Wild Life Sanctuary or National Park within the study area of 10 km. The detailed faunal species is as follows:

FAUNA WITHIN CORE ZONE:

MAMMALS			
Sl.No.	**English Name**	**Scientific Name**	**Schedule as per WPA**
1.	Indian Palm Squirrel	*Funambulus pennanti*	II
2.	Jungle Cat	*Felis chaus*	II

3.	Rat	*Rattus rattus*	V
4.	Rabbit	*Lepus nigricolis*	IV
REPTILES			
Sl.No.	**English Name**	**Scientific Name**	**Schedule as per WPA**
1.	Chameleon	*Chameleon zeylanicus*	II
2.	Krait	*Bungarus caeruleus*	II
BIRDS			
Sl.No.	**English Name**	**Scientific Name**	**Schedule**
1.	Weaver bird	*Ploccus phillipinus*	IV
2.	Cuckoo	*Eudynamis Scolopaceus*	IV
3.	Crow	*Corvus splendens*	V
4.	Parrot	*Psittacula krameri*	IV
5.	Pigeon	*Columba livia*	IV
6.	Sparrow	*Passer domesticus*	IV

FAUNA WITHIN BUFFER ZONE:

MAMMALS			
Sl.No.	**English Name**	**Scientific Name**	**Schedule**
1.	Indian Elephant	*Elephas maximas*	I
2.	Sloth Bear	*Melursus ursinus*	I
3.	Jackal	*Canis aureus linnaeus*	II
4.	Rhesus Macaque	*Macaca mulata*	II
5.	Hanuman Langur	*Presbytis entellus*	II
6.	Spotted Deer	*Axis axis*	II
7.	Jungle cat	*Felis chaus*	II
8.	Barking deer	*Muntiacu muntjak*	III
9.	Mongoose	*Herpesres edwardis*	IV

10.	Rabbit	*Presbytes entellus*	IV
11.	House Rat	*Rattus rattus*	V
REPTILES			
Sl.No.	**English Name**	**Scientific Name**	**Schedule**
1.	Indian Python	*Python molurus*	I
2.	Rat Snake	*Ptyas mucosus*	II
3.	Cobra	*Naja naja*	II
4.	Russel's viper	*Viper russelli*	II
5.	House gecko	*Hemidactylus flaviviridis*	IV
6.	Indian Chameleon	*Chamaeleo zeylanicus*	IV
BIRDS			
Sl.No.	**English Name**	**Scientific Name**	**Schedule**
1.	Weaver bird	*Ploccu phillipinus*	IV
2.	Cuckoo	*Eudynamis Scolopaceus*	IV
3.	Crow	*Corvus splendens*	V
4.	Parrot	*Psittacula krameri*	IV
5.	Pigeon	*Columba livia*	IV
6.	Sparrow	*Passer domesticus*	IV
7.	Red Jungle fowl	*Gallus gallus*	IV
8.	Blue Jay	*Coracias benghalensis*	IV

FISH DIVERSITY RECORDED IN BUFFER ZONE:

BIRDS		
Sl. No.	**English Name**	**Scientific Name**
1	Bata	*Labeo bata*
2	Labeo kalbasu	*Labeo calbasu*
3	Katla	*Catla catla*
4	Magur	*Clarias batrachus*
5	Mirgal	*Cirrhina mrigala*
6	Rohu	*Labeo rohita*

N.B.- The authenticated list of Flora and Fauna for both the Project area (Core Zone) and the buffer zone has been attached in Annexure-III.

Details of Endemic, threatened and Scheduled Species

No endemic species is noticed either in the Core or Zone of Influence. As far as, threatened fauna is concerned, all Schedule-I species is threatened. **Schedule-I species like Elephant, Sloth Bear, Python** are noticed in ZoI.

1. F) i) Description of Forest and habitat condition

Forest Type:

This lease area is in Koira Range, Malda Section and Gonua beat of Bonai Division. This proposal covers 86.886 ha (as per RoR) and 88.516 Ha (as per DGPS) which is distributed in two Villages i.e. Patabeda over 19.918 ha and Gonua over 66.968 ha. Out of the total lease area, forest land covers 76.882 ha which includes 49.513 ha of Khesera Forest and 27.369 ha of DLC land. Out of the balance area 10.004 ha is non-forest land including private tenanted land of 3.003 ha.

In the ZoI Baitarani R.F. & Siddhamatha R.F. of Keonjhar Divn. Exist and Mendhamaruni R.F. Chamakpur R.F.& Khajurdihi R.F. of Bonai Division. These R.Fs have been classified in Champion and Seth's classification as forest type 3C/C2e(i) Moist Peninsular High level Sal. The sub-type is confined to upper slopes, ridges and flat tops of Mendhamaruni and Karo blocks. The quality of Sal is IV but the crop is somewhat open. Regeneration of Sal is fairly good but repeated fire (every year) influences floristic significantly indicating species composition as mentioned below: - Within the Sal belt there are patches of mixed forest with Dhaura (*Anogeissus latifolia*) as dominant species. Sundergarh Dist. has a Forest Cover of However, Karo RF, Baitarani R.F. and Mendhmaruni R.F. exist in the ZoI. These forests have been included in forest type sub-group 3C-Northern Indian Tropical Moist Deciduous Forest, 5B-Northern Tropical Dry Deciduous Forest, 2B Northern tropical semi-evergreen forest. The quality of Sal is usually IV but the crop is somewhat open. In these areas, the patches of mixed forests with predominance of *Anogesissus latifolia* are also found within the Sal belts. Regeneration of Sal is fairly good but there is risk of repeated annual fire. The area is however free from frost. The common associates of Sal in the top canopy are *Terminalia alata* (Asan), *Anogeissus latifolia* (Dhaura), *Syzygium cuminii* (Jamun), *Lagerstroemia parviflora* (Patuli), *Pterocarpus marsupium* (Bija). The middle storey contains *Careya arborea* (Kumbhi), *Bauhinia purpurea* (Kanchan), *Bridelia retusa* (Kasi), *Ougeinia oogeinensis* (Bandhan). *Wedlandia excelsa*. *Helectoris isora* (Modaphal) and *Indigofera pulchela* are commonly found as undergrowth. The common species of climbers available are *Bauhinia vahlii* (Siali) and *Smylax macrophylla* (Muturi). *Themida* and *Imperata* are the common grasses. Bamboo species like *Dendrocalamus strictus* (Salia) does not occur in this sub-type.

Forest Condition According to FSI Report:

As per FSI Report 2019, Sundergarh Dist has a Geographical area over 9712 Sq.Km. Total Forest Area is 4273.37 ha (44% of Geographical area) which include 1020.87 Sq.K.M. of Very Dense Forest (Canopy Density above 70%), 1858.39 Sq.K.M. of Moderate Dense Forest (Canopy density 40% to 70%), Open Forest 1394.12 Sq.K.M. (Canopy Density 10 to 40%). Within last two years (2017 to 2019) forest in this district has increased over 9.37 Sq.K.M.

1. F) ii) Wildlife habitat and prevailing wildlife scenario:

From the Data Collected from villagers of ZoI and field executives of Forest Dept. it appears the presence of Elephants in the area and from the wildlife-human conflict data, presence of bear is confirmed. Presence of other wildlife is mentioned in the list of fauna**.**

The habit and habitats of particularly Schedule-I species are narrated below-

Elephant (*Elephas maximus*):

Habit: Elephants are social animals and live-in herds, which vary between 3–6. The Elephants are matriarchal and the herd is led by the oldest female. Herd usually breaks into clans and rejoins again. For long-distance movement some time a few herd mixes and form a big group which is coordinated by the oldest female for searching for better habitat – food and water. Several herds maintain contact through sub-sonic vocalization according to findings on work with African Elephants. Adult males remain away from the herd and occasionally join with the herd when females are in oestrous. They are polygamous. Only dominant males have the chance to mate with females. Old males usually lead a solitary life, while sub-adult males some time form an unstable group of 2 to 7 animals. Such a group is known as *Muljuria* group. Elephants are very sensitive to hot and prefer shady moist areas during noontime. The matriarch herds, as well as males, are long-ranging. Their home Range varies between 150 and 1200 sq km, depending on the habitat condition. An Elephant may run at a speed of 45 km per hour for a short distance for two to five minutes. Their average life span is the same as human beings, and around 70 years. In Elephant there is no seasonality in oestrous cycle, and the interbirth interval varies from 3 to 5 years, depending on the habitat quality. The gestation period is 18 to 22 months and the suckling period is around one and a half years. Young calves start taking grass from 6 months onwards. Mother continues to bestow maternal care to their offspring for several years after weaning. The sense of touch and hearing is well developed in Elephant but its eyesight is poor. Most males have prominent tusks, while some time females have tushes which are hardly visible from

outside. Male Elephants sometime have only one tusk (known as *Ganesh*), or even without tusk (known as *Makhna*). They have 6 sets of molar teeth, of which only one set is in use at a given time. With the loss of the last set of molar teeth they are deprived of taking any food and eventually do not survive. The unique identity of Elephant is his trunk with a single finger-like tip at the end and it has versatile utility, used in eating, drinking, smelling, breathing, touching, washing & dusting of the body, fighting, and vocalizing. Mud wallowing is fun for the Elephants, though it protects them from insects and sun.

Habitat: The body size and food requirement of this non-ruminant "mega-herbivore" have made the Elephant a generalist vegetarian to feed on a variety of plant species. Even within one region, they feed on well over a hundred species of plants. They not only depend on leaves, fruits & twigs but also consume barks, roots, stem pith, flowers, grasses and salt with soil. Though, depending on seasons they select distinctly different plant parts depending on their availability. In the dry deciduous Forest region, their dietary habit usually alternates between predominantly grazing during the wet season and browsing during the dry season. In quantitative terms, they prefer grasses, reeds, and sedges (Poaceae and Cyperaceae). Their preferred tree families are Combretaceae, Euphorbiaceae, Moraceae, Malvaceae, and Legumes. They cannot survive entirely as grazers. Thus, browse species are extremely important in the nutrition of Elephant. On average, take 150 kg of vegetation and 100 liters of water per day. The efficiency of digestion is poor (40 to 45%) with the symbiotic bacteria in the stomach. They are in constant motion while feeding and generally cover 15 to 20 km in a day. Elephants are well established in dry deciduous Forests to moist evergreen Forest.

Human activities like agriculture (cultivation of crop, irrigation system); development works (Roads, Railways, Townships, Dams, Industries, and Mines etc.) are fragmenting their habitat and creating obstructions to their movement which they traditionally follow. They are in conflict with human when they move through that fragmented area and also damage various cultivated crops (like paddy, ragi, banana, sugar cane etc.

Sloth Bear (*Melursus ursinus*):

Distributed throughout the Odisha, except a few areas of the coastal Districts and is an endangered species.

Habit: Sloth Bear has a long snout and lips are detached from the gum and are well adapted to the forceful intake and expulsion of air. The absence of a middle pair of incisors in the upper jaw permits the passage of air freely. The tongue is large protractible. Long claws of the forelimbs (longer than hind limbs) are good instruments of digging. The animal produces enough suction force to suck out termites from mounds.

Bears are nocturnal in habit, their sense of smell is well developed than their sight and hearing. During an accidental encounter with a human being, they cause severe damage to the human or even death. When they have cubs, they move with them, otherwise, they are solitary or are in pair with the opposite sex. They have a specific breeding season. Mating takes place in June or July and they give birth to cubs in caves during December and January. Litter varies between 1 and 3 cubs. Parental care lies with mother only. Their average life span is around 40 years.

Habitat: They are in good number in drier and secondary Forests are also found in dense forests. They are omnivorous in nature. They feed on tubers, roots, grubs, various fruits, various insects, honey, termites, flowers (mahua, simul, etc.). It also damages sugar cane crop, maize, etc. Their home Range is limited and restricted. In the quest of food, they may travel several kilometres. It is believed that their gall bladder and bile have medicinal properties and hence they are exposed to poaching, particularly due to the demand of these parts in China and other southeast Asian countries.

Indian Python (*Python molurus*):

Habit: This is a non-venomous snake and can grow up to 4m and weigh 45 kg. The colour is dark brown to yellowish-white in a blotched pattern. They are very good swimmers and take to water when disturbed but on land, they hiss and remain motionless. The species is oviparous and lay up to 100 eggs in a clutch protected and incubated by the female. Being exothermic, python basks in open but can also raise body temperature by muscular contraction.

Habitat: Python occurs in wide Range of habitats viz. rocky foothills, grasslands, marshes, swamps, woodlands, open jungle. At times, they take refuge in mammal burrows, hollow trees etc. It has also been reported close to habitation and crop fields. The snake feeds on small mammals, birds, and reptiles but prefers the first. Chital deer, fawns, hares, mouse deer, jungle fowl are natural food.

It can swallow prey bigger than its size as the jaw bones are not hinged. The prey is constricted to death by muscular movement and swallows headfirst. Once held in the jaw, prey cannot escape because of inward bent teeth.

It is listed as one of the Lower Risk /Near Threatened species according to IUCN Red List.

1. G) Movement of mega Wildlife

Elephant is the flagship species of this area and the only mega herbivore (wildlife) with long ranging movement behaviour, present in the study area. Elephants follow streams but move in valleys and unless hard pressed try to avoid hilly terrain to conserve energy. There was movement of elephant between:

Baitarani - Siddhamath - Karo - Mendhamaruni - Khajuridihi and vice versa.

1. H) Man-animal conflict and Depredation caused by the wild animals:

As per the record available in **Bonai Forest Division** 33 house damage cases have yet been recorded, 12 in 2016-17, 15 in 2017-18 and 06 in 2018-19.

So far human kill is concerned, 01 case have been reported in 2017-18 and01 case in 2018-19. So far human injury is concerned, no case has been reported.

From 2016-17 to 2018-19, 01 elephant and 01 wild boar have died due to Human-Animal conflict i.e., 01in 2016-17 and 01 in 2018-19.

As per the Divisional record found 68.62 acre of crops were damaged by the elephant have yet been recorded,40.30 acre in 2016-17 197.followed by 5.44 acre in 2017-18 and 22.88 acre in 2018-19. In all the cases compensation has been paid to the victims.

House damage by Elephants

Year	No. of Houses damaged
2016-17	12
2017-18	15
2018-19	6

Human Death by Wild Animal

Year	Human Death	Animal causing human death
2016-17	Nil	-
2017-18	One	Elephant
2018-19	One	Elephant

Human Injury by Wild Animal

Year	No. of Human involved	Animal causing injury
2016-17	Nil	-

2017-18	Nil	-
2018-19	Nil	-

Details of death of wild animals

Year	Date	Animal killed	Location	Cause of death
2016-17	12.05.2016	Female Elephant-1	Teherai Khesra Forest, Tehrai Beat. 21o54'33.5" N & 85o17'0.7" E	Natural
2017-18	-	Nil	-	-
2018-19	11.10.2018	Wild Boar - 1	Podadihi Khajuridihi Beat	Poaching

Crop damage by Elephants

Year	Crop area damaged in Ac.	Compensation paid in Rs.
2016-17	40.30	4,03,000
2017-18	5.44	54,400
2018-19	22.88	2,28,800

Cattle kill by Wild Animal

Year	Name of Human Kill	Date & place of occurrence	Location
2016-17	- NIL -		
2017-18	- NIL -		
2018-19	- NIL -		

1. I) Working Plan Prescription

The Project area consists of Revenue Forest and DLC Forest which have not been included in the Working Plan. However, Baitarani Reserve Forest of Keonjhar Forest Division and Mendhamaruni R.F. of Bonai Divn. exists in the ZoI.

Baitarani Reserve Forest was included in Selection Working Circle in the last Working Plan ending 2016-17. Sal conversion and coppice system which had been adopted in the last plan could not achieve the desired objective and therefore it has been included in Selection Working Circle. The special objects of management for this Working Circle are given below:

1. To improve the density and composition of forest crop and to encourage the natural regeneration and establishment of principal species by taking suitable silvicultural operation with due emphasis on soil and water conservation.
2. To resort to artificial regeneration wherever necessary.
3. In consistence with primary objective, removal of mature and silvicultural available trees before they become unsound, on sustained yield basis.
4. Removal of unsound and defective trees under improvement felling so as to improve and increase the stocking of principal species.

Likewise, this M.L. area being revenue forest and DLC Forest may be required to be treated according to the prescriptions for **Rehabilitation Working Circle.** The objects of management of this working circle as per the approved Working Plan **of Bonai Division** are: -

1. To tend and improve the existing growing stock through suitable silvicultural measures.
2. To regenerate the barren and blank patches by planting suitable site exacting hardy species.
3. To rehabilitate and improve the productivity of the depleted and degraded forest through enrichment plantation and other suitable measures.
4. To tend the existing plantation so as to get maximum annual increment.
5. To raise block plantation preferably of economically important species in the large gaps having extent of more than 4 Ha.
6. To improve micro-edaphic conditions, especially in dry and open patches by taking suitable soil and water conservation measures.
7. To provide effective protection against illicit felling, encroachment, shifting cultivation, over grazing and fire hazards so as to check further retrogression of site.
8. To meet the bonafied needs and requirements of local inhabitants in regards of fire wood, small timber and fodder etc.

1. J) Location of other project in the Zone of Impact of the current project

In the buffer zone of this project site, another 15 industries exist. The list of projects is furnished below: -

Sl. No.	Name of Industry
1	Oraghat Iron Ore of M/s Rungta sons (P) Ltd.
2	Sanindpur Iron & Mn. Mines of M/s National Enterprisers
3	Ranisal Mn. Mines of M/s O.M.& M
4	Teherai Iron & Mn. Mines of M/s N.K.Pal
5	Teheral Iron &Mn. Mines of M/s Tarini Minerals
6	Kanther Koira Iron& Mn. Mines of M/s B.S.Mishra
7	Kanther Koira Mn. Mines of M/s Rungta Mines Ltd.
8	Teherai Iron & Mn. Mines of M/s B.I.CO.Ltd.
9	Banjhikusum Mn. Mines of M/s O.M.& M
10	Kasira Iron ore Mines of M/s O.M.C.Ltd.
11	Nadidih Iron & Mn. Mine of M/s Feegrade & Co.Pvt.Ltd.
12	Nadidih Iron & Mn. Mine of M/sB.I.CO. Ltd
13	Kolmong Manganese Mine of M/s Rungta Mines Ltd.
14	Malda Manganese Mine of M/s TISCO Ltd.
15	Patamunda Mines of M/s O.M.& M

1. K) Experts involved in the study

Sl. No.	Name	Expertise
1.	Mr. L. K. Das, IFS (Retd.)	Forest, Biodiversity & Wildlife
2.	Mr. Siba Kumar Mohanty, OFS (Retd.)	Forest & Wildlife
3.	Dr. Bidyut Kumar Patra	Environment
4.	Mr. Debasis Mohanty	Coordination
5.	Miss. Swetagni Mohanty	Wildlife & Biodiversity

The above personnel conducted the study being assisted by local Forest Officers of Bonai forest division. The site was visited during January, 2020, April,2020 and the flora and fauna available in the study area was listed through field observations synchronizing with the list given in the Working Plan. In the course of study, dropping of wild animals, pug marks, burrows, nests, scratching, scat/dung and physical presence on ground, tress bushes were recorded.

