By E-mail

ବନଖଣ୍ଡ ଅଧିକାରୀଙ୍କ କାର୍ଯ୍ୟାଳୟ: ବଣାଇଁ ବନଖଣ୍ଡ ।

OFFICE OF THE DIVISIONAL FOREST OFFICER: BONAI DIVISION.

Phone / Fax – 06626-244434; E-mail
At- dfobonai@rediffmail.com

Memo No. 3664 /6F-(Mg.)Dt: 21 · 05 .2019

To

The Regional Chief Conservator of Forests,
Rourkela Circle, Rourkela.

Sub:- Submission of Site Specific Wildlife Conservation Plan for Ghoraburhani-Segasahi Iron Ore Block of M/s Essar Steel India Ltd. over an area of 139.165 ha. in village Ghoraburhani, Kalamang & Segasahi in Koira Tehsil of Sundargarh District, Odisha.

X-Sub: - Proposal for diversion of 120.838 ha. of forest land for Iron Ore Mining U/s-2 (ii), and for according permission under section-2 (iii) of the Forest (Conservation) Act'1980 for the entire forest land 126.401 ha. including safety zone area of 5.563 ha. in favour of M/s Essar Steel India Ltd. within their allotted **Ghodabuduni-Segasahi Iron Ore Block** of 139.165 ha. located in village Segasahi, Kalmang, Ghodabuduni and Mendhamaruni PRF-I in **Koira Tehsil and Koira Range** under Bonai Forest Division of Sundargarh District, Odisha

Ref:- Letter No.09 dt.5.4.2019 of the User Agency addressed to this office.

With reference to above, I would inform you that the User Agency has submitted the Site Specific Wildlife Conservation Plan pertaining to above Project for onward transmission to the PCCF (WL) & CWLW, Odisha, Bhubaneswar. The Site Specific Wildlife Conservation Plan duly signed by the undersigned pertaining to this Division is forwarded herewith for favour of kind approval.

Further, the information in the prescribed Proforma-I, II & III as per revised guidelines issued vide Memo No.7648 dt.2.11.2012 of the PCCF, (WL) & CWLW, Odisha, Bhubanewar is sent herewith for needful.

This is for your kind information and necessary action.

Encl:- As above.

21/5/19
Divisional Forest Officer,
Bonai Division.

Memo No. 3665 /6F-Dt: 21.05.2019

Copy forwarded to the Principal Chief Conservator of Forests (Wildlife) & Chief Wildlife Warden, Odisha, 5th Floor, BDA Apartment, Prakruti Bhawan, Nilakanthanagar, Bhubaneswar for favour of kind information and necessary action.

21/5/19
Divisional Forest Officer,
Bonai Division.

Memo No. 3666 /6F-Dt: 21.05.2019

Copy forwarded to the Addl. Principal Chief Conservator of Forests, Forest Diversion & Nodal Officer, F.C. Act, O/O the P.C.C.F., Odisha, Bhubaneswar for favour of kind information and necessary action.

21/5/19
Divisional Forest Officer,
Bonai Division.

PROFORMA-I

Details of Site Specific Wildlife Conservation Plans for which Stage-II clearance have been granted for as on date.			
Total no. of Projects for which funds are deposited by project proponents	Funds deposited for implementation Site Specific Wildlife Conservation Plan (₹ In Lakh)	Funds utilized by end of Previous Financial year	Action taken by the DFO for implementation of the plan (in 20 words)
1	2	3	4
37 Nos.	₹ 9167.36 Lakhs	₹ 9,97,33,782/-	• Soil & Moisture Conservation measures. • Enrichment plantation • Bio-diversity study. • Fire protection / fire line • Eradication weeds • Distribution of fuel efficient challahs • Creation and maintenance of water bodies etc.

PROFORMA-II

Details of funds deposited in respect of Regional Wildlife Management plans for which Stage-II clearance have been granted as on date.			
Total no. of Projects for which funds are deposited by project propcnents	Funds deposited for implementation of Regional Wildlife Management Plan (₹ In Lakh)	Funds utilized by end of Previous Financial year	Action taken by the DFO for implementation of these plan (in 20 words)
1	2	3	4
51 Nos.	₹ 4586.630	Nil	The Regional Wildlife Management Plan for 10 years for 2013-14 to 2023-24 is under preparation.

PROFORMA-III

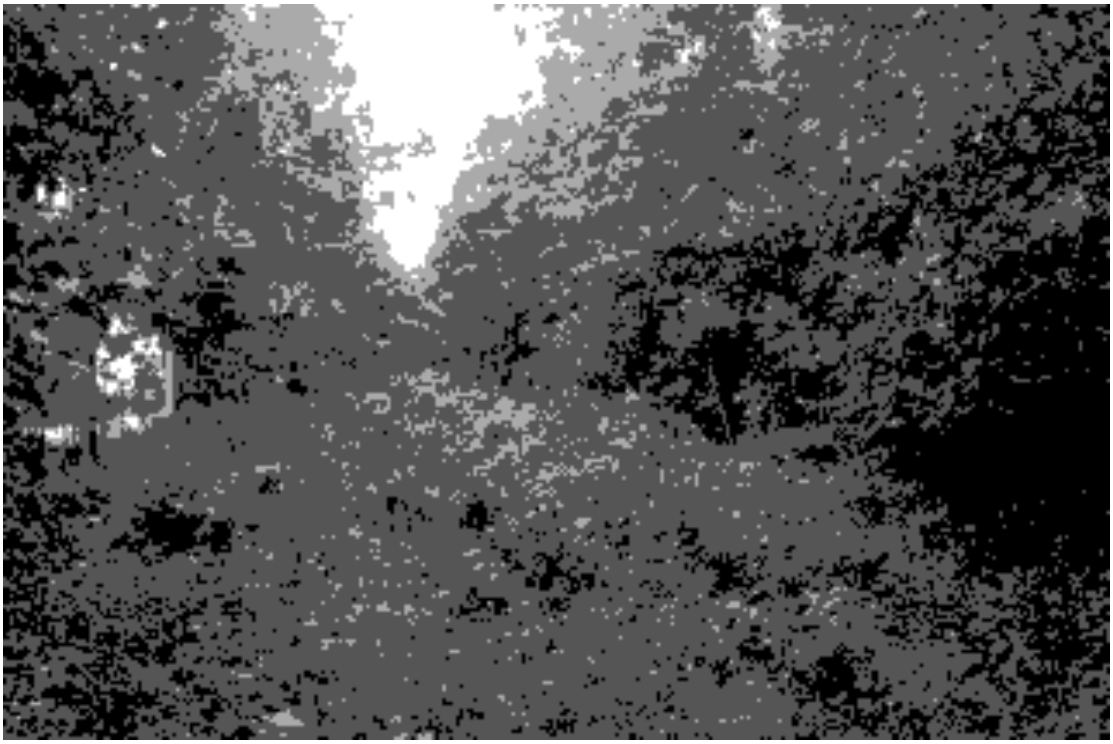
Information about present project.				
Name of the Project	Time required (in months) for start of Implementation of the present Site Specific Wildlife Conservation Plan / Regional Wildlife Management Plan by the DFO after Stage-II clearance	Time required (in months) for giving proposal for including in CAMPA Action Plan	Time required (in months) for start of implementation after receipt of funds under CAMPA Action Plan	Remark
1	2	3	4	
Ghoraburhani-Segasahi Iron Ore Block of M/s Essar Steel India Ltd.	6 months of release of funds.	3 Months	3 months of release of funds	

21/5/19

Divisional Forest Officer,
(11) Bonai Division.

SITE SPECIFIC WILDLIFE CONSERVATION PLAN OF

GHORABURHANI- SAGASAHI IRON ORE BLOCK (139.165 Ha) IN SUNDERGARH DISTRICT OF ODISHA



OF
M/s. ESSAR STEEL INDIA LTD.
KOIRA, SUNDARGARH, ODISHA

Prepared By

P. K. Sarangi, Retd. IFS

Sangram Keshari Ray OFS(I)

SARANGI & RAY ECO CONSULTANTS

&

VISIONTECH CONSULTANCY SERVICES

C O N T E N T S

Plates

Annexure

PREFACE

P. K. Sarangi, Retd. IFS

The Ghoraburhani-Sagasahi Iron Ore block of M/s Essar Steel India Ltd. located in the village (s) of Ghoraburhani, Sagasahi & Kalmang under Koira Tehesil of Sundargarh district, Odisha. The total leasehold area over 139.165 Ha comprises of 126.401 ha of Forest land & 12.764 ha of non-forest land. Application for diversion proposal of entire forest land included within the leasehold area for mining and ancillary purpose has already been submitted. Although the mining activities will be taken up in phased manner, the same will have some impact on the wildlife which necessarily requires the preparation of a comprehensive wildlife management plan to mitigate the adverse impact. Moreover it is left to the discretion of the DFO/ Forest Department to alter the proposal depending on the field demand and necessity.

This plan aims at minimizing the threats posed by mining activities during the plan period and to improve the Wildlife Habitat in the adjoining Forest area such as the Zone of Influence and beyond. Proper implementation of the Plan will definitely improve the Wildlife Habitat in the area and will reduce man-wild animal conflict.

I would like to thank Visiontech Consultancy Services for extending adequate help, in collection of data, information and preparation of this conservation plan.

I would also like to thank the Divisional Forest Officer, Bonai Forest Division Sri Sudhansu Sekhar Khora, IFS, and his staff for providing relevant information for preparation of the plan. I also extend my thanks to Range officer, Koira & Barbil range and their staff for providing relevant information for the plan.

My thanks are also due to the staff and officials of M/s Essar Steel India Ltd. for providing the required information and documents and extending necessary help at all stages for preparing this plan.

P.K.Sarangi

Sarangi & Ray Eco Consultants
Plot No-2134, Baramunda
Bhubaneswar-751003

EXECUTIVE SUMMARY

.0.0 This Site Specific Wild Life Conservation Plan is prepared in compliance of condition No. 18 of the ToR issued by MoEF & CC, Govt. of India, as per the revised guide lines for preparing site specific Wild Life Conservation Plan prescribed by the Principal Chief Conservator of Forests (Wild Life), and Chief Wild Life Warden, Odisha.

.1.0 The Ghoraburhani-Sagasahi Iron Ore block of M/s Essar Steel India Ltd. is located in the village(s) of Ghoraburhani, Sagasahi & Kalmang under Koira Tehesil of Sundargarh district, Odisha. The total leasehold area ~~is~~ over 139.165 Ha. which includes 126.401 ha of Forest lands & 12.764 ha of non-forest land.

.2.0 Application for forest diversion proposal of entire forest land included within the leasehold area for the purpose of mining and ancillary activities have already been submitted.

.3.0 Based on the approved mining plan, the mineable and geological reserves in the blocks are estimated to be 78.24 Mill. Ton and 98.61 Mill. Tons respectively.

.4.0 The lease area of Ghoraburhani-Sagasahi Iron Ore block is located on the Topo Sheet No. F45N5(73 G/5) and bounded by

Latitude - 21° 56' 08.83896" - 21° 57' 09.61956"North

Longitude - 85° 17' 02.52096" - 85° 17' 48.99336" East

0.5.0 The motorable road passes through the lease area and connecting to the NH-215 before Koira at a distance of 1.9 Kms from the lease. The distance of the lease area is around 30 kms from Barbil and around 58 kms from Rourkela. The area is highly undulating and mountainous and the altitudes vary from 600 m to 745 meters above MSL.

0.5.1 The climate is tropical with a very hot summer and moderate to cool winter, the temperature rising up to 47°C. The area is characterized with well defined rainy season. The minimum temperature during winter goes to 4°C.

0.5.2 The existing Forest kissam land can be classified as PRF (Mendhamaruni), Village forest (VF) & Deemed forest (DLC).

0.5.3 The lease area does not form a part of any National Park or Wild life Sanctuary or Critical Wild Life habitat. No protected area is situated in the lease area or within the Zone of Influence.

0.5.4 The lease area is being surrounded by existing mines and no important wild animals are noticed in the area.

.5.0 There are total 85 nos. of rural villages and one urban area coming within the 10 Km. buffer area. The total population of these 85 rural villages and 1 urban area is 70835 in which the male population is 36320 (51.27 %) and the female population is 34515 (48.73%). This shows that the male and female population ratio is almost equal.

- Among the total population 67.51 % is Scheduled Tribes, 8.70 % is Scheduled Caste.
- Out of the total population, 45.3 % of the people are literate and 54.7 % of the people are illiterate.
- The non-workers constitute about 63.47 % (44961) and remaining part constitute the working population i.e. 36.53 % (25874).

0.6.0 The process of mining will be Opencast Fully Mechanized method with drilling and blasting.

0.7.0 The Mega wild animals like elephants have been found to be seen in Mendhamurhani PRF, Sidhamath RF, Karampada RF and Karo RF areas.

0.8.0 The households depending on agriculture for their livelihood are very few in numbers. Most of the household depends on mining for their livelihood and work as construction laborer & mining laborer.

