Bhushan Power & Steel Limited
(A JSW Group Company)
Village : Theikoloi, Post : Lapanga, Teh. : Rengali
Dist. : Sambalpur - 768 212, Odisha, INDIA
T +91(0)663 6636000
Website : www.jsw.in, CIN : U27100DL1999PLC100350

To **Date:-24.07.2025**
The Divisional Forest Officer,
Bonai Forest Division.

Sub: - Proposal for seeking prior approval of the Central Government under Section 2 (ii) of the Forest (Conservation) Act,1980 in favour of M/s Bhusan Power & Steel Limited for non-forestry use of 112.621 ha. forest land (including 1.808 ha. earmarked for Safety Zone) in village Baldihi under KoiraTahasil and Koira Range of Bonai Forest Division of Sundargarh District within the Block area of 139.223 ha. in respect of NetrabandhaPahar Iron Ore Block in Odisha State (Online Proposal No.FP/OR/MIN/26965/2017).

X-Sub:- Submission of Stage-I compliance

Ref:- 1. Letter No.8-31/2022-FC dt.21.12.2023 of the MoEF& CC, GoI**.**
2. Memo No.26685/FE&CC dt.28.12.2023 of the FE&CC Deptt. Govt. of Odisha.
3. Memo No.25274 dt.27.12.2023 of the Conservator of Forests (Nodal), Bhubaneswar.
4. Your Letter No.7622 dt.22.7.2025.

Sir,

With reference to the above-mentioned subject matter, I would like to inform you that we have submittedthe point-wise compliance of the observation raised vide your Letter under reference (4) of the Stage-I condition imposed vide No.8-31/2022-FC dt.21.12.2023 of the MoEF& CC, GoI is furnished below**.**

1. **The detailed Point-wise compliance of the Stage-I conditions has been furnished vide Annexure-A**
2. **All approved Scheme with Map are enclosed with the Stage-I compliance.**
3. **All payment details has been enclosed in the Stage-I compliance in CAMPA format.**
4. **The Site Specific WL Conservation Plan is enclosed with the Stage-I compliance.**
5. **All KML files are enclosed with the compliance in Pen Drive form**
6. **All enclosures are enclosed in 5 copies.**

I, therefore, request your good-self to kindly take necessary action for further processing of the compliance of Stage-I approval conditions to the higher authority for grant of final approval.

Thanking you,

Yours faithfully

For Bhushan Power & Steel Ltd.

Encl :**Annexure-A alongwith all enclosures**

Bhushan Power & Steel Limited
(A JSW Group Company)
Village : Theikola, Post : Lapanga, Teh. : Rengali
Dist. : Sambalpur - 768 212, Odisha, INDIA
T +91(0)663 6636000
Website : www.jsw.in, CIN : U27100DL1999PLC100350

Annexure-A.

Compliance to the Conditions stipulated in Stage-I approval letter of Ministry of Environment, Forest & Climate Change, (Forest Conservation Division), Government of India, New Delhi vide F. Letter No.8-31/2022-FC dt.21.12.2023 for diversion of 112.621Ha Forestland forNetrabandha Iron Ore Block under BonaiSub-Division of Sundargarh District, Odisha.

Sl. No.	Condition	Compliance
1	Legal status of the diverted forest land shall remain unchanged;	Legal status of the diverted forest land shall remain unchanged. An undertaking to this effect is enclosed as **Annexure-1.**
2	**Compensatory Afforestation:**	
a.	The User Agency shall transfer the cost of raising and maintaining the compensatory afforestation as per the approved CA Scheme at the current wage rate in consultation with State Forest Department in the account of CAMPA of the concerned State through online portal;	An area of 110.813 ha. of non-forest land has been identified in village Jhurmur over 51.744 ha. and Jaidega over 59.069 ha. under Biramitrapur Tehsil of Rourkela Forest Division for Compensatory Afforestation. M/s. Bhusan Power & Steel Limited has deposited an amount of **Rs. 11,04,85,101.02/-** (out of which **Rs. 8,83,88,080.82** towards CA &**Rs. 2,20,97,020.20** towards SMC)Cost as per demand raised vide Letter No.4801 dt.26.4.2024 of DFO, Rourkela Division (**Annexure-1A**) in ORISSA CAMPA Account No. **150825826965501** of Union Bank Lodi Road New Delhi vide RTGS UTRNo.**SBINR52024043019258308**dtd. 30.04.2024 **(Annexure-2)**. Further, an area of 2.731 ha. of Dharopani Protected Forest land under Rengali Range of Sambalpur Forest Division has been identified for Compensatory Afforestation scheme. An amount of **Rs.44,00,500/-** towards CA cost in ORISSA CAMPA Account No- 150825826965492 of Union Bank Of India ,JetikaTowes, Mission Road, Bengaluru, Vide UTR No- **SBINR52025071592136009** dated: 15.07.2025 has been deposited enclosed as **(Annexure-3)**

b.	The land identified for raising Compensatory Afforestation shall be notified by the State Government as RF under Section-4 or PF under Section-29 of the Indian Forest Act. 1927 or under the relevant Section(s) of the local Forest Act, as the case may be, before the Stage-II approval;	The Govt. non-forest land over 110.813 ha. identified in village Jhurmur over 51.744 ha. and Jaidega over 59.069 ha.under Biramitrapur Tehsil of Rourkela Forest Division under Sundargarh District has already been mutated and transferred in favour of the Forest Dept. Copy of RoR is enclosed as **Annexure-4 & 5.** Further, the said non-forest Govt. lands has been notified as Protected Forest vide Order No.**12237/FE&CC**, on dated 29.05.25 in Mouza- **Jaidega** (**Area-59.068Ha.)** and vide Order no- **12223/FE&CC** on dated : 29.05.25 Mouza- **Jhurmur (Area - 50.830 Ha.). (Annexure-6 & 7)** Further, an area of 2.7316 ha. identified inDharopani Protected Forest land under Rengali Range of Sambalpur Forest Division under Sambalpur District has already been mutated and transferred in favour of Forest Deptt. Copy of RoR is attached vide **Annexure-8.** Further, the said land has been notified as Protected Forest vide Notification No. **12230/FE& C**C on dated;29.05.25 (copy enclosed as **Annexure-9).**
c.	The cost of survey, demarcation and erection of permanent pillars, if required on the identified CA land, shall be deposited in advance with the Forest Department by the user agency. The CA will be maintained for 10 years. The scheme may include afforestation of indigenous species with appropriate provision for anticipated cost increase for works scheduled for subsequent years;	An area of 110.813 ha. of non-forest land has been identified in villageJhurmur over51.744 ha. and Jaidega over 59.069 ha.under Biramitrapur Tehsil of Rourkela Forest Division for Compensatory Afforestation. M/s. Bhusan Power & Steel Limited has deposited an amount of **Rs. 11,04,85,101.02/-** (out of which **Rs. 8,83,88,080.82** towards CA &**Rs. 2,20,97,020.20** towards SMC) Cost in ORISSA CAMPA Account No. **150825826965501** of Union Bank Lodi Road New Delhi vide RTGS UTRNo.**SBINR52024043019258308**dtd. 30.04.2024 Further, an area of 2.731 ha. of Dharopani Protected Forest land under Rengali Range of Sambalpur Forest

		Division has been identified for Compensatory Afforestation scheme. An amount of **Rs.44,00,500/-** towards CA cost in ORISSA CAMPA Account No-150825826965492 of Union Bank Of India ,JetikaTowes, Mission Road, Bengaluru, Vide UTR No- **SBINR52025071592136009** dated: 15.07.2025 has been deposited. The CA scheme has been approved for 10 years and includes afforestation of indigenous species.
d.	The compensatory afforestation over non-forest land, equal in extent to the forest land being diverted i.e. 112.621 ha, shall be raised by the State Forest Department at the project cost within three years from the date of grant of Stage-II approval. Further the details of CA on NFL along with KML will be submitted at the time of submission of compliance of Stage-I.	An area of 110.813 ha. of non-forest land has been identified in village Jhurmurover 51.744 ha. and Jaidega over 59.069 ha.under Biramitrapur Tehsil of Rourkela Forest Division for Compensatory Afforestation. M/s. Bhusan Power & Steel Limited has deposited an amount of **Rs. 11,04,85,101.02/-** (out of which **Rs. 8,83,88,080.82** towards CA &**Rs. 2,20,97,020.20** towards SMC) Cost in ORISSA CAMPA Account No. **150825826965501** of Union Bank Lodi Road New Delhi vide RTGS UTRNo.**SBINR52024043019258308**dtd. 30.04.2024 Further, an area of 2.731 ha. of Dharopani Protected Forest land under Rengali Range of Sambalpur Forest Division has been identified for Compensatory Afforestation scheme. An amount of **Rs.44,00,500/-** towards CA cost in ORISSA CAMPA Account No-150825826965492 of Union Bank Of India ,JetikaTowes, Mission Road, Bengaluru, Vide UTR No- **SBINR52025071592136009** dated: 15.07.2025 has been deposited. The CA Schemes are attached herewith along with KML file **(Annexure-10 & Pen Drive)**
e.	Afforestation on degraded forest land to be selected elsewhere, measuring one and a half times the area under safety zone, shall also be done at the	An area of 3.00 ha. of degraded forest land has been identified in Kunjar RF of Sole Range of Bonai Forest Division for scheme of 1.5 times Safety Zone Afforestation. The

	project cost under the supervisions of the State Forest Department and afforestation will be done within three years from the date of Stage-II clearance and maintained thereafter in accordance with the approved Plan in consultation with the State Forest Department;	Scheme has been approved by the RCCF, Rourkela vide his Memo No.5414 dt.28.10.2024 for Rs.49,27,900/- Further, M/s. Bhushan Power & Steel Limited has deposited an amount of **Rs. 49,27,900.00/-** in ORISSA CAMPA Account No. **150825826965233** of Union Bank Lodi Road New Delhi vide RTGS UTR No. **SBINR52024111261850413**dtd. 12.11.2024(**Annexure-11**).The 1.5 time Saftey Zone Scheme is enclosed as **Annexure -12.**
f.	User agency either himself or through the State Forest Department shall undertake gap planting and soil & moisture conservation activities to restock and rejuvenate the degraded open forests (having crown density less than 0.40), if any, located in the area within 100 meter from outer perimeter of the mining lease. The plan for plantation and SMC activities will be prepared and submitted to MoEF& CC before Stage-II Clearance;	A scheme for gap planting and soil & moisture conservation activities to restock and rejuvenate the degraded open forests (having crown density less than 0.4), located in the area within 100 metres from outer perimeter of the mining lease has been technically approved by the RCCF, Rourkela with financial outlay of Rs.66,20,100/-. The scheme will be implemented by the User Agency at the project cost in a phased manner. An undertaking to this effect is enclosed as **Annexure-1.** Copy of the approved scheme is enclosed as **Annexure-13.**
g.	25% of the CA cost additionally will be spent towards soil and moisture conservation activities in the proposed CA area as per site requirement and deposited in CAF;	In compliance to this condition, M/s. Bhusan Power & Steel Limited has deposited an amount of **Rs. 11,04,85,101.02/-** (out of which **Rs. 8,83,88,080.82** towards CA &**Rs. 2,20,97,020.20** towards SMC) Cost in ORISSA CAMPA Account No. **150825826965501** of Union Bank Lodi Road New Delhi vide RTGS UTR No. **SBINR52024043019258308**dtd. 30.04.2024 (copy already enclosed as **Annexure-2**.
3.	**NPV:**	
a.	The User Agency shall transfer the funds towards the cost of Net Present Value (NPV) of the forest land being	In compliance to this condition, M/s. Bhusan Power & Steel Limited has deposited an amount of Rs.16,17,99,212/-

	diverted under this proposal from the User Agency as per the orders of the Hon'ble Supreme Court of India dated 28.03.2008, 24.04.2008 and 09.05.2008 in Writ Petition (Civil) No. 202/1995 and the guidelines issued by this Ministry vide its letter No. 5-3/2007-FC dated 06.01.2022 read with 22.03.2022 through online portal of CAMPA account of the State Concerned;	towards NPV over 112.621 ha. of entire forest land @ Rs.14,36,670/- per ha**.** in ORISSA CAMPA Account No. **15082581146896156** of Union Bank Lodi Road New Delhi vide RTGS UTR No. **SBIN123122038775**dtd. 03.05.2023 enclosed as **Annexure -14.**
b.	At the time of payment of the Net Present Value (NPV) at the present rate, the user agency shall furnish an undertaking to pay the additional amount of NPV, if so determined, as per the final decision of the Hon'ble Supreme Court of India;	The user agency will abide by the condition. An undertaking to this effect is enclosed as **Annexure-1.**
4.	The CA area has been provided over 110.813 ha NFL; therefore, the State Govt. shall ensure that the equivalent non-forest land to the extent of the forest land being diverted will be provided;	In compliance to this condition, M/s. Bhushan Power & Steel Limited provided CA land in BiramitapurTahasil of Sundargarh District at Village - Jhurmur&Jaidega area 50.830Ha. and 59.068 ha respectively. The additional CA land of 2.731 Ha. has been provided, out of some private land owned by M/s. Bhusan Power & Steel Limited at Village-Dharopani under RengaliTahasil , Dist-Sambalpur.
5.	Transportation of ore shall be as per the recommendation in the report submitted by CSIR-NEERI;	The user agency will abide by the condition. An undertaking to this effect is enclosed as **Annexure-1.**
6.	A holistic transportation plan shall be prepared by the State Govt. aiming to have minimum impact in the landscape. The same shall be implemented. Transportation of ore should be as far as possible through common conveyor belt, slurry pipeline, railways, etc. Transportation of ore through road should be minimized in a time bound manner;	The user agency will abide by the condition. An undertaking to this effect is enclosed as **Annexure-1.**
7.	An Oversight Committee shall be constituted under the Chairmanship of the DDGF (Central) RO Bhubaneswar for 10	The user agency will abide by the condition. An undertaking to this effect is enclosed as

	years who will monitor and review the compliance of the conditions stipulated in the approval for these five **mines [namely-1. NetrabandhaPahar Iron Ore Block (area 112.621 ha, 2. NetrabandhaPahar (West) area 66.242 ha), 3. LaserdaPacheri Manganese & Iron Ore Block (area 94.351 ha), 4. Kalmang West (Northern Part) Block for Iron Ore Mines Iron Ore Block (Area 42.608 ha) and 5. Guali Opencast Iron Ore Mines (area 194.683 ha)]** twice a year and submit their yearly report to this Ministry in the month of December. This Oversight Committee shall consist following members and logistics of this Committee shall be borne by State Government at the cost of UAs: a. DDGF (Central) - Regional Office Bhubaneswar-Chairman. b. One Representative from IIFM Bhopal. c. One Representative from WII Dehradun. d. One Representative from ICFRE. e. One Representative from NEERI. f. One expert in Geology to be nominated by DDGF (Central) g. Two other experts as nominated by MoEF& CC. h. Two recommendation made by the said committee shall be considered by the Ministry and if agreed the same shall be binding on the UAs;	**Annexure-1.**
8.	Integrated Regional Wildlife Conservation Plan shall be prepared for 10 years covering the forest Division of Sundargarh, Jharsuguda and Keonjhar Districts at the cost of UA. The works shall be executed as per APO and the regional plan shall have site/species specific wildlife sub plans/prescriptions;	The user agency will abide by the condition. An undertaking to this effect is enclosed as **Annexure-1.**
9.	A Bio-diversity Conservation Plan for this entire landscape shall also be prepared by the State Govt at the cost of UA;	In compliance to this condition, M/s. Bhusan Power & Steel Limited has deposited an amount of **Rs.6,30,847.00/-** in favour of IIFM, BHOPAL, vide. Account

		NO. **30662291254** of State Bank of India IIFM Campus, Bhopal vide **RTGS UTR No. SBIN402058484**dtd. 01.06.2024 **(Annexure-15)**. The Bio-diversity Conservation plan Scheme is enclosed as **Annexure -16.**
10.	Soil and moisture conservation measures shall be undertaken in and around 10KM radius of the mining lease areas at project cost;	A Scheme for Soil and Moisture Conservation within 10 km radius of mining lease areas has been approved by the RCCF, Rourkela vide his Memo no:-5414/3F-871/2024 dt.28.10.2024 for □1,96,30,800/-. The approved Scheme is attached as **Annexure-17**. The scheme will be implemented by the User Agency at the project cost in a phased manner. An undertaking to this effect is enclosed as **Annexure-1.**
11.	The conditions stipulated in EC should be strictly implemented and monitored;	In compliance to this condition, Environment Clearance has been granted vide EC Identification No.EC23B001OR185677 dt.26.05.2023 of the MoEF& CC(**Annexure-18).** An undertaking to this effect is enclosed as **Annexure-1.**
12.	Compensatory levies to be realized from the User Agency under the project shall be transferred/ deposited, through e-challan, in to the account of CAMPA pertaining to the State concerned through e-portal (https://parivesh.nic.in/);	In compliance to this condition, M/s. Bhushan Power & Steel Limited declare that all the Compensatory levies has already been deposited through e-challan, in to the account of CAMPA pertaining to the State concerned through e-portal (https://parivesh.nic.in/). Undertaking to this effect is attached as **Annexure-1.**
13.	The KML files of diverted area, the CA areas, the proposed SMC treatment area and the WLMP area shall be uploaded on the e-Green watch portal with all requisite details prior to Stage-II approval;	The KML files of the area to be diverted, the CA areas, the proposed SMC treatment area and the WLMP area is attached herewith for uploading on the e-Green watch portal **(Enclosed with Pen Drive).**

14.	Following activities, as per approved plan/ schemes, shall be undertaken in the lease area by the User Agency under the supervision of the State Forest Department. approved scheme/plan shall be submitted to the Ministry along with compliance of Stage-I approval;	
(a)	Mitigative measures to minimize soil erosion and chocking of stream shall be implemented within a period of three years with effect from the issue of Stage-II clearance in accordance with the approved Plan in consultation with the State Forest Department;	A scheme containing appropriate mitigative measures to minimize soil erosion and choking of streams has been technically approved by the RCCF, Rourkela with financial outlay of Rs.1,03,56,000/-. The scheme will be implemented by the User Agency at the project cost within a period of 03 years. An undertaking to this effect is enclosed as **Annexure-1.** Copy of the approved scheme is enclosed as **Annexure-19.**
(b)	Planting of adequate drought hardy plant species and sowing of seeds, in the appropriate area within the mining lease to arrest soil erosion in accordance with the approved scheme;	A scheme, regarding planting drought hardy plant species and sowing of seeds in the appropriate area within the mining lease has been technically approved by the RCCF, Rourkela with financial outlay of Rs.33,06,500/-. The scheme will be implemented by the User Agency at the project cost in phased manner. An undertaking to this effect is enclosed as **Annexure-1.** Copy of the approved scheme is enclosed as **Annexure-20.**

(c)	Construction of check dams, retention / toe walls to arrest sliding down of the excavated material along the contour in accordance with the approved scheme;	A scheme for Construction of check dams, retention/toe walls to arrest sliding down of the excavated material along the contour has been technically approved by the RCCF, Rourkela with financial outlay of Rs.66,70,300/-. The scheme will be implemented by the User Agency at the project cost in phased manner. An undertaking to this effect is enclosed as **Annexure-1.** Copy of the approved scheme is enclosed as **Annexure-21.**
(d)	Stabilize the overburden dumps by appropriate grading/ benching, in accordance with the approved scheme, so as to ensure that angles of repose at any given place is less than 28^0; and	A scheme to Stabilize the overburden dumps by appropriate grading/benching so as to ensure that the angles of repose at any given place is less than 28^0 has been technically approved by the RCCF, Rourkela with financial outlay of Rs.2,21,48,600/-. The scheme will be implemented by the User Agency at the project cost in phased manner. An undertaking to this effect is enclosed as **Annexure-1.** Copy of the approved scheme is enclosed as **Annexure-22.**
15.	**Safety Zone Management:** Following activities, at project cost, shall be undertaken by the user agency for the management of safety zone as per relevant guidelines issued by the Ministry's guidelines:	
(a)	User agency shall ensure demarcation of safety zone (7.5-meter strip all along the inner boundary of the mining lease area), and its fencing, protection and regeneration by erecting adequate number of 6 feet high RCC boundary pillars inscribed with DGPS coordinates with barbed wire fencing and deploying adequate number of watchers under the supervision of the State Forest Department;	We have demarcated the safety zone (7.5-meter strip all along the inner boundary of the mining lease area), and its fencing, protection and regeneration by erecting adequate number of 6 feet high RCC boundary pillars inscribed with DGPS coordinates with barbed wire fencing and deploying adequate number of watchers has been included in the Safety Zone Scheme. The said scheme will be implement by the User Agency.

		An undertaking to this effect is enclosed as **Annexure-1.**
(b)	Boundary of the safety zone of the mining lease, adjacent to habitation/roads, should be properly fenced by the user agency;	The user agency will abide by the condition. An undertaking to this effect is enclosed as **Annexure-1.**
(c)	Safety zone shall be maintained as green belt around mining lease and to ensure dense canopy in the area, regeneration shall be taken up in this area by the user agency at project cost under the supervision of the State Forest Department;	A scheme for fencing, protection and regeneration of safety zone over 3.442 ha. has been technically approved by RCCF, Rourkela with financial outlay of Rs.2,11,98,400/-. The scheme will be implemented by the user Agency at the project cost in a phased manner. An undertaking to this effect is enclosed as **Annexure-1** Copy of the approved scheme is enclosed as **Annexure-23.**
(d)	The State Government and the user agency shall ensure that safety zone is maintained as per the prescribed norms;	The user agency will abide by the condition. An undertaking to this effect is enclosed as **Annexure-1.**
16.	No damage shall be caused to the top-soil and the user agency will follow the top soil management plan;	A scheme for top soil management has been technically approved by the RCCF, Rourkela with financial outlay of Rs.65,39,200/-. The scheme will be implemented by the User Agency at the project cost in a phased manner. An undertaking to this effect is enclosed as **Annexure-1.** Copy of the approved scheme is enclosed as **Annexure-24.**
17.	The User Agency shall prepare a list of existing village tanks and other water bodies with GPS co-ordinates located within five km from the mine lease boundary. This list is to be duly verified by the concerned Divisional Forest Officer. The User agency shall regularly undertake desilting of these village tanks and other water bodies so as to mitigate the impact of siltation of such tanks/water bodies. A detailed	A scheme for de-silting of village tanks & other water bodies located within 5km from the mine lease boundary so as to mitigate the impact of siltation of such tanks/water bodies, whenever required has been technically approved by the RCCF, Rourkela with financial outlay of Rs.1,63,18,000/-. The scheme will be implemented by the

	approved plan for desilting of identified ponds and water bodies to be prepared in consultation with forest department and shall be submitted to MoEF& CC before Stage-II approval;	User Agency at the project cost in a phased manner. An undertaking to this effect is enclosed as **Annexure-1.** Copy of the approved scheme is enclosed as **Annexure-25.**
18.	The cost of felling of trees shall be deposited by the User Agency with the State Forest Department;	The user agency will abide by the condition. An undertaking to this effect is enclosed as **Annexure-1.**
19.	Trees should be felled in phased manner as per the requirement in the approved Mining Plan with prior permission of concerned DFO;	The user agency will abide by the condition. An undertaking to this effect is enclosed as **Annexure-1.**
20.	The User Agency shall undertake that afforestation of the non-mineralized virgin forest land within the mining area shall be taken up at project cost;	The user agency will abide by the condition. An undertaking to this effect is enclosed as **Annexure-1.**
21.	The user agency shall explore the possibility of translocation of maximum number of trees identified to be felled and shall ensure that any tree felling shall be done only when it is unavoidable and that too under strict supervision of the State Forest Department.	The user agency will abide by the condition. An undertaking to this effect is enclosed as **Annexure-1.**
22.	A site-specific Wildlife Management Plan shall be prepared by the State Government in consultation with the PCCF (Willdlife) for the protection and conservation of wildlife of the area. A copy of approved Plan shall be submitted to the Ministry along with the compliance of Stage-I approval. Entire cost of implementation of the provisions of the Wildlife Management Plan shall be deposited into the account of CAMPA of the State;	The Site-Specific Wildlife Conservation Plan for NetrabandhaPahar Iron Ore Block of M/s Bhushan Power & Steel Ltd. has been approved by the P.C.C.F (Wildlife) and Chief Wildlife Warden, Odisha vide letter No: 757 dated 19.1.2023 with financial outlay of Rs. 549.33 lakhs (Rs.378.68 Lakh for Bonai Division &Rs. 170.65 Lakh for Keonjhar Division) for implementation of activities in the ZOI (Buffer zone). Further, we have deposited □**5,49,33,000/-** towards cost of Site Specific Wildlife Conservation Plan through e-portal of MoEF& CC (http://parivesh.nic.in) in ORISSA CAMPA account No. **150825826965491** of Union Bank Lodi

		Road New Delhi dtd. 04.03.2024 **(Annexure-26)** Further, regarding implementation of activities in the core zone, the User agency will implement the same in a phase wise manner under the guidance of the DFO Bonai division. An undertaking to this effect is enclosed as **Annexure-1.** Copy of the approved plan is enclosed as **Annexure-27.**
23.	State Government shall complete settlement of rights, in term of the Scheduled Tribes and Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, if any, on the forest land to be diverted and submit the documentary evidence, along with compliance of Stage-I approval, as prescribed by this Ministry's letter No. 11-9/1998-FC (Pt.) dated 03.08.2009 read with 05.07.2013, in support thereof;	The Collector, Sundargarh has issued certificate under Forest Right Act,2006 in the entire forest land over 112.621 ha. of forest land vide his Letter 1326/ITDA (FRA) dtd. 04.05.2023 **(Annexure-28).**
24.	The User Agency shall undertake that user agency and the State Forest Department shall create and maintain from funds to be provided by the user agency alternate habitat/home for the avifauna, whose nesting trees are to be cleared in this project as per the plan duly approved by the Principal Chief Conservator of Forests (Wildlife) and the Chief Wildlife Warden Odisha. Bird nests artificially made out of eco-friendly materials shall be used in the area, including forest area and human settlements, adjoining the forest area being diverted for the project;	In compliance to this condition, M/s. Bhushan Power & Steel Limited already prepared the scheme for alternate habitat/home for the avifauna, whose nesting trees are to be cleared in this project as per the plan duly approved by the Principal Scheme for Creation and maintenance of alternative habitat / home for avifauna has been approved by the Principal Chief Conservator of Forests (Wildlife) and the Chief Wildlife Warden Odisha has been approved vide Memo No.7404 dt.3.7.2024 for Rs.14,52,000/-. Further, we have deposited Rs.14,52,000/- through e-portal of MoEF& CC (http://parivesh.nic.in) in ORISSA CAMPA account No. 150825826965402 of Union Bank Lodi Road New Delhi dtd. 18.07.2024 **(Annexure-29).**

		The Scheme for Avi-Fauna is enclosed as **Annexure -30.**
25.	The User Agency shall undertake that the project authority needs to take up works for construction and cleaning of garland drains, stabilizing retaining walls, proper terracing of OB dumps and checking gully formation resulting in soil erosion;	The user agency will abide by the condition. An undertaking to this effect is enclosed as **Annexure-1.**
26.	The User Agency shall undertake that plants which are having lowest translocation factor can be preferred under afforestation on the OB dumps and fruit trees to be avoided in planting during biological stabilization of OB dumps;	The user agency will abide by the condition. An undertaking to this effect is enclosed as **Annexure-1.**
27.	The User Agency shall undertake that prevention of fall of wild animals into mining pit by fencing the open pit area;	The user agency will abide by the condition. An undertaking to this effect is enclosed as **Annexure-1.**
28.	The User Agency shall undertake that the angle of repose in OB dumps to be maintained to ensure stability and safety;	The user agency will abide by the condition. An undertaking to this effect is enclosed as **Annexure-1.**
29.	The User Agency shall undertake that vetiver grass can be planted at the lower reaches of the dump to bind the soil and prevent soil erosion giving better stability to the dump;	The user agency will abide by the condition. An undertaking to this effect is enclosed as **Annexure-1.**
30.	The User Agency shall undertake mining in a phased manner after taking due care for reclamation of the mined over area. The concurrent reclamation plan as per the approved mining plan shall be executed by the User Agency from the very first year, and an annual report on implementation thereof shall be submitted to the Nodal Officer, Forest (Conservation) Act, 1980, in the concerned State Government and the concerned Regional Office of the Ministry. If it is found from the annual report that the activities indicated in	The user agency will abide by the condition and take due care for reclamation of the mined out area in a phased manner as per the approved mining plan. Further, the User Agency will submit an annual report on status of reclamation to the concerned Dept. An undertaking to this effect is enclosed as **Annexure-1.**

	the concurrent reclamation plan are not being executed by the User Agency, the Nodal Officer or the concern Addl. Principle Chief Conservator of Forests (Central) may direct that the mining activities shall remain suspended till such time, such reclamation activities area satisfactorily executed;	
31.	The User Agency shall comply with the Hon'ble Supreme Court order on re-grassing, and re-grass the mining area and any other areas which may have been disturbed due to mining to restore them to a condition which is fit for growth of fodder, flora, fauna, etc. in a timely manner;	The user agency will abide by the condition. An undertaking to this effect is enclosed as **Annexure-1.**
32.	Period of diversion of the said forest land under this approval shall be for a period co-terminus with the period of the mining lease proposed to be granted under the Mines and Minerals (Development and Regulation) Act, 1957, as amended and the Rules framed there-under;	The period of diversion of forest land under this proposal will be co- terminus with the period of the mining lease as amended vide the Mines & Minerals (Development & Regulation) Amendment Act, 2015 and the Rules framed thereunder i.e 50 years from the date of execution of mining lease.
33.	The User Agency shall obtain the Environmental Clearance as per the provisions of the Environmental (Protection) act, 1986, if required;	The Environment Clearance has been granted vide EC Identification No.EC23B001OR185677 dt.26.05.2023 of the MoEF& CC(**Already enclosed as Annexure-18).**
34.	No labour camp shall be established on the forest land and the User Agency shall provide fuels preferably alternate fuels to the labourers and the staff working at the site so as to avoid any damage and pressure on the nearby forest areas;	The user agency will abide by the condition. An undertaking to this effect is enclosed as **Annexure-1.**
35.	The boundary of the diverted forest land, mining lease and safety zone, as applicable, shall be demarcated on ground at the project cost, by erecting four feet high reinforced cement concrete pillars, each inscribed with its serial number, distance from pillar	The boundary of the diverted forest land, mining lease and safety zone has already been demarcated on the ground at the project cost by erecting 4 feet high RCC pillars. Each pillar is inscribed with serial number, DGPS co-ordinates, and distance from pillar to pillar **(Annexure-31)**

	to pillar and GPS coordinates;	
36.	The layout plan of the mining plan/proposal shall not be changed without the prior approval of the Central Government and the forest land shall not be used for any purpose other than that specified in the proposal;	The user agency will abide by the condition. An undertaking to this effect is enclosed as **Annexure-1.**
37.	The forest land proposed to be diverted shall under no circumstances be transferred to any other agency, department or person without prior approval of the Central Government;	The user agency will abide by the condition. An undertaking to this effect is enclosed as **Annexure-1.**
38.	No damage to the flora and fauna of the adjoining area shall be caused;	The user agency will abide by the condition. An undertaking to this effect is enclosed as **Annexure-1.**
39.	Any other condition that the concerned Regional Office of this Ministry may stipulate with the approval of competent authority in the interest of conservation, protection and development of forests & wildlife; and	The user agency will abide by the condition that the Regional office of the Ministry may stipulate in the interest of conservation, protection and development of forest & wild life. An undertaking to this effect is enclosed as **Annexure-1.**
40.	The user agency shall comply with all the provisions of the all Acts, Rules, Regulations, Guidelines, Hon'ble Court Order (s) and NGT Order (s) pertaining to this project, if any, for the time being in force, as applicable to the project.	The user agency will abide by the condition. An undertaking to this effect is enclosed as **Annexure-1.**
41.	Violation of any of these conditions will amount to violation of Forest (Conservation) Act, 1980 and action would be taken as prescribed in para 1.21 of Chapter 1 of the Handbook of comprehensive guidelines of Forest (Conservation) act, 1980 as issued by this Ministry's letter No. 5-2/2017-FC dated 28.03.2019.	Agreed. An undertaking to this effect is enclosed as **Annexure-1.**
42.	The User Agency shall submit the annual self-compliance report in respect of the above stated conditions to the State Government, concerned Regional Office and to this Ministry	The user agency will abide by the condition. An undertaking to this effect is enclosed as **Annexure-1.**

Bhushan Power & Steel Limited
(A JSW Group Company)
Village : Theikola, Post : Lapanga, Teh. : Rengali
Dist. : Sambalpur - 768 212, Odisha, INDIA
T +91(0)663 6636000
Website : www.jsw.in, CIN : U27109OL1999PLC106350

	by the end of March every year regularly;	
43.	The compliance report shall be uploaded on **e-portal** (https://parivesh.nic.in/).	The user agency will abide by the condition. An undertaking to this effect is enclosed as **Annexure-1.**

The statement of funds deposited by the User Agency in CAMPA Account pertaining to the above proposal is **enclosed as** (**Annexure-31).**

For Bhushan Power & Steel Ltd.

Authorized Signatory

Bhushan Power & Steel Limited
(A JSW Group Company)
Village : Theikola, Post : Lapanga, Teh. : Rengali
Dist. : Sambalpur - 768 212, Odisha, INDIA
T +91(0)663 6636000
Website : www.jsw.in, CIN : U27109DL1999PLC100350

ANNEXURE-1

UNDERTAKING

Condition No.1
We do hereby undertake that the legal status of the diverted forest land shall remain unchanged.

Condition No.2.(f):
We do hereby undertake to take up gap planting and soil & moisture conservation activities to restock and rejuvenate the degraded open forests (having crown density less than 0.40), if any, located in the area within 100 meter from outer perimeter of the mining lease, as per the approved scheme, in a phased manner at the project cost.

Condition No. 3.(b):
We do hereby undertake to pay the additional amount of the NPV, if so determined, as per the final decision of the Hon'ble Supreme Court of India.

Condition No.5
We do hereby undertake toimplement thetransporation of ore as per the recommendation in the report submitted by CSIR-NEERI.

Condition No.6

We do hereby undertake that a holistic transportation plan will be implemented. Transportation of ore should be as far as possible through common conveyor belt, slurry pipeline, railways, etc. Transportation of ore through road should be minimized in a time bound manner.

Condition No.7
We do hereby undertake to adhere with the said condition as per direction.

For M/s Bhushan Power & Steel Limited
(Netrabandha Pahar Iron Ore Block)

Bhushan Power & Steel Limited
(A JSW Group Company)
Village : Thelikola, Post : Lapanga, Teh. : Rengali
Dist. : Sambalpur - 768 212, Odisha, INDIA
T +91(0)663 6636000
Website : www.jsw.in, CIN : U27100DL1999PLC100350

ANNEXURE-1

UNDERTAKING

Condition No.8

We do hereby undertake to pay the contribution towards the Integrated Regional Wildlife Conservation Plan as per demand received from the Forest Department.

Condition No.9

We do hereby undertake to adhere the conditions as per approved plan.

Condition No.10:

We do hereby undertake to implement Scheme for Soil & Moisture conservation measures as per the approved plan/scheme in consultation with the State Forest Department, in a phased manner, at the project cost.

Condition No.11:

We do hereby undertake to implement the conditions stipulated in Environmental Clearance.

Condition No.12:

We do hereby undertake to pay the Compensatory Levies through e-challan in to the account of CAMPA pertaining to State concerned through e-portal (https://parivesh.nic.in/);

Condition No.14(a):

We do hereby undertake to implement mitigative measures to minimize soil erosion and choking of stream within a period of three years with effect from the date of grant of Stage-II forest clearance as per the approved plan/scheme in consultation with the State Forest Department, in a phased manner, at the project cost.

Condition No.14(b):

We do hereby undertake to implement the scheme for planting of adequate drought hardy plant species and sowing of seeds in the appropriate areas within the mining lease as per the approved scheme, in a phased manner at the project cost.

For M/s Bhushan Power & Steel Limited
(Netrabandha Pahar Iron Ore Block)

Bhushan
POWER & STEEL

Bhushan Power & Steel Limited
(A JSW Group Company)
Village : Thelikola, Post : Lapanga, Teh. : Rengali
Dist. : Sambalpur - 768 212, Odisha, INDIA
T +91(0)663 6636000
Website : www.jsw.in, CIN : U27100DL1999PLC100350

ANNEXURE-1

UNDERTAKING

Condition No.14(c):

We do hereby undertake to construct check dams, retention/toe walls to arrest sliding down of the excavated materials along the contour as per the approved scheme, in a phased manner at the project cost.

Condition No.14(d):

We do hereby undertake to stabilize the overburden dumps in a phased manner at the project cost by appropriate grading/benching to ensure that the angles of repose at any given place is less than 28 degree and will be as per the approved scheme.

Condition No.15(a):

We do hereby undertake to demarcate boundary of safety zone (7.5 meter strip all along inner boundary of the mining lease) and its fencing, protection and regeneration by erecting adequate number of 6 feet high RCC boundary pillars inscribed with DGPS coordinates with barbed fencing and deploying adequate number of watchers under the supervision of State Forest Department as per approved scheme.

Condition No.15(b):

We do hereby undertake that the boundary of the safety zone of the lease adjacent to the habitation/road will be properly fenced at the project cost to protect the vegetation/regeneration activities in the safety zone.

Condition No.15(c):

We do hereby undertake that safety zone shall be maintained as green belt to ensure dense canopy cover in the area and regeneration shall be taken in this area as per the approved scheme, in a phased manner at the project cost.

Condition No.15(d):

We do hereby undertake to maintain the safety zone as per the prescribed Norm, under the supervision of State Forest Department.

For M/s Bhushan Power & Steel Limited
(Netrabandha Pahar Iron Ore Block)

Bhushan Power & Steel Limited
(A JSW Group Company)
Village : Theikola, Post : Lapanga, Teh. : Rengali
Dist. : Sambalpur - 768 212, Odisha, INDIA
T +91(0)663 6636000
Website : www.jsw.in, CIN : U27100DL1999PLC100350

ANNEXURE-1

UNDERTAKING

Condition No.16:

We do hereby undertake to implement theScheme for Top soil management as per the approved schemein a phased manner at the project cost.

Condition No.17:

We do hereby undertake to implement the scheme for de-silting of the village tanks and other water bodies located within five km from the mining lease boundary so as to mitigate the impact of siltation of such tanks/water as per the approved scheme, in a phased manner at the project cost.

Condition No.18:

We do hereby undertake to deposit the cost of felling of trees to the forest department before felling.

Condition No. 19:

We do hereby undertake to fell minimum no. of trees in phased manner as per the requirement in the approved Mining Plan with prior permission of concerned DFO.

Condition No.20:

We do hereby undertake that afforestation of the non-mineralized virgin forest land within the mining area will be taken up at project cost.

Condition No.21:

We do hereby undertake to explore the possibility of translocation of maximum number of trees identified to be felled and shall ensure that any tree felling shall be done only when it is unavoidable and that too under strict supervision of the State Forest Department.

Condition No.22:

We do hereby undertake to implement the interventions as mentioned in the approved Site Specific wildlife Conservation plan for the core zone under the guidance of DFO,Bonai Division.

For M/s Bhushan Power & Steel Limited
(Netrabandha Pahar Iron Ore Block)

Bhushan Power & Steel Limited
(A JSW Group Company)
Village : Thelikola, Post : Lapanga, Teh. : Rengali
Dist. : Sambalpur - 768 212, Odisha, INDIA
T +91(0)663 6636000
Website : www.jsw.in, CIN : U27100DL1999PLC100350

ANNEXURE-1

UNDERTAKING

Condition No.25:

We do hereby undertake to take up works for construction and cleaning of garland drains, stabilizing retaining walls, proper terracing of OB dumps and checking gully formation resulting in soil erosion as and when required.

Condition No.26:

We do hereby undertake that plants which are having lowest translocation factor can be preferred under afforestation on the OB dumps and fruit trees to be avoided in planting during biological stabilization of OB dumps.

Condition No.27:

We do hereby undertake that prevention of fall of wild animals into mining pit by fencing the open pit area will be done.

Condition No.28:

We do hereby undertake that the angle of repose in OB dumps will be maintained to ensure stability and safety.

Condition No.29:

We do hereby undertake that vetiver grass will be planted at the lower reaches of the dump to bind the soil and prevent soil erosion giving better stability to the dump.

Condition No. 30:

We do hereby undertake to carry out mining in a phased manner, and will take due care for reclamation of the mined out area as per the approved Mining Plan.

We also undertake to submit an annual report on reclamation status of the mine to the concerned Govt. Departments/Authorities.

Condition No. 31:

We do hereby undertake to comply with the Hon'ble Supreme Court order on re-grassing, and re-grass the mining area and any other area which may have been disturbed due to mining to restore them to a condition which is fit for growth of fodder, flora, fauna, etc. in a timely manner.

For M/s Bhushan Power & Steel Limited
(Netrabandha Pahar Iron Ore Block)

Regd. Office: 4th Floor, A-2, NTH Complex, Shaheed Jeet Singh Marg, USO Road, Qutab Institutional Area, New Delhi - 110067, T +91(0)11 26438000, 46074400, INDIA
Kolkata: (C) J K Millennium Centre, 6th Floor, 4A-D, Jawahar Lal Nehru Road, Kolkata - 71, T +91(033) 40512299, INDIA
(W) NH-2, Delhi Road, Vill. Benghoti, Post: Mallickpara, Dist: Hooghly - 712223, T +91(033) 39513000, INDIA
Chandigarh: 3, Industrial Area, Phase-I, Chandigarh - 160002, T +91(0172) 2910000, INDIA

Bhushan Power & Steel Limited
(A JSW Group Company)
Village : Thelikola, Post : Lapanga, Teh. : Rengali
Dist. : Sambalpur - 768 212, Odisha, INDIA
T +91(0)663 6636000
Website : www.jsw.in, CIN : U27100DL1999PLC100350

ANNEXURE-1

UNDERTAKING

Condition No. 34:

We do hereby undertake that, no labour camp will be established in the forest areaand we will provide alternate fuels to the labourers and the staff working at the site to avoid any damage and pressure on the nearby forest areas.

Condition No. 36:

We do hereby undertake that, the layout plan of the mining plan/proposal shall not be changed without the prior approval of the Central Government and the forest land shall not be used for any purpose other than that specified in the proposal.

Condition No. 37:

We do hereby undertake that, the forest land will not be transferred to any other agency, department or person without prior approval of the Central Government.

Condition No. 38:

We do hereby undertake that, no damage to the flora and fauna of the adjoining area shall be caused by us and that we will take all protective measures as would be required in consultation with the concerned Divisional Forest office.

Condition No. 39:

We do hereby undertake that any other conditions that the concerned Regional Office of this Ministry may stipulate with the approval of competent authority in the interest of conservation, protection and development of forests & wildlife; shall be complied by the User Agency.

Condition No. 40:

We do hereby undertake to comply all the provisions of all the Acts, Rules, Regulations, Guidelines, Hon'ble Court Order (s) and NGT order (s) pertaining to this Project, if any, for the time being in force, as would be applicable to the project.

For M/s Bhushan Power & Steel Limited
(Netrabandha Pahar Iron Ore Block)

Bhushan Power & Steel Limited
(A JSW Group Company)
Village : Theikola, Post : Lapanga, Teh. : Rengali
Dist. : Sambalpur - 768 212, Odisha, INDIA
T +91(0)663 6636000
Website : www.jsw.in, CIN : U27100DL1999PLC100350

ANNEXURE-1

UNDERTAKING

Condition No. 41:

We do hereby undertake that, we shall ensure compliance to provisions of all Acts, Rules and Regulations as prescribed in Para 1.21 of Chapter-1 of the Handbook of comprehensive guidelines of Forest (Conservation) Act, 1980 as issued by the Ministry's letter No. 5-2/2017-FC dated 28.03.2019.

Condition No. 42:

We do hereby undertake to submit annual self-monitoring report on compliance of stipulated conditions to the State Government ,concerned Regional Office and to the Ministry by the end of March every year.

Condition No.43:

We do hereby undertake that the stage-I compliance report will be uploaded on e-portal (https://parivesh.nic.in) of MoEF& CC, Govt. of India.

For M/s Bhushan Power & Steel Limited
(Netrabandha Pahar Iron Ore Block)

ବରଗଡ ପରିକ୍ଷେତ୍ର ତଥା ବରପଲ୍ଲୀ ବନ୍ୟପ୍ରାଣୀ ରକ୍ଷଣାବେକ୍ଷଣକାରୀଙ୍କ କାର୍ଯ୍ୟାଳୟ, ରାଉରକେଲା

OFFICE OF THE DIVISIONAL FOREST OFFICER CUM WILDLIFE WARDEN ROURKELA FOREST DIVISION, ROURKELA, SUNDARGARH, ODISHA

Phone No. 0661-2664637, Fax No. 0661-2664638, e mail- dfo.rourkela@odisha.gov.in

Letter No.4861.....**4F(Misc.)/dt.**26.04.2024

To

The Director,
M/s Bhusan Power & Steel Ltd.,
Vill. -Thelkoloi, PO- Lapanga, Dist-Sambalpur.

Sub: **Proposal for seeking prior approval of the Central Government under Section-2 (ii) of the Forest (Conservation) Act, 1980 in favour of M/s Bhusan Power & Steel Limited for non-forestry use of 112.621 Ha. forest land (including 1.808 Ha. earmarked for safety Zone) in village Balidihi under Koira Tahasil and Koira Range of Bonai Forest Division in Sundargarh district within the block area of 139.223 Ha. in respect of Netrabandha Pahar Iron Ore Block in Odisha State (Online Proposal No.- FP/OR/MIN/26965/2017)- Stage-I approval regarding.**

Ref: This Office Letter No.-4671, dtd.25.04.2024.

Sir,

In suppression to this office letter no under reference, the revised requirement of fund for raising of compensatory Afforestation as per **2024-25 One Time Cost Norm** is detailed below.

SL.NO.	Particulars of work	Amount in Rs.
1	Revised Compensatory Afforestation Cost as per One Time cost norm-**2024-25.**	**8,83,88,080.82**
2	25% of the additional Compensatory Afforestation cost will be spent towards Soil & Moisture conservation activities in the proposed Compensatory Afforestation	**2,20,97,020.20**
	G. Total: -	**11,04,85,101.02** **Or Say** **11,04,85,101.00**

(Rupees Eleven Crore Four Lakh Eighty Five Thousand One Hundred One only)

P.T.O.

Further, the Principal Chief Conservator of Forests, Forest Diversion and Nodal Officer FC, Act has also approved in the compensatory afforestation scheme for supply of 2 nos. vehicles in kinds by the project proponent i.e.

(1) ***Supply of Toyota Innova Crysta ZX2.4AT7STR (Pearl White) with all accessories, including RTO, insurance & other charges.***

(2) ***Supply of Mahindra Scorpio-N Z8 L Duesek NT 4WD 7 STR (pearl white) with all accessories, including RTO, insurance & other charges.***

Hence, it is requested that following **revised funds may kindly be deposited** in the **State Specific CAMPA Account maintained by Government of India through "e" payment mode by using the web portal of Ministry of Environment & Forests (CAMPA).** The evidence with **UTR no.** of deposited amount may be furnished to the undersigned for further needful action at this end. **Further, the above mentioned 2 nos. of vehicles be supplied at an early date.**

Yours faithfully,

24/4/24

Divisional Forest Officer
Rourkela Division.

Memo No. 4803 **/4F, Dated.** 26-04-2024

Copy forwarded to the Principal Chief Conservator of Forest (Forest Diversion & Nodal Officer) FC Act. O/o the PCCF & HoFF, Odisha, Bhubaneswar for favour of kind information and necessary action with reference to this office memo no.-4672, dtd.25.04.2024.

24/4/24

Divisional Forest Officer
Rourkela Division

Memo No. 4803 **/4F, Dated.** 26-04-2024

Copy forwarded to the Regional Chief Conservator of Forest Rourkela Circle, Rourkela for favour of kind information and necessary action with reference to this office memo no.-4673, dtd.25.04.2024.

24/4/24

Divisional Forest Officer
Rourkela Division

AGENCY COPY

NEFT / RTGS CHALLAN for CAMPA Funds

Date : 29-04-2024

Agency Name.	**Bhushan Power and Steel Limited**
Application No.	**5826965501**
MoEF/SG File No.	**8-31/2022-FC**
Location.	**ORRISA**
Address.	**International Trade Tower, Nehru Place, New Delhi.Sambalpur**
Amount(in Rs)	**110485101.02/-**

Amount in Words :Eleven Crore Four Lakh Eighty-Five Thousand One Hundred and One Rupees Only

NEFT/RTGS to be made as per following details;

Beneficiary Name:	**ORRISA CAMPA**
IFSC Code:	**UBIN0996335**
Pay to Account No.	**150825826965501** **Valid only for this challan amount.**
Bank Name & Address:	**Union Bank Of India FCS Centre,21/1, III Floor, Jelitta Towers, Mission Road, Bengaluru-560027**

- **This Challan is strictly to be used for making payment to CAMPA by NEFT/RTGS only**

BANK COPY

NEFT / RTGS CHALLAN for CAMPA Funds

Date : 29-04-2024

Agency Name.	**Bhushan Power and Steel Limited**
Application No.	**5826965501**
MoEF/SG File No.	**8-31/2022-FC**
Location.	**ORRISA**
Address:	**International Trade Tower, Nehru Place, New Delhi. Sambalpur**
Amount(in Rs)	**110485101.02/-**

Amount in Words :Eleven Crore Four Lakh Eighty-Five Thousand One Hundred and One Rupees Only

NEFT/RTGS to be made as per following details;

Beneficiary Name:	**ORRISA CAMPA**
IFSC Code:	**UBIN0996335**
Pay to Account No.	**150825826965501** **Valid only for this challan amount.**
Bank Name & Address:	**Union Bank Of India FCS Centre, 21/1, III Floor, Jelitta Towers, Mission Road, Bengaluru-560027**

- **This Challan is strictly to be used for making payment to CAMPA by NEFT/RTGS only**

Note:After making the required payment through challan, if the payment status has not been updated even after 7 working days, then kindly mail a copy of your challan with transaction date and reference id to Email: fcsblr@unionbankofindia.bank , epurse@unionbankofindia.bank, ubin0903710@unionbankofindia.bank

UTR- SBINR52024041301925830B

AGENCY COPY

यूनियन बैंक Union Bank of India

NEFT / RTGS CHALLAN for CAMPA Funds

Date : 29-04-2024

Agency Name.	Bhushan Power and Steel Limited
Application No.	5826965501
MoEF/SG File No.	8-31/2022-FC
Location.	ORRISA
Address.	International Trade Tower, Nehru Place, New Delhi.Sambalpur
Amount(in Rs)	110485101.02/-

Amount in Words :Eleven Crore Four Lakh Eighty-Five Thousand One Hundred and One Rupees Only

NEFT/RTGS to be made as per following details;

Beneficiary Name:	ORRISA CAMPA
IFSC Code:	UBIN0996335
Pay to Account No.	150825826965501 Valid only for this challan amount.
Bank Name & Address:	Union Bank Of India FCS Centre,21/1, III Floor, Jalitta Towers, Mission Road, Bangaluru-560027

- This Challan is strictly to be used for making payment to CAMPA by NEFT/RTGS only

BANK COPY

यूनियन बैंक Union Bank of India

NEFT / RTGS CHALLAN for CAMPA Funds

Date : 29-04-2024

Agency Name.	Bhushan Power and Steel Limited
Application No.	5826965501
MoEF/SG File No.	8-31/2022-FC
Location.	ORRISA
Address:	International Trade Tower, Nehru Place, New Delhi. Sambalpur
Amount(in Rs)	110485101.02/-

Amount in Words :Eleven Crore Four Lakh Eighty-Five Thousand One Hundred and One Rupees Only

NEFT/RTGS to be made as per following details;

Beneficiary Name:	ORRISA CAMPA
IFSC Code:	UBIN0996335
Pay to Account No.	150825826965501 Valid only for this challan amount.
Bank Name & Address:	Union Bank Of India FCS Centre, 21/1, III Floor, Jalitta Towers, Mission Road, Bengaluru-560027

- This Challan is strictly to be used for making payment to CAMPA by NEFT/RTGS only

Note :After making the required payment through challan, if the payment status has not been updated even after 7 working days, then kindly mail a copy of your challan with transaction date and reference no. to ZO.BBSR.fcsbe@unionbankofindia.bank , epurse@unionbankofindia.bank , SBIN0003710@unionbankofindia.bank

SBI THELKOLI BRANCH

SBINR52024043019258308

AGENCY COPY

Union Bank of India

NEFT / RTGS CHALLAN for CAMPA Funds

Date : 11-07-2025

Agency Name.	Bhushan Power and Steel Limited
Application No.	5826965492
MoEF/SG File No.	8-31/2022-FC
Location.	ORRISA
Address.	International Trade Tower, Nehru Place, New Delhi.Sambalpur
Amount(in Rs)	4400500/-

Amount in Words :Forty-Four Lakh Five Hundred Rupees Only

NEFT/RTGS to be made as per following details;

Beneficiary Name:	ORRISA CAMPA
IFSC Code:	UBIN0996335
Pay to Account No.	150825826965492 Valid only for this challan amount.
Bank Name & Address	Union Bank Of India FCS Centre,21/1, III Floor, Jeljita Towers, Mission Road, Bengaluru-560027

- This Challan is strictly to be used for making payment to CAMPA by NEFT/RTGS only

Note :After making the required payment through ch
even after 7 working days, then kindly mail a copy o
id to Email: fcsblr@unionbankofindia.bank , epurse
ubin0903710@unionbankofindia.bank

SUMIT KUMAR
SBI, TELKOI BRANCH
15/11/25

SBINRS 20250715921360O9

Schedule I Form No.39-A

ଖତିୟାନ

ତହସିଲ : ଭୁବନେଶ୍ୱର

ଗାଁ : ଜୟଦେବ

ଗାଁ ନମ୍ବର : 38

ପରଗଣା : ବିରାଟିପୁର

ପରଗଣା ନମ୍ବର : 38

ଜିଲ୍ଲା : ଖୋରଧା

ଜମିମାଲିକ ନାମ ଓ ପୈତୃକ ନାମ ଓ ଖତିୟାନର ଫୁଲିଓ ନମ୍ବର	ଓଡିଶା ସରକାର ରେଭେନ୍ୟୁ ନମ୍ବର 1
୧) ଖତିୟାନର ଫୁଲିଓ ନଂ	246/88
୨) ଫୁଲାର ନାମ, ପିତାର ନାମ , ଜାତି ଓ ବାସସ୍ଥାନ	ସରକାର ଓଡିଶାକୁ ଓ ସରକାରୁ ଓଡିଶାର ଅଧିକାର ବିଭାଗ ଓଡିଶା ସରକାର ମାର୍ଫତ ଜିଲ୍ଲାପାଳ ଖୋରଧା

ଜମାର	ବିବରଣୀ					
	ଜମାର	ଖଜଣା	ଜମର	ଜିଲ୍ଲା ପରିଷଦ ଓ ପ୍ରାଥମିକ ବିଦ୍ୟାଳୟ ପାଇଁ ଦେୟ ଟିକସ ହାର	ମୋଟାଦ	୩) ପୂର୍ବତନଜମିଦାରଙ୍କ ଜମିଜମାର ବିବରଣୀ
		0.00	0.00	0.00	0.00	

୩) ବିକ୍ରୟ ଅନୁଯାୟୀ ଜମି ଜମି ହାର	Alienation ଜମି ନଂ 2/2024 ଭୁକୁଣା ପୁରାତନ ପ୍ଲଟ ନଂ 1076 ଜମା ଏ 39.00, ପ୍ଲଟ ନଂ 3561 ଜମା ଏ 23.870, ପ୍ଲଟ ନଂ 3526 ଜମା ଏ 2.07, ପ୍ଲଟ ନଂ 3626 ଜମା ଏ 3.14, ପ୍ଲଟ ନଂ 3631 ଜମା ଏ 31.86, ପ୍ଲଟ ନଂ 3634 ଜମା ଏ 3.42, ପ୍ଲଟ ନଂ 3635 ଜମା ଏ 17.80, ପ୍ଲଟ ନଂ 3648 ଜମା ଏ 0.242, ପ୍ଲଟ ନଂ 1077/3626 ଜମା ଏ 4.2 ପୁରାତନ ଖତା ନଂ 259 ରୁ

BLANK SPACE FOR STAMPING

ଶେଷ ପୁରୁଣା ତାରିଖ :20/05/1977

ବର୍ତ୍ତମାନ ତାରିଖ :

RECORD ROOM TAHASIL OFFICE BHUBANESWAR

ଖତିୟାନ ନମ୍ବର ଟି : 246/89		ତହସିଲ : ବୀରମିତ୍ରପୁର				ଜିଲ୍ଲା : ସୁନ୍ଦରଗଡ଼
ପ୍ଲଟ ନମ୍ବର ଓ ଉପପ୍ଲଟ ନମ୍ବର	ଜିଲ୍ଲା ଓ ମୌଜା ନାମକ	ଜିଲ୍ଲାର ପିଲାଠିଆ ବିବରଣୀ ଓ ପରିମାଣ	ପରିମାଣ			ମନ୍ତବ୍ୟ
			ଏକର	ଡି	ଡେସିମ୍ବ	
୫	୮	୯	୧୦		୧୧	୧୨
1076/4416	ଓଡ଼ିଶା ଗଣ୍ଡି		140000		13.7828	
1561	ସୁନ୍ଦରଗଡ଼		23870		9.6598	
1562/4417	ସୁନ୍ଦରଗଡ଼		2070		0.8375	
3626/4418	ସୁନ୍ଦରଗଡ଼		3140		1.2707	
3631/4419	ସୁନ୍ଦରଗଡ଼		31860		12.8933	
3634/4420	ସୁନ୍ଦରଗଡ଼		3420		1.3840	
3635/4421	ସୁନ୍ଦରଗଡ଼		17800		7.2034	
3648/4422	ସୁନ୍ଦରଗଡ଼		8242		3.0979	
1077/3826	ଓଡ଼ିଶା ଗଣ୍ଡି		4200		1.6997	
୯ ରେକର୍ଡ			125932		50.9294	

AMIN
BIRMITRAPUR
TAHSIL OFFICE

Verified
R.K

Addl. Tahsildar
Birmitrapur

ସଫ୍ଟୱେର ଦ୍ୱାରା ସୃଜନ କରାଯାଇଛି ,ତାରିଖ 31/01/2025

Schedule I Form No.39-A

ଖତିୟାନ

ତହସିଲ	: ଜୟପୁରରା	ଜରିପ	: ବିରାଟପୁର
ଥାନା	: ଜୟପୁରରା	ଜରିପ ମଉଜା	: 46
ଥାନା ନମ୍ବର	: 44	ଜିଲ୍ଲା	: କୁନ୍ଦାରବ

ଜମିଜରତ ଥାନା ଓ ଏସ୍ତାହ ବା ଖତିୟାନର ପୁରିନ ନମ୍ବର	ଚରିଲା ଗୁରୁତାର ଏସ୍ତାହ ନମ୍ବର 1
୧ ଖତିୟାନର ପୁରିନ ନଂ	214/103
୨) ପୁରାନ ଥାନା, ଓରାନ ଥାନା , ଜାତି ଓ ନାମସ୍ତାର	ନଗଦ ପରିମାଣ ଓ ଜମାମତୁ ପରିବର୍ତ୍ତନ ବିନାର ଚରିଲା ସରକାର ମାଟିର ବିନାଟ ସାରାଂଶରେ।

୩/୩୫	ବିସୟିତ

୪/୩୫୩	ନମ୍ବର	ଜରିଲା	ଚାରି	ବିସୟ ସ୍ୱର ଓ ଚରାଜାର ସ୍ୱର ଯତି ସିଲ ନଂ	ମନୋ	୫) ପୁରାନଜିଂଜାର ଜରିଲାର ବିବରଣୀ
		0.00	0.00	0.00	0.00	

୬) ବିସୟର ଅନୁସର ଯତି ସିଲ ନଂ	Alienation ଚକ୍ର ନଂ 3/2024 ଜୁନ୍ଦା ପୁରାନ ପୁର ନଂ 2377 ରକବା ଏ 12.13, ପୁର ନଂ 2562 ରକବା ଏ 69.26, ପୁର ନଂ 2630 ରକବା ଏ 64.57 ପୁରାନ ଖତା ନଂ 219 ରୁ

BLANK SPACE FOR STAMPING

ଚରିଲା ପୁରାନ ତାରିଖ :19/03/1976

ରକବା ଯାଞ୍ଚି ତାରିଖ :

জমিয়তের তুলিৰ নং : 214/103		মৌজা : বাৰপেটা				জিলা : কামৰূপ
ভূমি পাটা বা পত্তন দাগ	ধৰণ বা তুলাৰ প্ৰকাৰ	ধাৰণৰ ধৰিয়ত বিবৰণ বা মন্তব্য	ধাৰণ			মন্তব্য
			পত্তন	বৃ	বৰ্তমান	
ৰ	ৰ	ৰ	ৰ ৰ		ৰ ৰ	ৰ ৰ
2377/3689	ৰৰৰৰ	ৰৰৰ ৰৰৰ	12130		4.9088	
2562/3690	ৰৰৰৰ	ৰৰৰ ৰৰৰ	69260		28.0286	
2630	ৰৰ্ষা		64570		26.1306	
3 ৰূপ			145960		59.0680	

Verified

AMIN
BIRMITRAPUR
TAHSIL OFFICE

Addl. Tahsildar
Birmitrapur

ৰাজহুৱা কৃষ্ণ বিষয়া দেৱ, ৰাজিৰা

31/01/2025

GOVERNMENT OF ODISHA

FOREST, ENVIRONMENT AND CLIMATE CHANGE DEPARTMENT

NOTIFICATION

Bhubaneswar, Dated the 29 MAY 2025

No.FE-DIV-FLD-0088-2022 (10F-(Cons)-47/2022)- 12237 /FE&CC. In exercise of the powers conferred under Section-33 of the Odisha Forest Act, 1972 (Odisha Act 14 of 1972), the State Government do hereby declare that the following land situated in Village-**Jaidega** under Biramitrapur Tahasil of Sundargarh District mutated and transferred in favour of Forest, Environment & Climate Change Department for raising Compensatory Afforestation thereon against the proposed diversion of 112.621 Ha of Forest land (including 1.808 ha earmarked for Safety Zone) in village Baldihi under Koira Tahasil and Koira Range of Bonai Forest Division of Sundargarh District within the block area of 139.223 ha in respect of Netrabandha Pahar Iron Ore Block by M/s Bhusan Power & Steel Limited vide 'Stage-I/in-principle' approval of Government of India, MoEF&CC, Forest Conservation Division, New Delhi communicated in letter No.8-31/2022-FC dated 21.12.2023 under Section-2 of the Forest (Conservation) Act, 1980, the limits of which are specified below and the area of which is 59.068 ha (145.960 Ac) shall be a Protected Forest with effect from the date of issue of the Notification and shall be known as "**Jaidega Protected Forest**".

Forest Block:

Name of the Protected Forest	:	**Jaidega**		
		Patch-I	Patch-II	Total
Area of Protected Forest in Ha	:	32.9374	26.1306	59.0680
Area in Acres	:	81.390	64.570	145.960
Name of the Village	:	Jaidega		
Name of the Police Station	:	Raibaga		
Name of the Tahasil	:	Birmitrapur		
Name of the Sub-Division	:	Panposh		
Name of the District	:	Sundargarh		

Land Schedule:

Village	Khata No.	Plot No.	Kissam	Area in Ac.	Boundary description				Remarks
					North	South	East	West	
Jaidega	214/ 103	2377/ 3689	Chatana	12.13	Plot No. 2376, 2375, 2374 & 2373	Plot No. 2531, 2532, 2533, 2535 & 2537	Plot No. 2562/3690	Plot No. 2424, 2527 & 2528	Patch-A (The plots are in Sheet No. 7)
		2562/ 3690		69.26	Plot No. 2373 & 2562/3507	Plot No. 2538, 2540, 2541, 2556, 2557, 2560 & 2561, 2563	Plot No. 2566, 2567 & 2565	Plot No. 2377/ 3689	
	Sub Total	2 Plots in Patch-I 81.390Ac							
	214/ 103	2630	Dungurl	64.57	Plot No. 2630/3508	Plot No. 2614, 2615, 2616 &	Plot No. 2631 &	Plot No. 2567 &	Patch-A

						2029	2647	2901	(The plots are in Sheet No. 7)
	Sub Total	1 Plots in Patch-II	64.570Ac						
Grand Total		3 Plots in two Patches	145.968 Ac or 59.068 Ha						

By order of the Governor

(Satyabrata Sahu)
Additional Chief Secretary to Government

By e-Mail: deputydirectorpp@rediffmail.com

Memo No. 12238 /FE&CC, Date 29 MAY 2025

Copy with soft copy forwarded to the Director of Printing, Stationery and Publication, Odisha Cuttack for publication in an extra-ordinary issue of the Odisha Gazette and supply 10 copies of printed notification each to Forest, Environment & Climate Change Department/ Director of Land Records and Surveys, Odisha, Cuttack/ Collector, Sundargarh District/ Divisional Forest Officer, Rourkela Forest Division/ Tahasildar, Biramitrapur Tahasil, Dist.-Sundargarh.

2. The Notification is statutory and may be assigned SRO number.

OSD-cum-Special Secretary to Government

Memo No. 12239 /FE&CC, Date 29 MAY 2025

Copy forwarded to the Assistant Inspector General of Forests, Govt. of India, Ministry of Environment, Forest and Climate Change, (F.C. Division), Indira Paryavaran Bhawan, Jor Bagh Road, Aliganj, New Delhi-110003/ Deputy Director General of Forests (Central), Govt. of India, MoEF&CC, Regional Office, A/3, Chandrasekharpur, Bhubaneswar-23 for information and necessary action.

OSD-cum-Special Secretary to Government

Memo No. 12240 /FE&CC, Date 29 MAY 2025

Copy forwarded to the Revenue & Disaster Management Department/ Steel & Mines Department/ Director, Environment-cum-Special Secretary to Government, FE&CC Department/ Member Secretary, SPCB, Odisha/ Director of Land Records and Surveys, Odisha, Cuttack/ RDC (Northern Division) Sambalpur/ Collector, Sundargarh/ Tahasildar, Biramitrapur Tahasil, Dist.-Sundargarh for information and necessary action.

OSD-cum-Special Secretary to Government

Memo No. 12241 /FE&CC, Date 29 MAY 2025

Copy forwarded to the Principal Chief Conservator of Forests & HoFF, Odisha / Principal Chief Conservator of Forests (WL) & CWLW, Odisha/ Addl. Principal Chief Conservator of Forests (FDA&NO, FC Act), O/o the PCCF & HoFF, Odisha w.r.t. his Letter No.9635, dt.02.05.2025/ Regional Chief Conservator of Forests, Rourkela Circle/ Divisional Forest Officer, Bonai Forest Division/ Divisional Forest Officer, Rourkela Forest Division for information and necessary action.

OSD-cum-Special Secretary to Government

Memo No. 12242 /FE&CC, Date 29 MAY 2025

Copy forwarded to the Head State Portal, IT Centre, Odisha Secretariat, Bhubaneswar/ OE (IT) Section, FE&CC Department w.r.t. this Department letter No.21646/F&E dtd.22.11.2016/ 5 spare copies for G.F. for information and necessary action.

OSD-cum-Special Secretary to Government

Memo No. 12243 /FE&CC, Date 29 MAY 2025

Copy forwarded to the VP (Projects), BPSL, Thelkoloi, Po-Lapanga, Dist.-Sambalpur, Odisha, Pin-768212 for information and necessary action.

OSD-cum-Special Secretary to Government

FE-DIV-FLD-0089-2023/9/2025

GOVERNMENT OF ODISHA
FOREST, ENVIRONMENT AND CLIMATE CHANGE DEPARTMENT
****

NOTIFICATION

Bhubaneswar, Dated the 29 MAY 2025

No.FE-DIV-FLD-0088-2022 (10F-(Cons)-47/2022)-12223 /FE&CC, In exercise of the powers conferred under Section-33 of the Odisha Forest Act, 1972 (Odisha Act 14 of 1972), the State Government do hereby declare that the following land situated in Village-**Jhurmur** under Biramitrapur Tahasil of Sundargarh District mutated and transferred in favour of Forest, Environment & Climate Change Department for raising Compensatory Afforestation thereon against the proposed diversion of 112.621 Ha of Forest land (including 1.808 ha earmarked for Safety Zone) in village Baldihi under Koira Tahasil and Koira Range of Bonai Forest Division of Sundargarh District within the block area of 139.223ha in respect of Netrabandha Pahar Iron Ore Block by M/s Bhusan Power & Steel Limited vide 'Stage-I/in-principle' approval of Government of India, MoEF&CC (Forest Conservation Division), New Delhi communicated in letter No.8-31/2022-FC dated 21.12.2023 under Section-2 of the Forest (Conservation) Act, 1980, the limits of which are specified below and the area of which is 50.830ha (125.602 Ac) shall be a Protected Forest with effect from the date of issue of the Notification and shall be known as '**Jhurmur Protected Forest**'.

Forest Block:

Name of the Protected Forest	:	Jhurmur		
		Patch-I	**Patch-II**	**Total**
Area of Protected Forest in Ha	:	33.3476	17.4829	50.8304
Area in Acres	:	82.402	43.200	125.602
Name of the Village	:	Jhurmur		
Name of the Police Station	:	Kaliarbaga		
Name of the Tahasil	:	Biramitrapur		
Name of the Sub-Division	:	Sundargarh		
Name of the District	:	Sundargarh		

Land Schedule:

Village	Khata No.	Plot No.	Kissam	Area in Ac.	Boundary description				Remarks
					North	South	East	West	
Jhurmur	248/88	3561	Dungari	23.670	Plot No. 3137, 3138, 3139, 3150, 3150/3812, 3152, 3153, 3154, 3155, 3154/4094, 3913, 3102 & 3914	Plot No. 3562 & 3631	Plot No. 3560	Plot No. 3128 & 3128/4056	Patch-A (The plots are in both the Sheet No. I & II)
		3562/4417		2.070	Plot No. 3561	Plot No. 3569, 3570, 3604 & 3610	Plot No. 3631	Plot No. 3563	
		3626/4418		3.140	Plot No. 3627 & 3628	Plot No. 3626/3706	Plot No. 3634	Plot No. 3626/4088	
		3631/4419		31.800	Plot No. 3561	Plot No. 3618, 3630	Plot No. 3635	Plot No. 3611, 3618	

						3632, 3633 & 3628/4294		& 3617	
		3634/ 4429		3.420	Plot No. 3628 & 3633	Reserved Forest	Plot No. 3635	Plot No. 3626	
		3635/ 4421		17.830	Plot No. 3635/3885 & 3560	Reserved Forest	Plot No. 3629, 3637 & 3638	Plot No. 3634, 3633 & 3631	
		3648/ 4422		0.242	Plot No. 3643	Plot No. 3640/3701	Plot No. 3647 & 3649	Plot No. 3639, 3635 & 3637	
	Sub Total	7 Plots in Patch-I		82.402 Ac					
	246/89	1076/ 4418	Patharbani	39.00	Plot No. 1076/3629, 1033/3630, 1034, 1036 & 1037/3631	Plot No. 1075/3650 & 1075	Plot No. 1055/3632, 1050/3633, 1050/3635, 1050/3634, 1050, 1050/3636, 1050/3639 & 1050/3640	Plot No. 1077/3626, 1077/3642, 1102/3644, 1102/3645, 1102/3646 & 1075/3648	Patch-B (The plots are in both the Sheet No. 7)
		1077/ 3626		4.39	Plot No. 1077/3628	Plot No. 1077/3642 & 1076/4418	Plot No. 1076/4418 & 1076/3629	Plot No. 1077/3627, 1077 & 1077/3625	
	Sub Total	2 Plots in Patch-II		43.390 Ac					
Grand Total		9 Plots in two Patches		125.602 Ac or 50.8294 Ha					

By order of the Governor

29/5/25

(Satyabrata Sahu)
Additional Chief Secretary to Government

By e-Mail: deputydirectorrpo@rediffmail.com

Memo No. 12224 /FE&CC, Date 29 MAY 2025

Copy with soft copy forwarded to the Director of Printing, Stationary and Publication, Odisha Cuttack for publication in an extra-ordinary issue of the Odisha Gazette and supply 10 copies of printed notification each to Forest, Environment & Climate Change Department/ Director of Land Records and Surveys, Odisha, Cuttack/ Collector, Sundargarh District/ Divisional Forest Officer, Rourkela Forest Division/ Tahasildar, Biramitrapur Tahasil, Dist.-Sundargarh.

2. The Notification is statutory and may be assigned SRO number.

OSD-cum-Special Secretary to Government

Memo No. 12225 /FE&CC, Date 29 MAY 2025

Copy forwarded to the Assistant Inspector General of Forests, Govt. of India, Ministry of Environment, Forest and Climate Change, (F.C. Division), Indira Paryavaran Bhawan, Jor Bagh Road, Aliganj, New Delhi-110003/ Deputy Director General of Forests (Central), Govt. of India, MoEF&CC, Regional Office, A/3, Chandrasekharpur, Bhubaneswar-23 for information and necessary action.

OSD-cum-Special Secretary to Government

Memo No. 12226 /FE&CC, Date 29 MAY 2025

Copy forwarded to the Revenue & Disaster Management Department/ Steel & Mines Department/ Director, Environment-cum-Special Secretary to Government, FE&CC Department/ Member Secretary, SPCB, Odisha/ Director of Land Records and Surveys, Odisha, Cuttack/ RDC (Northern Division) Sambalpur/ Collector, Sundargarh/ Tahasildar, Biramitrapur Tahasil, Dist.-Sundargarh for information and necessary action.

OSD-cum-Special Secretary to Government

Memo No. 12227 /FE&CC, Date 29 MAY 2025

Copy forwarded to the Principal Chief Conservator of Forests & HoFF, Odisha / Principal Chief Conservator of Forests (WL) & CWLW, Odisha/ Addl. Principal Chief Conservator of Forests (FD&NO, FC Act), O/o the PCCF & HoFF, Odisha w.r.t. his Letter No.9630, dt.02.05.2025/ Regional Chief Conservator of Forests, Rourkela Circle/ Divisional Forest Officer, Bonai Forest Division/ Divisional Forest Officer, Rourkela Forest Division for information and necessary action.

OSD-cum-Special Secretary to Government

Memo No. 12228 /FE&CC, Date 29 MAY 2025

Copy forwarded to the Head State Portal, IT Centre, Odisha Secretariat, Bhubaneswar/ OE (IT) Section, FE&CC Department w.r.t. this Department letter No.21546/F&E dtd.22.11.2016/ 5 spare copies for G.F. for information and necessary action.

OSD-cum-Special Secretary to Government

Memo No. 12229 /FE&CC, Date 29 MAY 2025

Copy forwarded to the VP (Projects), BPSL, Thelkoloi, Po-Lapanga, Dist.-Sambalpur, Odisha, Pin-768212 for information and necessary action.

OSD-cum-Special Secretary to Government

Annexure-A

Schedule I Form No.39-A

ଖତିୟାନ

ଜିଲ୍ଲା : କଟକସଦର
ତହ. : ବାରବାଟୀ
ମୌଜା ନମ୍ବର : 32

ଜିଲ୍ଲା : କଟକସଦର
ମୌଜା ନମ୍ବର : 32
ମିନ୍ଦ୍ର : ଘାଟକୁଳ

ଦଲିଲଖତ ନମ୍ବର ଓ ସାବରେ ଏ ଖତିୟାନର ଦୁମିଳ ନମ୍ବର	ଚଳିତ ଆଦାୟ ସାବର ନମ୍ବର 0001
(1) ଖତିୟାନ ଦୁମିଳ ନମ୍ବର	181/243
(2) ଦୁକାର ନାମ, ପିତାର ନାମ, ଜାତି ଓ ବାସସ୍ଥାନ	ବାବୁ ଅଧୁନା ଘାଟକୁଳ ବାସୀ ଚଳିତ ଆଦାୟ ତହସିଲରୁ ଜୁଲୁସ ଆଦାୟ କରା ଯିବାର ଜୁଲୁସ ନଂ: D.F.O ଫୁଲ ଭିଲ, ଘାଟକୁଳ, ପିନ- 768001

(3) ଜୁଲୁ	ଜମି					
	ପ୍ରକାର	ଆୟତ	ପରତ	ପିନ୍ଧିବା ଥରେ ଓ ଅଦାୟକାରୀ ଥରେ ଯାହା ଦିଆ ଯାଇଛି	ମନ୍ତବ୍ୟ	(4) ଜୁମାବନ୍ଦିକାରର ଆଦାୟର ବିବରଣୀ
(4) ଜମା :		12980.00	8735.00		22715.00	

(5) ବିଭାଗର ଅନୁରୋଧ ଯାହା ଦିଆ ଯାଇଛି	ଆଦାୟ ଆଦେଶ ନମ୍ବର ଜି 1181/2024 ତାରିଖ୍ୟାଦେଶର ଦ୍ୱାରା 27.09.2024 ଅନୁଯାୟୀ ଜି ଜି ନଂ 181/82 ଓ ପୁଣ୍ଡ ନଂ 1523 ର 1.39 ଡି ର ପୁଣ୍ଡ ନଂ 1522 ର 5.10 ଡି ଆଦାୟ ଯୋଗ୍ୟ ଜି ଜି ନଂ 181/243 ରେ ଅନ୍ତର୍ଭୁକ୍ତ କରାଯାଇଛି ।

BLANK SPACE FOR STAMPING

ଦସ୍ତୁରା ପ୍ରଦାନର ତାରିଖ -

ପ୍ରଦାନର ସାକ୍ଷୀ ତାରିଖ -

Annexure-A

Schedule I Form No.39-A

ଖତିୟାନ

ତହସିଲ : ବ୍ରହ୍ମଗିରି
ଥାନା : ବ୍ରହ୍ମଗିରି
ଗାଁ/ସହର : 32

ଜିଲ୍ଲା : ପୁରୀ
ମୌଜା : ବ୍ରହ୍ମଗିରି
ଖତିୟାନ ନମ୍ବର : 32

ଜମିଦାରଙ୍କ ନାମ ଓ ସେରେସ୍ତା ରୁ ଜମିଦାରଙ୍କ କୁହିସ ନମ୍ବର	ଯୁଗିଲା ଚରଣ ସାହୁ ଓ ଅନ୍ୟ 1
ଜମାବନ୍ଦୀରେ କୁହିସ ନଂ	181/242
ଜମି ଥିବା ଗାଁ, ତିହାଡ଼ ନାମ , ଜାତି ଓ ଜମାବନ୍ଦୀ	ଯୁଗିଲା ଚରଣ ସାହୁ ଓ ଅନ୍ୟମାନେ ଠିକଣା ଗ୍ରାମ+ପୁରୀ ଜମାବନ୍ଦୀ ଯୁଗିଲା ଚା: D.F.O. କୁହି ପୁରୀ, ବ୍ରହ୍ମଗିରି, ପିନ-768001

ଜମାବନ୍ଦୀ	ଜମାବନ୍ଦୀ					
ଜମାବନ୍ଦୀ	ଜମାବନ୍ଦୀ	ଜମାବନ୍ଦୀ	ଜମାବନ୍ଦୀ	ଜମାବନ୍ଦୀ ଜମାବନ୍ଦୀ ଜମାବନ୍ଦୀ ଜମାବନ୍ଦୀ	ଜମାବନ୍ଦୀ	ଜମାବନ୍ଦୀ ଜମାବନ୍ଦୀ ଜମାବନ୍ଦୀ
ଜମାବନ୍ଦୀ		210.00	158.00	0.00	368.00	

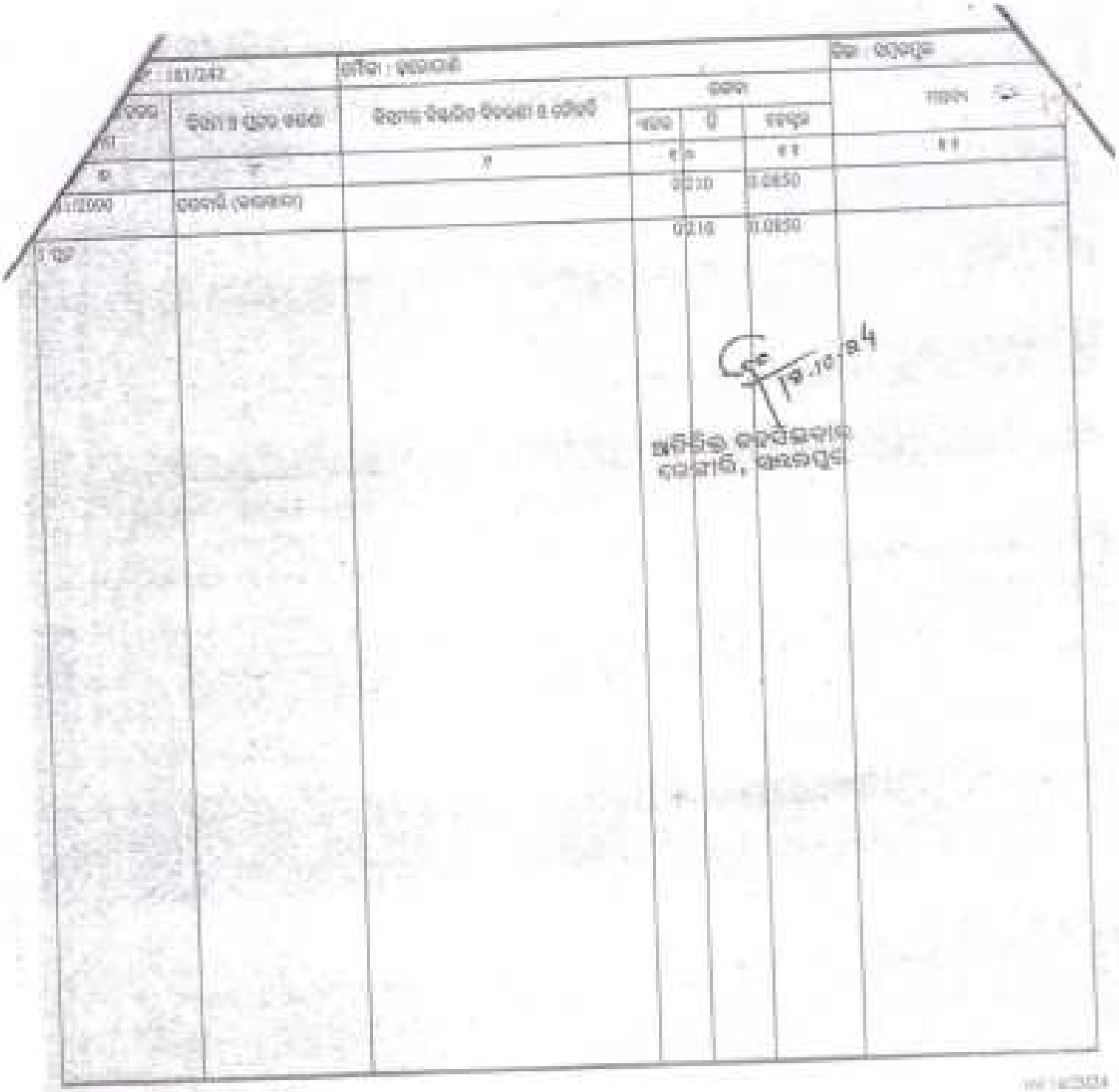
ଜମାବନ୍ଦୀ ଜମାବନ୍ଦୀ ଜମାବନ୍ଦୀ	ଜମାବନ୍ଦୀ ଜମାବନ୍ଦୀ ଜମାବନ୍ଦୀ ନଂ 1180/2024 ଜମାବନ୍ଦୀଜମାବନ୍ଦୀ ଚା 27.09.2024 ଜମାବନ୍ଦୀଜମାବନ୍ଦୀ ଖା ନଂ 181/79 ର ପୁରା ନଂ 1381 ରୁ ଏ 0.21 ଟି ଜମାବନ୍ଦୀ ଜମାବନ୍ଦୀ ଟୁ ଖା ନଂ 181/242 ରେ ଜମାବନ୍ଦୀ ଜମାବନ୍ଦୀ ।

ଜମାବନ୍ଦୀଜମାବନ୍ଦୀ
ଜମାବନ୍ଦୀ, ଜମାବନ୍ଦୀ

BLANK SPACE FOR STAMPING

ଯୁଗିଲା ପ୍ରସ୍ତୁତ କାରିଜ :
ଯୁଗିଲା ଯାଞ୍ଚ କାରିଜ :

ଜମାବନ୍ଦୀ ଜମାବନ୍ଦୀ ଜମାବନ୍ଦୀ ନମ୍ବର



Annexure-I

Schedule I Form No.:VII-A

প্রতিজ্ঞাপত্র

জমির : [illegible]

মৌজা : [illegible]

জে.এল.নং : 32

থানা : [illegible]

পরগণা : [illegible]

তিস্তা : [illegible]

প্রতিবেদক তথা ও প্রস্তাবক বা অভিজ্ঞতার পূর্ণাঙ্গ নমুনা	প্রতিষ্ঠা প্রকাশনা প্রকাশের নমুনা ।
ঘ.অভিজ্ঞতার পূর্ণাঙ্গ নং	185/3
ক) পূর্ণাঙ্গ ঘন.মিটার প্রকা.,প্রতি ও প্রকাশন	প্রতিষ্ঠা প্রকাশনার জন্য প্রস্তাবিত এক প্রস্তাবনা বা প্রস্তাবিত পূর্ণাঙ্গ নমুনা, যেমন- প্রকা- প্রস্তাবিত, ঘ - প্রস্তুতকৃত, ঘ - প্রস্তাবনা ।

ক্রমিক	প্রকার					
	প্রকাশক	প্রকাশ	প্রকাশ	প্রকাশ (যদি) ও প্রকাশন প্রকাশ যদি প্রস্তাবিত	প্রকাশ	ক) পূর্ণাঙ্গ/প্রকাশ প্রকাশ বিবরণী
১		50.00	338.00	0.00	88.00	

প্রতিবেদন প্রস্তুতের জন্য প্রস্তাবিত	প্রকাশ বিবরণ প্রকাশ নং ধারা 2025 প্রকাশনার ঘ 14.2.2025 প্রকাশনার ঘ নং 1197/1 ঘ পূর্ণ নং 1991 পূর্ণ ৩.০৫ ঘ প্রকাশ প্রকাশ পূ ঘ নং 185/1 এর প্রকাশনে প্রকাশিত ।

প্রতিষ্ঠা প্রকাশনার
প্রকাশক, প্রকাশনা

BLANK [illegible] STAMPING

প্রতিষ্ঠা পূর্ণাঙ্গ প্রকাশ :

প্রকাশনা প্রতি প্রকাশ :

GOVERNMENT OF ODISHA

FOREST, ENVIRONMENT AND CLIMATE CHANGE DEPARTMENT

****

NOTIFICATION

Bhubaneswar, Dated the 29 MAY 2025

No.FE-DIV-FLD-0088-2022 (10F-(Cons)-47/2022)- 12230 /FE&CC. In exercise of the powers conferred under Section-33 of the Odisha Forest Act, 1972 (Odisha Act 14 of 1972), the State Government do hereby declare that the following land situated in Village-**Dharopani** under Rengali Tahasil of Sambalpur District mutated and transferred in favour of Forest, Environment & Climate Change Department for raising Compensatory Afforestation thereon against the proposed diversion of 112.621 Ha of Forest land (including 1.809 ha earmarked for Safety Zone) in village Baldihi under Koira Tahasil and Koira Range of Bonai Forest Division of Sundargarh District within the block area of 139.223 ha in respect of Netrabandha Pahar Iron Ore Block by M/s Bhusan Power & Steel Limited vide 'Stage-I/in-principle' approval of Government of India, MoEF&CC, Forest Conservation Division, New Delhi communicated in letter No.8-31/2022-FC dated 21.12.2023 under Section-2 of the Forest (Conservation) Act, 1980, the limits of which are specified below and the area of which is 2.7316 ha (6.750 Ac) shall be a Protected Forest with effect from the date of issue of the Notification and shall be known as "**Dharopani Protected Forest**".

Forest Block:

Name of the Protected Forest	:	**Dharopani**		
		Patch-I	Patch-II	Total
Area of Protected Forest in Ha	:	2.6264	0.1052	2.7316
Area in Acres	:	6.490	0.260	6.750
Name of the Village	:	Dharopani		
Name of the Police Station	:	Katarbaga		
Name of the Tahasil	:	Rengali		
Name of the Sub-Division	:	Sambalpur		
Name of the District	:	Sambalpur		

Land Schedule:

Village	Khata No.	Plot No.	Kissam	Area in Ac.	Boundary description				Remarks
					North	South	East	West	
Dharopani	181/243	1522	Ghanaban (Karakhana	5.100	Plot No. 1524	Plot No. 1502	Plot No. 1521 & 1502	Plot No. 1523	Patch-A (the plots are in Sheet No.1)
		1523		1.390	Plot No. 1524	Plot No. 1502	Plot No. 1522	Plot No. 1502	
	Sub Total	2 Plots in Patch-I		6.490 Ac					
	181/242	1381/ 2090	Ghanaban (Karakhana	0.210	Plot No. 1383	Plot No. 1382	Plot No. 1382	Plot No. 1381	Patch-B (the plots are in Sheet No.2)

	185/3	1381/2094		0.050	Plot No. 1377/1721	Plot No. 1382	Plot No. 1381/1722 & 1381/2095	Plot No. 1381	
	Sub Total	2 Plots in Patch-II		0.260 Ac					
Grand Total		4 Plots in two Patches		6.750 Ac or 2.7316 Ha					

By order of the Governor

(Satyabrata Sahu)
Additional Chief Secretary to Government

By e-Mail: deputydirectorop@rediffmail.com

Memo No. 12231 /FE&CC, Date 29 MAY 2025

Copy with soft copy forwarded to the Director of Printing, Stationery and Publication, Odisha Cuttack for publication in an extra-ordinary issue of the Odisha Gazette and supply 10 copies of printed notification each to Forest, Environment & Climate Change Department/ Director of Land Records and Surveys, Odisha, Cuttack/ Collector, Sambalpur District/ Divisional Forest Officer, Sambalpur Forest Division/ Tahasildar, Rengali Tahasil, Dist.-Sambalpur.

2. The Notification is statutory and may be assigned SRO number.

OSD-cum-Special Secretary to Government

Memo No. 12232 /FE&CC, Date 29 MAY 2025

Copy forwarded to the Assistant Inspector General of Forests, Govt. of India, Ministry of Environment, Forest and Climate Change, (F.C. Division), Indira Paryavaran Bhawan, Jor Bagh Road, Aliganj, New Delhi-110003/ Deputy Director General of Forests (Central), Govt. of India, MoEF&CC, Regional Office, A/3, Chandrasekharpur, Bhubaneswar-23 for information and necessary action.

OSD-cum-Special Secretary to Government

Memo No. 12233 /FE&CC, Date 29 MAY 2025

Copy forwarded to the Revenue & Disaster Management Department/ Steel & Mines Department/ Director, Environment-cum-Special Secretary to Government, FE&CC Department/ Member Secretary, SPCB, Odisha/ Director of Land Records and Surveys, Odisha, Cuttack/ RDC (Northern Division) Sambalpur/ Collector, Sambalpur/ Tahasildar, Rengali Tahasil, Dist.-Sambalpur for information and necessary action.

OSD-cum-Special Secretary to Government

Memo No. 12234 /FE&CC, Date 29 MAY 2025

Copy forwarded to the Principal Chief Conservator of Forests & HoFF, Odisha / Principal Chief Conservator of Forests (WL) & CWLW, Odisha/ Addl. Principal Chief Conservator of Forests (FD&NO, FC Act), O/o the PCCF & HoFF, Odisha w.r.t. his Letter No.9626, dt:02.05.2025/ Regional Chief Conservator of Forests, Sambalpur Circle/ Regional Chief Conservator of Forests,

Rourkela Circle/ Divisional Forest Officer, Bonai Forest Division/ Divisional Forest Officer, Sambalpur Forest Division for information and necessary action.

OSD-cum-Special Secretary to Government

Memo No. 12235 /FE&CC, Date 29 MAY 2025

Copy forwarded to the Head State Portal, IT Centre, Odisha Secretariat, Bhubaneswar/ OE (IT) Section, FE&CC Department w.r.t. this Department letter No.21645/F&E dtd.22.11.2016/ 5 spare copies for G.F. for information and necessary action.

OSD-cum-Special Secretary to Government

Memo No. 12236 /FE&CC, Date 29 MAY 2025

Copy forwarded to the VP (Projects), BPSL, Thelkoloi, Po-Lapanga, Dist.-Sambalpur, Odisha, Pin-768212 for information and necessary action.

OSD-cum-Special Secretary to Government

FE-DIV-FLD-0088-2022/8/2025

SCHEME FOR COMPENSATORY AFFORESTATION AGAINST NETARABANDHA PAHAR IRON ORE BY M/S BHUSAN POWER & STEEL LTD.

Jaldega- (Non-Forest land)	38.0 ha @ 1800 nos. plants per ha
Jhurmur- (Non-Forest land)	27.0 ha @ 1600 nos. plants per ha
Total:-	65.0 ha
Jaldega- (Open-Forest land)	15.0 ha @ 500 nos. plants per ha
Jhurmur- (Open-Forest land)	17.0 ha @ 500 nos. plants per ha
Total:-	32.0 ha
Total area: 95.0 ha	(1,16,800 nos. Plants)

UNDER

BIRAMITRAPUR FOREST RANGE
UNDER ROURKELA FOREST DIVISION
AGAINST NETARABANDHA PAHAR IRON ORE BY

M/S BHUSAN POWER & STEEL LTD

USER AGENCY:- M/S BHUSAN POWER & STEEL LTD

PREPARED BY

DIVISIONAL FOREST OFFICER,
ROURKELA FOREST DIVISION.

SCHEME FOR COMPENSATORY AFFORESTATION OF NETRABANDHA PAHAR IRON ORE BY M/S BHUSAN POWER & STEEL LTD

1. BRIEF NOTE ON THE PROPOSED FOREST DIVERSION PROPOSAL

M/s Bhusan Power & Steel Ltd. has applied for mining lease for exploitation of iron ore over an area of 112.621 ha of forest land including Safety Zone (1.808ha) in Netrabandha iron ore mines situated in Bonai Sub-Division of Sundergarh District. The ore is meant for supply to Steel Ltd in India and abroad.

In accordance with Section-2 of the Forest Conservation Act,1980, M/s Netrabandha iron ore mines by M/s Bhusan Power & Steel Ltd. have submitted diversion proposal for diversion of 112.621 ha of forest land including Safety Zone (1.808ha). The much amount of area is meant for diversion as per provision of Forest (Conservation) Act, 1980 for which this compensatory Afforestation scheme over an equivalent amount of non-forest land is being submitted.

2. IDENTIFICATION OF THE NON-FOREST GOVT. LAND:

Tahasildar, Biramitrapur Tahasil have identified 110.813 ha non-forest Govt. land in the Village- Jhumur (51.744 ha) and Jaldega (59.069 ha) under the jurisdiction of this Division for the purpose of Compensatory Afforestation (CA) against the diversion of 110.813(112.63 – 1.808 Safety Zone) of forest land for Netrabandha Iron ore mines by M/s Bhusan Power & Steel Ltd.,

Village	Khata No	Plot No.	Khata	Area (in ROR in Hy)	Proposed Area (in Ha)
Jhumur	220(AAA)	3501	Dungri	23.670	9.269
		1078	Pathuraburi	39.240	15.785
		3628	Pathuraburi	4.200	1.700
		3662	Dungri	7.420	6.834
		3629	-do-	3.480	1.350
		3631	-do-	32.850	12.438
		3634	-do-	8.720	1.516
		3635	-do-	10.130	7.019
		3640	-do-	5.810	1.700
		Total:-		133.87	51.744
Jaldega	219(AAA)	2577	Chaitana	12.126	7.798
		2562	-do-	39.200	22.447
		2620	-do-	84.570	28.824
		Total:-		145.959	59.069
		G.Total:-		279.829	110.813

For diversion of 119.8 ha (117.07 – 1.503 Safety Zone) forest land 1,19,613 nos. of saplings is to be planted.

On verification of the above land through GIS, it was observed that, the identified area is suitable for accommodating plantation @ 1600 saplings / ha in ANR mode over 63.0 ha(Non-forest land), amounting to 1,00,800 nos. of plants & @330 saplings / ha over 32.0 ha(Open forest land) amounting to 10,560 nos. plants.

Hence an area of 95.0 ha is considered for raising compensatory Afforestation @ 1600 / ha & @500 / ha. But, the grass area to an extent over 10.813 ha area (which includes additional extent of 15.813 ha in the MDP patch) is considered for treatment and SMC purpose for assisting the natural regeneration of forest growth. Further the identified area has been verified with the help of Decision Support System (DSS) & found suitable for Compensatory Afforestation.

The purpose of drawl of the scheme is to make good the loss of forest land to be diverted for the development work which is non-forestry in nature. Apart from this, as per the provision of Forest (Conservation) Act and rules framed there under, it is obligatory to formulate a suitable scheme for the purpose of Compensatory Afforestation with a view to keep overall forest area intact. So compensatory Afforestation is required both from legal and environmental point of view.

3. TOPOGRAPHY AND SOIL:

The area undulating and in small hilly rocks with gentle to moderate slope. The soil devoid of moisture, humus and is degraded in nature. The portion taken for DA consists of rocks, gullies and nalah.

4. CLIMATE

The area experiences Sub-tropical climate. It is characterized by very hot summer and cool winter. Maximum temperature during summer rises up to 44° Celsius and the minimum goes down to 8° Celsius. The area gets rain from South-east Monsoon, which breaks during second fortnight of June and continues up to last week of September. The annual rainfall varies from 730 to 1880mm. The annual average rainfall is 1630mm. The bulk of precipitation occurs during July-August. During April-May, occasional rainfall occurs along with thunder storm.

EXISTING VEGETATION

The vegetation of the degraded forest land identified for raising Compensatory Afforestation comprises of Sal, Asan, Kendu, Mahul, Char, Dhaura, Kanda, Kurei, Sisha, Haldu, Jamu, Kathsalai, Gambhari, Kumbhi etc.

6. **OBJECTIVE OF THE SCHEME :**

The aims of the proposed scheme are as follows:

i) To restock the barren Non-forest land by planting suitable species

ii) To improve the micro Edaphic conditions by undertaking suitable soil and moisture conservation measures.

iii) To protect the area against encroachment, illicit felling, fire occurrence, grazing etc., so as to check further degradation of the area

iv) To provide gainful employment to the local people mainly involving SC/ST population.

v) To create awareness among the local villagers on protection and maintenance of plantation and forest

8. **PROPOSED TECHNIQUE:**

To achieve the above objectives, it has been proposed to take up ANR with gap Plantation @ 500 no seedlings per hectare and @1111/ha at spacing of 3.0 m x 3.0 m in the identified non-forest land at Jaleya & Jharmur. The field plantation work shall be undertaken in the first year, followed by maintenance during 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th and 10th year. The detailed expenditure statement per hectare is enclosed as Annexure-I

(A) SURVEY AND DEMARCATION:

The area is surveyed and demarcated in the field with the help of D.G.P.S. The DGPS co-ordinates of each pillar of the boundary of the site are delineated in the Map as well as in the field enclosed as (Annexure-II) 47 (Forty Seven) RCC pillars (372 nos) have been posted at visible distance along the boundary line. This operation will be helpful in future maintenance and management.

(B) REGENERATION CLEANING AND TENDING OPERATION:

The operation aims at tending the existing crop silviculturally for better growth. It involves removal of inferior, dead, dying and diseased tree growth. During this operation, high stump, climber elimination interfere the growth of the principal and secondary species is to be felled. This operation helps saplings to grow better and faster. The site clearance is to be done by cutting and removing of Eupatorium, Lantana and other unwanted growth.

The following operation will be carried out during the operation.

i) Cutting back of individual inferior poles interfering with the growth of better trees.

ii) Cutting back of malformed and diseased individuals.

iii) Singling of coppice shoots & retaining healthier ones.

iii) Actual Planting:

The seedlings will be planted @800 & @1600 seedlings per ha in the dugout pits of size 45cm x 45cm x 45cm with a spacing of 2.5mtr x 2.5mtr. Plantation shall be taken up after first regular shower of monsoon and completed by the end of July. Species will be planted as per suitability of the soil condition. NPK fertilizer @30gms per plant shall be applied as basal dosage. Anti-termite insecticide shall also be applied to each pit while planting. Casualties if any noticed shall be replaced with the excess seedlings raised for the purpose. During second year also, casualty replacement will be done for which seedlings shall be raised.

iv) Weeding, Soil working & manuring :

For establishment and better growth of the planted seedlings, timely weeding, soil working and manuring are necessary. It is proposed to carry out two weeding, soil working and manuring during the first year and second year of plantation and one weeding and soil working during third year. During first year and second year first weeding and manuring shall be carried out during August-September and the second one during October-November along with soil working. First weeding shall be around the plants and the second will be of strip weeding. The weeding of third year will be around the plants, which will be carried out during August.

After each weeding, soil working will be done around each plant at a radius of 0.6mtr, and manuring of each plant will be done @30gms of NPK per plant in ring form.

vi) Application of insecticides:

The plantation site after planting good healthy seedlings may cause influx of insects, which usually eat and damage the tender leaves and shoots of the plants. To get rid of such insect attack, application of insecticides will be taken up in required doses at desired intervals. Spraying of insecticides shall be done preferably in a sunny day in the forenoon as per requirement.

vii) Fire line tracing and maintenance:

Fire causes heavy losses to the forest & plantation during fire season. To prevent incidence of fire, the area shall be divided in to suitable blocks by tracing fire lines. Boundaries of the plantation patches and these block lines will be scrapped of the growth to a width of 3.0 mtr during February-March and the cut back materials and the dry leaves stacked along these lines will be burnt under strict supervision. This operation shall be carried out for three years.

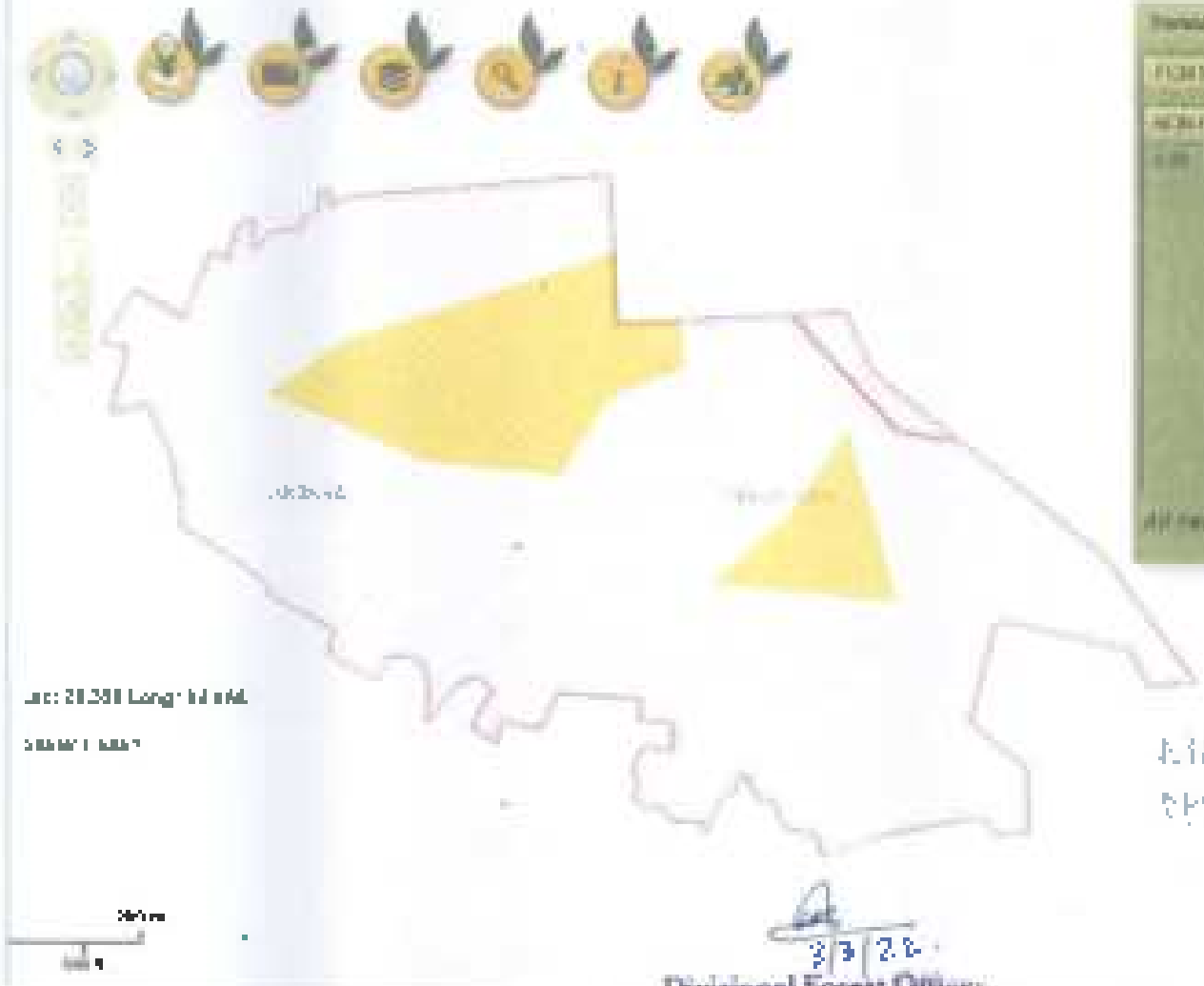
Financial Outlay for Compensatory Afforestation Scheme over an area of 95.00 ha of non Forest land & Open/Scrub land identified in vill-Jaldega & Jhirkuma under Rourkela Forest Division against Mining project of Sarandasaulha Pahar Iron Ore by M/s Bhusan Power & Steel ltd.

Sl. No	Description	Amount (Rs.)
1	Cost of Block Plantation (AR)@ 1900 plants per ha with 18 months old seedling over 83.00 ha @ Rs 2,25,62 3/-	2,06,14,249.00
2	Cost of Block Plantation (ANR)@520 plants per ha with 18 months old seedling over 32.00 ha @ Rs 1,42 304/-	45,72,928.00
3	Cost of fencing with wire mesh over 110 813 ha @ Rs.4,40,299/-per ha	4,87,90 953.08
4	Soil & Moisture Conservation work @ 37 415/- per 110 813 Ha over ha	41,45,068.39
	Total:-	**7,80,24,098.47**
5	**Water provision to CA Plantation**	
	Water provision to CA Plantation through Solar system with Bore wel. (1 system for 5 ha. Plantation) fitted with Drip system = Rs. 2,12,144/- X 95 ha (Since Plantation area is 95 ha)	2,01,82 180.00
	Total Plantation Cost	**9,82,06,278.47**
6	15% of total plantation cost towards FP/Incentives to VSS including Monitoring & Evaluation	1,47,30,941 77
	Total:-	**11,29,37,220.24** Or **11,29,37,220.00**
	Infrastructure to be provided as per consent of the user agency (IN KIND)	
7	(i) Supply Toyota Innova Crysta ZX 2.4 AT 7STR (Pearl White) with all accessaories, including RTO, Insurance and other charges. (ii) Supply Mahindra Scorpio-N Z8 L Diesel MT 4WD 7 STR (Pearl White) with all accessories including RTO, Insurance and other charges. (iii) Supply and Installation of LG-LED all-in-one Smart Seines LAEC-138" (10 'x5 5") fixed pixel pitch 1.52mm, screen resolution 1920x1080 built in speaker. (iv) Supply of Inverter of 11 000 KVA along with 15 batteries of 4 years warranty. (v) One high end Laptop for office use of Divisional Forest Officer (MAC Model –Apple (Mac book Pro) 14" (Protection Film)	

(Rupees Eleven Crore Twenty-nine Lakh Thirty Seven Thousand Two Hundred Twenty)

Divisional Forest Officer
Rourkela Forest Division

Annexure - II



All results are in Square Kilometer

C.K Level

3/3/22

Divisional Forest Officer
Rourkela Division

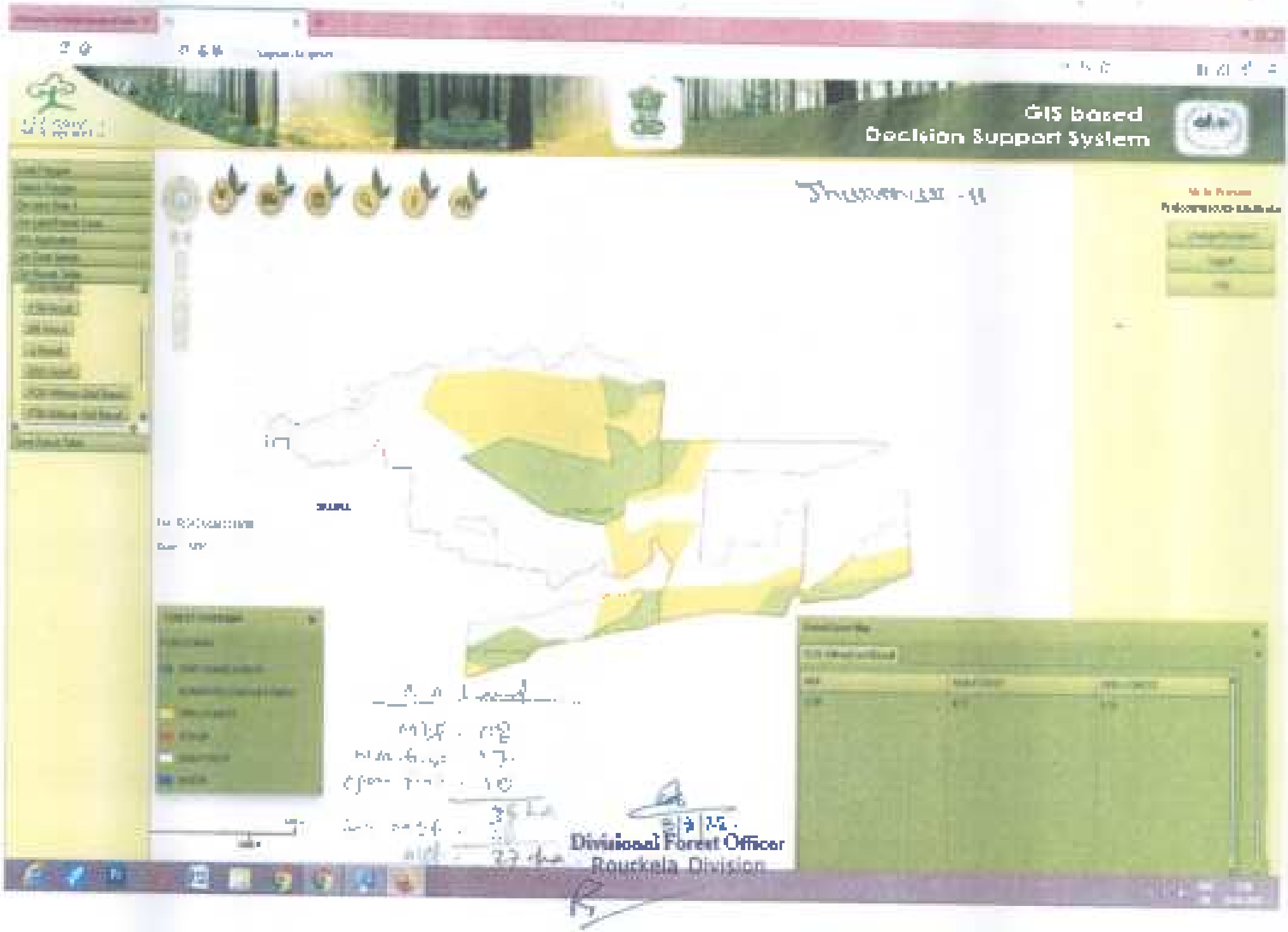
Jabdega - I

Forest Cover Map

	NON FOREST	OPEN FOREST
	1.11	0.19

All results are in Square Kilometer

Divisional Forest Officer
Rourkela Division


GIS based
Decision Support System
Divisional Forest Officer
Rourkela Division

GIS based
Decision Support System
Divisional Forest Officer
Rourkela Division

JOINT VERIFICATION REPORT

Date: | **Range: Birmitrapur Range** | **Tehsil: Birmitrapur**

LAND SCHEDULE IN VILLAGE: JHURMURA Jatiha-(a) UNDER TAHASIL: BIRMITRAPUR, DISTRICT: SUNDARGARH IDENTIFIED FOR RAISING COMPENSATORY AFFORESTATION IN LIEU OF diversion of FOREST LAND over an AREA OF 110.833 Ha. IN FAVOUR OF HERBAGANDHA PAHAR IRON ORE BLOCK OF M/S DEVIDAYAL POWER & STEEL LTD.

Sl. No	Name of Village	Khata No.	Plot No.	Khasra	Area Found Suitable for plantation			Area found unsuitable with reason	Remarks
					Block	RDF	Total		
1	2	3	4	5	6	7	8	9	10
1	JHURMURA	259	3561	Dungari			9.369		
2	JHURMURA	259	3676	Pathar Jabad			15.761		
3	JHURMURA	259	3720	Pathar Jabad			1.700		
4	JHURMURA	259	3682	Dungari			0.834		
5	JHURMURA	259	3626	Dungari			1.380		
6	JHURMURA	259	3631	Dungari			32.191		
7	JHURMURA	259	3654	Dungari			1.516		
8	JHURMURA	259	3675	Dungari			7.074		
9	JHURMURA	259	3648	Dungari			1.706		
10	JHURMURA	259	3677	Dungari			7.761		
11	JHURMURA	259	3552	Dungari			12.447		
12	JHURMURA	259	3670	Dungari			16.874		
				TOTAL AREA =			108.819		

TEHSILDAR
BIRMITRAPUR

FOREST RANGE OFFICER
BIRMITRAPUR (SUNDARGARH)

Revenue Inspector
Jhurmura

Divisional Forest Officer
Rourkela Division

1. Certified that the above degraded/non forest government land as mentioned in column No.7, 8&9 is in compact patches of 362.874 ha. or more having adequate soil depth suitable for plantation.
2. Certified that the above government land found suitable for plantation and is free from encroachment and encumbrance.
3. Certified that the above government land is not covered under 4(1) Notification
4. Certified that the above government land is not covered/covered under III reserve/proposed under DLC vested.
5. Certified that the above government land is not allotted previously.
6. Certified that the above government land is not covered under any NAP/P.L area
7. Certified that the above plots are not settled in favour individual/community under F.R Act, 2006
8. Certified that the status of the above plot was non forest/forest as on 25.10.1980.
9. Certified that the above plots are not covered under any proposed reserved forest.
10. Certified that the above plots are unfit not only for agriculture, but also for other developmental requirements (applicable in case Non forest Govt land).
11. Certified that the above plots have no future potential for regration or industrial use (applicable in case Non-forest Govt.land)

Divisional Forest Officer
Rourkela Division

Section Inspector
Sundergarh

FOREST RANGE OFFICER
BIRMITRAPUR RANGE

TEHSILDAR
BIRMITRAPUR

CERTIFICATE ON DSS ANALYSIS FOR CA/ACA/PCA

This is to certify that DSS Analysis of land identified for CA/ACA/PCA and subsequent ground truthing have been done. The outcome is as mentioned below

Sl No	Name of Range	Name of the forest Block/RF /PRF/PF/ DPF/Other than Forest)	Area details for CA/ACA /PCA(in ha)	Classification of identified land (in ha)							Area suitable for plantation in ha				Plantation Model (adopted)	Remarks
				Very Dense Forest	Moderately Dense Forest	Open Forest	Non Forest	Scrub	Water	Total	Open Forest	Non-Forest	Scrub	Total		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Bhamanda	Non Forest Land	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Block Plantation NET AREA 63 HA. @ 1600 PLANTS/HA & strip plantation 32 HA @ 900 PLANTS/HA	[illegible]

Divisional Forest Officer
Rourkela Forest Division

CERTIFICATE ON DSS ANALYSIS FOR CA/ACA/PCA

This is to certify that DSS Analysis of land identified for CA/ACA/PCA and subsequent ground truthing have been done. The outcome is as mentioned below:

Sl. No.	Name of Range	Name of the Forest Block/RF (Plain/Hill/Reserve Forest)	Area identified for CA/ACA/PCA (in ha)	Classification of identified land (in ha)							Area suitable for plantation in ha				Plantation Model (AR/Afr/R)	Remarks
				Very Dense Forest	Moderately Dense Forest	Open Forest	Non-Forest	Scrub	Water	Total	Open Forest	Non-Forest	Scrub	Total		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Bisramkela	Non-Forest Land	113.813	0	15.813	32.0	66.0	0	0	113.813	32.0	66.0	0	98.0	Block Plantation RF1 AR/ A R/ 1110, @ 1600 PLANTS/HA & AR/ gap plantation near V/ 114 @ 900 PLANTS/HA	0

Divisional Forest Officer
Rourkela Forest Division

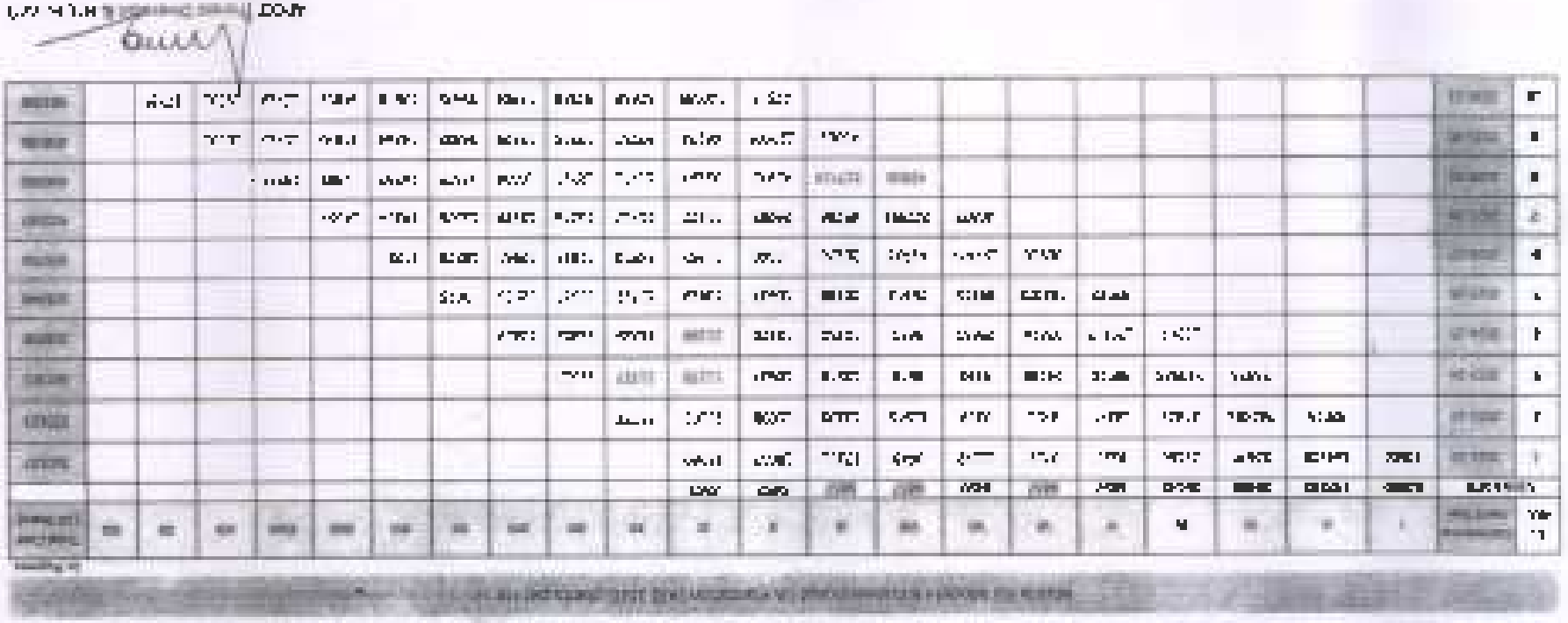
ANNEXURE-5

BASIS COST NORM FOR COMPENSATORY AFFORESTATION (BLOCK PLANTATION) @ 1600 PLANTS PER HECTARE (10 months old seedling)

WAGE RATE Rs. [illegible] PER MANDAY

Sl. No	Items of work	Periodicity Period of Execution	No of Mandays	Labour Cost (In Rs.)	Material Cost (In Rs.)	Total cost (Rs/Ha)
1	2	3	4	5	6	7
Pre Year (Advance work) Pre Planting Operation						
1	Survey, Demarcation and Pillar posting	Nov/Dec	2	633	0	633
2	Preparation of Treatment Map (Digital Map)	Nov/Dec	1	317	500	817
3	Site preparation (Clearing & removal of debris)	Nov/Dec	12	7732	0	7732
4	Creation of 5.00 m wide inspection Path	Feb/Mar	1	233	0	233
5	Alignment and marking	Feb/Mar	2	633	0	633
6	Digging of pits (45 cm x 45 cm X 45 cm) in hard and gravelly soil	Feb/Mar	64	19004	0	19004
7	Construction of Temporary Labour Shed, Drinking water facility and First-Aid etc.	Jan/Mar	1	0	4500	4500
	Total		83	26552	5000	31552
1st Year, Planting Year						
1	Refilling of pits by shoring the dug-out soil of the pits, application of Organic components/ Chilly/ FYM etc. mixing the same properly.	Jun/Jul	12	3797	8000	11732
2	Transportation of 10 months old polypot seedlings in hired truck /tractor from the [illegible] nursery to planting site including Loading & unloading (Average load of 10 Nos.) & Making the seedlings @ Rs.6/- per Seedling (1760 nos.)	Jul/Aug	0	0	10560	10560
3	Watering the polypot seedlings at planting site	1 st Aug	2	633	0	633
4	Conveyance of polypot seedlings at [illegible] plantation seedling site to individual target plantation site in planting site, applying insecticide, fertilizer, in plant pit after scraping the soil with other appropriate tools & pressing the soil properly around the planted seedlings.	1 st Aug	44	13596	0	13596
5	Cost of Fertilizer & Insecticide (a) NPK/Bio-fertilizer @ 50 gms/plant x [illegible] plants = [illegible] kg @ Rs.10/- per kg = Rs. 2112.00 (b) Urea/Vermicompost/Bio Khaad/Super phosphate to be in two subsequent doses @ Rs. 1,200.00 (c) Insecticide/ Bio pesticide @ 5 gms/plant= 8 kg @ Rs.150/- per kg = Rs. 1200.00	1st Aug	3	0	4812	4,000

Sl. No.	Name of work	Periods per Period of Reception	No of Mandays	Labour Cost (in Rs.)	Material Cost (in Rs.)	Total cost (in Rs.)
1	2	3	4	5	6	7
	3rd Year Maintenance					
4	Cost of Fertilizer/kg/NPK/Bio-fertilizer/Vermicompost/Mc Rock/any other fertilizer	Apr/Mar	0	0	4000	4000
4	Weeding, Hoeing & Soil working (Inter cultivation around the plants)	Aug/Nov	40	8240	0	8240
5	Pits Excavating @ rs. 400/- Pits Excavation 400 cu.ft including maintenance of inspection path	Feb/Mar	2	800	0	800
6	Watch & Ward for 4 guards @ Rs. 6000/- per month each	Apr/Mar	12	72000	0	72000
7	Expenses on temporary establishment (Fencing, repairing of well, pump set, Pipeline etc.)	Apr/Mar			1000	1000
	Total		42	81040	5000	86040
	4th Year Maintenance					
1	Pits Excavating @ rs. 400/- Pits Excavation 400 cu.ft including maintenance of inspection path	Feb/Mar	2	800	0	800
2	Watch & Ward	Apr/Mar	10	60000	0	60000
	Total		12	60800	0	60800
	5th Year Maintenance					
1	Pits Excavating @ rs. 400/- Pits Excavation 400 cu.ft including maintenance of inspection path	Feb/Mar	2	800	0	800
2	Watch & Ward	Apr/Mar	10	60000	0	60000
	Total		12	60800	0	60800
	6th Year Maintenance					
1	Pits Excavating @ rs. 400/- Pits Excavation 400 cu.ft including maintenance of inspection path	Feb/Mar	2	800	0	800
2	Pruning of branches, Training use of multiple shoots	Jun/Mar	5	10000	0	10000
3	Watch & Ward	Apr/Mar	10	60000	0	60000
	Total		17	70800	0	70800
	7th Year Maintenance					
1	Pits Excavating @ rs. 400/- Pits Excavation 400 cu.ft including maintenance of inspection path	Feb/Mar	2	800	0	800
2	Watch & Ward	Apr/Mar	10	60000	0	60000
	Total		12	60800	0	60800
	8th Year Maintenance					
1	Pits Excavating @ rs. 400/- Pits Excavation 400 cu.ft including maintenance of inspection path	Feb/Mar	2	800	0	800
2	Watch & Ward	Apr/Mar	10	60000	0	60000
	Total		12	60800	0	60800
	9th Year Maintenance					
1	Pits Excavating @ rs. 400/- Pits Excavation 400 cu.ft including maintenance of inspection path	Feb/Mar	2	800	0	800
2	Watch & Ward	Apr/Mar	10	60000	0	60000



ANNEXURE-I

Item Cost Norms for Compensatory Afforestation through Assisted Natural Regeneration (ANR) of 100 Seedlings/Ha.

WASTELANDS (ALL) FREE AGENCY

Sl. No	Items of work	Preferable Period of Execution	No of Mandays	Labour Cost (in Rs.)	Material Cost (in Rs.)	Total cost (in Rs.)
	1st Year (Assisted weeding, Pre-Planting operations)					
1	Boring, Demarcation and Pillar pointing	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	Preparation of Treatment Map (Digital Map)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	Site preparation	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	Excavation operations including demarcation of lines, cutting of shrubs, slight leveling, digging of pits to a minimum of 1m cut after drying these pits back to ground level	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	Mobilization and awaiting for digging of pits	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	Digging of pits [illegible] and refilling of pits with [illegible] soil mixed with [illegible] and partially soil	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Total		[illegible]	[illegible]	[illegible]	[illegible]
	1st Year Planting cost					
1	Marking of pits by altering the diagonal axis of the pits, application of inorganic components (DAP/ FYM & retaining the same partially)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	Transportation of Fill saplings and polythene bag seedlings to field levels (Tractor from [illegible] premises/Departmental planting site including Loading & unloading (Manager level at 10 Kms) & Backing the seedling [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	Planting polythene bag seedlings at marking site of plantation	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	Conveyance of polythene bag seedlings on head load from the planting site to individual dugout pits, distributing planting site, supplying inorganic [illegible] covering the soil with other applied materials [illegible] the seedlings around the planted seedling.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	Cost of Fertilizers & Insecticides [illegible] [illegible] Rs. 375.00 [illegible] Rs.1500 per Ha.= Rs. 2250.)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	Casualty Replacement @ 10% (10 nos)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7	Harrowing & Weeding	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Sl. No	Name of work	Probable Period of Execution	No of Mandays	Labour Cost (in Rs.)	Material Cost (in Rs.)	Total cost (in Rs.)	
Sl. no	Item	No. persons each	Labour cost @ Rs 311/per day (D)	Material cost	Material for Embankment, Guarding, Compaction and Other contingency (10% of D+E)	Total workings 30% of D per workings	Grand total
1	2	3	4	5	6	7	8
1	[illegible]	45	[illegible]	[illegible]	[illegible]	0.00	[illegible]
2	[illegible]	450	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	450	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	[illegible]	450	[illegible]	[illegible]	[illegible]	0.00	[illegible]
5	[illegible]	15	[illegible]	0.0	[illegible]	0.00	[illegible]
6	[illegible]	15	[illegible]	0.0	[illegible]	0.00	[illegible]
7	[illegible]	15	[illegible]	0.0	[illegible]	0.00	[illegible]
8	[illegible]	15	[illegible]	0.0	[illegible]	0.00	[illegible]
9	[illegible]	15	[illegible]	0.0	[illegible]	0.00	[illegible]
10	[illegible]	15	[illegible]	0.0	[illegible]	0.00	[illegible]
11	[illegible]	15	[illegible]	0.0	[illegible]	0.00	[illegible]
	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Notes:

1. Priority must be given to the indigenous local species available nearby for the site of plantation.
2. 10 % indigenous shrub bearing trees should be preferred in Plantation.
3. Site specific Soil conservation work like CCTs, Gully Plugging, Staggered Trench, Contour Trench, Loose Boulder Check, etc. may be taken up.
4. Open hole bearing can be adopted in the CA plantations taken up outside the forest area and Bamboo / any Planting may be preferred in CA plantations.
5. Watering facilities for ensuring survival of saplings & watering may be adopted as per the requirements of lands.
6. The cost factor of various items can be changed with the approval of the concerned [illegible]

[illegible]

[illegible]

Sl.No	Item of Works	Protectable Period of Execution	Total Cost
	0-0 Year [Pre-Cleaning Operation]		0
1	NIL		
	1st Year		
2	Soil Conservation measure structures like Staggered Trench, Percolation pit, Contour trench, Graded earthen bund, CCCD, Wire mesh GBCD, Gabion surface Dyke & WHS as per the slope & site requirement (I)	4ps/Sqm.	23.7[illegible]
	2nd Year		
3	Maintenance of SMC structures @ 10 % of initial area cost	4ps/Sqm	3,011
	3rd Year		
4	Maintenance of SMC structures @ 15 % of initial year cost	4ps/Sqm	3,011
	4th Year		
5	Maintenance of SMC structures @ 15 % of initial year cost	4ps/Sqm	3,011
	5th Year		
6	Maintenance of SMC structures @ 15 % of initial year cost	4ps/Sqm	3,011
	Total		35,565.0

Sl. No	Year	No. person days	Labour cost @ Rs. 311/-per day	Material Cost	Total cost (Rs.)
1	0th year	0.0	0.0	0.0	0.0
2	1st year	0.0	0.0	23,711.0	23,711.00
3	2nd year	0.0	0.0	3,011.00	3,011.00
4	3rd year	0.0	0.0	3,011.00	3,011.00
5	4th year	0.0	0.0	3,011.00	3,011.00
6	5th year	0.0	0.0	3,011.00	3,011.00
	Total	0.0	0.00	35,765.0	35,765.0

Different types of SMC structures may be taken up as per the scope & requirements of the plan/site also use of the design & specification of different structures enclosed along this document.

ADEE (Forest Division & WS, PC Hill)

Sl. No	Items of work	Profile with Method of Execution	Man days	Wages	Material cost (Rs)	Total Cost (Rs per Ha.)
	1st Year (FYM)					
1						
2						
3						
4						
5						
6						
7						
8						
	TOTAL					
	1st Year Maintenance					
1						
	2nd Year Maintenance					
1						
	3rd Year Maintenance					
1						
	4th Year Maintenance					
1						
	5th Year Maintenance					
1						
	6th Year Maintenance					
1						
	7th Year Maintenance					
1						
	8th Year Maintenance					
1						
	9th Year Maintenance					
1						
	10th Year Maintenance					

SCHEME FOR ADDITIONAL COMPENSATORY AFFORESTATION (ACA) OF

AREA 2.731 HA. @1000 PLANTS

OF

DHAROPANI PROTECTED FOREST LAND

IDENTIFIED BENGALI RANGE

UNDER

SAMBALPUR FOREST DIVISION

IN LIEU OF DIVERSION OF 112.621 HA OF FOREST LAND IN RESPECT OF NETRAHANDHA PAHAR IRON ORE

BY

M/s BHUSAN POWER & STEEL LIMITED

Prepared By

DIVISIONAL FOREST OFFICER,

SAMBALPUR FOREST DIVISION

SCHEME FOR ADDITIONAL COMPENSATORY AFFORESTATION OF NETRABANDHA PAHAR IRON ORE MINES BY M/s. BHUSAN POWER & STEEL LTD.

INTRODUCTION:

M/s. Bhusan Power & Steel Ltd. has applied for mining lease for exploitation of Iron ore over an area of 112.621 Ha. of forest land including safety Zone (1.808ha) in Netrabandha Iron Ore mines situated in Bonai Sub-Division of Sundergarh District.

IDENTIFICATION OF LAND:

District - Sambalpur

Division- Sambalpur Forest Division

Range - Rengali Range

Tahasildar, Bimanitrapur Tahasil have identified 109.897 Ha. non-forest Govt. land in the village- Jhurmur (50.829 ha) and Jaidega (59.068ha). The rest area M/s. Bhusan Power & Steel has transferred through gift deed and mutated in favour of the State Forest Department located in Dharapani Protected Forest under Rengali Tahasil of Sambalpur District in lieu of Forest area proposed for diversion involved in Netrabandha Pahar Iron Ore Block of M/s. Bhusan Power & Steel Ltd.

Sl. No.	Name of Village	Khata No.	Plot No.	Kisam	RoR Area in Ha.	Proposed Area in Ha.
1	Dharapani	181/243	1522	Gharuburi (Karukhana)	2.0639	2.0639
2		181/243	1523	Gharuburi (Karukhana)	0.5625	0.5625
3		181/242	1381/2090	Gharuburi (Karukhana)	0.0850	0.0850
4		185/3	1381/2094	Gharuburi (Karukhana)	0.0202	0.0202
Total					**2.7316**	**2.7316**

The purpose of this scheme is to make good the loss of protected forest land to be diverted for this diverted for this development work which is non-forestry in nature. Apart

from this, as per the provision of Forest Conservation Act and rules , it is obligatory to formulate a suitable scheme for the purpose of Compensatory Afforestation with a view to keep over all forest area intact. So compensatory Afforestation is required both from legal and environmental point of view.

OBJECTIVE OF THE SCHEME:

1. To enhance the environmental condition of locality.
2. To conserve soil and moisture of Protected Forest area.
3. To provide fuel wood and small timber to local consumers.

SITE SELECTION:

- **GPS READING OF SURVEYED POINTS:**

GPS reading of the area taken up for Afforestation in Dharapani Protected Forest, Rengali Forest Range under Sambalpur Division of Sambalpur District for Additional Compensatory Afforestation area:

CO-ORDINATES OF ACA BOUNDARY POINTS						
PATCH-1						
Sl. No.	POINT ID	EASTING	NORTHING	LONGITUDE	LATITUDE	DISTANCE IN METER
1	1	199574.581	2406053.577	84°05'44.92384"	21°43'57.44616"	9.084
2	2	199578.302	2406045.290	84°05'45.05862"	21°43'57.17935"	19.503
3	3	199583.547	2406026.505	84°05'45.25318"	21°43'56.57224"	23.68
4	4	199590.855	2406003.981	84°05'45.52200"	21°43'55.84507"	4.365
5	5	199594.386	2406001.087	84°05'45.64665"	21°43'55.75320"	13.588
6	6	199607.863	2405999.354	84°05'46.11634"	21°43'55.70613"	6.758
7	7	199609.618	2405992.828	84°05'46.18161"	21°43'55.49420"	17.801
8	8	199618.933	2405977.541	84°05'46.51546"	21°43'55.00333"	15.039
9	9	199623.846	2405963.327	84°05'46.69554"	21°43'54.54460"	35.818
10	10	199625.123	2405927.533	84°05'46.76330"	21°43'53.38261"	15.695
11	11	199629.243	2405912.387	84°05'46.91646"	21°43'52.89317"	25.857

12	12	199629.011	2405886.531	84°05'46.92526"	21°43'52.05314"	30.645
13	13	199608.370	2405886.922	84°05'46.30740"	21°43'52.05325"	147.071
14	14	199461.757	2405875.324	84°05'41.11774"	21°43'51.58705"	26.52
15	15	199436.059	2405868.774	84°05'40.22861"	21°43'51.35860"	11.012
16	16	199425.054	2405868.384	84°05'39.84625"	21°43'51.33921"	8.926
17	17	199416.133	2405868.697	84°05'39.53590"	21°43'51.34391"	30.589
18	18	199413.683	2405899.188	84°05'39.43078"	21°43'52.33287"	25.789
19	19	199413.772	2405924.977	84°05'39.41703"	21°43'53.17065"	8.294
20	20	199414.819	2405933.205	84°05'39.44806"	21°43'53.43855"	25.923
21	21	199411.510	2405958.914	84°05'39.31022"	21°43'54.27163"	14.663
22	22	199422.674	2405968.421	84°05'39.69813"	21°43'54.58729"	15.481
23	23	199436.572	2405975.240	84°05'40.17687"	21°43'54.81730"	19.913
24	24	199453.215	2405986.171	84°05'40.74833"	21°43'55.18258"	13.651
25	25	199465.970	2405991.036	84°05'41.18862"	21°43'55.34835"	20.208
26	26	199486.152	2405992.052	84°05'41.88964"	21°43'55.39366"	10.129
27	27	199493.814	2405988.577	84°05'42.15168"	21°43'55.61855"	97.659

PATCH-2						
Sl. No.	POINT ID	EASTING	NORTHING	LONGITUDE	LATITUDE	DISTANCE IN METER
1	28	199353.436	2405942.352	84°05'37.30802"	21°43'53.69823"	3.863
2	29	199357.299	2405942.358	84°05'37.44232"	21°43'53.70076"	7.174
3	30	199364.473	2405942.402	84°05'37.69168"	21°43'53.70658"	11.915
4	31	199369.123	2405953.372	84°05'37.84617"	21°43'54.06576"	5.119
5	32	199371.495	2405957.908	84°05'37.92569"	21°43'54.21455"	9.715
6	33	199374.200	2405948.579	84°05'38.02604"	21°43'53.91318"	14.578
7	34	199376.892	2405934.166	84°05'38.11146"	21°43'53.44632"	32.264
8	35	199376.045	2405901.804	84°05'38.12049"	21°43'52.39748"	17.543
9	36	199359.345	2405897.578	84°05'37.53923"	21°43'52.24754"	5.066
10	37	199354.316	2405896.701	84°05'37.36843"	21°43'52.21586"	25.546
11	38	199353.852	2405922.243	84°05'37.33582"	21°43'53.04527"	20.113

DETAILS OF SITE SELECTED:

Due to biotic interference, erratic rainfall, prolonged heat conditions like vegetation is in degraded condition. This results to bushy growth, pole size crop with scattered matured trees. The growing stock is struggling against the biotic interference like grazing, fire hazard and fire wood collection by nearby villagers. However, whatever regeneration is sprouting does not grow vigorously due to biotic interference by fringe villagers encircling that PFs.

a) Crop Composition:

The main species noticed around the PRF are Sal (*Shorearobusta*), Asan(Terminaliaalata),Dhaura(Anogeissuslatifolia),Moi(Lannescoromandelica),Salai(Boswel liaserrata), Kendu (Dyospyrosmelanoxylon),Simal(Bombaxceiba),Char(Buchananialanzan) and salia bamboo(Dendocalamusstrictus) with shrubs and herbs of profound importance tomaintain the Bio diversity.

b) Temperature:

The average annual temperature varies from 15^{0}C to 40^{0}C the minimum being in December - January and the maximum in May-June.

c) Rainfall:

The annual rainfall varies from 780 to 1880mm. The annual average rainfall is 1500mm.The maximum rainfall is received during the rainy season from July to August.

d) Climate:

The area experience Sub-tropical climate. It is characterized by very hot summer and cool winter. Maximum temperature during summer rises up to 40^0 C and minimum goes down to 8^{0}C. The area gets rain from South-East Monsoon, which breaks during June and continues up to last week of September. The rainfall is fairly uniform throughout the Division.

OBJECTIVE OF THE SCHEME:

1. To restrict the degradation by reducing the biotic interference to barest minimum and reverse the trend towards the process of restoration of vegetation.
2. To develop the forest by providing site-specific silvicultural treatment.

3. To conserve soil and moisture of area.

4. To facilitate the boosting of natural regeneration and ensure their establishement.

5. To generate employment to the villagers living around the identified area.

6. To improve the bio-diversity of these blocks.

7. To create awareness among the local on protection and maintenance of plantation and forest.

8. To meet the need of the local villagers with regard to fire wood small timber depending upon the productivity (from silvicultural operations like thining, subsidiary silvicultural operation, climber cutting, cutting of high stumps, double shoot cutting etc.)

ITEMS OF WORKS TO BE TAKEN UP:

To achieve the objective narrated in the foregoing para, the following items of work are mainly prescribed to be taken up.

1. Plantation in AR Block @ 1000 Plants per Ha. with 10 year maintenance, in Dhorapani PF (2.731 Ha.) of Rengali Range.

2. Watering provision to the above Plantation Site as per one time cost norm for CA.

3. SMC Provisions as per one time Cost Norm for CA.

4. Fencing Provisions Iron Angle & Chain Link (Fencing Model F-II) as per one time Cost Norm for CA.

5. Cattle Proof Trench as per one time Cost Norm for CA.

PLANTATION TECHNIQUE:

The area should be well demarcated before raising plan by GPS survey and fixing of Boundary pillar (where missing) by engraving there on the co-ordinates and distance to next pillar. As far as possible weeds will be removed especially prior to flowering time in order to prevent fruiting and dispersal of seeds. Preferably indigenous species are to be planted in the area coupled with soil and moisture conservation measures.

a) **Survey and Demarcation of Boundary:**

The boundary line of this block will be cleared of weeds at a width of 5m. and stone pillars will be constructed at every curvature, The Proposed Compensatory Plantation area will be surveyed and demarcated in the field by the user agency at the project cost by putting RCC pillars. Before on year of planting, the treatment area will be surveyed and demarcated in the field silvicultural cleaning will be done in this area to provide facility to dominant promisent species to grow faster than the others. The Plantation area will be indicated by signboards at corners or at points of intersection with roads, inspection paths and boundary lines. The signboard should contain the name of plantation site, area, scheme and year of planting, model of plantation, Project cost, species preferred and other details. Treatment map must be prepared before execution of work and the same should be approved by DFO with intimation to the RCCF.

b) **Fencing:**

As the area in nearer to the habitation and lies adjacent to the agricultural land and there is every chance of biotic interference to the plantation area. To protected the plantation from grazing and other biotic interference, it will be provided with Iron Angle and Chain Link wire mesh fencing (Fencing Model F-II) the periphery of the plantation site as per the cost norm provided by the PCCF, Odisha . The length of perimeter of the plantation site is = 836.616 meter.

c) **Cattle Proof Trench:**

The trench create a physical barrier that discourages cattle from entering the protected area. To protected the plantation area where livestock might cause damage, a type of barrier a deep ditch deigned to prevent livestock from entering the plantation area. It's typically constructed by digging a trench and placing the excavated soil on the side of the trench to create a small mound or barrier. The trench's dimensions and the mound's size are chosen to effectively deter cattle from attempting to cross or jump over it.

d) **Soil Moisture Conservation:**

Since the most of area is shiwals and alfisols type soil observed, various SMC measures should be constructed as provided in the one time Cost Norm for Compensatory Afforestation Scheme.

e) **Planting & Post-planting Operations:**

Core Block plantation shall be taken up with 1000 plants per hectares in Dhorapani CA at spacing of 2.5 m X 2.5 m. Alignment and pit marking should be done carefully

in slopes so that the horizontal distance between plants in a row remains 2.5 meters and not the distance measured along the slop. All post-planting measures like casualty replacement, soil working, manuring, fire protection etc. will be undertaken. Cost norm for Block plantation @ 1000 plant/ ha cost norm are furnished under one-time Cost Norm for Compensatory Afforestation Scheme section.

While taking up plantation, the following vital points shall be taken up for consideration:

- Care to be taken to raise healthy palatable seedling of minimum 30cm to 1 meter height and 10% extra of the required stock have to be raised.
- Pitting shall be invariably done during January-February. When the soil is moist by fall of dew. The sites being the slopes, pits shall be dug along with contours and alternate lines should be staggered. Planting shall be done at the onset of monsoon.
- Planting shall be done on the onset of monsoon to get full benefit of monsoon rain and planting should never be delayed.
- Fertilizer, insecticides and organic manure per plant should be applied at the time of planting carefully by mixing with top-soil so that the roots of seedlings do not come in direct contact with fertilizer.
- In case of any mortality of planted seedlings, it should be replaced with good seedlings as soon as possible for better success rate.
- Complete weeding in proper time will be done in AR site. Strip weeding will not be permitted.
- Soil-working and application of 2nd dose fertilizer per plant as per cost norm should be done in time.
- Since the area is provided with Iron Angle & Chain Link Fencing, watch & ward will be easier and the watchers may be engaged in weeding in problematic areas along with watch & ward of the site.

f) **Species:**

Although indigenous species are to be preferred in the plantation, considering adverse soil & moisture conditions we may go for hardy exotic species where required so that the plants are able to survive. For success of plantation in interior tribal areas, plantation of fruit and NTFP species plays a great role since economic species have a little value for local people. Considering the topography, soil and moisture availability of the plantation area, the following species will be planted

1. Pongamia pinnata (Karanja)
2. Terminalia belerica (Bahada)
3. Terminalia arjuna (Arjuna)
4. Pterocarpus marsupium (Bija)
5.Terminalia chebula (Harida)
6. Diospyros melanoxylon (Kendu)
7. Dalbergia latifolia (Paladi Sisoo)

The following operation will be taken up for plantation:

i) Raising of Nursery:

18th Month old seedlings will be planted on the selected CA site where the seedlings for the plantation shall be raised in the different permanent Nurseries of concerned CA Plantation Range of Sambalpur Forest Division and transportation of seedlings shall be done from each CN to Plantation site during planting period. Further 10% extra seedlings shall be raised to compensate and mitigate the eventuality of seedling casualty in the nursery. Standard nursery practices shall be followed for raising to seedling in polythene bags.

ii) Alignment and Pitting:

Alignment and Pitting will be taken up in the same month of March-April. Pits size 45cm X 45cm will be dug maintaining a spacing of 2.5mtr X 2.5mtr @1000 seedlings per Ha. It is proposed to taken up Plantation in the identified gaps of minimum 0.4ha or more.

iii) Actual Plantation:

The seedlings will be planted @1000 seedlings per ha in the dugout pits of size 45cm X 45cm X 45cm with a spacing of 2.5mtr X 2.5mtr plantation shall be taken up after first regular shower of monsoon and completed by the end of July. Species will be planted as per suitability of the soil conditions. As per norm application of manure & fertilizer of desired dose must be applied. Anti termite insecticide should also be applied to each pit while planting casualties if any termite should be replaced with the excess seeding raised for the purpose. During 2nd year also causality replacement will be done for which seeding shall be raised.

iv) Weeding, Soil working & Manuring:

For establishment and better growth of the planted seeding, circular weeding, soil working and manuring are necessary. It is prescribed that two weedings, soil working and manuring will be done during the first year. During the first year & second year, first weeding and manuring shall be carried out during August-September and the second one during

October-November. First weeding shall be an entire area weeding (Scraping) and the second year will be a strip weeding which will be carried out during August.

v) Application of Insecticides:

The Plantation site after planting good healthy seedlings may cause influx of insects, which usually eat and damage the tender leaves and shoots of the plants. To get rid of such insect attack, application of insecticides will be taken up in required doses at desired intervals. Spraying of insecticides shall be done preferably in a sunny day in the forenoon as per requirement.

vi) Fire line tracing and maintenance:

Fire causes heavy losses to the forest & plantation during fire season. To prevent incidence of fire , the area shall be divided in to suitable blocks by tracing fire lines. Boundaries of the plantation patches and these block lines will be scrapped of the growth to a width of 3mtr during February-March and the cut back materials and dry leaves stacked along these lines will be brunt under strict supervision.

MOTIVATION OF PEOPLE:

As per Govt. resolution of 1993 and 2011, the villagers of the Dhavpani of Rengali Range is to be involved in protection and management of plantation. Before execution of the work, a meeting will be conducted in the village and resolution regarding support to plantation activities will be made. To motivate the people in this direction, they will be provided with incentives in shape of different community articles, buildings and different community amenities of fixed and movable type through entry point activities (EPA). Health camps shall be organized in the village.

INSPECTION, MONITORING & EVALUATION:

It was told by Late H.F. Mooney, Conservator of Forest that every visit of Forest Officer to plantation site will add manure to the plantation. Therefore, to make this Afforestation scheme successful, intensive inspection of the plantation by forest field staff and the officers at different level is required. Moreover, for frequent monitoring & evaluation proper infrastructure facility shall have to be made in the scheme.

CONTROL:

The nursery journal, the plantation journal micro planning with other records shall be maintained for each patch separately in accordance with the provision of

"The Odisha Forest Plantation" Manual 1977 indication the Physical and Financial achievements. Necessary entries with regard to plantation activities undertaken shall be entered in the journals and shall be produced before the inspecting officers. The date of inspection and comments of the visitor will also find place in the journal.

EXECTING AGENCY:

The divisional Forest Officer, Sambalpur Division through his staff will execute the scheme as per fund to be provided by the User Agency.