METHODOLOGY

- The study is based on Survey of India Topo Maps F45N1, F45N5, F45H8 & F45H4.
- The Village list and demographic composition has been collected from 2011 Census Report.

- A model questionnaire has been prepared with our own developed model for the survey of the surrounding Villages and collection of data.
- Human-animal Conflict data has been collected from the Bonai Forest Division.
- Active search method applied for listing of the flora and fauna. Villagers were shown photographs from a book compiled by Sri N.C. Mohanty, IFS (Retd.) to identify the faunal species for confirmation.
- For Socio-economic study and environmental impact study, random sampling method was followed.

Findings:

In the Project area the Scheduled (I) species like **Asiatic Elephant, Sloth Bear, Indian Rock Python** and scheduled (II) species like Jackal, Jungle cat and common Indian mongoose were observed. Similarly Scheduled III and IV species like Barking Deer, Rabbit and Chital were found besides birds and reptiles.

CHAPTER-2

THE PERCEIVED IMPACTS OF THE PROJECT ON THE ENVIRONMENT

A. Impact of the Project on the environment in general:

Any mining project has its impacts on the biotic, physical and socio-economic environment. Some are beneficial to the society some are not. Evaluating these impacts, all projects are implemented. This project is not left untouched in these aspects. When certain impacts are disasters, it necessitates mitigating such problem with established technology and scientific study. Such negative impacts are discussed here to help in implementing mitigative measures.

The environmental impacts can be categorized as either primary or secondary. Primary impacts are those, which are attributed directly to the project and secondary impacts are those, which are indirectly induced and typically include the associated changed pattern of social and economic activities of surrounding community.

Before any attempt is made to reduce various stresses and to avoid/minimize or mitigate their adverse impacts, it is necessary to identify various factors that have negative influence on the biodiversity (flora and fauna). These are specified below considering the terms of reference for the preparation of Site-Specific Wildlife Conservation Plan.

i) Impact on soil

Impact on soil will arise during operation, it is due to open yard storage of raw materials like iron ore. Further, dumping of solid wastes and storage of lump ore, fines etc. On land would also deteriorate soil quality, if appropriate control and mitigation measures will not be implemented. The top soil and other stored material may erode and thereby affect the soil of the periphery and introduce toxic materials to the soil If not properly stored and will affect to the wildlife like rodents and other burrowing animal present in that area.

Geomorphic changes:

This lease area mainly consists of two parts of separate hills, where iron ore deposits occur at various level. Geographically, the Iron Ore Block over 88.516 ha has been designated as Patabeda quarry, situated in the Since Gonua Block is already in operation by northern part of the lease and Gonua quarry which is in the Southern part of the lease. Keeping in view the production requirement, the mining operation will be carried out in both the blocks. 70% of total RoM production has been planned in Gonua block. Since Gonua block is already in operation by the ex-lessee Sri P.K. Ahluwalia, existence of higher grade and Patabeda block is in development side 15 to 20% of the total production is from this block.

Moisture loss:

There is no perennial stream in the lease area. But there exist one seasonal nala which divides the lease area physically into two parts as northern part in Patabeda village and southern in Gonua village. The gradient of the nala is from east to west. This nala becomes active during rainy season and ultimately drains to Karapani nala which is perennial and flowing at a distance of 1.5 Km west of the lease area. Keeping in view the evapo-transpiration and seepage into sub-surface at 40% water flow within the lease area will be 711,596.4 m^3 which will be drained. Other major drainage channels are Tehrai nala of South West of the M.L., Kundra nala on South West as well as North of the lease and Baitarani River on the east.

There will be soil erosion from the mining area specially from the quarries, Over Burden dump, Road cuttings, till the soil is stabilised through engineering and vegetative methods. This sediment load will go into water course. Turbid water curtails sunlight as a result the submerged plant growth is affected due to the reduced photosynthesis. Fish and other aquatic fauna dependent on such plant and phytoplankton will ultimately be affected. Fishes will also be affected by chocking of their gills by silt. Spillage of diesel and Engine oil from vehicles as well as machineries will ultimately find way to aquatic eco-system and affect invertebrates, fishes and frogs.

Moisture loss will be occurred in both the core and the buffer zone of the Mining Lease due to release of very high temperature from the machineries like crusher plant, screening plant, if adequate measures will not be taken. Operation of heavy vehicle for transportation and loss of vegetation due to the project will also cause moisture loss. Under such circumstances, re-establishment of vegetation is delayed and difficult but constant attention if imparted for establishment of saplings planted on Dump, Safety Zone etc., the growth of plants will not be affected.

ii) Impact on Vegetation

Deforestation without proper reclamation will have an ecological / biodiversity loss at the conceptual stage, if not followed up by a proper conservation management plan. Apart from the loss of forest in the mining, there is infrastructure development for mining, establishment of hutments, Kiosks and the subsequent population pressure certainly put a huge anthropogenic pressure on the flora on the locality directly and indirectly.

Habitat loss:

Habitat destruction is a process, which alters or eliminates conditions needed for animals and plants to survive. Rendered functionally weak by mining activities, the ecosystems' ability to support species is reduced. Reduced carrying capacity of the habitat means decline in population and sudden disappearance of species. Habitat loss is manifested in loss of food

plants and failure of the plant in regenerating itself. So is the case with horizontal cover (loss of undergrowth) and vertical cover (canopy contiguity). Habitat loss impacts nitrogen, phosphorous, sulphur, carbon and hydrological cycles, which affects ecosystem values adversely and culminates in either emigration of species or outright extinction.

iii) Impact on Water Regime

The daily requirement of water for mining and ancillary operation will be collected from Baitarani River.

Water pollution:

Soil erosion leads to carriage of sediment load in water. Proposed haulage roads are earthen roads, with 1: 12 gradients. As there will be accumulation of dust on the slopping surface, the first run off will usually carry silt and the colour of turbid water will be brownish red. Higher the gradient more is the velocity of running water. If the velocity increases two-fold, with change in slope, the erosive power will be considerably increased. Moreover, from the O.B. Dump will also pollute the Suna Nadi flowing within a close proximity of the lease area.

iv) Impact on Air

The mining area and as well as surroundings is affected by the following ways:

Dust pollution:

Mining activity particularly blasting, transport mechanism and dumping generate considerable dust, which will settle on nearby vegetation or on the ground. While the former component will affect the net production of organic matter, the latter will be awaiting to be washed away during rains. Blow of dust, will definitely settle on the smaller animal fur, affects its respiration and push the animal to a zone of stress.

The broad impacts of dust pollution are:

- Reduced photosynthesis leading to reduced growth rates of plants.
- Increased incidences of plant pests and diseases from both fungi and insecticides. Reduced seeding, less viable seeds and hence, lowered or absence of regeneration.

Noise pollution:

Drilling - blasting, loading, dumping, transportation and working activities all will produce noise. One can well imagine the nature of stress from the fact that a mere whisper in tranquil forest is enough to alarm the approaching animal to water hole, who takes to flight at once. Small reptiles manage to adapt in such a noisy environment because their facility of escape by such noise is limited. This is one of the factors contributing to displacement of species, even large ones like deer and elephants.

Hearing impairment:

Signal masking i.e., inability to hear important environmental clues and alarm.
Increased heart rate, respiration and stress reaction. Loss of fecundity or inability to litter or increase in abortion. Decline in bird population due to muffling of mating calls.

Light pollution:

The animals are adapted to natural light. Depending on the intensity of light in which an animal is most active, it is either classified as diurnal, crepuscular or nocturnal. Animals are not accustomed and adapted to artificial light, which usually prevail in mining area in the night shift, from the tippers carrying ore after evening and other fixed lights. All animals in the forest area of either the lease or ZoI area will be affected by the incidence of light as artificial lights are very sensitive to the cornea. So, it causes flight of animal from the ZoI of the mining area. Animals are adapted to constant phase of light, when changes happen, they move to area of their choice. Sudden lighting, off and on after dusk by the moving vehicles is harmful. At times, animals will face accidental death, unable to escape and get distracted from their natural path will lead to depredation to the nearby villages or accidental fall in the deep mining pit. The above activities will increase the stress condition. Animals exposed to light exhibit erratic behaviour pattern (mauling by bear, causing injury by elephant), expressed in their deflected movement and aggressive behaviour.

B. Quantum of pollutants that may be produced by the project and effect on soil, water, air, vegetation and animals.

During mining operation, dust and water pollution is inevitable due to functioning of heavy earth moving machineries (HEMM), movement of loaded tippers, drilling and blasting etc. The monitoring data as observed in the region envisage that SO_2& NO_x concentration are within the permissible limit of AAQ standard of CPCB. It has been mentioned that the pollutants are within the permissible limit. Also, there will be accumulation of garbage/ solid waste due to anthropogenic pressure.

C. Degradation Anticipated on account of the project implementation in quantified terms on appropriate models to be explained. Qualitative change in the wildlife habitat pattern in the study area due to project implementation should also be detailed in the plan.

Direct degradation is observed in the form of loss of forest growth in area of mining. This complete removal of forest growth displaced the wildlife existing in that area due to loss of abode, food, water and tranquillity. The mine workers will collect fuel wood for their bonafied

use from the ZoI which will cause degradation. The consequence of these stress on forest are discussed below:

Habitat fragmentation:

This is the result of clearance of natural vegetation either by mining or by allied development activities like haul road, infrastructure etc. Habitats, once fragmented, the resident wildlife will face insurmountable difficulties. After clearance of existing vegetation, small units of fragmented forest area will be formed exposing animals to non-forest/ village area during movement from one patch to another habitat patch. Food resources and cover types get limited in a small patch. Habitat fragmentation involves some habitat impairment of the isolated forest land as well. Fragmentation involves increase in edge habitats and decrease in interior habitats. Biodiversity of each of the fragmented area get reduced for the above reason. Habitat fragmentations are rarely representative samples of the initial landscape. Species like elephants, deer, move between the fragments and make use of both. Small species like lizards, mongoose, civets, ground nesting birds, snakes etc. having low cruising radii adjust/ adapt to small habitat patches.

Microclimate changes alter ecology of interior and exterior habitats. Species adapted to interior habitats are less likely to survive in an edge habitat of smaller units. Smaller units support smaller population with reduced carrying capacity. Small population face decreased heterozygosity, increase in inbreeding and possibly inbreeding depression. If there is no migration between populations and genetic exchange, genetic drift sets in. This means, directional selection for advantageous alleles can cause certain alleles to become fixed in a population, thereby decreasing variation. Such loss of diversity, however, will not affect elephants, as movement path of elephant changes with available alternatives. But, species with low cruising radius will be affected. However, alternate corridors exist for elephants although it is difficult to conclusively say whether this is traditional or deflected route. Another dimension to fragmentation is the propensity of depredation.

Loss of biodiversity:

Biodiversity is an important component for maintaining natural balance and sustainable ecosystems. Clearly, biodiversity loss is critical for survival of human and wildlife in many ways. Development activities such as mining can significantly alter the biodiversity of an area. Its biggest impact is due to felling of trees for mining purpose and forest fire.

The forests are home to huge number of organisms. Felling of trees for mining purpose leads to loss of habitat of wildlife. This puts the survival of animal species at stake. The cutting down of trees itself is a bigger threat to number of plants, birds and animals growing in the forests.

Deforestation in clusters leads to land cover change in the landscape. Fragmentation of habitat through tree felling, pollution of soil, air and water are direct drivers in loss of biodiversity. Indirect divers include human population growth in mining areas (due to increased opportunity of employment) and their demand on forest resources and improved technology introduced in mining and transport. As the forest canopy is opened up, casualty descends fast on shade bearing plants, they fail to regenerate and with this, the dependent animal community's loose foothold. The area vacated by the native shade bearers is partially compensated by the regeneration of light demanding plants. Similarly, fires which occur annually, favour fire hardy annuals and destroy insect life. Plant biomass is affected as it is related to insect inter relations. Blanks created in forest areas get invaded by alien species of plant which increase in area every year at the cost of indigenous species. With the loss of plant diversity, animal diversity also diminishes. The irony is, diversity is getting lost at a faster rate than it is even assessed and scientifically documented, closing all future options of development.

Habitat destruction by illicit felling:

The mine workers are in habit of collection of fuel wood for their bonafied use. The villagers of the ZoI also collect fuel wood, small timber, NTFP etc. from the adjoining forest. These are designated as illicit felling. Such action will not only create gaps in the forest but also decreases percentage of qualifier species required for wildlife. This results in depredation of wildlife to adjoining villages in search of alternate palatable food substance like paddy, sugarcane, mahua and in search of water to satisfy their thirst.

Habitat destruction by Grazing and transmission of disease:

Tribal households have average 3-5 cattle/ pigs which are not in the practice of stall feeding rather let loose in the forest without any watch and ward. Cattle are reared more for dung in local villages than milching. They return to the village after grazing in evening. Cattle are considered a sign of wealth by tribal. Uncontrolled grazing has created sub-optimal habitats around habitations and has introduced agricultural weeds in forest areas. Wild animals like chital and barking deer are susceptible to pathogens of FMD (Foot and mouth Disease), by grazing cattle.

Forest fire:

Forest fire affects both vegetation and soil. It is also helpful in maintaining diversity and stability of ecosystems. Effect of forest fire and prescribed fire on forest soil is very complex. It affects soil organic matter, macro and micro-nutrients, physical properties of soil like texture, color, pH, Bulk Density as well as soil biota. The impact of fire on forest soil depends on various factors such as intensity of fire, fuel-wood and soil moisture. Fire is beneficial as well as harmful for the forest soil depending on its severity. In low intensity fire, combustion

of litter and soil organic matter increase plant available nutrients, which results in rapid growth of herbaceous plants and a significant increase in plant storage of nutrients. Whereas high intensity fire can result into complete loss of soil organic matter, death of microbes, etc. Intense forest fire results into formation of some organic compounds with hydrophobic properties, which results into high water repellent soils. Forest fire also causes long term effect on forest soil.

D. Nature of threats to the flora and fauna

Habitat loss, habitat fragmentation, fire are the major threats as discussed above, there are other threats also emerges due to degradation of forests and those are mentioned below.

Encroachment:

Increase in human presence occur due to implementation of projects. This also results in development of town and human habitation near the industry area. This plant does not involve any forest land and interestingly the workers are most recruited from local villages.

Litter generation:

Labourers generate much litter in shape of polythene wrappers, carry bags, paper wrappers, leaf plates and left- over food. This is not only is obtrusive to sight but can attract animals like pigs, Hyena. Wolf and jackals. Ingestion of indigestible polythene can lead to blockade of gut and eventual death of these animals. The workshop will produce mobile cans, plastic jars, spent mobile and grease. The canteen and office will also produce various wastes. Litters strewn all over not only destroy aesthetic appeal but are injurious to plant and animal life in many other respects.

E. Probable increase in the vehicular traffic and its impact.

Presently about 2500-3000 vehicles move in and out of the mining belt, creating traffic congestion. This happens due to poor road surface, narrow mine roads, breakdown of vehicles and both to and frow traffic of loaded vehicles going out and empty vehicles coming in. This, for sure, can prevent wild animals from their natural movement, confining them to small unfavourable patches of habitat. Such artificial confinement usually manifests in aggressiveness and deflected movement apart from physiological stress.

F. Noise Pollution, Air and underground pollutions etc. and it's probable impact on flora and fauna:

These are discussed in details in this chapter in Section **(a)** above.

G. Study techniques adopted and Details of Visit

The experts comprising of experienced and retired Forest Officers visited the Core and parts of the ZoI of the mine extending over 10Km radius. They were accompanied by the local Forest Range Officer, Koira and his subordinates besides the local staff of the lessee JSW Steel limited. The team also visited Oraghat Iron Ore Mine of M/s Rungta Sons (P) Ltd, San-Indiur Iron & Manganese Ore Mines of M/s National Enterpruise, Kanther Koida Manganese Mines of M/S Rungta Mines Ltd and Kalmong Manganese Mines of M/s Rungta Mines Ltd. And interacted with local villagers regarding implementation of various interventions.

Duration of Visit: - 25.04.2021 to 28.04.2021

The site was visited during April,2021 and the flora and fauna available in the study area was listed through field observations synchronizing with the list given in the Working Plan. In the course of study, dropping of wild animals, pug marks, burrows, nests, scratching, scat/dung and physical presence on ground, tress bushes were recorded.

Observation of Visit

To maintain ecological balance and check harmful effects due to mining and allied activities, environmental control measures have been integrated on to the process of planning. Many of the areas of EMP requires multi-disciplinary approach as per field requirement, suggestion from experts in relevant fields like forestry, ground water etc. Are to be taken from time to time to meet statutory requirements.

Records Referred:

Details of the reference are given below:

1. Champion H G. and Seth S K. (1968). *A revised survey of forest types of India.* Govt. of India: New Delhi.
2. Flora of Orissa-Bihar, Saxena & Brahman.
3. E.I.A. & E.M.P. Report of Gonua Iron Ore Mines of M/S JSW STEEL Ltd.
4. Right of Passage-elephant corridors of India - Wildlife Trust of India.
5. Sar C. K. and Lahiri-Choudhury D.K. (2009). Project: Elephant – Human Conflict in Asia, Report on Orissa, India (Part-I), State Report. Education Centre, Kolkata.
6. Sar C K & Lahiri-Choudhury D K. (2002). Project**:** Elephant - Human Conflict in Asia, Report on Orissa - India (Pt.-II-e), Keonjhar Forest Division, Keonjhar District (1992-April 2000). Kolkata.
7. State of India's Forest Report (2019). Forest Survey of India. Dehradun.
8. Working Plan of Bonai Division.
9. Wildlife Odisha, 2020

10. Fundamentals of Wildlife Management by Rajesh Gopal, IFS

Sampling method adopted

a) Point sampling method on road side adopted to enlist Flora and fauna.
b) Local forest officials and villagers were taken into confidence about movement of Elephants besides man-animal conflict.
c) Data on elephant depredation/ death report of wild animals.

Justification in extrapolation

As no data is available on the exact impact of the mining on flora and fauna, the perceived impact has been extrapolated based on interaction with local staff, villagers and study teams personal experience.

CHAPTER-3

OBJECTIVE OF MANAGEMENT AND MITIGATION STRATEGIES

A. Objective of Management:

Gonua iron ore mine is surrounded by about 15 mines. Hence, the synergetic adverse impact is felt in the ZoI. However, there being medium dense forests in patches but, more or less interconnected, big animals manage to thrive in the area despite enormous biotic interferences.

As can be seen from the land use pattern hardly half of the lease area i.e., 50.479 ha has so far been used leaving aside 38.037 ha (Page 73 of Mining Plan) untouched which will be used during the lease period. Therefore, the lessee has to be vigilant about the forests standing over 38.037 ha which is now serving as abode for small and large wildlife. Therefore, the management in the M.L. area will focus on creating congenial conditions for restoration of lost cover at the earliest. The management of buffer zone primarily will focus on maintenance of optimal habitats for all varieties of wild animals, small and big, maintenance of biodiversity and migration corridors.