Because of mining activities in and around the project area, dependence of the local population on NTFP collection is minimal. Around 20% population of the area, depend on NTFP collection. The major NTPF are Sal leaves, Sal seeds, Kendu leaves, Mahua flowers & seeds.

0.9.0 The threats perceived due to the project operation are

- Reduction of wildlife habitat
- Soil erosion
- Water pollution & water scarcity
- Dust hazards
- Noise disturbance

- Lighting problems
- Garbage problems
- Physical threats such as fall of animals in the pits, poaching etc.
- Forest fire

0.10.0 The present management plan is prepared to minimize the above threats.

A total of 131.812 ha of forest land will be utilized for mining and ancillaries activities. This area will be disturbed in its original shape and vegetation during the mining operation. The Safety zone along the Lease Boundary and Revenue Village Road will remain unchanged. The proposed Reclamation and Afforestation activities will be carried out in phase manner over 131.812 ha disturbed area as well as in the safety zone area along the mine boundary. It has been proposed to undertake gap plantation in the blank area from the starting year of the mine operation and reclamation and afforestation will be started from the 6th year of the mine operation in mine pit area. Out of 131.812 ha, 40.081 ha will be proposed to be back filled and then after afforestation will be carried out and 42.761 ha will be proposed for bench plantation. Further in the mined out area the surface layer will be covered with topsoil stored elsewhere and planting will be done with quality planting material (QPM).

The Interventions proposed to be taken up is as follows:

A. <u>Project Area:</u>

1. Water pollution will be checked by diverting the water to pass through garland drains and settling tanks and treating the water generated in the mine.
2. Dust hazards will be controlled by regular sprinkling of water on haul roads and the mine product at the time of loading and transportation. Dry fog system in the Crushing & screening unit will also be adopted to reduce spreading of dust.
3. Garbage will be disposed of through efficient garbage management methods.
4. Plantation in blanks and green belt will be done with 14000 seedlings at a cost of Rs.71.442 lakhs.
5. 10,000 Seedlings will be distributed annually, at cost of Rs.1.00 lakh per year. Total cost Rs.10.00 lakhs.
6. Skill Development of local youths will be taken up with financial support @1.00 lakh

per year and total cost Rs.10.00 lakhs.

7. Financial Assistance will be extended to VSS for alternate livelihood with annual expenditure of Rs.2.00 lakhs. Total expenditure will be Rs.20.00 lakhs.
8. Solar Electric fencing will be done around the mine pit to prevent the animals from falling in to the mine pit. Proposed expenditure Rs.20.00 lakhs.
9. Creation of Awareness in the villages around the mine area will be taken up at a cost of Rs.1.00 lakh annually and total cost Rs.10.00 lakhs.
10. Bio-diversity study & Research will be taken up with expenditure of Rs.10.00 lakhs.
11. Wages of Site Manager of Khandadhar Rs. 30.00 lakhs proposed for this.
12. One rescue van will be provide and the Cost of Rescue Van will be Rs.25.00 lakhs.
13. Wages of Driver and cost of Fuel for the rescue van will be Rs.2.20 lakhs annually and total cost Rs.22.20lakhs.
14. One Four Wheeler Vehicle for the RCCF – Rs.25.00 lakhs provided for the purpose.
15. Wages of Driver, Fuel and maintenance – Rs.40.00 lakhs provided for the purpose.
16. Contingency – Rs.7.00 lakhs proposed for contingency expenses.

Total cost proposed for the project area is Rs.290.642 lakhs and cost of escalation @20% is Rs.58.128 lakhs. (Grand Total amount proposed = Rs.348.770 lakhs.)

B. Project Impact Area (Buffer Zone):

1. ANR plantation over 200ha @ 200 plants/ha will be taken up at a cost of Rs.84.532 lakhs.
2. Bamboo plantation 100 ha @400/ha. will be taken up at a cost of Rs.80.136 lakhs.
3. Soil & Moisture conservation activities will be done over 30 ha with expenditure of Rs.21.716 lakhs.
4. 8 nos. of Water bodies will be created with expenditure of Rs.36.00 lakhs.
5. One Watch Tower will be constructed at a cost of Rs.14.740 lakhs.
6. One Permanent Protection Camp will be developed at a cost of Rs.10.10 lakhs.
7. Wages of Anti-depredation Squad 10nos @11,503/- per month. Total expenditure proposed Rs.138.036 lakhs.
8. Hire charges of Vehicle for the Squad: One vehicle is to be hired for the Squad with monthly expenditure of Rs.3.60 lakh and total expenditure Rs.36.00 lakhs
9. Appropriate Equipments will also be provided for the Squad at a cost of Rs.5.00 lakhs.
10. Solar Electric Fencing and Solar Lighting will be provided around the villages

frequently invaded by elephants. Proposed expenditure Rs.80.00 lakhs.

11. Two persons will be engaged as Motivators and Elephant Trackers. The wage component @11,503/- is Rs.27.607 lakhs.
12. Anti Depredation Equipments to the extent of Rs.5.00 lakhs will be provided.
13. Wages of Fire Watchers- 10 nos. of Fire watchers will be engaged for 5months/year to prevent forest fire. The wage component @8,400/- is Rs.42.00 lakhs
14. Hiring of Vehicles: Whenever required vehicles will be hired for fire fighting. Total expenditure proposed @33,000/- per month is Rs.16.50 lakhs.
15. Fire Fighting Equipments to the tune of Rs.8.50 lakhs will be provided.
16. Incentive to Forest Fringe Villages will be provided for forest fire prevention. Rs.10.00 lakhs proposed for this.
17. Fire Line Clearance: Annually 200 kms of fire line will be cleared and maintained @2800/km, with total cost of Rs.56.00 lakhs.
18. Cattle Immunization will be done @1 lakh/year – total cost of Rs.10.00 lakhs.
19. Incentive to VSS for motivation for fire protection will be paid @1 lakh annually. Total cost Rs.10.00 lakhs.
20. Rewards to Informers: Informers will be rewarded for providing information regarding poachers and smugglers. Total amount proposed Rs.10.00 lakhs.
21. To reduce pressure on forest, alternate Fuel for Forest Fringe Villages will be supplied. Total cost proposed is Rs.10.00 lakhs.
22. Training will be imparted to SHGs for skill development. Proposed expenditure is Rs.10.00 lakhs.
23. Alternate Livelihood activities such as Apiculture, Poultry etc will be supported and encouraged. Total cost Rs.20.00 lakhs.
24. Creation of Awareness in the forest fringe villages will be done and the proposed expenditure is Rs.10.00 lakhs.
25. Monitoring & Evaluation will be taken up at regular intervals and the amount proposed is Rs.5.00 lakhs.

The cost of the proposed activities within the Impact area is Rs.756.867 lakhs and cost escalation @20% is Rs.151.373 lakhs. Hence the total amount proposed is **Rs.908.240** lakhs.

However, the Forest Department is free to utilize the entire amount or a part of it for other suitable areas depending on actual need.

C. **Total Cost:**

The total cost of this Plan is (Rs.348.770 lakhs + Rs.908.240 lakhs=) **Rs.1257.010** lakhs.

D. The activities proposed in this plan are expected to be undertaken within a period of 10 years with the presumption that, the desired result will be achieved within this period. However, after completion of the plan period the objectives as well as the achievements will be reviewed and further steps as may be required will be taken.

CHAPTER- 1

DETAILS OF THE PROJECT AREA & IMPACT AREA

In pursuant to the Mines and Minerals (Development and Regulation) Amendment ACT, 2015 and The Mineral (Auction) Rules, 2015, Govt. of Odisha issued the notice inviting tender dated 23rd Dec 2015 for commencement of the auction process to grant the mining Lease under captive category in respect of Ghoraburhani - Sagasahi iron ore Block located in Koira Tahasil of Sundargarh district of Odisha. The e-auction process was conducted in accordance with the tender document and the mineral auction rule, 2015 for said mineral block and M/s Essar Steel India Limited was declared as the preferred Bidder under Rule 9(4) (b) (iii) of the Rules.

Ghoraburhani - Sagasahi Iron Ore Block over 139.165 ha of M/s Essar Steel India Ltd is in the villages of Ghoraburhani, Sagasahi and Kalmang, Koira Tahasil, district Sundargarh Odisha.

M/s Essar Steel India Ltd has already made a payment of Rs 9, 26,24,600.00 (Rupees Nine crore twenty-six lakhs twenty-four thousand six hundred only) through treasury challan on 17.03.2016 against the first installment being ten percent of the upfront money. Accordingly, the Government of Odisha has issued letter of Intent under Rule 10(2) of Mineral Auction Rules 2015 to M/s Essar Steel India Ltd for grant of Mining Lease for Ghoraburhani - Sagasahi Block for iron ore over an area of 139.165Ha (90.629Ha of Mineralized area and 48.536 ha for ancillary activities) in Ghoraburhani, Sagasahi and Kalmang village, Koira Tahasil of Sundargarh district of Odisha for a period of 50 years from the date of execution.

This letter of intent is valid subject to the provision of the Act and the Rules made there under and M/s Essar Steel India Limited shall be designated as the Successful Bidder and the subsequently granted the mining lease only upon satisfactory completion of all the requirements under the Act and Rules made there under.

Sundargarh District is very rich in Forest as well as wild life. This district is a part of Eastern Ghats and is a continuation of famous Saranda Forest containing diversified Flora & Fauna. Various Wild Life species including Elephants & sloth bears are present in this District.

The entire Sundergarh District is very rich in mineral deposits such as Iron Ore and Manganese Ore. Besides this District is also an Industrial Belt. A number of Industries have come up in the District. Presence of Wildlife along with Industries and Mining activities create a conflicting situation.

As per the exploration carried out by GSI, the geological and mineable reserves in the blocks are estimated to be respectively 98.61 Million Tons and 78.24 Million Tons respectively.

LOCATION OF THE PROJECT AND ITS IMPACT AREA:

Location of the project Area:

The lease area of Ghoraburhani-Sagasahi Iron ore Block is located on the Topo-sheet No. F45N5(73 G/5) and bounded by

Latitude - 21° 56' 08.83896" - 21° 57' 09.61956"North

Longitude - 85° 17' 02.52096" - 85° 17' 48.99336" East

The project area comes under Koira Beat of Koira Range of Bonai Forest Division.

A part of Mendhamaruni PRF is included within the project area.

Impact Area:

The project area is located at the border of Sundargarh and Keonjhar districts. Therefore the impact area extends over both the districts.

- Forest Blocks: Parts of the following forest blocks fall within the impact area of 10 km radius:
    1. Mendhamaruni RF,
    2. Baitarani RF,
    3. Sidhamath RF,
    4. Lakraghat RF,
    5. Karo RF,
    6. Toda RF,
    7. Uliburu RF etc.
- Forest Beat: Koira , Malda, , Guali, uliburu, Dubuna, Kendudih
- Forest Range: Koira, Barbil
- Forest Division: Bonai & Keonjhar.

- **Land Schedule**:

Forest diversion proposal for entire forest land of 126.401 Ha. included within the leasehold area over 139.165 ha for the purpose of mining and ancillary activities has already been submitted.

Existing Land Use:

P R F	-	76.666 Ha
Revenue Forest	-	3.794 Ha.
D L C Forest	-	45.941 Ha
Total Forest Land	-	126.401 Ha
Private (Tenant) Land	-	3.257 Ha
Government Land	-	6.063 Ha
Gochar	-	3.444 Ha
Grand Total	-	139.165 Ha.

The details of land use plan is as follows: -

Proposed Land Use plan of Project Area:

The present & Plan period land use pattern is given below:

Particulars	AREA IN HECTARE				
	At present	**Additional area during plan period**	**Land use at the end of plan period**	**Additional area beyond plan period**	**Land use during conceptual period**
Area under mining**	0.50	40.273	40.773	47.986	88.759
Storage of topsoil	0	0.320	0.32	0	0
Waste dump	0	4.967	4.967	1.036	6.003
Sub grade stack / Mineral storage	0	7.551	7.551	0	0
Infrastructure Facilities (Site services & utilities, admn. building , Conveyor belt, etc)	0	2.4303	2.4303		2.4303
Roads	0.598	2.2714	2.8694	0	0.950
Railway	0	0	0	0	0
Tailing Pond	0	4.923	4.923		4.923
Effluent treatment plant	0	0	0		0
Mineral separation plant (Crushing & screening unit, beneficiation plant)	0	15.6557	15.6557	0	12.85

Township area	0	0	0	0	0
Others (Retaining wall, Garland drain, check dams, settling tank, Sump, embankment etc magazine with safety zone)	0	6.4557	6.4557		6.4557
Sub Total	**1.098**	**84.8471**	**85.9451**	**49.022**	**122.371**
Safety zone (ML Boundary, road)	**6.755**		**6.755**		**6.755**
Untouched area	**131**		**46.464**		**10.03**
Grand total	**139.165**		**139.165**		**139.165**

'** Old quarries / excavations of very low and negligible depth.

Statutory Clearance

- **Status of Forest Clearance**

Stage-I clearance for diversion of forest land for mining purpose has been issued by Government of India, in their ministry of Environment, Forest & Climate Change Letter, F. No.8-55/2018-FC, dated 6th March, 2019.