Cost norm for Core plantation @1000 seedling/Ha. is given in **Annexure-I.**

The Matrix for Core plantation @ 1000 seeding /Ha. with 10 year maintenance is given in **Annexure-II.**

The cost norm of Iron Angle & Chain Link (Fencing Model F-II of cost norm for CA communicated by the PCCF, Odisha) is given in **Annexure-III.**

The Matrix for fencing with 10 year maintenance is also given in **Annexure-IV.**

The Matrix for fencing with 10 year maintenance is also given in **Annexure-V.**

The cost norm of watering (watering Model W-II for CA - Bore well fitted with Diesel pump Set /5Ha plantation) is given in **Annexure-VI.**

The cost norm for soil & Moisture Conservation (SMC) works is given in **Annexure-VII.**

The Matrix for soil & Moisture Conservation is given in **Annexure-VIII.**

Analysis of Rate for Cattle Proof Trench is given in **Annexure-IX.**

Detailed estimate for excavation of cattle proof trench is given in **Annexure-X.**

FIANCIAL OUTLAY

TOTAL PROJECT COST OF THE COMPENSATORY AFFORESTATION PLANTATION SCHEME

The total financial outlay for proposed Additional Compensatory plantation (@1000 plants per Ha.) with indigenous and fruit bearing species over 2.731 Ha. at Dhuropani Protected Forest under Rengali Range of Sambalpur Forest Division :

TOTAL COST OF THE PROJECT

Sl. No.	Description of the Work	Unit Price	In Rupees
A	Block Plantation over 2.731 ha.@ Rs2,85,302/- (As per Matrix for the year **2025-26** for Gap Plantation @1000 seedling/Ha with 10 year maintenance)	2,85,302/- X 2.731	7,79,159.76
B	Fencing through Iron Angle & Chain Link (Fencing Model F-II as per Matrix for the year **2025-26** @Rs.5,09,705/-per Ha.) Length of perimeter patch-I = 683.96 /250 = = 2.735 Length of perimeter patch-II = 152.656 / 250 = 0.610 Total length of perimeter = 2.735 + 0.610 = 3.345 Rmt Rate as per Matrix F-II for 2025-26 =Rs.5,09,705/-Ha-250mt. For 3.345 Ha.	5,09,705/- X 3.345	17,04,963.22
C	Provision for watering Model W-II Bore well fitted with Diesel pump set as per Matrix for the year **2025-26** @ Rs. 5,81,372 /- for 5 Ha.	5,81,372/- X 2.731	15,87,726.93
D	Provision for soil & Moisture Conservation as per Matrix for the Year **2025-26** @ Rs.43,310/-per Ha. X 2.731	43,310/- X 2.731	1,18,279.61

E	Cattle Proof Trench @ Rs 836.616 Rmt (1km)		936855
Total			**51,26,984.52**
F	20 % Escalation cost		**10,25,396.90**
Grand Total			**61,52,381.42 Or say 61,52,381**
(Rupees Sixty One Lakhs Fifty Two Thousand Three Hundred Eighty One only)			

Monitoring mechanism: - The scheme shall be executed by the department staff through regular inspection and checking. All prescribed records are to be maintained by the department staff.

Any other information: - Work to be carried out as per the technical advice of the concerned forestry experts such as D.F.O, ACF and Range Officer concerned.

Total cost of the project: - The total cost of the project will be **Rs. 61,52,381/- (Rupees Sixty One Lakhs Fifty Two Thousand Three Hundred Eighty One only)** which shall be payable by the User Agency.

Divisional Forest Officer
Sambalpur Forest Division

Annexure – I

CORE PLANTATION BASE COST NORM FOR COMPENSATORY AFFORESTATION @ 1000 SEEDLING/ Ha. WITH 10 YEAR MAINTENANCE						
			WAGES RATE	462	PER MANDAY	
Sl. No.	Items of work	Preferable Period of Execution	No of Mandays	Labour Cost (In Rs)	Material Cost (In Rs)	Total Cost (In Rs)
1	2	3	4	5	6	7
0th Year (Advance work) Pre-Planting Operation						
1	Survey, Demarcation and Pillar posting	Nov/Dec	2	924.00	0.00	924.00
2	Preparation of Treatment Map (Digital Map)	Nov/Dec	1	462.00	100.00	562.00
3	Site preparation (Cleaning & removal of debrises)	Nov/Dec	12	5544.00	0.00	5544.00
4	Creation of 4.00 mt wide Inspection Path	Feb/Mar	1	462.00	0.00	462.00
5	Alignment and stacking of pits	Feb/Mar	1	462.00	0.00	462.00
6	Digging of pits (45 cm x 45 cm x 45 cm) in hard and gravelly soil	Feb/Mar	40	18480.00	0.00	18480.00
7	Construction of Temporary Labour shed, Drinking water facility and First Aid, etc.	Jan/Mar	0	0.00	3500.00	3500.00
Total			57	26334.00	3600.00	29934.00
1st Year -Planting Year						
1	Refilling of pits by altering the dug-out soil of the pits, application of Organic compounds/CDM/FYM & mixing the same properly.	Jun/Jul	7.5	3465.00	8000.00	11465.00
2	Transportation of 18 months old polythene bag seedlings in hired truck/tractor from the permanent/Mega nursery to planting site including Loading & unloading, (Average lead of 10 Rkm) & Stacking the seedling @ Rs.6/- per Seedling. (220 nos.)	Jul/Aug	0	0.00	10560.00	10560.00
3	Watering the polypot seedlings at planting site	Jul/Aug	2	924.00	0.00	924.00

4	Conveyance of polypot seedlings on head load from the stacking site to individual dugout pits within the planting site, applying insecticide, fertilizers & planting after scooping the soil with other applied materials & pressing the soil properly around the planted seedlings.	Jul/Aug	22.5	10395.00	0.00	10395.00
5	**Cost of Fertilizer & Insecticide** (a) NPK/Bio-fertilizer @ 50 gms/plant as basal dose = 50kg @ Rs. 30/- per kg = Rs.1500/- (b) Urea/Vermicompost/ Mo Khata/any other fertilizer @ Rs.750/- (c) Insecticide/Bio-pesticide @ 5 gms/plant = 5 kg @ Rs. 150/-per kg = Rs.750/-	Jul/Aug	0	0.00	4800.00	4800.00
6	Casualty Replacement @ 10% (100 nos.)	Jul/Aug	2.5	1155.00	0.00	1155.00
7	1st weeding & mamuring	Aug/Sept	12	5544.00	0.00	5544.00
8	2nd Weeding, Soil working (1mt. Diameter around the plants) and Manuring	Oct/Nov	15	6930.00	0.00	6930.00
9	Fire line tracing (2m. Wide fire line over 400m. Long) including maintenance of inspection path	Feb/Mar	3	1386.00	0.00	1386.00
10	Watch & Ward including watering as per requirement	Aug/Mar	12	5544.00	0.00	5544.00
Total			**76.5**	**35343.00**	**23360.00**	**58703.00**
2nd year Maintenance						
1	Transportation of 100 seedlings from Nursery to plantation site including loading, unloading & conveyance by Tractor @ Rs.6/- per seedlings	Jul	0	0.00	960.00	960.00
2	Casualty replacement-10%	Jul	2.5	1155.00	0.00	1155.00
3	Cost of Fertilizer & Insecticide - (A) Cost of Insecticide/Bio-pesticide (Themet/Forate) @ 5 gms/plant = 0.5kg @ Rs. 150/- per kg = Rs. 75/-	Jul/Aug	0	0.00	4606.00	4606.00

	(B) Urea/NPK/Bio-fertilizer/Vermicompost/Mo Khata/any other fertilizer @ Rs. 2800/-					
4	Complete weeding, Manuring & Soil working (1mt. Diameter around the plants)	Sep/Oct	15	6930.00	0.00	6930.00
5	Fire line tracing (2m. Wide fire line over 400m long) & Inspection path	Feb/Mar	3	1386.00	0.00	1386.00
6	Watch & Ward including watering as per requirement	Apr/Mar	18	8316.00	0.00	8316.00
7	Maintenance of Temporary Labour shed, Drinking water facility and First Aid etc.	Apr/Mar	0	0.00	1000.00	1000.00
Total			**38.5**	**17787.00**	**6566.00**	**24353.00**
3rd year Maintenance						
1	Cost of Fertilizer: Urea/NPK/Bio-fertilizer/Vermicompost/Mo Khata/any other fertilizer)	Jul/Aug	0	0.00	4486.00	4486.00
2	Complete weeding, Manuring & Soil working (1mt. Diameter around the plants)	Sep/Oct	15	6930.00	0.00	6930.00
3	Fire line tracing (2m. Wide fire line over 400m long & Inspection path	Feb/Mar	3	1386.00	0.00	1386.00
4	Watch & Ward including watering as per requirement	Apr/Mar	18	8316.00	0.00	8316.00
5	Maintenance of Temporary Labour shed, Drinking water facility and First Aid etc.	Apr/Mar	0	0.00	1000.00	1000.00
Total			**36**	**16632.00**	**5486.00**	**22118.00**
4th year Maintenance						
1	Fire line tracing (2m. Wide fire line over 400m long) including maintenance of inspection path	Feb/Mar	3	1386.00	0.00	1386.00
2	Watch & Ward including maintenance of vegetative fencing	Apr/Mar	18	8316.00	0.00	8316.00
Total			**21**	**9450.00**	**0.00**	**9450.00**
5th year Maintenance						
1	Fire line tracing (2m. Wide fire line over 400m long) including maintenance of inspection path	Feb/Mar	3	1386.00	0.00	1386.00
2	Watch & Ward	Apr/Mar	18	8316.00	0.00	8316.00
Total			**21**	**9702.00**	**0.00**	**9702.00**

6th year Maintenance						
1	Fire line tracing (2m. Wide fire line over 400m long)	Feb/Mar	3	1386.00	***0.00	1386.00
2	Pruning of branches, Singling out of multiple shoots	Jan/Mar	3	1386.00	0.00	1386.00
3	Watch & Ward	Apr/Mar	18	8316.00	0.00	8316.00
Total			**24**	**11088.00**	**0.00**	**11088.00**
7th year Maintenance						
1	Fire line tracing (2m. Wide fire line over 400m long)	Feb/Mar	3	1386.00	0.00	1386.00
2	Watch & Ward	Apr/Mar	18	8316.00	0.00	8316.00
Total			**21**	**9702.00**	**0.00**	**9702.00**
8th year Maintenance						
1	Fire line tracing (2m. Wide fire line over 400m long)	Feb/Mar	3	1386.00	0.00	1386.00
2	Watch & Ward	Apr/Mar	18	8316.00	0.00	8316.00
Total			**21**	**9702.00**	**0.00**	**9702.00**
9th year Maintenance						
1	Fire line tracing (2m. Wide fire line over 400m long)	Feb/Mar	3	1386.00	0.00	1386.00
2	Watch & Ward	Apr/Mar	18	8316.00	0.00	8316.00
Total			**21**	**9702.00**	**0.00**	**9702.00**
10th year Maintenance						
1	Fire line tracing (2 m. wide fire line over 400m length)	Feb/Mar	3	1386.00	0.00	1386.00
2	Watch & Ward	Apr/Mar	18	8316.00	0.00	8316.00
Total			**21**	**9702.00**	**0.00**	**9702.00**

Year wise Abstract of Cost Norm (Showing Seeding Cost separately)

Sl No.	Year	No. of Mandays	Labour cost @ Rs. 462/- per day (Rs)	Material Cost (In Rs)	MELD and other contingency (5%) of (4+5)	Cost of Seeding @Rs 58.31 per Seedlings	Total Cost (In Rs)
1	2	3	4	5	6	7	8
1	0th Year	57	26334.00	3600.00	1496.70	0.00	31430.70
2	1st Year	76.5	35343.00	23360.00	2935.15	88546.00	150184.15
3	2nd Year	38.5	17787.00	6566.00	1217.65	8050.00	33620.65
4	3rd Year	36.0	16632.00	5486.00	1105.90	0.00	23223.90
5	4th Year	21.0	9702.00	0.00	485.10	0.00	10187.10
6	5th Year	21.0	9702.00	0.00	485.10	0.00	10187.10
7	6th Year	24.0	11088.00	0.00	554.40	0.00	11642.40
8	7th Year	21.0	9702.00	0.00	485.10	0.00	10187.10
9	8th Year	21.0	9702.00	0.00	485.10	0.00	10187.10
10	9th Year	21.0	9702.00	0.00	485.10	0.00	10187.10
11	10th Year	21.0	9702.00	0.00	485.10	0.00	10187.10
	Total	**358**	**165396.00**	**39012.0**	**10220.40**	**96596.00**	**311224.40**

Matrix for Vested & Conventional Oil Plantation (40,000 plants per ha

S. No.	Conversion Variant Name	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII	XIX	XX	XXI	XXII	Total Cost (in Rupees)
Base Matrix																								
1																								
2																								
3																								
4																								
5																								
6																								
7																								
8																								
9																								
10																								

Annexure – III

Annexure – III

Fencing Model F-II						
Fencing through Angle Iron & Chain Link wire mesh						
WAGE RATE Rs.462/- PER DAY						
0th Year (PPO)						
Sl. No.	Items of Works	Preferable Period of Execution	Man Days	Wages	Material Cost (In Rs.)	Total Cost (Rs. Per Ha.)
1	Earth Work (Excavation of hole) in Hard soil at a distance 3 mt. 0.40m x 0.40mx 0.40m = 0.064 x84 = 5.376 cum @ Rs. 140/ cum = Rs. 753.		2.42	1118.04	0.0	1118.04
2	Cement Concrete (1:4:8) using 40mm BHG metal 84 x 0.40m x0.40m x 0.40m x 0.10m = 1.344 @ 3755.94 / cum				5,047.40	5,047.00
3	Angle Iron pole o size 50 mm x 50 mm x 6 mm of height 2.40 mt. 84 x 2.40 = 201.60 Sqmt. @ 4.50/kg/Sqmt. = 907.20 kg @69.50 per kg				63,050.00	63,050.00
4	Cement Concrete (1:2:4) for fixing the iron angle pole using 12 mm BHG Chips 84 x0.40m x 0.40 m x 0.30 = 4.032 cum @ 5486.77 / cum				22,123.00	22,123.00
5	Cost of Chain links mess using 4 mm Dia GI wire having gap size 50 mm x 50mm 250 Rmt x 2.10 mt. = 525 Sq. mt. @ 331/Sqmt. = Rs. 1,73,775				1,73,775.00	1,73,775.00
6	Double cost painting of iron angle pole over a coat of primer using good quality enamel paint 84 x 2.10 x 0.20 = 35.25 Sqmt. @ Rs. 108.80 / Sqmt.				3,838.00	3,838.00
7	Painting of GI chain links mess 250 x 2.10 x 2 = 1050/10 = 105 Sqmt.@ Rs. 108.80 Sqmt.				11,424.00	11,424.00

8	Transportation of Chain link mess, Iron angle, Straightening & tying of chain link mess etc. @ 2% of the total cost.				5,600.00	5,600.00
Total			**2.42**	**1118.04**	**284857.40**	**285975.04**
Rate per running mt. 2,85,975.04/250 = Rs. 1144/ Rmt						
		1st Year Maintenance				
No Maintenance is required		Sept./Oct	0	0	0	0
		2nd Year Maintenance				
Maintenance of wire mess fence		Sept./Oct	0	0	11000	11000
		3rd Year Maintenance				
Maintenance of wire mess fence		Sept./Oct	0	0	11000	11000
		4th Year Maintenance				
Maintenance of wire mess fence		Sept./Oct	0	0	11000	11000
		5th Year Maintenance				
Maintenance of wire mess fence		Sept./Oct	0	0	11000	11000
		6th Year Maintenance				
Maintenance of wire mess fence		Sept./Oct	0	0	11000	11000
		7thYear Maintenance				
Maintenance of wire mess fence		Sept./Oct	0	0	11000	11000
		8thYear Maintenance				
Maintenance of wire mess fence		Sept./Oct	0	0	11000	11000
		9thYear Maintenance				
Maintenance of wire mess fence		Sept./Oct	0	0	11000	11000
		10thYear Maintenance				
Maintenance of wire mess fence		Sept./Oct	0	0	11000	11000.

ABSTRACT					
Sl. No.	**Year**	**No. Person days**	**Labour cost @ Rs. 462/- per day**	**Material Coast**	**Total Coast (Rs.)**
1	0th Year	2.42	1118.0	284857.40	285975.44
2	1st Year	0.0	0.0	0.00	0.00
3	2nd Year	0.0	0.0	11000.00	11000.00
4	3rd Year	0.0	0.0	11000.00	11000.00
5	4th Year	0.0	0.0	11000.00	11000.00
6	5th Year	0.0	0.0	11000.00	11000.00
7	6th Year	0.0	0.0	11000.00	11000.00
8	7th Year	0.0	0.0	11000.00	11000.00
9	8th Year	0.0	0.0	11000.00	11000.00
10	9th Year	0.0	0.0	11000.00	11000.00
11	10th Year	0.0	0.0	11000.00	11000.00
Total		**2.42**	**1089.0**	**383857.40**	**384946.40**

Annexure – IV

Annexure -V

Watering Model W-II Bore well fitted with Diesel pump set		
Watering Provisions to CA Plantation		
Diesel pump set with well (1 pump set + Bore well for 5 Ha Plantation)		
Wage rate @ Rs. 462/-		
Year of Installation (0th Yer)		
1	Cost of Borewell	1,50,000
2	Cost of Diesel pump set 5HP	60,000
3	Diesel pump set & accessories like coommander ,pipes, etc.	30,000
4	Water Storage Tanks / Flexible pipes	15,000
	Total	**2,55,000**
Cost of Water per Plant (2,55,000/5000) = Rs. 51/-		
Cost of Water per Ha. = Rs 51,000/-		51,000
1st Year Watering		
1	Recurring expenditure i.e Diesel, Mobil, Engine Oil, etc. for pumping water -21 x 1000	21,000
3	Watering 1000 Plants (Nov-Mar) @ 200 plants/MD with 7 days rotation 20MD x 5 months = 100MD x 462	46,200
	Total	**67,200**
2nd Year Watering		
1	Recurring expenditure i.e Diesel, Mobil, Engine Oil, etc. for pumping water -21 x 1000= 103 x 20% = 20.60 or 21.00 For 1000 plants = 21 x 1000	- 21,000
2	Maintenance Diesel pump set. @ 15% of the installation cost.	7,650
3	Watering 1000 Plants (Nov-Mar) @ 200 plants/MD with 7 days rotation 20MD x 8 months = 160MD x 462	73,920
	Total	**1,02,570**
3rd Year Watering		
1	Recurring expenditure i.e Diesel, Mobil, Engine Oil, etc. for pumping water -21 x 1000= 103 x 20% = 20.60 or 21.00 For 1000 plants = 21 x 1000	21,000
2	Maintenance Diesel pump set. @ 15% of the installation cost.	7,650
3	Watering 1000 Plants (Nov-Mar) @ 200 plants/MD with 7 days rotation 20MD x 8 months = 160MD x 462	73,920
	Total	**1,02,570**
4th Year Watering		

1	Recurring expenditure i.e Diesel, Mobil, Engine Oil, etc. for pumping water -21 x 1000= 103 x 20% = 20.60 or 21.00 For 1000 plants = 21 x 1000	21,000
2	Maintenance Diesel pump set. @ 15% of the installation cost.	7,650
3	Watering 1000 Plants (Nov-Mar) @ 200 plants/MD with 7 days rotation 20MD x 8 months = 160MD x 462	73,920
	Total	**1,02,570**
5th Year Watering		
1	Recurring expenditure i.e Diesel, Mobil, Engine Oil, etc. for pumping water -21 x 1000= 103 x 20% = 20.60 or 21.00 For 1000 plants = 21 x 1000	21,000
2	Maintenance Diesel pump set. @ 15% of the installation cost.	7,650
3	Watering 1000 Plants (Nov-Mar) @ 200 plants/MD with 7 days rotation 20MD x 8 months = 160MD x 462	73,920
	Total	**1,02,570**

ABSTRCT					
Sl. No.	**Year**	**No. person days**	**Labour cost @ Rs. 462/- per day**	**Material Cost**	**Total cost (Rs.)**
1	0th Year	0	0.0	51000.0	51000.0
2	1st Year	100	46200.0	21000.0	67200.0
3	2nd Year	160	73920.0	28650.0	102570.0
4	3rd Year	160	73920.0	28650.0	102570.0
5	4th Year	160	73920.0	28650.0	102570.0
6	5th Year	160	73920.0	28650.0	102570.0
Total		**740**	**341880.0**	**186600**	**5,28,480**

Matrix for Watering Model-W- (Diesel Pumpset Fitted with Borewell) per Ha

(In Rupees)

Sl. No.	Components / Head Taken	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	Total Cost
	Base Values	7270	51500	9611	5812	5412	9168											
1																		
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

ANNEXURE-VI

ANNEXURE -VII

Cost Norms for creation of Compensatory Afforestation with Stabilization of soil & Conservation of Moisture (1000 plants/ha)			
WAGE RATE Rs. 462 /- PER DAY			
Sl no.	Item of Works	Preferable Period of Execution	Total Cost
0th Year 90Pre-Planting Operation)			
1	Nill		0
1st Year			
2	Soil Conservation measure structures like Staggered Trench, Percolation pit, Contour trench, Graded earthen bund, LBCD, Wire mesh LBCD, Sub surface Dyke & WHS as per the slope & site requirment on LS	Apr/Sept.	20,215
2nd Year			
3	Maintenance of SMC structures @ 15% of initial Year cost	Apr/Jul	3,032
3rd Year			
4	Maintenance of SMC structures @ 15% of initial Year cost	Apr/Jul	3,032
4th Year			
5	Maintenance of SMC structures @ 15% of initial Year cost	Apr/Jul	3,032
5th Year			
6	Maintenance of SMC structures @ 15% of initial Year cost	Apr/Jul	3,032
Total			32,343

ABSTRACT					
Sl No.	Year	No. person days	Labour cost @ Rs. 462/- per day	Material Cost	Total cost (Rs.)
1	0th Year	0.0	0.0	0.0	0.0
2	1st Year	0.0	0.0	20215.0	20215.0
3	2nd Year	0.0	0.0	3032.0	3032.0
4	3rd Year	0.0	0.0	3032.0	3032.0
5	4th Year	0.0	0.0	3032.0	3032.0
6	5th Year	0.0	0.0	3032.0	3032.0
Total		0.0	0.0	32,343.00	32,343.00

12

Matrix for [SMC]

in Rupees

S. NO.	Commence ment Nom	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	Total Cost
New Norm		X	XXXII	XCII	XXII	XCII	XXII											
1	2021-22	X	7170	8412	8112	8080	8870											35444
2	2022-23		X	71187	8109	9086	9899	9004										31455
3	2023-24			X	73452	8084	8670	4092	4107									88004
4	2024-25				X	7674	8068	4084	5181	4482								41398
5	2025-26					X	7489	4781	4107	4479	3754							42832
6	2026-27						X	7709	4284	4480	4772	4777						46475
7	2027-28							X	5643	4477	3754	4897	5198					47749
8	2028-29								X	79867	3781	4649	5181	5182				85186
9	2029-30									X	81340	4916	5196	4918	5712			92943
10	2030-31										X	6/408	5180	5486	5712	6203		95874

APCCF (Forest Protection & Nod. FC Act)

ANNEXURE-VIII

ANNEXURE -IX

Analysis of Rate for Cattle Proof Trench

1. Earth work in excavation of stony earth and gravel mixed with stone and boulder in foundation within 50m initially lead and 1.50m initial lift including rough dressing and breaking clods to maximum 5cm to 7cm and laying in layers not exceeding 0.30 mtr in depth & leveling bed etc. complete as directed.

a) Man mulia =33.53 nos. @462/nos.		Rs.	15490.86
Female mulia =33.53 nos. @ 462/ nos.		Rs.	15490.86
	Total	**Rs.**	**30981.72**
b) Overhead charges @ 10% on (a)		Rs.	3098.17
c) 2% sundries and T & P etc on (a)		Rs.	619.63
	Total	Rs.	3717
	Total	Rs.	34698.72/100cum
		Rs.	346.99/cum

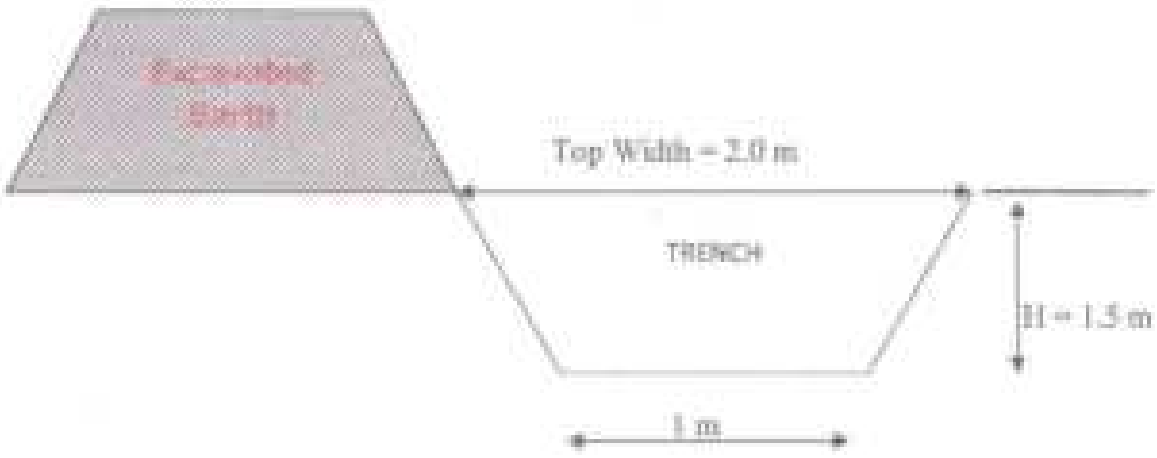
2. Add 20% for fine dressing of the excavated materials in slope side of trapezium on one side Rs. 69.39/ cum

TOTAL Rs. 416.38 / cum

ANNEXURE -X

DETAILED ESTIMATE FOR EXCAVATION OF CATTLE PROOF TRENCH 1 KM

SIZE-(size 2 x 1.5 x 1 mt. Top 2.0 mt. Bottom 1mt.



1. Earth work in stoney soil to propeer profile with initial lead & lift in proper section and profile including breaking and levelling to proper slop and level complete as directed.

a)	Earth work	$\frac{100 \times 2.00 + 1.00}{2} \times 1.50$	=	2250.00cum
b)	Stoney Earth	2250.00 cum @ Rs. 416.38/ cum		Rs.936855
			Total =	**Rs.936855**

(Rupees Nine Lakh Thirty Six Thousand Eight Hundred Fifty Five Only)

ancial Outlay for **Compensatory Afforestation Scheme** over an area **2.731 ha identified in Dharopani Protected Forest land** under **Rengali Range** in **Sambalpur Forest Division** against diversion of 112.621 ha of forest land in respect of **Netrabandha Pahar Iron Ore by M/s Bhusan Power & Steel Ltd.** as per matrix 2025-26 of approved One-time Cost Norm

Sl. No.	Description	Amount (Rs.)
1.	Cost of AR Plantation @ 1000 Plant per ha over 2.731 ha @ Rs.2,85,302/- per ha with 10 years maintenance	7,79,159.00
2.	Cost of Angle Iron & Chain Link Wire Mesh Fencing over 836.61 RMT with 10 years maintenance @ Rs.5,09,705/- per ha per 250 RMT (As proposed by the DFO, Sambalpur Forest Division)	17,05,697.00
3.	Cost of SMC activities like staggered trenches, percolation pits, contour trench, graded earthen bund, LBCD, wire mesh LBCD, Sub-Surface Dyke and WHS as per the slope and site requirement @ Rs.43,310/- per ha over 2.731 ha with 5 years maintenance (As proposed by the DFO, Sambalpur Forest Division)	1,18,279.00
4.	Watering borewell fitted with diesel pump set for 2731 Nos. of plants @ Rs.5,81,372/- per 1000 plants (As proposed by the DFO, Sambalpur Forest Division)	15,87,726.00
	Total	41,90,861.00
5.	Add Escalation @ 5%	2,09,543.00
	Grand Total	**44,00,404.00 or rounded off to 44,00,500.00**

(Rupees Forty Four Lakhs and Five Hundred) only

Approved

Additional Principal Chief Conservator of Forests
Forest Diversion & Nodal Officer, FC Act
Addl. Principal Chief Conservator of Forests
(Forest Diversion & Nodal Officer, F.C. Act)
O/o the P.C.C.F., Odisha, Bhubaneswar

AGENCY COPY

NEFT / RTGS CHALLAN for CAMPA Funds

Date : 11-11-2024

Agency Name.	**Bhushan Power and Steel Limited**
Application No.	**5826965233**
MoEF/SG File No.	**8-31/2022-FC**
Location.	**ORRISA**
Address.	**International Trade Tower, Nehru Place, New Delhi.Sambalpur**
Amount(in Rs)	**4927900/-**

Amount in Words :Forty-Nine Lakh Twenty-Seven Thousand Nine Hundred Rupees Only

NEFT/RTGS to be made as per following details;

Beneficiary Name:	**ORRISA CAMPA**
IFSC Code:	**UBIN0996335**
Pay to Account No.	**150825826965233** **Valid only for this challan amount.**
Bank Name & Address:	**Union Bank Of India FCS Centre,21/1, III Floor, Jelitta Towers, Mission Road, Bengaluru-560027**

- **This Challan is strictly to be used for making payment to CAMPA by NEFT/RTGS only**

BANK COPY

NEFT / RTGS CHALLAN for CAMPA Funds

Date : 11-11-2024

Agency Name.	**Bhushan Power and Steel Limited**
Application No.	**5826965233**
MoEF/SG File No.	**8-31/2022-FC**
Location.	**ORRISA**
Address:	**International Trade Tower, Nehru Place, New Delhi. Sambalpur**
Amount(in Rs)	**4927900/-**

Amount in Words :Forty-Nine Lakh Twenty-Seven Thousand Nine Hundred Rupees Only

NEFT/RTGS to be made as per following details;

Beneficiary Name:	**ORRISA CAMPA**
IFSC Code:	**UBIN0996335**
Pay to Account No.	**150825826965233** **Valid only for this challan amount.**
Bank Name & Address:	**Union Bank Of India FCS Centre, 21/1, III Floor, Jelitta Towers, Mission Road, Bengaluru-560027**

- **This Challan is strictly to be used for making payment to CAMPA by NEFT/RTGS only**

Note:After making the required payment through challan, if the payment status has not been updated even after 7 working days, then kindly mail a copy of your challan with transaction date and reference id to Email: fcsblr@unionbankofindia.bank , epurse@unionbankofindia.bank, ubin0903710@unionbankofindia.bank

11/11/24, 3:01 PM

AGENCY COPY

यूनियन बैंक Union Bank

NEFT / RTGS CHALLAN for CAMPA Funds

Date : 11-11-2024

Agency Name.	Bhushan Power and Steel Limited
Application No.	8888866233
MoEF&CC File No.	8-31/2022-FC
Location.	ORISSA
Address.	International Trade Tower, Nehru Place, New Delhi,Sambalpur
Amount(in Rs)	4827906/-

Amount in Words: Forty-Nine Lakh Twenty-Seven Thousand Nine Hundred Rupees Only

NEFT/RTGS to be made as per following details;

Beneficiary Name:	ORISSA CAMPA
IFSC Code:	UBIN0996033
Pay to Account No.	199529038866233 Valid only for this challan amount.
Bank Name & Address:	Union Bank Of India PCB Centre,21/1, III Floor, Jaffar Towers, Mission Road, Bangalore-560027

- This Challan is strictly to be used for making payment to CAMPA by NEFT/RTGS only

Note:-After making the required payment through cl
even after 7 working days, then kindly mail a copy
id to Email: fcsbl@unionbankofindia.bank , epuras
ubin0996710@unionbankofindia.bank

12 NOV 7.11

UTR CBINRS 2024 1112 6185 04 5

SCHEME FOR

1.5 TIMES SAFETY ZONE AFFORESTATION

OVER 3.00 HA. IN DEGRADED

FOREST LAND IDENTIFIED

IN KUNJAR R.F.

OF

SOLE RANGE

OF

BONAI FOREST DIVISION

FOR NETRABANDHA PAHAR IRON ORE BLOCK

OF

M/S BHUSHAN POWER & STEEL LIMITED.

SCHEME FOR 1.5 TIMES SAFETY ZONE AFFORESTATION OVER 3.00 HA. IN DEGRADED FOREST LAND IDENTIFIED IN KUNJAR R.F. OF SOLE RANGE OF BONAI FOREST DIVISION FOR NETRABANDHA PAHAR IRON ORE BLOCK OF M/S BHUSHAN POWER & STEEL LIMITED.

1. INTRODUCTION:

Government of India in the Ministry of Environment, Forest and Climate Change, Govt. of India has granted Stage-I approval for diversion of 112.621 ha. of forest land (including 1.808 ha. of Safety Zone) for Netrabandha Pahar Iron Ore Block of M/s Bhushan Power & Steel Limited within their said allotted Block of 139.223 ha. in Bonai Forest Division vide his Letter No.8-31/2022-FC dt.21.12.2023. The MoEF & CC has stipulated certain conditions for fulfillment. As per Condition No.2 (e) of the MoEF & CC, the afforestation on degraded forest land to be selected elsewhere measuring one and half times the area under safety zone shall be done at the project cost. The total Safety zone in the forest area comes to 1.808 ha. So, 1.5 times Safety Zone area comes to 2.712 ha. (1.808 ha. X 1.5 times). Accordingly, the Range Officer, Sole Range has identified 3.00 ha. of degraded forest land. The location of the 1.5 times Safety zone afforestation area has been shown in the Topo map vide **Annexure-IX.**

Plantation of 1000 nos. of seedlings per ha. at a spacing of 2.5 Mt. x 2.5 Mt. will be taken up over 3.00 Ha. of identified area. The cost estimate for this plantation calculated as per cost norm for AR plantation is enclosed as **Annexure-I.**

2. IDENTIFICATION OF THE DEGRADED FOREST AREA:

An area of 3.00 ha. of degraded forest land has been identified in Kunjar RF of Sole Range of Bonai Forest Division for taking up 1.5 times Safety Zone Afforestation. Kunjar RF comes under Selection Working Circle as per the Working Plan of Bonai Forest Division. The area has been inspected by the Range Officer, Sole Range and found to be suitable for 1.5 times Safety Zone Afforestation, and free from encroachment & encumbrances. Certificate to this effect furnished by the Range Officer, Sole Range **(Annexure-V).**

Further the identified area has been verified with the help of Decision Support System (DSS) & found the area suitable for plantation. The DSS report is attached as **(Annexure-VI).**

The Certificate on DSS analysis report in the prescribed format is enclosed as **(Annexure-VII)**

3. **TOPOGRAPHY AND SOIL:**

The forest land identified for this purpose is Hilly, Approx 16 degree in slope, gravel and soil mixed. The area experiences tropical climate with monsoon rainfall.

4. **CLIMATE**

The area experiences Sub-tropical climate. It is characterized by very hot summer and cool winter. Maximum temperature during summer rises upto 44^{0} Celsius and the minimum goes down to 8^{0} Celsius. The area gets rain from South-East Monsoon, which breaks during second fortnight of June and continues upto last week of September. The annual rainfall varies from 780 to 1880mm. The annual average rainfall is 1500mm. The bulk of precipitation occurs during July-August. During April-May, occasional rainfall occurs along with thunder storm.

5. **EXISTING VEGETATION.**

The vegetation of degraded forest land identified for raising 1.5 times of Safety Zone area in Kunjar RF comprises of Sal, Kendu, Asan etc. The canopy density has been reported to be below 0.3.

6. **OBJECTIVE OF THE SCHEME:**

i) To restock the barren forest land by planting suitable species.

ii) To improve the micro-edaphic conditions by undertaking suitable soil and moisture conservation measures.

iii) To protect the area against encroachment, illicit felling, fire occurrence, grazing etc., so as to check further degradation of the area.

iv) To provide gainful employment to the local people mainly involving SC/ST population.

v) To create awareness among the local villagers on protection and maintenance of plantation and forest.

7. **PROPOSED TECHNIQUE:**

To achieve the above objectives, it has been proposed to take up AR Plantation @ 1000 seedlings per hectare at a spacing of 2.5 mtr x 2.5 mtr over 3.00 ha. (18 months old seedlings) in the identified degraded forest area of Kunjar RF of Sole Range. The said plantation work shall be undertaken in the 0th year (Pre-plantation operation) followed by first year plantation work and maintenance during 2nd, 3rd, 4th 5th, 6th, 7th, 8th, 9th, & 10th year. The detailed expenditure statement per hectare is enclosed as Annexure-I.

(A). SURVEY AND DEMARCATION:

The area is surveyed and demarcated in the field with the help of G.P.S. The GPS co-ordinates of the boundary of the site are mentioned in the Map. RCC Pillars of usual size will be posted along the boundary line. This operation will be helpful in future maintenance and management. The GPS Map showing the identified area has been **enclosed as Annexure-VIII.**

(B). REGENERATION CLEANING AND TENDING OPERATION:

The operation aims at tending the existing crop silviculturally for better growth. It involves removal of inferior and diseased tree growth. During this operation, climbers etc which interferes with the growth of the existing crop are to be cut. This operation helps sapling to grow better and faster. The site clearance is to be done by cutting and removal of Eupatorium and all other unwanted growth.

The following operation will be carried out during the operation.

i) Cutting back of individual inferior poles interfering with the growth of better ones.
ii) Cutting back of malformed and diseased individuals.
iii) Singling of coppice shoots & retaining healthier ones.
iv) Cutting of climbers.
v) Cutting back of high stumps flush to the ground.
vi) Pruning the branches of the poles up to hand reach.

During 1st year operation, climber cutting, high stump cutting, and cutting of shrub, herbs, malformed and diseased plants will be done. In the next two years, cutting of individuals and singling of economically important species will be done.

(C). PLANTATION:

The area will be stocked by way of raising plantation in AR with gap Plantation. Taking in to consideration the soil condition, the local habitation and suitability of the site, the following species are selected.

1. *Dalbergia latifolia* (Sisoo)
2. *Pongamia pinnata* (Karanja)
3. *Emblica officinalis* (Amla)
4. *Terminalia belerica* (Bahada)
5. *Terminalia chebula* (Harida)
6. *Acacia catechu* (Khair)
7. *Gmeline arborea* (Gambhari)
8. *Mangifere indica* (Mango)
9. *Artocarpus heterophyllus (Panas)*
10. *Limonia acidissima (Kaitha)*
11. *Syzygium cumini* (Jamu)

The following operations will be taken up for plantation;

i) Raising of nursery:

Seedlings required for plantation shall be raised in a temporary nursery nearer to the planting site and water sources. Nursery work will be started 18 months prior to the year of plantation so that quality seedling stock will be available for plantation. The seedlings shall be raised 10% extra besides the actual requirement to compensate the casualties. Seedlings will be raised in polythene bags of 9" x 5" size following standard nursery practice.

ii) Alignment and pitting:

Alignment and pitting will be taken up in the month of March-April. Pits of size 45cm x 45cm x 45cm will be dug maintaining a spacing of 2.5mtr x 2.5mtr @1000 seedlings per ha. It is proposed to take up Plantation in the blank patches.

iii) Actual Planting:

The seedlings will be planted @1000 seedlings per ha. in the dug out pits of size 45cm x 45cm x 45cm with a spacing of 2.5mtr x 2.5mtr. Plantation shall be taken up after first regular shower of monsoon and completed by the end of July. Species will be planted as per suitability of the soil condition. NPK/ Bio fertilizer @50grms per plant shall be applied as basal dosage. Anti-termite insecticide shall also be applied to each pit while planting. Casualties if any noticed shall be replaced with the excess seedlings raised for the purpose. During second year also, casualty replacement will be done for which seedlings shall be raised.

iv) Weeding, Soil working & manuring :

For establishment and better growth of the planted seedlings, timely weeding, soil working and manuring are necessary. It is proposed to carry out two weedings, soil working and manuring during the first year and second year of plantation and one weeding and soil working during third year. During first year and second year, first weeding and manuring shall be carried out during August-September and the second one during October-November along with soil working. First weeding shall be around the plants and the second will be of strip weeding. The weeding of third year will be around the plants, which will be carried out during August.

After each weeding, soil working will be done around each plant at a radius of 0.5mtr, and manuring of each plant will be done @50grms of NPK/ Bio fertilizer per plant in ring form.

v) Application of insecticides:

After planting of good healthy seedlings, the plantation site may cause influx of insects, which usually eat and damage the tender leaves and shoots of the plants. To get rid of such insect attack, application of insecticides will be taken up in required doses at desired intervals. Spraying of insecticides shall be done preferably in a sunny day in the forenoon as per requirement.

vi) Fire line tracing and maintenance:

Fire causes heavy loss to the forest & plantation during fire season. To prevent incidence of fire, the area shall be divided in to suitable blocks by tracing fire lines. Boundaries of the plantation patches and these block lines will be scrapped of the growth to a width of 2.0mtr during February-March and the cut back materials and the dry leaves stacked along these lines will be burnt under strict supervision. This operation shall be carried out for three years.

8. SOIL CONSERVATION MEASURES:

The site selected for 1.5 times Safety Zone Afforestation is degraded Reserve Forest, undulating, and gullies have been formed due to erosion. So, Soil Conservation Measures like Staggered Trench, Percolation Pit, Contour Trench, Graded earthen bund, LBCD, Wire mesh LBCD, Sub surface Dyke and WHS as per site requirement have been proposed. The cost norm of SMC is enclosed as **Annexure-III.**

9. WATCH AND WARD:

The plantation area is exposed to biotic interference. Hence, 1 no. of special watchers for protection of the Plantation have been proposed.

10 FENCING:

To protect the AR plantation from biotic interference, Angle Iron & Chain link wire mesh fencing is proposed over the identified area of 3.00 ha. in Kunjar Reserve Forest of Sole Range. The total perimeter of the said identified area is 708 RMT (Or, 0.708 Km) length of boundary.

The cost norm for Angle Iron & Chain link wire mesh fencing is enclosed as **Annexure-II.**

11. WATERING :

Watering of the plantation (Watering Model-W-III) will be carried out aided by solar system (One Solar Energy Pump / 5 ha. Plantation). The cost norm is furnished as **Annexure-IV**.

12. **MOTIVATION OF PEOPLE:**

As per Govt. resolution of 2011, the villagers of the adjoining village, i.e. Tamperkela and Kunjar village is to be involved in protection and management of plantation. Before execution of the work, a meeting will be conducted in the above villages and resolution regarding support to plantation activities will be made. To motivate the people in this direction, they will be provided with incentives in shape of different community articles, buildings, and different community amenities of fixed and movable type through entry point activities (EPA). Health camps shall also be organized in the villages.

13. **EXECUTING AGENCY :**

The Divisional Forest Officer, Bonai Division shall execute the work by involving the local VSS mentioned above.

14. **INSPECTION, MONITORING & EVALUATION:**

In order to make the Afforestation under this 1.5 times Safety Zone Afforestation Scheme successful, intensive inspection of the plantation by the Forest field staff and the Officers at the Divisional level is necessary. Moreover, frequent monitoring and evaluation shall have to be done at different stages.

15. **REQUIREMENT OF FUNDS:**

For implementation of all prescriptions outlined above ₹ **49,27,900/-** (Rupees Forty Nine Lakh Twenty Seven Thousand Nine Hundred) only will be required as detailed below.

1.	AR Plantation @1000 plants per hectare over 3.00 ha. @₹2,71,716/-	₹	8,15,148.00
2.	Angle Iron & Chain link wire mesh fencing over 0.708 KM (Or, 708 RMT) @₹1,941.728/- per RMT.	₹	13,74,743.00
3.	Soil conservation measures structures like staggered trench, percolation pit, contour trench, graded earthen bund, LBCD, wire mesh, LBCD, Sub surface Dyke and Water Harvesting structures = 3.00 ha X ₹41,248/-.	₹	1,23,744.00
4.	Special plantation watcher 1 No. (1 x 13500 x 12 x 10 years).	₹	16,20,000.00
5.	Water Model-W-III, water provision to plantation: Solar system (One Solar Energy pump for 5 ha. Plantation) @ ₹5,46,274/- X 1 no.	₹	5,46,274.00
	Sub-Total :-	₹	**44,79,909.00**
6.	Entry Point Activities (10%) of the cost		4,47,991.00
	G. TOTAL :-	₹	**49,27,900.00**

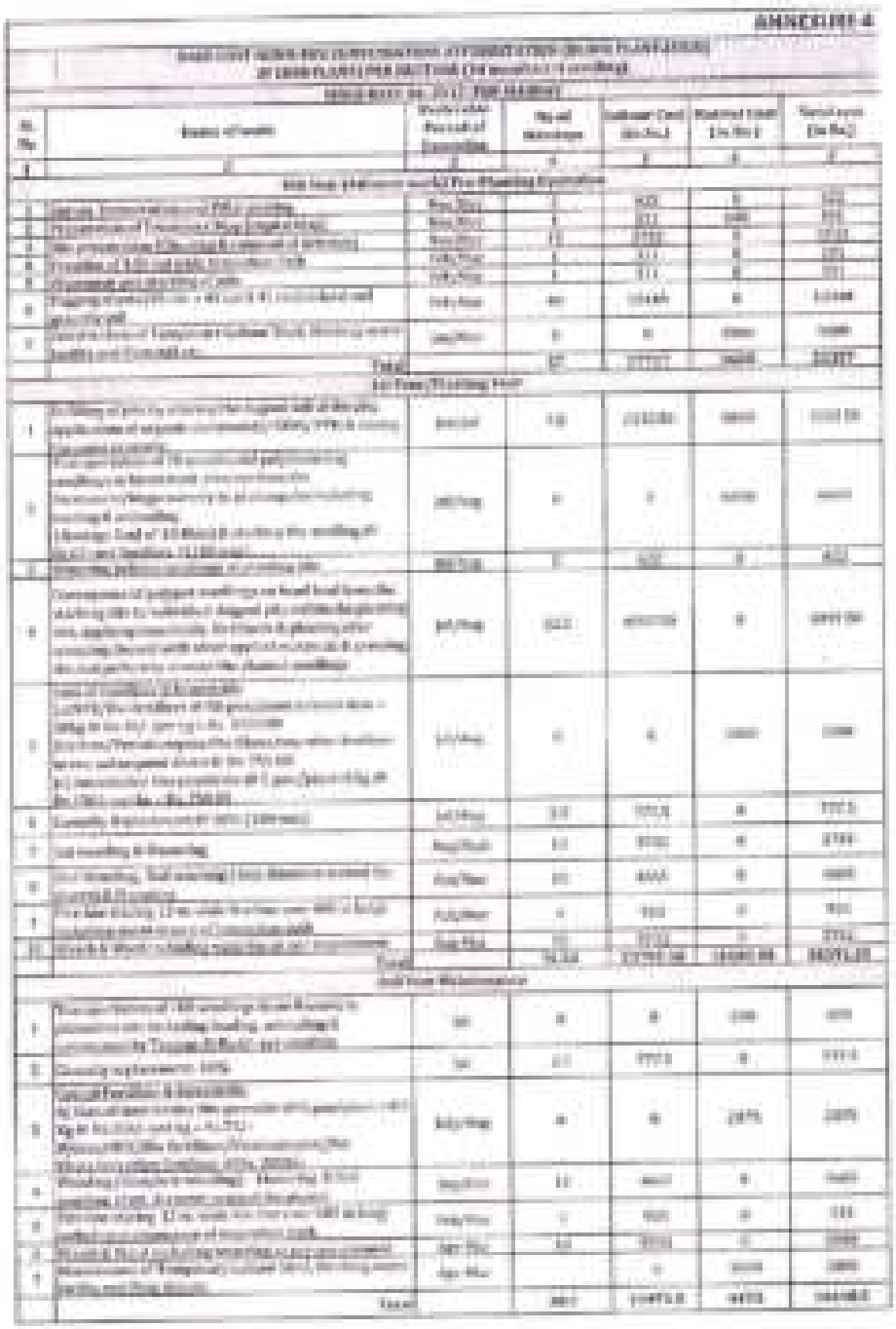
(Rupees Forty Nine Lakh Twenty Seven Thousand Nine Hundred) only.

Technically Approved

Regional Chief Conservator of Forests
Rourkela Circle

Divisional Forest Officer,
Bonai Division.

ANNEXURE-I



ANNEXURE-A

Sl. No.	Name of work	Probability Symbol of Description	No. of Months	Labour Cost (In Rs.)	Store full Cost (In Rs.)	Total cost (In Rs.)
1	2	3	4	5	6	7
	1st Year Maintenance					
1	[illegible]	[illegible]	0	0	[illegible]	[illegible]
2	[illegible]	[illegible]	0	[illegible]	0	[illegible]
3	[illegible]	[illegible]	0	[illegible]	0	[illegible]
4	[illegible]	[illegible]	0	[illegible]	0	[illegible]
5	[illegible]	[illegible]	0	0	[illegible]	[illegible]
	Total		[illegible]	[illegible]	[illegible]	[illegible]
	2nd Year Maintenance					
1	[illegible]	[illegible]	0	[illegible]	0	[illegible]
2	[illegible]	[illegible]	0	[illegible]	0	[illegible]
	Total		[illegible]	[illegible]	0	[illegible]
	3rd Year Maintenance					
1	[illegible]	[illegible]	0	[illegible]	0	[illegible]
2	[illegible]	[illegible]	0	[illegible]	0	[illegible]
	Total		[illegible]	[illegible]	0	[illegible]
	4th Year Maintenance					
1	[illegible]	[illegible]	0	[illegible]	0	[illegible]
2	[illegible]	[illegible]	0	[illegible]	0	[illegible]
	Total		[illegible]	[illegible]	0	[illegible]
	5th Year Maintenance					
1	[illegible]	[illegible]	0	[illegible]	0	[illegible]
2	[illegible]	[illegible]	0	[illegible]	0	[illegible]
	Total		[illegible]	[illegible]	0	[illegible]
	6th Year Maintenance					
1	[illegible]	[illegible]	0	[illegible]	0	[illegible]
2	[illegible]	[illegible]	0	[illegible]	0	[illegible]
	Total		[illegible]	[illegible]	0	[illegible]
	7th Year Maintenance					
1	[illegible]	[illegible]	0	[illegible]	0	[illegible]
2	[illegible]	[illegible]	0	[illegible]	0	[illegible]
	Total		[illegible]	[illegible]	0	[illegible]
	Total		[illegible]	[illegible]	0	[illegible]

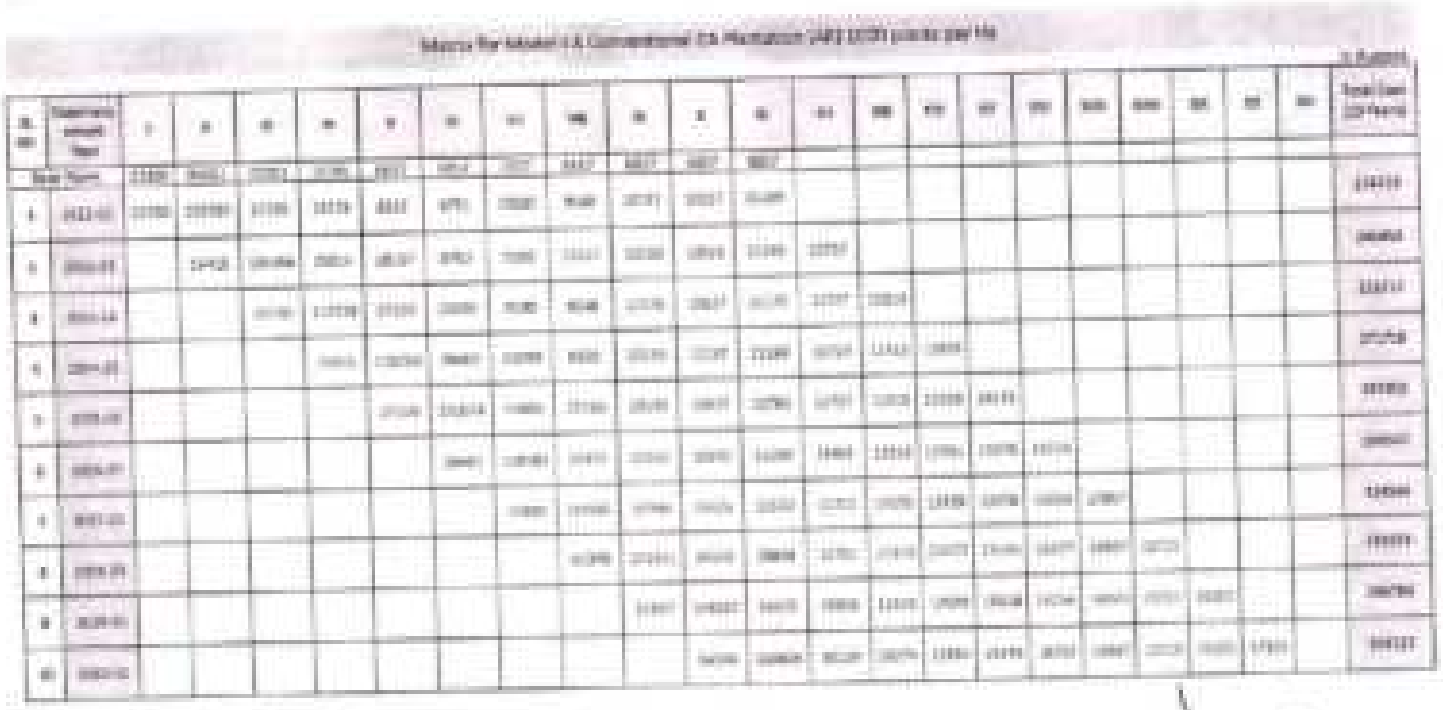
Sl. No.	Name of work	Probable Period of Execution	No. of Members	Earnest Cost (In Rs.)	Material Cost (In Rs.)	Total cost (In Rs.)	
1	2	3	4	5	6	7	
Sl. No.	Name	No. of Dwellings	Estimated cost (In Rs)	Material Cost(In Rs.)	Manufacturing, Co-ordination, Contracting, Transportation, Labour, Overhead expenses (Misc) Overhead expenses (Misc) col (3+4)	Cost of Dwellings (Misc.10.25 per dwellings)	TOTAL COST (In Rs.)
1	2	3	4	5	6	7	8
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Note:

1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]
5. [illegible]
6. [illegible]

[illegible] (Name) (Member & MD, DC Rs.)

Matrix for Market Cooperational Co Mediation (ARE 1(3) plots per Ha



ATCP (Retail Coalition & NC, H. Hill)

ANNEXURE-II

Fencing Model-II

Fencing for Compensatory Plantation raised outside the Forest Areas using Angle Iron & Chain Link wire mesh

(Old Item: No.)

Sl. No.	Name of work	Period of Contract	Man days	Wages	Material cost (Rs)	Total Cost (Rs. per Ha.)
	1st Year (1st Cy)					
1						
2						
3						
4						
5						
6						
7						
8						
	1st Year Maintenance					
1						
	2nd Year Maintenance					
1						
	3rd Year Maintenance					
1						
	4th Year Maintenance					
1						
	5th Year Maintenance					
1						
	6th Year Maintenance					
1						
	7th Year Maintenance					
1						
	8th Year Maintenance					
1						
	9th Year Maintenance					
1						
	10th Year Maintenance					

Sl. No.	Name of work	Applicable Period of Execution	Mandays	Wages	Material cost (Rs)	Total Cost (Rs per No.)
1	Supply, laying, jointing and testing of 110 mm dia HDPE pipes conforming to IS:4984 of PN 6 kg/cm² including excavation in all kinds of soil, sand bedding, refilling, disposal of surplus excavated soil, etc. complete as per drawing and technical specifications. (Rate as per Sch. of Rates 2021-22 Vol-II, Sl. No. 21)	One Year	0	0	11000	11000

Analysis

Sl. No.	Item	No. per man day input	Labour cost @ Rs. 511/- per day	Material Cost	Total cost (Rs.)
1	Mazdoor	1.00	511.00	10489.71	11000.71
2	Beldar	1.00	511.00	0.00	511.00
3	Fitter	1.00	511.00	10489.71	11000.71
4	Welder	1.00	511.00	10489.71	11000.71
5	Helper	1.00	511.00	10489.71	11000.71
6	Mason	1.00	511.00	10489.71	11000.71
7	Carpenter	1.00	511.00	10489.71	11000.71
8	Plumber	1.00	511.00	10489.71	11000.71
9	Bhisti	1.00	511.00	10489.71	11000.71
10	Chowkidar	1.00	511.00	10489.71	11000.71
11	Supervisor	1.00	511.00	10489.71	11000.71
	Total	1.00	5110.00	104897.10	110007.10

AEE/ (Panel Description & Intl. PF No.)

ANNEXURE-III

Annexure-III			
Cost Statement for creation of Compensatory Afforestation with Establishment of Soil & Conservation of Moisture (CSM)			
WORK DATA No. 01/F. FOR MAP			
Sl.No	Name of Works	Projectable Period of Execution	Total Cost
	Site Visit (Pre-Planting Operations)		
1	Site		0
	1st Year		
2	Soil Conservation measures structures like Staggered Trench, Percolation pit, Contour trench, Eroded gullies Plugs, Gully, Wire mesh (RCC, Rock masonry Gabion etc. (RCP as per the design & site requirements etc.))	Apr-Sept	20,233
	2nd Year		
3	Maintenance of SWC structures @ 15 % of actual price cost	April'24	3,035
	3rd Year		
4	Maintenance of SWC structures @ 15 % of actual price cost	April'25	3,035
	4th Year		
5	Maintenance of SWC structures @ 15 % of actual price cost	April'26	3,035
	5th Year		
6	Maintenance of SWC structures @ 15 % of actual price cost	April'27	3,035
	Total		32,343.0

Abstract					
Sl. No	Year	No. persons days	Tal(Rec. cost @ Rs. 311/- per day)	Material Cost	Total cost (Rs.)
1	0th year	0.0	0.0	0.0	0.0
2	1st year	0.0	0.0	20,233.0	20,233.00
3	2nd year	0.0	0.0	3,035.00	3,035.00
4	3rd year	0.0	0.0	3,035.00	3,035.00
5	4th year	0.0	0.0	3,035.00	3,035.00
6	5th year	0.0	0.0	3,035.00	3,035.00
	Total	0.00	0.00	32,343.0	32,343.0

Additional Copies of SWC structures must be taken up as per the design & requirements of the plantation site out of the design & specifications of different structures annexed along this statement.

ACF (Social Forestry & WL Pl. Cir.)

Water for [illegible]

Particulars	Rs.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Opening Balance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Receipts																					
[illegible]																					
[illegible]																					
[illegible]

ANNEXURE-IV

Matrix for Model-W-III Watering (Solar System Fitted with Borewell) per Ha (One solar pump/ 5 Ha)

In Rupees

Sl. NO.	Commercial crops/Year	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	Total Cost
Investment		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]											
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]											[illegible]
2	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]										[illegible]
3	[illegible]			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]									[illegible]
4	[illegible]				[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]								[illegible]
5	[illegible]					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]							[illegible]
6	[illegible]						[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]						[illegible]
7	[illegible]							[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					[illegible]
8	[illegible]								[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				[illegible]
9	[illegible]									[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			[illegible]
10	[illegible]										[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]

[illegible] (Forest Diversion & Hill PC Act)

OFFICE OF THE FOREST RANGE OFFICER: SOLE RANGE

Memo No. 814 /Dt. 04/09/2024

ANNEXURE -V

To

The Divisional Forest Officer,
Bonai Division.

OFFICE OF THE DIVISIONAL FOREST OFFICER BONAI DIVISION 5882 Date 04.09.2024

Sub:- Proposal for seeking prior approval of the Central Government under Section 2 (ii) of the Forest (Conservation) Act,1980 in favour of M/s Bhusan Power & Steel Limited for non-forestry use of 112.621 ha. forest land (including 1.808 ha. earmarked for Safety Zone) in village Baldihi under Koira Tahasil and Koira Range of Bonai Forest Division of Sundargarh District within the Block area of 139.223 ha. in respect of Netrabandhu Pahar Iron Ore Block in Odisha State.

X-Sub:- **Identification of degraded forest land of 1.5 times Safety Zone.**

Ref:- Your Memo No.413 dt.11.01.2024.

Sir,

With reference to above subject, I would like to report you that an area of 3.00 ha. of degraded forest land for raising of 1.5 times Safety Zone Afforestation has been identified in Kunjar RF of this Range and the following certificate is furnished below.

1.	Name of the degraded forest land and Compartment No.	Kunjar RF, Compartment No.KJ-7
2.	Certificate regarding boundary description of the area along with GPS reading from pillar to pillar.	Attached in Annexure-I.
3.	RCC Pillars should be posted around the demarcated area, and pillars should be numbered at the cost of User Agency.	RCC pillars has been posted in the identified area.
4.	Density of vegetation with reference to existing forest growth, and name of the species available.	The density of vegetation 0.3 and available species are Sal, Kendu, Asan etc.
5.	Suitability of the area for raising of plantation under 1.5 times SZ Afforestation.	Suitable for ANR Plantation @500 plant per hectare.
6.	Suitability of the site from Management point of view.	The site is suitable for management.
7.	Whether the area is free from encroachment and encumbrances, and not included under FRA 2006.	The area is free from encroachment and encumbrances and not included in FRA,2006.
8.	That the area has not been allotted previously for any other Project.	The area has not been allotted previously for any other project.
9.	GPS Map, Treatment Map, and Photograph of the sites are to be enclosed.	GPS Map, Topo Map attached in Annexure II.
10.	Length of boundary for fencing.	The periphery of the boundary is about 708 Mtr.
11.	Topography and soil of the identified area.	Hilly, Approx 16 degree in slope, Gravel and soil mixed.
12.	Name of the adjoining villages in the identified area in each case.	The adjoining village of identified area is Tamparkela, Kunjar.
13.	The name of Working Circle should be mentioned as per Working Plan of Bonai Division.	The area comes under Selection Working Circle.
14.	A Masonry Sign Board should be fixed at the site to facilitate easy identification of the area during execution.	Masonry sign board will be fixed at the time of execution of the Project.

Farther, this is to intimate that on verification through DSS it is found that the said area comes under Very Dense Forest. But on physical verification of the said area, it is found that the canopy density is about 0.3 (Open Forest).

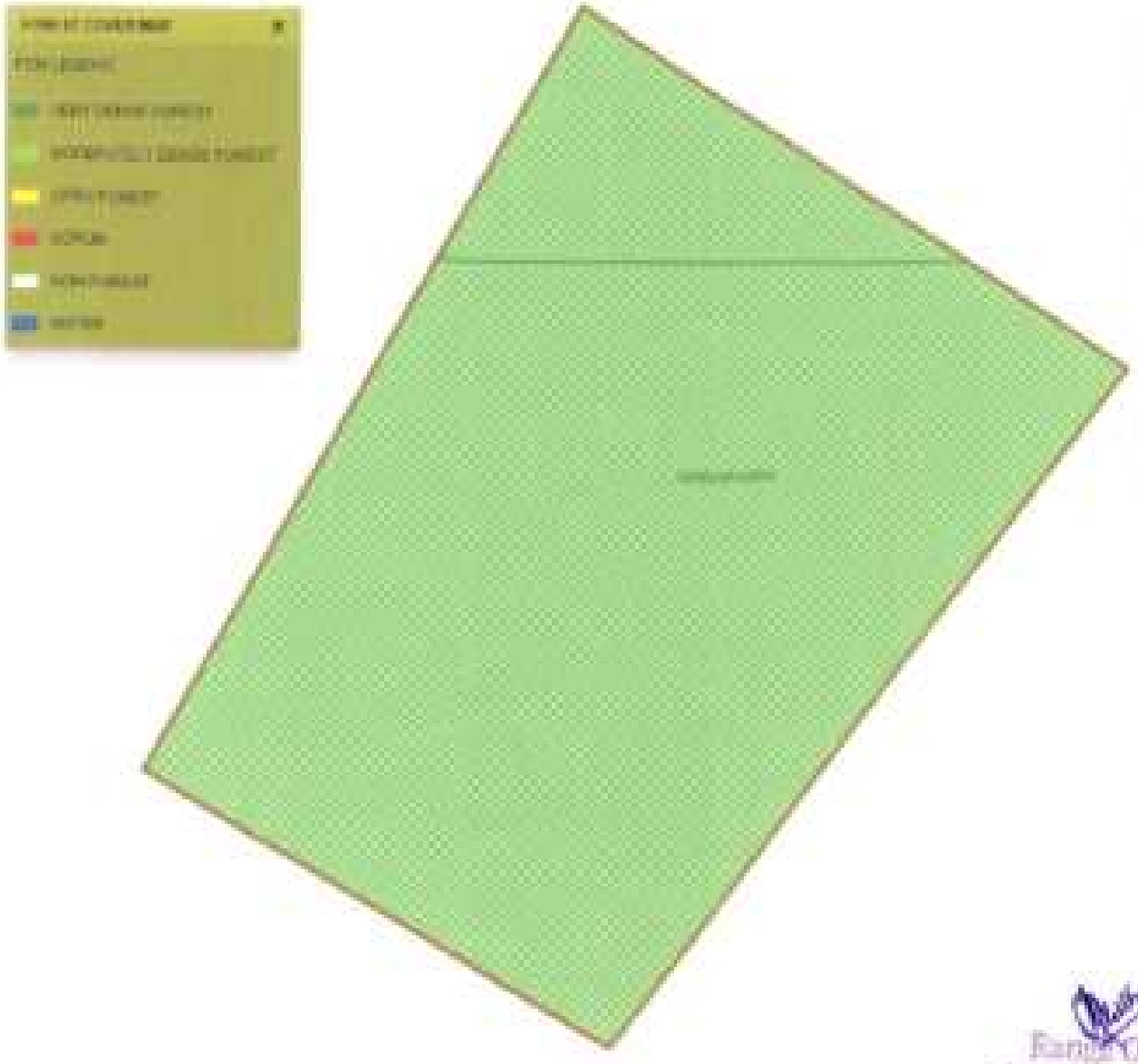
This is for favour of kind information and necessary action.

Received 04.9.24

Yours faithfully,

Forest Range Officer

ANNEXURE - VI



Ranger Officer
Sub- Forest Range

COUNTERSIGNED

DIVISIONAL FOREST OFFICER
BONAI DIVN. JKN

CERTIFICATE ON DSS ANALYSIS FOR CA/ACA/PCA

ANNEXURE - VII

This is to certify that DSS Analysis of land identified for CA/ ACA/ PCA and subsequent ground truthing have been done. The outcome is as mentioned below:

Sl. No	Name of Range	Name of the Forest Block (RF/PRF/PF/ DPF/Revenue Forest)	Area identified for CA/ ACA /PCA (in ha.)	Classification of identified land (in ha.)							Area suitable for plantation				Plantation Model (AR/ANR)	Remark
				Very Dense Forest	Moderately Dense Forest	Open Forest	Non-Forest	Scrub	Water	Total	Open Forest	Non-Forest	Scrub	Total		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Sole	Kunjhar RF	3.000	3.00	-	-	-	-	-	3.000	-	-	-	3.000	The RO, Sole has intimated that on verification through DSS it is found that the said area comes under very Dense Forest. But on physical verification of the said area it is found that the canopy density is about 0.3 Hence, ANR@500 plant / Ha. over 3.0 ha. has been proposed.	-

Countersigned

RCCF, Rourkela Circle

Divisional Forest Officer
Bonai Division

84°39'55"E 84°40'0"E 84°40'5"E 84°40'10"E 84°40'15"E 84°40'20"E

GPS MAP SHOWING THE 1.5 TIMES SZ AFFORESTATION AREA OVER 3 HA OF DEGRADED FOREST LAND INDENTIFIED IN KUNJAR RF IN SOLE RANGE OF BONAI FOREST DIVISION FOR NETRABANDHA PAHAR IRON ORE BLOCK M/S BHUSHAN POWER & STEEL LTD.

ANNEXURE-VIII

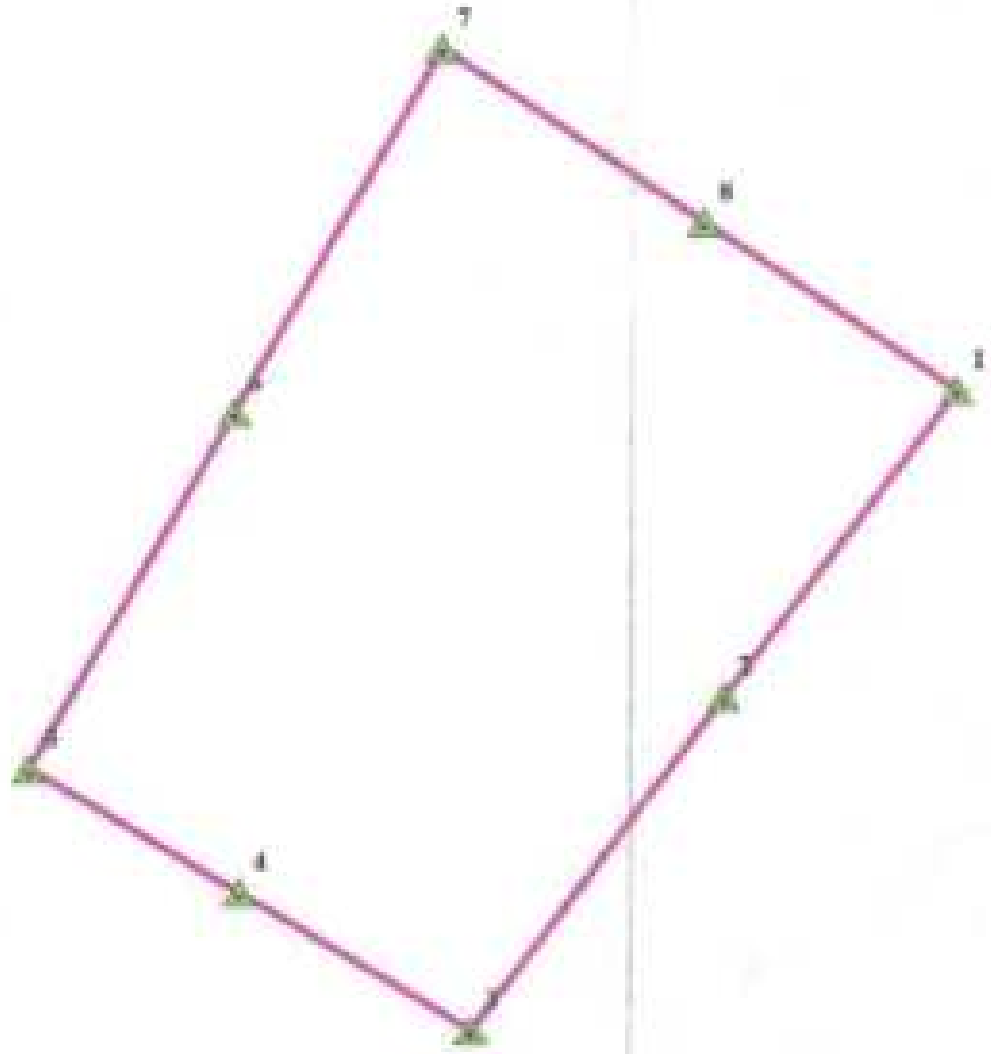
N

SCALE:-1:2,000

21°52'10"N

21°52'5"N

21°52'0"N



Pillar No	Latitude	Longitude
1	21° 52' 8.4"	84° 40' 10.1"
2	21° 52' 5.7"	84° 40' 8.1"
3	21° 52' 2.9"	84° 40' 5.9"
4	21° 52' 4"	84° 40' 3.9"
5	21° 52' 5.1"	84° 40' 2.1"
6	21° 52' 8.2"	84° 40' 3.9"
7	21° 52' 11.3"	84° 40' 5.6"
8	21° 52' 9.8"	84° 40' 7.9"

Divisional Forest Officer
Bonai Division

Range Officer
Sole Forest Range

0 37.5 75 150 225 300 Meters

Legend

- PILLAR
- 1.5 TIMES SZ PLANTATION BOUNDARY (Perimeter:- 708 Meter)

84°39'55"E 84°40'0"E 84°40'5"E 84°40'10"E 84°40'15"E 84°40'20"E

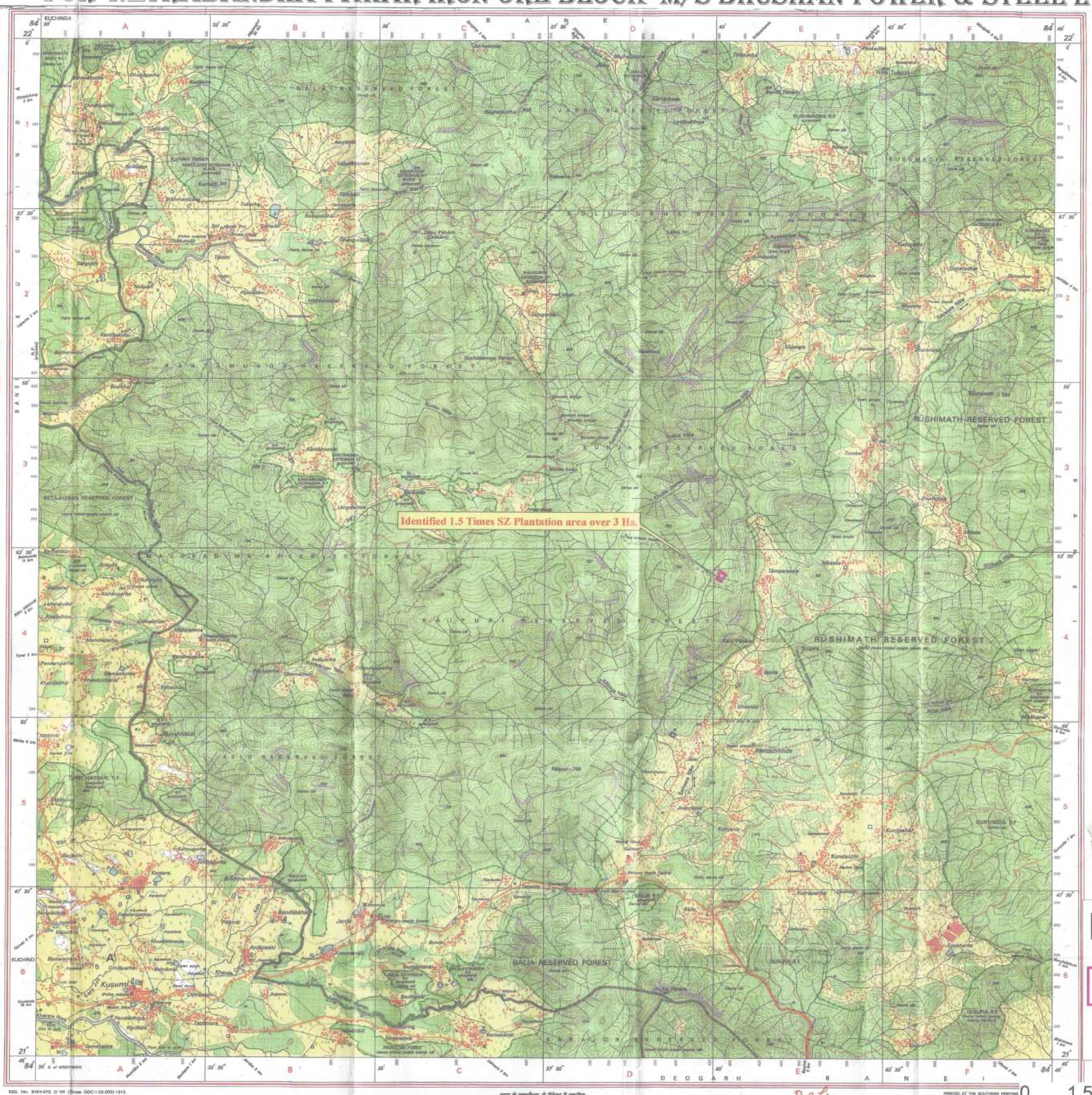
Range Officer
Sadr Forest Range

Divisional Forest Officer
Bonai Division

Range Officer
Solo Forest Range

Divisional Forest Officer
Bonai Division

TOPO MAP SHOWING THE 1.5 TIMES SZ AFFORESTATION AREA OVER 3 HA OF DEGRADED FOREST LAND INDENTIFIED IN KUNJAR RF IN SOLE RANGE OF BONAI FOREST DIVISION FOR NETRABANDHA PAHAR IRON ORE BLOCK M/S BHUSHAN POWER & STEEL LTD.



निर्यात के लिए नहीं NOT FOR EXPORT

OPEN SERIES MAP

No. F45M9

Scale 1:50,000

F45G8 (73B16) | F45G12 (73B12) | F45G16 (73B16)
F45M5 (73C5) Sambalpur ORISSA | F45M9 (73C9) Bundargarh ORISSA | F45M13 (73E13)
F45M6 (73C6) | F45M10 (73C10) | F45M14 (73C14) Deogarh ORISSA

1 Paschimi Singhbhum, JHARKHAND.
2 Deputed.

भारतीय सर्वेक्षण विभाग SURVEY OF INDIA

1st Edition 2009. Price : Rs. 70/-

CONVENTIONAL SYMBOLS

NOTES :-

COMPILATION INDEX

Projection – UTM Datum – WGS 84

Magnetic Variation from True North about 1° West in 2005. Decreasing by about 7' annually.

1:50,000

CONTOUR INTERVAL 20 METRES

For further details about this map, please contact:
Director
Orissa Geo-Spatial Data Centre
Survey of India
Survey Bhawan, PO – R R Laboratory
Bhubaneshwar – 751013
Fax : 0674 – 2304418

WEBSITE – www.surveyofindia.gov.in

Reproduction in whole or part by any means is prohibited without the written permission of Survey of India, the National Mapping Agency.

© GOVERNMENT OF INDIA COPYRIGHT, 2009.

SCALE:-1:50,000

Pillar No	Latitude	Longitude
1	21° 52' 8.4"	84° 40' 10.1"
2	21° 52' 5.7"	84° 40' 8.1"
3	21° 52' 2.9"	84° 40' 5.9"
4	21° 52' 4"	84° 40' 3.9"
5	21° 52' 5.1"	84° 40' 2.1"
6	21° 52' 8.2"	84° 40' 3.9"
7	21° 52' 11.3"	84° 40' 5.6"
8	21° 52' 9.8"	84° 40' 7.9"

Fr Kunjar

Ranger Officer
Sole Forest Range

Legend

1.5 TIMES SZ PLANTATION BOUNDARY

PILLAR

0 1.5 3 6 9 12 KM.

Divisional Forest Officer
Bonai Division

- Ref.-
1- Existing Road

SOI. No. 5464-SPC D '09 (Orissa GDC-(-50,000)-1013.

Published under the direction of Surveyor General of India, Survey of India, Hathibarkala Estate, Post Box No. 37, Dehra Dün – 248001 (Uttarakhand), Department of Science & Technology, Government of India.

PRINTED AT THE SOUTHERN PRINTING

Scheme

For

GAP PLANTING, SOIL & MOISTURE CONSERVATION ACTIVITIES TO RESTOCK AND REJUVINATE DEGRADED OPEN FORESTS (HAVING CROWN DENSITY <0.4) WITHIN100 M OUTER PERIMETER OF MINING LEASE

In compliance

with

Condition No.2 (f) of

Stage-I approval granted vide

Letter No.8-31/2022-FC, Dated.21.12.2023

of Govt. of India, Ministry of Environment, Forests

& Climate Change,

New Delhi,

for

Diversion of 112.621 Hects of Forest Land for U/s-2 (ii) (including 1.808 ha. of Safety Zone) of FC Act-1980

within 139.223 Ha. Netrabandha Pahar Iron Ore Block

of

M/S Bhushan Power & Steel Limited.

In village Baldihi of Koira Tahsil, Sundargarh District

Odisha.

1. INTRODUCTION

M/s Bhushan Power and Steel Ltd (henceforth be known as BPSL) is a manufacturer of Steel in the country incorporated on 22/02/1999 under the Company Act by Ministry of Corporate Affairs, Govt. of India. The company is a manufacturer of flat and long products and have state-of-the-art plants at Chandigarh, Derabassi, Kolkata and Odisha in India. As reported by the User Agency in the project proposal, manufacture value added products covering entire steel value chain right from Coal Mining to Manufacturing Pig Iron, DRI, Billets, HR Coils, CR Coils, GP/GC Sheets, Precision tubes, Black Pipe/GI Pipe, Cable Tapes, for Steel, Carbon and Special Alloy Steel Wire Rods and Rounds conforming to IS and international standards. Present turnover of the company is above ₹8/00 Crores with large volume of exports. The Company has successfully implemented and commissioned a green field integrated steel plant with the present capacity of 2.3 Million Tonnes which is being enhanced to 3.4 Million Tonnes of Steel and Captive Power Plant in Odisha with HR Coil making facility-First in Private Sector in the State of Odisha.

The company was not having an Iron Ore Mines of its own. Government of Odisha, pursuant to the Mines and Minerals (Development & Regulation) Act, 1957 and the Mineral (Auction) Rules, 2015 as amended from time to time (the "Auction Rules), issued the notice inviting tender dated 17/03/2017 to commence the auction process for grant of mining lease for Nettrabandha Pahar Iron Ore Block located in Sundargarh District of Odisha. The e-auction process was conducted in accordance with the tender document for the said mineral block and M/s BPSL was declared as the prefered Bidder under Rule 9(4)(b)(iii) of the Rules. Government of Odisha has awarded the Letter of Intent vide letter No.5283/SM, Bhubaneswar dated 24.06.2017 for Grant of Mining Lease for Iron Ore in favour of M/s BPSL the successful bidder in respect of Nettrabandh Pahar Iron ore Block over an area of 139.223hects. (as per DGPS)/138.579hects. (as per RoR) in Baldihi village under Koira Tahasil of Sundargarh District under jurisdiction of Koira Forest Range of Bonai Division.

Further the said LoI has been modified vide Letter No.6285/SM dt.27.7.2017 revising the earlier mentioned area of 139.00 ha. to 139.223 ha. The said Letter of Intent (LoI) has been allowed to extension of the validity for another period of 2 years w.e.f. 26.6.2020 by the Steel & Mines Department, Govt. of Odisha vide Letter No.6350/SM dt.27.7.2020.

Despite the iron ore block is allocated to M/s BP&SL in June 2017 minimal progress has been made in terms of obtaining statutory approvals and clearances such as the EC/FC/Land acquisition, the clearance for the forest diversion proposal, the issuance of the Terms of Reference ("TOR") etc. primarily because of the following reasons.

(i) Corporate insolvency resolution process ["CIRP"] was initiated in respect of BPSL vide the order passed by the Hon'ble National Company Law Tribunal, New Delhi ["NCLT"] dated 26 July 2017 ("Insolvency Commencement Date");

(ii) The CIRP resulted in approval of the resolution plan dated 03 October 2018 as amended by addendum letter dated 10 October 2018 ("Resolution Plan") of JSW Steel Limited, which was the Resolution Applicant, on 16 October 2018. Pursuant thereto, the Resolution Plan was filed before the NCLT for its approval and was accorded the same under Section 31 of the Code vide order passed by it on 05 September 2019 ("NCLT Order");

(iii) Though the NCLT Order was challenged before the Hon'ble NCLAT, the Hon'ble NCLAT vide its judgment dated 17 February 2020 ("NCLAT Order"), disposed off the said challenges and approved the Resolution Plan after making certain modifications in the NCLT Order;

(iv) The NCLAT Order approving the Resolution Plan was further challenged before the Hon'ble Supreme Court. Since the Hon'ble Supreme Court did not grant a stay on the implementation of the Resolution Plan, the JSW Steel Limited has started the implementation of the Resolution Plan w.e.f. 26 March 2021.

In view of the above, after the change of ownership, the necessary procedures to obtain the Forest Clearances and other approval started and gradually progress is made in this regards.

The block comprises of 139.223 ha lies within the Baladihi village in Kolra Tehasil of Sundargarh District. The exploration under G2 category following UNFC guidelines was carried by the State Directorate of Geology. Hence the Block was auctioned for mining lease. As per the letter of intent as per Rule 10(2) of the Rules, the mining lease period will be for 50 years. The substantial quantity of the product from this block will be consumed in the Integrated Steel Plant of BP&SL situated at Tholkoloi in Jharsuguda.

The lease area over an area of 139.223 hects. (as per DGPS)/138.579 hects. (as per ROR). The authenticated land schedule is jointly verified by Mining, Revenue & Forest Department. As all the calculation will be based on map (DGPS survey map) it is always advisable to consider the DGPS area for land use and other calculation. During verification of the land schedule allotted for said Mining Lease area it is found that the total area (DGPS) over 139.223 hectare consists of 48.346 ha. PRF, 19.532 ha. Revenue Forest, 44.743 ha. DLC forest and 26.602 ha non-forest land.

Further, Stage-I approval over 112.621 ha. of Forest Land U/s-2 (i) (including 1.808 ha. of Safety Zone) has been granted by MoEF& CC vide their Letter No.8-31/2022-FC, dated 21.12.2023 where in it has been stipulated as per **Condition No. 2 (f) for undertaking gap planting and soil & moisture conservation activities to restock and rejuvenate the degraded open forest (having crown density less than 0.40), if any, located in the area within 100m from outer perimeter of the mining lease.**

2. LOCATION

The mining lease area finds place in the Survey of India Topo sheet No.F45N5 (73 G/5) and situated between the latitude 21° 52' 05.242" to 21° 52' 54.542" N, and longitude 85° 17' 10.449" to 85° 17' 56.810" E. The above ML area covering villages such as Baldhi in Koira Range, Bonai Forest Division, Sundargarh District, Odisha.

3. TOPOGRAPHY

Netrabandha Pahar Block lies in Southern continuation of Bonai-Keonjhar belt of Ranchi Plateau. In general of Bonai-Keonjhar belt is deeply dissected given rise to a rugged topography with high and narrow hill ranges interspersed by broad valley. It is a discrete physiographic market by wide, flat, soil and alluvium covered tracks separated by low lying hills. The high hills are in fact, long range controlled by the out crop pattern of the BIF. The highest peak in the adjacent area is represented by Bala pahar (1010m). The said block represents an undulating to plain topography. At places flat topped low mounds are noticed with general gradient to NE and SE. The highest contour in this area at 678 m (north-central & south-central part of the block) and lowest contour is at 618 m at the northeast part of the block.

4. SOIL TYPE

Soil type in the study area varies widely from hard rock to lateritic soil. Areas of higher elevations are usually hard rock consisting of laterite. The top soil is scanty in the area. Whatever top soil is available is thinly spread over all Soil profile in nature. The pH of the soil is slightly acidic in nature.

5. CLIMATE

The study area is characterized by an oppressively hot summer with high humidity. Summer generally commences in the month of March. Temperature beings to rise rapidly attaining a maximum in the month of May. During the summer maximum temperature can go up to 47.7°C. The weather becomes pleasant with onset on monsoon in June and remains as such upto end of October. The temperature in the month of December is lowest, i.e., 7° C. The average annual rainfall as recorded at IMD observatory is 1325.16 mm. Predominant wind direction is South-West. Area remains calm for nearly50% of the year

6. DRAINAGE

The drainage system of the area is controlled by Teheral nala flowing to the North of the block and its tributaries. However, Khajuridih Nala flowing in the Southern part of the area control the drainage in the southern part.

7. LAND USE PATTERN

During the life of the mine, about 139.223 hectares will be utilized for mining, Minerals processing, Road, and green belt plantation in Safety Zone area etc. The details of land use pattern will be as follows:

Item wise Proposed Land Use Pattern in Forest and Non-Forest Land of Total Lease Hold Area

Sl.No.	Pattern of utilization	Undiverted/ Virgin Forest (in Ha.)				Non-Forest	Grand Total
		PRF	RevenueForest	DLCForest	Total Forest		
1.	Mining with Haul Road	27.444	17.829	42.160	87.433	16.877	**104.310**
2.	Dump	9.607	-	-	9.607	-	**9.607**
3.	Sub-grade	0.650	-	1.472	2.122	0.030	**2.152**
4.	Storing of ore	1.835	-	-	1.835	-	**1.835**
5.	Top Soil	0.500	-	-	0.500	-	**0.500**
6.	Stacking of Minerals	5.726	-	0.113	5.839	-	**5.839**
7.	Infrastructure	0.130	-	-	0.130	1.687	**1.817**
8.	Road	-	-	-	-	0.534	**0.534**
9.	Water Harvesting	-	-	-	-	0.066	**0.066**
10.	Green Belt	-	-	-	-	2.017	**2.017**
11.	Others	1.411	1.392	0.544	3.347	3.757	**7.104**
	TOTAL	**47.303**	**19.221**	**44.289**	**110.813**	**24.968**	**135.781**
12.	Safety Zone around ML boundary	1.043	0.311	0.454	1.808	1.634	**3.442**
	TOTAL	**48.346**	**19.532**	**44.743**	**112.621**	**26.602**	**139.223**

8. AVAILABILITY OF DEGRADED FOREST LAND HAVING CANOPY DENSITY LESS THAN 0.4 WITHIN 100M OF OUTER PERIPHERY OF MINING LEASE

a) The M.L area of the instant project is 139.223 Ha. The adjoining area within 100m II is shown in **Plate-1**. It is worth mentioning here that there are other mines namely Netrabandha Iron Ore Block of M/s Rage Tradecon Pvt. Ltd. and Khajuridhi Iron & Mn. Ore Mines of Mahadin Sharda adjoining to the instant mining area, an area of 5.311 Ha. of Revenue and PRF land is available for gap planting.

LAND SCHEDULE OF DEGRADED FOREST LAND OF 100 METER OUTER PERIFERI OF MINING LEASE OF NETRABANDHA PAHAR IRON ORE BLOCK

Sl No	Village Name	Khata No	Plot No	Total Plot area (in Acr)	Kissam	For_Class	Applied Area for Plantation (in Ha)	Applied Area for Plantation (In Acr)	Remarks
1	Bakdihi	65	107	36.25	Bad Jangpal	Rakshit	1.126	2.815	PRF
2	Bakdihi	45	108	21.97	Bad Jangpal	Rakshit	2.833	7.083	Revnue forest
3	Bakdihi	68	106	50	Pahad	AAA	1.352	3.380	PRF
Total							5.311	13.278	

Forest plots of village Bakdihi in Sundargarh District have been selected for gap plantation (canopy density is < 0.4). Location of the plots is shown in the map annexed to this scheme.

The inner periphery of the above patches is the lease boundary where pillars have been posted by the user agency to know their limit of ML area. Hence the outer periphery of the above patches has to be fenced by angle iron & chain link wire to complete the fencing work.

9. EXISTING VEGETATION

The above area is devoid of any promising forest growth but contains bushy growth of mainly miscellaneous species. During field visit it is observed that trees like Sal, Aswastha, Bel, Kali Kendu, Kusum, Kanchan, Mahul etc. are available within 100 mtr outer periphery of the lease area. About 1000 no of seedlings per Ha i.e about 5311 seeding of indigenous species to be planted as per onetime cost norm approved by PCCF & HoFF, Odisha.

10. OBJECTIVE OF THE SCHEME

The main objective of the present scheme is to fulfil the Condition No 2(f) of the Stage-I approval granted vide Letter No.8-31/2022-FC, Dated. 21.12.2023 of MoEF & CC to undertake "gap plantation and soil & moisture conservation activities to restock and rejuvenate the degraded open forest (having crown density less than 0.4) if any, located in the area within 100m from outer perimeter of the mining lease". The steps to be followed are as under:

a) To re-stock and re-rejuvenate degraded forest land by AR plantation within 100m from the outer perimeter of the lease area.

b) To Demarcate and fence the area in ground to dispense with biotic interference.

c) To improve the micro edaphic conditions by undertaking suitable soil and moisture conservation measures within the AR Plantation.

d) To create awareness among the local villagers for protection and maintenance of this plantation and the adjoining forest for ensuring enrichment of the ecosystem in general.

11. SELECTION OF SITE FOR GAP PLANTING

The area for gap plantation is to be within 100 m outer perimeter of the mining lease of iron ore mining project of M/s Bhushan Power & Steel Ltd. in Sundargarh Districts of Odisha. The proposed area has been explored through field inspection to find such area by user agencies and forest department staff.

The M.L area of the instant project is 139.223 Ha. The adjoining area within 100m. It is worth mentioning here that there are other mines namely Nebrabandha Iron Ore Block of M/s Raga Tradecon Pvt. Ltd. and Khajuridih Iron & Mn. Mines of Mafadin Sharda adjoining to the instant mining area. an area of 5.311 Ha. of Revenue and PRF forest is available for gap planting.

The location of the proposed plantation site is enclosed as **Plate No-1.**

Hence, the area of 5.311 ha will be re-stocked by raising plantation @1000 plants per hectare in AR mode. Taking into consideration the site specific soil condition, existing species growing there naturally and the requirement of the local people, the following species are proposed to be planted in the area.

12. Species Proposed For Plantation

1. *Syzygiumcumini*[Jamu]
2. *Ficus religiosa* (Aswastha)
3. Azadirachta indica(Neem)
4. Aegle marmelos (Bel)
5. Shorea robusta (Sal)
6. Diospyros melanoxylon (Kendu)
7. Schleicheraoleosa (Kusum)
8. Madhuca indica (Mahul)

13. PROPOSED TECHNIQUE

To achieve the above objectives, it has been proposed to take up Gap plantation @ 1000 plants/ha at a spacing of 2.5m x 2.5m in blank spaces as per the availability in permanent gaps. The said plantation will be taken up as per **AR Mode**, as per items of works prescribed in the cost norm approved by the PCCF, Odisha. The detailed cost norm is enclosed in **Annexure-I.**

The identified degraded forest lands has been surveyed clearly with reference to the village maps and forest boundary and demarcated by posting of 4 ft high R.C.C. pillars at every corner/turning of boundary line and the Scheme proposes financial implication for the same.

14. REGENERATION, CLEANING & TENDING OPERATION

The operation aims at tending [climber cutting, clearing, double shoot cutting, pruning etc.] of the existing crop for the growth of promising principal species of the locality for ensuring better growth of the plants. It includes removal of inferior, diseased, malformed, dead, drying and defective tree growth and disposal of them by distributing it among the local VSS members. Apart from it, weed eradication is also an integral part as they interfere with the growth of both planted species and natural Regeneration.

The detailed operation to be carried out is as follows-

i) Cutting of herbs and shrubs interfering with the growth of the promising species.
ii) Cutting back of individual top broken poles interfering with growth of well formed pole crops.
iii) Cutting back of malformed and diseased species.
iv) Cutting of climbers up to hand reach.

v) Sharp cutting of high stumps flush to the ground to get a smooth Stoll with least damage to the cortex.

vi) Singling of coppice shoots coming out from stools and retaining the most promising one.

vii) Pruning of the branches of the pole crops up to hand reach.

15. PROPOSED METHODOLOGY :

The following methodology will be adopted for the purpose of plantation

Pre-Planting & Post-Planting

- **Soil and water conservation measures**

This will be done as per the prescription provided in the cost norm approved by PCCF, Odisha for plantation under AR mode.

- **Pitting:**

As mentioned above pits of size 45 cm x 45 cm x 45 cm will be dug during April/May to ensure drying of pits and to increase humus content.

- **Planting:**

Before planting farm yard manure to be added in the pits. Planting will be done with plantable size seedlings of species narrated above during July in pre-dug pits of size 45 cm X 45 cm X 45 cm. A basal dose of N.P.K fertilizer shall be applied at the time of planting, besides mixing with insecticides to prevent termites & insects. Care should be taken to complete the planting during July while rains are still on preferably during first or second week of July.

- **Weeding & Soil working:**

For establishment and better growth of the planted seedlings, weeding, soil working and manuring are bare necessity. It is proposed to carry out two weedings, soil working and manuring during second year and third year of plantation and one weeding and soil working during fourth year. During the second year and third year, first weeding and manuring shall be carried out during August-September, and the second one during October-November. First weeding shall be an area weeding and the second one will be of strip weeding. The weeding of third year will be an area weeding which will be carried out during August. After each weeding, soil working will be done around each plant at a radius of 0.5mtr and manuring of each plant will be done @30gms of NPK per plant.

- **Application of Insecticides :**

The plantation site, after the planting of good healthy seedlings, may cause influx of insects, which usually eat and damage the Tender leaves

and shoots of the plants. To overcome such insects attack, application of insecticides will be taken up in required doses at intervals. Spraying of insecticides shall be done preferably in a sunny day in the forenoon.

- **Fire Line Tracing And Maintenance** :

Fire causes irreparable damage to the plantation and the forest growth during fire season and to prevent such fire out-breaks in the area, the plantation area shall be divided into suitable blocks by tracing fire lines. Boundaries of the plantation patches and these block lines will be scrapped of forest growth to a width of 3.0 mt. during Feb-March and the cut back materials and the dry leaves stacked along these fire lines shall be burnt under direct supervision. This operation is highly essential and the scheme proposes to carry this operation during the planned period for five years.

- **Fencing**:

To protect the plantation from grazing and other biotic interference, it will be provided with angle iron & chain link fencing as per the norm approved by PCCF, Odisha. The cost estimate is enclosed as **Annexure-2**.

The outer periphery of the planting site is 1277 m or 1.277 Km excluding the existing barbed wire fencing in the boundary line of the ML area. Hence length of fencing over 1277mtr will be done.

- **SPECIAL SOIL CONSERVATION MEASURES**

To check soil erosion and the rain water draining out of the area, it has been proposed to take up special conservation measures by digging staggered trenches along the contour over the area @ 250 nos per hectare. The size of the trenches will be 2 Mtr x 0.5 Mtr x 0.5mtr. Digging of staggered trenches will be done during September of 1st year. Agave planting will also be taken up on the dugout soil of the trench for its stabilisation and to restrict the dugout soil from re-filling into the trench.

The detail of estimate of staggered trench is given in **Annexure-3**.

- **Watering**

Watering of the plantation will be carried out aided by solar system with Borewell (1 system for 5 ha. plantation) fitted with Drip system. The cost norm is furnished as **Annexure-4**.

16. **MOTIVATION OF PEOPLE:**

As per Govt. resolution of 2011, the villagers of the adjoining village, i.e. Baldihi and Sanua of Bonai Division are to be involved in protection and management of plantation. Before execution of the work, a meeting will be conducted in the above villages and resolution regarding support to plantation activities will be made. To motivate the people in this direction, they will be provided with incentives in shape of different community articles, buildings, and different community amenities of fixed and movable type through entry point activities (EPA). Health camps shall also be organized in the villages. Thus, 15% of the plantation cost has been earmarked for expenditure on this score.

17. **INSPECTION, MONITORING & EVALUATION**

For successful implementation of the present Scheme, intensive inspection and technical guidance from concerned technical wing is required. Sufficient fuel/ conveyance charges for the executing agency and technical experts shall be provided by the user agency for proper execution of this programme.

18. **EXECUTING AGENCY**

The works in the present Scheme shall be executed by the User Agency i.e. M/s Bhushan Power & Steel Ltd. The entire work shall be carried out in coordination with the Forest Department.

19. REQUIREMENT OF FUNDS

The total cost of the implementation of proposed scheme will be **Rs.64,20,100/- (Rupees Sixty Four Lakh Twenty Thousand One Hundred) Only**, details are as under:-

TOTAL COST OF GAP PLANTING, SOIL & MOISTURE CONSERVATION WITHIN 100MTR.FROM OUTER PERIMETER OF MINING LEASE TO RESTOCK AND REJUVENATE DEGRADED FOREST

Wage Rate Rs.450.00

1.	AR Plantation with 1000 seeding per Ha. over 5.311 ha @Rs.2,71,716/- per hа.	14,43,084.00
2.	Cost of Angle Iron & Chain link wire mesh fencing over 1.277 KM (Or, 1277 RMT) @₹1,941.72/- per RMT.	24,79,576.00
3.	Excavation of staggered trench over 5.311 ha. @ Rs.89,835/- per Ha.	4,71,803.00
4.	Water provision to plantation: Solar system with Bore well (1 system for 5 Ha. Plantation) fitted with Drip system @₹2,57,751/- X 1 no.	2,57,751.00
	Total :-	**46,52,214.00**
5.	15% of the total cost for motivation of VSS / People involved.	6,97,832.00
	Total :-	**53,50,046.00**
6.	Add 20% escalation	10,70,009.00
	Grand Total :-	**64,20,055.00** **Or,** **64,20,100.00**

(Rupees Sixty Four Lakh Twenty ThousandOne Hundred) only.

Technically Approved

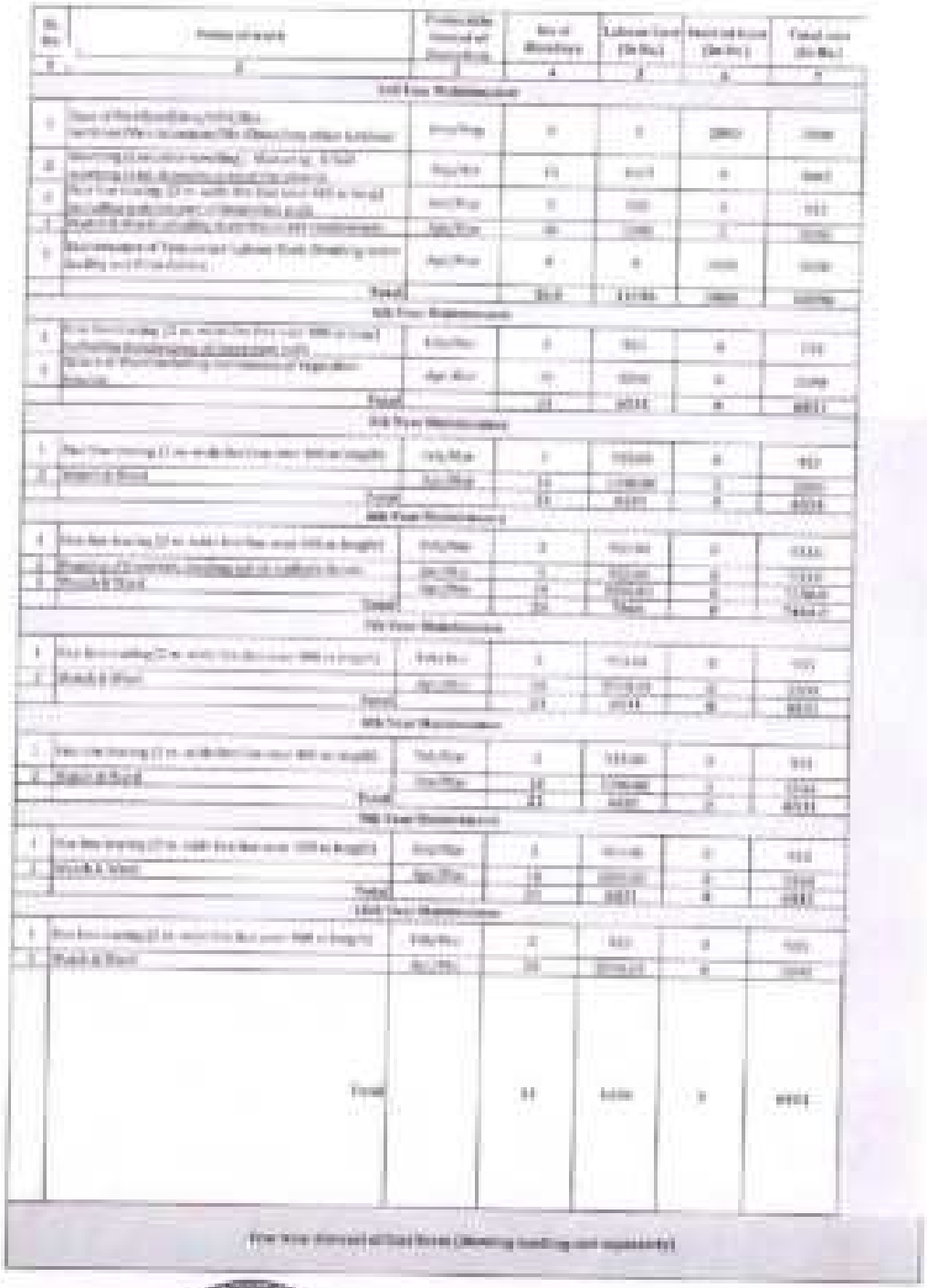
Regional Chief Conservator of Forests
Rourkela Circle

COUNTERSIGNED

DIVISIONAL FOREST OFFICER
BONAI DIVISION

ANNEXURE-4

Sl. No.	Name of work	Unit	No. of Persons	Labour Cost (Rs./Unit)	Material Cost (Rs./Unit)	Total cost (Rs./Unit)
1	2	3	4	5	6	7
	Unit Cost (Addl. work) For Blending Section					
1		Per Ton				
2		Per Ton				
3		Per Ton				
4		Per Ton				
5		Per Ton				
6		Per Ton				
7		Per Ton				
	Total					
	Unit Cost (Blending Shop)					
1		Per Ton				
2		Per Ton				
3		Per Ton				
4		Per Ton				
5		Per Ton				
6		Per Ton				
7		Per Ton				
8		Per Ton				
9		Per Ton				
10		Per Ton				
	Total					
	Unit Cost (Maintenance)					
1		Per Ton				
2		Per Ton				
3		Per Ton				
4		Per Ton				
5		Per Ton				
6		Per Ton				
	Total					



Sl. No.	Particulars of work	Unit	No. of Mandays	Labour Cost (In Rs.)	Material Cost (In Rs.)	Total cost (In Rs.)
1	2	3	4	5	6	7
	Unit Area Maintenance					
1		Area/Nos	0	0		
2		Nos/Area			0	
3		Area/Nos	0		0	
4		Nos/Area			0	
5		Nos/Area	0	0		
	Total					
	Unit Area Maintenance					
1		Area/Nos	0		0	
2		Nos/Area			0	
	Total					
	Unit Area Maintenance					
1		Area/Nos	0		0	
2		Nos/Area			0	
	Total					
	Unit Area Maintenance					
1		Area/Nos	0		0	
2		Nos/Area			0	
3		Nos/Area			0	
	Total					
	Unit Area Maintenance					
1		Area/Nos	0		0	
2		Nos/Area			0	
	Total					
	Unit Area Maintenance					
1		Area/Nos	0		0	
2		Nos/Area			0	
	Total					
	Unit Area Maintenance					
1		Area/Nos	0		0	
2		Nos/Area			0	
	Total					
	Total					
	Total Area covered at Coal Areas (Meaning loading not separately)					

THE LKOLO
SHYAM POWER & STEEL LTD.

Sl. No.	Name of Branch	Applicable Provident Association	No. of Members	Subscription (Rs. Rs.)	Share Lal Fund (Rs. Rs.)	Total cost (Rs. Rs.)	
1	2	3	4	5	6	7	
Sl. No.	Year	No. of Members	Subscription (Rs. Rs.)	Share Lal Fund (Rs. Rs.)	Provisioning, Contribution, Interest, Provisioning, Interest (Rs. Rs.) (7% of 5+6)	Capital Expenditure (Rs. Rs.)	Total (Rs. Rs.)
1	2	3	4	5	6	7	8
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Notes:

1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]
5. [illegible]
6. [illegible]

[illegible]

[illegible]

Matrix for Shutter-I (Concentrated Cb Perimeter (KM) 2000 plants per Sq.

S. No.	Commodity Wise Plan	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII	XIX	XX	XXI	XXII	Total Cost (In Crores)
Base Value																								
1																								
2																								
3																								
4																								
5																								
6																								
7																								
8																								
9																								
10																								

THELMOLCO

SHUSHAN POWER & STEEL (I) LTD.
SAMBALPUR

Angle Iron and chaing link wire mesh fencing

Fencing Model # 2

Fencing for Compensatory Plantation raised outside the Forest Areas using Angle Iron & Chain Link wire mesh

(SSR Rate / Rs.)

Wage RATE Rs. 333/- PER DAY

Sl. No	Items of work	Preferable period of Execution	Man days	Wages	Material cost (Rs)	Total Cost (Rs. per No.)
	1st Year (PPV)					
1			2.22	737.87	0.0	752.6
2			0	0	3,047.8	3,047.8
3					47,050.0	47,050.0
4					21,123.0	21,123.0
5					1,71,777.0	1,71,777.0
6					3,038.0	3,038.0
7					11,424.0	11,424.0
8					5,085.0	5,085.0
	TOTAL		2.22	737.87	2,64,827.8	2,65,415.0
	Rate per running mt. 1,95,815/ 2500= Rs. 1142/Rmt					
	1st Year Maintenance					
1	No Maintenance is required.	Sept./Oct.	0	0	0	0
	2nd Year Maintenance					
1		Sept./Oct.	0	0	11000	11000
	3rd Year Maintenance					
1		Sept./Oct.	0	0	11000	11000
	4th Year Maintenance					
1		Sept./Oct.	0	0	11000	11000
	5th Year Maintenance					
1		Sept./Oct.	0	0	11000	11000
	6th Year Maintenance					
1		Sept./Oct.	0	0	11000	11000
	7th Year Maintenance					
1		Sept./Oct.	0	0	11000	11000
	8th Year Maintenance					
1		Sept./Oct.	0	0	11000	11000
	9th Year Maintenance					
1		Sept./Oct.	0	0	11000	11000
	10th Year Maintenance					

Sl. No	Name of work	Preferable Period of Execution	Man days	Wages	Material cost (Rs)	Total Cost (Rs. per No.)
1	Manufacture of wire mesh fence of 1ft per running mtr. [size of mesh/hole is 1/4" pi 1114sq ft) = 13.10 nos Rs 11	Days / No	0	0	11000	11000

Sl. No	Year	No. of trees Alive	Labour cost @ Rs. 311/- per man day	Material Cost	Total cost (Rs)
1	0th year	240	712.8	[illegible]	[illegible]
2	1st year	8.0	0.0	0.0	0.0
3	2nd year	8.0	0.0	11000.0	11000.0
4	3rd year	8.0	0.0	11000.0	11000.0
5	4th year	8.0	0.0	11000.0	11000.0
6	5th year	8.0	0.0	11000.0	11000.0
7	6th year	8.0	0.0	11000.0	11000.0
8	7th year	8.0	0.0	11000.0	11000.0
9	8th year	8.0	0.0	11000.0	11000.0
10	9th year	8.0	0.0	11000.0	11000.0
11	10th year	8.0	0.0	11000.0	11000.0
	Total	240	712.8	3850857.4	3,84,010.0

APCCF (Forest Diversion & NC), FC Act)

Marks for Passing Golden A = (70% and above with Distinction)

ADD Upper Division & RO (C&G)

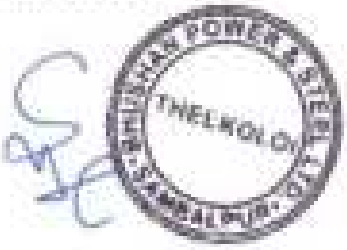
Annexure-3

Estimate for digging of one no. of staggered trench of size 2 mt x 0.5 mt x 0.5 mt along with Agave plantation on the dug out soil.

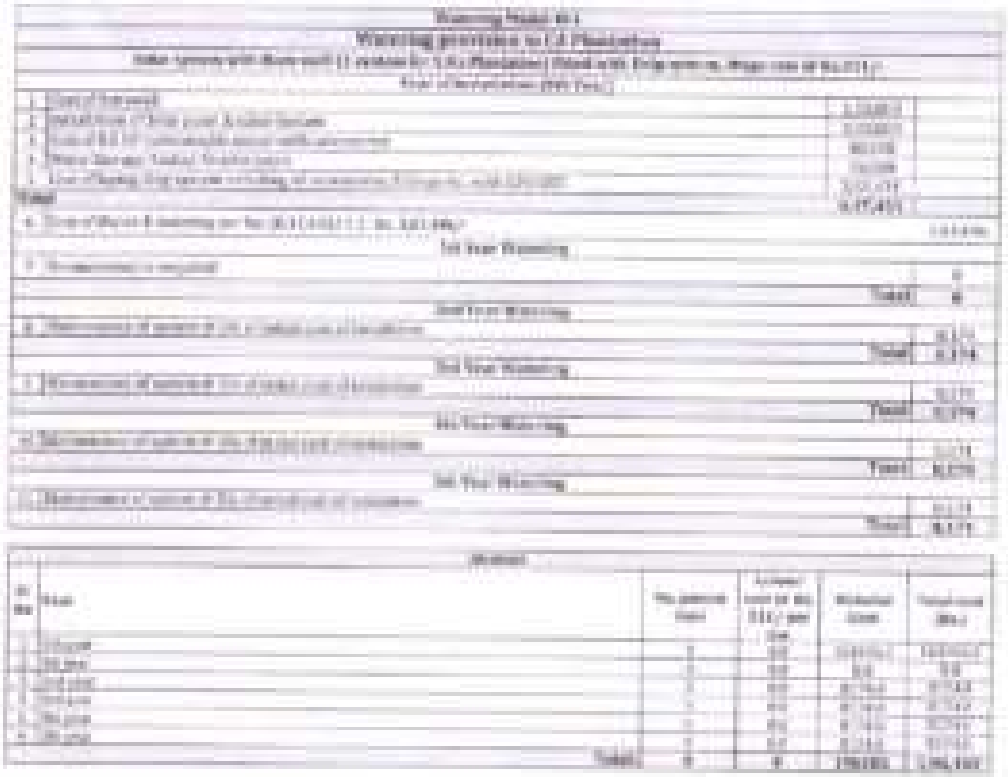
Wage rate Rs.450.00

i)	Earth work in excavation of staggered trench in hard soil including rough dressing and leveling the beds and heaping the dug out soil at the down hill side of the trench and leveling the same too.		
	Size of a trench = 2.0 mt x 0.5 mt x 0.5 mt = 0.5 cum		
	@ 888.72 per 2.83 cum	Rs.	157.01
ii)	Cost for Agave planting on the dugout soil and its maintenance including weeding, soil working, manuring, cost of fertilizer etc. for three years		
	3 nos. of Agave plants per trench @ Rs.66.11/- per plants on LS	Rs.	198.33
	Total :-	Rs.	355.34

Cost of 250 nos. of staggered trenches covering one Ha. = 250 x 355.34 = Rs.88,835.00



ANNEXURE-4



Marks for Watering W1 (Solar borewell) fitted with Drip System (per Ha)

in Rupees

S. NO.	Contractor Point Total	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	Total Cost
	Base Point	120160	3	8(3)	8(3)	8(3)	8(3)											
1	0321-22	[illegible]	3	8(3)	[illegible]	[illegible]	[illegible]											[illegible]
2	0322-23		[illegible]	8	[illegible]	[illegible]	[illegible]	[illegible]										[illegible]
3	0323-24			[illegible]	8	[illegible]	[illegible]	[illegible]	[illegible]									[illegible]
4	0324-25				[illegible]	8	[illegible]	[illegible]	[illegible]	[illegible]								[illegible]
5	0325-26					[illegible]	8	[illegible]	[illegible]	[illegible]	[illegible]							[illegible]
6	0326-27						[illegible]	8	[illegible]	[illegible]	[illegible]	[illegible]						[illegible]
7	0327-28							[illegible]	8	[illegible]	[illegible]	[illegible]	[illegible]					[illegible]
8	0328-29								[illegible]	8	[illegible]	[illegible]	[illegible]	[illegible]				[illegible]
9	0329-30									[illegible]	8	[illegible]	[illegible]	[illegible]	[illegible]			[illegible]
10	0330-31										[illegible]	8	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]

THELKOLOI

AFCO Forest Division & NO, FC Act)

PLAN SHOWING GAP PLANTATION, SOIL AND MOISTURE CONSERVATION ACTIVITIES TO RESTOCK AND REJUNENATE THE DEGRADED OPEN FOREST (HAVING CROWN DENSITY LESS THAN 0.4) WITHIN 100 MTRS. FROM OUTER PERIMETER OF THE MINING LEASE OF NETRABANDHA PAHAR IRON ORE BLOCK M/S BHUSHAN POWER & STEEL LTD.

N
W E
S

SCALE:-1:6,000

0 100 200 400 600 800
Meters

85°17'0"E 85°17'20"E 85°17'40"E 85°18'0"E
N.49°25'12"
N.49°24'0"
N.49°22'48"
N.49°21'36"

Common Boundary With M/s Raga Tradecon Pvt. Ltd.

Common Boundary With M/s Matadin Sharda

Legend

- DGPS ML BOUNDARY
- 100 Mtr. OUTER PERIPHERY
- PRF
- Revnue Forest
- Plantation Area
- Plantation Fencing(1.277 km)
- STAGGERED TRENCH(22 nos)
- ALL_PLOTS
- Common Lease Boundary

Area for Plantation	
Category	Area in Ha.
PRF	2.478
Revenue Forest	2.833
Total Forest	5.311

COUNTERSIGNED

DIVISIONAL FOREST OFFICER
BONAI DIVISION

BHUSHAN POWER & STEEL LTD. THELKOLOI SUNDARGARH (ORISSA)

PLANTATION LAND SCHEDULE OF 100 METER OUTER PERIPHERY OF MINING LEASE AREA

Sl.No	Village Name	Khata No.	Plot No.	Total Plot area (In Acre)	Division	Soil_Class	Applied Area for Plantation (In Ha)	Applied Area for Plantation (In Acre)	Category of Land	Remarks
1	Sukda	47	107	32.33	Bonai Sluggal	Kakshi	1.220	3.013	Khas Forest	DEF
2	Sukda	47	108	31.47	Bonai Sluggal	Kakshi	2.853	7.045	Govt. Forest	Revenue Forest
3	Sukda	48	109	11	Kakadi	KAKA	1.011	2.498	Govt.	DEF
Total							5.311	13.278		

LAND SCHEDULE OF 100 METER OUTER PERIPHERY OF MINING LEASE AREA

Sl.No.	Village Name	Khata No.	Plot No.	Total Plot area (In Acre)	Division	Soil_Class	Applied Area for Plantation (In Ha)	Applied Area for Plantation (In Acre)	Category of Land	Remarks
1	Sukda	1	1(P)	0.10 (P)	Bonai	Kakshi	0.040	0.099	Govt. Forest	
2	Sukda	1	2	0.01	Bonai	Kakshi	0.004	0.010	Govt. Forest	
3	Sukda	1	3	0.01	Bonai	Kakshi	0.004	0.010	Govt. Forest	
4	Sukda	1	4	0.01	Bonai	Kakshi	0.004	0.010	Govt. Forest	

AGENCY COPY

यूनियन बैंक Union Bank of India

NEFT / RTGS CHALLAN for CAMPA Funds

Date : 27-04-2023

Agency Name.	Bhushan Power and Steel Limited
Application No.	58146896156
MoEF/SG File No.	6-03/2022-FC
Location.	ORRISA
Address.	International Trade Tower, Nehru Place, New Delhi.Sambalpur
Amount(in Rs)	161799212/-

Amount in Words :Sixteen Crore Seventeen Lakh Ninety-Nine Thousand Two Hundred and Twelve Rupees Only

NEFT/RTGS to be made as per following details;

Beneficiary Name:	ORRISA CAMPA
IFSC Code:	UBIN0996335
Pay to Account No.	150825814689615 6 Valid only for this challan amount.
Bank Name & Address:	Union Bank Of India FCS Centre,21/1, III Floor, Jelitta Towers, Mission Road, Bengaluru-560027

- This Challan is strictly to be used for making payment to CAMPA by NEFT/RTGS only

Note:After making the required payment through cha
even after 7 working days, then kindly mail a copy of
id to Email: fcsblr@unionbankofindia.bank , epurse@
ubin0903710@unionbankofindia.bank

UTR No

UTR No.
SBIN123122038775

KALPANA PRADHAN 30049709
SBI BRANCH
- 2 MAY 2023
Valid

Send | From: aninda.das@jsw.in

To Sanjay Mahajan ×

Cc

Details of payment to Directorate of Indian Institute of Forest on 01.06.24

Beneficiary Name	Bank Name	IFSC Code	Credit Account Number	Release Date	UTR Number
DIRECTOR INDIAN INSTITUTE OF F	STATE BANK OF INDIA	SBIN0012194	'30662291254	01-06-24 06:06	402058484

BIODIVERSITY CONSERVATION PLAN FOR THE NETRABANDH PAHAR LANDSCAPE, ODISHA

प्रगतेः मूलं प्रकृतिः

Indian Institute of Forest Management, Bhopal

PREPARATION OF BIODIVERSITY CONSERVATION PLAN FOR OF NETRABANDH PAHAR LANDSCAPE, ODISHA

Team Leader

Dr. K. Ravichandran

Team Members

Dr. Yogesh K Dubey
Dr. Advait Edgaonkar
Dr. Anvita Pandey
Dr. Paribhasha Sharma
Dr. Bhimappa Kittur

Researcher

Mr. Aman Bhatia
Mr. S A Francis Ishmael

for

Odisha Forest Department

by

Indian Institute of Forest Management

Bhopal – 462003, MP, India

June 2025

ACKNOWLEDGEMENT

We express our sincere gratitude to Shri Suresh Pant, IFS, PCCF & Head of Forest Force (HoFF), Odisha Forest Department, Shri Debidutta Biswal, IFS, Former PCCF & Head of Forest Force (HoFF), Shri Prem Kumar Jha, IFS, Chief Wildlife Warden, Odisha Forest Department and Shri G. Rajesh, IFS, Chief Executive Officer, CAMPA, Odisha Forest Deaprtment for their invaluable support, encouragement, and strategic guidance extended to the Indian Institute of Forest Management (IIFM), Bhopal and the project team throughout the course of this study.

We also gratefully acknowledge the support and cooperation extended by the Keonjhar and Bonai Forest Divisions for field-level activities.

We are particularly thankful to Shri Dhanraj Hanumant Dhamdhere, IFS (DFO, Keonjhar Forest Division), and Shri Lalit Patra, IFS (DFO, Bonai Forest Division), for their continuous support and for providing access to relevant data and operational assistance during the study period.

The support received from the Range Forest Officers of Barbil, Champua, Bansapal (BJP), Koira, and Barsuan ranges is gratefully acknowledged, as it was instrumental in ensuring efficient field coordination.

Special thanks are due to forest staff members – Ms. Anupama, Ms. Suraj, and Mr. Jyotiranjan – from both the forest divisions for their dedicated field assistance and valuable inputs throughout the fieldwork.

We would also like to place on record our appreciation for the contributions of the research team members – Mr. Sibasish Sahoo, Mr. Shantibhushan Sahoo, Mr. Souvik Ghosal, Mr. Digvijaya Pattnaik, Mr. Manoranjan Giri, and Mr. Jayaprakash Prusty – for their diligent efforts in data collection, field management, and knowledge sharing.

Finally, we extend our sincere thanks to all individuals and institutions who, directly or indirectly, contributed to the successful completion of this study.

EXECUTIVE SUMMARY

A Biodiversity Conservation Plan (BCP) is an internationally recognised program that addresses threatened species and habitats, with the goal of protecting and restoring biological systems. These plans include an assessment of biodiversity, set conservation goals, and describe concrete steps for achieving those goals, along with monitoring and evaluation mechanisms. BCPs are crucial because they help prevent biodiversity loss, protect vital ecosystem services like clean water, soil fertility, and climate regulation, and ensure sustainable development.

As part of the preparation of the Netrabandha Pahar Landscape Biodiversity Conservation Plan, the Odisha Forest Department has entrusted the task of preparing a biodiversity conservation plan for the netrabandh pahar landscape to the Indian Institute of Forest Management (IIFM), Bhopal.

The plan covers two forest divisions: Keonjhar Forest Division (including the Barbil, Champua, and Banspal ranges) and Bonai Forest Division (including the Koira and Barsua ranges). The study involves five mines: Netrabandha Pahar Iron Ore Block, Guali Iron Ore Mines, Laserda Pacheri Manganese & Iron Ore Block, Kalmang West (Northern Part) Iron Ore Mines, and Netrabandha Pahar (West) Iron Ore Block. The mining companies involved are M/s Bhusan Power & Steel Ltd., M/s OMC Ltd., M/s Thriveni Earthmovers Pvt. Ltd., M/s Tata Steel BSL Ltd., and M/s Raga Tradecon Pvt. Ltd. These five mines together cover a total forest land area of 510.505 ha.

Key aspects of the plan include the protection and conservation of floral and faunal resources, with a special focus on threatened species. The plan also addresses the management of wildlife corridors to ensure the uninterrupted movement of animals, as well as the conservation of riverine and aquatic habitats. Additional components involve the control and management of invasive weeds, forest fire prevention and response strategies, and regulation of grazing to minimize habitat degradation. Measures to mitigate human-wildlife conflict are included, in addition to the conservation of medicinal plants. The plan also considers the sustainable management of local community's dependence on forest resources, and outlines efforts to reduce air and water pollution through targeted interventions. Finally, it emphasizes training and capacity-building initiatives for various stakeholders, including representatives from five organizations, to strengthen protection and surveillance efforts across the region.

The field visits were carried out during December 2024 & January 2025 to February 2025. Baseline information of the biodiversity comprising fauna, flora, ethnobotanical, environmental information, human-wildlife conflict, landscape connectivity and habitat

use by large mammals was collected to identify the important habitats, species and communities to assess the potential impacts of mining.

In total 401 species recorded from the study area highlights the floral richness in the study area. Further, 401 floral species documented belong to 278 genera and 88 families. Fabaceae was the most dominant family of overall flora group with 67 species contributing to 16.71% of species followed by Poaceae with 22 species and Rubiaceae with 19 species contributing 5.49% and 4.74% of the overall species. Overall, five habits of flora were assessed. Among the five habits, tree species dominated with a total of 178 species of 119 genera of 45 families followed by shrubs that recorded 89 species of 76 different genera from 38 families. Species richness of climbers was 65 species of 47 genera and 21 families. Grasses recorded lowest species richness among the five habits with 22 species of 21 genera from a single family and herb recorded 57 species of 40 genera and 27 families.

Red List of Threatened Species, further 105 out of 178 total tree species were listed as least concern, two species were listed as Near Threatened, four were as Vulnerable and one species was Endangered and two shrub species were Least Concern and Endangered. Aegle marmelos and Pterocarpus marsupium are listed in Near Threatened category, Chloroxylon swietenia, Santalum album, Cleistanthus collinus and Dalbergia latifolia are Vulnerable, and Pterocarpus santalinus and Cycas circinalis are listed as Endangered.

Herpetofauna recorded a total 53 species comprising snakes, lizards/gecko, frogs/toads, turtle/tortoise and crocodiles. Out of 53 species, 19 species of reptiles and amphibians were selected as species of conservation significance based on their protection status as per the Indian Wildlife Protection Act, 1972 (amendment 2022) and International Union for Conservation of Nature (IUCN).

Avifauna recorded a total of 59 families which represented 104 unique genera from 136 species. A total of 15 species represented by 9 families were listed in the list of threatened species as per IUCN in which 14 species are listed in the Schedule I category of the Wildlife Protection Act, 2022 (WPA 2022).

A total of 51 species of mammalian fauna was identified in the landscape, represented by 43 genera of 22 different families. The study reported an overall 51 species of mammals out of which 27 species were listed as highly threatened species. As per the Indian Wildlife Protection Act, 1972 with latest amendment in 2022 (WPA, 2022), 26 species of mammals were listed under Part A of Schedule I category providing the highest degree of protection in India.

Forest fire is a common threat to the forest and wildlife of Keonjhar and Bonai Forest Divisions, especially during the dry season which lasts from October to June. The frequency and intensity of fire peaks during the hot summer months between March

and June. Almost all recorded forest fires in this division are anthropogenic in nature. Common causes include the burning of dry forest litter by local people, herders, honey collection and for growth of new grass. A total of 1085 fire events were recorded by MODIS and SNPP in the year 2021 which is the highest in these four years, the lowest 333 fire events between 2021 to 2024 were recorded in 2022, 667 fire events in 2023 and 547 fire events were recorded in the year 2024

The areas surrounding the five mining sites and their 10-kilometre buffer zones in Keonjhar and Bonai Forest Divisions have been enduring persistent and escalating human-wildlife conflicts (HWC), primarily involving the Asian elephant (Elephas maximus). These conflicts stem from habitat fragmentation, development, and disturbances in the wildlife corridors. One notable example is the Karo-Karampada Elephant Corridor, stretching 15.17 km in length and 2.3 km in width within the Barbil range of the Keonjhar Forest Division. It is one of 14 proposed corridors under Project Elephant (2023) but yet to be notified. There is a need to notify this corridor for effective conservation efforts, managing increased elephant foraying, disrupted migration routes, and frequent incursions into human settlements, often with fatal consequences.

The local communities residing within the Zone of Influence (ZOI) forest ranges, possess rich ethnobotanical knowledge, utilising a wide diversity of forest plants for food, medicine, fibre, and various cultural practices. Key plant species such as Bambusa arundinacea (Daba bamboo), Bauhinia vahlii (Siali), Buchanania lanzan (Char), and Madhuca longifolia (Mohua) play an integral role in the daily lives and livelihoods of many villagers. Several plant species, such as Abrus precatorius, Azadirachta indica, and Aegle marmelos, are commonly used in traditional medicine, rituals, and as food supplements.

The forest ranges within the Zone of Influence (ZOI) exhibit a diverse demographic composition. Ethnic groups are represented as follows: Scheduled Tribes constitute the majority at 66.94%, followed by Other Backward Classes (OBC) at 17.66%, Scheduled Castes at 7.06%, and the General category at 8.35%. Minority communities form a very small proportion of the population.

The study has resulted in the preparation of Biodiversity conservation plan for a of period of 10 years with the total capital cost of 70,24,00,000.00 (Rs. Seventy Crore twenty-four lacs). It is hoped that with the successful implementation of the proposed conservation plan the lager objective and the overarching aim of ecologically sustainable development will be achieved. It is expected that with this biodiversity conservation plan the forests of Bonai and keonjhar Forest Division that fall in the zone of impact of the proposed five mines will support biodiversity over the period of time.

Table of Contents

Chapter 1 – INTRODUCTION 1

1.1 BIODIVERSITY 2

1.2 BIODIVERSITY CONSERVATION PLAN 3

1.3 MINING IN INDIA: KEY MINERALS, STATES, AND ENVIRONMENTAL IMPACTS 4

1.4 SCOPE AND CHALLENGES OF MINING IN ODISHA 5

1.4.1 Mineral Wealth and its Economic Contributions 6

1.4.2 The Challenges of Mining: Environmental and Social Impacts 6

1.4.3 Mining and Biodiversity Conservation in Odisha 7

1.5 BIODIVERSITY CONSERVATION PLAN FOR NETRABANDHA PAHAR LANDSCAPE 7

1.6 TECHNICAL SCOPE OF WORK 9

Chapter 2 – STUDY AREA 10

2.0 INTRODUCTION 10

2.1 Major Forest Types- Champion and Seth (1968) 11

2.1.1 Forest Type- 3C/C2e(ii) Moist Peninsular low level Sal Forest 11

2.1.2 Forest Type- 5B/C1c Dry Peninsular Sal Forest 12

2.1.3 Forest Type- 5B/C2 Northern Dry Mixed Forest 12

2.2 MINING BLOCKS 12

2.2.1 Netrabandha Pahar Iron Ore Block (M/s Bhusan Power & Steel Ltd.) 12

2.2.2 Guali iron ore Mines (M/s OMC Ltd.): 14

2.2.3 Lasarda Pacheri Manganese & Iron Ore Block (M/s Thriveni Earthmovers Pvt. Ltd.): 16

2.2.4 Kalmang West (Northern part) Iron Ore (M/s Tata Steel BSL Ltd.): 18

2.2.6 Netrabandha Pahar (West) iron Ore Block (M/s Raga Tradecon Pvt. Ltd.): 19

Chapter 3 – STUDY APPROACH AND METHODS 22

3.1 GENERAL APPROACH 22

3.2 DELINEATION OF STUDY AREA 22

3.3 IDENTIFICATION OF HABITATS 23

3.4 DATA COLLECTION AND ANALYSIS 25

3.4.1 Floral Component 25

3.4.2 Faunal Component 26

3.4.3 Social Component 26
3.4.4 Human-wildlife conflict component 27
3.4.5 Environmental components 27
3.4.6 Management components and analysis 27

Chapter 4 – BASELINE RESULT 29

4.1 STATUS OF FLORA 29
4.1.1 Taxonomical status and species richness 29
4.1.2 Taxonomic status and habit types 32
4.1.3 Dominant family of tree species 33
4.1.4 Dominant family of shrub species 34
4.1.6 Dominant family of herbs and grasses 37
4.1.7 Flora species of high conservation value 38
4.1.8 Invasive species 39
4.2 STATUS OF FAUNA 41
4.2.1 Status of Herpetofauna 41
4.2.2 Status of birds 44
4.2.3. Status of mammals 49
4.3. STATUS OF RIVERINE AND AQUATIC HABITAT 53
4.4 STATUS OF FOREST FIRE 56
4.5 STATUS OF GRAZING 64
4.6 HUMAN WILDLIFE CONFLICT 65
4.6.1 Ecological Context and Elephant Corridors 65
4.6.2 Elephant Movement in the Mining Zone of Impact (ZOI) 66
4.6.3 Human Casualties by Wildlife: 67
4.6.4 Crop raids and economic losses 69
4.6.5 House damage by elephants 70
4.6.6 Human-Wildlife Conflict Compensation Guidelines in Odisha: 71
4.6.7 Anukampa Yojna 73
4.7 SOCIO-ETHNOBOTANICAL, SOCIO-ECONOMIC AND SOCIO-ECOLOGICAL STATUS 74
4.7.1 Socio-Ethnobotanical Status 74
4.7.2 Socio-Economic Status 76
4.7.3 Non-Timber Forest Products (NTFP) 77
4.7.4 Income from Minor Forest Produce 78
4.7.5 Socio-Ecological Status 79

4.8 ENVIRONMENTAL STATUS 81
4.8.1 Air Quality 81
4.8.2 Water Quality 82
4.8.3 Soil Quality 84
4.9 WILDLIFE MOVEMENT AND CONNECTIVITY 85
4.9.1 Landscape Connectivity 86
4.9.2 Elephant connectivity and habitat fragmentation 88

Chapter 5 – BIODIVERSITY CONSERVATION AND MANAGEMENT PLAN 91

5.1 INTRODUCTION 91
5.2 SALIENT FINDINGS OF THE STUDY 91
5.2.1 Overall Biodiversity of Netrabandh Pahar Landscape 92
5.2.2 Threatened Biodiversity Groups 93
5.3 BIODIVERSITY CONSERVATION PLAN: IMPACTS & MITIGATION 95
5.3.1 Land Use and Topography 96
5.3.2 Roads/Dust, Noise and Air pollution: Avenue plantation- Phytoremediation 97
5.3.2 Muck dumps, dust, Soil, and Visual impacts: Restoration of Muck Dumps 100
5.3.3 Reservoirs/Sedimentation: Check dams- Sedimentation trap 102
5.3.4 Afforestation - Safe Zone Green Shelterbelt 104
5.4 HABITAT MANAGEMENT FOR WILDLIFE 106
5.4.1 Management of aquatic habitats: restoration of village tanks/ponds and development of micro wetlands 106
5.4.2 Habitat Connectivity and Corridors 111
5.4.3 Weed Management 117
5.4.4 Grazing management 118

REFERENCES 145

ANNEXURE I – List of Tree species of Netrabandh pahar landscape 148

ANNEXURE II – List of Shrub species of Netrabandh pahar landscape 156

ANNEXURE III – List of Climbers of Netrabandh pahar landscape 159

ANNEXURE IV – List of Herbs and Grasses of Netrabandh pahar landscape 161

ANNEXURE V – Herpetofauna recorded in the Netrabandh pahar landscape 164

ANNEXURE VI – Bird species recorded in the of Netrabandh pahar landscape 168

ANNEXURE VII – Mammalian fauna recorded in the of Netrabandh pahar landscape 174

ANNEXURE VIII – Elephant casualty in the zone of impact (ZOI) of Keonjhar and Bonai Forest division from 2020 to2024 (Sources - EIA and Working Plan) 177

ANNEXURE IX – H uman death related to human- elephant conflict in Keonjhar and Bonai Forest division from 2019 to 2024. 179

ANNEXURE X – P lant Species with medicinal uses in ZOI's Forest Ranges 181

ANNEXURE XI – NTFPs and their collection time. (Source- Working Plan of Bonai and Keonjhar FD) 185

List of Figures

Figure 2.1.	Location of five mines with 10 km radius in Netrabandh pahar landscape.	20
Figure 2.2.	Current operational mines in the Netrabandh pahar landscape	21
Figure 2.3	Proposed five mines with the existing mines in the Netrabandh pahar landscape	21
Figure 4.1.	Habit wise richness of taxonomic group	32
Figure 4.2.	Familywise species richness recorded in herpetofauna	42
Figure 4.3.	Bird species with different habitats preferences	45
Figure 4.4.	Family wise species richness of birds in the landscape	47
Figure 4.5.	Habitat preference of bird species according to their foraging guild	48
Figure 4.6.	Family wise species richness of mammals	51
Figure 4.7.	Fire events in Barbil, Champua and Bjp ranges of Keonjhar Division.	61
Figure 4.8.	Fire events in Koira and Barsuan ranges of Bonai Division.	62
Figure 5.1.	Recommended measures for Aquatic Habitat in ZOI areas of Netrabandh Pahar Landscape.	107
Figure 5.2.	Recommended Steps for Long-term HWC Management	129

List of Maps

Map 2.1:	Study area map focused on five mines under Keonjhar and Bonai Forest Divisions, Odisha.	11
Map 3.1.	Forest Cover of Keonjhar and Bonai Forest Divisions.	25
Map 4.1.	Forest fire points from 2021-2024.	58
Map 4.2.	Forest cover map of netrabanch pahar landscape	59
Map 4.3.	Fire hotspots in the in netrabandh pahar landscape	60
Map 4.5.	Heat Map: Human death incident hot-spot caused by wildlife in Bonai and Keonjhar Forest Division, Netrabandh Pahar Landscape	68
Map 4.6.	Karo-karampada elephant corridor on Odisha-Jharkhand border	88
Map 4.7.	Elephant movement and the forest fragmentation in the landscape	90
Map 5.1.	Elephant crossing locations and connectivity in the landscape	115

List of Plates

Plate 2.1.	Forest habitat at netrabandha Pahar Iron Ore Block/Bhushan steel	13
Plate 2.2.	Guali iron ore mines/OMC Ltd. mines and dumpsite	15
Plate 2.3.	Sidhamata reserve forest adjoining the OMC mines	16
Plate 2.4.	Forest at lasarda Pacheri Manganese & Iron Ore Block and Karo river separating Lasarda and Pacheri villages	17
Plate 2.5.	Kalmang West Iron Ore–Tata steel mine site forest	18
Plate 2.6.	Forest habitat at Netrabandha Pahar (West) iron Ore Block (M/s Raga Tradecon Pvt. Ltd.)	19
Plate 3.1.	Visit at mines by IIFM, forest department and mines representatives.	23
Plate 3.2.	Major land use and habitats in the landscape	24
Plate 3.3.	Field visit and data collection for the different components of the study	28
Plate 4.1.	Chromolaena odorata (weed) infested areas	40
Plate 5.1.	Existing underpass on NH520	114

List of Tables

Table 1.1.	The list of five mines for preparation of the BCP for the entire Netrabandh Pahar Landscape.	9
Table 3.1.	Details of forest cover in the landscape	24
Table 4.1.	Taxonomic status of flora in Netra bandh Pahar landscape.	29
Table 4.2.	Relative percentage of overall floral species from different family	30
Table 4.3.	Habit wise taxonomic status of flora in Netrabandh Pahar landscape.	32
Table 4.4.	Taxonomic status of the Trees recorded in Netrabandh Pahar Landscape	33
Table 4.5.	Familywise relative percentage of species of Trees recorded in Netrabandh Pahar Landscape	33
Table 4.6.	Taxonomic status of the shrubs recorded in Netrabandh Pahar Landscape	35
Table 4.7.	Familywise relative percentage of species of shrubs recorded in Netrabandh Pahar Landscape	35
Table 4.8.	Taxonomic status of the climbers recorded in Netrabandh Pahar Landscape	36
Table 4.9.	Family wise relative percentage of climber species recorded in Netrabandh Pahar Landscape	36
Table 4.10.	Taxonomic status of herbs and grasses recorded in Netrabandh Pahar Landscape.	37
Table 4.11.	Familywise relative percentage of herbs and grasses species recorded in Netrabandh Pahar Landscape	37
Table 4.12.	IUCN status of threatened species of flora	39
Table 4.13.	Floral species of high conservation significance	39
Table 4.14.	Exotic species of flora recorded in the landscape	40
Table 4.15.	Taxonomic status of herpetofauna	42
Table 4.16.	Protection status of herpetofauna recorded in the study	43
Table 4.17.	Taxonomic status of bird species	45
Table 4.18.	Foraging status of bird species in the landscape	47
Table 4.19.	Threatened species of birds recorded in the study	48
Table 4.20.	Taxonomic status of mammals	50
Table 4.21.	Protection status of mammals in the landscape	52
Table 4.22.	Site-Specific Status of Riverine and Aquatic Habitats in Mining Areas	54
Table 4.23.	Fire incidences in the selected beats of ranges Barbil, Champua and Bjp in forest division Keonjhar (2020-2024), and beats of ranges Koira and Barsuan in Bonai Forest division (2021-2024)	62
Table 4.24.	Human deaths due to HEC in the ZOI forest ranges from 2019 to 2024.	69
Table 4.25.	Crop loss due to HEC in the ZOI forest ranges from 2017 to 2024.	70
Table 4.26.	House damage due to HEC in the ZOI forest ranges from 2017 to 2024.	71
Table 4.27.	Ex-Gratia Payments Guidelines for Human Death or Injury Caused by Wildlife	72
Table 4.28.	Compensation Payments for Livestock Depredation by Wildlife	72
Table 4.29.	Compensation Payments for Property Damage by Wildlife	73
Table 4.30.	Percentage of Occupation from the Villages of ZOI's Forest Ranges.	77
Table 4.31.	Main NTFPs and Their Socio-Economic Importance	78
Table 4.32.	List of Common Minor Forest Produce (MFP) Species and their Harvested Parts	80
Table 4.33.	Baseline Ambient Air Quality	82
Table 4.34.	Water Quality	83
Table 4.35.	Soil Quality	85

Table 5.1.	Overall status of biodiversity in the landscape	93
Table 5.2.	Overall status of threatened flora and fauna in the landscape	94
Table 5.3.	Tree Species for Avenue Plantation (Native, hardy, pollution-tolerant, and suitable for long-term ecosystem restoration).	98
Table 5.4.	Shrub and Herbaceous Species for Phytoremediation and Slope Stabilization.	99
Table 5.5.	Grasses and Groundcovers for Overburden Dumps & Dust Suppression.	100
Table 5.6.	Elephant crossing locations at major roads and railway lines	113
Table 5.7.	Plant species for phytoremediation and pollution absorption	126
Table 5.8.	Palatable plants and fodder species	127
Table 5.9.	Priority Species for Community Seed Bank Conservation.	140
Table 5.10.	Proposed Budget Estimate for Biodiversity Conservation Plan	143

Chapter 1 – INTRODUCTION

Historically, conservation and development have often been perceived as conflicting goals, with development frequently labelled as detrimental to society and the environment. However, various instances of mutual dependence between the two have been documented, as highlighted in the *World Conservation Strategy* (1980). According to this strategy, development involves modifying the biosphere to enhance human well-being, while remaining within the ecological limits of ecosystems. Conservation, on the other hand, refers to managing human use of the biosphere in a way that sustains current needs without compromising the availability of resources for future generations.

Environmental modifications are an inherent outcome of development activities, much like the natural behaviour of any species on Earth. Yet, as the *World Conservation Strategy* developed by the International Union for Conservation of Nature (IUCN) emphasizes, these changes do not always align with the intended social and economic goals. Without grounding development in ecological, social, cultural, and ethical principles, it is unlikely to yield sustainable or equitable outcomes. Therefore, an integrated approach combining conservation and development is essential to achieve true sustainable development, ensuring both environmental integrity and human welfare.

It is also crucial to focus on the core objectives of development—social and economic well-being—while acknowledging the limitations imposed by finite natural resources and the carrying capacity of ecosystems. The *Convention on Biological Diversity* (CBD), adopted in 1992 and enforced from 1993, reinforces this perspective by advocating for the sustainable use of biological resources and the fair and equitable sharing of benefits derived from genetic resources.

In recent years, mining and its impacts on forests, wildlife, and local communities have become prominent issues in policy and conservation discussions across India. While the necessity of resource extraction for national development is widely acknowledged, significant concerns remain about its effects on natural habitats and dependent populations.

Minerals are vital to the country's economic growth, serving as essential raw materials for various industries. The responsible development and efficient utilization of these resources are key indicators of a nation's progress (Singh and Shukla, 2008). Mining operations are often situated in remote regions and contribute substantially to India's GDP and international trade. However, when mining is carried out indiscriminately and without adequate planning, it can lead to irreversible degradation of natural resources.

Such activities adversely impact surrounding environments, including air, water, soil, land, and biodiversity. With the increasing globalization of the mining sector, public scrutiny has intensified, demanding a more balanced assessment of the environmental and social costs associated with mineral extraction. Consequently, it is imperative for India's mineral industry to adopt sustainable development practices. This includes minimizing pollution, rehabilitating degraded land, ensuring future usability of mined areas, and responsibly managing the displacement of affected communities

1.1 BIODIVERSITY

Biodiversity provides the basic goods and services for human society to exist and secure economic and social development. Health, wealth, food security and many other needs of human beings are dependent on natural resources, and yet human beings have used these with scant regard to long term health and survival. Commercial exploitation of biodiversity significantly decreased the carrying capacity of the region. Such indiscriminate use resulted in loss of biodiversity.

Definition

- Biodiversity means the variability among living organisms from all sources, including, inter alia, terrestrial, marine, and other aquatic ecosystems, and the ecological complexes of which they are part; this includes diversity within species, between species, and of ecosystems. (Convention on Biological Diversity, 1992)
- Biodiversity is the variety of life in all its forms, levels, and combinations. (E.O. Wilson)
- Biodiversity is the variety and variability of life on Earth. It includes all living things and the ecological complexes in which they occur. Biodiversity is typically

recognised as being composed of three main components: ecosystem diversity, species diversity, and genetic diversity. (UNEP)

- Biodiversity is the living fabric of our planet, and it is this rich diversity of life that sustains the Earth's systems and maintains the health of the planet. (David Attenborough)
- Biodiversity is the variety of life on Earth, which includes all plants, animals, fungi, and microorganisms, as well as the genetic diversity within each species, and the ecosystems they form. (WWF)
- Biodiversity is a fundamental and essential feature of the natural world, representing the intricate and varied array of species, ecosystems, and ecological processes that have evolved on Earth. (George Wald)
- Biodiversity refers to the variety and variability of life on Earth. It includes all living organisms and the ecosystems they inhabit, and it is critical for maintaining the health of the planet. (National Geography)

1.2 BIODIVERSITY CONSERVATION PLAN

A Biodiversity Conservation Plan (BCP) is an internationally recognised program that addresses threatened species and habitats, with the goal of protecting and restoring biological systems. The initial impetus for these plans came from the 1992 Convention on Biological Diversity (CBD), which emphasised the importance of conserving biodiversity worldwide. BCPs are systematic approaches to biodiversity management that help organisations contribute to positive outcomes for nature by implementing strategies to protect threatened species and conserve ecosystems. They include comprehensive species documentation, habitat management, and public awareness initiatives to ensure effective protection.

BCP a strategy for protecting nature and ensuring sustainable futures:

A BCP is a strategic framework designed to conserve, manage, and restore biodiversity in a specific area or region. It outlines the necessary actions, priorities, and objectives to protect ecosystems, species, and genetic diversity, often in areas undergoing environmental pressure due to human activities like development, pollution, or land use changes. These plans include an assessment of biodiversity, set conservation goals, and describe concrete steps for achieving those goals, along with

monitoring and evaluation mechanisms. BCPs are crucial because they help prevent biodiversity loss, protect vital ecosystem services like clean water, soil fertility, and climate regulation, and ensure sustainable development. They also help organisations comply with legal and ethical obligations, such as international environmental agreements, and are essential in addressing the challenges posed by climate change. Furthermore, BCPs raise public awareness about the importance of biodiversity and guide education efforts.

The benefits of a BCP are substantial. They preserve ecosystem functions and services, ensure the protection of species, and enhance the resilience of ecosystems to environmental stressors. Healthy ecosystems contribute to local and national economies, especially in sectors like agriculture, fisheries, tourism, and forestry. BCPs also contribute to global biodiversity goals and help mitigate climate change by protecting carbon-sequestering ecosystems such as forests and wetlands. For businesses, industries, and governments, a BCP enhances corporate social responsibility, improving their public image. Moreover, BCPs facilitate research, sustainable land use planning, and active involvement of local and indigenous communities, ensuring that conservation efforts align with their livelihoods. Ultimately, a BCP is not only vital for biodiversity preservation but also essential for sustaining human well-being, economic stability, and global environmental health.

1.3 MINING IN INDIA: KEY MINERALS, STATES, AND ENVIRONMENTAL IMPACTS

Mining in India is a crucial sector for the economy, with key minerals such as coal, iron ore, bauxite, limestone, and mica driving various industries. Coal mining, particularly in Jharkhand, Odisha, and Chhattisgarh, is vital for energy production and steel manufacturing, though it faces environmental concerns like pollution and displacement. Similarly, iron ore mining, primarily in Odisha, Jharkhand, and Chhattisgarh, supports the steel industry but also contributes to deforestation and land degradation. Bauxite mining, essential for aluminium production, occurs in states like Odisha and Maharashtra, with similar environmental impacts. Limestone, used in cement manufacturing, is abundant in Rajasthan and Tamil Nadu, while mica mining in Jharkhand and Bihar is significant for cosmetics and electrical industries, despite

concerns over child labour. Gold mining, though less widespread, is growing in states like Karnataka and Rajasthan. Other minerals like zinc and copper are mined in states like Rajasthan and Tamil Nadu, supporting infrastructure and manufacturing.

The environmental impacts of mining in India are substantial. Activities such as coal and iron ore mining contribute to pollution, deforestation, and land degradation, affecting ecosystems and biodiversity. Moreover, mining often results in the displacement of local communities, leading to social and economic challenges. Health hazards due to exposure to dust and chemicals during mining pose risks to workers and nearby residents. Additionally, mica mining has been associated with child labour, highlighting the need for stricter regulations to protect vulnerable populations.

Despite its economic importance, the mining sector faces several challenges. Environmental degradation, land displacement, health hazards, and illegal mining are pressing issues that need to be addressed. To mitigate these challenges, technological advancements and stricter regulations are being explored to promote sustainable practices. The Indian government has introduced policies aimed at enhancing transparency, efficiency, and private sector participation in the mining sector. Initiatives like ‘Atmanirbhar Bharat’ focus on expanding domestic manufacturing and reducing import dependence. However, balancing economic growth with environmental sustainability remains a significant challenge for India's mining industry. Promoting sustainable mining practices can help mitigate environmental and social issues, ensuring that the sector contributes positively to both the economy and the environment.

1.4 SCOPE AND CHALLENGES OF MINING IN ODISHA

Odisha is renowned for its rich mineral deposits, playing a pivotal role in India's mining sector and contributing significantly to the national economy. The state is a major hub for minerals such as iron ore, chromite, coal, bauxite, and manganese, making it a key player in global markets. This mineral wealth has positioned Odisha as India's leading mining state, with significant economic benefits and infrastructure development.

1.4.1 Mineral Wealth and its Economic Contributions

Odisha's mineral resources are among the most valuable in India, with substantial reserves of key minerals like iron ore, chromite, coal, bauxite, and manganese. The state holds nearly 50% of India's iron ore reserves, making it crucial for the domestic steel industry and global markets. Major districts such as Keonjhar and Sundargarh are hubs for high-quality iron ore extraction. Odisha is also the largest producer of chromite, essential for ferro-chrome production used in stainless steel. The extensive deposits of coal, bauxite, and manganese further enhance the state's mineral profile.