In the ZoI 03 species of Schedule I fauna e.g., Elephants, Beer and Pythons are noticed and care has to be taken for their food, cover and protection, which are narrated below: -

Elephant- Elephants chiefly frequent areas covered with tall forests where the ground is hilly or undulating and where bamboos grow in profusion. Elephants sleep during hot hours of the day being intolerant of the sun, feed early in the morning and evening and come out after nightfall to feed in open forest or to raid crops, retiring to sleep after midnight. Their food consists of various kinds of grasses and leaves and stems and leaves of wild bamboo and plantains, all species of crops and the bark of particular kinds of fibrous trees (moraceae family). A full-grown elephant, consumes 240 kg of green fodder per day. Besides it requires 30 kg of grass and 150 ltrs of water per day. In order to meet this, we have given provision for bamboo ball technology to increase percentage of bamboo in the forest. There is also a provision for 2 water holes to be excavated in slanting manner (1:6) so that in the upper slope big animals can consume water and at the dead end the reptiles can quench their thirst.

Sloth Bear- Sloth bear prefer places where out cropping's of rock and tumbled boulders offer them shelter during the hot weather and the rains. They come out of their cave shortly before sunset, hunt for food throughout the night and retire at the dawn. Their food consists mainly of fruit and insects. Fruit available in our forests is more plentiful during summer like

banyan, wild figs, mangoes, jamun, dates, jack fruit etc. They are also fund of honey (*Apis dorsata* or *Apis indica*). During monsoon insect food is more plentiful and bears find many insects under stone, fallen logs, under bark and in the crevices of trees, but main insect it likes is **termite.**

They also prefer sugar cane, maize and where date palms are tapped, they climb the trees to drink the toddy (neera) from the pots fixed by villagers. In the cold weather ber fruit and between Mach-April, mohua trees bloom and carpet the ground with heavy scented flowers. Therefore, plantation of jamun, mango, bel, date palm etc. has been prescribed. Attempts should be made to protect Termite mounds.

Indian Rock Python– Python is a good swimmer and therefore provision of water holes has been provided. After a long swimming when it feels hungry, go for preying in the adjoining forests. It prefers to swallow fawn of deer group, civets, even calf, goat, sheep and twist around a tree to break the bone of the prey for easy digestion.

They are nocturnal, mostly found on ground or bushes, also found in crevices or tree holes, below rock boulders and active during evening hours. They feed on small insects, lizards and small snakes which are plentily available in the ZoI.

The strategic measures to be taken are: -

- Habitat restoration of the mine pits and O.B. dumps by reclamation concurrently with advancement of mines and abandonment of pits through afforestation for colonization/return of displaced animals.
- Management of safety zone covered with vegetation of mine as a wildlife refuge by provision of habitat essentials as far as practicable.
- Maintenance of biodiversity in the mine surrounds to create optimal conditions for all species of wildlife. Maintain habitat contiguity or corridors for migrant wildlife.

Wildlife management planning has 5 steps viz.

- Wildlife survey and range inventory
- Census/ status survey
- Yield determination, i.e., annual productivity
- Diagnosis, i.e., evaluation of range factors as inventoried in (i) above in relation to wildlife numbers.
- Manipulation of population and range.

Data on (i) has been collected from field inspection, reference to working plan and discussion with local officials. (ii) Census has been omitted due to paucity of time. Step (iii) has not been attempted as this is conservation management without harvest. (iv) Diagnosis has been attempted in Chapter-IV. (v) The W.L. (Protection) Act does not provide for population management except by translocation. Hence, this is not touched. Hence, range manipulation

has been prescribed with a view to improve the habitat conditions rather than making any radical change.

The under mentioned prescriptions are aimed at promoting welfare factors, arresting decimating factors, neutralizing limiting factors by providing the same in the range and control of animal damage.

B. Strategies to mitigate and minimize adverse impacts:

Undertake appropriate remedial measures to minimize the adverse impacts of mining on Wildlife Conservation and protection in the Core and buffer zone of the mine.

Improve ecological status and quality of the Wildlife habitat in and around the mine, through restorative interventions.

Enlist people's participation in conservation initiatives through awareness, motivation and capacity building and through suitable incentives.

Undertake strategic fire protection measures over the entire project/ ZoI by creating suitable fire lines with annual maintenance, engagement of fire watcher, awareness and involvement of VSS in fire fighting measures.

Undertake deployment of anti-depredation squad to overcome elephant menace and crop raiding.

Providing glow signage at sensitive locations of elephant movement to aware the people and avoid man-elephant accident.

I) Strategies for Core Zone:

I.1) Photovoltaic fencing:

Wild Elephants move through forests of Bonai division area regularly. They come to near Villages for crop raiding, house damage and thus starts human elephant conflict and ends at injury or casualty to either of them. To prevent accidental fall of wildlife into mining pit, it is suggested to install Solar Fencing (Photo Voltaic Fencing) over 2 KMs with RCC Pillar with 5 strands with Energiser machine and keep provision for Annual Maintenance contract for a period of 10 years.

I.2) Awareness Promotion:

The User Agency will create awareness among the Mines Executive, staffs and workers and sensitize them to maintain cleanliness of the project premises. They will also be aware to protect any type of wildlife including snakes if noticed in the project area. In such an event instead of killing it being afraid, they should intimate the nearest Forest staff or snake charmer available in every Division Office now-a-days for rescue of the wildlife and safe

release in the nearby forest. They should also be aware not domesticate any wildlife as it goes against the Rule 49 of Wildlife Protection Act, 1972. The Drivers of heave earth moving vehicles will be conveyed to keep the noise levels to the barest minimum, take all precaution against fire, damage to trees etc. Drivers will be cautioned to control speed so as not to run over slow-moving wildlife like snakes, lizards, mongoose, civets etc. Behavioural change will be expected from each worker on the above points and use of garbage bins. Any sick and injured wildlife will have to be rescued and given first aid and water. Such animal is to be subsequently handed over to the nearest forest official and released after healing the wound. No worker shall get involved in crime against poaching & illicit felling or business of wildlife trophies as per Rule 49 B of Wildlife Protection Act, 1972.

I.3) Provision of One 2-wheeler:

One Motorcycle to be procured by the User Agency and delivered to DFO, Bonai for used by the protection squad. There is also a provision of POL to be provided by the User Agency.

I.4) Provision of One Four-wheeler:

One Four-wheeler (Mahindra Bolero) to be procured by the User Agency and delivered to DFO, Bonai for used by protection squad There is also a provision of driver and POL to be provided by the User Agency.

II)Strategies to mitigate and minimize the adverse impact so observed in the Zone of Influence (ZoI).

(IN BONAI DIVISION)

Habitat Improvement

II.1) Plantation of Siali in Open Patch of Mendhamaruni RF:

Siali (*Bauhinia vahlii*- Fabaceae) is a climber having tendency to twine the tree and go to the top canopy. The leaf of this species is bi-lobbed which is suitable for leaf plate making (eco-friendly). Therefore, such plantation will eventually help the SHG group for one of their sustenance. TDCC (Tribal Development Cooperative Cooperation)/ ORMAS (Odisha Rural Management Agricultural Society) are the marketing agency of this product.

II.2) Construction of Check Dam:

There is only one stream i.e., Kakrpani nala which is passing on the western side of Gonua Iron ore Mine, this nala drains to Suna Nadi which is a tributary of Baitarani River. In order to check deposition of silt in Baitarani River, it has been proposed to construct series of check

dams of size 10m x 5m x 5m in Kakrpani nala. The distance between consecutive check dams will be according to site condition.

Protection and Surveillance

II.3) Fire Watchers:

Five fire watchers will be deployed for 5 months in a year during February-June to take up regular patrolling, extinguishing ground fire by using bunch of green branches. They will be informing the local Forest Guard/Forester/ Range Officer regarding location of fire incidence and extent of damage. They will organize fire fighting with the help of VSS/eco-development members in case of emergency situations. They are expected to maintain good rapport with village committees.

II.4) Anti-depredation Squad:

A squad of 5 members will be engaged for anti-depredation activities. Their place of posting will be according to wildlife particularly elephant movement in the ZoI of Gonua Iron Ore Mine. They will be equipped with mobile phone with recharge facility, medicine. Besides they will also be given contingent fund to meet exigencies. They will be engaged throughout the year but particularly during crop harvesting period, pre-harvesting period and storage in mud huts.

II.5) Provision of Solar lighting system:

From the study, it was evident that in the Zone of Influence (ZoI), the main problem is man-animal conflict, particularly with the mega herbivore i.e., elephant. Elephants make their frequent depredation to the nearby villages located in the ZOI of the project area, especially from dusk to dawn. One of the causes of conflict occur in the wee hours when the whole area become darker, due to absence of a regular stretch of lighted areas around the villages, because of lack of electric supply. It results in direct confrontation between the people and the elephant, which usually hide itself in dark and bushy areas.

Hence, taking in to account the whole scenario of conflict, there is a provision to install solar street lights, most preferably at strategic locations around the elephant affected village areas in Bonai Forest Division.

As these lights can work even without electricity, it will help the villagers to get rid of elephant attack. The solar lights will be provided at the required strategic locations in the ZoI of the project area considering the elephant movement.

II.6) Glow Signage (Sign Boards):

To promote coexistence with wildlife and to aware people, good quality sign boards with display of wildlife features should be placed along the Project premises, road etc. Fluorescent Sign Boards with good write ups about movement of wild animals will be provided on in order to make aware the passers-by about occurrence of accident if they confront with wildlife.

II.7) Awareness Publicity:

<u>Public Awareness Programme</u>

Strong awareness will be built up among mine workers and villagers about working ethics in the Project area. They will be appraised to keep the noise levels to the barest minimum, take all precaution against fire, damage to trees etc. Drivers will be convinced to control speed so as not to run over slow-moving creatures. Behavioral change will be expected from each worker on the above points and use of garbage bins. Any sick and injured animal will have to be rescued and given first-aid and water. Such animal is to be subsequently handed over to the nearest forest official and released after healing the wound. No worker shall get involved in poaching and illicit felling.

Documentary

Important events of the division will be documented by engaging some professional wildlifers, so that annually a brochure can be published which will be helpful for Forest Guard (in Odia), Forester and Range Officer in English. It is to be shown in all villages for awareness generation. This document will include important information's of the division.

II.8) Support to VSS members to mitigate HEC by Providing Grain Bins:

VSS have been constituted with the aim to protect forest & wildlife and to support their livelihood they have also been included to maintain eco-tourism sites. On the other hand, whatever paddy, store in bamboo made bins (Doli), after harvesting periods elephants invade into the villages in search of food including paddy. So, they break mud walls of the hutment and damage the bamboo made bins. In order to safeguard their hard-earned food grains, it has been proposed to provide Grain Bins to villagers to prevent loss of paddy.

II.9) Purchase of Wildlife Monitoring equipments:

Purchase of Wildlife Monitoring Equipments like camera traps, etc. will be procured for monitoring wildlife and conducting periodical census.

II.10) Intelligence gathering:

Periodical meetings will be conducted in a place where villagers adjacent 4-5 villages will gather and they will be appraised to provide information to the nearest forest field executives like Forest Guard, Forester and Range Forest Officer about presence of elephants and /or causing damage to crops, so that the villagers will be vigilant and the Forest Officers too. The villagers will also be adviced to communicate information to local Forest Officers about illicit felling, poaching & encroachment.

II.11) Elephant Proof Trench:

In order to prevent elephants coming out of Khajurdihi RF it has been proposed to excavate elephant proof trench over 03 KM of size 3m top, 1m bottom and 2.5m depth and heap the dug-up earth inside the forest. A mixture of grass seeds, leguminous species should be sown over the dug-up earth.

III) Strategies to mitigate and minimize the adverse impact so observed in the Zone of Influence (ZoI).

(IN KEONJHAR DIVISION)

III.1) Plantation of Sal in Open Patch of Baitarani RF:

Baitarani RF comes under Rehabilitation Working Circle. The average canopy density is below 0.4. The natural regeneration percentage of dominant species of the area like Sal (*Shorea robusta*-Diplocarpaceae) is low in this RF. Therefore, it has been suggested to raise 5000 nos. of Sal seedlings in vacant but permanent gaps (4 Ha.). In order to supplement the percentage of Sal and gradually to cover the open areas. While raising plantations of Sal it should be kept in mind that Sal is a shade bearer. Therefore, no individual seedlings should be planted below any tree.

III.2) Plantation of Siali in Open Patch of Baitarani RF:

Siali (*Bauhinia vahlii*- Fabaceae) is a climber having tendency to twine the tree and go to the top canopy. The leaf of this species is bi-lobbed which is suitable for leaf plate making (eco-friendly). Therefore, such plantation will eventually help the SHG group for one of their sustenance. TDCC (Tribal Development Cooperative Cooperation)/ ORMAS (Odisha Rural Management Agricultural Society) are the marketing agency of this product.

III.3) Soil Moisture Conservation:

Baitarani is the only river passing through Keonjhar district whose main tributaries are Kundra and Suna. If soil conservation measures like Graded Bonds, wire mesh & check dam are undertaken in these two nallas, siltation in Kanhupur Medium Irrigation Project will be reduced considerably.

III.4) a) Provision of Solar lighting system:

From the study, it was evident that in the Zone of Influence (ZoI), the main problem is man-animal conflict, particularly with the mega herbivore i.e., elephant. Elephants make their frequent depredation to the nearby villages located in the ZOI of the project area, especially from dusk to dawn. One of the causes of conflict occur in the wee hours when the whole area become darker, due to absence of a regular stretch of lighted areas around the villages, because of lack of electric supply. It results in direct confrontation between the people and the elephant, which usually hide itself in dark and bushy areas.

Hence, taking into account the whole scenario of conflict, there is a provision to install solar street lights, most preferably at strategic locations around the elephant affected village areas in Keonjhar Forest Division.

As these lights can work even without electricity, it will help the villagers to get rid of elephant attack. The solar lights will be provided at the required strategic locations in the ZoI of the project area considering the elephant movement.

b) Provision for Grain Store House for Villagers:

Villages prone to repeated Elephant Depredation, the farmers apprehend damage to their crop which is stored in individual households with maximum precaution. Still then the megafauna damage the house and consume paddy stored therein. Here it has been proposed to construct community paddy storage house where paddy of the whole village can be stored by giving some marks to identify whose paddy is stored where. And during elephant depredation, the villagers will unitedly expel the elephant group because this is a community stored house. Besides, all precaution will be taken to protect the paddy from damage by insects by adopting biological method i.e., heaping leaf of Begunia (*Vitex negundo*-Verbenaceae).

III.5) Glow Signage (Sign Boards):

To promote coexistence with wildlife and to aware people, good quality sign boards with display of wildlife features should be placed along the Project premises, road etc. Fluorescent Sign Boards with good write ups about movement of wild animals will be provided on in order to make aware the passers-by about occurrence of accident if they confront with wildlife.

III.6) Provision for providing Grain bins:

In remote villages located deep in the forest, people store paddy in bamboo bins or in sacks. Elephants are very intelligent and therefore after harvesting i.e., from February to June they depredate to villages, and damages mud huts in search of paddy. To prevent this, it is proposed to provide Grain Bins to villagers to prevent loss of paddy which has been harvested by extorting hard labour of villagers.

CHAPTER-4

MANAGEMENT STRATEGIES WITHIN THE PROJECT AREA WITH FINANCIAL FORECAST

A. Interventions with Justification:

All measures for protection of bio-diversity of the site as well as wildlife have been discussed in **Chapter-3.** The financial requirement of various interventions suggested in the plan as per current costs of Rs.315/- day is given in the following table for the plan period of 10 years i.e., 2021-22 to 2029-30 and annual cash flow there-of. All activities within the project area will be implemented by the project proponent.

B. Location of the proposed intervention

The map showing the intervention implemented inside the project area by the project authority has been furnished in **Chapter 6** of this plan.

Table 4.1: Financial provision of works in the project area (Wage rate@ Rs.315.00)

Sl.No.	Para Ref.	Management Interventions	Amount in lakh
1.	3.B.I. 1)	Photovoltaic fencing around the active Pit over 2.0 K.M. @Rs.4.0 lac per K.M. + Rs.1.0 lac maintenance cost per year. = **Rs. 17.00 Lakhs**	**Cost will be borne by User Agency**
2.	3.B.I. 2)	To create awareness among the mine workers regarding operation of the overhead piped conveyor belt @Rs. 1.00 lac per year x 10 years = **Rs. 10.00 Lakhs**	
3.	3.B.I. 3)	**a)** Provision of One Motorcycle for protection work to be used by Foresters= **Rs 1.00 Lakhs** **b)** Cost of POL @ 10,000/- PM x 12 months x 10 years = **Rs 12.00 Lakhs**	
4.	3.B.I. 4)	**a)** Cost of one Four-wheeler = **Rs.12.00 Lakhs** **b)** Cost of POL @ 15000/- PM x 12 months x 10 years = **Rs 18.00 Lakhs** **c)** Cost of Driver @ 16,250/-PM x 12 months x 10 years = **Rs 19.50 Lakhs**	
Total			
20% Escalation			
Grand Total			

Plan period preferably for 10 years with suitable provision for interim review and suitable modification

Annual Work Programme:

Details of the flow of funds for different years of the plan for project area are given below: (Rs. in Lakh)

Sl. No.	Para Ref	Type of interventions	y1	y2	y3	y4	y5	y6	y7	y8	y9	y10	Total
1.	**3.B.I. 1)**	Photovoltaic Fencing	-	-	-	-	-	-	-	-	-	-	**Cost will be borne by User Agency**
2.	**3.B.I. 2)**	Awareness Programme	-	-	-	-	-	-	-	-	-	-	
3.	**3.B.I. 3)**	Provision of One 2-wheeler	-	-	-	-	-	-	-	-	-	-	
4.	**3.B.I. 4)**	Provision of One Four-wheeler	-	-	-	-	-	-	-	-	-	-	
Total													
20 % escalation													
Grand Total													

CHAPTER- 5

MANAGEMENT STRATEGIES WITHIN THE ZONE OF INFLUENCE OF THE PROJECT WITH FINANCIAL FORECAST

A. Financial Provision of Works in Zone of Influence (ZoI):

The financial requirement of various interventions suggested in the conservation plan as per current costs is given in following table for a plan period of 10 years and annual cash flow for the buffer zone of the project area. All activities in the buffer zone will be implemented by the respective Divisional Forest Officer.