- **Status of Environment Clearance:**

ToR for this project has been issued by MoEF&CC by their letter No. J-11015/192/2016.IA.II (M) dated 16th January 2017, for 7.16 MTPA ROM productions with 6.00 MTPA beneficiation plant. Draft EIA & EMP has been submitted to State Pollution Control Board, Bhubaneswar and Public hearing has been completed successfully on 19.05.2017.

The point No.16 of the Standard TOR prescribes " *A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted*."

The point No.18 of the Standard TOR prescribes "*A detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, endangered, endemic and RET species duly authenticated, separately for core and buffer zones should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any schedule-I fauna found in the study area, the necessary plan along with budgetary*

provisions for the conservation should be prepared in consultation with State Forest and wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost."

Hence this plan is prepared in compliance to these conditions.

- **Status of Mining Plan:**

Mining plan for the block approved by Indian Bureau of Mines vide. letter no MP/FM/02-ORI/ BHU/2016 dated 11th July 2016.

b) Village and Habitation:

Project area:

The project area partially covers three villages such as (1) Kalmanga, (2)Ghorhaburhani and (3)Sagasahi.

Total no. of Households in these villages is 411, out of which 26 families are to be displaced. The project proponent has to take up the RR Scheme at a cost of Rs.354.05 lakhs.

- **Demography & Occupation:**

There are 86 villages located within the impact zone which are expected to be affected by various mining operations.

OPULATION DISTRIBUTION, LITERACY RATE, ETC IN STUDY AREA/ IMPACT ZONE:

The impact zone of the project area encompassing 12.70 km radial around the Project.

The study details based on 2011 census data are highlighted below:

- There are total 83 nos. of rural villages and one urban area coming within the 10 Km. buffer area. These villages spread over two districts as given below:

Name of District	Name of Tahsil	Number of Villages
Sundargarh	Koida	51
Keonjhar	Rugudi	16
	Joda	1
	Bolani	6
	Bamebari	10
	TOTAL	84
Jharkhand		2
GRAND TOTAL		86

The population pattern and other details as per 2011 Census are as follows:

Total No. of House Holds	16625

Sl. No.	Particulars	Population		
		Male	Female	Total
1	Total population	36320	34515	70835
2	Scheduled Caste	3109	3051	6160 (8.7%)
3	Scheduled Tribe	23810	24016	47826 (67.51%)
4	Literates	20555 (56.6%)	11571 (33.5%)	32126 (45.35%)
5	Main Workers	16101	3883	19984
6	Cultivators	621	175	796
7	Agricultural labourers	123	46	169
8	Marginal workers	3062	2829	5891
9	Non workers	17157	27804	44961

- Out of the total population of these 83 rural villages and 1 urban area is 70835 in which the male population is 36320 (51.27 %) and the female population is 34515 (48.73%). This shows that the male and female population ratio is almost equal.
- Among the total population 67.51 % is Scheduled Tribes, 8.70 % is Scheduled Caste and 23.79 % people belong to other castes mainly the Most Backward Communities and Backward Communities.
- Among the total population, 45.3 % of the people are literate and 54.7 % of the people are illiterate. This shows that nearly half of the population is illiterate.
- Among the literates 29 % are males and 16.3 % are females. This shows that the male literates are slightly more than the female literates and the illiterate constitute 22.3 % are male and the female 32.4 %.
- Among the total population non workers are about 63.47 % (44961) and remaining part constitute the working population i.e. 36.53 % (25874).
- Among the population, 28.21 % people are main workers (19984) and 8.32 % people are marginal workers (5890).

- **Cropping Pattern:**

The numbers of household in the village depending solely on agriculture for their livelihood are few in numbers and are categorized as construction worker and mining worker. Mining activities contributes maximum days to the workers than the daily construction wage salary job and private work. The cultivators mostly depend on manual methods and use the traditional plough and bullock for tiling their land and other related operations. The major types of crops are Khariff (Paddy, Maize & Ragi) & Rabi (Mung, Mustard, Black gram. Ground nut etc.). Some people also raise vegetables such as Beans, Cauliflower, Cabbage, Brinjal etc. on small scale. During Khariff season from July to October (July-October). Agricultural activities take place both in rain-fed areas and irrigated areas and during Rabi season vegetables crops are generally grown.

The Extent of Biotic Pressure on impact area with interference to forest growth.

The different biotic pressures are

i. Collection of firewood
ii. Cattle grazing
iii. Forest fire
iv. Collection of small timbers for use in household
v. Collection of NTPF

A large chunk of the rural population use firewood for their cooking. Besides almost all the population uses Timber for construction purpose. Demand of the increasing population results in depletion of forests. Families settled near the forest are directly depending on fuel requirement from forest.

- **Population Dependent upon NTFP collection and its impact on wildlife**

The dependence of the local population in and around the project area on NTFP collection is minimal. Roughly around 22% of household collect NTFP, such as Sal leaves, Sal seeds, Kendu leaves, Mahua flowers & seeds and Tamarind.

The anxiety of collecting more quantity of NTFP and fuel wood, prompt the individuals for early entry in to the forest area and results in confrontation with the wild animals.

Some times Mohua flower collection is done by cleaning the ground around the mohua trees by burning and the fire at times spreads to the nearby forest areas causing damage to various flora and fauna.

- **Cattle Population and its dependency on forest**

Total cattle population of 9 villages surrounding the project area is more than 1453 as per census data of 2003-04.The livestock populations include cows, buffaloes, goats and oxen in the impact Region. These cattle mostly depend on the forest area for grazing. Normally stall feeding is not practiced in this area. It was observed that the grazing of livestock was practiced as a group activity and all cows gather at a common place and then led to the nearby forest area for grazing. Entry of large number of cattle in to the forest damages the forest and also responsible for transmission of diseases to the wild. Cattle population of 09 villages of Sundergarh dist. is 1453 (2003-04 Census).

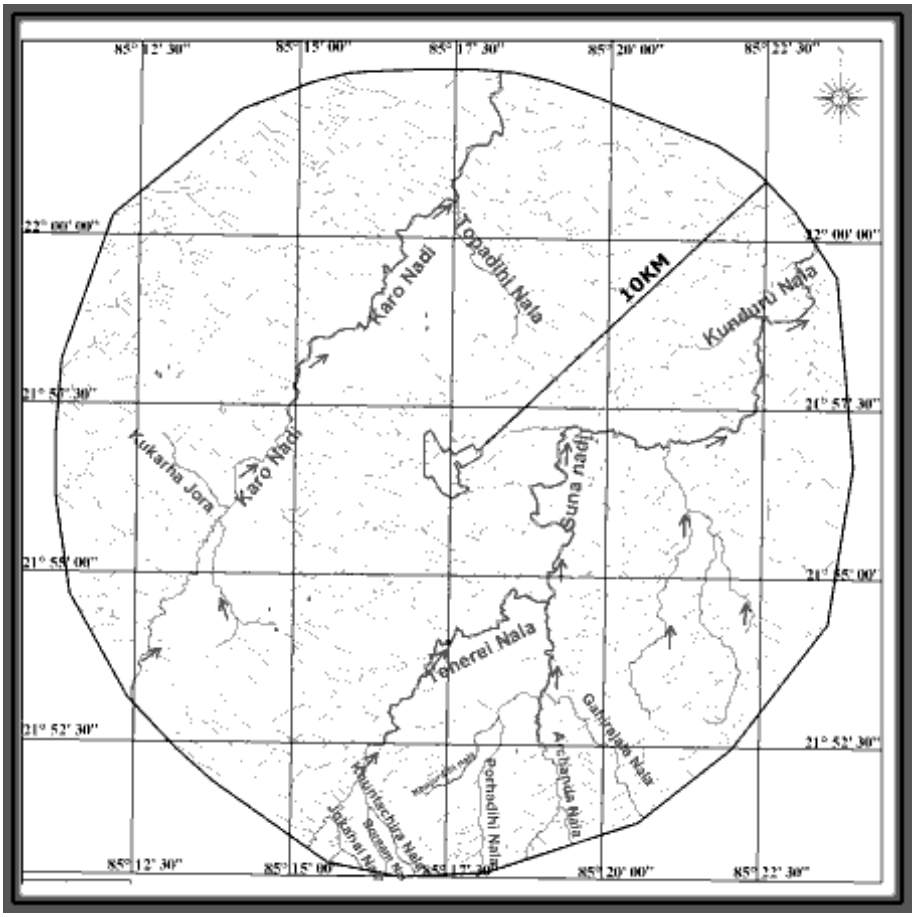
Sl. No.	Name of Village	Total Cattle	Total Buffalo	Total Goat	Total Sheep
Koida P.S. (Sundergarh)					
1	Sanindpur	247	0	205	23
2	Kalmanga	115	8	60	0
3	Maida	188	0	200	0
4	Patabeda	89	0	75	0
5	Ganua	495	127	400	75
6	Rusiberna	NA			
7	Mandajada	150	44	112	0
8	Dalita	90	0	65	0
9	Baserdh	79	0	54	0
	TOTAL	**1453**	**179**	**1171**	**98**

c) Topography and natural drainage:

The project area is with highly rugged terrain, and elongated hills trending ENE-WSW direction, low mounds and narrow valleys. The highest elevation of ridges in the area is 745m. The low lying valleys occur at an elevation of around 600m. Lateritic soil recorded in the ridges and valleys are mainly covered by alluvial soil.

The drainage of the project area takes place through Karo river in NW and Suna Nadi in SE, which flows in the western & eastern side of the lease area at a distance of 4.0 Km &

1.6 km respectively from the lease boundary. Few rain water drainage channels are passing through the lease area



d. Infrastructure Facilities and its impact:

Roads: The area can be approached from Barbil or Koira through NH-215. The National Highway No.215 connecting Panikoili on National Highway No.5 is located at a distance of 1.9 km. NW.

Railway Line/Siding: The nearest railway station head is Barbil which is located at a distance of 30 km from the lease area in NE direction. This Railway line has been in existence for quite some time and no new impact could be perceived for this.

Moreover, no new railway line is proposed to be laid in the area. However, expansion of single line in to double line of railway is under process.

Dam: There is no water reservoir within the impact area.

Water Way: The only major water way in this area are Karo river & Suna Nadi which are 4.0 Km & 1.6 km respectively from the lease boundary. As it is a natural perennial water source, it is beneficial for the wild animals.

Mine Pits: As there are number of mines in these areas**,** there are number of working & non-working pits. There is likelihood of the animals falling in to it. But the present user proposes to surround its own mine pit with Solar Electric fencing along chain mesh provision to prevent entry of all types of wild animals.

Unguarded dug Wells: There are no such un-guarded dug wells in the study area. So there is no chance of fall of animals inside the well.

Mining Projects: The other important mining centers in the vicinity are Kalta, Tensa, Barsuan in Koira circle and Joda circle in Keonjhar district.

e. Description of Flora & Fauna:

This is a new mine & yet to be executed. This area does not form a part of any wild life Sanctuary or National Park or critical Wildlife habitat. This area is also surrounded by various mines and mining activities.

The Forest around the lease & impact zone area are disturbed due to various Mining activities and presence of Wildlife is very sparse. As per the information collected the following flora & fauna are found in the core and Buffer area of the project.

No endemic species are found either in project area & in the ZOI area.

During the site inspection of the project area as well as the buffer (impact) area detailed study of Flora and fauna has been conducted.

The list of Flora and Fauna so prepared and authenticated by the forest officials is enclosed.

LIST OF PLANT RECORDED IN CORE ZONE

List of Floral Fauna Recorded in the Core Zone & Buffer Zone of Ghoraburhani-Sagasahi Iron ore Block (139.165 Ha) of M/s Essar Steel India Ltd. in the District of Sundargarh, Odisha.