Mining activities form the backbone of Odisha's economy, providing employment and generating significant revenue through taxes, royalties, and exports. Major entities are the Odisha Mining Corporation (OMC), National Aluminium Company (NALCO), and private players such as Tata Steel, Vedanta, and Jindal Steel & Power drive large-scale mining operations. Their economic contribution has facilitated infrastructure development, enhanced local economies, and provided livelihoods to many communities, especially in mining districts.

1.4.2 The Challenges of Mining: Environmental and Social Impacts

Despite its economic benefits, the mining industry poses significant environmental and social challenges. Mining in ecologically sensitive areas leads to deforestation, soil erosion, water and air pollution, contributing to habitat degradation. The extraction process often destroys critical ecosystems supporting diverse plant and animal species, complicating biodiversity conservation efforts (CSE Report, 2021; State Pollution Control Board Odisha, 2020).

Additionally, mining activities frequently disturb indigenous and local communities due to the acquisition of land, the emission of pollution, a decrease in resource use, etc. Many tribal populations in Odisha have been displaced due to land acquisition for mining projects, leading to protests and conflicts over land rights, compensation, and rehabilitation. These social dimensions further

complicate the challenges associated with mining operations (NCST Report, 2020).

1.4.3 Mining and Biodiversity Conservation in Odisha

The rapid growth and intensity of mining activities in Odisha necessitate urgent and effective biodiversity conservation plans. Balancing industrial growth with ecological conservation is crucial. The state must address environmental concerns such as deforestation, soil erosion, and water pollution while ensuring that mining operations do not compromise the livelihoods of local communities. Implementing sustainable mining practices and robust environmental regulations can help mitigate these impacts and ensure that Odisha's mineral wealth benefits both the economy and the environment (Odisha Forest Department, 2021; MOEFCC Guidelines on Sustainable Mining, 2018).

To address the challenges posed by mining, Odisha needs to focus on sustainable mining practices, advanced geological studies to identify new deposits, and infrastructure development to enhance resource utilization. The state should prioritize biodiversity conservation plans to minimize ecological damage (NITI Aayog Report on Sustainable Development, 2020).

1.5 BIODIVERSITY CONSERVATION PLAN FOR NETRABANDHA PAHAR LANDSCAPE

The Netrabandha Pahar landscape in Odisha is a hilly region with undulating topography, and an elevation ranging from 400 meters to 1100 meters. The area is characterized by flat-topped low mounds and a general gradient towards the northeast and southeast. The landscape is particularly important for elephant habitat, but faces challenges such as dust pollution and noise from road transport, fragmentation of corridors impeding the movement of wildlife species. The region also requires soil and moisture conservation measures. Additionally, the Netrabandha Pahar area is known for its iron ore mines, making it a significant mining site. The Netrabandha Pahar landscape is an important source of iron ore for India's steel industry and is also a major source of employment for the local population. The area is located in the Eastern Ghats and is surrounded by dense forests. The mines are a major source of

employment for the local population and provide direct and indirect employment to the local communities. There would be an environmental/ecological impact due to iron ore mining, in trems of contamination of water, deposition of dust particles in the surrounding environment, health issues, etc. and the Biodiversity Conservation Plan is aimed at providing mitigation measures to minimize the environmental/ecological impacts.

As part of the preparation of the Netrabandha Pahar Landscape Biodiversity Conservation Plan, the Odisha Forest Department has entrusted the task of preparing a biodiversity conservation plan for the netrabandh pahar landscape to the Indian Institute of Forest Management (IIFM), Bhopal.

The plan covers two forest divisions: Keonjhar Forest Division (including the Barbil, Champua, and Banspal ranges) and Bonai Forest Division (including the Koira and Barsua ranges). The study involves five mines: Netrabandha Pahar Iron Ore Block, Guali Iron Ore Mines, Laserda Pacheri Manganese & Iron Ore Block, Kalmang West (Northern Part) Iron Ore Mines, and Netrabandha Pahar (West) Iron Ore Block. The mining companies involved are M/s Bhusan Power & Steel Ltd., M/s OMC Ltd., M/s Thriveni Earthmovers Pvt. Ltd., M/s Tata Steel BSL Ltd., and M/s Raga Tradecon Pvt. Ltd. These five mines together cover a total forest land area of 510.505 ha (Table 1.1).

Key aspects of the plan include the protection and conservation of floral and faunal resources, with a special focus on threatened species. The plan also addresses the management of wildlife corridors to ensure the uninterrupted movement of animals, as well as the conservation of riverine and aquatic habitats. Additional components involve the control and management of invasive weeds, forest fire prevention and response strategies, and regulation of grazing to minimize habitat degradation. Measures to mitigate human-wildlife conflict are included, in addition to the conservation of medicinal plants. The plan also considers the sustainable management of local community's dependence on forest resources, and outlines efforts to reduce air and water pollution through targeted interventions. Finally, it emphasizes training and capacity-building initiatives for various stakeholders, including representatives from five organizations, to strengthen protection and surveillance efforts across the region.

1.6 TECHNICAL SCOPE OF WORK

The following is the Technical scope of work as communicated by the office of the Principal Chief Conservator of Forest & HoFF vide Memo no 9236 dated 2nd May 2024

“Preparation of Biodiversity Conservation Plan for the entire landscape of Netrabandha Pahar in respect of 5 (five) Nos of mines as per the common conditions envisaged in the Stage-1/in principle approval”.

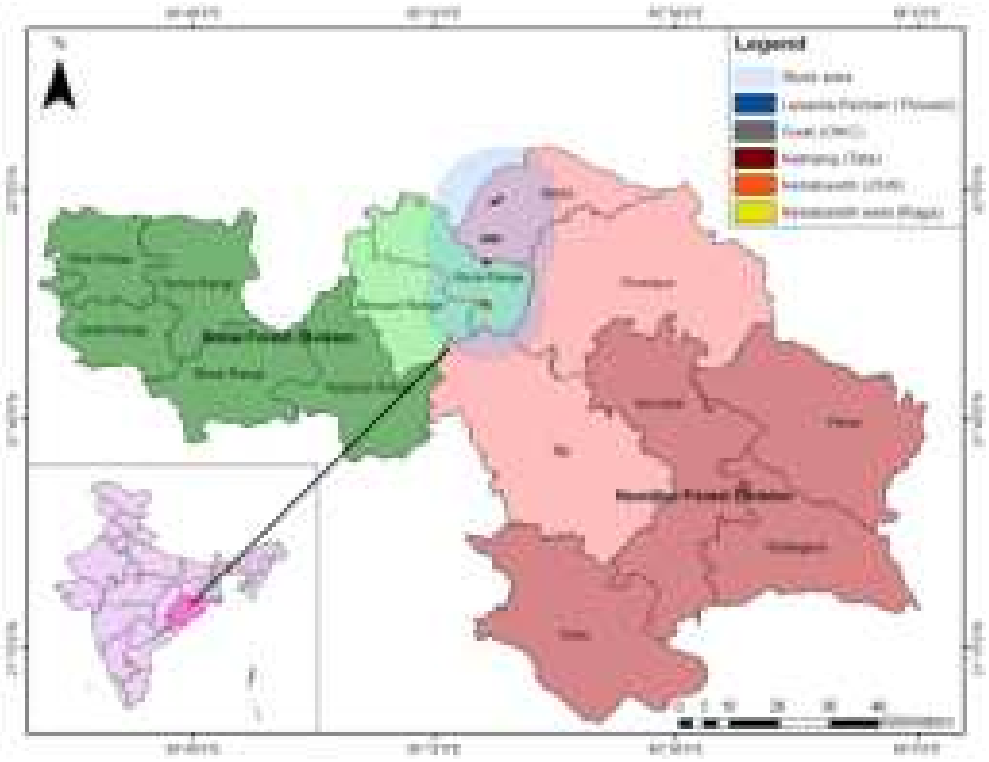
Table 1.1. The list of five mines for preparation of the BCP for the entire Netrabandh Pahar Landscape.

S. No.	Name of the Project	Area of Forest (ha)	Forest Division	Forest Range
1.	Netrabandha Pahar Iron Ore Block (M/s Bhushan Power & Steel Ltd.)	112.621	Bonai	Koira
2.	Guali iron ore Mines (M/s OMC Ltd.)	194.683	Keonjhar	Barbil
3.	Lasarda Pacheri Manganese & Iron Ore (M/s Thriveni Earthmovers Pvt Ltd.)	94.351	Keonjhar	Barbil
4.	Kalmang West (Northern part) Iron Ore (M/s Tata Steel BSL Ltd.)	42.608	Keonjhar and Bonai	Barbil & Koira
5.	Netrabandha Pahar (West) iron Ore Block (M/s Raga Tradecon Pvt. Ltd.)	66.242	Bonai	Koira

Chapter 2 – STUDY AREA

2.0 INTRODUCTION

The Netrabandh Pahar landscape, situated in the state of Odisha and sharing its boundary with Jharkhand, forms a critical ecological and mineral-rich zone in north Odisha. This landscape spans two key forest divisions, Bonai and Keonjhar, and comprises areas that are increasingly being subjected to mining related pressures. The current study focuses on assessing the ecological and environmental implications within the potential or zone of impact (ZOI) of five proposed and operational mining blocks. These mining blocks include, Netrabandha Pahar Iron Ore Block operated by M/s Bhushan Power & Steel Ltd. (now JSW), Guali Iron Ore Mines under M/s Odisha Mining Corporation (OMC) Ltd., Lasarda Pacheri Manganese & Iron Ore Block managed by M/s Thriveni Earthmovers Pvt. Ltd., Kalmang West (Northern Part) Iron Ore Block held by M/s Tata Steel BSL Ltd., and Netrabandh Pahar (West) Iron Ore Block under M/s Raga Tardecon Pvt. Ltd. Collectively, these blocks involve a diversion of approximately 510.505 ha of forest land. The study area, defined by a 10-kilometre buffer surrounding these mining sites, encompasses a total of 788.30 km2. This buffer zone spreads across five forest ranges, Barbil, Champua, and BJP forest ranges within the Keonjhar Forest Division, and Koira and Barsuan forest ranges within the Bonai Forest Division. These forested zones are significant for both biodiversity conservation and the socio-ecological balance of the region.



Map 2.1: Study area map focused on five mines under Keonjhar and Bonai Forest Divisions, Odisha.

2.1 Major Forest Types- Champion and Seth (1968)

The forest of the Netrabandh Pahar is as per Champion and Seth is classified as follows:

2.1.1 Forest Type- 3C/C2e(ii) Moist Peninsular low level Sal Forest

This forest type is confined in few pockets in this Division on flat or nearly flat ground, valleys and lower slopes, where Sal is principal species. In favorable areas it is found in pure patches The principal associates of Sal are *Terminalia tomentosa*, *Halanda cordifolia*, *Schleichera oleosa*, etc. There are other species found in top canopy are *Dalbergia latifolia*, *Pterocarpus marsupium*, *Bridelia retusa*. The middle story consists of *Mangifera indica*, *Terminalia belerica*, *Terminalia chebula*, *Anogeissus latifolia*, *Cassia fistula*, *Mitragyna parviflora*, *Malotus sp*. The scrubby undergrowth is generally found observed. In some areas it is dense. Sal regeneration is moderate to fair.

2.1.2 Forest Type- 5B/C1c Dry Peninsular Sal Forest

This sub-type of forest is found extensively throughout forests of this Division. It is seen in almost all the Blocks and regressing towards Dry Mixed Deciduous Forests. The main species in the top canopy are Sal, Piasal, Asan, Dhaura, and Sisoo. The middle story comprises of Bahada, Kusum, Chara, Mai, Rai, Kumbhi, Kendu, Karada, Amla and Bela. Fire and grazing is the common phenomenon in the above areas. Sal regeneration is quite high. But it is adversely affected by biotic pressure. Though the regeneration of Sal is sufficient, its establishment became difficult due to annual ground fire and grazing.

2.1.3 Forest Type- 5B/C2 Northern Dry Mixed Forest

This subtype is found in degraded forest blocks and miscellaneous species are replacing the Sal due to heavy biotic pressure and fire. The canopy height is about 15 to 20 m of uneven canopy. *Dentrocalamus strictus* is observed extensively. The top canopy consists of *Anogeissus latifolia*, *Terminalia tomentosa, Madhuca indica, Buchanania lanzan, Diospyros melanoxylon, Vridelia retusa, Cleistanthus collinus, Phyllanthus emblica, Lagerstroemia sp. Combretum decadrum, Smilex macrophyla, Butea* climbers are encountered during field visit. Grazing and fire are common phenomena in major forest blocks.

2.2 MINING BLOCKS

The details of the five proposed mining blocks are described below:

2.2.1 Netrabandha Pahar Iron Ore Block (M/s Bhusan Power & Steel Ltd.)

The Netrabandha Pahar Iron Ore Block mining lease, granted to M/s Bhushan Power & Steel Ltd. (BPSL) by the Government of Odisha, spans 139.223 ha located at Baladihi village, Koira tahsil, Sundargarh district. The lease was initially granted for non-captive steel manufacturing, with a planned lifespan of 33 years. The mine is expected to produce 2.680 million tonnes of iron ore per

annum (MTPA), generating significant overburden and subgrade material. A total of 38,402 people live within the project area, with a substantial proportion of Scheduled Tribes (66.08%) and Scheduled Castes (8.49%). Given the demographic profile, socio-economic upliftment and cultural preservation are key concerns. The area is ecologically diverse, although there are no designated wildlife sanctuaries or national parks. The primary land use types within the study area include built-up land (2.6%), forest land (7.4%), agricultural land (16.9%), and waste land (70%). Environmental monitoring, including ambient air and water quality, indicates that pollutants are within permissible limits. Given the mining operations scale, the plan must integrate effective biodiversity management and habitat restoration strategies.

Plate 2.1. Forest habitat at netrabandha Pahar Iron Ore Block/Bhushan steel

2.2.2 Guali iron ore Mines (M/s OMC Ltd.):

Guali Iron Ore Mine, located at village Guali along with four other villages Loidapada, Panduliposhi, Topadihi, Rugudihi, and Sidhamatha RF in Barbil Tehsil of Keonjhar district, Odisha, lies within the forest range of Barbil in the Keonjhar forest division, covering an area of 194.683 ha. The Zone of Impact (ZOI), which is defined as the area within a 10 km radius from the project boundary, has been computed to cover 398.30 km², extending into Jharkhand, specifically the Singhbhum West district. The ZOI includes 33 villages, with 16 in Keonjhar and 17 in Sundargarh district. As of the 2011 Census, 31,741 people inhabit this area, with a majority from Scheduled Tribes (61.89%). The mine is projected to extract 5.70 million tonnes of iron ore annually, with expansion plans to reach 30 MTPA. Environmental considerations for this project are outlined in a Site-Specific Wildlife Conservation Plan (SSWCP) and the Environmental Impact Assessment (EIA). Key environmental concerns include land degradation, water, air, noise pollution, and socio-economic impacts, particularly on agriculture and the local workforce. The project's mining operations involve drilling, blasting, and rock-breaking techniques. Water usage for mining activities is substantial, and dust suppression and water management strategies must be carefully implemented. The biodiversity plan will focus on mitigating the impacts on local flora and fauna while ensuring sustainable land use.

Plate 2.2. Guali iron ore mines/OMC Ltd. mines and dumpsite

Plate 2.3. Sidhamata reserve forest adjoining the OMC mines

2.2.3 Lasarda Pacheri Manganese & Iron Ore Block (M/s Thriveni Earthmovers Pvt. Ltd.):

The Lasarda Pacheri Manganese & Iron Ore Block in Dhanurjaypur, Kanarda, and Laserda villages, Barbil Tehsil, Keonjhar district, Odisha, with an area of 131.800 ha, is a Category-A project under the Ministry of Environment, Forest and Climate Change (MoEF&CC). The project covers both forest and non-forest land. Mining operations will utilize open-cast mechanized methods, and

the production capacity is set at 1.545 MTPA of manganese and iron ore. The project will lead to the displacement of 25 families, and resettlement plans are currently underway. Environmental concerns, including the diversion of 94.351 ha of forest land and compensatory afforestation, must be addressed in the biodiversity plan. The project area is also home to various flora and fauna, making it essential to ensure that conservation measures for these species are included.

Plate 2.4. Forest at lasarda Pacheri Manganese & Iron Ore Block and Karo river separating Lasarda and Pacheri villages

2.2.4 Kalmang West (Northern part) Iron Ore (M/s Tata Steel BSL Ltd.):

The Kalmang West Iron Ore Mine spans 42.608 ha of forest land, and its mining operations will extract 2.95 MTPA of iron ore using a fully mechanized, opencast mining method. The mine's geological reserves are estimated at 92.97 million tonnes, and the project will generate approximately 14.6 million cubic meters of waste. A green belt will be developed over 4.17 ha, and a rainwater harvesting system will recharge 302,471.1 kilo liters annually. The project also includes provisions for the rehabilitation of 71 affected families and water management, with an estimated water requirement of 235 KLD. Environmental clearance has been granted, but the project is subject to various stipulations, including the implementation of biodiversity conservation plan.

The biodiversity conservation plan must ensure that the mine's operations do not disrupt local habitats and species, with particular attention to Schedule-I species.

Plate 2.5. Kalmang West Iron Ore–Tata steel mine site forest

2.2.6 Netrabandha Pahar (West) iron Ore Block (M/s Raga Tradecon Pvt. Ltd.):

M/s Raga Tradecon Pvt. Ltd. has proposed the Netrabandha Pahar (West) Iron Ore Block for the extraction of 1.0 million tonnes per annum (MTPA) of iron ore, with an associated 750 TPH crushing unit and a 600 TPH screening unit. The mining activities will span an area of 74.370 ha, located in the villages of Baladiha and Sanua, within the Koira Tehsil of Sundergarh District, Odisha.The project aims to contribute to the iron ore production capacity while adhering to environmental and regulatory requirements. The environmental clearance for the project is required for the proposed 1.0 MTPA iron ore production, and a detailed baseline study was conducted by M/s. Geogreen Testing Laboratory.

Plate 2.6. Forest habitat at Netrabandha Pahar (West) iron Ore Block (M/s Raga Tradecon Pvt. Ltd.)

The entire landscape of netrabandh pahar is currently under a large number of iron ore mines. A total of approximately 32 mines are already in operation. Figure 2.1 shows the location of the proposed five mines namely Netrabandha Pahar Iron Ore Block (M/s Bhushan Power & Steel Ltd.), Guali Iron Ore Mines, (M/s OMC Ltd.), Lasarda Pacheri Manganese & Iron Ore, (M/s Thriveni Earthmovers Pvt Ltd.), Kalmang West (Northern part) Iron Ore, (M/s Tata Steel BSL Ltd.) and Netrabandha Pahar (West) iron Ore Block, (M/s Raga Tradecon Pvt. Ltd.) along with the 10 km radius area around them. Figure 2.2 shows the distribution of the existing 32 mines already in operation in the landscape and Figure 2.3 shows the proposed five mines along with the existing 32 mines in the landscape. It can be seen from Figures 2.1 to 2.3 that the entire landscape is covered with the mines.

Figure 2.1. Location of five mines with 10 km radius in Netrabandh pahar landscape.

Figure 2.2. Current operational mines in the Netrabandh pahar landscape

Figure 2.3 Proposed five mines with the existing mines in the Netrabandh pahar landscape

Chapter 3 – STUDY APPROACH AND METHODS

This study involves assessing the status of floral and faunal assemblage, faunal movement mostly focused on the Asian Elephant, riverine and aquatic habitats, status of weeds, forest fire, cattle grazing, human-wildlife conflict, medicinal plants, dependence of local communities on forest resources, status of environmental components such as air and water. The findings will contribute to prepare a Biodiversity Conservation Plan for Netrabandha Pahar landscape, covering five mines as part of the common condition of stage I/in principle approval for forest clearance for mining projects located within the forest habitats of Keonjhar and Bonai Forest Divisions in Keonjhar and Sundargarh district of Odisha. The PCCF & Nodal Officer, FC Act, State Forest Headquarters, Odisha requested the Indian Institute of Forest Management (IIFM), Bhopal, to prepare the Biodiversity Conservation Plan. Accordingly, IIFM planned a rapid field study complemented by the compilation of primary & secondary data to assess all the project components under the study area with the following study approach and the field methodology.

3.1 GENERAL APPROACH

Considering the short duration of study period, a rapid assessment approach was adopted to cover the huge landscape. The forest in the landscape and proposed mines were visited during January 2025 to February 2025. Baseline information of the biodiversity comprising fauna, flora, ethnobotanical, environmental information, human-wildlife conflict, landscape connectivity and habitat use by large mammals was collected to identify the important habitats, species and communities to assess the potential impacts of mining.

3.2 DELINEATION OF STUDY AREA

The proposed mining area for five mines requires a total of 510.505 ha of forest area. A buffer of 10 km radius was created as the impact zone for all five mines. The impact zones of most of the mines are overlapping, and total area of impact was around 843.17 sq.km. in which 725.09 sq. km. area is falling under Keonjhar and Bonai Forest Divisions of Odisha and 118.08 sq. km. is falling under Jharkhand. The impact area in Odisha is falling under the Barbil, Champua and BJP ranges of Keonjhar Forest

Divisions, and the Koira and Barsuan ranges of Bonai Forest Divisions. The study was focused on the forest area falling under the Keonjhar and Bonai Forest Divisions of Odisha.

Plate 3.1. Visit at mines by IIFM, forest department and mines representatives.

3.3 IDENTIFICATION OF HABITATS

Based on Forest Cover, Forest Survey of India (2017), five major habitats were identified within the study area. The study area/mines impact zone spans 725.09 sq km across the Keonjhar and Bonai Forest Divisions. Among these, moderately dense forest constitutes the largest area at 245.62, followed by Open-Forest covering 129.81 sq km, and Dense Forest occupying an area of 106.5534 sq km. Scrubland and water bodies/aquatic shared 11.37 sq km and 1.03 sq km of area respectively. Habitat classification provides a clear understanding of the ecological profile of the landscape and can be related to the potential faunal diversity. This classification is crucial for

targeted conservation, habitat restoration, and help in mitigating mining-related impacts on wildlife.

Forest Habitat

Open forest/scrub land

Baitrani river (riverine habitat)

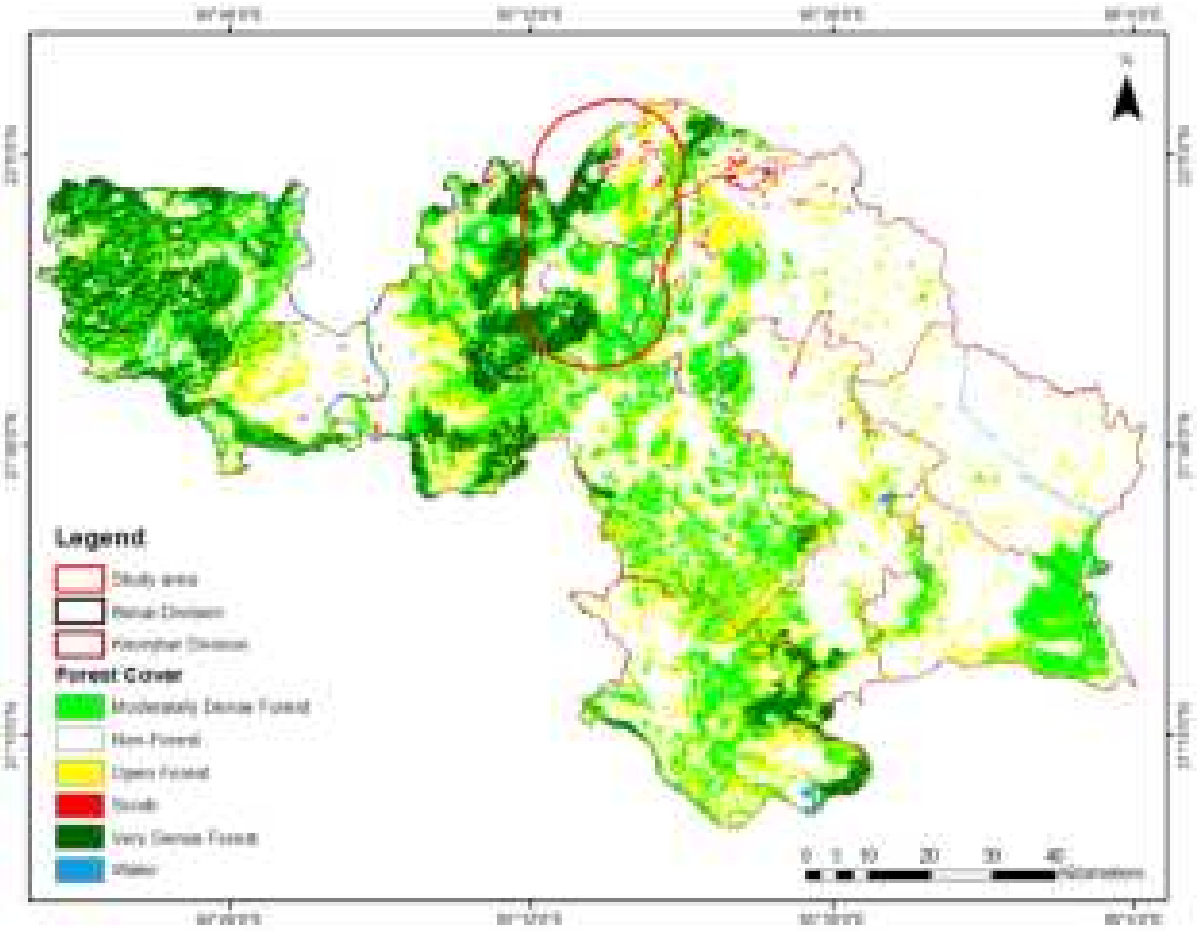
Human habitation (Koira village)

Plate 3.2. Major land use and habitats in the landscape

Table 3.1. Details of forest cover in the landscape

Forest Cover	Keonjhar (km^2)	Bonai (km^2)	Study area (km^2)
Water	36.90461	12.855425	1.032925
Non-Forest	3707.965	818.05972	230.6866
Scrub	36.28897	7.477478	11.37902
Open-Forest	1182.841	446.325873	129.8136
Moderately Dense Forest	1167.621	845.957426	245.6266
Very Dense Forest	163.0175	625.297586	106.5534

Source: Forest Cover, 2017 (Forest Survey of India)



Map 3.1. Forest Cover of Keonjhar and Bonai Forest Divisions.

3.4 DATA COLLECTION AND ANALYSIS

This section presents different standard field techniques adopted efficiently about the field condition of the project site in terms of important factors like; habitat types, extent of area available, topography, accessibility and prevailing season, and also time constraints. Considering those habitat factors, component-specific (flora and different faunal groups) field methods were used to assess the overall wildlife attributes of the project study area.

3.4.1 Floral Component

Comprehensive floristic survey was undertaken in the study area and baseline data prepared using primary and secondary data (Elzinga *et al.* 2001). In order

to collect the floral composition, representative plots were laid randomly in the study area. Random vegetation plots were surveyed to get the checklist of floral species in the landscape and secondary data comprising site specific wildlife conservation plans of five mines, working plans of Keonjhar and Bonai Forest Divisions and research articles were reviewed to prepare a comprehensive baseline of vegetation structure.

3.4.2 Faunal Component

Rapid surveys were conducted in different beats of range forests falling under the study area. Opportunistic sampling was used for mammals, herpetofauna and lepidopteran/butterfly's species. Point count method was used for avifaunal assessment (Buckland *et al.*, 2001; Jathanna *et al.*, 2008). Data was collected based on both direct and indirect evidence. Direct evidence included sightings of the species and indirect evidence were different signs of wild animals such as tracks, scat, pellet, dung, scrape/ scratch marks, pugmarks, and hoof marks (Wilson et al., 1996). To supplement the primary data, secondary data was collected from the forest department and EIA reports of five mines were analysed (Karanth & Nichols, 2002). Elephant presence data of the last three to six years was collected from the forest department. Mammalian species from the camera trap data were gathered from the forest department. Research papers, articles and interviews with the front-line forest staff, and local communities were done to support the data. Comprehensive checklists of different faunal groups were prepared by combining all the existing data and species of high conservation significance were assessed based on their status in the Wildlife Protection Act, 1972 (amendment 2022) and IUCN, 2024.

3.4.3 Social Component

The field team visited villages along the forest areas to understand the socio-economic and socio-ecological status of the study area. Focus group discussions were conducted during the surveys. Information about the dependence of local communities on forests such as firewood, NTFP collection, livestock grazing, their traditional knowledge about medicinal plants, human-wildlife interaction was gathered (Martin, 2004; Alexiades, 1996).

3.4.4 Human-wildlife conflict component

To understand the human-wildlife conflict, local villagers and front-line forest staff were interviewed. The areas with high human-wildlife interactions were visited. Data of Elephant presence was gathered based on the information provided by the forest department and local communities. Secondary data from the forest department were collected including elephant presence, human deaths due to wild animals, crop damage, house damage, water bodies and other natural resources.

3.4.5 Environmental components

As the project duration was short term and it was not feasible to collect primary data of water and soil which takes a lot of time and resources to analyse so the study relied on the existing information of environmental components such as air, water, and soil from the site specific wildlife conservation plans and EIA reports of five mines, working plan of both the forest divisions, and research article/literature available.

3.4.6 Management components and analysis

Other than all the components mentioned above, the data of corridors were collected. Both primary and secondary data comprising locations of elephant presence were collected to understand their movement pattern and connectivity. The vegetation and forest connectivity were mapped using FragStats to visualise the forest fragmentation in the landscape. Data of aquatic habitats including river, village pond, and natural water bodies were also collected during the field visit. Satellite based data of forest fire was gathered. All the primary and secondary data were combined, and a comprehensive data was prepared, and literature review was done for a more accurate outcome. All the maps were prepared using ArcGIS 10.3. and other analysis were done using Microsoft Excel 365 and R Studio.

Plate 3.3. Field visit and data collection for the different components of the study

Chapter 4 – BASELINE RESULT

4.1 STATUS OF FLORA

The phytosociological study was undertaken in the months of January-February 2025. The study quantified different lifeforms/habits of floral species covering tree, shrub, creeper, herb, and grass species (angiosperms), and lower plants (Pteridophytes and Bryophytes) were not included. The documentation of flora was done within the forest habitat of both the forest divisions to understand the phytosociology of forest species for management interventions. Three sources of secondary information (an EIA reports and Site-Specific Wildlife Management Plans of all five mines and forest working plans of both the forest divisions) were used to assess the overall status of flora in the study area. The baseline data mentioned below includes taxonomical status, species richness and lifeform/habit, and Relative percentage.

4.1.1 Taxonomical status and species richness

In total 401 species recorded from the study area highlights the floral richness in the study area. Further, 401 floral species documented belong to 278 genera and 88 families (Table 4.1). Fabaceae was the most dominant family of overall flora group with 67 species contributing to 16.71% of species followed by Poaceae with 22 species and Rubiaceae with 19 species contributing 5.49% and 4.74% of the overall species identified in the Netrabandh Pahar landscape of Keonjhar and Bonai Forest Divisions (Table 4.2). Out of 88 families, 11 family represented 10 or more than 10 species.

Table 4.1. Taxonomic status of flora in Netra bandh Pahar landscape.

Taxonomic classes	Study Area
Family	88
Genus	278
Species	401

Table 4.2. Relative percentage of overall floral species from different family

S. No.	Overall Family	Overall Species Count	Relative %
1	Fabaceae	67	16.71
2	Poaceae	22	5.49
3	Rubiaceae	19	4.74
4	Apocynaceae	18	4.49
5	Lamiaceae	17	4.24
6	Malvaceae	15	3.74
7	Euphorbiaceae	11	2.74
8	Asteraceae	11	2.74
9	Moraceae	10	2.49
10	Combretaceae	10	2.49
11	Dioscoreaceae	10	2.49
12	Rutaceae	9	2.24
13	Arecaceae	9	2.24
14	Acanthaceae	8	2.00
15	Convolvulaceae	8	2.00
16	Phyllanthaceae	7	1.75
17	Anacardiaceae	7	1.75
18	Rhamnaceae	6	1.50
19	Annonaceae	6	1.50
20	Meliaceae	6	1.50
21	Ebenaceae	5	1.25
22	Lythraceae	5	1.25
23	Burseraceae	4	1.00
24	Oleaceae	4	1.00
25	Myrtaceae	4	1.00
26	Zingiberaceae	4	1.00
27	Asparagaceae	4	1.00
28	Cucurbitaceae	4	1.00
29	Amaranthaceae	4	1.00
30	Solanaceae	4	1.00
31	Bignoniaceae	3	0.75
32	Dilleniaceae	3	0.75
33	Verbenaceae	3	0.75
34	Vitaceae	3	0.75
35	Sapotaceae	3	0.75
36	Lauraceae	3	0.75
37	Smilacaceae	3	0.75
38	Capparaceae	2	0.50
39	Sapindaceae	2	0.50
40	Salicaceae	2	0.50
41	Celastraceae	2	0.50
42	Menispermaceae	2	0.50
43	Cornaceae	2	0.50

44	Cannabaceae	2	0.50
45	Moringaceae	2	0.50
46	Cactaceae	2	0.50
47	Lecythidaceae	2	0.50
48	Loganiaceae	2	0.50
49	Costaceae	1	0.25
50	Gnetaceae	1	0.25
51	Araceae	1	0.25
52	Martyniaceae	1	0.25
53	Santalaceae	1	0.25
54	Melastomataceae	1	0.25
55	Ulmaceae	1	0.25
56	Cycadaceae	1	0.25
57	Proteaceae	1	0.25
58	Calophyllaceae	1	0.25
59	Bixaceae	1	0.25
60	Asphodelaceae	1	0.25
61	Aristolochiaceae	1	0.25
62	Moraceae	1	0.25
63	Sterculiaceae	1	0.25
64	Dipterocarpaceae	1	0.25
65	Magnoliaceae	1	0.25
66	Musaceae	1	0.25
67	Primulaceae	1	0.25
68	Myrsinaceae	1	0.25
69	Putranjivaceae	1	0.25
70	Araliaceae	1	0.25
71	Hypoxidaceae	1	0.25
72	Ochnaceae	1	0.25
73	Commelinaceae	1	0.25
74	Olacaceae	1	0.25
75	Boraginaceae	1	0.25
76	Apiaceae	1	0.25
77	Simaroubaceae	1	0.25
78	Opiliaceae	1	0.25
79	Crassulaceae	1	0.25
80	Papaveraceae	1	0.25
81	Symplocaceae	1	0.25
82	Cleomaceae	1	0.25
83	Urticaceae	1	0.25
84	Piperaceae	1	0.25
85	Malpighiaceae	1	0.25
86	Plumbaginaceae	1	0.25
87	Flagellariaceae	1	0.25
88	Loranthaceae	1	0.25
Total		**401**	**100**

4.1.2 Taxonomic status and habit types

Overall, five habits of flora were assessed. Among the five habits, tree species dominated with a total of 178 species of 119 genera of 45 families followed by shrubs that recorded 89 species of 76 different genera from 38 families (Table 4.3 & Figure 4.1). Species richness of climbers was 65 species of 47 genera and 21 families. The study also identified herbs and grasses. Grass recorded lowest species richness among the five habits with 22 species of 21 genera from a single family and herb recorded 57 species of 40 genera and 27 families (Table 4.3 & Figure 4.1). The range of elevation varies from 400 meters to 1100 meters which can be the influencing factor for High species richness of flora in the landscape.

Table 4.3. Habit wise taxonomic status of flora in Netrabandh Pahar landscape.

Habit	Family	Genus	Species
Trees	45	119	178
Shrubs	38	76	89
Climbers	21	47	65
Herbs	27	40	57
Grasses	1	21	22

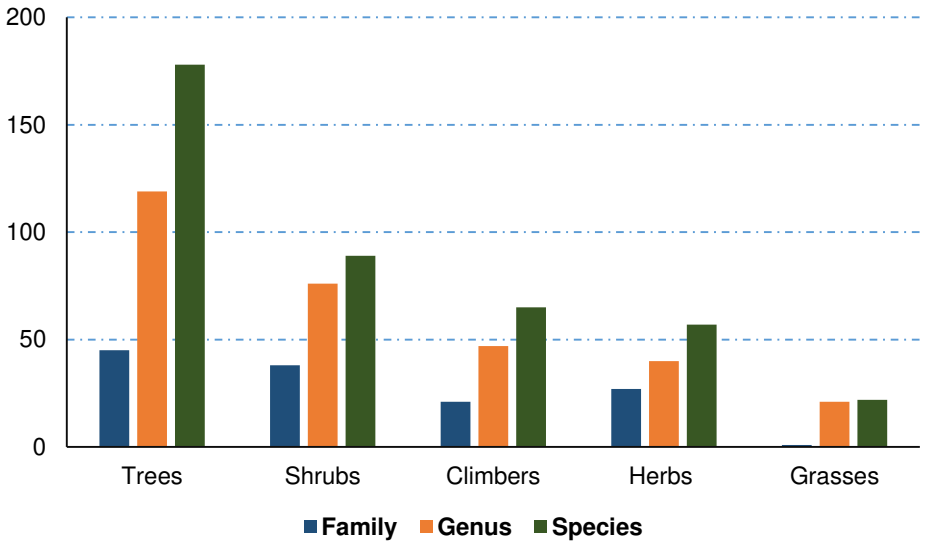


Figure 4.1. Habit wise richness of taxonomic group

4.1.3 Dominant family of tree species

A total 178 species of trees were documented in Netrabandh Pahar landscape of Bonai and Keonjhar Forest Divisions and those species were represented by 119 genera of 45 families (Table 4.4). Among the floral family, Fabaceae was the most dominant with 37 species or 20.79% of all species recorded in the study area, followed by Rubiaceae–13 (7.30%) species and Malvaceae–11 species (6.18%). Out of 45 family, the prominent seven family contributed for more than 50% of species identified in the landscape. In the rest of the 38 family, 16 family represented a single species each, nine family represented two species each and five family represented three species each contributing to 27.53 % of the total species recorded. (Table 4.5). *Areca catechu* and *Cocos nucifera* were added based on secondary data and these are uncertain to be found in the landscape.

Table 4.4. Taxonomic status of the Trees recorded in Netrabandh Pahar Landscape

Taxonomic classification	Count
Family	45
Genus	119
Species	178

Table 4.5. Familywise relative percentage of species of Trees recorded in Netrabandh Pahar Landscape

S. No.	Family	Species Count	Relative Species %
1	Fabaceae	37	20.79
2	Rubiaceae	13	7.30
3	Malvaceae	11	6.18
4	Moraceae	9	5.06
5	Combretaceae	8	4.49
6	Anacardiaceae	7	3.93
7	Euphorbiaceae	6	3.37
8	Rutaceae	6	3.37
9	Phyllanthaceae	5	2.81
10	Arecaceae	5	2.81
11	Annonaceae	5	2.81
12	Lamiaceae	5	2.81
13	Ebenaceae	4	2.25

14	Myrtaceae	4	2.25
15	Meliaceae	4	2.25
16	Dilleniaceae	3	1.69
17	Rhamnaceae	3	1.69
18	Apocynaceae	3	1.69
19	Burseraceae	3	1.69
20	Sapotaceae	3	1.69
21	Moringaceae	2	1.12
22	Sapindaceae	2	1.12
23	Bignoniaceae	2	1.12
24	Loganiaceae	2	1.12
25	Lecythidaceae	2	1.12
26	Oleaceae	2	1.12
27	Cornaceae	2	1.12
28	Lauraceae	2	1.12
29	Lythraceae	2	1.12
30	Ulmaceae	1	0.56
31	Moraceae	1	0.56
32	Salicaceae	1	0.56
33	Ochnaceae	1	0.56
34	Simaroubaceae	1	0.56
35	Celastraceae	1	0.56
36	Cannabaceae	1	0.56
37	Magnoliaceae	1	0.56
38	Santalaceae	1	0.56
39	Proteaceae	1	0.56
40	Dipterocarpaceae	1	0.56
41	Putranjivaceae	1	0.56
42	Symplocaceae	1	0.56
43	Bixaceae	1	0.56
44	Capparaceae	1	0.56
45	Calophyllaceae	1	0.56
Total		**178**	**100**

4.1.4 Dominant family of shrub species

The project study area reported 89 species of shrubs belonging to 76 genera of 38 family (Table 4.6). Within those 38 families, fabaceae was the most dominant family having 11 species of nine genera followed by Apocynaceae and Lamiaceae with nine and eight species respectively contributing to 31.46% of overall shrub species in the landscape (Table 4.7). Out of 38 family, top seven family contributed more than 50% of shrub species. More than 60% family (n=23) recorded only single species each (Table 4.7).

Table 4.6. Taxonomic status of the shrubs recorded in Netrabandh Pahar Landscape

Taxonomic classification	Count
Family	38
Genus	76
Species	89

Table 4.7. Familywise relative percentage of species of shrubs recorded in Netrabandh Pahar Landscape

S. No.	Family	Species	Relative %
1	Fabaceae	11	12.36
2	Apocynaceae	9	10.11
3	Lamiaceae	8	8.99
4	Asteraceae	6	6.74
5	Rubiaceae	5	5.62
6	Acanthaceae	5	5.62
7	Euphorbiaceae	4	4.49
8	Malvaceae	3	3.37
9	Rutaceae	3	3.37
10	Meliaceae	2	2.25
11	Cactaceae	2	2.25
12	Oleaceae	2	2.25
13	Lythraceae	2	2.25
14	Asparagaceae	2	2.25
15	Verbenaceae	2	2.25
16	Rhamnaceae	1	1.12
17	Myrsinaceae	1	1.12
18	Ebenaceae	1	1.12
19	Bignoniaceae	1	1.12
20	Phyllanthaceae	1	1.12
21	Annonaceae	1	1.12
22	Cycadaceae	1	1.12
23	Sterculiaceae	1	1.12
24	Moraceae	1	1.12
25	Solanaceae	1	1.12
26	Convolvulaceae	1	1.12
27	Burseraceae	1	1.12
28	Primulaceae	1	1.12
29	Araliaceae	1	1.12
30	Arecaceae	1	1.12
31	Cannabaceae	1	1.12
32	Salicaceae	1	1.12
33	Melastomataceae	1	1.12
34	Capparaceae	1	1.12

35	Amaranthaceae	1	1.12
36	Vitaceae	1	1.12
37	Lauraceae	1	1.12
38	Loranthaceae	1	1.12
Total		**89**	**100**

4.1.5 Dominant family of climber species

The outcome of the documentation of climbers species in the study area revealed that 64 species of climbers from 47 genera in 21 family were identified in Bonai and Keonjhar Forest Divisions. As expected, Fabaceae was dominant accounting for 15 species (23.08%) of overall species recorded in 21 family as climbers (Table 4.8). Top four family contributed >50% of overall species which included Dioscoreaceae (n=10), Apocynaceae(n=6), Convolvulaceae (n=6) after Fabaceae. Out of 21 family, 10 family recorded single species each (Table 4.9).

Table 4.8. Taxonomic status of the climbers recorded in Netrabandh Pahar Landscape

Taxonomic Classification	Count
Family	21
Genus	47
Species	65

Table 4.9. Family wise relative percentage of climber species recorded in Netrabandh Pahar Landscape

S. No.	Family	Species	Relative %
1	Fabaceae	15	23.08
2	Dioscoreaceae	10	15.38
3	Apocynaceae	6	9.23
4	Convolvulaceae	6	9.23
5	Cucurbitaceae	4	6.15
6	Arecaceae	3	4.62
7	Smilacaceae	3	4.62
8	Combretaceae	2	3.08
9	Menispermaceae	2	3.08
10	Rhamnaceae	2	3.08
11	Vitaceae	2	3.08
12	Rubiaceae	1	1.54
13	Plumbaginaceae	1	1.54

14	Piperaceae	1	1.54
15	Euphorbiaceae	1	1.54
16	Celastraceae	1	1.54
17	Olacaceae	1	1.54
18	Malpighiaceae	1	1.54
19	Opiliaceae	1	1.54
20	Flagellariaceae	1	1.54
21	Gnetaceae	1	1.54
TOTAL		**65**	**100**

4.1.6 Dominant family of herbs and grasses

Grasses and herbs were documented together. Predominantly grasses were observed in the study area revealing Poaceae covered 31.88 % of overall species represented 21 genera and 22 species. In addition, a total of 47 species of herbs recorded belong to 40 genera of 27 family. The cumulative of herbs and grasses gave 69 species of 61 genera from 28 family (Table 4.10). Total 10 family recorded over 70% of overall species (Table 4.9). Asteraceae was the dominant herbeceous family with five species contributing only 7.25 % of overall herbs and grasses (Table 4.11).

Table 4.10. Taxonomic status of herbs and grasses recorded in Netrabandh Pahar Landscape.

Taxonomic classification	Grasses	Herbs	Total
Family	1	27	28
Genus	21	40	61
Species	22	47	69

Table 4.11. Familywise relative percentage of herbs and grasses species recorded in Netrabandh Pahar Landscape

S. No.	Family	Habit	Species	Relative %
1	Poaceae	Grass	22	31.88
2	Asteraceae	Herb	5	7.25
3	Lamiaceae	Herb	4	5.80
4	Fabaceae	Herb	4	5.80
5	Zingiberaceae	Herb	4	5.80
6	Amaranthaceae	Herb	3	4.35
7	Solanaceae	Herb	3	4.35

8	Acanthaceae	Herb	3	4.35
9	Asparagaceae	Herb	2	2.90
10	Apiaceae	Herb	1	1.45
11	Musaceae	Herb	1	1.45
12	Malvaceae	Herb	1	1.45
13	Commelinaceae	Herb	1	1.45
14	Phyllanthaceae	Herb	1	1.45
15	Convolvulaceae	Herb	1	1.45
16	Cleomaceae	Herb	1	1.45
17	Costaceae	Herb	1	1.45
18	Martyniaceae	Herb	1	1.45
19	Araceae	Herb	1	1.45
20	Papaveraceae	Herb	1	1.45
21	Aristolochiaceae	Herb	1	1.45
22	Asphodelaceae	Herb	1	1.45
23	Hypoxidaceae	Herb	1	1.45
24	Urticaceae	Herb	1	1.45
25	Verbenaceae	Herb	1	1.45
26	Boraginaceae	Herb	1	1.45
27	Lythraceae	Herb	1	1.45
28	Crassulaceae	Herb	1	1.45
Total			**69**	**100**

4.1.7 Flora species of high conservation value

Out of 401 floral species reported in the landscape through primary and secondary sources including previous working plan reports pertaining to Bonai and Keonjhar Forest Divisions, Site Specific Wildlife Conservation Plans of five mines, and their EIA reports were reviewed during the field study. A total of 114 species were listed in IUCN Red List of Threatened Species, further 105 out of 178 total tree species were listed as least concern, two species were listed as Near Threatened, four were as Vulnerable and one species was Endangered and two shrub species were Least Concern and Endangered (Table 4.12). *Aegle marmelos* and *Pterocarpus marsupium* are listed in Near Threatened category, *Chloroxylon swietenia, Santalum album, Cleistanthus collinus* and *Dalbergia latifolia* are Vulnerable, and *Pterocarpus santalinus* and *Cycas circinalis* are Endangered (Table 4.13). The species with high conservation significance need to be given priority in the management plan.

Table 4.12. IUCN status of threatened species of flora

IUCN	Tree	Shrub	Climber	Herbs & Grasses	Total
Least Concern	105	1	–	–	106
Near Threatened	2	–	–	–	2
Vulnerable	4	–	–	–	4
Endangered	1	1	–	–	2
					114

Table 4.13. Floral species of high conservation significance

S. No.	Vernacular name	Science Name	Family	IUCN Status
1	Bela	Aegle marmelos	Rutaceae	Near Threatened
2	Bija (Piasal)	Pterocarpus marsupium	Fabaceae	Near Threatened
3	Bheru	Chloroxylon swietenia	Rutaceae	Vulnerable
4	Chandan	Santalum album	Santalaceae	Vulnerable
5	Karada	Cleistanthus collinus	Phyllanthaceae	Vulnerable
6	Sisoo	Dalbergia latifolia	Fabaceae	Vulnerable
7	Raktachandan	Pterocarpus santalinus	Fabaceae	Endangered
8	Arguna	Cycas circinalis	Cycadaceae	Endangered

4.1.8 Invasive species

In the study area, a total of 178 tree species, 89 shrubs, 65 climbers, 57 herbs and 22 grasses were recorded from the landscape. After the analysis 17 exotic species of nine families were recorded, in which seven were trees, six were shrubs, three were herbs and only one was a climber. *Acacia auriculiformis* is one of the invasive species possibly planted by the mining agencies and forest department as phytoremediator and it could be observed at many of the mining sites and along the roads. Two species of shrubs and one species of herb are highly invasive in the landscape and one of the causes for habitat degradation. *Chromolaena/eupatorium odorata* has highly invaded the landscape, it was mostly observed in the human influenced areas such as open land of villages,

on the boundary of forest and along the road (Table 4.14) (plate 4.1). *Lantana camara* (shrub) and *Parthenium hysterophorus*(herb) are widely known for their invasion in India.

Plate 4.1. Chromolaena odorata (weed) infested areas

Table 4.14. Exotic species of flora recorded in the landscape

S. No.	Vernacular name	Science Name	Family
	TREE		
1	Acacia/Sunajhari	Acacia auriculiformis	Fabaceae
2	Krushnachuda	Delonix regia	Fabaceae
3	Eucalipatas	Eucalyptus globulus	Myrtaceae
4	Silveroak	Grevillea robusta	Proteaceae
5	Gauva	Psidium guajava	Myrtaceae
6	Bada Chakunda/Rain Tree	Samanea saman	Fabaceae
7	Chakunda	Senna siamea	Fabaceae
	SHRUB		
8	Baramasi	Agave americana	Asparagaceae
9	Eupatorium	Eupatorium perfoliatum	Asteraceae
10	Chromolaena/ Eupatorium	Chromolaena/eupatorium odorata	Asteraceae
11	Bisalyakarani	Tridax procumbens	Asteraceae
12	Baigaba	Jatropha gossypifolia	Euphorbiaceae
13	Lantana (Bholupodi)	Lantana camara	Verbenaceae
	CLIMBER		
14	Hadabhanga	Cissus quadrangularis	Vitaceae
	HERB		
15	Samdulan	Elephantopus scaber	Asteraceae
16	Gazar ghaas	Parthenium hysterophorus	Asteraceae
17	Gongatulasi	Hyptis suaveolens	Lamiaceae

4.2 STATUS OF FAUNA

4.2.1 Status of Herpetofauna

Herpetofauna includes amphibians and reptiles. The occurrence of species richness in this group depends on habitat heterogeneity and microhabitat specificity. Threat factors responsible for the decline of herpetofauna are habitat loss, fragmentation, invasive species, species exploitation, climate change, and diseases (Dodd and Smith 2003; Gibbons et. al. 2000; Pounds et. al. 2006; Sodhi et. al. 2008). Both these taxa are key bioindicators of environmental health and habitat quality and can be used to assess habitat conditions and help evaluate restoration success (Mifsud 2014). Hence this group was studied, and this section discusses species richness, abundance, species of conservation significance, and overall probable species richness of amphibians and reptiles in the project study area.

4.2.1.1 Taxonomic status and species richness

Herpetofauna was divided into five categories; amphibians which included frogs and toads, turtle/tortoise, lizards, snakes and crocodiles. A total of 53 species were identified belonging to 40 genera of 22 families. Out of these five categories snakes dominated with 20 species from 17 genera of six families while 15 species of amphibian from 10 genera of five family were identified, lizards contributed to 12 species represented by 7 genera of 6 family, three family of lizards and geckos gave four species all from different genus, Marsh Crocodile *Crocodylus palustris* and Gharial *Gavialis gangeticus* were two species in Crocodiles (Table 4.15). The Colubridae family recorded the highest species richness with eight species of snakes followed by Dicroglossidae representing seven species of amphibians and Elapidae with five species of snakes (Figure 4.2). Based on the interviews with the research team of the forest department, Monocled cobra, Indian tent turtle, Elongated turtle and Gharial are four species out of overall herpetofauna which are uncertain to be found in the landscape.

Table 4.15. Taxonomic status of herpetofauna

	Species	Genus	Family
Snakes	20	17	6
Amphibian	15	10	5
Lizards and Geckos	12	7	6
Turtle/ Tortoise	4	4	3
Crocodiles	2	2	2
	53	**40**	**22**

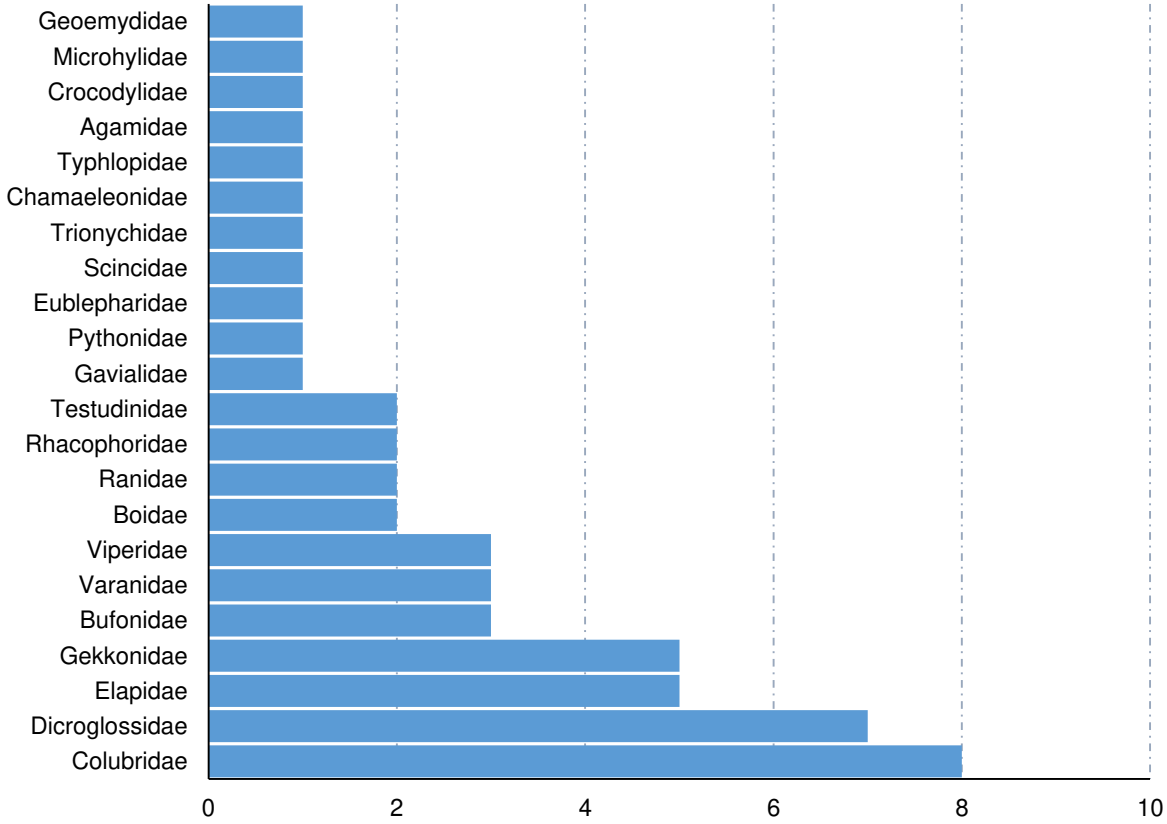


Figure 4.2. Familywise species richness recorded in herpetofauna

4.2.1.2. Status of protection and species of conservation significance

Herpetofauna recorded a total 53 species comprising snakes, lizards/gecko, frogs/toads, turtle/tortoise and crocodiles. Out of 53 species, 19 species of reptiles and amphibians were selected as species of conservation significance based on their protection status as per the

Indian Wildlife Protection Act, 1972 (amendment 2022) and International Union for Conservation of Nature (IUCN). 17 species were identified that lies under Schedule I category of Wildlife Protection Act, 2022 (WPA, 2022) were listed for species of conservation significance and, two species were not given in the WPA, 2022 (Table 4.16). Those two species; *Indotestudo elongata, Raorchestes sanctisilvaticus* are listed as Critically Endangered as per IUCN. Other than these, one more species is listed as Critically Endangered; *Gavialis gangeticus.* Only *Varanus flavescens* was listed as Endangered, three species were listed each in Near Threatened and Vulnerable category, and 37 species were listed as Least Concern. Six species were neither listed in the WPA, 2022 nor in IUCN.

Table 4.16. Protection status of herpetofauna recorded in the study

S. No.	Common names	Science Name	WPA, 2022	IUCN
	Boidae			
1	Red Sand Boa	*Eryx johnii*	I	Near Threatened
	Colubridae			
2	Checkered Keelback	*Fowlea piscator*	I	Least Concern
3	Rat Snake	*Ptyas mucosa*	I	Least Concern
	Elapidae			
4	Monocled Cobra	*Naja kaouthia*	I	Least Concern
5	Indian Cobra	*Naja naja*	I	Least Concern
6	King Cobra	*Ophiophagus hannah*	I	Vulnerable
	Pythonidae			
7	Indian Python	*Python molurus*	I	Near Threatened
	Viperidae			
8	Russell's Viper	*Daboia russelii*	I	Least Concern
	Chamaeleonidae			
9	Indian Chameleon	*Chamaeleo zeylanicus*	I	Least Concern
	Crocodylidae			
10	Freshwater Crocodile (Mugger)	*Crocodylus palustris*	I	Vulnerable

	Gavialidae			
11	Gharial	*Gavialis gangeticus*	I	Critically Endangered
	Varanidae			
12	Bengal Monitor	*Varanus bengalensis*	I	Near Threatened
13	Yellow Monitor Lizard	*Varanus flavescens*	I	Endangered
14	Water Monitor	*Varanus salvator*	I	Least Concern
	Geoemydidae			
15	Indian Tent Turtle	*Pangshura tentoria*	I	Least Concern
	Testudinidae			
16	Indian Star Tortoise	*Geochelone elegans*	I	Vulnerable
17	Elongated Tortoise	*Indotestudo elongata*	–	Critically Endangered
	Trionychidae			
18	Flap-shelled Turtle	*Lissemys punctata*	I	Least Concern
	Rhacophoridae			
19	Sacred Grove Bush Frog	*Raorchestes sanctisilvaticus*	–	Critically Endangered

4.2.2 Status of birds

Birds are known to maintain the health of ecosystem, check on pest population and bioindicators of forest and habitat quality. The bird surveys were done in different habitats and later habitat preferences were listed such as forest, scrubland, grassland, agriculture and water bodies. Secondary sources such as forest working plan of Keonjhar and Bonai Forest Divisions and Site-Specific Wildlife Conservation Plan of five mines were assessed to prepare a cumulative list of birds in the landscape. The chapter discusses taxonomic status of avian fauna, species richness, habitat preference, feeding guild and protection status of bird species.

4.2.2.1 Taxonomic status and species richness of birds

The taxonomic diversity of the studied organisms was assessed at three levels. A total of 59 distinct families were identified which represented 104 unique genera from 136 species (Table 4.17 & Annexure 4.6). Out of 59 family of birds, Accipitridae family contributed to the highest number of species (n=10), followed of the family Phasianidae and

Muscicapidae with seven species each (Figure 4.3). 26 species were recorded from 26 unique families. The habitat preference of species across different habitat types revealed variations in species richness. The forest habitat supported the highest number of species (n=45) which contributed to about 33.33% of overall species, followed by aquatic habitats (n=32) and agricultural habitat (n=22). Lower species counts were observed in scrubland and grassland contributed to 18 species each (Figure 4.4). These findings suggest that forest and aquatic habitat in the study area harbour a greater diversity of the bird species which is more than 50% of the overall recorded species and protection of these habitat can be prioritized in the management plan.

Table 4.17. Taxonomic status of bird species

Taxonomic classification	Count
Family	59
Genus	104
Species	136

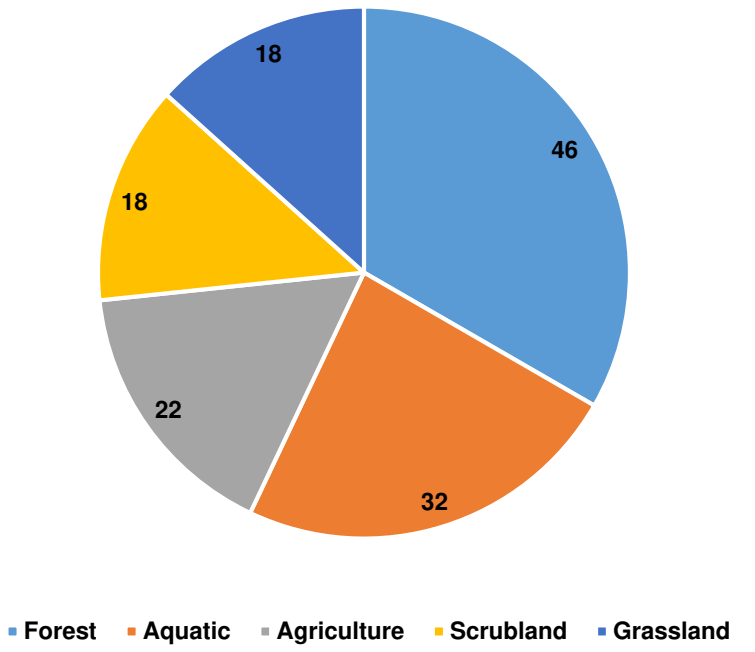


Figure 4.3. Bird species with different habitats preferences

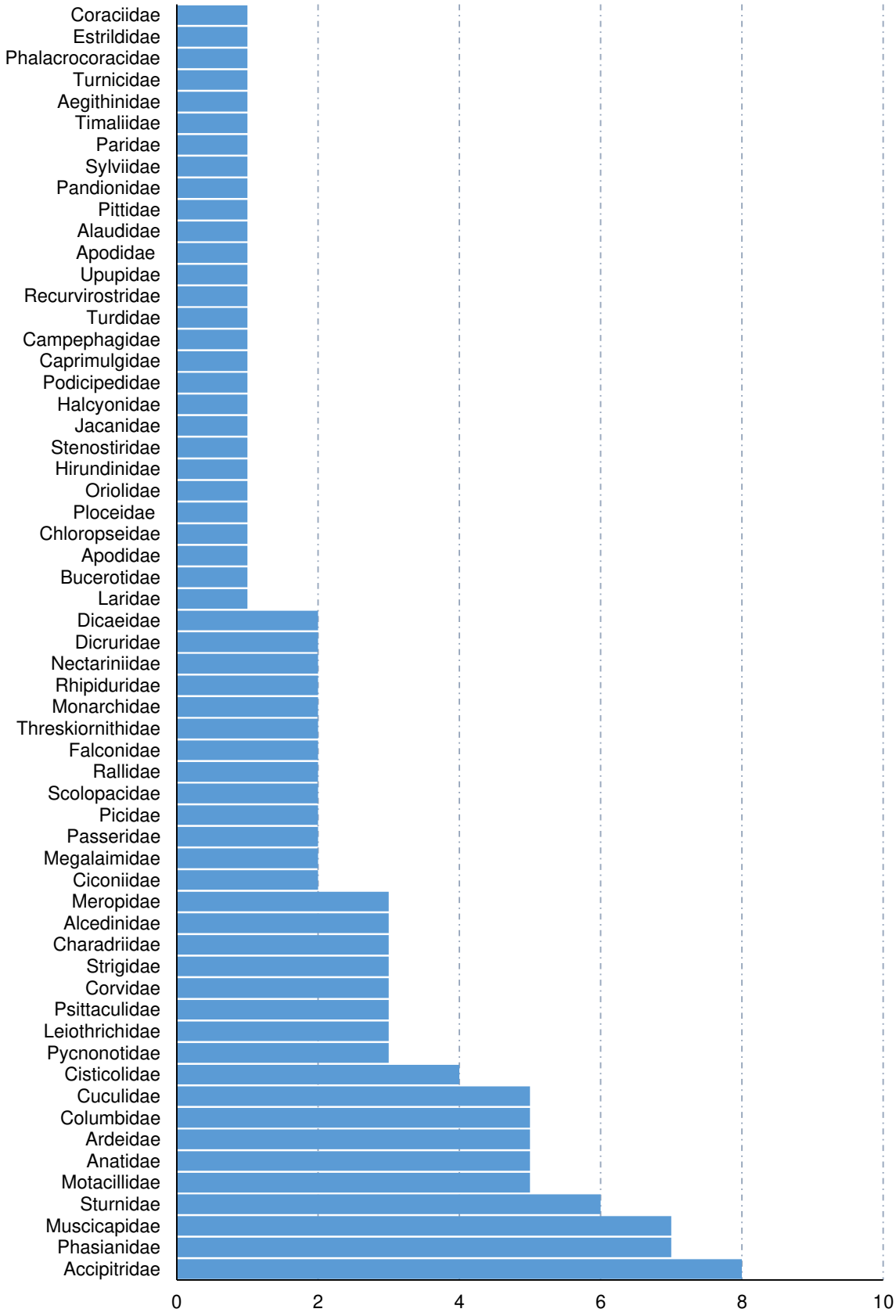

Coraciidae
Estrildidae
Phalacrocoracidae
Turnicidae
Aegithinidae
Timaliidae
Paridae
Sylviidae
Pandionidae
Pittidae
Alaudidae
Apodidae
Upupidae
Recurvirostridae
Turdidae
Campephagidae
Caprimulgidae
Podicipedidae
Halcyonidae
Jacanidae
Stenostiridae
Hirundinidae
Oriolidae
Ploceidae
Chloropseidae
Apodidae
Bucerotidae
Laridae
Dicaeidae
Dicruridae
Nectariniidae
Rhipiduridae
Monarchidae
Threskiornithidae
Falconidae
Rallidae
Scolopacidae
Picidae
Passeridae
Megalaimidae
Ciconiidae
Meropidae
Alcedinidae
Charadriidae
Strigidae
Corvidae
Psittaculidae
Leiothrichidae
Pycnonotidae
Cisticolidae
Cuculidae
Columbidae
Ardeidae
Anatidae
Motacillidae
Sturnidae
Muscicapidae
Phasianidae
Accipitridae
0
2
4
6
8
10

Figure 4.4. Family wise species richness of birds in the landscape

4.2.2.2. Status of Foraging Guild

Overall bird species were identified from eight different feeding guild. Insectivore birds were dominant with 58 species recorded and 23 species of them preferred forest habitat (Table 4.18). It can be possible that forest habitat supports more insects and insectivore birds are dependent on forest habitat for their foraging activity. Insectivore species represented almost 40% of the overall richness. Omnivore was the second most dominant foraging guild (n=24) that preferred agricultural habitat with nine species (Figure 4.5). Forest habitat supported 14 frugivore species which is second highest in the forest habitat. Frugivore, Piscivore and Nectarivore prefers to be habitat specific which supported by forest habitat, aquatic habitat and scrubland respectively. Two species of sunbirds were recorded as Nectarivore, and these can be found in another habitat as well.

Table 4.18. Foraging status of bird species in the landscape

S. No.	Foraging Guild	Species	Relative %
	Insectivore	58	42.96
2	Omnivore	24	17.77
3	Carnivore	15	11.11
4	Frugivore	14	10.37
5	Piscivore	12	8.88
6	Granivore	8	5.92
7	Scavenger	2	1.48
8	Nectarivore	2	1.48
		135	

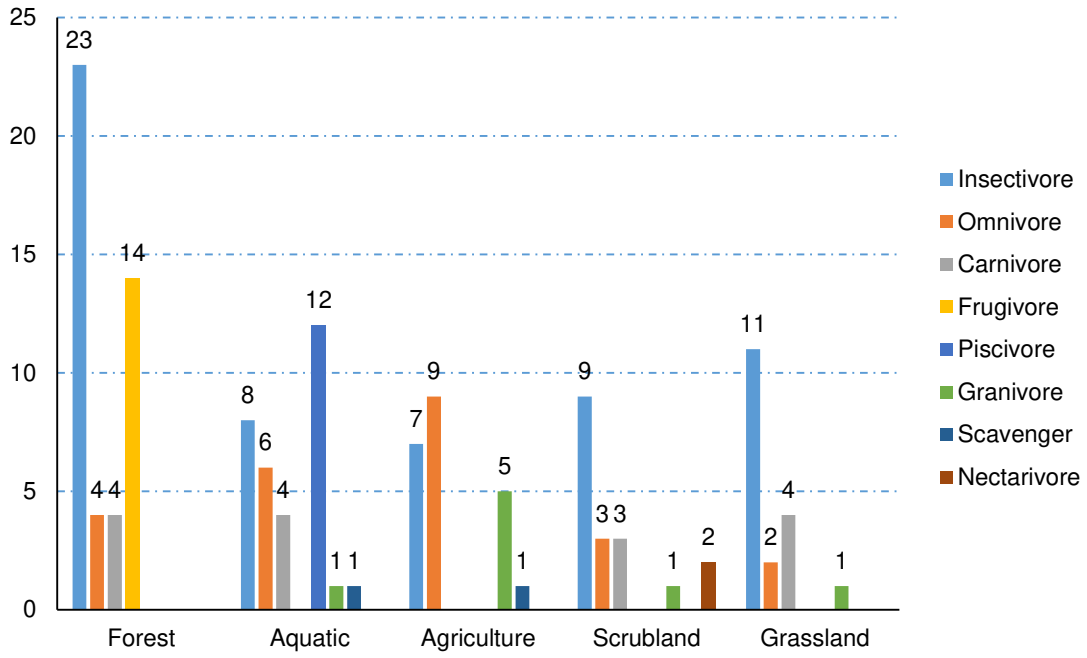


Figure 4.5. Habitat preference of bird species according to their foraging guild

4.2.2.3. Protection status and species of conservation significance

Protection status of birds was assessed nationally and globally by referring Indian Wildlife Protection Act, 1972 (amendment 2022) and International Union for Conservation of Nature (IUCN, 2024). A total of 15 species represented by 9 families were listed in the list of threatened species in which 14 species are listed in the Schedule I category of the Wildlife Protection Act, 2022 (WPA 2022). One bird species was listed as Near Threatened and one was vulnerable (Table 4.19). Rest 134 species are listed as Least Concern and lies in the Schedule II category of WPA 2022 except Indian Rock Pigeon (Annexure 4.6).

Table 4.19. Threatened species of birds recorded in the study

S. No.	Common Name	Science Name	WPA 2022	IUCN
	Accipitridae			
1	Shikra	*Accipiter badius*	I	Least Concern
2	White-eyed Buzzard	*Butastur teesa*	I	Least Concern

3	Marsh Harrier	*Circus aeruginosus*	I	Least Concern
4	Pallid Harrier	*Circus macrourus*	I	Least Concern
5	Brahminy Kite	*Haliastur indus*	I	Least Concern
6	Crested Hawk-Eagle	*Nisaetus cirrhatus*	I	Least Concern
7	Crested Serpent Eagle	*Spilornis cheela*	I	Least Concern
	Cisticolidae			
8	Rufous-fronted Prinia	*Prinia buchanani*	I	Least Concern
	Falconidae			
9	Peregrine Falcon	*Falco peregrinus*	I	Least Concern
	Laridae			
10	River Tern	*Sterna aurantia*	I	Vulnerable
	Pandionidae			
11	Osprey	*Pandion haliaetus*	I	Least Concern
	Phasianidae			
12	Indian Peafowl	*Pavo cristatus*	I	Least Concern
	Psittaculidae			
13	Alexandrine Parakeet	*Psittacula eupatria*	II	Near Threatened
	Strigidae			
14	Indian Eagle-Owl	*Bubo bengalensis*	I	Least Concern
	Sturnidae			
15	Hill Myna	*Gracula religiosa*	I	Least Concern

4.2.3. Status of mammals

The status of mammals discussed is based on the indirect evidence found during the field survey and secondary data gathered from the working plan of Keonjhar and Bonai Forest Divisions, and site-specific wildlife management plans of five mines. The study reported 51 mammalian species. Taxonomic status, species richness, national and global status of protection, and species of conservation significance was discussed in this chapter.

4.2.3.1. Taxonomic status of mammals and species richness

A total of 51 species of mammalian fauna was identified in the landscape, represented by 43 genera of 22 different families (Table 4.20). Muridae was the dominant family which recorded 10 species of eight different genera followed by Felidae with six species represented by four genera (Figure 4.6). Asian Elephant *Elephas maximus indicus* is the largest mammal recorded in the study and Bengal Tiger *Panthera tigris* was the largest carnivore present in the landscape. Asian Elephant and Indian Gaur *Bos gaurus* are two mega herbivores sharing the landscape and plays significant role in the ecosystem. Bengal tiger is not resident in the landscape but use the landscape for movement and last recorded in 2024 in both the forest divisions. Habitat restoration and connectivity can play a crucial role for future movement of tiger and elephants in the landscape. Other than Tiger, Leopard *Panthera pardus fusca*, Indian grey wolf *Canis lupus pallipes*, and Striped hyena *Hyaena hyaena* are the large carnivores whereas Golden jackal *Canis aureus*, Jungle cat *Felis chaus*, Fishing cat *Prionailurus viverrinus,* Leopard cat *Prionailurus bengalensis*, Rusty spotted cat *Prionailurus rubiginosus*, Honey badger *Mellivora capensis* and Smooth-coated otters *Lutrogale perspicillata* are some of the small carnivores present in the landscape, but their distribution is not ascertained. As per the research team of both the forest divisions, four species of mammals listed in this study are uncertain to be found in the landscape; Indian gaur, Sambar deer, Fishing cat, and Nilgai as either their numbers are very less, or they are locally extinct. Long term monitoring of the landscape can reveal the actual status of mammals.

Table 4.20. Taxonomic status of mammals

Taxonomic Classification	Count
Family	22
Genus	43
Species	51

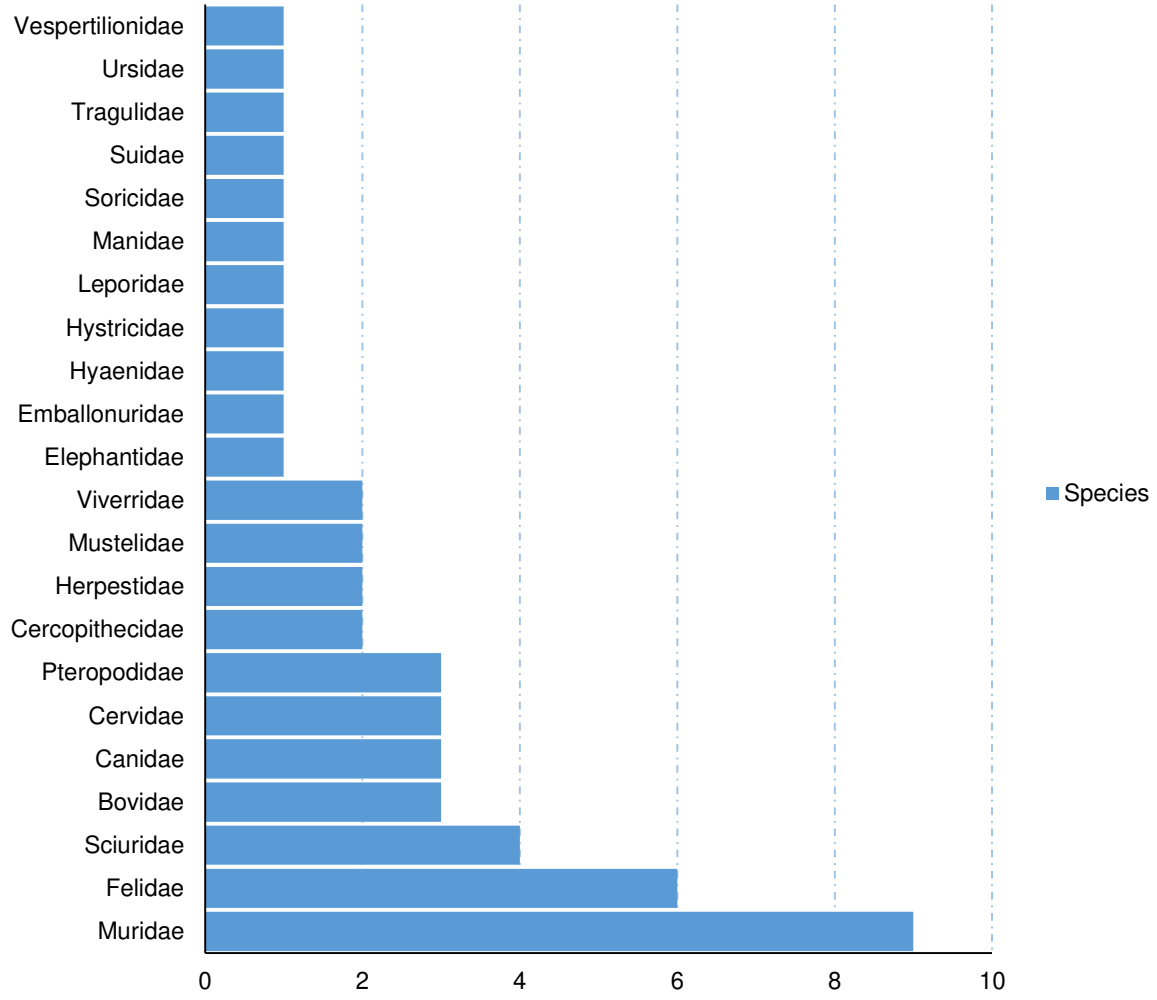


Figure 4.6. Family wise species richness of mammals

4.2.3.2. Protection status and species of conservation significance

The study reported an overall 51 species of mammals out of which 27 species were listed as highly threatened species. As per the Indian Wildlife Protection Act, 1972 with latest amendment in 2022 (WPA, 2022), 26 species of mammals were listed under Part A of Schedule I category providing the highest degree of protection in India. Asian Elephant, Bengal Tiger and Indian Pangolin are three mammal species listed as Endangered as per International Union for Conservation of Nature's Red list of Threatened Species. Whereas 7 species are listed as Vulnerable, 2 species are near threatened, and 39 species are listed as Least concern (Table 4.21). All the major carnivores are listed in

Schedule I category. Indian Gaur, Sambar Deer and Fishing Cat are three species which are uncertain to be found in this landscape.

Table 4.21. Protection status of mammals in the landscape

S. No.	Common Name	Science Name	WPA, 2022	IUCN, 2024
	Bovidae			
1	Four-horned Antelope	*Tetracerus quadricornis*	I	Vulnerable
2	Indian Gaur	*Bos gaurus*	I	Vulnerable
	Canidae			
3	Bengal Fox	*Vulpes bengalensis*	I	Least Concern
4	Golden Jackal	*Canis aureus*	I	Least Concern
5	Indian Grey Wolf	*Canis lupus pallipes*	I	Least Concern
	Cervidae			
6	Barking Deer (Indian Muntjac)	*Muntiacus muntjak*	I	Least Concern
7	Sambar Deer	*Rusa unicolor*	I	Vulnerable
	Elephantidae			
8	Asian Elephant	*Elephas maximus indicus*	I	Endangered
	Felidae			
9	Jungle Cat	*Felis chaus*	I	Least Concern
10	Rusty-spotted cat	*Prionailurus rubiginosus*	I	Least Concern
11	Leopard Cat	*Prionailurus bengalensis*	I	Least Concern
12	Fishing Cat	*Prionailurus viverrinus*	I	Vulnerable
13	Indian Leopard	*Panthera pardus fusca*	I	Vulnerable
14	Bengal Tiger	*Panthera tigris tigris*	I	Endangered
	Herpestidae			
15	Indian Grey Mongoose	*Herpestes edwardsii*	I	Least Concern
16	Ruddy mongoose	*Urva smithii*	I	Least Concern
	Hyaenidae			
17	Striped Hyena	*Hyaena hyaena*	I	Near Threatened
	Hystricidae			
18	Indian Crested Porcupine	*Hystrix indica*	I	Least Concern
	Manidae			
19	Indian Pangolin	*Manis crassicaudata*	I	Endangered
	Mustelidae			
20	Honey Badger (Ratel)	*Mellivora capensis*	I	Least Concern
21	Smooth-coated Otter	*Lutrogale perspicillata*	I	Vulnerable
	Pteropodidae			

	Fruit bat	Rousettus leschenaultii	–	Near Threatened
	Sciuridae			
22	Indian Giant Flying Squirrel	*Petaurista philippensis*	I	Least Concern
23	Indian Giant Squirrel	*Ratufa indica*	I	Least Concern
	Tragulidae			
24	Indian Mouse Deer	*Moschiola indica*	I	Least Concern
	Ursidae			
25	Sloth Bear	*Melursus ursinus*	I	Vulnerable
	Viverridae			
26	Asian Palm Civet	*Paradoxurus hermaphroditus*	I	Least Concern
27	Small Indian Civet	*Viverricula indica*	I	Least Concern

4.3. STATUS OF RIVERINE AND AQUATIC HABITAT

Rivers and aquatic habitats are vital ecosystems that support diverse flora and fauna. This habitat includes rivers, streams, wetlands, lakes, and associated riparian areas. They are vital for preserving the hydrological balance, supporting biodiversity, and delivering key ecosystem services, including water purification, flood control, and the sustenance of livelihood of local communities.

The Bonai and Keonjhar Forest Divisions encompass a range of riverine and aquatic habitats, including major rivers such as the Baitarani in Keonjhar and the Brahmini in the Bonai Forest Division. The five mining areas are located in proximity to the Baitarani River, approximately 12 km from the Guali Iron Ore and Kalmang West Iron Ore blocks. Additionally, other significant water bodies include the perennial Teherei Nala, Kakrapani Nala, Kaksipani Nala, Karo River and Suna River, as well as the seasonal Topodihi Nala. The water bodies are very essential for both biodiversity and the well-being of local communities, especially within the 10 km zone of impact (ZOI) around the mining areas.

A site-specific study conducted using Google Earth to identify the water sources with respect to the exact locations of each mine is detailed below:

A. Netrabandha Pahar Iron Ore Block (Bhusan Power & Steel Ltd.)

The Netrabandh Pahar Iron Ore Block, covering an area of 112.62 ha, is located in the Koira forest range of the Bonai Forest Division. The block is located in close proximity to significant water bodies, including the Khajuradihi Nala within the block (south side), Teherei Nala (1.2 km north), Karo River (7.8 km northwest), Kundra/Suna River (4.6 km northeast), and Suna Nala (1.9 km east), as reported in the EIA Final Reports Vol. I of the Netrabandh Pahar Iron Ore Block.

B. Guali Iron Ore Block (Odisha Mining Corporation Ltd.)

The Guali Iron Ore Block, spanning 194.68 ha, is located within the Barbil forest range of the Keonjhar forest division. The Topodihi Nala, a seasonal water source, flows within the lease area. Other perennial water bodies within the buffer zone include the Karo River (0.5 km west), Suna River (4.25 km south), Kakrapani Nala (7.25 km southeast), and Teherei Nala (8.5 km south), as specified in the Site-Specific Wildlife Conservation Plan (SSWCP) for Guali Iron Ore Block.

Table 4.22. Site-Specific Status of Riverine and Aquatic Habitats in Mining Areas

S. No.	Mining Block	Forest Division & Range	Key Nearby Water Bodies (with distance)	Notes
1	**Netrabandha Pahar Iron Ore Block** (Bhushan Power & Steel Ltd.)	Bonai, Koira Range	Khajuradihi Nala (within block)	Close proximity to multiple perennial streams and rivers
			Teherei Nala (1.2 km N)	
			Karo River (7.8 km NW)	
			Suna River (4.6 km NE)	
			Suna Nala (1.9 km E)	
2	**Guali Iron Ore Block** (Odisha Mining Corporation Ltd.)	Keonjhar, Barbil Range	Topodihi Nala (within lease)	Seasonal and perennial water bodies within lease and buffer zone
			Karo River (0.5 km W)	
			Suna River (4.25 km S)	
			Kakrapani Nala (7.25 km SE)	
			Teherei Nala (8.5 km S)	
3	**Lasarda Pacheri Mines** (Thriveni Earthmovers)	Keonjhar, Barbil Range	Karo River (passes through lease)	Presence of a major river within the lease; ecologically sensitive site
			Ganse Nala (1.4 km SE)	
			Topodihi Nala (5.1 km S)	

4	**Kalmang West Iron Ore Block** (Tata Steel BSL)	Keonjhar & Bonai, Barbil & Koira Ranges	Suna River (1.9 km E)	Surrounded by multiple perennial rivers and nalas
			Karo River (3.1 km NW)	
			Teherai Nala (4.1 km SE)	
			Topodihi Nala (3.9 km N)	
			Kaksipani Nala (5.1 km E)	
5	**Netrabandh Pahar (West) Iron Ore Block** (Raga Tradecone)	Bonai, Koira Range	Suna River (7 km NE)	Multiple interconnected seasonal and perennial nalas and rivers; complex hydrological system
			Kurahi River (8 km NW)	
			Sarkunda Nala (4.2 km S)	
			Kuradi River (5.0 km SW)	
			Teherei Nala (via tributaries)	

C. Lasarda Pacheri Mines (Thriveni Earthmovers)

The Lasarda Pacheri Mines, covering an area of 94.35 ha, are situated in the Barbil forest range of the Keonjhar forest division. The Karo River passes through the lease area, forming a critical aquatic habitat. Additionally, Ganse Nala flows 1.4 km southeast of the lease area, while Topadihi Nala, a seasonal stream, flows 5.1 km to the south, as stated in the Environment Clearance (EC) Report of Lasarda Pacherei Mines.

D. Kalmang West Iron Ore Block (Tata Steel BSL)

The Kalmang West Iron Ore Block, covering an area of 42.6 ha, is located within the Barbil and Koira forest ranges of Keonjhar and Bonai forest divisions. Key water sources in proximity to the block include Suna River (1.9 km east), Karo River (3.1 km northwest), Teherai Nala (4.1 km southeast), Topadihi Nala (3.9 km north) and Kaksipani Nala (5.1 km east), as per the Environment Impact Assessment (EIA) report for Kalmang West Iron Ore Block.

E. Netrabandh Pahar (West) Iron Ore Block (Raga Tradecone)

The Netrabandh Pahar (West) Iron Ore Block, covering 66.242 ha, is located in the Koira forest range of the Bonai forest division. According to the site-specific wildlife management plan, the Suna River is located 7 km to the northeast, and the Kurahi River flows 8 km to the northwest of the lease area. The Sarkunda Nala, flowing 4.20 km to the south, joins the Kuradi River 5.0 km to the southwest. Several nalas and

sub-nalas, including Khajurdihi Nala, Archanda Nala, and Kundra Nala, converge into Teherai Nala in the southwestern region before discharging into the Suna River. Seasonal streams also flow through the lease area. The high flood levels of the Baitarani and Suna Rivers are significantly lower than the mining lease elevation.

4.4 STATUS OF FOREST FIRE

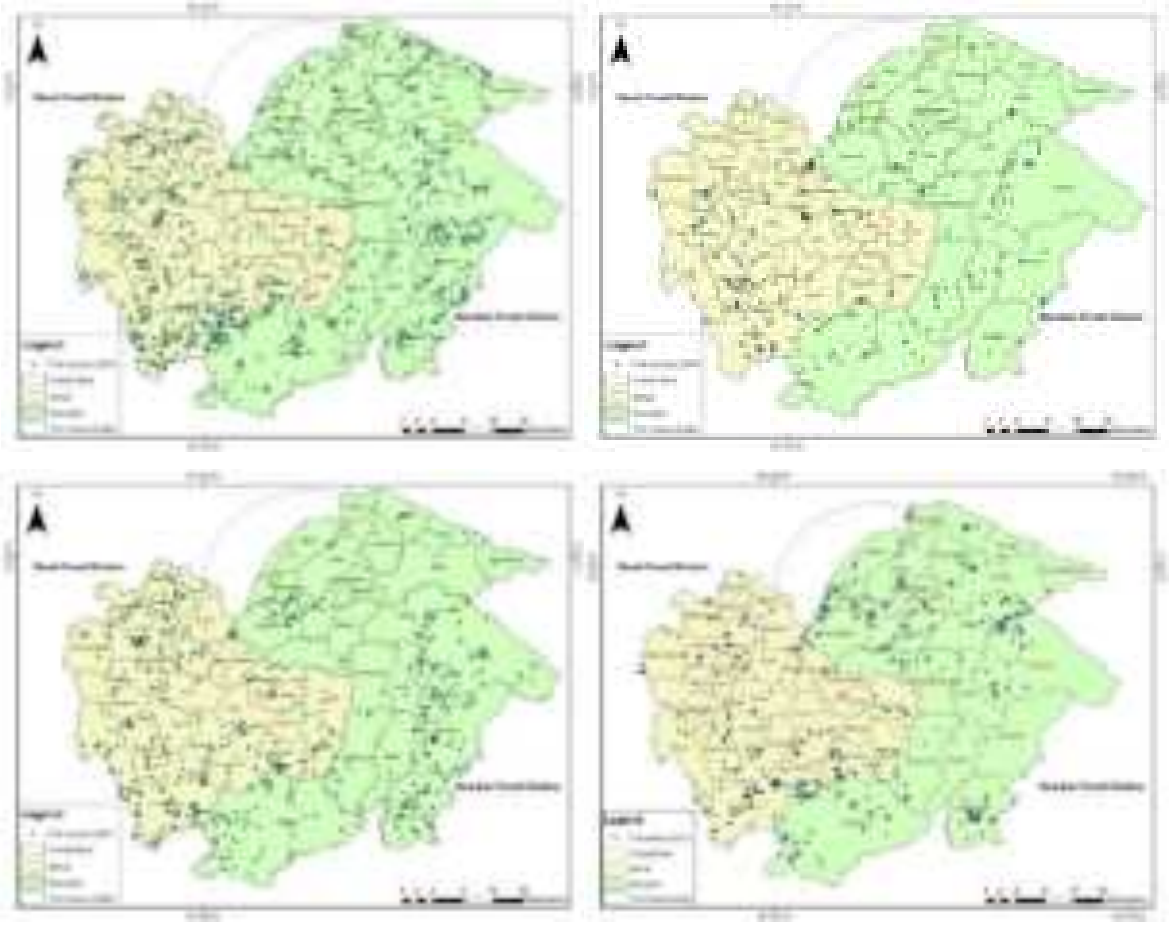
Forest fire is a common threat to the forest and wildlife of Keonjhar and Bonai Forest Divisions, especially during the dry season which lasts from October to June. The frequency and intensity of fire peaks during the hot summer months between March and June. The forests of this region, which are primarily Tropical Dry Deciduous, become highly flammable due to the accumulation of dry leaves, twigs, and grass on the forest floor. Almost all recorded forest fires in this division are anthropogenic in nature. Common causes include the burning of dry forest litter by local people, herders, honey collection and for growth of new grass. Belief that forest burning would enhances the yield of Mohua flowers and Kendu leaves and helps in collection of NTFP. Other sources of ignition include careless disposal of cigarette and bidi stubs, cooking fires during forest picnics, and the preparation of charcoal from green wood. In some cases, people intentionally set fire to deter wild animals such as elephants, clear forest for encroachment, or to generate ash for use as a natural fertilizer in nearby farmland. The cumulative impact of these activities results in large-scale damage to the forest ecosystem. Fires burn the organic litter on the ground, destroying microbes and insects that play a vital role in maintaining soil fertility. The destruction of this organic matter reduces the formation of humus, which is essential for supporting plant growth. Continuous annual fires cause degradation of the forest structure and composition, leading to a reduction in tree regeneration, especially of sensitive species like Sal (Shorea robusta). The destruction extends to wildlife habitats, disrupting the movement and behavior of animals, and increasing the mortality of smaller fauna like amphibians, reptiles, and insects. Forest fires also alter the natural succession of vegetation by promoting fire-tolerant and invasive species like Lantana, Chromolina and Eupatorium, while economically important species decline. Soil structure becomes hardened due to intense heating, which reduces water infiltration and accelerates erosion.

Overall, these repeated fires are transforming forested areas into degraded and unproductive landscapes. In response to the growing threat, several monitoring and management strategies have been implemented. Real-time fire monitoring using satellite data from MODIS sensors aboard the Terra and Aqua satellites has been introduced. The Forest Survey of India (FSI) sends alerts to the state forest departments based on active fire detections. These alerts help forest staff take timely action to prevent minor fires from escalating into large wildfires. In addition, fire vulnerability maps and fire management plans are prepared in advance. Forest departments trace and maintain fire lines, deploy fire-fighting squads, and supply necessary equipment like blowers and beaters before the fire season begins. Additional vehicles are hired to improve the mobility of field staff during emergency responses. Local communities play a critical role in fire prevention and control. Awareness campaigns are conducted in nearby villages to educate people about the ecological and economic consequences of forest fires. Village Forest Protection Committees and Vana Suraksha Samitis (VSSs) are actively involved in fire prevention activities. These groups are provided incentives to protect their assigned forest areas, and their participation helps build local ownership of forest conservation efforts. A combination of remote sensing technology, community engagement, and on-ground preparedness is essential to minimize the frequency and impact of these fires and to maintain the ecological health of the forest landscape.

In this study, forest fire data spanning four years (2021 to 2024) was analyzed to assess trends and fire density across selected forest ranges. To better reflect the landscape context and ecological connectivity, data was collected from five specific ranges: Champua, Barbil, and Bhuyan & Juangpirh (BJP) within the Keonjhar Forest Division, and Koira and Barsuan from the Bonai Forest Division. All 15 beats under the Barbil Range were included in the analysis. From Champua Range, eight beats were selected, while only one beat was considered from the BJP Range. In the Bonai Forest Division, all beats from both Koira and Barsuan Ranges were considered for a comprehensive assessment (Table 4.23).

A total of 1085 fire events were recorded by MODIS and SNPP in the year 2021 which is the highest in these four years, the lowest 333 fire events between 2021 to 2024

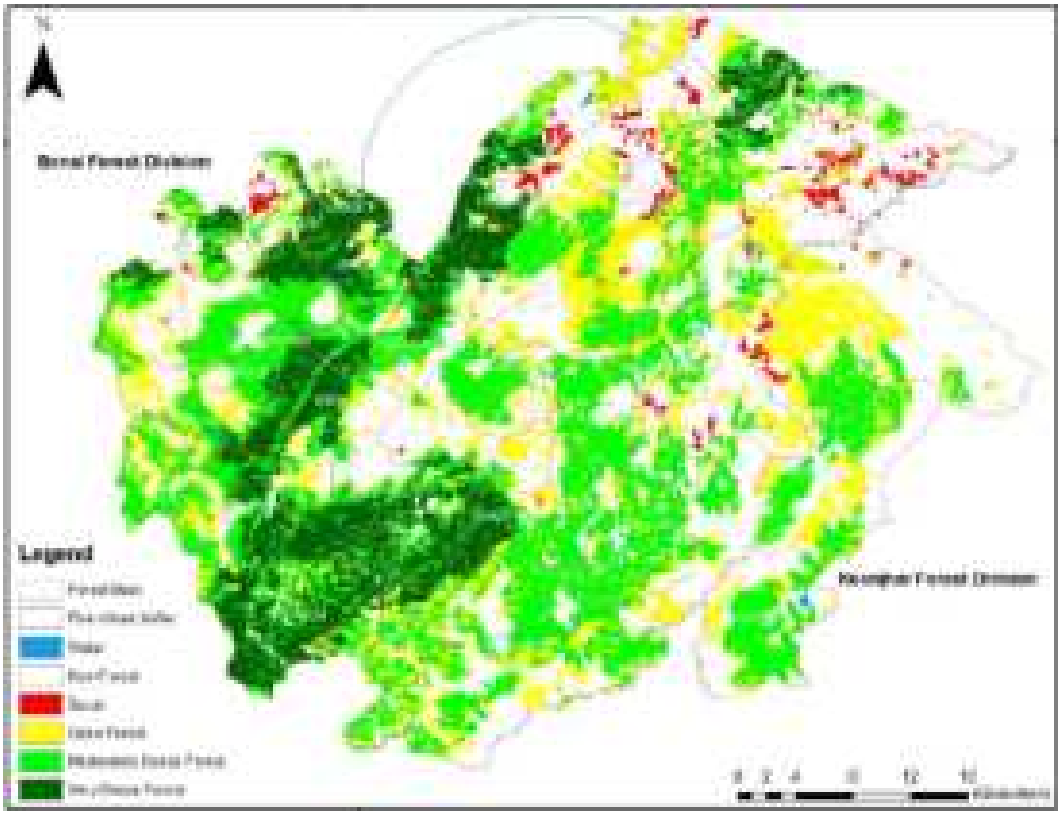
were recorded in 2022, 667 fire events in 2023 and 547 fire events were recorded in the year 2024 (Map 4.1).



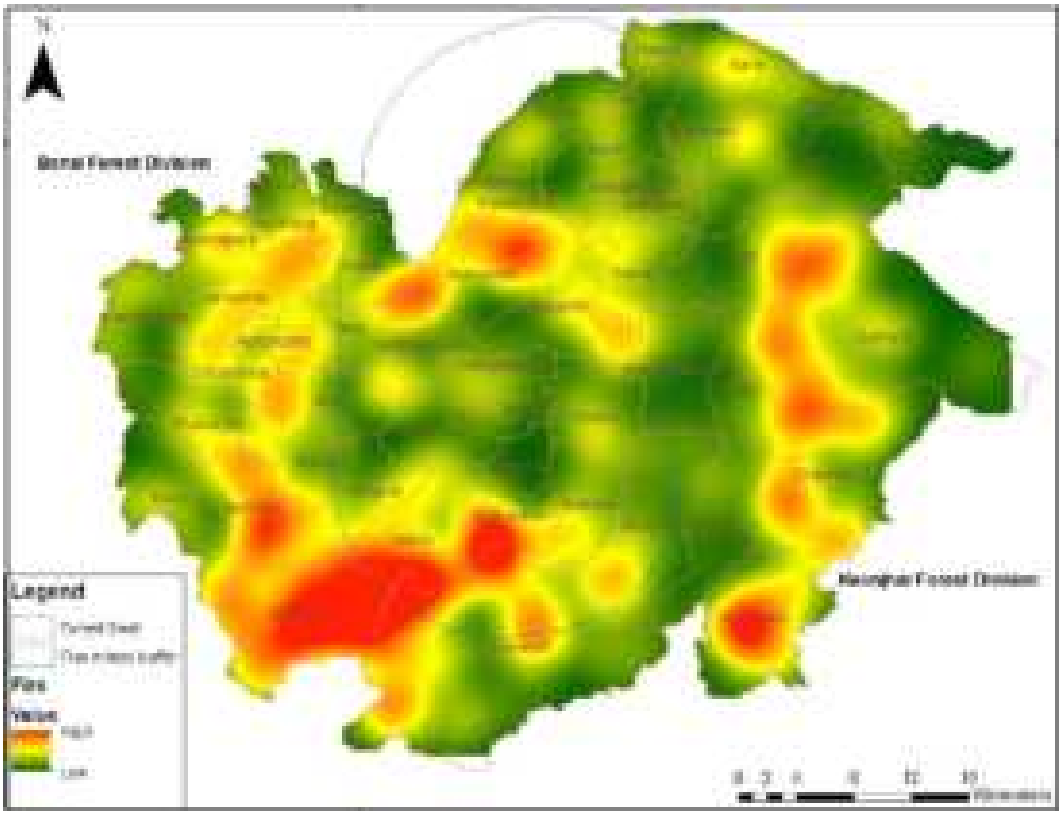
Map 4.1. Forest fire points from 2021-2024.

The analysis of forest fire data from 2021 to 2024 across selected beats in Keonjhar and Bonai Forest Divisions reveals clear spatial patterns in fire distribution and intensity (Map 4.1). The fire intensity map shows that the highest fire occurrences are concentrated in the southwestern part of Bonai Forest Division, particularly in beats such as Bhutuda, Jaldihi, and Barsuan. Similarly, high fire activity was observed in the eastern and southeastern regions of Keonjhar Forest Division, perticularly in Nayakote, Gumurah, Chipinda, and Nayagarh beats. Very dense forest in the selected beats of Koira, Barsuan and Barbil ranges are fire prone areas. Nayakot being the largest beat was the most fire prone beat under Bhuyan & Juang Pidha (BJP) range which shares boundary with Bhutuda beat of Barsuan range. Bhutuda beat, comparatively small, with highest frequency of fire. The dense and moderate dense forest continues to Jaldihi, Khajuridihi, Barsuan, Jamadiha, Puranapani, Kendudihi,

borders of Kula-Nuatantra-Chordhara-Kunchpani-Toda, Soyamba-Jamadiha-Jhirpani-Topadihi, jhirpani-kendudihi-toda-kalta-nadidihi are some of the beats with high frequency of forest fire (Map 4.2 & 4.3). Moderate dense forest and open forest of Gumura, joda, chipinda, nayagarh, and rugidihi are also beats with high frequency fire. These hotspots align with the fire event data, where Nayakote recorded the highest number of incidents (314), followed by Bhutuda (277), Gumurah (204), and Chipinda (146) (Figure 4.7 & 4.8). The pattern of fire frequency also shows connectivity of the forests.



Map 4.2. Forest cover map of netrabanch pahar landscape



Map 4.3. Fire hotspots in the in netrabandh pahar landscape

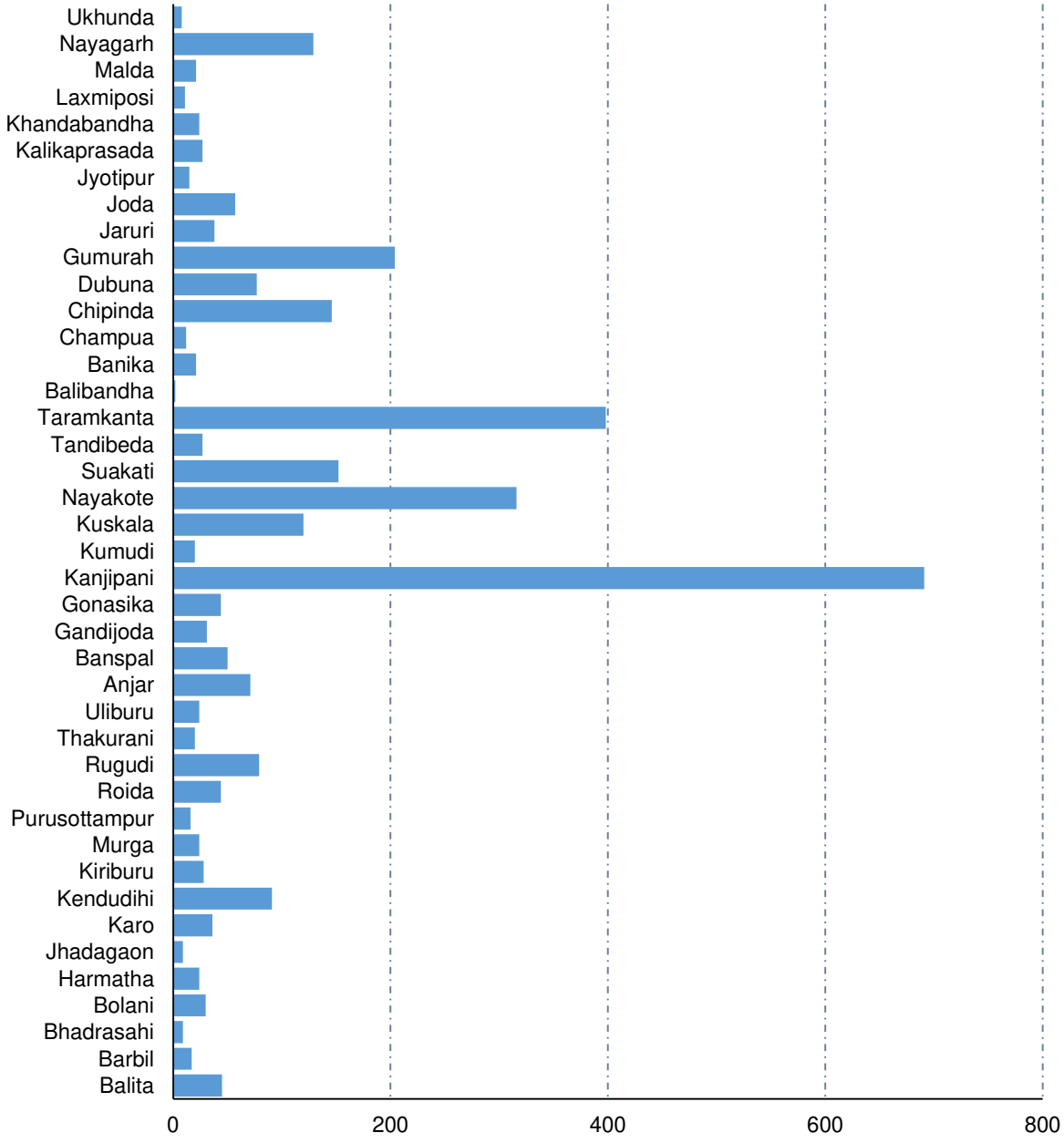


Figure 4.7. Fire events in Barbil, Champua and Bjp ranges of Keonjhar Division.

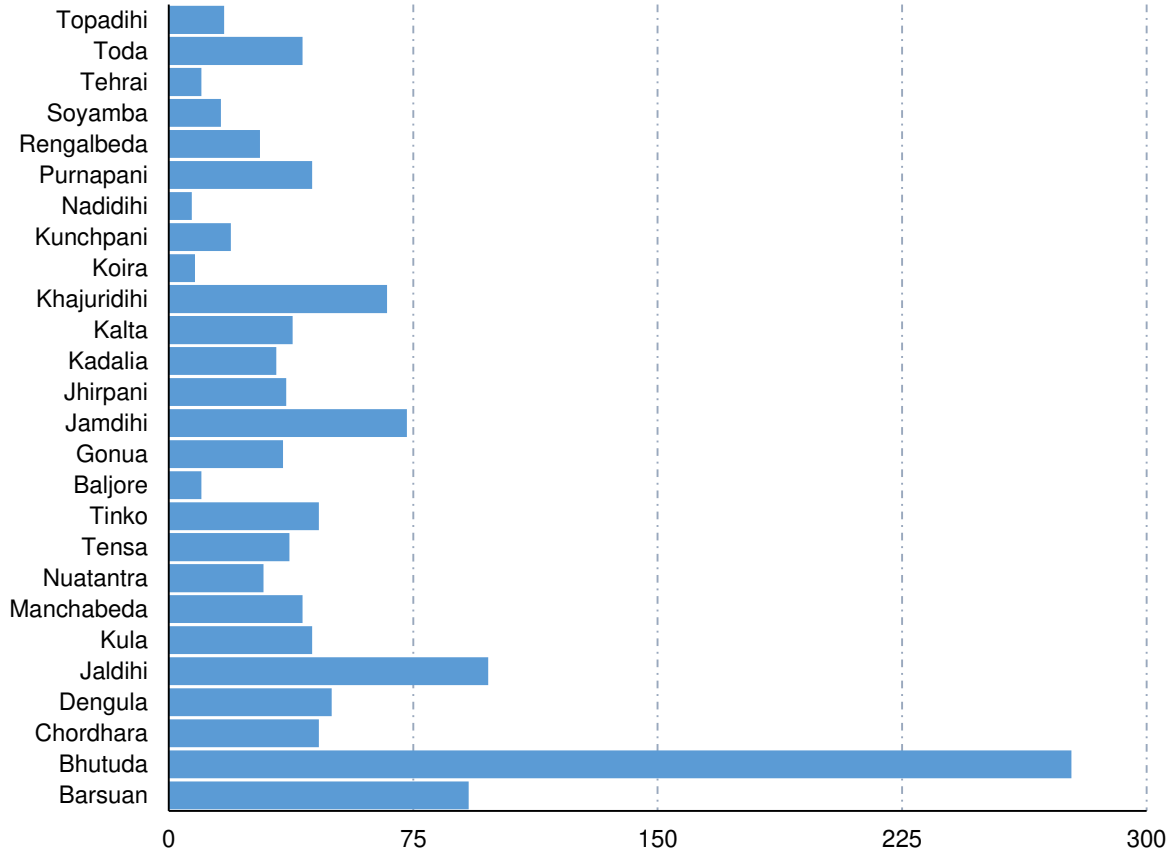


Figure 4.8. Fire events in Koira and Barsuan ranges of Bonai Division.

Table 4.23. Fire incidences in the selected beats of ranges Barbil, Champua and Bjp in forest division Keonjhar (2020-2024), and beats of ranges Koira and Barsuan in Bonai Forest division (2021-2024)

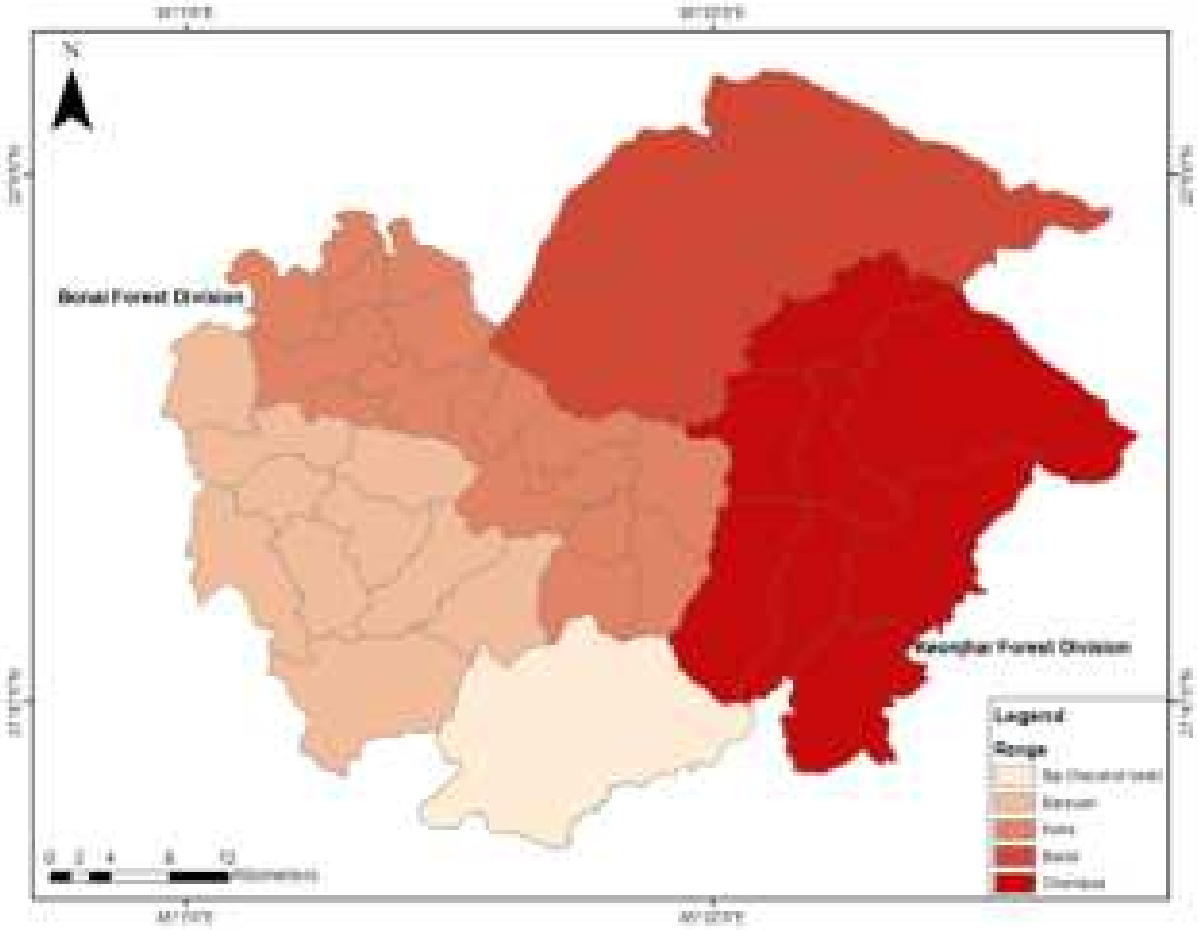
Forest Division	Forest Range	Beat	Fire incidences
Keonjhar (2020-2024)	**Barbil**	Balita	45
		Barbil	17
		Bhadrasahi	9
		Bolani	30
		Harmatha	24
		Jhadagaon	9
		Karo	36
		Kendudihi	91
		Kiriburu	28
		Murga	24
		Purusottampur	16

		Roida	44
		Rugudi	79
		Thakurani	20
		Uliburu	24
	Bhuyan & Juangpirh	Anjar	71
		Banspal	50
		Gandijoda	31
		Gonasika	44
		Kanjipani	691
		Kumudi	20
		Kuskala	120
		Nayakote	316
		Suakati	152
		Tandibeda	27
		Taramkanta	398
	Champua	Balibandha	2
		Banika	21
		Champua	12
		Chipinda	146
		Dubuna	77
		Gumurah	204
		Jaruri	38
		Joda	57
		Jyotipur	15
		Kalikaprasada	27
		Khandabandha	24
		Laxmiposi	11
		Malda	21
		Nayagarh	129
		Ukhunda	8
Bonai (2021-2024)	**Barsuan**	Barsuan	92
		Bhutuda	277
		Chordhara	46
		Dengula	50
		Jaldihi	98
		Kula	44
		Manchabeda	41
		Nuatantra	29
		Tensa	37
		Tinko	46
	Koira	Baljore	10
		Gonua	35
		Jamdihi	73

		Jhirpani	36
		Kadalia	33
		Kalta	38
		Khajuridihi	67
		Koira	8
		Kunchpani	19
		Nadidihi	7
		Purnapani	44
		Rengalbeda	28
		Soyamba	16
		Tehrai	10
		Toda	41
		Topadihi	17

4.5 STATUS OF GRAZING

Rapid assessment approach was used and based on expert interviews and observations, the status of grazing was assessed in some beats of Champua range, Barbil, Koira, Barsuan ranges and Nayakot beat of BJP range. The most vulnerable range for cattle grazing is champua range because of its connectivity with the villages and agriculture in the eastern part. Second is Barbil range, due to number of villages and sal dominated dense forest around karo river which used by local communities for cattle grazing. Koira range is comparatively low in cattle grazing as most of the local people are dependent on mines for their livelihood. Barsuan range is a dense forest, number of villages are also lower, and pressure of grazing is also the lowest. For BJP range, only nayakot beat was taken so it is not possible to assess the grazing pressure. Overall Champua and Barbil are the two most affected forest ranges from the cattle grazing.



Map 4.4. Cattle grazing in five ranges of keonjhar and bonai forest divisions.

4.6 HUMAN WILDLIFE CONFLICT

The areas surrounding the five mining sites and their 10-kilometre buffer zones in Keonjhar and Bonai Forest Divisions have been enduring persistent and escalating human-wildlife conflicts (HWC), primarily involving the Asian elephant (*Elephas maximus*). These conflicts stem from habitat fragmentation, development, and disturbances in the wildlife corridors.

4.6.1 Ecological Context and Elephant Corridors

The forested landscape between the Baitarani and Brahmani rivers has historically served as a vital habitat and migratory route for elephants. It connects significant elephant populations between the Mayurbhanj Elephant Reserve and the Sambalpur Elephant Reserve, as well as between Odisha and neighbouring Jharkhand state. This migratory corridor plays a crucial role in

facilitating gene flow, which is essential for maintaining the genetic health and long-term viability of Odisha's elephant population (Sar CK, 2004).

One notable example is the Karo-Karampada Elephant Corridor, stretching 15.17 km in length and 2.3 km in width within the Barbil range of the Keonjhar Forest Division. It is one of 14 proposed corridors under Project Elephant (2023) but yet to be notified. There is a need to notify this corridor for effective conservation efforts, managing increased elephant foraying, disrupted migration routes, and frequent incursions into human settlements, often with fatal consequences.

4.6.2 Elephant Movement in the Mining Zone of Impact (ZOI)

According to forest department data, significant elephant activity has been documented in the study region, particularly within the forest ranges of Barbil, Champua, and Bjp in the Keonjhar Forest Division and Koira and Barsuan in the Bonai Forest Division. These areas fall within the 10-kilometre Zone of Impact (ZOI) around the mines, where human-elephant encounters are most frequent.

Between 2020 and 2024, a total of 34 elephant deaths were recorded in the Zone of Impact (ZOI) of Keonjhar and Bonai Forest Divisions, with 25 cases in Keonjhar and 9 in Bonai. The most frequent causes of death included electrocution (7 incidents), natural causes (5 incidents), train collisions (3 incidents), and various diseases such as anthrax, tympanitis, respiratory failure, and septicaemia. Many incidents also involved trauma, shock, and injuries from fighting. Notably, the Champua Range in Keonjhar Division reported the highest number of casualties. Some incidents involved multiple elephant deaths on the same day, indicating localised high-risk zones. The data highlights ongoing human-elephant conflict, particularly near villages, railway lines, and agricultural areas. (ANNEXURE 4.8.).

The key causes of elephant death

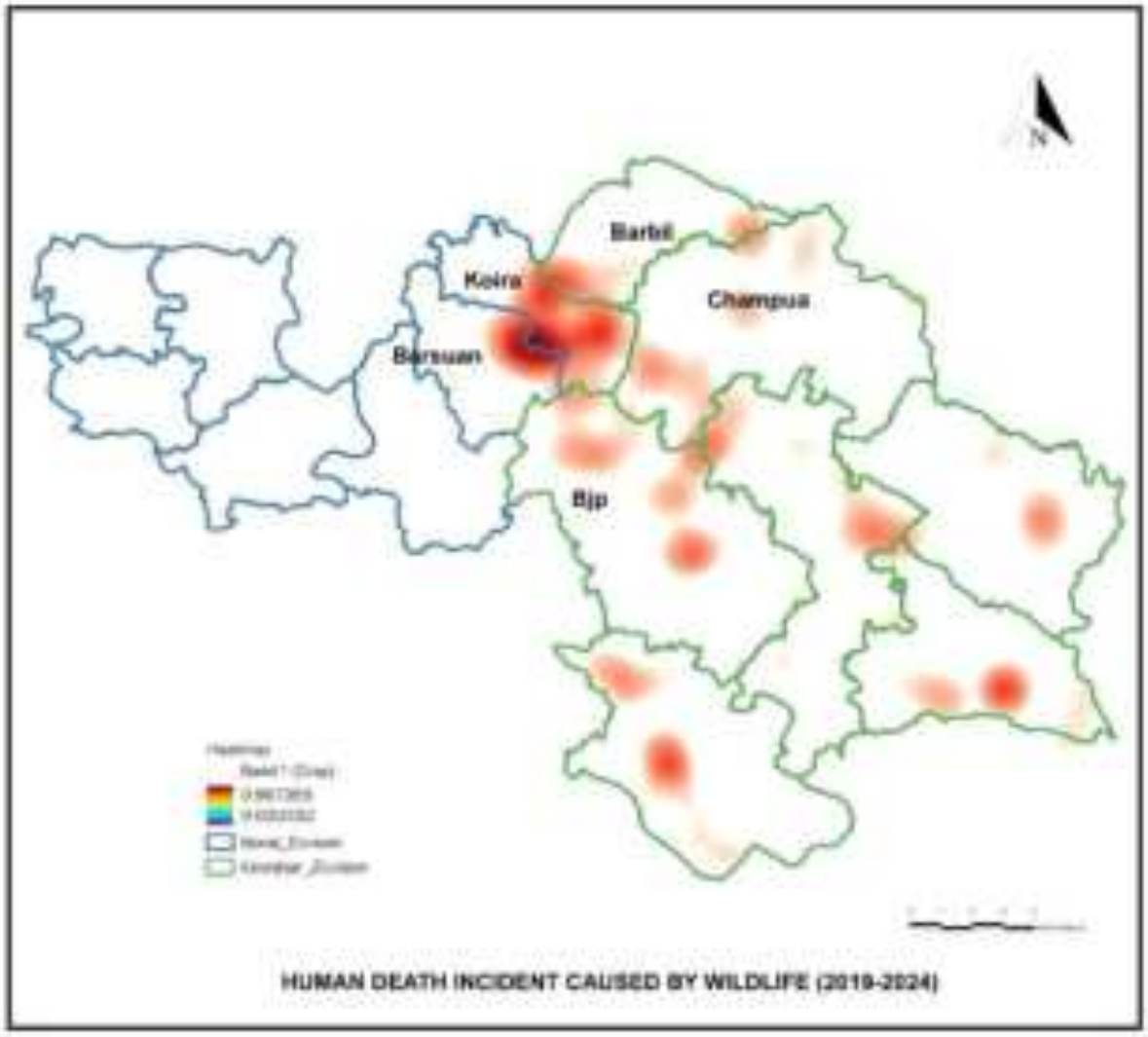
- **Electrocution** (most frequent, including incidents in Talachampei, Bholbeda, Nekadaghara, and Koira),
- **Train collisions** (notably between Banspani-Jurudi and Barsuan)
- **Disease** (including septicaemia, hepatitis, anthrax, and Clostridium haemolyticum)
- **Natural causes** (such as dystocia and respiratory failure)
- **Trauma and injury** (including those due to infighting)

4.6.3 Human Casualties by Wildlife:

Human-elephant conflict (HEC) remains a pressing issue in the Keonjhar and Bonai forest divisions of Netrabandh landscape. From 2019 to 2024, government records indicate a total of 79 human fatalities attributed to elephant encounters. Of these, the Keonjhar Forest Division reported 47 deaths, while the Bonai Forest Division accounted for 32 deaths (Annexure 4.9).

Spatial analysis through the heat map (Map 4.5) reveals that within Bonai, the Koira and Barsuan forest ranges experienced the highest concentration of incidents during this period. In contrast, Keonjhar Forest Division exhibited a more scattered pattern of incidents across its various forest ranges. Notably, areas falling within the Zone of Impact (ZOI), as a 10 km radius surrounding five mining blocks were particularly vulnerable to HEC related fatalities.

Out of the total 79 deaths, 43 occurred within forest ranges intersecting the ZOI, specifically Barbil, Bansapal (Bjp), Champua, Koira, and Barsuan (Table 4.24). These findings underscore the heightened intensity of human-elephant conflict in regions disturbed by mining and related land-use changes.



Map 4.5. Heat Map: Human death incident hot-spot caused by wildlife in Bonai and Keonjhar Forest Division, Netrabandh Pahar Landscape

The year-wise analysis of human deaths in ZOI, ranging from 2019 to 2024, shows an increasing trend in casualties, escalating from 1 death in 2019 to a peak of 16 deaths in 2023, followed by a slight decline to 8 deaths in 2024. The data underscores a growing threat to human life in areas near mining sites, as these locations often disrupt elephant habitats, leading to increased encounters. Koira and Barsuan ranges in the Bonai division have been particularly affected, accounting for over 74% of deaths in the ZOI forest ranges.

Table 4.24. Human deaths due to HEC in the ZOI forest ranges from 2019 to 2024.

Forest Division	Forest Range	No. of Incidents (Human Deaths Due to Human-Elephant Conflict)						
		2019	**2020**	**2021**	**2022**	**2023**	**2024**	Total
Keonjhar	*Barbil*	0	0	0	0	1	0	1
	Bjp	0	0	0	2	2	0	4
	Champua	0	1	1	1	3	0	6
Bonai	*Koira*	1	1	4	3	6	4	19
	Barsuan	0	0	2	3	4	4	13
Total		**1**	**2**	**7**	**9**	**16**	**8**	**43**

(Source- Forest Department Records)

4.6.4 Crop raids and economic losses

Crop loss is a recurrent issue in the ZOI forest ranges. Farmers frequently report raids by elephants, resulting in substantial economic losses. The forest department has recorded large number of compensation claims over the years. For example, in the Champua range alone, 1,017 claims were filed in 2017–18, covering 243.06 acres with over Rs 24 lakh sanctioned. Between 2017 and 2024 (Table 4.25), across the Barbil, Champua, Bjp, Koira, and Barsuan ranges, thousands of acres of crops have been damaged. Government compensation through sanctioned amounts often matches the amounts paid, indicating administrative responsiveness but also highlighting the scale of loss:

- **Champua** (2018–19): Rs 20.88 lakh for 228.84 acres
- **Koira** (2023–24): Rs 14.07 lakh for 69.39 acres

Table 4.25. Crop loss due to HEC in the ZOI forest ranges from 2017 to 2024.

Division	Range	Year	No. of cases	Damaged area in acres.	Amount sanctioned (Rs)
Keonjhar	*Barbil*	2017-18	113	57.64	588740
	Champua	2017-18	1017	243.06	2432480
	Bjp	2017-18	186	40.56	416600
	Champua	2018-19	1021	228.84	2087980
	Bjp	2018-19	637	170.47	1723902
	Barbil	2019-20	2	0.60	6000
	Champua	2019-20	6	0.96	11280
Bonai	*Koira*	2019-20	177	65.51	657300
	Koira	2021-22	243	109.09	1090900
	Koira	2022-23	134	53.121	531210
	Koira	2023-24	222	69.387	1407490
	Barsuan	2019-20	73	27.93	280700
	Barsuan	2020-21	10	3.6	36000
	Barsuan	2021-22	96	43.321	398000
	Barsuan	2022-23	139	51.094	555192
	Barsuan	2023-24	77	17.388	390345

(*Source*: Bonai Forest Division & SSWLCP of Laserda mines)

4.6.5 House damage by elephants

In addition to crops, house damage has also been significant. Between 2017–18 and 2023–24, significant number of partial and full house damage incidents were recorded (Table 4.26). Highlighting as per records availabilities

- **Koira Range (2023–24)**: 91 houses damaged, Rs 7.6 lakh sanctioned
- **Champua Range (2017–18)**: 117 houses damaged, Rs 4.74 lakh sanctioned
- **Barsuan Range (2023–24)**: 74 houses damaged, Rs 6.74 lakh sanctioned

Such damage not only incurs financial costs but also leads to trauma and displacement for affected families.

Table 4.26. House damage due to HEC in the ZOI forest ranges from 2017 to 2024.

Division	Range	Year	No. of House Damage			Amount sanctioned (Rs)
			Partly	Fully	Total	
Keonjhar	Barbil	2017-18	40	2	42	100000
	Champua	2017-18	87	30	117	474000
	Bjp	2017-18	13	2	15	46000
	Champua	2018-19	41	45	86	532000
	Champua	2019-20	10	09	19	110000
Bonai	Koira	2019-20	42	33	75	414000
	Koira	2020-21	32	18	50	244000
	Koira	2021-22	34	51	85	578000
	Koira	2022-23	36	33	69	402000
	Koira	2023-24	77	14	91	760000
	Koira					
	Barsuan	2019-20	3	4	7	46000
	Barsuan	2020-21	2	5	7	54000
	Barsuan	2021-22	13	8	21	106000
	Barsuan	2022-23	13	20	33	226000
	Barsuan	2023-24	58	16	74	674000

(*Source*: Bonai Forest Division & SSWLCP of Laserda mines)

4.6.6 Human-Wildlife Conflict Compensation Guidelines in Odisha:

Issued under the Anukampa Yojna by the Forest, Environment & Climate Change Division, Government of Odisha, these guidelines outline the compensation entitlements provided to individuals and communities affected by human-wildlife conflict.

1. Ex-Gratia Payments for Human Death or Injury Caused by Wildlife: Provisions ensure timely relief and support to affected individuals and their families. Victims of wildlife attacks are entitled to ex-gratia compensation based on the nature and extent of injury or fatality:

Table 4.27. Ex-Gratia Payments Guidelines for Human Death or Injury Caused by Wildlife

Type of Incident	Ex-Gratia Amount
Death	Rs 6,00,000/-
Grievous Injury	Rs 10,000/- (Temporary Injury)
Minor Injury	Rs 5,000/- (for injuries requiring medical treatment for one week or less; includes free medical care at government hospitals)
Permanent Disability	Rs 2,50,000/- (for disabilities exceeding 60%)
	Rs 1,50,000/- (for disabilities less than 60%)
Temporary Disability	Covered under medical and injury compensation

2. Compensation for Livestock Depredation by Wildlife: The compensation is aimed at reducing the economic burden on rural and tribal communities dependent on livestock for livelihood. When livestock is attacked or killed by wild animals, the following compensation rates are applicable:

Table 4.28. Compensation Payments for Livestock Depredation by Wildlife

Type of Livestock	Compensation Amount
Cow / Buffalo	Rs 37,500/-
Bullock	Rs 32,000/-
Calf	Rs 5,000/-
Goat / Sheep	Rs 4,000/-
Calf of Goat / Sheep	Rs 1,500/-

3. Compensation for Crop Depredation by Wildlife: These measures are intended to support farmers affected by wildlife-related crop destruction and promote coexistence. As per Notification No. 5266-8F (WL)-6/2011-F&E, dated March 23, 2011, crop losses due to wildlife incursions are compensated as follows:

    - Paddy and Cereal Crops: Rs 5,000/- per acre
    - Vegetables and Cash Crops (e.g., banana, sugarcane, mango): Rs 10,000/- per acre

4. Compensation for Property Damage by Wildlife: The relief measures aim to rehabilitate affected families and restore their basic living conditions. In cases where wildlife causes damage to residential property, compensation is provided based on the extent of damage:

Table 4.29. Compensation Payments for Property Damage by Wildlife

Type of House Damage	Compensation Amount
Fully Damaged House	Rs 20,000/- (plus housing support under Biju Pucca Ghar scheme)
Partially Damaged House	Rs 10,000/-

The compensation guidelines reflect the Odisha government's commitment to balancing wildlife conservation with the well-being of local communities. Prompt support under the Anukampa Yojna helps mitigate the adverse impacts of human-wildlife interactions.

4.6.7 Anukampa Yojna

The Government of Odisha, through its ANUKAMPA platform, has implemented a streamlined compensation mechanism. ANUKAMPA, developed in collaboration with the Odisha Space Application Centre (ORSAC), enables affected individuals to claim relief for loss of life, injury, crop, cattle, and property damage due to wildlife. This initiative is governed by Chapter-VAA of the Wildlife (Protection) (Odisha) Rules, 1974, and aims to ensure timely, transparent, and accessible disbursal of compassionate payments. Claims can be filed via the web or mobile app.

The data and trends indicate that human-wildlife conflict in the mining ZOI is increasing, with special reference to elephants and local communities facing threats to life, livelihood, and property. The recognition of elephant corridors, is needed for urgent conservation planning and mitigation strategies.

4.7 SOCIO-ETHNOBOTANICAL, SOCIO-ECONOMIC AND SOCIO-ECOLOGICAL STATUS

The Barbil and Koira ranges, known for their extensive iron ore mining, have large areas of forest leased to mining companies. As a result, local communities are predominantly dependent on mining for their livelihoods, with minimal engagement in Non-Timber Forest Product (NTFP) collection. Due to frequent elephant movement and the economic reliance on mining, rice cultivation is minimal in villages particularly in the Kalta, Nandihi, Toda, and Jhirpani.

In the Barsuan range, villages like Bandal, Commando, and Jaldihi face similar challenges, with paddy cultivation mostly abandoned due to human-elephant conflicts. However, these communities are actively involved in collecting NTFPs. Sal leaves are widely used for making disposable plates and bowls, while Sal gum, known locally as "Jhoona", is used as incense for religious activities and rituals. The forest department supports vermicompost production in several villages and facilitates its sale. Additionally, broom grass and bamboo-based products are crafted, and Tentulidihi village has initiated mustard cultivation in the Dengula beat. The jackfruit trees attracts elephants during fruiting season, often results human-wildlife conflict. Millets are cultivated, promoted, and marketed with the assistance of the forest department.

In the Champua range, cattle grazing presents a major ecological concern. The range is frequently traversed by elephants due to the presence of the Baitarani River, which serves as a year-round water source. The forest department supports villagers by promoting vermicomposting and facilitating Self-Help Groups (SHGs). Mushroom cultivation is also encouraged. Locals collect Tendu and Sal leaves, Sal gum, broom grass, bamboo, and red ants (used for chutney). Millets are grown and sold, with active support from forest authorities. Cattle grazing is a common practice across all three ranges, further influencing ecological dynamics.

4.7.1 Socio-Ethnobotanical Status

The local communities residing within the Zone of Influence (ZOI) forest ranges, possess rich ethnobotanical knowledge, utilising a wide diversity of forest plants for food, medicine, fibre, and various cultural practices. Key plant species such

as *Bambusa arundinacea* (Daba bamboo), *Bauhinia vahlii* (Siali), *Buchanania lanzan* (Char), and *Madhuca longifolia* (Mohua) play an integral role in the daily lives and livelihoods of many villagers. The occurrence of *Bambusa arundinacea* is rare in the forest and is predominantly found near villages where it is cultivated by locals for personal use. Many Non-Timber Forest Products (NTFPs) are harvested from both government and privately held lands, with villagers taking an active role in managing and conserving these resources to ensure their long-term sustainability. Several plant species, such as *Abrus precatorius*, *Azadirachta indica*, and *Aegle marmelos*, are commonly used in traditional medicine, rituals, and as food supplements. While ethnobotanical practices generally promote sustainable harvesting, certain destructive methods, such as raking Sal seeds along with leaf litter, pose a threat to forest regeneration and biodiversity.

The listed plant species (ANNEXURE 4.10) represent a rich diversity of medicinal flora traditionally used in Indian herbal medicine. Many climbers, like *Abrus precatorius*, *Asparagus racemosus*, and *Celastrus paniculatus*, are valued for their role in treating reproductive, neurological, and inflammatory disorders. Shrubs such as *Abutilon indicum*, *Andrographis paniculata*, and *Desmodium gangeticum* are used widely for respiratory ailments, fevers, and as immunomodulators. Trees like *Aegle marmelos*, *Azadirachta indica*, and *Terminalia chebula* are highly used for their antimicrobial, digestive, and detoxifying properties. Herbs including *Centella asiatica*, *Hyptis suaveolens*, and *Phyllanthus niruri* serve as potent remedies for liver ailments, cognitive enhancement, and skin conditions. Further *Eclipta alba* and *Curculigo orchioides*, are recognised for promoting hair growth and enhancing vitality, respectively. Other notable species such as *Mucuna pruriens*, *Rauvolfia serpentina*, and *Piper longum* are used in neurological and cardiovascular therapies. Climbing vines like *Cissampelos pareira* and *Ichnocarpus frutescens* contribute to treatments for urinary and menstrual disorders, while prostrate herbs like *Euphorbia hirta* and *Emilia sonchifolia* support treatment for asthma and wound healing. Plants like *Lawsonia inermis* (henna) and *Woodfordia fruticosa* are also important for their topical and anti-inflammatory applications. This botanical wealth, which spans across common, rare, and vulnerable

species, reflects a deeply rooted ethnomedicinal knowledge where each plant part -root, leaf, seed, or bark- is employed in maintaining health, treating disease, and promoting overall well-being. Conservation of these medicinal plants is vital, especially for the rare and vulnerable species, to sustain traditional healing practices and ensure biodiversity for future generations.

4.7.2 Socio-Economic Status

The forest ranges within the Zone of Influence (ZOI) exhibit a diverse demographic composition. Ethnic groups are represented as follows: Scheduled Tribes constitute the majority at 66.94%, followed by Other Backward Classes (OBC) at 17.66%, Scheduled Castes at 7.06%, and the General category at 8.35%. Minority communities form a very small proportion of the population.

According to the Keonjhar and Bonai Forest Divisional Working Plans, the educational profile of the region indicates that 28% of the population is illiterate. Among the literate population, 20% have studied up to upper primary, 18% up to middle education, 13% have completed Class 10, 11% have attained high school certification, 6% have completed higher secondary, and only 2% each are graduates or hold postgraduate and higher qualifications.

In terms of infrastructure, housing conditions vary significantly: approximately 81.92% of houses are kachha, 13.92% are of mixed type, and only 4.22% are pucca constructions. Around 73.35% of households have access to electricity. Drinking water sources are limited, with only 7.35% having access to direct drinking water sources, 5.99% relying on public water systems, 5.99% on tube wells, 2.42% on dug wells, and 1.06% using village ponds. Other sources account for 0.64%.Economically, the population is categorised as very poor (17%), poor (60%), middle class (15%), and well-off (8%), based on assessments in the forest divisional working plans of Keonjhar and Bonai. Livestock rearing is a common practice, with households raising bullocks, cows, buffaloes, goats, sheep, pigs, and chickens.

Regarding occupation, cultivation is the primary livelihood activity among forest fringe communities. Secondary occupations include NTFP collection and trade, daily wage labour, and animal husbandry. A significant portion of households also engage in wage labour under government programmes like MGNREGA or work in construction and other local development activities. Forest resources such as firewood and various NTFPs are collected and sold in local markets for supplemental income. Additionally, some individuals engage in small-scale business or artisan work or are employed in government and non-government organisations.

Table 4.30. Percentage of Occupation from the Villages of ZOI's Forest Ranges.

S. No.	Ethnic background	Cultivation (%)	Daily wage (%)	Business (%)	Service (%)	Others (%)
1	SC	2	51	8	9	16
2	ST	5	39	11	42	56
3	OBC	78	10	56	39	28
4	General	15	0	25	10	0
5	Minorities	0	0	0	0	0

(*Source* – Working Plan of Keonjhar & Bonai FD)

4.7.3 Non-Timber Forest Products (NTFP)

Non-Timber Forest Products (NTFP) serve as the economic backbone for local communities in this region, providing a primary source of livelihood through the collection and sale of various forest derived resources. Key NTFPs are Kendu leaves, Sal seeds, Mohua flowers and seeds, Siali leaves and fibre, Lodh and Medha barks, hill broom grass, Tamarind, and char seeds, all of which play a significant role in sustaining household incomes (Table 4.31). Among these, Kendu leaf collection is commercially important, accounting for approximately 75% of the total NTFP production in the two forest divisions. This resource is subject to substantial commercial exploitation and is tightly regulated by government agencies to ensure both economic viability and ecological balance.

In the villages within the Keonjhar and Bonai forest divisions, the collection and trade of major NTFPs are governed by state regulations under Odisha's forest acts and are managed through agencies such as the Odisha Forest Department, Odisha Forest Development Corporation (OFDC) Ltd., and the Tribal Development Cooperative Corporation (TDCC) Ltd. Leases for NTFP collection and trade are periodically settled with both private entities and government undertakings to ensure oversight and equitable benefit sharing with local communities. Considerable potential for value addition at the village level through activities like grading, drying, and basic processing, which can significantly enhance incomes for primary collectors was observed. The promotion of NTFP-based micro-enterprises is supported through training programmes and exposure visits aimed at building skills and improving market linkages. Furthermore, income diversification is encouraged through a range of livelihood activities such as sericulture, pisciculture, vermiculture, and the collection of lac and honey.

Table 4.31. Main NTFPs and Their Socio-Economic Importance

NTFP	Collection Time	Main Use	Economic Role
Kendu Leaf	Feb–June	Bidi industry	Major income source
Sal Seed	May–June	Oil, trade	Regulated, significant income
Mohua Flower	April–May	Food, liquor, trade	High value, local consumption
Siali Leaf	Oct–May	Plate making	Women's micro-enterprises
Hill Broom	Mar–June	Broom making	Value addition possible
Tamarind	Mar–April	Food, industry	Market demand, local use
Char Seed	April–May	Food, trade	Local delicacy, commercial use

(Source – Working Plan of Bonai and Keonjhar FD)

4.7.4 Income from Minor Forest Produce

Minor Forest Produce (MFP) includes non-timber forest products such as leaves, seeds, fruits, gums, resins, honey, and medicinal plants collected by forest-dwelling communities, especially tribal populations. In Odisha, MFP

plays a crucial role in the livelihoods of tribal and forest-dependent communities. To prevent exploitation by middlemen and ensure fair prices for the local communities, the Government of India launched the Minimum Support Price (MSP) scheme for MFP, which is implemented in Odisha by the Odisha Tribal Development Cooperative Corporation (TDCCOL) under the Ministry of Tribal Affairs. Collection of MFPs is a major source of income for the forest fringe community in these areas.

4.7.5 Socio-Ecological Status

The socio-ecological status of local communities in this region reflects both rich biodiversity and emerging sustainability concerns. The region hosts a diverse array of flora, many of which hold ecological, economic, and cultural significance. Unsustainable collection practices, such as excessive ranking of sal seeds or premature harvesting of char fruits, threaten the regeneration of forests, soil health, and the delicate balance of microflora and fauna. Many Non-Timber Forest Produce (NTFP) species, including hill broom grass, tamarind, and mohua, play crucial ecological roles by aiding in soil conservation, maintaining moisture, and providing habitat for wildlife. The harvesting time period of NTFP collection is strategically spread across the year, ensuring that pressure on any single resource is minimised and natural regeneration cycles are sustained. Sustainable harvesting methods, such as waiting for the natural fall of mohua flowers or selectively cutting broom grass, are encouraged to align economic benefits with long-term ecological sustainability, recognising that each NTFP has its specific season and method for optimal and responsible harvest. According to the working plan of the Keonjhar and Bonai Forest Department, the list of NTFP and their collection time pertinent to the landscape are mentioned in ANNEXURE 4.11.

Table 4.32. List of Common Minor Forest Produce (MFP) Species and Their Harvested Parts

Sl. No.	Science Name	Local Name	Type of Plant	Part used
1	*Emblica officinalis*	Am la	Tree	Fruit
2	*Hemidesmus indicus*	Anantamula	Climber	Root
3	*Terminalia belerica*	Bahada	Tree	Fruit
4	*Aegle marmelos*	Bela	Tree	Fruit
5	*Andrographis paniculata*	Bhuin Neem	Shrub	Leaves, Root
6	*Buchanania lanzan*	Char	Tree	Fruit
7	*Woodfordia fruticosa*	Dhatki Flower	Shrub	Flower
8	*Terminalia chebula*	Harida	Tree	Fruit
9	*Syzygium cumini*	Jamu	Tree	Fruit
10	*Pongamia pinnata*	Karanja	Tree	Fruit, leaves
11	Mushroom	Katha Chathu	Fungi	all part
12	*Diospyros melanoxylon*	Kendu	Tree	Fruit
13	*Scheichera oleosa*	Kusum	Tree	Fruit
14	*Madhuca indica*	Mahua	Tree	Flower
15	*Madhuca indica*	Mahua seed	Tree	Fruit
16	*Azadirachta indica*	Nima	Tree	Seed
17	*Butea monosperma*	Palasa	Tree	Seed
18	*Shorea robusta*	Sal	Tree	Leaves, Seed
19	*Asparagus racemosus*	Satabari	Herb	all part
20	*Bauhinia vahlii*	Siali	Climber	Leaves, Seed
21	*Tamarindus indica*	Tamarind	Tree	Fruit

(*Source* - Working Plan of Keonjhar and Bonai Forest Division)

4.8 ENVIRONMENTAL STATUS

The environmental status of the Zone of Impact (ZOI) was assessed based on key indicators such as air, water, and soil quality. The ZOI encompasses the forest ranges of Barbil, Champua, and BJP under the Keonjhar Forest Division and Koira and Barsuan under the Bonai Forest Division in Odisha.

4.8.1 Air Quality

Barbil: As of March 2025, the Air Quality Index (AQI) in Barbil was recorded at 258, classifying it as poor. The primary pollutant was PM_{10}, mainly attributed to fugitive dust emissions due to high-intensity mining and truck traffic. (CPCB)

Keonjhar: During the same period, AQI levels in Keonjhar ranged from 86 to 140, indicating *moderate* air quality, depending on proximity to mining and transportation routes. (ABP news) Koira and Barsuan: While specific AQI data for Koira and Barsuan are limited, these areas lie within the Barbil-Koira Valley, which hosts the highest concentration of iron ore mines in Odisha. Due to the extensive mining operations, the region is facing substantial air pollution challenges.

The ambient air quality monitoring covered the following key pollutants:

- **Particulate Matter:** PM_{10} and $PM_{2.5}$
- **Gaseous Pollutants:** Sulphur Dioxide (SO_2), Oxides of Nitrogen (NO_x), Carbon Monoxide (CO), Nitrogen Dioxide (NO_2), Ammonia (NH_3), and Ozone (O_3)
- **Volatile Organic Compounds and Heavy Metals:** Benzene (C_6H_6), Lead (Pb), Arsenic (As), Nickel (Ni), Benzo(a)pyrene (BaP)
- **Additional Parameters in PM_{10}:** Free silica and mineralogical composition

Table 4.33. Baseline Ambient Air Quality

Ambient Air Quality (AAQ)		***The average maximum- minimum across all 5 mines***
Parameter		**µg/m³**
Particulate Matter	**PM_{10}**	32.6 - 93.8
	$PM_{2.5}$	16.9 - 56.3
Gaseous Pollutants	**SO_2 (Sulphur Dioxide)**	3.4 - 18.6
	No_x (Oxides of Nitrogen)	6.4 - 29.2
	NO_2 (Nitrogen Dioxide)	11.5 - 28.4
	CO (Carbon Monoxide)	<419
	O_3 (Ozone)	2.2 – 7.8
	NH_3 (Ammonia)	<20.0 - 40.8
Volatile Organic Compounds and Heavy Metals	**C_6H_6 (Benzene)**	<4
	BaP (Benzo(a)pyrene)	<0.5
	Pb (Lead)	<0.02
	As (Arsenic)	<1
	Ni (Nickel)	<1 - 2.5
Additional Parameters in PM_{10}	**Free silica**	4.4

(*Source* - EIA Reports of all mines and the Working Plans of Keonjhar and Bonai FD)

4.8.2 Water Quality

According to the Environmental Clearance (EC) documents, EIA reports, and the Working Plans of the respective mines and forest divisions, secondary data on water quality parameters were collected and recorded. (Table 4.34).

For surface water, the pH ranges from 5.94 to 7.96, indicating slightly acidic to neutral conditions. Total Dissolved Solids (TDS) vary from 79 to 215 mg/l, and fluoride concentrations range from 0.12 to 0.6 mg/l. Chloride levels fall between

3.99 and 32 mg/l, while iron (Fe) ranges from 0.08 to 0.48 mg/l. Dissolved Oxygen (DO) levels are between 5.6 and 6.3 mg/l, and Biological Oxygen Demand (BOD) ranges from 2.4 to 3.0 mg/l. In groundwater, pH ranges from 5.6 to 7.92, again indicating slightly acidic to neutral conditions. TDS is higher in groundwater, ranging from 170 to 346 mg/l, while fluoride levels span 0.19 to 0.8 mg/l. Chloride concentrations vary from 23.4 to 38.0 mg/l, sulphate levels from 7.8 to 23.4 mg/l, and iron levels from 0.01 to 0.5 mg/l. These values provide a comprehensive baseline for assessing water quality variations and potential environmental impacts across the mining sites.

Table 4.34. Water Quality

Water Quality		***The average maximum-minimum across all 5 mines***
Surface Water Quality	pH	5.94 - 7.96
	TDS (mg/l)	79 - 215
	Fluoride (mg/l)	0.12 - 0.6
	Chloride (mg/l)	3.99 - 32
	Fe (mg/l)	0.08 - 0.48
	Dissolved Oxygen (mg/l)	5.6 - 6.3
	Biological Oxygen Demand (BOD) (mg/l)	2.4 - 3.0
Ground Water Quality	pH	5.6 - 7.92
	TDS (mg/l)	170 - 346
	Fluoride (mg/l)	0.19 - 0.8
	Chloride (mg/l)	23.4 - 38.0
	Sulphate	7.8 - 23.4
	Iron	0.01 - 0.5

(*Source* - EIA Reports of all mines and the Working Plans of Keonjhar and Bonai FD)

4.8.3 Soil Quality

Soil quality, as assessed through soil test classification, provides a detailed understanding of soil health based on parameters such as pH, salinity, organic carbon, nitrogen, phosphorus, and potash content. Soil pH can range from extremely acidic (<4.5) to very strongly alkaline (>9.0), with neutral soils falling between 6.51 and 7.30. Salinity, measured by electrical conductivity, is considered average up to 1.00 µmhos/cm, harmful to germination between 1.01 and 2.00 µmhos/cm, and damaging to salt-sensitive crops from 2.01 to 3.00 µmhos/cm. Organic carbon is considered very low below 0.2%, sufficient above 0.81%, and more than sufficient above 1.0%. Nitrogen levels are very low below 50 kg/ha and sufficient above 300 kg/ha. Phosphorus is very low below 15 kg/ha and more than sufficient above 80 kg/ha. Potash is very low below 120 kg/ha and more than sufficient above 360 kg/ha. These classifications serve as guidelines for evaluating soil fertility and determining appropriate management practices.

In the ZOI areas of Keonjhar and Bonai forest divisions, the soil is predominantly red, with some southern areas showing black cotton soil. Intensive mining activities in these regions have contributed to soil degradation, adversely impacting its fertility and structure. In the Bonai Forest Division, areas affected by forest fires also display altered tree species composition, suggesting changes in soil properties.

According to data obtained from Environmental Clearance (EC) documents, EIA reports, and Working Plans of the respective mines and forest divisions, the soil texture in the area varies from silty loam and clayey loam to clayey. The pH ranges from 4.6 to 5.9, indicating acidic conditions. Water holding capacity ranges from 7.8% to 21.3%, while electrical conductivity values between 39.9 and 102.9 µS/cm further confirm soil acidity. Although nutrients like nitrogen (N), phosphorus (P), and potassium (K) are available in abundance, organic carbon and organic matter are present in low concentrations (Table 4.35).

Table 4.35. Soil Quality

Soil Quality	*The average maximum- minimum across all 5 mines*
Colour	Reddish Brown
Texture	silty loam, clayey loam to clayey
Water Holding Capacity %	7.8 – 21.3
pH	4.6. - 6.5
Electrical Conductivity (µS/cm)	39.9 – 102.9
Organic Carbon %	0.6 – 1.2
Organic matter %	1.06 - 2.82
Nitrogen (mg/kg)	45.7 – 84.105
Potassium (mg/kg)	78.4 – 204.75
Sodium (mg/kg)	42 - 94
Potassium %	0.066 - 0.074

(*Source*- EIA Reports of all mines and the Working Plans of Keonjhar and Bonai FD)

4.9 WILDLIFE MOVEMENT AND CONNECTIVITY

The landscape is a mosaic of forests, agricultural fields, rivers, human settlements, and iron mines. A total of 51 mammal species were documented during the study. Although the tiger is a flagship species for large-scale habitat conservation in India, it does not reside permanently in this landscape. However, occasional tiger movement was recorded in the Kula beat of the Barsuan Range within the Bonai Forest Division in February 2024. Similarly, tiger presence was noted in the Ghatgaon and Telkoi ranges of the Keonjhar Forest Division in 2023 and 2024, respectively, though no sightings were reported within the specific study area. Other mammal species in the region are distributed based on resource availability and ecological niches. The Asian elephant, being the largest terrestrial mammal in the landscape and an umbrella species, plays a key role in biodiversity conservation. Protecting elephants helps

safeguard a wide range of tropical flora and fauna. Consequently, this study emphasizes elephant presence and movement patterns across the landscape.