Financial provision of works in Zone of Influence (Wage rate @ Rs.315.00)

FOR BONAI DIVISION

Sl. No.	Para Ref.	Description of work	Amount in lakh
Wildlife Habitat Improvement			
1.	**3.B. II. 1)**	Cost of Siali plantation (5000 Nos.) with 200 Plants per ha. with 10 years maintenance@Rs.79,274/- for 200 plants. Hence, for 5000 plants @Rs.79,274 x 25=Rs.19,81,850/- or **Rs.19.82 Lakh** in Open Patch of Mendhamaruni RF	**19.82**
2.	**3.B. II. 2)**	Treatment of identified Nallas in the impact area by constructing series of Check dams on L.S. = **Rs. 20.00 Lakhs**	**20.00**
Protection and Surveillance			
3.	**3.B. II. 3)**	a. 05 nos. of **Fire watchers** will be engaged a period of 5 months (February to June) for 10 years @ Rs.9,450/- per month/watcher x 05 nos. x 05 months x 10 years = **Rs. 23.625 Lakhs** **b.** Recharge of Mobile Phone @ Rs.1000/- PM/ per Squad x 05 months x 10 years = **Rs. 0.50 lakhs** **c.** Medicinal Expenses Rs.5,000/- per Squad/ per year x 10 years = **Rs. 0.50 lakh** **d.** Contingencies expenses on L.S. = **Rs 0.50 lakhs**	**25.125**

4.	**3.B. II. 4)**	a. One No. **Elephant Squad** consisting of 05 members Rs.13,950 (Highly skilled@Rs.465.00 Pm)- x 05 members x 12 months x 10 years = **Rs 83.70 lakhs** b. Recharge of Mobile Phone @ Rs.1000/- PM/ per Squad x 12 months x 10 years = **Rs. 1.20 lakhs** c. Medicinal Expenses Rs.10,000/- per Squad per year x 10 years = **Rs. 1.00 lakh** d. Contingencies expenses on L.S. = **Rs. 0.50 lakhs**	**86.40**
5.	**3.B. II. 5)**	**Solar lighting system**. Solar Street Light in villages affected by Elephant depredation @ Rs. 0.3 Lakh/- per light x 50 nos. = **Rs. 15.00 Lakhs** (Locations to be decided by DFO)	**15.00**
6.	**3.B. II. 6)**	Fixing glow elephant signages at strategic location sensitive to elephant pass and to make aware the passer-by to be vigilant.	**5.00**
7.	**3.B. II. 7)**	Awareness Publicity	**10.00**
8.	**3.B. II. 8)**	Support to VSS members to mitigate HEC by Provision of providing Grain Bins 250 nos. @Rs.2000/- each	**5.00**
9.	**3.B. II. 9)**	Purchase of Wildlife Monitoring equipments	**10.00**
10.	**3.B. II. 10)**	Intelligence gathering	**5.00**
11.	**3.B. II. 11)**	Elephant Proof Trench 3 KM of size 3m top width + 1m bottom width x 2m depth @Rs/8.662 Lakh per K.M.	**25.986**
		Total	**227.331**
		20% Escalation	**45.466**
		Grand Total	**272.797**

(Rupees Two Hundred Seventy-Two Lakhs Seventy-Nine Thousand and Seven Hundred Only)

Divisional Forest Officer
Bonai Division

Annual Work Programme:

Details of the flow of funds for different years of the plan for ZoI area are given below (Rs. In Lakh)

Sl. No.	Para Ref	Type of interventions	y1	y2	y3	y4	y5	y6	y7	y8	y9	y10	Total
1.	3.B. II. 1)	Siali plantation in Mendhamaruni RF	7.742	2.001	1.675	1.200	1.200	1.200	1.200	1.200	1.200	1.202	**19.82**
2.	3.B. II. 2)	Construction of Check dams	10.00	10.00	-	-	**-**	**-**	**-**	**-**	**-**	**-**	**20.00**
3.	3.B. II. 3)	Fire watcher	2.5125	2.5125	2.5125	2.5125	2.5125	2.5125	2.5125	2.5125	2.5125	2.5125	**25.125**
4.	3.B. II. 4)	Elephant squad	8.64	8.64	8.64	8.64	8.64	8.64	8.64	8.64	8.64	8.64	**86.40**
5.	3.B. II. 5)	Solar lightning system	15.00	-	-	-	-	-	-	-	-	-	**15.00**
6.	3.B. II. 6)	Fixing Glow Elephant Signages	5.00	-	-	-	-	-	-	-	-	-	**5.00**
7.	3.B. II. 7)	Awareness Publicity	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	**10.00**
8.	3.B. II. 8)	Support to VSS by Provision for providing Grain bins	5.00	-	-	-	-	-	-	-	-	-	**5.00**

9.	3.B. II. 9)	Purchase of Wildlife Monitoring equipments	10.00	-	-	-	-	-	-	-	-	-	**10.00**
10.	3.B. II. 10)	Intelligence gathering	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	**5.00**
11.	3.B. II. 11)	Elephant Proof Trench	25.986	-	-	-	-	-	-	-	-	-	**25.986**
		Total	**91.3805**	**24.6535**	**14.3275**	**13.8525**	**13.8525**	**13.8525**	**13.8525**	**13.8525**	**13.8525**	**13.8545**	**227.331**
												Cost escalation 20%	**45.466**
												Grand total	**272.797**

Divisional Forest Officer
Bonai Division

FOR KEONJHAR DIVISION

Sl. No.	Para Ref.	Description of work	Amount in lakh
Wildlife Habitat Improvement			
1.	**3.B. III. 1)**	Cost of Sal plantation (5000 nos.) with 500 Plants per ha. with 10 years maintenance@Rs.1,17,087/- for 500 plants. Hence, for 5000 plants @Rs.1,17,087 x 10=Rs.11,70,870/- or **Rs.11.71 Lakh** in Open Patch of Baitarani RF	**11.71**
2.	**3.B. III. 2)**	Cost of Siali plantation (5000 Nos.) with 200 Plants per ha. with 10 years maintenance@Rs.79,274/- for 200 plants. Hence, for 5000 plants @Rs.79,274 x 25=Rs.19,81,850/- or **Rs.19.82 Lakh** in Open Patch of Baitarani RF	**19.82**
3.	**3.B. III. 3)**	Soil Moisture Conservation activities	**30.00**
4.	**3.B. III. 4)**	a) Solar Street Light 25 nos. @20,000/-per light=**Rs.5.00 Lakh** b) Provision for a Grain Store House for villagers= **Rs. 25.00 Lakh**	**30.00**
Protection and Surveillance			
5.	**3.B. III. 5)**	Fixing glow Elephant signages at strategic location sensitive to elephant pass and to make aware the passer-by to be vigilant.	**5.00**
6.	**3.B. III. 6)**	Provision for providing Grain bins of 350 nos. @Rs.2000/- each = **Rs.7.00 lakhs**	**7.00**
		Total	**103.53**
		20% Escalation	**20.706**
		Grand Total	**124.236**

(***Rupees One Hundred Twenty-Four Lakhs Twenty-Three Thousand and Six Hundred Only***)

Divisional Forest Officer
Keonjhar Division

Annual Work Programme:

Details of the flow of funds for different years of the plan for ZoI area are given below (Rs. In Lakh)

Sl. No.	Para Ref	Type of interventions	y1	y2	y3	y4	y5	y6	y7	y8	y9	y10	Total
1.	3.B. III. 1)	Sal plantation in Baitarani RF	6.23	1.23	0.89	0.48	0.48	0.48	0.48	0.48	0.48	0.48	**11.71**
2.	3.B. III. 2)	Siali plantation in Baitarani RF	7.742	2.001	1.675	1.200	1.200	1.200	1.200	1.200	1.200	1.202	**19.82**
3.	3.B. III. 3)	Soil Moisture Conservation activities	10.00	10.00	10.00	-	-	-	-	-	-	-	**30.00**
4.	3.B. III. 4)	a) Solar Street Lights b) Provision for Grain Store House	5.00 25.00	- -	- -	- -	- -	- -	- -	- -	- -	- -	**30.00**
5.	3.B. III. 5)	Fixing glow Elephant signages	5.00	-	-	-	-	-	-	-	-	-	**5.00**
6.	3.B. III. 6)	Provision for providing Grain bins	7.00	-	-	-	-	-	-	-	-	-	**7.00**

Total	65.972	13.231	12.565	1.68	1.68	1.68	1.68	1.68	1.68	1.682	103.53
										20% Escalation	20.706
										Grand Total	124.236

Divisional Forest Officer
Keonjhar Division

B. Location of the proposed Interventions

Location of the above-mentioned interventions will be decided by DFO, Bonai Division & DFO, Keonjhar Division according to availability of space and requirement.

C. Monitoring Committee

There shall be a monitoring committee for proper implementation, planning, site selection providing guidance and review of the activities/interventions. The committee will be headed by the DFO Bonai and DFO Keonjhar Forest Division with representative of the Project proponent, Range officers, Foresters as members. ACF (HQ) will be the member Secretary of the committee.

D. Plan period

This plan is for 10-year period from 2021-22 to 2030-31. No revision of plan is anticipated during the period except escalation of cost. However, interim revision may be necessary if there is any drastic change in policy or departure from the present method of mine working or reduced / enhanced rates of production due to slump / escalation in market demand. All deviations will be brought on record with reasons thereof for subsequent plan revision.

E. Cumulative total of Interventions for both Project Area and Zone of Influence: The total cost of the conservation plan is **Rs.397.033 Lakhs (Rs. 272.797 lakhs for Bonai Forest Division and Rs.124.236 lakhs for Keonjhar Forest Division)** including **cost escalation @ 20%**. **The entire amount will be deposited by the User Agency in CAMPA.**

ABSTRACT OF COST

Division	Core	Buffer	Total Amount in lakh(s)
BONAI	-	272.797	272.797
KEONJHAR	-	124.236	124.236
TOTAL AMOUNT IN LAKH(S)	-	397.033	397.033

(Rupees Three Hundred Ninety-Seven Lakhs Three Thousand and Three Hundred Only)

Divisional Forest Officer
Bonai Division

Divisional Forest Officer
Keonjhar Division

Approved

Regional
Chief Conservator of Forests
Rourkela

Principal Chief Conservator Forests (WL)
& Chief Wildlife Warden, Odisha, BBSR

CHAPTER- 6

ANNEXURE AND MAPS

a) MAP INDICATING PROJECT AREA WITH 10 K.M RADIUS. **(PLATE-I)**

b) MAP INDICATING ELEPHANT MOVEMENT OF THE AREA. **(PLATE-II)**

c) MAP INDICATING THE DISTANCE OF PROTECTED AREA TO PROJECT AREA. **(PLATE-III)**

d) MAP INDICATING PROJECT AREA WITH 15 K.M RADIUS. **(PLATE-IV)**

e) COPY OF PROCEEDINGS OF THE MEETING OF SEAC DATED. 09.04.2021 **(ANNEXURE-I)**

f) COPY OF COST NORM OF SAL PLANTATION. **(ANNEXURE-II)**

g) COPY OF COST NORM OF SIALI PLANTATION. **(ANNEXURE-III)**

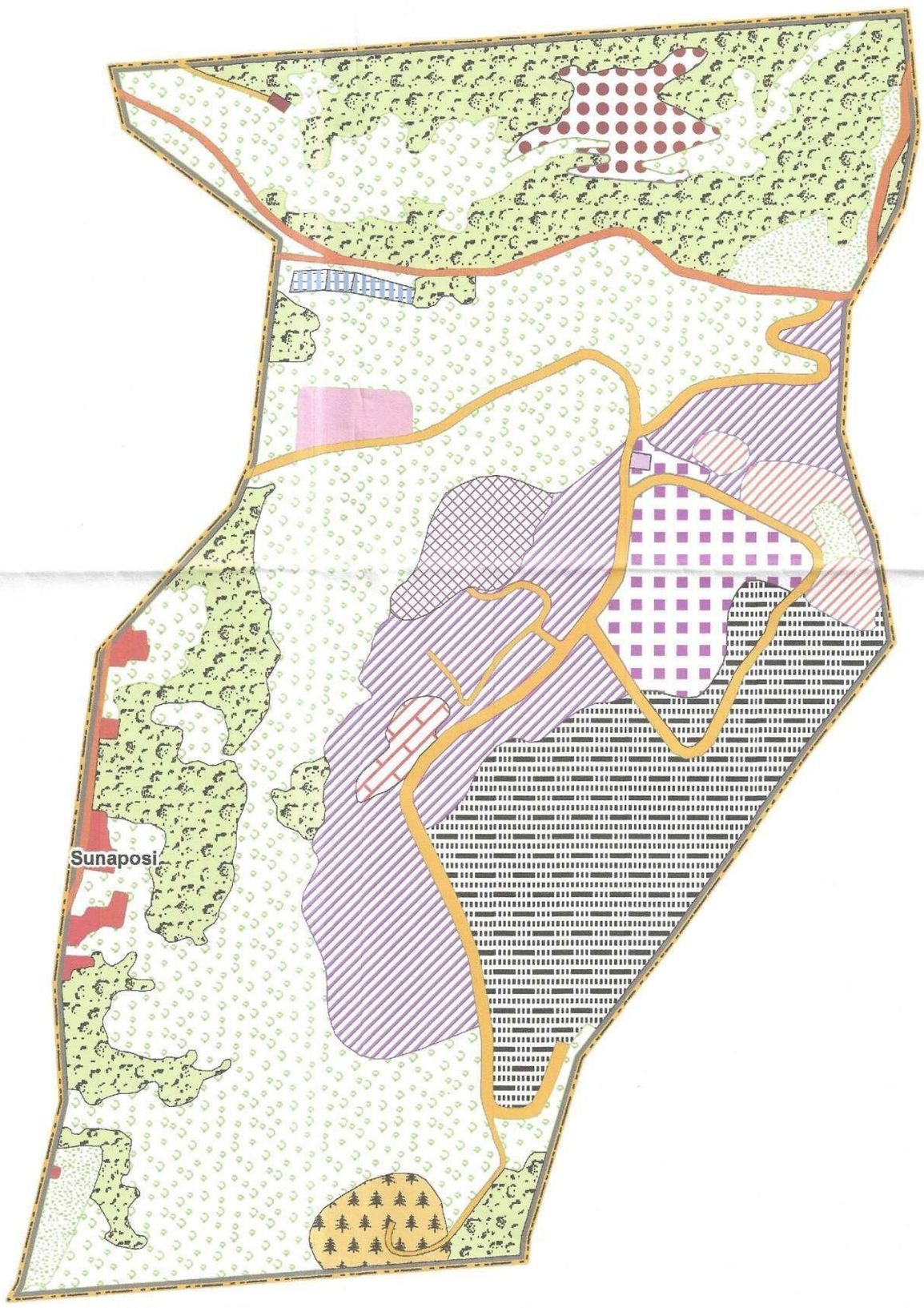
h) AUTHENTICATED LIST OF FLORA & FAUNA **(ANNEXURE-IV)**

ANNEXURE IX

LANDUSE / LANDCOVER MAP OF GANUA IRON ORE MINE IN SUNDERGARH DITRICT OF M/S JSW STEEL LTD.

0 0.15 0.3 0.6 Kilometers

SCALE - 1:5,000



Legend

- Habitation
- Plantation Over Dump
- Tree Clad Area
- Tree Felling Area
- Land With Scrub
- Land Without Scrub
- Mining Quarry
- Old Quarry
- Sub - Grade Dump
- OB Dump
- Stock Yard / Ore Stack
- Settling Pond
- Site Services
- Workshop
- Processing Yard
- Weigh Bridge
- Magazine
- Haul Road
- Other Road
- Safety Zone
- Mining Lease Boundary

ORISSA SPACE APPLICATIONS CENTRE * BHUBANESWAR * Map No. 2599/1 Date 09-12-2021 Auth. Signatory

SOURCE : -

Drone Image Supplied By M/s JSW Steel Ltd.
Month - August , Year - 2021

ANNEXURE X

Personal Protective Equipment

ANNEXURE XI

Steel Limited

Regd. Office: JSW Centre
Bandra Kurla Complex,
Bandra (East), Mumbai – 400 051
CIN : L27102MH1994PLC152925
Phone : +91 22 4286 1000
Fax : +91 22 4286 3000
Website : www.jsw.in

OFFICE ORDER

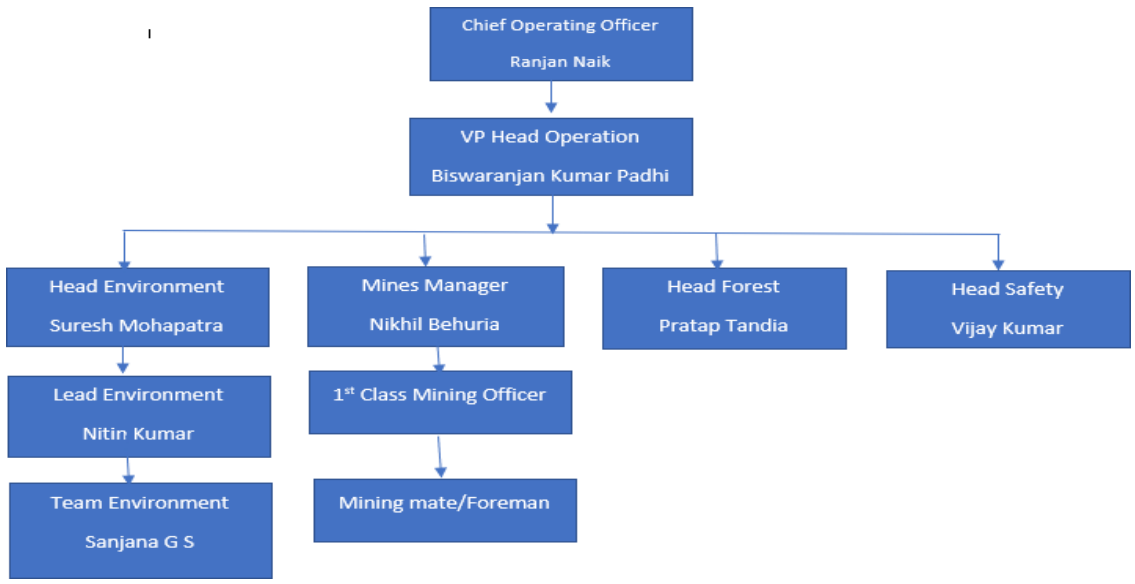
GONUA IRON ORE MINES

Environment Management Cell

Environment management cell (EMC) working for the management of Environmental monitoring of the mines and to act upon mitigation measures on the impacts of the production of mine with its surrounding environment so that pollution load, water and air quality can be maintained. Key functioning of EMC would be for compliance monitoring and to adhere with Environmental aspects and issues of the project during operation phase. EMC created with an objective of organizational framework for operating Environment Management System (EMS) and other functions of responsibilities for environmental betterment; and formulating Environmental Action Plans (EAPs) which specify mitigation, periodic and annual monitoring activities during project implementation and operation phase of mining.

The potential activities structured for the control mechanism by EMC, such activities are: Air pollution due to the emission of particulate matter, Gaseous pollutants and fugitive emissions; Noise pollution due to various noise generating equipment and mining activities; Wastewater generation from domestic activities; and Solid waste disposal. In order to minimize these impacts and to ensure that the environment in and around the project site as well as the neighboring population is well protected; an effective environment management plan to be developed and maintained by Environment management cell.