Core Zone

The complete species of flora & fauna recorded in Core Zone is furnished below separately;

FLORA (Core Zone)

Sl.No	Local Name/Common Name	Botanical Name	Family
Trees			
1	Khair	*Acacia catechu*	Mimosaceae
2	Kurum	*Adina cordifolia*	Rubiaceae
3	Bel	*Aegle marmelos*	Rutaceae
4	Mahula	*Aesandra butyracea*	Sapotaceae
5	Chhatian	*Alstonia scholaris*	Apocynaceae
6	Piasa	*Anogeissus acuminata*	Combretaceae
7	Dhaura	*Anogeissus latifolia*	Combretaceae
8	Kadamba	*Anthocephalus cadamba*	Rubiaceae
9	Neem	*Azadirachta indica*	Meliaceae
10	Semul	*Bombax ceiba*	Bombacaceae
11	Chai	*Buchanania lanzan*	Anacardiaceae
12	Palasa	*Butea monosperma*	Fabaceae
13	Kumbhi	*Careya arborea*	Myrtaceae
14	Khokada	*Cassia fistula*	Caesalpiniaceae
15	Sudha	*Cassia fistula*	Fabaceae
16	Phasra	*Chloroxylon swietenia*	Meliaceae
17	Kendu	*Diospyros melanoxylon*	Ebenaceae
18	Sahu	*Dolichandrone falcata*	Bignoniaceae
19	Mankadi Kendu	*Diospyros montana*	Ebenaceae
20	Kendu	*Diospyros melanoxylon*	Ebenaceae
21	Palidhaura	*Erythrina suberosa*	Fabaceae
22	Bara	*Ficus benghalensis*	Moraceae
23	Dagra	*Ficus hispida*	Moraceae
24	Asvattha	*Ficus religiosa*	Moraceae

Sl. No	Local Name/Common Name	Botanical Name	Family
25	Gambhari	*Gmelina arboria*	Verbenaceae
26	Dhaman	*Grewia tilifolia*	Tiliaceae
27	Sidha	*Lagerstroemia parviflora*	Lythraceae
28	Mas	*Lannea coromandelica*	Anacardiaceae
29	Kainth	*Limonia acidissima*	Rutaceae
30	Mahul	*Madhuca longifolia*	Sapotaceae
31	Aamba	*Mangifera indica*	Anacardiaceae
32	Champa	*Michelia champaca*	Magnoliaceae
33	Khirkoli	*Mimusops hexandra*	Sapotaceae
34	Anchhu	*Morinda tinctoria*	Rubiaceae
35	Barudhana	*Ougeinia oojeinensis*	Fabaceae
36	Piasala	*Pterocarpus marsupium*	Fabaceae
37	Kusum	*Schleichera oleosa*	Sapindaceae
38	Bhollia	*Semecarpus anacardium*	Anacardiaceae
39	Sal	*Shorea robusta*	Dipterocarpaceae
40	Ambala	*Spondias mangifera*	Anacardiaceae
41	Ghirkhiri	*Sterculia urens*	Malvaceae
42	Patuli	*Stereospermum suaveolens*	Bignoniaceae
43	Jamun	*Syzygium cumini*	Myrtaceae
44	Tentuli	*Tamarindus indica*	Caesalpiniaceae
45	Teak	*Tectona grandis*	Verbenaceae
46	Arjun	*Terminalia arjuna*	Combretaceae
47	Bahada	*Terminalia belerica*	Combretaceae
48	Harida	*Terminalia chebula*	Combretaceae
49	Amla	*Terminalia tomentosa*	Combretaceae
50	Asana	*Terminalia grandis*	Verbenaceae
51	Kangada	*Xylia xylocarpa*	Fabaceae
52	Barkoli	*Zizyphus mauritiana*	Rhamnaceae

Sl No.	Local Name/Common Name	Botanical Name	Family
Shrubs			
1	Arakha	*Calotropis procera*	Asclepidaceae
2	Aswagandha	*Withania somnifera*	Solanaceae
3	Basanga	*Adhatoda vasica*	Acanthaceae
4	Gila	*Caesalpinia decapetala*	Ceasalpiniaceae
5	Girili	*Indigofera pulchella*	Fabaceae
6	Kanteikoli	*Zizyphus nenoplia*	Rhamnaceae
7	Ghurudu	*Gardenia gumifera*	Rubiaceae
8	Nagaiti	*Lantana camara*	Verbenaceae
9	Ranidamakathi	*Flemingia chappar*	Fabaceae
10	Telkoruan	*Ixora parviflora*	Rubiaceae
11	Kurei	*Holarrhena antidysenterca*	Apocynaceae
Herbs			
1	Anantamula	Hemidesmus indicus	Asclepidaceae
2	Apamaranga	Achyranthes aspera	Amarantaceae
3	Baghanakhi	Martynia diandra	Pedaliaceae
4	Bhuinimba	Andrographis paniculata	Acanthaceae
5	Bhumgaraj	Wedelia calendulacea	Compositae
6	Chitaparu	Plumbago zeylanica	Plumbaginaceae
7	Dudura	Datura stramonium	Solanaceae
8	Haladi	Curcuma longa	Zingiberaceae
9	Patalagaruda	Rauwolfia serpentina	Apocynaceae
10	Palua	Curcuma aromatica	Zingiberaceae
11	Salaparni	Desmodium gangeticum	Fabaceae
12	Nagaphani	Opuntia vulgaris	Cactaceae
Climbers			
1	Abundi	Combretum decandrum	Combretaceae
2	Asadhua	Capparis zeylanica	Capparidaceae
3	Anantamoli	Hemidesmus indicus	Asclepiadaceae

Sl No	Local Name/Common Name	Botanical Name	Family
4	Arai / Gila	Entada scandens	Mimosaceae
5	Baidank	Mucuna pruriens	Fabaceae
6	Dantart	Acacia pennata	Mimosaceae
7	Desialu	Dioscorea alata	Dioscoreaceae
8	Gudmari	Gymnema sylvestre	Asclepiadaceae
9	Gulichi	Tinospora cordifolia	Menispermaceae
10	Kainche	Abrus precatorius	Fabaceae
11	Karaba	Dioscorea pentaphylla	Dioscoreaceae
12	Lata palas	Butea superba	Papilionaceae
13	Mardalai	Milletia auriculata	Papilionaceae
14	Mutum	Smilax macrophylla	Liliaceae
15	Modanga	Loranthus longiflorus	Loranthaceae
16	Satabari	Asparagus racemosus	Liliaceae
17	Siali	Bauhinia vahlii	Caesalpiniaceae
Bamboos			
1	Baunsa (salia)	Dendrocalamus strictus	Graminae
Grasses			
1	Broom	Thysalolaena maxima	-do-
2	Duba	Cynodon dactylon	-do-
3	Kasatandi	Saccharum spontaneum	-do-
4	Sabai	Pollinidium angustifolium	-do-
5	Sinkula	Heteropogon contortus	-do-

Range Officer,
Keira Range

Countersigned

Divisional Forest Officer,
Bonai Division

Table No - 3.23

LIST OF PLANT RECORDED IN BUFFER ZONE

BUFFER ZONE

The common species of flora & fauna noticed in Buffer zone is furnished below separately:

FLORA (Buffer Zone)

Sl No.	Local Name/Common Name	Botanical Name	Family
Trees			
1	Acacia	*Acacia auriculiformis*	Mimosaceae
2	Khair	*Acacia catechu*	Mimosaceae
3	Kurum	*Adina cordifolia*	Rubiaceae
4	Bel	*Aegle marmelos*	Rutaceae
5	Mahala	*Ailanthus excelsa*	Simarubaceae
6	Chhatian	*Alstonia scholaris*	Apocynaceae
7	Phasi	*Anogeissus acuminata*	Combretaceae
8	Dhaura	*Anogeisses latifolia*	Combretaceae
9	Kadamba	*Anthocephalus cadamba*	Rubiaceae
10	Neem	*Azadirachta indica*	Meliaceae
11	Simuli	*Bombax ceiba*	Bombacaceae
12	Char	*Buchanania lanjan*	Anacardiaceae
13	Palasa	*Butea monosperma*	Fabaceae
14	Bandiphala	*Butea parviflora*	Fabaceae
15	Kumbhi	*Careya arborea*	Myrtaceae
16	Khakada	*Casearia tomentosa*	Salicaceae
17	Sunari	*Cassia fistula*	Fabaceae
18	Bheru	*Chloroxylon swietenia*	Meliaceae
19	Kerada	*Cleistanthus collinus*	Euphorbiaceae
20	Arjundi	*Combretum decandrum*	Combretaceae
21	Sishu	*Dalbergia latifolia*	Fabaceae
22	Mankada kendu	*Diospyros embryopteris*	Ebenaceae
23	kendu	*Diospyros melanoxylon*	Ebenaceae

Sl. No.	Local Name/Common Name	Botanical Name	Family
24	Amla	*Phyllanthus emblica*	Phyllanthaceae
25	Palidhua	*Erythrina indica*	Fabaceae
26	Bara	*Ficus benghalensis*	Moraceae
27	Dimri	*Ficus hispida*	Moraceae
28	Aswastha	*Ficus religiosa*	Moraceae
29	Kataranga	*Gardenia latifolia*	Rubiaceae
30	Kakado	*Garuga pinnata*	Burseraceae
31	Gambhari	*Gmelina arborea*	Verbenaceae
32	Dhamo	*Grewia tiliifolia*	Tiliaceae
33	Sidha	*Lagerstroemia parviflora*	Lythraceae
34	Moi	*Lannea coromandelica*	Anacardiaceae
35	Kainth	*Limonia acidissima*	Rutaceae
36	Mahul	*Madhuca longifolia*	Sapotaceae
37	Aamba	*Mangifera indica*	Anacardiaceae
38	Champa	*Michelia champaca*	Magnoliaceae
39	Khirkoli	*Mimusops hexandra*	Sapotaceae
40	Achhu	*Morinda tinctoria*	Rubiaceae
41	Phanphasna	*Oroxylum indicum*	Bignoniaceae
42	Bandhana	*Ougeinia oojeinensis*	Fabaceae
43	Pijuli	*Psidium guajava*	Myrtaceae
44	Piasala	*Pterocarpus marsupium*	Fabaceae
45	Ritha	*Sapindus emarginatus*	Sapindaceae
46	Kusuma	*Schleichera oleosa*	Sapindaceae
48	Bhalia	*Semicarpus anacardium*	Anacardiaceae
49	Sal	*Shorea robusta*	Dipterocarpaceae
50	Ambada	*Spondias mangifera*	Anacardiaceae
51	Gindhini	*Sterculia urens*	Malvaceae
52	Patuli	*Stereospermum angustifolium*	Bignoniaceae

Sl. No.	Local Name/Common Name	Botanical Name	Family
53	Lodha	*Symplocos racemosa*	Styraceae
54	Jamun	*Syzygium cuminii*	Myrtaceae
55	Tentuli	*Tamarindus indica*	Caesalpiniaceae
56	Teak	*Tectona grandis*	Verbenaceae
57	Arjun	*Terminalia arjuna*	Combretaceae
58	Bahada	*Terminalia belerica*	Combretaceae
59	Haridu	*Terminalia chebula*	Combretaceae
60	Asana	*Terminalia tomentosa*	Combretaceae
61	Kangada	*Xylia xylocarpa*	Fabaceae
62	Barkoli	*Ziziphus mauritiana*	Rhamanaceae
Shrubs			
1	Arakha	Calotropis procera	Asclepiadaceae
2	Amari	Ipomea fistulosa	Convolvulaceae
3	Aswagandha	Withania somnifera	Solanaceae
4	Baincha	Flacourtia sepiaria	Flacourtiaceae
5	Basanga	Adhatoda vasica	Acanthaceae
6	Gila	Caesalpinia decapetala	Ceasalpiniaceae
7	Girili	Indigofera pulchella	Fabaceae
8	Karabir	Nerium indicum	Apocynaceae
9	Kanteikoli	Ziziphus oenoplia	Rhamnaceae
10	Gharadu	Gardenia gummifera	Rubiaceae
11	Mamun	Antidesma diandrum	Euphorbiaceae
12	Nagairi	Lantana camara	Verbenaceae
13	Ranidantakathi	Flemingia chappar	Fabaceae
14	Siju	Euphorbia nivulia	Euphorbiaceae
15	Telkoruan	Ixora parviflora	Rubiaceae
16	Kurei	Holarrhena antidysenterica	Apocynaceae
17	Dhatki	Woodfordia fruticosa	Myrtaceae
Herbs			

Sl. No.	Local Name/Common Name	Botanical Name	Family
1	Ankaranti	Solanum xanthocarpum	Solanaceae
2	Anantamula	Hemidesmus indicus	Asclepidaceae
3	Apamaranga	Achyranthes aspera	Amaranthaceae
4	Baghanakhi	Martynia diandra	Pedaliaceae
5	Bhuinimba	Andrographus paniculata	Acanthaceae
6	Bhumgaraj	Wedelia calendulacea	Compositae
7	Chitaparu	Plumbago zeylanica	Plumbaginaceae
8	Dudura	Datura stramonium	Solanaceae
9	Haladi	Curcuma longa	Zingiberaceae
10	Patalagaruda	Rauwolfia serpentina	Apocynaceae
11	Pelua	Curcuma aromatica	Zingiberaceae
12	Salaparni	Desmodium gangeticum	Fabaceae
13	Saptaphemi	Opuntia dillenii	Cactaceae
14	Tulasi (dhala)	Ocimum basilicum	Labiatae
15	Tulasi (kala)	Ocimum sanctum	-do-
16	Nagaphemi	Opuntia vulgaris	Cactaceae
Climbers			
1	Atundi	Combretum decandrum	Combretaceae
2	Asadhua	Capparis zeylanica	Capparidaceae
3	Anantamuli	Hemidesmus indicus	Asclepiadaceae
4	Arsi / Gila	Entada scandens	Mimosaceae
5	Baidank	Mucuna pruriens	Fabaceae
6	Dantari	Acacia pennata	Mimosaceae
7	Desiahu	Dioscorea alata	Dioscoreaceae
8	Gudmari	Gymnema sylvestre	Asclepiadaceae
9	Gulichi	Tinospora cordifolia	Menispermaceae
10	Kaincha	Abrus precatorius	Fabaceae
11	Kuraba	Dioscorea pentaphylla	Dioscoreaceae
12	Lata pales	Butea superba	Papilionaceae
13	Mandalsi	Milletia auriculata	Papilionaceae
14	Muturi	Smilax macrophylla	Liliaceae
15	Modanga	Loranthus longiflorus	Loranthaceae