The elephant's movement data was shared by the Keonjhar and Bonai Forest Divisions, collected through their dedicated elephant monitoring teams and technology. Due to the high concentration of iron mines, forest areas have become fragmented, which is a major reason why elephants are increasingly moving through non-forested zones. Visual analysis of GPS tracking points indicates that elephants prefer forested habitats; however, in areas where forest connectivity is lacking, they are forced to traverse agricultural fields or human-dominated areas to reach adjoining forest patches. During the paddy season, elephants often raid crops—primarily in fields located near forest edges—drawn by the easy availability of food. The presence of linear infrastructure such as roads and railways further contributes to habitat fragmentation. In certain areas, elephants are compelled to cross both roads and railway lines to move between forest blocks, which increases the risk of human-elephant conflict and accidental deaths. The Barbil and Champua ranges are particularly vulnerable to these disturbances. Koira, Champua, and Barbil emerge as the most disturbed ranges within the landscape.

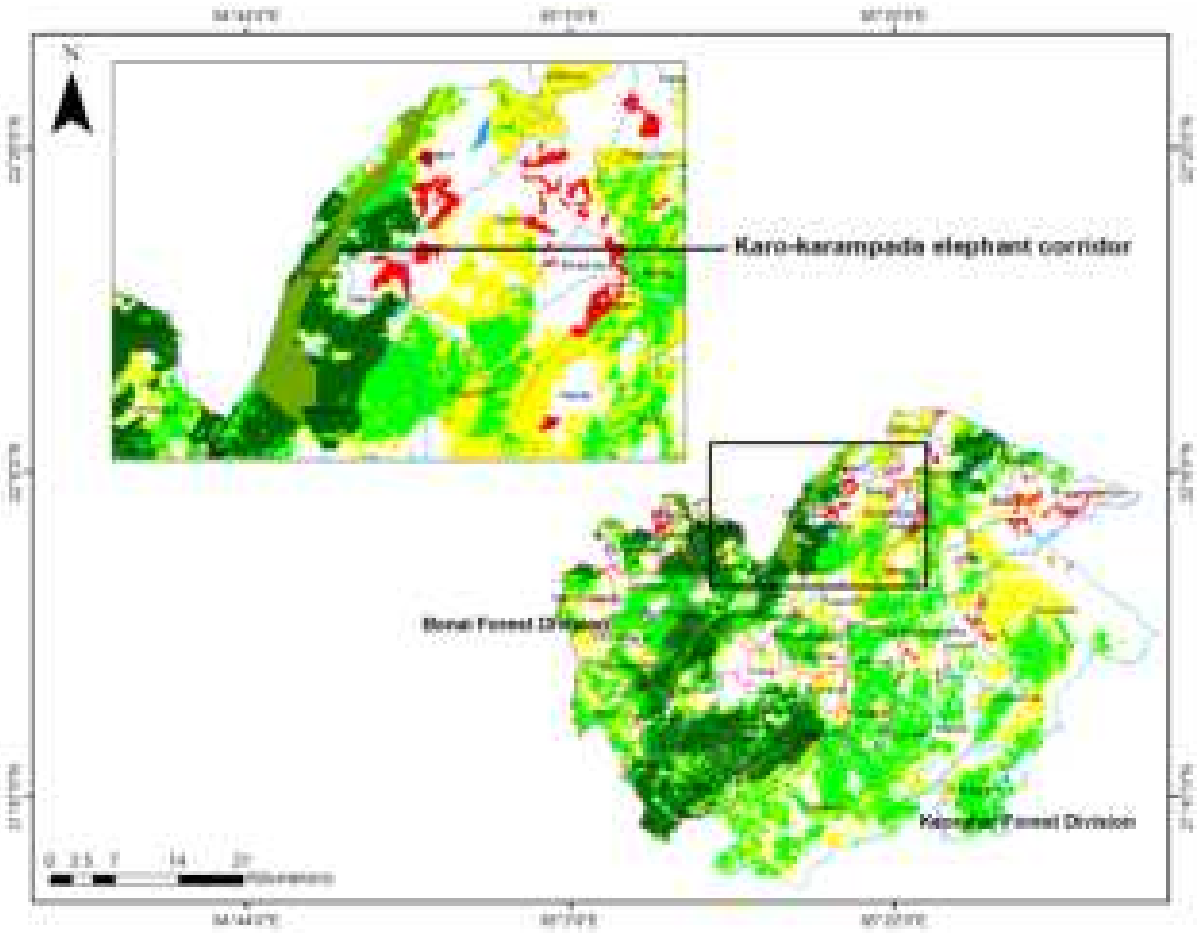
4.9.1 Landscape Connectivity

Elephants are mega herbivores and must keep moving in search of food and water resources. In this landscape three main rivers are Karo, Suna and Baitarni. Karo river situated on the Odisha-Jharkhand border. Karo flows from Jharkhand, enters Odisha from Barbil range of Keonjhar Forest Divisions, also part of karo-karampada corridor to elephants and continues to the Koira range under the Bonai Forest Division in Sundargarh district. Second river is a small range river Suna which originates from the river Baitrani in the champua range of Keonjhar Forest Division. Third and the biggest river of the landscape is Baitrani river which rises from the Gonasika in the Guptaganga hills of Keonjhar district and after traverses around 360 kms before falling into the Bay of Bengal. Brahmani river creates border of champua and barbil ranges by dividing champua, kalikaprasad beats of Champua range and purusotampur, balita beats of Barbil range. Baitrani river is also creates borders of many beats in

Champua range of Keonjhar. Elephants use the habitat around Baitrani river most of months in a year and it makes Champua range with the highly sensitive area for elephant movement.

Mines, human habitation, roads and railways lines causes the fragmentation of the forest in the landscape. Railway lines pass through koira, barsuan, champua and barbil ranges of both the forest divisions. One major National Highway is NH520 which creates a major barrier with no effective corridors or mitigation infrastructure such as overpasses or underpasses for elephants to cross. Another state highway from Joda to to Keonjhar along with the railway line divide the forest and restrict elephants to reach from western part of the landscape with karo and suna rivers to the eastern part of the Baitrani landscape. Another Joda to Bamebari road, which carries a heavy traffic flow of iron transportation trucks, creates barriers in the elephant movement from the suna river habitat to baitrani river habitat.

Karo-karampada elephant corridor is the only interstate elephant corridor that falls in the landscape. It connects the Saranda Forest Division of Jharkhand and Barbil range under the Keonjhar Forest Division. The corridor is located at the western side of karo river (N 22° 00' 20.2" E 85° 14' 41.7" & N 22° 07' 41.1" E 85° 16' 25.5"). The corridor is 15.17 km long, 2.3 km wide and dominated by Sal dense forest. (Source: Project Elephant, MoEF&CC, Government of India (2023)).



Map 4.6. Karo-karampada elephant corridor on Odisha-Jharkhand border

4.9.2 Elephant connectivity and habitat fragmentation

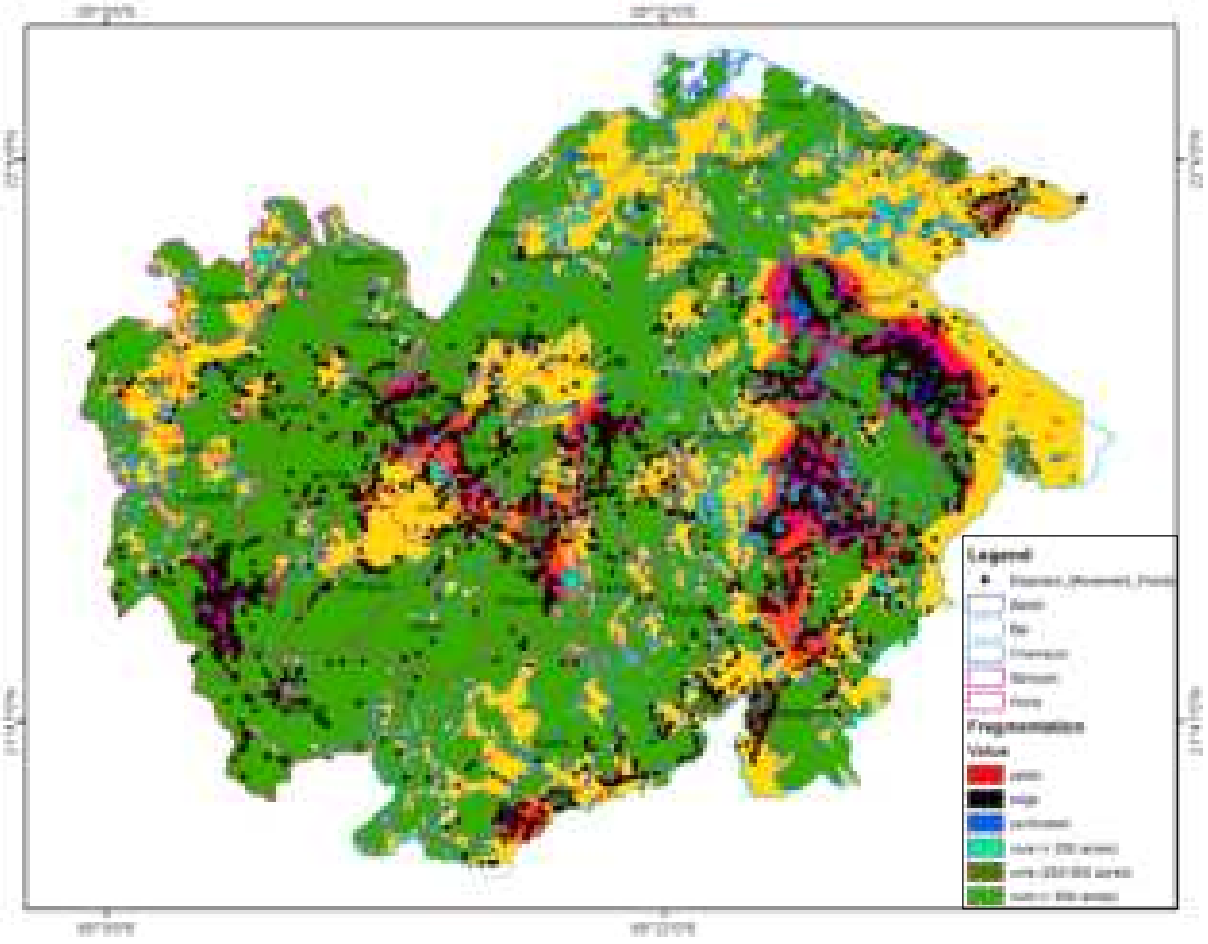
Over 200 Asian elephants are known to use this landscape, with the remaining forested habitats being extensively utilized. Elephants often enter villages located along forest edges in search of easy food, especially during the paddy season, when crop raiding becomes a common occurrence in fields near forested areas. All forest ranges in the landscape are significantly disturbed due to human activities. While elephants visit the Barbil Range occasionally, the Baitarani River habitat in the Champua Range serves as their primary and most preferred habitat. The Barsuan and Koira Ranges also support year-round elephant movement. In the central region, forest habitats in Rengalbeda and Tehrai beats of the Koira Range are highly fragmented by mining operations, highways, and expanding human settlements. However, smaller patches in

Koira and Ranisal beats act as crucial stepping stones that facilitate elephant movement.

Elephants from the western part of the landscape typically move through Nadidihi and Koira beats, crossing NH 520, and pass through forest patches in Tehrai and Ranisal beats. From there, they continue into Khajuridihi, Kadalia, and Gonua beats to access larger, more continuous forest areas in the south-central and north-central zones, which are better connected. The corridor between the central and eastern parts of the landscape—comprising Joda, Khandabandha, Jurudi, Dubuna, and Malda beats—is severely fragmented due to a dense line of mines, the Joda–Bamebari road, and a railway line. As a result, forest connectivity here is extremely limited. To move eastward, elephants use the Banspani area, located in the northern parts of Khandabandha and Jurudi beats, where they must cross both the road and railway line. This stretch represents one of the last remaining but highly degraded corridors in the region. In recent years, this area has also witnessed elephant deaths due to train collisions. On the eastern side of the landscape, elephants primarily utilize habitats along the Baitarani River, which forms natural boundaries between several beats such as Joda–Gumura, Gumura–Jurudi, Chininda–Malda, and Nayagarh–Malda. These riparian habitats are critical for supporting elephant presence in the eastern portion of the landscape (Map 4.7)**.** Elephant movement data was collected by the elephant tracking squads in the Keonjhar and Bonai Forest Divisions. Locations were recorded only when elephants moved out of the forest into open areas or patchy forests within human-dominated landscapes. Since the teams do not follow or track elephants inside dense forest areas, very few locations were recorded from within the forest itself. As a result, the map does not represent the complete picture of elephant presence. Instead, it primarily reflects elephant movements in non-forested areas and was used to understand general movement patterns rather than actual distribution.

Elephant movement points

Forest fragmentation



Map 4.7. Elephant movement and the forest fragmentation in the landscape

Chapter 5 – BIODIVERSITY CONSERVATION AND MANAGEMENT PLAN

5.1 INTRODUCTION

Most of the development project sites—whether in rural or urban settings—are likely to have some degree of ecological significance. While many forested areas fall under the protection status such as wildlife sanctuaries, national parks, tiger reserves, and elephant reserves, while habitats that are outside these classifications can also hold considerable ecological value. Some of the forest areas in the landscape are designated as reserve forests under the Indian Forest Act, of 1927. Therefore, it is essential to assess the biodiversity of the landscape and habitat significance prior to initiation of any developmental activity to prevent or biodiversity management plan to compensate for any potential negative impacts on the wildlife or biodiversity.

A similar situation arose at the proposed sites of five iron mines located in the Keonjhar and Bonai Forest Divisions of Odisha. Although the land had been leased for mining, forest clearance is still awaited. As part of the compliance conditions, the Ministry of Environment, Forest and Climate Change (MoEFCC) directed the mining companies to develop a Biodiversity Management Plan (BMP) for the Netrabandh Pahar landscape. In response, the Indian Institute of Forest Management (IIFM), Bhopal, conducted a rapid assessment of the area's wildlife, focusing especially on Schedule I species. Based on these findings, a comprehensive Biodiversity Management Plan (BMP) was prepared, which is detailed in the following section with respect to the five mining sites.

5.2 SALIENT FINDINGS OF THE STUDY

The Netrabandh Pahar landscape comprising Barbil, Champua, Koira, Barsuna, and part of BJP ranges under the Keonjhar and Bonai Forest Divisions, Odisha is a rich mosaic of forests, riverine ecosystem, agriculture, and human settlements, supporting high biodiversity. The study recorded a total of 401 floral species including trees, shrubs, climbers, herbs, and grasses, and 239 species of fauna, including 51 mammals, 136 birds, and 53 herpetofauna. Forests are predominantly tropical dry deciduous, and moist with Fabaceae being the most dominant floral family. Key wildlife

includes Asian elephants, Bengal tigers (occasional visitors), Leopards, and several Schedule I species under the Wildlife Protection Act, 2022 amendment.

Asian elephants extensively use the landscape, but forest fragmentation due to iron ore mining, highways, and railways has severely disrupted habitat connectivity. Human-elephant conflict (HEC) is escalating, with 79 human deaths and 34 elephant deaths recorded from 2019–2024 in the Zone of Impact (ZOI). Crop raiding, house damage, and economic losses are frequent in forest-edge villages, particularly in the Champua, Koira, and Barsuan ranges.

Forest fires, mostly man-made, peak between March and June and have degraded large swathes of forest. Cattle grazing is another major ecological pressure, highest in the Champua and Barbil ranges due to their proximity to villages. Despite these challenges, local communities engage in the collection of non-timber forest products (NTFPs), ethnobotanical practices, and eco-friendly livelihoods like vermicomposting and broom-making.

The Karo-Karampada elephant corridor yet to be notified remains a critical conservation gap. The Anukampa Yojna and forest department initiatives play a key role in conflict mitigation and community engagement. Urgent measures are needed to protect connectivity, reduce conflict, and ensure the coexistence of wildlife and local livelihoods.

5.2.1 Overall Biodiversity of Netrabandh Pahar Landscape

The Netrabandh Pahar landscape in Odisha exhibits rich biodiversity, encompassing varied flora and fauna. A total of 401 plant species across 278 genera and 88 families were recorded, with Fabaceae being the most dominant. Tree species were the most abundant (n=178), followed by shrubs (n=89), climbers (n=65), herbs (n=47), and grasses (n=22) (Table 5.1). This diverse group of flora supports complex ecological interactions and wildlife. Among fauna, 51 mammal species were documented, including key species such as Asian elephant, leopard, Bengal tiger (occasional visitor), and Indian pangolin. Overall species richness of birds was also high, with 136 species from 59 families. Insectivore birds dominated the foraging guild, followed by omnivores

and frugivores. Forest and aquatic habitats supported over 50% of the bird species, indicating high habitat quality and ecological importance. Herpetofaunal species richness was represented by 53 species, including 20 snakes, 15 amphibians, 12 lizards, four turtles/tortoises, and two crocodiles. This biodiversity is increasingly threatened by habitat fragmentation, mining, forest fires, and human-wildlife conflict, underscoring the need for integrated conservation strategies.

Table 5.1: Overall status of biodiversity in the landscape

	Species
Flora	
Trees	178
Shrubs	89
Climber	65
Herbs & Grasses	79
Fauna	
Mammals	51
Birds	136
Herpetofauna	53
Overall species group	**650**

5.2.2 Threatened Biodiversity Groups

The Netrabandh Pahar landscape harbors several threatened species across different taxonomic groups, reflect its ecological significance and the need for conservation management. Among mammals, 27 out of 51 species are the species of conservation significance. These include the Asian elephant, Indian pangolin, and Bengal tiger—all listed as Endangered on the IUCN Red List and Schedule I of the Wildlife Protection Act (WPA), 2022 amendment. Species like the Four-horned antelope, Indian gaur, and Sambar deer are classified as Vulnerable and Schedule I under the Wildlife Protection Act (WPA), 2022 amendment.

Bird assessments revealed 15 threatened species. Although most of the avian species are listed as Least Concern under the IUCN Red List, they fall under the Schedule I category of the WPA, 2022 amendment. The River Tern is the only Vulnerable species recorded under IUCN.

The herpetofauna group includes 19 threatened species. Notably, the Gharial *Gavialis gangeticus* and Elongated tortoise *Indotestudo elongata* are Critically Endangered but it is uncertain whether these species to be found in the landscape which needs long-term monitoring for the actual status, while the King cobra, Indian star tortoise, and Freshwater crocodile are listed as Vulnerable and Near Threatened. Overall, four mammals and four herpetofauna species are marked as uncertain for their presence in the study area and all those eight species fall under either Schedule I of the Indian Wildlife (Protection) Act, 2022 amendment or are listed as vulnerable and critically endangered category of IUCN Red list of threatened taxa, 2024.

Floral diversity includes rare and ecologically sensitive species; many used traditionally by local communities. However, destructive harvesting practices threaten regeneration. A total of eight floral species were marked as threatened, of which, seven species of trees are listed under the near threatened, vulnerable, and endangered, and one species of shrub is listed under the endangered category of IUCN Red List species. The presence of multiple threatened species in all groups highlights the landscape's critical conservation value. Immediate action is required to mitigate threats from mining, habitat loss, and human-wildlife conflict to ensure the survival of these vulnerable taxa.

Table 5.2. Overall status of threatened flora and fauna in the landscape

	Species
Flora	
Trees	7
Shrubs	1
Climber	-
Herbs & Grasses	-
Fauna	
Mammals	27
Birds	15
Herpetofauna	19
Overall species group	**69**

5.3 BIODIVERSITY CONSERVATION PLAN: IMPACTS & MITIGATION

Mining operations within the Netrabandha Pahar landscape, if not scientifically managed, pose significant threats to both the ecological and socio-economic fabric of the region. These activities lead to drastic alterations in land use and topography, where expansive tracts of forest and vegetation are stripped away, leaving behind barren excavated zones that permanently change the natural configurations of the terrain. The removal of green cover contributes to microclimatic changes, with increased dust emissions and reduced evapotranspiration resulting in localised warming and climate variability. The degradation of land not only impacts biodiversity but also compromises agricultural productivity and forest-based livelihoods, particularly for indigenous and forest dependent communities.

Air quality in the region deteriorates sharply due to the release of particulate matter and vehicular emissions from mining operations, creating respiratory health concerns for both wildlife and human populations. The hydrological regime is also affected by mining disturbs the natural drainage patterns, pollutes surface water bodies with sediments and heavy metals, and reduces groundwater recharge potential due to compaction and alteration of soil profiles. Elevated noise levels from continuous blasting, drilling, and movement of heavy machinery generate acoustic pollution, causing stress to sensitive fauna and potentially displacing wildlife from critical habitats. Vibration-induced disturbances further contribute to structural instability in burrows and nesting areas.

The destruction and fragmentation of habitats result in the direct loss of flora and fauna, threatening endemic and vulnerable species while weakening the ecological integrity of wildlife corridors. In addition to ecological damage, mining projects often bring social disruptions such as community displacement, increased human-wildlife conflict, and loss of traditional livelihoods. Without the implementation of a robust biological mitigation strategy, these compounded impacts could lead to long-term ecological imbalance and unsustainable land use. Therefore, the Wildlife Management Plan under the Biodiversity Conservation framework for Netrabandha Pahar emphasizes an urgent need for integrated habitat restoration, corridor conservation,

pollution control, and community-based management to ensure that development does not come at the cost of irreversible biodiversity loss.

5.3.1 Land Use and Topography

Impact Description:

Mining drastically alters the natural landform. The removal of topsoil and overburden not only leads to landscape disruption but also results in the loss of fertile soil that supports vegetation. Additional features like overburden dumps and garland drains would change the terrain, making it less important for native flora and fauna. These alterations fragment habitats, reduce forest cover and interfere with natural ecological processes, ultimately affecting wildlife movement and biodiversity.

Mitigation:

1) **Topsoil Preservation:** Carefully strip and store topsoil separately during excavation for future reclamation and re-vegetation activities.
2) **Graded Overburden Dumps:** Stabilize overburden dumps through grading, contouring, and compaction to reduce erosion.
3) **Ecological Restoration:** Rehabilitate degraded lands using native species adapted to local conditions to facilitate the natural regeneration of habitats.
4) **Bio-engineering Measures:** Incorporate vegetative stabilization techniques like vetiver grass and fast-growing legumes on slopes to prevent soil erosion and enhance soil health.
5) **Backfilling and Landform Reconstruction:** Where feasible, backfill voids with overburden material and contour the landform to resemble natural topography. This shall reduce visual impact and enhances post-mining land usability.
6) **Geotextiles and Mulching:** Use geotextile fabric or organic mulches (e.g., straw, coir) on bare or disturbed slopes to stabilize soil, retain moisture, and promote vegetation establishment.

7) **Terracing and Bench Formation:** On steep terrains, implement terracing or create benches in dumps and disturbed areas to reduce surface runoff and prevent gully formation.
8) **Drainage Management:** Design garland drains and diversion channels to mimic natural drainage patterns. Include sedimentation ponds to capture silt and reduce erosion.
9) **Monitoring and Adaptive Management:** Regularly monitor landform stability, erosion, and vegetation recovery. Modify restoration strategies based on site-specific feedback and ecological outcomes.

5.3.2 Roads/Dust, Noise and Air pollution: Avenue plantation-Phytoremediation

Impact Description:

The development of roads in and around project areas often leads to several environmental and biological concerns. These include increased dust due to vehicular movement, emission of harmful gases such as CO_2, NOx, and SOx from vehicles, and elevated noise levels. These disturbances affect both terrestrial and avian wildlife by fragmenting habitats, disturbing animal communication and breeding cycles, and reducing vegetation quality along roadsides.

Biological Mitigation:

Avenue Plantation and Phytoremediation

To mitigate these impacts, avenue plantation is recommended along both sides of the road selecting native, dust-tolerant, and fast-growing species. These green buffers act as natural barriers, helping to absorb air pollutants, trap dust particles, and reduce ambient noise. Additionally, phytoremediation may be used by selecting broad leaved species to trap pollutants from the air and soil. This shall enhance the environmental quality of the area. Species with high pollutant-trapping capacity shall be prioritized to maintain ecological balance.

The list of native species to Netrabandh Pahar landscape (Odisha), dust-tolerant, and fast-growing plant species that are suitable for avenue plantation and phytoremediation as part of a biological mitigation strategy is given in Table 5.3, Table 5.4 and Table 5.5.

Table 5.3. Tree Species for Avenue Plantation (Native, hardy, pollution-tolerant, and suitable for long-term ecosystem restoration).

S. No.	Science Name	Local/ Common Name	Characteristic
1	*Azadirachta indica*	Neem	Air-purifying, dust-tolerant, medicinal value.
2	*Polyalthia longifolia*	Ashok	Fast-growing, noise and dust barrier.
3	*Terminalia arjuna*	Arjun	Tolerant to drought and pollution, soil stabilizer.
4	*Ficus benghalensis*	Banyan	Large canopy, pollutant absorption, bird habitat.
5	*Ficus religiosa*	Peepal	Excellent for air purification and ecosystem restoration.
6	*Cassia fistula*	Amaltas	Ornamental, nitrogen-fixer, moderately pollution-tolerant.
7	*Madhuca indica*	Mahua	Native to tribal belts, supports local wildlife and pollinators.
8	*Syzygium cumini*	Jamun	Dust-resistant, fruit-bearing, enhances biodiversity.
9	*Albizia lebbeck*	Siris	High noise and air pollution absorber.
10	*Delonix regia*	Gulmohar	Heat and drought resistant, fast-growing.

(**Source:** Orissa Forest Development Corporation, OFDC- 2019, Central Pollution Control Board, CPCB- 2010)

Table 5.4. Shrub and Herbaceous Species for Phytoremediation and Slope Stabilization.

S. No.	Science Name	Local/ Common Name	Characteristic
1	*Vetiveria zizanioides*	Vetiver Grass (Khus Ghaas)	Excellent for slope stabilization and heavy metal absorption.
2	*Calotropis gigantea*	Aakanda	Grows on poor soils, absorbs toxic metals like lead and cadmium.
3	*Canna indica*	Kalabati Phula	Fast-growing, used in constructed wetlands to remove nitrates and phosphates.
4	*Typha latifolia*	Cattail (Patera Ghaas)	Wetland plant for wastewater and sediment control.
5	*Pongamia pinnata*	Karanj	Fixes nitrogen, tolerates salinity and poor soils.
6	*Leucaena leucocephala*	Subabul	Biomass producer, pollutant absorber (caution: invasive if unmanaged).
7	*Aloe vera*	Ghrutakumari	Air purification, binds loose soil.
8	*Andrographis paniculata*	Kalmegh	Medicinal, grows in degraded soil.

(Source: Tripathi, R. D. et al. 2006; Naik, B. S. et al. 2013**)**

Table 5.5. Grasses and Groundcovers for Overburden Dumps & Dust Suppression.

S. No.	Science Name	Local/ Common Name	Characteristic
1	*Cymbopogon citratus*	Lemongrass	Grows on poor soil, traps dust.
2	*Saccharum spontaneum*	Kansha Ghaas	Stabilizes overburden slopes and riverbanks.
3	*Desmostachya bipinnata*	Kusha	Hardy grass, used in erosion control.
4	*Cynodon dactylon*	Bermuda Grass (Durba Ghaas)	Ground cover, fast-growing, excellent for dust control.
5	*Imperata cylindrica*	Ulu Ghaas	Strong rhizomes, useful for slope stabilization.

(**Source:** ICFRE-Dehradun & Indian Grassland and Fodder Research Institute (IGFRI), Jhansi-2015)

5.3.2 Muck dumps, dust, Soil, and Visual impacts: Restoration of Muck Dumps

Impact Description:

During large-scale excavation and construction activities, substantial quantities of muck or overburden are generated. Unscientific dumping of this material results in:

1) *Airborne dust affecting air quality:* Dumped muck is often composed of fine particles, which become airborne under windy conditions or due to vehicular movement. This dust contributes to ambient air pollution, posing respiratory

health risks to nearby communities, workers, and wildlife. It also settles on vegetation, hindering photosynthesis and affecting local biodiversity.

2) *Soil erosion and degradation of land productivity:* Improperly stabilized muck dumps are highly susceptible to erosion by wind and rain. This not only erodes the topsoil but also leads to increased downstream sediment flow, affecting water bodies and reducing the fertility of nearby agricultural or natural lands.
3) *Aesthetic and visual impact on natural landscapes:* The appearance of barren muck heaps disrupts the visual and aesthetic value of the natural landscape.
4) *Potential hazards such as landslides or runoff into nearby streams:* Dumping on steep slopes can result in landslides, especially during monsoons. Runoff from these areas may carry silt and pollutants into rivers and streams, negatively impacting aquatic ecosystems and water quality for human use and other purposes like agricutlure.

Biological Mitigation:

Restoration of Muck Dump

The restoration of muck dumping sites involves scientific stabilization of slopes through terracing, geo-textile layering, and bio-engineering techniques. Native grass, shrub, and tree species bind the soil and prevent erosion. This not only stabilizes the slopes but also revives ecological functions and improves the landscape's visual appeal. Creating green cover over these slopes will also contribute to carbon sequestration and supports microhabitats for small wildlife apart from controlling the dust in the area.

1. **Slope Stabilization and Terracing:** Slopes may be recontoured and terraced to reduce the steepness and allow for better controlled water runoff to avoid erosion. Terracing breaks long slopes into smaller, more manageable sections, reducing erosion and facilitating plant establishment and sussequent regeneration.
2. **Use of Geo-textiles and Coir Mats:** Geo-textiles and coir mats (biodegradable) are laid over the muck surface to hold soil in place during

the initial phase of restoration. These materials reduce surface runoff, promote seed retention, and support root establishment. The use of geo-textiles and coir mats for slope rehabilitation and stabilization shoud be done pre monsoon along with seeding of the plant species.

3. **Bioengineering with Native Vegetation:** this shall involve the planting of indigenous grasses, shrubs, and trees. Fast-growing grass species like *Vetiveria zizanioides* or *Cymbopogon spp.* are introduced first for surface binding. Over time, native shrubs and deep-rooted tree species such as Acacia, Albizia, Ficus, and Bauhinia species shall enhance structural stability and ecological succession.
4. **Topsoil Application and Soil Amendments:** Where possible, nutrient-rich topsoil is spread over the muck to improve growing conditions. Organic compost/Farm yard manure (FYM), microbial inoculants, and inoculation of mycorrhizal fungi should be used for increasing the soil fertility.
5. **Monitoring and Maintenance:** Post-restoration, the sites should be monitored for plant survival, erosion control effectiveness, and ecological recovery. Replanting and maintenance (e.g., watering, mulching, weed control) are essential till the vegetation is stabilised.

5.3.3 Reservoirs/Sedimentation: Check dams- Sedimentation trap

Impact Description:

The presence of rivers, streams, and nalas in proximity to mining activities increases the likelihood of soil erosion and sediment runoff into aquatic systems, particularly during the monsoon season in the Netrabandh Pahar landscape due to mining realted activities. The alteration of natural drainage patterns due to mining, roads and disturbed slopes further accelerates sediment transport, threatening the ecological integrity of riverine systems such as the Karo, Suna, and Teherai rivers and their tributaries.

Biological Mitigation:

Check Dams and Sedimentation Traps

To control sediment flow into reservoirs, the construction of check dams and sedimentation traps in upstream catchment areas is proposed. These small, strategically placed barriers play a crucial role in slowing down water flow, allowing suspended particles to settle before reaching the reservoir, thereby reducing sedimentation. In addition to enhancing water quality, these structures also promote groundwater percolation and help maintain the ecological integrity of downstream aquatic habitats by trapping sediments and contributing to the restoration and health of the overall watershed.

To mitigate the negative impacts of sedimentation on downstream aquatic habitats, the following eco-engineering and biological interventions are recommended:

1. **Construction of Check Dams:** Small check dams made of local stone, brushwood, or gabions shall be installed across seasonal nalas and drainage lines in the upstream catchment of reservoirs and perennial streams. These structures reduce water velocity, minimize surface runoff.
2. **Vegetative Buffer Zones:** Planting native grasses (e.g., *Vetiveria zizanioides, Saccharum spontaneum*), shrubs (*Clerodendrum infortunatum, Adhatoda vasica*), and riparian tree species (*Barringtonia acutangula, Syzygium cumini, Terminalia arjuna*) along the banks of nalas and rivers helps trap sediments naturally, stabilize banks, and improve infiltration.
3. **Periodic Desilting and Monitoring:** Routine desilting of check dams and traps will ensure continued effectiveness. Monitoring of sediment load, turbidity levels, and aquatic biodiversity indicators will help evaluate the success of mitigation measures and guide adaptive management.

5.3.4 Afforestation - Safe Zone Green Shelterbelt

Impact Description:

The development of mining infrastructure, such as excavation pits, haul roads, stockyards, and ancillary industrial units, within the forested landscapes of Keonjhar and Bonai forest divisions resulted in degradation and fragmentation of contiguous wildlife habitats. This disruption has particularly affected the elephant corridors and forest-dependent species that rely on undisturbed forest tracts for foraging, breeding, and seasonal migration. As forest canopy is lost and habitat patches become isolated, wildlife is often forced to move through human dominated landscapes, escalating instances of human-wildlife conflict, crop damage, and wildlife mortality. The ecological integrity of the region's moist deciduous and semi-evergreen forest types already disturbed due to mining pressure around each of the five mines.

Biological Mitigation Strategy:

Afforestation and Safe Zone Green Shelterbelt Development

To mitigate the adverse impacts on forest cover and biodiversity, a comprehensive afforestation and green shelterbelt program is proposed, specifically tailored to the biogeographic context of Keonjhar and Bonai. This will involve:

1. Afforestation with Native Species: Large-scale replantation using indigenous and site-appropriate tree, shrub, and grass species (e.g., *Shorea robusta*, *Terminalia tomentosa*, *Lagerstroemia parviflora*, *Bambusa*) to recreate functional habitats. This program should be scientifically planned to reflect the original vegetation profile and support the faunal assemblages of the area.

2. Establishment of Green Shelterbelts: Dense vegetative barriers should be developed along the periphery of active mining zones, haul roads, and industrial units. These shelterbelts will serve to:

- Act as buffer zones that limit the interface between mining operations and wildlife habitats.
- Facilitate movement of smaller mammals, birds, reptiles, and insect pollinators.
- Filter particulate emissions and reduce acoustic disturbances from mining machinery.
- Stabilize soil and reduce erosion near disturbed sites.

3. Safe Green Zones within ZOI:

Specific undisturbed patches of forest land within and surrounding the mining lease areas will be notified and managed as 'Safe Green Zones.' These will act as mini-reserves, ensuring in-situ conservation of flora and fauna. Management interventions may include fencing (as needed), habitat enrichment, waterhole development, and removal of invasive plant species.

4. Connectivity Enhancement:

Shelterbelt plantations will be aligned in a way that they enhance ecological connectivity by linking fragmented forest patches, assisting in the re-establishment of functional wildlife corridors, especially for elephants and other large mammals.

5. Community Participation and Co-Management:

Local forest-dependent communities should be engaged in plantation activities, protection, and long-term upkeep of the green belts and afforested areas. This participatory model will foster stewardship and create alternative livelihoods.

6. Monitoring and Adaptive Management:

A biodiversity monitoring framework should be integrated, assessing survival rate, species diversity, wildlife usage of afforested areas, and impact on human-wildlife conflict. Data so collected and coalated shall inform adaptive strategies to optimise plantation design and species composition.

5.4 HABITAT MANAGEMENT FOR WILDLIFE

5.4.1 Management of aquatic habitats: restoration of village tanks/ponds and development of micro wetlands

Aquatic ecosystems, particularly village tanks, ponds, and micro wetlands, play a vital role in maintaining biodiversity, regulating microclimates, and providing essential ecosystem services to both wildlife and human communities. The Netrabandh Pahar landscape, marked by the presence of rivers, streams, and small water bodies within the Bonai and Keonjhar forest divisions, the restoration and management of such aquatic habitats are critical for ecological sustainability, especially within mining-impacted zones.

The restoration of village ponds and the development of micro wetlands in and around the 10 km Zone of Impact (ZOI) serve multiple purposes as it helps in improving habitat quality for aquatic species, strengthening groundwater recharge, reducing soil erosion and sediment transport, and supporting livelihoods through fisheries and irrigation for marginal farmers. These small aquatic systems also act as biodiversity hotspots, especially for amphibians, reptiles, aquatic invertebrates, and wetland flora.

To strengthen aquatic habitat health in the mining affected areas of Netrabandh Pahar, particular to the ZOI areas the following framework measures are recommended as shown in Figure 5.1.

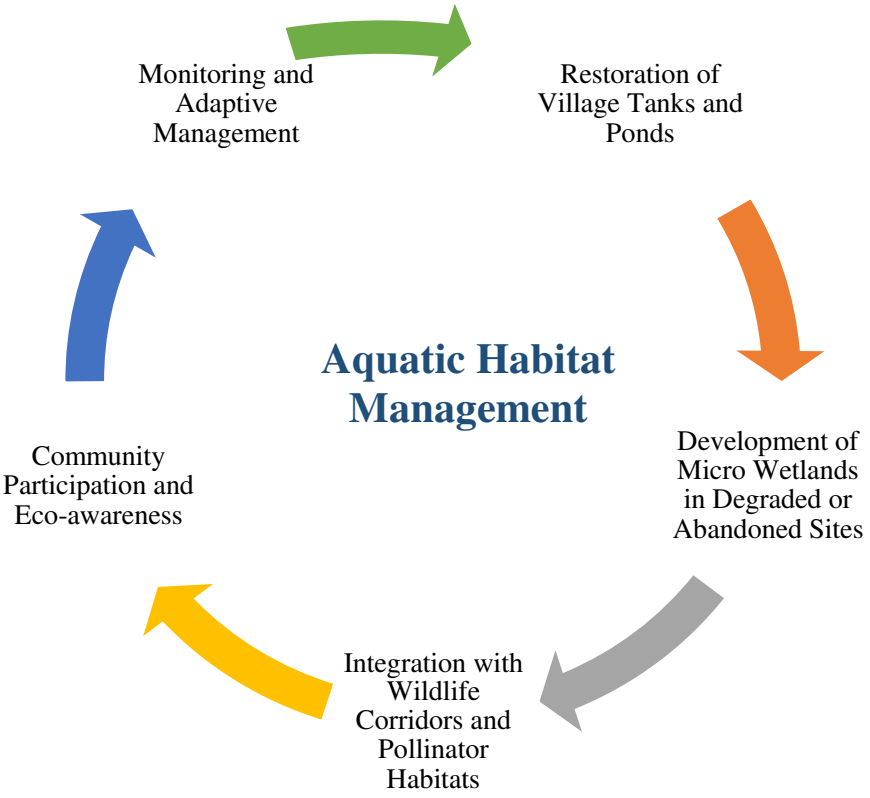


Figure 5.1. Recommended measures for Aquatic Habitat in ZOI areas of Netrabandh Pahar Landscape.

Restoration of Village Tanks and Ponds

1) Desilting and deepening of existing village tanks and ponds to restore their original water-holding capacity.

2) Strengthening of embankments using native grass species such as *Vetiveria zizanioides* and *Cynodon dactylon* to prevent erosion.

3) Removal of invasive aquatic vegetation (e.g., *Eichhornia crassipes*) and promotion of native aquatic plants to improve oxygenation and biodiversity.

4) Introduction of fish species compatible with local ecology, avoiding exotics that may disrupt native aquatic fauna.

5) Community led maintenance of restored tanks with support from forest and rural development departments.

Development of Micro Wetlands in Degraded or Abandoned Sites

1) Identification of low-lying or water-logged patches in abandoned or disturbed areas (e.g., near muck dumps or mine voids) for conversion into functional wetlands.

2) Grading and shallow excavation to create a mosaic of microhabitats (open water, marshy zones, and wet meadows).

3) Planting of native wetland vegetation like *Typha angustata*, *Phragmites karka*, *Nymphaea nouchali*, and *Scirpus spp.* to promote biological filtration, nesting sites, and food resources for aquatic birds and insects.

4) Use of bioengineering techniques (e.g., coir logs, brushwood fencing) to stabilize banks and support vegetation growth.

Integration with Wildlife Corridors and Pollinator Habitats

1) Strategically resoring ponds and wetlands near wildlife corridors to serve as seasonal water sources for elephants, deer, and other wildlife species.

2) Planting nectar-rich flowering species around wetland margins to support pollinator diversity, particularly bees, butterflies, and wetland birds.

Community Participation and Eco-awareness

1) Involving local communities, SHGs, and panchayats in the upkeep and ecological monitoring of ponds and wetlands.

2) Conducting awareness programs on wetland values, responsible water use, and biodiversity conservation.

3) Introducing participatory water budgeting and pond management to ensure sustainability of these ecosytems for longer duration.

Monitoring and Adaptive Management

1) Regular monitoring of water quality parameters (pH, DO, turbidity), aquatic flora and fauna, and seasonal hydrology.
2) Adaptive management of interventions based on ecological feedback and community input.
3) Use of geospatial tools to map and assess the ecological health of aquatic habitats over time.

These efforts will also serve as a nature-based solution to counter the hydrological and sedimentation impacts of mining along with improving the climae reaseilience, while contributing to the long-term conservation of aquatic and riparian biodiversity in the Bonai and Keonjhar forest divisions.

GROUNDWATER MANAGEMENT:

Effective groundwater management is critical in the Netrabandha Pahar landscape, where mining operations have significantly disrupted natural hydrological systems. These mining activities, compact the soil, reduce filtration, and disturb surface and subsurface water flows, resulting in a severe decline in groundwater recharge. Furthermore, the stripping of vegetation and topsoil not only increases runoff and erosion but also limits the natural infiltration of rainwater, compounding the stress on aquifers.

To address these challenges and ensure the long-term sustainability of groundwater resources in mining impacted areas, the Government of Odisha has initiated and strengthened several existing water conservation and recharge schemes.

CHHATA: The CHHATA (Community Harnessing and Harvesting Rainwater Artificially from Terrace to Aquifer) scheme focuses on capturing rooftop rainwater and directing it into the aquifer through scientifically designed recharge structures. This decentralized, community-based approach empowers villagers to actively participate in local water resource management, ensuring ownership and long-term maintenance.

ARUA: The ARUA (Artificial Recharge to Underground Aquifer) initiative focuses on building larger recharge structures such as check dams, filtration tanks, and recharge wells in strategic locations. These structures help in replenishing groundwater levels by enhancing infiltration during monsoon seasons, especially in areas affected by the loss of natural recharge due to mining.

Both these state-level flagship schemes are closely aligned with the Ministry of Jal Shakti's 'Jal Shakti Abhiyan: Catch the Rain (JSA: CTR) 2024', which promotes rainwater harvesting and watershed development across India. By integrating central schemes such as MGNREGS (for labour-intensive water conservation work), AMRUT (for urban water supply improvement), and PMKSY (Pradhan Mantri Krishi Sinchayee Yojana for irrigation enhancement), Odisha ensures a multi-tiered, intersectoral strategy to sustain groundwater in vulnerable landscapes like Netrabandha Pahar.

To further enhance agricultural resilience and reduce dependency on conventional energy sources, the region is also benefitting from the Solar Tubewell Yojana, also referred to as the "Exploitation of Ground Water through Deep Bore Wells with Solar Pumping System" scheme. This program involves the installation of solar-powered pumping systems on deep borewells to provide sustainable irrigation in remote, off-grid mining-affected villages. These solar tubewells ensures consistent water availability for farming but also promote clean energy use.

Collectively, these initiatives represent a complete groundwater management framework that combines traditional conservation methods, modern technologies, and community participation. In the context of biodiversity conservation and ecological restoration in Netrabandha Pahar, such integrated groundwater management is essential to restoring hydrological balance, supporting reforestation efforts, improving agricultural productivity, and ensuring water security for local communities in the face of expanding mining pressures.

5.4.2 Habitat Connectivity and Corridors

It is very important to mitigate the impact of roads and railways on wild animals especially in the case of Asian elephants which are long-ranging animals that need habitat connectivity for continuous movement. Many Elephants have died in the landscape due to road and railway accidents. There are very few mitigation structures such as underpasses built for the animals to provide safe passage and they also are very small and disturbed that Elephants do not use those underpasses perhaps due to structural design and rather prefer crossing the road with high visibility.

A. Connectivity barriers – roads and railway lines

There are three major roads–NH520, NH10B, and Joda-Bamebari in the landscape with a railway line that passes almost parallel to the Joda-Bamebari Road. All these roads and railway lines are crucial for the transportation of iron ore. However, there are very few mitigation structures such as underpasses or overpasses, and culverts are developed to provide safe passage. There are two underpasses on NH520 in such a huge landscape, and both are not used by elephants. These are not sufficient for other wildlife as well. There are 11 such locations mentioned in Table 5.6. Other than these, a large patch of NH520 passes through dense forest in between Bhusugaon/Jhargaon and Rugudihi, in Toda beat and Jamadihi beat where Elephant crossing locations are not certain but there are no mitigation structures given for wild animals to cross the road which creates a huge barrier in the connectivity of forest. Therefore, some mitigation measures are suggested.

- The centralised early warning system attached with AI-enabled cameras should be installed wherever the railway line passes through the forest area as per locations given in Table 5.6, which can detect the movement of Elephants and other large wild animals near the railway line and send warning signal to the forest department and as well as the railway department to mitigate as potential collision of wildlife and train.
- An underpass was built on NH520 (22.05036 N, 85.401586 E) close to the Elephant crossing point, but Elephants have never used that underpass for

possible reasons of its small size, openness in the center, the sound of traffic and human disturbance on either side (Plate 5.1). These sturcures need retro designing to suit the needs of the elephants by making the area sound proof and free from disturbance.

- A large noise and visual barrier should be built along both sides of the highway for 1 km on either side of the underpass. This will also guide the Elephants to use that underpass and stop elephants from passing through the road. In the center of the underpass, the highway is open which allows sound and vibration to reach the downside, it should also be covered by using appropriate noise and vibration barriers.
- All the Elephant crossing locations provided in Table 5.6 are very crucial because these are some of the last remaining small patches of forest that connect large forest habitats, so it is needed to establish connectivity around these locations and no distunance should be allowed in these area in the future.
- It is recommended that mining companies secure land and plant native vegetation around these locations to establish good connectivity between the large forest habitat, which will also result in the reduction of human-elephant interactions.
- On the eastern side of the landscape, there is a linear barrier in the form of a road, a railway line, and the human settlements. The Joda-Bamebari road is highly used by trucks carrying iron ore, and it connects Joda to different mines in the landscape. Heavy vehicle movement is very high, and it is one of the busiest roads in the landscape with no mitigation structures for wild animals to cross. There are a few locations that act as corridors for elephants to go from Suna River Forest to Baitrani River Forest which is used by the elephants throughout the year. One such location is near Banspani (location 3 in Table 5.6), where elephants cross both the road and railway line. Once there was a major collision between a train and elephants 4-5 elephants died on the spot. So, it is very important to restore the forest around that location and build an underpass or overpass to provide safe passage to the elephants and till the underpass is not planned, that location should be secured for the elephant movement. The Indian railways should be taken on board and a suitable alert and information system needs to bne

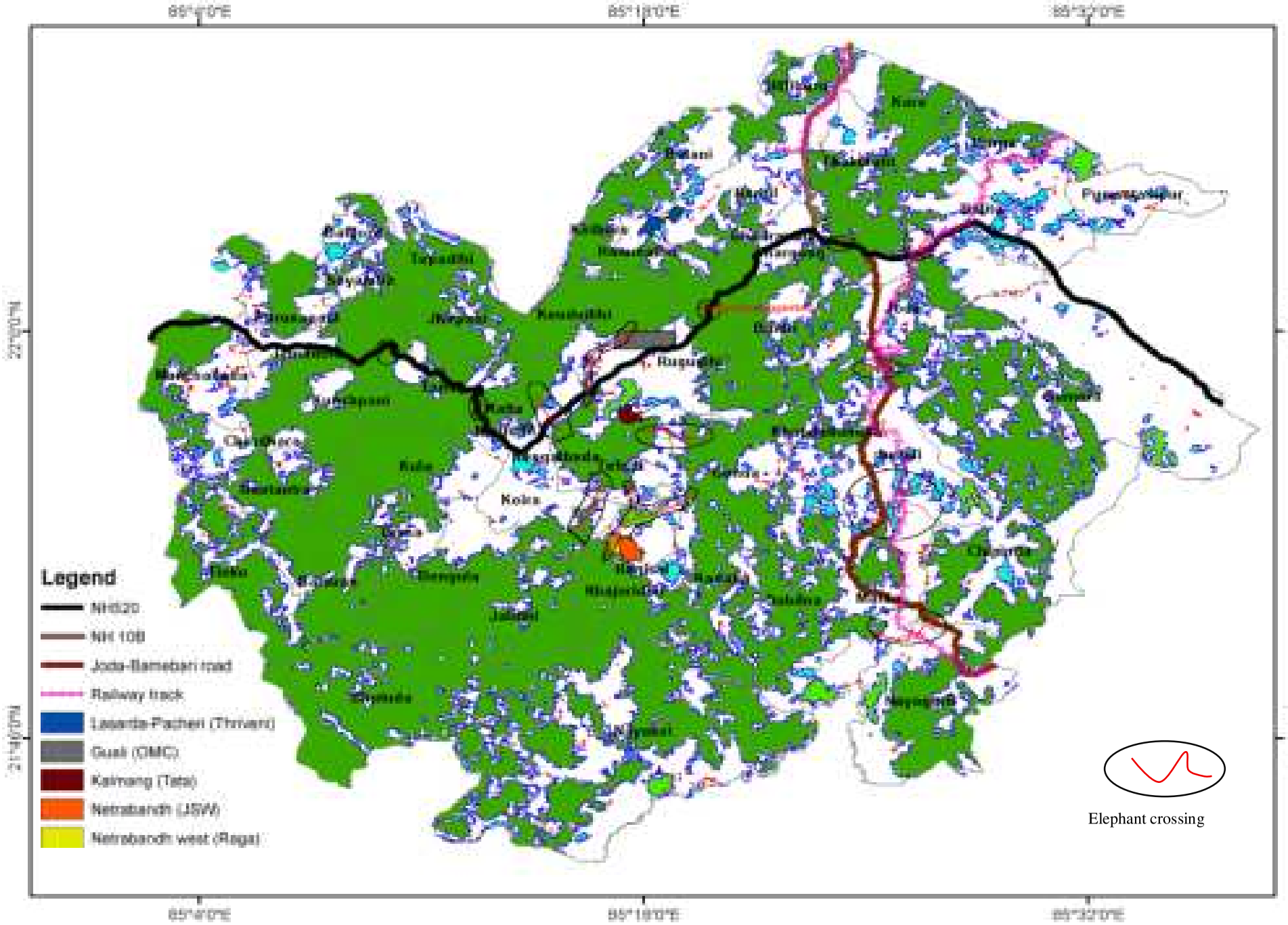
developed to provide aprior information on the elephant herd movement in such areas to avoid the case of collisions.

- On the NH520, between Rugudihi and Jhargaon, the highway passes through the dense forest, and the road passes below the ground level cutting the landscape which provides an opportunity to build an overpass to provide safe passage to the wild animals. Wherever such a possibility is there in the landscape, it is recommended to provide an overpass.

Table 5.6. Elephant crossing locations at major roads and railway lines

Sl. No.	Latitude	Longitude	Road	Railway line	Beats
1.	21.826293° 21.835063°	85.442598° 85.447471°	Joda-Bamerbari	✔	Nayagarh, Chipinda
2.	21.889019° 21.907168°	85.422104° 85.434686°	Joda-Bamerbari	✔	Dubuna, Malda, Jurudi
3.	21.980460°	85.425198°	Joda-Bamerbari	✔	Joda, Khandabandha, Jurudi
4.	22.045695°	85.446902°	NH520	✔	Balita, Joda
5.	22.050449°	85.401642°	NH520	**X**	Balita, Jhargaon
6.	21.964704°	85.271936°	NH520	**X**	Nadidihi, Koira, Rengalbeda, Rugudihi
7.	21.946949°	85.248866°	NH520	**X**	Nadidihi, Koira, Rengalbeda
8.	21.951663°	85.213698°	NH520	**X**	Kalta, Toda
9.	21.957658°	85.212480°	NH520	**X**	Kalta, Toda
10.	21.961758°	85.210765°	NH520	**X**	Kalta, Toda
11.	21.987228°	85.169063°	NH520	**X**	Jamadihi, Toda

Plate 5.1. Existing underpass on NH520



Map 5.1. Elephant crossing locations and connectivity in the landscape

B. Habitat connectivity

Due to mines and human settlements in fragmentation, the forest is also fragmented. Some large forest habitats are isolated due to villages, roads, and mines. In the Central part of the landscape, there is a large patch of forest isolated in Rengalbega and Tehrai beats due to Koira town in the surrounding, as well as NH520 at one side, mines, and other villages on the other side. When the elephants use this forest patch as a stepping stone to reach from the western side of the landscape to the eastern side of the landscape. Due to isolation, elephants some of the remaining degraded small forest-like patches reach the forest of Rengalbega and Tehrai beats which sometimes leads to interaction of humans and elephants resulting in conflict. There is a connectivity of forest marked in Map 5.1 with a red line with a black circle or polygon based on the spatial forest connectivity and elephant movement.

- As the forest department does not own much of the land around these two beats, it is very important to secure some of the land around the locations shown in Map 5.1, to secure connectivity of the forest with Rengalbeda and Tehrai beats which is very crucial as it lies in the central parts and connects eastern and western side of the landscape.
- It is suggested that through compensatory afforestation or CSR, mining companies around these areas should get some land where the locations are shown in Map 5.1. and plant native trees, and shrubs so that a good forest can be prepared to build better forest connectivity.
- The connectivity marked in Map 5.1 lies in the Kendudihi, Nadidihi, Rengalbeda, Koira, Tehrai, Ranisal, and Gonua.
- Habitat restoration activities including weed removal, and plantation of native flora species should be given priority in the Central part of the landscape.
- Karo-Karampada corridor is very significant for the movement of Elephants between Odisha and Jharkhand, so it is important to restore the degraded patches, increase monitoring and regulate grazing activity in the area.

C. Mining sites and Elephant movement

There are five proposed mining sites in the landscape of netrabandh Pahar which will have some impact on the forest and biodiversity. Amoung these five mines, three mining sites will be impacting the connectivity of forest and elephant movement. As shown in Map 5.1, OMC Guali mine, Netrabandh West/Raga Tradecon, and Netrbandh Bhushan steel/JSW are the mines that lie in the connectivity zone of forest and will have a negative impact on elephant and other wild animals' movement which cannot be completely mitigated. These three mines will act as a barrier to the movement of Elephants or other wild animals and contribute to habitat fragmentation. To reduce this impact, it is recommended to purchase land in key areas that support elephant movement according to the locations shown on the map. These areas should be restored with native vegetation and handed over to the Forest Department to develop as forested corridors which will help to reconnect two large forest patches and improve landscape connectivity for wildlife.

5.4.3 Weed Management

Weed is the major issue causing the degradation of the habitat everywhere in India. *Lantana camara* is found in more than 40% of the Indian forests and covers many pasture lands becoming one of the major weed changes in India leading to habitat degradation (Mungi NA et al., 2020). In this landscape, *Chromolaena odorata* is the top weed species that is causing habitat degradation, covering the areas of native grass and shrubs. It is densely spread inside the villages, along the forests, and on the roadside, also spreading inside the forests. *Lantana camara* and *Parthenium hysterophonus* are the second and third most widespread weeds in the landscape sharing similar areas as *Chromolaena odorata*. Furthermore, weed invasion is expected to intensify during the project construction period due to earth work, land use transformation, movement of vehicles and work force. So, the management of weeds and habitat is crucial and should be done on priority basis.

- Larger patches of open land invaded by these three weed species should be identified.

- Completely uproot them, not only once but multiple times after regeneration also before the formation of seeds and remove them carefully to avoid successive regeneration. This must be repeatedly done for atleast five years to ensure that the forest land is free from these weeds. Local community should be involved in this activity as it will also create livelihood oppurtinites for them.
- Build a seed bank for all the native grasses and herbs available in the landscape which will also prevent local extinction of any grass or herb.
- Prepare seed balls of the native grass fodder species and other important species by mixing the grass seeds with farmyard manure and soil with a 1:2:3 ratio using water.
- Seed balls should be braodcasred before the monsoon in the areas cleared of the weed to promte the food availability for elepahts and other herbivourus animal species. Bamboo planataion can also be carried out in such areas as Bamboo tends to grow faster and also provides good forage to the wildlife including elephants.

5.4.4 Grazing management

During the study of the status of grazing, champua and Barbil ranges in the Keonjhar forest division emerged as areas with high grazing intensity.Grazing cannot be completely stopped but it can be reduced through alternate methods of fodder availability and adopting more sustainable approaches. Some of the suggestions and approaches are discussed below.

A. Livestock assessment and fodder requirements

- It is necessary to understand the population of livestock in the villages around the forest with the requirement of fodder per year or seasonally.
- Documentation of the practices people follow for cattle grazing.
- Mapping of livestock hotspot villages and potentially affected forest areas.

B. Regulation and identification of grazing zones

- Identification of highly sensitive wildlife areas.
- Restriction of grazing in sensitive forests such as reserve forests, elephant corridors, water sources, fire-prone areas during the dry season, and plantation/regenerating forest patches.
- Less sensitive areas near the village boundaries can be designated for grazing activities and suitable pasture development activities must be carried out so that the villagers don't take their livestock in the forest areas.
- Implementation of rotational grazing system/Seasonal grazing in different zones to allow the recovery of vegetation and regeneration.

C. Community-level Fodder Development

- While weeds such as *Chromolaena odorata* and *Lantana camara* have covered most of the open land in the villages. After the weed removal, fodder grasses, herbs, and shrubs of native species should be planted with the consultation of the village-level committees and these areas may be permitted for the controlled grazing by livestock of the local community.
- Through JFM, village volunteer teams such as Van Suraksha Sameeti (VSS) can be included in the initiative. Designated fodder plots can be developed in the villages where native fodder species can be grown with the help of seed banks.
- Fodder plots can be used alternatively to allow regeneration.
- Stall feeding is also an option that is widely used, and subsidies can be provided for the fodder seeds, chopping machines, or the purchase of dry fodder to promote stall feeding.
- Agroforestry should be promoted to encourage farmers to grow fodder tree species along the farm boundaries.

D. Community awareness and livelihood Diversification

- Village-level grazing committees such as VSS should be involved to promote sustainable grazing practices.
- Promotion of alternate livelihood in the villages around the forest with high grazing pressure. The Five mining companies should be encouraged to take up such activites through their designated CSR funds.
- Promotion of poultry, vermicomposting which is already working in some of the villages, and NTFP-based income for the families dependent on the cattle should also be carried out.

E. Policy and Enforcement

- Limit the number of livestock for grazing by providing village-level permits.
- Monitor the grazing activity and enforce minimal but effective penalties for grazing in restricted areas or a greater number of livestock than permitted with the participation of village-level committees.
- Regular inspection of grazing activities in the forest area and monitoring of regeneration of vegetation should be done.

5.4.5 Forest Fire Management

The status of forest fire in the Netrabandh Pahar landscape is described detailed in detail in Chapter 4 of the report. Forest Survey of India (FSI) monitors near real-time forest fires using satellite data from MODIS sensors of Aqua and Terra satellites as well as SNPP satellite which is used for its early warning system to send alerts to the state forest department. The Forest Department acts based on the alert provided by FSI on the active detection of fire in the landscape. Fire density hotspots in the landscape are shown in Map 5.1. To mitigate or manage forest fire, no single approach is effective, therefore a multi-level management approach needs to be included starting from preventive and preparedness to rapid response and post-fire management. Four steps of management approaches are discussed in this chapter.

A. Fire Prevention

It is not suggested to wait for the alert of a forest fire; a proactive approach is needed as a preventive measure. About 90% of forest fires are intentionally or unintentionally man-made, sometimes for slash and burn, the forest is burnt to get land for agriculture, through smoking bidi–cigarette, fire during NTFP collection, etc (Bahuguna & Upadhay, 2002). Therefore, it is recommended to involve the local communities for forest fire prevention and management apart from the forest fire prevention and management implemented by the State forest department of Odisha.

- **Awareness Programs**: Conduct regular community awareness drives range-wise on the risks and impacts of forest fires, especially starting a few months before the dry season (October–June).
- **Community Inclusion**: Build a team of local volunteers such as Vana Agni Suraksha Samitis/Dals (VASSs/VASD) under the Joint Forest Management Committees (JFMC) Initiative, strengthen and incentivize these JFMCs to prevent, monitor and report fires.
- **NTFP Management**: During the NTFP season, regulate harmful practices such as burning of forest floor for Mohua or Kendu trees/coppice for enhanced leaf collection through community involvement, village leaders under the forest department supervision.

B. Preparation for Forest Fire Prevention and Management

- **Maintenance and creation of fire lines**: Maintain and widen fire lines before fire season to prevent spread. Undergrowth should be removed while trees are retained or create permanent fire lines by separating forest blocks or compartments.
- **Creation of water bodies**: Water bodies such as ponds or tanks should be developed in fire-prone areas so that during the fire, water is closely available and there is no need to carry heavy water tankers, which are attimes difficult to reach the deep areas inside the forest. Such water bodies shall also provide water source to the wild animals.

- **Controlled burning**: Controlled burning includes the burning of leaf litter, grass, or any dry undergrowth with the potential to act as fuel for fire. It is conducted in fire-prone areas during the early dry season. It is carried out in strips to separate forest blocks and compartments.
- **Mapping of fire**: Use satellite data to map fire-prone and hotspot identification for better planning and management. This must be done routinely to understand the changing and dynamco nature of forest fires.
- **Training support**: Train local village volunteers (Van Suraksha Samitiss) and frontline forest staff about all the preventive and responsive techniques, use of equipment, and demo sessions to handle and mitigate forest fires in the local language.
- **Awareness Training for Mining staff**: it is also important to conduct the awreness training on the significance of forest fire prevention for the staff of mining companies especially the drivers of the heavy trucks and other vehicles to ensure that there are no fires caused by the movement of the staff working with the mining companies.
- **Infrastructure and equipment Support**: Deployment for additional vehicles and establishing temporary field stations in fire-prone zones based on the fire hotspot maps in the landscape. Development of fire watch towers, procurement of fire extinguishing equipment used to deal with forest fires such as fire beaters, blower machines, fire rakers to clear ground, axes for chopping or trenching, portable water mist sprayers, water tankers mounted on four-wheel drive vehicles, fire resistant cloths/gloves/helmets/smoke masks/boots, walkie-talkies for communication, fire alert devices, drones, torches, etc is also required and the same needs to be provisioned through the biodiversity conservation plan.

C. Fire Response

- **Village Volunteers Teams**: All the forests are surrounded by the villages, and villagers can be the first line of action to prevent any activity in the forest. Develop a team of such volunteers on an incentive basis so that before the forest department reaches, this volunteer team can take the lead and control the fire by using the training and equipment provided during the preparation season.
- **Rapid Response Teams and counter fire**: Deploy dedicated teams of front-line staff during peak fire season (March–June) for immediate action on fire alert. Second, counter fire is a traditional technique ca rried out during the actual fire to burn all the fuel substances so when the actual forest fire reaches this area, there is no fuel material left for burn and gets doused. A team of frontline staff and village volunteers burns the dry undergrowth or leaf litter and another team on the other side extinguishes the fire.

D. Post-Fire Measures

- **Assessment of damage**: Evaluate Forest and biodiversity loss, plan and initiate restoration activities with native fire-resistant species.
- **Soil and moisture recovery**: It includes the development of trenches, gully, and water harvesting structures, apply mulching and other erosion control techniques to reduce fire frequency in the affected areas.
- **Incentive to JFMCs**: It is very important to motivate the volunteers by providing appreciation and incentives in front of their community which develops a feeling of responsibility and respect.
- **Monitoring and evaluation**: Long-term monitoring of fire-prone areas is necessary to understand the impact on fauna and flora. Use of digital equipment such as GPS and GIS tools for seasonal tracking and adaptive fire management.

5.4.6 Landscape restoration

Due to continuous mining, transportation, and human disturbances, there are many degraded habitats that need immediate intervention. Also, new mines will have an impact on the natural environment as well as the wild animals. The forest areas will be cleared which will be a direct loss of vegetation and habitat loss for the wild animals. Wild animals will move toward the surrounding habitats, so it is necessary to maintain habitat to accommodate those wild animals and overcome the existing challenges. Blasts in the mines and iron-ore transportation by trucks will have dust, noise, and gaseous pollution in the surrounding environment which is not only harmful to humans but wildlife also. So, it is necessary to mitigate those impacts through well-planned plantation of the species which can reduce and absorb the impact.

- For phytoremediation, dust suppression, noise, and gaseous pollutants absorption, plants are helpful in pollution absorption shown in Table 5.7 should be planted in the surroundings of not only these five mines but also around all the mines in the landscape (Mohapatra KK *et al. 2013)*.
- These species should be planted along all the major roads in the whole landscape because all the roads are used to transport iron ore which releases dust in the atmosphere.
- Village roads and kaccha mining roads also should be planted by these species to absorb dust and noise at the road verge itself.
- All the local roads that are used for iron-ore transportation should be sprinkled by water sprinklers to suppress dust. Atomiser based water sprinklers should beused to avoid the water wastage. If there are existing mine voids which have turned into reservoirs should be utilized for sprinkling on the roads to supress the fine iron ore dust.
- All the mines boundary should be covered by sutiable green belt to reduce visual and noise impact on the surrounding wildlife.
- The plant species listed in Table 5.7, should be planted in the degraded forests to provide fodder and edible plants to elephants and other herbivores.

- All the mines should have restored double the land of mining in the landscape by using fodder and fruiting plant species to provide food and shelter to the herbivores which will indirectly help the carnivores to grow in the landscape.
- The central part of the landscape comprises Rugudihi, Kendudihi, Rengalbeda, Tehrai, Koira, Nadidihi, Ranisal beats and the eastern part including Joda, Jurudi, Khanadabandha, Malda, Dubuna, and Nayagarh should be on priority undertaken for restoration of forest and connectivity.
- Wherever weed removal is carried out, it should follow the fodder and fruit sepcies plantation. While planting, understory, middle story, and canopy cover should be kept in consideration to create a 3 tiered layer in forest to enhance the biological diversity.
- Grasses, herbs, and shrubs should also be planted for soil and moisture conservation, these are important for small herbivores and other taxonomic groups for food and cover.
- Durgn the initital phase of planation and restoration, area should be secured by either manpower or fencing and grazing should be restricted for the growth of plants.
- Trees and shrubs preferred by wild animals such as elephants and other herbivore should be planted at a distance from the village to avoid any negative interaction between humans and wildlife.
- All the rivers, water bodies, and other aquatic habitats are crucial to any landscape, so it is necessary to secure those areas from cattle movement as well as human disturbances.
- The boundary of the OB dumps must be lined with a garland drain to avoid any leaching of mine waste in the nearby area.
- The OB dumps should be vegetated with grasses and shrubs, to reduce dust mixing in the air and runoff into water bodies or forested habitats during rains.
- The upper top layer of soil is rich in nutrients and microorganisms. Before the mining starts, the top layer of soil should be secured in one area so that it can be used for the restoration of the landscape.

Table 5.7. Plant species for phytoremediation and pollution absorption

Sl. No.	Species	Dust suppression	Noise barrier	Gaseous absorption	Heavy metal in soil
1	**Trees**				
2	*Aegle marmelos*	✔		✔	
3	*Albizia lebbeck*	✔		✔	
4	*Alstonia scholaris*			✔	
5	*Annona squamosa*				
6	*Azadirachta indica*	✔		✔	✔
7	*Bauhinia variegata*	✔		✔	
8	*Butea monosperma*	✔		✔	
9	*Cassia fistula*	✔		✔	
10	*Dalbergia sissoo*		✔		✔
11	*Delonix regia*	✔	✔	✔	
12	*Diospyros melanoxylon*				
13	*Ficus benghalensis*	✔	✔	✔	✔
14	*Ficus racemosa*			✔	
15	*Ficus religiosa*	✔	✔	✔	
16	*Holoptelea integrifolia*	✔		✔	
17	*Madhuca indica*			✔	
18	*Mangifera indica*	✔	✔	✔	
19	*Manilkara zapota*		✔		
20	*Melia azedarach*	✔	✔	✔	
21	*Phoenix sylvestris*				
22	*Pithecolobium dulce*	✔		✔	
23	*Pongamia pinnata*	✔	✔	✔	✔
24	*Psidium guajava*	✔		✔	
25	*Syzygium cumini*	✔	✔	✔	
26	*Tectona grandis*	✔			
27	*Terminalia catappa*	✔	✔	✔	
28	*Terminalia arjuna*	✔		✔	
29	*Shorea robusta*	✔			
30	*Tamarindus indica*	✔	✔	✔	

31	*Terminalia bellirica*	✔	✔	✔	
	Shrub				
32	*Adhatoda vasica*	✔	✔	✔	
33	*Calotropis procera*	✔		✔	✔
34	*Calotropis gigantea*	✔		✔	✔
35	*Vitex negundo*	✔	✔	✔	✔
36	*Ocimum sanctum*	✔		✔	✔
37	*Leucas aspera*	✔		✔	
38	*Clerodendron viscosum*		✔	✔	
39	*Cassia tora*	✔		✔	✔
40	*Jatropha gossypifolia*	✔		✔	✔
41	*Ricinus communis*			✔	✔
42	*Withania somnifera*			✔	✔
43	*Mimosa pudica*			✔	✔
44	*Lawsonia inermis*	✔	✔	✔	
45	*Pogostemon plectranthoides*	✔		✔	
46	*Nyctanthes arbor-tristis*	✔	✔	✔	
47	*Sida rhombifolia*	✔		✔	✔

Table 5.8. Palatable plants and fodder species

Sl. No.	Species	Sl. No	Species
1	*Aegle marmelos*	23	*Limonia acidissima*
2	*Albizia procera*	23	*Madhuca indica*
3	*Anogeissus latifolia*	24	*Mallotus philippensis*
4	*Bauhinia racemosa*	25	*Mangifera indica*
5	*Bauhinia vahlii*	26	*Mimosa pudica*
6	*Bombax ceiba*	27	*Mimusops elengi*
7	*Bridelia retusa*	28	*Pterocarpus marsupium*
8	*Butea monosperma*	29	*Pterocarpus santalinus*

9	*Careya arborea*	30	*Schleichera oleosa*
10	*Carissa spinarum*	31	*Shorea robusta*
11	*Cassia fistula*	32	*Smilax zeylanica*
12	*Cissus quadrangularis*	33	*Sterculia villosa*
13	*Cynodon dactylon*	34	*Streblus asper*
14	*Dalbergia sissoo*	35	*Syzygium cumini*
15	*Diospyros melanoxylon*	36	*Tamarindus indica*
16	*Ficus benghalensis*	37	*Terminalia bellirica*
17	*Ficus racemosa*	38	*Terminalia chebula*
18	*Ficus religiosa*	39	*Trewia nudiflora*
19	*Glycosmis pentaphylla*	40	*Ziziphus mauritiana*
20	*Kydia calycina*	41	*Ziziphus xylopyra*
21	*Lagerstroemia parviflora*	42	Ziziphus oenopolia

5.5 MANAGEMENT OF HUMAN-WILDLIFE CONFLICT

To mitigate human-wildlife conflict (HWC), particularly to reduce the elephant mortality, protect human lives and livelihoods, and promote coexistence between wildlife and local communities in mining-impacted areas, a Conservation and Management Plan is recommended. This plan specifically targets the Netrabandh Pahar Landscape, focusing on zones falling under the Zone of Impact (ZOI) of the five mines identified in the previous chapters. These areas include the Keonjhar Forest Division (Barbil, Champua, and Bjp ranges) and Bonai Forest Division (Koira and Barsuan ranges). The plan involves implementing long-term strategies for sustainable HWC management.

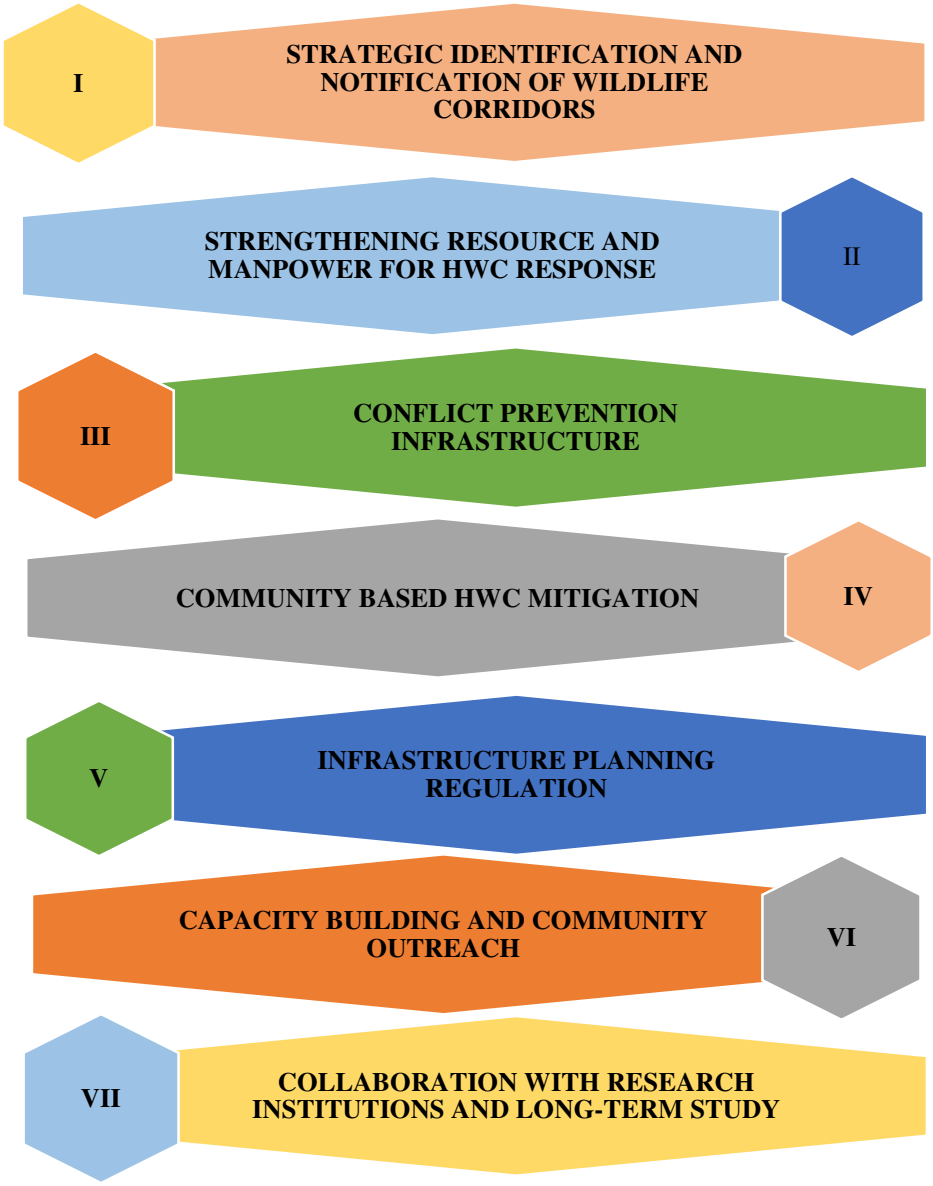


Figure 5.2. Recommended Steps for Long-term HWC Management

Recommended Steps for Long-term HWC Management:

Based on findings from the baseline survey, the entire mining-impacted zone (ZOI), defined as a 10 km buffer around five active mining sites, is significantly affected by HWC. Within this ZOI, the Champua Forest Range (Keonjhar Forest Division) and both Koira and Barsuan Forest Ranges (Bonai Forest Division) have reported the highest number of HWC incidents over the past five years. These areas have emerged

as critical hotspots requiring urgent and sustained interventions. To address these challenges, the following strategic steps are recommended for long-term HWC management in the affected areas:

STEP I. Strategic Identification and Notification of Wildlife Corridors

- **Accelerate Corridor Notification:** Prioritize formal notification of the Karo-Karampada Elephant Corridor and other proposed corridors under Project Elephant. Legal recognition is crucial for securing habitat connectivity and facilitating the safe movement of wildlife.
- **Corridor Restoration and Demarcation:** Restore degraded habitat patches within corridors through assisted natural regeneration, including the demarcation of forest patches and wildlife corridor boundaries with appropriate sinages.
- **Habitat and Passage Mapping:** Conduct comprehensive mapping of wildlife habitats with GIS-based tools, wildlife connectivity between forest patches, water bodies, and road-crossing points. This spatial understanding is crucial for designing species-specific mitigation measures. This must be carried out on long term basis.

STEP II. Strengthening Resource and Manpower for HWC Response

1. Establishment of Rapid Response Team (RRT)

Each RRT should include:

Wildlife Biologist:

During Conflict: Responsible for tracking the Conflict animals, collecting ground evidence using advanced tools and techniques, and providing technical support to the veterinary surgeon during animal capture operations.

Long-term: In charge of mapping the entire landscape, studying wildlife movement and behaviour, and conducting research and collating data human wildlife conflct in the landscape.

Veterinary Surgeon:

During Conflict: Leads the rescue, capture, and release operations of the conflict animals, and responds to other wildlife-related emergencies.

Long-term: Vaccination and routine health check-ups of livestock to prevent disease transmission between domestic animals and wildlife.

Sociologist:

During Conflict: Manages crowd control, coordinates with the media, liaises with forest officials, district and panchayat administration, and affected local communities.

Long-term: Conducts community awareness campaigns, student education programs, and broader outreach initiative to promote coexistence.

- The RRTs should be supported by a **Field Assistant-cum-Driver** for logistical operations.

- The RRT must also organize capacity-building programs for forest frontline staff and Primary Response Team (PRT) members to enhance their preparedness and response efficiency.

2. Deployment of Primary Response Team (PRT)

As a community integration model, two local volunteers per HWC-prone village, were selected for leadership ability. PRT serves as first responders and communication links to the RRT. The PRT provided training and recognition (gifts, incentives).

STEP III. Conflict Prevention Infrastructure and Techniques

- **Solar Fencing:** Install non-lethal solar fencing along conflict hotspots Bonai and keonjhar Forest Divisions. Solar fencing is powered by solar energy along the boundaries of conflict hotspots, such as farmlands adjacent to forests. These fences emit a mild electric pulse when touched, effectively deterring elephants and other animals from entering crop fields without causing harm.
- **Tentacular Hanging Fencing:** More effective for the large mammals such as elephants in various places. Hanging fences are unlike conventional fences, these are suspended at a height (about 14 feet), often electrified, and hang like curtains. Mainly the installation more in the road and railway crossing and the boundary of and conflict prone villages.
- **Elephant-Proof Trenches (EPT) and Watchtowers:** Construct strategically placed trenches where terrain permits, also regular maintenance of EPT. EPT are deep, wide ditches dug along forest boundaries to physically prevent elephants from entering human habitations and agricultural lands. Establish community-operated watchtowers in high-conflict villages.
- **Bio-Fencing:** Pilot bio-fencing by using living plants, such as citrus (lemon) or chilli plants, planted densely along the borders of croplands adjacent to forests. The thorns and strong scent of lemon trees, for example, naturally repel elephants, while the produce offers farmers an additional source of income.
- **Beehive Fencing:** Beehive fencing is an innovative, nature-based method designed to humanely deter large animals, particularly elephants, from entering and damaging crop fields. This technique involves stringing together a series

of active beehives along the perimeter of farmland, typically spaced about 6-8 meters apart and connected by wires. When elephants attempt to pass through, they disturb the wires, causing the hives to shake and agitate the bees inside. Elephants instinctively fear bees due to the painful stings they can receive in sensitive areas such as their trunks, eyes, and ears, which causes them to retreat and avoid the area. Many elephants learn to associate the buzzing sound and presence of bees with discomfort, leading to long-term avoidance of beehive-fenced fields.

- **Visual deterrent- Flash Light and Blinking Light**: The deployment of Flash Light at the border of the settlement and crop field in the identified HWC prone villages are a visual deterrent to wildlife arrival. The Blinking lights are the solar chargeable lights blink as darkness start in the evening which deter the animal's arrival towards the human settlement. Blinking lights have shown some definite success in the state of karnatka.
- **Early Warning and Surveillance Systems:**

  - ➢ Deployment SMS alert systems integrated with elephant tracking as well as other wildlife tracking.
  - ➢ Install motion-triggered camera traps and drone surveillance to monitor elephant movements near villages and mines in high conflct areas.
  - ➢ Trip Alarm (TA): A device used to alert the community at the entrance of large mammals such as elephants. One TA covers 100m thin ropes, once animals touch the alarm trigger and the people are aware of the animal's arrival.

STEP IV. Community-Based Conflict Mitigation

- **Smelly Deterrent**: Promote the use of traditional olfactory deterrents, such as a fermented neem-leaf solution combined with chilli, ginger, garlic, cow dung, and other ingredients. Villagers can prepare this deterrent by boiling all the ingredients together and then fermenting the liquid for one month. The resulting strong-smelling mixture is then spread along crop boundaries or around the perimeters of human settlements to repel elephants and other herbivores.
- **Chilli Smoke Technique:** Provide materials and conduct workshops for the chilli smoke technique. This technique uses the natural irritant properties of chilli to deter wildlife from entering crop fields. This method involves burning chilli-infused materials to produce smoke that irritates the sensitive respiratory and olfactory systems of elephants and other animals.
- **Village Elephant Task Forces (VETFs):** Engage local youth and forest volunteers, PRTs members in conflict mitigation and awareness campaigns.
- **Compensation Facilitation via ANUKAMPA:** Assist villagers in filing real-time claims through mobile ANUKAMPA app. Designate Forest department nodal officers for speedy claim processing.

STEP V. Infrastructure Planning and Regulation

- **Wildlife-Friendly Linear Infrastructure:** Mandate underpasses/overpasses on railway lines in conflict-prone stretches. Collaborate with Indian Railways to implement speed restrictions during elephant movement alerts. Whatsapp group may be created for sharing the information on the elephant presence and movement in the landscape.
- **Mining Activity Regulation:** Establish elephant migration zones' within ZOI, especially during peak migratory months.

STEP VI. Capacity Building and Community Outreach

- **Training and Sensitization:** Conduct regular workshops for forest staff, villagers, and mining personnel on elephant behaviour and conflict mitigation.
- **School and Youth Education:** Integrate HWC awareness in local school curricula with forest department collaboration and routinely street plays and

other such evetns are help to spread awareness on the subject amoingst the youth.

STEP VII. Collaboration with Research Institutions and Long-term study:

The long-term mitigation of HWC requires a strong foundation of scientific research, data-driven strategies, and continuous monitoring. Collaboration with academic and research institutions is essential for generating ecological knowledge, assessing the effectiveness of interventions, and adapting management approaches in real time.

- **Establishment of a Centralized HWC Monitoring and Database System:** A centralized database should be created and managed in collaboration with RRTs, forest frontline staff, and local authorities. This data repository will serve as the backbone for all research, policy interventions, and monitoring efforts.

  Key Components of the Database

  1) **Wildlife Mortality Records:** Systematically document all wildlife mortality incidents, including cause of death (e.g., electrocution, collision, poaching), species involved, and location coordinates, which helps in identifying high-risk zones and modifying mitigation structures accordingly.
  2) **Crop Damage Assessments:** Crop loss incidents due to wildlife, including type of crop, area affected, and time of year. This shall help timely compensation and better understanding of seasonal conflict patterns.
  3) **Human Injuries and Fatalities:** Maintain verified reports of any human casualties or injuries due to wildlife encounters. Critical for refining early warning systems and community preparedness protocols.
  4) **Livestock Depredation by Predators:** Track and record predation events, species involved, and response actions taken. This shall help in planning protective enclosures for livestocks and livestock insurance schemes.
  5) **Damage to Property:** Document damage to homes, fences, water tanks, or other infrastructure caused by elephants and other wildlife. Essential for planning physical deterrents and compensation schemes.

This database should be digital, GIS-integrated, and regularly updated. It will allow for predictive analytics, hotspot mapping, and real-time conflict trend analysis. This database can be housed in the office of either Bonai or keonjhar Forest Division.

- **Long-Term Research Collaboration with Institutions:** Building partnerships with universities, research institutes, and wildlife conservation NGOs is vital for deepening scientific understanding and strengthening on-ground action.

Focus Areas for Collaborative Research:

1) **Ecological Impact Assessments:** Conduct in-depth studies to evaluate the ecological consequences of mining and other peripheral development activity on wildlife habitats, corridor integrity, and species behaviour. This shall Inform policy decisions on mining leases, land-use change, and habitat restoration in the netrabandh pahar landscape.
2) **Wildlife Behaviour and Movement Studies:** Use drone surveillance, sign-survey and camera traps to monitor seasonal migration routes, habitat usage, and conflict-prone areas. It enables more effective corridor management and real-time early warning systems.
3) **Socio-Ecological Studies:** Assess community attitudes, traditional knowledge, and cultural practices related to wildlife. This shall facilitate culturally inclusive, appropriate mitigation and education strategies.

By institutionalizing long-term research and data collection, the HWC mitigation strategy in the entire Netrabandh Pahar landscape can evolve into a dynamic, knowledge driven framework that ensures the well-being of both wildlife and human communities.

5.6. MANAGEMENT OF ETHNOBOTANICAL VALUES AND FOREST DEPENDENCY OF LOCAL COMMUNITIES

A comprehensive strategy is crucial to preserving ethnobotanical heritage, minimizing harmful forest exploitation, and promoting community-based forest management. Key actions should involve recording indigenous knowledge, conserving culturally

important plant species, and supporting the development of sustainable alternative livelihoods.

I. Documentation and Conservation of Ethnobotanical Knowledge

Indigenous and traditional communities possess deep knowledge of forest biodiversity, particularly the medicinal and cultural uses of plants. Preserving this knowledge is critical for both cultural continuity and biodiversity conservation.

A. Community-led Ethnobotanical Surveys: Collaborate with local healers and elders to document medicinal plant use. There is a need to create digital and physical repository of indigenous knowledge through.

1) *Participatory Documentation:*

Engage traditional healers, village elders, forest dwellers, and herbal practitioners in ethnobotanical surveys to document the use of medicinal plants, food species, dyes, fibres, and other forest-based products.

2) *Knowledge Repositories:*

Create community-owned digital and physical repository (literature, herbaria, field guides, audio-visual archives) to store recorded knowledge. Materials should be bilingual (local language and English/Odia) to ensure accessibility and educational outreach.

3) *Intergenerational Knowledge Transfer:*

Organize local workshops, heritage camps, youth programs, women programs and school programs to ensure that the whole populations learn and value traditional ecological knowledge.

B. Protection of culturally significant forest patches: Identify and conserve the forest areas with presence of culturally significant flora.

1) *Ecological Restoration of Degraded Patches:*

Where degradation has occurred, support natural regeneration and enrichment planting with native medicinal and culturally important species, guided by local elders and forest officials.

2) *Cultural Interpretation Signage:*

Install educational signage in and around the forest patches, explaining their ecological and cultural significance. This supports eco-cultural tourism and awareness among visitors and younger community members.

II. Promotion of Sustainable Livelihood Alternatives

A. Strengthening Non-Timber Forest Products (NTFP) Value Chains:

1) Train community members in sustainable harvesting practices to ensure regeneration and long-term availability of key NTFPs such as kendu leaf (Bidi industry), mahua flowers (food, liquor trade), and sal seed (oil, trade), siali leaves (Plate making), hill broom (broom making), tamarind (food, industry), char seed (food, trade) etc.

2) Build capacity for processing, packaging, and value addition at the village level to improve product marketability. Facilitate market linkages through cooperatives or producer groups and connect with eco-certification and fair-trade channels to enhance income and ecological responsibility.

B. Establishment of Herbal Gardens and Medicinal Plant Nurseries:

Collaborate with Van Suraksha Samitis (VSS) and local healers to identify and cultivate regionally significant medicinal plant species. These efforts should be supported by the development of community-managed nurseries that contribute to reforestation initiatives while also enabling the creation of domestic herbal gardens. Such gardens act as vital centres for the preservation and transmission of ethno-botanical as well as ethno-medicinal knowledge in the community.

C. Skill Development and Promotion of Forest-based Microenterprises:

1) Offer vocational training programs in alternative green livelihoods such as beekeeping, vermicompost production, mushroom cultivation, leaf-plate making, broom making and bamboo related handicrafts, etc.

2) Support the formation of self-help groups (SHGs) and facilitate access to seed funding, tools, and technical guidance to scale these enterprises sustainably. Encourage women's participation and leadership in income-generating activities to promote inclusive development.

III. Community Forest Rights and Participatory Management

A. **Encouraging Forest Conservation through livelihood Integration:** Support community-led forest protection by integrating conservation efforts with income-generating programs like MGNREGS and the Green India Mission. Linking community-led forest care with economic incentives will strengthen long-term engagement and contribute to both ecological sustainability and local development.

IV. Creating Community Seed Bank (CSB)

Based on inputs from the baseline survey (**Chapter 3**) and literature review, the Zone of Impact (ZOI) in the study area hosts numerous native plant species with valuable medicinal and ethnobotanical properties. Many of these species are under threat due to habitat degradation, overharvesting, and lack of regeneration efforts.

To address this, it is recommended to establish Community Seed Banks (CSBs) focused on the conservation of rare and endangered species. CSBs are decentralized, community driven conservation systems managed by local farmers, self-help groups (SHGs), NGOs, individuals, and particularly women. They play a critical role in preserving indigenous and climate-resilient seed varieties, supporting local biodiversity, promoting sustainable use and conservation of forest plant species and enhancing availability of rare plants during ecological uncertainties or loss events

These CSBs will focus on systematic seed collection, preservation and storage using traditional and scientific methods, distribution and propagation to strengthen regeneration and availability, raising awareness on the value of these species among communities This model ensures the long-term conservation of medicinal and rare plant species, strengthens traditional knowledge systems, and supports local livelihoods.

Table 5.9. Priority Species for Community Seed Bank Conservation.

S. No.	Science Name	Local Name	Used part	Status
1	*Rauvolfia serpentina*	Patalgaruda	Shrub	Endangered (IUCN); overexploited for medicinal alkaloids
2	*Curculigo orchioides*	Kali musli	Herb	Vulnerable; habitat loss and overharvesting
3	*Pterocarpus marsupium*	Bijasal	Tree	Near Threatened (IUCN); valued for timber and medicine
4	*Oroxylum indicum*	Phanpana	Tree	Vulnerable; declining in the wild
5	*Smilax zeylanica*	Ramadantuni	Climber	Rare; localized populations
6	*Pueraria tuberosa*	Bhuinpokharu	Climber	Rare/Vulnerable; overexploited
7	*Tylophora indica*	Mendi	Shrub	Rare/Endangered in parts of India
8	*Hemidesmus indicus*	Duddhi	Climber	Rare in some regions due to habitat degradation
9	*Celastrus paniculatus*	Kujri	Climber	Rare; vulnerable due to seed demand
10	*Asparagus racemosus*	Satabhari	Climber	Vulnerable; root overharvested
11	*Desmodium gangeticum*	Anshumati	Shrub	Rare in wild, medicinally overused
12	*Rubia cordifolia*	Athakoli	Climber	Threatened in parts of India
13	*Mucuna pruriens*	Baidanka	Climber	Under pressure from high medicinal demand
14	*Semecarpus anacardium*	Soso	Tree	Rare due to limited distribution
15	*Costus speciosus*	Kankanka	Shrub	Rare in wild due to habitat change

5.7 INFRASTRUCTURE AND RESEARCH

5.7.1 Research and Monitoring

Research and monitoring on flora, fauna, and habitat is very important for enhanced ecological understanding. Long-term monitoring of the wild animals, plant regeneration, human-wildlife interaction, and different habitats is needed for effective and adapting management of the landscape. A total of 401 plant species and 239 species of fauna were recorded in this study signifies the richness of biodiversity in the netrabandh landscape. Hence, it is recommended that both Keonjhar and Bonai Forest Division should develop a robust research and monitoring team comprising biologists for wildlife monitoring, sociologists to understand socio-ecological complexities and understand opportunities for wildlife conservation as well as alternate livelihood for local communities, forestry experts to understand the vegetation structure, plan to prepare advance seed banks and nurseries, help with the ecological restoration in the landscape, environment analyst to keep on check on air, water and soil pollutants.

5.7.2 INFRASTRUCTURE, EQUIPMENT AND MANPOWER DEVELOPMENT

- Rescue and rehabilitation centres with a dedicated veterinary team in both the forest divisions for rehabilitation of injured wild animals such as Sloth bears, leopards, and Elephants.
- Forest rest houses to increase monitoring in the landscape by the forest officials, and research teams.
- Development of nakas/checkposts at sensitive areas such as Karo-Karampada corridor, fire prone areas, Elephant sensitive areas, and at dense forest areas from where the roads are passing to regulate human disturbances.
- Hiring of elephant trackers/ gaj sathi to monitor Elephant movement in five concerned ranges of landscape.
- Development of research and monitoring wing including Rapid Response Teams (RRT) in both the forest divisions with a team of biologist, sociologist, forestry experts, GIS expert, data scientist and environmental scientist to

monitor wild animals, forest/flora, socio-economic status, spatial study, and biological status such as soil, water, air pollution.

- Development of village economic centres in the dedicated villages to engage communities for sustainable and alternate livelihood to reduce dependency on the forest and their economic development.
- Seed bank and plant nurseries in both the forest divisions to develop the suggested plants for habitat management.
- Firefighting equipment such as fire beater, blower, fire safety suits, portable water tanks, water pumps and water tank vehicle.
- Equipment for research and monitoring such as camera traps and batteries, DSLR cameras, binoculars, drones, AI Cameras, laptops, mobile phones and dedicated softwares for Elephants detection.
- Two-wheeler and four-wheeler vehicles for Rapid Response Teams, Mobile veterinary services, elephant trackers and the forest department.
- Development of watch towers in fire prone areas, conflict prone areas, poaching prone areas and near water bodies.

5.8 PROPOSED BUDGET

5.8.1 Cost of Executing the Biodiversity Conservation Plan

The Conservation plan is applicable to the the proposed five mines falling in the Forest divsions of Bonai and keonjhar, which largely constitute the netrabandh pahar landscape.

The total capital cost of executing the biodiveesity conservation plan is **₹ 70,24,00,000.00 (Rs. Seventy Crore twenty-four lacs)** for a period of ten years (Table 5.10).

5.9 Conclusion

It is hoped that with the successful implementation of the proposed conservation plan the lager objective and the overarching aim of ecologically sustainable development will be achieved. It is expected that with this biodiversity conservation plan the forests of Bonai and keonjhar Forest Division that fall in the zone of impact of the proposed five mines will support biodivesity over the period of time.

Table 5.10. Proposed Budget Estimate for Biodiversity Conservation Plan

(For 10-year Implementation)

S. No.	Components	Amount (INR)
A	**Biological Mitigation**	
1	Phytoremediation: Avenue plantation along the roads and mines	₹ 1,80,00,000.00
2	Muck dump restoration: Development of grassland, tree plantation, restoration and mitigation of dump erosion	₹ 2,00,00,000.00
3	Soil and moisture conservation: Sedimentation traps, prevent soil erosion, promote water percolation, vegetation development for natural filter and management	₹ 1,50,00,000.00
4	Roadkill mitigation structures: Signages, box and pipe culverts	₹ 1,50,00,000.00
5	Safe zone green shelterbelt: Afforestation along the boundaries of mines	₹ 2,00,00,000.00
	Sub-Total	**₹ 8,80,00,000.00**
B	**Habitat Management**	
1	Aquatic habitats: Development and restoration of village ponds and water bodies inside the forest	₹ 2,00,00,000.00
2	Habitat connectivity and corridors: Habitat improvement to restore and increase functional connectivity of fragmented forest patches and ecological corridor	₹ 1,30,00,000.00
3	Development of AI enabled system for railway lines to prevent Wildlife collision	₹ 2,50,00,000.00
4	Weed, Fire and Grazing: Eradication of exotic/invasive plant species, fire and grazing management	₹ 2,00,00,000.00
5	Grassland development, fodder/food species plantation for wildlife, creation of wildlife habitats	₹ 2,00,00,000.00
	Sub-Total	**₹ 9,80,00,000.00**
C	**Human-Wildlife Conflict Management**	
1	Development and maintenance of mitigation structures: Solar electric fencing, hanging fence, bio-fence, trenches and trip alarm etc.	₹ 3,00,00,000.00
2	Development of Early warning system and other mitigation technology	₹ 2,00,00,000.00
3	Compensation for mortality, injury, crop loss, property damage, and livestock predation	₹ 5,00,00,000.00

	Sub-Total	**₹ 10,00,00,000.00**
D	**Community participation**	
1	Preservation of ethnobotanical values and sacred groves	₹ 80,00,000.00
2	Development of village volunteer team/JFM/EDC	₹ 1,00,00,000.00
3	Management and promotion of sustainable and alternate livelihood	₹ 80,00,000.00
4	Health camps	₹ 1,00,00,000.00
5	Community awareness + required resource and material	₹ 1,00,00,000.00
	Sub-Total	**₹ 4,60,00,000.00**
E	**Infrastructure and equipment**	
1	Watch towers, forest chowkis, naka/barrier, forest protection camps, fire walls and maintenance	₹ 1,20,00,000.00
2	Maintenance of forest rest houses	₹ 1,00,00,000.00
3	Development of research stations and maintenance x2	₹ 1,20,00,000.00
4	Development of two seed banks and two plant nurseries	₹ 1,00,00,000.00
5	Equipment for wildlife monitoring like camera traps, Unmanned Aerial Vehicle (UAV), Computers, system hardware, digital cameras, binoculars, GPS devices, range finder etc. and fire management equipment	₹ 3,00,00,000.00
6	Two-wheelers x 10, four-wheeler x 4 and maintenance	₹ 2,00,00,000.00
7	Development of souvenir shops to sell sustainable products by local communities	₹ 90,00,000.00
8	Vermicompost units for local communities x 8	₹ 1,50,00,000.00
9	Forest education and awareness-cum-interpretation centres x 2	₹ 2,00,00,000.00
10	Rescue and rehabilitation centres + required equipment/setup x 2	₹ 5,00,00,000.00
	Sub-Total	**₹ 18,80,00,000.00**
F	**Research, training and manpower**	
1	Long-term monitoring and status survey of fauna, flora and environment including population assessment	₹ 3,00,00,000.00
2	Training and workshop for forest frontline staff (Two workshop per year for both the forest divisions for 10 years)	₹ 1,20,00,000.00
3	Gaj sathi/elephant tracking team x 20 x 20000rs/month each (10 for each forest division) x 5 years + 5% increment per year	₹ 6,04,00,000.00
4	Research team and RRT: Field biologist, sociologist, botanist/restoration ecologist/ environment researcher, GIS expert x 2 x 60000/month each + 5% increment per year (One team for each forest division)	₹ 3,80,00,000.00
5	Medical staff for the rescue and rehabilitation centre and RRT for 5 years: 2 veterinary doctors + 2 veterinary assistants/care takers + 5% increment per year	₹ 4,20,00,000.00
	Sub-Total	**₹ 18,24,00,000.00**
	Grand Total (A+B+C+D+E+F)	**₹ 70,24,00,000.00**

Note: The proposed Lum-sum budget is for 10 years of implementation and should be distributed equally in the Keonjhar and Bonai Forest Divisions.

References

Alexiades, M.N. (1996). Selected guidelines for ethnobotanical research: A field manual. The New York Botanical Garden.

Attenborough, D. (2020). A life on our planet: My witness statement and a vision for the future. Random House.

Bahuguna, V., & Upadhay, A. (2002). Forest fires in India: policy initiatives for community participation. *The International Forestry Review*, *4*(2), 122–127. https://doi.org/10.1505/ifor.4.2.122.17446

Buckland, S.T., Anderson, D.R., Burnham, K.P., Laake, J.L., Borchers, D.L., & Thomas, L. (2001). Introduction to distance sampling: estimating abundance of biological populations. Oxford University Press.

Central Pollution Control Board (CPCB). (2010). Phytoremediation and green buffers for dust and noise pollution abatement. Ministry of Environment, Forest and Climate Change, Government of India.

Centre for Science and Environment (CSE). (2021). Report- State of India's Environment

Convention on Biological Diversity. (1992). Text of the Convention on Biological Diversity. United Nations. https://www.cbd.int/doc/legal/cbd-en.pdf

Ehrlich, P. R., & Wilson, E. O. (1991). Biodiversity studies: science and policy. Science, 253(5021), 758-762.

Elzinga, C.L., Salzer, D.W., Willoughby, J.W. & Gibbs, J.P. (2001). Monitoring plant and animal populations. Blackwell Science.

ENVIS Centre on Medicinal Plants http://envis.frlht.org/plantdetails

Foundation for Revitalisation of Local Health Traditions (FRLHT) – Medicinal Plants Database. https://envis.frlht.org

Ghose, M.K. (2002). *Air pollution due to opencast coal mining and its control in Indian context.* Journal of Scientific & Industrial Research, 61, 529–539.

ICFRE-Dehradun & Indian Grassland and Fodder Research Institute (IGFRI), Jhansi. (2015).

ICMM (International Council on Mining and Metals). (2020). *Good Practice Guidance for Mining and Biodiversity.*

International Union for Conservation of Nature (IUCN) Red List of Threatened Species (2024).

Jathanna, D., Karanth, K.U., & Johnsingh, A.J.T. (2008). Estimation of large herbivore densities in the tropical forests of southern India using distance sampling. Journal of Zoology, 279, 162-169.

Kala, C.P. (2005). *Ethnomedicinal botany of the Apatani in the Eastern Himalayan region of India*. Journal of Ethnobiology and Ethnomedicine.

Karanth, K.U., & Nicholas, J.D., (2002). Monitoring tigers and their prey: A manual for researchers, managers and conservationists in tropical Asia. Centre for Wildlife Studies, Banglaore, India.

Martin, G.J. (2004). Ethnobotany: a methods manual. Routledge.

Ministry of Environment, Forest and Climate Change (MOEFCC). (2018). Guidelines for sustainable mining. Government of India. https://moef.gov.in

Ministry of Environment, Forest and Climate Change, Government of India. (2021). State of Environment Report.

Ministry of Mines, Government of India. (2023). Annual Report 2022-23.

Mohapatra, K. K., Jr., Patra, A. K., Paramanik, D. S. (2013). Food and feeding behaviour of Asiatic elephant (Elephas maximus Linn.) in Kuldiha Wild Life Sanctuary, Odisha, India. *Journal of Environmental Biology*, ISBN 0254-8704. https://www.jeb.co.in/journal_issues/201301_jan13/paper_13.pdf

Mungi, N.A., Qureshi, Q., Jhala, Y.V. (2020); Expanding niche and degrading forests: Key to the successful global invasion of *Lantana camara* (sensu lato). https://doi.org/10.1016/j.gecco.2 020.e01080

Naik, B. S., & Patra, H. K. (2013). Application of native plants for phytoremediation of coal mine spoil in Odisha." Published in International Journal of Environmental Sciences, Vol. 4(2).

National Commission of Schedule Tribe (NCST). (2020-21). Annual Report.

National Medicinal Plants Board (NMPB), Ministry of AYUSH, Government of India. https://nmpb.nic.in

NITI Aayog. (2020). Report on sustainable development in India: Pathways for inclusive growth. Government of India. https://www.niti.gov.in

Odisha Forest Department. (2021). Annual report on forest and environment initiatives in Odisha. Government of Odisha.

Odisha Forest Development Corporation (OFDC). (2019). Species selection for plantation programs in Odisha. Bhubaneswar, Odisha.

Sandhya, B., Thomas, S., Isabel, W., & Shenbagarathai, R. (2006). *Ethnomedicinal plants used by the Valaiyan community of Piranmalai Hills (Tamil Nadu, India)*. A review.

Singh, G. (1992). *Environmental impact assessment of mining projects.* Journal of Mines, Metals and Fuels, 40(7-8), 253–256.

State Pollution Control Board (SPCB), Odisha. (2020). Public Hearing for Mining Projects in Odisha.

Tripathi, R. D., Srivastava, S., Mishra, S., & Nautiyal, B. D. (2006). Phytoremediation of metal-contaminated soils and water: The use of vetiver and other plant species." In Environmental Pollution Control Journal, Vol. 9(2).

United Nations Environment Programme. (2021). Biodiversity.

Ved, D. K., & Goraya, G. S. (2007). Demand and supply of medicinal plants in India. *NMPB, New Delhi & FRLHT, Bangalore, India*, *18*(85), 210-52.

Wilson, D.E., Cole, F.R., Nichols, J.D., Rudran, R., & Foster, M.S. (1996). Measuring and monitoring biological diversity: standard methods for mammals. Smithsonian Institute Press.

Wilson, E. O. (1988). Biodiversity.

World Wide Fund for Nature. (2022). Biodiversity.

World Wildlife Fund. (1980). World conservation strategy: Living resource conservation for sustainable development. Gland, Switzerland: IUCN.

Web references

https://www.unep.org/explore-topics/biodiversity
https://www.worldwildlife.org/topics/biodiversity

ANNEXURE I – List of Tree species of Netrabandh pahar landscape

S.No.	VERNACULAR NAME	BOTANICAL NAME	FAMILY	IUCN
1	Acacia/Sunajhari	Acacia auriculiformis	Fabaceae	Least Concern
2	Khair	Acacia catechu	Fabaceae	Least Concern
3	Garkhari	Acacia ferruginea	Fabaceae	–
4	Gadkhair	Acacia lenticularis	Fabaceae	–
5	Gohira	Acacia leucophloea	Fabaceae	–
6	Babul	Acacia nilotica	Fabaceae	Least Concern
7	Haldu (kurum)	Adina cordifolia	Rubiaceae	–
8	Bela	Aegle marmelos	Rutaceae	Near Threatened
9	Mahanimba	Ailanthus excelsa	Simaroubaceae	–
10	Ankulo	Alangium lamrckii	Cornaceae	–
11	Ankula	Alangium salvifolium	Cornaceae	–
12	Ghoralanjia	Albizia chinensis	Fabaceae	–
13	Siris	Albizia lebbeck	Fabaceae	Least Concern
14	Tinia	Albizia odoratissima	Fabaceae	–
15	Tentra	Albizia procera	Fabaceae	–
16	Ghodalanja	Albizia stipulata	Fabaceae	–
17	Chhatian ,Chhachina	Alstonia scholaris	Apocynaceae	–
18	Lankavalia	Anacardium occidentale	Anacardiaceae	–
19	Ata / Ramphal	Annona reticulata	Annonaceae	Least Concern
20	Badhial/Sitaphal	Annona squamosa	Annonaceae	Least Concern
21	Phasi	Anogeissus acuminata	Combretaceae	–
22	Dhaura	Anogeissus latifolia	Combretaceae	–

23	Kadamba	Anthocephalus cadamba	Rubiaceae	–
24	Mamuri	Antidesma diandrum	Phyllanthaceae	–
25	Gua	Areca catechu	Arecaceae	Least Concern
26	Panasa	Artocarpus heterophyllus	Moraceae	–
27	Panasa	Artocarpus integrifolia	Moraceae	–
28	Jeutha	Artocarpus lakoocha	Moraceae	–
29	Neem	Azadirachta indica	Meliaceae	Least Concern
30	Hinjal	Barringtonia acutangula	Lecythidaceae	Least Concern
31	Ambthi	Bauhinia malabarica	Fabaceae	–
32	Amaralata	Bauhinia racemosa	Fabaceae	Least Concern
33	Baghamari	Bauhinia retusa	Fabaceae	–
34	Siali	Bauhinia vahlii	Fabaceae	–
35	Simili	Bombax ceiba	Malvaceae	Least Concern
36	Semal	Bombax ceiba	Malvaceae	Least Concern
37	Tala	Borassus flabellifer	Arecaceae	–
38	Salai	Boswellia serrata	Burseraceae	–
39	Kasi	Bridelia retusa	Euphorbiaceae	–
40	Char	Buchanania lanzan	Anacardiaceae	–
41	Limburmoi	Bursera serrata	Burseraceae	–
42	Palas	Butea monosperma	Fabaceae	Least Concern
43	Kumbhar chikni	Canthium didymum	Rubiaceae	–
44	Kumbhi	Careya arborea	Lecythidaceae	–
45	Salapa	Caryota urens	Arecaceae	Least Concern
46	Khakada	Casearia elliptica	Salicaceae	–
47	Sunari	Cassia fistula	Fabaceae	Least Concern

48	Bheru	Chloroxylon swietenia	Rutaceae	Vulnerable
49	Karada	Cleistanthus collinus	Phyllanthaceae	Vulnerable
50	Genduli	Cochlospermum religiosum	Bixaceae	Least Concern
51	Nadia	Cocos nucifera	Arecaceae	–
52	Baruna	Crateva religiosa	Capparaceae	Least Concern
53	Barbakulia	Dalbergia lanceolaria	Fabaceae	–
54	Sisoo	Dalbergia latifolia	Fabaceae	Vulnerable
55	Sissu	Dalbergia sissoo	Fabaceae	Least Concern
56	Krushnachuda	Delonix regia	Fabaceae	Least Concern
57	Chotarai	Dillenia aurea	Dilleniaceae	Least Concern
58	Oau	Dillenia indica	Dilleniaceae	Least Concern
59	Rai	Dillenia pentagyna	Dilleniaceae	–
60	Gaigutia	Dimorphocalyx glabellus	Euphorbiaceae	–
61	Makharkendu	Diospyros embryopteris	Ebenaceae	–
62	Kendu	Diospyros melanoxylon	Ebenaceae	–
63	Damghurudu	Diospyros montana	Ebenaceae	Least Concern
64	Kalicha	Diospyros sylvatica	Ebenaceae	Least Concern
65	Chauli	Elaeodendron glaucum	Celastraceae	–
66	Chaladhua	Erythrina suberosa	Fabaceae	Least Concern
67	Paldhua	Erythrina variegata (syn. *Erythrina indica*)	Fabaceae	Least Concern
68	Eucalipatas	Eucalyptus globulus	Myrtaceae	–
69	Sijhu	Euphorbia royleana	Euphorbiaceae	Least Concern
70	Jari	Ficus retusa	Moraceae	–
71	Bara	Ficus benghalensis	Moraceae	Least Concern

72	Tambal	Ficus hispida	Moraceae	Least Concern
73	Dimri	Ficus racemosa	Moraceae	Least Concern
74	Aswasth	Ficus religiosa	Moraceae	Least Concern
75	Dimiri	Ficus retusa	Moraceae	–
76	Kodal	Firmiana colorata	Malvaceae	–
77	Gurudu	Gardenia gummifera	Rubiaceae	–
78	Damkurdu	Gardenia latifolia	Rubiaceae	Least Concern
79	Karadha (Khurundu)	Gardenia turgida	Rubiaceae	–
80	Pitamoi	Garuga pinnata	Burseraceae	Least Concern
81	Chikni (Kalicha)	Glochidion lanceolarium	Phyllanthaceae	Least Concern
82	Chauldhua (Paldhua)	Glycosmis pentaphylla	Rutaceae	Least Concern
83	Gambhari	Gmelina arborea	Lamiaceae	Least Concern
84	Silveroak	Grevillea robusta	Proteaceae	–
85	Mirigachara	Grewia elastica	Malvaceae	Least Concern
86	Dhaman	Grewia tiliaefolia	Malvaceae	Least Concern
87	Kurei	Holarrhena antidysenterica	Apocynaceae	Least Concern
88	Dhauranjo (Kanju)	Holoptelea integrifolia	Ulmaceae	Least Concern
89	Kanso, Kansa	Hymenodictyon excelsum	Rubiaceae	Least Concern
90	Telkuruma	Ixora arborea	Rubiaceae	Least Concern
91	Bankopasiak	Kydia calycina	Malvaceae	Least Concern
92	Sidha, Sena	Lagerstroemia parviflora	Lythraceae	Least Concern
93	Panipatuli	Lagerstroemia speciosa	Lythraceae	Least Concern
94	Mai or Moi	Lannea coromandelica	Anacardiaceae	Least Concern

95	Moi	Lannea grandis	Anacardiaceae	–
96	Kaitho	Limonia acidissima	Rutaceae	Least Concern
97	Jaisanda	Litsea glutinosa	Lauraceae	Least Concern
98	Badahatikana	Litsea nitida	Lauraceae	–
99	Manda	Macaranga peltata	Euphorbiaceae	Least Concern
100	Mohua, Mahula	Madhuca indica	Sapotaceae	Least Concern
101	Mahul	Madhuca latifolia	Sapotaceae	Least Concern
102	Kamalgundi	Mallotus philippensis	Euphorbiaceae	Least Concern
103	Amba	Mangifera indica	Anacardiaceae	–
104	Batra	Melia composita	Meliaceae	–
105	Nageswar	Messua ferrea	Calophyllaceae	Least Concern
106	Champa	Michelia champaca	Magnoliaceae	Least Concern
107	Gandhapalas	Miliusa velutina	Annonaceae	–
108	Baula	Mimusops elengi	Sapotaceae	Least Concern
109	Mundi	Mitragyna parvifolia	Rubiaceae	Least Concern
110	Achu	Morinda tinctoria	Rubiaceae	Least Concern
111	Sajana	Moringa oleifera	Moringaceae	Least Concern
112	Mungha	Moringa pterygosperma	Moringaceae	–
113	Bhersunga	Murraya koenigii	Rutaceae	Least Concern
114	Benta	Naringi crenulata	Rutaceae	–
115	Gangasiuli	Nyctanthes arbor-tristis	Oleaceae	Least Concern
116	Tangarchampa (Patharchampa)	Ochna obtusata	Ochnaceae	–
117	Bandhan	Ougeinia oojeinensis	Fabaceae	Least Concern
118	Radhachuda	Peltophorum pterocarpum	Fabaceae	Least Concern
119	Khajuri	Phoenix sylvastris	Arecaceae	–
120	Amla	Phyllanthus emblica	Phyllanthaceae	Least Concern

121	Amla	Phyllanthus emblica	Phyllanthaceae	Least Concern
122	Simakayan	Pithecellobium dulce	Fabaceae	Least Concern
123	Patmossu	Polyalthia cerasoides	Annonaceae	Least Concern
124	Debadaru	Polyalthia longifolia	Annonaceae	Least Concern
125	Karanja	Pongamia pinnata	Fabaceae	Least Concern
126	Gandhan	Premna latifolia	Lamiaceae	Least Concern
127	Gauva	Psidium guajava	Myrtaceae	–
128	Bija (Piasal)	Pterocarpus marsupium	Fabaceae	Near Threatened
129	Raktachandan	Pterocarpus santalinus	Fabaceae	Endangered
130	Muchukunda, Baila	Pterospermum acerifolium	Malvaceae	Least Concern
131	Giringa	Pterospermum heyneanum	Malvaceae	–
132	Poichandia	Putranjiva roxburghii	Putranjivaceae	Least Concern
133	Thelku	Randia malabarica	Rubiaceae	–
134	Telko	Randia uliginosa	Rubiaceae	–
135	Bada Chakunda/Rain Tree	Samanea saman	Fabaceae	Least Concern
136	Chandan	Santalum album	Santalaceae	Vulnerable
137	Ritha, Soap nut	Sapindus emarginatus	Sapindaceae	–
138	Asoka	Saraca indica	Fabaceae	–
139	Kusum	Schleichera oleosa	Sapindaceae	Least Concern
140	Mukha	Schrebera swietenioides	Oleaceae	Least Concern
141	Bhalia	Semecarpus anacardium	Anacardiaceae	Least Concern
142	Chakunda	Senna siamea	Fabaceae	–
143	Chauli (Mukha)	Senna surattensis	Fabaceae	Least Concern

144	Agasti	Sesbania grandiflora	Fabaceae	Least Concern
145	Sal ,Sargi, Rengal	Shorea robusta	Dipterocarpaceae	Least Concern
146	Rohini	Soymida febrifuga	Meliaceae	Least Concern
147	Ambada	Spondias pinnata	Anacardiaceae	Least Concern
148	Panikodala	Sterculia colorata	Malvaceae	Least Concern
149	Giridhini	Sterculia urens	Malvaceae	Least Concern
150	Kodala	Sterculia villosa	Malvaceae	Least Concern
151	Chhuipatali	Stereospermum angustifolium	Bignoniaceae	–
152	Patuli (Barapatuli)	Stereospermum chelonoides	Bignoniaceae	Least Concern
153	Sahada	Streblus asper	Moraceae	Least Concern
154	Kochila	Strychnos nux-vomica	Loganiaceae	Least Concern
155	Kotokol (Katak)	Strychnos potatorum	Loganiaceae	–
156	Lodha	Symplocos racemosa	Symplocaceae	Least Concern
157	Jamun	Syzygium cumini	Myrtaceae	Least Concern
158	Poijamu	Syzygium operculatum	Myrtaceae	–
159	Tentuli	Tamarindus indica	Fabaceae	Least Concern
160	Saguan (Teak)	Tectona grandis	Lamiaceae	Least Concern
161	Asana	Terminalia alata	Combretaceae	Least Concern
162	Arjuna	Terminalia arjuna	Combretaceae	Least Concern
163	Bahada	Terminalia bellirica	Combretaceae	Least Concern
164	Badam (Deshi)	Terminalia catappa	Combretaceae	Least Concern
165	Harida	Terminalia chebula	Combretaceae	Least Concern
166	Asan	Terminalia tomentosa	Combretaceae	–
167	Toon	Toona ciliata	Meliaceae	Least Concern

168	Kharkhas	Trema orientale	Cannabaceae	Least Concern
169	Panigambhari	Trewia nudiflora	Euphorbiaceae	Least Concern
170	Charaiguri	Vitex leucoxylon	Lamiaceae	Least Concern
171	Chadeigudi	Vitex peduncularis	Lamiaceae	Least Concern
172	Tilai	Wendlandia tinctoria	Rubiaceae	Least Concern
173	Pitakarichio	Wrightia arborea	Apocynaceae	Least Concern
174	Tangini	Xylia dolabriformis	Fabaceae	Least Concern
175	Kangada, Tangan	Xylia xylocarpa	Fabaceae	Least Concern
176	Ghantol	Ziziphus glaberrima	Rhamnaceae	–
177	Borkuli	Ziziphus mauritiana	Rhamnaceae	Least Concern
178	Ghanta	Ziziphus xylopyra	Rhamnaceae	Least Concern

ANNEXURE II – List of Shrub species of Netrabandh pahar landscape

S.No.	VERNACULAR NAME	BOTANICAL NAME	FAMILY	IUCN
1	Kakusia	Strobilanthes scaber	Acanthaceae	–
2	Basanga	Adhatoda vasica	Acanthaceae	–
3	Basanga	Adhatoda zeylanica	Acanthaceae	–
4	Gulsham	Eranthemum purpurascens	Acanthaceae	–
5	Basanga	Justicia adhatoda	Acanthaceae	–
6	Iswarjata	Celosia cristata	Amaranthaceae	–
7	Ata	Anona squamosa	Annonaceae	–
8	Anantamula	Hemidesmus indicus	Apocynaceae	–
9	Koli	Carissa carandas	Apocynaceae	–
10	Ankhukoli	Carissa opaca	Apocynaceae	–
11	Ankhukoli	Carissa spinarum	Apocynaceae	–
12	Kurei	Holarrhena pubescens	Apocynaceae	–
13	Karabira	Nerium indicum	Apocynaceae	–
14	Patalgaruda	Rauwolfia serpentina	Apocynaceae	–
15	Arakha	Calotropis gigantea	Apocynaceae	–
16	Arakha	Calotropis procera	Apocynaceae	–
17	Jari	Schefflera venulosa	Araliaceae	–
18	Bankhajuri	Phoenix acaulis	Arecaceae	–
19	Baramasi	Agave americana	Asparagaceae	–
20	Satabari	Asparagus racemosus	Asparagaceae	–
21	Eupatorium	Eupatorium perfoliatum	Asteraceae	–
22	Chromolaena/eupatorium	Chromolaena/eupatorium odorata	Asteraceae	–
23	Bisalyakarani	Tridax procumbens	Asteraceae	–
24	Agnijhal	Vernonia aspera	Asteraceae	–
25	Agnijal	Vernonia cinerea	Asteraceae	–
26	Agnijhal	Vernonia roxburghii	Asteraceae	–
27	Phanphana (Phapundi)	Oroxylum indicum	Bignoniaceae	–

28	Jojoka	Commiphora caudata	Burseraceae	–
29	Saptapheni	Opuntia dillenii	Cactaceae	–
30	Nagapheni	Opuntia vulgaris	Cactaceae	–
31	Bhanga	Cannabis sativa	Cannabaceae	–
32	Asadhua	Capparis zeylanica	Capparaceae	–
33	Badichang	Symphorema polyandrum	Convolvulacea e	–
34	Arguna	Cycas circinalis	Cycadaceae	Endanger ed
35	Guakuli	Diospyros ferrea	Ebenaceae	–
36	Kantasiju	Euphorbia nivulia	Euphorbiaceae	–
37	Baigaba	Jatropha gossypifolia	Euphorbiaceae	–
38	Lankajada	Ricinus communis	Euphorbiaceae	–
39	Mossu	Aporosa dioica	Euphorbiaceae	–
40	Lajwanti (Lajkulilata)	Mimosa pudica	Fabaceae	–
41	Banbiri	Vigna radiata	Fabaceae	–
42	Ban kulthi	Atylosia scarabaeoides	Fabaceae	–
43	Budel, Murdha	Butea parviflora	Fabaceae	–
44	Chakunda, (Chhotachakunda)	Cassia tora	Fabaceae	–
45	Rani Dantakati	Flemingia chappar	Fabaceae	–
46	Rani Dantakati(Salpini)	Flemingia paniculata	Fabaceae	–
47	Girelphool	Indigofera cassioides	Fabaceae	–
48	Giliri	Indigofera pulchella	Fabaceae	–
49	Kirkichikanta	Mimosa rubicaulis	Fabaceae	–
50	Gila	Caesalpinia decapetala	Fabaceae	–
51	Gayatulasi	Leucas aspera	Lamiaceae	–
52	Tulshi	Ocimum sanctum	Lamiaceae	–
53	Bana tulasi	Oscimum basilicum	Lamiaceae	–
54	Pokusunga	Pogostemon plectranthoides	Lamiaceae	–
55	Kumti (Telgunia)	Clerodendron viscosum	Lamiaceae	–
56	Chiani	Clerodendrum inerme	Lamiaceae	–
57	Agabadhu	Premna obtusifolia	Lamiaceae	–
58	Begunia	Vitex negundo	Lamiaceae	–

59	Sablia	Actinodaphne angustifolia	Lauraceae	–
60	Madanga	Loranthus longiflorus	Loranthaceae	–
61	Kathamanjuati	Lawsonia inermis	Lythraceae	–
62	Dhatki or Jhatki	Woodfordia fruticosa	Lythraceae	Least Concern
63	Sonaragoda	Grewia helicterifolia	Malvaceae	–
64	Lal Berela	Sida rhombifolia	Malvaceae	–
65	Bajramuli	Sida spinosa	Malvaceae	–
66	Gangai	Melastoma malabathricum	Melastomataceae	–
67	Nalbali	Cipadessa fruticosa	Meliaceae	–
68	Nahalbeil	Cipadessa baccifera	Meliaceae	–
69	KaskasiJhari	Ficus parasitica	Moraceae	–
70	Baibiring	Embelia robusta	Myrsinaceae	–
71	Banamalli	Jasminum arborescens	Oleaceae	–
72	Gangasiuli	Nyctanthes arbor tristis	Oleaceae	–
73	Jajangi	Phyllanthus collinus	Phyllanthaceae	–
74	NarasinghKhara	Ardisia solenacea	Primulaceae	–
75	Kanteikoli	Ziziphus oenoplia	Rhamnaceae	–
76	Potua	Catunaregam nutans	Rubiaceae	–
77	Telkoruan	Ixora parviflora	Rubiaceae	–
78	Jhumpuri	Phyllochlamys spinosa	Rubiaceae	–
79	Dalsingha	Canthium glabrum	Rubiaceae	–
80	Salra	Cantunaregam nutans	Rubiaceae	–
81	Narguni	Atalantia monophylla	Rutaceae	–
82	Kamini	Murraya paniculata	Rutaceae	–
83	Kamini	Murraya exotica	Rutaceae	–
84	Baincha	Flacourtia sepiaria	Salicaceae	–
85	Aswagandha	Withania somnifera	Solanaceae	–
86	Muraphal	Helicteres isora	Sterculiaceae	–
87	Lantana (Bholupodi)	Lantana camara	Verbenaceae	–
88	Badichand	Symphorea polyandrum	Verbenaceae	–
89	Banachiretia	Leea asiatica	Vitaceae	–

ANNEXURE III – List of Climbers of Netrabandh pahar landscape

S. No.	VERNACULAR NAME	BOTANICAL NAME	FAMILY
1	Malati	Aganosma caryophyllata	Apocynaceae
2	Dhudhiali	Cryptolepis buchanani	Apocynaceae
3	Gudmari	Gymnema sylvestre	Apocynaceae
4	SuamNoi	Ichnocarpus frutescens	Apocynaceae
5	Raigidi	Pentatropis capensis	Apocynaceae
6	Uturdi	Pergularia extensa	Apocynaceae
7	Beta	Calamus tenuis	Arecaceae
8	Kanta Beta	Calamus guruba	Arecaceae
9	Pani Beta	Calamus viminalis	Arecaceae
10	Malkamni, Korsana	Celastrus paniculata	Celastraceae
11	Achindi	Calycopteris floribunda	Combretaceae
12	Atundi	Combretum decandrum	Combretaceae
13	Baghchaar	Argyreia setosa	Convolvulaceae
14	Durkoli	Erycibe paniculata	Convolvulaceae
15	Kalama	Ipomea aquatica	Convolvulaceae
16	Kunjalata	Ipomoea quamoclit	Convolvulaceae
17	Paniloi	Merremia umbellata	Convolvulaceae
18	Amari	Ipomoea fistulosa	Convolvulaceae
19	Kankada	Momordica dioica	Cucurbitaceae
20	Matka	Solena amplexicaulis	Cucurbitaceae
21	Banakunduri	Trichosanthes cucumerina	Cucurbitaceae
22	Makirla	Trichosanthes tricuspidata	Cucurbitaceae
23	Karaba	Dioscorea pentaphylla	Dioscoreaceae
24	Desialu	Dioscorea alata	Dioscoreaceae
25	Kosa Alu	Dioscorea anguina	Dioscoreaceae
26	Korondia Alu	Dioscorea belophylla	Dioscoreaceae
27	Pita Alu	Dioscorea bulbifera	Dioscoreaceae
28	Kanta Alu	Dioscorea glabra	Dioscoreaceae
29	Bana alu	Dioscorea hispida	Dioscoreaceae
30	Pani Alu	Dioscorea oppositifolia	Dioscoreaceae
31	Kosa-alu	Dioscorea pubera	Dioscoreaceae

32	Tunga Alu	Dioscorea wallichii	Dioscoreaceae
33	Bichhuati	Tragia involucrata	Euphorbiaceae
34	Kaincha	Abrus precatorius	Fabaceae
35	Dantari	Acacia pennata	Fabaceae
36	Siali	Bauhinia vahlii	Fabaceae
37	Lata palas	Butea superba	Fabaceae
38	Nentei	Caesalpinia crista	Fabaceae
39	Maharada	Canavalia ensiformis	Fabaceae
40	Kathakatrirani	Dalbergia candenatensis	Fabaceae
41	Gohirakanta	Dalbergia spinosa	Fabaceae
42	Kalakatirani	Derris trifoliata	Fabaceae
43	Arsi / Gila	Entada scandens	Fabaceae
44	Marda	Milletta racemosa	Fabaceae
45	Mardalai	Millettia auriculata	Fabaceae
46	Baidank	Mucuna monosperma	Fabaceae
47	Baidank	Mucuna pruriens	Fabaceae
48	Handiphuta	Pueraria tuberosa	Fabaceae
49	Bahumruga	Flagellaria indica	Flagellariaceae
50	Mrigalendi	Gnetum scandens	Gnetaceae
51	Latanageshwar	Hiptage madablota	Malpighiaceae
52	Akanbindhi	Cissampelos pareira	Menispermaceae
53	Gulichi	Tinospora cordifolia	Menispermaceae
54	Koko aru	Olax scandens	Olacaceae
55	Bhadalia(Kara)	Opilia amentacea	Opiliaceae
56	Pipali	Piper longum	Piperaceae
57	Chitaparu	Plumbago zeylanica	Plumbaginaceae
58	Pichhuli	Gouania leptostachya	Rhamnaceae
59	PichhuliNoi	Gouania tiliaefolia	Rhamnaceae
60	Prasaruni	Paederia scandens	Rubiaceae
61	Muturi	Smilax macrophylla	Smilacaceae
62	Mutri	Smilax perfoliata	Smilacaceae
63	Muthuri	Smilax zeylanica	Smilacaceae
64	Hadabhanga	Cissus quadrangularis	Vitaceae
65	Pankanch	Vitis spp.	Vitaceae

ANNEXURE IV – List of Herbs and Grasses of Netrabandh pahar landscape

S.No.	VERNACULAR NAME	BOTANICAL NAME.	FAMILY	Habit
1	Bhuineem (Chireita)	Andrographis paniculata	Acanthaceae	Herb
2	Dandipohala	Canseora decussata	Acanthaceae	Herb
3	–	Ruellia beddomei	Acanthaceae	Herb
4	Apamaranga	Achyranthes aspera	Amaranthaceae	Herb
5	Mundia saga	Allmania nodiflora	Amaranthaceae	Herb
6	Ganjachulia	Celosia argentea	Amaranthaceae	Herb
7	-	Peucedanum nagpurense	Apiaceae	Herb
8	Ban olua	Amorphophallus bulbifer	Araceae	Herb
9	Rudrajata	Aristolochia indica	Aristolochiaceae	Herb
10	Biskandari	Chlorophytum aurindinaceum	Asparagaceae	Herb
11	Murga	Sansevieria roxburghiana	Asparagaceae	Herb
12	Ghikuari	Aloe vera	Asphodelaceae	Herb
13	Pokasunga	Ageratum conyzoides	Asteraceae	Herb
14	Samdulan	Elephantopus scaber	Asteraceae	Herb
15	Gazar ghaas	Parthenium hysterophorus	Asteraceae	Herb
16	Haldigundi	Spilanthes calva	Asteraceae	Herb
17	Bhurngaraj	Wedelia calendulacea	Asteraceae	Herb
18	Hatisundha	Heliotropium indicum	Boraginaceae	Herb
19	Banachanda	Cleome viscosa	Cleomaceae	Herb
20	Day flower (Kansiri)	Commelina benghalensis	Commelinaceae	Herb
21	Nirmuli	Cuscuta spp.	Convolvulaceae	Herb
22	Gaigobara	Costus speciosus	Costaceae	Herb
23	Amarpoi	Bryophyllum calycinum	Crassulaceae	Herb
24	Bhuinchakunda	Cassia obtusifolia	Fabaceae	Herb
25	Salaparni	Desmodium gangeticum	Fabaceae	Herb
26	Salpani, Krishnupani	Desmodium polycarpum	Fabaceae	Herb

27	Nilachara	Indigofera trita	Fabaceae	Herb
28	Talmuli	Cuculigo orchioides	Hypoxidaceae	Herb
29	Bhutamari	Anisomeles indica	Lamiaceae	Herb
30	Gongatulasi	Hyptis suaveolens	Lamiaceae	Herb
31	Barcha	Leonotis nepetifolia	Lamiaceae	Herb
32	Tulasi (dhala)	Ocimum basilicum	Lamiaceae	Herb
33	Kuranti	Ammannia baccifera	Lythraceae	Herb
34	Baidyachhanapata	Triumfetta rhomboidea	Malvaceae	Herb
35	Baghanakhi	Martynia diandra	Martyniaceae	Herb
36	Banakadali	Musa balbisiana	Musaceae	Herb
37	Sarpuni	Argemone mexicana	Papaveraceae	Herb
38	Bhui-aonia	Phyllanthus niruri	Phyllanthaceae	Herb
39	Dudura	Datura stramonium	Solanaceae	Herb
40	Ankaranti	Solanum surattense	Solanaceae	Herb
41	Ankaranti	Solanum xanthocarpum	Solanaceae	Herb
42	Bichhuati	Urtica dioica	Urticaceae	Herb
43	Jalajali	Stachytarpheta indica	Verbenaceae	Herb
44	Ambaada	Curcuma amada	Zingiberaceae	Herb
45	Banapalua	Curcuma angustifolia	Zingiberaceae	Herb
46	Karkhasi	Curcuma aromatica	Zingiberaceae	Herb
47	Haldi	Curcuma longa	Zingiberaceae	Herb
48	Chhana	Apluda mutica	Poaceae	Grass
49	Ghodalanja	Aristida setacea	Poaceae	Grass
50	Daba	Bambusa arundinacea	Poaceae	Grass
51	Indian Blue Grass	Bothriochloa pertusa	Poaceae	Grass
52	Dungi	Cephalostachyum pergracile	Poaceae	Grass
53	Banalanka	Chloris pallida	Poaceae	Grass
54	Guguchia	Chrysopogon aciculatus	Poaceae	Grass
55	Dhanwantary	Cymbopogon citratus	Poaceae	Grass
56	Duba grass	Cynodon dactylon	Poaceae	Grass
57	Bamboo	Dendrocalamus strictus	Poaceae	Grass
58	Marvel grass	Dichanthium annulatum	Poaceae	Grass
59	Nandi blue grass	Dichanthium caricosum	Poaceae	Grass

60	Panighasa	Eragrostis spp.	Poaceae	Grass
61	Bogai/Sabai/Panasi	Eulaliopsis binata	Poaceae	Grass
62	Spear grass(Sinkola)	Heteropogon contortus	Poaceae	Grass
63	Thatch grass	Imperata cylindrica	Poaceae	Grass
64	Nalia	Myriostachya wightiana	Poaceae	Grass
65	Babuli	Pollinidium angustifolium	Poaceae	Grass
66	Kasatandi	Saccharum spontaneum	Poaceae	Grass
67	Foxtail grass	Setaria glauca	Poaceae	Grass
68	Broom	Thysanolaena maxima	Poaceae	Grass
69	Khas-khas	Vetiveria zizanioides	Poaceae	Grass

ANNEXURE V – Herpetofauna recorded in the Netrabandh pahar landscape

S.No.	Common names	Scientific names	Species Presence	WPA, 2022	IUCN
1	**Boidae**				
1	Common Sand Boa	*Eryx conicus*		II	Least Concern
2	Red Sand Boa	*Eryx johnii*		I	Near Threatened
2	**Colubridae**				
3	Indian Vine Snake	*Ahaetulla nasuta*		II	Least Concern
4	Buff striped keelback	*Amphiesma stolatum*		II	Least Concern
5	Copper-headed Trinket	*Coelognathus radiatus*		II	Least Concern
6	Bronze-back Tree Snake	*Dendrelaphis tristis*		II	Least Concern
7	Checkered Keelback	*Fowlea piscator*		I	Least Concern
8	Indian wolf snake	*Lycodon aulicus*		II	Least Concern
9	Green Keelback	*Macropisthodon plumbicolor*		II	Least Concern
10	Rat Snake	*Ptyas mucosa*		I	Least Concern
3	**Elapidae**				
11	Common Indian Krait	*Bungarus caeruleus*		II	Least Concern
12	Banded Krait	*Bungarus fasciatus*		II	Least Concern
13	Monocled Cobra	*Naja kaouthia*	Uncertain	I	Least Concern
14	Indian Cobra	*Naja naja*		I	Least Concern
15	King Cobra	*Ophiophagus hannah*		I	Vulnerable
4	**Pythonidae**				
16	Indian Python	*Python molurus*		I	Near Threatened

5	**Typhlopidae**				
17	Blind Snake	*Indotyphlops braminus*		II	Least Concern
6	**Viperidae**				
18	Russell's Viper	*Daboia russelii*		I	Least Concern
19	Saw-scaled Viper	*Echis carinatus*		II	Least Concern
20	Bamboo Pit Viper	*Trimeresurus gramineus*		II	Least Concern
7	**Agamidae**				
21	Oriental Garden Lizard	*Calotes versicolor*		–	Least Concern
8	**Chamaeleonidae**				
22	Indian Chameleon	*Chamaeleo zeylanicus*		I	Least Concern
9	**Crocodylidae**				
23	Freshwater Crocodile (Mugger)	*Crocodylus palustris*		I	Vulnerable
10	**Eublepharidae**				
24	Fat-tailed Gecko	*Hemitheconyx caudicinctus (mainly African species)*			–
11	**Gavialidae**				
25	Gharial	*Gavialis gangeticus*	Uncertain	I	Critically Endangered
12	**Gekkonidae**				
26	Banded Gecko	*Cyrtodactylus spp.*		II	–
27	House Lizard (Common House Gecko)	*Hemidactylus frenatus*			Least Concern
28	Rock Gecko	*Hemidactylus maculatus*			Least Concern
29	Spotted House Gecko	*Hemidactylus parvimaculatus*			–
30	Termite Hill Gecko	*Hemidactylus triedrus*			–
13	**Scincidae**				

31	Skink / Mabuya	*Eutropis carinata*			Least Concern
14	**Varanidae**				
32	Bengal Monitor	*Varanus bengalensis*		I	Near Threatened
33	Yellow Monitor Lizard	*Varanus flavescens*		I	Endangered
34	Water Monitor	*Varanus salvator*		I	Least Concern
15	**Bufonidae**				
35	Common Indian Toad	*Duttaphrynus melanostictus*		–	Least Concern
36	Schneider's Toad	*Duttaphrynus scaber*		–	Least Concern
37	Marbled Toad	*Duttaphrynus stomaticus*		–	Least Concern
16	**Dicroglossidae**				
38	Skittering Frog	*Euphlyctis cyanophlyctis*		II	Least Concern
39	Paddy Field Frog	*Fejervarya limnocharis*		–	Least Concern
40	Orissa Frog	*Fejervarya orissaensis*		II	Least Concern
41	Jerdon's Bullfrog	*Hoplobatrachus crassus*		–	Least Concern
42	Indian Bullfrog	*Hoplobatrachus tigerinus*		II	Least Concern
43	Indian Burrowing Frog	*Sphaerotheca breviceps*		–	Least Concern
44	Marbled Sand Frog	*Sphaerotheca rolandae*		–	–
17	**Microhylidae**				
45	Balloon Frog	*Uperodon systoma*		–	Least Concern
18	**Ranidae**				
46	Wide-spread Fungoid Frog	*Hydrophylax bahuvistara*		–	–
47	Theobald's Randid Frog	*Hylarana tytleri*		–	Least Concern
19	**Rhacophoridae**				
48	Terai tree Frog	*Polypedates teraiensis*		II	Least Concern

49	Sacred Grove Bush Frog	*Raorchestes sanctisilvaticus*		–	Critically Endangered
20	**Geoemydidae**				
50	Indian Tent Turtle	*Pangshura tentoria*	Uncertain	I	Least Concern
21	**Testudinidae**				
51	Indian Star Tortoise	*Geochelone elegans*		I	Vulnerable
52	Elongated Tortoise	*Indotestudo elongata*	Uncertain	–	Critically Endangered
22	**Trionychidae**				
53	Flap-shelled Turtle	*Lissemys punctata*		I	Least Concern

ANNEXURE VI – Bird species recorded in the of Netrabandh pahar landscape

S.No.	Common names	Scientific names	WPA 2022	IUCN
1	**Accipitridae**			
1	Shikra	*Accipiter badius*	I	Least Concern
2	White-eyed Buzzard	*Butastur teesa*	I	Least Concern
3	Marsh Harrier	*Circus aeruginosus*	I	Least Concern
4	Pallid Harrier	*Circus macrourus*	I	Least Concern
6	Brahminy Kite	*Haliastur indus*	I	Least Concern
7	Black Kite	*Milvus migrans*	II	Least Concern
8	Crested Hawk-Eagle	*Nisaetus cirrhatus*	I	Least Concern
9	Crested Serpent Eagle	*Spilornis cheela*	I	Least Concern
2	**Aegithinidae**			
10	Common Iora	*Aegithina tiphia*	II	Least Concern
3	**Alaudidae**			
11	Singing Bush Lark	*Mirafra cantillans*	II	Least Concern
4	**Alcedinidae**			
12	Common Kingfisher	*Alcedo atthis*	II	Least Concern
13	Pied Kingfisher	*Ceryle rudis*	II	Least Concern
14	Stork-billed Kingfisher	*Pelargopsis capensis*	II	Least Concern
5	**Anatidae**			
15	Common Teal	*Anas crecca*	II	Least Concern
16	Indian Spot-billed Duck	*Anas poecilorhyncha*	II	Least Concern
17	Lesser Whistling Duck	*Dendrocygna javanica*	II	Least Concern
18	Cotton Pygmy Goose	*Nettapus coromandelianus*	II	Least Concern
19	Ruddy Shelduck	*Tadorna ferruginea*	II	Least Concern
6	**Apodidae**			
20	House Swift	*Apus nipalensis*	II	Least Concern
21	Little swift	*Apus affinis*	II	Least Concern
7	**Ardeidae**			
22	Purple Heron	*Ardea purpurea*	II	Least Concern
23	Indian Pond Heron	*Ardeola grayii*	II	Least Concern
24	Cattle Egret	*Bubulcus ibis*	II	Least Concern
25	Little Egret	*Egretta garzetta*	II	Least Concern

26	Black-crowned Night Heron	*Nycticorax nycticorax*	II	Least Concern
8	**Bucerotidae**			
27	Indian Grey Hornbill	*Ocyceros birostris*	II	Least Concern
9	**Campephagidae**			
28	Scarlet Minivet	*Pericrocotus speciosus*	II	Least Concern
10	**Caprimulgidae**			
29	Indian Nightjar	*Caprimulgus asiaticus*	II	Least Concern
11	**Charadriidae**			
30	Little Ringed Plover	*Charadrius dubius*	II	Least Concern
31	Red-wattled Lapwing	*Vanellus indicus*	II	Least Concern
32	Yellow-wattled Lapwing	*Vanellus malabaricus*	II	Least Concern
12	**Chloropseidae**			
33	Golden-fronted Leafbird	*Chloropsis aurifrons*	II	Least Concern
13	**Ciconiidae**			
34	Asian Openbill Stork	*Anastomus oscitans*	II	Least Concern
35	Painted Stork	*Mycteria leucocephala*	II	Least Concern
14	**Cisticolidae**			
36	Common Tailorbird	*Orthotomus sutorius*	II	Least Concern
37	Rufous-fronted Prinia	*Prinia buchanani*	I	Least Concern
38	Plain Prinia	*Prinia inornata*	II	Least Concern
39	Ashy Prinia	*Prinia socialis*	II	Least Concern
15	**Columbidae**			
40	Emerald Dove	*Chalcophaps indica*	II	Least Concern
41	Rock Pigeon	*Columba livia*	–	Least Concern
42	Spotted Dove	*Spilopelia chinensis*	II	Least Concern
43	Eurasian Collared Dove	*Streptopelia decaocto*	II	Least Concern
44	Yellow-footed Green Pigeon	*Treron phoenicopterus*	II	Least Concern
16	**Coraciidae**			
45	Indian Roller	*Coracias benghalensis*	II	Least Concern
17	**Corvidae**			
46	Jungle Crow	*Corvus macrorhynchos*	II	Least Concern
47	House Crow	*Corvus splendens*	II	Least Concern

48	Rufous Treepie	*Dendrocitta vagabunda*	II	Least Concern
18	**Cuculidae**			
49	Greater Coucal	*Centropus sinensis*	II	Least Concern
50	Pied Cuckoo	*Clamator jacobinus*	II	Least Concern
51	Common Cuckoo	*Cuculus canorus*	II	Least Concern
52	Indian Cuckoo	*Cuculus micropterus*	II	Least Concern
53	Asian Koel	*Eudynamys scolopaceus*	II	Least Concern
19	**Dicaeidae**			
54	Thick-billed Flowerpecker	*Dicaeum agile*	II	Least Concern
55	Pale-billed Flowerpecker	*Dicaeum erythrorhynchos*	II	Least Concern
20	**Dicruridae**			
56	Black Drongo	*Dicrurus macrocercus*	II	Least Concern
21	**Dicruridae**			
57	Racket-tailed Drongo	*Dicrurus paradiseus*	II	Least Concern
22	**Estrildidae**			
58	Scaly-breasted Munia	*Lonchura punctulata*	II	Least Concern
23	**Falconidae**			
59	Peregrine Falcon	*Falco peregrinus*	I	Least Concern
60	Common Kestrel	*Falco tinnunculus*	II	Least Concern
24	**Halcyonidae**			
61	White-throated Kingfisher	*Halcyon smyrnensis*	II	Least Concern
25	**Hirundinidae**			
62	Wire-tailed Swallow	*Hirundo smithii*	II	Least Concern
26	**Jacanidae**			
63	Bronze-winged Jacana	*Metopidius indicus*	II	Least Concern
27	**Laridae**			
64	River Tern	*Sterna aurantia*	I	Vulnerable
28	**Leiothrichidae**			
65	Common Babbler	*Argya caudata*	II	Least Concern
66	Large Grey Babbler	*Argya malcolmi*	II	Least Concern
67	Jungle Babbler	*Argya striata*	II	Least Concern
29	**Megalaimidae**			
68	Coppersmith Barbet	*Psilopogon haemacephalus*	II	Least Concern

69	Brown-headed Barbet	*Psilopogon zeylanicus*	II	Least Concern
30	**Meropidae**			
70	Chestnut-headed Bee-eater	*Merops leschenaulti*	II	Least Concern
71	Asian Green Bee-eater	*Merops orientalis*	II	Least Concern
72	Blue-tailed Bee-eater	*Merops philippinus*	II	Least Concern
31	**Monarchidae**			
73	Black-naped Monarch	*Hypothymis azurea*	II	Least Concern
74	Paradise Flycatcher	*Terpsiphone paradisi*	II	Least Concern
32	**Motacillidae**			
75	Paddyfield Pipit	*Anthus rufulus*	II	Least Concern
76	Tree Pipit	*Anthus trivialis*	II	Least Concern
77	White Wagtail	*Motacilla alba*	II	Least Concern
78	Citrine Wagtail	*Motacilla citreola*	II	Least Concern
79	White-browed Wagtail	*Motacilla maderaspatensis*	II	Least Concern
33	**Muscicapidae**			
80	Indian Robin	*Copsychus fulicatus*	II	Least Concern
81	White-rumped Shama	*Copsychus malabaricus*	II	Least Concern
82	Oriental Magpie Robin	*Copsychus saularis*	II	Least Concern
83	Blue-throated Flycatcher	*Cyornis rubeculoides*	II	Least Concern
84	Tickell's Blue Flycatcher	*Cyornis tickelliae*	II	Least Concern
85	Verditer Flycatcher	*Eumyias thalassinus*	II	Least Concern
86	Red-breasted Flycatcher	*Ficedula parva*	II	Least Concern
34	**Nectariniidae**			
87	Purple Sunbird	*Cinnyris asiaticus*	II	Least Concern
88	Purple-rumped Sunbird	*Leptocoma zeylonica*	II	Least Concern
35	**Oriolidae**			
89	Black-headed Oriole	*Oriolus chinensis*	II	Least Concern
36	**Pandionidae**			
90	Osprey	*Pandion haliaetus*	I	Least Concern
37	**Paridae**			
91	Yellow-cheeked Tit	*Machlolophus spilonotus*	II	Least Concern
38	**Passeridae**			
92	Chestnut-shouldered Petronia	*Gymnoris xanthocollis*	II	Least Concern
93	House Sparrow	*Passer domesticus*	II	Least Concern

39	**Phalacrocoracidae**			
94	Little Cormorant	*Microcarbo niger*	II	Least Concern
40	**Phasianidae**			
95	Painted Francolin	*Francolinus pictus*	II	Least Concern
96	Grey Francolin	*Francolinus pondicerianus*	II	Least Concern
97	Painted Spurfowl	*Galloperdix lunulata*	II	Least Concern
98	Red Spurfowl	*Galloperdix spadicea*	II	Least Concern
99	Red Junglefowl	*Gallus gallus*	II	Least Concern
100	Indian Peafowl	*Pavo cristatus*	I	Least Concern
101	Jungle Bush Quail	*Perdicula asiatica*	II	Least Concern
41	**Picidae**			
102	Golden-backed Woodpecker	*Dinopium benghalense*	II	Least Concern
103	Pygmy Woodpecker	*Yungipicus nanus*	II	Least Concern
42	**Pittidae**			
104	Indian Pitta	*Pitta brachyura*	II	Least Concern
43	**Ploceidae**			
105	Baya weaver	*Ploccus phillipinus*	II	Least Concern
44	**Podicipedidae**			
106	Little Grebe	*Tachybaptus ruficollis*	II	Least Concern
45	**Psittaculidae**			
107	Plum-headed Parakeet	*Psittacula cyanocephala*	II	Least Concern
108	Alexandrine Parakeet	*Psittacula eupatria*	II	Near Threatened
109	Rose-ringed Parakeet	*Psittacula krameri*	II	Least Concern
46	**Pycnonotidae**			
110	Red-vented Bulbul	*Pycnonotus cafer*	II	Least Concern
111	Red-whiskered Bulbul	*Pycnonotus jocosus*	II	Least Concern
112	White-browed Bulbul	*Pycnonotus luteolus*	II	Least Concern
47	**Rallidae**			
113	White-breasted Waterhen	*Amaurornis phoenicurus*	II	Least Concern
114	Common Moorhen	*Gallinula chloropus*	II	Least Concern
48	**Recurvirostridae**			
115	Black-winged Stilt	*Himantopus himantopus*	II	Least Concern
49	**Rhipiduridae**			

116	White-throated Fantail	*Rhipidura albicollis*	II	Least Concern
117	White-spotted Fantail	*Rhipidura aureola*	II	Least Concern
50	**Scolopacidae**			
118	Common Sandpiper	*Actitis hypoleucos*	II	Least Concern
119	Common Snipe	*Gallinago gallinago*	II	Least Concern
51	**Stenostiridae**			
120	Grey-headed Canary-flycatcher	*Culicicapa ceylonensis*	II	Least Concern
52	**Strigidae**			
121	Spotted Owlet	*Athene brama*	II	Least Concern
122	Indian Eagle-Owl	*Bubo bengalensis*	I	Least Concern
123	Eurasian Scops-Owl	*Otus scops*	II	Least Concern
53	**Sturnidae**			
124	Jungle Myna	*Acridotheres fuscus*	II	Least Concern
125	Bank Myna	*Acridotheres ginginianus*	II	Least Concern
126	Common Myna	*Acridotheres tristis*	II	Least Concern
127	Hill Myna	*Gracula religiosa*	I	Least Concern
128	Asian Pied Starling	*Gracupica contra*	II	Least Concern
129	Common Starling	*Sturnus vulgaris*	II	Least Concern
54	**Sylviidae**			
130	Yellow-eyed Babbler	*Chrysomma sinense*	II	Least Concern
55	**Threskiornithidae**			
131	Red-naped Ibis (Indian Black Ibis)	*Pseudibis papillosa*	II	Least Concern
132	Black-headed Ibis	*Threskiornis melanocephalus*	II	Least Concern
56	**Timaliidae**			
133	Tawny-bellied Babbler	*Dumetia hyperythra*	II	Least Concern
57	**Turdidae**			
134	Orange-headed Thrush	*Geokichla citrina*	II	Least Concern
58	**Turnicidae**			
135	Barred Buttonquail	*Turnix suscitator*	II	Least Concern
59	**Upupidae**			
136	Eurasian Hoopoe	*Upupa epops*	II	Least Concern

ANNEXURE VII – Mammalian fauna recorded in the of Netrabandh pahar landscape

S.No	Common names	Scientific names	Species presence	WPA 2022	IUCN
1	**Bovidae**				
1	Indian Gaur	Bos gaurus	Uncertain	I	Vulnerable
2	Nilgai (Blue Bull)	Boselaphus tragocamelus	Uncertain	II	Least Concern
3	Four-horned Antelope	Tetracerus quadricornis		I	Vulnerable
2	**Canidae**				
4	Golden Jackal	Canis aureus		I	Least Concern
5	Indian Grey Wolf	Canis lupus pallipes		I	Least Concern
6	Bengal Fox	Vulpes bengalensis		I	Least Concern
3	**Cercopithecidae**				
7	Rhesus Macaque	Macaca mulatta		–	Least Concern
8	Northern Plains Grey Langur	Semnopithecus entellus		II	Least Concern
4	**Cervidae**				
9	Chital (Spotted Deer)	Axis axis		II	Least Concern
10	Barking Deer (Indian Muntjac)	Muntiacus muntjak		I	Least Concern
11	Sambar Deer	Rusa unicolor	Uncertain	I	Vulnerable
5	**Elephantidae**				
12	Asian Elephant	Elephas maximus indicus		I	Endangered
6	**Emballonuridae**				
13	Black-beared Tomb Bat	Taphozous melanopogon		–	Least Concern
7	**Felidae**				
14	Jungle Cat	Felis chaus		I	Least Concern
15	Indian Leopard	Panthera pardus fusca		I	Vulnerable
16	Bengal Tiger	Panthera tigris tigris		I	Endangered

17	Leopard Cat	Prionailurus bengalensis		I	Least Concern
18	Rusty-spotted cat	Prionailurus rubiginosus		I	Least Concern
19	Fishing Cat	Prionailurus viverrinus	Uncertain	I	Vulnerable
8	**Herpestidae**				
20	Indian Grey Mongoose	Urva edwardsii		I	Least Concern
21	Ruddy mongoose	Urva smithii		I	Least Concern
9	**Hyaenidae**				
22	Striped Hyena	Hyaena hyaena		I	Near Threatened
10	**Hystricidae**				
23	Indian Crested Porcupine	Hystrix indica		I	Least Concern
11	**Leporidae**				
24	Indian Hare	Lepus nigricollis		II	Least Concern
12	**Manidae**				
25	Indian Pangolin	Manis crassicaudata		I	Endangered
13	**Muridae**				
26	Lesser bandicoot rat	Bandicota bengalensis		–	Least Concern
27	Large bandicoot rat	Bandicota indica		–	Least Concern
28	Indian bush rat	Golunda ellioti		–	Least Concern
29	White-tailed Woodrat	Madromys blanfordi		–	Least Concern
30	Indian field mouse	Mus booduga		–	Least Concern
31	House Mouse	Mus musculus		–	Least Concern
32	Mole rat	Nesokia indica		–	Least Concern
33	House rat	Rattus rattus		–	Least Concern
34	Indian Gerbil	Tatera indica		–	Least Concern

35	Long-tailed Tree Mouse	Vandeleuria oleracea		–	Least Concern
14	**Mustelidae**				
36	Smooth-coated Otter	Lutrogale perspicillata		I	Vulnerable
37	Honey Badger (Ratel)	Mellivora capensis		I	Least Concern
15	**Pteropodidae**				
38	Short-nosed Fruit Bat	Cynopterus sphinx		–	Least Concern
39	Indian Flying Fox	Pteropus giganteus		II	Least Concern
40	Fruit bat	Rousettus leschenaultii		–	Near Threatened
16	**Sciuridae**				
41	Three-striped Palm Squirrel	Funambulus palmarum		–	Least Concern
42	Five-striped Palm Squirrel	Funambulus pennantii		–	Least Concern
43	Indian Giant Flying Squirrel	Petaurista philippensis		I	Least Concern
44	Indian Giant Squirrel	Ratufa indica		I	Least Concern
17	**Soricidae**				
45	Asian House Shrew	Suncus murinus		–	Least Concern
18	**Suidae**				
46	Wild Boar	Sus scrofa		II	Least Concern
19	**Tragulidae**				
47	Indian Mouse Deer	Moschiola indica		I	Least Concern
20	**Ursidae**				
48	Sloth Bear	Melursus ursinus		I	Vulnerable
21	**Vespertilionidae**				
49	Indian House Bat	Scotophilus kuhlii		–	Least Concern
22	**Viverridae**				
50	Asian Palm Civet	Paradoxurus hermaphroditus		I	Least Concern
51	Small Indian Civet	Viverricula indica		I	Least Concern

ANNEXURE VIII: Elephant casualty in the zone of impact (ZOI) of Keonjhar and Bonai Forest division from 2020 to2024 (Sources - EIA and Working Plan)

Sl No.	Forest Division	Forest Range	Date	Place	GPS Location		Cause of death
					LAT	LONG	
1	**Keonjhar**	BJP	20.02.20	Tarmakanta Dpf	21.62417	85.27333	Unknown
2		Champua	05.05.20	Kasia Kf	21.78008	85.41986	Unknown
3		Champua	24.05.20	Unknown	22.01372	85.48456	Due to Acute Tympanitis
4		Champua	14.06.20	Bholbeda	21.97530	85.43714	**Electrocution**
5		Champua	14.06.20	Bholbeda	21.97530	85.43714	**Electrocution**
6		Barbil	03.07.20	Unknown	21.95800	85.36985	Due to respiratory failure
7		Keonjhar	11.09.20	Unknown	21.35167	85.97583	Pressure impacts on hearts & lungs
8		BJP	16.10.20	Nadapani village	21.70889	85.36361	Due to Septecemia
9		BJP	18.07.21	Rabboo Village	21.67667	85.32194	Due to acute hepatitis and oedema of the lungs
10		BJP	18.07.21	Rabboo Village	21.67667	85.32194	Due to acute hepatitis and oedema of the lungs
11		BJP	07.08.21	Talachampei Village	21.57639	85.54306	Due to respiratory failure
12		BJP	10.08.21	Sarukudar Village	21.55056	85.58556	Clostridium Haemolyticum
13		Champua	26.09.21	Rajia Village	22.00000	85.61972	Due to dystocia and cardiacarist
14		Keonjhar	07.12.21	Nekadaghara	21.59278	85.67028	**Electrocution**
15		Champua	19.05.22	Banspani to Jurudi	21.98056	85.42417	**Train Collision**
16		Keonjhar	25.08.22	Inside KVK Campus Judia, Keonjhar	21.63643	85.57666	**Electrocution**
17		Champua	01.12.22	Inside Chamakpur PRF	21.98241	85.50839	Cardiac failure resulting from several haemorrhages and hypovolaemic shock due to fighting
18		Champua	19.03.23	Near Village Jadipada Sahi, Basantapur	21.82528	85.40750	**Electrocution**
19		BJP	22.10.23	Thakurani DPF, Near Bhejidihi village	21.73944	85.29500	Disease

20		Champua	25.10.23	Near Kenameta Sahi, Ucchabahali Village	21.89000	85.43500	**Train Collision**
21		Champua	04.12.23	Inside Kalikaprasad RF	22.00722	85.62417	**Electrocution**
22		Champua	05.02.24	Paddy Filed of Daduan Village	22.02171	85.47235	Due to shock and traumatic injury
23		Champua	06.4.24	Inside Chamakpur PRF	21.99694	85.46917	Natural
24		Champua	02.05.24	Renta Sahi Hamlet Near Basantapur village	21.79972	85.37361	Dystocia (Natural)
25		Champua	02.05.24	Renta Sahi Hamlet Near Basantapur village	21.79972	85.37361	Removed mechanically by pulling
26	**Bonai**	Koira	13.09.20	Koira/Teherai	21.91508	85.27383	Trauma/ Injury
27		Koira	22.09.20	Koira	21.93306	85.31612	Due to Anthrax
28		Barsuan	28.02.21	Barsuan	21.79528	85.12972	Infectious disease
29		Koira	02.03.21	Koira	21.92900	85.29565	Due to shock leading from blunt injury to frontal part of the head along with dehydration
30		Koira	10.04.23	Koira	21.94097	85.23023	Natural
31		Koira	15.10.23	Koira	21.93167	85.31917	**Electrocution**
32		Koira	13.02.24	Koira	21.94726	85.32246	Natural
33		Koira	16.02.24	Koira	21.92122	85.23267	Natural
34		Barsuan	18.08.24	Barsuan	22.00258	85.05647	**Train Collision**

ANNEXURE IX: Human death related to human- elephant conflict in Keonjhar and Bonai Forest division from 2019 to 2024.