Organogram



Ranjan Nayak
Chief Operating Officer

ANNEXURE XII

JSW Steel Limited

Regd. Office: JSW Centre
Bandra Kurla Complex,
Bandra (East), Mumbai – 400 051
CIN : L27102MH1994PLC152925
Phone : +91 22 4286 1000
Fax : +91 22 4286 3000
Website : www.jsw.in

No. JSW/S/O/2022/785 Date: 04/11/2022

To,
The Member Secretary
State Pollution Control Board, Odisha,
Paribesh Bhawan, A/118, Nilakantha Nagar, Unit-8,
BHUBANESWAR- 751012

Sub: - Submission of report for the recommendations of carrying capacity study made by CSIR-NEERI, for environmentally sustainable iron and manganese ore mining activity for **Gonua Iron Ore Mine of M/s JSW Steel Ltd.**

Ref: - 1. Your letter No. 13055/ Ind. I-Con-(Misc) 1533 dated 27.07.2022
2. New Consent Order No 2941 vide letter number 4907/IND-I-CON-1539 dated 29th March 2022.
3. Our letter No. JSW/S/O/2022/362 dated 31.05.2022

Dear Sir,

With reference to aforesaid subject, please find enclosed herewith the 9 Points NEERI Compliance Status Report and carrying capacity study made by CSIR-NEERI, for environmentally sustainable iron and manganese ore mining activity of FY 2021-22 for **Gonua Iron Ore Mine of M/s JSW Steel Ltd**.

Seeking your co-operation as always.

Thanking you,

Yours Faithfully

Mrutyunjaya Mahapatra

For JSW Steel Ltd

Mrutyunjaya Mahapatra
(Authorized Signatory)

Encl: As above

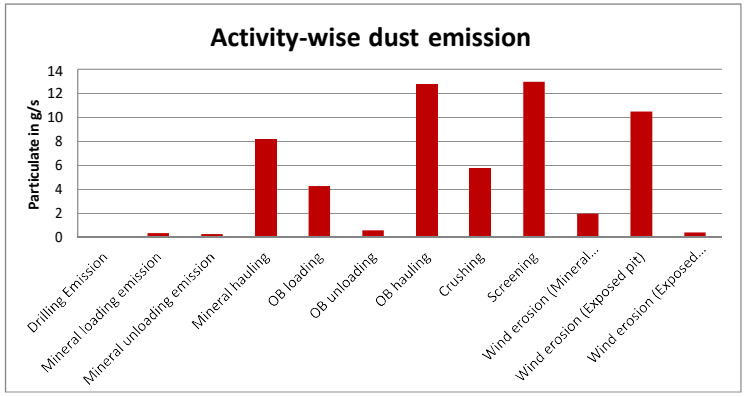
Copy to- The Regional Officer, Regional Office, Rourkela, Office of the State Pollution Control Board, Rourkela Town Engineering Office Premises, Sector – 5, Rourkela – 769 002, Odisha

Steel Limited

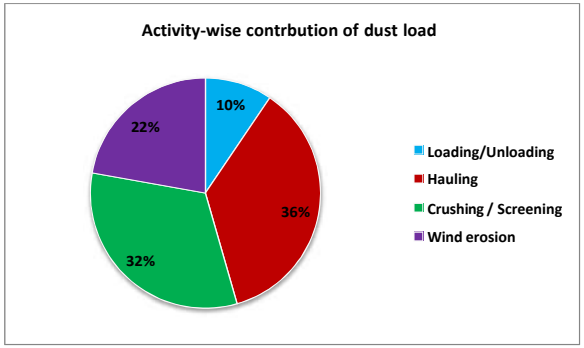
Regd. Office: JSW Centre
Bandra Kurla Complex,
Bandra (East), Mumbai – 400 051
CIN : L27102MH1994PLC152925
Phone : +91 22 4286 1000
Fax : +91 22 4286 3000
Website : www.jsw.in

RESULTS OF DUST LOAD CALCULATIONS

	Particulate matter in (g/s)	Particulate matter in (kg/d)	Particulate matter (kg per ton of ore)
Drilling Emission	0.04294477	3.710428514	0.00140966
Mineral loading emission	0.34601345	29.89556181	0.01135790
Mineral unloading emission	0.27205595	23.50563417	0.00893024
Mineral hauling	8.21114936	709.4433051	0.26953130
OB loading	4.2645656	368.4584679	0.13998453
OB unloading	0.60766552	52.50230061	0.01994664
OB hauling	12.772899	1103.578475	0.41927091
Crushing	5.78703704	500	0.18995971
Screening	12.962963	1120	0.42550976
Wind erosion (Mineral stack)	1.98549735	171.546971	0.06517402
Wind erosion (Exposed pit)	10.4977722	907.0075212	0.34458978
Wind erosion (Exposed OB dump)	0.41431955	35.79720952	0.01360005
Total	**58.16488**	**5025.4459**	**1.9092646**



Major Activity	Dust load (kg/day)
Loading/Unloading	474.361964
Hauling	1813.02178
Crushing / Screening	1620
Wind erosion	1114.3517



GO TO MAIN PAGE

GO TO DATA ENTRY PAGE

Annual Environmental Sustainability Report (ESR) for Gonua Iron Ore Mine of M/s JSW Steel Ltd.

Introduction-

The Gonua Iron Ore Mine (erstwhile lessee M/s Pawan Kumar Ahluwalia) was one of the mines whose lease expired on 31.03.2020. The lease area is located in villages Ganua and Patabeda, Tehsil Koira, District Sundargarh, Odisha State.

In pursuant to the Mines and Minerals (Development and Regulation) Act, 1957 and the Mineral (Auction) Rules, 2015, Govt. of Odisha issued the notice inviting tender dated 6th December, 2019 for commencement of the auction process to grant the mining lease in respect of Gonua Iron Ore Block over an area of 88.516 ha (As per DGPS) / 86.886 ha (As per ROR) in villages Ganua and Patabeda under Koira Tehsil of Sundergarh District, Odisha for a resource size of about 118.731 Million tonnes (Mt). The e-auction process was conducted in accordance with the tender document and the mineral auction rule, 2015 for the said mineral block and M/s JSW Steel Limited was declared as the preferred bidder under Rule 9(9)(iii) of Mineral (Auction) Rules 2015.

Without prejudice to the generality of the provisions of section 8B(2) of the MMDR Act, 1957, the details of the valid rights, approvals, clearances, licenses and the like held by the previous lessee are vested in favor of M/S JSW Steel Ltd by the Govt. of Odisha for a period of 2 years from the date of execution of lease deed or till the date of getting fresh approvals, clearances, licenses, permits, and the like, whichever is earlier vide vesting order No-4253/SM, dated 30.05.2020. M/s JSW Steel Limited being successful bidder upon execution of mining lease deed, the successful bidder shall immediately, but not later than one hundred twenty days from the date of execution of mining lease, apply afresh for all necessary rights, approvals, clearances, licenses and the like under the applicable statutes, rules or regulations, as the case may be, for obtaining the necessary clearances to enable further continuance of the mining operations beyond two years and vesting order shall be valid for a period of two years from the date of execution of new lease deed or till the date of getting all fresh approvals, clearances, licenses, permits, and the like, whichever is earlier.

The mining lease was granted in favor of M/s JSW Steel Limited for a period of 50 years w.e.f 27.06.2020. Subsequent to signing of the MDPA with the Collector, Sundargarh**, M/s JSW Steel Limited** has made payment of the third instalment being the eighty percent of the upfront value and executed and registered the mining lease with the Government of Odisha on 27.06.2020.

Indicative Coordinates Range of the Gonua Iron Ore Mine

Latitudes : 21°55'00.52356" N - 21°55'46.03440" N
Longitudes : 85°22'04.13616" E - 85°22'36.35616" E

Fully mechanized open cast method of mining by drilling and blasting and by deploying HEMM equipment's like hydraulic drills and excavators, wheel loaders, dumpers, will be undertaken. The height and width of the benches for iron ore will be kept at 9 m and 15 m respectively. The working of benches will be commenced from top and extended to bottom benches. The excavated ROM ore is proposed to be processed in the crushing and screening plants to obtain the lump and fine ore as product mix. The iron ore lumps and iron ore fines extracted from the mine will be transported through railway/port/road to JSW Steel Plants.

Production in FY 2020-21

Gonua mining operations started from 01.07.2020 based on the vested approvals. From July 2020 to March 2021, Gonua Mine has produced 774577 Mt Iron Ore (ROM) and same is dispatched to steel plants.

Production in FY 2021-22

From April 2021 to March 2022, Gonua Mine has produced 960730 Mt Iron Ore (ROM) and same is dispatched to steel plants.

Environment Management in Gonua Mine

Air Management-

Blasting Operation

- Controlled blasting method is in practice by restriction of explosive charge in the holes.
- Well-designed blast by effective stemming and use of mili second delay detonators, Proper blasting designing to see that the optimum breakage occurs.
- To control ground vibrations and arrest fly rocks, advanced initiation system is being used for blasting
- Ground vibrations are also being monitored and the results are well within limits.

Excavation, Hauling and Crushing & Screening

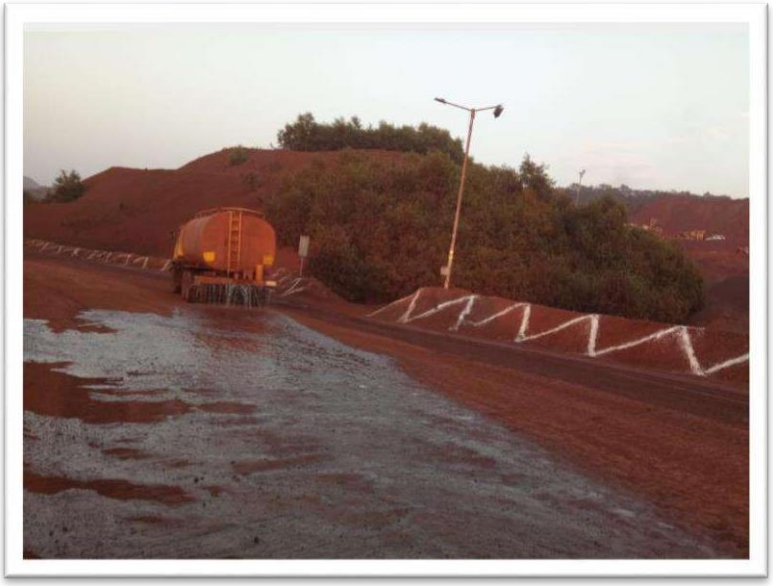
- Dry fog system for crusher & screen plants are provided.
- Proper maintenance of HEMM
- Using sharp teeth for shovels and other soil excavation equipment, and their periodical replacements.
- Acoustic enclosures for operator cabin.
- Avoiding overloading of dumpers
- Provision of dust filters / masks to workers working at highly dust prone and affected areas
- Imparting sufficient training to operators on safety and Environmental parameters.

Transportation

- Regular water sprinkling is being carried out by engaging mobile water tankers on the mine benches, mine haul, loading and unloading points and transfer points for dust suppressions.
- Maintenance of haul road by regular grading is carried out through grader, dozer.
- Ensuring that all mineral trucks are covered by tarpaulin.
- Vehicular emissions controlled through regular and proper preventive maintenance schedules.
- It is ensured that there is no overloading of trucks by having Quick Dispatch system at the weigh bridge near the dispatch gate.

- Regular water sprinkling arrangements have been made on the transportation roads/public road through mobile water tankers.

Wet Drilling System in Drilling Operation



Water Tanker Arrangement For Haul Road Dust Suppression

Dry Fog System in Mineral Handling Plants

Consolidated Air Quality Monitoring Data of FY 2021-2022

GONUA MINE AAQ DATA FOR THE PERIOD APRIL 2021 TO MARCH 2022										
	PM10		**PM2.5**		**SO2**		**NO2**		**CO**	
	Maximum	**Minimum**	**Maximum**	**Minimum**	**Maximum**	**Minimum**	**Maximum**	**Minimum**	**Maximum**	**Minimum**
CORE ZONE										
Near Mines Office	80	30	31	11	11.9	7.8	13.4	9.2	0.73	0.26
Near Weigh Bridge	91	54	34	18	12.8	8.8	14.1	10.3	0.82	0.46
Near Workshop	84	54	31	18	12.9	9.5	14.1	10.8	0.75	0.41
Near Crusher Area	85	59	32	21	11.7	8.5	12.9	9.9	0.62	0.35
Entry & Exit Gate (Gate No 02)	94	34	36	12	13.3	9.2	14.7	10.5	0.88	0.42
Pillar No 22 & 23	73	36	26	12	11.5	8	13.2	9.4	0.61	0.22

BUFFER ZONE										
KHANDBANDH VILLAGE	74	38	27	13	12.5	9.3	14	10.7	0.77	0.41
PALASA VILLAGE	70	33	26	11	11.6	7.9	13.1	9.3	0.63	0.29
SARGIGHAR VILLAGE	70	34	25	11	11.6	7.3	13	8.7	0.74	0.22
MALDA VILLAGE	67	29	24	10	10.8	6.2	12.1	7.5	0.51	0.16

Water & OB Dump Management

- Garland drains maintained of suitable size around mine area and dump with proper gradients to prevent rain water descent into active mine area.
- Settling ponds maintained to prevent flow of fine particles from OB / Waste dumps, check dams, parapet / retaining walls & garland drains.
- Usage of stored water in the settling ponds for watering of haul roads, vehicle washing and green belt development etc.
- De- silting of garland drains & settling ponds are being carried out at regular intervals.
- Maintenance of all the runoff management structures.

Retaining Wall

Series of Settling Ponds

Dump Plantation

Consolidated Ground Water Quality Monitoring Data of FY 2021-2022

Gonua Village (Borewell)						
Parameter	**Units**	**Max**	**Min**	**Avg.**	**Acceptable Limits**	**Permissible Limits**
PH	-	**6.64**	**6.75**	**6.71**	**6.5-8.5**	**No Relaxation**
Total Hardness	mg/l	**66**	**81**	**71.75**	**200**	**600**
Iron	mg/l	**0.06**	**0.08**	**0.0725**	**1**	**No Relaxation**

Chlorides	mg/l	**40**	**54**	**47.25**	**250**	**1000**
Total Dissolved Solids	mg/l	**132**	**215**	**170.25**	**500**	**2000**
Sulphates	mg/l	**15**	**28**	**21.5**	**200**	**400**
Fluoride	mg/l	**0.25**	**0.38**	**0.305**	**1**	**1.5**
Canabeda Village (Borewell)						
Parameter	**Units**	**Max**	**Min**	**Avg.**	**Acceptable Limits**	**Permissible Limits**
PH	-	**6.71**	**6.85**	**6.7725**	**6.5-8.5**	**No Relaxation**
Total Hardness	mg/l	**83**	**105**	**93**	**200**	**600**
Iron	mg/l	**0.07**	**0.08**	**0.075**	**1**	**No Relaxation**
Chlorides	mg/l	**42**	**59**	**48.25**	**250**	**1000**
Total Dissolved Solids	mg/l	**172**	**235**	**196.25**	**500**	**2000**
Sulphates	mg/l	**21**	**34**	**27.25**	**200**	**400**
Fluoride	mg/l	**0.31**	**0.35**	**0.3375**	**1**	**1.5**
Munjoda Village (Dug well)						
Parameter	**Units**	**Max**	**Min**	**Avg.**	**Acceptable Limits**	**Permissible Limits**
PH	-	**6.71**	**6.82**	**6.77**	**6.5-8.5**	**No Relaxation**
Total Hardness	mg/l	**52**	**60**	**54.75**	**200**	**600**
Iron	mg/l	**0.07**	**0.1**	**0.0875**	**1**	**No Relaxation**
Chlorides	mg/l	**48**	**53**	**50.25**	**250**	**1000**
Total Dissolved Solids	mg/l	**162**	**235**	**190.25**	**500**	**2000**
Sulphates	mg/l	**30**	**40**	**33.75**	**200**	**400**
Fluoride	mg/l	**0.26**	**0.4**	**0.345**	**1**	**1.5**
Doughar Village (Bore well)						
Parameter	**Units**	**Max**	**Min**	**Avg.**	**Acceptable Limits**	**Permissible Limits**
PH	-	**6.62**	**6.75**	**6.71**	**6.5-8.5**	**No Relaxation**
Total Hardness	mg/l	**48**	**54**	**50.5**	**200**	**600**
Iron	mg/l	**0.06**	**0.08**	**0.0675**	**1**	**No Relaxation**

Chlorides	mg/l	**31**	**50**	**38.75**	**250**	**1000**
Total Dissolved Solids	mg/l	**145**	**225**	**180.5**	**500**	**2000**
Sulphates	mg/l	**19**	**30**	**24.25**	**200**	**400**
Fluoride	mg/l	**0.25**	**0.38**	**0.3275**	**1**	**1.5**

Consolidated Surface Water Quality Monitoring Data of FY 2021-2022

Gonua Nala UpStream				
Parameter	**Units**	**Max**	**Min**	**Limits for Stream Water Standards**
PH	-	**6.9**	**6.62**	**6.5-8.5**
Total Dissolved Solids	mg/l	**132**	**75**	**1500**
Chlorides	mg/l	**20**	**7.1**	**600**
Iron	mg/l	**0.22**	**0.1**	**50**
Fluorides	mg/l	**0.2**	**0.11**	**1.5**
BOD	mg/l	**8**	**2**	**3**
DO	mg/l	**5.5**	**5.1**	**4**
Gonua Nala DownStream				
Parameter	**Units**	**Max**	**Min**	**Limits for Stream Water Standards**
PH	-	**6.98**	**6.74**	**6.5-8.5**
Total Dissolved Solids	mg/l	**168**	**92**	**1500**
Chlorides	mg/l	**30**	**11**	**600**
Iron	mg/l	**0.28**	**0.16**	**50**

Fluorides	mg/l	**0.2**	**0.12**	**1.5**
BOD	mg/l	**10**	**4**	**3**
DO	mg/l	**5.5**	**4.9**	**4**
Kakarpani Nala UpStream				
Parameter	**Units**	**Max**	**Min**	**Limits for Stream Water Standards**
PH	-	**6.9**	**6.62**	**6.5-8.5**
Total Dissolved Solids	mg/l	**138**	**75**	**1500**
Chlorides	mg/l	**24**	**8.1**	**600**
Iron	mg/l	**0.34**	**0.2**	**50**
Fluorides	mg/l	**0.16**	**0.1**	**1.5**
BOD	mg/l	**5**	**2**	**3**
DO	mg/l	**5.6**	**5.1**	**4**
Kakarpani Nala DownStream				
Parameter	**Units**	**Max**	**Min**	**Limits for Stream Water Standards**
PH	-	**6.97**	**6.75**	**6.5-8.5**
Total Dissolved Solids	mg/l	**172**	**104**	**1500**
Chlorides	mg/l	**39**	**12**	**600**
Iron	mg/l	**0.52**	**0.32**	**50**
Fluorides	mg/l	**0.2**	**0.12**	**1.5**
BOD	mg/l	**9**	**2**	**3**
DO	mg/l	**5.6**	**4.9**	**4**

Noise Management

- Providing sound proof operator's cabin for equipment like dumpers, shovel, tippers, etc.
- Planting trees at various places within the lease area to act as acoustic barriers.
- Proper and regular maintenance of vehicles, machinery and other equipment. All HEMMs are monitored for any abnormal sound and rectified with due precaution by maintenance personnel.
- Providing workers with ear muffs & earplugs against high noise levels.
- Conducting regular health check-ups of workers including Audiometry test
- Controlling the time of exposure of workers towards high noise areas.