Sl. No.	Local Name/Common Name	Botanical Name	Family
16	Satabari	Asparagus racemosus	Liliaceae
17	Siali	Bauhinia vahlii	Caesalpiniaceae
Bamboos			
1	Baunsa (salia)	Dendrocalamus strictus	Gramineae
2	-do- (daba)	Bambusa arundinacea	Gramineae
3	-do- (kanta)	Bambusa arundinacea	Gramineae
Grasses			
1	Bena	Vitiveria zizanioides	-do- Gramineae
2	Broom	Thyselolaena maxima	-do-
3	Duba	Cynodon dactylon	-do-
4	Kasatandi	Saccharum spontaneum	-do-
5	Sabai	Pollinidium argustifolium	-do-
6	Sindula	Heteropogan contortus	-do-

Range Officer,
Kolra Range

RANGE OFFICER
KOLRA FOREST RANGE

Countersigned

Divisional Forest Officer
Bonai Division

The fauna noticed in the Buffer Zone are given in table below:

FALNA (Buffer Zone)

Sl. No.	Oriya Name	English Name	Latin Name	Family	Schedule
1	Bidudi	Bat	Rousettute schenaulti	Pteropodidae	V
2	Banobiradi	Wild cat	Felis chaus affinis	Felidae	I
3	Barah	Wild boar	Sus crefa cristatus	Suidae	III
4	Bilua	Jackal	Canis latrans	Canidae	V
5	Bhalu	Black bear	Selenarctos tibetana	Ursidae	II
6	Chital	Spotted deer	Axis axis	Cervidae	III
7	Chemaru	House bat	Cynopterus sphinx	Pteropodidae	V
8	Gundichimusa	Squirrel	Funambulus pennanti	Sciuridae	V
9	Hati	Elephant	Elephas maximus	Elephantidae	I
10	Jhinka	Porcupine	Hystrix leucura	Hystricidae	IV
11	Katasa	Big wild cat	Paradoxurus hermaphrodit	Felidae	II
12	Kokisiali	Fox	Vulpes bengalensis	Canidae	II
13	Kutura	Barking deer	Cervulus muntjac	Cervidae	III
14	Mankada (hanu)	Black-faced monkey	Semnopithecus entellus	Cercopithecidae	II
15	-do- (patli)	Red-faced monkey	Macaca mulatta	Cercopithecidae	II

16	Musa	Mouse	Rattus rattus	Muridae	V
17	Neula	Mongoose	Herpestes bengalensis	Viverridae	IV
18	Odha	Otter	Lutra lutra	Mustelidae	III
19	Saliapatini	Civet	Viverricula indica	Viverridae	II
20	Thekua	Hare	Lepus ruficaudatus	Leporidae	III

B– BIRDS

List of birds

Sl. No.	Oriya Name	English Name	Latin Name	Family	Schedule
1	Bani	Common myna	Acridotheres tristis	Sturnidae	IV
2	Baya chadhei	Weaver bird	Ploceus phillipinus	Ploceidae	IV
3	Banakukuda	Jungle fowl	Gallus gallus	Phadianidae	IV
4	Bhrungaraj	Black bee	Dessomonus paradiseus	Dicruridae	IV
5	Gunduri	Bastard gull	Turnix buscitotor	Turnicidae	IV
6	Chatak	Swifty	Micropus affinis	Apodidae	IV
7	Chila	Kite	Mylvus migrans		IV
8	Gendalia	Grey crane	Anastromis oscitens	Ciconiidae	IV
9	Gharchatia	Sparrow	Passer domesticus	Ploceidae	IV
10	Ghokalika	Raven myna	Acridotheres ginginianus	Sturnidae	IV
11	Haldibasant	Golden oriole	Oriolus xanthornus	Oriidae	IV
12	Koeli	Cuckoo	Cuculus canorus	Cuculidae	IV
13	Kajalapati	King crow	Dicrurus macrocercus	Dicruridae	IV
14	Kau	Crow	Corvus splendens	Corvidae	V
15	Kumbhatua	Red crow	Centropus sinensis	Cuculidae	IV
16	Mayura	Peacock	Pavo cristatus	Phadianidae	I
17	Macharanka	King-fisher	Ceryle rudis	Alcedinidae	IV
18	Panikua	Little cormorant	Phalacrocorax nigar	Anatidae	IV
19	Pecha	Owl	Athene brama	Strigidae	IV
20	Para	Pigeon	Columba livia	Columbidae	IV
21	Sua	Parrot	Pistacula krameri	Sturnidae	IV
22	Sankachila	Brahmin kite	Haliastur Indus	Muscicapidae	I
23	Kapota	Dove	Streptopelichin opensis	Columbidae	IV
24	Baga (kanti)	Pond heron	Ardeola grayii	Ardeidae	IV

25	Baga (rani)	Cattle egret	Bubulcus ibis coromandus	Ardeidae	IV
26	Kathahana	Ceylon hoopoe	Upupa ceylonenses	Upupidae	IV

C – SNAKES

List of snakes

Sl.No.	Oriya Name	English Name	Latin Name	Family	Schedule
1	Ajagarh	Indian python	Python molurus	Boidae	I
2	Chitl	Painted krait	Bungarus coeruleus	Elapidae	IV
3	Dhaonara	Rat snake	Ptyas mucosus	Colubridae	II
4	Boda	Russell's viper	Vipera russelli	Viperidae	II
5	Domundia	John's sandboda	Eryx conicus	Boidae	IV
6	Gokhar	Cobra	Naja naja	Elapidae	II
7	Laudankia	Arboreal adder	Dryophis nasutus	Elapidae	IV
8	Dhanda	Water snake	Natrix piscator	Colubridae	IV
9	Rana	Banded krait	Bungarus fasciatus	Elapidae	II
10	Tampa	Monocellate cobra	Naja naja kaouthia	-do-	II
11	Telia	Blind snake	Typhlops braminus	Typhlopidae	IV

D – LIZARDS

List of lizards

Sl. No.	Oriya Name	English Name	Latin Name	Family	Schedule
1	Bahurupi	Indian chameleo	Chameleon zeylanicus	Chamaeleonidae	IV
2	Champeineoli	Mabuya	Mabuya biro	Scincidae	IV
3	Endua	Garden lizard	Calotes versicolor	Agamidae	IV
4	Godhl	Guana	Varanus monitar	Varanidae	I
5	Jhitipiti	Lizard	Hemidactylus flaviviridis	Gekkonidae	IV

Range Officer
RANGE OFFICER
KORA Range
KORA FOREST RANGE

Countersigned

Divisional Forest Officer
Bonai Division

FAUNA (Core Zone)

Sl. No.	Oriya Name	English Name	Latin Name	Family	Schedule
1	Badudi	Bat	Rouseltute schenaulti	Pteropodidae	V
2	Baraha	Wild boar	Sus crefa cristatus	Suidae	III
3	Bilua	Jackal	Canis latranus	Canidae	V
4	Bhalu	Black bear	Selenarctos tibetana	Ursidae	II
5	Chital	Spotted deer	Axis axis	Cervidae	III
6	Chemani	House bat	Cynopterus sphinx	Pteropodidae	V
7	Gundichimusa	Squirrel	Funambulus penanti	Sciuridae	V
8	Jhinka	Porcupine	Hystrix leucura	Hystricidae	IV
9	Katasa	Big wild cat	Paradoxurus hermaphrodit	Felidae	II
10	Kokisiali	Fox	Vulpes bengalensis	Canidae	II
11	Kutura	Barking deer	Cerrulus muntjac	Cervidae	III
12	Mankada (hanu)	Black-faced monkey	Semnopithecus entellus	Cercopithecidae	II
13	-do- (pati)	Red-faced monkey	Macaca mulatta	Cercopithecidae	II
14	Musa	Mouse	Rattus rattus	Muridae	V
15	Neula	Mongoose	Herpestes bengalensis	Viverridae	IV
16	Odha	Otter	Lutra lutra	Mustelidae	III
17	Thekua	Hare	Lepus ruficaudatus	Leporidae	III

B- BIRDS

List of birds

Sl. No.	Oriya Name	English Name	Latin Name	Family	Schedule
1	Bani	Common myna	Acridotheres tristis	Sturnidae	IV
2	Baya chadhei	Weaver bird	Ploceus phillipinus	Ploceidae	IV
3	Banakukuda	Jungle fowl	Gallus gallus	Phadianidae	IV
4	Bhrungaraj	Black bee	Dissomurus paradiseus	Dicruridae	IV

5	Gunduri	Bastard gull	Turnix buscitotor	Turnicidae	IV
6	Chatak	Swifty	Micropus affinis	Apodidae	IV
7	Chila	Kite	Mylvus migrans		IV
8	Haldibasant	Golden oriole	Oriolus xanthernus	Oriididae	IV
9	Koeli	Cuckoo	Cuculus caronus	Cuculidae	IV
10	Kajalapati	King crow	Dicrurus macrocercus	Dicruridae	IV
11	Kau	Crow	Corvus splendens	Corvidae	V
12	Kumbhatua	Red crow	Centropus sinensis	Cuculidae	IV
13	Macharanka	King-fisher	Caryle rudis	Alcedinidae	IV
14	Pecha	Owl	Athena brama	Strigidae	IV
15	Sua	Parrot	Pistacula kramerii	Sturnidae	IV
16	Kapota	Dove	Streptopelichin opensis	Columbidae	IV
17	Baga (kanti)	Pond heron	Ardeola grayii	Ardeidae	IV
18	Baga (rani)	Cattle egret	Bubulcus ibis coromandus	Ardeidae	IV
19	Kathahana	Ceylon hoopoe	Upupa ceylonensis	Upupidae	IV

C – SNAKES

List of snakes

Sl.No.	Oriya Name	English Name	Latin Name	Family	Schedule
1	Chiti	Painted krait	Bungarus coeruleus	Elapidae	IV
2	Dhamana	Rat snake	Ptyas mucosus	Colubridae	II
3	Boda	Rusell's viper	Vipera russelli	Viperidae	II
4	Domundia	John's sandboda	Eryx conicus	Boidae	IV
5	Gokhar	Cobra	Naja naja	Elapidae	II
6	Laudankia	Arboreal adder	Dryophis nasutus	Elapidae	IV
7	Dhanda	Water snake	Natrix piscator	Colubridae	IV
8	Rana	Banded krait	Bungarus fasciatus	Elapidae	II
9	Tampa	Monocellate cobra	Naja naja kunthia	-do-	II
10	Telia	Blind snake	Typhlops braminus	Typhlopidae	IV

D – LIZARDS

List of lizards					
Sl. No.	Oriya Name	English Name	Latin Name	Family	Schedule
1	Bahurupi	Indian chamleon	Chameleon zeylanicus	Chmaeleonidae	IV
2	Chanipeineoli	Mabuya	Mabuya bibra	Sciencidae	IV
3	Endua	Garden lizard	Calotes versicolor	Agamidae	IV
4	Jhitipiti	Lizard	Hemidactylus flaviviridis	Gekkonidae	IV

Range Officer
RANGE OFFICER
Keonjhar RANGE

Counter Signed

Divisional Forest Officer
Keonjhar Division

f. Description of the Forest and wildlife Scenario:

Forest and Forest types: -

As per the State of Forest Report published by F.S.I. the status of forest cover in the area under consideration are as follows:

(Area in Km^2)

District	Geographical Area	Status of Forest				
		Very dense forest	Moderately dense forest	Open forest	Total	
As per Report of 2015						
Sundargarh	9712	1020	1826	1309	4155	128
Keonjhar	8303	290	1401	1517	3208	56
As per Report of 2017						
Sundargarh	9712	1019	1814	1431	4264	89
Keonjhar	8303	289	1404	1519	3212	55

Forest Type: Total forests of Bonai Forest Division is 1683.677 km^2 as per current Working Plan. Forests of the Division have been classified into following types and sub-types by Champion and Seth.

1. Sub group 3C – Northern Indian Tropical Moist Deciduous Forests.
   Type 3C / C2 Moist Peninsular Sal
   Sub-type 3C/C2e (i) Moist Peninsular High level Sal
   3C/C2e (ii) Moist Peninsular Low level Sal
   3C/C2e (iii) Moist Peninsular Valley Sal
2. Sub group 5B – Northern Tropical Dry Deciduous Forests.
   (i) Type 5B/C1 Dry Sal bearing forests
   Sub-type 5B/C1e - Dry Peninsular Sal Forests
   (ii) Type 5B/C2 – Northern Dry Mixed Deciduous Forests
   (iii) Type 5E/ 9 Dry Bamboo break
3. Sub group 2B – Northern Tropical semi Evergreen Forests and *Terminalia tomentosa* forests.

g. Movement of Mega wildlife:

Small groups of elephants are known to move between Karampada forests of Jharkhand State to Odisha via Kiriburu – Uliburu RF, Sidhamath RF and to Karo RF. This group alternates between Jharkhand-Odisha forests. The movement is not confined to forest areas alone. Stray movement occurs in villages causing house & crop damages of Paddy, Banana plants, Jackfruit, Mangoes. Human death also occurs due to accidental encounter. Malda, Deojhar, Alaghat, Sargigarh, Gonua on Bonai side and Khandabandha and Guruda villages on Kendujhar District are affected by crop depredation. Elephant movement occurs in Teherai and Kundra Nala nearby villages and other plain lands where paddy is adequately available.