S. No	Date	Year	Forest Division	Forest Range	Village	Latitude	Longitude
1	04/06/19	2019-20	Keonjhar	--	Akul	21.79083	85.62028
2	30/11/19	2019-20	Keonjhar	--	Tangiri	21.15000	85.69750
3	13/04/20	2019-20	Keonjhar			21.22006	85.91033
4	03/12/20	2020-21	Bonai	Koira	Mukharji Hunting	22.06356	85.08189
5	19/12/20	2020-21	Keonjhar	Champua	Kaijoda	21.93250	85.56778
6	17/02/21	2020-21	Keonjhar	--	--	21.35722	85.35528
7	06/04/21	2021-22	Keonjhar			21.75255	85.09997
8	17/05/21	2021-22	Bonai	Koira		21.90667	85.22222
9	05/07/21	2021-22	Keonjhar			21.13739	85.14100
10	12/07/21	2021-22	Keonjhar			22.39667	85.48978
11	27/09/21	2021-22	Keonjhar	Champua		21.83250	85.58133
12	11/09/21	2021-22	Keonjhar			21.23622	85.34144
13	24/10/21	2021-22	Keonjhar		Dhanurjayapur	21.56906	85.27439
14	09/11/21	2021-22	Keonjhar		Balipokhari Rf	21.43972	85.83000
15	13/11/21	2021-22	Keonjhar		Ranibeda	21.25250	85.60778
16	01/01/22	2021-22	Keonjhar	Bjp		21.52111	85.54694
17	07/01/22	2021-22	Keonjhar			21.56222	85.23861
18	08/05/22	2021-22	Keonjhar			21.05500	85.79000
19	18/05/22	2021-22	Keonjhar			21.13167	85.14361
20	24.06.22	2022-23	Keonjhar	Bjp	KUNDHEI	21.57528	85.59333
21	21.10.22	2022-23	Keonjhar	Champua	Nuasahi Kendudihi	21.89234	85.62748
22	30.11.22	2022-23	Keonjhar		Mirigisingha	22.19222	85.88361
23	18.12.22	2022-23	Keonjhar		Jamunalia	21.11000	85.91222
24	19.12.22	2022-23	Keonjhar		Pedipokhari	21.64667	85.10583
25	01.01.23	2022-23	Keonjhar		Nichintapur	21.04889	85.50889
26	10.01.23	2022-23	Keonjhar		Raikudara	0.00000	0.00000
27	19.01.23	2022-23	Keonjhar	Barbil	Panduliposi	22.00000	85.27139
28	27.02.23	2022-23	Keonjhar		Raida	22.28333	85.68917
29	06.03.23	2022-23	Keonjhar		Bhanda	21.57494	86.46667
30	01.04.23	2023-24	Keonjhar		Fuljhar	0.00000	0.00000
31	28.04.23	2023-24	Keonjhar		Nuagaon	0.00000	0.00000
32	25.05.23	2023-24	Bonai	Barsuan	Banabiharipur	21.75139	85.11861
33	18.06.23	2023-24	Keonjhar		Kemundia	21.54917	85.11306
34	29.06.23	2023-24	Keonjhar	Champua	Jamirdihi	21.81222	85.44111
35	07.07.23	2023-24	Keonjhar	Champua	Siriabahal	21.82333	85.37361
36	08.09.23	2023-24	Keonjhar		Katabeda	21.32694	85.84917
37	24.09.23	2023-24	Keonjhar	Bjp	Murusuan	21.59639	85.52111
38	20.10.23	2023-24	Keonjhar		Basudevpur	21.07750	85.84472

39	31.10.23	2023-24	Keonjhar		Upardiha Chatarsahi	21.09000	85.74833
40	13.11.23	2023-24	Keonjhar		Basira	22.31900	85.72900
41	20.11.23	2023-24	Keonjhar		Malanda	21.32056	85.53944
42	03.12.23	2023-24	Keonjhar	Champua	Sudanga	21.99528	85.58806
43	07.12.23	2023-24	Keonjhar		Poipani	21.73811	85.67211
44	26.12.23	2023-24	Keonjhar	Bjp	Haridajodi	21.47700	85.39928
45	18.04.24	2024-25	Keonjhar		Nuagaon	21.13278	85.13778
46	07.06.24	2024-25	Keonjhar		Sankari	21.14556	85.17444
47	24.06.24	2024-25	Keonjhar		Kalapokhari	21.74817	86.00583
48	29.06.24	2024-25	Keonjhar		Purnapani	21.38456	85.07711
49	10.07.24	2024-25	Bonai	Koira	Badakalimati	22.00583	85.09210
50	25.07.24	2024-25	Keonjhar		Balidandasahi	21.15722	85.37639
51	22.08.24	2024-25	Keonjhar		Lunghar	21.34306	85.74083
52	07.07.19	2019-20	Bonai	Koira	Mandajoda	21.90533	85.34922
53	07.05.21	2021-22	Bonai	Koira	Oraghat	21.92780	85.32196
54	30.06.21	2021-22	Bonai	Koira	Jugalkishorepur	21.93947	85.31278
55	26.09.21	2021-22	Bonai	Barsuan	Sidimba	21.87955	85.24359
56	17.01.22	2021-22	Bonai	Koira	Sonua, Koira	21.90969	85.25850
57	01.11.21	2021-22	Bonai	Barsuan	Kamanda	21.93330	85.21242
58	01.12.21	2021-22	Bonai	Koira	Kusumdihi	21.94162	85.22944
59	13.01.22	2021-22	Bonai	Barsuan	Kurda	21.78150	85.17259
60	19.06.22	2022-23	Bonai	Koira	Sanpatuli	21.88315	85.31414
61	11.07.22	2022-23	Bonai	Koira	Panposia	21.89750	85.31389
62	14.09.22	2022-23	Bonai	Barsuan	Tentra(Phuljhar)	21.90470	85.16486
63	20.11.22	2022-23	Bonai	Barsuan	Manchabeda	21.98656	85.07906
64	20.02.23	2022-23	Bonai	Barsuan	Rengma	21.91157	85.19635
65	17.06.23	2023-24	Bonai	Koira	Jadipada_Patmunda	21.91234	85.32120
66	13.07.23	2023-24	Bonai	Barsuan	Dengula	21.87000	85.19722
67	23/07/23	2023-24	Bonai	Koira	Koira	21.90105	85.25500
68	06/08/23	2023-24	Bonai	Koira	Patmunda	21.83764	85.31029
69	01/09/23	2023-24	Bonai	Barsuan	Tinko	21.84056	85.11361
70	12/09/23	2023-24	Bonai	Koira	Koira	21.89208	85.25655
71	01/10/23	2023-24	Bonai	Koira	Tentuldihi	21.88638	85.22581
72	30/11/23	2023-24	Bonai	Koira	Jhirpani	21.88135	85.27773
73	09/03/24	2023-24	Bonai	Koira	Kusumdihi	21.95431	85.24735
74	28.03.24	2024-25	Bonai	Barsuan	Raikela	21.89333	85.19889
75	12.06.24	2024-25	Bonai	Koira	Kalta	21.96717	85.22014
76	14.08.24	2024-25	Bonai	Barsuan	Balijodi	21.88639	85.21694
77	14.08.24	2024-25	Bonai	Barsuan	Balijodi	21.88639	85.21694
78	08.07.24	2024-25	Bonai	Barsuan	Tinko_Dengula	21.83971	85.25261
79	01.07.24	2024-25	Bonai	Koira	Jhirpani_Kalta	22.00639	85.22278

ANNEXURE X: Plant Species with medicinal uses in ZOI's Forest Ranges

S. No.	Science name	Local Name	Habit	Uses
1	*Abrus precatorius*	Kaincha	Climber	Seeds are used in traditional medicine for joint pain and skin conditions, though toxic in raw form.
2	*Abutilon indicum*	Pedhipedhika	Shrub	Used for respiratory disorders, fevers, and wounds.
3	*Aegle marmelos*	Bel	Tree	Fruit and leaves used to treat diarrhea, dysentery, and digestive issues.
4	*Ageratum conyzoides*	Pakkasundar	Shrub	Known for wound healing and anti-inflammatory properties.
5	*Andrographis paniculate*	Chirota	Herb	Widely used for its bitter compounds in treating infections, fever, and liver problems.
6	*Asparagus racemosus*	Satabhari	Climber	nhances lactation, supports reproductive health, and used in adaptogenic therapy.
7	*Atalantia monophylla*	Wild Lime	Shrub	Applied for its antibacterial and digestive properties.
8	*Azadirachta indica*	Neem	Tree	Antibacterial, antifungal, and blood purifying agent; used for skin and dental care.
9	*Baliospermum montanum*	Danti	Shrub	Acts as a purgative; used in liver and spleen disorders.
10	*Bauhinia vahlii*	Siyalipatra	Climber	Used in wound healing and as an anti-inflammatory.
11	*Benkara malbarica*	Kontakoli	Tree	Known for astringent properties; used in treating ulcers and skin problems.
12	*Cassia fistula*	Sonari	Tree	Fruit pulp used as a mild laxative; also treats skin diseases.
13	*Cassia occidentalis*	Kaashunda	Shrub	Used in liver complaints, malaria, and fevers.
14	*Cassia siamia*	Sakunda	Tree	Known for its use in treating constipation and skin disorders.
15	*Celastrus paniculatus*	Kujri	Climber	Enhances memory, treats mental fatigue, and nerve disorders.

16	*Centella asiatica*	Thalkudi	Herb	Brain tonic; improves memory, treats wounds and skin diseases.
17	*Cissampelos pareira*	Kumutia	Shrub	Used for menstrual and urinary tract issues.
18	*Cleistanthus collinus*	Pitusing	Vine	Traditionally used as an abortifacient and in folk remedies.
19	*Clerodendrum inermes*	RangaSorisha	Shrub	Applied in treating epilepsy, skin problems, and respiratory issues.
20	*Clerodendrum viscosum*	Vanajai	Shrub	Used for its antipyretic and anti-inflammatory effects.
21	*Cocculus hirustus*	Karada	Climber	Known for anti-inflammatory and diuretic properties.
22	*Costos speciosus*	Kankanka	Shrub	Treats diabetes, skin diseases, and as a laxative.
23	*Curculigo orchioides*	Kali musli	Herb	Aphrodisiac and rejuvenator, treats debility.
24	*Desmodium gangeticum*	Anshumati	Shrub	Used in fever, asthma, and nervous disorders.
25	*Desmodium pulchellum*	Krishnaparni	Shrub	Anti-inflammatory, used in wound healing and fever.
26	*Dioscoria hamiltonii*	Mera,tuasanga	Climber	Used for hormonal imbalance and fertility issues.
27	*Eclipta alba*	Bhingraj	Prostrate	Promotes hair growth, treats liver ailments and skin diseases.
28	*Emilia sonchifolia*	Binj kudo	Herb	Traditionally used for wound healing and diarrhea.
29	*Eucalyptus polybractea*	Eucalyptus	Tree	Known for its essential oil with antimicrobial and respiratory benefits.
30	*Euphorbia hirta*	Chittakuttei	Prostrate	Used in respiratory ailments like asthma and bronchitis.
31	*Evolvulus nummularius*	Musakarni	Prostrate	Diuretic and anti-inflammatory.
32	*Flemingia spp.*	----	Shrub	Used for treating wounds and inflammation
33	*Gardenia spp.*	Dekamari, Papara	Tree	Used in jaundice and skin conditions.
34	*Glycosmis pentaphylla*	Kadudibadi	Shrub	Carminative, used in stomach disorders.
35	*Guazuma ulmifolia*	Debodaru	Tree	Used for diarrhea and skin issues.
36	*Hedyotis corymbose*	Gharapoadia	Herb	Treats fevers and digestive issues.
37	*Helicteres isora*	Baranga	Shrub	Treats colic, diarrhea, and respiratory ailments.

38	*Hemidesmus indicus*	Duddhi	Climber	Blood purifier, used in skin diseases.
39	*Holarrhena pubescens*	Kherwa	Tree	Used for dysentery, diarrhea, and intestinal parasites.
40	*Hyptis suaveolens*	Ganga Tulsi	Herb	Antimicrobial, treats cold and cough.
41	*Ichnocarpus frutescens*	Shyamlata	Climber	Treats rheumatism and diabetes.
42	*Jatropha gossypifolia*	Dumajada	Shrub	Applied for wounds, joint pain, and insect bites.
43	*Lawsonia inermis*	Manjuati	Shrub	Used as a dye and for cooling the skin.
44	*Mallatus phillippensis*	Sindoori	Tree	Anthelmintic, treats skin infections.
45	*Melia azadirachta*	Nageswar	Tree	Treats skin and respiratory ailments.
46	*Mimosa pudica*	Munde	Tree	Antidiarrheal and used in wound healing.
47	*Morinda tinctoria*	Somla	Tree	Used in liver disorders and skin ailments.
48	*Mucuna preriena*	Baidanka	Climber	Enhances libido and treats Parkinson's
49	*Ocimum spp.*	Tulsi	Herb	Used for colds, fever, and respiratory issues.
50	*Oroxylum indicum*	Phanpana	Tree	Anti-inflammatory, used in asthma and arthritis.
51	*Passiflora foetida*	Gandha Tamala	Vine	Sedative and antispasmodic.
52	*Phyllanthus spp.*	Bhui Amla, Amla	Herb	Hepatoprotective, used in jaundice and liver diseases
53	*Piper longum*	Pippali	Climber	Used in respiratory and digestive disorders.
54	*Pterocarpus marsupium*	Bijasal	Tree	Anti-diabetic and used in wound healing.
55	*Pueraria tuberose*	Bhuinpokharu	Climber	Rejuvenative, used in fertility issues.
56	*Rauvolfia serpentine*	Patalgaruda	Shrub	Treats hypertension and mental disorders.
57	*Rubia cordifolia*	Athakoli	Climber	Blood purifier, used in skin conditions.
58	*Scindapsus officinalis*	Patrogaja/ Gajapeepli	Climber	Aphrodisiac and used in digestive issues.
59	*Semecarpus anacardium*	Soso	Tree	Used in joint pain and skin diseases.
60	*Smilax zeylanica*	Ramadantuni	Climber	Tonic and anti-inflammatory.
61	*Spathodea campanulate*		Tree	Used for skin and urinary disorders
62	*Synedrella nudiflora*	BadiPokasunga	Shrub	Used in inflammation and wounds.

63	*Tephrosia purpurea*	Paharagacha	Tree	Liver tonic and anti-inflammatory.
64	*Terminalia spp.*	Bahada, Harda	Tree	Used in digestive and respiratory ailments (Part of Triphala)
65	*Triumfetta neglecta*	Nichardia	Shrub	Treats wounds and swelling.
66	*Tylophora indica*	Mendi	Shrub	Treats asthma and respiratory disorders.
67	*Vernonia cinerea*	Pokasunga	Shrub	Anti-inflammatory and anti-fertility agent.
68	*Vitex negundo*	BaiguniaSindura	Climber	Used for pain relief and respiratory issues.
69	*Woodfordia fruitcosa*	Dhartiki	Shrub	Used in dysentery, fever, and skin diseases.
70	*Wrightia tinctoria*	Koruan	Tree	Used in psoriasis and skin disorders.
71	*Zizyphus oenoplia*	Kanteikoli	Shrub	Tonic and used for gastrointestinal issues.

(Source- Working Plan of Bonai and Keonjhar FD)

ANNEXURE XI: NTFPs and their collection time. (Source- Working Plan of Bonai and Keonjhar FD)

S. No.	NTFP	Collection time		S. No.	NTFP	Collection time
1	Kendu Leaves	February - June		24	Semul cotton	March - May
2	Sal seeds	May - June		25	Honey & Wax	January
3	Siali leaf	October - May		26	Thatch grass	January - March
4	Sialifibre	October - May		27	Khajuripatra	October - March
5	Amla	October - April		28	Sabai grass	October - April
6	Harida	Nov - Feb		29	Sunari fruit	September - April
7	Bahada	January - April		30	Tentuli	Dec. – Feb.
8	Cashew nut	April - May		31	NeemSed	June - July
9	Char seed	April - May		32	Genduli gum	October - May
10	Mango	May - June		33	Kurei fruit	Dec. – Feb.
11	Bel	May - June		34	Hill broom	March - June
12	Marking nut	December - March		35	Khaira	October - May
13	Lac (Maghsiri)	January - February		36	Sal resin	January - April
14	Lac (Jestha)	June - July		37	Broom grass	October - May
15	Gum	October - March		38	Sisal fibre	October - May
16	Mahua Flower	April - May		39	Lemon grass	March - April
17	Mahua seed	May - June		40	Kamal gundi	February - March
18	Kusum seed	July - August		41	Ban tulsi	Nov. - March
19	Karanja seed	December - January		42	Lodha Bark	October - May
20	Kochila seed	Dec - Jan		43	Dantari Bark	October - May
21	Kendu fruits	April - May		44	Phenaphena	October - May
22	Dhatki flower	January - April		45	Mango kernel	June - July
23	Arrow root	December - January				

प्रगतेः मूलं प्रकृतिः

Indian Institute of Forest Management, Bhopal

SCHEME FOR

SOIL AND MOISTURE CONSERVATION MEASURES IN AND AROUND 10 KM RADIUS

OF

NETRABANDHA PAHAR IRON ORE BLOCK

OF

M/S BHUSHAN POWER & STEEL LIMITED

IN

BONAI FOREST DIVISION

OF SUNDARGARH, ODISHA.

SCHEME FOR SOIL AND MOISTURE CONSERVATION MEASURES IN AND AROUND 10 KM RADIUS OF NETRABANDHA PAHAR IRON ORE BLOCK OF M/S BHUSHAN POWER & STEEL LIMITED IN BONAI FOREST DIVISION OF SUNDARGARH DISTRICT, ODISHA.

1. INTRODUCTION

M/s Bhushan Power and Steel Ltd (henceforth be known as BPSL) is a manufacturer of Steel in the country incorporated on 22/02/1999 under the Company Act by Ministry of Corporate Affairs, Govt. of India. The company is a manufacturer of flat and long products and have state-of-the-art plants at Chandigarh, Derabassi, Kolkata and Odisha in India. As reported by the user Agency in the project proposal, manufacture value added products covering entire steel value chain right from Coal Mining to Manufacturing Pig Iron, DRI, Billets, HR Coils, CR Coils, GP/GC Sheets, Precision tubes, Black Pipe/GI Pipe, Cable Tapes, Tor Steel, Carbon and Special Alloy Steel Wire Rods and Rounds conforming to IS and international standards. Present turnover of the company is above ₹6700 Crores with large volume of exports. The Company has successfully implemented and commissioned a green field integrated steel plant with the present capacity of 2.3 Million Tonnes which is being enhanced to 3.4 Million Tonnes of Steel and Captive Power Plant in Odisha with HR Coil making facility- First in Private Sector in the State of Odisha.

The company was not having an Iron Ore Mines of its own. Government of Odisha, pursuant to the Mines and Minerals (Development & Regulation) Act, 1957 and the Mineral (Auction) Rules, 2015 as amended from time to time (the "Auction Rules), issued the notice inviting tender dated 17/03/2017 to commence the auction process for grant of mining lease for Nelrabandha Pahad Iron Ore Block located in Sundargarh District of Odisha. The e-auction process was conducted in accordance with the tender document for the said mineral block and M/s BPSL was declared as the preferred Bidder under Rule 9(4)(b)(ii) of the Rules. Government of Odisha has awarded the Letter of Intent vide letter No.5283/SM, Bhubaneswar dated 24.06.2017 for Grant of Mining Lease for Iron Ore in favour of M/s BPSL the successful bidder in respect of Nelrabandh Pahar Iron ore Block over an area of 139.223hects. (as per DGPS)/138.579hects. (as per RoR) in Baldihi village under Koira Tahasil of Sundargarh District under jurisdiction of Koira Forest Range of Bonai Division.

Further the said Lse has been modified vide Letter No.4283/SM dt.27.7.2017 revising the earlier mentioned area of 139.00 ha. to 139.223 ha. The said Letter of Intent (LoI) has been allowed to extension of the validity for another period of 2 years w.e.f. 26.6.2020 by the Steel & Mines Department, Govt. of Odisha vide Letter No.6350/SM dt.27.7.2020.

Despite the iron ore block is allocated to M/s BP&SL in June 2017 minimal progress has been made in terms of obtaining statutory approvals and clearances such as the EC/FC/Land acquisition, the clearance for the forest diversion proposal, the issuance of the Terms of Reference ("TOR") etc. primarily because of the following reasons.

(i) Corporate insolvency resolution process ("CIRP") was initiated in respect of BPSL vide the order passed by the Hon'ble National Company Law Tribunal, New Delhi ("NCLT") dated 26 July 2017 ("Insolvency Commencement Date");

(ii) The CIRP resulted in approval of the resolution plan dated 03 October 2018 as amended by addendum letter dated 10 October 2018 ("Resolution Plan") of JSW Steel Limited, which was the Resolution Applicant, on 16 October 2018. Pursuant thereto, the Resolution Plan was filed before the NCLT for its approval and was accorded the same under Section 31 of the Code vide order passed by it on 05 September 2019 ("NCLT Order");

(iii) Though the NCLT Order was challenged before the Hon'ble NCLAT, the Hon'ble NCLAT vide its judgment dated 17 February 2020 ("NCLAT Order"), disposed off the said challenges and approved the Resolution Plan after making certain modifications in the NCLT Order;

(iv) The NCLAT Order approving the Resolution Plan was further challenged before the Hon'ble Supreme Court. Since the Hon'ble Supreme Court did not grant a stay on the implementation of the Resolution Plan, the JSW Steel Limited has started the implementation of the Resolution Plan w.e.f. 26 March 2021.

In view of the above, after the change of ownership, the necessary procedures to obtain the Forest Clearances and other approval started and gradually progress is made in this regards.

The block comprises of 139.223 ha lies within the Baradhi village in Kolo Tehasil of Sundargarh District. The exploration under G2 category following UNFC guidelines was carried by the State Directorate of Geology. Hence the block was auctioned for mining lease. As per the letter of intent as per Rule 10(2) of the Rules, the mining lease period will be for 50 years. The substantial quantity of the product from this block will be consumed in the Integrated Steel Plant of RP&SL situated at Thakurani in Jharsuguda.

The lease area over an area of 139.223 hects. (as per DGPS)/138.579 hects. (as per ROR). The authenticated land schedule is jointly verified by Mining, Revenue & Forest Department. As all the calculation will be based on map (DGPS survey map) it is always advisable to consider the DGPS area for land use and other calculation. During verification of the land schedule allotted for said Mining Lease area it is found that the total area (DGPS) over 139.223 hectare consists of 48.346 ha. PRF, 19.532 ha.Revenue Forest, 44.743 ha. DLC forest and 26.602 ha non-forest lands.

Further, Stage-I approval over 112.621 ha. of Forest land U/s 2 (i) (including 1.808 ha. of Safety Zone) has been granted by MoEF & CC vide their Letter No.8-21/2022-FC, dated 21.12.2023 where in it has been stipulated as per **Condition No.10 for Soil and moisture conservation measures shall be undertaken in and around 10 KM radius of the mining lease areas at project cost**

2. LOCATION

The mining lease area finds place in the Survey of India Topo sheet No.F45N5 (73 G/5) and situated between the latitude 21° 52' 35.242" to 21° 53' 54.542" N, and longitude 85° 17' 10.449" to 85° 17' 36.916" E. The above ML area covering villages such as Baradhi in Kolra Range, Bonai Forest Division, Sundargarh District, Odisha.

3. TOPOGRAPHY

Netrabandha Pahar Block lies in Southern continuation of Bonai-Keonjhar belt of Ranchi Plateau. In general of Bonai Keonjhar belt is deeply dissected given rise to a rugged topography with high and narrow hill ranges interspersed by broad valley. It is a discrete physiographic market by wide, flat, soil and alluvium covered tracts separated by low lying hills. The high hills are in fact, long range controlled by the out crop pattern of the BIF. The highest peak in the adjacent area is represented by Bolia pahar (1010m). The said block represents an undulating to plain topography. At places flat topped low mounds are noticed with general gradient to NE and SE. The highest contour in the area at 628 m (north-central & south-central part of the block) and lowest contour is at 618 m at the northeast part of the block.

4. SOIL TYPE

Soil type in the study area varies widely from hard rock to lateritic soil. Areas of higher elevations are usually hard rock consisting of laterite. The top soil is scanty in the area. Whatever top soil is available is thinly spread over all Soil profile in nature. The pH of the soil is slightly acidic in nature.

5. CLIMATE

The study area is characterised by an oppressively hot summer with high humidity. Summer generally commences in the month of March. Temperature beings to rise rapidly attaining a maximum in the month of May. During the summer maximum temperature can go up to 47.3°C. The weather becomes pleasant with onset on monsoon in June and remains as such upto end of October. The temperature in the month of December is lowest, i.e., 7° C. The average annual rainfall as recorded at IMD observatory is 1325.16 mm. Predominant wind direction is South-West. Area remains calm for nearly50% of the year.

6. DRAINAGE

The drainage system of the area is controlled by Tenera nala flowing to the North of the block and its tributaries. However, Khajuridhi Nala flowing in the Southern part of the area control the drainage in the southern part.

7. EXISTING VEGETATION

Sal (*Shorea robusta*);Teak (*Tectona grandis*), Kusum (*Schleichera oleosa*), Bahada (*Terminalia bellerica*), Char (*Buchanania lanjan*), Jamu (*Syzygium cumini*), Asan (*Terminalia tomentosa*), Dhaura (*Anogeissus latifolia*), Kendu (*Diospyros melanoxylon*), Mahul (*Madhuca indica*), Karanja (*Pongamia pinnata*), Sidha (*Lagerstroemia parviflora*), Kurum (*Adina cordifolia*), Mango (*Mangifera indica*) etc. are major species among flora available in the applied area.

7. LAND USE PATTERN

During the life of the mine, about 139.223 hectares will be utilized for mining, Minerals processing, Road, and green belt plantation in Safety Zone area etc. The details of land use pattern will be as follows;

Item wise Proposed Land Use Pattern in Forest and Non-Forest Land of Total Lease Hold Area

Sl. No.	Pattern of utilization	Undiverted/ Virgin Forest (In Ha.)				Non-Forest	Grand Total
		PRF	Revenue Forest	DLC Forest	Total Forest		
1	Mining with Haul Road	27.444	17.829	42.160	87.433	16.877	104.310
2	Dump	9.407	-	-	9.407	-	9.407
3	Sub-grade	0.650	-	1.472	2.122	0.030	2.152
4	Storing of ore	1.835	-	-	1.835	-	1.835
5	Top Soil	0.500	-	-	0.500	-	0.500
6	Stacking of Minerals	5.726	-	0.113	5.839	-	5.839
7	Infrastructure	0.130	-	-	0.130	1.687	1.817
8	Road	-	-	-	-	0.534	0.534
9	Water Harvesting	-	-	-	-	0.066	0.066
10	Green Belt	-	-	-	-	2.017	2.017
11	Others	1.41	1.392	0.544	3.347	3.757	7.104
	TOTAL	**47.303**	**19.221**	**44.289**	**110.813**	**24.968**	**135.781**
12	Safety Zone around ML boundary	1.043	0.311	0.454	1.808	1.634	3.442
	TOTAL	**48.346**	**19.532**	**44.743**	**112.621**	**26.602**	**139.223**

8. OBJECTIVE OF THE SCHEME

1. To compliance the stipulated condition of Stage-I approval.
2. To protect the embankment of the streams in such a way that, soil erosion is restricted.
3. To increase the depth of ground water, which will be available for wildlife during peak summer.
4. To increase the ground water table through Soil & Moisture Conservation.
5. To construct graded bund to safe disposal of runoff water.
6. To construct LBCD across the existing Nala within the RF and PRF area.

A. Following proposed SMC work within 10 km radius of M.L area is as follows.

a) Construction of Check Dam.
b) Construction of LBCD
c) Construction of new water body
d) Construction of Graded Bund Line

a) Construction of water body

It is proposed to construct one no. of water body inside Bhawanipahar RF & Khajuripli PRF of size 40m x 30m x 3 m. The location of the same with respect to latitude and longitude is as follows.

Once the water body of above dimensions is constructed sufficient water can be available during rainy season. This water body will also have the scope of accumulated rain water flowing from upper region (upper contour to lower contour). The water collected therein will be highly useful to the animals and preferably the flag ship animal 'elephant'. During summer season there is scarcity of water and animals move to nearby habitation for search of water and in different occasions human wild life conflict are encountered with lot of displeasure by the local people. This water body created will help a lot to provide water facility to the wild animal and reduce human wild life conflict to some extent along with purpose of the scheme. The cost estimate of construction of water body has been provided in **Annexure-6.**

Sl. No	Forest Division	W.P. Name	Dimension	Latitude	Longitude
1	Bonai	Shawanipahar RF	40m x 30m x 3 m	21° 53' 2.59"	85° 13' 8.58"
2.	Bonai	Khajurdihi PRF	40m x 30m x 3 m	21° 50' 2.87"	85° 18' 34.76"

b) **Construction of check dam**

It is proposed to construct 5 nos. of check dam within Khajurdihi PRF located within the 10 km radius area of M.L. Care has been taken to locate the same corresponding to drainage pattern of the 10 km radius of the M.L area. The locations & size of the check dam are furnished below. The cost estimate of construction of Check dam has been provided in **Annexure-1.**

Sl. No	Forest Division	Name	Size	Latitude	Longitude
1.	Bonai	Khajurdihi PRF	Length=4.00 mtr. Hight=1.50 mtr. Slope U/S=1:1.5	21° 50' 9.08"	85° 18' 25.68"
2.				21° 50' 13.56"	85° 18' 32.53"
3.				21° 50' 20.13"	85° 18' 38.10"
4.				21° 50' 26.99"	85° 18' 44.12"
5.				21° 50' 39.68"	85° 18' 44.46"

c) **Plan for Construction of Loose Boulder Structure**

After studying the topography and the drainage pattern it has been found that there are 100 spots where the LBCD required and accordingly it is proposed to construct **20** nos. of loose boulder structure of 4m span, **45** nos. of loose boulder structure of 3m span and **35** nos. of loose boulder structure of 2m span across the existing nala within the Khajurdihi PRF area, the cost norm of LBCD has been provided in **Annexure-2,3 & 4.**

d) Plan for Construction of Graded Bund Line

After studying the topography and the drainage pattern it has been found that there are 4000 mtr. required to be construction graded bund to safe disposal of runoff water and also erected along the boundary of RF to guide the runoff along a longer path to increase time of concentration and promote infiltration within the Khajuridhi RF and Bhawanipathar RF boundary line. The starting Point of the graded bund of Khajuridhi RF is N21° 51' 9.25" E85° 19' 4.42" and Ending Point is N21° 51' 34.06" E85° 17' 25.54"] (2 Km) and starting Point of the graded bund of Bhawanipathar RF is N21° 53' 13.40" E85° 14' 17.11" and Ending Point is N21° 53' 25.79" E85° 13' 13.52"] (2 Km). The cost norm of Graded Bund line has been provided in **Annexure –5**.

The location of lease area, 10 km radious of buffer zone and interventions under a, b, c, & d above are shown in Map **(Plate-1)**.

9. **EXECUTING AGENCY.**

The User Agency shall execute the work under the supervision of the State Forest Department.

10. **INSPECTION, MONITORING AND EVALUATION.**

For successful implementation of the present Scheme, intensive inspection and technical guidance from concerned technical wing is required. Sufficient fuel/ conveyance charges for the executing agency and technical experts shall be provided by the user agency for proper execution of this programme.

11. **REQUIREMENT OF FUNDS**

The total cost of the implementation of proposed scheme will be **₹1,96,30,800/- (Rupees One Crore Ninety Six Lakhs Thirty Thousand Eight Hundred) only** details are as under.

	Works to be executed by the User Agency.		
1.	Construction of 5 nos. of Check dam@ ₹4,93,407/- each)	₹	24,67,035.00
2.	Soil Conservation measures		
	a] Loose boulder structure 2 mt. size 35 nos. @ ₹15125/-	₹	5,29,375.00
	b] Loose boulder structure 3mt. size 45 nos. @ ₹33944/-	₹	15,27,480.00
	c] Loose boulder structure 4mt. size 20 nos. @ ₹56442/-	₹	11,28,840.00
3.	Construction of 2 nos. water body @₹10,21,120.00 each	₹	20,42,240.00
4.	Construction Graded Bund line over 4000 RMT @2166.00 per RMT.	₹	86,64,000.00
	SUB-TOTAL :-	₹	**1,63,58,970.00**
	Price escalation @20%	₹	**32,71,794.00**
	GRAND TOTAL :-	₹	**1,96,30,796.00**
			Or.
		₹	**1,96,30,800.00**

(Rupees One Crore Ninety Six Lakhs Thirty Thousand Eight Hundred) only

COUNTERSIGNED

Divisional Forest Officer,
Sonai Division.

DIVISIONAL FOREST OFFICER
SONAI DIVISION

Technically Approved

Regional Chief Conservator of Forests
Amravati Circle

Annexure- 1

Wage Rate- Rs.480.00

Detail Estimate of Concrete Structure of Check Dam

Sl No	Description of Items	No	Length	Width	Height	Qty	Rate	Amount in Rs.
1	2	3	4	5	6	7	8	9
1	Earthwork lead upto embankment roads with in 50 mtr initial lead & L.50 mtr initial lift including rough dressing &breaking clods to Maximum 5.00c.m. to 7.00 c.m.&laying layers not exceeding 0.30 mtr depth as per specification approved by department along with proper compaction with H.R.# Excavation							
	Base	1	5.00	5.50	0.50	13.75		
	Wing Wall	4	2.00	0.50	0.50	2.00		
	Appron	2	3.00	5.00	0.20	6.00		
	Cut of wall	2	5.00	0.45	0.50	2.25		
						24.00	338.83	8131.90
2	Plain cement concrete (1:4:8)							
	Base	1	4.00	5.50	0.075	1.65		
	Wing Wall	4	2.00	0.50	0.08	0.30		
	Appron	2	3.00	5.00	0.08	2.25		
	Cut of wall	2	4.00	0.45	0.08	0.27		
						4.47	9842.83	43997.44
3	Cement concrete (1:2:4)							
	Below Ground Level							
	Base	1	4.00	5.50	0.40	8.80		
	Wing Wall	4	2.00	0.50	0.40	1.60		
	Appron	2	3.00	5.00	0.10	3.00		
	Cut of wall	2	4.00	0.45	0.50	1.80		
						15.20		
	Above Ground Level							
	Base	1	4.00	(2.00+5.00)/2	1.00	14.00		
	Wing Wall	4	2.00	0.40	1.00	3.20		
					Total	17.20		
				Grand Total		32.40	13619.67	441277.36
	Rate per one No Check Dam, Length=4.00 mtrHt=1.30 mtr Slope U/S=1:1.5 D/S=1:2					Total		493406.70 Or, 493407.00

COUNTERSIGNED

DIVISIONAL FOREST OFFICER
RONAI DIVISION

Annexure –2

LSCD UNDER BONAI FOREST DIVISION
Span- 3 mtr, Ht- 0.60 mtr, U/S- 1:1.5, D/S- 1:2

1 Earth work in Stony earth and gravels mixed with stone and boulder not exceeding 0.014 cum in volume within 50m initial lead and 1.5m initial lift including rough dressing and breaking clods to maximum 5cm to 7cm and laying in layer not exceeding 0.3m in depth and as per specification approved by the department.

Base	1	x	3.00	x	3.75	x	0.30		=	3.38		
Wing wall	4	x	0.50	x	0.50	x	0.30		=	0.30		
										3.68	Cum	
								@	Rs.	304.80	/cum	1121.66

2 Rough stone dry packing in apron and revetment including cost, conveyance, royalty & taxes of all materials to complete work.

Crest Wall	1	x	3.00	x	$\frac{3.75 + 0.60}{2}$		x	0.90	=	3.87		
Wing wall	4	x	0.50	x	0.50	x	1.00		=	1.00		
Side wall	2	x	3.45	x	0.30	x	1.00		=	3.45		
										10.32	Cum	
								@	Rs.	1356.99	/cum	14003.21
												15124.87
											Say	**15125.00**

(Rupees Fifteen Thousand One Hundred Twenty Five) only

COUNTERSIGNED

DIVISIONAL FOREST OFFICER
BONAI DIVISION

Annexure –3

L&CD UNDER BONAI FOREST DIVISION
Span- 3 mtr. Ht- 1.0 mtr. U/S- 1:1.5, D/S- 1:2

1 Earth work in Stony earth and gravels mixed with stone and boulder not exceeding 0.014 cum in volume within 50m initial lead and 1.5m initial lift including rough dressing and breaking clods to maximum 3cm to 7cm and laying in layer not exceeding 0.3m in depth and as per specification approved by the department.

Base	1	x	4.00	x	5.13	x	0.30	=	6.16			
Wing wal	4	x	0.50	x	0.50	x	0.30	=	0.30			
									6.46	Cum		
								@	Rs.	304.80	/cum	1975.10

2 Rough stone dry pacving in apron and revetment including cost, conveyance, royalty & taxes of all materials to complete work.

Cwal Wall	1	x	4.00	x	$\frac{5.13 + 0.60}{2}$	x	1.30	=	14.93			
Wing wal	4	x	0.50	x	0.50	x	1.40	=	1.40			
Side wal	2	x	5.13	x	0.50	x	1.40	=	7.21			
									23.56	Cum		
								@	Rs.	1356.90	/cum	31968.56
												33943.66
											Say	**33944.00**

(Rupees thirty Three Thousand Nine hundred Forty Four) only

COUNTERSIGNED
DIVISIONAL FOREST OFFICER
BONAI DIVISION

Annexure-4

LSCD UNDER BONAI FOREST DIVISION **Span- 4**

mtr. H8- 1.3 mtr. U/S- 1:1.5, D/S- 1:2

1 Earth work in Stony earth and gravels mixed with stone and boulder not exceeding 0.014 cum in volume within 50m initial lead and 1.5m initial lift including rough dressing and breaking clods to maximum 5cm to 7cm and laying in layer not exceeding 0.3m in depth and as per specification approved by the department.

Base	1	x	3.00	x	6.20	x	0.30	=	9.30		
Wing wall	4	x	0.50	x	0.50	x	0.30	=	0.30		
									9.60	Cum	
								@	Rs. 304.80	/cum	2926.08

2 Rough stone dry packing in apron and revetment including cost, conveyance, wastage & taxes of all materials to complete work.

Crest Wall	1	x	5.00	x	$\frac{6.20 + 0.60}{2}$	x	1.60	=	27.20		
Wing wall	4	x	0.50	x	0.50	x	1.70	=	1.70		
Side wall	2	x	6.20	x	0.50	x	1.70	=	10.54		
									39.44	Cum	
								@	Rs. 1356.90	/cum	53516.14
											56442.22
										Say	**56442.00**

(Rupees Fifty Six Thousand Four Hundred Forty Two) only.

COUNTERSIGNED

DIVISIONAL FOREST OFFICER
BONAI DIVISION

Annexure-5

GRADED BUND UNDER BONAI FOREST DIVISION
Base- 4.2 mtr, HI- 1.5 mtr, Top- 1.2 mtr

1	Triangular or Square section of 0.15m trench cutting for alignment and demarcation purpose of dug belling 10cm to 15cm.						
	2 x 1.00	=	2.00	Rm			
	@	Rs.	7.50	/Rm	15.00		
2	Clearing grass and removal of rubbish up to a distance of 30 meters outside the periphery of the area.						
	1 x 1.00 x 4.20	=	4.20	Sqm			
	@	Rs.	2.00	/Sqm	10.08		
3	Earth work in stony earth and gravels mixed with stone and boulder not exceeding 0.014cum in volume within 30m. initial lead and 1.5m initial lift including rough dressing and breaking clods to maximum 5cm to 7cm and laying in layer not exceeding 0.3m in depth and as per specification approved by the department						
	1 x 1.00 x $\frac{4.20 + 1.20}{2}$ x 1.50	=	4.05	Cum			
	Add 10% extra for Undulation & gully filling	=	0.41				
	Total	=	4.46	Cum			
	@	Rs.	304.80	/Cum	1359.41		
4	Excavation in all kinds of soil including moorum, stony earth, gravel etc. excepting all kinds of rock and boulders exceeding 0.014cum in volume etc. complete.						
	1 x 1.00 x 0.30 x 0.30	=	0.09	Cum			
	@	Rs.	234.50	/Cum	21.11		
5	Fine dressing earth work in ordinary or hard soil in embankment formation according to the direction of Engineer in charge incl. Cutting or filling earth up to 0.15m depth of Surface.						
	Top surface 1 x 1.00 x 1.20	=	1.20				
	Side surface 2 x 1.00 x 2.12	=	4.24				
			5.44	Sqm			
	@	Rs.	4.50	/Sqm	24.48		
6	Rough stone dry packing in apron and revetment including cost, conveyance, royalty & taxes of all materials to complete work.						
	1 x 1.00 x 0.30 x 0.30	=	0.09				
	1 x 1.00 x 0.30 x 1.41	=	0.42				
			0.51	Cum			
	@	Rs.	1442.40	/Cum	735.62		
					2160.70		
				Say	2164.00	/Mtr	

COUNTERSIGNED

DIVISIONAL FOREST OFFICER
BONAI DIVISION

Annexure-6

COST ESTIMATE FOR CONSTRUCTION OF WATER BODY

WATER BODY UNDER BONAI FOREST DIVISION
(40M X 30M X 3M)

1. Earth work in Stony earth and gravels mixed with stone and boulder not exceeding 0.014 cum in volume within 30m initial lead and 1.5m initial lift including rough dressing and break ins clods to maximum 5cm to 7cm and laying in layer not exceeding 0.3m in depth and as per specification sponsored by the department.

1st Lift	1	x	40.00	x	30.00	x	1.00	= 1200.00
2nd Lift	1	x	38.00	x	28.00	x	1.00	= 1064.00
3rd Lift	1	x	36.00	x	26.00	x	1.00	= 936.00
								3200.00 Cum
							@	Rs. 304.80 /cum 975360.00

2. Extra lift of 1.5m or part there of over the initial lift of 1.5m in all kinds of embankments and road works and ordinary earth work in general.

1st Lift	1	x	40.00	x	30.00	x	1.00	= 1200.00
2nd Lift	1	x	38.00	x	28.00	x	1.00	= 1064.00
3rd Lift	1	x	36.00	x	26.00	x	1.00	= 936.00
								3200.00 Cum
							@	Rs. 14.30 /cum 45760.00

1021120.00

COUNTERSIGNED

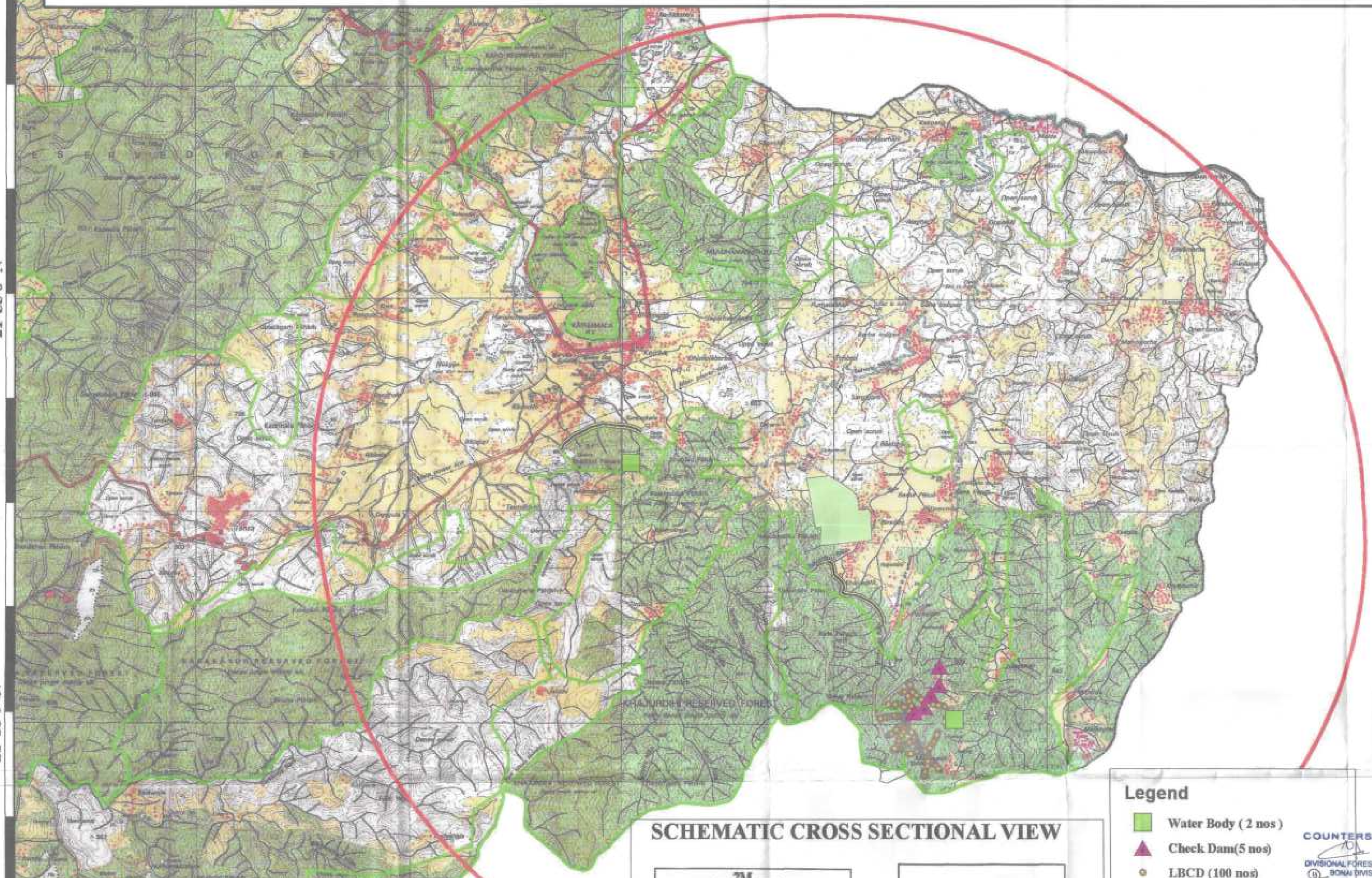
DIVISIONAL FOREST OFFICER
BONAI DIVISION

TOPO MAP SHOWING SMC WORKS TO BE DONE IN KHAJURDIHI PRF AND BHABNIPAHAR RF WHICH IS 10 KM ZONE OF INFLUENCE OF NETRABANDHA PAHAR IRON ORE BLOCK M/S BHUSAN POWER STEEL

85°10'0"E 85°15'0"E 85°20'0"E 85°25'0"E

21°55'0"N

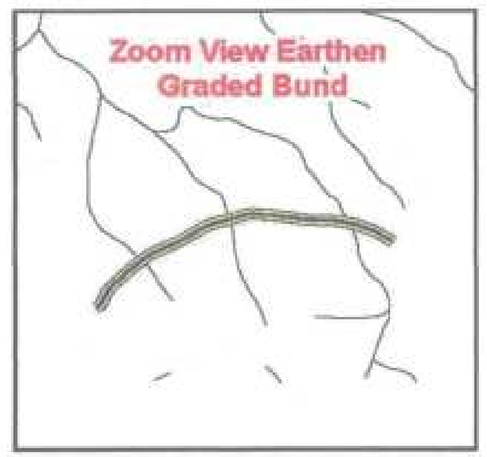
21°50'0"N



N
W E
S

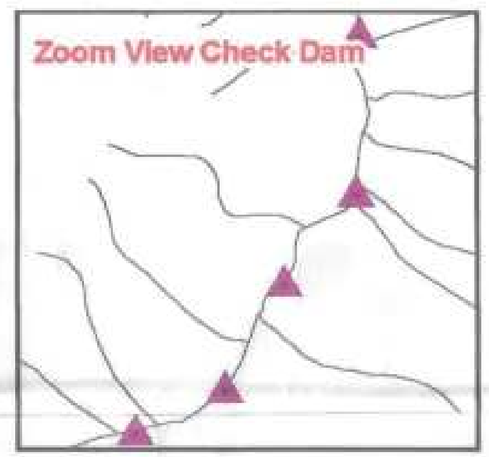
SCALE:-1:90,000

Zoom View Earthen Graded Bund

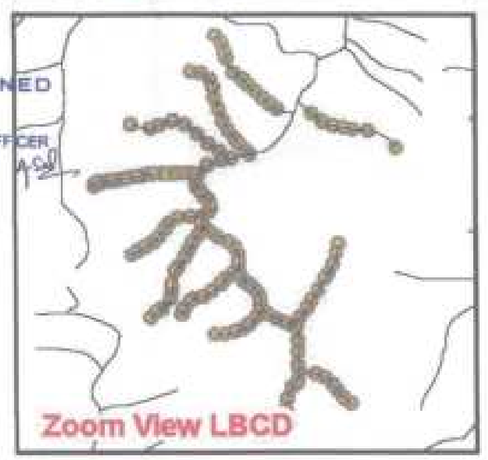


Zoom View Water Body

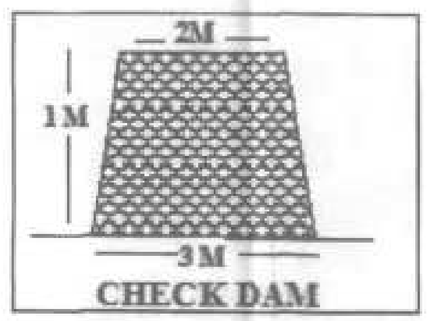
Zoom View Check Dam



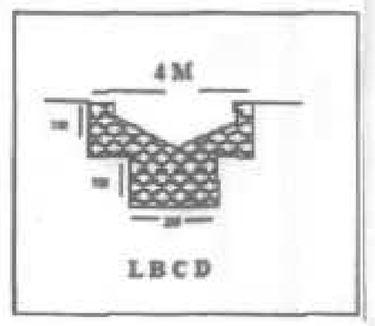
Zoom View LBCD



SCHEMATIC CROSS SECTIONAL VIEW



CHECK DAM



Legend

- Water Body (2 nos)
- Check Dam(5 nos)
- LBCD (100 nos)
- Earthen_Graded_Bund(4 km)
- 10 Km Zone of Influence
- ML Boundary
- Forest Boundary
- Drainage

COUNTERSIGNED
DIVISIONAL FOREST OFFICER
BONAI DIVISION

0 1.5 3 6 9 12 KM

MAP SHOWING SMC WORKS TO BE DONE IN KHAJURDIHI PRF AND BHABNIPAHAR RF WHICH IS 10 KM ZONE OF INFLUENCE OF NETRABANDHA PAHAR IRON ORE BLOCK M/S BHUSAN POWER STEEL

85°10'0"E 85°15'0"E 85°20'0"E 85°25'0"E

21°55'0"N

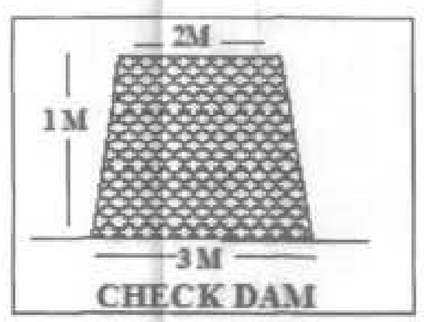
21°50'0"N

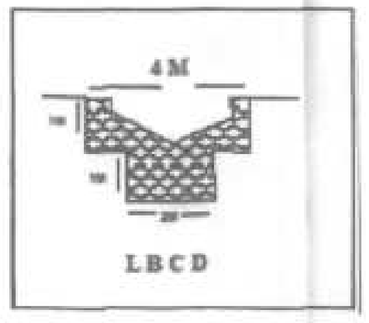
N W E S

SCALE:-1:90,000

0 1.5 3 6 9 12 KM

SCHEMATIC CROSS SECTIONAL VIEW





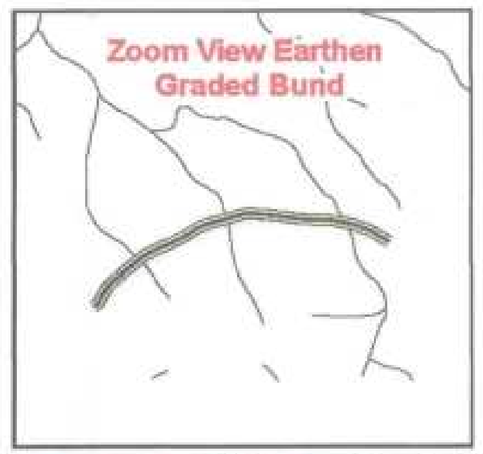
Legend

- Water Body (2 nos)
- Check Dam(5 nos)
- LBCD (100 nos)
- Earthen_Graded_Bund(4 km)
- 10 Km Zone of Influence
- ML Boundary
- Forest Boundary
- Drainage

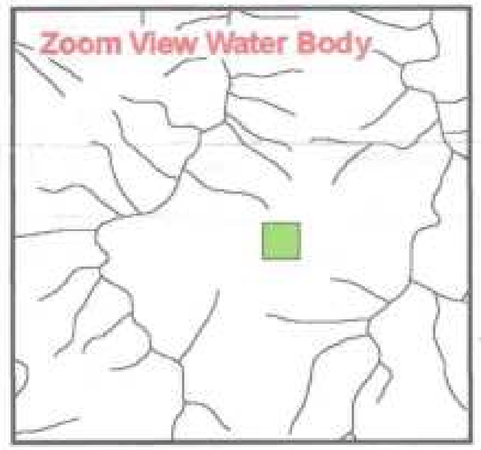
COUNTERSIGNED
DIVISIONAL FOREST OFFICER
BONAI DIVISION

BHUSAN POWER & STEEL LIMITED

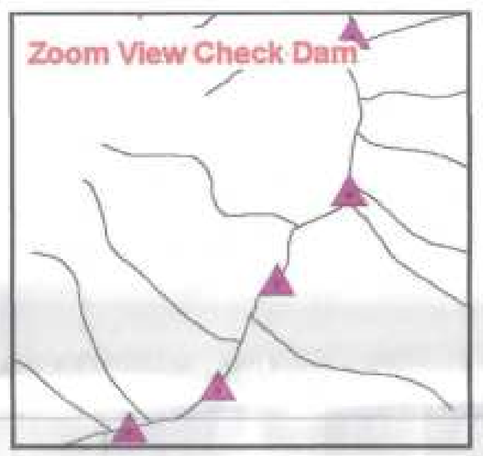
Zoom View Earthen Graded Bund



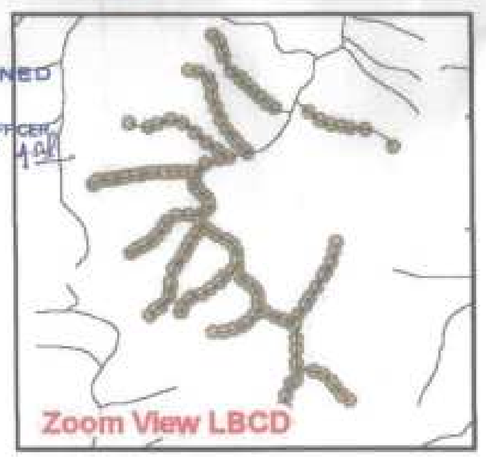
Zoom View Water Body



Zoom View Check Dam



Zoom View LBCD



ENVIRONMENTAL CLEARANCE

PARIVESH

(Pro-Active and Responsive Facilitation by Interactive, and Virtuous Environmental Single-Window Hub)

Government of India
Ministry of Environment, Forest and Climate Change
(Issued by the State Environment Impact Assessment Authority(SEIAA), Orissa)

To,

The AGM
Bhushan Power and Steel Limited
BPSL Township, Thekoloi,Lapanga, Sambalpur. -768212

Subject: Grant of Environmental Clearance (EC) to the proposed Project Activity under the provision of EIA Notification 2006-regarding

Sir/Madam,

This is in reference to your application for Environmental Clearance (EC) in respect of project submitted to the SEIAA vide proposal number SIA/OR/MIN/77359/2017 dated 27 May 2022. The particulars of the environmental clearance granted to the project are as below.

1.	**EC Identification No.**	**EC23B001OR185677**
2.	**File No.**	77359/734-MINB1/05-2022
3.	**Project Type**	New
4.	**Category**	B1
5.	**Project/Activity including Schedule No.**	1(a) Mining of minerals
6.	**Name of Project**	EC for Netrabandha Pahar Iron Ore Block with Total Excavation of 2.680 MTPA [2.0 MTPA (ROM), OB- 0.680 MTPA] along with 2x100 TPH Mobile Crusher in the mine lease area of 139.223 Ha, located at village Baladihi, Tehsil Koira, District Sundargarh, Odisha
7.	**Name of Company/Organization**	Bhushan Power and Steel Limited
8.	**Location of Project**	Orissa
9.	**TOR Date**	04 Aug 2021

The project details along with terms and conditions are appended herewith from page no 2 onwards.

(e-signed)
Dr. K. Murugesan, IFS
Member Secretary
SEIAA - (Orissa)

Date: 26/05/2023

Note: A valid environmental clearance shall be one that has EC identification number & E-Sign generated from PARIVESH.Please quote identification number in all future correspondence.

This is a computer generated cover page.

SEIAA File No. 77359/734-MINB1/05-2022

Subject: Proposal for Mining of Iron Ore from Netrabandha Pahar Iron Ore Block with Total Excavation of 2.680 MTPA (2.0 MTPA (ROM), OB-0.680 MTPA) along with 2x100 TPH Mobile Crusher in the ML area of 139.223 Ha. located at village- Baladihi, Tahasil- Koira, District- Sundargarh by M/s Bhushan Power and Steel Limited-Environmental Clearance reg.

Sir,

This has reference to your online proposal No. SIA/OR/MIN/77359/2017 dated 28.12.2022, submitted to SEIAA, Odisha for grant of Environmental Clearance(EC) for mining of iron ore from Netrabandha Pahar Iron Ore Block with Total Excavation of 2.680 MTPA (2.0 MTPA (ROM), OB-0.680 MTPA) along with 2x100 TPH Mobile Crusher in the ML area of 139.223 Ha. located at village- Baladihi, Tahasil- Koira, District- Sundargarh by M/s Bhushan Power and Steel Limited filed by Sri Rakesh Kumar Khandelwal, EVP-cum-WTD in terms of the provisions of the Environment Impact Assessment(EIA) Notification, 2006 under the Environment(Protection) Act,1986 and subsequent amendments thereto.

2. Proposal in Brief:

Proposal No.	SIA/OR/MIN/77359/2017
Date of Application	27.05.2022
File No.	77359/734-MINB1/05-2022
Project Type	Fresh EC
Category	B1
Project/Activity including Schedule No.	1(a) Mining of minerals
Name of the Project	Proposal for EC for Mining of Iron Ore from Netrabandha Pahar Iron Ore Block with Total Excavation of 2.680 MTPA (2.0 MTPA (ROM), OB-0.680 MTPA) along with 2x100 TPH Mobile Crusher in the mine lease area of 139.223 Ha. located at village- Baladihi, Tahasil- Koira, District- Sundargarh.
Name of the company/Organization	M/s Bhushan Power and Steel Limited
Location of Project	Odisha
ToR Date	04.08.2021

1. **Project Details:** The highlights of the proposal as ascertained from the application as submitted by PP and as revealed from proceedings/discussion held during the meeting of SEAC/SEIAA, are given as under.

(i) This is a proposal for EC for mining of iron ore from Netrabandha Pahar Iron Ore Block with Total Excavation of 2.680 MTPA [2.0 MTPA (ROM), OB- 0.680 MTPA] along with 2x100 TPH Mobile Crusher in the mine lease area of 139.223 Ha. located at village Baladihi, Tehsil Koira, District Sundargarh by M/s Bhushan Power and Steel Limited filed by Sri. Rakesh Kumar Khandelwal, (EVP-cum-Whole Time Director)

(ii) Netrabandha Pahar iron ore block mining lease was granted in favour of M/s Bhushan Power & Steel Limited (BPSL) for period of 50 years through e-auction process for winning iron-ore for non-captive purpose. Government of Odisha has issued the Letter of Intent (LoI) for grant of mining lease for Netrabandha Pahar Block for Iron Ore over an area of 139.00 Ha vide its letter no.5283/SM,IV(Misc)SM- 52/2017/SM, dt. 24.06.2017. The corrigendum was issued for 139.223 Ha vide letter no. IV(Misc)SM-52/2017/6285/SM, dt. 27.07.2017 and further, it was extended for a period of 6 months vide letter no.4493/ SM-MC1-MISC-0051-2021 Dt. 11.05.2022. Mining Plan and Progressive Mine Closure Plan was approved by IBM vide Letter No: MP/FM/13-ORI/BHL/2017-18, dated 18.10.2017.

(iii) BPSL was sub-judice at National Company Law Tribunal (NCLT) since July 2017 and it was managed by Resolution Professional appointed by the Committee of Creditors (COC) till 25th March, 2021. M/s JSW Steel Limited, India's largest steel producer, was the successful Resolution Applicant approved by COC and has taken over possession and management control of BPSL on 26th March 2021, after approval of NCLT. The unit continues to operate with the same name "Bhushan Power & Steel Limited". The project shall continue to undertake statutory clearances and operate in future under the name of "Bhushan Power & Steel Limited" even though the management possession and management control is with M/s JSW Steel Limited.

(iv) As per LS [Hal-Sabik] certified by Tahasildar, Koira & Director of Mines, Odisha vide Lr.No.259 dated: 08.02.2022 and subsequently vetted by M/s ORSAC, the total lease area includes Forest land: 112.621 ha and Non-Forest land:26.602 ha. Forest Clearance under FC Act,1980 for diversion of 112.621 ha of forest land has also been applied vide Proposal No. FP/OR/MIN/26965/2017 dated 05.07.2017 and is under process. Site Specific Wild Life Conservation Plan is under approval stage.

(v) TOR was issued by MoEF&CC, Govt. of India vide letter F.No.IA-J-11015/51/2021-IA.II(M) dated 04.08.2021 for undertaking detailed EIA studies for the project.

(vi) Baseline monitoring studies has been carried out for the period October '2021 to December '2021 (Winter Season).

(vii) Public Hearing for this project was conducted on 27.04.2022 at 11.00 A.M at Open ground near Khajuridihi Chowk Baladihi Village under Koira Tehsil of Sundargarh District. The major issues raised in the public hearing were on provision of employment to local people, education, health & medical facilities, electrification of street lights, school bus facility,

construction of check dams, water pollution, peripheral development and welfare activities, road maintenance, tree plantation, supply of drinking water facility, R & R for affected families, etc. Action plan for fulfilling the PH commitments has been proposed.

(viii) Location & Environmental Sensitivity: The geo-coordinates of the mine lease area is Latitude:21°52'05.242"N- 21°52'54.342" N, Longitude: 85°17'10.449"E- 85°17'56.810" E. There is no National Park, wildlife sanctuary, biosphere reserve within 10 km radius of the Mine. However, Karo - Karampada elephant corridor is located at about 13.31 km from the mine lease area in NNW direction. Two seasonal nalas are passing in ML area Khajuridihi seasonal nala is passing through the southern side and other one at Norther side of ML area. Porhadihi Nala (0.3 km, SSE) are the nearest water bodies. Baladihi and Biradihi villages are adjacent to the ML area in NE and E direction. The NH-215 passes at 4.7 km NW of the project site. Nearest major railway stations is Nayagarh RS 14.2 km, E.

(ix) Production & Mining Details: Netrabandha Pahar Iron Ore Block proposes to produce total excavation of 2.680 MTPA (2.0 MTPA (ROM)+ OB 0.680) along with 2x100 TPH Mobile Crusher in mine lease area of 139.223 ha located at Baladihi village, Koira Tehsil, Sundargarh District, Odisha. Total mineable reserves are 64.577 million tonnes (M) as per the approved mining plan. The mining is proposed to be carried out by fully mechanized method by deployment of earth moving machineries like crawler mounted drill rig, air compressor, backhoe shovels, rock breaker, 25 tonner dumpers etc., will be adopted. During the ensuing plan period, it has been envisaged to make the production of 8 MTPA ROM. Both lateral and depth ward development has been proposed to be undertaken to achieve the targeted production.

(x) The benches will be developed systematically following the terrain condition of the area to attain the production of iron ore of 2 million tonnes per annum at the end of 3rd year. The height and width of the benches will be kept at 6m and 10 m respectively for easy vehicular movement. The individual bench faces will be kept at 800 whereas the overall quarry slope angle is proposed to be kept at around 450 with the horizontal. Massive hard iron ore beds/ boulders will be loosened through drilling and blasting. Drilling will be carried out by means of 115 mm dia crawler drill with 610 HP compressor. For secondary breaking hydraulic rock breaker will be deployed. Thus, secondary drilling and blasting is eliminated. Blasting will be carried out with the help of explosives (slurry type) boosters and ANFO and class-VI explosives (TLD, electric detonators and detonating fuse). ROM with SLO, fines, BD will be fed directly to 4x150 TPH mobile screening plants and these screening plants will also be fitted with grizzly. The oversized materials will be fed to 2x100 TPH mobile crushing plant.

(xi) Water Requirement: Total water requirement for the proposed project is about 167 KLD which will be met from Teherai Nala, Ground water and Rainwater. CGWA Application

for withdrawal of 4 KLD is applied vide application no. 21-4/3719/OR/MIN/2022 Dt 24/05/2022 and application for surface water withdrawal is yet to be submitted.

(xii) No effluent will be generated due to mining activities. Sewage generated from toilet blocks would be disposed through septic tank and soak pits/STP.

(xiii) Power Requirement: Total power requirement for the proposed project is 2.5 MW which will be sourced from WESCO. Subsequently, after getting necessary permission from concerned department, power line will be utilized and DG will be used for emergency purpose.

(xiv) Waste Generation & Management: During the five year of mining plan period 1166241cum of waste will be generated. The alluvial soil capping the rock bed is the loosen OB that exists in some part of the block. The thickness of the OB is about 1.0 m. This will be removed separately and simultaneously used for plantation. Only temporary storage for top soil is proposed. Proposed generation of waste will be dumping in waste dump site and in the conceptual stage, which will be used for backfilled in 45.632 ha area within mined out pit.

(xv) Rainwater Harvesting: During the Initial stage of mining BPSL will be considering 3 no of RWH ponds of 6x3x2m which can accommodate 108 cum of rainwater. Considering Total RWH pit as 0.066 ha and with a total annual rainfall of 1300 mm and runoff coefficient as 0.65 with a depth of 5 m, it is estimated to harvest 2778.5 cum/annum of rainwater.

(xvi) The PP has submitted that Schedule-I species reported in the study area namely Bison, four horned Antelope, elephant, Leopard cat, Indian Pangolin, Peacock, Indian retel, Flying squirrel, Mouse deer, sloth bear, Rock python. However, they were never spotted/reported in the ML area by locals.

(xvii) To reduce fugitive dust emissions due to handling of ore, dust suppression systems will be installed at appropriate locations. Plain water type dust suppression system will be provided all around the ore stockpiles. In crushing and screening plant, all dust control measures will be adopted to control the dust emissions within prescribed limit.

(xviii) The Netrahandha Pahar Iron Ore block project of M/S BPSL is adjacent to Haladihi village. Based on the requirement of the project BPSL will acquire 12.787 Ha of private land from the Haladihi village. 53 households of Baladihi village will be affected as either their lands or houses will be acquired for the mining. The compensation and other R&R benefits will be fixed as per the Right to Fair Compensation and Transparency in land acquisition, Rehabilitation and Resettlement Act, 2013 (RFCT LARR Act, 2013).

(xix) Greenbelt Development: About 66.785 ha greenbelt will be developed in the backfilled area, bench plantation, safety zone along both sides of the road and Khajuridih nala. Greenbelt will be developed in non-operating areas. Shrubs and trees will be planted in encircling rows around the project site. About 3.783 ha is proposed to develop in the first 5 years plan period.

(xx) Project Cost & EMP Cost: The total capital investment for the proposed mine facilities is about Rs. 205 crores which includes the cost of mine development, plant & machinery, utility facilities. The proposed EMP cost is about Rs. 9.50 crore as capital cost & Rs. 2.75Crores as recurring cost and about Rs. 220 lakhs under CSR are proposed for 3 years.

(xxi) The proposed mine will boost the socio-economic profile of the region and will act as an engine of economic growth for the country and will open-up employment opportunities for the local people in the region.

(xxii) The Environment Consultant M/s. Vimta Labs Ltd. Hyderabad along with the proponent made a detailed presentation on the proposal before the SEAC on 16.08.2022.

(xxiii) The project proponent furnished additional information / documents on the project to SEAC on 13.09.2022.

4. The SEAC have appraised the proposal in its meeting dated 12.10.2022 and have recommended for grant of Environmental Clearance for the project, stipulating various conditions. However, the Environmental Clearance shall be issued by the SEIAA, Odisha after receipt of Stage-I Forest Clearance from the proponent as stipulated in MoEF&CC, Govt. of India office memorandum no. J-11013/41/2006-IA.II(I), dated 09.09.2011 and office memorandum no. J-11013/41/2006-IA.II(I), dated 18th May, 2012. The matter was further examined in the State Environment Impact Assessment Authority (SEIAA), Odisha in its 114th meeting held on held on 19th-21st April'2023 in accordance with the EIA Notification, 2006 and further amendments thereto. The Authority deferred the proposal and requested the PP to submit the revised EMP cost as per OM dated 30.09.2020 of MoEF & CC,GoI. The PP submitted the revised EMP on 17.04.2023.

5. This proposal conforms to the item no. 1(a)-' Mining of Minerals in the schedule of EIA Notification, 2006 as amended time to time, and the major mineral extraction project falls under Category B1 as the mining lease area is more than 5ha and less than 250Ha.

6. The matter was again examined in the State Environment Impact Assessment Authority (SEIAA), Odisha in its 120th meeting held on held on 23.05.2023, recommendation of SEAC and in accordance with the EIA Notification, 2006 and further amendments thereto. The Authority observed that the PP has received FC under section 2(ii) & has paid the NPV for the entire forest land involved in the project. In view of this, the Authority decided to grant EC with specific condition.

7. Environmental Clearance (EC) is granted under the provisions of EIA Notification No. S.O. 1533 (E) dated the 14th September, 2006 of the Government of India in the erstwhile Ministry of Environment and Forests, as amended from time to time for "Mining of Iron Ore from Netrabandha Pahar Iron Ore Block with Total Excavation of 2.680 MTPA (2.0 MTPA (ROM), OB-0.680 MTPA) along with 2x100 TPH Mobile Crusher of ML area of 139.223 Ha, located at village- Baludihi, Tahasil- Koira, District- Sundargarh by M/s Bhushan Power and Steel Limited" with the following stipulations (specific and standard), environmental conditions and safeguards.

Stipulations:

A. **Specific conditions:**

(i) The Environmental Clearance is issued for execution of the lease agreement. The PP is required to submit Stage-1 Forest Clearance within 12 months.

(ii) Grant of CTO to the project shall be subject to fulfilment of Condition no. A(i).

B. **Standard Conditions -**

I. **Statutory compliance:**

(i) This Environmental Clearance (EC) is subject to orders/ judgment of Hon'ble Supreme Court of India, Hon'ble High Court, Hon'ble NGT and any other Court of Law, Common Cause Conditions as may be applicable.

(ii) The Project proponent complies with all the statutory requirements and judgment of Hon'ble Supreme Court dated 2nd August,2017 in Writ Petition (Civil) No. 114 of 2014 in matter of Common Cause versus Union of India & Ors before commencing the mining operations.

(iii) The State Government concerned shall ensure that mining operation shall not be commenced 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 2nd August, 2017 in Writ Petition (Civil) No. 114 of 2014 in matter of Common Cause versus Union of India & Ors.

(iv) This Environmental Clearance shall become operational only after receiving formal NBWL Clearance from MoEF&CC subsequent to the recommendations of the Standing Committee of National Board for Wildlife, if applicable to the Project.

(v) This Environmental Clearance shall become operational only after receiving formal Forest Clearance (FC) under the provision of Forest Conservation Act, 1980, as applicable to the project.

(vi) Project Proponent (PP) shall obtain Consent to Operate after grant of EC and effectively implement all the conditions stipulated therein. The mining activity shall not commence prior to obtaining Consent to Establish / Consent to Operate from the concerned State Pollution Control Board.

(vii) The PP shall adhere to the provision of the Mines Act, 1952, Mines and Mineral (Development & Regulation), Act, 2015 and rules & regulations made there under. PP shall adhere to various circulars issued by Directorate General Mines Safety (DGMS) and Indian Bureau of Mines from time to time.

(viii) The Project Proponent shall obtain consents from all the concerned land owners, before start of mining operations, as per the provisions of MMDR Act, 1957 and rules made there under in respect of lands which are not owned by it.

(ix) The Project Proponent shall follow the mitigation measures provided in MoEF&CC's 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".

(x) The Project Proponent shall obtain necessary prior permission of the competent authorities for drawl of requisite quantity of surface water and from CGWA for withdrawal of groundwater for the project.

(xi) A copy of EC letter will be marked to concerned Panchayat / local NGO etc. if any, from whom suggestion / representation has been received while processing the proposal.

(xii) State Pollution Control Board shall be responsible for display of this EC letter at its Regional office, District Industries Centre and Collector's office/ Tahasildar's Office for 30 days.

(xiii) The Project Authorities should widely advertise about the grant of this EC letter by printing the same in at least two local newspapers, one of which shall be in vernacular language of the concerned area. The advertisement shall be done within 7 days of the issue of the clearance letter mentioning that the instant project has been accorded EC and copy of the EC letter is available with the State Pollution Control Board and web site of the Ministry of Environment, Forest and Climate Change (www.parivesh.nic.in). A copy of the advertisement may be forwarded to the concerned MoEF&CC Regional Office for compliance and record.

(xiv) The Project Proponent shall inform the MoEF&CC/SEIAA, Odisha for any change in ownership of the mining lease. In case there is any change in ownership or mining lease is transferred then mining operation shall only be carried out after transfer of EC as per provisions of the para 11 of EIA Notification, 2006 as amended from time to time.

(I) <u>Air quality monitoring and preservation</u>

(i) The Project Proponent shall install a minimum of 3 (three) online Ambient Air Quality Monitoring Stations with 1 (one) in upwind and 2 (two) in downwind direction based on long term climatological data about wind direction such that an angle of 120° is made between the monitoring locations to monitor critical parameters, relevant for mining operations, of air pollution viz. PM_{10}, $PM_{2.5}$, NO_2, CO and SO_2 etc. as per the methodology mentioned in NAAQS Notification No. B-29016/20/90/PCI/L dated 18.11.2009 covering the aspects of transportation and use of heavy machinery in the impact zone. The ambient air quality shall also be monitored at prominent places like office building, canteen etc. as per the site condition to ascertain the exposure characteristics at specific places. The above data shall be digitally displayed within 03 months in front of the main Gate of the mine site.

(ii) Effective safeguard measures for prevention of dust generation and subsequent suppression (like regular water sprinkling, metalled road construction etc.) shall be carried out in areas prone to air pollution wherein high levels of PM_{10} and $PM_{2.5}$ are evident such as haul road, loading and unloading point and transfer points. The Fugitive dust emissions from all sources shall be regularly controlled by installation of required equipments/ machineries and preventive maintenance. Use of suitable water-soluble chemical dust suppressing agents may be explored for better effectiveness of dust control system. It shall be ensured that air pollution level conform to the standards prescribed by the MoEF&CC/ Central Pollution Control Board.

D.K.

(II) Water quality monitoring and preservation

(i) In case, immediate mining scheme envisages intersection of ground water table, then Environmental Clearance shall become operational only after receiving formal clearance from CGWA. In case, mining operation involves intersection of ground water table at a later stage, then PP shall ensure that prior approval from CGWA and SEIAA,Odisha is in place before such mining operations. The permission for intersection of ground water table shall essentially be based on detailed hydro-geological study of the area.

(ii) 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 well located in village should be incorporated to ascertain the impact of mining over ground water table. The Report on changes in Ground water level and quality shall be submitted on six-monthly basis to the Integrated Regional Office of the Ministry, CGWA and State Groundwater Department / State Pollution Control Board.

(iii) Project Proponent shall regularly monitor and maintain records w.r.t. ground water level and quality in and around the mine lease by establishing a network of existing wells as well as new piezo-meter installations during the mining operation in consultation with Central Ground Water Authority/ State Ground Water Department. The Report on changes in Ground water level and quality shall be submitted on six-monthly basis to the Integrated Regional Office of the Ministry, CGWA and State Groundwater Department / State Pollution Control Board.

(iv) The Project Proponent shall undertake regular monitoring of natural water course/ water resources/ springs and perennial nallahs existing/ flowing in and around the mine lease and maintain its records. The project proponent shall undertake regular monitoring of water quality upstream and downstream of water bodies passing within and nearby/ adjacent to the mine lease and maintain its records. Sufficient number of gullies shall be provided at appropriate places within the lease for management of water. PP shall carryout regular monitoring w.r.t. pH and included the same in monitoring plan. The parameters to be monitored shall include their water quality vis-a-vis suitability for usage as per CPCB criteria and flow rate. It shall be ensured that no obstruction and/ or alteration be made to water bodies during mining operations without justification and prior approval of SEIAA, Odisha. The monitoring of water courses/ bodies existing in lease area shall be carried out four times in a year viz. pre- monsoon (April-May), monsoon (August), post-monsoon (November) and winter (January) and the record of monitored data be sent regularly to the Integrated Regional Office,Bhubaneswar of MoEF & CC,GoI, SEIAA, Odisha, Central Ground Water Authority and Regional Director, Central Ground Water Board, State Pollution Control Board and Central Pollution Control Board. Clearly showing the trend analysis on six-monthly basis.

(v) Quality of polluted water generated from mining operations which include Chemical Oxygen Demand (COD) in mines run-off, acid mine drainage and metal contamination

in runoff shall be monitored along with Total Suspended Solids (TDS), Dissolved Oxygen (DO), pH and Total Suspended Solids (TSS). The monitored data shall be uploaded on the website of the company as well as displayed at the project site in public domain, on a display board, at a suitable location near the main gate of the Company. The circular No. J- 20012/1 /2006-IA.II (M) dated 27.05.2009 issued by Ministry of Environment, Forest and Climate Change may also be referred in this regard.

(vi) The project proponent shall construct retaining wall and settling pond within the lease area. Further, check dams shall be constructed at strategic locations in which rain water passes in rainy season. Finally, the excess supernatted after sedimentation shall be allowed to spill away through stone pitch structure to the nearby valley.

(vii) De-silting of agricultural lands in buffer zone and beyond including nearby Nalas/rivers perennially periodically and perpetually caused due to wash up of minerals/OB/dumps shall be done as per SOP submitted. Retaining wall shall be constructed to ensure that no silt after wash up is escaped from the core / buffer zone of the mines.

(viii) Project Proponent shall plan, develop and implement rainwater harvesting measures on long term basis to augment ground water resources in the area in consultation with Central Ground Water Board/ State Groundwater Department. A report on amount of water recharged needs to be submitted to Integrated Regional Office, MoEF & CC as a part of compliance in the six monthly compliance report.

(ix) Industrial waste water (workshop and waste water from the mine) should be properly collected and treated in an ETP as proposed so as to conform to the notified standards prescribed from time to time, as applicable. The standards shall be prescribed through Consent to Operate (CTO) issued by concerned State Pollution Control Board (SPCB). The workshop effluent shall be treated after its initial passage through Oil and grease trap.

(x) The water balance/water auditing shall be carried out and measure for reducing the consumption of water shall be taken up and reported to the Regional Office of the MoEF & CC and State Pollution Control Board.

(III) <u>Noise and vibration monitoring and prevention</u>

(i) The peak particle velocity at 500m distance or within the nearest habitation, whichever is closer shall be monitored periodically as per applicable DGMS guidelines.

(ii) 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 /night hours.

(iii) The Project Proponent shall take measures for control of noise levels below 85 dBA in the work environment. The worker engaged in operations of HEMM, etc. should be provided with ear plugs /muffs. All personnel including laborers working in dusty areas shall be provided with protective respiratory devices along with adequate training, awareness and information on safety and health aspects. The PP shall be held responsible in case it has been found that workers/ personals/ laborers are working without personal

protective equipment.

(IV) Mining Plan

(i) The Project Proponent shall adhere to the working parameters of mining plan which was submitted at the time of EC appraisal wherein year-wise plan was mentioned for total excavation i.e. quantum of mineral, waste, over burden, inter burden and top soil etc. No change in basic mining proposal like mining technology, total excavation, mineral & waste production, lease area and scope of working (viz. method of mining, overburden & dump management, O.B & dump mining, mineral transportation mode, ultimate depth of mining etc.) shall not be carried out without prior approval of competent authority which entail adverse environmental impacts, even if it is a part of approved mining plan modified after grant of EC or granted by State Govt. in the form to Short Term Permit (STP), Query license or any other name.

(ii) The Project Proponent shall get the Final Mine Closure Plan along with Financial Assurance approved from Indian Bureau of Mines/Department of Mining & Geology as required under the Provision of the MMDR Act, 1957 and Rules/ Guidelines made there under. A copy of approved final mine closure plan shall be submitted within 2 months of the approval of the same from the competent authority to the concerned Regional Office of the Ministry of Environment, Forest and Climate Change for record and verification.

(iii) The land-use of the mine lease area at various stages of mining scheme as well as at the end-of-life shall be governed as per the approved Mining Plan. The excavation vis-a-vis backfilling in the mine lease area and corresponding afforestation to be raised in the reclaimed area shall be governed as per approved mining plan. PP shall ensure the monitoring and management of rehabilitated areas until the vegetation becomes self-sustaining. The compliance status shall be submitted half-yearly to the concerned Integrated Regional Office, Bhubaneswar of MoEF & CC,GoI.

(V) Land reclamation

(i) The Overburden (O.B.) generated during the mining operations shall be stacked at earmarked OB dump site(s) only and it should not be kept active for a long period of time. The physical parameters of the OB dumps like height, width and angle of slope shall be governed as per the approved Mining Plan as per the guidelines/circulars issued by D.G.M.S w.r.t. safety in mining operations shall be strictly adhered to maintain the stability of top soil/OB dumps. The topsoil shall be used for land reclamation and plantation.

(ii) The reject/waste generated during the mining operations shall be stacked at earmarked waste dump site(s) only. The physical parameters of the waste dumps like height, width and angle of slope shall be governed as per the approved Mining Plan as per the guidelines/circulars issued by DGMS w.r.t. safety in mining operations shall be strictly adhered to maintain the stability of waste dumps.

(iii) The reclamation of waste dump sites shall be done in scientific manner as per the Approved Mining Plan cum Progressive Mine Closure Plan.

(iv) The slope of dumps shall be vegetated in scientific manner with suitable native species to maintain the slope stability, prevent erosion and surface run off. The selection of local species regulates local climatic parameters and help in adaptation of plant species to the

microclimate. The gullies formed on slopes should be adequately taken care of as it impacts the overall stability of dumps. The dump mass should be consolidated with the help of dozer/ compactors thereby ensuring proper filling/ leveling of dump mass. In critical areas, use of geo textiles/ geo-membranes / clay liners / Bentonite etc. shall be undertaken for stabilization of the dump.

(v) The Project Proponent shall carry out slope stability study in case the dump height is more than 30 meters. The slope stability report shall be submitted to concerned regional office of MoEF&CC, Govt. of India, Bhubaneswar as well as SEIAA, Odisha.

(vi) Catch drains, settling tanks and siltation ponds of appropriate size shall be constructed around the mine working, mineral yards and topsoil / OB / waste dumps to prevent runoff of water and flow of sediments directly into the water bodies (Nullah/ River/ Pond etc.). The collected water should be utilized for watering the mine area, roads, green belt development, plantation etc. The drains/ sedimentation sumps etc. shall be de-silted regularly, particularly after monsoon season, and maintained properly.

(vii) Check dams of appropriate size, gradient and length shall be constructed around mine pit and OB dumps to prevent storm run-off and sediment flow into adjoining water bodies. A safety margin of 50% shall be kept for designing of sump structures over and above peak rainfall (based on 50 years data) and maximum discharge in the mine and its adjoining area which shall also help in providing adequate retention time period thereby allowing proper settling of sediments/ silt material. The sedimentation pits/ sumps shall be constructed at the corners of the garland drains.

(viii) The top soil, if any, shall temporarily be stored at earmarked site(s) within the mine lease only and should not be kept unutilized for long. The physical parameters of the top soil dumps like height, width and angle of slope shall be governed as per the approved Mining Plan and as per the guidelines framed by DGMS w.r.t. safety in mining operations shall be strictly adhered to maintain the stability of dumps. The topsoil shall be used for land reclamation and plantation purpose.

(ix) The mining lease holders shall, after ceasing mining operations, undertake re-grassing the mining area and any other area which may have been disturbed due to their mining activities and restore the land to a condition which is fit for growth of fodder, flora, fauna etc.

(VI) <u>Transportation</u>

(i) No Transportation of the minerals shall be allowed in case of roads passing through transportation of the minerals leaving an adequate gap (say at least 200 meters) so that the adverse impact of sound and dust along with chances of accidents could be mitigated. All costs resulting from widening and strengthening of existing public road network shall be borne by the PP in consultation with nodal State Govt. Department. Transportation of minerals through road movement in case of existing village/ rural roads shall be allowed in consultation with nodal State Govt. Department only after required strengthening such that the carrying capacity of roads is increased to handle the traffic load. The pollution due to transportation load on the environment will be effectively controlled and water sprinkling will also be done regularly. Vehicular emissions shall be kept under control and regularly monitored. Project should obtain Pollution Under Control (PUC) certificate

DH

for all the vehicles from authorized pollution testing centers.

(ii) The Main haulage road within the mine lease should be provided with a permanent water arrangement for dust suppression. Other roads within the mine lease should be wetted regularly with tanker-mounted water sprinkling system. The other areas of dust generation like crushing zone, material transfer points, material yards etc. should invariably be provided with dust suppression arrangements. The air pollution control equipments like bag filters, vacuum suction hoods, dry fogging system etc. shall be installed at Crushers, belt-conveyors and other areas prone to air pollution. The belt conveyor should be fully covered to avoid generation of dust while transportation. PP shall take necessary measures to avoid generation of fugitive dust emissions.

(iii) Traffic management shall be done as per recommendation of Traffic Management Study Report.

(iv) The Project Proponent shall provide parking plaza for the heavy vehicles within the lease area as per recommendation of NEERI.

(VII) <u>Green Belt</u>

(i) The Project Proponent shall develop greenbelt in 7.5m wide safety zone all along the mine lease boundary as per the guidelines of CPCB in order to arrest pollution emanating from mining operations within the lease. The whole Green belt shall be developed within first 5 years starting from windward side of the active mining area. The development of greenbelt shall be governed as per the EC granted by the Ministry irrespective of the stipulation made in approved mine plan.

(ii) The Project Proponent shall carryout plantation/ afforestation in backfilled and reclaimed area of mining lease, around water body, along the roadsides, in community areas etc. by planting the native species in consultation with the State Forest Department/ Agriculture Department/ Rural development department/ Tribal Welfare Department/ Gram Panchayat such that only those species be selected which are of use to the local people. The CPCB guidelines in this respect shall also be adhered. The density of the trees should be around 2500 saplings per Hectare. Adequate budgetary provision shall be made for protection and care of trees.

(iii) The Project Proponent shall make necessary alternative arrangements for livestock feed by developing grazing land with a view to compensate those areas which are coming within the mine lease. The development of such grazing land shall be done in consultation with the State Government. In this regard, Project Proponent should essentially implement the directions of the Hon'ble Supreme Court with regard to acquisition of grazing land. The sparse trees on such grazing ground, which provide mid-day shelter from the scorching sun, should be scrupulously guarded/ protected against felling and plantation of such trees should be promoted.

(iv) The Project Proponent shall undertake all precautionary measures for conservation and protection of endangered flora and fauna and Schedule-I species during mining operation. A Wildlife Conservation Plan shall be prepared for the same clearly delineating action to be taken for conservation of flora and fauna. The Plan shall be approved by Chief Wild Life Warden of the State Govt and implemented in consultation with the State Forest and Wildlife Department. A copy of Wildlife Conservation Plan and its implementation status

(annual) shall be submitted to the Regional Office of the Ministry.

(VIII) Human health issues, Public hearing & CER

(i) The Project Proponent shall appoint an Occupational Health Specialist for Regular as well as Periodical medical examination of the workers engaged in the mining activities, as per the DGMS guidelines. The records shall be maintained properly. PP shall also carryout Occupational health check-ups in respect of workers which are having ailments like BP, diabetes, habitual smoking, etc. The check-ups shall be undertaken once in six months and necessary remedial/ preventive measures be taken. A status report on the same may be sent to MoEF&CC Regional Office and DGMS on half-yearly basis.

(ii) A commitment in form of an undertaking for periodical occupational health checkup of the employee and the local people shall be done through an occupational health expert as per the detailed action plan submitted with the proposal within 6 months from the date of issue of Environmental Clearance.

(iii) The Project Proponent must demonstrate commitment to work towards 'Zero Harm' from their mining activities and carry out Health Risk Assessment (HRA) for identification workplace hazards and assess their potential risks to health and determine appropriate control measures to protect the health and wellbeing of workers and nearby community. The proponent shall maintain accurate and systematic records of the HRA. The HRA for neighborhood has to focus on Public Health Problems like Malaria, Tuberculosis, HIV, Anaemia, Diarrhoea in children under five, respiratory infections due to bio mass cooking. The proponent shall also create awareness and educate the nearby community and workers for Sanitation, Personal Hygiene, Hand washing, not to defecate in open, Women Health and Hygiene (Providing Sanitary Napkins), hazard of tobacco and alcohol use. The Proponent shall carryout base line HRA for all the category of workers and thereafter every five years.

(iv) The Proponent shall carry out Occupational health surveillance which be a part of HRA and include Biological Monitoring where practical and feasible, and the tests and investigations relevant to the exposure (e.g. for Dust a X-Ray chest; For Noise Audiometric; for Lead Exposure Blood Lead, For Welders Full Ophthalmologic Assessment; for Manganese Miners a complete Neurological Assessment by a Certified Neurologist, and Manganese (Mn) estimation in Blood; For Inorganic Chromium- Fortnightly skin inspection of hands and forearms by a responsible person. Except routine tests all tests would be carried out in a Lab accredited by NABH. Records of Health Surveillance must be kept for 30 years, including the results of and the records of Physical examination and tests. The record of exposure due to materials like Asbestos, Hard Rock Mining, Silica, Gold, Kaolin, Aluminium, Iron, Manganese, Chromium, Lead, Uranium need to be handed over to the Mining Department of the State in case the life of the mine is less than 30 years. It would be obligatory for the State Mines Departments to make arrangements for the safe and secure storage of the records including X-Ray. Only conventional X-Ray will be accepted for record purposes and not the digital one). X-Ray must meet ILO criteria (17 x14 inches and of good quality).

(v) The Proponent shall maintained a record of performance indicators for workers which includes (a) there should not be a significant decline in their Body Mass Index and it

should stay between 18.5 -24.9, (b) the Final Chest X-Ray compared with the base line X-Ray should not show any capacities,(c) At the end of their leaving job there should be no Diminution in their Lung Functions Forced Expiratory Volume in one second (FEV1),Forced Vital Capacity (FVC), and the ratio) unless they are smokers which has to be adjusted, and the effect of age, (d) their hearing should not be affected. As a proof an Audiogram (first and last need to be presented), (e) they should not have developed any Persistent Back Pain, Neck Pain, and the movement of their Hip, Knee and other joints should have normal range of movement, (f) they should not have suffered loss of any body part. The record of the same should be submitted to the Regional Office, MoEF&CC annually along with details of the relief and compensation paid to workers having above indications.

(vi) The Project Proponent shall ensure that Personnel working in dusty areas should wear protective respiratory devices and they should also be provided with adequate training and information on safety and health aspects.

(vii) Project Proponent shall make provision for the housing for workers/labors or shall construct labor camps within/outside (company owned land) with necessary basic infrastructure/ facilities like fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, creche for kids etc. The housing may be provided in the form of temporary structures which can be removed after the completion of the project related infrastructure. The domestic waste water should be treated with STP in order to avoid contamination of underground water.

(viii) The project proponent shall submit the time-bound action plan to the concerned integrated regional office of the Ministry within 6 months from the date of issuance of environmental clearance for undertaking the activities committed during public hearing by the project proponent and as submitted to SEAC, in terms of the provision of the MoEF & CC Office Memorandum No-22-65/2017-IA.III dated 30th September,2020. The action plan shall be implemented within three years of the commencement of the project.

(ix) The activities proposed in action plan prepared for addressing the issues raised during the Public Hearing shall be completed as per the budgetary provisions mentioned in the action plan and within the stipulated time frame. The status report on implementation of action plan shall be submitted to the concerned Regional Office of the Ministry along with District Administration. Project Proponent shall keep the funds earmarked for environmental protection measures in a separate account and refrain from diverting the same for other purposes. The Year wise expenditure of such funds should be reported to the IRO, Bhubaneswar, MoEF&CC, OSPCB & SEIAA, Odisha.

(IX) Miscellaneous

(i) The Project Proponent shall prepare digital map (land use & land cover) of the entire lease area once in five years purpose of monitoring land use pattern and submit a report to concerned Regional Office of the MoEF&CC.

(ii) 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.

DM

(iii) The Project Proponent shall submit six monthly compliance reports on the status of the implementation of the stipulated environmental safeguards to the concerned Integrated Regional Office (IRO),Bhubaneswar of Ministry, SEIAA, Odisha, Central Pollution Control Board and State Pollution Control Board.

(iv) A separate 'Environmental Management Cell' with suitable qualified manpower should be set-up under the control of a Senior Executive. The Senior Executive shall directly report to Head of the Organization. Adequate number of qualified Environmental Scientists and Mining Engineers shall be appointed and submit a report to RO, MoEF&CC.

(v) The proponent shall comply all the specific conditions as recommended by CSIR-NEERI on carrying capacity study (as applicable) & other specific conditions in time bound manner as applicable for the project.

(vi) The project proponent shall augment infrastructure on drinking water, health care and education in nearby villages as per time bound action plan submitted.

(vii) The project proponent shall obtain permission from DGMS under 106(2b) to carry out blasting operation within the lease area.

(viii) Fe grade - 55 and +45 to be attempted to use by blending with higher grade.

(ix) It shall be mandatory for the project management to submit six (06) monthly compliance reports on post environmental monitoring in respect of the stipulated terms and conditions in this Environmental Clearance to the State Environment Impact Assessment Authority (SEIAA), Odisha, SPCB & Regional Office of the Ministry of Environment & Forest, Odisha in hard and soft copies on 1st June and 1st December of each calendar year. The proponent shall also upload the six monthly compliance report including results of monitored data, as applicable in the website of the Ministry(www.parivesh.nic.in) for monitoring of EC Conditions.

(x) The environmental statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent to the Odisha State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of EC conditions and shall also be sent to the respective to the concerned Integrated Regional Office(IRO),Bhubaneswar of MoEF & CC,GoI, Central Pollution Control Board and State Pollution Control Board.

(xi) The proponent shall submit/upload six monthly reports on the status of compliance of the stipulated Environmental Clearance conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of MoEF&CC, Govt. of India, the respective Zonal Office of CPCB and the SPCB. The criteria pollutant levels namely; SPM, RSPM, SO_2, NO_x (ambient levels as well as stack emissions) or critical sectoral parameters, indicated for the project shall be monitored and displayed at a convenient location near the main gate of the company in the public domain.

(xii) The concerned Regional Office of the MoEF&CC shall randomly monitor compliance of the stipulated conditions. The project authorities should extend full cooperation to the

MoEF&CC officer(s) by furnishing the requisite data / information / monitoring reports.

(xiii) 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 and any other Court of Law relating to the subject matter.

(xiv) This Environmental Clearance (EC) is subject to orders/judgment of Hon'ble Supreme Court of India, Hon'ble High Court, Hon'ble NGT and any other Court of Law, Common Cause Conditions as may be applicable.

(xv) 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

Copy to:

1. **Joint Secretary (IA Division)**, 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**, Integrated Regional Office (IRO), Ministry of Environment & Forests, A-31, Chandrasekharpur, Bhubaneswar for information.
5. **Regional Director**, CGWA, South Eastern Region, Bhujal Bhawan, Khandagiri, Bhubaneswar, Pin-751030.
6. **The Director of Mines**, Odisha, Bhubaneswar/DDM,Koira for information and necessary action.
7. **Collector & DM**, Sundargarh for Information and necessary action.
8. Guard file for record/Website/Parivesh Portal.

Member Secretary

Scheme

For

MITIGATIVE MEASURES TO MINIMIZE SOIL EROSION AND CHOCKING OF STREAMS

In compliance

with

Condition No.14 (a) of

Stage-I approval granted vide

Letter No.8-31/2022-FC, Dated.21.12.2023

of Govt. of India, Ministry of Environment, Forests

& Climate Change,

New Delhi.

for

Diversion of 112.621 Hects of Forest Land for U/s-2 (ii) (including 1.808 ha. of Safety Zone) of FC Act-1980

within 139.223 Ha. Nelrabandha Pahar Iron Ore Block

of

M/S Bhushan Power & Steel Limited.

In village Baldihi of Koira Tahsil, Sundargarh District

Odisha.

1. INTRODUCTION

M/s Bhushan Power and Steel Ltd (henceforth be known as BPSL) is a manufacturer of Steel in the country incorporated on 22/02/1999 under the Company Act by Ministry of Corporate Affairs, Govt. of India. The company is a manufacturer of flat and long products and have state-of-the-art plants at Chandigarh, Derabassi, Kolkata and Odisha in India. As reported by the User Agency in the project proposal, manufacture value added products covering entire steel value chain right from Coal Mining to Manufacturing Pig Iron, DRI, Billets, HR Coils, CR Coils, GP/GC Sheets, Precision tubes, Black Pipe/GI Pipe, Cable Tapes, Tor Steel, Carbon and Special Alloy Steel Wire Rods and Rounds conforming to IS and International standards. Present turnover of the company is above ₹8700 Crores with large volume of exports. The Company has successfully implemented and commissioned a green field integrated steel plant with the present capacity of 2.3 Million Tonnes which is being enhanced to 3.4 Million Tonnes of Steel and Captive Power Plant in Odisha with HR Coil making facility First in Private Sector in the State of Odisha.

The company was not having an Iron Ore Mines of its own. Government of Odisha, pursuant to the Mines and Minerals (Development & Regulation) Act, 1957 and the Mineral (Auction) Rules, 2015 as amended from time to time (the "Auction Rules), issued the notice inviting tender dated 17/03/2017 to commence the auction process for grant of mining lease for Netrabandha Pahar Iron Ore Block located in Sundargarh District of Odisha. The e-auction process was conducted in accordance with the tender document for the said mineral block and M/s BPSL was declared as the preferred Bidder under Rule 9(4)(b)(ii) of the Rules. Government of Odisha has awarded the Letter of Intent vide letter No.5283/SM, Bhubaneswar dated 24.06.2017 for Grant of Mining Lease for Iron Ore in favour of M/s BPSL the successful bidder in respect of Netrabandh Pahar Iron ore Block over an area of 139.223hects. (as per DGPS)/138.579hects. (as per RoR) in Baldihi village under Koira Tahasil of Sundargarh District under jurisdiction of Koira Forest Range of Bonai Division.

Further the said LoI has been modified vide Letter No.6285/SM dt.27.7.2017 revising the earlier mentioned area of 139.00 ha. to 139.223 ha. The said Letter of Intent (LoI) has been allowed to extension of the validity for another period of 2 years w.e.f. 26.6.2020 by the Steel & Mines Department, Govt. of Odisha vide Letter No.6350/SM dt.27.7.2020.

Despite the iron ore block is allocated to M/s BP&SL in June 2017 minimal progress has been made in terms of obtaining statutory approvals and clearances such as the EC/FC/Land acquisition, the clearance for the forest diversion proposal, the issuance of the Terms of Reference ("TOR") etc. primarily because of the following reasons:

(i) Corporate insolvency resolution process ("CIRP") was initiated in respect of BPSL vide the order passed by the Hon'ble National Company Law Tribunal, New Delhi ("NCLT") dated 26 July 2017 ("Insolvency Commencement Date");

(ii) The CIRP resulted in approval of the resolution plan dated 03 October 2018 as amended by addendum letter dated 10 October 2018 ("Resolution Plan") of JSW Steel Limited, which was the Resolution Applicant, on 16 October 2018. Pursuant thereto, the Resolution Plan was filed before the NCLT for its approval and was accorded the same under Section 31 of the Code vide order passed by it on 05 September 2019 ("NCLT Order");

(iii) Though the NCLT Order was challenged before the Hon'ble NCLAT, the Hon'ble NCLAT vide its judgment dated 17 February 2020 ("NCLAT Order"), disposed off the said challenges and approved the Resolution Plan after making certain modifications in the NCLT Order;

(iv) The NCLAT Order approving the Resolution Plan was further challenged before the Hon'ble Supreme Court. Since the Hon'ble Supreme Court did not grant a stay on the implementation of the Resolution Plan, the JSW Steel Limited has started the implementation of the Resolution Plan w.e.f. 26 March 2021.

In view of the above, after the change of ownership, the necessary procedures to obtain the Forest Clearances and other approval started and gradually progress is made in this regards.

The block comprises of 139.223 ha lies within the Saladihi village in Kolra Tehasil of Sundargarh District. The exploration under G2 category following UNFC guidelines was carried by the State Directorate of Geology. Hence the Block was auctioned for mining lease. As per the letter of intent as per Rule 10(2) of the Rules, the mining lease period will be for 50 years. The substantial quantity of the product from this block will be consumed in the Integrated Steel Plant of BP&SL situated at Thokolai in Jhansuguda.

The lease area over an area of 139.223 hects. (as per DGPS)/138.579 hects. (as per ROR). The authenticated land schedule is jointly verified by Mining, Revenue & Forest Department. As all the calculation will be based on map (DGPS survey map) it is always advisable to consider the DGPS area for land use and other calculation. During verification of the land schedule allotted for said Mining Lease area it is found that the total area (DGPS) over 139.223 hectare consists of 48.346 ha. PRF, 19.532 ha.Revenue Forest, 44.740 ha. DLC forest and 26.602 ha non-forest land.

Further, Stage-I approval over 112.621 ha. of Forest Land U/s:2 (ii) (including 1.808 ha. of Safety Zone) has been granted by MoEF& CC vide their Letter No.8-21/2022-FC, dated 21.12.2023 where in it has been stipulated as per **Condition No. 14 (a) for undertaking mitigative measures to minimize soil erosion and chocking of streams which will be implemented in accordance with the approved plan in consultation with the State Forest Department.**

2. LOCATION

The mining lease area finds place in the Survey of India Topo sheet No.F45N5 (73 G/5) and situated between the latitude 21° 52' 05.242" to 21° 52' 54.542" N, and longitude 85° 17' 10.449" to 85° 17' 56.810" E. The above ML area covering villages such asBaldihin Koira Range, Bonai Forest Division, Sundargarh District, Odisha.

3. TOPOGRAPHY

Netrabandha Pahar Block lies in Southern continuation of Bonai-Keonjhar belt of Ranchi Plateau. In general of Bonai-Keonjhar belt is deeply dissected given rise to a rugged topography with high and narrow hill ranges interspersed by broad valley. It is a discrete physiographic market by wide, flat, soil and alluvium covered tracks separated by low lying hills. The high hills are in fact, long range controlled by the out crop pattern of the BIF. The highest peak in the adjacent area is represented by Baliapahar (1010m). The said block represents an undulating to plain topography. At places flat topped low mounds are noticed with general gradient to NE and SE. The highest contour in this area at 678 m (north-central & south-central part of the block) and lowest contour is at 618 m at the northeast part of the block.

4. SOIL TYPE

Soil type in the study area varies widely from hard rock to lateritic soil. Areas at higher elevations are usually hard rock consisting of laterite. The top soil is scanty in the area. Whatever top soil is available is thinly spread over all Soil profile in nature. The pH of the soil is slightly acidic in nature.

5. CLIMATE

The study area is characterized by an oppressively hot summer with high humidity. Summer generally commences in the month of March. Temperature beings to rise rapidly attaining a maximum in the month of May. During the summer maximum temperature can go up to 47.7°C. The weather becomes pleasant with onset on monsoon in June and remains as such upto end of October. The temperature in the month of December is lowest, i.e., 7° C. The average annual rainfall as recorded at IMD observatory is 1325.16 mm. Predominant wind direction is South West. Area remains calm for nearly50% of the year

6. DRAINAGE

The drainage system of the area is controlled by Teheral nala flowing to the North of the block and its tributaries. However, Khajuridhi Nala flowing in the Southern part of the area control the drainage in the southern part.

7. LAND USE PATTERN

During the life of the mine, about 139.223 hectares wil be utilized for mining,Minerals processing, Road, and green belt plantation in Safety Zone area etc. The details of land use pattern will be as follows:

Item wise Proposed Land Use Pattern in Forest and Non-Forest Land of Total Lease Hold Area

Sl.No.	Pattern of utilization	Undiverted/ Virgin Forest (in Ha.)				Non-Forest	Grand Total
		PRF	RevenueForest	DLCForest	Total Forest		
1	Mining with Haul Road	27.444	17.829	42.160	87.433	16.877	104.310
2	Dump	9.607	-	-	9.607	-	9.607
3	Sub-grade	0.650	-	1.472	2.122	0.030	2.152
4	Storing of ore	1.835	-	-	1.835	-	1.835
5	Top Soil	0.500	-	-	0.500	-	0.500
6	Stacking of Minerals	5.726	-	0.113	5.839	-	5.839
7	Infrastructure	0.130	-	-	0.130	1.687	1.817
8	Road	-	-	-	-	0.534	0.534
9	Water Harvesting	-	-	-	-	0.066	0.066
10	Green Belt	-	-	-	-	2.017	2.017
11	Others	1.411	1.392	0.544	3.347	3.757	7.104
	TOTAL	**47.303**	**19.221**	**44.289**	**110.813**	**24.968**	**135.781**
12	Safety Zone around ML boundary	1.043	0.311	0.454	1.808	1.634	3.442
	TOTAL	**48.346**	**19.532**	**44.743**	**112.621**	**26.602**	**139.223**

8. EXISTING VEGETATION

Sal (Shorea robusta),Teak (Tectona grandis), Kusum (Schleicheraoleosa), Bahada (Terminalia belerica), Char (Buchananialanjan), Jamu (Syzygiumcumini), Asan (Terminalia tomentosa), Dhaura (Anogeissus latifolia), Kendu (Diospyros melanoxylon), Mahul (Madhuca indica), Karanja (Pongamia pinnata), Sidha (Lagerstroemia parviflora), Kurum (Adina cordifolia), Mango (Mangifera indica) etc. are major species among flora available in the applied area.

9. FACTORS RESPONSIBLE FOR SOIL EROSION & CHOKING OF STREAMS

In mining activities the following factors are responsible for soil erosion and choking of streams.

- Sub-grade and overburden dumps are major contributions for soil erosion and chocking of streams inside the ML area.
- Normally gully erosion, rill erosion occur due to storm water runoff from mine faces, in sub-grade dump and OB dump slope areas due to carriage of substantial amount of solids in the lower order streamlets which cause in chocking of the higher order streams.
- The lower order streamlets and gullies have high erosion capacity due to steep gradients and transportation of rock fragments with higher velocity of the stream resulting in deposition of the same in the connecting high order streams.
- Erosion is also caused by streams due to under cutting of banks and this results formation of slumps or slides.

But in the instant case the project is a green field mine area and not an ongoing mine in this case the general erosion is considered with respect to its topographical, geographical and edaphic factors for which require mitigative measures have been kept.

10. OBJECTIVES OF THE SCHEME

The objectives of the proposed scheme are as follows:

To meet the requirement of condition No. 14 (a) of the Stage-I approval of GoI, MoEF& CC, the following areas need to be attended to.

1. Prevention of erosion of loose materials from Sub grade dump, OB dump.
2. Prevention of obstruction of natural water courses.
3. Proper Management of overburden materials so as to prevent siltation in the streams.
4. Prevention of overflow of eroded soils from the mining lease area if any to the cultivable lands, natural streams and inhabitations.

It is worth mentioning here about the mine drainage of the lease area as per approved mining plan.

11. PROPOSED METHODOLOGY

To achieve the above objectives, it has been proposed to take up both biological and structural works for soil and water conservation. The vegetative measures are to be adopted mostly in the upper reaches & around O.B dumping sites whereas the structural works are suggested in the lower reaches such as in the garland drain & critical points around O.B. dumps. check dams have been proposed across the contour to arrest the sediment load arising from up-slopes of seasonal streams, and to prevent choking of streams followed by de-silting before onset of monsoon. The following activities are proposed to be taken up to mitigate soil erosion and choking of streams:

a. During monsoon, surface runoff is expected to carry silts and sediments.To reduce the flow velocity of water flown from overburden dump, mining pits, stock piles, haul roads as well as areas clear of vegetation,check dam have been proposed, which have been demarcated at suitable location of the project area.
b. Periodic Sediment/ silt removal/ De-silting etc will also be undertaken in these proposed check dams as well as from garland drains and subsequently biological reclamation will be made (as per the approved mining plan).
c. Along with the above sedimentation control measures, erosion from OB dump slopes areas will be controled by additional garland drain, loose boulder structures, settling tanks etc. The main purpose is to control soil erosion from OB dumps and mineral stock piles.

12. MEASURES ALREADY ADOPTED

There is no biological and Structural measures exist. It is a fresh mining lease and no mining activities have been taken place so far.

13. MEASURES PROPOSED

The details of proposed mitigative measures to minimize soil erosion and choking of streams in Mining Lease of NetrabandhaPahar Iron Ore Block in favour of M/s Bhushan Power & Steel Ltd. over an area of 139.223 hectare in village Baidihat Sundargarh District are given below:

a. Structural Measures

Vegetative means of erosion control are the most feasible and economic measures. However, as the pressure on land is increasing, it is necessary to bring even highly eroded land underutilization. In these lands, vegetative measures are not adequate to keep down the erosion. Some structural measures are required to be taken before vegetative measures are adopted. Structural measures, therefore, serve as supplementary to vegetative measures. The objective behind building mechanical structures is to reduce the degree and length of the slope, reducing run-off and consequently, reducing soil erosion.

i) Plan for Construction of Loose Boulder Structure

After studying the topography and the drainage pattern it has been found that there are 7 spots where the LBCD required and accordingly it is proposed to construct 5nos. of loose boulder structure of 4m span across the existing & proposed garland drain along the dumps & settling pit will help in stabilization of silt & sediment as well as prevention of soil erosion & enrichment of vegetation & greenery development. The cost norm of LBCD has been provided in **Annexure –I.**

ii) Plan for Construction of Garland drain

A shallow trench (1.0mx 1.5m) will be dug for storage of runoff accumulated for draining surface water before it is released to the agriculture land or natural water course. Details of proposed Garland drain **546.091mtr** shall be constructed during the ensuing plan period with location shown in the map (Ref Plate No.- I).The cost norm of Garland drain has been provided in **Annexure –II.**

iii) Plan for Construction of Settling Pit

It is a process that involves separation of solid material from slurry. Sometimes, this process is called sedimentation. When waste water is treated, a large quantum of materials is filtered out of the liquid by physical barriers. Even then, the water will contain some solids which need to be removed. A settling tank is proposed to be used to protect the surface water. It has been proposed to construct **2nos** of settling pits. Details of proposed 2nos of settling Tanks are shown in the map. The cost norm of Settling Tank has been provided in **Annexure –III.**

iv) Desiltation

The de-silting works of the Check dam, settling tank & garland drain will be taken up at regular intervals to prevent sedimentation and choking of streams. This de-silting of settling tank will provide space and base to hold the sediment laden runoff thereby allowing settling and clear water to flow down. This de-silting work will be preferably undertaken once in a year before & after monsoon. The implementation of the plans will be site specific in nature depending upon the severity of the sedimentation and choking of stream.

v) Coir Matting

For the purpose of coir matting cost of the same per sq. mtr has been taken as Rs.150/- (as per present market rate) including labour cost. The detail financial forecast is given below.

Sl.No	Dump Name	Area to be treated for coir matting (in Ha)	Rate of Coir matting per Ha	Total cost in Rs.	Remarks
1	Dump	4.128	1500000.00	61,92,000.00	Unit cost @ 150/- per m² including labour cost

14. INSPECTION, MONITORING AND EVALUATION

For successful implementation of the above mitigative measures, intensive inspection and technical guidance from concerned technical wing is required. Sufficient fuel/ conveyance charges for technical experts shall be provided by the user agency for proper execution of these programmes.

15. EXECUTING AGENCY

The works in the present Scheme shall be executed by the User Agency having specialized departments headed by qualified persons with outsourced man and machinery. To facilitate this, the user agency shall establish its own executing and supervision cells along with required infrastructural facilities. In order to maintain the quality of work, in-house supervision through competent personnel shall be provided. The entire work shall be carried out in co-ordination with the Forest Department.

16. FINANCIAL FORECAST

The total cost of implementation of mitigative measures will be **Rs.1,03,56,000/- (Rupees one crore Three lakh Fifty Six Thousand) only**. The expenditure will be made during the next plan period. This budget will be subject to increase in amount considering the increase in cost of materials and labour charges. The tentative annual expenditure planned for next plan period for the implementation of the mitigative measures is given in the following tables:

FINANCIAL FORECAST OF THE PROJECT (ML AREA=139.223 HA.)

Wage Rate Rs.450.00

Sl.No.	Description of the Work	Fund Required in Rs.
A.	07 nos. of Loose Boulder Structure of 4mt span @ Rs.56442/- per each	3,95,094.00
B.	Construction of Garland drain over a length of 566.091 m @ Rs.636/- per RMT	3,60,034.00
C.	Construction of 3 nos. of settling tank @ Rs.19,059/- per each	57,177.00
D.	De-silfation work for Garland drain, setting pond and check dam twice in a year on LS	5,00,000.00
E.	Coir matting along dump slope area over 4.128 Ha@15,00,000.00/ha	61,92,000.00
	Sub Total	**75,04,305.00**
	15 % of the total cost for motivation of VSS/ People involved	**11,25,646.00**
	Sub Total	**86,29,951.00**
	Price escalation @ 20%	**17,25,990.00**
	GRAND TOTAL	**1,03,55,941.00 or 1,03,56,000.00**

(Rupees one crore Three lakh Fifty Six Thousand only)

M/s Bhushan Power & Steel Ltd.

Countersigned
COUNTERSIGNED
Divisional Forest Officer
Sonai Division
DIVISIONAL FOREST OFFICER
SONAI DIVISION

Technically Approved
Regional Chief Conservator of Forests
Rourkela Circle

LBCD UNDER BONAI FOREST DIVISION
mtr. HI- 1.3 mtr. U/S- 1:1.5, D/S- 1:2

Span- 4

1 Earth work in Stony earth and gravels mixed with stone and boulder not exceeding 0.014 cum in volume within 30m initial lead and 1.5m initial lift including rough dressing and breaking clods to maximum 5cm to 7cm and laying in layer not exceeding 0.3m in depth and as per specification approved by the department.

Base	1	x	5.00	x	6.20	x	0.30	=	9.30	
Wing wall	4	x	0.50	x	0.50	x	0.30	=	0.30	
									9.60	Cum
								@	Rs. 304.80	/cum 2926.08

2 Rough stone dry packing in apron and revetment including cost, conveyance, royalty & taxes of all materials to complete work.

Crest Wall	1	x	5.00	x	$\frac{6.20 + 0.60}{2}$	x	1.60	=	27.20		
Wing wall	4	x	0.50	x	0.50	x	1.70	=	1.70		
Side wall	2	x	6.20	x	0.50	x	1.70	=	10.54		
									39.44	Cum	
								@	Rs. 1356.90	/cum	53516.14
											56442.22
										Say	**56442.00**

Annexure-II

Wage Rate- Rs.450

Detail Estimate of construction of Garland Drain

Sl No	Description of Items	No	Length	Width	Height	Qty	Unit	Rate	Amount
1	Clearing of Jungles & bushes	1	200.00	7.00		1400.00	Sqm.	12.15	17006.42
2	Earth work in hard soil in embankment roads with in 50 mtrinlial lead &1.50 mtrinlial lift including rough dressing &breaking clods to Maximum 5.00c.m. to 7.00 c.m.&laying layers not exceeding 0.30 mtr depth as per specification approved by department along with proper compaction with H.R.R Excavation	1	200.00	2.00	0.75	300.00	Cum	338.84	101652.69
3	Rough Stone Dry Packing with local boulder only labour charges (Local boulder wil be Supplied by the Company through contractual manner)	2	3.00	2.00	0.30	3.60	Cum	2399.83	8639.38
									127298.49 Or, 127298.00

Rate/Running metre length – Rs.636.49 or 636/-

Annexure-III

Wage Rate- Rs.450.00

ESTIMATE FOR PER RMT CONSTRUCTION OF SETTLING TANK
(Length: 1m., width: 3.0m. height: 1.5m.)

Sl No	Description of Items	No	Length	Width	Height	Qty	Unit	Rate	Amount
1	Earth work in hard soil in embankment roads within 50 meinital lead &1.50 mtinital lift including rough dressing &breaking clods to Maximum 5.00c.m. to 7.00 c.m.&laying layers not exceeding 0.30 mtr depth as per specification aparoved by department along with proper compaction with H.R.F. Excavation	1	4.00	3.00	1.50	18.00	Cum	338.83	6098.93
2	Rough Stone Dry Packing with local boulder only labour charges (Local boulder will be Supplied by our Company)	1	4.00	6.00	0.20	4.80	Cum	2399.83	11519.18
3	Transportation charges for 5.00 K.M. lead by truck load from quarry to work site with all cost of , labour, T. & P, etc. all complete in all respect as per specification and direction of	As same as Item No-2				4.80	Cum	300.12	1440.57
								Rate per one No Settling tank	19058.68 Or. 19059.00

SCALE-1:4000

Meters

0 50 100 200 300 400 500 600 700 800 900

N

W E

S

ML-12

ML-13

ML-11

ZOOM VIEW OF CHECK DAM

ML-10

ML-9

ML-8

ML-7

ML-6

ML-5

ML-4

ML-3

ML-2

ML-1

ML-14

ML-15

ML-16

ML-17

ML-18

ZOOM VIEW OF TERRACE

ZOOM VIEW OF GARLAND DRAIN, BCD & RETAINING WALL

ZOOM VIEW OF SETLING TANK

ZOOM VIEW OF CATCH DRAIN

ZOOM VIEW OF CHECK DAM

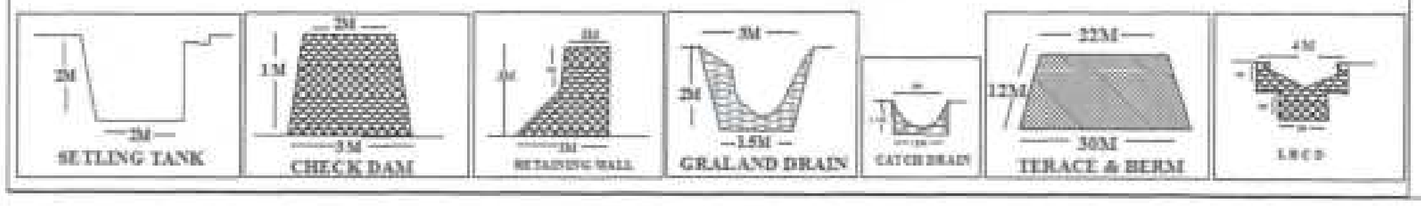
INDEX

- ML PILLARS
- ML BOUNDARY
- SAFETY ZONE
- CONTOUR
- DRAINAGE
- DRAINAGE DIRECTION
- GARLAND DRAIN
- RETAINING WALL
- OVERBURDEN DUMP
- TERRACE
- SOWING OF SEEDS
- AGAVE PLANTATION
- BLOCK PLANTATION
- COIR MATTING
- LBCD
- CATCH DRAIN
- CHECK DAM
- SETTLING TANK
- GREEN BELT
- ROAD
- NALA

AREA STATISTICS

SL NO	TYPE	DESCRIPTION	FOREST AREA (Ha.)	NON-FOREST AREA(Ha.)	GRAND TOTAL
1	GREEN BELT	Road	0.000	0.648	0.648
		Nala	0.000	3.262	3.262
		SUB-TOTAL	0.000	3.910	3.910
2	SAFETY ZONE	7.5 Meter Safety Zone Barrier along the Mining lease Boundary	1.808	1.978	3.787
TOTAL			1.808	5.888	7.696

SCHEMATIC CROSS SECTIONAL VIEW



COUNTERSIGNED

DIVISIONAL FOREST OFFICER
BONAI DIVISION

BHUSHAN POWER & STEEL LTD. ... THEENKOLO

PLAN SHOWING THE MITIGATIVE MEASURES TO MINIMIZE SOIL EROSION AND CHOKING OF STREAM

NETRABANDHA PAHAR IRON ORE BLOCK OF
M/s. BHUSHAN POWER & STEEL LTD.

ML AREA-139.223 Ha.	SCALE-1:4000

Scheme
For

PLANTING OF ADEQUATE DROUGHT HARDY PLANT SPECIES AND SOWING OF SEEDS IN THE APPROPRIATE AREA WITHIN MINING LEASE TO ARREST SOIL EROSION.

in compliance
with
Condition No.14 (b) of
Stage-I approval granted vide
Letter No.8-31/2022-FC, Dated.21.12.2023
of Govt. of India, Ministry of Environment, Forests
& Climate Change,
New Delhi.
For

Diversion of 112.621 Hects of Forest Land for U/s-2 (ii) (including 1.808 ha. of Safety Zone) of FC Act-1980
within 139.223 Ha. Netrabandha Pahar Iron Ore Block

of

M/S Bhushan Power & Steel Limited.
In village Baldihi of Koira Tahsil, Sundargarh District
Odisha.

1. INTRODUCTION

M/s Bhushan Power and Steel Ltd (henceforth be known as BPSL) is a manufacturer of Steel in the country incorporated on 22/02/1999 under the Company Act by Ministry of Corporate Affairs, Govt. of India. The company is a manufacturer of flat and long products and have state-of-the-art plants at Chandigarh, Derabassi, Kolkata and Odisha in India. As reported by the User Agency in the project proposal, manufacture value added products covering entire steel value chain right from Coal Mining to Manufacturing Pig Iron, DRI, Billets, HR Coils, CR Coils, GP/GC Sheets, Precision tubes, Black Pipe/GI Pipe, Cable Tapes, Tor Steel, Carbon and Special Alloy Steel Wire Rods and Rounds conforming to IS and international standards. Present turnover of the company is above ₹8700 Crores with large volume of exports. The Company has successfully implemented and commissioned a green field integrated steel plant with the present capacity of 2.3 Million Tonnes which is being enhanced to 3.4 Million Tonnes of Steel and Captive Power Plant in Odisha with HR Coil making facility-First in Private Sector in the State of Odisha.

The company was not having an Iron Ore Mines of its own. Government of Odisha, pursuant to the Mines and Minerals (Development & Regulation) Act, 1957 and the Mineral (Auction) Rules, 2015 as amended from time to time (the "Auction Rules), issued the notice inviting tender dated 17/03/2017 to commence the auction process for grant of mining lease for Netrabandha PaharR Iron Ore Block located in Sundargarh District of Odisha. The e-auction process was conducted in accordance with the tender document for the said mineral block and M/s BPSL was declared as the preferred Bidder under Rule 9(4)(b)(iii) of the Rules. Government of Odisha has awarded the Letter of Intent vide letter No.5283/SM, Bhubaneswar dated 24.06.2017 for Grant of Mining Lease for Iron Ore in favour of M/s BPSL the successful bidder in respect of Netrabandh Pahar Iron ore Block over an area of 139.223hects. (as per DGPS)/138.579hects. (as per RoR) in Baldihi village under Koira Tahasil of Sundargarh District under jurisdiction of Koira Forest Range of Bonai Division.

Further the said LoI has been modified vide Letter No.6285/SM dt.27.7.2017 revising the earlier mentioned area of 139.00 ha. to 139.223 ha. The said Letter of Intent (LoI) has been allowed to extension of the validity for another period of 2 years w.e.f. 26.6.2020 by the Steel & Mines Department, Govt. of Odisha vide Letter No.6350/SM dt.27.7.2020.

Despite the iron ore block is allocated to M/s BP&SL in June 2017 minimal progress has been made in terms of obtaining statutory approvals and clearances such as the EC/FC/Land acquisition, the clearance for the forest diversion proposal, the issuance of the Terms of Reference ("TOR") etc. primarily because of the following reasons.

(i) Corporate insolvency resolution process ("CIRP") was initiated in respect of BPSL vide the order passed by the Hon'ble National Company Law Tribunal, New Delhi ("NCLT") dated 26 July 2017 ("Insolvency Commencement Date");

(ii) The CIRP resulted in approval of the resolution plan dated 03 October 2018 as amended by addendum letter dated 10 October 2018 ("Resolution Plan") of JSW Steel Limited, which was the Resolution Applicant, on 16 October 2018. Pursuant thereto, the Resolution Plan was filed before the NCLT for its approval and was accorded the same under Section 31 of the Code vide order passed by it on 05 September 2019 ("NCLT Order");

(iii) Though the NCLT Order was challenged before the Hon'ble NCLAT, the Hon'ble NCLAT vide its judgment dated 17 February 2020 ("NCLAT Order"), disposed off the said challenges and approved the Resolution Plan after making certain modifications in the NCLT Order;

(iv) The NCLAT Order approving the Resolution Plan was further challenged before the Hon'ble Supreme Court. Since the Hon'ble Supreme Court did not grant a stay on the implementation of the Resolution Plan, the JSW Steel Limited has started the implementation of the Resolution Plan w.e.f. 26 March 2021.

In view of the above, after the change of ownership, the necessary procedures to obtain the Forest Clearances and other approval started and gradually progress is made in this regards.

The block comprises of 139.223 ha lies within the Baloidhi village in Koira Tehasil of Sundargarh District. The exploration under G2 category following UNFC guidelines was carried by the State Directorate of Geology. Hence the Block was auctioned for mining lease. As per the letter of intent as per Rule 10(2) of the Rules, the mining lease period will be for 50 years. The substantial quantity of the product from this block will be consumed in the Integrated Steel Plant of BP&SL situated at Thalkalai in Jharsuguda.

The lease area over an area of 139.223 hects. (as per DGPS)/138.579 hects. (as per ROR). The authenticated land schedule is jointly verified by Mining, Revenue & Forest Department. As all the calculation will be based on map (DGPS survey map) it is always advisable to consider the DGPS area for land use and other calculation. During verification of the land schedule allotted for said Mining Lease area it is found that the total area (DGPS) over 139.223 hectare consists of 48.346 ha. PRF, 19.532 ha. Revenue Forest, 44.743 ha. DLC forest and 26.602 ha non-forest land.

Further, Stage-I approval over 112.621 ha. of Forest Land U/s-2 (i) (including 1.808 ha. of Safety Zone) has been granted by MoEF& CC vide their Letter No.8-31/2022-FC, dated 21.12.2023 wherein it has been stipulated as per **Condition No.14 (b) for planting adequate drought hardy plant species and sowing of seeds in the appropriate area within in the mining lease to arrest soil erosion.**

2. LOCATION

The mining lease area finds place in the Survey of India Topo sheet No.F45N5 [73 G/5] and situated between the latitude 21° 52' 05.242" to 21° 52' 54.542" N, and longitude 85° 17' 10.449" to 85° 17' 56.810" E. The above ML area covering villages such as Baldihi in Koira Range, Bonai Forest Division, Sundargarh District, Odisha.

3. TOPOGRAPHY

Netrabandha Pahar Block lies in Southern continuation of Bonai-Keonjhar belt of Ranchi Plateau. In general of Bonai-Keonjhar belt is deeply dissected given rise to a rugged topography with high and narrow hill ranges interposed by broad valley. It is a discrete physiographic market by wide, flat, soil and alluvium covered tracts separated by low lying hills. The high hills are in fact, long range controlled by the out crop pattern of the BIF. The highest peak in the adjacent area is represented by Baliapahar (1010m). The said block represents an undulating to plain topography. At places flat topped low mounds are noticed with general gradient to NE and SE. The highest contour in this area at 676 m (north-central & south-central part of the block) and lowest contour is at 618 m at the northeast part of the block.

4. SOIL TYPE

Soil type in the study area varies widely from hard rock to lateritic soil. Areas of higher elevations are usually hard rock consisting of laterite. The top soil is scanty in the area. Whatever top soil is available is thinly spread over [illegible] profile in nature. The pH of the soil is slightly acidic in nature.

5. CLIMATE

The study area is characterized by an oppressively hot summer with high humidity. Summer generally commences in the month of March. Temperature beings to rise rapidly attaining a maximum in the month of May. During the summer maximum temperature can go up to 47.7°C. The weather becomes pleasant with onset on monsoon in June and remains as such upto end of October. The temperature in the month of December is lowest, i.e., 7° C. The average annual rainfall as recorded at IMD observatory is 1325.16 mm. Predominant wind direction is South-West. Area remains calm for nearly50% of the year

6. DRAINAGE

The drainage system of the area is controlled by Teheral nala flowing to the North of the block and its tributaries. However, Khajuridhi Nala flowing in the Southern part of the area control the drainage in the southern part.

6. EXISTING VEGETATION

Sal (*Shorea robusta*),Teak (*Tectona grandis*), Kusum (*Schleicheraoleosa*), Bahada (*Terminalia belerica*), Char (*Buchananialanjan*), Jamu (*Syzygiumcumini*), Asan (*Terminalia tomentosa*), Dhaura (*Anogeissus latifolia*), Kendu (*Diospyros melanoxylon*), Mahul (*Madhuca indica*), Karanja (*Pongamia pinnata*), Sidha (*Lagerstroemia parviflora*), Kurum (*Adina cardifolia*), Mango (*Mangifera indica*) etc. are major species among flora available in the applied area.

7. LAND USE PATTERN

During the life of the mine, about 139.223 hectares will be utilized for mining, Minerals processing, Road, and green belt plantation in Safety Zone area etc. The details of land use pattern will be as follows:

Item wise Proposed Land Use Pattern in Forest and Non-Forest Land of Total Lease Hold Area

Sl.No.	Pattern of utilization	Undiverted/ Virgin Forest (in Ha.)				Non-Forest	Grand Total
		PRF	RevenueForest	DLCForest	Total Forest		
1	Mining with Haul Road	37.444	17.809	40.160	87.433	16.877	104.310
2	Dump	9.607	-	-	9.607	-	9.607
3	Sub-grade	0.650	-	1.472	2.122	0.030	2.152
4	Storing of ore	1.835	-	-	1.835	-	1.835
5	Top Soil	0.500	-	-	0.500	-	0.500
6	Stacking of Minerals	5.726	-	0.113	5.839	-	5.839
7	Infrastructure	0.130	-	-	0.130	1.687	1.817
8	Road	-	-	-	-	0.534	0.534
9	Water Harvesting	-	-	-	-	0.066	0.066
10	Green Belt	-	-	-	-	2.017	2.017
11	Others	1.411	1.393	0.544	3.347	3.757	7.104
	TOTAL	47.303	19.221	44.289	110.813	24.968	135.781
12	Safety Zone around ML boundary	1.043	0.311	0.454	1.808	1.634	3.442

	TOTAL	48.346	19.532	44.743	112.621	36.602	139.323

8. FACTORS RESPONSIBLE

In mining activities the following factors are responsible for soil erosion in the mining lease area.

- The mining activities and overburden dumps are the major sources of drainage of soil and other substances in different places within the ML area.
- The instant mining lease area comprises of undulating plains, hilly slopes and drainage and through them causes soil erosion from the top side and get accumulated in the bottom sides/ lower areas.
- The forms of erosion observed in this region include mainly rill and gully erosion. The storm water runoffs from the hills, mine faces and OB dump slope areas also carry substantial amounts of solids in the lower order streamlets and choke the higher order streams.
- These lower order streamlets have high erosion capacity due to steep gradient and transportation of rock fragments with high velocity of the stream and deposition of same in the connecting high order streams due to velocity drop.
- Streams can also erode by undercutting their banks resulting in mass-wasting processes like slumps or slides. When the undercut material falls into the stream, the fragments are transported and deposited in the stream bed.

9. OBJECTIVE OF THE SCHEME:

The objectives of the proposed scheme are as follows:

- To minimize the soil erosion by planting drought hardy species over the degraded land.
- Sowing of seeds in the appropriate area within the Mining Lease to ensure vegetation from the sown seeds to arrest soil erosion.
- To provide a green cover under the implementation of above objectives to meet the requirement of the above condition of MoEF& CC.

10. MEASURES PROPOSED TO BE CARRIED OUT

a. PLANTATION

Soil erosion is moderate since the forest canopy is having density of more than 0.5, and hence it needs protection from soil getting further eroded by drips and the natural binding of the soil due to the root system. Hence, it is proposed to undertake plantation of drought hardy species over 5.562 ha in dump area. (Ref Plate No-1)

Accordingly it is proposed to plant 18 months old seedlings of the following species which are indigenous to the locality.

Species to be planted:-

1. *Syzygiumcumini*(Jamu)
2. *Adina cordifolia*(Kuruma)
3. *Ficus religiosa*(Aswastha)
4. *Azadirachta indica*(Neem)
5. *Pongamiapinnata* (Karanja)
6. *Embilica officinals* (Anla)
7. *Aegle marmelos* (Bel)
8. Tamarindus indica (Tentuli)

b. SOWING OF SEEDS

It is proposed to take up sowing of grass seeds (**Vetiveriazizanioides**)inthe dump area over 2.384 Ha to arrest soil erosion in the area within the mining lease. The cost estimate of the Grass seeding has been enclosed **as Annexure-2.**

DETAILED WORK SCHEDULE

a) PLANTING PLAN

Planting Plan reflects the species specific treatment of the identified site. Choice of species is based on the geo-morphology of the site, soil-texture, structure, fertility and depth, proneness of the site to water logging etc.

b) PRE-PLANTING OPERATION

(I) RAISING OF PLANTATION STOCK- NURSERY

Nursery to be raised 1 year prior to year of plantation keeping in view the target proposed for the said year. All pre-planting operation will be completed by March of the plantation year and to be followed by various operations as per approved cost norm of PCCF (O)(Ref. Annexure-1). Care should be taken to locate nursery in suitable site with adequate provision of water so as to ensure promising seedlings for the purpose of plantation. 10% excess of seedlings per hectare to be raised excluding nos of seedlings required for a particular year to meet the anticipated causality replacement.

c) **PLANTING OPERATION**

Planting of seedlings will be taken up in the month of July. The polythene covering of the balls of earth will be carefully removed before planting. Care will be taken to see that the ball of earth is not broken while doing so. The seedling with the ball of earth will then be placed firmly in the pit and buried at such a depth that the root collar is well below the surface of the soil. The soil around the plant will be well compacted with the heal as a final step so that there is a proper bond between the ball and the surrounding soil. The earth close to the collar will be slightly elevated so that rain water does not accumulate very close to the plant.

d) **POST PLANTING OPERATION**

(i) **CASUALTY REPLACEMENT**

The entire area will be gone over in the same order as plantation was carried out and casualties, if any, will be replaced as soon as the main plantation operation is over preferably in the 2nd year plantation.

(ii) **WEEDING AND SOIL WORKING**

Regular and efficient weeding will start immediately after sprouting of the stumps is complete or after the seedlings have started throwing up new buds.

(iii) **MANURING AND INSECTICIDE APPLICATION**

On degraded sites urban compost or farmyard manure, wherever available, will be added to the soil while refilling the pits. As regards artificial fertilizer, the minerals required and dosage @ 50 grammes of patent mixtures like 'Gromor' or N.P.K. (2:2:1) will be applied in two split doses one in August and the other in September.

(iv) **PROTECTION AGAINST FIRE AND GRAZING**

Fire line tracing will be ensured to protect the plantation from fire and watch & ward will be provided as per the approved norm for protecting the plantation from grazing.

(v) **Watering**

Watering of the plantation will be carried out aided by solar system with Borewell (1 system for 5 ha. plantation) fitted with Drip system. The cost norm is furnished as **Annexure-3.**

11. **INSPECTION, MONITORING & EVALUATION**

For successful implementation of the proposed measures under this Scheme, intensive inspection and technical guidance from concerned technical wing is required. Sufficient resources (i.e. budgetary approvals, technical guidance, man power etc.) shall be provided by User Agency for effective implementation of the proposals.

12. EXECUTING AGENCY.

The implementation of the scheme will be done by M/s Bhushan Power & Steel Ltd. in consultation with Forest Department.

13. REQUIREMENT OF FUNDS

The total following cost of the implementation of will be **₹33,06,500.00 (Rupees Thirty Three Lakhs Six Thousand Five) Only.**

TOTAL COST OF THE PROJECT

Wage Rate Rs.450/-

Sl. No.	Description of the work	Funds Required (Rs.)
1.	Block Plantation 5.563 ha. @ Rs.3,58,995/-	19,96,747.00
2.	Cost for sowing of grasseeds over 2.384 ha @ ₹59350.00/ha.	1,41,490.00
3.	Water provision to plantation: Solar system with Bore well (1 system for 3 Ha. Plantation) fitted with Drip system @₹2,57,751/ X 1 no.	2,57,751.00
	Total :-	**23,95,988.00**
4.	15% of the total cost for motivation of VSS / People involved	3,59,398.00
	Sub Total	**27,55,386.00**
5.	Price escaction @ 20%	5,51,077.00
	Grand Total	**33,06,463.00 OR 33,06,500.00**

(Rupees Thirty Three Lakhs Six Thousand Five) only

M/s Bhushan Power & Steel Ltd.