Consolidated Noise Quality Monitoring Data of FY 2021-2022

Gonua Iron Ore Mine			
	max	**min**	**Standards**
Near Ore Crushing Plant	**78.9**	**75.7**	**85 dB(A)**
Near Weigh Bridge	**81.2**	**73.9**	
Near Workshop	**78.2**	**68.8**	
Near Mines Office	**59.8**	**49.8**	

BUFFER ZONE					**STANDARDS**	
	Leq Day		Leq Night		**Day Equivalent**	**Night Equivalent**
	MAX	**MIN**	**MAX**	**MIN**		
MALDA VILLAGE	50.2	47.9	40.3	34.5	55 dB(A)	45 dB(A)
SARGIGHAR VILLAGE	52.4	50	42.5	37.3		
PALASA VILLAGE	52.1	49.8	42.2	37.7		
KHANDABANDH VILLAGE	52.9	50.5	42.9	38.7		
EAST BOUNDARY	63.7	59.4	54.6	49.7		
WEST BOUNDARY	66.9	59.6	55.9	52.1		

NORTH BOUNDARY	64.4	61.8	54.4	53.8		
SOUTH BOUNDARY	69.1	65.7	56.2	53.3		

Electronic Digital Display Board at Gonua Mine Gate

<u>Gonua Environmental Protection Measures Expenditure (head wise breakup) incurred from in FY July 2020-YTD</u>

Particulars	**Approximately Cost incurred (in Crores)**

Dust Suppression (Wet Drilling, Dry Fog System, Mobile Haul road water sprinkling system, etc.)	0.20
Online Environmental Monitoring System & Digital Display Board	0.50
Manual Environment Monitoring	0.10
Water Sprinkling on National Highway/nearby village/transportation roads	0.10
OB Dump & Surface Run-off Management	0.05
Environment Awareness in MEMC Week 2020-21	0.05
Grand Total (Rs. in Cr.)	**1.00**

ANNEXURE XIII

Tel : 2564033/2563924
EPABX : 2561909/2562847
E-mail: hwmd@ospcboard.org / paribesh1@ospcboard.org
Website: www.ospcboard.org

STATE POLLUTION CONTROL BOARD, ODISHA

[FOREST, ENVIRONMENT AND CLIMATE CHANGE DEPARTMENT, GOVERNMENT OF ODISHA]
Paribesh Bhawan, A/118, Nilakantha Nagar, Unit – VIII
Bhubaneswar – 751012, INDIA

BY SPEED POST

FORM 2
[See rule 6(2)]

RENEWAL OF AUTHORISATION BY STATE POLLUTION CONTROL BOARD, ODISHA TO THE OCCUPIER UNDER HAZARDOUS AND OTHER WASTES (MANAGEMENT AND TRANSBOUNDARY MOVEMENT) RULES, 2016

1. Number of authorization: **IND-IV-HW-1347/** 8177 and date of issue: 29-05-2023

2. Reference of application (No. and date): **4600061, dtd. 26-12-2022 / 16-05-2023.**

3. **Gonua Iron & Manganese Mines of M/s JSW Steel Limited** is hereby granted an authorization based on the enclosed signed inspection report for generation, storage, transport, reuse, utilization, disposal or any other use of hazardous or other wastes or both in the premises situated **At - Gonua, P.O. - Malda, Dist - Sundargarh, Odisha.**

Details of Authorization

Sl. No	Category of Hazardous Waste as per the Schedules I, II and III of these Rules	Waste Description	Quantity	Authorized Mode of Disposal or Recycling or utilization or Co-processing, etc.
1.	Schedules - I Stream - 5.1	Used/ Spent Oil	100T/A	Storage in containers over impervious floor under well ventilated covered shed followed by disposal through Actual Users authorized by SPCB, Odisha
2.	Schedules - I (Stream - 3.3, 5.2& 33.2)	Wastes/ Residue Containing Oil	100 T/A	Storage in impervious pits / containers under well ventilated covered shed followed by Co-processing in Cement Kiln Authorized by SPCB, Odisha / disposal in Authorized Hazardous Waste Incinerator / Common Hazardous Waste Treatment Storage Disposal Facility (CHWTSDF)
3.	Schedules - I Stream - 33.1	Empty Barrels	100 T/A	Storage on impervious floor under well ventilated covered shed followed by captive reuse / disposal through original supplier /Actual Users authorized by SPCB, Odisha

(1) The authorization shall be valid up to **31-03-2024**.

(2) The authorization is subject to the following general and specific conditions.

A. General Conditions of authorisation:

1. The authorized person shall comply with the provisions of the Environment (Protection) Act, 1986, and the rules made there under.

2. The authorization or its renewal shall be produced for inspection at the request of an officer authorized by the State Pollution Control Board.

3. The person authorized shall not rent, lend, sell, transfer or otherwise transport the hazardous and other wastes except what is permitted through this authorization.

4. Any unauthorized change in personnel, equipment or working conditions as mentioned in the application by the person authorized shall constitute a breach of his authorization.

5. The person authorized shall implement Emergency Response Procedure (ERP) for which this authorization is being granted considering all site specific possible scenarios such as spillages, leakages, fire etc. and their possible impacts and also carry out mock drill in this regard at regular interval of time.

6. The person authorized shall comply with the provisions outlined in the Central Pollution Control Board guidelines on "Implementing Liabilities for Environmental Damages due to Handling and Disposal of Hazardous Waste and Penalty"

7. It is the duty of the authorized person to take prior permission of the State Pollution Control Board to close down the facility.

8. The imported hazardous and other wastes shall be fully insured for transit as well as for any accidental occurrence and its clean-up operation.

9. The record of consumption and fate of the imported hazardous and other wastes shall be maintained.

10. The hazardous and other waste which gets generated during recycling or reuse or recovery or pre-processing or utilization of imported hazardous or other wastes shall be treated and disposed of as per specific conditions of authorization.

11. The importer or exporter shall bear the cost of import or export and mitigation of damages if any.

12. An application for the renewal of an authorization shall be made as laid down under these Rules.

13. Any other conditions for compliance as per the Guidelines issued by the Ministry of Environment, Forest and Climate Change or Central Pollution Control Board from time to time.

14. Annual return shall be filed by June 30th for the period ensuring 31st March of the year.

B. Specific Conditions:

1. Authorization granted herewith does not relieve you in complying with other provision laid down under Water (PCP) Act, 1974, Air (PCP) Act, 1981 and Environment (Protection) Act, 1986, and the Rules made there under.

2. This authorization is subject to statutory and other clearances from Govt. of Odisha and / or Govt. of India as and when applicable.

3. In case the quantity of generation of hazardous Waste exceeds the Authorized quantity, the mine shall apply for amendment of Authorization order.

4. The mine shall strictly comply to the provisions of Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 and amendments made thereafter.

5. Annual returns in Form - 4 (See Rules- 6 (5), 13 (8), 16 (6) & 20 (2)) shall be submitted to the Board for the financial year by 30th June of every year. It shall contain the detail quantities of generation, storage and disposal of different type of hazardous wastes such as recyclable, incinerable, land disposable.

6. Steps shall be taken for reduction and prevention of the hazardous waste generated or for recycling or reuse.

7. Environmental Information with respect to Air, Water, Hazardous Waste and Hazardous Chemicals shall be displayed at the main gate for public view.

8. The transport of the hazardous and other waste shall be in accordance with the provisions of the Rule, 2016 and the rules made by the Central Government under the Motor Vehicles Act, 1988 and the guidelines issued by the Central Pollution Control Board from time to time in this regard.

9. The occupier shall provide the transporter with the relevant information in **Form 9**, regarding the hazardous nature of the wastes and measures to be taken in case of an emergency and shall label the hazardous and other wastes containers as per **Form 8**.

10. In case of transportation of hazardous waste and other wastes for recycling or utilization including co-processing to outside the state, the sender shall intimate both the State Pollution Control Boards before handing over the waste to the transporter.

11. Manifest system (Movement document) shall be strictly followed as per Rule-19 and to be submitted to this office as per the Rule. The mine shall check the authenticity of the weigh bill of the transport vehicle to ensure supply of hazardous waste to the authorized destination.

12. The hazardous waste shall be sold if required only to Actual User having valid authorization from the State Pollution Control Board, Odisha and concerned SPC Board. Details of such wastes shall be entered in the passbook issued by respective SPCB.

13. All the hazardous waste shall be stored in impervious pits / containers / floors under cover shed with adequate capacity having spill containment facility. The spilled hazardous waste shall be re-collected and stored in impervious pits / containers / floors under cover shed prior to sale / disposal.

14. The schedule of hazardous waste and the quantity as specified shall only be disposed off as per the stipulation prescribed in this authorization.

15. This authorization does not permit you to either receive and process or generate hazardous waste in case validity of Consent to Operate of your industry / mine ceases. However you can carry out handling, storage, treatment, transport and disposal of hazardous waste and other wastes generated previously during such period to avoid accumulation of hazardous waste.

16. The mine shall store the accumulated hazardous waste for a period not exceeding 90 days and shall dispose as per the stipulation prescribed in this authorisation order. In case, generation of any category of Hazardous Waste is less than 10 T/A, then such waste can be stored up to a period of 180 days before disposal. In case of any violation, authorization granted shall be suspended / cancelled.

17. The mine shall apply for renewal of authorization in Form - 1, 120 days before expiry of this authorization order enclosing Annual Return in Form - 4, Manifest copies in Form - 10 and compliance to the conditions stipulated in this order along with adequate processing fees.

18. In case of transportation of hazardous and other waste, the responsibility of safe transport shall be either of the sender or the receiver whosoever arranges the transport and has the necessary authorization for transport from the concerned State Pollution Control Board. This responsibility should be clearly indicated in the manifest.

19. Hazardous Wastes having calorific value of more than 2500 Kcal/Kg shall not be land filled. It can only be disposed through authorized actual users or incinerated in authorized Hazardous Waste incinerator or co-processing in authorized cement kiln.

20. The mine shall follow On-site and Off-site Emergency plan during all activities involving hazardous wastes to avert accidents, fire and other environmental damages.

21. The mine shall follow all safety protocols during handling, transportation and disposal of hazardous wastes.

Member Secretary

To

The Deputy Managing Director
Gonua Iron & Manganese Mines of M/s JSW Steel Limited
At - Gonua, P.O. - Malda
Dist. - Sundargarh, Odisha

Memo No. _____ Dt. _____

Copy to the :

1. Collector & District Magistrate, **Sundargarh.**
2. Director, Factories & Boilers, Odisha, **Bhubaneswar.**
3. Regional Officer, State Pollution Control Board, Odisha, **Sundargarh.**
4. Guard file.

Additional Chief Environmental Engineer

FORM - 10
[See Rule 19 (1)]

MANIFEST FOR HAZARDOUS AND OTHER WASTE

1. Sender's Name & Mailing Address (including Ph. No.& email)	Narayani Sons India Pvt Ltd. C/o JSW Steel Ltd AT-Ganua PO-Haldia Dist. Sundargarh, Odisha
2. Sender's Authorisation No.	IND IV-HW-137/7/7427 dtd 31.05.21
3. Manifest Document No. BILL-No	- IV21GON22230016
4. Transporters's Name & Address (including Ph. No.& email)	Mangalam Lubricants (P) LTD Hardag Ranchi
5. Type of Vehicle	(Truck / Tanker / Special Vehicle)
6. Transporter's registration No.	Self -
7. Vehicle registration No.	ORO9J-8783
8. Receiver's Name and Mailing Address (including Ph. No.& email)	**MANGALAM LUBRICANTS PVT. LTD.** Ranchi Khunti Road,Vill - Hardag,Ranchi-835221 Ph: 9431170310, Email : pm@mangalamlubricants.com
9. Receiver's Authorisation No.	JSPCB/RAN/Reg.No.07/2015
10. Waste Description	Used waste oil
11. Total Quantity No. of Containers	0.420 KL ..... m3 or MT (374 kgs) 2 Barrels ..... Nos. only
12. Physical Form	(Solid / Semi Solid / Sludge/ ~~Oily~~ / Tarry / Slurry / Liquid)
13. Special Handling Instructions and Additional Information	with carefully
14. Sender's Certificate :	I hereby declare that the contents of the consignment are fully and accurately described above by proper shipping name and are categorised,packed, marked, andlabeled, and are in all respects in proper condition for transport byroad according to applicable national government regulations.
Name & Stamp	Signature — Month Day Year: 02 18 2023
15. Transporter's Acknowledgment of Receipt of Wastes	
Name & Stamp: Mangalam Lubricants Ranchi (Signatory)	Signature — Month Day Year: 02 18 2023
16. Receiver's Certification for Receipt of Hazardous and other Waste	
Name & Stamp: Mangalam Lubricants Ranchi (Signatory)	Signature — Month Day Year: 02 18 2023

FORM 10

[See rules 19(1)]

MANIFEST FOR HAZARDOUS AND OTHER WASTE

1.	Sender's Name & Mailing Address (Including Phone No & email)	:	Narayani sons India pvt Ltd C/O - JSW steel Ltd At- Gantea PO- Haldia Dist - Sendergarh, odisha
2.	Senders authorization No.	:	IND-IV-HW-134.7/7427 dt.31.05.21
3.	Manifest Document No.	:	GON2222500005
4.	Transporter's Name & Address (including Phone No. and email)	:	Self
5.	Type of Vehicle	:	✓ (Truck / Tanker / Special Vehicle)
6.	Transporter's Registration No.	:	—
7.	Vehicle. Registration No.	:	OR 01 V 4646
8.	Receiver's Name & mailing Address (Including phone No and email)	:	Raj Lubricants Remuen Golei Balasore pin-756019 odisha
9.	Receiver's authorisation No.	:	IND-IV-HW-210/10244 dt-26-07-21
10.	Waste Description	:	Used oil
11.	Total Quantity No. of Containers	:	0.630KL (560kgs) m3 or MT or KL 03 Barrels only Nos
12.	Physical form	:	Solid/Semi-Solid/Sludge/Oily/Tarry/Slurry/Liquid
13.	Special handling instructions and additional information	:	✓ a) Keep the material dry ✓ b) Never transport while hot and wet ✓ c) Avoid skin and eye contact ✓ d) Store in a dry and covered area ✓ e) Use safety shoes, helmet and goggles
14.	Sender's Certificate Mines Manager Gonua Iron Ore Block M/s JSW Steel Ltd. Types Name & Stamp Signature	:	I hereby declare that the contents of the consignment are fully and accurately described above by proper shipping name and are categorized, packed, marked and labeled, and are in all respect in proper condition for transport by road according to applicable national government regulations. Month Day Year 0 6 1 5 2 0 2 2
15.	Transporter Acknowledgment of Receipt of Wastes Name & Stamp Signature		Month Day Year 0 6 1 5 2 0 2 2
16.	Receivers Certification for Receipt of Hazardous and other waste Name & Stamp Signature		Month Day Year 0 6 1 5 2 0 2 2

e-Way Bill

E-Way Bill No.	8512 8983 9928
E-Way Bill Date	18/02/2023 07:31 PM
Generated By	21AAD CM728 2N1ZA - M/S NARAYANI SONS INDIA PVT. LTD.
Valid From	18/02/2023 07:31 PM (209Kms)
Valid Until	20/02/2023
IRN	bd1fdcab9b63fc13511c635e9b14e11079ff1957d4364b0de994840f2bf8992f

Part - A

GSTIN of Supplier	21AADCM7282N1ZA,Narayani Sons India Pvt. Ltd.
Place of Dispatch	Keonjhar,ODISHA-758035
GSTIN of Recipient	20AAB CM247 6J1ZO ,MANGALAM LUBRICANTS PRIVATE LIMITED
Place of Delivery	Ranchi,JHARKHAND-835221
Document No.	IV21GON22230016
Document Date	18/02/2023
Transaction Type	Combination of 2 and 3
Value of Goods	25721.84
HSN Code	27101971 - OLD REJECTED LUBRICANT
Reason for Transportation	Outward - Supply
Transporter	

Part - B

Mode	Vehicle / Trans Doc No & Dt.	From	Entered Date	Entered By	CEWB No. (If any)	Multi Veh.Info (If any)
Road	OR09J8783	Keonjhar	18/02/2023 07:31 PM	21AADCM7282N1ZA	-	-

JSPCB

Passbook for Authorised actual users of Hazardous Wastes under rules 6(7) of the Hazardous and other wastes (Management and Transboundary Movement) Rules, 2016

Name and Address of the Industry : M/s MANGALAM LUBRICANTS PVT LTD., HARDAG, RANCHI

Telephone/Fax No. : 94311-70310,

E-Mail Address : pm@mangalamlubricants.com

Authorization No. : JSPCB/HD/RNC/HWM-103819/2019/01

Date of Issue : 16-01-2019

Validity Period : Date of issue to 31.12.2023

Type & quantity of the Hazardous Waste(s) permitted for Procurement :

S. No.	Hazardous Wastes (Used / Waste Oil Type	Quantity (Kilolitres Per Annum
01	USED OIL	16650 MTPA
02	WASTE OIL	7400 MTPA
03	ORGANIC RESIDUE	960 MTPA
04	SPENT CLAY	1600 MTPA

Rajeev Barik

Authorised Signatory & Seal

NARAYANI SONS INDIA PVT. LTD.

Station Road, Barbil, District- KeonjharKeonjhar-758035

GSTIN:21AADCM7262H

PAN No. AADCM7262H

TAX INVOICE

Original/Duplicate/Triplicate

Invoice No.	IV21GON22230016		Vehicle No.	OR09J8783	
Invoice Date	18-02-23				
State	OD	State Code 21	Date of Supply	18-02-2023	
Transport Mode		Place of Supply Ranchi			

IRN NO. 8D1FDCA89B63FC13511C635E9B14E11079FF1957D436480DE994840F28
ACK NO. 182313065729205
ACK Date 2023-02-18 19:31:0 **EWB Valid Date** 2023-02-20 23:59:00
EWB No. 851289839928
EWB Date 2023-02-18 19:31:00

Details of Receiver / Billed to

Name MANGALAM LUBRICANTS PRIVATE LIMITED
Address Plot No 121, Off Ranchi - Khunti Road,
Hardag, Ranchi,JharkhandHardag, Ranchi,Jharkhand
Ranchi, 835221 ; India
Phone : Contact Person :
GSTIN 20AABCM2476J1ZO
State JH State Code: 20

Details of Consignee / Shipped to

Name MANGALAM LUBRICANTS PRIVATE LIMITED
Address Plot No 121, Off Ranchi - Khunti Road,
Hardag, Ranchi,JharkhandHardag, Ranchi,Jharkhand
Ranchi - 835221, JHARKHAND, India
Phone No :
State

Order No.
Order Date 18-Feb-23
Payment Terms
State Code:

Sl No.	Item Code	Name of Product /Services	HSN ACS	UOM	Qty	Rate	Amount	Taxable Amount	TCS Amount	CGST		SGST / UTGST		IGST		Total Amount (incl. tax)
										Rate	Amount	Rate	Amount	Rate	Amount	
1	OL-00006	OLD REJECTED LUBRICANT -	27101971	LTR	420	51.90	21,798.00	21,798.00	257.00	0.00	0.00	0.00	0.00	18.00	3,923.64	25,978.64
2		Round Off -	NA		1	2.36	2.36	2.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.36
		Grand Total					**21,800.36**	**21,800.36**	**257.00**		**0.00**		**0.00**		**3,923.64**	**25,981.00**

Total Invoice value (in words) :

Amounts in Words : **INR *** TWENTY FIVE THOUSAND NINE HUNDRED EIGHTY ONE RUPEES AND ZERO PAISA ONLY**

420LTR (2 BARREL) @10900/-

Certified that the particulars given above are true and correct

For NARAYANI SONS INDIA PVT. LTD.