Eelephant movement is also found occasionally in Mendhamaruni PRF.

h. Man- animal conflict Data: (depicted on map and enclosed as Plate-e),

(Details collected from DFO office Bonai, Range office Barbil & Champua)

Human – Elephant Conflict is on rise in the state and has become one of the major issues in the fight to save Asia's endangered elephants. It is one of main cause of elephant death. Due to loss and fragmentation of elephant habitat/forest, lack of fodder, water and shelter, the elephants are rather turning to crop raiding for sustenance. At times the human habitations are destroyed in the conflict, besides loss of human life.

The elephant population in the district of Sundargarh is rather fluctuating. Elephant movement takes place between Jharkhand and Odisha.

The data on Man-animal conflict is furnished in respect of Koira Range of Bonai Forest Division.

BONAI DIVISION
Elephant Census

Year	No. of elephant found
2010	**45**
2012	**42**
2015	**65**
2017	**60**

Human Death by Wild Animal

Year	Human Death	Animal causing human death
2015-16	Nil	-
2016-17	Nil	-
2017-18	One	Elephant
2018-19	One	Elephant

Human Injury by Wild Animal

Year	No of Human involved	Animal causing injury
2015-16	Nil	-
2016-17	Nil	-
2017-18	Nil	-
2018-19	Nil	-

House damage by Elephants

Year	No. of Houses damaged
2015-16	30
2016-17	12
2017-18	15
2018-19	6

Crop damage by Elephants

Year	Crop area damaged in Ac.	Compensation paid in Rs.
2015-16	3.04	30,400
2016-17	40.30	4,03,000
2017-18	5.44	54,400
2018-19	22.88	2,28,800

Cattle kill by Wild Animal

Year	Name of Human Kill	Date & place of occurrence	Location
2015-16	- NIL –		
2016-17	- NIL –		
2017-18	- NIL –		
2018-19	- NIL –		

Details of death of wild animals

Year	Date	Animal killed	Location	Cause of death
2015-16	-	Nil	-	-
2016-17	12.05.2016	Female Elephant-1	Teherai Khesra Forest, Tehrai Beat. 21°54'33.5"N & 85°17'0.7" E	Natural
2017-18	-	Nil	-	-
2018-19	11.10.2018	Wild Boar - 1	Podadihi Khajuridihi Beat	Poaching

i. Survey of Working Plan

The following Reserved Forests are located within the Impact area.

Sl. No.	Name of the Forest Block	Area in Ha.	Location with reference to the project area	Working Circle
1	Mendhamaruni PRF	I- 472.937 II- 340.875	Part within the project	RWC
2	Mendhamaruni RF	512.973	Adjacent SW	SWC–287.750ha RWC-225.187ha
3	Kathmal RF	101.174	4.0 km SW	SWC
4	Karo RF	1419.063	3.3 Km - NW	SWC
5	Bhabanipahar RF	370.295	6.3 km. SW	Prot.WC-209.109 RWC- 161.187

	Bhabanipahar PRF	1290.313	6.6 kmSW	RWC
6	Khajuridihi RF	2144.312	9.5 km. S	SWC
7	Sidhamath RF	5766.059	4.0 km NE	IWC-3046.9766 RWC-2719.0825
8	Baitarani RF	3517.677	5.0 km NE	RWC
9	Uliburu RF	980.205	5.5 km NW	IWC

The Working Plan prescriptions for different Working Circles as above are:

i. **Selection Working Circle**

Special provisions are:

1. Trees standing within 50 mts on either side of nala banks shall not be marked for felling.
2. Trees standing within 50 mts radius of key habitats of wild animals shall not be marked
3. Trees having nesting dens of arboreal animals and the hollow trees which are used as assylum by wild animals shall not be marked for felling.
4. Except dead and uprooted trees, no tree standing within 20 mts along road sides shall be marked for felling.
5. Except for dead & uprooted trees, no tree shall be marked for felling in eroded areas and steep slopes.
6. Fruit bearing species shall not be marked.
7. All climbers should be cut at the time of marking except for endangered species.

Subsidiary silvicultural operations

1. Cleaning and thinning operations to be carried out in the year following main felling.
2. All marked trees left out to be removed.
3. Trees damaged more than 1/3rd at the time of main felling to be cut back.
4. All other species under 60 c.m. g.b.h. interfering with the growth of established regeneration of principal & secondary species to be felled and removed.
5. All the defective and mal formed stems of secondary species interfering with the growth of established regeneration of principal species are to be felled and removed.
6. Thinning is to be carried out in congested group of principal & secondary species under 60 c.m. g.b.h. as per prescribed formula.
7. No cleaning to be carried out in eroded atreas.
8. In the blanks, eroded patches and pockets having sparse or bushy type are to be taken up for enrichment planting.

ii. **Rehabilitation-cum-Plantation Working Circle**:

The major provisions are:

1. Cutting back of high stumps and climbers, singling out multiple coppice shoots, C-grade thinning in congested patches. Planting with two year old seedlings of bamboo along with fruit bearing and NTFP species.
2. In barren areas and blanks, planting of fast growing indigenous species such as Ailanthus, Siris, Karada, Sidha, Neem, Chakunda, Kusum, Sissoo etc. In the eroded patches species like Babul, Khair, Rohini, Sabai grass are to be planted. Planting of Jamu, Karanja, Arjun etc. to be taken up in low lying moist degraded patches.

3. Suitable Soil conservation measures such as gully plugging, cotour bunding etc. to be taken up on hill slopes.
4. In the areas having slope more than 15^{o}, staggered contour trenches are to be dug along the contours. Aegave and Sabai grass may be planted in the intervening spaces of contour trenches.
5. In the areas having moderate to gentle slope of less than 15^{o}, small contour bunds are to be erected along the contours. The bunds and intervening spaces are to be planted with suitable species.
6. The open blank patches are to be planted with fast growing species.
7. Areas infested with weeds are to be cleared through control burning and revegetated by planting.
8. In areas having dense bushy and scrubby types of growth, control burning, cleaning and prunning operations are to be carried out. Afterwards enrichment planting may be taken up.
9. Required administrative measures for dissuading shifting cultivation are to be taken up.
10. In areas planted previously, tending and thinning operations may be taken up along with enrichment plantation.
11. The biotic interference is to be minimized by effectively closing the forest to grazing, browsing, and illicit felling etc. through fencing measures such as vegetative fencing, trench fencing and stone wall fencing.

iii. **Wild life (Overlapping) Working Circle:**

All the Forest Blocks coming within impact area have been placed under Wild Life Overlapping Working Circle. The prescriptions of Wildlife (Overlapping) Working Circle are:-

1. **Habitat Improvement :-**

Habitat shall be developed with the cooperation of the local people using sound silvicultural technique. The aim should be to provide more food water shelter for the wildlife and reduce man animal conflict. It is therefore necessary to evaluate the concerned wildlife habitat in advance. Physical and biological parameters are to be considered while evaluating the habitat. The important physical parameters needing evaluation are, climate, topography, edaphic features, incidence of fire, spatio-temporal availability of water. The biological parameters include, availability of cover and fodder in respect to wild fauna, species diversity with their distribution and number, feeding activities and reproduction. For the improvement and development of wildlife habitat, the following measures are to be taken.

A. **Improving availability of food**: Food is an essential prerequisite for any lving organism. The adequacy of food in wild life habitat depends upon the quality and quantity of food produced and the animal population living therein. Keeping in view this aspect of wild life management, restricted removal of trees is prescribed. Similarly, under various subsidiary silvicultural operations like opening of canopy, thinning of congested patches, improving the general availability of food shall always be taken into consideration. The fruit bearing trees have been prohibited from felling.under the respective Working Circle.

- Food availability in a habitat changes with the season. Herbivores depend on plant materials for their sustainance and are normally selective feedersas their food preferences are related to palatability. Herbivores prefer the leaves, barks, twigs, flowers, fruits and seed of species like *Mallotus philippinensis, Dendrocalamus strictus, Adina cordifolia, Albizzia lebbek, Aegle marmelos, Cassia fistula, Ficus bengalensis, Ougeinia ougenensis, Shorea robusta, Syzygium cumini, Terminalia alata, Terminalia belerica, Zizyphus mauritiana, Bombax ceiba* etc. These species are to be preserved and propagated.
- Deer, Monkey, Langur, Rats and Hare feed on wild fruits of plants like *Ficus spp. Terminalia belerica, Buchnania lanzan, Aegle marmelos, Syzygium cumini, Emblica officinalis, Zizyphus mauritiana, Diospyrus melanoxylon, Grewia hirsute etc.* These animals help in dispersal of seeds.
- Among the plant materials, grasses constitute major portion of herbivores food. Grasses which are highly preferred and consumed by herbivores are: *Axonopus compresses, Eragrostis pilosa, Saccharum bengalensis* etc. The grasses are proposed to be raised in the wildlife concentrated areas to meet the food requirement of herbivores.
- The carnivores survive on the availability of prey animals.
- Wild elephants feed on barks and leaves of species like *Ficus bengalensis, Ficus religiosa, Mallotus philippinensis, Dendrocalamus strictus, Ougeinia ougenensis, Bombax ceiba, Kydia calycina* etc.

Bonai Forest Division does not have extensive grass lands. However scattered patches of grasses are available. The available grass species are not very nutritive and some of them are even unpalatable. For improving the food availability of herbivores, there is a great need of improving the existing food stock by raising suitable mix of the grass species of annual and perennial nature alongwith leguminous shrubs and trees.

B. **Measures for improving Water availability:** The presence of adequate water resources in the form of water holes, rivers, streams etc. is of utmost importance in the wildlife habitat. The distribution of water holes in a habitat and their interspersion with the cover types determine the distribution of wild animals. Waterbodies themselves serve as habitat for several species of animals and birds.

Bonai Division has a number of perennial and seasonal streams. There is no dearth of water during rainy season and winter season. However scarcity is felt from January to June, when most of the nallas and streams dry up and water becomes a scarce commodity, particularly in the hilly and drier localities. For making the availability of water to wild fauna in all seasons possible, it is necessary to protect all existing water holes and to construct small check-dams on plateau and upper slopes of all important nalas. From better wildlife management point of view, it is necessary to have a water hole for every 15-20 sq. kms of forest area.

C. **Measures for Improving the cover**: Providing adequate cover to wild animals within their habitat is an important element of habitat improvement programme. The cover within a habitat is essentially a variation which provides shelter as well as protection to wild animals from weather, predators or enemies by offering a better vantage point and it can be vegetal and non-vegetal in nature. To improve the availability of shelter to different animals very selective removal of mature trees without creating a lasting gap in canopy in the areas under Selection Working Circle has been prescribed. The measures like improving the density of forest and its composition, loose piling of debries, no felling of trees within radius of 50 mts along

nalas, water holes, wallows, saltlicks and core habitat of wild animals etc. have also been prescribed for improving the cover for different wildlife species. Measure should also be taken for improving the proportion of sal and other semi-ever green species. The pure plantations are to be avoided and in the mixed plantation, ground flora and middle storey is to be developed and maintained.

D. **Measures for Improving Wilderness**:- The forest areas subjected to regular biotic interference in the form of grazing, felling, encroachments, etc. gradually lose the element of wilderness, so vital for the thriving of wildlife. Most of the forest ares of Bonai Forest Division have been subjected to severe biotic interference due to rising population pressure and prevailing poverty and there has been rapid shrinkage of wilderness. To maintain proper wilderness the following steps are to be taken up.

- The forest areas which are key habitats for wildlife need to be identified and delineated on a map and efforts are to be made to reduce the biotic interference to the minimum possible level.
- Most of the domestic cattle are left stray in forest areas for grazing purpose. This not only causes shrinkage of wilderness but also reduce food availability. It is high time that, the local inhabitants are persuaded to reduce their uneconomic cattle population and to adopt stall feeding.
- The ongoing reckless mining operations within interior forest areas are to be regulated in such such a manner so as to cause minimum damage and disturbance to wildlife.
- Proper measures are to be taken up for preventing illicit felling, poaching, encroachment, shifting cultivation, setting of fire etc.
- Mulching in the dry areas is to be carried out.

E. **Measures for Protection & Development of salt licks:** Herbivores need salt in addition to food. For this purpose the herbivores depend on naturally available salt licks. These natural salt licks are available on sides of natural nalas and foot hills. Sincere efforts are to be made to identify and protect the areas which are having high salt concentration and frequently visited by the herbivores.