Countersigned

Divisional Forest Officer
Bonai Division

Technically Approved

Regional Chief Conservator of Forests
Rourkela Circle

Annexure-I

Base Cost Norm for Compensatory Afforestation (Block Plantation) @ 1600 Plants Per Hectare (18 months old seedlings)

BASE COST NORM FOR COMPENSATORY AFFORESTATION (BLOCK PLANTATION) @ 1600 PLANTS PER HECTARE (18 months old seedlings)						
WAGE RATE Rs. 313/- PER MANDAY						
Sl. No	Items of work	Preferable Period of Execution	No. of Mandays	Labour Cost (in Rs.)	Material Cost (in Rs.)	Total cost (in Rs.)
1	2	3	4	5	6	7
6th Year (Advance work) Pre Planting Operation						
1.	Survey, Demarcation and Pillar putting	Nos/Ha.	2	622	0	622
2.	Preparation of Treatment Map (Digital Map)	Nos/Ha.	1	311	100	411
3.	Site preparation (Clearing & removal of unwanted)	Man/Ha.	12	3732	0	3732
4.	Creation of 0.20 cft. Pits (operation Pit)	Pit/Ha.	1	311	0	311
5.	Alignment and marking	Pit/Ha.	2	622	0	622
6.	Digging of pits (45 cm x 45 cm x 45 cm) in hard soil promptly soil	Pit/Ha.	64	19904	0	19904
7.	Construction of Temporary Labour Shed, Drinking water facility and First Aid etc.	Lot/Plot	0	0	3500	3500
	Total		82	25102	3600	29101
6th Year/Planting Year						
1.	Refilling of pits by altering the dug out soil of the pits, application of Organic compounds/ UREA/ FYM & mixing the same properly	Lot/Ha	12	3732	8000	11732
2.	Transportation of 10 months old polypot seedlings in hired truck/tractor from the government/Mega nursery to planting site including loading & unloading. (Average lead of 10 Km) & Stacking the seedlings @ Rs.1/- per Seedling. (1760 nos.)	Ind/Veg	0	0	1850	1850
3.	Watering the polypot seedlings at planting site	Ind/Veg	3	933	0	933
4.	Conveyance of polypot seedlings on head load from the stacking site to individual dugout pits within the planting site applying insecticide, fertilizers & planting after scraping the soil with other approved materials & pressing the soil properly around the planted seedlings.	Ind/Veg	36	11196	0	11196
5.	Cost of Fertilizers & Insecticide (a) NPK/Bio-fertilizer @ 50 gm/plant as basal dose = 80kg @ Rs.30/- per kg = Rs. 2400.00 (b) Urea/Phosphatic compound/Bio-fertilizer as Top dressing/Foliar spray @ Rs. 1,200.00 (c) Insecticide/ Bio-pesticide @ 5 gm x 1/2 acre = 0.5 kg @ Rs.150/- per kg = Rs. 1,500.00	Ind/Veg	0	0	4000	4000

THELKOL

BASE COST NORM FOR COMPENSATORY AFFORESTATION (BLOCK PLANTATION) @ 1600 PLANTS PER HECTARE (18 months old seedling)						
WAGE RATE Rs- 311/- PER MANDAY						
Sl. No	Items of work	Permissible Period of Execution	No of Mandays	Labour Cost (in Rs.)	Material Cost (in Rs.)	Total cost (in Rs.)
1	2	3	4	5	6	7
6	Casualty Replacement @ 10% (160 nos.)	July/Aug	4	1244	0	1244
7	Soil weeding & Mulching	Aug/Sept.	15	4665		4665
8	Soil Weeding, Soil working (1m. diameter around the plants) and Mulching	Oct/Nov	19	6220	0	6220
9	Pre-fire beating (2 m. wide fire line over 600 m long) including maintenance of inspection path	Feb/Mar	3	933	0	933
10	Watch & Ward including watering as per requirement	Aug/Mar	33	9702	0	9702
	Total		105	33655	23968	58815
2nd Year Maintenance						
1	Transportation of 160 seedlings from Nursery to plantation site including loading, unloading & conveyance by Tractor @ Rs.6/- per seedlings	Jul	0	0	960	960
2	Casualty replacement- 10%	Jul	4	1244	0	1244
3	Cost of Fertilizer & insecticide: A) Cost of fertilizer/ Bio-pesticide @ 5 gm/plant = 8.0 Kg @ Rs.150/- per Kg = Rs.1200/- B) Cost of NPK/Bio fertilizer/Vermicompost/Bio Khata/any other fertilizer @Rs. 4486/-	Aug/Sept.	0	0	4486	4486
4	Weeding (Complete weeding), Mulching & Soil working (1m. diameter around the plants)	Sept/Oct	19	6220	0	6220
5	Pre-fire beating (2 m. wide fire line over 600 m long) including maintenance of inspection path	Feb/Mar	3	933	0	933
6	Watch & Ward including watering as per requirement	Apr/Mar	18	5598	0	5598
7	Maintenance of Temporary Labour Shed, Drinking water facility and First-Aid etc.				1000	1000
	Total		45	13995	6446	20441

BASE COST NORM FOR COMPENSATORY AFFORESTATION (BASIC PLANTATION)
@ 4000 PLANTS PER HECTARE (10 months old seedlings)

WAGE RATE Rs. 111/- PER MANDAY

Sl. No	Name of work	Permissible Period of Execution	No of Mandays	Labour Cost (in Rs.)	Material Cost (in Rs.)	Total cost (in Rs.)
1	2	3	4	5	6	7
	2nd Year Maintenance					
1	Cost of Pit (0.6m×0.6m×0.5m) including refilling/ removal weeds/ Mud Blocks/ soil after Fertilizer	Nos/Hect	0	0	0/No	0/Hect
2	Weeding, Watering & Soil working (1 time during the period for plants)	Nos/Hect	20	4220	0	4220
3	Fire line tracing (2 m. wide fire line cover 400 m long) including maintenance of the existing path	Km/Hect	1	933	0	933
4	Shrubs & Mound bedding watering as per requirement	Nos/Hect	10	5598	0	5598
5	Maintenance of Temporary Labour Shed, Drinking water facility and First Aid etc.	Nos/Hect			1000	1000
	Total		31	10751	1000	11751
	3rd Year Maintenance					
1	Fire line tracing (2 m. wide fire line cover 400 m long) including maintenance of cropped or cut grass	Km/Hect	1	933	0	933
2	Watch & Ward	Nos/Hect	10	5598	0	5598
	Total		11	6531	0	6531
	4th Year Maintenance					
1	Fire line tracing (2 m. wide fire line cover 400 m long)	Km/Hect	1	933.00	0	933.0
2	Watch & Ward	Nos/Hect	10	5598.00	0	5598.0
	Total		11	6531	0	6531.0
	5th Year Maintenance					
1	Fire line tracing (2 m. wide fire line cover 400 m long)	Km/Hect	1	933.00	0	933.0
2	Pruning of branches, lopping out of multiple shoots	Nos/Hect	5	1110.00	0	1110.0
3	Watch & Ward	Nos/Hect	10	5598.00	0	5598.0
	Total		16	6641	0	7641.0
	6th Year Maintenance					
1	Fire line tracing (2 m. wide fire line cover 400 m long)	Km/Hect	1	933.00	0	933
2	Watch & Ward	Nos/Hect	10	5598.00	0	5598
	Total		11	6531	0	6531
	7th Year Maintenance					
1	Fire line tracing (2 m. wide fire line cover 400 m long)	Km/Hect	1	933.00	0	933
2	Watch & Ward	Nos/Hect	10	5598.00	0	5598
	Total		11	6531	0	6531
	8th Year Maintenance					
1	Fire line tracing (2 m. wide fire line cover 400 m long)	Km/Hect	1	933.00	0	933
2	Watch & Ward	Nos/Hect	10	5598.00	0	5598
	Total		11	6531	0	6531
	9th Year Maintenance					
1	Fire line tracing (2 m. wide fire line cover 400 m long)	Km/Hect	1	933.00	0	933
2	Watch & Ward	Nos/Hect	10	5598.00	0	5598
	Total		11	6531	0	6531

THELKOLDI

Sl. No.	Name of work	Probable Period of completion	No of Workers	Labour Cost (Rs Rs.)	Material Cost (Rs Rs.)	Total Cost (Rs Rs.)
1	2	3	4	5	6	7
	Total					
	100% Free Accommodation					
1						
2						
	Total					
	Cost value Statement of Cost Borne following enrolling cost separately					

Sl. No.	Item	No. per work days	Achievement of Rs. 10 L/- per shut (Rs)	Material Cost	Monitoring, Evaluation, Learning, Documentation and Other Contingencies @ (7%) of (5+6)	Cost of Bandage (Rs) (1.2) per enrolling	TOTAL COST
1	2	3	4	5	6	7	8
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
	Total						

Note:

1. Priority must be given to the indigenous local workers available nearby to the site of construction.
2. 15 % indigenous local labour must be employed by Contractor.
3. The statutory labour welfare works like (a) Safe Drinking Water (b) Latrines (c) Urinals (d) Washing facilities (e) First aid facilities (f) Canteen (g) Rest shelter (h) Crèche etc. may be provided by the Contractor as per the statutory requirement.
4. Overtime working (if) for completion of the GA production takes no account the hours over and above eight hours a day.
5. Working for Double shift system of work is allowing only for exigent circumstances.
6. The Govt. Minimum wages are to be changed / enhanced as per the notification issued by the competent authority from time to time.

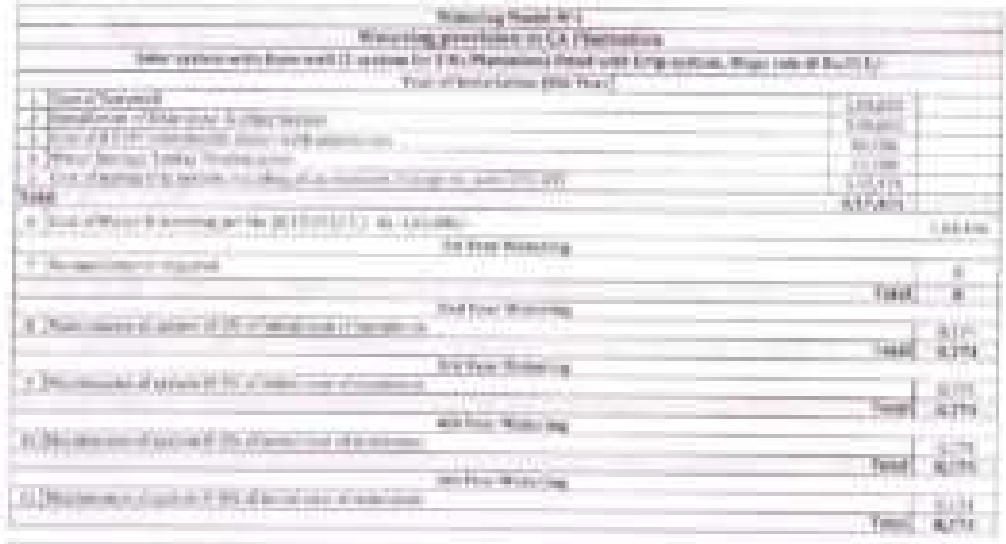
Annexure- 2

COST OF GRASS SEED SOWING

Wage Rate Rs.450.00

Sl No	Purpose	No of Labour / Quantity of materials	Rate (Rs.)	Amount (Rs.)
1	Spreading of good top soil	03 Nos	450 / labour	1350.00
2	Adding FYM and good earth	2 TL FYM	1499.82 /TL FYM	5999.28
		2TL good earth	1499.82 /TL Good earth	
3	Cost of grass seed 500Kg/ per ha.		95/kg	47,500.00
4	Broadcasting	10 nos.	450.00/ labour	4,500.00
			Total	**59,349.28 Or, 59,350.00**

ANNEXURE-3



Statistical Report on Marriage and Divorce Registration in Syria for the Year 2021

Governorate	Marriages				Divorces			
	Total	Urban	Rural	Camps	Total	Urban	Rural	Camps
Damascus	12,450	12,450			1,870	1,870		
Rif Dimashq	18,320	9,160	9,160		2,745	1,372	1,373	
Aleppo	21,600	14,040	7,560		3,240	2,106	1,134	
Homs	9,870	6,910	2,960		1,480	1,036	444	
Hama	8,540	4,270	4,270		1,281	641	640	
Tartous	6,210	3,105	3,105		931	466	465	
Idlib	7,980	3,990	3,990		1,197	599	598	
Latakia	5,430	3,800	1,630		814	570	244	
Deir ez-Zor	4,760	2,380	2,380		714	357	357	
Al-Hasakah	5,120	3,072	2,048		768	461	307	
Raqqa	3,890	2,334	1,556		584	350	234	
Daraa	6,340	3,170	3,170		951	476	475	
As-Suwayda	2,980	1,788	1,192		447	268	179	
Quneitra	1,120	560	560		168	84	84	
Total	114,610	76,029	43,581		17,190	11,205	6,534	

SCALE-1:4000

Meters

0 50 100 200 300 400 500 600 700 800 900

N

W E

S

ML-12

ML-13

ML-11

ML-10

ML-9

ML-8

ML-7

ML-6

ML-5

ML-4

ML-3

ML-2

ML-1

ML-14

ML-15

ML-16

ML-17

ML-18

632

637

642

647

652

657

662

667

672

677

682

687

692

697

702

707

ZOOM VIEW
OF TERRACE

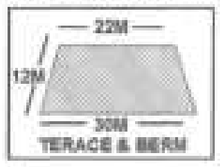
INDEX

- ML PILLARS
- ML BOUNDARY
- SAFETY ZONE
- CONTOUR
- ROAD
- OVERBURDEN DUMP
- TERRACE
- SOWING OF SEEDS
- BLOCK PLANTATION

COUNTERSIGNED

DIVISIONAL FOREST OFFICER
SONAI DIVISION

SCHEMATIC CROSS SECTIONAL VIEW



THELKOLOI

PLAN SHOWING THE PLANTING OF ADEQUATE DROUGHT HARDY PLANT SPECIES AND SOWING OF SEEDS, IN THE APPROPRIATE AREA WITHIN THE MINING LEASE TO ARREST SOIL EROSION

NETRABANDHA PAHAR IRON ORE BLOCK OF
M/s. BHUSHAN POWER & STEEL LTD.

ML AREA-139.223 Ha.	SCALE-1:4000

Scheme

For

CONSTRUCTION OF CHECK DAMS, RETENTION/TOE WALLS TO ARREST SLIDING DOWN OF THE EXCAVATED MATERIAL ALONG THE CONTOUR IN ACCORDANCE WITH THE APPROVED SCHEME

In compliance

with

Condition No.14 (c) of

Stage-I approval granted vide

Letter No.8-31/2022-FC, Dated 21.12.2023

of Govt. of India, Ministry of Environment, Forests

& Climate Change,

New Delhi.

for

Diversion of 112.421 Hects of Forest Land for U/s-2 (ii) (including 1.808 ha. of Safety Zone) of FC Act-1980

within 139.223 Ha. Nehrabandha Pahar Iron Ore Block

of

M/S Bhushan Power & Steel Limited.

in village Baldihi of Koira Tahsil, Sundargarh District

Odisha.

1. INTRODUCTION

M/s Bhushan Power and Steel Ltd (henceforth be known as BPSL) is a manufacturer of Steel in the country incorporated on 22/02/1999 under the Company Act by Ministry of Corporate Affairs, Govt. of India. The company is a manufacturer of flat and long products and have state-of-the-art plants at Chandigarh, Derabassi, Kolkata and Odisha in India. As reported by the User Agency in the project proposal, manufacture value added products covering entire steel value chain right from Coal Mining to Manufacturing Pig Iron, DRI, Billets, HR Coils, CR Coils, GP/GC Sheets, Precision tubes, Black Pipe/GI Pipe, Cable Tapes, for Steel, Carbon and Special Alloy Steel Wire Rods and Rounds conforming to IS and International standards. Present turnover of the company is above ₹8700 Crores with large volume of exports. The Company has successfully implemented and commissioned a green field integrated steel plant with the present capacity of 2.3 Million Tonnes which is being enhanced to 3.4 Million Tonnes of Steel and Captive Power Plant in Odisha with HR Coil making facility- First in Private Sector in the State of Odisha.

The company was not having an Iron Ore Mines of its own. Government of Odisha, pursuant to the Mines and Minerals (Development & Regulation) Act, 1957 and the Mineral (Auction) Rules, 2015 as amended from time to time (the "Auction Rules), issued the notice inviting tender dated 17/03/2017 to commence the auction process for grant of mining lease for Nelitabandha Pahar Iron Ore Block located in Sundargarh District of Odisha. The e-auction process was conducted in accordance with the tender document for the said mineral block and M/s BPSL was declared as the preferred Bidder under Rule 9(4)(b)(ii) of the Rules. Government of Odisha has awarded the Letter of Intent vide letter No.5283/SM, Bhubaneswar dated 24.06.2017 for Grant of Mining Lease for Iron Ore in favour of M/s BPSL the successful bidder in respect of Nelitabandh Pahar Iron ore Block over an area of 139.223hects. (as per DGPS)/138.579hects. (as per RoR) in Bolidihi village under Koira Tahasil of Sundargarh District under jurisdiction of Koira Forest Range of Bonai Division.

Further the said LoI has been modified vide Letter No.6285/SM dt.27.7.2017 revising the earlier mentioned area of 139.00 ha. to 139.223 ha. The said Letter of Intent (LoI) has been allowed to extension of the validity for another period of 2 years w.e.f. 26.6.2020 by the Steel & Mines Department, Govt. of Odisha vide Letter No.6350/SM dt.27.7.2020.

Despite the iron ore block is allocated to M/s BP&SL in June 2017 minimal progress has been made in terms of obtaining statutory approvals and clearances such as the EC/FC/Land acquisition, the clearance for the forest diversion proposal, the issuance of the Terms of Reference ("ToR") etc. primarily because of the following reasons:

(i) Corporate insolvency resolution process ("CIRP") was initiated in respect of BPSL vide the order passed by the Hon'ble National Company Law Tribunal, New Delhi ("NCLT") dated 26 July 2017 ("Insolvency Commencement Date");

(ii) The CIRP resulted in approval of the resolution plan dated 03 October 2018 as amended by addendum letter dated 10 October 2018 ("Resolution Plan") of JSW Steel Limited, which was the Resolution Applicant, on 16 October 2018. Pursuant thereto, the Resolution Plan was filed before the NCLT for its approval and was accorded the same under Section 31 of the Code vide order passed by it on 05 September 2019 ("NCLT Order");

(iii) Though the NCLT Order was challenged before the Hon'ble NCLAT, the Hon'ble NCLAT vide its judgment dated 17 February 2020 ("NCLAT Order"), disposed off the said challenges and approved the Resolution Plan after making certain modifications in the NCLT Order;

(iv) The NCLAT Order approving the Resolution Plan was further challenged before the Hon'ble Supreme Court. Since the Hon'ble Supreme Court did not grant a stay on the implementation of the Resolution Plan, the JSW Steel Limited has started the implementation of the Resolution Plan w.e.f. 26 March 2021.

In view of the above, after the change of ownership, the necessary procedures to obtain the Forest Clearances and other approval started and gradually progress is made in this regards.

The block comprises of 139.223 ha lies within the Baloddhi village in Kolra Tehsil of Sundargarh District. The exploration under G2 category following UNFC guidelines was carried by the State Directorate of Geology. Hence the Block was auctioned for mining lease. As per the letter of intent as per Rule 10(2) of the Rules, the mining lease period will be for 50 years. The substantial quantity of the product from this block will be consumed in the Integrated Steel Plant of BP&SL situated at Thelkoloi in Jharsuguda.

The lease area over an area of 139.223 hects. (as per DGPS)/138.579 hects. (as per ROR). The authenticated land schedule is jointly verified by Mining, Revenue & Forest Department. As all the calculation will be based on map (DGPS survey map) it is always advisable to consider the DGPS area for land use and other calculation. During verification of the land schedule allotted for said Mining Lease area it is found that the total area (DGPS) over 139.223 hectare consists of 48.346 ha. PRF, 19.532 ha. Revenue Forest, 44.743 ha. DLC forest and 26.602 ha non-forest land.

Further, Stage-I approval over 112.621 ha. of Forest Land U/s-2 (i) (including 1.808 ha. of Safety Zone) has been granted by MoEF & CC vide their Letter No.8-31/2022-FC, dated 21.12.2023 where in it has been stipulated as per **Condition No.14 (c) for construction of check dams, retention/toe walls to arrest sliding down of the excavated material along the contour in accordance with the approved scheme.**

2. LOCATION

The mining lease area finds place in the Survey of India Topo sheet No.F45N3 (73 G/3) and situated between the latitude 21° 52' 05.242" to 21° 52' 54.342" N, and longitude 85° 17' 10.449" to 85° 17' 56.810" E, the above ML area covering villages such as Baldihi in Keira Range, Bonai Forest Division, Sundargarh District, Odisha.

3. TOPOGRAPHY

Hetrabandha Pahar Block lies in Southern continuation of Bonai-Keonjhar belt of Ranchi Plateau. In general of Bonai-Keonjhar belt is deeply dissected given rise to a rugged topography with high and narrow hill ranges interspersed by broad valley. It is a discrete physiographic marked by wide, flat, soil and alluvium covered tracts separated by low lying hills. The high hills are in fact, long range controlled by the out crop pattern of the BIF. The highest peak in the adjacent area is represented by Balaspahar (1010m). The said block represents an undulating to plain topography. At places flat topped low mounds are noticed with general gradient to NE and SE. The highest contour in this area at 678 m (north-central & south-central part of the block) and lowest contour is at 618 m at the northeast part of the block.

4. SOIL TYPE

Soil type in the study area varies widely from hard rock to laterific soil. Areas at higher elevations are usually hard rock consisting of laterite. The top soil is scanty in the area. Whatever top soil is available is thinly spread over all Soil profile in nature. The pH of the soil is slightly acidic in nature.

5. CLIMATE

The study area is characterized by an oppressively hot summer with high humidity. Summer generally commences in the month of March, temperature beings to rise rapidly attaining a maximum in the month of May. During the summer maximum temperature can go up to 47.7°C. The weather becomes pleasant with onset on monsoon in June and remains as such upto end of October. The temperature in the month of December is lowest, i.e., 7° C. The average annual rainfall as recorded at IMD observatory is 1325.16 mm. Predominant wind direction is South-West. Area remains calm for nearly50% of the year.

6. DRAINAGE

The drainage system of the area is controlled by Tehwal nala flowing to the North of the block and its tributaries. However, Khajuridih Nala flowing in the Southern part of the area control the drainage in the southern part.

7. LAND USE PATTERN

During the life of the mine, about 139.223 hectares will be utilised for mining. Minerals processing, Road, and green belt plantation in Safety Zone area etc. The details of land use pattern will be as follows:

Item wise Proposed Land Use Pattern in Forest and Non-Forest Land of Total Lease Hold Area:

Sl. No.	Pattern of utilization	Undivested / Virgin Forest (in ha.)				Non-Forest	Grand Total
		PRF	Revenue Forest	DLC Forest	Total Forest		
1	Mining with Haul Road	27.444	17.629	42.160	87.433	16.877	104.310
2	Dump	9.407	-	-	9.407	-	9.407
3	Sub-grade	0.450	-	1.472	2.122	0.030	2.152
4	Storing of ore	1.835	-	-	1.835	-	1.835
5	Top Soil	0.500	-	-	0.500	-	0.500
6	Stacking of Minerals	5.726	-	0.113	5.839	-	5.839
7	Infrastructure	0.130	-	-	0.130	1.687	1.817
8	Road	-	-	-	-	0.534	0.534
9	Water Harvesting	-	-	-	-	0.044	0.044
10	Green Belt	-	-	-	-	2.017	2.017
11	Others	1.411	1.392	0.544	3.347	3.757	7.104
	TOTAL	47.303	19.221	44.289	110.813	24.948	135.761
12	Safety Zone around ML boundary	1.043	0.311	0.454	1.808	1.634	3.442
	TOTAL	48.346	19.532	44.743	112.621	26.582	139.203

8. EXISTING VEGETATION

Sal (*Shorea robusta*),Teak (*Tectona grandis*), Kusum (*Schleicheraoleosa*), Sahada (*Terminalia belerica*), Char (*Buchananialanzan*), Jamu (*Syzygiumcumini*), Asan (*Terminalia tomentosa*), Dhaura (*Anogeissus latifolia*), Kendu (*Diospyros melanoxylon*), Mahul (*Madhuca indica*), Karanja (*Pongamia pinnata*), Siaha (*Lagerstroemia parviflora*), Kurum (*Adina cordifolia*), Mango (*Mangifera indica*) etc. are major species among flora available in the applied area.

9. FACTORS RESPONSIBLE

In mining activities the following factors are responsible for sliding down of the excavated material along the contour which needs to be checked to prevent soil erosion and choking of streams:

- Stability of slope.
- Curvature of slope.
- Slope angle
- Rill & gully erosion due to steep gradient

10. OBJECTIVE OF THE SCHEME:

The objectives of the proposed scheme are as follows:

- To comply the condition No. 14 (c) of the Stage –I approval granted by MoEF& CC, Govt. of India.
- To avoid sliding down of the excavated material along the contour.
- To prevent obstruction to natural water source.
- To prevent flow of eroded soil from the mining areas to the cultivable lands, natural streams and habitations.
- To achieve the objectives, it is required to provide check dam, retention/toe walls so that sliding down of excavated materials can be prevented.

11. PROPOSED METHODOLOGY:

(a) To construct check dams, Retaining / toe wall and garland drain around the waste dumping site and mineral rejected dump site with respect to drainage pattern of the project area.

(b) To develop the dump by terracing method. The height of all the terraces will be10 m.

(c) To control soil erosion and to confine the dumped material for which check dams, toe wall and garland drains will be constructed.

(d) Propose to develop garland drains with settling tanks at the toe of the dumps to allow the settling of silt.

All the dead slopes of the dumps are proposed to be covered with coir matting/vertiver grass seeding.

The Salient features of the drainage management plan are as follows:

1. The overall drainage planning has been done in such a manner which follows the existing pre-mining drainage routing to the extent possible, maintaining the overall slope in the direction of pre-mining flow direction so that run off distribution is not affected.
2. Garland drains have been planned on the sides of Sub-grade and temporary waste dumps (depending on contours).
   The garland drains shall be routed through catch drain and settling tanks to settle out suspended solids in the storm water. The purified water will be discharged to natural water sources.
3. Grass and bushes in drains hold back solid particles during the flow of water in the drain. Small stone barriers constructed across the drain will check water flow and arrest solids.
4. Stone pitching will be made at suitable places to regulate the slope and hence water flow will not be obstructed.
5. Settling pits and drains shall be cleaned intermittently, especially during monsoon.
6. Outside of the cross-check dams on the drainage lines shall be reinforced with green cover of non-browsable species like Jatropa, Vitex negunda, Gliricidia maculate etc.

12. MEASURES ALREADY ADOPTED

There is no biological and Structural measures exist. It is a fresh mining lease and no mining activities have been taken place so far.

13. MEASURES TO BE ADOPTED

Following measures are proposed to arrest sliding of excavated material.

i) Plan for Construction of Check Dams

After studying the drainage pattern it has been found total number of check dam required is 2 and accordingly 2 nos. of Check Dam will be constructed. During monsoon there is heavy on-rush of water as a runoff arising from up slope/higher elevation to lower elevation. Hence, attention is to be paid to reduce the flow velocity of runoff & settle the silt/sediments flown through drainage systems, haul roads inside the mine and areas cleared of vegetation. The check dam will be constructed over the drainage systems and near proposed dump area. Details of proposed Check Dams are furnished below and location of the said check dam is shown in the map. The cost norm of the above is enclosed as **Annexure-I**.

The map of the above structures is shown in Plate no.- 1.

II) Plan for Construction of Retaining wall

A retaining wall is a structure designed and constructed to resist the lateral pressure of soil when there is a change in ground elevation that exceeds the angle of repose of the soil. The Retaining walls are proposed for construction over **1105.283mtr.** Also, there is a provision for maintenance of the retaining wall for the next 4 years. The cost norm of the above is enclosed as **Annexure-II.**

The proposed measures narrated above are shown the**Plate no.-1.**

14. INSPECTION, MONITORING AND EVALUATION

Intensive inspection and technical guidance from concerned technical wing is required for successful implementation of the above measures. Sufficient fuel/ conveyance charges for technical experts shall be provided by the user agency for proper execution of these programmes.

15. EXECUTING AGENCY

The works in the present Scheme shall be executed by the User Agency i.e. M/s Bhushan Power & Steel Ltd. The entire work shall be carried out in coordination with the Forest Department.

14. FINANCIAL FORECAST

The financial forecast of **Rs.66,70,300.00 (Rupees Sixty Six Lakhs Seventy Thousand Three Hundred) Only** for construction of Check Dam and retaining wall etc.

FINANCIAL FORECAST OF THE PROJECT (NL AREA=139.223 HA.)

Wage Rate Rs.450.00

Sl. No.	Description of the Work	Fund Required (in Rs.)
A.	Construction of retaining wall over 1105.250 m @ Rs.3491per Rmt	37,53,248.00
B.	Construction of 3 nos. of check dams@ Rs.4,93,407.00/- per each	14,80,221.00
C.	De-silteation work for check dam twice in a year on LS	3,00,000.00
D.	Maintenance of retaining walls	3,00,000.00
	Total	**48,33,481.00**
E.	15% of the total cost for motivation of VSS / People involved	7,25,022.00
	Sub Total :-	**55,58,503.00**
	Price escalation @ 20%	11,11,701.00
	GRAND TOTAL	66,70,204.00 or 66,70,300.00

(Rupees Sixty Six Lakhs Seventy Thousand Three Hundred) only

M/s Bhushan Power & Steel Ltd.

Countersigned

Divisional Forest Officer
Bonai Division

Technically Approved

Regional Chief Conservator of Forests
Rourkela Circle

Annexure- I

Wage Rate: Rs.450.00

Detail Estimate of Concrete Structure of Check Dam

Sl No	Description of Items	No	Length	Width	Height	Qty	Rate	Amount In Rs.
1	2	3	4	5	6	7	8	9
1	Earthworkin hard soilin embankment roads with in 30 mtr initial lead &1.50 mtr initial lift including rough dressing &breaking clods to Maximum 5.00c.m. to 7.00 c.m.&laying layers not exceeding 0.30 mtr depth as per specification approved by department along with proper compaction with U.R.R Excavation							
	Base	1	5.00	5.50	0.50	13.75		
	Wing Wall	4	2.00	0.50	0.50	2.00		
	Apporn	2	3.00	5.00	0.20	6.00		
	Cut of wall	2	5.00	0.45	0.50	2.25		
						24.00	338.83	8131.92
2	Plain cement concrete [1:4:8]							
	Base	1	4.00	5.50	0.075	1.65		
	Wing Wall	4	2.00	0.50	0.08	0.30		
	Apporn	2	3.00	5.00	0.08	2.25		
	Cut of wall	2	4.00	0.45	0.08	0.27		
						4.47	9842.20	43997.44
3	Cement concrete							
	Below Ground Level							
	Base	1	4.00	5.50	0.40	8.80		
	Wing Wall	4	2.00	0.50	0.40	1.60		
	Apporn	2	3.00	5.00	0.10	3.00		
	Cut of wall	2	4.00	0.45	0.50	1.80		
						15.20		
	Above Ground Level							
	Base	1	4.00	(2.00+3.00)/2	1.00	14.00		
	Wing Wall	4	2.00	0.40	1.00	3.20		
					Total	17.20		
				Grand Total		32.40	13619.47	441377.36
	Rate per one No Check Dam. Length=4.00 mtrHt=1.30 mtr Slope U/S=1:1.5 D/S=1:2					Total		493406.70 Or, 493407.00

Annexure-II

Wage Rate- Rs.450.00

Detail Estimate of Retaining wall of loose local Boulder with cement-Sand Patching over the surface of Boulder wall.

Sl. No.	Description of Items	No	Length	Width	Height	Qty	Unit	Rate	Amount
1	2	3	4	5	6	7	8	9	10
For one R.M.Length									
1	Rough Stone Dry Packing with local boulder only labourcharges (Local boulder will be Supplied by our Company)	1	1000.00	(1.00+1.30)/2	1.20	1380.00	Cum		
		1	1000.00	1.80	0.30	450.00	Cum		
						1830.00	Cum	945.14	1729023.0
2	Irregular cement sand patches on the both side of the wall with 2" thick cement sand mortar(1:6) on top	1	1000.00	1.20		1000.00	Sqm		
		2	1000.00	1.20		2400.00	Sqm		
						3400.00	Sqm	225.00	765000.00
		Rate per one R.M. length				Total			2491023.00 Or 2491023.00

Cost for Running Meter length **2491.00**

SCALE-1:4000

Meters

0 50 100 200 300 400 500 600 700 800 900

ZOOM VIEW OF TERRACE

ZOOM VIEW OF GARLAND DRAIN & RETAINING WALL

ZOOM VIEW OF SETLING TANK

ZOOM VIEW OF CATCH DRAIN

ZOOM VIEW OF CHECK DAM

ML-1 ML-2 ML-3 ML-4 ML-5 ML-6 ML-7 ML-8 ML-9 ML-10 ML-11 ML-12 ML-13 ML-14 ML-15 ML-16 ML-17 ML-18

INDEX

- ML PILLARS
- ML BOUNDARY
- SAFETY ZONE
- CONTOUR
- DRAINAGE
- DRAINAGE DIRECTION
- GARLAND DRAIN
- RETAINING WALL
- OVERBURDEN DUMP
- TERRACE
- NORTH TOP SOIL EXCAVATED AREA
- SOUTH TOP SOIL EXCAVATED AREA
- SOWING OF SEEDS
- AGAVE PLANTATION
- BLOCK PLANTATION
- CATCH DRAIN
- CHECK DAM
- SETTLING TANK
- GREEN BELT
- ROAD
- NALA

COUNTERSIGNED

DIVISIONAL FOREST OFFICER
SONAI DIVISION

AREA STATISTICS

SL NO	TYPE	DESCRIPTION	FOREST AREA (Ha.)	NON-FOREST AREA(Ha.)	GRAND TOTAL
1	GREEN BELT	Road	0.000	0.648	0.648
		Nala	0.000	3.262	3.262
		SUB-TOTAL	**0.000**	**3.910**	**3.910**
2	SAFETY ZONE	7.5 Meter Safety Zone Barrier along the Mining lease Boundary	1.808	1.978	3.787
TOTAL			**1.808**	**5.888**	**7.696**

SCHEMATIC CROSS SECTIONAL VIEW

SETLING TANK — CHECK DAM — RETAINING WALL — GRALAND DRAIN — CATCH DRAIN — TERACE & BERM — LBCD

PLAN SHOWING THE CONSTRUCTION OF CHECK DAMS, RETENTION / TOW WALLS TO ARREST SLIDING DOWN OF THE EXCAVATED MATERIAL ALONG THE CONTOUR

NETRABANDHA PAHAR IRON ORE BLOCK OF M/s. BHUSHAN POWER & STEEL LTD.

ML AREA-139.223 Ha. | SCALE-1:4000

Scheme
For

STABILIZING THE OVERBURDEN DUMPS BY APPROPRIATE GRADING/BENCHING SO AS TO ENSURE THAT ANGLES OF REPOSE AT ANY GIVEN PLACE IS LESS THAN 28°

In compliance

with

Condition No.14 (d) of

Stage-I approval granted vide

Letter No.8-31/2022-FC, Dated.21.12.2023

of Govt. of India, Ministry of Environment, Forests

& Cilmate Change,

New Delhi.

for

Diversion of 112.621 Hects of Forest Land for U/s-2 (ii) (including 1.808 ha. of Safety Zone) of FC Act-1980

within 139.223 Ha. Netrabandha Pahar Iron Ore Block

of

M/S Bhushan Power & Steel Limited.

In village Baldihi of Koira Tahsil, Sundargarh District

Odisha.

1. INTRODUCTION

M/s Bhushan Power and Steel Ltd (henceforth be known as BPSL) is a manufacturer of Steel in the country incorporated on 22/02/1999 under the Company Act by Ministry of Corporate Affairs, Govt. of India. The company is a manufacturer of flat and long products and have state-of-the-art plants at Chandigarh, Derabassi, Kolkata and Odisha in India. As reported by the User Agency in the project proposal, manufacture value added products covering entire steel value chain right from Coal Mining to Manufacturing Pig Iron, DRI, Billets, HR Coils, CR Coils, GP/GC Sheets, Precision tubes, Black Pipe/GI Pipe, Cable Tapes, for Steel, Carbon and Special Alloy Steel Wire Rods and Rounds conforming to IS and international standards. Present turnover of the company is above ₹8700 Crores with large volume of exports. The Company has successfully implemented and commissioned a green field integrated steel plant with the present capacity of 2.3 Million Tonnes which is being enhanced to 3.4 Million Tonnes of Steel and Captive Power Plant in Odisha with HR Coil making facility-first in Private Sector in the State of Odisha.

The company was not having an Iron Ore Mines of its own. Government of Odisha, pursuant to the Mines and Minerals (Development & Regulation) Act, 1957 and the Mineral (Auction) Rules, 2015 as amended from time to time (the "Auction Rules"), issued the notice inviting tender dated 17/03/2017 to commence the auction process for grant of mining lease for Netrabandha Pahar Iron Ore Block located in Sundargarh District of Odisha. The e-auction process was conducted in accordance with the tender document for the said mineral block and M/s BPSL was declared as the preferred Bidder under Rule 9(4)(b)(ii) of the Rules. Government of Odisha has awarded the Letter of Intent vide letter No.5283/SM, Bhubaneswar dated 24.06.2017 for Grant of Mining Lease for Iron Ore in favour of M/s BPSL the successful bidder in respect of Netrabandh Pahar Iron ore Block over an area of 139.223hects. (as per DGPS)/138.579hects. (as per RoR) in Baldihi village under Koira Tahasil of Sundargarh District under jurisdiction of Koira Forest Range of Bonai Division.

Further the said LoI has been modified vide Letter No.6285/SM dt.27.7.2017 revising the earlier mentioned area of 139.00 ha. to 139.223 ha. The said Letter of Intent (LoI) has been allowed to extension of the validity for another period of 2 years w.e.f. 26.6.2020 by the Steel & Mines Department, Govt. of Odisha vide Letter No.6350/SM dt.27.7.2020.

Despite the iron ore block is allocated to M/s BP&SL in June 2017 minimal progress has been made in terms of obtaining statutory approvals and clearances such as the EC/FC/Land acquisition, the clearance for the forest diversion proposal, the issuance of the Terms of Reference ("TOR") etc. primarily because of the following reasons.

(i) Corporate insolvency resolution process ("CIRP") was initiated in respect of BPSL vide the order passed by the Hon'ble National Company Law Tribunal, New Delhi ("NCLT") dated 26 July 2017 ("Insolvency Commencement Date");

(ii) The CIRP resulted in approval of the resolution plan dated 03 October 2018 as amended by addendum letter dated 10 October 2018 ("Resolution Plan") of JSW Steel Limited, which was the Resolution Applicant, on 16 October 2018. Pursuant thereto, the Resolution Plan was filed before the NCLT for its approval and was accorded the same under Section 31 of the Code vide order passed by it on 05 September 2019 ("NCLT Order");

(iii) Though the NCLT Order was challenged before the Hon'ble NCLAT, the Hon'ble NCLAT vide its judgment dated 17 February 2020 ("NCLAT Order"), disposed off the said challenges and approved the Resolution Plan after making certain modifications in the NCLT Order;

(iv) The NCLAT Order approving the Resolution Plan was further challenged before the Hon'ble Supreme Court. Since the Hon'ble Supreme Court did not grant a stay on the implementation of the Resolution Plan, the JSW Steel Limited has started the implementation of the Resolution Plan w.e.f. 26 March 2021.

In view of the above, after the change of ownership, the necessary procedures to obtain the Forest Clearances and other approval started and gradually progress is made in this regards.

The block comprises of 139.223 ha lies within the Baladihi village in Koira Tehasil of Sundargarh District. The exploration under G2 category following UNFC guidelines was carried by the State Directorate of Geology. Hence the Block was auctioned for mining lease. As per the letter of intent as per Rule 10(2) of the Rules, the mining lease period will be for 50 years. The substantial quantity of the product from this block will be consumed in the Integrated Steel Plant of BP&SL situated at Tholkolai in Jharsuguda.

The lease area over an area of 139.223 hects. (as per DGPS)/ 138.579 hects. (as per ROR). The authenticated land schedule is jointly verified by Mining, Revenue & Forest Department. As all the calculation will be based on map (DGPS survey map) it is always advisable to consider the DGPS area for land use and other calculation. During verification of the land schedule allotted for said Mining Lease area it is found that the total area (DGPS) over 139.223 hectare consists of 48.346 ha. PRF, 19.532 ha. Revenue Forest, 44.743 ha. DLC forest and 26.602 ha non-forest lands.

Further, Stage-I approval over 112.621 ha of Forest Land U/s-2 (ii) (including 1.809 ha. of Safety Zone) has been granted by MoEF & CC vide their Letter No.8-31/2022-FC, dated 21st December 2023, wherein it has been stipulated as per **Condition No.14 (d) for stabilization of Over burden dumps by appropriate grading/benching so as to ensure that the angle of repose at any given place is less than 28°.**

2. LOCATION

The mining lease area finds place in the Survey of India Topo sheet No.F45N5 (73 G/5) and situated between the latitude 21° 52' 05.242" to 21° 52' 54.542" N, and longitude 85° 17' 10.449" to 85° 17' 56.810" E. The above ML area covering villages such as Baldihi in Koira Range, Sonai Forest Division, Sundargarh District, Odisha.

3. TOPOGRAPHY

Netrabandha Pahar Block lies in Southern continuation of Bonai-Keonjhar belt of Ranchi Plateau. In general of Bonai-Keonjhar belt is deeply dissected given rise to a rugged topography with high and narrow hill ranges interspersed by broad valley. It is a discrete physiographic marked by wide, flat, soil and alluvium covered tracks separated by low lying hills. The high hills are in fact, long range controlled by the out crop pattern of the BIF. The highest peak in the adjacent area is represented by Sallapahar (1010m). The said block represents an undulating to plain topography. At places flat topped low mounds are noticed with general gradient to NE and SE. The highest contour in this area at 678 m (north-central & south-central part of the block) and lowest contour is at 618 m at the northeast part of the block.

4. SOIL TYPE

Soil type in the study area varies widely from hard rock to lateritic soil. Areas at higher elevations are usually hard rock consisting of laterite. The top soil is scanty in the area. Whatever top soil is available is thinly spread over all Soil profile in nature. The pH of the soil is slightly acidic in nature.

5. CLIMATE

The study area is characterized by an oppressively hot summer with high humidity. Summer generally commences in the month of March. Temperature beings to rise rapidly attainting a maximum in the month of May. During the summer maximum temperature can go up to 47.7°C. The weather becomes pleasant with onset on monsoon in June and remains as such upto end of October. The temperature in the month of December is lowest, i.e., 7° C. The average annual rainfall as recorded at IMD observatory is 1325.16 mm. Predominant wind direction is South-West. Area remains calm for nearly50% of the year

6. DRAINAGE

The drainage system of the area is controlled by Teherol nala flowing to the North of the block and its tributaries. However, Khajuridhi Nala flowing in the Southern part of the area control the drainage in the southern part.

7. LAND USE PATTERN

During the life of the mine, about 139.223 hectares will be utilized for mining, Minerals processing, Road, and green belt plantation in Safety Zone area etc. The details of land use pattern will be as follows:

Item wise Proposed Land Use Pattern in Forest and Non-Forest Land of Total Lease Hold Area

Sl.No.	Pattern of utilization	Undiverted/ Virgin Forest (In Ha.)				Non-Forest	Grand Total
		PRF	RevenueForest	DLCForest	Total Forest		
1	Mining with Haul Road	27.444	17.829	42.160	87.433	16.877	**104.310**
2	Dump	9.607	-	-	9.607	-	**9.607**
3	Sub-grade	0.650	-	1.472	2.122	0.030	**2.152**
4	Storing of ore	1.835	-	-	1.835	-	**1.835**
5	Top Soil	0.500	-	-	0.500	-	**0.500**
6	Stacking of Minerals	5.726	-	0.113	5.839	-	**5.839**
7	Infrastructure	0.130	-	-	0.130	1.687	**1.817**
8	Road	-	-	-	-	0.534	**0.534**
9	Water Harvesting	-	-	-	-	0.066	**0.066**
10	Green Belt	-	-	-	-	2.017	**2.017**
11	Others	1.411	1.392	0.544	3.347	3.757	**7.104**
	TOTAL	**47.303**	**19.221**	**44.289**	**110.813**	**24.968**	**135.781**
12	Safety Zone around ML Boundary	1.043	0.311	0.454	1.808	1.634	**3.442**

	TOTAL	48.346	19.532	44.743	112.621	26.602	139.223

8. EXISTING VEGETATION

Sal (*Shorea robusta*),Teak (*Tectona grandis*), Kusum (*Schleicheraoleosa*), Bahada (*Terminalia belerica*), Char (*Buchananialanjan*), Jamu (*Syzygiumcumini*), Asan (*Terminalia tomentosa*), Dhaura (*Anogeissus latifolia*), Kendu (*Diospyros melanoxylon*), Mahul (*Madhuca indica*), Karanja (*Pongamia pinnata*), Sidha (*Lagerstroemia parviflora*), Kurum (*Adina cordifolia*), Mango (*Mangifera indica*) etc. are major species among flora available in the applied area.

9. REASONS FOR FAILURE OF DUMPS

- Slope failure
- Toe failure
- Base failure

Hence the above aspects need to be addressed so as to ensure stabilization of over burden dumps.

10. OBJECTIVE OF THE SCHEME:

The objectives of the proposed scheme are as follows:

- To propose measures for stabilization of OB dumps by way of grading/benching as prescribed in the approved mining plan.
- To ensure that angle of repose at any place is less than 28°.
- The prescription in the mining plan for terracing and benching are to be adhered to.

11. BRIEF DESCRIPTION ON OB DUMP/WASTE DUMP ETC.

As per the approved mining plan, it has been estimated that 662782.35 CuM OB will be generated during current 5 year plan. Total of 1838160.95 CuM waste will be generated during current 5 year plan.

12. PHASE WISE MINING ACTIVITY AND MANAGEMENT OF OVERBURDEN DUMP.

Taking into consideration the topography of the deposit, estimated reserve and grade, disposition of ore body, nature of intercalated waste, incidence of iron ore, capital available and production requirement, the deposits will be mined by fully

mechanized method with the deployment of major earth moving machines like blast hole drill, hydraulic shovel, dumpers, dozers etc on three shift basis.

a. **Waste Generation**

In the approved mining plan period 18381.60.95 CuM waste will be generated. During the plan period waste will be generated in form of alluvial soil, ferruginous laterite & limonite (both as overburden & intercalated waste). Therefore, waste management should be concerned with dumping of alluvial soil, laterite & limonite. A part of the block area has been proved to be barren (through core drilling) and this patch of land has been earmarked for waste dumping by State OG also. Same land will be utilized by the applicant. Since the depth of the ore zone is not very high, it is likely that back filling of excavated area through generated waste, in future, seems a possibility. However, once the block is thoroughly explored in a grid of 100 x 100 mt, a more rationale picture can be visualized regarding back filling.

The salient features of OB / waste dump management practices

Retaining wall and garland drain would be provided around the proposed dumps. Precautionary measures to be adopted during waste disposal are as follows: -

i) The ultimate dump slope to be maintained around 28° with individual terraces slope not exceeding 37°
ii) Individual terrace height will be maintained at 10 m
iii) Each terrace will have inward slope with catch drains at the inwards side of the terrace.
iv) The catch drains of the individual terrace will be connected to the garland drain outside the periphery of the dump.
v) These catch drains will have half concrete open pipes followed by 4nos of settling tanks to avoid wash offs.
vi) Each terrace will have a provision of berms at the outer end to reduce gully formation due to rain water wash offs.
vii) The retaining wall will be made to arrest the waste dump materials for consolidation. The retaining wall constructed during the plan period will cater to the requirement of the entire plan period.
viii) Planting of vetiver grass/lemon grass with provision of coir matting will be provided in the dump slopes, which will hold the materials in its fibrous and spread over roots to protect wash off in the rainy seasons.

13. THE OBJECTIVES OF THE PROPOSED PLAN / SCHEME

The objectives of the proposed Schemes are as follows:

i) To fulfil the stipulation, i.e., Condition No.14 (d) imposed in the Stage-I approval granted vide Letter No. 8-31/2022-FC, Dated. 21.12.2023 of MoEF& CC to prepare plan for **Stabilization of Over burden dumps by appropriate grading/benching. In accordance with the approved scheme, so as to ensure that the angle of repose at any given place is less than 28°**
ii) To adopt proper Management and scheduling of overburden materials so as to minimize external dumping.
iii) To provide methodologies and implement the proposed works in time bound manner to prevent slope failures there-by providing stable OB dump slopes.
iv) To stabilize the over burden dumps by plantation.
v) To prevent overflow of eroded soil from the fines, OB dump areas which lead to siltation in the streams.

14. MEASURES ALREADY ADOPTED

There is no biological and Structural measures existing. It is a fresh mining lease and no mining activities have been taken place so far.

15. PROPOSED METHODOLOGY

Due to the geological feature of the mining lease area, the dumps would be higher than the adjoining ground level. Top soils from the slopes of the dump are likely to flow during heavy rains and disturb the topography of its adjoining land, till the dump surface is completely stabilized by biological means. In order to curb this situation, retaining walls of three meter height [1105.283mtr length as per approved mining plan] have been planned along the peripheral contour of the dumps to arrest the possible material running down on the slopes. Waste dumping has been planned in such a manner that backfilling can be done with a view to reclaim the degraded land.

The methods to be adopted for stabilization of OB dumps are as follows:

a. Structural measures

- Terracing of slopes, plugging of gullies by construction of catch drain.
- Construction of Garland drains, Catch drains, retaining walls, Check Dam, Settling tank, loose boulder structure etc. at appropriate places.

To give an ideal shape to the dump, appropriate slope has to be maintained for which terraces to be made in dumps to maintain the slope. The angle of repose of the terrace would be around 28°. Backfilled areas would be biologically reclaimed. Terraces would be developed having maximum height of 10m in dumps keeping in view the gradual progress of dump and area available for minimum utilisation of virgin land.

b. <u>Biological Measures</u>

i) <u>Plantation on OB dumps</u>

Soil erosion is moderate since the forest canopy is having density of more than 0.5, and hence it needs protection from soil getting further eroded by drips and the natural binding of the soil due to the root system.

It is also proposed to plant Agave Plants in degraded and poor soils along the slope & toe of plantations over a length of 2108.627 running meter for controling soil erosion. Details of proposed plantation & Agave plantation is provided in the map.

The cost norm of Agave Plantation has been provided in **Annexure –I**

II) Terracing of OB Dump Slope

It is proposed to construct berm & terraces over a length of **11394.24 m** (Appx). on the proposed Dumps considering the volume of OB materials &the area earmarked for dumping. The slope of individual terrace should be within the permissible range considering the angle of repose of the soil and space available, thereby maintaining the angle of repose at less than 28°. The terracing will be done through the internal resources by deploying the operating mining equipment. All these operations will be carried out after sufficient deposition of OB. When OB dump will partially maturate, the work will be executed. The cost norm of Terrace Development has been provided in **Annexure-II.**

III) Plan for Construction of catch drain

A pyramid structure catch drain has been proposed to stream-line the flow of surface runoff from the dump to the foot of the dump, and stair of the catch drain will be placed inward to restrict flow of water. Catch drain is preferably made up of half concrete with number of stairs to reduce gully formation due to rain water wash off, so that runoff water will flow through each terrace of the dump & connect to the catch drain, the water of which goes through catch drain via setting pit to the garland drain. The catch drain will be constructed after the proposed dump height exceeds 26 m. 6 nos of catch drain have been proposed. The cost norm of Catch Drain has been provided in **Annexure –III.**

The details of the above are shown in Plate No.1

16. INSPECTION, MONITORING AND EVALUATION

For successful implementation of the above works under the present Scheme, intensive inspection and technical guidance from concerned technical wing is required. Sufficient fuel/ conveyance charges for technical experts shall be provided by the user agency for proper execution of these programmes.

17. EXECUTING AGENCY

The works in the present Scheme shall be executed by the User Agency having specialized departments headed by qualified persons with outsourced man and machinery. To facilitate this, the user agency shall establish its own executing and supervision cells along with required infrastructural facilities. In order to maintain the quality of work, in-house supervision through competent personnel shall be provided. The entire work shall be carried out in co-ordination with the Forest Department.

18. FINANCIAL FORECAST

The financial forecast of **Rs.2,21,48,600.00 (Rupees Two Crore Twenty OneLakh Forty Eight Thousand Six Hundred) Only** for Stabilization of over burden Dumps to arrest sliding down of the excavated material along the contour by means of, Plantation, Construction of Catch Drain, terracing etc.

FINANCIAL FORECAST OF THE PROJECT (ML AREA=139.223 HA.)

Wage Rate Rs.450.00

Sl. No.	Description of the Work	Fund Required (in Rs.)
1.	**Biological Measures**	
A.	Agave Plantation at the toe of dump over a length of 2108.427m. @ Rs.7,61,126.00/- for 1000 RM	16,04,931.00
	Total (1)	16,04,931.00
2.	**Structural Measures**	
A.	Terracing of OB dump over a length of 11394.24mtrs @ Rs.1065/- per RM	1,21,34,864.00
B.	Construction of 6 nos. of catch drain (26 m. at dump slope) @ Rs.3,84,977.00/- per each	23,09,862.00
	Total (2)	1,44,44,726.00
	Total (1+2)	1,60,49,659.00
3.	15% of the total cost for motivation of VSS / People involved	24,07,449.00
	Sub Total :-	1,84,57,108.00
	Price escalation @ 20%	36,91,422.00
	GRAND TOTAL	2,21,48,530.00 or 2,21,48,600.00

(Rupees Two Crore Twenty OneLakh Forty Eight ThousandSix Hundred) only

M/s Bhushan Power & Steel Ltd.

Countersigned

Divisional Forest Officer
Bonai Division

Technically Approved

Regional Chief Conservator of Forests
Sourkela Circle

ANNEXURE-I

COST NORM FOR AGAVE PLANTATION (FOR 5 ROWS & 40 MTRS)

Wage Rate :₹450/day.

Sl. No.	Name of the work	Man-day	Labour cost (₹)	Material	Total
FIRST YEAR OPERATION					
1	Site clearance alignment and stacking	2	900.00	-	900.00
2	Cost of lime materials including transportation	0		494.00	494.00
3	Digging pits and application of lime	6	2700		2700.00
4	Cost of 300 Ac. (sucker) including transportation			2,483.00	2,483.00
5	Carriage and planting	2	900.00	-	900.00
6	Soil working and application of fertilizer (twice) and lime	8	3600.00		3600.00
7	Cost of fertilizer			554.00	554.00
8	Contingency			554.00	554.00
	Total:-	**18**	**8100.00**	**4085.00**	**12180.00**
SECOND YEAR OPERATION					
1	Casualty replacement (20%) including cost of suckers and pitting	2	900.00	494.00	1394.00
2	Weeding and application of fertilizer and lime	6	2700.00	-	2700.00
3	Cost of fertilizer insecticides & lime			374.00	374.00
	Total:-	**8**	**3600.00**	**868.00**	**4468.00**
THIRD YEAR OPERATION					
1	Weeding, soil working and application of fertilizers	6	2700.00		2700.00
2	Cost of fertilizer and insecticides		-	374.00	374.00
3	Plant protection measures including material cost		-	374.00	374.00
	Total:-	**6**	**2700.00**	**748**	**3448.00**
FORTH YEAR OPERATION					
1	Weeding, cleaning, soil working and application of fertilizers	6	2700.00		2700.00
2	Cost of fertilizer and insecticides		-	374.00	374.00
3	Plant protection measures including material cost		-	374.00	374.00
	Total:-	**6**	**2700.00**	**748**	**3448.00**
FIFTH YEAR OPERATION					
1	Weeding, cleaning, soil working and application of fertilizers	6	2700.00		2700.00
2	Cost of fertilizer and insecticides		-	374.00	374.00
3	Plant protection measures including material cost		-	374.00	374.00
	Total:-	**6**	**2700.00**	**748**	**3448.00**
SIXTH YEAR OPERATION					
1	Weeding, cleaning, soil working and application of fertilizers	6	2700.00		2700.00
2	Cost of fertilizer and insecticides		-	374.00	374.00
3	Plant protection measures including material cost		-	374.00	374.00
	Total:-	**6**	**2700.00**	**748**	**3448.00**
	G.Total	**50**	**22500.00**	**7945.00**	**30445.00**
Cost norm for Agave Planting with five rows 01 km for 6 year		**30445 / 40**	**x 1000 =**	**7,61,126.00**	

Annexure-II

Wage Rate-Rs.450.00

TERRACING OF THE DUMP SLOPE

Engagement of HEMM on the O/B dump slope for terracing

Location – Over Burden Dump

Work efficiency per hour – 3.38 running metre on the dump.

Width & height of the terrace – 5 m. & 5 m.

Rate for engagement of HEMM – Rs.3600.00/hr. i.e. Rs.3600.00/3.38 running meter i.e.

Rate /r running metre = Rs.1065.08/-

Therefore, terracing to be done over a length of RM is Rs.1065/-

Annexure -III

Wage Rate-Rs.450.00

Details & Estimate for Construction of Catch Drain (26.00 Mtr.) at Dump Slope

Sl. No	Description of Items	No.	Length	Width	Height	Qty	Unit	Rate	Amount
1	**Earth work excavation in F&F**								
	Foundation								
	Side wall both sides	2	29.000	0.400	0.400	9.280	Cum		
	Between wall	1	29.000	3.000	0.300	26.100	Cum		
					Total	**35.380**	**Cum**	338.83	11987.79
2	**Sand Filling**	1.00	29.00	3.80	0.05	**5.510**	Cum	2205.00	12149.55
3	**R R Stone Masonry with Local Boulder**								
	Foundation								
	Side wall both sides	2	29.000	0.400	0.60	**13.920**	Cum	3031.42	70037.39
4	Rough stone Dry packing with top layer grouting								
	Floor	1	29.000	3.000		87.000	Sqm	611.99	53243.74
					Total=	**100.920**	**Cum**		
5	**Earth Filling**								
	Back filling (1/3rd of earth work)					11.793	Cum		
					Total=	**11.793**	**Cum**	143.99	1698.04
6	**20mm thick plastering in C.M (1:6)**								
	Both sides wall	4	29.000	0.600		69.600	Sqm		
	Top	2	29.000	0.400		23.200	Sqm		
			Plastering work Total			**92.800**	**Sqm**	408.12	37873.47
7	**C.C.work(1:2:4)**								
	Wall	2.00	29.00	0.40	0.10	2.320	Cum		
	Floor	1	29.000	3.000	0.100	8.700	Cum		
					Total	**11.02**	**Cum**	13409.53	147772.98
							Total		334762.95
	Add 15% for Critical Area								50214.44
						Grand Total			**384977.39**
									Or
									384977.00

SCALE-1:4000

Meters

0 50 100 200 300 400 500 600 700 800 900

N

W E

S

ML-12

ML-13

ML-11

ML-10

ML-9

ML-8

ML-7

ML-6

ML-5

ML-4

ML-3

ML-2

ML-1

ML-14

ML-15

ML-16

ML-17

ML-18

ZOOM VIEW OF TERRACE

ZOOM VIEW OF GARLAND DRAIN & RETAINING WALL

ZOOM VIEW OF SETLING TANK

ZOOM VIEW OF CATCH DRAIN

INDEX

- ML PILLARS
- ML BOUNDARY
- SAFETY ZONE
- 667 CONTOUR
- DRAINAGE
- DRAINAGE DIRECTION
- GARLAND DRAIN
- RETAINING WALL
- OVERBURDEN DUMP
- TERRACE
- SOWING OF SEEDS
- COIR MATTING
- AGAVE PLANTATION
- BLOCK PLANTATION
- CATCH DRAIN
- SETTLING TANK
- GREEN BELT
- ROAD
- NALA

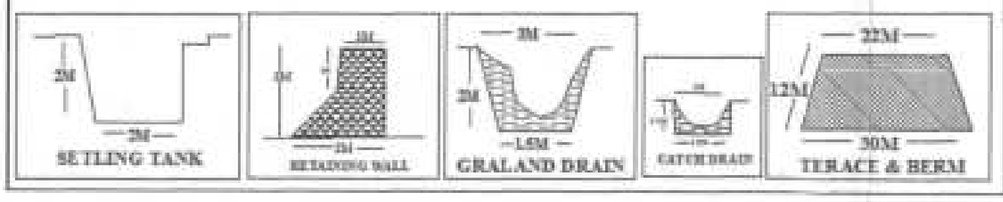
COUNTERSIGNED

DIVISIONAL FOREST OFFICER
BONAI DIVISION

AREA STATISTICS

SL NO	TYPE	DESCRIPTION	FOREST AREA (Ha.)	NON-FOREST AREA(Ha.)	GRAND TOTAL
1	GREEN BELT	Road	0.000	0.648	0.648
		Nala	0.000	3.262	3.262
		SUB-TOTAL	0.000	3.910	3.910
2	SAFETY ZONE	7.5 Meter Safety Zone Barrier along the Mining lease Boundary	1.808	1.978	3.787
TOTAL			1.808	5.888	7.696

SCHEMATIC CROSS SECTIONAL VIEW



PLAN SHOWING TO STABILIZE THE OVERBURDEN DUMPS BY APPROPRIATE GRADING / BENCHING , SO AS TO ENSURE THAT ANGLES OF REPOSE AT ANY GIVEN PLACE IS LESS THAN 28°

NETRABANDHA PAHAR IRON ORE BLOCK OF M/s. BHUSHAN POWER & STEEL LTD.

ML AREA-139.223 Ha.	SCALE-1:4000

SCHEME FOR

FENCING, PROTECTION AND REGENERATION OF THE SAFETY ZONE OVER 3.442 HA.

(FOREST-1.808 HA. (+) NON-FOREST-1.634 HA.)

ALL ALONG THE INNER BOUNDARY OF THE ML AREA OF 139.223 HA.

FOR NETRABANDHA PAHAR IRON ORE BLOCK OF

M/S BHUSHAN POWER & STEEL LIMITED

COMING UNDER

BONAI FOREST DIVISION

SCHEME FOR FENCING, PROTECTION AND REGENERATION OF THE SAFETY ZONE OVER 3.442 HA. (FOREST-1.808 HA. (+) NON-FOREST-1.634 HA.) ALL ALONG THE INNER BOUNDARY OF THE ML AREA OF 139.223 HA. FOR NETRABANDHA PAHAR IRON ORE BLOCK OF M/S BHUSHAN POWER & STEEL LIMITED

1. INTRODUCTION:

Ministry of Environment, Forest and Climate Change, Govt. of India granted Stage-I approval vide Letter No.8-31/2022-FC dt.21.12.2023 for diversion of 112.621 ha. of forest land (including 1.808 ha. of Safety Zone forest area) in favour of M/s Bhushan Power & Steel Ltd. within Netrabandha Pahar Iron Ore Block area in Bonai Forest Division, subject to some conditions. As per condition No.15 of the Stage-I approval order, the fencing, protection and regeneration of the Safety Zone area shall be done at the project cost. The total Safety zone area with a width of 7.5 mtrs along ML boundary comes to 3.442 ha. (Forest-1.808 ha. (+) Non-forest-1.634 ha.). The location of the Safety zone area has shown in the map enclosed as **Annexure-V.**

2. LOCATION :

The mining lease area is covered in the Survey of India Toposheet No.F45NS (73 G/5) and situated between the latitude 21° 52' 05.242" to 21°52' 54.542" N. and longitude 85° 17' 10.449" to 85° 17' 56.810" E.

3. TOPOGRAPHY AND SOIL:

Netrabandha Pahar Block lies in Southern continuation of Bonai-Keonjhar belt of Ranchi Plateau. In general of Bonai-Keonjhar belt is deeply dissected given rise to a rugged topography with high and narrow hill ranges interspersed by broad valley. It is a discrete physiographic market by wide, flat, soil and alluvium covered tracks separated by low lying hills. The high hills are in fact, long range controlled by the out crop pattern of the BIF. The highest peak in the adjacent area is represented by Balia pahar (1010m). The said block represents an undulating to plain topography. At places flat topped low mounds are noticed with general gradient to NE and SE. The highest contour in this area at 676 m (north-central & south-central part of the block) and lowest contour is at 618 m at the northeast part of the block. Soil type in the study area varies widely from hard rock to lateritic soil. Areas at higher elevations are usually hard rock consisting of laterite. The top soil is scanty in the area. Whatever top soil is available is thinly spread over all Soil profile in nature. The pH of the soil is slightly acidic in nature.

4. CLIMATE

The study area is characterized by an oppressively hot summer with high humidity. Summer generally commences in the month of March. Temperature beings to rise rapidly attaining a maximum in the month of May. During the summer maximum temperature can go up to 47.7°C. The weather becomes pleasant with onset on monsoon in June and remains as such upto end of October. The temperature in the month of December is lowest, i.e., 7° C. The average annual rainfall as recorded at IMD observatory is 1325.16 mm. Predominant wind direction is South-West. Area remains calm for nearly 50% of the year.

5. EXISTING VEGETATION.

The crop composition of the Safety Zone area is Sal (*Shorea robusta*), Teak (*Tectona grandis*), Kusum (*Schleichera oleosa*), Bahada (*Terminalia belerica*), Char (*Buchanania lanjan*), Jamu (*Syzygium cumini*), Asan (*Terminalia tomentosa*), Dhaura (*Anogeissus latifolia*), Kendu (*Diospyros melanoxylon*), Mahul (*Madhuca indica*), Karanja (*Pongamia pinnata*), Sidha (*Lagerstroemia parviflora*), Kurum (*Adina cordifolia*), Mango (*Mangifera indica*) etc. are major species among flora available in the applied area. ***Sal (Shorea robusta)*** is the pre-dominant species.

6.OBJECTIVES OF THE SCHEME:

The objectives of the proposed scheme are as mentioned under :-

i) To restock the degraded forest land within the Safety Zone by planting suitable species.

ii) To improve the micro-edaphic conditions by undertaking suitable soil and moisture conservation measures.

iv) To protect the area against encroachment, illicit felling, fire occurrence, grazing etc., so as to check further degradation of the area.

7. PROPOSED TECHNIQUE:

To achieve the above aims and objectives, basing on field survey it has been proposed to take up AR plantation over 3.442 ha. @ 1600 / ha. at a spacing of 2.5 mtr X 2.5 mtr., in the safety zone of the lease hold area of M/s Bhushan Power & Steel Ltd. under Bonai Forest Division. The Plantation work will be done in the 1st year followed by maintenance during 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th and 10th year. The detailed expenditure statement of AR Plantation is enclosed as **Annexure-I**.

(A) Survey & Demarcation.

The M.L. area has been surveyed and demarcated in the field by the User Agency at their cost by erecting 4 feet high reinforced cement concrete pillars inscribed with its serial number, forward and back bearing and distance from pillar to pillar after due consultation with the concerned Range Officers. The length of outer periphery of Safety Zone area is 5073 mt. The inner perimeter comes to 5010 mt. The total perimeter, i.e., outer perimeter and inner perimeter comes to 10083 MT (5073 mt. + 5010 mt.).

(B). REGENERATION, CLEANING AND TENDING OPERATION:

The operation aims at tending the existing crop silviculturaly for better growth. It involves removal of inferior and diseased tree growth. During this operation, weeds, climber and other unwanted & species which interferes with the growth of the existing crop are to be cut. This operation helps saplings to grow better and faster. The site clearance is to be done by cutting and removing of Eupatorium and all other unwanted growth.

Detailed activities to be taken up are as discussed below.

i) Cutting back of individual inferior poles interfering with the growth of better ones.
ii) Cutting back of malformed and diseased individuals.
iii) Singling of coppice shoots & retaining healthier ones.
iv) Cutting of climbers.
v) Cutting back of high live stumps flush to the ground.
vi) Pruning the branches of the promising poles up to hand reach height.

During 0th year operation, climber cutting, high stump cutting and cutting back of malformed and diseased plants will be done. Followed by next three years, i.e, (1st, 2nd, 3rd year), cutting back of unwanted individuals and singling of economically important species will be done.

(C) Plantation.

The safety zone area will be planted with the species mentioned below over 3.442 ha. by AR Plantation @ 1600 seedlings per ha. at a spacing of 2.5 mtr X 2.5 mtr. has been proposed. So, 5507 nos. of seedlings will be required for AR plantation @1600 plants per hectare. As far as possible, species suitable for the site shall be planted as detailed below;

1. *Pongamia pinnata* (Karanja).
2. Ficus religiosa (Jari)
3. *Psidium guajava* (Guava).
4. *Azadirachta indica* (Neem).
5. *Syzizium cumuni* (Jamun).
6. *Mangifera indica* (Mango).
7. *Artocarpus heterophyllus* (Panas).
8. *Ficus bengalensis* (Bara).
9. *Aegle marmelos* (Bela).

and other indigenous species.

The following items of work will be taken up for planting the area.

(i) Raising of Nursery :-

Seedlings required for plantation shall be raised in a temporary nursery nearer to the planting site and water sources. Nursery work will be started 18 months prior to the year of plantation so that quality seedling stock will be available for plantation. The seedlings shall be raised 10% extra besides the actual requirement to compensate the casualties. Seedlings will be raised in polythene bags of 9" x 5" size following standard nursery practice.

(ii) Site Clearance:

The miscellaneous unwanted growth in the Safety Zone area will be cleared before taking up pitting work.

iii) Alignment and pitting.

Alignment and pitting will be taken up in March-April. Pits of size 45 cm x 45 cm x 45 cm will be dug, maintaining a spacing of 2.5 mtr. X 2.5 mtr. in the safety zone area.

iv) Actual planting.

The seedlings will be planted @ 1600 seedlings per ha. in the dug out pits of size 45cm x 45cm x 45cm with a spacing of 2.5mtr x 2.5mtr. Plantation shall be taken up after first regular shower of monsoon and completed by the end of July. Species will be planted as per suitability of the soil condition. NPK/ Bio fertilizer @50gms per plant shall be applied as basal dosage. Anti-termite insecticide shall also be applied to each pit while planting. Casualties if any noticed shall be replaced with the excess seedlings raised for the purpose. During second year also, casualty replacement will be done for which seedlings shall be raised.

v) Weeding, Soil working and Manuring.

For establishment and better growth of the planted seedlings, timely weeding, soil working and manuring are necessary. It is proposed to carry out two weedings, soil working and manuring during the first year and second year of plantation and one weeding and soil working during third year. During first year and second year, first weeding and manuring shall be carried out during August-September and the second one during October-November along with soil working. First weeding shall be around the plants and the second will be of strip weeding. The weeding of third year will be around the plants, which will be carried out during August.

After each weeding, soil working will be done around each plant at a radius of 0.5mtr. and manuring of each plant will be done @50gms of NPK/ Bio fertilizer per plant in ring form.

(vi) Application of Insecticides.

After planting of good healthy seedlings, the plantation site may cause influx of insects, which usually eat and damage the tender leaves and shoots of the plants. To get rid of such insect attack, application of insecticides will be taken up in required doses at desired intervals. Spraying of insecticides shall be done preferably in a sunny day in the forenoon as per requirement.

(vii) Fire line tracing and maintenance.

Fire causes heavy loss to the forest & plantation during fire season. To prevent incidence of fire, the area shall be divided in to suitable blocks by tracing fire lines. Boundaries of the plantation patches and these block lines will be scrapped of the growth to a width of 2.0mtr during February-March and the cut back materials and the dry leaves stacked along these lines will be burnt under strict supervision. This operation shall be carried out for three years.

(D) Soil Conservation Measures.

The site selected for Safety Zone Afforestation is undulating, and gullies have been formed due to erosion. So, Soil Conservation Measures like Staggered Trench, Percolation Pit, Contour Trench, Graded earthen bund, LBCD, Wire mesh LBCD, Sub surface Dyke and WHS as per site requirement have been proposed in the area Safety Zone area of 3.442 ha. The cost norm of SMC is enclosed as **Annexure-II.**

(E) Fencing.

To protect the AR plantation from biotic interference, Barbed wire fencing is proposed over the Safety Zone area of 3.442 ha. The length of outer periphery of Safety Zone area is 5073 mt. The inner perimeter comes to 5010 mt. The total perimeter, i.e., outer perimeter and inner perimeter comes to 10080 MT (5073 mt. + 5010 mt.) are required to be fenced with Barbed wire fencing.

The cost norm of Barbed wire fencing is enclosed as **Annexure-IV**

(F) Protection.

The Safety Zone area is exposed to biotic interference. The User Agency shall deploy 4 nos. of special watchers for protection of the Plantation under the supervision of the Forest Department.

(G). WATERING :

Watering of the plantation will be carried out aided by solar system with Borewell (1 system for 5 ha. plantation) fitted with Drip system. The cost norm is furnished as **Annexure-III.**

(H) Motivation of People from adjoining villages:

As per Govt. resolution of 2011, the villagers of the adjoining village, i.e. Baldhi and Sanua of Bonai Forest Division are to be involved in protection and management of plantation. Before execution of the work, a meeting will be conducted in the above villages and resolution regarding support to plantation activities will be made. To motivate the people in this direction, they will be provided with incentives in shape of different community articles, buildings, and different community amenities of fixed and movable type through entry point activities (EPA). Health camps shall also be organized in the villages. Thus, 10% of the plantation cost has been earmarked for expenditure on this score.

(I) **Executing Agency:**

The User Agency shall execute the work under the supervision of the State Forest Department.

FINANCIAL FORECAST

For implementation of all the prescriptions outlined above ₹ 2,11,98,400/- (Rupees Two Crore Eleven Lakhs Ninety Eight Thousand Four Hundred only) will be required as detailed below.

	Works to be executed by the User Agency.		
1.	AR Plantation @1600 plants per hectare over 3.442 ha. @ ₹3,58,996/- per ha.	₹	12,35,671.00
3.	Soil conservation measures structures like staggered trench, percolation pit, contour trench, graded earthen bund, LBCD, wire mesh, LBCD, Sub surface Dyke and Water Harvesting structures = 3.442 ha X ₹41,248/-.	₹	1,41,976.00
4.	Water provision to plantation: Solar system with Bore well (1 system for 5 Ha. Plantation) fitted with Drip system @ ₹2,57,751/- X 1 nos.	₹	2,57,751.00
5.	Special plantation watcher 4 Nos. (4 x 13500 x 12 x 10 years).	₹	64,80,000.00
6.	Cost of Barbed wire Fencing over 10080 RMT (Outer periphery-5070 Rmt. (+) Inner Periphery-5010 Rmt), (Or, 10080 RMT = 10.080 Km) @1073/- per RMT with 3 years maintenance of 3 years (3rd, 6th & 9th) year.	₹	1,08,15,840.00
7.	4 nos. of fire blower (₹60,000/- x 4 nos.) with POL (₹5,000/- x 5 years x 4 nos.).	₹	3,40,000.00
	Total :-	₹	**1,92,71,238.00**
8.	Entry Point Activities 10% of the cost	₹	19,27,124.00
	Total :-	₹	**2,11,98,362.00**
			Or
		₹	**2,11,98,400.00**

(Rupees Two Crore Eleven Lakhs Ninety Eight Thousand Four Hundred only).

Technically Approved

Regional Chief Conservator of Forests
Rourkela Circle

Divisional Forest Officer,
Bonai Division.

ANNEXURE-I

ANNEXURE-5

Sl No	Items of work	Applicable Period of Execution	No. of Monsoons	Labour Rate (in Rs.)	Material Cost (in Rs.)	Total cost (in Rs.)
1	2	3	4	5	6	7
	I St Year (Advance work) Pre Planting Operations					
1	Survey, Demarcation and Pillar pointing	Nov/Dec	0	643	0	643
2	Preparation of Treatment map (Digital Map)	Nov/Dec	1	211	100	311
3	Site preparation (Clearing & removal of debris)	Nov/Dec	12	3732	0	3732
4	Creation of 1.00 cm wide temporary Path	Feb/Mar	1	311	0	311
5	Alignment and marking	Feb/Mar	1	643	0	643
6	Digging of pits (45 cm x 45 cm x 45 cm) in hard and gravelly soil	Feb/June	60	19984	0	19984
7	For construction of Temporary Labour Shed, Drinking water facility and First Aid etc.	June/Dec	0	0	3000	3000
	Total		80	25524	3600	29124
	II I nd Planting Year					
1	Refilling of pits by adopting the engineering soil of the pits, application of Organic manure(s) / CPR/ FYM & mixing the mixer properly	Jan/Feb	12	3122	8000	11122
2	Transportation of 10 months old polypot seedlings in transport truck /tractor from the nurseries/ Mega nurseries to planting site including handling & unloading (Average load of 10 Kms) & Shifting the seedlings @ 5 x 5 / pot/ Seedling (1750 nos.)	Jul/Aug	0	0	10500	10500
3	Watering the polypot seedlings at planting site	Jul/Aug	0	932	0	932
4	Transplant of polypot seedlings on level land from the stocking site to the final dugout pits within the stocking site, avoiding loosening the fertilizers & planting after removing the said with water repelled impervious bag & protecting the soil properly around the planted seedlings	Jul/Aug	50	13100	0	13100
5	Cost of Fertilizer & Micronutrients (URFN) Per fertilizer @ 50 gm/pit (i.e. as Casual labour = 50 kg @ Rs 50/- per kg = Rs. 2500.00) (ii) Urea/Per transplant/Pit (Basis/cup wise fertilizer for transplantation - dose @ Rs. 1,250.00 (iii) Mixed Cake/ Per pit (Basis @ 1 kg/pit/cost 5 kg @ Rs 250/- per kg = Rs. 1250.00	Jul/Aug	0	0	4850	4850

BASE COST NORM FOR CONSERVATORY APPROVED AREAS (BLOCK PLANTATION) @ 1600 PLANTS PER HECTARE (10 months old seedling)						
WAGE RATE Rs. 211/- PER MANDAY						
Sl. No	Items of work	Periodicity/ Period of Execution	No of Mandays	Labour Cost (Rs/Ha.)	Material Cost (Rs/Ha.)	Total cost (Rs/Ha.)
1	2	3	4	5	6	7
i)	Casualty Replacement @ 10% (160 nos.)	Ist/Aug	4	1266	0	1266
ii	1st weeding & Manuring	Aug/Oct	12	4467		4467
iii	2nd Manuring, 2nd weeding (2nd circumcision around the plants) and Mulching	Oct/Nov	20	6220	0	6220
iv	Pit/Bori making (2 m. wide fire line over 400 m long) including maintenance of inspection path	Feb/Mar	3	969	0	969
(v)	Watch & Ward including watering as per requirement	Aug/Mar	10	3787	0	3787
	Total		149	47469	47469	94938
2nd Year Maintenance						
i	Transportation of 160 seedlings from Nursery to plantation site including handling, unloading & conveyance by Tractor @ Rs 0.5/- per seedlings	Jul	4	4	768	960
2	Casualty replacement - 10%	Jul	4	1266	0	1266
3	Cost of Pesticides & Insecticides a) Cost of Insecticides like gammaxine @ 5 gms/plant = 0.8 kg @ Rs 1375/- per kg = Rs 1100/- Bidiesa/NPV/Bio-Control for subsequent/Bio-Kitaby/any other fertilizer @Rs. 600/-	/kg/Dept	0	0	4400	4400
4	Weeding (Complete weeding), Manuring & 3rd weeding (3rd circumcision around the plants)	Sep/Oct	12	4272	0	4272
5	Fire line making (2 m. wide fire line over 400 m long) including maintenance of inspection path	Feb/Mar	3	970	0	970
6	Watch & Ward including watering as per requirement	Apr/ Mar	10	3599	0	3599
7	Maintenance of Temporary Labour Shed, Drinking water facility and First Aid etc.				1000	1000
	Total		93	33773	6168	39941

BASE COST NORMS FOR COMPENSATORY AFFORESTATION (BLOCK PLANTATION) @ 1600 PLANTS PER HECTARE (18 months old seedling)

WAGE RATE Rs. 311/- PER MANDAY

Sl. No.	Items of work	Periods/able Period of Execution	No of Mandays	Labour Cost (In Rs.)	Material Cost (In Rs.)	Total cost (In Rs.)
1	2	3	4	5	6	7
	2nd Year Maintenance					
3	Cost of Fertilizers/Insecticides/Pesticides/Mulching material/Soil conditioner/Polythene tube/Stakes/Any other item if any	Each/Unit	0	0	4480	4480
4	Weeding, Watering & Soil working (1st& 2nd time)	Day/Mdy	20	6220	0	6220
5	Fire line cleaning (3 m. wide fire line over 400 m long) including maintenance of inspection path	Rmt/Year	3	933	0	933
6	Watch & Ward including watering as per requirement	Apn/Year	10	3230	0	3230
7	Maintenance of Temporary Labour Shed, Drinking water facility and First Aid etc.	Apn/Year			1610	1610
	Total:		41	12753	6090	18843
	4th Year Maintenance					
1	Fire line cleaning (3 m. wide fire line over 400 m long) including maintenance of inspection path	Rmt/Year	3	933	0	933
2	Watch & Ward	Apn/Year	10	3230	0	3230
	Total:		13	4163	0	4163
	5th Year Maintenance					
1	Fire line cleaning (3 m. wide fire line over 400 m long)	Rmt/Year	3	933.00	0	933
2	Watch & Ward	Apn/Year	10	3230.00	0	3230
	Total:		13	4163	0	4163
	6th Year Maintenance					
1	Fire line cleaning (3 m. wide fire line over 400 m length)	Rmt/Year	3	933.00	0	933.0
2	Pruning of branches, Straightening out of multiple stems	Apn/Year	5	1555.00	0	1555.0
3	Watch & Ward	Apn/Year	10	3230.00	0	3230.0
	Total:		18	5718	0	5718.0
	7th Year Maintenance					
1	Fire line cleaning (3 m. wide fire line over 400 m length)	Rmt/Year	3	933.00	0	933
2	Watch & Ward	Apn/Year	10	3230.00	0	3230
	Total:		13	4163	0	4163
	8th Year Maintenance					
1	Fire line cleaning (3 m. wide fire line over 400 m length)	Rmt/Year	3	933.00	0	933
2	Watch & Ward	Apn/Year	10	3230.00	0	3230
	Total:		13	4163	0	4163
	9th Year Maintenance					
1	Fire line cleaning (3 m. wide fire line over 400 m length)	Rmt/Year	3	933.00	0	933
2	Watch & Ward	Apn/Year	10	3230.00	0	3230

BASE COST NORM FOR COMPENSATORY AFFORESTATION (MIXED PLANTATION)
@ 2500 PLANTS PER HECTARE (10 months soil working)

WAGE RATE Rs. 212/- PER MANDAY

Sl. No	Items of work	Preferable Period of Execution	No of Mandays	Labour Cost (in Rs.)	Material Cost (in Rs.)	Total cost (in Rs.)
1	2	3	4	5	6	7
	Total:		19	4031	0	4031
	10th Year Maintenance					
1	Pre-flood marking (3 m wide line from over 900 m roughly)	July/Aug	2	953	0	953
2	Watch & Ward	Apr/Nov	19	3248.00	0	3248
	Total:		21	4031	0	4031

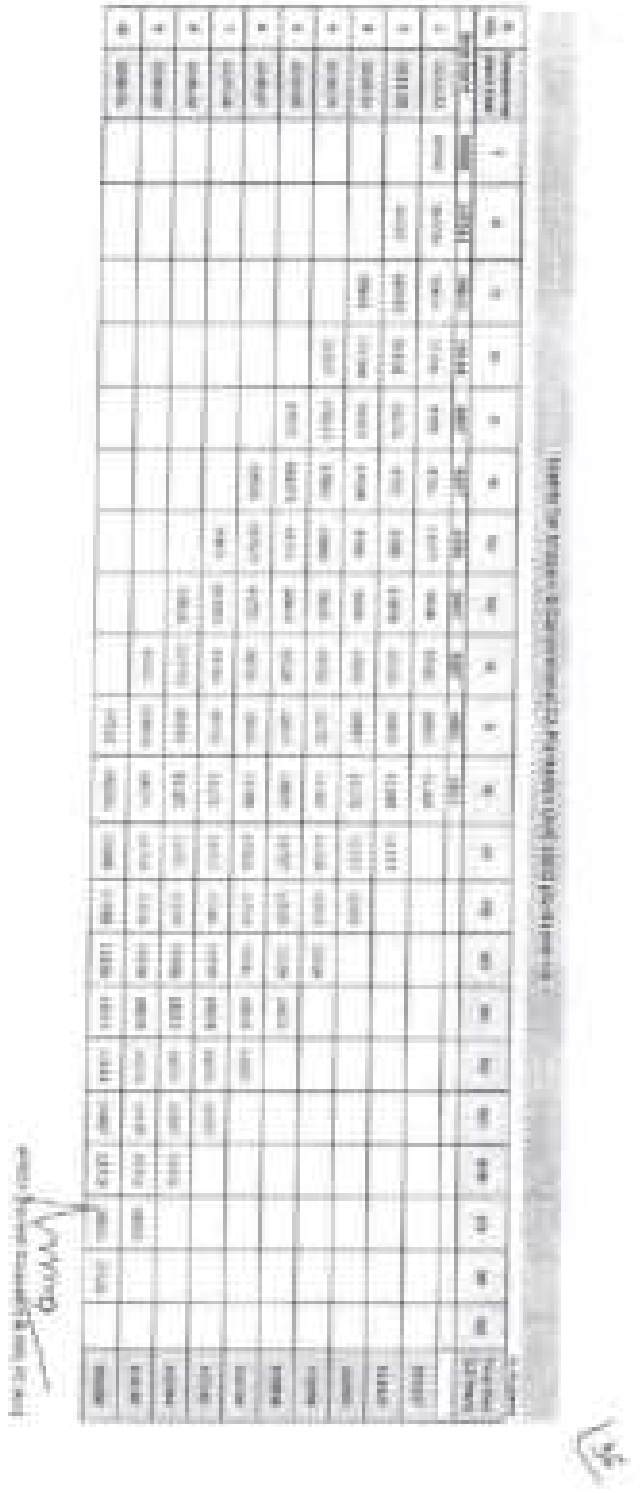
Year wise Abstract of Cost Norm (showing yearling cost separately)

Sl. No	Year	No. person days	Labour cost @ Rs.212/- per day (Rs)	Material Cost	Monitoring, Evaluation, Learning, Documentation and Other Contingency @3%) of (4+5)	Cost of Seedlings @Rs.10.00 per seedlings	TOTAL COST
1	2	3	4	5	6	7	8
1	1st year	92	19504	25000	1350.00	0	45854.00
2	2nd year	107	22684	22500	1370.52	8750	55304.52
3	3rd year	42	8904	5000	417.12	0	14321.12
4	4th year	44	9328	5000	427.28	0	14755.28
5	5th year	23	4876	0	225.78	0	5101.78
6	6th year	23	4876	0	225.78	0	5101.78
7	7th year	26	5512	0	255.36	0	5767.36
8	8th year	27	5724	0	265.56	0	5989.56
9	9th year	27	5724	0	265.56	0	5989.56
10	10th year	27	5724	0	265.56	0	5989.56
	Total:	420	89054	59000	4997	8750	161801

Note:

1. Priority would be given to the indigenous local species available nearby to the site of plantation.
2. 10 % indigenous fruit bearing trees must be provided in Plantation.
3. Site specific land conservation work like LBCS, Gully Plugging, Staggered Trench, Contour Trench, Grassed Pond etc. may be
4. Water Harvesting may be adopted in the CA problematic taken up outside the forest area and Rainfall harvesting may be
5. Water bag Facilities for procurement of water in harvesting may be adopted as per the availability of water.
6. The Cost Norms of various items can be changed with the approval of the competent SLEC's keeping the overall cost norm fixed for each Financial Year.

APCCF (Forest) Directorate & Nodal, FC Hqrs



Annexure-II

Annexure-II

Sl.No	Name of Works	Probable Period of Execution	Total Cost
	Pre Year (For Planning/Surveying)		
1	NA		0
	1st Year		
2	Steel Culvert cum Bridge structure Km Proposed Pranthi, Pamulaparru (p), Gambhiri mandal, Dronakonda Block, Lambi, Dhruva mandal (MCH) Tech portfolio (table) for PPSB as per the design & site requirement sq.m	Apr/Sept	Rs.2 Cr
	2nd Year		
3	Maintenance of SMC structures @ 1.5 % of initial cost upto	Apr/Jun	1.0 Cr
	3rd Year		
4	Maintenance of SMC structures @ 3.0 % of initial cost upto	Apr/Jun	2.0 Cr
	4th Year		
5	Maintenance of SMC structures @ 3.0 % of initial cost upto	Apr/Jun	3.0 Cr
	5th Year		
6	Maintenance of SMC structures @ 3.0 % of initial cost upto	Apr/Jun	3.0 Cr
	Total		12.0 Cr

Workers

Sl. No	Name	No. persons days	Labour cost @ Rs. 311/- per day	Material Cost	Total cost (Rs.)
1	1st year	0.0	0.0	0.0	0.0
2	2nd year	0.0	0.0	0.0 Cr	0.0 Cr
3	3rd year	0.0	0.0	0.0 Cr	0.0 Cr
4	4th year	0.0	0.0	0.0 Cr	0.0 Cr
5	5th year	0.0	0.0	0.0 Cr	0.0 Cr
6	6th year	0.0	0.0	0.0 Cr	0.0 Cr
	Total	0.00	0.00	0.0 Cr	0.0 Cr

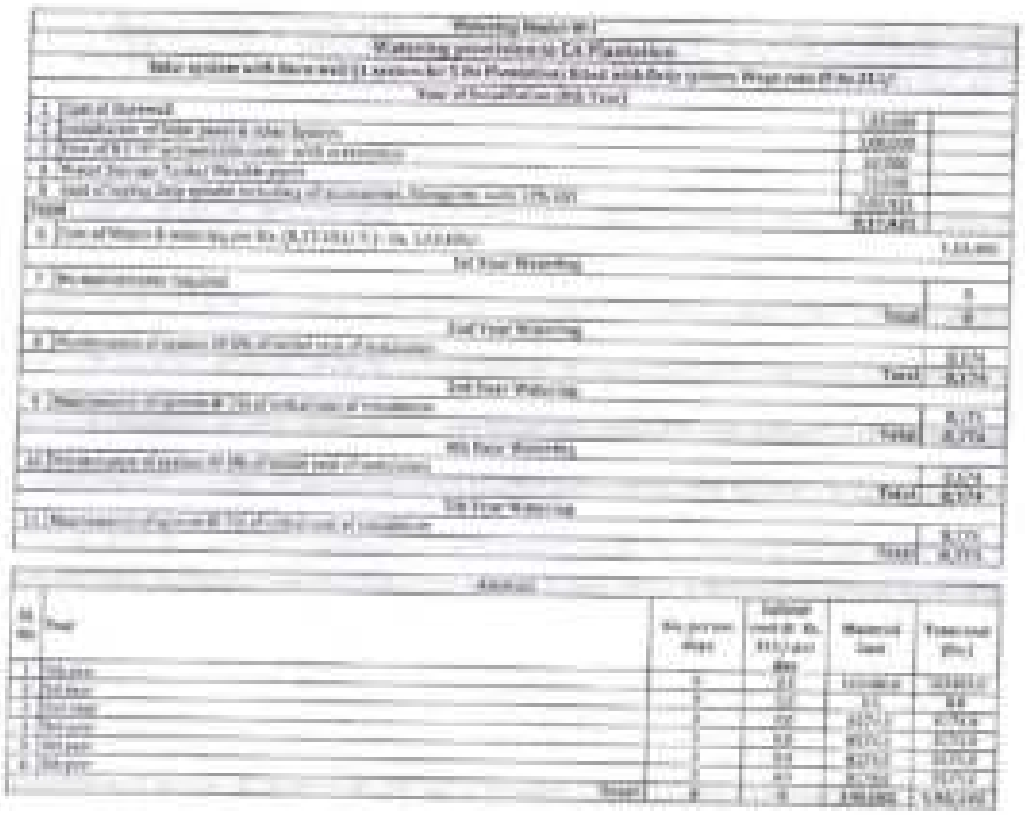
100% is in lumpsum of SMC structures may be taken up as per the design & requirements of the proposed site, cost of the design & specifications of different structures enclosed along this Annexure.

DFO (Forest Environment & Wild life) Ong

Matrix for (Qno)

| Qno | Qno | Qno |

ANNEXURE-III



ANNEXURE-IV

ESTIMATE FOR BARBED WIRE FENCING

ESTIMATE FOR BARBED WIRE FENCING

ANNEXURE-IV

(01) (i) 2ply barbed wire (5 Rent per kg)
7 straight strand x 1000 Mt = 7000Mt
7 Diagonal strand = $2 \times \sqrt{(6.5')^2 + (6.2')^2} = 2 \times 10.10$ ft
=21.00 ft x 400 nos=8400 ft or = 2560M
=9560Mt

Requirement of Barbed wire per Km
Cost per KM=9560/5= 1912 Kg @ Rs.80/Kg Rs.152,960.00

(02) Construction of RCC pillars of size
Length—6ft, Bottom width 6"x6", Top width=4"x4"
Reinforced with 6mm rods with proper curing

$\left\{ 6" \times \frac{6"+4"}{2} \times 6' \right\} \times \frac{1}{2} = 1.34$ cft or 0.038 cum

i) Cost of r.c. work 1:2:4=0.038 cum @9282.57/cum = 259.59
ii) Cost of rod including cutting, bending & binding
0.035x80 kg/c=0.014Q qtl @ Rs. 10,549.80/qtl. = 362.38
iii) Contingency (15%) including = 81.03
Curing, shaping, provision of hooks etc.

Rs.693.41 or Rs. 644/-

Requirement of pillars per KM
Spacings 2.5mts/2.5mts
Requirement=1000m/2.5mt = 400
Strut pillar in every 10th pillar=(400/10)x2 = 80
480 Nos

Cost of pillars per Kilometer= 480@ 644/- Rs.3,09,120.00

(03) Fixing fixing of RCC pillars in position with 1:4:8 metal (4cum) in C.M (1:4:8)
i) Digging of pits 1.5'x1.5'x1.5'=3.375cft/pit
for 480 pits 480x3. 375=1620 cft or 45.86 cu.m @ Rs. 33,048/100cum = 1521.34
ii) Fixing of pillars with 4cm hdg metals in C.M 1:4:8
pit size=1.5'x1.5'x1.5' =3.375 cft
Deduct 1/3rd of bulk of pillar i.e 2.25/3 =(-) 1.125 cft
Total c.c. work per pillar = 2.25cft
For 480 pillars=480x2.25=1080cft or 30.577 cum @ Rs. 8629.48/cum Rs.2,38,878.00

04) Labour for straightening the barbed wire and fixing & clipping with pillars
7094 @ per km@Rs2/- = Rs.28,600.00
05) Carriage of Barbed wire & pillars to work site
@Rs 2500/Tt. and cost of loading & unloading within 5 km distance
Approximately 10 Tnt @ 800/Tnt = Rs.18,000.00
06) Provision of one iron Gate of size (4' x 3') on (1) = Rs. 7,700.00

Total = Rs.6,23,660.00
Labour Cost 1% = Rs. 6,237.00
Expenditure per 1 km of barbed wire fencing Rs 6,29,937.00
Or say, Rs.629 91/- or Rs 630/- per meter

62

07) Expenditure towards maintenance for 3 years (3rd, 4th & 5th year)
@ 2% of cost per rkm = 3 x 2% x Rs.8,29,917/- = Rs.37,795.00
Expenditure per 1 km of barbed wire fencing including maintenance = Rs.8,67,712.00

So, expenditure per running meter for fencing = Rs.867 /-(Mtr. or say Rs.868/-Mtr.
(Rupees Six hundred sixty eight) only

Addl.PCCF (FP&A) Addl.PCCF (Nomad & PC) Addl.PCCF (FP&A) Addl.PCCF (WL & IV)

CCF (CAMPA) RCCF, Bhubaneswar Dy.CF (Affn.)

Principal CCF, Odisha

@ 280.00 per MD = Rs.667.71 / Mtr.

Now @ 450.00 per MD = Rs.1073.10 (Or, say 1073.00 / Mtr.)

Divisional Forest Officer,
Bonai Division.

SAFETY ZONE AREA OF NETRABANDHA PAHAR IRON ORE BLOCK

SL NO.	Details Safety zone & green belt	PRF Forest (Ha)	Rev. Forest (Ha)	DLC Forest (Ha)	Total (Ha)	Non- Forest (Ha)	G.Total (Ha)
1	7.5 m around the Mining lease boundary	1.043	0.311	0.454	1.808	1.634	3.442
TOTAL		1.043	0.311	0.454	1.808	1.634	3.442

SCALE:-1:4,000

0 100 200 400 Meters

CO-ORDINATES OF SAFETY ZONE POINT

SL NO.	POINT_ID	EASTING	NORTHING	LONGITUDE	LATITUDE
1	SZ-1	323205.869	2419221.958	85°17'20.35068"	21°52'05.51496"
2	SZ-2	323196.176	2419230.399	85°17'23.49276"	21°52'05.82852"
3	SZ-3	323196.643	2419240.212	85°17'26.98800"	21°52'06.17736"
4	SZ-4	323496.170	2419248.796	85°17'30.45084"	21°52'06.52296"
5	SZ-5	323595.811	2419259.270	85°17'33.91764"	21°52'06.86892"
6	SZ-6	323696.224	2419268.678	85°17'37.41508"	21°52'07.21740"
7	SZ-7	323796.421	2419278.465	85°17'40.89732"	21°52'07.56516"
8	SZ-8	323895.623	2419287.957	85°17'44.34864"	21°52'07.90968"
9	SZ-9	323995.590	2419297.524	85°17'47.82696"	21°52'08.25672"
10	SZ-10	324095.788	2419307.110	85°17'51.31284"	21°52'08.60448"
11	SZ-11	324195.784	2419316.678	85°17'54.79188"	21°52'08.95152"
12	SZ-12	324241.713	2419321.456	85°17'56.52924"	21°52'09.12468"
13	SZ-13	324239.216	2419434.773	85°17'56.26080"	21°52'12.15624"
14	SZ-14	324232.358	2419533.854	85°17'55.98852"	21°52'15.37500"
15	SZ-15	324225.386	2419633.418	85°17'55.70844"	21°52'18.60924"
16	SZ-16	324217.459	2419727.735	85°17'55.38840"	21°52'22.32264"
17	SZ-17	324219.279	2419834.022	85°17'55.41828"	21°52'25.12884"
18	SZ-18	324221.516	2419930.779	85°17'55.45536"	21°52'28.60032"
19	SZ-19	324180.614	2419993.171	85°17'54.00276"	21°52'30.59924"
20	SZ-20	324086.034	2419979.539	85°17'50.71344"	21°52'30.46188"
21	SZ-21	323887.699	2419967.632	85°17'47.29368"	21°52'30.04908"
22	SZ-22	323979.565	2420073.418	85°17'46.96944"	21°52'33.44304"
23	SZ-23	323974.742	2420161.086	85°17'46.76748"	21°52'36.32232"
24	SZ-24	323943.177	2420270.301	85°17'45.62556"	21°52'39.86328"
25	SZ-25	323942.260	2420308.092	85°17'45.59100"	21°52'41.08800"
26	SZ-26	323874.133	2420382.060	85°17'43.17756"	21°52'43.47156"
27	SZ-27	323770.197	2420460.163	85°17'39.53716"	21°52'45.97356"
28	SZ-28	323687.686	2420526.638	85°17'36.62736"	21°52'48.03960"
29	SZ-29	323580.165	2420608.621	85°17'32.85060"	21°52'50.73132"
30	SZ-30	323488.523	2420686.488	85°17'29.63616"	21°52'53.57956"
31	SZ-31	323403.693	2420720.053	85°17'26.66040"	21°52'54.29028"
32	SZ-32	323306.430	2420709.827	85°17'23.27676"	21°52'53.92272"
33	SZ-33	323205.749	2420699.242	85°17'19.77360"	21°52'53.54184"
34	SZ-34	323106.363	2420688.793	85°17'16.31616"	21°52'53.16636"
35	SZ-35	323006.426	2420678.266	85°17'12.83892"	21°52'52.78836"
36	SZ-36	322946.489	2420671.585	85°17'10.75380"	21°52'52.56192"
37	SZ-37	322961.371	2420579.408	85°17'11.30784"	21°52'49.56420"
38	SZ-38	322977.561	2420479.111	85°17'11.91084"	21°52'46.30296"
39	SZ-39	323008.772	2420279.168	85°17'13.11036"	21°52'39.81432"
40	SZ-40	323025.853	2420179.349	85°17'13.70940"	21°52'36.57504"
41	SZ-41	323041.891	2420079.799	85°17'14.30664"	21°52'33.34440"
42	SZ-42	323058.080	2419979.309	85°17'14.90964"	21°52'30.08316"
43	SZ-43	323074.087	2419879.886	85°17'15.50580"	21°52'26.85684"
44	SZ-44	323090.132	2419780.156	85°17'16.10364"	21°52'23.62656"
45	SZ-45	323118.217	2419606.018	85°17'17.14884"	21°52'17.96916"
46	SZ-46	325233.259	2419627.242	85°17'21.14736"	21°52'18.72372"
47	SZ-47	323228.547	2419554.967	85°17'21.01128"	21°52'16.34952"
48	SZ-48	323224.469	2419495.211	85°17'20.99348"	21°52'14.40840"
49	SZ-49	323217.427	2419394.445	85°17'20.68620"	21°52'11.12664"
50	SZ-50	323208.285	2419263.101	85°17'20.41872"	21°52'06.86640"

CO-ORDINATES OF ML BOUNDARY PILLARS

SL NO.	PILLAR ID	EASTING	NORTHING	LONGITUDE	LATITUDE
1	ML 1	323197.874	2419213.659	85°17'20.07528"	21°52'05.24244"
2	ML 2	324253.702	2419314.686	85°17'56.81004"	21°52'08.90760"
3	ML 3	324224.957	2419727.567	85°17'55.64976"	21°52'22.32012"
4	ML 4	324229.058	2419922.678	85°17'55.71744"	21°52'28.66476"
5	ML 5	324184.621	2420001.326	85°17'54.13920"	21°52'31.20564"
6	ML 6	323992.454	2419973.632	85°17'47.45852"	21°52'30.23616"
7	ML 7	323982.184	2420162.297	85°17'47.02596"	21°52'36.36624"
8	ML 8	323939.060	2420311.577	85°17'45.46644"	21°52'41.20356"
9	ML 9	323879.423	2420387.466	85°17'43.35972"	21°52'43.64940"
10	ML 10	323774.758	2420466.116	85°17'39.68376"	21°52'46.16868"
11	ML 11	323584.487	2420614.762	85°17'32.99856"	21°52'50.93256"
12	ML 12	323405.497	2420727.784	85°17'26.72052"	21°52'54.54228"
13	ML 13	322937.824	2420678.615	85°17'10.44924"	21°52'52.77432"
14	ML 14	323112.068	2419597.033	85°17'16.93824"	21°52'17.67504"
15	ML 15	323228.713	2419621.977	85°17'20.99112"	21°52'18.52788"
16	ML 16	323221.076	2419555.652	85°17'20.75100"	21°52'16.36896"
17	ML 17	323216.987	2419495.828	85°17'20.63184"	21°52'14.42280"
18	ML 18	323200.800	2419263.980	85°17'20.15772"	21°52'06.87936"

Range Officer
Koira Forest Range Tehsildar
KOIRA

Revenue Supervisor
KOIRA

Range Officer
Kolira Forest Range

COUNTERSIGNED
DIVISIONAL FOREST OFFICER
BONAI DIVISION

JUNIOR MINING OFFICER
DIST-SUNDARGARH

COUNTERSIGNED
Divisional Forest Officer
Bonai Division

DEPUTY DIRECTOR OF MINES
KOIRA MINING CIRCLE : KOIRA

LEGEND

- ML BOUNDARY
- SAFETY ZONE PILLAR
- ML BOUNDARY
- ML SAFETY ZONE
- GREEN BELT
- NALA
- DLC FOREST
- VILLAGE FOREST
- PRF
- PVT PLOTS
- GOVT PLOTS
- ROAD

SAFETY ZONE PLAN

NETRABANDHA PAHAR IRON ORE BLOCK

Village -Baldihi ,Koira Tahasil,Sundargarh District

Bhushan POWER & STEEL

M/s. BHUSHAN POWER & STEEL LTD.

Prepared by:-

Digital Cartography & Services (DCS) Pvt.Ltd
1015, Bhagabat Sandhan,GGP Canal Road,
Rasulgarh,Bhubaneswar

Authorised Signatory

Scheme
For

TOP SOIL MANAGEMENT

in compliance

with

Condition No.16of

Stage-I approval granted vide

Letter No.8-31/2022-FC, Dated.21.12.2023

of Govt. of India, Ministry of Environment, Forests

& Climate Change,

New Delhi.

for

Diversion of 112.621 Hects of Forest Land for U/s-2 (ii) (including 1.808 ha. of Safety Zone) of FC Act-1980

within 139.223 Ha. Netrabandha Pahar Iron Ore Block

of

M/S Bhushan Power & Steel Limited.

In village Baldihi of Koira Tahsil, Sundargarh District

Odisha.

1. INTRODUCTION

M/s Bhushan Power and Steel Ltd (henceforth be known as BPSL) is a manufacturer of Steel in the country incorporated on 22/02/1999 under the Company Act by Ministry of Corporate Affairs, Govt. of India. The company is a manufacturer of flat and long products and have state-of-the-art plants at Chandigarh, Derabassi, Kolkata and Odisha in India. As reported by the User Agency in the project proposal, manufacture value added products covering entire steel value chain right from Coal Mining to Manufacturing Pig Iron, DRI, Billets, HR Coils, CR Coils, GP/GC Sheets, Precision tubes, Black Pipe/GI Pipe, Cable Tapes, for Steel, Carbon and Special Alloy Steel Wire Rods and Rounds conforming to IS and International standards. Present turnover of the company is above ₹8700 Crores with large volume of exports. The Company has successfully implemented and commissioned a green field integrated steel plant with the present capacity of 2.3 Million Tonnes which is being enhanced to 3.4 Million Tonnes of Steel and Captive Power Plant in Odisha with HR Coil making facility-first in Private Sector in the State of Odisha.

The company was not having an Iron Ore Mines of its own. Government of Odisha, pursuant to the Mines and Minerals (Development & Regulation) Act, 1957 and the Mineral (Auction) Rules, 2015 as amended from time to time (the "Auction Rules), issued the notice inviting tender dated 17/03/2017 to commence the auction process for grant of mining lease for Netrabandha PahaR Iron Ore Block located in Sundargarh District of Odisha. The e-auction process was conducted in accordance with the tender document for the said mineral block and M/s BPSL was declared as the preferred Bidder under Rule 9(4)(b)(ii) of the Rules. Government of Odisha has awarded the Letter of Intent vide letter No.5283/SM, Bhubaneswar dated 24.06.2017 for Grant of Mining Lease for Iron Ore in favour of M/s BPSL the successful bidder in respect of Netrabandh Pahar Iron ore Block over an area of 139.223hects. (as per DGPS)/138.579hects. (as per RoR) in Bolaihi village under Koira Tahasil of Sundargarh District under jurisdiction of Koira Forest Range of Bonai Division.

Further the said LoI has been modified vide Letter No.6285/SM dt.27.7.2017 revising the earlier mentioned area of 139.00 ha. to 139.223 ha. The said Letter of Intent (LoI) has been allowed to extension of the validity for another period of 2 years w.e.f. 26.6.2020 by the Steel & Mines Department, Govt. of Odisha vide Letter No.6350/SM dt.27.7.2020.

Despite the iron ore block is allocated to M/s BP&SL in June 2017 minimal progress has been made in terms of obtaining statutory approvals and clearances such as the EC/FC/Land acquisition, the clearance for the forest diversion proposal, the issuance of the Terms of Reference ("TOR") etc. primarily because of the following reasons.

(i) Corporate insolvency resolution process ("CIRP") was initiated in respect of SPSL vide the order passed by the Hon'ble National Company Law Tribunal, New Delhi ("NCLT") dated 26 July 2017 ("Insolvency Commencement Date");

(ii) the CIRP resulted in approval of the resolution plan dated 03 October 2018 as amended by addendum letter dated 10 October 2018 ("Resolution Plan") of JSW Steel Limited, which was the Resolution Applicant, on 16 October 2018. Pursuant thereto, the Resolution Plan was filed before the NCLT for its approval and was accorded the same under Section 31 of the Code vide order passed by it on 05 September 2019 ("NCLT Order");

(iii) though the NCLT Order was challenged before the Hon'ble NCLAT, the Hon'ble NCLAT vide its judgment dated 17 February 2020 ("NCLAT Order"), disposed off the said challenges and approved the Resolution Plan after making certain modifications in the NCLT Order;

(iv) the NCLAT Order approving the Resolution Plan was further challenged before the Hon'ble Supreme Court. Since the Hon'ble Supreme Court did not grant a stay on the implementation of the Resolution Plan, the JSW Steel Limited has started the implementation of the Resolution Plan w.e.f. 26 March 2021.

In view of the above, after the change of ownership, the necessary procedures to obtain the Forest Clearances and other approval started and gradually progress is made in this regards.

The block comprises of 139.223 ha lies within the Balgdihi village in Kolra Tehasil of Sundargarh District. The exploration under G2 category following UNFC guidelines was carried by the State Directorate of Geology. Hence the Block was auctioned for mining lease. As per the letter of intent as per Rule 10(2) of the Rules, the mining lease period will be for 50 years. The substantial quantity of the product from this block will be consumed in the Integrated Steel Plant of BP&SL situated at Thalkobi in Jharsuguda.

The lease area over an area of 139.223 hects. (as per DGPS)/138.579 hects. (as per ROR). The authenticated land schedule is jointly verified by Mining, Revenue & Forest Department. As all the calculation will be based on map (DGPS survey map) it is always advisable to consider the DGPS area for land use and other calculation. During verification of the land schedule allotted for said Mining Lease area it is found that the total area (DGPS) over 139.223 hectare consists of 48.346 ha. PRF, 19.532 ha. Revenue Forest, 44.743 ha. DLC forest and 26.602 ha non-forest land.

Further, Stage-I approval over 112.621 ha. of Forest Land U/s-2 (i) (including 1.808 ha. of Safety Zone) has been granted by MoEF & CC vide their Letter No. 8-31/2022-FC, dated 21.12.2023 where in it has been stipulated as per **Condition No.14 for undertaking top soil management.**

2. LOCATION

The mining lease area finds place in the Survey of India Topo sheet No.F45N5 (73 G/5) and situated between the latitude 21° 52' 05.242" to 21° 52' 54.542" N, and longitude 85° 17' 10.449" to 85° 17' 56.810" E. The above ML area covering villages such as Baldihi in Koira Range, Bonai Forest Division, Sundargarh District, Odisha.

3. TOPOGRAPHY

Netrabandha Pahar Block lies in Southern continuation of Bonai-Keonjhar belt of Ranchi Plateau. In general of Bonai-Keonjhar belt is deeply dissected given rise to a rugged topography with high and narrow hill ranges interspersed by broad valley. It is a discrete physiographic market by wide, flat, soil and alluvium covered tracks separated by low lying hills. The high hills are in fact, long range controlled by the out crop pattern of the BIF. The highest peak in the adjacent area is represented by Baliapahar (1010m). The said block represents an undulating to plain topography. At places flat topped low mounds are noticed with general gradient to NE and SE. The highest contour in this area at 678 m (north-central & south-central part of the block) and lowest contour is at 618 m at the northeast part of the block.

4. SOIL TYPE

Soil type in the study area varies widely from hard rock to lateritic soil. Areas at higher elevations are usually hard rock consisting of laterite. The top soil is scanty in the area. Whatever top soil is available is thinly spread over all Soil profile in nature. The pH of the soil is slightly acidic in nature.

5. CLIMATE

The study area is characterized by an oppressively hot summer with high humidity. Summer generally commences in the month of March. Temperature beings to rise rapidly attainting a maximum in the month of May. During the summer maximum temperature can go up to 47.7°C. The weather becomes pleasant with onset on monsoon in June and remains as such upto end of October. The temperature in the month of December is lowest, i.e., 7° C. The average annual rainfall as recorded at IMD observatory is 1325.16 mm. Predominant wind direction is South-West. Area remains calm for nearly50% of the year

6. DRAINAGE

The drainage system of the area is controlled by Teheral nala flowing to the North of the block and its tributaries. However, Khajuridih Nala flowing in the Southern part of the area control the drainage in the southern part.

7. LAND USE PATTERN

During the life of the mine, about 139.223 hectares will be utilized for mining, Minerals processing, Road, and green belt plantation in Safety Zone area etc. The details of land use pattern will be as follows:

Item wise Proposed Land Use Pattern in Forest and Non-Forest Land of Total Lease Hold Area

Sl.No.	Pattern of utilization	Undiverted/ Virgin Forest (in Ha.)				Non-Forest	Grand Total
		PRF	RevenueForest	DLCForest	Total Forest		
1	Mining with Haul Road	27.444	17.829	42.160	87.433	16.877	104.310
2	Dump	9.607	-	-	9.607	-	9.607
3	Sub-grade	0.650	-	1.472	2.122	0.030	2.152
4	Storing of ore	1.835	-	-	1.835	-	1.835
5	Top Soil	0.500	-	-	0.500	-	0.500
6	Stacking of Minerals	5.726	-	0.113	5.839	-	5.839
7	Infrastructure	0.130	-	-	0.130	1.687	1.817
8	Road	-	-	-	-	0.534	0.534
9	Water Harvesting	-	-	-	-	0.066	0.066
10	Green Belt	-	-	-	-	2.017	2.017
11	Others	1.411	1.392	0.544	3.347	3.757	7.104
	TOTAL	**47.303**	**19.221**	**44.289**	**110.813**	**24.968**	**135.781**
12	Safety Zone around ML boundary	1.043	0.311	0.454	1.808	1.634	3.442
	TOTAL	**48.346**	**19.532**	**44.743**	**112.621**	**26.602**	**139.223**

8. EXISTING VEGETATION

Sal (*Shorea robusta*),Teak (*Tectona grandis*), Kusum (*Schleicheraoleosa*), Bahada (*Terminalia belerica*), Char (*Buchananialatanjan*), Jamu (*Syzygiumcumini*), Asan (*Terminalia tomentosa*), Dhaura (*Anogeissus latifolia*), Kendu (*Diospyros melanoxylon*), Mahul (*Madhuca indica*), Karanja (*Pongamia pinnata*), Sidha (*Lagerstroemia parviflora*), Kusum (*Adina cordifolia*), Mango (*Mangifera indica*) etc. are major species among flora available in the applied area.

9. SOURCES OF GENERATION OF TOP SOIL

The said block has a meager thickness of around 0.3 m of top-soil. Total area having top soil is 10.281 Ha. Hence, a total of 10.281 Ha x 0.3m= 30,843 m³of top-soil will be generated during the conceptual period. This will be temporarily stocked within the ML area and shall be used for different plantation programmes. Retaining wall and garland drain are also to be constructed around the top-soil stack.

10. OBJECTIVES

The objectives of Top soil management to be executed are as follows:

i) To meet the stipulation No.16 of Stage-I Forest clearance accorded vide letter No. 8-31/2022-FC, dated 21.12.2023 of MoEF& CC, GOI, New Delhi i.e., **"No damage shall be caused to the top soil and the User Agency will follow the Top soil management Plan".**

ii) To identify top soil resources, and to follow stripping guidelines for optimum recovery.

iii) To identify stockpile locations and dimensions.

iv) To manage and conserve the top soil reserves by implementing biological measures.

v) To provide sufficient stable top soil for reclamation work of dumps, back filled areas and degraded lands.

11. PLAN FOR MANAGEMENT OF TOP SOIL TO BE GENERATED FROM MINING

Top soil management is a vital issue in respect of mining projects. This aspect should be carefully handled to utilise the top soil generated from a mining area so as to its proper utilisation inside the mining lease area upto the process of reclamation stage. Hence it is important to keep the top soil generated in specific site, particularly near to mine bench area, haul road area and backfilling area with a view to utilise the top soil more economically and to prevent any wash off of the top soil to other areas of the mining lease area.

12. METHODOLOGY

In accordance with the above objectives of providing sufficient stable soil for reclamation and to optimize soil recovery, the following strategies have to be followed:

i) Top soil stockpiles are to be identified outside quarry area.
ii) Stripping off the topsoil by dozer or by small shovel dumper combination rather than scrappers to minimize structural degradation;
iii) Construction of stockpiles with a "rough" surface condition to reduce erosion hazard.
iv) Improvement of drainage and promotion of re-vegetation.
v) Stabilization of Top soil surface by biological measures i.e. by sowing seeds of grass with other leguminocease (Fabaceae) species.
vi) To utilize stripped top soil as soon as possible for reclamation in a phased manner in accordance with the reclamation plan as prescribed in the approved mining plan.

A) Collection:

Top soil is to be stripped in areas proposed to be broken in future like the proposed mining on forest and non-forest lands. The soil encountered shall be scrapped before the commencement of any mining activity. The scrapped top soil shall be transported to earmarked top soil stack area for storage for future use.

As per approved mining plan the following activity will generate top soil to the extent of 30843 m³(10.281 x0.3m)from an area of 10.281 ha. The dumping of this top soil so generated will be kept over 0.500 ha.area within the M.L area as shown in Plate No-1. Dumping of top soil will be kept preserved by providing a wall type structure around the area where top soil will be kept. The said top soil will be utilized and managed for the different plantation programmes.

B) Storage:

The top soil shall be transported to the earmarked places, where it shall be stacked upto a height of 3.5 metres. Around 0.500 ha areashall be used for stacking. The levelling and stacking shall be done manually. The edges shall be ramped down to ensure that there is no erosion. The following vegetation shall be grown for preservation of the top soil.

13. GRASS PLANTATION: TO PREVENT THE EROSION OF TOP SOIL.

As mentioned above care will be taken so that the edges shall be ramped down to ensure that there is no erosion of the top soil stored there. It is proposed to keep the top soil intact by way of grass seeding plantation in each top soil stack and to ensure that the sold grass seeding survive and takes growth so that the purpose of prevention of erosion can be ensured.The cost of estimate of Grass seeding is enclosed as **Annexure-1**.

- The top soil generated will be stored in one place.
- The dimension of the storage will be 0.50 ha with height upto 3.5 mtr average.

The above work will be taken up in a periodic manner keeping in view the height of storage. This will facilitate covering the sites of top soil storage in time so that there will be no erosion of the same.

The location map of the above structures is furnished in Plate no.- 1.

14. CONSTRUCTION OF RETAINING WALL

A retaining wall is a structure designed and constructed to resist the lateral pressure of soil when there is a change in ground elevation that exceeds the angle of repose of the soil. The Retaining walls are proposed for construction over **363.66mtr.** Also, there is a provision for maintenance of the retaining wall for the next 4 years. The cost norm of the above is enclosed as **Annexure-2.**

15. CONSTRUCTION OF GARLAND DRAIN

A shallow trench (3mx 2m) will be dug for storage of runoff accumulated for draining surface water before it is released to the agriculture land or natural water course. Details of proposed Garland drain **339.013mtr** shall be constructed during the ensuing plan period with location shown in the map (Ref Plate No.-1).The cost norm of Garland drain has been provided in **Annexure –3.**

C) Usage:

The top soil so generated will be utilised for the following purposes during subsequent mining plan period.

- For Spreading on Back fill area
- For plantation purpose

16. EXECUTING AGENCY

The implementation of the scheme will be done by M/s Bhushan Power & Steel Ltd. in consultation with Forest Department.

17. REQUIREMENT OF FUNDS

The total cost of implementation of measures for Top Soil Management will be Rs.**65,39,200.00/- (Rupees Sixty Five Lakh Thirty Nine Thousand Two Hundred) only.** This budget will be subject to increase in amount considering the increase in material cost and labour charges.

TOTAL COST OF TOP SOIL MANAGEMENT

Sl. No.	Description of the work	Funds Required (in ₹)
1.	Unbroken / Virgin area from where top soil can be collected =10.281 Ha. A. Stripping cost:-0.5ha./hr. @ ₹ 5310.51 Therefore – 10.281 Ha. Cost =21 hrs. + 1 hrs. marching = 22 hrs x Rs.5310.51= ₹ 1,16,831.00 B. Loading &Transportation cost from site to top soil stockpile comes to be= 30843m³ (tonnage factor 1.6) = 49349mt. @ ₹ 60.75/Mt.=Rs.29,97,952.00. C. Cost of leveling with 1000 manpower @ ₹ 450.00 i.e. ₹ 4,72,500.00 **Hence total cost A+B+C = Rs.35,87,283.00**	35,87,283.00
2.	Cost for sowing of grasseeds over 0.300 ha @ ₹ 39150.00/ha	29,745.00
3.	Cost for erection of 363.66 m dry retaining wall around top soil stock pile @ ₹ 2491 RML	9,05,877.00
4.	Cost for construction of Garland drain of 309.012 m @ ₹ 636 RML	2,15,612.00
	TOTAL :-	**47,38,537.00**
5.	Inspection, Monitoring & Evaluation 15% of the total project cost.	7,10,781.00
	TOTAL	**54,49,318.00**
	Price escalation @ 20%	10,89,864.00
	Grand Total	**65,39,182.00** **Or,** **65,39,200.00**

(Rupees Sixty Five Lakh Thirty Nine Thousand Two Hundred) only.

M/s Rourkela Power & Steel Ltd.

THELADOLI

Countersigned

COUNTERSIGNED

Divisional Forest Officer
Sonar Division

Technically Approved

Regional Chief Conservator of Forests
Rourkela Circle

Annexure:-1

COST OF GRASS SEED SOWING

Wage Rate Rs.450.00

Sl No	Purpose	No of Labour / Quantity of materials	Rate (Rs.)	Amount (Rs.)
1	Spreading of good top soil	03 Nos	450 / labour	1350.00
2	Adding FYM and good earth	2 TL FYM	1499.82 /TL FYM	5999.28
		2TL good earth	1499.82 /TL Good earth	
3	Cost of grass seed 500Kg/ per ha.		95/kg	47,500.00
4	Broadcasting	10 nos.	450.00/ labour	4,500.00
			Total	**59,349.28 Or, 59,350.00**

Annexure–2

Wage Rate- Rs.450.00

Detail Estimate of Retaining wall of loose local Boulder with cement-Sand Patching over the surface of Boulder wall.

Sl. No.	Description of Items	No	Length	Width	Height	Qty	Unit	Rate	Amount
1	2	3	4	5	6	7	8	9	10
For one K.M.Length									
1	Rough Stone Dry Packing with local boulder only labour charges (Local boulder will be Supplied by our Company)	1	1000.00	(1.00+1.30)/2	1.20	1500.00	Cum		
		1	1000.00	1.50	0.30	450.00	Cum		
						1950.00	Cum	885.14	1726023.0
2	Irregular cement sand patches on the both side of the wall with 2" thick cement sand mortar(1:4) on top	1	1000.00	1.00		1000.00	Sqm		
		2	1000.00	1.20		2400.00	Sqm		
						3400.00	Sqm	225.00	765000.00
		Rate per one K.M. Length				Total			2491023.00 Or 2491023.00

Cost for Running Meter length **2491.00**

Annexure-3

Wage Rate- Rs.450

Detail Estimate of construction of Garland Drain

Sl No	Description of Items	No	Length	Width	Height	Qty	Unit	Rate	Amount
1	Cleaning of Jungles & bushes	1	200.00	7.00		1400.00	Sqm	12.15	17006.42
2	Earth work in hard soil in embankment roads with in 50 mtrsfor lead &1.50 mtrsfor lift including rough dressing &breaking clods to Maximum 5.00c.m. to 7.00 c.m.&laying layers not exceeding 0.30 mtr depth as per specification approved by department along with proper compaction with HJR excavation	1	200.00	2.00	0.75	300.00	Cum	336.84	101052.69
3	Rough Stone Dry Packing with local boulder only labour charges [Local boulder will be Supplied by the Company through contractual manner]	2	3.00	2.00	0.30	3.60	Cum	2399.83	8639.38
									127298.49 Or, 127298.00

Rate/Running metre length – Rs.636.49 or 636/-

SCALE-1:4000

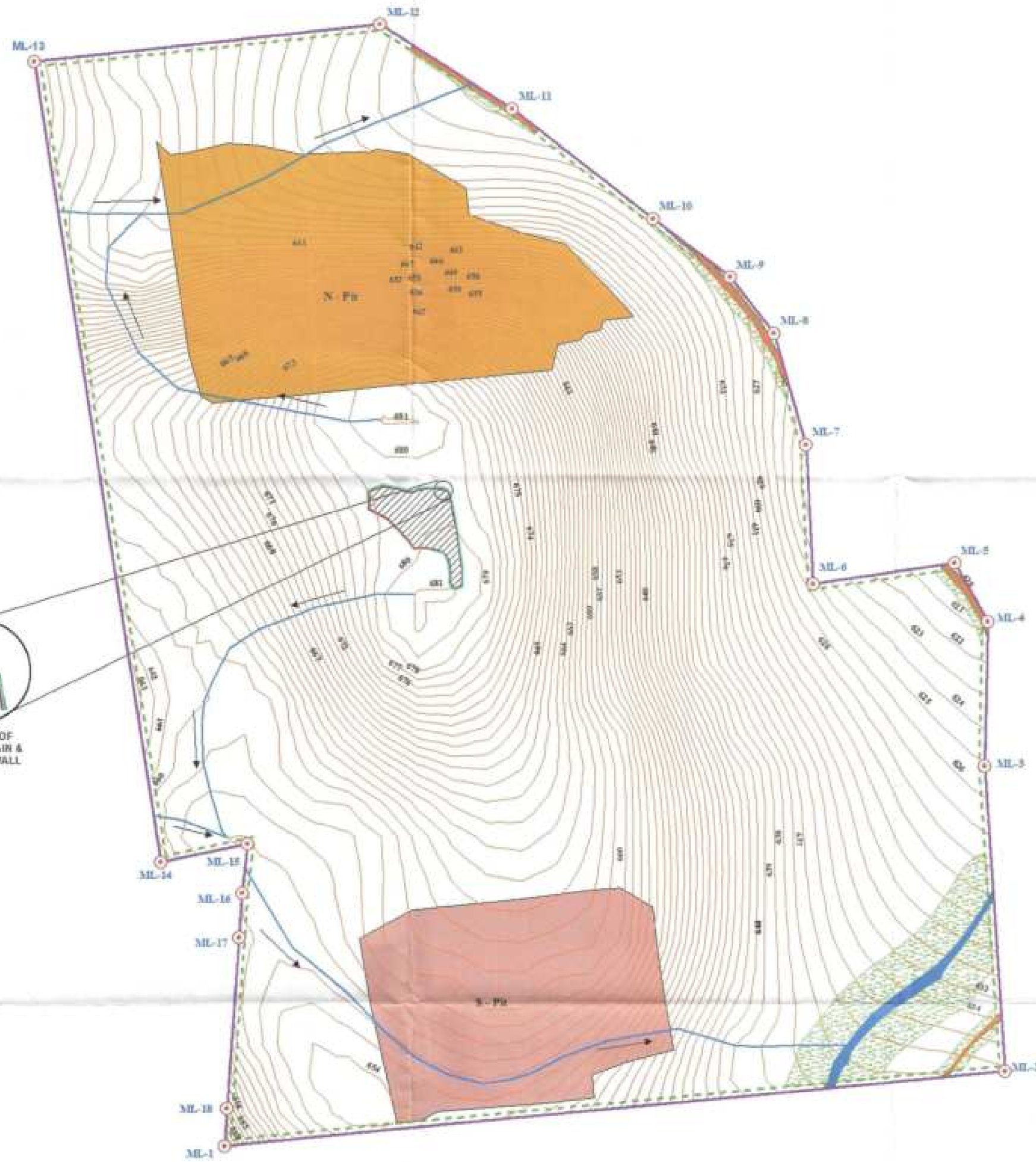
Meters

0 50 100 200 300 400 500 600 700 800 900

N

W E

S



INDEX

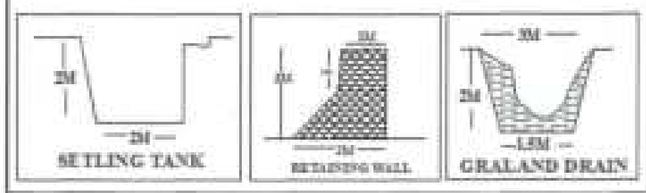
- ML PILLARS
- ML BOUNDARY
- SAFETY ZONE
- CONTOUR
- DRAINAGE
- DRAINAGE DIRECTION
- GARLAND DRAIN
- RETAINING WALL
- TOP SOIL STACK
- NORTH TOP SOIL EXCAVATED AREA
- SOUTH TOP SOIL EXCAVATED AREA
- GRASS PLANTATION
- GREEN BELT
- ROAD
- NALA

COUNTERSIGNED

DIVISIONAL FOREST OFFICER
BONAI DIVISION

BHUSHAN POWER & STEEL LTD. KHARSAWAN (JHK) THE SOLOR

SCHEMATIC CROSS SECTIONAL VIEW



AREA STATISTICS

SL NO	TYPE	DESCRIPTION	FOREST AREA (Ha.)	NON-FOREST AREA(Ha.)	GRAND TOTAL
1	GREEN BELT	Road	0.000	0.648	0.648
		Nala	0.000	3.262	3.262
		SUB-TOTAL	0.000	3.910	3.910
2	SAFETY ZONE	7.5 Meter Safety Zone Barrier along the Mining lease Boundary	1.808	1.978	3.787
TOTAL			1.808	5.888	7.696

MAP SHOWING THE TOP SOIL MANAGEMENT PLAN

NETRABANDHA PAHAR IRON ORE BLOCK OF M/s. BHUSHAN POWER & STEEL LTD.

ML AREA-139.223 Ha.	SCALE-1:4000

Scheme

For

DE-SILTING OF VILLAGE TANKS AND OTHER WATER BODIES LOCATED WITHIN 05 KM FROM THE MINE LEASE BOUNDARY SO AS TO MITIGATE THE IMPACT OF SILTATION OF SUCH TANKS/ WATER BODIES

in compliance

with

Condition No.17of

Stage-I approval granted vide

Letter No.8-31/2022-FC, Dated.21.12.2023

of Govt. of India, Ministry of Environment, Forests

& Climate Change,

New Delhi.

for

Diversion of 112.621 Hects of Forest Land for U/s-2 (ii) (including 1.808 ha. of Safety Zone) of FC Act-1980

within 139.223 Ha. Netrabandha Pahar Iron Ore Block

of

M/S Bhushan Power & Steel Limited.

in village Baldihi of Koira Tahsil, Sundargarh District

Odisha.

1. INTRODUCTION

M/s Bhushan Power and Steel Ltd (henceforth be known as BPSL) is a manufacturer of Steel in the country incorporated on 22/02/1999 under the Company Act by Ministry of Corporate Affairs, Govt. of India. The company is a manufacturer of flat and long products and have state-of-the-art plants at Chandigarh, Derabassi, Kolkata and Odisha in India. As reported by the User Agency in the project proposal, manufacture value added products covering entire steel value chain right from Coal Mining to Manufacturing Pig Iron, DRI, Billets, HR Coils, CR Coils, GP/GC Sheets, Precision tubes, Black Pipe/GI Pipe, Cable Tapes, Tor Steel, Carbon and Special Alloy Steel Wire Rods and Rounds conforming to IS and international standards. Present turnover of the company is above ₹8700 Crores with large volume of exports. The Company has successfully implemented and commissioned a green field integrated steel plant with the present capacity of 2.3 Million Tonnes which is being enhanced to 3.4 Million Tonnes of Steel and Captive Power Plant in Odisha with HR Coil making facility-First in Private Sector in the State of Odisha.

The company was not having an Iron Ore Mines of its own. Government of Odisha, pursuant to the Mines and Minerals (Development & Regulation) Act, 1957 and the Mineral (Auction) Rules, 2015 as amended from time to time (the "Auction Rules), issued the notice inviting tender dated 17/03/2017 to commence the auction process for grant of mining lease for Netrabandha Pahad Iron Ore Block located in Sundargarh District of Odisha. The e-auction process was conducted in accordance with the tender document for the said mineral block and M/s BPSL was declared as the preferred Bidder under Rule 9(4)(b)(iii) of the Rules. Government of Odisha has awarded the Letter of Intent vide letter No.5283/SM, Bhubaneswar dated 24.06.2017 for Grant of Mining Lease for Iron Ore in favour of M/s BPSL the successful bidder in respect of Netrabandh Pahar Iron ore Block over an area of 139.223hects. (as per DGPS)/138.579hects. (as per RoR) in Baldihi village under Koira Tahasil of Sundargarh District under jurisdiction of Koira Forest Range of Bonai Division.

Further the said LoI has been modified vide Letter No.6285/SM dt.27.7.2017 revising the earlier mentioned area of 139.00 ha. to 139.223 ha. The said Letter of Intent (LoI) has been allowed to extension of the validity for another period of 2 years w.e.f. 26.6.2020 by the Steel & Mines Department, Govt. of Odisha vide Letter No.6350/SM dt.27.7.2020.

Despite the Iron ore block is allocated to M/s BP&SL in June 2017 minimal progress has been made in terms of obtaining statutory approvals and clearances such as the EC/FC/Land acquisition, the clearance for the forest diversion proposal, the issuance of the Terms of Reference ("TOR") etc. primarily because of the following reasons.

(i) Corporate insolvency resolution process ("CIRP") was initiated in respect of BPSL vide the order passed by the Hon'ble National Company Law Tribunal, New Delhi ("NCLT") dated 26 July 2017 ("Insolvency Commencement Date");

(ii) The CIRP resulted in approval of the resolution plan dated 03 October 2018 as amended by addendum letter dated 10 October 2018 ("Resolution Plan") of JSW Steel Limited, which was the Resolution Applicant, on 16 October 2018. Pursuant thereto, the Resolution Plan was filed before the NCLT for its approval and was accorded the same under Section 31 of the Code vide order passed by it on 05 September 2019 ("NCLT Order");

(iii) Though the NCLT Order was challenged before the Hon'ble NCLAT, the Hon'ble NCLAT vide its judgment dated 17 February 2020 ("NCLAT Order"), disposed off the said challenges and approved the Resolution Plan after making certain modifications in the NCLT Order;

(iv) The NCLAT Order approving the Resolution Plan was further challenged before the Hon'ble Supreme Court. Since the Hon'ble Supreme Court did not grant a stay on the implementation of the Resolution Plan, the JSW Steel Limited has started the implementation of the Resolution Plan w.e.f. 26 March 2021.

In view of the above, after the change of ownership, the necessary procedures to obtain the Forest Clearances and other approval started and gradually progress is made in this regards.

The block comprises of 139.223 ha lies within the Baladihi village in Koira Tehasil of Sundargarh District. The exploration under G2 category following UNFC guidelines was carried by the State Directorate of Geology. Hence the Block was auctioned for mining lease. As per the letter of intent as per Rule 10(2) of the Rules, the mining lease period will be for 50 years. The substantial quantity of the product from this block will be consumed in the Integrated Steel Plant of BP&SL, situated at Tholkoloi in Jharsuguda.

The lease area over an area of 139.223 hects. (as per DGPS)/138.579 hects. (as per ROR). The authenticated land schedule is jointly verified by Mining, Revenue & Forest Department. As all the calculation will be based on map (DGPS survey map) it is always advisable to consider the DGPS area for land use and other calculation. During verification of the land schedule allotted for said Mining Lease area it is found that the total area (DGPS) over 139.223 hectare consists of 48.346 ha. PRF, 19.532 ha.Revenue Forest, 44.743 ha. DLC forest and 26.602 ha non-forest land.

Further, "in principle approval" Stage-I approval over 112.621 ha. of Forest Land U/s-2 (ii) (including 1.808 ha. of Safety Zone) has been granted by MoEF& CC vide their Letter No.8-31/2022-FC, dated 21.12.2023 where in it has been stipulated as per **Condition No.17 for de-silting of village tanks and other water bodies located within 05 km from the mine lease boundary so as to mitigate the impact of siltation of such tanks/ water bodies.**

2. LOCATION

The mining lease area finds place in the Survey of India Topo sheet No.F45N5 (73 G/5) and situated between the latitude 21^0 52' 05.242" to 21^0 52' 54.542" N, and longitude 85^0 17' 10.449" to 85^0 17' 56.810" E. The above ML area covering villages such as Baldihi in Koira Range, Bonai Forest Division, Sundargarh District, Odisha.

3. TOPOGRAPHY

Netrabandha Pahar Block lies in Southern continuation of Bonai-Keonjhar belt of Ranchi Plateau. In general of Bonai-Keonjhar belt is deeply dissected given rise to a rugged topography with high and narrow hill ranges interspersed by broad valley. It is a discrete physiographic market by wide, flat, soil and alluvium covered tracks separated by low lying hills. The high hills are in fact, long range controlled by the out crop pattern of the BIF. The highest peak in the adjacent area is represented by Baliapahar (1010m). The said block represents an undulating to plain topography. At places flat topped low mounds are noticed with general gradient to NE and SE. The highest contour in this area at 678 m (north-central & south-central part of the block) and lowest contour is at 618 m at the northeast part of the block.

4. SOIL TYPE

Soil type in the study area varies widely from hard rock to lateritic soil. Areas at higher elevations are usually hard rock consisting of laterite. The top soil is scanty in the area. Whatever top soil is available is thinly spread over all Soil profile in nature. The pH of the soil is slightly acidic in nature.

5. CLIMATE

The study area is characterized by an oppressively hot summer with high humidity. Summer generally commences in the month of March. Temperature beings to rise rapidly attainting a maximum in the month of May. During the summer maximum temperature can go up to 47.7^{0}C. The weather becomes pleasant with onset on monsoon in June and remains as such upto end of October. The temperature in the month of December is lowest, i.e., 7^0 C. The average annual rainfall as recorded at IMD observatory is 1325.16 mm. Predominant wind direction is South-West. Area remains calm for nearly50% of the year

6. DRAINAGE

The drainage system of the area is controlled by Teherai nala flowing to the North of the block and its tributaries. However, Khajurdihi Nala flowing in the Southern part of the area control the drainage in the southern part.

7. LAND USE PATTERN

During the life of the mine, about 139.223 hectares will be utilized for mining, Minerals processing, Road, and green belt plantation in Safety Zone area etc. The details of land use pattern will be as follows:

Item wise Proposed Land Use Pattern in Forest and Non-Forest Land of Total Lease Hold Area

Sl. No.	Pattern of utilization	Undiverted/ Virgin Forest (in Ha.)				Non-Forest	Grand Total
		PRF	Revenue Forest	DLC Forest	Total Forest		
1	Mining with Haul Road	27.444	17.829	42.160	87.433	16.877	**104.310**
2	Dump	9.607	-	-	9.607	-	**9.607**
3	Sub-grade	0.650	-	1.472	2.122	0.030	**2.152**
4	Storing of ore	1.835	-	-	1.835	-	**1.835**
5	Top Soil	0.500	-	-	0.500	-	**0.500**
6	Stacking of Minerals	5.726	-	0.113	5.839	-	**5.839**
7	Infrastructure	0.130	-	-	0.130	1.687	**1.817**
8	Road	-	-	-	-	0.534	**0.534**
9	Water Harvesting	-	-	-	-	0.066	**0.066**
10	Green Belt	-	-	-	-	2.017	**2.017**
11	Others	1.411	1.392	0.544	3.347	3.757	**7.104**
	TOTAL	**47.303**	**19.221**	**44.289**	**110.813**	**24.968**	**135.781**
12	Safety Zone around ML boundary	1.043	0.311	0.454	1.808	1.634	**3.442**
	TOTAL	**48.346**	**19.532**	**44.743**	**112.621**	**26.602**	**139.223**

9. FACTORS RESPONSIBLE FOR SILTATION

In mining activities the following factors are responsible for soil erosion and causing siltation in village tanks and water bodies existing with 5 km from the mine lease area.

- Siltation is an inherent problem with ponds, lakes and almost all types of water reservoirs world over. Siltation occurs due to deposition or setting of soil eroded from the shore line, decaying fallen leaves, grass and other vegetative materials and decomposed organic materials settled on pond bottoms.
- Soil erosion may be attributed as the primary factor responsible for pond siltation in this area.
- Higher gradient and excess rainfall are the most common reasons of soil erosion.
- Erosion of soil occurs from the waste dumps, excavated areas and naturally denuded ground surface.
- However, looking into the current problem of siltation of the village ponds, the major factor is the erosion of the pond embankments and decomposition of in-situ aquatic weeds like water hyacinth and other air borne vegetative materials falling into the pond.
- As the age of the ponds increase, new layers of silt accumulate on the older ones and the silt layers become thicker.
- Finally the depth of the pond decreases and it loses its water storage capacity. At this time it needs to be desilted to recover.

The best practice against siltation is to desilt bottom of the pond at regular intervals as well as taking adequate preventive measures.

10. SELECTION OF PONDS

For the purpose as mentioned in Condition No.17 of the Stage-I approval letter, a survey of ponds within the buffer area of 5 Kms from the lease boundary was made. Total 2 numbers of following ponds are identified for desiltation within 5 km vicinity of the lease area in consultation with local people and forest staff.

Location of the ponds proposed for desilting

Sl. No.	Forest Division	Name of village	Name of water bodies	District	GPS reading
1.	Bonai	Sargigarh	Sargigarh Pond	Sundargarh	N 21°54' 03.55" E 85°18'25.39"
2.	Bonai	Badapatuli	Badapatuli Pond	Sundargarh	N 21°52'53.00" E 85°18'44.61"

Sargigarh Pond

Badpatuli Pond

11. <u>OBJECTIVE OF THE SCHEME:</u>

The objectives of the proposed scheme are as follows:

- De-silting of village tanks and other water bodies including renovation work located within the five kilometres from the mining lease area of Netrabandha Pahar Iron Ore Block so as to mitigate the impact of siltation.
- To ensure availability of water in village tanks and other water bodies to facilitate the villagers for their requirement of water including that of their livestock.
- Hence to ensure a congenial livelihood to the local people.

12. PRINCIPLE OF DE-SILTATION:

To meet the requirement with respect to the condition imposed by MoEF& CC this scheme involves the best way to ensure availability of water in village tanks/ water body by way of de-siltation of the same at regular intervals and to make the embankments soil erosion proof. In addition to strengthening of embankment, planting of tree species is to be provided to prevent soil erosion, flow of garbage of etc. to the ponds and this will ensure of availability of water for the local people for their day to day requirement throughout the year.

13. PROPOSED MEASURE AS PER CONDITION STIPULATED BY MoEF& CC.

After field verification by user agency and staff of forest department within 05 km of the mining lease area, the following sites have been identified in following villages for the purpose of de-siltation. During inspection it is observed that the water depth in the said ponds is about 1.5 mtr to 2.00 mtr. Hence the ponds need to be dug to a depth of further 1mtr.

Sl No	Name of the village	Status of Ownership	Size of the pond in mtr	Perimeter in Mtr	Surface area in Sq.m	GPS location	
						Latitude	Longitude
1	Sargigarh	Govt.	73m x 68m	282	4964m^2	N 21°54' 03.55"	E 85°18'25.39"
2	Badapatuli	Govt.	66m x 63m	258	4158m^2	N 21°52'53.00"	E 85°18'44.61"

Matrix to indicate the benefits to be derived by Villagers from Pond/village tank after desiltation.

Name of the village with water bodies	Population benefited	Cattle to Benefited	Irrigation to be derived	Pisciculture Benefit
Sargigarh Pond	***	**	*	*
Badapatuli Pond	***	**	*	*

*** = Maximum benefit, **= Average benefit, *= Low benefit

14. METHOD OF DE-SILTATION:

- De-siltation to be taken up at regular intervals in dry months of the summer season to get best result & depth required to be maintained.
- The dried silts to be removed manually or mechanically depending on the site condition/ quantity of silt accumulated.
- Silt accumulation is mainly found in the base of the pond which is about 40% less that the size of the pond mentioned.
- Silting to a depth of 1m is to be carried out manually. In the 2nd round de-silting to a depth of 0.30 m will be taken up.

- De-siltation may be taken up at 3 years cycle.
- The silts so excavated will be placed around the pond in an embankment design at about width of 2.5 m and height of 1m simultaneously compacting the soil.
- Grass tufting on both the side of the bund will be done. Water inlet PVC pipe of 6" diameter two numbers are to be provided.
- Similarly to drain out the excess water let PVC pipe of 6" diameter two numbers are also to be fixed.
- A bathing Ghats of 3m wide with steps (Step height of 25cm) to be provided.
- On the embankment of both ponds60 plants will be planted with gabion facilities. Ficus sp, Aegle marmelos, Amla &Jamun are favoured species.

15. POSSIBILITY OF SILTATION OF THE VILLAGE PONDS/WATER BODIES DUE TO MINING ACTIVITIES

The sub water shed where the mining lease falls is drained mainly by Sona River which is flowing outside the lease area. The area has a natural slope from NW to SE with well drained topography.

As far as village ponds in the proximity of the lease are concerned, it is observed that the identified village ponds are not affected from the surface runoff carrying any silt from the lease area, as these are located either far away from the working pits.

However, siltation in these identified village tanks may occur due to possible soil erosion outside the lease area beyond the sub watershed boundary. Hence, de-silting of these village ponds may be considered in subsequent phases.

16. METHODOLOGY

It is proposed to carry out the total de-siltation of the selected ponds as above every five years during summer when the ponds shall dry up exposing the silts. The dried silt shall be removed manually or mechanically based on the ground condition. In case of mechanical removal of silt, small excavators such as back-hoe / small hydraulic shovels or pay loader, depending upon the quantity of silt accumulation shall be used. For the purpose of evaluation of work required for de siltation, an estimate of de siltation in the individual ponds was made, which has been summarized in**Annexure-1**

The work shall comprise:-

a) Total de-siltation in the five year period.

b) Implementing preventive measures during the following four years to minimize re-siltation of the ponds.

c) To prevent or slowdown future siltation, the embankment stabilization by grass turfing /stone pitching , plantation of suitable species and constructing bathing ghat is also included in the de-silting and improvement plan.

It is proposed that the ponds having accumulation of over 1000 m^3 shall be de-silted by mechanical means and the rest shall be handled manually. It is proposed to deploy one 0.9 m^3 back hoe with one 10 tonne tipper for de-silting of the pond in a period of two-three days. The machines shall be deployed in a planned manner to complete the work in a shortest time frame. Necessary advice of BDO, Koira& Panchayat Sarpanch will be taken into account.

In case of smaller ponds, where the accumulation of silt is very small, the de-siltation operation shall be done manually by engaging sufficient manpower.

The ponds shall be allowed to dry up completely during the early summer i.e. during March and April followed by de-siltation in the above described manner.

a) 1st Year Plan & Management:

The first year work shall also comprise the following preventive measures to minimize siltation.

- Providing embankment to the ponds where ever necessary.
- Strengthening the existing pond embankment to check external flow of surface run-off in to the pond.
- Regular removal of aquatic weeds and polythene bags /bottle thrown by villagers.
- Plantation of trees on the top of the embankment and stone pitching on the slopes to prevent bank erosion.
- Plantation of selected species like Bela, Pipal, Champa, Baula, Mango, Jamunetc. will be taken up.

b) Subsequent 2 Years Plan and Management: In the subsequent 2 years, the rate of siltation shall be negligible, which can be dealt by manual methods using the local labourers. This will also otherwise help in employment generation.

c) Preventive Measures & Maintenance: It is essential to take up preventive measures in order to minimize re-siltation of the ponds. Activities like pond bank strengthening and stabilization by way of earth work with stone patching, grass seeding and plantation of appropriate species shall be taken up in the first year followed by their maintenance in successive four years.

d) Dewatering of village pond: This will be carried out by engaging dewatering pump.

e) De-silting: After pumping out the water from the pond, silts are to be removed either manually by deploying labour or excavator & dumper combination.

f) **Earthwork Excavation:** Wherever required, soil has to be removed for deepening the pond to increase water holding capacity of the pond.

g) **Bathing Ghat(separately for men and women):**In the above Ponds, separate arrangement will be made for bathing by male and female of the Villages. Since the villagers are conscious from mythological point of view, a Tulsi (Ocimumsanctum) Chaura (Platform) has also to be provided where the villagers after bath can offer water to Sun God. The Detailed estimate is enclosed as **Annexure-2**.

h) **Sitting Platform on the embankment of the Pond(s) –** In each Pond, a masonry platform will be provided where the villagers (age old persons and youth) can sit during summer evening. This platform will also serve the purpose of puja / karma.

i) **Planting all along the embankment of the Pond –** According to availability of land all along the pond (s), plantation of Bela, Pipal, Champa, Baula, Mango, Jamun etc. will be made to form a Green belt. This Green belt will also give an aesthetic view to the area and villagers can collect leaf, fruit, flower etc. for spiritual purposes. The detailed estimate of plantation programme is enclosed in **Annexure- 3.**

17. INSPECTION AND MONITORING

After commencement of mining operation start the scheme will be implemented. For successful implementation of the above mitigative measures, intensive inspection and technical guidance from concerned technical wing is required. Sufficient fuel/ conveyance charges for technical experts shall be provided by the user agency for proper execution of these programmes.

18. MOTIVATION OF PEOPLE:

As per Govt. resolution of 2011, the villagers of the adjoining village, i.e. Baldihiis to be involved in protection and management of plantation. Before execution of the work, a meeting will be conducted in the above villages and resolution regarding support to plantation activities will be made. To motivate the people in this direction, they will be provided with incentives in shape of different community articles, buildings, and different community amenities of fixed and movable type through entry point activities (EPA). Health camps shall also be organized in the villages. Thus, 15% of the plantation cost has been earmarked for expenditure on this score.

19. EXECUTING AGENCY

The works in the present Scheme shall be executed by the User Agency having specialized departments headed by qualified persons with outsourced man and machinery. To facilitate this, the user agency shall establish its own executing and supervision cells along with required infrastructural facilities. In order to maintain the quality of work, in-house supervision through competent personnel shall be provided. The entire work shall be carried out in co-ordination with the Forest Department.

21. REQUIREMENT OF FUNDS

The total cost of this Scheme for de-silting and improvement of the selected pond in **Sargigarh** and **Badapatuli** villages is **Rs.1,63,18,000.00 (Rupees One Crore Sixty Three Lakh Eighteen Thousand) only.**

TOTAL COST OF THE PROJECT Wage Rate Rs.450.00

Sl. No	Description of Job	Estimate for Pond of village Sargigarh	Estimate for Pond of village Badapatuli	Total fund required (Rs.)
1	Excavation, loading, unloading & carriage by mechanical means of all kinds of soil including stoneyearth, gravel & morum etc inter spread with boulders upto 1/2 cum size with all lifts & delifts including trimming of slopes & bed to design section &depositing the excavated materials away from work site as per the specification & directed by EIC with an initial lead of 1.00 KM from the place of excavation complete. Providing rough stone (15cm-30cm) dry packing in apron & all top four sides berm with our local boulder (boulder supplied by management). Construction of bathing ghat with local boulder Room near bathing ghat for change of clothes by women. Construction of Bench on the embankment for sitting			1,02,77,702.00
2	Tulsi Chaura	30209.00	30209.00	***60,418.00***
3	Preparation of ramp on one side of the pond with slope for the village cattle to go near the water body on L.S. @ ₹ 50,000/- per pond	50,000.00	50,000.00	***1,00,000.00***
4	*Provision for plantation on all three sides to control Soil erosion (plant will be supplied by management) and resting place of villagers coming for bathing*	100 Plant 5,93,255.00	100 Plant 5,93,255.00	*11,86,510.00*
5	Provision for annual maintenance of pond for cleaning aquatic weeds from pond & cutting of bushes from apron & berms on LS.	**1,00,000.00**	**1,00,000.00**	***2,00,000.00***
			Total :-	***1,18,24,630.00***
6	15% of the total cost for motivation of VSS / People involved			***17,73,695.00***
			Total :-	***1,35,98,325.00***
			Escalation 20%	***27,19,665.00***
			Grand Total	**1,63,17,990.00 Or, 1,63,18,000.00**

(Rupees One Crore Sixty Three Lakh Eighteen Thousand) only

M/s Bhushan Power & Steel Ltd.

Countersigned

Divisional Forest Officer
Bonai Division

Technically Approved
Regional Chief Conservator of Forests
Rourkela Circle

Annexure-1

De-silting the Pond, Construction of Bathing Ghat & bench at Sargigarh and Badapatuli Pond by Bhushan Power & Steel Ltd. @ Rs.450.00 per MD.