Authorised Signatory

Term And Conditions:

Unless otherwise stated, tax on this invoice is not payable under reverse charge

ANNEXURE XIV

Wheel Washing System

ANNEXURE XV

भारत सरकार ÿë
ĕि 4 मंT ाĕय
ÿë संसाधन, नदी िि कास
ठर गंगा संरĆ िि भाग
कĩ ीय भ्ûिम ÿë Û
ाि धकरĆ
Government of India
Ministry of Jal Shakti
Department of Water Resources,
River Development & Ganga Rejuvenation
Central Ground Water Authority

(भूजल निकासी हेतु अनापत्ति प्रमाण पत्र)

NO OBJECTION CERTIFICATE (NOC) FOR GROUND WATER ABSTRACTION

Project Name:	M/s Jsw Steel Limited Gonua Iron Ore Mine		
Project Address:	Village: Ganua, Post:patamunda,, Gp: Malda, Ps: Koida, Block: Koida, Tehsil-koida, District-sundargarh, Odisha , 770048		
Village:	Ganua	Block:	Koida
District:	Sundargarh	State:	Odisha
Pin Code:			
Communication Address:	Village: Ganua , Post:patamunda,, Gp: Malda, Ps: Koida, Tehsil-koida, District-sundargarh, Odisha, 770048, Koida, Sundargarh, Odisha - 770048		
Address of CGWB Regional Office :	Central Ground Water Board South Eastern Region, Bhujal Bhawan, Khandagiri Square, Nh-5, Bhubaneshwar, Khordha, Odisha - 750001		

1.	**NOC No.:**	CGWA/NOC/MIN/ORIG/2022/15411			
2.	Application No.:	21-4/3339/OR/MIN/2022	3.	Category: (GWRE 2020)	Safe
4.	Project Status:	Existing Project	5.	NOC Type:	New
6.	**Valid from:**	10/05/2022	7.	**Valid up to:**	09/05/2024

8. Ground Water Abstraction Permitted:

Fresh Water		Saline Water		Dewatering		Total	
m³/day	m³/year	m³/day	m³/year	m³/day	m³/year	m³/day	m³/year
75.00	27375.00						

9. Details of ground water abstraction /Dewatering structures

	Total Existing No.:1						Total Proposed No.:0					
	DW	DCB	BW	TW	MP	MPu	DW	DCB	BW	TW	MP	MPu
Abstraction Structure*	0	0	1	0	0	0	0	0	0	0	0	0

*DW- Dug Well; DCB-Dug-cum-Bore Well; BW-Bore Well; TW-Tube Well; MP-Mine Pit;MPu-Mine Pumps

10.	Ground Water Abstraction/Restoration Charges paid (Rs.):	48413.00			
11.	Number of Piezometers(Observation wells) to be constructed/ monitored & Monitoring mechanism.	No. of Piezometers	Monitoring Mechanism		
			Manual	DWLR**	DWLR With Telemetry
	**DWLR - Digital Water Level Recorder	1	0	1	0

(Compliance Conditions given overleaf)

This is an auto generated document & need not to be signed.

18/11, जामनगर हाउस, मानसिंह रोड, नई दिल्ली – 110011 / 18/11, Jamnagar House, Mansingh Road, New Delhi- 110011Phone: (011) 23383561 Fax: 23382051, 23386743
Website: cgwa-noc.gov.in

जल बचायें – जीवन बचायें
SAVE WATER - SAVE LIFE

Validity of this NOC shall be subject to compliance of the following conditions:

Mandatory conditions:

1) Installation of tamper proof digital water flow meter with telemetry on all the abstraction structure(s) shall be mandatory for all users seeking No Objection Certificate and intimation regarding their installation shall be communicated to the CGWA within 30 days of grant of No Objection Certificate.

2) Proponents shall mandatorily get water flow meter calibrated from an authorized agency once in a year.

3) Construction of purpose-built observation wells (piezometers) for ground water level monitoring shall be mandatory as per Section 14 of Guidelines. Water level data shall be made available to CGWA through web portal. Detailed guidelines for construction of piezometers are given in Annexure-II of the guidelines.

4) Proponents shall monitor quality of ground water from the abstraction structure(s) once in a year. Water samples from bore wells/ tube wells / dug wells shall be collected during April/May every year and analysed in NABL accredited laboratories for basic parameters (cations and anions), heavy metals, pesticides/ organic compounds etc. Water quality data shall be made available to CGWA through the web portal.

5) In case of mining projects, additional key wells shall be established in consultation with the Regional Director, CGWB for ground water level monitoring four (4) times a year (January, May, August and November) in core as well as buffer zones of the mine.

6) In case of mining project the firm shall submit water quality report of mine discharge/ seepage from Govt. approved/ NABL accredited lab.

7) The firm shall report compliance of the NOC conditions online in the website (www.cgwa-noc.gov.in) within one year from the date of issue of this NOC.

8) Industries abstracting ground water in excess of 100 m 3 /d shall undertake annual water audit through certified auditors and submit audit reports within three months of completion of the same to CGWA. All such industries shall be required to reduce their ground water use by at least 20% over the next three years through appropriate means.

9) Application for renewal can be submitted online from 90 days before the expiry of NOC. Ground water withdrawal, if any, after expiry of NOC shall be illegal & liable for legal action as per provisions of Environment (Protection) Act, 1986.

10) This NOC is subject to prevailing Central/State Government rules/laws/norms or Court orders related to construction of tube well/ground water abstraction structure / recharge or conservation structure/discharge of effluents or any such matter as applicable.

General conditions:

11) No additional ground water abstraction and/or de-watering structures shall be constructed for this purpose without prior approval of the Central Ground Water Authority (CGWA).

12) The proponent shall seek prior permission from CGWA for any increase in quantum of groundwater abstraction (more than that permitted in NOC for specific period).

13) Proponents shall install roof top rain water harvesting in the premise as per the existing building bye laws in the premise.

14) The project proponent shall take all necessary measures to prevent contamination of ground water in the premises failing which the firm shall be responsible for any consequences arising thereupon.

15) In case of industries that are likely to contaminate the ground water, no recharge measures shall be taken up by the firm inside the plant premises. The runoff generated from the rooftop shall be stored and put to beneficial use by the firm.

16) Wherever feasible, requirement of water for greenbelt (horticulture) shall be met from recycled / treated waste water.

17) Wherever the NOC is for abstraction of saline water and the existing wells (s) is /are yielding fresh water, the same shall be sealed and new tubewell(s) tapping saline water zone shall be constructed within 3 months of the issuance of NOC. The firm shall also ensure safe disposal of saline residue, if any.

18) Unexpected variations in inflow of ground water into the mine pit, if any, shall be reported to the concerned Regional Director, Central Ground Water Board.

19) In case of violation of any NOC conditions, the applicant shall be liable to pay the penalties as per Section 16 of Guidelines.

20) This NOC does not absolve the proponents of their obligation / requirement to obtain other statutory and administrative clearances from appropriate authorities.

21) The issue of this NOC does not imply that other statutory / administrative clearances shall be granted to the project by the concerned authorities. Such authorities would consider the project on merits and take decisions independently of the NOC.

22) In case of change of ownership, new owner of the industry will have to apply for incorporation of necessary changes in the No Objection Certificate with documentary proof within 60 days of taking over possession of the premises.

23) This NOC is being issued without any prejudice to the directions of the Hon'ble NGT/court orders in cases related to ground water or any other related matters.

24) Proponents, who have installed/constructed artificial recharge structures in compliance of the NOC granted to them previously and have availed rebate of upto 50% (fifty percent) in the ground water abstraction charges/ground water restoration charges, shall continue to regularly maintain artificial recharge structures.

25) Industries which are likely to cause ground water pollution e.g. Tanning, Slaughter Houses, Dye, Chemical/ Petrochemical, Coal washeries, pharmaceutical, other hazardous units etc. (as per CPCB list) need to undertake necessary well head protection measures to ensure prevention of ground water pollution as per Annexure III of the guidelines.

26) In case of new infrastructure projects having ground water abstraction of more than 20 m3/day, the firm/entity shall ensure implementation of dual water supply system in the projects.

27) In case of infrastructure projects, paved/parking area must be covered with interlocking/perforated tiles or other suitable measures to ensure groundwater infiltration/harvesting.

28) In case of coal and other base metal mining projects, the project proponent shall use the advance dewatering technology (by construction of series of dewatering abstraction structures) to avoid contamination of surface water.

29) The NOC issued is conditional subject to the conditions mentioned in the Public notice dated 27.01.2021 failing which penalty/EC/cancellation of NOC shall be imposed as the case may be.
30) This NOC is issued subject to the clearance of Expert Appraisal Committee (EAC) (if applicable).

(Non-compliance of the conditions mentioned above is likely to result in the cancellation of NOC and legal action against the proponent.)

ANNEXURE XVI


NOISE DETAILS (BUFFER ZONE)
LOCATION
NOISE LEVEL
Leq dB(A)
Standard
dB(A)
Malda village (DAY) 49.9 55
Malda village (NIGHT) 40.3 45
Sargighar village (DAY) 51.4 55
Sargighar village (NIGHT) 40.4 45
JSW
GONUA

THE NEW INDIAN EXPRESS

27.12.19

PUBLIC NOTICE

This is to inform to the public that Sri Pawan Kumar Ahluwalia is having a mining lease in Gonua Iron & Manganese Mines unde Koira Tehesil of Sundargarh District, Odisha. They have enhance Iron Ore Production from **0.36 MTPA to 1.20 MTPA** by the State Level Environment Impact Assessment Authority, Odisha, Bhubaneswar vide their letter No. **76851/SEIAA Dt 21-12-2019**. Copy is available in the State Pollution Control Board, as well as in Forest & Environment department, Odisha, Bhubaneswar in the website **www.environmentalclearance.nic.in**

MANAGER, Mines
M/s Sri Pawan Kumar Ahluwalia

ANNEXUREX VI

Annexure II

STATE LEVEL ENVIRONMENT IMPACT ASSESSMENT AUTHORITY, ODISHA, BHUBANESWAR

Ref. No. 7685/SEIAA

Dt. 21.12.19

SEIAA File No: 38069/03-MIN-V/09-2019

To

Shri Pawan Kumar Ahluwalia,
Gonua Iron & Manganese Mines,
PB No. 3, Infront of MMTC, Weigh Bridge,
At/Po-Barbil, Dist-Keonjhar-758035

Sub: Proposal for expansion of Gonua Iron & Manganese Mines for enhancement of production of iron ore from 0.36 MTPA to 1.2 MTPA with crushing and screening plant extent over an area of 86.886 ha. located at village-Gonua & Patabeda, Dist-Sundargarh of Sri Pawan Kumar Ahluwalia - environmental clearance regarding.

Ref: Your online application dated 27.06.2019 for issue of EC vide File No: SIA/OR/MIN/38069/2019.

Sir,

This has reference to your online application seeking environmental clearance of the project proposal for expansion of Gonua Iron & Manganese Mines for Enhancement of Production of Iron Ore from 0.36 MTPA to 1.2 MTPA with Crushing and Screening Plant extent over an area of 86.886 ha. located at village-Gonua & Patabeda, Dist-Sundargarh. The proposal falls in the category 1(a) of the schedule of EIA Notification, 2006 as amended from time to time. The proposal has been appraised on the basis of the documents enclosed with the application, such as form-1, form-2, prefeasibility report, approved mining plan, final EIA /EMP, public hearing proceedings, certified compliance report and clarifications furnished to SEIAA/SEAC in response to their observations.

Background:

1. This is an expansion proposal of Gonua Iron & Manganese Mine of M/s Pawan Kumar Ahluwalia. The said Gonua Iron & Manganese Mine extent over an area of 86.886 Ha located at Village Gonua & Patabeda, District Sundargarh, Odisha and the proponent has applied for expansion of Iron ore production from 0.36 MTPA to 1.2 MTPA with crushing & screening plant.

[Constituted under the Environment Protection Act, 1986 and Environment Impact Assessment Notification, 2006 vide Notification No. S.O. 1217(E) dated the 8th March, 2019 of Ministry of Environment, Forests & Climate Change, Govt. of India]
Address: 5RF-2/1, Unit – IX, Bhubaneswar – 751022,
Tel: 0674-2540669, E-Mail-seiaaorissa@gmail.com

2. The said mining lease is situated on the Southern and South-western flank of Satkutania Pahar in village Gonua and Patabeda, Tehsil- Koira in Sundargarh District of Odisha State. The area can be located in New Toposheet No. F45N5. It is bounded by the Latitude: 21° 55' 0.52356" to 21° 55' 46.03440" N and Longitude: 85° 22' 04.13616" to 85° 22' 36.35616" E.
3. As per Section 8A (6) of the MMDRA Act 2015, the lease is valid up to 31st March 2020. In this regard supplementary lease deed was executed on dated 21st March 2018.
4. EIA/EMP report was prepared on the basis of the TOR issued by MoEF&CC, Govt. of India vide letter No. J- 11015/211/2010-IA.II (M), dated 19th August 2010. Public hearing for this project was held on 04th April 2012. Final EIA/EMP with public hearing proceeding was submitted at MoEF&CC, Govt. of India on dated 9th June 2012. The project was recommended for Environmental Clearance by the Expert Appraisal Committee in its meeting held during 21st – 23rd November 2012.
5. However, as it's a violation case mentioned in the minutes of meeting, the MoEF&CC, Govt. of India vide its letter dated 18th June 2013 and subsequent letter dated 17th October 2013, asked the project proponent to submit "(I) written commitment in the form of a formal resolution is submitted to MoEF&CC, Govt. of India to ensure that violations of the Environment (Protection) Act will not be repeated and (ii) the State Government has initiated credible action on the violation and evidence provided to MoEF&CC, Govt. of India of the action taken". The detail written commitment by the lessee and credible action by State Govt. was submitted at MoEF&CC, Govt. of India on dated 31st July 2013 and subsequent letter on dated 12th November 2013.
6. In the meantime, in pursuance of the Supreme Court order dated 02.08.2017 in CWP no. 114/2014, DDM, Koira has raised the demand notice for payment of `21,49,33,689/- and the Proponent has made the total payment as directed in two phases. Two payments one of ` 21,00,000,00/- and the other of ` 49,33,689/- made on 27.12.2017.
7. Subsequently, in view of the Gazette Notification of MoEF&CC, Govt. of India dated 14.03.2017 which requires that the proposal (which is in violation category) to be submitted before the MoEF&CC, Govt. of India within 6 months of the said notification. Further as per MoEF&CC, Govt. of India Office Memorandum dated 16th March 2018, the time for the application for such violation cases has been extended to another 30 days from the date of this notification. Accordingly on dtd.11.04.2018, the proponent submitted required documents at online portal of MoEF&CC, Govt. of India as violation case and requested for grant of environmental clearance at the earliest.
8. The project proponent submitted the Affidavit in compliance with the MoEF&CC, Govt. of India OM no. 3-50/2017-IA-III (Pt.) dated 30th May 2018.
9. The proposal has been appraised at SEIAA and Terms of Reference (ToR) for preparation of Environment Impact Assessment (EIA) Report has been issued with exemption of Public Hearing on dt. 14th December 2018.
10. As per the ToR, the Baseline data was collected for the summer season during the period March, April and May 2019.

11. The project proponent along with the consultant M/s ERS(I) Pvt. Ltd., Bhubaneswar along with the proponent has made a detailed presentation on the final EIA/EMP report before the SEAC on dated 19.10.2019.
12. The project proponent furnished additional information / documents on the project to SEAC for necessary compliance to clarification raised by SEAC on dated 10.11.2019 and the SEAC observed the following:
    a) The proposal was considered by the State Level Expert Appraisal Committee (SEAC), Odisha in its meeting held on 06th December, 2018 for appraisal of the proposal for ToR in pursuance of the MoEF&CC, Govt. of India Notification dated 14th March, 2017. The SEAC, after deliberations on the proposal in terms of the provisions of the Notification dated 14th March, 2017, confirmed the case to be of violation of the EIA Notification, 2006 and recommended for the following:
        (i) The State Government to take action against the project proponent under the provisions of section 19 of the Environment (Protection) Act, 1986, and further no Consent to Operate to be issued till the project is granted Environmental Clearance.
        (ii) The project proponent shall be required to submit a bank guarantee equivalent to the amount of remediation plan and natural and community resource augmentation plan with the SPCB prior to the grant of Environmental Clearance. The quantum shall be recommended by the SEAC and finalized by the regulatory authority i.e. SEIAA, Odisha. The bank guarantee shall be released after successful implementation of the EMP, followed by recommendations of the SEAC and approval of the regulatory authority i.e. SEIAA, Odisha.
        (iii) Public hearing has already been conducted for the proposal earlier on 04th April 2012, a copy of which is also furnished with EIA/EMP. For this reason, conducting a fresh Public Hearing has been exempted.
    b) EIA/EMP study report has been prepared by a NABET Accredited / NABL Accredited Consultant namely M/s ERS(I) Pvt. Ltd., Bhubaneswar.
    c) Detailed assessment of Ecological Damage, Remediation Plan and Natural and Community Resource Augmentation Plan has been incorporated in Chapter - 10 of the EIA report.
    d) An amount of ` 1.21 Crores has been estimated in the EIA / EMP report towards the cost of assessment of Environmental / Ecological damage due to violation as well as Natural and Community Resource Augmentation Plan.
    e) There is no specific guideline issued by the MoEF&CC, Govt. of India for assessment of Environmental and Ecological Damage as well as estimation of cost for remediation plan as well as Natural and Community Resource Augmentation Plan.
    f) In the absence of any guidelines, the cost as suggested by the proponent above to be taken into account for remediation plan as well as Natural and Community Resource Augmentation Plan. However, the proponent has to abide by the guidelines if issued by the MoEF&CC, Govt. of India in future and accordingly the proponent has to comply.
    g) No record is available in the file about initiation of legal action against the project proponent by the State Govt./SPCB under the provisions of section 19 of the Environment (Protection) Act, 1986 for violation of the EIA Notification, 2006.
13. Considering the information furnished by the proponent and presentation made by the consultant on behalf of proponent, the State Expert Appraisal Committee (SEAC) recommended for grant of Environmental Clearance for the project stipulating various conditions along with specific conditions in terms of the provisions of the MoEF & CC, Govt. of India notification dated 14th March, 2017.

(i) The SEAC recommended for an amount of Rs.1.21 Crores towards Remediation plan and Natural and Community Resource Augmentation plan as the proponent has gone for excess production of Iron Ore without prior Environmental Clearance under EIA Notification, 2006.