2. **Silvicultural measures**

The wildlife management does not demand fundamental change in silvicultural operations. Some small modification in in the forest management can serve the cause of wildlife. The following measures are to be taken while carrying out silvicultural operations.

i. No felling of dead and green diseased trees to be done in the areas covering the key habitats of wildlife.
ii. No felling should be carried out in the areas having crown density of 0.4 and less.
iii. Hollow trees and the trees supporting nesting dens of wild animals and birds shall not be felled.
iv. A portion of the left over lops and tops and other debries after main felling are to be piled up so as to provide shelter to Civet Cat, Lepus, Porcupine and other small wild animals.
v. No marking and felling of trees is to be carried out within 50 mts radius around the key habitat of wild animals such as den, saltlick, wallows, water holes etc..
vi. No fruit bearing trees like harida, bahada, anla, zizyphus, kendu, mahul and ficus etc. should be felled.

vii. Emphasis to be given on improvement of flora composition and density.
viii. Planting of grasses and trees favourable to wildlife is to be taken up in blanks and in the patches sparsely vegetated.
ix. In the plantation areas creation of ground flora and middle storey should be encouraged.

3. **Legal and Administrative Measures:**
   - Effective implementation of Wildlife Protection Acts and Rules require adequate infrastructure, field staff and supporting funds. As far as Bonai Forest Division is concerned non of these is available.
   - Adequate number of anti-poaching gates operating round the clock are to be erected at the entrance and exit of each of the roads passing through forest areas rich in wildlife.
   - Watch towers need to be erected in the key habitats of wild animals.
   - Adequate exposure training to be provided to the staff on wildlife management.
   - Required number of posts of Forest Rangers, Foresters and Forest Guards to be deployed specially for wildlife protection and management are to be created.
4. **Scientific Study and Wildlife Census:**

   In order to have a scientific basis for wildlife management, the following steps may be taken:

   i. Regular and systematic training to be provided to the staff with rgard to data collection and analysis.
   ii. Comprehensive wildlife census to be carried out on regular basis.
   iii. Study involving wildlife pattern with respect to structure, composition and density of vegetation.
   iv. Study involving wildlife pattern with respect to physical parameters like rainfall, temperature, water and soil.
   v. Study on migration pattern and behavioural aspect of important wild animals.
   vi. Study on health status and wild animal diseases.
   vii. Study on socio-economic status of tribals living around forest areas and their dependence/biotic interference on forest.
5. **Integrated Development:**
   Due to sharp rise in human population and lack of adequate income generation avenues, the dependence of local inhabitants on forst is increasing over the years. Therefore intensive efforts are to be made to improve the Socio-economic status of the local inhabitants. It is suggested to develop Agriculture through appropriate imput support and take steps to develop small industries.
6. **Fire protection measures:**

   Forest fire is a regular feature in Bonai Forest Division. Most of the forest fires are intentional and man made. Due to such fire all the ground flora and most of the middle storey are destroyed. Small animals and reptiles are invariably killed and large animals are also trapped in the process.
   Necessary fire protection measures needs to be taken along with cleaning of firelines.
7. **Development of Tourism:**
   Turism will provide an opportunity to the people to interact with nature and wilderness and create awareness among the peple about importance of Forest and Wildlife.

8. **Measures to reduce Animal depredation:**

The maximum depredation is caused by elephants. Elephants do no stay in Bonai Forest Division permanently. They are migrating from Bamra and keonjhar Divisions and from Saranda Forests of Bihar. Their stay is temporary and seasonal. However the elephants are seen through out the year in few pockets of Toda RF, Silkuta RF, Balai RF and Lunga RF. The steps suggested to reduce animal depredation are:

i. Driving away the Wild elephants by beating of drums, shot-guns, crackers, fire, tear gas and trained elephants.
ii. Creation of elephant proof trenches adjoining the settlement areas.
iii. Creation of low cost corridor with water and food facility so as to confine the migration movement of elephants.
iv. Plantation af Bamboos and other palatable species in the forest areas frequented by elephants.
v. Immobilization and capture method in extreme cases.

j. Indicative Plan Showing the Location of Other Projects:

The surrounding mining leases are shown in table below

Sl. No	LEASE NAME WITH LESSEE	AREA (Ha.)
1	Ghoraburhani-Sagasahi iron ore block (ESIL)	139.165
2	Sagasahi iron mines (National Enterprices)	41.844
3	Kalmang mn. mines (Rungta Mines ltd.)	218.530
4	Malda mn. mines block-1 (TISCO)	681.564
5	Sanindpur iron & bx. mines (Rungta Sons)	147.100
6	Oraghat iron & mn. mines (SA Halim)	25.847
7	Oraghat iron ore mines (Rungta Sons)	82.966
8	Sanindpur iron & mn. (National Enterprises)	70.917
9	Malda mn. mines block-2 (TISCO)	37.405
10	Patabeda iron ore mines (MGM Minerals)	28.397
11	Patabeda iron ore mines (MG Mohanty)	14.000
12	Patabeda iron-mn. mines (MG Mohanty)	19.425
13	Gonua iron & manganese mines (P K Alhuwalia)	86.886
14	Ganua iron & mn. mine (KC Pradhan)	12.560
15	Ganua iron & mn mines (Zenith Mining)	129.179
16	Ganua iron & mn mines (KJS Alluwallia)	23.166
17	Ganua iron & mn. mines (P. Mohanty)	13.796
18	Malda mn. mines block-5 (TISCO)	55.220
19	Ganua iron_mn mines (MG Mohanty)	83.151
20	Dalita iron & mn. mines(BC Dogra)	22.165
21	Dubuna iron & mn. mines (Neelanchal Ispat Nigam Limited)	868.816
22	Patamunda mn. mine (Orissa Manganese & Mineral)	807.306
23	Malda mn. mines block-3 (TISCO)	46.137
24	Sanpatholi mn. mines (Orissa Manganese & Mineral)	23.290

25	Patamunda mn. mine (Sun Alloys & Minerals ltd.)	81.197
26	Tehari-Sonua iron mn. mines (Tarani Minerals)	29.076
27	Bhanjapali, Koira & Teherai manganese mines (RS Sindhu)	65.710
28	Bhanja kusum mn. mines (Orissa Manganese & Mineral)	8.498
29	Teherai iron-mn. mines (BICO)	116.572
30	Kanther-Koira iron-mn. mines (BS Mishra)	13.270
31	Kanther Koida mn. mines (Rungta Mines ltd.)	73.653
32	KJST iron-mn-bux (S.N.Mohanty)	333.063
33	Tentulidihi mn. mines (Orissa Manganese & Mineral)	35.610
34	Bhanjapalii iron mines (JN Patnaik)	18.000
35	Toda iron ore mines (SAIL)	3.340
35	Bhanjapali iron ore mines (OMC Ltd.)	141.235
36	Koida iron mines (ESSEL)	90.143
37	Nuagaon iron & mn. mines (SD Sharma)	12.922
38	Orahuri mn. mines (Orissa Manganese & Mineral)	51.476
39	Nuagaon mn. mines (Tarani Minerals)	7.850
40	Narayanaposi iron-mn. mines (AMTC)	349.254
41	Kasira iron ore mines (OMC Ltd.)	418.335
42	Nadidihi iron & mn. mines (Feegrade)	121.405
43	Nadidihi iron-mn. mines (BICO)	73.855
44	Nuagaon iron & mn. mines (S.N.Mohanty)	29.297
45	Bandhal mn. mines (Kanakdhara)	28.021
46	Kamando mn. mines (UC Mishra)	60.700
47	Kusumdihi-Kamanda mn.&bx (Rungta Sons)	43.067
48	Kusumdihi mn. mines (Orissa Manganese & Mineral)	31.549
49	Kusumdihi mn. & bx. mines (BICO)	52.176
50	Kusumdihi mn. mines (Kavita Agarwal)	47.486
51	Barsuan-Kalta iron ore mines (SAIL)	2486.382
52	TISCO-Khandbandh iron mine	978.000
53	R P Sao, Chormalda mn mine	141.122
54	Rungta,_Katasahi_mn_mine	196.860
55	SN Paul Katasai mn mime	9.700
56	KJS Alluwalia, Nuagaon iron	767.284
57	R.P. Sao & Sons, Guali iron mines	365.026
58	KJS Alluwalia Panduliposi-Kendudihi iron & mn	40.470
59	KC Pradhan-Paradeipur iron mine	12.600
60	OMC_Parlipada mn	104.860
61	TISCO Tiring pahar mn mines	169.000
62	Shri Metaliks Ltd. Khandband iron mine	35.774
63	R B Das Kundrupani iron & mn	10.255
64	OMC_Tiringpahar iron & mn	79.300

65	OMC_Khandband iron ore mine	366.311
66	Rungta, Siljoda mn mine	715.369
67	Serajudin_Guruda mn mine	40.064
68	S N Dasmohapatra Katasahi mn mine	36.474
69	omdc_bhadrasahi iron & mn	998.700
70	FACOR Katashi block-a manganese mine	8.936
71	FACOR Katasahi block-b manganese mine	4.560
	TOTAL	**13582.640**

The total area comprising the buffer zone of 10 sq. KM is coming to 37121.00 Ha. Out of that, the area coming within the lease hold area of the adjacent mining leases falling inside the10 Km radius is 13582.640 Ha. Hence the area within the 10 Km buffer zone was proportionately increased by extending the radius of 10 Km to 12.70 Km to compensate the equal amount of the area. The locations of these mines have been indicated in plate-b.

k Experts Engaged for the study:

The study was taken up by Shri P.K.Sarangi IFS (Retd.) and Shri Sangram Keshari Ray along with the staff of Visiontek Consultancy Service4s and the staff of Essar Steel India Ltd.

Sampling Techniques

Vegetation study:

Lease area:

A large chunk of the lease area has been broken up. Detail study was conducted in four patches where the original vegetation is available. Sample plots of 100mx100m was laid and the list of flora available in the area was recorded.

Impact area:

Since impact zone extends over some RF it was felt prudent to take up the study in the Reserve Forest area. The nearest Reserve Forest being Mendhamaruni RF was taken for the study. The methodology adopted for the study was as follows:

Vegetation Analysis

1. A base line of 500mts was selected in E-W direction.
2. Transacts line of 500mts each perpendicular distance to the baseline at 100mts interval was marked, starting at 50mts from the initial point. Total transacts were therefore 5.
3. Sample plots of size 30mx30m (15mts on either side of the transact) were laid on these transact lines at 100mts interval, starting the sample plot at 50mts from the base line. Hence the total numbers of sample plots were 25.
4. The list of the tree species was prepared. Specimens of unidentified plants were preserved for identification.

5. Further sample plots of 5mx5m was laid at the center of each sample plot and in this secondary sample plot the list of herbs and shrubs were prepared.

6. Tertiary sample plots of size 1mx1m was laid within the secondary sample plot to list out the grasses and ground cover.

Study of Fauna

This plan is prepared for conservation and management of wildlife depending on site specific problems. It is therefore necessary to know the wildlife species present within the lease area as well as the impact area so as to design an appropriate plan.

Methodology:

Direct sighting of wild animals is a rare chance. The study had to rely on indirect evidences, and information collected from the surrounding areas from various stake holders such as available records (wildlife offence cases, animal depredation etc.), discussion with mine workers, and Forest Department staff and with the villagers within the impact zone yielded the desired result. Besides at the time of study of flora, where ever animal signs & Tracks were noticed the same were taken in to consideration. The wildlife habitat has also been studied and analyzed for possible presence of the animals.

Animal signs were also observed and recorded at the time of vegetation study.

The information was collected to deduce the presence of important wild animal species present in the area, particularly the scheduled animals in the category of Mammals, Birds, Herpatofauna and Insects and thereafter the final list has been prepared.

The mammals in the project study area has listed along with the frequency of occurrence for sighting, calls, scats/ fecal matter, track marks or other indirect signs along the transects as well as quadrant.

CHAPTER – 2

PERCEIVED IMPACT

2.a Impact of Project:

The mining process adopted in the said mines is open cast fully mechanized mining method with deployment of mechanized shovel and high capacity dumpers of matching size. Drilling and blasting activities as per the requirement will also be taken up by deployment of proper machineries. Excavation of Ore & Waste will be done using combination of shovel dumper system and the Ore will be mechanically crushed to the desired size. During the initial period, the transportation of ore will be through the road using high capacity trucks to the destination/ Railway siding. However, at the latter stage the Iron ore fines will be transported through the slurry pipeline and the CLO will continue to be transported through the road to the railway siding.

General Impact on Environment

Impact on Soil: - The mining activity will involve removal of all the forest cover, top Soil due to digging of large pits. Major part of the forest land will come under the mining pit setting aside the safety zone. The topographical features of the lease area put it in high soil erosion prone area. Therefore large scale soil erosion is bound to take place which may cause formation of Gullies and Ravines leading to further destruction of adjoining forest as well as wildlife habitat. The running of heavy machinery will lead to soil compaction which will have tilling effect on the normal morphology and the micro flora & fauna residing within sub soil. Denudation of soil & its green cover will also reduce the biotic material from the soil making it difficult for the green cover to come up again in the area. More over the area being bereft of its natural green cover, there is possible chances of being infested with weeds and if no weeds come up exposure of bare earth to sun would definitely reduce the moisture regime of the top soil & immediate sub soil.