Sl. No.	Items	Location	No	L	B	H	Qty	unit	Rate	Amount
1	Pumping of water by diesel pump incl. spllying diesel & lubricant						15	hours	750.13	11251.98
2	Desilting the pond	Sargigarh	1	73.0	68.0	1.0	4964.0	cum		
		Badapatuli	1	66.0	63.0	1.0	4158.0	cum		
							9122.0	cum	900.00	8209800.00
3	Removing weeds & bush from the bund of the pond	Sargigarh, Badapatuli	2	40.00	4.00		320.00	sqm	16.63	5320.64
4	Removing amary from the pond	Sargigarh, Badapatuli	2	30.00	7.00		420	sqm	46.33	19460.56
5	Rough stone masonry for bathing ghat	Sargigarh	4	10.00	0.60	0.45	10.80			
			2	10.00	2.50	0.45	22.50			
		Badapatuli	4	10.00	0.60	0.45	10.80			
			2	10.00	2.50	0.45	22.50			
							66.6	cum	6601.42	439654.79
6	20mm c p 1:4	Sargigarh	1	10.00	3.20		32.00			
		Badapatuli	1	10.00	3.20		32.00			
		step face	80	2.50	0.20		40.00			
		change room floor	4	5.00	2.00		40.00			
							144.00	sqm	301.49	43414.16
7	Neat cement punning	Sargigarh	1	10.00	3.20		32.00			
		Badapatuli	1	10.00	3.20		32.00			
		step face	80	2.50	0.20		40.00			
		change room floor	4	5.00	2.00		40.00			
							144.00	sqm	37.79	5442.10
8	Earth work in excavation	Change room								
		Sargigarh	1	3.00	0.40	0.40	0.48			
			2	1.25	0.40	0.40	0.40			
			1	2.00	0.40	0.40	0.32			
			1	6.00	0.40	0.40	0.96			
		Badapatuli	1	3.00	0.40	0.40	0.48			
			2	1.25	0.40	0.40	0.40			
			1	2.00	0.40	0.40	0.32			
			1	6.00	0.40	0.40	0.96			

		Bench	12	2.50	0.40	0.40	4.80			
							9.12	cum	450.00	4104.00
9	C C 1:3:6	Change room								
		Sargigarh	1	3.00	0.40	0.10	0.12			
			2	1.25	0.40	0.10	0.10			
			1	2.00	0.40	0.10	0.08			
			1	6.00	0.40	0.10	0.24			
		Badapatuli	1	3.00	0.40	0.10	0.12			
			2	1.25	0.40	0.10	0.10			
			1	2.00	0.40	0.10	0.08			
			1	6.00	0.40	0.10	0.24			
		Bench	12	0.50	0.40	0.10	0.24			
		Flooring	2	5.00	2.00	0.10	2.00			
							3.32	cum	9906.25	32888.75
10	C C 1:2:4	Bathing ghat	2	10.00	2.50	0.05	2.50	cum	9600.78	24001.94
11	B W 1:6	Change room								
		Sargigarh	1	3.00	0.24	3.20	2.30			
			2	1.25	0.24	3.20	1.92			
			1	2.00	0.24	3.20	1.54			
			1	6.00	0.24	3.20	4.61			
		Badapatuli	1	3.00	0.24	3.20	2.30			
			2	1.25	0.24	3.20	1.92			
			1	2.00	0.24	3.20	1.54			
			1	6.00	0.24	3.20	4.61			
		Bench	12	0.50	0.24	0.80	1.15			
							21.89	cum	12600.0	275814.00
12	12mm c p 1:6	Change room								
		Sargigarh	1	3.00		3.00	9.00			
			2	1.25		3.00	7.50			
			1	2.00		3.00	6.00			
			1	6.00		3.00	18.00			
		Badapatuli	1	3.00		3.00	9.00			
			2	1.25		3.00	7.50			
			1	2.00		3.00	6.00			
			1	6.00		3.00	18.00			
		Bench	12	0.50		0.10	0.60			
							81.6	sqm	255.13	20818.78
13	20mm c p 1:6	Change room								
		Sargigarh	1	3.00		3.00	9.00			
			2	1.25		3.00	7.50			
			1	2.00		3.00	6.00			
			1	6.00		3.00	18.00			
		Badapatuli	1	3.00		3.00	9.00			
			2	1.25		3.00	7.50			
			1	2.00		3.00	6.00			
			1	6.00		3.00	18.00			
		Bench	12	0.50		0.10	0.60			

							81.6	sqm	270.00	22032.00
14	Lift charge for B W 1:6	Change room								
		Sargigarh	1	3.00	0.24	2.40	1.73			
			2	1.25	0.24	2.40	1.44			
			1	2.00	0.24	2.40	1.15			
			1	6.00	0.24	2.40	3.46			
		Badapatuli	1	3.00	0.24	2.40	1.73			
			2	1.25	0.24	2.40	1.44			
			1	2.00	0.24	2.40	1.15			
			1	6.00	0.24	2.40	3.46			
							15.56	cum	301.49	4691.14
15	Lift charge for C p	Change room								
		Sargigarh	2	3.00		2.40	14.40			
			4	1.25		2.40	12.00			
			2	2.00		2.40	9.60			
			2	6.00		2.40	28.80			
		Badapatuli	2	3.00		2.40	14.40			
			4	1.25		2.40	12.00			
			2	2.00		2.40	9.60			
			2	6.00		2.40	28.80			
							129.6	sqm	16.63	2154.86
16	Roofing with GCI sheet		2	5.00	3.00		30.00	sqm	301.49	9044.62
17	Carrying cutting to size & erecting strl steel		2	3.00	5.00	4.50	135.00	kg		
							0.135	MT	9000.00	1215.00
18	White wash 3 coats on new surface	Change room								
		Sargigarh	2	3.00		2.40	14.40			
			4	1.25		2.40	12.00			
			2	2.00		2.40	9.60			
			2	6.00		2.40	28.80			
		Badapatuli	2	3.00		2.40	14.40			
			4	1.25		2.40	12.00			
			2	2.00		2.40	9.60			
			2	6.00		2.40	28.80			
							129.6	sqm	36.00	4665.27
									Sub Total	**9135774.59**
19	Cement						11	MT	17399.24	191391.61
20	Angle						0.135	MT	119996.9	16199.59
									Total	**9343365.79**
									Contigency @ 10%	934336.57
								Grand Total		**10277702.37 Or, 10277702.00**

Annexure-2

CONSTRUCTION OF TULSICHAURA ON THE BATHING GHAT @ Rs.450.00

Sl. No.	Description of Items	Unit	Nos	L	B	H	Quantity	Rate	Amount
1	Earthwork in excavation	M3	1	6	0.4	0.3	**0.63**	319.03	200.99
2	Plain cement concrete 1:3:6	M3	1	6	0.35	0.1	0.21		
							0.21	10342.33	2171.89
3	Brick Work (1:6) (Above G.LIn Super Structure)	M3	1	6	0.25	1.5	**2.25**	10091.22	22705.25
4	12 mm thick plaster	M2	1	6		1.5	9		
							9	234.87	2113.82
5	Applying Lime Wash	M2		Same qty as item no 4			**9**	23.56	212.04
								Sub total	**27463.03**
								Contingency 10 %	2746.30
								Total Amount (Rs.)	**30209.33 Or, 30209.00**

(Rupees Thirty Thousand Two hundred Nine) only.

Annexure-3

COST NORM FOR PLANTATION OF FRUIT BEARING SPECIES ALONG THE POND EMBANKMENT @ Rs.450.00 per MD
400 Plants per Km. in 2 rows

Sl No.	Item of work	Mandays	Labour rate @ 450.00	Material cost in Rs.	Total (Rs.)
0 th year advance work/pre-planting/ 1st Yr. plant.					
1	Site preparation & alignment	2	900.00		900.00
2	Pitting 45 cm cube	25	11250.00		11250.00
3	Cost of 400 nos. of 1 yr. old seedling @ Rs.141/- per seedling	0	0	56400	56400
4	Carriage of plants & planting	6	2700.00		2700.00
5	1st weeding &manuring	2	900.00		900.00
6	Casualty replacement	2	900.00		900.00
7	Soil working, application of insecticides	2	900.00		900.00
8	Cost of FYM& fertilizer including transportation		0	4480	4480.00
9	Cost of Iron gabion 400 Nos. @ 1869/- per gabion on LS		0	747600	747600.00
10	Misc expenditure		0	3734	3734
11	Cost of engaging one watcher for year (9 month)	234	105300.00		105300.00
12	Watering at least 5 days in a month for 4 months (8 person X 6 times in a month X 4 month)	192	86400.00		86400.00
13	Const. of 2 nos. Sign-board on LS. @ Rs 1500/- per signboard		0	3745	3745.00
	Total :-	**465**	**209250.00**	**815959.00**	**1025209.00**
2nd Year Operation					
14	Weeding, soil working, manuring (twice)	4	1800.00		1800.00
15	Casualty replacement 15% including cost of seedling including cost of seedlings (60 Nos. @ 112/-)	2	900.00	8400	9300.00
16	Cost of fertilizer & pesticides		0	2240	2240.00
17	Gabion maintenance including painting	20	9000.00	37333	46333.00
18	Misc expenditure		0	1872	1872.00
19	Watering at least 6 days in a month for 8 months (April to July & November to March) (8 person X 5 times in a month X 8 month)	320	144000.00		144000.00
20	Cost of engaging one watcher for year (12 month)	312	140400.00		140400.00
	Total :-	**658**	**296100.00**	**49845.00**	**345945.00**

Sl No.	Item of work	Mandays	Labour rate @ 450.00	Material cost in Rs.	Total
3rd Year Operation					
25	Weeding, soil working	3	1350.00		1350.00
26	Gabion maintenance	20	9000.00	37333	46333
27	Cost of engaging one watcher for year (12 month)	312	140400.00		140400.00
28	Unforeseen		0	1872	1872
29	Watering at least 6 days in a month for 8 months (April to July & November to March) (8 person X 5 times in a month X 8 month)	320	144000.00		144000.00
	Total :-	**655**	**294750.00**	**39205.00**	**333955.00**
4th Year Operation					
25	Weeding and pruning	3	1350.00		1350.00
26	Gabion maintenance	20	9000.00	37333	46333
27	Cost of engaging one watcher for year (12 month)	312	140400.00		140400.00
28	Unforeseen		0	1872	1872
29	Watering at least 6 days in a month for 8 months (April to July & November to March) (8 person X 5 times in a month X 8 month)	320	144000.00		144000.00
	Total :-	**655**	**294750.00**	**39205.00**	**333955.00**
5th Year Operation					
30	Weeding and purning	3	1350.00		1350.00
31	Gabion maintenance	20	9000.00	37333	46333
32	Cost of engaging one watcher for year (12 month)	312	140400.00		140400.00
33	Unforeseen		0	1872	1872
34	Watering at least 6 days in a month for 8 months (April to July & November to March) (8 person X 5 times in a month X 8 month)	320	144000.00		144000.00
	Total :-	**655**	**294750.00**	**39205.00**	**333955.00**
	Grand Total :-	**3088.00**	**1389600.00**	**983419.00**	**2373019.00**

ABSTRACT

Sl No.	Year	Amount (inRs.)
1	1st year	**1025209.00**
2	2nd year	**345945.00**
3	3rd year	**333955.00**
4	4th year	**333955.00**
5	5th year	**333955.00**
	Total :-	**2373019.00**

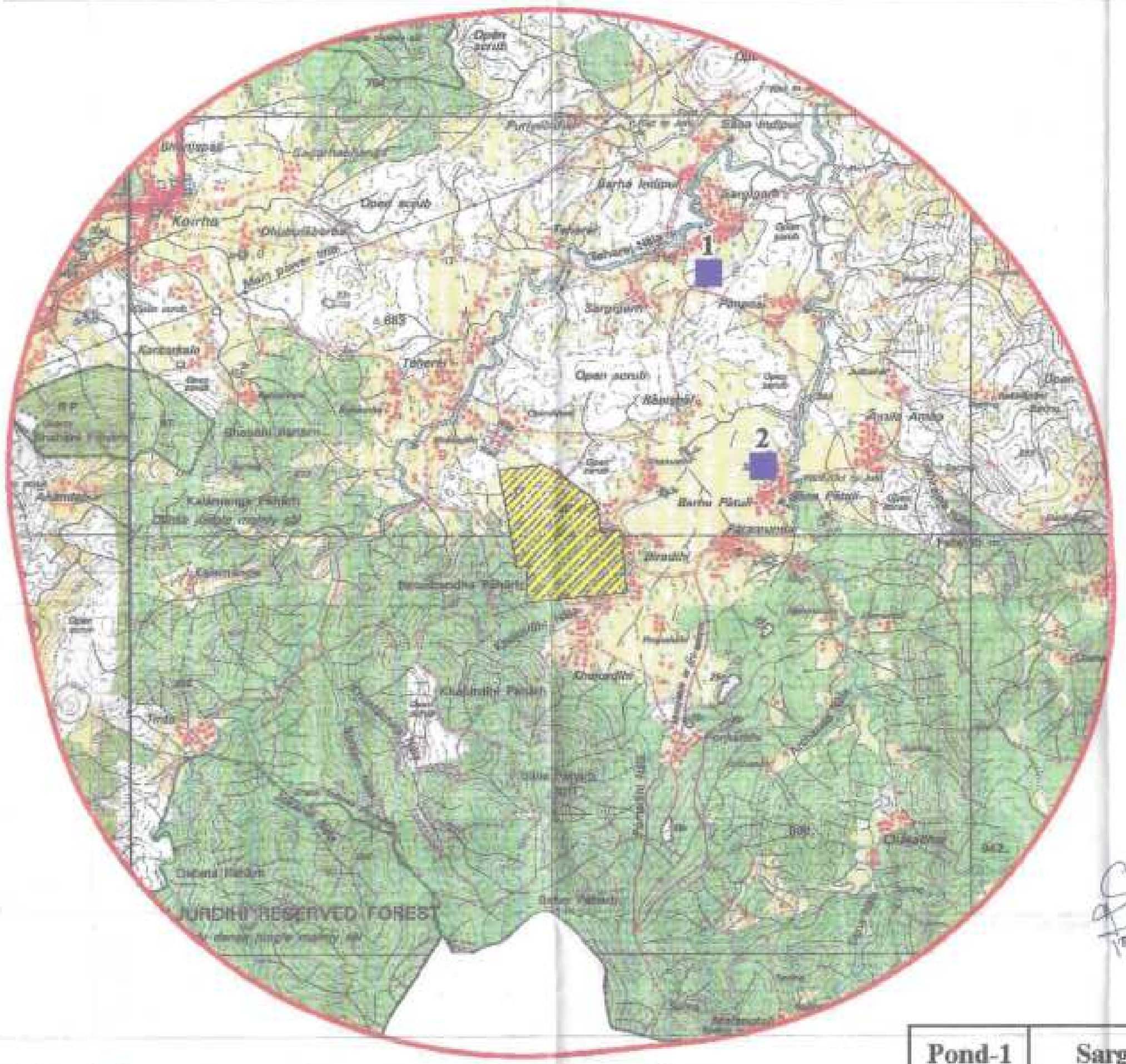
Total Expenditure for 400 plants = **Rs.23,73,019.00**

Expenditure for 200plant = Rs.11,86,509.5 (Or, 11,86,510.00)

TOPO MAP SHOWING THE LOCATION OF PONDS/ WATER BODIES WITHIN 05 KM RADIUS FROM THE LEASE BOUNDARY OF NETRABANDHA PAHAR IRON ORE BLOCK M/S BHUSHAN POWER & STEEL LTD UNDER BONAI FOREST DIVISION

N
W E
S

SCALE:-1:80,000



COUNTERSIGNED
DIVISIONAL FOREST OFFICER
BONAI DIVISION

Pond-1	Sargigarh Pond
Pond-2	Badpatuli Pond

Legend

- Water_Body
- 5 KM RADIUS
- DGPS ML BOUNDARY

Water body Location

Sl No	Latitude	Longitude
1	21°54'03.55"N	85°18'25.39"E
2	21°52'53.00"N	85°18'44.61"E

0 1 2 4 6 8 Km.

85°15'0"E 85°18'0"E 85°21'0"E 85°24'0"E

21°54'0"N 21°51'0"N

AGENCY COPY

Union Bank

NEFT / RTGS CHALLAN for CAMPA Funds

Date : 04-03-2024

Agency Name.	Bhushan Power and Steel Limited
Application No.	5626965491
MoEF/SC File No.	6-31/2022-FC
Location.	ORISSA
Address.	International Trade Tower, Nehru Place, New Delhi-Sambalpur
Amount(in Rs)	54933000/-

Amount in Words: Five Crore Forty-Nine Lakh Thirty Three Thousand Rupees Only

NEFT/RTGS to be made as per following details;

Beneficiary Name:	ORISSA CAMPA
IFSC Code:	UBIN0996335
Pay to Account No.	156825626965491 Valid only for this challan amount.
Bank Name & Address:	Union Bank Of India FCS Centre,21/1, III Floor, Jolitta Towers, Mission Road, Bengaluru-560027

- This Challan is strictly to be used for making payment to CAMPA by NEFT/RTGS only

BANK COPY

Union Bank

NEFT / RTGS CHALLAN for CAMPA Funds

Date : 04-03-2024

Agency Name.	Bhushan Power and Steel Limited
Application No.	5626965491
MoEF/SC File No.	6-31/2022-FC
Location.	ORISSA
Address.	International Trade Tower, Nehru Place, New Delhi, Sambalpur
Amount(in Rs)	54933000/-

Amount in Words: Five Crore Forty-Nine Lakh Thirty Three Thousand Rupees Only

NEFT/RTGS to be made as per following details;

Beneficiary Name:	ORISSA CAMPA
IFSC Code:	UBIN0996335
Pay to Account No.	156825626965491 Valid only for this challan amount.
Bank Name & Address:	Union Bank Of India FCS Centre, 21/1, III Floor, Jolitta Towers, Mission Road, Bengaluru-560027

- This Challan is strictly to be used for making payment to CAMPA by NEFT/RTGS only

Note:After making the required payment through challan, if the payment status has not been updated even after 7 working days, then kindly mail a copy of your challan with transaction date and reference id to Email: fcsblr@unionbankofindia.bank , epurse@unionbankofindia.bank, ubin0903710@unionbankofindia.bank

AGENCY COPY

यूनियन बैंक Union Bank of India

NEFT / RTGS CHALLAN for CAMPA Funds

Date : 04-03-2024

Agency Name.	Bhushan Power and Steel Limited
Application No.	5826565491
MoEF/SG File No.	8-31/2022-FC
Location.	ORRISA
Address.	International Trade Tower, Nehru Place, New Delhi.Sambalpur
Amount(in Rs)	54933000/-

Amount in Words :Five Crore Forty-Nine Lakh Thirty-Three Thousand Rupees Only

NEFT/RTGS to be made as per following details;

Beneficiary Name:	ORRISA CAMPA
IFSC Code:	UBIN0996335
Pay to Account No.	150825826565491 Valid only for this challan amount.
Bank Name & Address:	Union Bank Of India FCS Centre,21/1, III Floor, Jalitta Towers, Mission Road, Bengaluru-560027

- This Challan is strictly to be used for making payment to CAMPA by NEFT/RTGS only

BANK COPY

यूनियन बैंक Union Bank of India

NEFT / RTGS CHALLAN for CAMPA Funds

Date : 04-03-2024

Agency Name.	Bhushan Power and Steel Limited
Application No.	5826565491
MoEF/SG File No.	8-31/2022-FC
Location.	ORRISA
Address:	International Trade Tower, Nehru Place, New Delhi. Sambalpur
Amount(in Rs)	54933000/-

Amount in Words :Five Crore Forty-Nine Lakh Thirty-Three Thousand Rupees Only

NEFT/RTGS to be made as per following details;

Beneficiary Name:	ORRISA CAMPA
IFSC Code:	UBIN0996335
Pay to Account No.	150825826565491 Valid only for this challan amount.
Bank Name & Address:	Union Bank Of India FCS Centre, 21/1, III Floor, Jalitta Towers, Mission Road, Bengaluru-560027

- This Challan is strictly to be used for making payment to CAMPA by NEFT/RTGS only

Note:After making the required payment through challan, if the payment status has not been updated even after 7 working days, then kindly mail a copy of your challan with transaction date and reference Id to Email: fcsblr@unionbankofindia.bank , epurse@unionbankofindia.bank, ubin0903710@unionbankofindia.bank

UTR NO- SBINR52024040514197176

SITE SPECIFIC WILD LIFE CONSERVATION PLAN

(For implementation at Keonjhar&Bonai Divisions)

Proposal of M/s Bhushan Power & Steel Limited for Nelrabandha Pahar Iron Ore Mine with total excavation of 2.680 MTPA (2.0 MTPA (ROM), OB 0.680 MTPA) along with 2 x 100 TPH mobile crusher in the mine lease area of 139.223 ha, located at Village Baladihi, Tehsil Koira, District Sundargarh, Odisha

TABLE OF CONTENTS

TABLE OF CONTENTS	Page No.
EXECUTIVE SUMMARY	3-4
Chapter I	5-8
Chapter II	9-76
Chapter III	77-83
Chapter IV	84-126
Chapter IV-A	127-138
Chapter V	139-142
Chapter VI	142

EXECUTIVE SUMMARY

Ministry of Environment, Forest & Climate Change vide its letter communicated vide F. No. IA-J-11015/51/2021-IA-II(M) has conveyed Terms of Reference (hereinafter referred as "ToR") for Ferro-chromite Chromite Block owned by M/s Bhushan Power & Steel Limited with a total excavation of 2.500 MTPA (2.0 MTPA (ROM), Ore+Waste) along with 2 x 100 TPH mobile crushers in the mine lease area of 139.223 Ha, located at village Purunagarh, Tehsil Kalinga, District Sundergarh, Odisha covered under Survey of India Toposheet No. F45 G/3 and is bounded by the geographical co-ordinates ranging from 21°02'05.247" N to 21°03'54.540" N and 85°07'04.442" E to 85°07'56.810" E. Anticipated life of mine is 33 years. Opencast fully mechanized mining method is proposed to be adopted including drilling, blasting, loading and transportation to the crusher.

Out of the total Mining area of 139.223 ha, forest area is 112.821 ha, Government land is 13.815 ha (Gochar 7.507 ha, road 0.210 ha, habitation 3.947 ha, worship place 0.752 ha, grave yard 0.597 ha & Nala 0.44 ha) & remaining land is 12.787 ha (0.545 ha Gharbari & 12.142 ha Agriculture).

As per the land schedule approved by Range officer Kora (Forest Range regarding the status of forest areas proposed for diversion in Non-Coal Mine Lease from Core Block of M/s BPSL in Sundergarh district, Total forest area required for the project is 112.821 ha wherein RF= 0.000; PRF= 48,315 Revenue Forest= 19.562; DLC forest= 44.743 and Unclassified forest = 0.000

The project does not involve violations of the provisions of The Environment Impact Assessment Notification, 2006 and/or subsequent amendments. Proposal for diversion of forest area of 112.821 ha is submitted by the proponent vide proposal no. FP/OR/MIN/266(5)/2017 dated 05.07.2017. There is no National Park, Wild life Sanctuary, Elephant Tiger Reserves or Wild life Corridors within 10 km radius. There is no area of historical importance in the study area.

The study area comprises the mine lease area (Core Zone- CZ) and the area within 10 km radius (Buffer Zone- BZ) of the mine lease boundaries. The core zone is dominated by four major habitat types namely Agricultural Land (AL), Barren Land (BL), Forest Land (FL) and Water Systems (WS). The buffer zone also includes five habitat types namely Agricultural Land (AL), Forest Land (FL), Barren Land (BL) and Water systems (WS).

Thirty five species of trees were observed in the core zone during field assessment wherein the most common observed species among trees is found to be Anogeissus latifolia while the least occurrence was observed for Dalbergia sissoo. Thirty species of shrubs were recorded in the core zone during field investigations wherein the most common species noticed among shrubs being Carissa carandas and the least being Crewia scabrifolia. Thirteen species of herbs were observed during field investigations wherein the most dominant observed species was Sporobolus diandrus and the least observed was Phyllanthus. The Shannon Wiener Index (H) for the core zone has been worked out which showed 3.2614 for trees, 2.8113 for shrubs and 1.9705 for herbs/ grasses. Hence, as per the diversity index obtained for different life forms namely trees shrubs and herbs, it connotes that the core zone is more diverse in shrubs as compared to trees and herbs. Five species belonging to 02 families, thirty-two species of shrubs belonging to eighteen families and fifty-five species of herbs belonging to twenty one family were observed in the buffer zone. The Shannon Wiener index (H) for the buffer zone has been worked out which showed 3.2491 for trees, 2.9843 for shrubs and 2.1104 for herbs/ grasses. Hence, as per the diversity index obtained for different life forms namely trees shrubs and herbs, it connotes that the buffer zone is more diverse in trees as compared to shrubs and herbs.

The forest diversity of the forest & non-forest areas of core zone is very poor because of the cumulative disturbance caused by the mine dominated landscape. No mammal other than rats, squirrels, hare, porcupine and domesticated cows, dogs, cats etc. were seen in and around the core zone. Common leopard, Jackal etc. may also be rarely sighted in the nearby area. 26 species of mammals, 43 species of birds, 14 species of reptiles, 24 varieties of amphibians and 57 species of fishes are identified in the study area.

Three Schedule I species are reported in the nearby forests present in the buffer zone of the project site. They are: (1) Elephas maximus - Asian Elephant (2) Manis crassicaudata - Indian Pangolin (3) Melursus ursinus - Sloth bear/ Bhalu (4) Bos gaurus - Indian Bison (5) Panthera pardus - Leopard/ Bibatu (6) Axis porcinus - Hog deer/ Ghoreghan and (7) Pavo cristatus - Indian peacock. Among them, (1) Manis crassicaudata (the Indian pangolin) (2) Melursus ursinus (the Sloth bear/ Bhalu) and (3) Petaurista philippensis (the flying squirrel) are the only Schedule I species found in the forest and near by core zone. Out of the 7 Schedule I species, 4 of them belong to the Least concern (LC) category of the IUCN, one belongs to the Near Threatened (NT), 1 belongs to the Vulnerable (VU) and 1 belong to the Endangered (EN) category of the IUCN Red list. Both NT and VU are over risk categories in the IUCN system. Only 2 are in the Higher Risk Endangered (EN) to Apply. The Asian Elephant (Elephas maximus) and the Indian pangolin (Manis crassicaudata) are under the higher risk EN category of the IUCN Red list.

Site specific wildlife management plan to include Wildlife Habitat Management, Plantation for natural ecosystem management, Supporting the Protection Squad, training & awareness measures to prevent diseases in wild animals, environmental pollution & restriction, Wildlife Protection and anti-depredation, Providing of watch tower/ camp shed for elephant tracking, fencing of open wells with rat hole wells, charging Warning & Guiding system, rescue van with animal experts, IEC activities for educating the community through awareness and competitions, monitoring & Evaluation, constituting Wildlife Cell, exploring Corpus fund for inter departmental coordination etc. and further a comprehensive conservation plan for schedule-I species amounting to Rupees Four crore eighty one lakhs sixty thousand only have been proposed.

Since the project area is a region of mines wherein nearly 6 industrial units are working and where in the existing environmental conditions do not cause much harm to the biotic community, which may be sustainable. It may be expected that with the effective implementation of suggested mitigation measures, wildlife management plans and further conservation activities of Schedule- I species, the Ecology & Biodiversity of the study area shall be maintained sustainably.

CHAPTER- I
INTRODUCTION

1.1 Background

Government of India, vide its erstwhile Ministry of Environment & Forests Notification S.O.1533 (E) dated 14th September 2006 and further vide subsequent amendments thereof (hereinafter referred as EIA Notification, 2006 or Notification), have initiated mandatory prior Environmental Clearance for all new projects or activities listed in the Schedule of the said Notification. Accordingly, mining of minerals having mine lease area ≥ 50 hects listed as activity 1 (a) in the schedule of EIA Notification, 2006. The proposal of M/s Bhushan Power & Steel Limited (hereinafter referred as BPSL) for Mahalandihal Pahar Iron ore block with proposed excavation of 2.650 MTPA (2.0 MTPA (ROM), 0.650 MTPA) along with 2 x 100 TPH mobile crusher in the mine lease area of 139.223 Ha, located at Village Kolabiri, Tehsil Kolaib, District Sundergarh, Odisha falls in Category A of the schedule of the Notification, and hence, the project required prior Environmental Clearance from the Central Government or its Ministry of Environment, Forest & Climate Change (hereinafter referred as MoEF & CC).

The project proponent, M/s Bhushan Power & Steel Limited (BPSL) sought Environmental Clearance from MoEF and on a part of it applied for approval of Terms of Reference (hereinafter referred as TOR) for Mahalandihal Pahar Iron ore block with proposed excavation of 2.650 MTPA (2.0 MTPA (ROM), 0.650 MTPA) along with 2 x 100 TPH mobile crusher in the mine lease area of 139.223 Ha, located at Village Kolabiri, Tehsil Kolaib, District Sundergarh, Odisha.

Considering all the above, and in compliance with TOR conditions specified by MoEF& CC, the Wildlife Conservation Plan (WCP) including flora and fauna in the core and buffer zone of Mahalandihal Pahar Iron Ore Block is prepared.

1.2 About The Proponent

M/s Bhushan Power & Steel Limited is a leading manufacturer of flat and long products and have state-of-the-art plants at Chandigarh, Dadri (U.P.) and Orissa in India. These plants manufacture wide ranging products spanning the steel value chain right from coal mining to manufacturing pig iron, DRI, billets, HR coils, CR coils, CR/GC sheets, Precision tubes, Black pipes, GI pipes, Cable tapes, Forgings, Carbon and Special alloy steel wire rods and rounds conforming to IS and International standards. Present turnover of the company is about Rs. 8000 Crores with huge volume of exports. The company has successfully implemented and commissioned a greenfield integrated steel plant with the present capacity of 2.8 Million Tonnes which is being

and united to 3.4 Million Tonnes of steel and captive power plant in Odisha with HR coil making facility. He first to private sector in the State of Odisha. For the plant technology and experts were tied up from leading world-renowned companies namely Lurgi, ABB Ltd, SMS Siemag, SMS Mevr Demag, TCI Texmaco, Fouks etc. BPSL has a wide marketing network in India with about 35 sales offices as well as dealers for selling its value-added products. The successful completion combined with continuous upgradation and innovation has enabled the company to overcome its targeted goals. BPSL's end to end portfolio has enabled it to offer a wide spectrum of products of superior quality consistently exceeding customers' specifications. In addition to the export thrust, BPSL caters to the domestic steel requirements of fast-growing sectors like automotive, white goods, construction/ infrastructure, furniture, boilers, telecommunication, power etc.

With a view to make its presence in a big way in specialty alloy steel long product business, BPSL has commissioned a most modern state of the art Wire Rod cum Bar mill and is commissioning a host of downstream finishing facilities namely heat treatment facilities, Bright bar manufacture, besides galvanized products together with colour coating sheet and profile etc.

The company have certifications of ISO 9001:2008 & TS 16949 Quality standards and ISO 14001:2004 Environment Management Standards.

BPSL was subjected to National Company Law Tribunal (NCLT) since July 2017 and it was managed by Resolution Professional appointed by the Committee of Creditors (COC) till 25th March, 2021. M/s JSW Steel Limited, India's largest steel producer, was the successful Resolution Applicant approved by COC and has taken over possession and management control of BPSL on 26th March 2021, after approval of NCLT. The unit continues to operate with the same name 'Bhushan Power & Steel Limited'. The area over 3,220 ha in Nehrabandha Tehsil, Village Kotabandha, Sundergarh, Odisha and M/s Bhushan Power & Steel Limited became the preferred bidder and the Letter of Intent (LoI) for grant of mining lease for iron ore over the entire area of 129.225 ha has been issued by Government of Odisha. The project shall continue to undertake statutory clearances and operate in future under the name of 'Bhushan Power & Steel Limited' even though the management possession and management control is with M/s JSW Steel Limited.

1.3 About The Project

M/s Bhushan Power & Steel Limited has been allocated the Nehrabandha Iron Ore Block under auction. Government of Odisha issued the Letter of Intent (LoI) for grant of mining lease (ML) for Nehrabandha Iron ore block for iron ore over an area of 129.00 ha vide its letter no. 7085/SM IV (Misc) SM-52/2017 dated 24.04.2017. The corrigendum was issued for 129.220 ha vide letter no. V(Misc.)SM-72/2017/4065/SM Dated 27.07.2017. Validity of LoI has been extended by the Government of Odisha, Department of Steel and Mines vide its letter no. 3697/V(S) Misc-56/2017 dated 27.07.2020 for a period of two years w.e.f. 24.05.2020. The ML area of 129.225 ha

comprises of 3.818 ha Government land, 12.797 ha forested land and 12.62 ha of forest land. The reported iron ore reserves (probable) are 64.357 million tons, total resource of iron ore is estimated as 91.976 million tons. The peak production will be 2.0 MTPA.

The entire forest area, barring a small portion in the west-central part is mineralised containing the iron ore. The area has been explored through 38 number of drill holes (total 1454.4 m drilling) at a grid of 200 x 200 m. The exploration conforms to G2 category under UNFC guidelines. Anticipated life of mine is 30 years. Opencast fully mechanized mining method is proposed to be adopted including drilling, blasting, loading and transportation to the crusher. Two quarries named as 'Kp' and 'Kpll', based on their location in the north & south part of the block, are proposed to be developed in working in phase.

1.4 Significance of the Study

As pointed out earlier, this is a unique ore excavation project wherein open cast mining is involved. Iron ore is mostly of universal use. It is the backbone of modern civilization. It is the foundation of our basic economic systems located over the world. The standard of living of the people of a country is judged by the consumption of iron and steel.

Continuous unabated mining for long periods may cause irreversible changes in the nature and topography of the area. The open cast pits once which were lush green forests scattered as a part of mine closure plan do not guarantee the return of earlier existed environmental conditions, in a foreseeable.

Major environmental issues concerned with mining are deforestation and as a result loss of ecosystem as well as species of wild origin which may be supportive as food, fodder, shelter or any kind of social or economic importance. As a result of vegetation loss, another concern is soil erosion within the mine leads to loss of soil fertility, disturbances in surface water flow, resultant inundations or landslides etc. The net result is loss of biodiversity that may finally affect the livelihood of mankind.

It may be because of these reasons that the Government of India through EIA Notification 2006, makes it mandatory to obtain prior Environmental Clearance and to have Environment Impact Assessment and EMP for all major developmental projects listed in the schedule of EIA Notification. It is for the preparation of EIA, in this case, MoEF&CC has issued TOR. While undertaking an detailed floral and faunal assessment of the project site & 10 km radius around the periphery of the project site is mandatory followed with conservation plan for flora, fauna and wildlife wherein the proponent is liable to financially support the LVI.

1.5 Objectives of Study

With the aim of assessing the floral, faunal and ecosystem diversity of the project area and

developing strategies towards environmental management plan including wildlife protection of the existing biota, the following objectives were formulated and followed:

- Identification and listing of ecologically significant floral and faunal species of the study area (Rare, endangered, threatened, endemic, exotic) in accordance with IUCN, The Wildlife (Protection) Act, 1972.
- Identification of ecologically sensitive areas (protected areas, geologically significant areas, biosphere reserves, sanctuaries, mangroves, grasslands, wetlands, heritage resources etc.) within the study area.
- Identify the likely impacts of the project activity on the flora/fauna/ecosystem of the study area.
- Develop appropriate strategies for ecological & biological environment.
- Suggest ways and means of conservation of scheduled species of flora and fauna, if any, reported in the study area and develop site specific Wild life Conservation & Management Plan for the identified Schedule I species (as per the Wildlife Protection) Act, 1972) of the study area.

Core Zone: The proposed project area of Neloubandha Pahar iron ore block located in Village Jabahal, Tehsil Kolta, District Sundergarh of Odisha is covered under Survey of India Toposheet No. 73 G/5 and is bounded by the geographical coordinates ranging from 21° 52'05.242" N to 21°52'54.242" N and 84°17'15.449" E to 84°17'56.910" E, has been designated as Core Zone (CZ) for this study purpose. Out of the total ML area of 136.523 ha, forest area is 112.437 ha, Conveyance corridor is 13.815 ha (Secondary road 2.5 ha no. habitation 3.947 ha, worship place 0.759 ha, grave yard 0.599 ha & Nala 0.44 ha) & tenanted land is 12.761 ha (3.642 ha Gharbari & 9.142 ha Agriculture). Out of the total 112.437 ha of forest land within the ML area, 67.022 ha is reserve forest (Sonai DMS land Forest Range 3(4)(b)) and 45.599 ha is DLC Forest.

Buffer Zone or Zone of Influence: The area encompassing 10 km radius from the boundaries of the proposed project area of Neloubandha Pahar iron ore block, say 10 km radius of the core zone, has been designated as the Buffer Zone (BZ) for this study purpose. Within BF of about 135 km of aerial distance of the project boundary at WSW, 9 reserve forests exist within 10 km radius of the project boundary. They are: (i) Ml near Amandaur, 2.9 km WNW (ii) Mendhamunda RF, 4.2 km NNW (iii) Kolliansolda RF, 4.8 Km NW (iv) Sarkanda RF, 5.5 Km W (v) Khaparli RF, 7.4 Km SW (vi) Utkura RF, 8.5 Km NNW (vii) Kuru RF, 8.9 Km NNW (viii) Saliaguni RF, 9.0 Km. NE (ix) Siddhamani RF, 9.6 KME.

CHAPTER- II
PROJECT AND IMPACT AREA

2.1.1 Project Highlights

Metabaronichahar Block is in south continuation of Bonaikela group of Barsuan plateau. It gently dips towards the Sankh Kesaghar belt is deeply dissected giving rise to a rugged topography with high & narrow hill ranges in association by broad valley. It is a classic physiographic unit marked by wide, flat, valley alluvium covered tracts separated by low lying hills, the high hills are, in fact, long ranges controlled by the outcrop pattern of the BIF. The Metabaronichahar Block is located on a hilly area with undulating topography. At places like opposed low mounds are noticed with general gradient to NE and SE.

The soil characteristics show wide variation depending upon their occurrence, physical and chemical properties. The soil in this area is broadly grouped into 2 types are 4 basic. The types include red sandy soils and yellowish soils with neutral to slightly acidic in nature (pH varies from 6.5 to 8.5). These soils are suitable for cultivation of paddy and other crops whereas the unsuitable comprises mainly of clastic soils are red and yellow soils. These soils are mildly acidic in nature and deficient in nitrogen, phosphorous and potassium and organic matter.

Fully mechanized method with the deployment of earth moving machineries like crawler mounted drilling, air compressors, backhoe shovels, rock breaker, 25 tonner dumpers etc. will be adopted. Mine working will be on three shifts basis. Mining is envisaged based on a peak production of 2 Mtpa per annum to cater to the need market as well as to carry feed over to integrated steel plant.

Benches will be developed in consideration of the terrain condition of the area to attain the rated production at iron ore of 2 million tons per annum. The height and width of the benches shall be maintained at 6 m x 10 m respectively for safe vehicular movement. The individual bench faces will be kept at 90° whereas the overall quarry slope angle is proposed to be kept at around 45° with the horizontal. Massive hard iron ore body / sections will be blasted through drilling and blasting. Drilling will be carried out by means of 115mm dia. crawler drill with 600 HP compressor. For secondary breaking, hydraulic rock breaker will be deployed. But, secondary drilling and blasting is minimized. Blasting will be carried out with the help of explosives (slurry type), boosters and ANFO and Class-VI explosives (NONEL electric detonators and detonating fuse). 90% of drilling mainly blasted here are will be taken to a mobile crushing screening plant fitted with grizzly. ROM with 300 mm size 10 and will be fed directly to mobile screening plant and these screening plants will also be fitted with grizzly. The oversized materials will be taken to crushing plant. For ore handling/waste handling shovel of 1.9 Mᵌ bucket capacity (PC 350) in combination with 25 tonner dumpers (Tata 2510) will be utilized. 10 m wide haul road is proposed to be developed with the gradient of 1:14 to 1:20 for facilitating easy movement of machineries & transportation of ore and waste. Dumpers will be loaded with hinged / locked

material with the help of backhoe shovels.

Drilling machine is proposed to work in a fully mechanized manner. 32 nos. of holes are to be charged and blasted per day to suit the proposed excavation by drilling and blasting. Wagon drills will be used for drop hole drilling. Drill holes will be vertical depth of 6.5 m and with 115 mm dia. Blasting will be carried out with the help of explosives (slurry type) boosters and ANFO and Gurs-M explosives (H.E. electric detonators and detonating fuse) and will be done before and after working hours when the number of the working persons are comparatively less. Being a commercial block, individual buyers will be at varied locations and may use different routes by road. A major consumer shall be BPSL's steel plant at Jharsuguda, Odisha. Several options of transportation are (i) By road to BPSL steel plant (ii) by road from mine to Barbaria railway siding at a distance of 30 km followed by rail to BPSL steel plant at a distance of 200 km and (iii) through a proposed slurry pipe line from Kalinga to Thelkoloi for iron ore fines beneficiation. No new material is required. Only diesel is required for transportation vehicles, operation of HEMM and generators in emergency.

2.1.2 Project Location

The project area is located in Village Bolanihi, Tehsil Kalinga, District Sundergarh of Odisha State and is covered under Survey of India toposheet No. 73 G/5 and is bounded by the geographical coordinates ranging from 21°52'06.242" N to 21°52'54.242" N and 83°17'10.449" E to 83°17'58.813" E. A Panchayath road running from Kalinga to Palmunda, Khajuripath runs along the eastern boundary of the block, traversing through the lease area and sometimes outside the lease area. This panchayath road joins NH 215 at a distance of about 7 km from the lease area. SH 10 (A) runs at a distance of about 7 km from the lease area. Both the NH and SH joins the lease area to Rourkela via Tensa/Kalinga respectively. Rourkela is about 77 km from the lease area. Rajgangpur (SE Railway) is the nearest railway station.

FIGURE 2.1
LOCATION MAP OF NETRABANDHA PAHAR IRON ORE BLOCK

2.1.3 Project Area Characteristics

The project site of 139.223 ha consists of Government land (have both forest and non forest areas) and tenant lands as detailed below:

Table 2.1
Land description

FOREST		NON- FOREST				
Government land		Government land			Tenanted land	
Forest type	Area in ha	Type	Sub-type	Area in ha	Type	Area in ha
Proposed Reserve Forest	67.054	Reserved	Gochar*	7.567	Gharbari	1.645
DLC Forest	45.269		Road	0.576	Agricultural	12.142
			Habitation	3.547		
		Common	Roads	0.124		
			Devasthal**	0.722		
			Smashan***	0.592		
		Other	Nala	0.449		
Total	112.621			13.815		12.787
TOTAL PROJECT AREA 139.223 ha						

* Graveyard; Grazing land; **Deosathali; Place of worship; ***Shmasan; Graveyard

SPECIAL NOTE on FOREST LAND: As per the Land schedule approved by Range officer Kirthi Forest Range regarding the statistics of forest areas proposed for diversion in Kandabanda Pahar for Gin Block of M/s SPSCL in Sundargalihafsi cl. Total forest area required for the project is 112.621 h which is RF= 0.000; PF= 48.316; Revenue Forest= 19.552; DLC Forest= 44.743 and any other forest= 0.000.

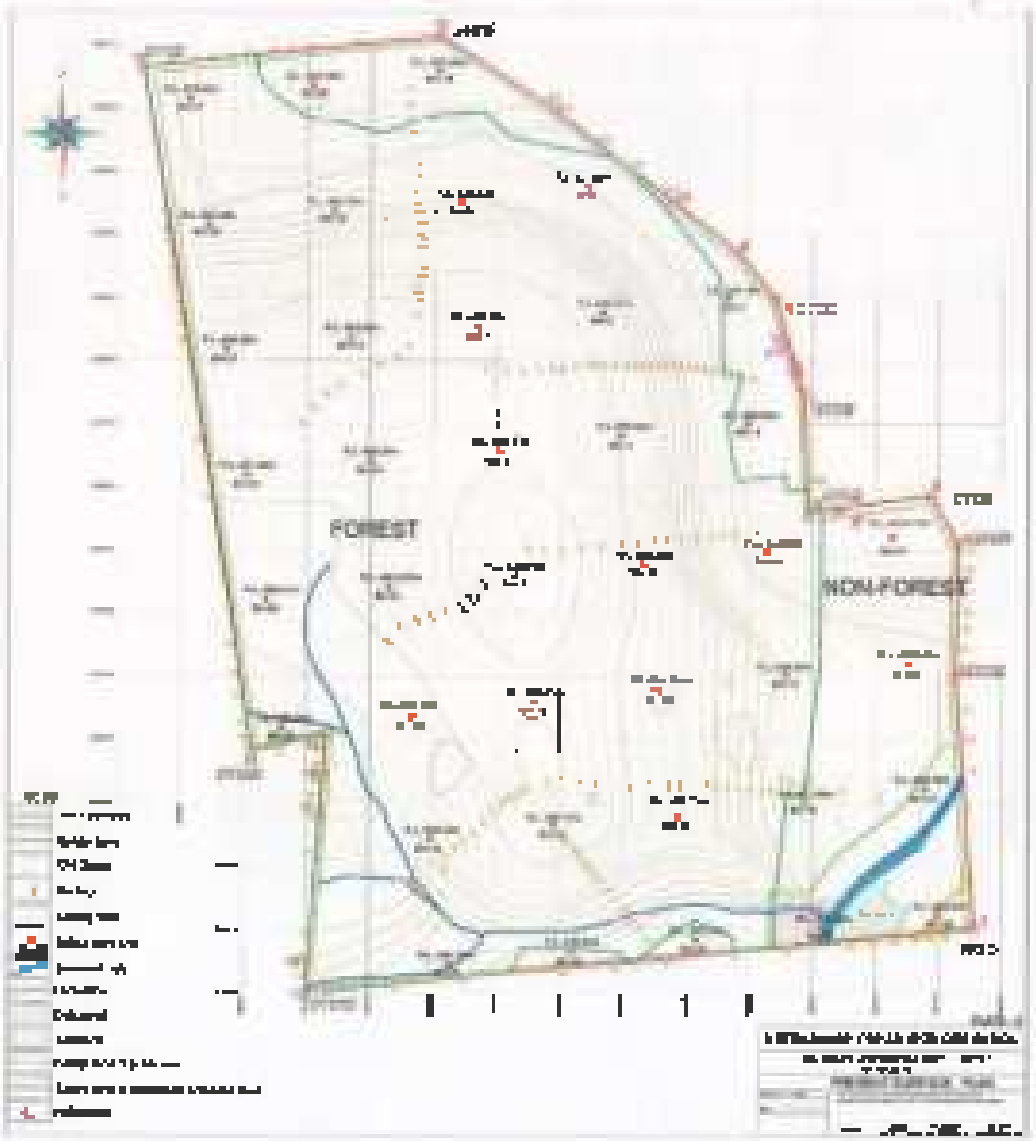


FIGURE 2.2
PRESENT SURFACE PLAN

Proposed for diversion of forest land of 112.40 ha in submission by the proponent vide proposal no. IA/OR/MIN/264945/2017 dated 03.07.2017. Nehrubandha Pahar Block lies in southern continuation of Bonai Keonjhar belt of Nanchi Plateau. In general the Nanchi Keonjhar belt is deeply dissected giving rise to a rugged topography with high and narrow hill ranges interspersed by broad valley. It is a dissected physiographic unit marked by wide laterite and lateritic covered flat-topped hills separated by low lying hills. The high hills are, in fact, long ranges controlled by the outcrops pattern of the BIF. The highest peak in the adjacent area is represented by Bali Pahar (1010 m). The Nehrubandha Pahar block represents an undulating to plain topography. At places, flat topped low mounds are noticed with general gradient to NE and SE. The highest contour in this area is 870 m (north central and south central part of the block) and lowest contour is at 810 m at the north east part of the block.

2.1.4 Project Significance

Haematite and magnetite are the most important ores in India. About 77 % haematite ore deposits are found in the Eastern belts (Assam, Bihar, Chhattisgarh, Jharkhand, Odisha & Uttar Pradesh) while about 23 % magnetite deposits are found in southern belts (Andhra, Telangana, Karnataka, Kerala & Tamil Nadu). Karnataka alone contributes 72 % of magnetite deposits in India. Of these, haematite is considered to be superior because of its higher grade. Iron ore is a metal of universal use. It is the backbone of modern civilization. It is the foundation of our basic core industry and is used all over the world. The standard of living of the people of a country is judged by the range of iron and steel. The commencement of mining activities shall result in direct revenue to State and Central Government exchequer in the form of royalty and various CESS on iron ore production. This will enhance the direct and indirect employment and enhanced industrial activity leading to income tax and more money circulation and benefit to the public at large.

2.1.5 Project Category

The project does not involve violations of the provisions of the Environment Impact Assessment Notification, 2006 and/or subsequent amendments. Mining of minerals having mine lease area > 50 ha is listed as Activity 1 (a) in the schedule of EIA notification, 2006. The iron ore mining project of M/s Rohitar Power & Steel Limited (hereinafter referred to as RPSL) for Nehrubandha Pahar iron ore block with a total production of 2.480 MTPA (2.0 MTPA (ROM), OB-0.480 MTPA) along with 2 x 100 TPH mobile crusher in the mine lease area of 139.928 ha, located at Village Saladihi, Tehsil Bonai, District Sundergarh, Odisha falls in Category A of the schedule of the Notification, and hence, the project required prior Environmental Clearance from the Central Government or its Ministry of Environment, Forest & Climate Change.

As per the said notification, the process of Environmental Clearance takes place through certain procedural aspects. They are: Screening, scoping, public consultation and appraisal that may end with the issuance / rejection of environmental clearance by the competent regulatory

authority as specified in the notification. It is at the stage of scoping that the regulatory authority decides whether a project require a detailed Environmental Impact Assessment (EIA) Report and if, it would undergo public hearing or not subject to the provision & procedural aspects envisaged in the EIA notification 2006. If the competent authority is of the opinion that the project falls in a sensitive area, detailed EIA Report, then the Terms of reference (ToR) for the EIA study shall be assigned with general and project specific conditions.

Here, in the present project of M/s Khaitan Power & Steel Limited for the mineral extraction in the block, the MoEF, being the regulatory authority as in case of category A projects of EIA Schedule, have prescribed ToR and hence, as a part of complying with ToR conditions, this study is undertaken.

2.1.6 Land Use Details

There is no National Park, Wild life Sanctuary, Elephant / Tiger Reserve or Wild Life Corridors within 10 km radius. There is no area of historical importance in the study area. There one small area used as place of worship and a graveyard in the south eastern corner of the block. There is no proposal for mining of these areas. Further, safety zones have been proposed as: (i) safety zone of 7.5 m all along the block boundary, (ii) Safety zone of 10 m from the village road which passes along the block boundary, (iii) 15 m from the nala in the south east corner of the block. Barred by the presence of special areas like bijesthali, mandir, main road etc. and (iv) 50 m from pakam kidi nala. Rehabilitation and resettlement are required since there is human habitation within the target area. There are several water bodies and forests within 15 km radius of the project, as detailed below:

Table-2.2
Water bodies and Forest (s) with in 15km radius

Sr. No	Name of waterbody/ Forest	Distance in kms	Direction
Water Body			
	Chaurcolh Nala	Project site	-
2	Kathgain Nala	0.25	E
3	Tehesi Nala	0.7	NW
4	Archanda Nala	1.7	E
5	Khursedih Nala	?	NW
6	Pukpan Nala	2.1	W
7	Gohla (pit) Nala	2.4	E
8	Sunkhad	2.6	S
9	Baura Nala	3	NW
10	Kundra Nala	5	SW
11	Lokanci Nala	5.3	SW
12	Jurdi Nala	5.4	S
13	Barkamsarh Nala	7.1	SSW

Sr. No	Name of waterbody/ Forest	Distance in kms	Direction
14	Kam Nala	7.3	NW
15	Kalmang Nala	7.5	N
16	Champajhar Nala	8	SSW
17	Bolchhakuanital Nala	8.1	SW
18	Jalpahadi	8.5	E
19	Kaliyana Nala	8.5	SSE
20	Sankardahadi	8.6	SSW
21	Khandadhar Nala	8.9	S
22	Bakuru Nala	9.1	S
23	Ghatgaon Nala	10	SE
24	Sukuni Nala	10.2	SSW
25	Tarendihi Nala	10.4	N
26	Dalak Nala	10.7	SE
27	Sami Nala	11.2	WNW
28	Anka Nala	11.8	SSW
29	Anenka Nala	11.9	SSW
30	Baraschhan Nala	12	SSW
31	Kaliparena Nala	12.1	SW
32	Gurhuji Nala	12.3	SW
33	Kundaru Nala	12.3	NNE
34	Malda Nala	12.4	S
35	Nalakhand	13	SE
36	Baharani River	14.1	SE
Forests			
1	Kendpar Anchal	2.83	WNW
2	Nandhanchua RF	4.15	NNW
3	Kalhandala RF	4.76	NW
4	Sankarda RF	5.26	W
5	Khajuridihi RF	5.45	SW
6	Uthuda RF	5.85	NNW
7	Kaka RF	8.07	NNW
8	Kalamati RF	9.04	NE
9	Akadarda RF	9.44	NNE
10	Jarakha RF	10.3	WSW

TABLE-2.3

INDUSTRIES & MINES WITH IN 15KM RADIUS

Sr. No	Name	Status	Distance in kms	Direction
	Industries & Mines			
1	Manganese Ore (India) Ltd. Mines, AMG - STP/CCR	Lease lapse	6.2	NW
2	R.J. Co. Ltd, Nishipithora Manganese Mine	Lease lapse	9.9	NNW

Sr. No	Name	Status	Distance in kms	Direction
3	MGM Minerals Pvt Ltd Kalabeda Iron	Mine Working	9.6	NE
4	Prabodh Mohanty Nuagaon Fe & Mn	Mine Working	7.7	WNW
5	Deepak Steel & Company Pvt. Ltd. Bangurdeeka, Hardikela Fe & Mn Mines	Lease lapse	9.7	NNW
6	Jindal Steel & Power Tantloi-Kalsua-Durchhatia	mine Working	11	W
7	Bangur Mining Agencies Pvt Ltd Kalsua Tantia	mine Working	11	W
8	Bangur Sons (P) Ltd. Serindpur Iron	Mine Working	5.2	NNE
9	S N Mohanty, Kst. Jaldih Iron, Manganese & Barite (O M and M (P) Ltd. Cracker on Lease status A? WNW	Mine Working	7.5	WSW
10	Orissa Mines (P) Ltd. Orissa Mn Lease status	Not available	9.7	WNW
11	Bangur Mines Ltd. Kalmang Mn Mines	Lease lapse	8.3	NNE
12	Bangur Mines Ltd, Kanthar Kalsa Mn Mines	Lease lapse	9.3	NW
13	Bangur Sons (P) Ltd. Palusahi Mn Mine	Lease lapse	9.	NNE
14	B.L.Co. Ltd. Jeherla Fe & Mn Mine	Lease lapse	2.3	N
15	Prabodh Mohanty Gonuchua Fe & Mn Mine	Lease lapse	8.	NNW
16	Sarojini Iron & Coal Iron Ore Mine Kalsa Block	Working	11.3	ESE
17	Shrachal Mohanty Kalkata Iron Mines	working	11.5	W
18	Kalyani Resources (p) Ltd. Tantloi Iron Ore Mine	working	12.4	WNW
19	National Enterprises Kalsua Iron Ore Mine	working	8.9	WNW
20	Bangur Sons Pvt Ltd Gangharmal Iron Ore Mine	working	5.1	NNE
21	Kanakdhara Mining & Minerals (P) Ltd. Mandhal manganese mine	working	2	SW
22	Goel Iron Ore mines, or OMC, Mn	working	13.6	NNE
23	Goel Mining & Industries Ltd., Jilling Langalda Iron Mine	Lease lapse	13.6	ENE
24	Pennar Minerals Pvt Ltd, Jarbahan Iron Mine	Lease lapse	12.2	ENE
25	Bangur Mines P Ltd, Jalanpiran & Mohalbera	Lease lapse	14.1	ENE
26	Indiankalmalk, Jarbahal Iron Ore Mine	working	13.7	E

Sr. No	Name	Status	Distance in kms	Direction
27	Bijay Kalimati Mn Mines (M/s Mangilal Kungilal)	working	0.2	ENE
28	JSW Nuagaon Fe & Mn mine	Working	15.9	N
29	Tata steel Barsua	working	13.6	ENE
30	R. B. Das Debacher Barbaran Fe & Mn Mines	working	15	NE
31	Tarani Ensign Mohanty, Nilakagi Kalupali Fe & Mn mines	working	11.5	ESE
32	M/s Ambuvela, Nuagaon Iron & Manganese	Lease lapse	10	NNE
33	M/s Padmanabh Mafin Pvt	not available	1.4	SE
34	Kamanda Steel Plant	working	7.7	NW
35	M.D. Agarwal Tantra Bauxite Mine	Lease lapse	12.4	WNW
36	G.P. Sharma Kalkatali Fe & Mn Mine	working	9.2	W
37	Kalinga Enterprise Gamadpur Fe & Mn Mines	working	5.1	N
38	P.K. Ambwalia Gamda Fe & Mn Mines	Lease lapse	7.1	NE
40	S.D. Sharma Kalkati Iron Ore Mine	Terminated	9.7	WNW
41	S.N. Mohanty Kalkata Iron Ore Mine	working	9.8	W
42	Tata Steel Malda	Lease lapse	11.9	ENE
43	P.S. Mishra Kandhar Corporation & Mn Mines	Lease lapse	3	NW
44	Bhairabi Nath Patnaik Bhamadeli Iron Ore Mines	working	5.1	NW
45	Chinga Kr. Kishore Pati Kalkata Mine	not available	9.7	NW
46	BC Dagera Gamda Mandajata Fe & Mn Mine	not available	8.9	NE
47	K.C. Pradhan Gamda Fe & Mn Mine	Lease lapse	8.9	NE
48	K. S. Ambwalia Gamda Fe & Mn Mine	not available	8.9	NE
49	L.S. Ambwalia Jantigram Fe & Mn mine	not available	10	NNE
50	M.C. Mohanty Gamda Fe & Mn Mine Lease status	not available	8.9	NE
51	Tarini Minerals Tensa-Gamda Fe & Mn Mine	Lease lapse	7	NE
52	Rama Mining (P) Ltd. Gamda Fe & Mn Mine	Delisted	7.1	NE
53	O.M.C. Ltd. Bhanjapani Iron Ore Mine Lease status	not available	5.3	NW
54	S.N. Das Mohapatra, Kansanthi-Kalta-Kaudakela Mn Mines	Delisted	7.4	NNE
55	SH Paul, Kalta-Kaudakela Manganese Mine	Temporarily discontinued	7.5	N
56	Steel Mining & Industries Limited, Bhanjapani Iron Ore Mine	Lease status Not available	1.7	E

Sr. No	Name	Status	Distance in kms	Direction
57	Pro Minerals Pvt. Ltd.		13.9	SE
58	BS(A)3 Steel India Ltd. + 5 LSL			
59	Sonya Mining And Metal Industries Pvt Ltd.		12.7	ESE
60	Narayanpur Minerals		14.5	ESE
61	Nikka Alloys (p) Ltd.		4.7	ENE
62	Shivam Mineral Ltd		9.0	NW
63	Mukhmahesha Devi Alloys (p) Ltd.		9.0	NW
64	Gurmukh Sambrani		9.5	NNW
65	Gopi Krishna Minerals & Metals (p) Ltd		9.3	NNW
66	OP Abhyuday Steel & Power Ltd.		10.0	NNE
67	Sambhavnath Ispitex (Sunil)		12.7	NNE
68	Rashmi Ferro Alloys Pvt. Ltd.		13.6	NNE
69	Deepak Steel And Power Ltd.	Operational	12.6	NNE

2.1.7 General Meteorological Conditions

The area is directly influenced by the South West Monsoon. As evidenced from the records of Keira valley the minimum temperature in cold season varies between 5°C and 25°C. Summer is not very hot. However sometimes it reaches 47°C. The atmosphere of this region is dry so due because of good vegetation cover. The seasonal variation of this area is Summer season - March to May, Rainy season: June to October and winter season: November to February. Rainfall in the rainy season is well distributed in this area and the average annual rainfall as collected from block office is about 1650 mm. The windrose diagram wind direction is from SW to NNE followed by SW to NE and west to East. The average wind velocity is about 1.4 m/s and the calm period is around 25%.

2.1.8 Core Zone

The proposed project area of M/s Bhusan Power & Steel Ltd. is situated in Village Bolasiri Tehsil Keira District Sundergarh of Odisha State. As per the Survey of India Toposheet No.73 G/5 it is bounded by the geographical coordinates ranging from 21° 57'05.2"N to 21°59'54.5"N and 85°17'10.449" E to 85°17'56.910" E has been designated as Core Zone (CZ) for the study purpose. Out of the total ML area of 129.220 ha forest area is 112.621 ha, Government land is 13.815 ha (Govt. Rd 7.587 ha, road 0.510 ha, nallah/river 3.547 ha, worship place 0.022 ha, grave yard 0.799 ha & Nala 0.741 ha) & remaining land is 12.787 ha (Lease to Ghanashyam 12.142 ha Agriculture land out of the total 112.621 ha of forest land will in the ML area, 67.022 ha is Reserve Forest (Bonai Division Forest Range, Kendal and 45.799 ha is D. C Forest

2.1.9 Buffer Zone

The area which is falling 10 km radius from the boundaries of the proposed project area of

Nehrbandha Tehsil from one block, say 10 km radius of the core zone, has been designated as the Buffer Zone (BZ) for this study purpose. Tundha RF at about 1.33 km aerial distance of the project boundary on WSW, 9 reserve forests exist within 10 km radius of the project boundary. They are: (i) RF near Amanpur, 2.5 km WNW (ii) Mendhar Kalan RF, 4.2 km NNW (iii) Kamlamek RF, 4.8 km NW (iv) Sarvandia RF, 5.5 Km W (v) Khajuakhal, 5.7 Km SW (vi) Dikoliy RF, 8.9 Km NNW (vii) Kura RF, 8.9 Km NNW (viii) Bandarana RF, 9.3 km NE and (ix) Siddhnath RF, 9.6 NNE.

Hereinafter, wherever CZ is mentioned shall mean Core Zone, BZ is mentioned shall mean Buffer zone and study area (SA) is mentioned shall mean both core zone and buffer zone together.

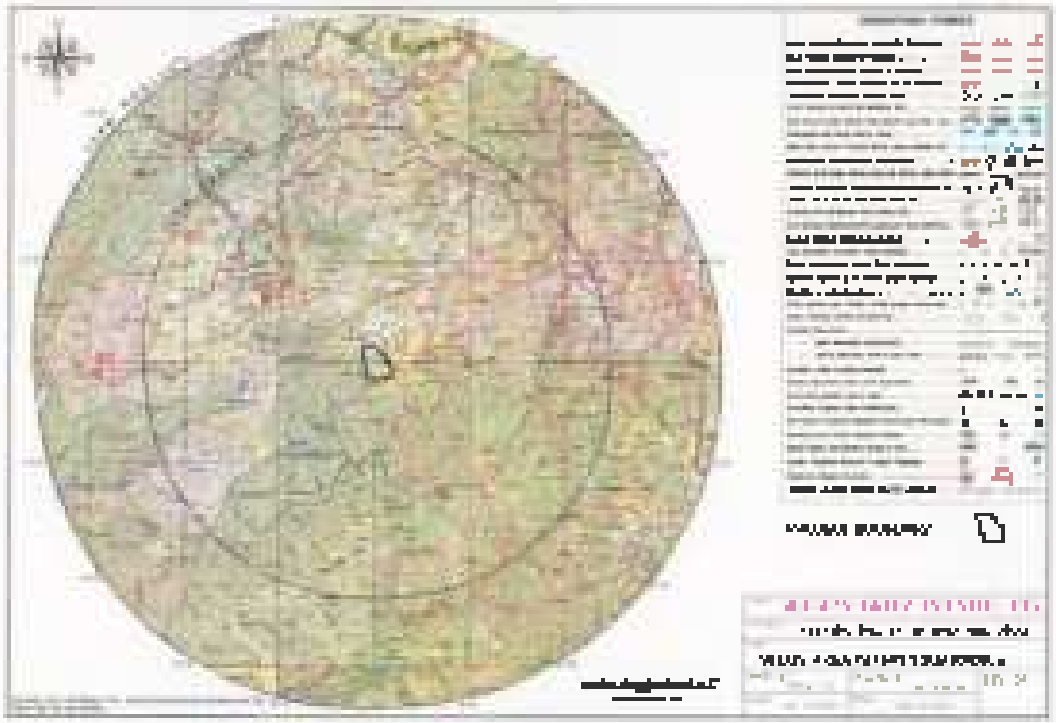


FIGURE 2.3

MAP SHOWING AMENITIES WITHIN 15KM RADIUS

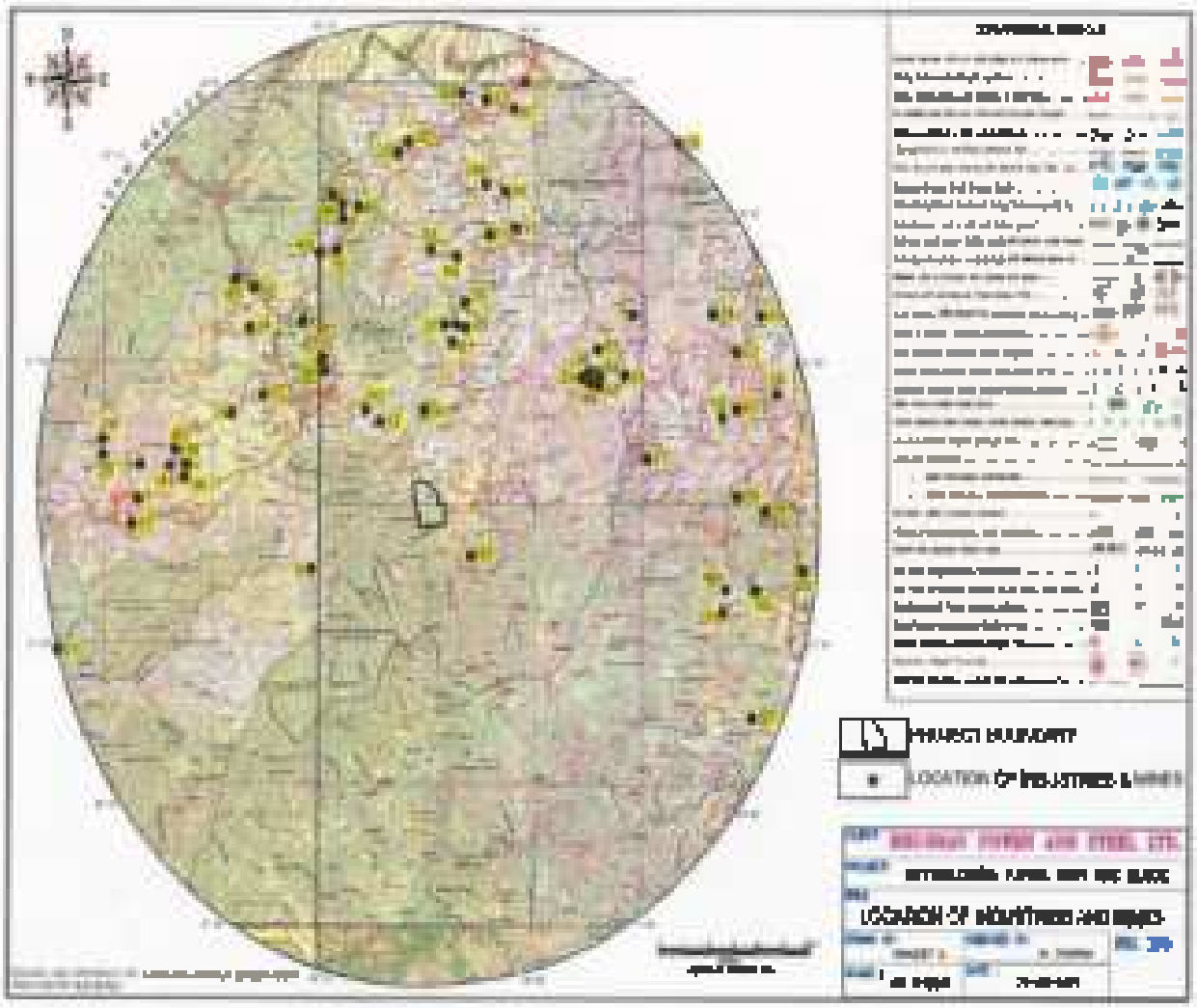


FIGURE 2.4
INDUSTRIES & MINES WITH IN 15KM RADIUS

2.2.1 Pattern of Assessment

In this section, the present biodiversity status of the study area is discussed in detail. The biodiversity status comprises the estimation of different ecosystems (different life forms of flora (components (trees, shrub, herb, grass etc.) and major animal groups (mammals, terrestrial birds, aquatic birds and mammals. The baseline status of biodiversity assessment is being discussed at three levels.

i Core zone: The mine lease area of 135.223 ha.
ii Buffer zone: Area within 10 km radius of the lease boundary
iii Study area: Combined area of both core & buffer zone

2.2.2 Ecosystem Components

The study area comprises the mine lease area (Core Zone (C)) and the area within 10 km radius (Buffer Zone (B)) of the mine lease boundaries. The Core zone is constituted by four major habitat types namely Agricultural Land (AL), Barren Land (BL), Forest land (FL) and Water Systems (WS). The buffer zone also includes four habitat types namely Agricultural land (AL), Forest land (FL), Barren Land (BL) and Water Systems (WS).

2.2.3 Status of flora

The plant species profiled in the study area are discussed at the ongoing paras. A nested sheet, quadrat method was adopted for studies. Accordingly, in each quadrant, individual species of trees (10 x 10 m), shrub (5 x 5 m) and herb (1 x 1 m) were identified separately and recorded on site during the field investigation. The field study denoted the following:

Table-2.4
Vegetation in Core and Buffer Zone

Sr. No	Type of Vegetation	Core Zone	Buffer Zone
1	Trees	33	83
2	shrubs	60	32
3	Herbs	30	55
4	Climbers	13	9
5	Epiphytes	1	4
Total		117	183

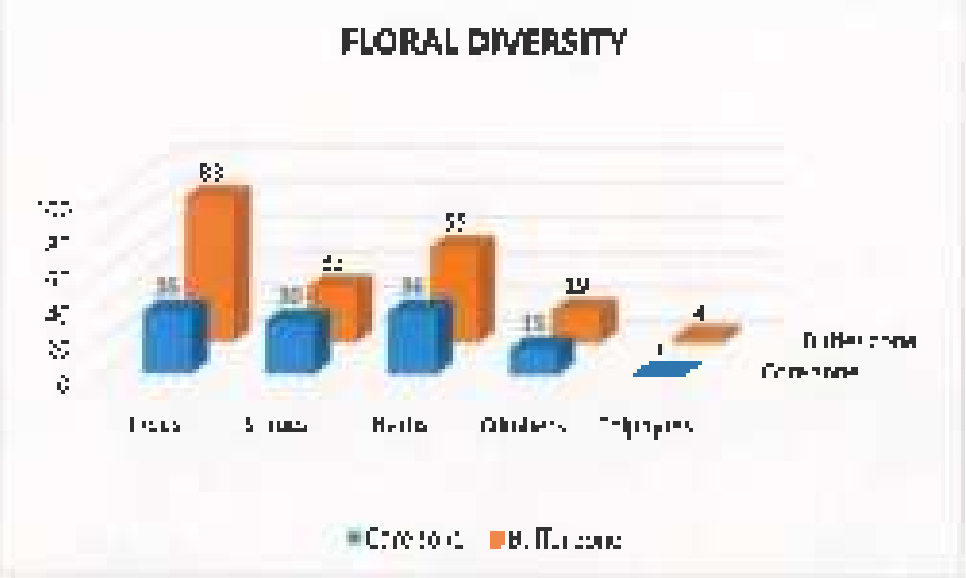


FIGURE-2.5
FLORAL DIVERSITY OF CORE AND BUFFER ZONE

Core Zone- Flora

Trees

Table-2.5
LIST OF TREE SPECIES REPORTED IN THE CORE ZONE

Sl. No	Scientific Name	Common/ Vernacular Name	Family	Nature
1	Bauhinia variegata var. candida	Kachnar/ Orchard	Anacardiaceae (cashew family)	DNM
2	Semecarpus anacardium	Bhilawa	Anacardiaceae (cashew family)	DNM
3	Boerhavia diffusa	Punarnava	Amaranthaceae (Amaranth family)	DNS
4	Terminalia bellerica	Bahera/ Baheda	Combretaceae (Leadwood family)	DNM
5	Gmelina arborea	Khamar/ Gamhar	Combretaceae (Combretum family)	DNM
6	Delonix regia	Gulmohar	Combretaceae (Combretum family)	DNM
7	Holoptelea integrifolia	Aavla	Combretaceae (Combretum family)	DNE
8	Anogeissus latifolia	Axle wood/ Moy/ Ghanda	Combretaceae (Terminalia family)	DNM

Sr. No	Scientific Name	Common/ Vernacular Name	Family	Nature
9	Terminalia arjuna	Arjun	Combretaceae (Rangada / Badam family)	LND
10	Terminalia bellirica	Bahada	Combretaceae (Rangada / Badam family)	DNS
11	Terminalia chebula	Hirda/ Harad	Combretaceae (Rangada / Badam family)	DNS
12	Terminalia tomentosa	Asan/ Saj/ Sadada	Combretaceae (Rangada / Badam family)	ENS
13	Shorea robusta	Sal	Dipterocarpaceae (Sal family)	ENS
14	Diospyros melanoxylon	Tendu/ Timru	Ebenaceae (Ebony family)	DNS
15	Butea monosperma	Palas/ Flame of the forest/ Kesudo	Fabaceae (Pea family)	LNV
16	Dalbergia latifolia	Tali/ Sisso	Fabaceae (Pea family)	ENS
17	Pongamia pinnata	Pongam Tree/ Karanja	Fabaceae (Pea family)	LNV
18	Pterocarpus marsupium	Bija Sal/ Vijaysar	Fabaceae (Pea family)	LND
19	Bauhinia racemosa	Apta/ Ayra	Leguminosae	DNV
20	Azadirachta indica	Neem	Meliaceae (Neem family)	ENS
21	Soymida febrifuga	Rohan/ Red cedar/ Kavthi/ Mahogany	Meliaceae (Neem family)	DNS
22	Senegalia pennata	Black kolechur/ Khair	Mimosaceae (Touch-me-not family)	LNM
23	Vachellia nilotica	Babul/ Kikar/ Babool	Mimosaceae (Touch-me-not family)	ENM
24	Artocarpus heterophyllus	Fanas/ Jackfruit	Moraceae (Mulberry family)	LND
25	Syzygium cumini	Jambhul	Myrtaceae (Guava family)	ENS
26	Gardenia resinifera	Dikemali/ Dikamali	Rhamnaceae (Jujube family)	DNM
27	Ehretia laevis	Ambat/ Ambta	Rhamnaceae (Jujube family)	DNM
28	Phyllanthus emblica	Indian gooseberry	Rhamnaceae (Jujube family)	LNM
29	Ziziphus mauritiana	Ber/ Bor	Rhamnaceae (Jujube family)	ENM
30	Adina cordifolia	Haldu/ Kadamb	Rubiaceae (Coffee family)	ENS
31	Gardenia resinifera	Dikamali/ Dikemali	Rubiaceae (Coffee family)	ENV
32	Wrightia tinctoria	Indian dyer tree/ Mahuda	Sapotaceae (Mahua family)	ENS
33	Sterculia urens	Gum karaya/ Kadaya	Sterculiaceae (Cocoa family)	DNS
34	Clerodendrum inerme	Karanjar	Verbenaceae (Verbena family)	DNS

Sl. No	Scientific Name	Common/ Vernacular Name	Family	Nature
25	Tectona grandis	Teak/ Saga	Verbenaceae (Verbena family)	Mb

*: Perennial; H: Herbs; N: Non-timber; D: Deciduous; E: Evergreen; B: Big; Mb: Medium/small

The core zone was enumerated with 35 tree species belonging to 17 families:

Table-2.6

FAMILY COMPOSITION OF TREE SPECIES-CORE ZONE

Sr No.	Family	Number
1	Anacardiaceae	3
2	Caesalpiniaceae	4
3	Combretaceae	5
4	Dipterocarpaceae	1
5	Ebenaceae	1
6	Lobaceae	1
7	Leguminaceae	1
8	Meliaceae	2
9	Mimosaceae	2
10	Myrtaceae	1
11	Myrsinaceae	1
12	Phyllanthaceae	2
13	Rhamnaceae	1
14	Rubiaceae	2
15	Sapindaceae	1
16	Sterculiaceae	1
17	Verbenaceae	2
Total		35

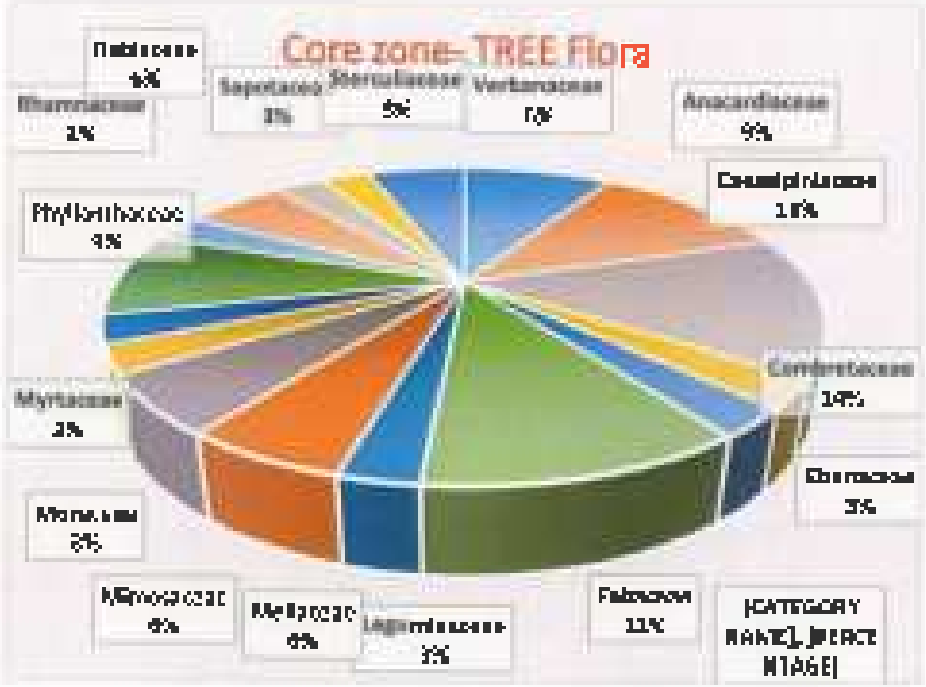


FIGURE-2.9
CORE ZONE-TREE FLORA

Shrubs

TABLE 2.7
LIST OF SHRUB SPECIES REPORTED IN THE CORE ZONE

Sr. No	Scientific Name	Common/ Vernacular Name	Family	Nature
1	Carissa carandas	Karonda	Apocynaceae (Oleander family)	TNS
2	Calotropis gigantea	Crown flower/ Swallow wort	Apocynaceae (Oleander family)	TNS
3	Calotropis procera	Rubber bush	Apocynaceae (Oleander family)	TNS
4	Agave sisalana	Century plant	Asparagaceae (Asparagus family)	TNS
5	Carissa carandas	Common carissa	Apocynaceae	TNS

Sr. No	Scientific Name	Common/ Vernacular Name	Family	Nature
		Tamil	(Sub-major family)	
6	Caesalpinia pulcherrima	Peacock flower	Caesalpiniaceae (Sub-major family)	PNS
7	Capparis zeylanica	Indian caper/ Adavitondu	Capparaceae (Caper family)	PNS
8	Costus pictus (Red bud species)	Crepe ginger/ Kustha	Costaceae (Spiral ginger family)	PNS
9	Euphorbia nivulia	Dog's tongue	Euphorbiaceae (Castor family)	PNH
10	Indigofera cuspidata	Coastal Indigo/ Nukanu	Fabaceae (Pea family)	PNS
11	Lathyrus aphaca L. var.	Wild peas/ Kusumi	Fabaceae (Pea family)	DNS
12	Crotalaria hissuta	Hairy rattlepod/ Gilugunchi	Fabaceae (Pea family)	PNS
13	Crotalaria pusilla	Small rattlepod	Fabaceae (Pea family)	PNS
14	Woodfordia fruticosa	Fire flame bush/ Dhawa	Lythraceae (Crape myrtle family)	PNS
15	Abutilon indicum	Indian mallow/ Kanghi	Malvaceae (Mallow family)	PNS
16	Hibiscus diversifolius	Congo jarrah/ Bachita	Malvaceae (Mallow family)	PNS
17	Hibiscus lampas	Brinjal okra/ Jangli bhindi	Malvaceae (Mallow family)	PNS
18	Artabotrys hexapetalus	Scented climbing shrub	Unidentified	PNS
19	Randia dumetorum	Medicinal plant	Rubiaceae (Coffee family)	PNS
20	Garcinia gummi-gutta	Gamboge tree/ Cokum	Rubiaceae (Coffee family)	PNS
21	Ixora coccinea	Indian jasmine/ Kankare	Rubiaceae (Coffee family)	PNS
22	Dodonaea viscosa	Hop bush/ Sanatta	Sapindaceae (Soapberry family)	PNS
23	Solanum nigrum	Indian nightshade	Solanaceae (Potato family)	PNS
24	Withania somnifera	Sleepy morning/	Sterculiaceae	PNS

Sr. No	Scientific Name	Common/ Vernacular Name	Family	Nature
		monkey bush	(Cocoa family)	
35	Glycosmis pentaphylla	Crossberry/ Kamath	Rutaceae (Orange family)	PNS
36	Clerodendrum serratum	Bedela tree/ Bharang	Verbenaceae (Verbena family)	PNS
37	Lantana camara	Lantana/ Kamaniya	Verbenaceae (Verbena family)	PNS
38	Vitex negundo	Chaste tree	Verbenaceae (Verbena family)	PNS
39	Bauhinia racemosa	Asiatic mesquite/ banchalia	Fabaceae (Pea family)	PNS
40	Bauhinia purpurea	Large leaf Mesquite/ Kathchara	Fabaceae (Pea family)	PNS

P: Perennial; N: Native; N: Naturalised; S: Shrub

The core zone was identified with 30 shrub species belonging to 17 families:

Table-2.8
FAMILY COMPOSITION OF SHRUB SPECIES CORE ZONE

Sr No.	Family	Number
1	Apocynaceae	2
2	Asteraceae	1
3	Caesalpiniaceae	2
4	Capparaceae	1
5	Costaceae	1
6	Euphorbiaceae	1
7	Fabaceae	4
8	Lythraceae	1
9	Myrtaceae	3
10	Phyllanthaceae	1
11	Rubiaceae	3
12	Sapindaceae	1
13	Solanaceae	1
14	Sterculiaceae	1
15	Tiliaceae	1
16	Verbenaceae	5
17	Vitaceae	2
Total		30

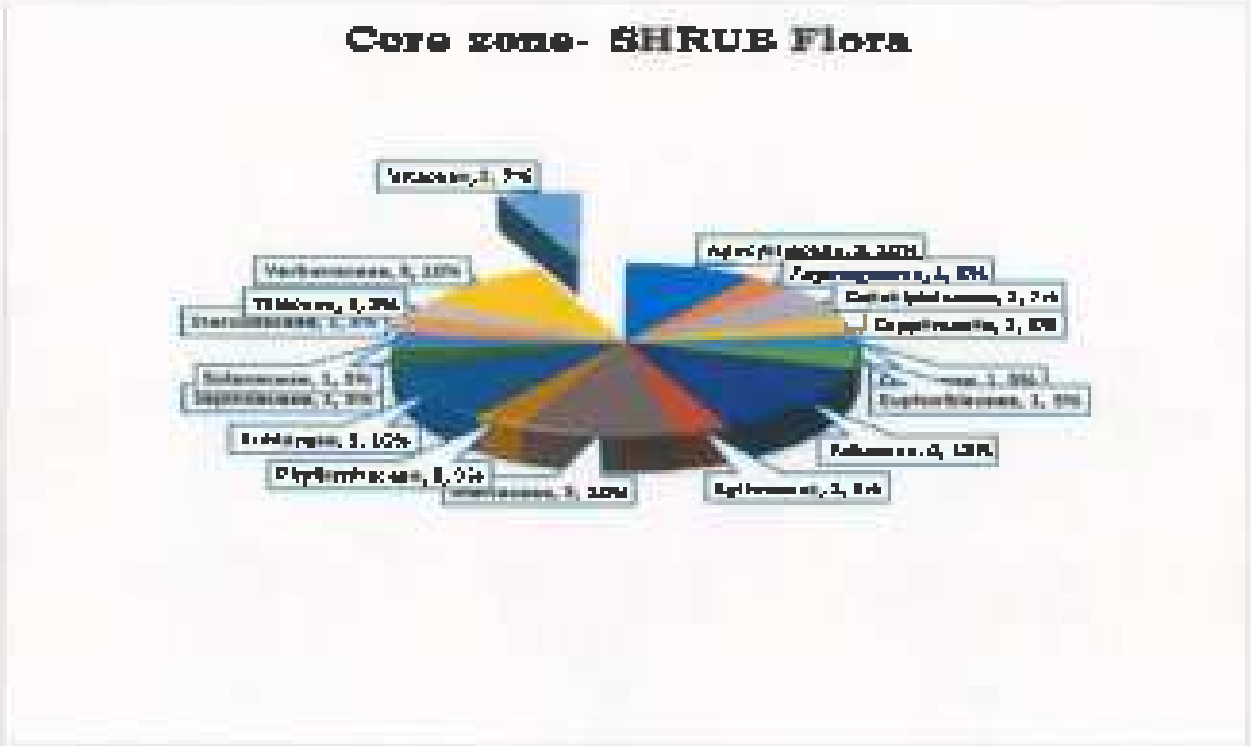


FIGURE-2.10
CORE ZONE-SHRUBS

Herbs/ Grass

TABLE 2.9
COMMON HERB SPECIES REPORTED IN THE CORE ZONE

Sr. No	Scientific Name	Common/ Vernacular Name	Family	Nature
1	Andrographis paniculata	Kalmegh/ Kala chiryata	Acanthaceae (Acanthus family)	AnH
2	Achyranthes aspera	Chaff flower/ Aghara	Amaranthaceae (Amaranth family)	PNH
3	Achyranthes sessilis	Sessile joyweed	Amaranthaceae (Amaranth family)	PNH
4	Asparagus racemosus	Indian asparagus/ Satmuli	Asparagaceae (Asparagus family)	PNH
5	Ageratum conyzoides	Goat weed/ Jangli ajwain	Asteraceae (Sunflower family)	AnH

Sr No	Scientific Name	Common/ Vernacular Name	Family	Nature
6	Parthenium hysterophorus [Ramosa hysterophorus]	Parthenium/ congressgrass	Asteraceae [sunflower family]	ANH
7	Vernonia cinerea	Little ironweed/ Sahadevi	Asteraceae [Sunflower family]	ANH
8	Xanthium strumarium	Common cocklebur/ Chotakuli ghaas	Asteraceae [Sunflower family]	ANH
9	Bidens pilosa	Tall beggarticks	Asteraceae [Sunflower family]	ANH
10	Cuscuta reflexa	Creeping coldenia/ Tripurari	Convolvulaceae [Morning glory family]	ANH
11	Cynodon dactylon	Crested dog's tail/ Kukkhali	Commelinaceae [Dayflower family]	ANH
12	Cyperus rotundus	Purple nut sedge/ Motha	Cyperaceae [Sedge family]	PNH
13	Cyperus iria	Rice flat sedge/ Motha	Cyperaceae [Sedge family]	PNH
14	Cyperus difformis	Small flower sedge	Cyperaceae [Sedge family]	PNH
15	Acalypha indica	Indian copperleaf/ Kuppi	Euphorbiaceae [Spurge family]	PNH
16	Phyllanthus amarus	Seaside leaf flower/ Jaharkatri	Fabaceae [Pea family]	PNH
17	Convolvulus arvensis	Field bindweed	Fabaceae [Pea family]	PNH
18	Argyreia nervosa	Elephant creeper/ Chaudi	Fabaceae [Pea family]	ANH
19	Crotalaria retusa	Rattlepod/ Ghanti	Fabaceae [Pea family]	ANH
20	Desmodium gangeticum [Pleurolobus gangeticus]	Creeping beggarweed/ Salvan	Fabaceae [Pea family]	PNH
21	Indigofera	Indigo/ Nili	Fabaceae [Pea family]	PNH
22	Cynodon dactylon	Golden eye grass/ Kuli ghaas	Hypoxidaceae [Star grass family]	PNH
23	Melissa officinalis	Lemon balm	Lamiaceae [Mint family]	H
24	Ammannia baccifera	Acid weed/ Agnikuli	Lythraceae [Crape myrtle family]	ANH

Sr. No	Scientific Name	Common/ Vernacular Name	Family	Nature
25	Abelmoschus manihot	Sweet Hibiscus/ Jungli bhindi	Malvaceae (Mallow family)	AN
26	Sida cordata	Long stalk sida/ Bhuri	Malvaceae (Mallow family)	PN
27	Mimosa pudica	Touch me not	Mimosaceae (touch me not family)	PNI
28	Dendrocalamus strictus	Bans/ Male bamboo	Poaceae (Grass family)	PNH
29	Cymbopogon martinii	Ginger grass/ Gandhabel	Poaceae (Grass family)	PNH
30	Dactyloctenium aegyptium	Duck grass/ Mukra	Poaceae (grass family)	ANH
31	Desmodium triflorum	Indian crow foot grass/ Makandi	Poaceae (Grass family)	ANH
32	Heteropogon contortus	Black spangle grass/ twisted beard grass	Poaceae (Grass family)	PNH
33	Setaria italica	Indian foxtail grass/ dev nal	Poaceae (grass family)	AN
34	Vetiveria zizanioides	Sevan/ Khas/ Khus	Poaceae (grass family)	PN
35	Tridax procumbens	Coat buttons/ Ghamra	Asteraceae (Sunflower family)	PNH
36	Hyptis suaveolens	Spanish hyptis/ Bantulsi	Lamiaceae (Mint family)	PNH

P: Perennial; D: Deciduous; A: Annual; N: Native; Ne: Naturalized; E: Exotic

The core zone was identified with 36 Herby grass species belonging to 17 families.

Table-2.10

FAMILY COMPOSITION OF HERB/GRASS SPECIES -CORE ZONE

Sr. No	Family	Number
1	Acanthaceae	1
2	Amaranthaceae	2
3	Asparagaceae	-
4	Asteraceae	5
5	Boraginaceae	1
6	Commelinaceae	1
7	Cyperaceae	3
8	Euphorbiaceae	1
9	Fabaceae	6

Sl. No	Family	Number
10	Hypoxidaceae	1
	Lamiaceae	1
12	Lythraceae	1
13	Malvaceae	2
14	Mimosaceae	1
15	Poaceae	7
16	Verbenaceae	1
17	Violaceae	1
Total		36

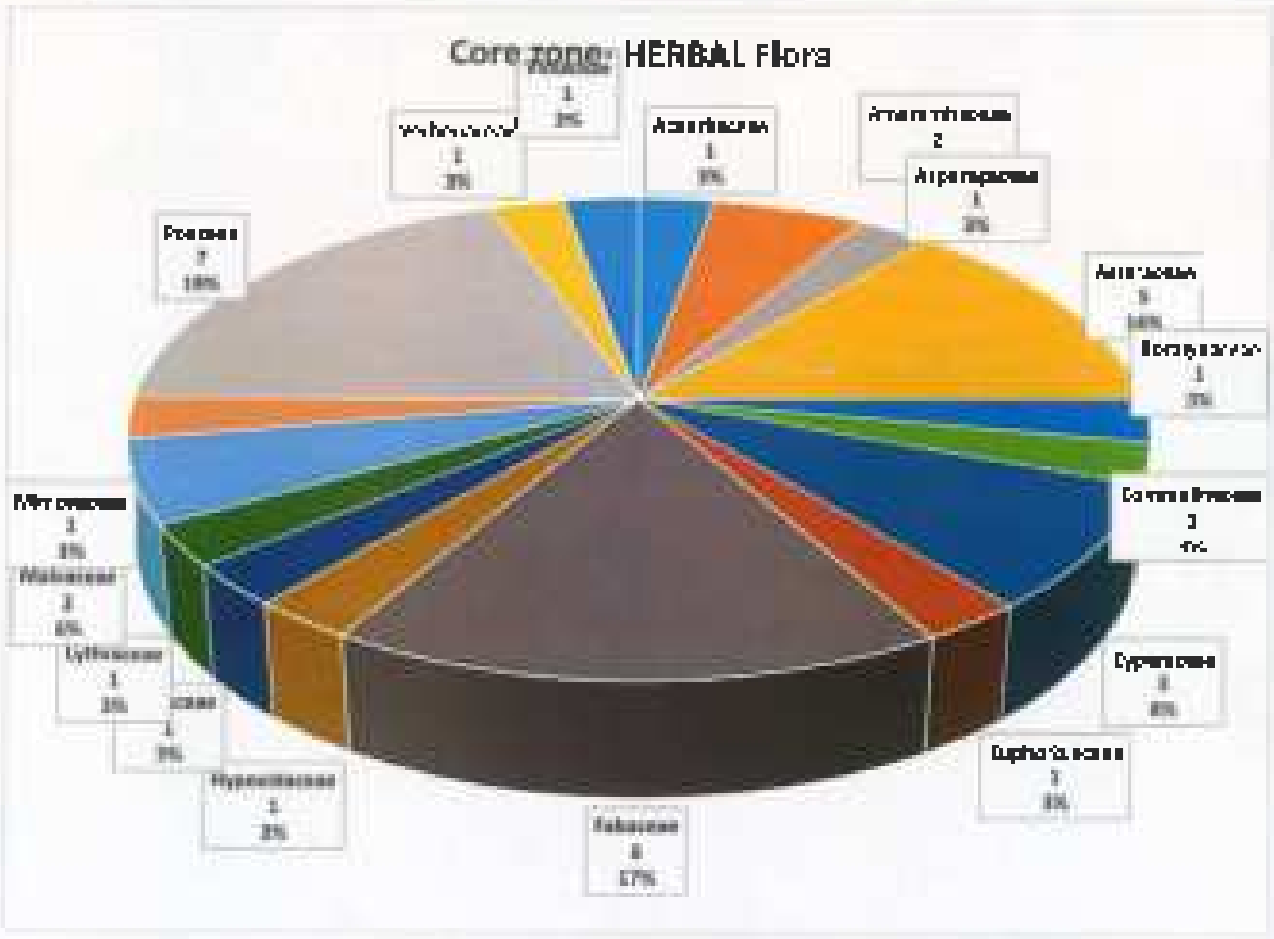


FIGURE-2.18
CORE ZONE – HERBS

Environmental Impact Assessment (EIA) Report for Mahanadi Coalfields Limited (MCL) Proposed for Mahanadi Coalfields Limited (MCL) Proposed for Mahanadi Coalfields Limited (MCL) Proposed

Table-2.12
FAMILY COMPOSITION OF CLIMBER SPECIES CORE ZONE

Sr. No	Family	Number
1	Apocynaceae	2
2	Asclepiadaceae	1
3	Convolvulaceae	1
4	Combretaceae	1
5	Dioscoreaceae	1
6	Fabaceae	5
7	Menispermaceae	1
8	Rhamnaceae	1
9	Vitaceae	1
Total		15

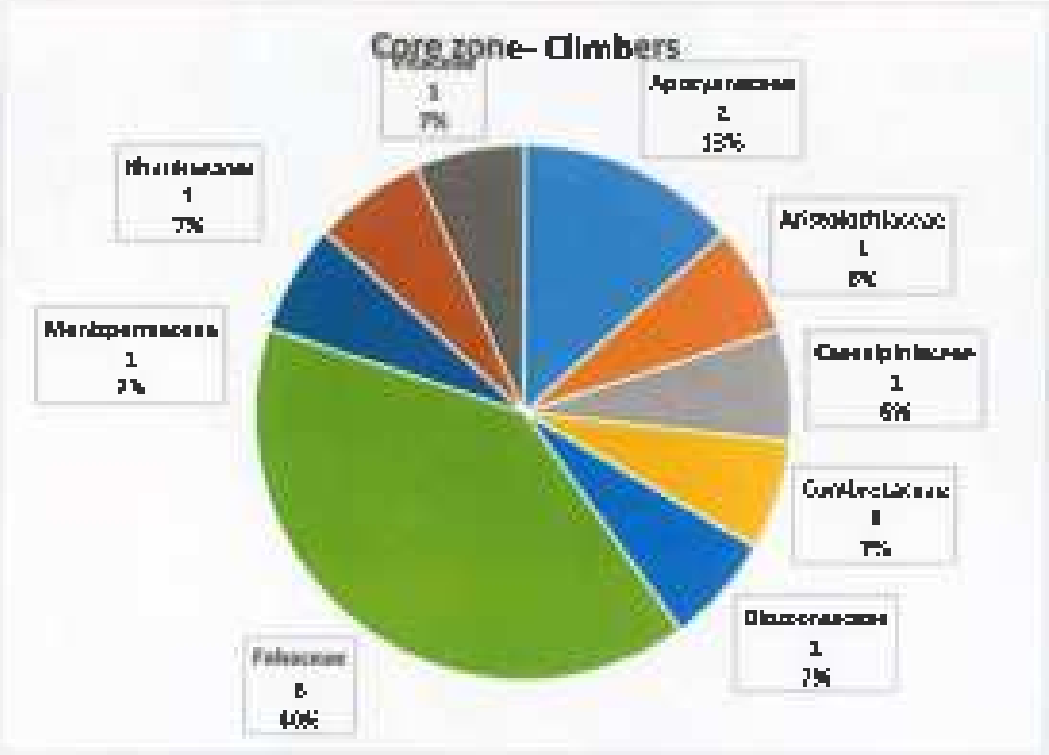


FIGURE-2.12
CORE ZONE - CLIMBERS

Buffer Zone- Flora

Trees

TABLE 2.12
LIST OF TREE SPECIES REPORTED IN THE BUFFER ZONE

Sr. No	Scientific Name	Common/ Vernacular Name	Family	Nature
1	Buchanania cochinchinensis	Charol/ Chiranji	Anacardiaceae (Cashew family)	DNM
2	Lannea coromandelica	Indian ash tree	Anacardiaceae (Cashew family)	DNM
3	Mangifera indica	Mango/ Amy/ Amba	Anacardiaceae (Cashew family)	ENM
4	Semecarpus anacardium	Bibba	Anacardiaceae (Cashew family)	DNM
5	Spondias pinnata	Wild mango	Anacardiaceae (Cashew family)	DNB
6	Moringa oleifera	Mast tree	Moringaceae (Drumstick family)	ENB
7	Alstonia scholaris	Scholar tree	Apocynaceae (Oleander family)	ENB
8	Holarrhena antidysenterica	Indrajav/ Kutaja	Apocynaceae (Oleander family)	DNM
9	Wrightia tinctoria	Sweet indrajav	Apocynaceae (Oleander family)	ENM
10	Dalbergia latifolia	Indian rosewood tree	Fabaceae (Legume family)	DNM
11	Stereospermum personatum	Padri tree/ Padri	Bignoniaceae (Jacaranda family)	DNB
12	Stereospermum suaveolens	Fragrant padri tree	Bignoniaceae (Jacaranda family)	DNB
13	Tectona grandis	Sagwan/ Sakhar	Lamiaceae (Teak wood family)	DNM
14	Terminalia tomentosa	Sid/ Asan tree	Combretaceae (Myrobalan family)	DNM
15	Bauhinia variegata	Orchid tree/ Kachnal	Caesalpiniaceae (Gulmohar family)	DNM
16	Cassia siamea	Kassod tree/ Seemia	Caesalpiniaceae (Gulmohar family)	ENM
17	Delonix regia	Rain tree/ Gulmohar	Caesalpiniaceae (Gulmohar family)	ENM

Sr. No	Scientific Name	Common/ Vernacular Name	Family	Nature
18	Hardwickia binata	Anjan	Caesalpiniaceae (Gulmohar family)	DNB
19	Peltophorum pterocarpum	Copperpod/ Peela Gulmohar	Caesalpiniaceae (Gulmohar family)	LNBA
20	Tamarindus indica	Tamarind/ Imli	Caesalpiniaceae (Gulmohar family)	DNB
21	Anogeissus latifolia	Axle wood tree/ Dhawan	Combretaceae (Rangoon creeper family)	DNB
22	Terminalia bellirica	Bahera	Combretaceae (Rangoon creeper family)	DNB
23	Terminalia chebula	Harad/ Kanocha	Combretaceae (Rangoon creeper family)	DNB
24	Terminalia elliptica	Silver Oak/ Asan	Combretaceae (Rangoon creeper family)	DNB
25	Terminalia paniculata	Indian Almond	Combretaceae (Rangoon creeper family)	DNM
26	Sterculia urens	Gangaperchet/ Sal	Sterculiaceae (Sal family)	ENB
27	Diospyros melanoxylon	Ebony/ Tendu	Ebenaceae (Ebony family)	DNB
28	Diospyros montana	Bistendu	Ebenaceae (Ebony family)	DNM
29	Lagerstroemia parviflora	Red creape/ Dewdaru	Lythraceae (Crape myrtle family)	ENM
30	Butea monosperma	Flame of the forest/ Palash	Fabaceae (Pea family)	DNM
31	Dalbergia paniculata	Tinbi/ Dandra	Fabaceae (Pea family)	DNB
32	Dalbergia latifolia	Rosewood tree/ Sisso	Fabaceae (Pea family)	DNM
33	Pongamia pinnata	Indian beech/ Karanja	Fabaceae (Pea family)	DNB
34	Pterocarpus marsupium	Kino tree/ Vijaysar	Fabaceae (Pea family)	DNB
35	Pterocarpus marsupium	Kino tree	Fabaceae (Pea family)	DNB
36	Careya arborea	Wild guava	Lecythidaceae (Brazil nut family)	DNM
37	Bauhinia purpurea	Butterfly tree	Leguminaceae	DNM
38	Lagerstroemia parviflora	Sendan/ Benadara	Lythraceae (Crape myrtle family)	DNB
39	Bombax ceiba	Silk cotton tree/ Shalmali	Malvaceae (Mallow family)	DNB
40	Kydia calycina	Bonkopasa	Malvaceae (Mallow family)	DNB

Sr. No	Scientific Name	Common/ Vernacular Name	Family	Nature
41	Tectona grandis	Teak tree/ Sagwan	Malvaceae (Mallow family)	END
42	Azadirachta indica	Neem	Meliaceae (Neem family)	LNB
43	Toona ciliata	Jamaican cedar/ Red cedar	Meliaceae (Neem family)	DNB
44	Albizia procera	White siris	Mimosaceae (Touch me not family)	PNB
45	Xylia xylocarpa	Iron wood/ Jamrul	Mimosaceae (Touch me not family)	DNB
46	Acacia nilotica	Babul/ Kikar	Mimosaceae (Touch me not family)	BM
47	Albizia lebbeck	Indian siris/ Shirish	Mimosaceae (Touch me not family)	LNB
48	Albizia odoratissima	Black siris/ Chichawa	Mimosaceae (Touch me not family)	DNB
49	Senegalia catechu	Black katha/ Khair	Mimosaceae (Touch me not family)	DNM
50	Vachellia nilotica	Gum Arabic/ Babool	Mimosaceae (Touch me not family)	BNM
5	Artocarpus heterophyllus	Panas/ Jackfruit	Moraceae (Mulberry family)	ENB
52	Ficus benghalensis	Banyan tree/ Bath	Moraceae (Mulberry family)	ENB
53	Ficus religiosa	Peepal/ Ashwattha	Moraceae (Mulberry family)	DNB
54	Ficus virens	White fig	Moraceae (Mulberry family)	DNB
55	Moringa oleifera	Drumstick tree/ Sahjana	Moringaceae (Drumstick family)	DNM
56	Syzygium cuminiflorum	Kulhijamun	Myrtaceae (Bottle brush family)	BNM
57	Syzygium cumini	Jambhu	Myrtaceae (Bottle brush family)	BNB
58	Psidium guajava	Guava	Myrtaceae (Bottle brush family)	PNM
59	Nyctanthes arbor-tristis	Queen of the night	Oleaceae (Jasmine family)	ENM
60	Cleistanthus collinus	Oduvel/ Garug	Phyllanthaceae (Amla family)	DNM
61	Emblica officinalis	Amla/ Avala	Phyllanthaceae (Amla family)	DNM
62	Phyllanthus emblica	Indian gooseberry	Phyllanthaceae (Amla family)	DNM
63	Antidesma ghaesembilla	Black currant tree	Phyllanthaceae (Amla family)	PNB
64	Syzygium jambos	Jackfruit/ Jambul	Putranjivaceae (Putranjiva family)	PNB
65	Zizyphus jujuba	Chinese apple	Rhamnaceae (Ber family)	DB
66	Ziziphus oenoplia	Beautiful ber	Rhamnaceae (Ber family)	PNB
67	Ziziphus rugosa	Indian plum/ Ber	Rhamnaceae (Ber family)	DNM
68	Ziziphus xylocarpus	Kokni ber	Rhamnaceae (Ber family)	PNB

Sr. No	Scientific Name	Common/ Vernacular Name	Family	Nature
69	Adina cordifolia	Kelidar/ Kadam	Rubiaceae (Coffee family)	DNM
70	Anthocephalus cadamba	Kadamb	Rubiaceae (Coffee family)	EME
71	Gardenia resinifera	Dikamali gardenia/ Dikamali	Rubiaceae (Coffee family)	ENM
72	Mitragyna parvifolia	Kadamb/ Kahr	Rubiaceae (Coffee family)	DNB
73	Cordia dichotoma	Moumdir gardenia	Rubiaceae (Coffee family)	DNM
74	Morinda pubescens	Ach/ Nilkanthi	Rubiaceae (Madder family)	ENM
75	Flacourtia indica	Indian plum/ Bhorgandu	Salicaceae (Willow family)	DNM
76	Madhuca longifolia	Indian butter tree/ Mahua	Sapotaceae (Mahua family)	DNM
77	Ailanthus excelsa	Indian tree of heaven/ Mahanimb	Simaroubaceae (Quassia family)	DNB
78	Holoptelea integrifolia	Aavlo	Sterculiaceae (Cocoa family)	DNM
79	Helicteres isora	Muri leaved screw tree/ marorphali	Sterculiaceae (Cocoa family)	DNM
80	Sterculia urens	Gum karaya/ Kadi.	Sterculiaceae (Cocoa family)	DNB
81	Grewia tiliifolia	Dhamani/ Dhaman	Tiliaceae (Phalsa family)	ENM
82	Gmelina arborea	Gamhar	Verbenaceae (Verbena family)	DNB
83	Tectona grandis	Teak/ sagun	Verbenaceae (Verbena family)	DNB

P- Perennial, N- Native, E- Exotic, M- Medium, E- Evergreen, B- Big Canopy, I- Introduced, M- Medium/ small tree

The Buffer zone was identified with 83 tree species belonging to 32 families

Table-2.14

FAMILY COMPOSITION OF TREE SPECIES BUFFER ZONE

Sr. No	Family	Number
1	Anacardiaceae	5
2	Annonaceae	
3	Apocynaceae	3
4	Rubiaceae	3
5	Burseraceae	1
6	Caesalpiniaceae	7
7	Combretaceae	5
8	Dipterocarpaceae	1
9	Rhamnaceae	2

Sr. No	Family	Number
10	Phyllanthaceae	1
11	Poaceae	6
12	Lecythidaceae	1
13	Leguminaceae	1
14	Lythraceae	1
15	Malvaceae	5
16	Meliaceae	2
17	Moraceae	7
18	Moraceae	4
19	Moringaceae	1
20	Myrtaceae	3
21	Oleaceae	1
22	Phyllanthaceae	4
23	Putranjivaceae	1
24	Rhamnaceae	4
25	Rubiaceae	5
26	Rutaceae	1
27	Salicaceae	1
28	Sapotaceae	1
29	Simaroubaceae	1
30	Sterculiaceae	3
31	Tiliaceae	1
32	Verbenaceae	2
Total		63

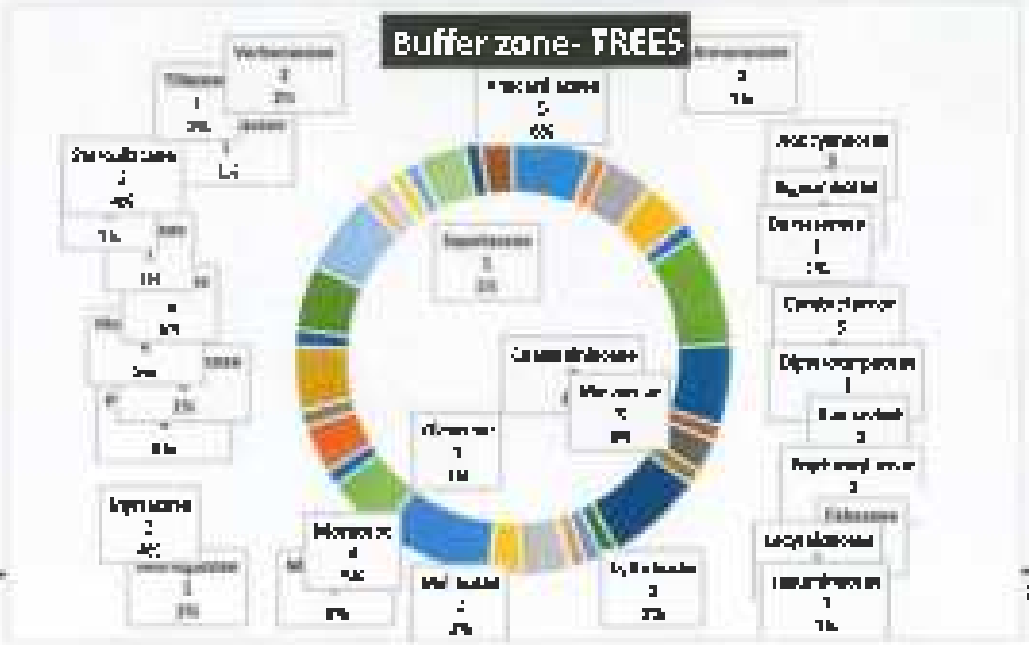


FIGURE-2.13
BUFFER ZONE-TREES

Shrubs

TABLE 2.15

COMMON SHRUB SPECIES REPORTED IN THE BUFFER ZONE

Sr.No.	Scientific Name	Common/ Vernacular Name	Family	Nature
1	Calotropis procera	Rui/Erukku	Asclepiadaceae (Oleander family)	PWS
2	Carissa carandas	Karvand/Karvi/Perunkalli	Apocynaceae (Oleander family)	EHS
3	Carissa congesta	Karvi/Perunkalli	Apocynaceae (Oleander family)	PWS
4	Calotropis gigantea	Rui/Erukku	Asclepiadaceae (Asclepiadaceae family)	PHS
5	Parkinsonia aculeata	Vilayati chinch/Seemai	Caesalpiniaceae (Gulmohar family)	APWS
6	Cassia auriculata	Tarwad/Avarai/Tangedu	Caesalpiniaceae (Cassia tree family)	PHS
7	Caesalpinia pulcherrima	Peacock flower	Caesalpiniaceae (Cassia tree family)	PHS
8	Capparis zeylanica	Indian caper/Adhonda	Capparaceae (Caper family)	PHS
9	Costus speciosus (Koenig) Sm.	Crepe ginger/Kushta	Costaceae (Spiral ginger family)	PWS
10	Dichrostachys cinerea	Dongri bangar	Leguminosae (Pea family)	PWS
11	Indigofera cassioides	Dhokta bhongi/Nasarni	Leguminosae (Pea family)	PWS
12	Tephrosia purpurea	Wild indigo/Sarpunkh	Leguminosae (Pea family)	PHS
13	Crotalaria juncea	Patti/Tattipodi/ Elagonesu	Leguminosae (Pea family)	PWS
14	Crotalaria pallida	Small rattlepod	Leguminosae (Pea family)	PHS
15	Woodfordia fruticosa	Fire flame bush/ Dhataval	Lythraceae (Grape myrtle family)	PWS
16	Abutilon indicum	Indian mallow/ Mangti	Malvaceae(Mallow family)	PHS
17	Sida cordata	Bala/Jurev/Brahma	Malvaceae (mallow family)	PWS
18	Hibiscus furcatus	Sankasur/Jangli bhindi	Malvaceae (mallow family)	PWS
19	Antidesma acidum	Sour currant shrub	Phyllanthaceae (Amla family)	PWS
20	Gardenia gummifera	Dikamali/Gum tree/ Dekamali	Rubiaceae (Coffee family)	PHS

Sr.No.	Scientific Name	Common/ Vernacular Name	Family	Nature
26	Psychotria nilgiriensis	Nilgiri Wild Coffee	Rubiaceae (Coffee family)	PNS
27	Cephalanthus occidentalis	Common Buttonbush	Rubiaceae (Madder family)	PNS
28	Rubus ellipticus	Yellow Himalayan Raspberry	Rosaceae (Rose family)	PNS
29	Solanum nigrum	Black nightshade	Solanaceae (Potato family)	PNS
30	Phyllanthus niruri	Stonebreaker, Gale of the wind	Phyllanthaceae (Spurge family)	PNS
31	Grewia abutilifolia	Dhamin	Malvaceae (Mallow family)	PNS
32	Stachytarpheta cayennensis	Blue porterweed	Verbenaceae (Verbena family)	PNS
33	Clerodendrum infortunatum	Bhat, Hill Glory Bower	Verbenaceae (Verbena family)	PNS
34	Lantana camara	Common lantana, Wild sage	Verbenaceae (Verbena family)	PNS
35	Vitex negundo	Chaste Tree	Verbenaceae (Verbena family)	PNS
36	Leea asiatica	Asian Leea, Bandicoot berry	Vitaceae (Grape family)	PNS
37	Leea macrophylla	Large leaf Leea, Hairy-stem Leea	Vitaceae (Grape family)	PNS

P: Perennial; H: Herb; Sh: Shrub; S: Shrub

In the buffer zone was identified with 37 shrub species belonging to 16 families.

Table-2.16

FAMILY COMPOSITION OF SHRUB SPECIES BUFFER ZONE

Sr No.	Family	Number
1	Apocynaceae	3
2	Asparagaceae	
3	Asteraceae	
4	Cannabaceae	2
5	Capparaceae	1
6	Cyperaceae	1
7	Euphorbiaceae	1
8	Fabaceae	4
9	Lythraceae	1

Sr No.	Family	Number
10	Malvaceae	3
11	Phyllanthaceae	1
12	Rubiaceae	3
13	Salicaceae	1
14	Solanaceae	1
15	Sterculiaceae	1
16	Tiliaceae	1
17	Verbenaceae	4
18	Vitaceae	2
Total		53

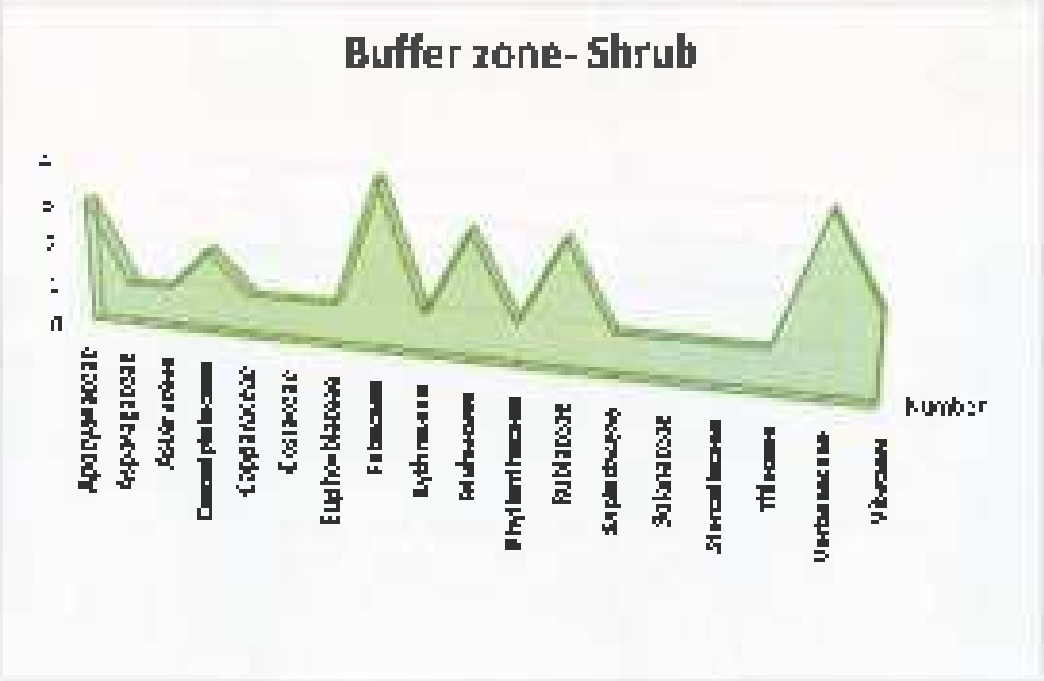


FIGURE-2.14
BUFFER ZONE-SHRUB

Herbs/Grass

TABLE 2.17

COMMON HERB SPECIES REPORTED IN THE BUFFER ZONE

Sr. No	Scientific Name	Common/ Vernacular Name	Family	Nature
1	Andrographis paniculata	Kalmegh/ Kalo Chiretta	Acanthaceae (Acanthus family)	ANH
2	Tephrosia purpurea	Purple tephrosia/ Sharpunkha	Acanthaceae (Acanthus family)	PNH
3	Achyranthes aspera	Chaff flower/ Agnijara	Amaranthaceae (Amaranth family)	PNH
4	Urginia indica	Indian squill/ Ban piaj	Asparagaceae (Asparagus family)	PNH
5	Ageratum conyzoides	Goat weed/ Jungli pudina	Asteraceae (Sunflower family)	ANH
6	Blumea lacera (Blumea membranacea)	Ramphal/ Kukurjhar	Asteraceae (Sunflower family)	ANH
7	Vernonia cinerea	Little ironweed/ Sahadevi	Asteraceae (Sunflower family)	ANH
8	Xanthium strumarium	Common cocklebur/ Chotokathalia	Asteraceae (Sunflower family)	ANH
9	Mikania micrantha	Climbing hempweed	Asteraceae (Sunflower family)	PNH
10	Artemisia vulgaris	Mugwort	Asteraceae (Sunflower family)	PNH
11	Chromolaena odorata	Devil weed	Asteraceae (Sunflower family)	PNH
12	Eclipta prostrata	Tal/ Bhringraj	Asteraceae (Sunflower family)	ANH
13	Lactuca virosa	Compass/ Bitter lettuce	Asteraceae (Sunflower family)	ANH
14	Coldenia procumbens	Creeping coldenia/ Punarnava	Boraginaceae (Forget-me-not family)	ANH
15	Cyanotis axillaris	Cradles/ Dew grass/ Nalita	Commelinaceae (Dayflower family)	ANH
16	Cyperus iria	Rice flat sedge/ Mutha	Cyperaceae (Sedge family)	ANH
17	Carex digitata	Fingered sedge	Cyperaceae (Sedge family)	PNH

Sr. No	Scientific Name	Common/ Vernacular Name	Family	Status
18	Cyperus rotundus	Coco grass/ Nagarmotha	Cyperaceae (Sedge family)	PNH
19	Acalypha indica	Indian nettle/ Kupoi	Euphorbiaceae (Castor family)	PNH
20	Psoralea corylifolia	Babchi/ Bakuchi	Fabaceae (Pea family)	PNH
21	Cajanus scarabaeoides	Wild pea	Fabaceae (Pea family)	PNH
22	Alysicarpus vaginalis	Alys clover/ Dhauli	Fabaceae (Pea family)	ANH
23	Crotalaria retusa	Wedge leaf rattlepod/ Sadhrad	Fabaceae (Pea family)	ANH
24	Desmodium gangeticum (Pleurolobus gangeticus)	Salwood desmodium/ Dhaiwa	Fabaceae (Pea family)	PNH
25	Indigofera hirsuta	Hairy indigo/ Sirangia	Fabaceae (Pea family)	ANH
26	Uraria picta	Desert Pilvan	Fabaceae (Pea family)	PNH
27	Zornia gibbosa	Gras like zornia/ Jangli	Fabaceae (Pea family)	ANH
28	Crotalaria retusa	Wedge leaf	Fabaceae (Pea family)	ANH
29	Curculigo orchioides	Golden eye grass/ Kali musli	Hypoxidaceae (Star grass family)	PNH
30	Orthosiphon pallidus	Pale Java tea/ Jyoti	Lamiaceae (Mint family)	PNH
31	Lindernia oppositifolia	Tongue flower herb	Linderniaceae (Lindernia family)	ANH
32	Lindernia ruellioides (Torenia crustacea)	Pink false pimpernel	Linderniaceae (Lindernia family)	PNH
33	Ammannia baccifera	Monarch woods/ Agnibuti	Lythraceae (Crape myrtle family)	ANH
34	Ammannia multiflora	Many flowered ammannia	Lythraceae (Crape myrtle family)	PNH
35	Abelmoschus manihot	Sweet hibiscus/ Jungli bhindi	Malvaceae (Mallow family)	ANH
36	Sida cordata	Long stalk sida/ Bhuri	Malvaceae (Mallow family)	PNH
37	Hibiscus sabdariffa	Red sorrel	Malvaceae (Mallow family)	PNH
38	Osbeckia zeylanica	Wall osbeckia/ Gulbeck	Melastomataceae (Melastome family)	ANH

Sr. No	Scientific Name	Common/ Vernacular Name	Family	Nature
39	Mimosa pudica	Touch me not	Mimosaceae (touch me not family)	P-H
40	Mollugo pentaphylla	Five leaved carpet weed/ Chamas	Molluginaceae (Carpetweed family)	A-H
41	Oryza sativa	Dhanya/ Rice	Poaceae (Grass family)	P-H
42	Dactyloctenium aegyptium	Durva/ Hard bunch grass	Poaceae (Grass family)	C-H
43	Chrysopogon fulvus	Mountain beard grass/ Dhanda	Poaceae (Grass family)	P-H
44	Cymbopogon martini	Ginger grass/ Gandhabel	Poaceae (Grass family)	P-H
45	Dactyloctenium aegyptium	Duck grass/ Mokra	Poaceae (grass family)	A-H
46	Desmostachya bipinnata	Indian crow foot grass/ Mukakuti	Poaceae (Grass family)	A-H
47	Heteropogon contortus	Black spear grass/ twisted beardgrass	Poaceae (Grass family)	P-H
48	Oplismenus compositus	Running mountain grass	Poaceae (Grass family)	P-H
49	Perotis indica	Indian comet grass/ dhenrail	Poaceae (grass family)	A-H
50	Vetiveria zizanioides	Sevendia/ Khas/Cus	Poaceae (grass family)	P-H
51	Cenchrus ciliaris	Buffel grass	Poaceae (Grass family)	P-H
52	Dendrocalamus giganteus	Rough giant bamboo	Poaceae (Grass family)	P-H
53	Cordyline australis	Forest palm/ Mallow/ Chonch	Liliaceae (Phalsa family)	A-H
54	Phyla nodiflora	Frog fruit/ Bhui okra	Verbenaceae (Verbena family)	P-H
55	Hybanthus enneaspermus	Spade flower/ Bethan patrach	Violaceae (Violet family)	P-H

A: Annual; B: Biennial; A-H: Annual Herb; N-H: Herb; C: Climber
The Buffer zone was identified with 55 herb/ grass species belonging to 27 families

Table-2.18
FAMILY COMPOSITION OF HERB/GRASS SPECIES BUFFER ZONE

Sr. No	Family	Number
1	Acanthaceae	2
2	Amaranthaceae	1

Sr. No	Family	Number
3	Asparagaceae	1
4	Asteraceae	9
5	Boraginaceae	1
6	Commelinaceae	1
7	Cyperaceae	3
8	Euphorbiaceae	1
9	Fabaceae	9
10	Hypoxidaceae	1
11	Lamiaceae	1
12	Lindernicaceae	2
13	Lythraceae	2
14	Malvaceae	3
15	Melastomataceae	1
16	Mimosaceae	1
17	Molluginaceae	1
18	Poaceae	12
19	Tiliaceae	1
20	Verbenaceae	1
21	Violaceae	1
Total		55

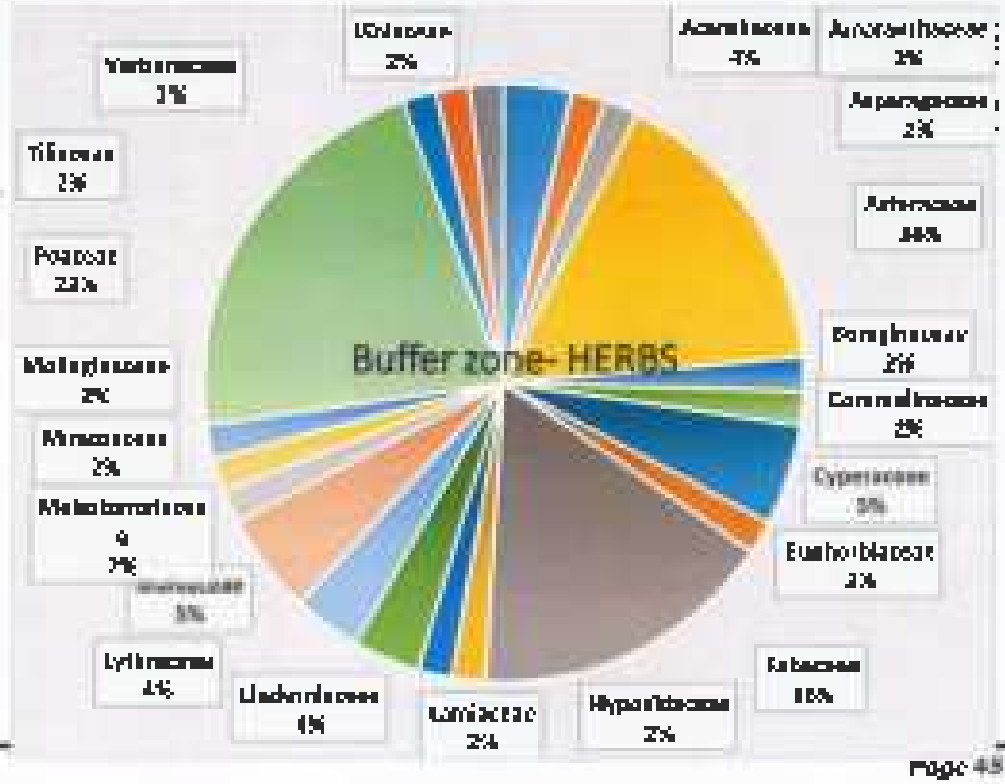


Figure-2.15
BUFFER ZONE – HERBS

Climbers

TABLE 2.19
CLIMBER SPECIES REPORTED IN THE BUFFER ZONE

Sr. No	Scientific Name	Common/ Vernacular Name	Family	Nature
1	Hemidesmus indicus	Indian sarsaparilla/ Anantamul	Apocynaceae (Oleander family)	PNC
2	Ichnocarpus frutescens	Black creeper / Dudhi lata	Apocynaceae (Oleander family)	EHC
3	Cryptolepis buchanani	Wax-leaved climber/ Kavalya	Apocynaceae (Oleander family)	PNC
4	Aristolochia indica	Duck flower/ Isharmul	Aristolochiaceae (Birthwort family)	PNC
5	Pergularia daemia	Wild cucumber/ Utarni	Cucurbitaceae (Gourd or bottle family)	PNC
6	Combretum latifolium	Paper flower/ Pakoliary	Combretaceae (Rangoon creeper family)	PNC
7	Ipomoea staphylina	Hog-vine	Convolvulaceae (Morning glory family)	PNC
8	Dioscorea pentaphylla	Five-leaved wild potato	Dioscoreaceae (yam family)	PNC
9	Mucuna pruriens	Velvet bean/ Kiwach	Fabaceae (pea family)	ANC
10	Abrus precatorius	Rosary pea	Fabaceae (Pea family)	PNC
11	Cajanus scarabaeoides	Pigeon pea/ Rani tur	Fabaceae (Pea family)	PNC
12	Gentz scandens	Jewel vine/ gentz	Fabaceae (Pea family)	PNC
13	Tephrosia purpurea	Blue wild indigo/ Sharpunkha	Fabaceae (Pea family)	PNC
14	Rhynchosia capitata	Cotton flowered Snout bean	Fabaceae (Pea family)	ANC
15	Rhynchosia minima	Burma vatli/ Vilayti Kuchla	Fabaceae (Pea family)	PNC
16	Cissampelos pareira	Velvet leaf/ Padrivel	Menispermaceae (moonseed family)	PNC
17	Vernonia cinerea	Ash-colored fleabane/ Rukhmani	Asteraceae (Daisy family)	PNC
18	Syngonium podophyllum	Nephthytis/ Arrowhead vine/ Goosefoot/ Caladium/ Trileaf wonder	Araceae (Arum family)	PNC
19	Argyreia cuneata	Woolly morning glory/ Samudra	Convolvulaceae (Morning glory family)	PNC

P: Perennial; E: Evergreen; A: Annual; N: Native; C: Climber

The buffer zone was identified with 9 climber species belonging to 12 families

Table-2.20

FAMILY COMPOSITION OF CLIMBER SPECIES BUFFER ZONE

Sr. No	Family	Number
1	Apocynaceae	3
2	Asclepiadaceae	1
3	Caesalpiniaceae	1
4	Combretaceae	1
5	Convolvulaceae	1
6	Dioscoreaceae	1
7	Fabaceae	2
8	Meliaceae	1
9	Menispermaceae	1
10	Rhamnaceae	1
11	Verbenaceae	1
12	Vitaceae	1
Total		15

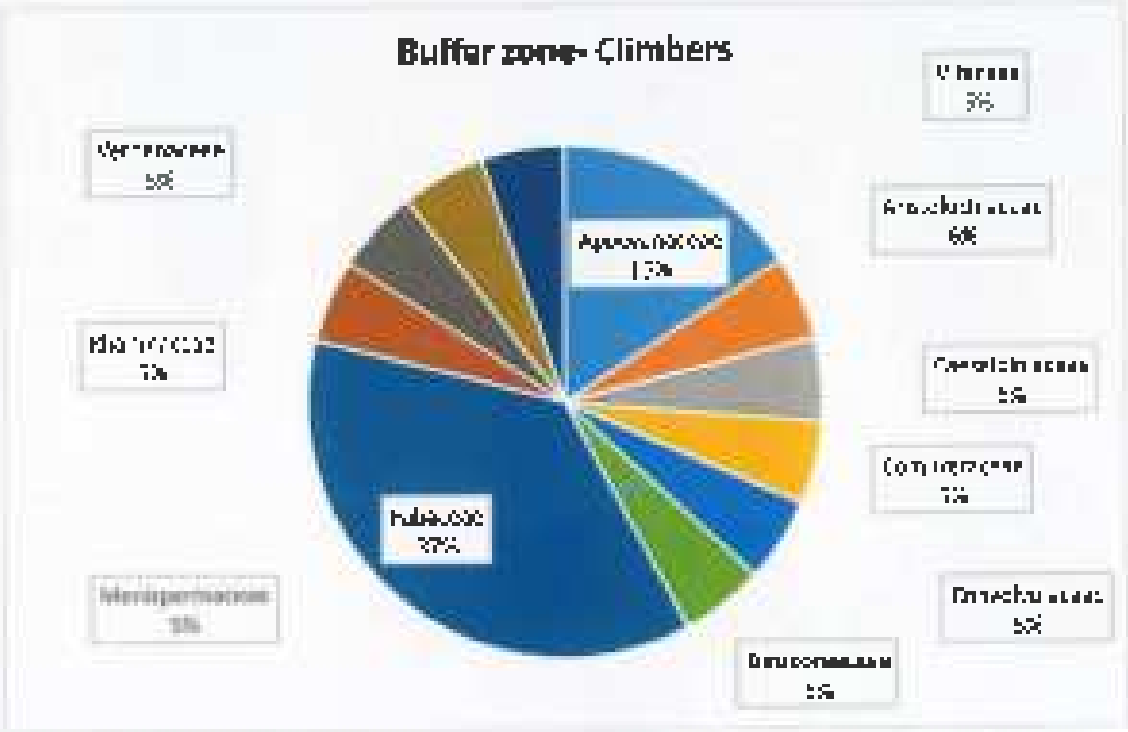


FIGURE-2.16 BUFFER ZONE - CLIMBERS

Epiphytes/ Parasites

Table-2.21

EPIPHYTES/PARASITES

Sr. No.	Scientific Name	Common/ Vernacular Name	Family	Nature
1	Cassytha filiformis	Love vine/Akas bel	Lauraceae (Laurel family)	PNC
2	Dendrophthoe falcata	Honeysuckle Mistletoe/ Banda	Loranthaceae (Mistletoe family)	PNS
3	Vanda (cultivated)	Cultivated vandar Perasan	Orchidaceae (Orchid family)	PNT
4	Viscum orientale	Leafless mistletoe/ Bushi	Santalaceae (Sandalwood family)	PNS

* In cultivation P: Perennial H: Hydrophyte H: Herb C: Climber S: Shrub

Syzygium cumini

Tectonic grandis

Carexglobosa

Hurriekinpaleris

Melissa officinalis

Alternanthera sessilis

Mikania micrantha

Delonix regia

Lrera lobata

Terminalia catappa

Psidium guajava

Calotropis procera

Mirmecodia pudica

Dalbergia volubilis

Crotalaria retusa

Lantana camara

Cenchrus ciliaris

Aristida vulgaris

Camera drone shot

Mare meadow shot

Cephalophus sylvicultor

Pellorneum fuscocapillum

Semnopithecus entellus

Fig. 3.1 Sumolenas

Carex cruciata

Lactucavirosa

Pongamia pinnata

Anogeissus heterophylla

Boswellia serrata

Stachyraphis cayennensis

Hibiscus sabdariffa

Ficus virens

Others

TABLE 2.22

AQUATIC FLORA REPORTED IN THE ACCESSIBLE STUDY AREA

Sr. No	Scientific Name	Common/ Vernacular Name	Family	Nature
1	Limnophyton obtusifolium	Round-leaved Gunapu	Alismataceae (Water plantain family)	ANP
2	Pistia stratiotes	Water cabbage/ Jalkumbhi	Araceae (Arum family)	PNH
3	Eichhornia crassipes	Elephant Ear/ Samaudh/ Bon-lambadu	Pontederiaceae (Pickerelweed family)	PNH
4	Ipomoea aquatica	Water morning glory/ Nali	Convolvulaceae	PNH

Sr. No	Scientific Name	Common/ Vernacular Name	Family	Nature
			[illegible] family]	
5	Acacia [illegible]	[illegible]	Fabaceae [Pea family]	PNH
6	[illegible]	Red waterwillow	Heteropyxidaceae [Waterwillow family]	ANH
7	[illegible]	Round-leaf foothorn	Lythraceae [Loose-strife family]	PNH
8	[illegible]	Red wood/Bandicha	Meliaceae [illegible]	PNH
9	[illegible]	Lotus/ Kamal	Nelumbonaceae [Lotus family]	PNH
10	[illegible]	Blue water lily/ Kokalamma	Nymphaeaceae [Water lily family]	PNH
11	[illegible]	Yellow primrose/ Bankruy	Onagraceae [Evening primrose family]	PNH
12	[illegible]	[illegible]	Phyllanthaceae [Phyllanthus family]	PNH
13	[illegible]	Oval leaf [illegible]	Pteridaceae [Pteris family]	AHP
14	[illegible]	Creeping [illegible]	Rubiaceae [Coffee family]	PHH
15	[illegible]	Cape yellow eyed grass	Xyridaceae [Yellow eyed grass family]	PNH

Table 2.23
SUMMARY OF FLORA

Sr. No	Type of Vegetation	Core Zone	Buffer Zone
1	[illegible]	33	100
2	Shrubs	30	30
3	Herbs	36	36
4	Climbers	13	15
5	Epiphytes	1	1
6	Aquatic flora	7	15
Total		124	208
Grand Total			332

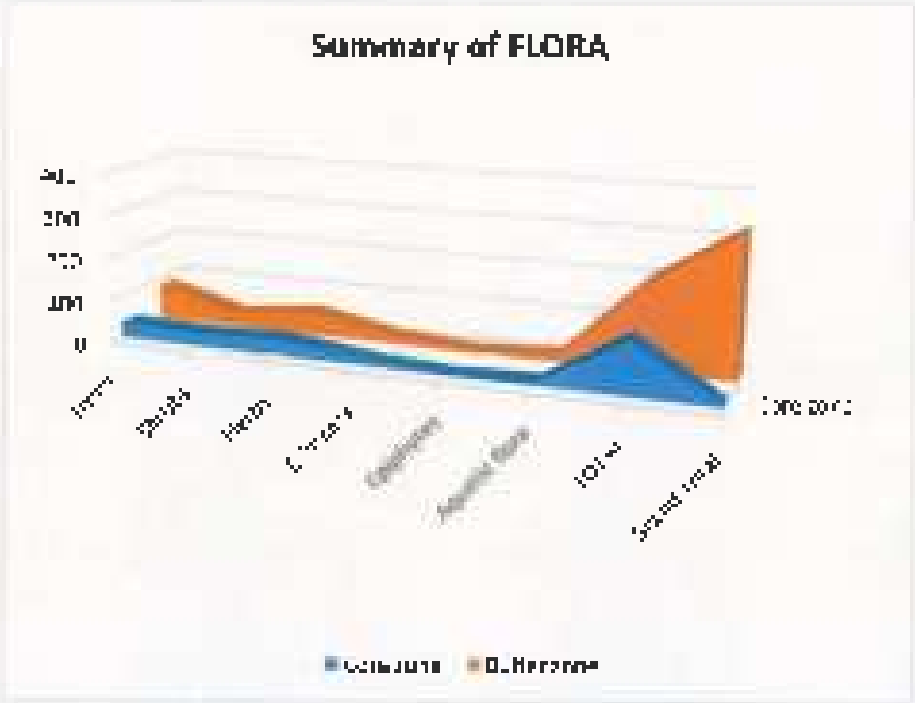


FIGURE-2.17

SUMMARY OF FLORA

2.2.4 Status of Fauna

In order to have the assessment of fauna diversity of the random sightings were preferred and various methods of observations were practiced as stated in the methodology study method and various techniques thereon. Avifaunal was assessed by overlooking several lake inlets in and around the core and buffer zones during early mornings and early dusk. Amphibians were searched near muddy lands, other agricultural fields, near the stagnant water pools and small perennial nala, seasonal stream beds. Reptiles were searched also by lifting of stones, of rock crevices and wet spaces of shrubberies etc. On random survey and interacting with local people and also by sighting of animals, it is very ill of because of being a mine dominated area being occupied by so many mining activities and heavy plying of a large number of heavy load trucks the possibility of sighting many animals have become scarce.

The fauna diversity of the Inside & non-mined areas of core zone is very poor because of the cumulative disturbance caused by the mine dominated landscape. The fauna of the area (core zone) includes that of the forest areas also within the ML area. No domestic animals, such as cattle, goats and horses called cows, dogs, cats etc were seen in and around the core zone. Common lizards, jackals etc may also be contributed to the core zone. Faunal

diversity that can be found in the core zone (CZ) and buffer zone (BZ) together constituting the study area is listed below:

MAMMALS

TABLE 2.24
FAUNA- MAMMALS REPORTED IN THE STUDY AREA

Sr. No	Species	CZ	BZ	Common name	Family	CITES App	WPA Sch.	IUCN Status
1	Bos gaurus	–		Indian Bison	Bovidae	–	I	VU
2	Boselaphus tragocamelus	–	–	Blue bull/ Nilgai	Bovidae	–	III	LC
3	Tetracerus quadricornis	–	–	Four horned Antelope	Bovidae	–	I	VU
4	Canis aureus	+	+	Jackal	Canidae	–	II	LC
5	Canis aureus	I	+	Common Jackal	Canidae	–	II	LC
6	Cuon alpinus	–	+	Indian wild dog	Canidae	–	II	EN
7	Vulpes bengalensis	–	+	Indian Pencil fox	Canidae	–	II	LC
8	Macaca mulatta	–	+	Rhesus monkey	Cercopithecidae	–	II	LC
9	Semnopithecus entellus	–	+	Common langur/ Bandar	Cercopithecidae	–	II	LC
10	Axis axis	–	+	Spotted deer/ Chital	Cervidae	–	III	LC
11	Muntiacus muntjak	–	+	Barking deer	Cervidae	–	III	LC
12	Rusa unicolor	–	+	Indian sambar	Cervidae	–	III	VU
13	Elephas maximus	–	I	Asian Elephant	Elephantidae	I	I	EN
14	Felis chaus	I	+	Jungle cat	Felidae	–	I	LC
15	Prionailurus bengalensis	–	+	Leopard cat	Felidae		I	VL
16	Herpestes edwardsii	I	+	Common mongoose	Herpestidae	–	II	LC
17	Hyaena hyaena	–	–	Striped hyaena/ Lakkbaghra	Hyaenidae	–	III	NT
18	Hystrix indica	I		Indian crested porcupine	Hystricidae	–	IV	LC
19	Lepus nigricollis	+	+	Indian hare/ Khargosh	Leporidae	–	IV	C
20	Martes flavigula	+	+	Indian Pine marte	Mustelidae	–	I	EN
21	Lutra	+	+	Common otter/ Hooam	Mustelidae	–	II	NT
22	Lutrogale perspicillata	–	+	smooth Indian otter	Mustelidae	–	II	VU
23	Mellivora capensis	–	+	Honey badger/ Indian ratel	Mustelidae	–	I	LC
24	Funambulus palmarum	–	+	common palm Squirrel	Sciuridae	–	IV	LC

Sr. No	Species	CZ	BZ	Common name	Family	CITES App	WPA Sch.	IUCN Status
25	Pelinda myctocephalus	–	+	Flying squirrel	Sciuridae	-	II	LC
26	Sus scrofa cristatus	-	+	Wild boar	Suidae	-	III	LC
27	Moschiola indica	-	+	Mouse deer/ Chevrotain	Tragulidae	-	II	LC
28	Melursus ursinus	–	+	Sloth bear/ Bhalu (Local Name)	Ursidae	I	I	VU

EN: Endangered; VU: Vulnerable; LC: Least Concern; NT: Near Threatened; C: Carnivore; H: Herbivore; Om: Omnivore; F: Folivore; Fr: Frugivore; Ca: Carnivore; In: Insectivore; Gr: Granivore; Bur: Burrowing; Ar: Arboreal; I: Invertebrate

Table 3.25

FAMILY COMPOSITION OF FAUNA- MAMMAL SPECIES IN CORE &BUFFER ZONE

Sr. No	Family	Species in Core Zone	Species in Buffer Zone
1	Bovidae	-	3
2	Canidae	2	2
3	Cercopithecidae	-	2
4	Cervidae	-	3
5	Erinaceidae	-	1
6	Felidae	1	2
7	Herpestidae	1	1
8	Hyaenidae	-	1
9	Hystricidae	1	1
10	Leporidae	1	1
11	Manidae	1	1
12	Muridae	1	2
13	Sciuridae	2	2
14	Tragulidae	-	1
15	Ursidae	-	1
Total		10	27

↑Herd of elephants found near boundary↓

FIGURE-2.13
MAMMALIAN FAUNA

BIRDS

TABLE 2.26
FAUNA- BIRDS REPORTED IN THE STUDY AREA

Sl. No	Occ	Scientific name	Area C	Area K	Common name	Family	WPA Sch	IUCN Status	Migrator Habitus
1	A	Pavocristatus	-		Indian peafowl	Phasianidae	I	LC	R
2	C	Gallus Sonneratii	+	+	Grey Jungle fowl	Phasianidae	IV	LC	R
3	O	Coturnix coturnix	-	+	Rain quail	Phasianidae	IV	LC	R
4	O	Coturnix coromandelica	-	+	Painted quail	Phasianidae	IV	LC	R
5	C	Francolinus pondicerianus	-	+	Grey partridge/ Grande	Phasianidae	IV	LC	R
6	C	Francolinus	-		Black partridge	Phasianidae	IV	LC	R
7	C	Ophrysia superciliosa	-	+	Indian grey hornbill	Bucerotidae	IV	LC	R
8	O	Anser indicus	-	+	Bar headed goose	Anatidae	IV	LC	LM
9	O	Anas poecilorhyncha	-	+	Spot billed duck	Anatidae	IV	LC	R
10	O	Pterocles exustus	-		Chestnut bellied sandgrouse	Pteroclidae	IV	LC	R
11	O	Pterocles indicus	-	+	Painted sandgrouse	Pteroclidae	IV	LC	R
12	C	Perdicula asiatica	+	-	Jungle bush quail/ Common	Phasianidae	IV	LC	R
13	C	Alectoris graeca	-	+	Snow partridge	Phasianidae	IV	LC	R
14	C	Halcyon smyrnensis	-	+	White breasted kingfisher	Alcedinidae	IV	LC	R
15	C	Alcedo atthis	+	+	Common kingfisher	Alcedinidae	IV	LC	R
16	C	Pelargopsis capensis	-	+	Stork billed kingfisher	Alcedinidae	IV	LC	R
17	C	Melanocorypha yeltoniensis	-	+	Indian Bush Lark	Alaudidae	IV	LC	R
18	C	Hirundo rustica rustica	-	+	Common swallow	Hirundinidae	IV	LC	WM
19	A	Buteo buteo	-	+	Common buzzard	Accipitridae	IV	LC	R
20	C	Accipiter gentilis	+	-	Indian goshawk	Accipitridae	IV	LC	R
21	A	Falco peregrinus	-	-	Little falcon	Falconidae	IV	LC	WV
22	A	Megalaima haemacephala	-	+	Coppersmith barbet	Megalaimidae	IV	LC	R
23	O	Merops orientalis	-	+	Asian green bee-eater	Meropidae	IV	LC	LM
24	C	Coracias benghalensis	-	-	Indian roller	Coraciidae	IV	LC	R
25	A	Columba livia	-	+	Common Blue Rock pigeon	Columbidae	IV	LC	R
26	C	Streptopelia chinensis	-		Spotted dove	Columbidae	IV	LC	R
27	A	Streptopelia orientalis	-	-	Oriental turtle dove	Columbidae	IV	LC	R
28	A	Eudynamys scolopaceus	+	+	Indian Koel	Cuculidae	IV	LC	R
29	A	Cacomantis passerinus	+	+	Common cuckoo	Cuculidae	IV	LC	WV
30	A	Clamator jacobinus	-	+	Pied cuckoo	Cuculidae	IV	LC	R
31	C	Centropus sinensis	-	+	Greater coucal	Cuculidae	IV	LC	WM
32	C	Copsychus saularis	-	+	Oriental magpie robin	Muscicapidae	IV	LC	WM
33	A	Pycnonotus cafer	-	+	Red vented bulbul	Pycnonotidae	IV	LC	R
34	C	Pycnonotus	-	+	Ashy prinia	Cisticolidae	IV	LC	R
35	A	Corvus splendens	+	+	House crow	Corvidae	V	LC	R
36	O	Dicrurus macrocercus	+	+	Black drongo	Dicruridae	IV	LC	R
37	A	Acridotheres	-	+	Brown starling	Sturnidae	V	LC	R
38	O	Acridotheres	-	+	Common myna	Sturnidae	V	LC	WM

Sr. No	Occ	Scientific name	Area		Common name	Family	WPA Sch.	IUCN Status	Migration Status
			CI	B					
39	O	Alcedo atthis	-		Kingfisher	Alcedinidae	IV	VU	WM
40	A	Merops orientalis	-	–	Green bee-eater	Meropidae	IV	LC	S
41	O	Motacilla alba dukhunensis	-	+	White browed wagtail	Motacillidae	IV	LC	WM
42	O	Motacilla cinerea	-	+	Grey wagtail	Motacillidae	IV	LC	WM
43	O	Saxicoloides fulicata	+	+	Paddy field pipit	Motacillidae	IV	LC	R
44	O	Copsychus saularis	-	+	Oriental magpie robin	Muscicapidae	IV	LC	R
45	O	Orthotomus sutorius	–	+	Common tailorbird	Cisticolidae	IV	LC	LM
46	A	Acrocephalus dumetorum	-	+	Blyth's reed warbler	Acrocephalidae	IV	LC	LM
47	A	Lonchura malabarica	-		Indian silverbill	Estrildidae	IV	LC	R
48	O	Saxicola caprata	-	+	Indian robin	Muscicapidae	IV	LC	R
49	A	Riparia paludicola	–	+	Plain martin	Hirundinidae	IV	LC	R
50	A	Hirundo rustica	-	+	Barn swallow	Hirundinidae	IV	LC	R
51	A	Riparia paludicola	-	+	Asian pale martin	Hirundinidae	IV	LC	R
52	C	Pycnonotus cafer	+	+	Red-vented bulbul	Pycnonotidae	IV	LC	R
53	C	Pycnonotus jocosus	-	+	Red-whiskered bulbul	Pycnonotidae	IV	LC	R
54	A	Passer domesticus	+	+	House sparrow	Passeridae	IV	LC	R
55	A	Passer pyrrhonotus	-		Sind sparrow	Passeridae	IV	LC	R
56	A	Pycnonotus cafer	+		Red-vented bulbul	Pycnonotidae	IV	LC	R
57	O	Phalacrocorax niger	-		Little cormorant	Phalacrocoracidae	IV	LC	R
58	O	Sterna	-	-	Black-headed gull	Laridae	IV	LC	R
59	O	Anastomus oscitans	-		Asian openbill stork	Ciconiidae	IV	LC	R
60	O	Acridotheres tristis	–	+	Common myna	Sturnidae	IV	LC	R
61	A	Sturnus roseus	-	+	Rosy pastor/starling	Sturnidae	IV	LC	W
62	O	Sturnus contra	-	+	Grey headed myna	Sturnidae	IV	LC	R
63	A	Sturnus pagodarum	-	+	Brahminy starling	Sturnidae	IV	LC	R
64	O	Alcippe brunea	-	+	Spotted babbler	Timaliidae	IV	LC	R
65	O	Dicrurus	-	+	Common drongo	Dicruridae	IV	LC	R

Occ: Occurrence; EN: Endangered; VU: Vulnerable; LC: Least Concern; NT: Near Threatened; R: Resident; WM: Winter Migrant; LM: Local Migrant; S: summer; D: Occasional; A: Abundant

REPTILES

TABLE 2.37

FAUNA- REPTILES REPORTED IN THE STUDY AREA

Sr. no	Scientific name	C1	B2	Common name	Family	CITES App	WPA Sch.	IUCN Status
1	Typhlops braminus	+		Blind snake	Typhlopidae	-	-	NE
2	Eryx conicus	+	+	Rough tailed sand boa/ Common sand boa	Boidae	II	IV	NT
3	Python molurus	-	+	Indian rock python	Pythonidae	I	I	NT

				Abhoona				
4	Ptyas mucosus	+	+	Rat snake/ Dhaman	Colubridae	I	II	NE
5	Amphiesma stolatum	-	+	Buff striped keel back/ Kandonaa	Colubridae	I	II	NE
6	Xenochrophis piscator	-	+	Water snake/ Dhanda	Colubridae	II	II	LC
7	Naja naja	-	+	Monocled cobra/ Kamba	Elapidae	II	I	LC
8	Naja naja	-	-	Indian cobra/ Gehara	Elapidae	II	I	LC
9	Bungarus caeruleus	+	-	Indian krait	Elapidae		II	LC
10	Vipera russelii /Daboia russelii	-	-	Russell's viper	Viperidae	II	II	NE
11	Hemidactylus prashadkariei	+	+	Spotted house Gecko	Gekkonidae		IV	NL
12	Hemidactylus leschenaultii	-	+	Bark gecko	Gekkonidae		IV	NL
13	Hemidactylus triedrus	-	+	Termite hill gecko	Gekkonidae		IV	NL
14	Hemidactylus flaviviridis	-	+	Yellow leaf nosed gecko	Gekkonidae		V	LC

Ex. Endangered; VU: Vulnerable; LC: Least Concern; NT: Near Threatened; NE: Not Evaluated; DD: Data Deficient

AMPHIBIANS

TABLE 2.28
FAUNA- AMPHIBIA REPORTED IN THE STUDY AREA

Sr No	Scientific Name	CZ	BZ	Common Name	Family	WPA Sch.	IUCN Status
1	Duttaphrynus melanostictus	+	+	Common Indian toad	Bufonidae	IV	LC
2	Duttaphrynus stomaticus	-	-	Marbled toad	Bufonidae	IV	LC
3	Duttaphrynus scaber	-	+	Schneider's toad	Bufonidae	IV	LC
4	Microhyla ornata	-	-	Ant frog	Microhylidae	IV	LC
5	Microhyla rubra	-	+	Red marrow mouthed frog	Microhylidae	IV	LC
6	Uperodon systoma	+	+	Common bull frog	Microhylidae	IV	LC
7	Uperodon variegatus	-	+	White bellied pug snout frog	Microhylidae	IV	LC
8	Uperodon globulosus	-	+	Globular frog	Microhylidae	IV	LC
9	Uperodon systoma	-	+	Balloon frog	Microhylidae	IV	LC
10	Fejervarya caperensis	-	+	Skittering frog	Dicroglossidae	IV	LC
11	Hoplobatrachus tigerinus	+	+	Indian bull frog	Dicroglossidae	IV	LC
12	Hoplobatrachus crassus	-	+	Jerdon's bull frog	Dicroglossidae	IV	LC
13	Sphaerotheca breviceps	+	+	Indian burrowing frog	Dicroglossidae	IV	LC
14	Sphaerotheca dobsonii	-	+	Dobson's	Dicroglossidae	IV	LC

				Burrowing frog			
15	Hydrophylax bahuvistara	-	I	Wide sphere forested frog	Ranidae	IV	LC
16	Polypedates taeniatus	+	+	Striped tree frog	Dicroglossidae	IV	LC
17	Minervarya sahyadrensis	+	+	Long legged cricket frog	Dicroglossidae	V	LC
18	Sphaerotheca breviceps	-	I	Marbled snipe frog	Dicroglossidae	V	LC
19	Hylarana malabarica	-	I	Theobald's Sand frog	Ranidae	IV	LC
20	Chiromantis sp.	-	-	Annandale's tree frog	Rhacophoridae	IV	C
21	Philautus sp. nov.	-	I	Sacred grove bush frog	Rhacophoridae	IV	CR
22	Rhacophorus pseudomalabaricus	+	+	Terrible bush frog	Rhacophoridae	IV	DD
23	Polypedates pseudocruciger	-	+	Tenasserim tree frog	Rhacophoridae	IV	C
24	Gegeneophis ramaswamii	-	I	Eastern gegg	Indotyphlidae	NL	NL

EN: Endangered; VU: Vulnerable; LC: Least Concern; NT: Near Threatened; NL: Not Listed; DD: Data Deficient; CR: Critically Endangered

FISHES

TABLE 2.29

FAUNA- FISHES REPORTED IN THE STUDY AREA

Sr. No	Scientific Name	CI	BI	Common Name	Family	Occurrence	Avg
1	Labeo rohita	-	+	Rohu/ Rohi	Cyprinidae	1,2	R
2	Cirrhinus mrigala	-	+	Mrigal/ Mirkali	Cyprinidae	1	R
3	Catla catla	-	I	Katla/ Bhakur	Cyprinidae	1,2	R
4	Notopterus	-	I	Patti	Notopteridae	4	R
5	Gonialosa manmina	-	+	Dhela	Clupeidae	4	R
6	Chela cachius	-	I	Silver hatchet chela	Cyprinidae	3,4	R
7	Chela laubuca	-	+	Dwarf minnow	Cyprinidae	2, 3,4	M
8	Salmostoma bacaila		I	Large salinity minnow	Cyprinidae	1,2, 3,4	M
9	Puntius sarana	+	+	Olive barb	Cyprinidae	3,4	M
10	Salmostoma	-	+	Dhelkhowa	Cyprinidae	1	R
11	Salmostoma phulo	-	-	Angela	Cyprinidae	4	R
12	Devario aequipinnatus	+	-	Giant danio	Cyprinidae	3,4	R
13	Puntius sophore	+	+	Pool barb	Cyprinidae	3	R
14	Puntius sp.	-	+	Jebra barb/ Anju	Cyprinidae	1,2, 3,4,5	A
15	Puntius dorsalis	-	+	Rohu bundi	Cyprinidae	1,2, 3,4, 5	A

Sr. No	Scientific Name	C 2	B 2	Common Name	Family	Occurrence	Av el
				Perch			
16	Rasbora daniconius	+		Slender barb/ Lilo	Cyprinidae	1,2, 3,4,	M
17	Amblypharyngodon mola	-	+	Mola carplet	Cyprinidae	1,2,	M
18	Aspidoparia morar	-	+	Orange bream	Cyprinidae	4	R
19	Cirrhinus reba	-	+	Reba carp	Cyprinidae	2,3,4	R
20	Ctenopharyngodon idella	-	+	Grass carp	Cyprinidae	-	R
21	Cyprinus carpio	-	+	Common carp	Cyprinidae	-	R
22	Garra gotyla	-	+	Sucker head	Cyprinidae	3	R
23	Hypophthalmichthys molitrix	-	+	Silver carp	Cyprinidae	1	R
24	Labeo dero	-	+	Scaly labeo	Cyprinidae	3	R
25	Labeo gonius	-	+	Sarkhi	Cyprinidae	4	R
26	Labeo rohita	-	+	Rohu carp	Cyprinidae	2	R
27	Mystus seenghala	-	+	Bachi	Cyprinidae	2	R
28	Osteobrama cotio	-	+	Kalia	Cyprinidae	2,3,4	R
29	Puntius amphibious	+	+	Scarlet banded (eyed)	Cyprinidae	2,3	R
30	Puntius conchonius	-	+	Pitch spotted	Cyprinidae	4	R
31	Puntius gelius	-	-	Golden barb	Cyprinidae	2	R
32	Puntius sarana	-	+	Olive barb/ Pora	Cyprinidae	2,4	R
33	Puntius sophore	+	+	Pool barb	Cyprinidae	1,2, 3,4	M
34	Puntius ticto	-	+	Ticto barb	Cyprinidae	1,2, 3,4	M
35	Tepidoscopris chirwaterdmor el	-	+	Burmese loach	Cobitidae	1,2, 3,4	M
36	Nemacheilus botia	-	+	Hora loach/ botia	Nemacheilidae	3,4	R
37	Glyptothorax	-	+	Sisorhaki	Sisoridae	2,4	R
38	Glyptothorax	-	+	Sisorhaki	Sisoridae	3,4	R
39	Oreinus plagiostomus	-	+	Butter catfish	Siluridae	4	R
40	Glyptosternum	-	-	Garua/ sucker fish	Sisoridae	4	R
41	Oreinus sinuatus	-	+	Butter catfish	Siluridae	4	R
42	Anguilla bengalensis	+	+	Tropical eel/ fish	Anguillidae	3	R
43	Channa punctatus	-	+	Murrel / Marrel	Channidae	1,2	R
44	Heteropneustes fossilis	-	+	Singhara catfish	Heteropneustidae	2,3	R
45	Wallago attu	-	+	Freshwater catfish	Siluridae	3,4	R
46	Crocodylus palustris	-	+	Indian crocodile	Crocodylidae	1	R
47	Aplocheilus panchax			Panchax/ Gurjor	Aplocheilidae	1,3,4	M
48	Gambusia affinis	-	-	Mosquito fish	Poeciliidae	1	M
49	Channa punctatus	+	-	Glass snakehead	Anabantidae	2, 4	R

Sr. No	Scientific Name	CI	BT	Common Name	Family	Occurrence	Avi
				Kosala			
50	Oreochromis mossambicus	I	+	Tilapia	Cichlidae	I	M
51	Glossogobius giuris	-	+	Bar eyed goby/ Cotan	Gobiidae	1,2,3,4	M
52	Channa punctata	-	+	Snake head/ Chuang	Channidae	1,2,3,4	M
53	Channa marulius	-	-	Bum/ Sol	Channidae	4	R
54	Channa punctata	-	+	Hiyuli-chelo/ Gorsa	Channidae	1,2,3,4	M
55	Mastacembelus armatus	-	+	Spiny eel/ Guichi	Mastacembelidae	1,2	R
56	Mastacembelus pancalus	-		Baigny/ Bunni	Mastacembelidae	3,4	R
57	Macrognathus pancalus	-	-	Many striped spiny eel	mastacembelidae	1,2,3,4	M

Use : Documented; Ex: Ecological; Nu: Nationalist; Wi: Wild Dependent; Ni: Non Threatened; I: Fresh; F: Forest; S: Stream; A: Riverine; Poultry Tobacco; Abandoning; Ag: Agricultural; S: Rare; Avo: Avoidable

Altogether, 28 species of mammals, 65 species of birds, 14 species of reptiles, 24 varieties of amphibians and 37 species of fishes are identified in the study area.