(ii) The project proponent shall be required to submit a bank guarantee of an amount of Rs.1.21 Crores towards Remediation plan and Natural and Community Resource Augmentation plan with the State Pollution Control Board, Odisha prior to the grant of Environmental Clearance.

(iii) The bank guarantee shall be released after successful implementation of the EMP, followed by recommendations of the SEAC, Odisha and approval of the regulatory authority (i.e. SEIAA, Odisha).

(iv) The SEIAA, Odisha may consider to request to the Govt. in F&E Deptt., Govt. of Odisha to take action against the project proponent under the provisions of section 19 of the Environment (Protection) Act, 1986 for violation of the EIA Notification, 2006. Environmental Clearance is to be issued after initiation of legal action against the project proponent.

(v) The proponent has to abide by the guidelines if issued by the MoEF & CC, Govt. of India in future for assessment of Environmental and Ecological Damage as well as estimation of cost for remediation plan as well as Natural and Community Resource Augmentation Plan.

The F & Env. Deptt. Govt. of Odisha vide letter no. ENV-I-23/2018 / 25071 / F&E dated 20.12.2019 has furnished information to SEIAA that the Collector, Sundergarh has already filed a prosecution against the project proponent for the violation committed under the provisions of section 19 of the Environment (Protection) Act, 1986 for violation of the EIA Notification, 2006 vide Criminal Case No.2(C) C.C.33/2013 before the court of SDJM, Bonai. Further, the project proponent have also submitted the bank guarantee of Rs.1.21 Crores with SPCB vide letter no. PKA/Gonua/SPCB/640 dt.07.12.2019 towards cost for remediation plan as well as Natural and Community Resource Augmentation Plan and have furnished the copy of submission of bank guarantee to SEIAA vide letter no. PKA/Gonua/SEIAA/641 on dt.07.12.2019. The proponent shall mandatorily implement the remediation plan as well as natural and community resource augmentation plan as submitted in the Final EIA/EMP Report of Chapter -10.

The State Environment Impact Assessment Authority (SEIAA) after considering the proposal and recommendations of SEAC, Odisha hereby accords Environmental Clearance in favour of the project under the provisions of EIA Notification 2006 and subsequent amendments thereto subject to strict compliance of all stipulated conditions, as follows. Detailed compliance report of these conditions is mandatorily to be submitted by the project proponent to SEIAA at half yearly intervals by 1st June and 1st December each year.

Stipulated Conditions:-

A. Specific conditions

1. This Environmental clearance is granted subject to final outcome of Hon'ble Supreme Court of India, Hon'ble High Court of Odisha, Hon'ble NGT and any other Court of Law, if any, as may be applicable to this project.
2. This Environmental Clearance will not be operational till such time the Project proponent complies with all the statutory requirements and Judgment of Hon'ble Supreme Court dated the 2nd August 2017 in Writ Petition (Civil) No. 114 of 2014 in the matter of Common Cause versus Union of India and Ors applicable to this project.

3. The Department of Mines and Geology, Government of Odisha shall ensure that mining operation shall not commence till the entire compensation levied, if any, for illegal mining paid by the Project Proponent through their respective Department of Mining & Geology in strict compliance of judgment of Hon'ble Supreme Court dated the 2nd August 2017 in writ Petition (Civil) No. 114 of 2014 in the matter of Common Cause versus Union of India and Ors.
4. The proponent shall comply all the specific conditions as recommended by CSIR-NEERI on carrying capacity study (as applicable) in time bound manner as proposed.
5. The project proponent shall mandatorily implement the remediation plan as well as Natural and Community Resource Augmentation Plan as submitted in the Final EIA/EMP Report in Chapter -10. The status of implementation shall be submitted to the Regional Office, MoEF & CC,SPCB and SEIAA, Odisha along with six monthly compliance reports.
6. The Project Proponent shall obtain Consent to Operate from the State Pollution Control Board, Odisha and effectively implement all the conditions stipulated therein.
7. The Project Proponent shall carryout sustainable and scientific mining in conformity with the approved mining plan and accordingly, strict monitoring shall be carried out by the Regional Office, MoEF & CC, Govt. of India, Bhubaneswar, Odisha State Pollution Control Board and Department of Mines and Steel, Government of Odisha.
8. The Project Proponent shall carryout monitoring of air quality parameters covered under NAAQS notification, 2009 and Fugitive dust emission monitoring as per the action plan submitted to the Ministry. The frequency of monitoring shall be governed by MoEF & CC, Govt. of India circular dated 27.05.2009 and Consent to Operate issued by Odisha State Pollution Control Board for ambient air and fugitive dust emission respectively.
9. No mining activities will be allowed in forest area for which the Forest Clearance is not available.
10. The Environmental Clearance is subject to obtaining requisite NBWL Clearance, if any, from the Standing Committee of National Board for Wildlife for Mining project.
11. Project Proponent should plant only native species for green belt development. Plantation of local species should be carried out during the Monsoon Season.
12. The Proponent shall install online Ambient Air Quality Monitoring System and there should be system for display of digital AAQ data within 03 months at least at three locations as per wind direction. Online provisions of pH and turbidity meters at discharge points of STP and ETP and also at water storage ponds in the mining area may be made. Project Proponent should display the result digitally in front of the main Gate of the mine site.
13. Project Proponent shall obtain the necessary prior permission from the Central Ground Water Authority (CGWA) in case of intersecting the Ground water table. The intersecting ground water table can only be commence after conducting detailed hydrogeological study and necessary permission from the CGWA/MoEF&CC. The Report on six monthly basis on changes in Ground water level and quality shall be submitted to the Regional Office of the Ministry, CGWA and State Pollution Control Board.
14. The project should also implement community Development and Welfare programme in the area of Health, Education and Environmental Protection.
15. Proponent shall appoint an Occupational Health Specialist for Regular and Periodical medical examination of the workers engaged in the Project and maintain records accordingly; also, Occupational health check-ups for workers having some ailments like BP, diabetes, habitual smoking, etc. shall be

undertaken once in six months and necessary remedial/preventive measures taken accordingly. The Recommendations of National Institute for ensuring good occupational environment for mine workers shall be implemented; The prevention measure for burns, malaria and provision of anti-snake venom including all other paramedical safeguards may be ensured before initiating the mining activities.

16. Project Proponent shall run an awareness campaign on sanitation for women and utilization of Sanitary Napkin and also to distribute the Sanitary Napkin/pads to the women and provide the training for proper disposal.
17. The Regular monitoring of ground water table to be carried out by establishing a network of existing wells and constructing new piezometers. The reports shall be submitted at interval of six months to the Regional Office of the MoEF & CC, Govt. of India, Bhubaneswar and Odisha State Pollution Control Board.
18. The water balance/ water auditing shall be carried out and measures for reducing the consumption of water shall be taken up and reported to the Regional Office of the MoEF & CC, Govt. of India, Bhubaneswar and Odisha State Pollution Control Board.
19. The Regular monitoring of water quality upstream and downstream of water bodies shall be carried out and record of monitoring data should be maintained and submitted to the at interval of six months to the Regional Office of the MoEF & CC, Govt. of India, Bhubaneswar and Odisha State Pollution Control Board.
20. The Plantation/Green belt at the periphery of the water body, particularly on eastern and western boundaries, shall be maintained in the mined out area in order to reduce the loss of surface water.

B. General conditions:

1. A Final Mine Closure Plan along with details of Corpus Fund shall be submitted to the Ministry of Environment, Forest and Climate Change (MoEF & CC), Govt. of India as well as SEIAA, Odisha 3 years in advance of final mine closure for approval.
2. No change in mining technology and scope of working should be made without prior approval of the SEIAA, Odisha.
3. No change in the calendar plan including excavation, quantum of mineral and waste should be made.
4. The project proponent shall obtain necessary prior permission of the competent authority for drawl of requisite quantity of water (surface water and ground water) for the project.
5. Mining shall be carried out as per the provisions outlined in mining plan approved by Indian Bureau of Mines (IBM) as well as by abiding to the guidelines of Directorate General Mines Safety (DGMS).
6. The project proponent shall carry out scientific investigation in respect of Blast induced ground vibration, fly rock & air blast. Based on this study, Project Proponent should design an effective blast design to curb blast induced menace and public annoyance. The Report shall be submitted to the SEIAA, Odisha as well as the Regional Office of the Ministry.
7. The lands which are not owned by Proponent, mining will be carried out only after obtaining the consents from all the concerned (and owners as per the provisions of the Mineral Concession Rules, 1960 and MMDR Act, 1957.
8. Digital processing of the entire lease area using remote sensing technique shall be carried out regularly once in three years for monitoring land use pattern and report submitted to the SEIAA, Odisha as well as to the Ministry of Environment, Forest and Climate Change and its Regional Office.
9. The critical parameters of ambient air quality as per the Notification 2009 such as PM_{10}, $PM_{2.5}$, NO_2 and SO_2 etc. 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 [(TDS, 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, Forest and Climate Change shall also be referred in this regard for its compliance.

10. Effective safeguard measures such as regular water sprinkling shall be carried out in critical areas prone to air pollution and having high levels of PM_{10} and $PM_{2.5}$ such as haul road, loading and unloading point and transfer points. Fugitive dust emissions from all the sources shall be controlled regularly. It shall be ensured that the Ambient Air Quality parameters conform to the norms prescribed by the Central Pollution Control Board in this regard. Monitoring of Ambient Air Quality to be carried out based on the Notification 2009, as amended from time to time by the Central Pollution Control Board.
11. Regular monitoring of ground water level and quality shall be carried out in and around the mine lease by establishing a network of existing wells and constructing new piezometers during the mining operation. The project proponent shall ensure that no natural water course and/or water resources shall be obstructed due to any mining operations. The monitoring shall be carried out four times in a year pre- monsoon (April-May), monsoon (August), post-monsoon (November) and winter (January) and the data thus collected may be sent regularly to the SEIAA, Odisha as well as Ministry of Environment, Forest and Climate Change and its Regional Office, Central Ground Water Authority and Regional Director, Central Ground Water Board.
12. Regular monitoring of the flow rate of the springs and perennial nallahs flowing in and around the mine lease shall be carried out and records maintain. The natural water bodies and or streams which are flowing in an around the village, should not be disturbed. The Water Table should be nurtured so as not to go down below the pre-mining period. In case of any water scarcity in the area, the Project Proponent has to provide water to the villagers for their use. A provision for regular monitoring of water table in open dug wall located in village should be incorporated to ascertain the impact of mining over ground water table.
13. Regular monitoring of water quality upstream and downstream of water bodies shall be carried out and record of monitoring data should be maintained and submitted to the SEIAA, Odisha as well as Ministry of Environment, Forest and Climate Change and its Regional Office, Central Ground Water Authority, Regional Director, Central Ground Water Board, State Pollution Control Board and Central Pollution Control Board.
14. Transportation of the minerals by road passing through the village shall not be allowed. A 'bypass' road should be constructed (say, leaving a gap of at least 200 meters) for the purpose of transportation of the minerals so that the impact of sound, dust and accidents could be mitigated. The project proponent shall bear the cost towards the widening and strengthening of existing public road network in case the same is proposed to be used for the Project. No road movement should be allowed on existing village road network without appropriately increasing the carrying capacity of such roads.
15. The illumination and sound at night at project sites disturb the villages in respect of both human and animal population. Consequent sleeping disorders and stress may affect the health in the villages located close to mining operations. Habitations have a right for darkness and minimal noise levels at night. PPs must ensure that the biological clock of the villages is not disturbed; by orienting the

floodlights/ masks away from the villagers and keeping the noise levels well within the prescribed limits for day light/night hours.

16. Main haulage road in the mine should be provided with permanent water sprinklers and other roads should be regularly wetted with water tankers fitted with sprinklers. The material transfer points should invariably be provided with Bag filters and or dry fogging system. In case of Belt-conveyors facilities the system should be fully covered to avoid air borne dust; Use of effective sprinkler system to suppress fugitive dust on haul roads and other transport roads shall be ensured.
17. Sufficient number of Gullies to be provided for better management of water. Regular Monitoring of pH shall be included in the monitoring plan and report shall be submitted to the Ministry of Environment, Forest and Climate Change and its Regional Office on six monthly basis.
18. There shall be planning, developing and implementing facility of rainwater harvesting measures on long term basis and implementation of conservation measures to augment ground water resources in the area in consultation with Central Ground Water Board.
19. The Project Proponent has to take care of gullies formed on slopes. Dump mass should be consolidated with proper filling/leveling with the help of dozer/compactors.
20. The reclamation at waste dump sites shall be ecologically sustainable. Scientific reclamation shall be followed. The local species may be encouraged and species are so chosen that the slope, bottom of the dumps and top of the dumps are able to sustain these species. The aspect of the dump is also a factor which regulates some climatic parameters and allows only species adopted to that micro climate.
21. The top soil, if any, shall temporarily be stored at earmarked site(s) only andit should not be kept unutilized for long. The topsoil shall be used for land reclamation and plantation. The over burden (OB) generated during the mining operations shall be stacked at earmarked dump site(s) only and it should not be kept active for a long period of time. The maximum height of the dumps shall not exceed 8m and width 20 m and overall slope of the dumps shall be maintained to 45°. The OB dumps should be scientifically vegetated with suitable native species to prevent erosion and surface run off. In critical areas, use of geo textiles shall be undertaken for stabilization of the dump. The entire excavated area shall be backfilled and afforested. Monitoring and management of rehabilitated areas should continue until the vegetation becomes self-sustaining. Compliance status shall be submitted to the Ministry of Environment, Forest and Climate Change and its Regional Office on six monthly basis.
22. Catch drains and siltation ponds of appropriate size shall be constructed around the mine working, mineral and OB dumps to prevent run off of water and flow of sediments directly into the 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 monsoon and maintained properly. The drains, settling tanks and check dams of appropriate size, gradient and length shall be constructed both around the mine pit and over burden dumps to prevent run off of water and flow of sediments directly into the river and other water bodies and sump capacity should be designed keeping 50% safety margin over and above peak sudden rainfall (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.

23. Plantation shall be raised in a 7.5m wide green belt in the safety zone around the mining lease, backfilled and reclaimed area, around water body, along the roads etc. by planting the native species in consultation with the local DFO/Agriculture Department and as per CPCB Guidelines. The density of the trees should be around 2500 plants per ha. Greenbelt shall be developed all along the mine lease area in a phased manner and shall be completed within first five years.
24. Project Proponent shall follow the mitigation measures provided in Office Memorandum No. Z-11013/57/2014-IA.II (M), dated 29th October, 2014, titled "Impact of mining activities on Habitations-Issues related to the mining Projects wherein Habitations and villages are the part of mine lease areas or Habitations and villages are surrounded by the mine lease area", if any, applicable to the project.
25. The Project Proponent shall make necessary alternative arrangements, where required, in consultation with the State Government to provide alternate areas for livestock grazing, if any. In this context, Project Proponent should implement the directions of the Hon'ble Supreme Court with regard to acquiring grazing land. The sparse trees on such grazing ground, which provide mid-day shelter from the scorching sun, should be scrupulously guarded against felling and plantation of such trees should be promoted.
26. The project propcnent shall take all precautionary measures during mining operation for conservation and protection of endangered fauna, if any, spotted in the study area. Action plan for conservation of flora and fauna shall be prepared and implemented in consultation with the State Forest and Wildlife Department. A copy of action plan shall be submitted to the Ministry of Environment, Forest and Climate Change and its Regional Office.
27. Project proponent has to complied the Corporate environment Responsibility (CER) as per the provisions mentioned in the OM of Ministry no 22-65/2017.IA-III dated 1st May, 2018 based on local needs and action plan with financial and physical breakup/details shall be prepared and submitted to the Ministry's Regional Office located at Bhubaneswar. Implementation of such program shall be ensured accordingly in a time bound manner.
28. 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, creche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.
29. Measures should be taken for control of noise levels below 85 dBA in the work environment. Workers engaged in operations of HEMM, etc. should be provided with ear plugs / muffs.
30. 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 of workshop effluents.
31. Personnel working in dusty areas should wear protective respiratory device sand they should also be provided with adequate training and information on safety and health aspects.
32. 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.
33. 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 and its Regional Office.

34. The project authorities should inform to the Regional Office regarding date of financial closures and final approval of the project by the concerned authorities and the date of start of land development work.
35. The project proponent shall submit six monthly reports on the status of the implementation of the stipulated environmental safeguards to the Ministry of Environment, Forest and Climate Change, its Regional Office, Central Pollution Control Board and State Pollution Control Board.
36. The Regional Office of this Ministry 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.
37. A copy of clearance letter will be marked to concerned Panchayat / local NGO, if any, from whom suggestion / representation has been received while processing the proposal.
38. State Pollution Control Board should display a copy of the clearance letter at the Regional office, District Industry Centre and Collector's office/ Tehsildar's Office for 30 days.
39. The project authorities should advertise at least in two local newspapers 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, Forest and Climate Change at www.environmentclearanee.nic.in and a copy of the same should be forwarded to the Regional Office.
40. The SEIAA, Odisha or any other competent authority may alter/modify the above conditions or stipulate any further condition in the interest of environment protection.
41. Concealing factual data or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may result in withdrawal of this clearance and attract action under the provisions of Environment (Protection) Act, 1986.
42. The above conditions will be enforced inter-alia, under the provisions of the Water (Prevention & Control of Pollution) Act, 1974, the Air (Prevention & Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986 and the Public Liability Insurance Act, 1991 along with their amendments and rules made there under and also any other orders passed by the Hon'ble Supreme Court of India/ High Court of Odisha and any other Court of Law relating to the subject matter.
43. Any appeal against this environmental clearance shall lie with the National Green Tribunal, if preferred, within a period of 30 days as prescribed under Section 16 of the National Green Tribunal Act, 2010.

Yours faithfully,

Member Secretary

Memo No 7686/SEIAA /Dt. 21.12.19.

Copy to

1. Joint Secretary (Environment), Ministry of Environment, Forests and Climate Change Govt. of India, Indira Paryavaran Bhavan, Jor Bagh Road, Aliganj, New Delhi-110003 for information.

2. Additional Chief Secretary, Forests & Environment Dept., Government of Odisha for information.
3. Member Secretary, State Pollution Control Board, Odisha, Paribesh Bhawan, A/118, Nilakantha Nagar, Unit-8, Bhubaneswar for information.
4. Additional Principal Conservator of Forests, Regional Office (EZ), Ministry of Environment & Forests, A-31, Chandrasekharpur, Bhubaneswar for information.
5. Chairman, Central Pollution Control Board, CBD-cum-office Complex, East Arjun Nagar, New Delhi-110032 for information.
6. Member Secretary, CGWA, 18/11, Jamnagar House, Man Singh Road, New Delhi-110011for information.
7. Copy to the Collector, Sundargarh for information.
8. Chairman/Member / Member Secretary, SEIAA for information.
9. Chairman, SEAC/Member Secretary, SEAC, Paribesh Bhawan, A/118, Nilakantha Nagar, Unit-VIII, Bhubaneswar for information.
10. Guard file for record.

Member Secretary

OIC.