2.2.5 WILD LIFE CORRIDORS/ CRITICAL WILD LIFE HAMTATS

Out of the total MI area of 197.225 ha. forest area is 112.521 ha. Government land is 13.813 ha (Gochar 7.587 ha, road 0.510 ha, Pulpit ation 3.947 ha, worship place 0.732 ha, grave yard 0.599 ha & Nala 0.44 ha) & tenanted land is 19,787 ha (0.645 ha Ghatbarik, 12.142 ha Agricultural). Out of the total 112.521 ha of forest land within the ML area, 67.022 ha is Reserve Forest (Kenia Division of Forest Range Kalda) and 45.599 ha is D.C. Forest. Proposal for diversion of forest land of 112.521 ha is submitted by the proponent vide proposal no. HY/DR/MN/289/5/2017 dated 05.07.2017.

There is no National Park, Wild life Sanctuary, Biosphere reserves, Ramsar sites, Elephant/ Tiger Reserves or Wild Life Corridors or nesting grounds within 10 km radius. There is no area of historical importance in the study area.

2.2.6 HUMAN WILDLIFE CONFLICT

The instances of man animal conflict has been showing a rising tendency in recent years. Cases reported include human kill, human injury, cattle kill, house damage & crop damage by wild animals while retaliatory killing of wild animals is also being reported. A report of Orissa wild life deputies from whole that during the 5 year period of 2004-05 to 2008-09 there were a total of 352 cases of human death, 192 cases of human injury, 3653 cases of house damage and 21768 cases of crop damage due to elephant depredation, and 75 human death cases and 671 human injury cases due to other animals like bear, crocodile, wild pig, wolf and gaur. On the

other hand, 331 elephant / death cases are also reported during the same period, which include 55 deaths due to poaching for ivory, 56 cases due to accidents (mainly non-electrocution), 47 natural deaths, 92 due to disease and 19 for unknown reason.

Total number of humans killed during the 6-year period of 1998-99 to 2003-04 due to elephant attack was 228, wherein Keonjhar district alone reported 93 number followed by Sundergarh and Sundergarh that reported 58 & 28 respectively. Only five forest divisions of Keonjhar and the adjoining Sundergarh, Baripada and Rairangpur account for 57.5 % of the total depredation instances due to elephants in the state of Odisha. Out of the total 21 number of humans killing by man-animal conflicts reported between 1998-99 to 2003-04, Keonjhar district reported 6 cases and Sundergarh Rural division also recorded certain incidences of man-animal conflict.

Sundergarh, Rairangpur and Keonjhar divisions have reported depredation instances due to leopard also.

The project area of Mahabandhaliahar corridor is in Koira Tehsil of Sundergarh district of Odisha State. The area is under the jurisdiction of Chief Wildlife Warden PCCF (Wildlife) BDO Rourkela, DFO Keonjhar (Wildlife) and DFO Soroi (Forest).

CHAPTER - III

PROBABLE IMPACTS OF THE PROJECT ON FLORA & FAUNA

3.1 Impact Identification

The inter-dependence between the environment (i.e. biodiversity [both flora & fauna]) is the basis of upkeeping human livelihoods. The outstanding of ecosystem goods including carbon sequestration, keeping up natural environment, maintaining of watershed, recycling of nutrients etc. also denote the significance of biodiversity conservation.

Any mining activities have the potential to cause considerable changes in the biodiversity of an area both flora & fauna, and further directly, indirectly and cumulatively in addition to those of inherent in nature. The open cast mining activities involve development of mine pit, road, haulage roads, benches, storage & transportation of mineral material, loading and unloading etc. All these activities are likely to have some impacts over the surrounding biota. These may depend on the severity and sensitivity of mining impacts are

(i) Topography: The undulating topography of the hilly terrain area will change further with the removal of vegetation of the forest land within the Mine Lease area. Topography will change. Since the topography is a hilly terrain, benching only slopes is not possible.

(ii) Drainage: The Mine Lease area have a Nala of 0.44 ha, which is perennial and 50 m safe distance will be kept from either side of the nala as undisturbed area. Even though, as the topography of the area tends to change due to mining, the drainage pattern is also likely to change, thereby resulting in changes of watershed.

(iii) Climate: The micro weather conditions of an area like temperature variations, wind direction & speed, rainfall & humidity are sometimes influences are governed by regional factors and monsoon. Because of the removal of vegetations inside the ML area, slight temperature variations and wind direction & speed are likely to occur, but there may not be considerable changes in climate of the area.

(iv) Air quality: Due to plying of vehicles and machinery, excavation, loading & unloading, transportation and/or storage, blasting, drilling and haulage etc. are likely to cause considerable dust generation. The fuels used in the machineries & vehicles, and the following operations are also likely to cause more release of oxides of nitrogen in the atmosphere.

(v) Soil: Due to the regular to & fro movement of vehicles, especially through the unformed roads from & to the mine area, the erosion of fertile topsoils shall be accelerated due to runoff during rainy seasons not only in the ML area but also in the unmined areas as well as the approach roads and haulage roads etc.

(vi) Noise: Presently existing noise level shall be altered due to drilling, blasting, excavation, crushing, loading & unloading, movement of vehicles & machineries etc.

The impacts on the biological environment when continuation, the above aspects are to be dealt with. The above-mentioned aspects will have different impacts on them and also on fauna.

Impacts on Flora: The adverse impacts on flora may be mainly due to vegetation removal, dust emission and SO2 emissions. The impacts due to vegetation removal are likely to overcome by the extensive plantation proposed in green belt development which will serve not only as a pollution sink but also noise barrier. Further, all the conditions likely to be stipulated in the Forest Clearance, if given, shall be scrupulously followed. In order to contain dust, mineral and fuel transportation will be done only in covered trucks. The transportation route shall be sprinkled with water sprinklers also. Therefore, significant adverse impacts on flora on the surrounding agro-ecosystem is not envisaged due to development management plan implementations.

Impacts on Fauna: The adverse impacts on fauna may be mainly due to deforestation, noise and dust. The noise and dust management by adopting green belt development and extensive plantations will get rid off that aspect. The wild life management plan, if implemented appropriately and monitored continuously, with the aid of the project proponent will also help the fauna from losing their ecosystems.

Another aspect is the likely chances of fall of animals in mine pits. As the mine pits are likely to be steep and deep any accidental fall of any animal due to unawareness of it or by light fog or when chased by predators etc. may become either fatal or may cause permanent disability leading ultimately to death. In order to avoid this, fencing shall be provided around the mine pits.

For identification of impacts, it is necessary to have an overlook on all the activities, all the likely sources that are capable of creating substantial impacts and net result or output (s) of it that are likely to take place in the proposed project. For example when we consider the air pollution sources of a mining site, we have to consider the area sources, line sources as well as the predominant point sources. Extraction of iron ore by various activities in the mining area constitutes area sources, transportation of mineral materials from the mining area to the stockyard/ processing/ disposal (i.e.) forms the line source whereas the drilling involves mainly a point source.

The activities mainly involved in mining are:

i) Land acquisition
ii) Site development, construction camp, creation of infrastructure, making roads etc.
iii) Top soil removal and storage
iv) Overburden removal for stocking/ dumping/ backfilling
v) Drilling and blasting
vi) Mineral extraction
vii) Mine water pumping/ removal
viii) Disposal
ix) Mineral transport
x) Heavy Earth Moving Machinery (HEMM) use and maintenance
xi) Toxic waste treatment/removal

(xii) mineral processing.

(xiii) Site restoration/ reclamation- backfilling, bed metal spreading of topsoil revegetation etc.

Particulate matter, Carbon monoxide, Nitrogen oxides, unburned hydrocarbons etc may be expected considering all these activities which are likely to have environmental concerns.

Emission component	Health concerns
Carbon Monoxide	Cardiovascular effects especially in those having heart problems
Oxides of Nitrogen	Lung irritation Lower resistance to respiratory infections
Particulate Matter	Premature mortality Aggravation of respiratory and cardiovascular diseases Changes in lung pulmonary Increased respiratory symptoms Changes in lung tissues and structure Altered respiratory defense mechanisms
Unburned hydrocarbons	Eye irritation, respiratory tract infection Headaches Dizziness Nausea, fatigue Memory impairment

3.2 Mining related activities and likely impacts

All the above activities take place at different stages. An overview of environmental impacts at different phases of mining can be summarized as below:

TABLE-3.1

Mining related activities and likely impacts

Mining phase (s)	Activity involved	Likely environmental impact
Mine development	Land clearing, excavation, construction of haul roads, in some cases access roads, electric and other essential site services	1. Habitat loss, disturbance & fragmentation of habitation of flora and fauna. 2. Reduction in the aesthetics of the area. 3. Changes in land use and hence alteration in ecosystems. 4. Minor changes and loss of elevation in drainage and runoff flows leading to ecosystem damages. 5. Increased erosion and sediment loading to ecological disturbances.

Mining phase (s)	Activity involved	Likely environmental impact
		6. Topographical changes leading to changes in surface water movement.
Removal and storage of stones and/ or unwanted rock/waste materials	Quarrying/ mining of top soil and overburden. Waste rock stock piling/ removal/ stone piling.	7. Land alienation from waste rock stockpiles. 8. Disturbance from noise of vehicles and machinery 9. Disturbance of agriculture in the vicinity/alienation of land.
Blasting / Mining and excavating	Blasting for extraction, collection and sizing of ore	10. Disturbance over soil properties 11. Disturbances due to ground level vibrations 12. Disturbances due to dust 13. Dust and fumes from blasting/ operation mining vehicles/ machineries and transportations. 14. Contamination from explosive residues
Transport of the finished product to user agency	Loading of final product Transportation of final product	15. Disturbances due to noise vibrations and light 16. Dust & fumes from exposed products and stockpiles
Mine closure and post operational waste	Decommissioning of voids Dismantling of building/ Post mine land use/ other areas Managing water dumps water quality/ quantity Fencing dangerous areas.	17. Noise and dust from dismantling 18. Accumulation of civil construction & demolition waste 19. Subsidence and flooding of previously mined areas. 20. Hazards due to being accessed. 21. Contaminations/discharges of pollutants in ground and surface water through seepage

Methodology adopted for assessing the impacts associated with activity was taken up at different stages. They are:

(i) Identification of activities involved in the project & its impacts: It is based identifying the activities like clearing of land, demolition of buildings, movement of vehicles, way of discarding wastes, nature of fuels used and all external releases into the atmosphere due to these identified activities and the likely environmental impact of each component.

(ii) Assigning significance of the identified environmental impacts: the significance of the identified impacts is assigned by considering:

a. Likeliness (frequency) and intensity of the impact: How likely the impact may happen as in whether once in a while, periodically or continuously only and whether the impact is caused by the toxic substances or low level of pollutants etc.

b. Extent (spatial) of the impact: The area to which it may have impact as to whether

confined to the area of release of pollutant only or to the nearby areas or to a long range of surrounding areas etc.

c. Duration (temporal) of the impact i.e. for life in past will continue or to exist only for moments, for short duration or long duration for e.g.

d. Severity (vulnerability) of the impacted areas i.e. in case life is in presence of the main impacted like sensitive areas, high security areas, areas of significant social, geological, ongoing flora, wild life or migratory paths or nesting grounds, public places etc.

3.3. Impact significance levels

The impact significance level is arrived at from the above matrix is decided and categorized as under below to develop strategies of environmental management.

High (H) Those activities which may result in severe and adverse effects to the receptors severe and irreversible deterioration of the quality or environment or may seriously affect the sustainability of the living/biotic environment and/or irreversible and adverse modification of landscape or may cause irreparable damage to the ecological balance.

Moderate (M): Those activities which may result in moderate effects to the receptors, slight deterioration of the quality of environment or slightly affect the sustainability of the living/biotic environment and/or irreversible but acceptable/environmentally feasible modification of landscape which may not cause irreparable damage to the ecological balance.

Low (L): Those activities which may result in little effects to the receptors, minimum but reversible deterioration of the quality of environment or not to seriously affect the sustainability of the living/biotic environment and/or irreversible and acceptable modification of landscape considering its positive benefits.

Negligible (N): Those activities which may not have significant effects to the receptors, or may not adversely affect the sustainability of the ecological environment or/or may not cause irreparable damage to the working ecological balance.

Assessment is carried out on the likely impacts on most environmental attributes its impact parameters and the mining activity concerned that may exert impact on the biological environment.

TABLE-3.2

MATRIX FOR EIA OF MINING ON ECOLOGY & BIODIVERSITY

Environmental Attributes	Impact parameter	Activity						
		Drilling and Blasting	Mining operation	Material handling and transport	Waste material storage including overburden	Movement of vehicles	Water usage	Mine drainage
Soil / Land	Soil quality							
	Soil contamination							
Resources	Fuel / waste oil / explosive residues							
	Mineral excavation							
Water	Water quality							
	Surface run off and contamination							
Air	Air quality							
	Noise quality							
	Traffic							
Biological	Vegetation / fauna removal							
	Disturbance to biological environment							
Socio economic	Development of local employment							
	Increase in living cost in locality							
	Impact on health							

From the above, it is seen that major impact to biological environment may be encountered due to:

a. Required disposal of used engine oil from HEMM and use of fuel in vehicles / explosive residues and dust generated during vehicle movements,
b. Surface run off and contamination of water from mine drainages
c. The exhaust gas and their contents that are generated due to blasting, drilling, vehicles/ machineries and also by the operation and movement of vehicles and dust and noise generated by them.
d. Removal of vegetation, fauna displacement and disturbance towards ecosystem / damages caused due to all the above said activities.

3.4 Predicted Impacts of the iron ore mining on flora & fauna

While addressing the likely impacts of an activity on the environment, especially over the ecology & biodiversity, we need to look into not only the direct impacts but also indirect and cumulative. Here, in the project activity i.e ore mining, and hence, the major issues associated with it shall be the nuisance to the fauna and flora due to dust and noise. The dust may give rise to problems to the ecosystem, especially during rainy seasons. The run off from the mining area, if not properly managed by garland drains, settling tanks etc. shall cause accretion of small particles in the bed of water bodies. Another issue may be disturbance within the ecosystem wherein the free movement of fauna in the buffer zone may likely to be disturbed either by the noise from the project area at all timings and also from the lightings will in the project area during night, and the fauna in the buffer zone may sense.

The report deals with all aspects relating to the status and conservation of the identified Schedule I species in the study area. The Schedule I species as per The Wild Life (protection) Act, 1972 are: Asian Elephant (Elephas maximus), Indian Porcupine (Hystrix indica), Sloth bear/ Snail- fish (Melursus ursinus), Indian Bison (Bos gaurus), Leopard/ Panther (Panthera pardus), four horned Antelope (Tetracerus quadricornis), Flying squirrel (Petaurista petaurista), Mouse deer/ Chevrotain (Moschiola indica), Ratel/ honey badger/ Indian wild (Mellivora capensis), among mammals; Indian peafowl (Pavo cristatus) among birds and Indian rock python/ Ajgar/ Indian (Python molurus) among reptiles.

CHAPTER IV
MITIGATION MEASURES REQUIRED

4.1 Identified Impacts and strategies of mitigation

In earlier section, the likely impacts were discussed. In order to minimize the adverse impacts due to mining, strategies are to be provided to mitigate the impacts aiming to sustainable development and socio economic enhancement as a matter of human development in the national scenario.

Activities within project area:

The activities mainly involved in mining area are:

(xiv) Land acquisition
(xv) Site development- construction camps, creation of infrastructure including access roads etc
(xvi) Top soil – removal and storage
(xvii) Overburden removal for stocking/ dumping/ backfilling etc.
(xviii) Drilling and blasting
(xix) Mineral extraction
(xx) Mine water pumping/ removal
(xxi) Disposal
(xxii) Mineral transport
(xxiii) Heavy Earth Moving Machinery (HEMM) use and maintenance
(xxiv) Tailings waste treatment/ removal
(xxv) Mineral processing
(xxvi) site reclamation/ rehabilitation- backfilling, treatment, spreading of topsoil, revegetation etc.

Activities within project impact area:

The activities mainly involved in project impact area are:

(i) Site development- construction camps, creation of infrastructure including access roads etc
(ii) Mine water pumping/ removal
(iii) Disposal of rejects, if any
(iv) Mineral transport and related works
(v) Heavy Earth Moving Machinery (HEMM) maintenance

TABLE-6.1

Identified impacts and strategies of mitigation

Identified impacts	Proposed mitigation measures
Disposal of used engine oils/ exploded machines	Shall be stored in bins placed in oil storage shed and shall be handed over to SPCB authorized agencies for safe disposal. Ensuring use of good quality explosives having proper oxygen balance.
Dust and noise emanation due to vehicle movements	Water sprinklers shall be deployed along the transport routes both load and empty. Dust suppression in open areas to be controlled through water hoses / jets with nozzles. Dust suppression system related in all drill machines in the form of water jets shall be installed. Transportation of materials only through covered trucks shall be made mandatory. Acoustic enclosures as well as greenbelt plantation shall considerably reduce the nuisance caused by noise. Greenbelt development envisaged along all the haul roads and mechanized dumps.
Mine drainages and water contamination	Garland drains shall be provided around the mine area with settling ponds and check dams if required, and only supernatant shall be allowed to overflow to reach any waterbody.
Emission of pollutant gases in exhaust gas from vehicles/ machineries	The low emissions of NO_x due to mining operation will have insignificant impact on ambient air quality and the NO_x concentration shall be within NAAQ standards. Extensive plantation comprising of pollutant resistant species as suitable to the locality shall be developed around the mine area with a minimum width of 7.5 m.
Removal of vegetation/ fauna displacement and ecosystem disturbances	A greenbelt of about 10 ha is envisaged in the project. The extensive greenbelt plantation as per CPCB guidelines and plant species as available in the local agro-climatic zone shall serve not only as pollution sink but also as a noise barrier.

It is expected that, with the adoption of the above mentioned mitigation measures, the impact due to mining operations & found at the study area shall be minimized on the terrestrial ecosystem. Progressive plantation with over a period of time shall create conditions favorable for fauna also.

4.2 Legislations related to ecological conservation in India:

In India, ecological biodiversity is safeguarded through many enactments like the Wild life (Protection) Act, 1972, the Forest (Conservation) Act, 1980, The Environment (Protection) Act, 1986 and The Biological Diversity Act, 2002etc. Furthermore, we have species-specific conservation statutes for individual species like Tiger, Elephant, Crocodile and Sea Turtles.

The Wildlife (Protection) Act, 1972 is an important statute that provides a powerful legal framework for:

- Prohibition of hunting
- Protection and management of wildlife habitats
- Establishment of protected areas
- Regulation and control of trade in parts and products derived from wildlife
- Management of zoos.

The WPA provides for several categories of Protected Areas/Reserves:

- National Parks
- Wildlife Sanctuaries
- Tiger Reserves
- Conservation reserves
- Community Reserves

The National Forest Policy, 1988, (NFP) is primarily concerned with the sustainable use and conservation of forests and further strengthens the Forest Conservation Act, 1980, the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Rights) Act, 2006, The Environment (Protection) Act, 1986, The Biological Diversity Act, 2002 and, also, the provides mandatory

Conservation approach inside Protected Areas

1. Train frontline forest staff in wildlife legislations.
2. Train frontline forest staff in trauma management.
3. Train frontline forest staff in systematic patrolling.
4. Support intelligence gathering to curb takeover on wildlife trade.
5. Help hire specialized lawyers to fight critical wildlife cases.
6. Improve mobility of frontline forest staff by providing vehicles.
7. Help deploy radio-collars and monitoring and combat/prevent Adipersal.
8. Conduct health check-up camps for frontline forest staff.
9. Provide veterinary support to conduct post-mortems of wild animals.
10. Influence policy through targeted research and dialogue.
11. Work in close co-ordination with the forest department.

12. Provide veterinary help during rehabilitation of wild animals
13. Estimate carnivore populations using camera trapping
14. Help strategize and implement anti-poaching operations
15. Help monitor human disturbance and animal distribution inside tiger reserves
16. Motivate forest staff through Wildlife Service Awards
17. Provide essential equipment for forest guards and patrolling camps (anti-poaching camps)
18. Train frontline forest staff in wildlife monitoring

Conservation approach outside Protected Areas

1. Enhance livelihood options for local communities to reduce their dependence on forests
2. Strengthen human wildlife interface management to mitigate future conflict
3. Sensitize intelligence gathering to crack down on wildlife trade
4. Estimate populations of large carnivores in human dominated landscapes
5. Advocate a holistic integrated conservation approach involving local communities and the forest department
6. Study long-term changes in land use and land cover patterns
7. Assess impact of climate change on forest connectivity and suggest mitigation measures
8. Partner with NGOs, educational institutions, corporate and multilateral agencies to strengthen further our conservation goals
9. Work in close coordination with the existing government machinery
10. Influence policy through long-term research and dialogue
11. Assess landscape connectivity and help identify wildlife corridors
12. Spread awareness on wildlife and climate change
13. Provide veterinary support in mitigating human-wildlife conflict
14. Train the staff on territorial forest divisions in wildlife legislations
15. Help improve the law enforcement mechanism along with its sanctions
16. Study dispersal of tigers and responses in human-dominated landscapes using camera trapping and genetics
17. Strengthen the curriculum of education system – Teacher training; Developing learning skills; School infrastructure support
18. Increase public sensitization between human behavior and conservation

4.5 Site specific wildlife management plan(s):

Knowing the preferred ecology of an organism, the threat faced by the species and the ways

and medicine reduce. It also play a good role in conserving wildlife naturally. Hence instead of living to opt conservation of an individual species or a few individuals in plunge habitats the safest way is to secure the same and release them in a nearby sanctuary, with the permission of the Govt. authorities. Wildlife Conservation and Management Plan requires monitoring to be conducted for its meaningful implementation and successful achievement.

3.Animal behaviour: The animal behaviour under different circumstances and environmental conditions are to be taken care of while preparing conservation plan. This includes territoriality.

4.Habitat suitability and adequacy: Spatial and topographical areas, resource inventory, carrying capacity, threat perception, conflict with human and/or domesticated animals and suitability of the habitat need to be examined before trying to conserve a species in situ.

5.Residential status: It is important to know whether the wild animal found in a location under consideration is use to casual or accidental visitor, whether it is on the move or migrating and whether there is sustainable residential population.

6. Population monitoring: A program of regular, systematic monitoring of known populations is essential. Breeding grounds should be identified and mapped. Census techniques are to be refined and standardized so that they are scientifically credible. Viability is required in selected areas.

7. Protection of habitats: Changes in habitats such as resource base, changes in topography, land use and land cover, water resources etc. require monitoring. Adequate protection should be made to prevent poaching and destruction of breeding grounds. It is absolutely necessary to maintain the integrity of the ecosystem so that they survive to support the wildlife. This includes controlling pollution by urban waste and industries, development of potentially disturbing water harnessing projects.

8. Captive Breeding: It is essential only when there is a negative population growth rate due to lower birth rates and higher death rates.

9.post-release monitoring of translocated animals: A number of studies in India and abroad show that many of animals produced in captivity failed to survive when released in wild. The problem of captive breeding of tigers in India is in a kind of crisis due to overcrowding in captive breeding centre which mostly of the success of restocking.
Identification and minimization of negative anthropogenic influences: Some of the major anthropogenic threats are known but need to be prioritized and mapped. Thus, multidisciplinary actions involving all stakeholders, such as the people living in wildlife habitats, Government Departments such as Wildlife, Forest, Irrigation and Fisheries are needed. Identification and mitigation of human/livestock disturbances to wildlife habitats are needed.

5. Public awareness/education about wildlife: Public awareness is an important aspect within the scope of overall management plans for the species. Zoos could play a greater role in lobbying for public sympathy. Conservation NGOs need to utilize the media as part of awareness programme.

10.Sustainable use schemes: As long as we by NGO to alienate people from wildlife and not living on there is LITTLE conflict between wildlife and people, conservation plans shall yield positive results

11. Wildlife Sanctuaries, National Parks, Wildlife Reserves: The presence and sustenance of any wild species in any particular area over a long period of time is an enough indication that the area under consideration shall be best suited for conservation of the wild species.

Considering all the above, following management strategies are proposed both for wind farm area (Core zone) and also for the surrounding zone of influence (Buffer zone).

4.4 OBJECTIVE OF MANAGEMENT:

The main objective of this plan is to reduce various stresses occurring due to implementation of this project in the particular locality having wildlife importance. The site specific Wildlife Conservation Plan will suggest measures to mitigate such stress and if possible how to avoid certain activities which could reduce the negative influence. Wildlife management consists of promoting welfare factors aiming at reducing the impacts of declining factors and neutralizing normal effects of limiting factors that keep the animal population lower than the carrying capacity of the area. It also aims at management of human attitudes relating to regulation of habitat use, sustenance from animal damages, livelihood issues and taking people as partners in conservation management. Such notions are reflected in the prescriptions. The management of the project's core area will aim for maintenance of habitat for wild animals that used to live and share habitat with project area. The management of BZ will target optimization and maintenance of wildlife habitat and biodiversity, involving local people as far as practicable and aim to avoid / minimize or mitigate the adverse impacts of the project activity. Small animals & large mammals can clear and elephants make use of the area regularly as the area is undisturbed. Large animals will be displaced from the area once the Plant commences with full expansion. The displaced animals would not be left as refugees, their rehabilitation would be the major objective of the plan. To fulfill all these requirements, the plan focused on improving forage and browse volume by increasing food plant diversity with vertical and horizontal cover. These will check habitat destruction and fragmentations and also prevent soil erosion and loss of biodiversity. Keeping natural water resource free from negative impacts of the project activity will also be targeted.

Objective of management to mitigate the impacts to the wildlife is covering the following aspects:

1. To conserve the viable population of wildlife in general and the Pachyderms in particular in the riverine habitat.

2. Conservation, Protection and Improvement of the flora and fauna in and around the Project area in a sustainable basis despite production of Steel and other ancillary activities.

3. To maintain the natural biodiversity, aesthetic and panoramic ecological value of the area through appropriate management of site, habitat and landscape.

4. To ensure the coexistence of local people on the forest resources of the Soil through community, socially, economically acceptable and ecologically sustainable and viable alternatives by undertaking eco-development programmes.

5. To reduce man-animal conflict by ensuring contiguity of habitat in the buffer zone by improving forest cover in long term basis.

STRATEGIES TO MITIGATE AND MINIMIZE ADVERSE IMPACTS:

I) **Strategies for Core Zone:**

FOR FOREST DIVISION

I.1) Fire Watchers

Fire is one major threat to wildlife habitat in the area. 02 nos. of villagers preferably youth will be engaged as casual labour from local villages on the suggestion of WB for a period of 6 months (January to June) annually. They will be termed as Fire Watchers. It will be better that the fire watchers should either be linked earlier with poaching / illegal collection of forest produce with working knowledge of forest tracks, path and routes followed by villagers as well as wildlife, with previous work in forest, ability to move on foot / cycle. Fire watchers should be well trained by the local forest Staff the way how to douse fire 'ground fire' / crown fire / check using bunch of green branches or locally available plants. They should possess the local mobile station for exchange number and in case of exigencies when the occurrence of fire goes beyond their control can call the fire brigade Executives to put off the fire before it aggravates. They will also be supplied Fire Rakers to cut weeds, heap them and practice 'Control Burning'.

I.2) Awareness Promotion

i) The User Agency will create awareness among the Plant Executives/staff/workers and villagers of adjoining areas regarding wildlife conservation, wildlife conservation, forest protection & forest based wildlife sensitize them to maintain the proper balance of biodiversity in the surrounding areas.

ii) Plant Executives/staff/workers should aware about boundaries 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 immediately inform the nearest Forest staff or Snake charmer available in every Resident Office nearby for rescue of the wildlife and safe release in the nearby forest. They should also be made aware to domestic or any wildlife as it goes against the Wildlife Protection Act, 1972.

(ii) The Drivers of heavy earth moving vehicles will be told to keep the noise level to the barest minimum, take all precaution against the damage to trees etc. Drivers will be told to control speed so as not to run over slow moving wildlife like snakes, lizards, mongooses, civets etc. Scholarium incharge will be expected from each worker on the above points and use of garbage bins. Any wounded injured animal will have to be rescued and given first aid and vet. Such animals not on subsequently handed over to the nearest forest official and relevant after healing the wound. No worker should get involved in crime against animals & forests.

(iii) There should be enough provision and locally for creating awareness through media, announcements, awareness meetings, brochures, documentation etc. in the surrounding linkage villages towards community mobilization for protection of wildlife and forest.

I.3) **Garbage Collection Bin:**

Since the Project is a construction time, only quite a good number of workers will be engaged. During lunch break they will use plastic bags for food and after consumption will throw haphazard there. Mostly Polythene bags are forbidden in forest areas because if they are chewed by wild animal and go to their stomach it may create obstacle in food processing resulting in death. Therefore, putting garbage bins near work and appointing watchmen to workers will overcome the above problem.

I.4) **Provision for bird bath within the project area:**

A bird bath is an artificial puddle or small shallow pond, created when a water-filled basin in which birds may drink, bathe and cool themselves. A bird bath can be a garden ornament, small reflecting pool, outdoor sculpture, and also can be a part of planting a small wildlife garden. A bird bath is an attraction for many different species of birds to visit, especially during the summer and drought periods. Bird baths may provide a reliable source of water year round due to the popularity and "user-friendliness" appeal. Bird baths can be pre-made ceramic pedestals and columns or many can be made or be carved out depressions in rocks and boulders. Requirements for a bird bath should include the following: a shallow gradually sloping bowl, clean and renewed refilled water and cleaning to avoid contamination and mosquitoes. Two inches of water in the center is sufficient for most backyard birds, considering they do not submerge their bodies, only dipping their wings to splash water on their backs. Deeper, wide basins can have "perch islands" in the water which can also help discourage fishing predators. Bee fountain on a pedestal is a common safety measure, providing a clear area around the bird bath that is free of hiding locations for predators. The bowl should also be shallow

enough to avoid the risk of birds drowning. A depth of 2" is right for most species. This requirement may be fulfilled by providing the bowl shallow enough to allow birds to perch in the water. A bird feeder can complement the bird bath to encourage birds to linger and return.

I.5) Provision for Eco-friendly bird nests on trees within the project area and fringe villages.

A bird nest is the spot in which a bird lays and incubates its eggs and rears its young. Although the term popularly refers to a specific structure made by the bird itself—such as the grassy cup nest or the elaborately woven hanging nest. For some species, a nest is simply a shallow depression made in sand; for others, it is the knothole left by a broken branch, a burrow dug into the ground a chamber attic into a tree, an elaborate rolling pile of vegetation and earth, a tidal mode of dried saliva or a mud dome with an entrance tunnel. Grass, moss, feathers, flowers, mud, stony etc may be used to construct nesting eco friendly bird nests within the project area and adjoining fringe villages. Few examples could be taken for consideration such as

a) A clay / Saucer shaped nest: The type of nest will be prepared from weeds and small climbers or of bamboo splits by local artisans. If necessary some adhesives can be used to keep the twigs together in their nest some fine twigs will be spread inside the nest to keep the bird free from contamination if any. The nests will be 6" to 12" diameter will be ideal. These nests will be decided on tree branches, house pompers. It may be replaced mostly annually

b) Nest on trees trunk: Half opened box shaped prepared from the Bamboo strips covered with palm leaves and Bamboo sticks with opening can also be prepared and fixed on tree trunk/ branches with a will cut. Camouflage may help in improving habitation of birds. The models are given below. The local Bamboo artisans/ women self makers can prepare the materials after short demonstration

I.6) Provision of Two wheelers (inbuilt with gps tracker) for implementation in protection activities through ground staff:

Most of the times the ground staff and para squad members are facing trouble within immediate reach to the sensitive points, where any conflict issue/depredation issues happened. To minimize the time lapse, these two wheelers is going to easy access these points and subsequently the short can plan to combat the conflict issues in time.

I.7) Provision of distribution of Grain Bins to the household of surrounding villages of project area for storage of food materials in order to mitigate the Human-Elephant Conflict

The surrounding livelihood of the project area mostly comprises of lower middle class people and low economic class people. They are mostly fond of their social custom such as to consume desi liquor and to store the same in to their houses along with other food grains. Normally they don't have any luxurious houses. Their small kuccha houses are mostly prevalent here where they use to live, being fond of meat and liquor, elephants mostly

some human vs. elephant fringe village areas in a frequent manner. Subsequently there is always a chance of Human-Elephant Conflict, by which loss or mishap/destruction will going to be observed. In order to mitigate these issues, there is a proposal for distribution of eco friendly gunnies to the surrounding fringe villages/house holds so that even in proper storage facility the pilferage of elephant may be avoided to some extent. The food grains could be stored safely as well as their social customs too. On the other hand we can motivate/persuade them towards avoiding the storage of desi liquor to some extent also.

I.8) **Infrastructure support in Range Office, Koira, Bonai Forest Division**

The User Agency will procure one computer with Printer (A4 in size) and deliver to Range Office, Koira, Bonai Forest Division along with the proper internet facility to office use.

I.9) **Provision of high powered torches at Division Office, Bonai Forest Division**

In the wee hours the elephants usually come out of the habitat and depredate the paddy crop as well as storage place in villages. To curb on their presence in each village, it is proposed to have sufficient number of high powered torches, so that it will be delivered to the villagers as well as forest staffs in order to get proper coordination amongst themselves during tracing the elephant movement.

I.10) **Measures to prevent diseases to wild animals:**

Grazing by domestic animals in the wildlife habitat has to be controlled by sensitizing the local communities and VSS volunteers. The local villagers are to be motivated to rear high yielding milching cows / buffaloes for which stall feeding will be necessitated in place of free grazing in the forest. The domestic cattle population in the surrounding area should be given immunizations or regular intervals so as to prevent spread of any cattle borne diseases to wild animals. Provision is proposed to conduct immunization campaign on domestic cattle twice in a year for the domestic cattle in the surrounding area including the cost of medicine, operating charges etc.

II) **Strategies to mitigate and minimize the adverse impact as observed in the Zone of Influence (ZoI):**

<u>FOR BONAI DIVISION</u>

<u>Protection & Enforcement Activities</u>

II.1) **Establishment of Anti-Poaching Barrack to support protection activities and elephant monitoring activities (including water supply, tube wells, solar light system, boundary facility etc.):**

In suitable location of border area of the Sanjpatar PF and Khuntni RF, one anti poaching barrack need to be constructed, which will be a 2 storied structure. In the ground storey vehicle

of the squad can be stationed by. The staffs will remain in the 2nd storey to locate the movement of elephants and the hazard during the season. Also, this unit will provide first immediate to the anti depredation squad or the squad in need of the hour. This will also help in monitoring the protection activities by proper coordination amongst staffs of Kolai Range of Sonai Forest Division of the sensitive areas.

II.2) **Anti-depredation/ Protection Squad:**

They will be engaged throughout the year to minimize depredation activities from wild animals especially from elephants. The trackers will be selected from local villages throughout the area well conversant with animal behaviours particularly elephants. The job of the trackers will be primarily to gather data on number of elephants, their location, their line of movement and the quantum and nature of depredation being done, such data can be collected by pursuing elephants in morning hours along their routes when animals are on retreat to scattered spots (dense valleys, close to water or dense woods), information thus collected can be soon relayed to the Range officer, area forester and concerned villages. Regular tracking will help to map movement routes, identify intensity of depredation from which the nature of movement whether benign or deliberate can be framed. If the depredation is repetitive, a plan will be organized. The same may also be engaged in the protection activities in order to assist the ground staffs. The overall aspect of protection from poaching, illegal conversion of woods, encroachments, wildlife trafficking etc. can be monitored on a regular basis. The safety of people and animals are prime concern of this action. They will be provided with hired vehicles, h.a., mobile recharge facilities medical expenses, uniform etc.

II.3) **Procurement of camping equipments (Tents, sleeping bag, water bottle, all terrain shoes, haversack, torch etc.):**

Squad members will be provided with tents, sleeping bag, haversack, water bottle, notebook, pencil, Khukri, measuring tape etc. to support their day to day activities during patrolling time. Provision of such type of incentives will definitely encourage the squad teams towards delivering their overall duty with a prescribed action.

Wildlife Habitat Management

II.4) **Grassland Management (weed eradication in existing open patches with necessary grass planting, its maintenance etc.):**

The most competition faced by the forest growth towards heavy weed grown inside the forest areas. One should be taken towards removal of such weeds (Lantana, Eupatorium etc.) where heavy infestation is going on. Continuous removal through manually or by Brush-Saw is felt is going to create a better environment to grow the trees inside forest. It is also proposed to improve these open patches in existing selected management system. Once the weed removal is completed in a particular area, this should be re-planted through suitable grass species and

subsequently maintained through regular attention. This will provide a better ecosystem towards sustaining a particular micro climate. The suitable sites to be located as per the suitable field condition by Range Office and team in Bhebanipathar RF, Bhebanipathar PRF, Khajurdhi RF, Khajurdhi PRF, Sakuntala RF, Sakuntala PRF etc.

II.5) **Desilting, Renovation & maintenance of existing water bodies:**

During summer most of the streams except some water worn sources remain dry in which the wild animals often face difficulty to get water deep inside the forest. During this time the wild animal come close to the human habitation in search of water and as a result, the chance of human-wildlife conflict gets increased. Hence, to resolve the water scarcity inside the forest area during the dry season period, artificial water holes inside the adjacent forest patches have already created in previous years. In course of time they need regular maintenance and sanitation towards maintaining the health status of wildlife. In continuous rainy season the silt action is also more in these water bodies which is need to be removed on a regular basis for smooth availability of water sources to wildlife. Therefore it is proposed to regular renovation and maintenance in these structures at Khajurdhi RF, Mendhamandi PRF, Tada RF, Sarc DPF, Kalimati PRF etc. in order to maintain the regular behavior towards healthiness of wildlife inside a particular forest.

II.6) **Construction of Check dams along the nallah:**

In order to mitigate water crisis for the wild animals particularly in summer season at Kalia Range area, there is provision for construction of 1 no. of RCC check dam in Bhebanipathar RF at Kalia beat under Kalia Section, Kalia Range (K II) keeping in the buffer zone area of the project. It is useful to check the small water storage location for improvement of flora and fauna of the forest area. Several wildlife movements have been recorded in the above proposed check dam area which will be helpful to cater to the improvement of flora and fauna in water needs. The final location of the construction site will be decided at the suitable location of the small nallah constituting flow of water at a particular feasible time.

Wildlife Monitoring

II.7) **Procurement of Camera Trap:**

It is proposed to establish the trap cameras at sensitive locations of Bhebanipathar RF, Khajurdhi RF, Sakuntala RF and Mendhamandi PRF in order to monitor the wildlife movement and their behavioral aspects towards the climate change on a regular basis. This will provide a foundation to observe their seasonal demand from the forest.

II.8) **Procurement of Monitoring Kits (including Binoculars, Compass, Range Finders etc.):**

These monitoring kits including Binoculars, Compass, Range Finders etc. will improve the quality of ground level skill towards identification of wildlife species and their regular approach

towards the wildlife species. They could gather better faunal and floral diversity of their respective jurisdictional areas. The knowledge of indigenous species will be beneficial to conserve on all the particular species in future.

Human Elephant Conflict Mitigation

II.9) Installation of Solar Street lamp/light in elephant affected villages and its maintenance:

From the study it was evident that in the Zone of Influence (ZoI), the main problem is man-animal conflict, particularly with the single herbivore i.e. Elephant. Elephants make their frequent penetration 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 villages area become darker, due to presence of no regular shelter 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 take place in dark and patchy areas. Hence, taking into account the whole scenario of conflict, there is a provision to install high mast solar street lights, most probably at strategic locations around the elephant affected villages near to Barsi Forest Division. As these lights can work even without electricity, it will help the villagers in get rid of elephant attack. Total eight lights will be provided at the required strategic locations in the ZoI of the project area considering the elephant movement.

II.10) Engagement of Eco-sathis in the sensitive areas to mitigate Human Elephant Conflict:

It is felt that more involvement of communities is required to handle Human Elephant Conflict. Project Elephant division of MoEF&CC has issued draft suggested Operating Procedure for Dealing with Emergency Situations of Human Elephant Conflict. Under item 10.0 'role of villagers volunteers / local animal activists in conflict situations' it states as below:

"A volunteer group of villagers from Village/Rapid Response teams/ elephant alert teams may be formed in villages acutely affected by Human-Elephant conflict. The Forest Department should identify motivated youth from the villages and train them in human-elephant conflict management." Their role during conflict situations includes:

i. Communicate the details of elephant presence / movement to Forest Department. Such details may sometimes be gathered by interacting with cattle grazers and villagers who may have seen elephants or their signs.
ii. Assist Forest Department in monitoring conflict at the village level.
iii. Assist various line agencies in safely moving people, especially women and children from the conflict affected areas.

In the light of above, the following is suggested for high Human Elephant Conflict markets having high incidence of elephant related conflict.

i. Identify clusters of villages severely affected by Human-Elephant Conflict.
ii. DFO concerned shall get in touch with village bodies like VSS/EDC etc. Discuss with such village bodies about the problem. A group of youth of village not less than 5 shall be

identified by the VSS/EDC this group will be named as "EAJA / AATHy".

ii. These volunteers selected by VSS/EDC shall be imparted with training in anti-depredation measures and about ecology and behaviour of elephants.

iii. A set of equipment like flash lights, megaphones, crackers etc shall be placed at their disposal.

iv. On sighting of elephants or getting information about presence of elephants near their village these Gajasakthi will immediately inform the villagers and forest division control room.

v. Gajasakthis will also take as far as practical preliminary and dispersal/anti-depredation measures to keep elephants away till forest department staff and squad reaches the spot.

vi. Such Primary Response Teams will be active from October to February to cross-check when there is more conflict.

vii. For such association in anti-depredation work apart VSS/EDC will be provided incentive to the tune of Rs.12,000/- for two months.

ix. Tentative time line is:
May- Identification of Conflict Prone village clusters
June- Meeting with VSS/EDC and selection of volunteers
July-August- Training and Supply of Equipments
October-February- Anti Depredation work.

x. Concerned Range Officer/Forester/Forest Guard will remain in close contact with such Primary Response teams on day to day basis and shall immediately respond to their call.

II, 11) **Provision of tranquilizing kit (Dart Gun & Medicines with other accessories):**

In case of elephants particularly in case of tusker when it comes in musth condition, they become very violent and aggressive in nature. This instinctive will come by losing out of white chemical type of thing in volatile state. Such secretion comes through an opinal rendering to called as Mandgand. At this time the tusker becomes violent and need the accomplishment of female elephant. Several times it is difficult to control the human elephant conflict situations at this time of aggressiveness. Also there are several circumstances where elephants are in unhealthy condition due to various reasons. In this context they need severe medication with a proper watch by a medical team. To overcome mentioned situations tranquilization is required by experts to take control over the elephant. This precaution is also required when any contractor resources to human habitation. In such cases to capture the same veterinarian's counsel is essential. In such cases translocation is essential but at the same time revival of the tranquilized will also play an important role to save them from casualty. Therefore, tranquilizing kit (Dart Gun & Medicines with other accessories) are provided and should be in ready condition where ever required in immediate basis by the experts.

II 12) **Provision of fishape barricading open wells in the impact area (in agricultural lands)to avoid elephant accidents in open wells**

The areas surrounding to project proponent are mostly covered with lower middle class and

poor economic status. For their livelihood purpose they also depend upon the prevalent agriculture practices. As these areas mostly found upon the fringe areas related to forest corridor, regular movement of elephants are observed there in search of their preferred food items. Simultaneously these local inhabitants (ryots) have some open wells for their agriculture purpose and most of the times they are remain uncared. In the odd hours during the movement of elephant to these areas may create some mishap/accidental by these open wells. Therefore it is proposed to construct some barricading using T Shape Concrete and ridge railing around these open wells by ecological manner so that any mishap could be avoided. The T-shape concrete post is of height of 40 inches with upper side dimension is about 3.5" x 2.5" and lower side dimension is about 6" x 4".

Public Awareness and Livelihood Generation Activity through community mobilization

II.13) **Existing VSS strengthening along with its infrastructure development, clean water facilities, sanitation facility etc.:**

It has been suggested to re-constitute and strengthen the existing Van Suraksha Samiti (VSS) to include various right of villagers so that the working efficiency of the VSS can keep pace with the need of the day. It has also been thought of providing Entry Point Activities such as infrastructure development, clean water facilities, sanitation facility etc. to villagers to gain their confidence on forest field executives so that the line of need like fire hazard, illicit felling, poaching, and depredation of wild elephants etc. their support can be obtained. To strengthen the financial backbone of local forest dependent community through convergence with line departments it has been proposed to provide them support for Vegetable and Mushroom Cultivation, Poultry farming, honey bee farming, rare farming, Piggery, Goatery, production of Sal leaf plates (eco friendly), preparation of pickles of noble leaf and stem etc.

Strategies to mitigate and minimize the adverse impact as observed in the Zone of Influence (ZoI):

FOR KEONJHAR DIVISION

4.5.1 Wildlife Habitat Management

4.5.1.1 **Plantation for natural ecosystem management:**

Aiming at improving the availability of food and fodder for the wild elephants and sloth bear, it is proposed to plant seedlings of fodder and fruit bearing species like Artocarpus heterophyllus (Jack fruit), Mangifera indica (Mango), Dendrocalamus strictus (Bamboo), Musa velutina (wild banana), Ficus racemosa (fig plant), Terminalia indica (Hamara), Careya arborea (Wild guava), Ficus benghalensis (Banyan tree) along either side of streams at both perennial & seasonal nalas.

It will be necessary to improve the forest density with a good mixture of plant varieties. In addition to the protection efforts of enrichment planting any planting of trees when needed or wanted. ANE (Assisted Natural Regeneration) plantation also need to be developed. For the purpose it may be necessary to make like planting of selected varieties of plants with 2-year-old seedlings in 0.5 m pits, filled with suitable soil, biofertilizers and bio pesticides. Instead of using purchased seedlings, an in-house nursery should be developed within the forest area for growing better quality seedlings, required species wise, prevention of damage due to long distance & prolonged time for transportation besides economy and survival efficiency.

4.6.1.2 PLANT SPECIES PROPOSED FOR PLANTING

As discussed above, and in tune with the suggested guidelines proposed by the Central pollution Control Board, further considering the suitability as per the prevailing agro-climatic conditions of the project site, the following 15 plant species are considered to be appropriate for being considered for planting in this project under various schemes.

TABLE 4.2
PLANT SPECIES PROPOSED

Sl. No	Scientific name	CN	Family	Fl	G/R	S/T	R	E/D
1	Abutilon indicum	Country mallow/ Kankapnuga	Malvaceae	Most of the year	Fast growing	S	Through seeds	D
2	Acacia auriculiformis	The Ear pod tree	Mimosaceae	May Aug	Fast growing	S	Through seeds	E
3	Acacia decurrens	Silver wattle	Mimosaceae	Apr-Jun	Fast growing	T	Through seeds	F
4	Acacia leucophloea	Subabul/ Ivelmaram	Mimosaceae	Jun-Feb	Fast growing	I	Through seeds	D
5	Acacia nilotica	Indian gum/ Babul	Mimosaceae	Aug-Jan	Fast growing	T	Through seeds	L
6	Acacia pennata	Biswal/ Kumaka	Mimosaceae	Jun-Aug	Fast growing	T	Through seeds	=
7	Acacia Senegal	Kumtha	Mimosaceae	Aug-Dec/ Jan-Mar	Fast growing	T	Through seeds	D
8	Acacia tortilis	Umbrella thorn	Mimosaceae		Fast growing	I	Through seeds	F
9	Achras sapota	Sapota	Sapotaceae	Round the year/ Coastal	Slow growing/ Hardy	T	Grafting	L

Sr. No.	Scientific name	CN	Family	FS	GR	S/T	R	E/D
				Shrub/ Tree/Other plants	early stages			
10	Actinodaphne angustifolia	Bagrata	Lauraceae	May-Jun/ Nov	Slow growing	T	Through seeds	E
	Adenanthera pavonina	Red wood/ Rakt	Mimosaceae	Mar-Aug	Fast growing	T	Through seeds	D
12	Adina cordifolia	Haldu	Rubiaceae	Jun-Sep	Slow growing	T	Through seeds	D
13	Aegle marmelos	Bael/ Bela	Rutaceae	May-Jul	Slow growing	T	Through seeds/ root cuttings	E
14	Ailanthus excelsa	Tree of heaven/ Maharukh	Simaroubaceae	Feb-Mar	Fast growing	T	Seed/ shoot/ root cuttings	D
15	Albizia amara	Shirish/ Safed Siris	Mimosaceae	Apr-Jun	Fast growing	T	Seeds/ root suckers	D
16	Albizia lebbeck	Siris	Mimosaceae	Apr-May	Fast growing	T	Through seeds	D
17	Albizia procera	Safed Siris/ Rajsiris or Kalpi	Mimosaceae	Jul-Oct	Fast growing	T	Through seeds	E
18	Albizia saponaria	Phool siris	Mimosaceae	Apr-Jun	Fast growing	T	Through seeds	E
19	Albizia lebbeck	White siris	Mimosaceae	Jun-Sep	Fast growing	T	Through seeds	D
20	Alstonia scholaris	Saptaparni/ Chatwan	Apocynaceae	Feb-May	Fast growing		Through seeds	E
21	Anona squamosa	Seetaphal	Annonaceae	Mar-Sep	Fast growing	Small tree	Seeds/ grafting/ budding	E
22	Anona reticulata	Ramphal/ Kamaphal	Annonaceae	Jun	Fast growing	T	Through seeds	E
23	Anogeissus latifolia	Dhawa/ Dhok	Combretaceae	May-Jun	Slow growing	T	Seed/ root suckers	E
24	Artocarpus heterophyllus	Kathal	Moraceae	Nov-Feb	Fast growing	T	Through seeds	D
25	Aphanamixis polystachya	Pithraj/ Harin	Meliaceae	Jul	Slow growing		Through seeds	E
26	Areca catechu	Betel nut tree	Palmae	Nov-Jan	Slow growing	T	Through seeds	E
27	Artocarpus lakoocha	Monkey	Urticaceae	Mar-Apr	Fast	T	Through seeds	D

Sr. No.	Scientific name	CN	Family	FS	GR	S/T	R	E/D
		javal Dahia			growing			
36	Azadirachta indica	Neem tree	Meliaceae	Jan-Mar Aug-Sep	quick growth after 5 years	T	Through seeds	E
37	Bauhinia racemosa	Jhule/ Ingalichada	Caesalpiniaceae	April-Jun	Fast growing	T	Through seeds	L
38	Bambusa arundinacea	Bhamy bamboo/ Bandu	Poaceae	—	Fast growing	S	By cuttings	D
39	Bambusa vulgaris	golden bamboo/ Sunbracad	Poaceae	—	Fast growing	S	By cuttings	D
40	Bougainvillea glabra	Indian paper/ Hirwa	Bougainvillaceae	Mar-May Sep-Oct	Fast growing	T	Through seeds	L
41	Bauhinia acuminata	Kunchan	Caesalpiniaceae	Jun	Fast growing	S	Through seeds	D
42	Bauhinia purpurea	Khairwal	Caesalpiniaceae	Sep-Nov	Fast growing	T	Through seeds	D
43	Bauhinia racemosa	Apta/ Ambadi	Caesalpiniaceae	Mar-Jun	Fast growing	Small tree	Through seeds	D
44	Bauhinia variegata	Seralu	Caesalpiniaceae	Sep-Nov	Fast growing	T	Through seeds	D
45	Bauhinia vahlii	Keemar	Caesalpiniaceae	Nov	Fast growing	T	Through seeds	D
46	Bischofia javanica	Bhutkeli/ Limgal	Bischofiaceae	Apr-Sep	Fast growing	T	Seed/ cuttings	SD
47	Bougainvillea spectabilis	Bougainvillea	Nyctaginaceae	Round the year	Fast growing	S	Cuttings	E
48	Bridelia squamosa	Khajri	Euphorbiaceae	May-Oct	Fast growing	T	Seed/ root suckers	D
49	Brownea coccinea	Rose of Venezuela/ Jungli Gulab	Fabaceae	Aug-Nov	Fast growing	T	Seeds/ cuttings/ air-layering	D
50	Butea monosperma	Palas/ Khakra	Papilionaceae	Jan-Mar	Fast growing	T	Seed/ root suckers	F
51	Callistemon citrinus	Bottle brush	Myrtaceae	Round the year	Slow growing	Small tree	Seed/ Cuttings	-
52	Canthium parviflorum	Pavanya	Rubiaceae	Dec-Jan	Slow		Through seeds	E

Sr No.	Scientific name	CN	Family	FS	GR	S/T	R	E/D
	ytum				growing			
45	Cuscuta glomerata	Glomerate Swallow wort	Asclepiadaceae	Feb-Jul	Fast growing	S	Seeds/ Cuttings	E
46	Calotropis procera	Akanda/Aak	Asclepiadaceae	Dec	Fast growing	S	Seeds/ Cuttings	E
47	Carissa carandas	Karamunda/ Amb	Apocynaceae	Mar-May	Fast growing	S	Seeds/ root suckers	-
48	Cassia fistula	Golden showers/ Sunari	Caesalpiniaceae	Mar-May	Fast growing	T	Seeds/ suckers	D
49	Cassia javanica	Apple blossom cassia	Caesalpiniaceae	May-Jun	Fast growing		Through seeds	D
50	Cassia pumila	Yellow cassia	Caesalpiniaceae	-	Fast growing	T	Through seeds	E
51	Cassia renigera	Pink cassia	Caesalpiniaceae	May-Jun	Fast growing	T	Through seeds	D
52	Casuarina equisetifolia	Iron wood tree	Casuarinaceae	Aug-May	Fast growing	T	Through seeds	E
53	Ceiba pentandra	Kapok	Bombacaceae	Mar-Jul	Fast growing	T	Through seeds	D
54	Citrus aurantium	Limon/ Nibu	Rutaceae	Sep-Nov	Fast growing		Cutting/ grafting	E
55	Citrus limon	Kagzi nimbu	Rutaceae	Nov-Jan	Slow growing	S	Cutting/ grafting	C
56	Clerodendrum infortunatum	Bhent	Verbenaceae	Oct-Jan	Fast growing	S	Seeds/ Cuttings	E
57	Cocos nucifera	Coconut tree	Arecaceae	Round the year	slow growing	T	Through seeds	E
58	Combretum indicum	Dasmul/ Indian chem	Combretaceae	Mar-Apr	Quick after 1st year	T	Seeds/ Cuttings	E
59	Delonix elata	Shisham	Fabaceae	Mar-Apr-Jun	Quick after 1st year	T	Seed, root/stem cuttings	E
60	Dracaena reflexa	Gulmohur	Caesalpiniaceae	Apr-Jun	Fast growing	T	Seeds/ Cuttings	D
61	Dracaena sanderiana	Solid Bamboo/ Sahibansa	Polygonaceae	-	Fast growing	S	Seeds/ stem/ branch cuttings/ layering	D
62	Duranta erecta	Pungam/ Kanak	Fabaceae	Apr-Jun	Fast growing	T	Through seeds	-
63	Elaeocarpus	Saaraj/	Rhizophoraceae	Dec-Apr	Slow		Seeds/ root	D

Sr. No.	Scientific name	CN	Family	FS	GR	S/T	R	E/D
	melanoxylon	Sandu			growing		suckers	
64	Drypetes roxburghii	Putranjiva	Euphorbiaceae	Mar-May	Slow growing	T	Through seeds	E
65	Delonix elata	Sky flower	Caesalpiniaceae	Round the year	Fast growing	S	Through seeds	E
66	Emblica officinalis	Amla	Euphorbiaceae	Jun-Jul Feb-Mar-May	Fast growing	T	Seed/ cutting/ budding/ inarching	D
67	Erythrina suberosa	Gaab	Fabaceae	Mar-May	Fast growing		Through seeds	D
68	Erythrina variegata	Indian coral tree	Fabaceae	Feb-May	Fast growing	T	Seed/ stem Cuttings	D
69	Eucalyptus citriodora	Lemon scented gum	Myrtaceae	Feb Apr. Oct-Dec	Fast growing		Through seeds	L
70	Eucalyptus hybrid	Mysore gum	Myrtaceae	Feb-Apr Oct-Dec	Fast growing	T	Through seeds	E
71	Ficus benjamina	Benjamin tree	Moraceae	Apr-Jun	Fast growing	T	Seeds/ Cuttings	L
72	Ficus glomerata	Dumar	Moraceae	Apr-May	Fast growing	T	Seeds/ Cuttings	F
73	Ficus glomerata	Dimro	Moraceae	Aug Oct. Dec Feb	Fast growing	T	Seeds/ Cuttings	D
74	Ficus religiosa	Peepul tree	Moraceae	Jun-May	Slow in earlier stages later fast growth	T	Seeds/ Cuttings	F
75	Grewia asiatica	Phalsa/ Pherasaki	Tiliaceae	Apr-Jun	Fast growing	T	Through seeds	E
76	Hibiscus rosa-sinensis	Indian/ Chinese hibiscus	Malvaceae	Round the year	Fast growing	T	Cutting/ grafting	F
77	Holoptelia integrifolia	Indian Elm/ Dhaman	Ulmaceae	Feb-Apr	Fast growing	T	Seeds/ stem cuttings	D
78	Ixora coccinea	Rangan	Rubiaceae	Round the year	Fast growing	T	Cutting	E
79	Kigelia africana	Sausage tree	Bignoniaceae	Mar-Jun	Fast growing	Small tree	Through seeds	F
80	Lagerstroemia	Pulodi	Lythraceae	Apr-Jun	Fast	T	Through seeds	E

Sr. No.	Scientific name	CN	Family	FS	GR	S/T	R	E/D
	spurinsa	Queen crepe myrtle			growing			
81	Lun ena camara	Wild sage	Verbenaceae	Round the year	Fast growing	S	Seeds/ Cuttings	C
82	Lawsoniainermis	Henna/ Mehndi	Lythraceae	Apr-Jul	Fast growing	S	Seeds/ Cuttings	E
83	Madhuca longifolia	Mahwa/ Mahula	Sapotaceae	Feb-Apr	Fast growing	T	Through seeds	D
84	Mangifera indica	Mango tree/ Aam/ Aamri	Anacardiaceae	South: Jan-Mar North: Feb-Apr	Quick growing taller in year	T	Seeds/ inter-planting/ grafting/ budding/ air-layering/ root-cutting/ suckering	L
85	Moringa oleifera	Drumstick tree/ Sajna	Moringaceae	Jun-Aug	Fast growing	T	Seeds/ Cuttings	D
86	Mallotus philippensis	Kamala	Euphorbiaceae	Jun-Oct	Fast growing	S	Seeds/ Cuttings	C
87	Nerium indicum	Pink oleander	Apocynaceae	Round the year	Fast growing	S	Cutting	F
88	Nyctanthes arbortristis	Parijat/ Harsingar	Oleaceae	Round the year	Fast growing	S	Seeds/ Cuttings	D
89	Ougeinia oojeinensis	Sandan/ Bandan	Fabaceae	Feb-May	Fast growing	T	Seeds/ Cuttings	T
90	Peltophorum pterocarpum	Copper pod tree	Caesalpiniaceae	May-Sep	Fast growing	T	Through seeds	E
91	Phyllanthus acidus	Harfarauri	Euphorbiaceae	Feb-May	Fast growing	T	Seeds/ Cuttings/ Buddings	D
92	Pithecellobium dulce	Vilayati imli	Mimosaceae	Jun-Feb	Fast growing		Seeds/ branch cuttings	F
93	Polyalthia longifolia	Devdar	Annonaceae	Apr-Jun	Fast growing	T	Through seeds (Fresh)	C
94	Prosopis chilensis	Sherry/ Vilayti	Mimosaceae	Dec-Apr	Fast growing	T	Seeds/ root suckers	F
95	Psidium guajava	Amrud	myrtaceae		Fast growing	T	Seeds/ Cutting/ grafting/ budding	F
96	Ricinus communis	Castor/ Erandi	Euphorbiaceae	Sep-Oct	Fast growing	S	Through seeds	E

Sl. No.	Scientific name	CN	Family	FS	GR	S/T	R	E/D
97	Schleichera oleosa	Indian Lac tree/ Kusum	Sapindaceae		Fast growing	T	Cutting	D
98	Senna siamea	Kakatik	Caesalpiniaceae	Dec-Mar	Fast growing	T	Through seeds	D
99	Sesbania grandiflora	Swamp pea/ Agasthi	Fabaceae	Sep Dec	Fast growing	T	Through seeds	L
100	Sesbania sesban	Common sesban/ Jayanthi	Fabaceae	Aug Dec	Fast growing	S	Through seeds	F
101	Soymida febrifuga	Indian redwood/ Soham	Meliaceae	Mar	Fast growing	T	Through seeds	D
102	Stereospermum chelonoides	Padri/ Padri	Bignoniaceae	Mar-May	Fast growing	T	Through seeds	D
103	Strychnos nux-vomica	Asthan/ Kanjiram	Loganiaceae	Mar-Apr	Fast growing	T	Through seeds	D
104	Syzygium cumini	Jamun/ Njaval	Myrtaceae	Mar-May	Fast growing	T	Seeds/ Cuttings/ grafting/ budding	E
105	Tamarindus indica	Tamarind/ Puli	Caesalpiniaceae	Apr Oct	Fast growing (Bold)	T	Through seeds	F
106	Tectona grandis	Teak/ Thegu	Verbenaceae	Jun Sep	Fast growing	T	Through seeds	D
107	Terminalia alata	Laurel/ Ashuja	Combretaceae	May-Jul	Fast growing	T	Seeds/ Cuttings	D
108	Terminalia arjuna	Arjun/ Arjuna	Combretaceae	Apr-Jul	Fast growing		Seeds/ Cuttings/ air-layering	D
109	Terminalia bellirica	Baheda/ Thani	Combretaceae	Apr-May	Fast growing	T	Seeds/ Cuttings	D
110	Terminalia chebula	Kumil/ Kadukka	Combretaceae	Mar Oct	Fast growing		Through seeds	D
111	Thevetia peruviana	Yellow oleander/ Manjaneriyan	Apocynaceae	Round the year	Fast growing	S	Seeds/ Cuttings	E
112	Tieghemella heckelii	Chemmaram tree/ Mukkala	Linaceae	Round the year	Fast growing	T	Seeds/ cuttings	F
113	Toona ciliata	Indian	Cedrelaceae	Apr Oct	Fast	T	Through seeds	E

Sr. No.	Scientific name	CN	Family	FS	GR	S/T	R	E/D
3		jujube/ Ber/Bor			growing			
114	Ziziphus oenoplia	Jackal jujube/ Kankerkoli	Rhamnaceae	Apr-Jun	Fast growing	Shrub or shrub	Throughout	E
115	Zizyphus xylopyra	Kathber/ Gotebor	Rhamnaceae	Apr-Jun	Fast growing	Shrub or shrub	Throughout	D

Ex: CN: Common Name, FS: flowering Season; GR: Growth Rate; R: Regeneration; S: Shrub; T: Tree; E/D: Evergreen/ Deciduous; S/D=Semi-deciduous; South: South India; North: North India

4.5.1.3. Supporting Fire Protection Squad:

Expanded incidences of forest fire cover width of their kind and severity. Forest fires caused due to anthropogenic activities or by negligence seriously affect the ecological balance in an ecosystem or habitat. It needs to be ensured that the boundary has up to 10 m width is cleared and maintained all along every type of forest boundary like RF, PF, DLCs etc. Additionally, 5 m width subsidiary fire lines may also be made along the principal kaccha paths on both the sides. The fire protection squad (FPS) should work in close coordination with local villagers or VSS volunteers. The FPS should be well equipped with mobile phones for communication, firefighting equipments etc. and should have received proper training. The project proponent proposes to support the cost expenses required for engaging one number of firefighting squads.

The firefighting squad should have been provided with basic firefighting equipment's which may include axe, spade, knapsack sprays, shovels, pit hooks, drinking water in chagal bottles, food packets and communication equipments including first aid kit. For any time mobility of the squad a four wheel drive vehicle is also required. The project proponent aims to provide support for need of one single squad unit.

4.5.1.4 Training & Awareness

Mock drills at regular intervals are required for ensuring professionalism in the services of the firefighting squad. The local villagers, VSS volunteers, grass root level forest officers and the fighting personnel are to be trained on various aspects of detection, communication, information and overall work and means of different firefighting techniques or site suited to the movement, fire safety measures, techniques of counter fire etc. need to be taught. For the suppression operations viz. extinguishing, smothering logs, covering ground of fire, fire mapping, evaluation of assistance to fire etc. are also to be taught. The project proponent proposes to support this.

4.5.1.5 Measures to prevent diseases to wild animals

Grazing by domestic animals in the wildlife habitat has to be controlled by sensitizing the local communities and VSS volunteers. The local villagers are to be motivated to rear high yielding milching cows / buffaloes for which stall feeding will be necessitated in place of free grazing in the forest. The domestic cattle population in the surrounding area should be given immunizations at regular intervals so as to prevent spread of any cattle borne diseases to wild animals.

4.5.1.6 Infiltration & Recharge:

Nowadays it has become a common phenomenon that people are complaining on the perennial wells becoming seasonal only or the discharge of wells becoming lesser in perennial rivers year after year. It happens because of the soil erosion, immediate run off, and/or less percolation for water infiltration etc. in the mountain ranges or forest areas where origin of many of the rivers lies. So, in order to increase the quantity of discharge of water in the water bodies it is essential that we have to take measures to ensure infiltration of water in the soil in forests areas/ areas with high slope. For this, the construction of subsurface dykes is the recommended one nowadays. Size of an ideal sub surface dyke is length 20 mt, width 50 mt, depth 2 mt, depth level 0.03 m and capacity 10 liters per capita per day (10 lpcd). The subject proponent will processes to support this.

4.5.2 Wildlife Protection and anti-depredation

4.5.2.1 PROVIDING PORTABLE CABINS/ CAMP SHED/ TRACKER FOR ELEPHANT TRACKING:

The elephant movement can be tracked using

(i) Open collar elephant tracker to ensure speedy action on elephant depredation activities encountered with

(ii) Portable cabins/ camp shed must be available on places of frequent elephant movements. The proposes to support this activity.

4.5.2.2 Fencing of open wells without side walls

There are instances of elephants and their cubs being trapped and/or accidentally fall into open wells but do not have permanent side walls. PP proposes to support providing fencing around such unwalled open wells.

4.5.2.3 Animating Warning & Wading system:

This is an advanced technique of acoustic deterrent of the presence of elephant even in noisy environments. The communication of elephants with one another is in a low frequency sound that can travel several kilometers. This sound of elephant is called rumble, which may be lying in infrasound band. It is a harmonic sound energy with a fundamental frequency

range of 15-35 Hz lasts for a known duration of 0.5 - 5 seconds. The acoustic detection of elephants by their call is currently the most advanced approach enabling an early warning system. It helps to deter the presence of elephants in large areas.

The system involves the utilization of two PIR (Passive Infra-Red) sensors and two vibration sensors. The two vibration sensors have different operating range (say 20m, 15m etc.). When elephant movement causes heavy vibration, and is sensed within 20 m, first step of sensor electrical pulses. It is then compared with threshold value, and if it matches, the powerful flashing lights are activated. This in turn may drive back the elephant. Due to this, the vibration sensors will turn off the flashing light.

On the other hand, either if the first sensor doesn't work OR if the elephant continues in its path without looking for the light, the second vibration sensor gets activated once it is within its range and send the electrical pulses. If it matches with the same threshold value, it activates three PIR sensors which in turn activates the sound system that may produce beats sound and with the help of GSM, messages are also sent to village representatives and the forest department and makes everyone alert. If the bee sound drives the elephant back into the forest, then messages are again sent to forest department that the elephants are not in human settlement area.

The acoustic fence intrusion system is used to detect the intrusion of elephant using fences which separate human and wildlife habitats. A network of sensors is used here to detect any locale damages instantly and alert communities under threat via the mobile communication network. The PF proposes to support usage of the advanced technology to watch closely the wild elephants from encroachments from village areas to their habitat forest areas.

4.5.2.4 Rescue van with animal trap crates:

Due to the flourishing and growth of industrial & mining activities in and around mining clusters and further net effect of population explosion both in urban and semi-urban areas shall finally result in fragmentation of wildlife habitat. This will in turn lead to the straying of wild animals in human habitation. In such circumstances, it is necessary to have medium sized rescue vans with 2-4 units of trap crates, necessary tools and instruments for the purpose. Additionally, some snake catchers, crates and tools are also required to trap poisonous snakes and/or python etc., and to release them into their natural habitat to avoid human-animal conflict. The proposes to support this activity.

4.5.3 IEC activities

IEC refers to Information Education and Communication. For the effective and successful implementation of any campaign, the involvement of local people is necessary. For wildlife conservation also, it is required. But, for getting the active involvement of the local people in

the campaign. They should, first of all, know the importance of wild animals as well as their role in keeping the biodiversity intact and which in turn keeps up the livelihood of mankind. In order to execute the awareness activities there with mainly two steps are required.

4.5.3.1 Educating the community:

The initial step towards it is to educate the rural community particularly the young generation and rural communities located in core and buffer zones on the actual importance of wildlife and the need to protect them for our own livelihoods and sustainable existence. They are to be taught as to why to protect forest and wildlife from fire, illegal felling and also on what to do if human life or crops is suspected. They should also be taught on the issues that the mankind are likely to face if the encroachment, shifting cultivation, grazing etc. are uncontrolled in these areas.

(i) Conducting awareness camps: It shall include (a) an awareness component and outlay components aiming to educate the public especially the young generations on the importance of wildlife, need to protect them, issues mankind may face due to encroachment, poaching etc.

(ii) Providing grain bin: It is proposed to provide 200 grain bins, metallic corrugated steel or appropriate structures of equal to the locally for storing dry grains that can be used for human consumption as well as animal feed.

(iii) Strengthening GIS cell: It is proposed to provide essential equipments like plotter, printer etc. as per requirement for effective functioning of GIS cell.

4.5.3.2 Hoardings, signages, wall writings, competitions etc.

Awareness should be made not only with help of camps, public gatherings, drama schools, drawings but also through print & visual medias including online platforms. Posters, wall writings, street plays, drawing/essay writing/ elocution competitions by students, documentary shows etc. may also be used for it. Students may be motivated to participate documentaries on these aspects. All important national and international days related to environment may be celebrated suitably with the involvement of the people, and in every case knowledgeable person among the community may also be used to interact with the community on the significance of nature & wildlife conservation and the ways and means of participation and the people can do towards it. The FF proposes in principal these

4.5.3.3 Monitoring & Evaluation

For the effective implementation of the proposed schemes and for its successful outcomes, continuous monitoring is required. It requires monitoring, mapping, physical assessments, collective decisions or other interactions or guidance from veterans in the field of forestry also. It includes the following and the FF proposes to support these activities (viz.

4.5.3.4 Monitoring Cell:

It may be under the direct control of the concerned DCF of the area of jurisdiction wherein mineral forestry professional shall also be members. The expenses for this monitoring cell

including the establishment costs and software etc., as is required and for which the undertaking cell shall be handed.

4.5.3.5 **Vehicle for mobility:**
For ensuring the mobility of the members for the assigned purpose, a vehicle may be provided wherein the maintenance cost may be met from the corpus fund meant for its activity.

4.5.3.6 **Corpus fund:**
A corpus fund is required, not only for meeting the maintenance cost of the vehicle but also to support the victims of man animal conflict as per policy by the elephant depredation compensation fund.

4.5.3.7 **Inter departmental coordination:**
Many Government departments like Agriculture, Community Development, Education, Health & Family Welfare, Horticulture, Local Self Government, Rural Development, Soil conservation, Tribal welfare etc. and Gonda Panchayats are working in these said areas. Effective inter departmental co ordination is required for the success of all these suggested programs. A District Level Coordination Committee (DLCC) under the Chairmanship of the District Collector is in place. Implementation of some of the proposed activities may require the involvement of other departments like Veterinary, Agriculture etc. which is required including the activities of DLCC also. The CF proposes to work in tune with it.

4.6 COMPREHENSIVE CONSERVATION PLAN FOR SCHEDULE I SPECIES

4.6.1 Conservation of Asian Elephant (Elephas maximus):

Ecology & Habitat

The Asian elephant is one of the few mega herbivores still on earth. They feed on a variety of plants that may vary depending upon the habitat and season. Elephants appear to preferentially feed on monocots (Campos Arceiz and Blake, 2011), Elephants especially favour species of Poaceae (English et al. 2014). Usually they inhabit grasslands, evergreen- moist deciduous- dry deciduous and thorny forests in addition to cultivated and secondary forests or scrublands. They may spend up to 14-19 hrs. a day feeding. elephants are seen from sea level to more than 3000 m ASL in the Eastern Himalayas (Choudhury 1999). Because of being an inhabitant in a wide variety of habitats, the optimal suitable habitat for elephants is still unknown. Elephants can range over large areas, and as a result, elephants disperse seeds over longer distances and hence responsible for shaping and maintaining plant biodiversity within ecosystems (Campos Arceiz et al 2008, 2011). Earlier, the home range of elephants depended on the availability of forage and also on the availability of water for drinking, bathing and wallowing. But nowadays, the home ranges are being influenced by the level of disturbance and other developmental activities like roads, fences, cut slopes etc.

Because of their large area requirements, elephants are considered as 'Umbrella species', and

hence. Its conservation will protect a large number of other species occupying the same area. They can be said as 'flagship species' because of its cultural and touristic importance and as "keystone species" because of their significant ecological role and impact over environment.

Habit	Type	Suitability	Major Importance
Trees	Sub-tropical/ Tropical Dry	Suitable	Yes
	Sub-tropical/ Tropical Moist Deciduous	Suitable	Yes
	Sub-tropical/ Tropical Moist Evergreen	Suitable	Yes
Shrubland	Sub-tropical/ Tropical Dry	Suitable	Yes
	Sub-tropical/ Tropical Moist	Suitable	Yes
Grassland	Sub-tropical/ Tropical Dry	Suitable	Yes
Artificial/ Terrestrial	Sub-tropical/ Tropical Seasonally Wet/ Flooded	Suitable	Yes
	Artificial/ terrestrial Plantations	Marginal	
	Sub- tropical/ Tropical heavily degraded former forest	Marginal	

Threats& Challenges

The main challenges that elephant conservation strategies in many elephant range states are facing are habitat loss and fragmentation, human elephant conflict, poaching and the illegal trading of these. In addition to the case of ivory, indiscriminate killing of elephants of both sexes for skin trade which is being used to make beads that are worn as bracelets and necklaces, sold as good-luck charms. The habitat fragmentation has further happened because of the linear intrusions like railway lines, power transmission lines, highways cutting through their habitats. Protection of existing elephant corridors has become the need of the hour nowadays for

conservation of elephants. Poaching and elephants are inherently coming in conflict with local villagers as usual habitats are either being converted to agricultural cultivated lands and plantations and/or mined sector construction of dams, power generating stations or fragmented by roads, roads, powerlines etc.

Threats			Scope	Its impact & target		Impact score	Severity
1. Residential & commercial dvpt	Housing & urban areas		Majority (50-90%)	Ecosystem conversion	Ecosystem conversion	Medium 7	Rapid decline
					Ecosystem degradation		
				Species stress	Species displacement		
	Commercial & industrial areas		Minority (<50%)	Ecosystem conversion	Ecosystem conversion	Low 5	Slow significant decline
					Ecosystem degradation		
				Species stress	Species displacement		
2. Agriculture & Aquaculture	Annual & perennial non-timber crops	Shifting cultivation	Minority (<50%)	Ecosystem stress	Ecosystem conversion	Low 5	Slow significant decline
					Ecosystem degradation		
		Small holder farming	Majority (50-90%)	Ecosystem stress	Ecosystem conversion	Medium 7	Rapid decline
					Ecosystem degradation		
		Agroindustry farming	Majority (50-90%)	Ecosystem stress	Ecosystem conversion	Medium 7	Rapid decline
					Ecosystem degradation		
	Wood & Pulp plantations	Agro-forestry plantations	Majority (50-90%)	Ecosystem stress	Ecosystem conversion	Medium 7	Rapid decline
					Ecosystem degradation		
	Livestock farming & ranching	Small scale grazing, ranching or farming	Minority (<50%)	Ecosystem stress	Ecosystem conversion	Medium 7	Rapid decline
					Ecosystem degradation		
3. Energy production & mining	Mining & Quarrying		majority (>90%)	Ecosystem stress	Ecosystem conversion	Medium 7	Slow decline
					Ecosystem degradation		
4. Transportation & service corr.	Roads and railroads		Majority (50-90%)	Ecosystem stress	Ecosystem conversion	High 8	Very Rapid decline
					Ecosystem degradation		
	Hunting & trapping terrestrial	Intentional use of species in the wild	Minority (<50%)	Species stress	Species mortality	Medium 7	Rapid decline
		Unintentional	Minority	Species	Species	Low	Slow

Threats			Scope	The Impact & Target		Impact score	Severity
1. Ecosystem vulnerability	Climate change	Climate change effects (Species is not the target)	Pervasive (71-100%)	Species decline	Species mortality	5	Significantly declining
		Temperature variation	Pervasive (71-100%)	Species decline	Species mortality	Slight Increase	Very Rapid declining
	Habitat loss & Habitat fragmentation	Habitat loss (unknown/ unspecified)	Restricted (11-30%)	Ecosystem decline	Ecosystem degradation	Medium Increase	Rapid declining
2. Human-wildlife conflicts	Crop & Property depredation	Increase in the frequency / intensity	Majority (50-90%)	Ecosystem decline	Ecosystem degradation	Medium Increase	Slow significant declining
	Human & wildlife interactions/ Attacks	Attacks	Majority (50-90%)	Ecosystem decline	Ecosystem degradation	Medium Increase	Slow significant declining
		Unnatural deaths	Majority (50-90%)	Ecosystem collapse	Ecosystem degradation	Medium Increase	Rapid declining
	Other ecosystem modifications		Restricted (11-30%)	Ecosystem collapse	Ecosystem degradation	Low Increase	Slow significant declining
3. Invasive and other problematic species, genes & diseases	Invasive non-native/ alien species/ diseases	Unspecified species	Majority (50-90%)	Species decline	Species distribution	Slight Increase	Very Rapid declining
	Problematic native species/ diseases	Unspecified species	Pervasive (71-100%)	Species decline	Species distribution	Increase	Unknown
4. Climate change & severe weather	Habitat shifting and alteration		Whole (>90%)	Species decline	Species distribution	Increase	Slow significant Declining

Source: https://www.iucnredlist.org/species/7140/45818288#conservation

Conservation activities & actions needed/ proposed:

The key components and activities that are suggested for the Asian elephant (*Elephas maximus*) are:

- Maintaining elephants' genuine and natural habitat and human mediated its connectivity by securing corridors.
- Managing human elephant conflict as part of an integrated landscape scale landuse policy.
- Continuous monitoring of law enforcement and identifying the obstacles faced by it, if any.

for effective enforcement.

- Improving and further enhancing field sensitizing and capacity building modules by involvement and/or other relevant projects.
- Conducting regular surveillance on intervention at specific sensitive interaction areas to assess the success or failure of conservation interventions, and thereby preparing for adaptive conservation techniques.

- Associating with the MIKE (Monitoring the Illegal Killing of Elephants)
- Associating with Haathi Mere Saathi campaign that aims at increasing public awareness and developing friendship and communication between local population and elephants.

- Working in collaboration with the Compaign of Mahout Cooperative focuses on various groups which include local people near elephant corridors, youth, policymakers and others. To achieve the visions to set up elephant control over the entire life in the elephant landscapes. It aims to spread awareness about the plight of elephants and promote peoples participation in addressing these issues.

- Supporting the activities of the Elephant task force (ETF) which was constituted by the Ministry of Environment and Forest has recommended the campaign of Tuke Gajah (The elephant is the Pride (the people)) in order to increase public awareness and their participation in the conservation and welfare of the elephants.
- Promoting R&D activities in conservation techniques aiming at adaptive conservation innovative techniques.

Sr. No	Area of interest	Activity required	Level of management
1	Forest/ Habitat protection	Site/ area protection	Local level
		Resources/ habitat protection	Forest/ State level
2	Forest/ Habitat Management	Site/ Site management	Local level
		Habitat/ Animal/ process restoration	Local level
3	Species Management	Human/ Management	Local level
		Trade/ Management	State/ National level
4	Education & Awareness	Training	State level
		Awareness & Communication	State level (primary school level)
5	Legal Policy	Compliance of Rules/ Acts	National/ State/ Local level

6	Research & Development	Taxonomy	Wildlife wing of the State Forest Department
		Population size, distribution & trends	Wildlife wing of the State Forest Department
		Harvest, use & livelihoods	Community interviews
		Threats	Community/ local stakeholder level
		Actions	Community/ local stakeholder level
7	Monitoring	Implementation	State level

4.4.2 Conservation of Indian Pangolin (*Manis crassicaudata*):

Ecology & Habitat:

Pangolins usually named as scaly anteaters are the only known true scale bearing mammals of the world. They lead a secret life and are nocturnal and shy creatures. Except during mating, they always lead a solitary life.

Pangolins are insectivorous mammals that feed on eggs, larvae and adults of ants and termites thereby acting as biological pest controlling agents. They don't have any teeth but use their long sticky tongue for feeding on these insects. During day time, they will remain inactive and shall hide in their burrows. In case they sense any predators in their vicinity, they will roll their body to form a ball like structure. For defence, their anal glands secrete strong odour.

Habit	Type	Suitability	Major importance
Forest	Sub-tropical/ Tropical Dry	Suitable	Yes
	Sub-tropical/ Tropical Moist Lowland	Suitable	Yes
Savanna	Savanna – Moist	Marginal	

Shrubland	Sub-tropical/ Tropical Dry	Suitable	Yes
	Sub-tropical/ Tropical Moist	Suitable	Yes
Grassland	Sub-tropical/ tropical Dry	Suitable	Yes
Artificial/ Terrestrial	Artificial/ terrestrial Plantations	Marginal	
	Sub tropical/ Tropical heavily degraded former forest	Marginal	

Threats & Challenges:

The Indian Pangolin is under threat due to over exploitation through hunting and poaching for both its meat and scales that are used and consumed on a local subsistence level but it is increasingly by illegal international trade. Pangolin's meat is used as a source of protein and its scales are being used in whole or powdered form in the preparation of traditional medicines. These are the most trafficked mammals in the illegal wildlife trade. The scales are also used in the manufacture of boots but at poor pockets also.

In addition to the above, some other threats also exist and they are the expansion of agriculture to more areas mainly facilitated by pangolins and thereby the disturbance/loss of their ecosystem, that is habitat loss and degradation that are likely to open up formerly inaccessible areas to hunting and poaching. The extensive use of pesticides and road kill are also reported as the cause of loss of these species.

Conservation activities & actions needed/ proposed:

The Indian Pangolin is listed in the CITES Appendix I and is a protected species in all the range states. It further requires protection enforcement of these enactments. The species is now banned in many of the protected areas. Further, complimentary interventions are required especially on consumer behaviour change in key markets promoting poaching and trafficking. Further local community people to be engaged at key sites where the illegal trafficking is likely to happen.

Research is also required specially to find out the ways and means to be later so that the species can live and the protected human resource stay from poaching and trading.

Sr. No	Area of Interest		Activity Required	Level of Management
1	Land/ Water management		Site/ area protection	Local level
			Resource/ habitat protection	Local/ State level
2	Species Management	Species Management	Harvest Management	Local level
			Trade Management	State/ National level

Sn No	Area of Interest		Activity Required	Level of Management
		Ex-situ conservation	Captive breeding/ artificial propagation	State level
2	Education & Awareness		Training	With appropriate authorities, including protected area management, wildlife, CITES and customs agencies.
			Awareness & Communication	Needed at the local community level and among relevant agencies and stakeholders including protected area management, wildlife, CITES and customs agencies.
4	Law & Policy	Legislation		National level
		Compliance & Enforcement	Compliance with CITES and its adopted provisions including Res. Conf. 17.10 on conservation of and trade in penguins.	International level
			Compliance with CMS and its adopted provisions including Res. Conf. 17.6 on conservation of and trade in penguins.	National/ State/ Local levels
5	Research & Development on		Population size distribution & trends	Micro watershed level
			Life history & Ecology	Habitat/ Ecosystem level
			Conservation & livelihoods	Community wise level
			Threats	Community/ local/ global/ national level
6	Conservation planning		Species action/ recovery plan	State level

Sr. No	Area of Interest	Activity Required	Level of Management
		Harvest & trade management plan	State level
7	Monitoring	Population trends	State level
		Trade trends	State/ National level

4.6.3 Conservation of Sloth Bear (Melursus ursinus):

Ecology & Habitat:

Sloth bears survive primarily on termites, ants and fruits. They are the only species of bear adapted specifically for myrmecophagy (ant and termite eating) (Garshelis et al 1999). It is endemic to Indian subcontinent and it has discontinuous distribution. Sloth Bear populations have declined and its range has shrunk over the past century primarily due to habitat loss. Though it is in the lower risk category of the IUCN, its numbers are declining mainly due to loss of habitat. Wildlife Conservation Society-India Program and the Centre for Wildlife Studies are working on developing distribution maps of the endangered species in India. Basu et al (2015) have identified the critical habitat of Sloth bear and suggested linking critical habitat of sloth bear with Mahanadi primus for their conservation in Angharmalai hills, Western Ghats, India. Sloth bear generally in remote will in the forest area, but occasionally intrudes within the village area. This is mainly due to the Mahua flower, because Mahua trees are most common around the village areas. Sloth bear occupies a wide range of habitats including scrublands and grasslands where boulders and scattered shrubs and trees provide shelter. The most common shelter is often a cave-like structure generally in rocks. Sloth bears avoid areas where human disturbance is high, however the bear raid peanut, maize and fruit crops. Sloth bears like to escape from the heat of the day and forage for food at night. They will start to become active as the sun starts to set. This is also the time when many insects such as termites are more active.

Threats & Challenges

Major threats to this species are habitat loss, poaching and conflicts. Habitat loss is mainly due to overharvesting of forest products, expansion of agriculture areas, human settlements and roads. Poaching is mainly for the commercial trade in bear parts. Encounters resulting in conflicts between people and sloth bears occur mainly where the habitat has become severely degraded but still being used by both. The only natural enemy to sloth bears are tigers and possibly leopards. Bear parts are valuable commodities in the trade for traditional medicines. Incentives for killing bears are therefore high. The sloth bear is more inclined to attack when unprovoked than almost any other animal. Major incidences occur during the mahua flowering season. Persons going only to collect the flower encounter the animal frequently sometimes the bear remain sleeping but the man after collecting large amount of mahua flower and is one of the major causes of man bear conflicts. Persons going to the forest for the collection of wood or other forest produce encounter the bear inadvertently resulting in conflicts.

Conservation activities & actions needed/ proposed

Sloth bear is listed in the CITES Appendix I and is a protected species under Schedule I of the Wildlife (Protection) Act, 1972.

- ✓ Education will help to reduce bear human conflicts and enhance conservation efforts in the mining leases.
- ✓ Habitat improvements would be helpful in alleviating conflicts.
- ✓ Planting of fruit trees may not only the species of ficus, because ficus species are not collected by man and bear or leopard diet is the primary.
- ✓ Promoting honey bees in the area will not only serve as food to the bear but also will help in warding off the elephant.
- ✓ Bee hive can be promoted easily to earn additional income. This will serve as important source of input diet and may compensate for the termites and
- ✓ Local communities may be encouraged to reduce dependency on resources needed by bears
- ✓ Villagers should growing crops that are favorable to bear not too close their homesteads.

4.6.4 Conservation of Indian Bison (Bos gaurus):

Ecology & Habitat:

Bison are usually confined to evergreen, semi-evergreen, and moist deciduous forest but may also be seen in dry shorea mix forest areas. Gaur habitat is characterized by large, relatively undisturbed forest tracts, hilly terrain below an altitude of 2000 m, wherever availability of water is plenty and wherever availability of forage in the form of diverse grasses including bamboo shoots, fruits, leaves etc. are abundant. It both grazes and browses, mostly eating young green grasses but also leaves, twigs and bark of various woody species, as well as some dry grasses and bamboos. It is able to maintain good condition on relatively low quality food. It may also feed on crops in cultivation, such as sugarcane, and young bamboo trees, sometimes causing great damage to cultivators.

Threats & Challenges:

The main cause of death of bison is said to be predation by Tigers. Firstly, bull is killed by tiger when fighting, and at occasions they are severely injured in fighting. Predation is by far the major cause of Gaur mortality, followed by disease. Poaching is also identified as a major issue, compounded by loss of suitable habitat, build of degradation and conversion is continually reducing the bison population. Temporary settlement made through traditional indigenous hunting which were often very difficult to get to and thus relatively free from hunting were previously the most at Gaur habitat.

Some Bison mortality due to the ingestion of agrochemicals and human conflicts especially while wandering in to agricultural fields and village habitations. Diseases, particularly rinderpest and foot-and-mouth disease transmitted by domestic cattle are a potentially serious threat. Foot-and-mouth is the most frequent, but rinderpest has had a

particularly dramatic impact in India and several subpopulations of Gaur were nearly destroyed as a result of the disease in 1956 (Karmon et al. 1972).

Conservation activities & actions needed/ proposed:

The Indian Bison is listed in the CITES Appendix I and is a protected species under Schedule I of The Wildlife Protection Act, 1972.

Sr. No	Area of Interest		Activity required	Level of management
1	Land/ Water protection		Wetlands protection	Local level
			Resources habitat protection	Local/ State level
2	Land/ water management		Shelterbelt management	Local/ State level
3	Species Management	Species management	Harvest Management	Local level
			Trade Management	State/ National level
		Species recovery	Captive breeding	State level
4	Education & Awareness		Training	With appropriate authorities, including protected area management, wildlife, CITES and customs officials
			Awareness & Communication	State/ Regional/ Village level
5	Law & Policy	Legislation		National level
		Compliance & Enforcement	Compliance with CITES and its adopted provisions	International level
			Compliance with CITES and its adopted provisions	National/ State/ Local levels
6	Research & Development		Population size, distribution & trends	Micro watershed level
			Threats, use & trade issues	Community/ micro level
			Results	Community/ local/ state/ national level
			Actions	
7	Monitoring		Population trends	State level

4.6.5 **Conservation of leopard cat (Prionailurus bengalensis):**

Ecology & Habitat:

Antelope calls occur in a wide range of habitats from tropical rainforest to temperate broadleaf as well as thick forest and succession grasslands. They can also be found close to rural settlements. They are excellent swimmers. Murids dominate their diet. Other small mammals, eggs and fish including domestic poultry may also be preyed upon. It is predominantly nocturnal in habit.

Threats & Challenges:

Leopard Cat skins were being exported in the 1980s. Although commercial trade is of less concern now, this species continues to be hunted throughout for fur, for food and as pets. They are also viewed as cattle pests and killed in retribution. Hybridization with domestic cats as shown by the popular crosses in breed, the Bengal Cat. Hybridization in the wild has been reported but is not considered a significant threat. Although this species is less dependent on forest cover than others, habitat loss and fragmentation is still a threat.

Conservation activities & actions needed/ proposed:

The Leopard Cat is listed on CITES Appendix II, and populations in Bangladesh, India and Thailand are included on Appendix I as Prionailurus bengalensis bengalensis. This species is protected at the national level over part of its range, with hunting prohibited in India also. It is found in numerous protected areas. A clearer understanding of the Leopard Cat's use of agricultural plantations and the effect of habitat disturbance is needed to make better plans for its conservation.

4.4.4 **Conservation of Four Horned Antelope (Tetracerus quadricornis):**

Ecology & Habitat:

Four horned Antelopes are restricted to forest habitats and grassland margins, and mostly occur in open, dry deciduous mixed forests in undulating or hilly areas and never far from water; they are solitary and exhibit the habit of browse and graze.

Threats & Challenges:

The major threat to the Four Horned Antelope species is habitat destruction through the clearance of scrub and forest for agriculture and/or encroachment leading to direct habitat loss and lack of connectivity between protected areas. Further, the threat is increased with the compounding effects of hunting and competition with livestock.

Conservation activities & actions needed/ proposed:

The Antelope species occur in many protected areas in India. It is legally protected by law on Schedule I of the Indian Wildlife (Protection) Act. Resource and habitat protection along with

enforcement of act will help to preserve the species.

4.8.7 Conservation of Indian Rock Python (Python molurus):

Ecology & Habitat:

This is a non-venomous snake and are very good swimmers and take to water when disturbed but on land, they like to remain motionless. The species is oviparous and lay up to 100 eggs in a clutch protected and incubated by the female. Being ectothermic, python body is open but can also raise body temperature by muscular contractions. Python occurs in wide range of habitats viz. rocky hill, grass lands, marshes, swamps, wood lands, open jungle. At times, they take refuge in mammal burrows, hollow trees etc. It has also been reported close to habitation and crop fields. It feeds on mammals, birds and reptiles but prefers the former. Chital, sloth bears, hares, mouse deer, jungle fowl etc. return items. 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 head first. Once held in jaw, prey cannot escape because of inward bent teeth.

Threats & Challenges:

They are not killed for meat but for skin in India. The main threat is due to fear of snakes. They are also killed when they attack sheep or goats etc. They are killed also in retaliation or out of fear when they enter habitation and capture goats or poultry. They are also illegally poached for their ornamental skin. Road kill is also very huge for Pythons as the cross roads slowly they are subject to death by fast moving vehicles.

Conservation activities & actions needed/ proposed:

Pythons are protected by law under Schedule I of the Wildlife (Protection) Act. Python's listed in Appendix II of CITES, but subspecies molurus is listed in Appendix I. In its range it occurs in many protected areas. According to the IUCN data, there is no immediate threat to the Python and hence they are placed in the lower risk category of NT. No workable or practically feasible in-situ conservation plan can be suggested for conservation of Pythons. The vehicle drivers shall be instructed to ensure safe road crossing by Pythons since road kill is one of the causes for the decline of Pythons.

The occurrence in the area is rare. Reports of its conflicts with human being are extremely rare. Public awareness is the most important method for its conservation. The people living in the surrounding area and employees of the company are motivated towards the protection of the animal. Motivation is leading to timely information to the concerned authorities about any threat to wild life or any cases of poaching/hunting. Further, more research is required to understand its biology, ecology, population status and trends.

4.6.6 Conservation of Flying squirrel (Petinomys/Hylopetes spadiceus):

Ecology & Habitat:

Flying squirrel is an arboreal and nocturnal species. It occurs in evergreen, deciduous and mixed forests. It may occupy tree cavities and holes. In slightly modified habitat like semi deciduous former evergreen areas also they may survive. It raises in plantations adjacent to forest area acceptable to them. They are social solitary nocturnal species.

Threats & Challenges:

Habitat loss due to expansion of agriculture, small wood plantations, mal-scale logging, infrastructure development and human settlements are considered as major threats. Harvesting for local consumption is considered as a major threat.

Conservation activities & actions needed/ proposed:

The species is not listed in the Schedule I of the Wildlife (Protection) Act, 1972. Taxonomic studies, site specific survey, ecological studies, population monitoring and habitat management are recommended for this species (Molur et al. 2005).

4.6.7 Conservation of Honey Badger/Indian ratel (Mellivora capensis):

Ecology & Habitat:

Honey Badgers are mainly nocturnal but may sometimes be active during the day times especially in areas where there is little human disturbance, and also during cooler day temperature seasons. They are opportunistic, generally carnivores, and feed on a range of prey items varying in size from small insects and mice to young ungulates. Even though they are primarily hunters of their own food, they may sometimes include food from other carnivores and will also scavenge from the kills of larger animals. All mammalian carnivores smaller than Honey Badgers are prey items. Large carnivores such as Lion (Panthera leo) and Leopard (Panthera pardus) prey on Honey Badger, while cubs are also killed by Black-backed Jackals (Canis mesomelas). Honey Badgers are normally solitary in nature.

Threats & Challenges:

Honey Badgers are used as bushmeat and in traditional medicine, and mostly they are directly persecuted "using snares/dead traps and poisons" by apiculturists and small livestock farmers. They are also indirectly killed by rodenticide, insecticide control programmes targeting other species, such as Jackals and Caracal. They have economically extinct in many areas through poisoning.

Conservation activities & actions needed/ proposed:

Commensal live damage from Honey badgers can be effectively reduced by securing bee hives 1 m or more above the ground on a stand or trestle thereby minimizing conflicts between Honey badgers and beekeepers.

4.6.10 Conservation of Mouse Deer/ Chevrotain (Moschiola indica):

Ecology & Habitat:

Mouse Deer is found in tropical peninsulas and moist evergreen and semi-evergreen forests, plains, and hillocks extending into montane forests. It favours rocky habitats & grass covered rocky hill slabs and forest land and often occurs along forest streams and they. Occasionally, it occurs in some moist topographically disturbed areas, such as plantations, rural gardens, and coppiced forests. Very little is known about the ecology and behaviour of the mouse deer where much of the information are being in the form of anecdotal observations and zoo records. Like other forest ruminants, adults are mostly solitary except at the time of courtship. During the day, Chevrotains stay concealed in dense thickets, may be in hollows at the base of trees or in rocky crevices. They are able to climb up sloping tree boles. Its activity appears to be mostly crepuscular and nocturnal. Mouse deer are shy and retiring disposition, avoiding open areas and ready to scurry away at the least hint of alarm. They forage for herbs and shrubs and often visit the same feeding sites. The Indian species of mouse deer call the fruits of species such as Terminalia bellerica, Grewia asiatica and Syzygium cumini. common in the deciduous forests of south India.

Threats & Challenges:

Indian mouse deer are among the most frequently hunted animals in the forests where they occur. Active hunting uses hunting dogs to locate and flush the animals and clubs/machetes to kill them, while passive hunting methods include dead fall traps. Mostly the hunting is for the pot, though wild meat is sold in markets in many places. The species is the one that both women and children join with men in hunting during the day. The locals of hunters beat bushes and flush animals towards nets held by people where the animals are caught and killed. In addition, low wire snares with many nooses may be placed along the ground across trails to catch passing Chevrotains. A serious concern has been degradation and fragmentation of the habitats. The Indian Chevrotain appears to be widely hunted for its meat in south India [Wolf-Meyer et al. 2004]. Firearms and snares are routinely used by the local people where involved in these activities. It is not usually kept as livestock.

Conservation activities & actions needed/ proposed:

The control of hunting may be required for the conservation of the species. There is no empirical

information on habitat relevant to conservation. As a forest-scheduled species, forest conversion has obviously greatly reduced the area holding the mouse over the years. The species is listed in Schedule I of the Indian Wildlife Protection Act (1972) and occurs in numerous protected areas. Several of these are well secured from damaging levels of hunting and from serious habitat encroachment. Conservation of the species outside well secured protected areas is hampered by and lack of knowledge of its specific conservation needs. Radio-telemetry studies of home range and social organization and broad-scale ecological studies on habitat preferences and use, foraging ecology the effects of habitat alteration and degradation, and on reproduction and population dynamics are sorely needed to develop a more realistic and comprehensive conservation protocol of mouse deer.

4.6.11 **Conservation of Indian Peacock/ Indian Peafowl (Pavocristatus):**

Ecology & Habitat

Having been declared the national bird in 1963, the Indian Peacock finds itself under the highest level of legal protection in the country, being placed in Schedule I of the Wildlife (Protection) Act, 1972 and its later amendments. The Indian Peafowl appears so frequently in religion, folklore, art and craft that it is possibly the most recognized bird across India. Internationally as well, the peafowl (peacock alongside the tiger) is immediately associated with India. Peafowl are sparsely across the plains and hills of India except in extremely dry or wet regions. The abundance trend is that of a general increase, both in the long term and currently. This trend appears to result from a combination of range expansion (e.g., into Kerala, from where it was formerly absent), and of population increase virtually throughout its distribution. The reasons for this perhaps have not been investigated in detail but expansion into Kerala may be associated with an overall drying trend, and expansion in to the Thar desert appears to have greatly profited the spread of canals and irrigation. The protection (and associated penalties for poaching and pestering) afforded by being in Schedule I may also have contributed to increase. Some parts of the country report greater levels of crop damage by peafowl, a trend that calls for careful conflict assessment and management. According to the State of India's Birds 2020 report, Peacock population more than doubled in India during the past one decade. According to the IUCN red list, Peacock is in the least concern (LC) category.

Peacock is a huge and beautiful flying bird and rightly crowned as the National Bird. It occurs all over India both in forest and non-forest areas. The Peacocks worshipped as the Vahana (vehicle) of Kartikeya (Subrahmanya swamy) throughout in India, Nepal and Sri Lanka. Hence, there is no threat from locals. In the project under consideration, Peacocks were found in the outer zone. It is an omnivorous bird. Its diet consists of small animals like, mice, reptiles like lizards and snakes, amphibians, arthropods like insects, ticks, worms, ants, locusts and seeds, fruit, vegetables and minnows in shallow streams and so on. Around human habitations, they feed on a variety of readily available.

Threats & Challenges:

There are two major kinds of threats to Peacocks. One is illegal poaching for meat and feathers and the other is due to consumption of pest-like seeds sown by farmers.
Methods to identify if farmers have been attacked or have been shot naturally have been developed. Evidence allows the collection of feathers that have been shed. Its feathers are in great demand for commercial purposes and are the main threat to its survival. Their loud calls make them easy to detect even in forests/areas.

In spite of the above, there are healthy populations according to the State of India's Birds 2020 Report and there is no risk of extinction. It allowed to domesticate. Peacocks will become pests and its numbers can increase very much.

Conservation activities & actions needed/ proposed:

Peacocks are of Wildlife and economic and there is no specific conservation plan for Peacocks similar to the specific conservation plan of Tigers, Elephants, Crocodiles, sea turtles etc. Species conservation implies sustainable management under in situ conditions. Creating awareness among the public in general and the project development people in particular about the need to conserve them and motivating them to act as ambassadors of Peacocks through mass media, social media, public education and Nature clubs can be a model.

The State of India's Birds 2020 Report suggests that it is important to promote collaborations between public initiatives and researchers. It also suggests that the government should support the monitoring and conservation efforts by citizens and researchers. The report also suggests that there should be a dedicated fund for high concern species so that scientists and researchers can save these birds.

CHAPTER IV A
ANIMAL PASSAGE PLAN

4.A.1. Wildlife of the study area: Rare / Endangered/ Threatened (REE) and Schedule I Fauna

A Panchayath road running from Kalia to Belmunda/ Khajuribahal runs along the northern boundary of the block, some time through the lease area and sometimes outside the lease area. This Panchayath road joins NH 215 at a distance of about 7 km from the lease area. SH [ITA] runs at a distance of about 8 km from the lease area. Both the NH and SH joins the lease area to Rourkela via Iersa and Kalta respectively. Rourkela is about 110 km from the lease area. Division of South Eastern Railway is the nearest railway station, there are no eco-sensitive areas such as the Wildlife Sanctuaries or National Parks or Biosphere Reserves or Ramsar Wetlands or Important Bird Areas (IBAs) out there are protective areas such as the Reserve Forests and Protected Forests as shown in Section 2. Based on both the primary survey and on the available secondary data such as the working plans of the forest department as well as the references cited in the reference section, the following 11 nos of Schedule I species are to be found in the reserve forests present in the buffer zone of the project site. Among them, Hanuman Langur, the Indian pangolin, fly squirrels & palmus like Sloth bears, Jackal and Indian porcupines, the flying squirrels are the only Schedule I species found in the forest patches of core zone.

4.A.2. Identified Schedule I species in Core area & Zone of Influence

Table-4.3
Identified Schedule I species in the study area as per WPA

List of Schedule I species recorded from the core & buffer zone study area for Ramesh Powerol Steel Udyog project.
IUCN Category refers to the IUCN List of Threatened species 2004 ; WPA refers to the Schedule I of the Wild Life (Protection) Act, 1972 as: Endangered; LC: Least Concern; NT: Near Threatened

Sl. No	Scientific Name	Common Name	WPA	IUCN	Migrant /Local
1	Elephas maximus	Asian Elephant	I	EN	
2	Manis crassicaudata	Indian Pangolin	I	EN	
3	Melursus ursinus	Sloth Bear/ Bhalu Kalu	I	VU	
4	Panthera pardus	Leopard/ Chita	I	VU	
5	Presbytis entellus	Langoor/ Bandar	I	VU	
6	Hystrix indica	Indian Porcupine/ Sehi	I	VU	

7	Python molurus	Indian rock python	I	NT	
8	Naja naja (spectacled)	Indian cobra	I	LC	
9	Varanus bengalensis	Bengal monitor lizard	I	LC	
10	Uromastyx hardwickii	Indian spiny-tailed lizard	I	LC	
11	Pteropus giganteus	Indian flying fox	I	LC	R

* Present in more zone also R: Resident

It is evident from the data mentioned above table that a total of 11 Schedule I species are most likely to be found in the Study area. Out of the 11 schedule I species, 4 of them belong to the Least concern (LC) category of the IUCN and 5 belongs to the Near Threatened (NT), 1 belong to the Vulnerable (VU) and 1 belong to the Endangered (EN) category of the IUCN Red list. Both NT and VU are lower risk categories in the IUCN system. Only 1 are in the higher risk Endangered (EN) category. The Asian Elephant (Elephas maximus) and the Indian pangolin (Manis crassicaudata) fall are under the highest risk EN category of the IUCN Red list.

Special considerations of biodiversity conservation area:

- ✓ Conservation of an area should be to the extent that it develops in to an ecosystem which is of public climax to the area. While the aim of conservation is a stable ecosystem;
- ✓ Emphasis should not be given to the conservation of a single species. This may require altered maintenance of an ecosystem which may lead ultimately to the destruction of the ecosystem.

4.4.3 WILD LIFE CORRIDORS/ CRITICAL WILD LIFE HABITATS

Out of the total ML area of 1599.223 ha. forest area is 1112.621 ha, Government land is 338.15 ha (Gochar 7.587 ha road 0.510 ha, habitation 3.947 ha, worship place 0.795 ha, grave yard 0.369 ha & Nala 0.141 ha) & tenanted land is 135.787 ha (Deeds ha Ghatpadi& 15.142 ha Ag & fallow). Out of the total 1112.621 ha of forest land within the ML area, 67.022 ha is Reserve Forest (Bonai Divisional Forest Range Kuldiha and 45.999 ha is DLC Forest. Proposal for diversion of forest land of 1112.621 ha is submitted by the proponent vide proposal no. FP/OR/MIN/269/es/2017 dated 06.07.2017.

There is no National Park, Wild Life Sanctuary, Biosphere reserves, Ramsar sites, Elephant Tiger Reserves or Wild Life Corridors or nesting ground within 10 km radius. There is no sign of Physical encroachment in the study area.

CHAPTER - V

FINANCIAL IMPLICATIONS AND MONITORING

5.1 Plan Period

The present proposal is for 10 years. All the costs are worked out on the prevailing rates of 2022. At about the expiry of the 10th year, it will be reviewed by the experts in field, on the effectiveness of implementation, pros and cons and/or obstacles faced and/or the advantages and disadvantages and/or additions or deletions or modifications required etc. and the prevailing cost, if any, exist by then. Accordingly, it shall be reviewed, revised and continued by then.

5.2 Financial outlay

The revised guidelines for preparation of the specific wildlife conservation plan issued by Government of Odisha or its Department of Forest & Environment vide dtd 17 September 2021, have shown at its para 12 indicative financial limits based on the total project cost.

5.3 Plan of Implementation

The project area of relocation/rehabilitation area / habitat is in Kolaib Tehsil of Sundergarh district Odisha state. The area is under the jurisdiction of Chief Wildlife Warden PCCF (Wildlife) ROCP Rourkela, DFO Rourkela (Wildlife) and DFO Bonai (Forest). It is proposed to implement the program through DFO Bonai (Forest).

All the work under this scheme are to be executed by the DFO Rourkela Division & DFO Bonai Division both within the core area (Project area) & buffer zone (Zone of influence) under the guidance of Regional Chief Conservator of Forests Rourkela Circle (RCCF Rourkela) in consultation with Chief Wildlife Warden PCCF (Wildlife).

Considering some of the buffer areas fall in the jurisdiction of Rourkela division and some other areas fall under the jurisdiction of Bonai division, the RCCF Rourkela in consultation with Chief Wildlife Warden PCCF (Wildlife) may decide the quantum of activities to be carried out in

Kenjhar&Bonai division depending on the actual field requirements at the time of implementation.

There are likely chances of overlapping and duplication of activities taken under this plan with similar plans developed by other line departments/ other agencies/ other bodies/ under Regional Wildlife management plans for Kenjhar&Bonai divisions etc. In order to overcome these, the DFO Kenjhar& DFO Bonai may apportion areas/villages within their jurisdiction under the scheme from time to time for dealing with issues placed by different programs/plans or make a composite plan as they deem fit, once the quantum of activities are allocated/approved by SCCF Kolkata for each Kenjhar&Bonai division.

5.4 Cash flow statement

The cash flow/ transfer mechanism shall be as per the prevailing Rules & Regulations from time to time which shall be decided by the department of Forest & Environment, Government of Odisha. The estimated amount for the proposed activities shall be deposited with CAMPA. Every payment for implementation of any program under the SWLMP should invariably be made under the due authorization of DFO Bonai (Forest) or DFO Kenjhar (Wildlife) as the case may be.

The amount will be deposited by the project proponent in the Compensatory Afforestation Fund Management and Planning Authority (CAMPA).

5.5 Budget Allocation for Site Specific Wildlife Management Plan

Table 5.1: Financial provision of works borne by User Agency/Project Proponent for Bonai Forest Division

To be borne by User Agency For Bonai Forest Division			
SL No.	Management Interventions	Area in ha./Unit in nos/RKM	Total Amount (Rs. in Lac)
1	05 Nos. of Fire Watcher will be engaged for a period of 05 months (February to June) for 05 years @ wage rate of Rs. 233.00/day (05 nos. x 5 x 30 days x 5 months x 05 years)	55 Nos.	To be Done by User Agency
2	Awareness Generation regarding wildfire prevention, wildlife conservation, forest protection & forest conservation	5	

Divisional Forest Officer
Bonai Division

3	Provision for bird perch within the project area	50 Nos.
4	Provision for Bee-friendly bird nests on trees within the project area and Nearby villages	50 Nos.
5	Provision of Two wheelers (Hero Honda) with gps tracker for implementation in protection activities through ground staff	02 Nos.
6	Provision of distribution of Gobar Gas to the household of surrounding villages at primary zone for the stoppage of forest materials in order to mitigate the Human-Elephant Conflict	300 Nos.
7	Infrastructure Support- One computer with printer (A4 in Size) in Range Office, Kalunkiri with proper internet connectivity facility	13
8	Provision of High powered camera at Division Office, Bonai Forest Division for regular tracking of movement of elephants in different Range	200 Nos.
9	Immunization camp/vaccination of domestic cattle : Conducting two immunization camps per year for the domestic cattle in the surrounding areas including the cost of medicine, organizing charges etc.	13
For Keonjhar Forest Division		
10	Station Master (CPU) Dell make with high configuration	01 No.
11	Drone Battery DJI Mavipro enterprise Zoom	05 Nos.
12	DSLR Camera for wildlife photography	01 No.
13	Biodiversity study of Rhynchostylis Gr. in Nayakote by Odisha Biodiversity Board.	--

Table 8.2: Financial provision of works in Zone of Influence implemented by Bonai Forest Division

Divisional Forest Officer
Bonai Division

Divisional Forest Officer

To be borne by Forest Department				
Sl. No.	Management Interventions	Area in ha./Unit in no./RKM	Unit cost (Rs. In Lac.)	Total Amount (Rs. In Lac.)
I	**Protection & Enforcement Activities**			
	(a) Establishment of Anti Poaching Barrack to support protection activities and seasonal monitoring activities (including water supply, tube well, solar light system, boundary fencing etc.)	No.	25.00	25.00
	(b)(i) Engagement of 05 squad members including staff in protection, wildlife monitoring and anti-depredation activities with provision of one hired vehicle in protection (Highly sensitive-Rs.4530.00 per Month) = 03 members x 12 months x 05 years = Rs.43.47 Lacks	05 Nos	43.47	43.47
	(b)(ii) Hired Vehicle Rs. 31,000/- x 12 months x 05 years = Rs. 18.60 Lakhs	01 No	18.60	18.60
	(b)(iii) POL for vehicle Rs. 150.00/- x 12 months x 05 years = Rs. 09.00 Lakhs	LS	9.00	9.00
	(c) Procurement of camping equipments (tents, sleeping bag, water bottle, all terrain shoes, camp cot, torch etc.)	20 Nos.	0.30	6.00
2	**Wildlife Habitat Management**			
	(a) Grassland Management (weed eradication in existing open patches with necessary grass planting, maintenance etc.)	10 ha.	2.00	20.00
	(b) Desilting, Renovation & maintenance of existing water bodies	02 Nos.	1.00	2.00
	(c) Construction of Check dam along the nalah	01 No.	15.00	15.00
3	**Wildlife Monitoring**			
	(a) Procurement of Camera Trap	10 Nos.	0.25	2.50
	(b) Procurement of Monitoring Kits (Pug chip Binoculars, Compass, Range Finder, torches etc.)	20 Nos.	0.30	6.00

Divisional Forest Officer
Rajgangpur Division

4	Human Elephant Conflict Mitigation			
	(a) Installation of Solar Street light in elephant affected villages and its maintenance	50 Nos	0.40	20.00
	(b) Engagement of Gajsathis (1 unit of 05 member each)			
	(c) (1) Identification of village level volunteers preferably from VSS/PRC units and subsequent training on dealing with the HEC situation	16 Nos.	0.40	6.40
	(d) (2) Supply of monitoring kits and equipment to individual unit (flash lights, megaphones all terrain shoes, uniforms raincoats, whistle jackets etc.)	16 Nos	0.20	3.20
	(e) (3) Incentive @ Rs 25000/unit for 05 months (Rs. 25000 x 16 units x 05 months x 05 years = Rs. 1000000/-)	16 Nos.	100.00	100.00
	(f) Provision of Tranquilizing Gun (Dart Gun & Medicines with other accessories)	01 No	7.00	7.00
	(g) Provision of T-shape concreting open walk in the impact area (only cultivated lands) to avoid elephant crossovers in open walk	15	20.00	20.00
5	Public Awareness and Livelihood Generation Activity through community mobilization			
	(a) Existing VSS strengthening in path with its infrastructure development, check water recharge facility etc.	05 Nos	1.00	5.00
	Total			313.97
	21% Escalation			65.114
	Grand Total			378.05

Divisional Forest Officer
Keonjhar Division

5.8 ANNUAL WORK PROGRAM – BONAI DIVISION

To be borne by Forest Department

Sl. No.	Management Interventions	Area ju ka./Unit in ea./R.M	Total Amount (Rs. In Lac.)	Year wise Financial Target (Rs. In Lac.)				
				1st year	2nd year	3rd year	4th year	5th year
1	Protection & Enforcement Activities							
	(a) Establishment of Anti-Poaching Barrack to support protective activities and elephant monitoring activities (including water supply, tube well, solar light system, boundary facility etc.)	1 No.	25.00	25.00	-	-	-	-
	(b)(i) Engagement of 05 Squad members for assisting staff in protection, wildlife monitoring and anti-depredation activities with provision of one hired vehicle in protection (Highly skilled@Rs.4833.00 per Man/p x 05 members x 12 months x 05 years = Rs.43.47 Lakhs	05 Nos.	43.47	8.69	8.69	8.69	8.69	8.69
	(b)(2) Hired vehicle Rs. 31,000/- x 12 months x 05 years = Rs. 18.60 Lakhs	01 No	18.60	18.60	-	-	-	-
	(b)(3) POL for vehicle Rs. 15000/- x 12 months x 05 years = Rs. 09.00 Lakhs	15	9.00	9.00	-	-	-	-
	(c) Procurement of camping equipments (Tents, sleeping bag, water bottle, all terrain shoes, carry bag, torch etc.)	20 Nos	6.00	2.00	2.00	2.00	-	-

Divisional Forest Officer
Bonai Division

2	**Wildlife Habitat Management**							
	(a) Grassland Management (weed eradication in existing open patches with necessary grass planting, its maintenance etc.)	10 ha.	20.00	4.000	4.00	4.00	4.000	4.00
	(b) Desilting, Rejuvenation & maintenance of existing water bodies	02 Nos.	2.00	2.00	-	-	-	-
	(c) Construction of Check dam along the nallah	01 No.	15.00	15.00	-	-	-	-
3	**Wildlife Monitoring**							
	(a) Procurement of Camera Trap	10 Nos.	2.50	2.50	-	-	-	-
	(b) Procurement of Monitoring Kits (Binoculars, Compass, Range Finders, torches etc.)	20 Nos.	6.00	2.00	2.00	2.00	-	-
4	**Human Elephant Conflict Mitigation**							
	(a) Installation of Solar Street lamps/light in elephant affected villages and its maintenance	50 Nos.	20.00	10.00	10.000	-	-	-
	(b) Engagement of Orissathis (16 units of 05 members each)							
	(b) (i) Identification of village level volunteers preferably from VSS-EDC units and subsequent training on dealing with the HEC situation	16 Nos.	6.40	3.20	3.20	-	-	-

Divisional Forest Officer
Rural Division

	(b) (2) Supply of monitoring kits and equipment to individual unit (flash lights, mosquitoes, all terrain shoes, uniforms, raincoats, winter jackets each	16 Nos.	0.01	0.40	-	-	-	-
	(c) Allocation to units (Rs2500/unit for 05 months (Rs. 2500 x 16 units x 05 months x 05 years = Rs. 1000/- Each)	16 Nos.	100.00	20.000	20.00	20.00	20.00	20.00
	(c) Provision of Tranquilizing Kit (Dart Gun & Medicines with other accessories)	01 No.	7.00	7.000	-	-	-	-
	(d) Provision of T shape harnessing open wells in the impact area (in agricultural lands) to avoid elephant accidents in open wells	15	20.00	4.00	4.00	4.00	4.00	4.00
5	Public Awareness and Livelihood Generation Activity through community mobilization							
	(a) Existing Weli strengthening -Along with its infrastructure development, clean water facilities, solar fencing facility etc	05 Nos.	5.00	5.00	-	-	-	-
	Total		378.68	147.39	52.39	40.00	30.00	25.00
	20% Escalation		68.114	29.478	10.478	8.000	6.000	5.000
	Grand Total		378.68	177.11	64.67	48.00	36.00	30.00

Development Officer
Badulla Division

5.5 SSWCMP PROGRAMS AND FINANCIAL FORECAST FOR KOONJHAR DIVISION

The following are proposed as the financial implications that Koonjhar Division is likely to be required for the plan implementation under the DFO Koonjhar.

Table 5.4

SSWCMP PROGRAMS AND FINANCIAL FORECAST FOR KOONJHAR DIVISION

Sl no	Para Ref	Description of work	Amount Rs. in Lakhs
	4.5	Proposed interventions in buffer zone	
	4.5.	Wildlife habitat management	
1	4.5.1 1	Plantation for natural ecosystem management at appropriate forest patches @ 200 plants per Ha ensuring plant mix selecting from varieties listed in Table 4.5.1.2 expecting that one tree may require 25 m2 when fully grown with the expected canopy. 5000 plants over 25.00 Ha land like Jia, Jadi, Kol, Sindi, Bamboo Pothpokuri RF Cost of identified species of 2-year old healthy seedlings, construction of 0.5 m3 pits (for big trees it shall be 1 m3) for plant ng sap lings, filling the pits with suitable soil/ bio-fertilizers/ bio-pesticides before planting, cost of tree guard and its installation, regular watering, regular application of organic compost at suitable intervals etc. complete including transportation, loading, unloading, planting materials/ and labor =13.36 Lakh Construction of a waterbody in Pothpokuri RF of size (5m x 4m x 3m = 6.61 Lakh (Total 19.97 Lakh or 20 Lakh)	20 Lakh
2	4.5.1.3 (i)	Supporting fire protection squad Engaging fire watchers through service provider as part of a fire fighting squad 5 nos (3 Nayaks + 2 Mazdoors) @ Rs. 13512/- X 5 Nos X 5 Months X 5 years	10.14 Lakh
3	4.5.1 3 (ii)	Providing strategic tools for fire fighting squad Providing basic firefighting equipments which may	3 Lakh

Divisional Forest Officer
Koonjhar Division

		include axe, spade, broom, sticks, shovels, bill hooks, drinking water in clean bottles, food packets and communication equipment's including first aid kit.	
4	4.5.1.5	Immunization campaign of domestic cattle Conducting one immunization camp per year for the domestic cattle in the surrounding areas including cost of medicine and organizing cost	2 Lakh
5	4.5.2	Wildlife protection and anti-depredation	
6	4.5.2.1 (i)	Providing elephant tracker 3 nos, (2 for Nayakote and 1 for Dubuna) through service provider @ Rs 12,000 X 12 X 3 Nos X 5 years Supporting the latest technology of Elephant Tracking Bracelet/collar tracker helps in real time tracking to avoid man-animal conflicts.	21.122 Lakh
7	4.5.2.1 (ii)	Providing portable solar 2 nos each one for Dubuna and Nayakote @ 5 Lakh Supporting construction and/or management of watch tower/ camp shed at selected locations (to be decided by the DFO concerned) at places of frequent elephant movements.	10 Lakh
8	4.5.2.2	Fencing of unprotected open wells-100 nos Installation of precautionary measure of providing fencing around identified unwalled wells so as to prevent elephants or their cubs or any wild animal being trapped accidentally falling in to the open wells without side walls	5 Lakh
	4.5.3	IEC activities	
10	4.5.3.1	Handholding support to the community/SSG around Khandadhar reserve for conducting awareness camps (shall include both awareness component and action component) aiming to educate the public especially the young generations on the importance of wild life need to protect them, issues mankind may face due to encroachment, poaching etc. – **15 Lakhs**	15 Lakh
11		Providing Grain bin 300 Nos @ Rs 3000/- – **9 Lakhs**	9 Lakh
12		Providing Solar street lights 20 Nos @ Rs 25000/- – **5 Lakhs**	5 Lakh
13		Providing CFL Light bulbs 1000 nos@ Rs 100/- = **1 Lakhs**	1 Lakh
14	4.5.3.2	Hoardings, wall writings, competitions etc. Supporting minimum 5 programs of awareness creations	2 Lakh

Divisional Forest Officer
Kandhar Division

		per year for 10 years i.e. these activities use of print & visual medias including online platforms, creating Posters, wall writings, street plays, drawing/essay writing/ elocution competitions to showcase, documentary shows etc	
15	4.5.3.4	GIS Cell maintenance including repair & software changes and exigencies shall be funded with a lumpsum amount	3 Lakh
16	4.5.3.6	Corpus fund for enforcement activities to support the victims of man-animal conflict and related exigencies	10 Lakh
17	4.5.3.7	Inter departmental coordination Effective inter departmental co-ordination is required for the success of all these suggested programs. A District Level Coordination Committee (DLCC) under the Chairmanship of the District Collector is in place.	4 Lakh
18	4.5.1.8	Provision of Agarbatti 5 nos per VSS in 5 villages in Nayakote and Dalvann Beat @Rs 2000/- X5 nos X 5 villages X12 X 5 Years = 15.00 Lakh. Equipments i.e. Torch and Kitbag @Rs 8500/- per year X 5 VSS X5 years = 2.125 Lakh - T Shirt, Cap and Shoe @ 1300/-X 5 nos X 5 VSS X 5 years = 1.625 Lakh.	18.75 Lakh
			142.2121Lakh

(17) Inter departmental coordinated : 50,000 Lakhs
Total :- 142.65 Lakh

Divisional Forest Officer
Kaonjhar Division

5.10 ANNUAL WORK PROGRAM – KEONJHAR DIVISION

Table 5.5

ANNUAL WORK PROGRAM – KEONJHAR DIVISION

Sl. No.	Para Ref.	Type of Intervention	Amount allocations (Rupees in Lakhs)					
			1st Yr	2nd Yr	3rd Yr	4th Yr	5th Yr	Total (in Rs. Lakhs)
1	4.5.1.1	Plantation of appropriate forest patches & all parts of the catchment area including water body	[illegible]	2.5	1.25	1.25	1.25	[illegible]
2	[illegible]	Supporting the education of the neighboring villages	2.028	2.028	2.028	2.028	2.028	10.14
3	4.5.1.1 (ii)	Awareness strategic tools for biodiversity conservation	5.00					5.00
4	4.5.1.5	Implementation campaign of the above tools	0.40	0.40	0.40	0.40	0.40	2.00
5	4.5.1.1 (i)	Providing elephant tracker Implementation of Elephant Tracking	4.5644	4.5644	4.5644	4.5644	4.5644	22.822
6	4.5.1.1 (i)	Providing water towers and shed	10.00	0	0	0	0	10.00
7	4.5.2.2	Fencing of forest patches and open wells	2.50	2.50	0	0	0	5.00
8	4.5.3.1	Training the communities	10.00	10.00	3.50	3.50	3.00	30.00
9	4.5.3.1	Workshops, wall writings, [illegible] etc.	2.00	1	1	0	0	4.00
10	4.5.3.7	Monitoring of Biodiversity cell	5.00	0	0	0	0	5.00
11	4.5.3.6	Conservation	1.00	1.00	1.00	1.00	0	4.00
12	4.5.3.7	Inter agency awareness communication	1.00	1.00	1.00	0.50	0.50	4.00
13	4.5.3.2	Capacity building	3.75	3.75	3.75	3.75	3.75	18.75
		TOTAL						149.312

Divisional Forest Officer
Keonjhar Division

5.11 COST ABSTRACT

Table 5.6
ABSTRACTOF COSTS

Division	Project area (Core zone)	Zone of influence (Buffer zone)	Total amount Rs. in lakhs
DONGI	-	378.68	378.68
KHOVRAS	-	142.212	142.212
Net amount	-	520.892	520.892

Divisional Forest Officer
Bonal Division

Divisional Forest Officer
Keonjhar Division

Countersigned

Conservator of Forests
Wildlife Circle, Bonfala

Principal Chief Conservator of Forests
Wildlife Management Wing
Orissa, Bhubaneswar

N.B : This plan is for 5 years and will be reviewed by the Divisional Forest Officers concerned at least one year before expiry of the implementation period. The copy will be submitted to the Govt. for approval.

CHAPTER - VI

MAPS AND ANNEXURES

Annexures

Annexure 1 : Undertaking from user agency to revise the presently submitted Site Specific Wildlife Conservation in the future in accordance with any observations or suggestions made by the WCCF, Govt. of Govt. of Odisha

Maps

Plate 1 : Map showing the 1 KM peripheral SOI toposheet for Nomination area in Mines of M/S Bhushan Power and Steel Limited

Plate 2 : Map showing the distance of the project area of Nomination Lease for ore block from the nearest National parks/ Sanctuaries/ Elephant reserves/ Tiger reserves/ Biosphere Reserves/ Elephant corridors and Ranger sites

Plate 3 : Proposed Land use plan

Plate 4 : Elephant movement in 10 KM radius in Sundargarh district under Bonai division

Plate 5 : Elephant movement in 10 KM radius in Keonjhar district under Keonjhar Division

Bhushan Power & Steel Ltd.
Vill. : Tamando, P.O. : Lachanga – 768212
Teh. : Rengali, Dist-Sambalpur (Orissa)
INDIA

T +91 (0)663 6896300
T +91 (0)663 2085209 / 210
T +91 (0)663 2580305 – 39
F +91 (0)663 2582011 / 2059
email@bhushan.in www.bhushan.in
CIN : U27100OR1999PLC005150

Bhushan POWER & STEEL

UNDERTAKING

We do undertake that we shall revise the presently submitted Site Specific Wild life Conservation Plan with respect to the Project "Netrabandha Pahar Iron Ore Block by M/s Bhushan Power & Steel Limited" in the future in accordance with any observations or suggestions made by the MoEF, GoI or the Govt. of Odisha.

Dhananjay Kumar Sinha
Vice President, Administration
(Authorised Signatory)

COUNTERSIGNED
Divisional Forest Officer
Rengali Division

ସମନ୍ୱିତ ଆଦିବାସୀ ଉନ୍ନୟନ ସଂସ୍ଥା, ସୁନ୍ଦରଗଡ଼

INTEGRATED TRIBAL DEVELOPMENT AGENCY, SUNDARGARH

Tel.No. - 06622-273057, Fax – 273057, e-mail- itdasng@nic.in

No. 1388 /ITDA Date: 11/5/23

To

The Divisional Forest Officer,
Bonai Forest Division, Bonai.

Sub: Diversion proposal of 112.621 Ha. of forest land for non-forest purpose under the forest (Conservation) Act, 1980 ensuring compliance of the STs and Other Traditional Forest Dwellers (FRA) Act, 2006 for Netrabandha Pahar Iron Ore Block in village Baldihi of Patamunda G.P. under Koira Tahasil by user agency M/s Bhusan Power & Steel Limited for mining operation.

Sir,

With reference to the letter on the subject cited above, I am to furnish herewith the certificates regarding compliance of Scheduled Tribes and other traditional forest dwellers (Recognition of Forest Right) Act,2006 in respect of Diversion proposal of 112.621 Ha. of forest land for non-forest purpose under the forest (Conservation) Act, 1980 ensuring compliance of the STs and Other Traditional Forest Dwellers (FRA) Act, 2006 for Netrabandha Pahar Iron Ore Block in village Baldihi of Patamunda G.P. under Koira Tahasil by user agency M/s Bhusan Power & Steel Limited for mining operation for taking further course of action at this end.

Enclosure:-

1. FRA Certificate in Form No. II along with land schedule and List of IFR title holders in the proposed area of diversion.
2. Gram Sabha Resolutions of village Baldihi.
3. English version of Gram Sabha Resolutions.
4. Report of Tahasildar, Koida
5. SDLC Proceedings.
6. DLC Proceedings.

Yours faithfully,

Project Administrator,
ITDA, Sundargarh.

Memo No. 1389 **/ITDA Date:** 11/5/23

Copy submitted to the Additional District Magistrate, Sundargarh for favour of kind information.

Project Administrator,
ITDA, Sundargarh.

Memo No. 1390 **/ITDA Date:** 11/5/23

Copy to M/s Bhusan Power & Steel Limited for information and necessary action.

Project Administrator,
ITDA, Sundargarh.

Form-II

(For projects other than linear projects and Plantations)

[Rule 6 (3) (e) of Forest (Conservation) Rules 2003 as amended up to date]

Government of Odisha

OFFICE OF THE DISTRICT COLLECTOR, SUNDARGARH

No. 1326 / DDA(FRA) Dated 4/5/23

TO WHOM SOEVER IT MAY CONCERN

In compliance of the Rule 6 (3) (e) of Forest (Conservation) Rules 2003 [as amended vide the Forest (Conservation) second Amendment Rules 2014; Forest (Conservation) second Amendment Rules 2014; and Forest (Conservation) Amendment Rules 2016] it is certified that **112.621 Hectares** of forest land proposed to be diverted in favour of **M/s Bhusan Power & Steel Limited for Mining activities** purpose in the district falls within the jurisdiction of village **Baldihi of Patamunda GP under Kuira Tahasil**. It is further certified that:

(a) the complete process of recognition and vesting of forest rights under the FRA,2006 has been carried out for the entire **112.621 Hectares** of forest land proposed for diversion. There are **13** Nos. of IFR title holders vested with Forest land of **1.42 Hectares (3.51 Ac.)** out of proposed area of **112.621 Hectares**. A copy of records of all consultations and meetings of the Forest Rights Committee (s), Gram Sabha (s), Sub-Division Level Committee(s), list of IFR title holders and the District Level Committee are enclosed as **Annexure-I** to **Annexure-IV**.

(b) the proposal for such diversion (with full details of the project and its implications, vernacular/ local language) have been placed before each concerned Gram Sabha or forest-dwellers, who are eligible under the FRA, 2006.

(c) each of the concerned Gram Sabha (s), has certified that all formalities/ process under the FRA have been carried out and that they have given their consent to the proposed diversion and the compensation and ameliorative measures, if any, having understood the purpose and details of proposed diversion. **As regard to the compensation, the user agency M/s Bhusan Power & Steel Limited has given undertaking vide letter No. Admin/2023/33 dated 17.04.2023 to the effect that "Compensation amount will be given to the affected FRA title holders in Netrabandha Pahar Iron Ore Block as per applicable Laws/Rules of Govt., if the said land is acquired by the user agency, M/s Bhusan Power & Steel Limited in future".** Copies of certificate issued by the Gram Sabha Resolution of Baldihi village is enclosed as **Annexure-I.**

(d) the discussion and decisions on such proposals had taken pace only when there was a quorum of minimum 50% of the members of Gram Sabhas present;

(e) the diversion of forest land for facilities managed by the Government as required under Section 3 (2) of the FRA have been completed and the Gram Sabhas have given their consent to it;

(f) the rights of Primitive Tribal Groups and Pre-Agricultural Communities, where applicable have been specifically safeguarded as per Section 3 (1) of the FRA,2006.

Encl: As above.

(Dr. Gavali Parag Harshad, IAS)
COLLECTOR,
SUNDARGARH
COLLECTOR
SUNDARGARH

Land Scheduled of proposed land, Mouza- Baldihi

Sl. No.	Khata No.	Plot No.	Kisam	Area in Ha
1	68	16	Pahad	0.537
2	68	99	Pahad	12.289
3	68	100	Pahad	12.101
4	68	101	Pahad	17.669
5	65	102	Jungle	5.807
6	65	103	Jungle	1.725
7	68	104	Pahad	20.247
8	68	105	Pahad	19.836
9	68	106	Pahad	1.506
10	65	107	Bad-Jungle	1.322
11	65	108	Bad-Jungle	6.387
12	65	218/570	Gramya Jungle	11.086
13	65	99/571	Gramya Jungle	2.059
			Total	**112.621**

Project Administrator
ITDA, Sundargarh

COLLECTOR,
SUNDARGARH
COLLECTORATE
SUNDARGARH

AGENCY COPY

Union Bank

NEFT / RTGS CHALLAN for CAMPA Funds

Date : 15-07-2024

Agency Name.	Bhushan Power and Steel Limited
Application No.	6826665402
MoEF/SG File No.	8-31/2022-FC
Location.	ORRISA
Address.	International Trade Tower, Nehru Place, New Delhi,Bandalpur
Amount(in Rs)	1452000/-

Amount in Words :Fourteen Lakh Fifty-Two Thousand Rupees Only

NEFT/RTGS to be made as per following details;

Beneficiary Name:	ORRISA CAMPA
IFSC Code:	UBIN0906225
Pay to Account No.	150823626963402 Valid only for this challan amount.
Bank Name & Address:	Union Bank Of India IFCS Centre,311, III Floor, Jolitte Towers, Mission Road, Bengaluru-560027

- This Challan is strictly to be used for making payment to CAMPA by NEFT/RTGS only

Note:After making the required payment through ch even after 7 working days, then kindly mail a copy o id to Email: fcsbir@unionbankofindia.bank , apurse ubin0903710@unionbankofindia.bank

SBIN 52420092121 2.

Annexure-31

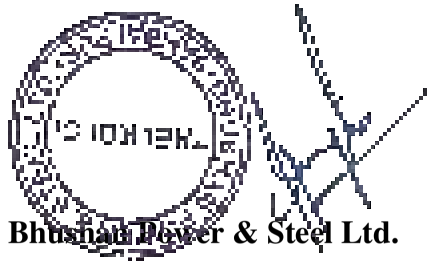
PROFORMA FOR VERIFICATION OF DEPOSITS IN COMPENSATORY AFFORESTATION FUND

1.	Name of Regional Office	Regional Office, MoEF& CC, Bhubaneswar
2.	State/District/Forest Division to which the proposal relates	Odisha/ Sundargarh/ Bonai Forest Division
3.	Name of User Agency, nature of proposal	**M/s Bhushan Power & Steel Ltd.** (Netrabandha Iron Ore Mining Block)
4.	Nature and category of proposal	Mining
5.	Proposal number	FP/OR/MIN/26965/2017
6.	Extent of forest area involved	112.621 ha. of forest land
7.	Whether original or extension	Original
8.	If extension of lease, please clarify if proposal involves additional forest area and if so, specify	-
9.	Date of 1st Stage clearance	Stage-I granted on 21.12.2023
10.	**Extent of CAMPA charges, head wise viz.:**	
	(a) Compensatory Afforestation	₹ 11,48,85,601.02
	(b) Addl. Compensatory Afforestation	Nil
	(b) Penal Compensatory Afforestation	Nil
	(c) Wildlife Management Plan	
	i) Site Specific Wildlife Conservation Plan	₹ 5,49,33,000/-
	ii) Regional Wildlife Management Plan	Nil
	(d) Additional charges for diversion of area falling under notified/protected areas	Nil
	(e) Net Present Value	₹ 16,17,99,212/-
	(f) 1.5 times Safety Zone Affn.	₹ 49,27,900/-
	(g) Safety Zone	Nil
	(h) Scheme for Avifauna	₹ 14,52,000/-
11.	Whether payment made through challan or otherwise. In case of online payment, details of challan	
12.	Details of deposits	

Contd.2....

Sl. No.	Type of deposit [NPV/CA/ RWMP/ Others (specify)]	Whether by RTGS /DD / NEFT (Specify)	UTR/ DD No.	Amount deposited (₹)	Date of deposit	Name of Bank from which amount transferred to account of CAF	Bank Account of CAF managed by CAMPA in which fund deposited
i)	NPV	Online	UTR No.SBIN1231220387 75	16,17,99,212/-	Challan dated 27.4.2023, payment dated 2.05.2023	SBI, Thelkuli Branch	A/c No.150825814689615 6 Union Bank of India FCS Centre, 21/1, III Floor, Jelitta Towers, Mission Road, Bengaluru-560027.
ii)	Compensatory Afforestation	Online	UTR No. SBINR520240430192 58308	11,04,85,101.02	Challan dated 29.4.2024, payment dated 30.04.2024	SBI, Thelkuli Branch	A/c No.150825826965501, ORRISA CAMPA, IFSC No.UBIN0996335, Union Bank of India FCS Centre 21/1, III Floor, Jelitta Tower, Mission Road, Bengaluru-560027.
		Online	UTR No. SBINR520250715921 36089	44,00,500.00	Challan dated 11.7.2025, payment dated 15.7.2025	SBI, Thelkuli Branch	A/c No.150825826965492, ORRISA CAMPA, IFSC No.UBIN0996335, Union Bank of India FCS Centre 21/1, III Floor, Jelitta Tower, Mission Road, Bengaluru-560027.
iii)	Site Specific Wildlife Conservation Plan	Online	UTR No. SBINR520240405141 97176	5,49,33,000/-	Challan dated 4.3.2024, payment dated 15.04.2024	SBI, Thelkuli Branch	A/c No.150825826965491, ORRISA CAMPA, IFSC No.UBIN0996335 Union Bank of India FCS Centre, 21/1, III Floor, Jelitta Towers, Mission Road, Bengaluru-560027.
iv)	1.5 times Safety Zone Affn.	Online	UTR No.SBINR520241112 61850413	49,27,900/-	Challan dated 11.11.2024, payment dated 12.11.2024	SBI, Thelkoloi Branch	A/c No.150825826965233, ORRISA CAMPA, IFSC No.UBIN0996335 Union Bank of India FCS Centre,

							21/1, III Floor, Jelitta Towers, Mission Road, Bengaluru-560027.
v)	Scheme for Creation and maintenance of alternative habitat / home for avifauna	Online	UTR No-SBIN524200921212	14,52,000/-	Challan dated 15.07.2024 Payment dated 18.07.2024	SBI, Thelkoloi Branch	A/c No.150825826965402, ORRISA CAMPA, IFSC No.UBIN0996335 Union Bank of India FCS Centre, 21/1, III Floor, Jelitta Towers, Mission Road, Bengaluru-560027



For Bhushan Power & Steel Ltd.