Impact on Vegetation: - Due to mining activity over the lease area, the biotic pressure which was exerted over the Forest area now being leased-out, will be shifted to the surrounding areas. Collection of fuel wood, small timber and other NTFP by the local people will also be shifted to the surrounding area which will create additional pressure on the surrounding Forest area. Grazing pressure of the local Cattle will also be shifted to these Forest. Therefore the wildlife habitat in these Forest areas is likely to be disturbed.

With the de-forestation there is every likely hood of increased incidents of man animal conflict. This would be due to marginalization of access to basic life supporting resources like forest, drinking & breeding grounds.

Impact on water regime: - Large quantities of water produced in the process of mining which are highly polluted will be released in to the natural drainage system, thereby contaminating natural water sources. The slurry generated in the mining process will also be pumped out in to the natural drainage system making the natural water source unfit for consumption by animals as well as human beings. Besides large amount of Garbage will be generated in the mining area and will contaminate the water. The contaminated water will create health problems within the Zone of Influence as well as beyond. As the entire water requirement for mines would be from bore holes, this would adversely affect the ground water table which would not only affect the quality & health of forest but also would minimize the potable drinking water to the population.

Impact on Air: - The mining process, Ore Crushing & Screening, transportation, and plying of large number of heavy vehicles may spread large quantities of dust in the surrounding area. There will be heavy air pollution in and around the lease area creating various problems for the animals and the fringe village dwellers living around the mines area.

2.b Quantum of Pollutants and Its Effects:

2.b.1 Quantum of Pollutants

Air Pollution:

The Impact on Ambient air quality will be estimated by using the Air Dispersion Model for prediction of Ground level concentration from mining activities and crusher area are computed by using Industrial source complex sort term model version 3 (ISCST3) as prescribed by MoEF & OSPCB for area source and point source respectively at the time of EIA/EMP preparation.

The predicted incremental PM10 concentration value is 7.0 micro.gm/ CUM core zone and 1.0- 7.0 micro.gm/CUM in buffer zone. It reveals the values of AAQ in the zone of Impact are within the norms. The Data is enclosed as **(Annexure-8).**

Water Pollution:

The adverse impact on nearby water body due to mining is envisaged because of contamination silt carry-over along with run-off water. However, the same will be control within the SPCB prescribed norms by taking the suitable control measures like; de-silting checks/check weirs, settling pits and gully plugs besides well managing the mine waste dumps with adequate sloping followed by application of coir-geo textiles, plantation, mixed grass application, toe wall etc.

Besides the above, the Oil & Grease and silt carry-over is envisaged with the work-shop service centre water. However, the same will be well separated, collected, stored and disposed properly to the authorized re-processers. The treated water will be utilized for adjacent plantation purpose as it is very negligible in quantity.

Sewage generation due to domestic / site-specific Camps is envisaged, it will result in carryover of organic pollutants. However, the same will brought within the norms by treating at Sewage treatment plants / Soak pits.

Other waste:

The wastes like Used Oil, e-waste, Used batteries and Oil contaminated wastes generation are envisaged; provisions will be to put in place for their collection, storage and disposal to authorized reprocesses. There by pollution caused will nullify.

Noise and Vibration:

The generation of Noise will be envisaged due to operation of plant and machinery. It is limited to the work zone only and will be monitored and maintained within the norms prescribed by DGMS (less than 85 leq dB(A). Ground Vibration due to Blasting is envisaged. However, the same will be well within the norms prescribed by DGMS(less than 5 mm/sec) by controlled blasting utilizing the nonel technology.

2. b.2 Effect of Pollutants

Impact on Soil: - The mining activity will involve removal of all the forest cover, top Soil and digging of large pits. Major part of the forest land will come under the mining pit setting aside the safety zone. The Topographical features of the lease area puts it in high erosion prone area. Therefore large scale soil erosion is bound to take place which may cause formation of Gullies and Ravines leading to further destruction of adjoining Forest as well as wildlife habitat. The possibility of land slide also cannot be ruled out.

Loss of Moisture:- Due to mining activity there will be large scale evaporation from the exposed soil and moisture retention capacity of the soil along the periphery of the mine pits will reduce. The sub-soil water will also be reduced which may lead to destruction of some more vegetation due to desiccation. The process of dewatering and releasing huge quantities of water in to the natural drainage system may reduce the Sub-soil water. Besides the ground water recharge in the area will reduce resulting in water scarcity.

Water accumulation: - Digging of large pits may accumulate huge quantities of water which will lure the Wild animals and ultimately may trap them in the pits which will be fatal for them.

Impact on Vegetation: - Due to mining activity over the lease area, the biotic pressure which was exerted over the Forest area now being leased out & will be shifted to the surrounding areas. Collection of fuel wood, small timber and other NTFP by the local people will also be shifted to the surrounding area which will create additional pressure on the surrounding Forest area. Grazing pressure of the local Cattle will also be shifted to these Forests. Therefore the wildlife habitat in these Forest areas is likely to be disturbed.

Impact on water regime: - Large quantities of water produced in the process of mining which are highly polluted will be released in to the natural drainage system, thereby contaminating natural water sources. The slurry generated in the mining process will also be pumped out in to the natural drainage system making the natural water source unfit for consumption by animals as well as human beings. Besides large amount of Garbage will be generated in the mining area and will contaminate the water. The contaminated water will create health problems within the Zone of Influence as well as beyond.

Impact on Air: - The mining process, Beneficiation, Ore Crushing & Screening, transportation, and plying of large number of heavy vehicles will spread large quantities of dust in the surrounding area. There will be heavy air pollution in and around the lease area creating various problems for the wild animals.

Accumulation of Garbage: Due to various activities in the mining process, movement of large number of work force and vehicles within the mining area, a large quantity of garbage will be generated within the mining area.

The Garbage includes Solid Wastes such as over burden, Mine Waste, Sub-grade Ore. Besides some amount of Bio degradable waste and Hazardous waste such as used oil, used batteries, oily sludge, filter materials containing oil are likely to be generated within the lease area.

These dangerous materials will create various health problems for both human population as well as animal population including wild animals

2.c Degradation Anticipated:

Due to diversion of forest area to the extent of 126.401 ha, the biotic pressure which will be exerted on this area further divert to the impact zone causing degradation of the forest cover within the impact zone. Decrease in wildlife habitat to the extent is anticipated.

Since this new mining lease area is surrounded by working mines, the wildlife habitat of the area has already been disturbed and that it can be presumed that, the wild animals of the area have migrated to the nearby forest areas which are not disturbed by mining. Though elephants have been seen occasionally visiting existing forest areas in and around the mine area.

Generation of substantial quantity of dust may create unhealthy condition for animals. This being equally applicable for the human beings the same has been taken care in the Environment Management Plan.

Removal of top soil and digging of large pits may lead to large scale Soil erosion.

Change of land use pattern within the mining area may permanently make the area unsuitable for animal habitat unless properly reclaimed.

2.d Nature of Threats to Flora & Fauna:

Fall of animals in the Mine Pits

The mine pits are dug with very steep slopes with 10 metres bench height with vertical slope (the overall slope being 45^0). Usually no physical barrier is provided around the mine pits. Any accidental fall of the animals in those pits may be fatal for the animals.

Poaching

The poachers may also drive the animals and lead them in to the mine pits using the same as animal trap.

Destruction of wildlife habitat.

Due to mining activity over the lease area, the biotic pressure which will exerted over the Forest area, be shifted to the surrounding areas. The collection of fuel wood, small timber and other NTFP by the local people will shift to the surrounding area and further create additional pressure on the surrounding Forest area. Grazing pressure of the local

Cattle will also be shifted to these Forests. Therefore the wildlife habitat in these Forest areas is likely to be disturbed.

Distraction of the normal migratory path of elephants & other mega fauna of the area

As a result of the bright light & the noise generated within the mine area, this will possibly impede the normal perambulation of the animals along their traditional routes which will likely to increase the human animal contact, there by posing the threats to either parties.

2.e Transportation and Its Impact:

It has been proposed that, the following machineries will be deployed for the mining operation.

Unit operation	Name	Numbers
Drilling	DTH	2
Excavation & loading	Excavator	5+1
	Loader	2+1
Transporting	Dumper	12+2
Leveling & road making	Dozer	2
Mineral processing	Crushing and screening unit (Stationary)	1
	Crushing and screening unit (mobile)	2
Motor Grader		01
Water Tanker		04
Light vehicle		04
Explosive Van		01
Ambulance		01
D.G.Set		01
Rock Breaker	SPN220B	01
Bus	Tata LP709	01

- Movement of large number of vehicles at night with their lights on in and around the lease area will disturb the Wild animals.
- Vehicles/rails may hit the nocturnal animals
- Noise/Sound created by the vehicles & rail engine will create stress amongst the wild fauna.

2.f Pollution and Its Impact

Noise Pollution: Disturb the environment of animals and create stress amongst the wild fauna.

Water pollution: Besides disturbing the aquatic ecosystem, pollution will make the water unfit for animal consumption leading to various health problems.

Air Pollution: Air pollution may take place due to decrease in Oxygen content in the air and increase of poisonous gases like; Carbon monoxide & PM generation due to the movement of large number of vehicles and operation of heavy machineries. Deposition of dust on the leaves will decrease the efficiency of photosynthesis. Deposit of large quantity of dust on the leaves will make the fodder unfit for consumption and lead to scarcity of food.

Under ground Pollution: There may be some underground pollution due seepage of oil and emulsion released from the machineries.

2g) Study Techniques

The study techniques adopted for collection of data/information has been described in the foregoing chapter.

CHAPTER – 3

OBJECTIVES OF MANAGEMENT & STRATEGIES

a) Objectives of Management:

Basing on the information collected as per the foregoing chapters, the Management objectives can be described as:

Conservation of Wild Life habitat

The forest area of 126.401 ha will not be available for general purpose such as collection of fuel, small timber and other NTFP items by the local population. This area will also not be available for use by the wild animals. The objective therefore is to provide minimum possible cover and protection for the small animals which are available within the project area and to create conditions for absorbing the additional biotic pressure that may accrue on the surrounding forest areas.

Soil & Moisture Conservation

1. The mining activity will involve removal of all the forest cover, top soil and digging of large pits. Major part of the forest land will come under the mining pit setting aside the safety zone. Due to digging of large pits a lot of soil erosion including formation of gullies is bound to take place which is required to be treated properly.
2. Similarly due to mining activity there will be large scale evaporation from the exposed soil and moisture retention capacity of the soil along the periphery of the mine pits will reduce. The sub-soil water will also be reduced which may lead desiccation condition and destruction of some more vegetation.
3. Repeated forest fire has created refractory condition of the soil in almost all the forests irrespective of the impact zone. Water retention capacity as well as permeability of the soil will be reduced. The management objective will therefore emphasise taking of steps for improvement of soil conditions.

Control of Water pollution

The water accumulated within the mining area is likely to be muddy due to presence of large amount of dust and broken up soil and coal powder. It is also likely to be contaminated due to excessive plying and cleaning of heavy vehicles and machineries. At the time of rainy season run off water to be extracted from the mine and released to the

natural drainage system. This water if contaminated or polluted will also pollute the natural water source. Hence mitigation measures need to be taken in this respect.

Control of Air Pollution & Dust hazards

The mining process includes Blasting, Drilling, movement of heavy vehicles and machineries etc. These activities will produce large amount of dust and coal powder. Such dust mixed with coal powder will cause air pollution. This will create respiratory problems in wild animals. Large amount of dust will also settle on the grasses and other fodder plants making these plants/grasses unpalatable. Specified measures needs to be taken to minimize this hazard

Control of Noise pollution

The Environmental Management Plan sets out that, there will be no impact of Noise produced in the Mining process. The Noise Levels are proposed to be kept within permissible limits. However operation of heavy machinery and Blasting in the mining area will produce large amount of sound which may cause disturbance to wild animals. So necessary mitigate measures will be taken to control it.

Waste Management

Due to various activities in the mining & beneficiation process, movement of large number of work force and vehicles within the mining area, a large quantity of garbage will be generated within the mining area. The Garbage includes Solid Wastes such as over burden, mine waste, sub-grade ore. Besides some amount of Bio degradable waste and Hazardous waste such as used oil, used batteries, oily sludge, filter materials containing oil are likely to be generated within the project area.

These dangerous materials will create pollution leading to various health problems for wild animals. So, proper handling & Management is required to avoid such contamination/pollution.

Preventive steps for the animals not to fall in the Mine Pits

The mine pits are dug with very steep slopes. It is necessary to take preventive steps so that, the wild animals/ domestic animals do not fall in the mine pits.

Man animal conflict

Due to reduction of habitat, additional biotic interference will be exerted in the Impact Zone which will create disturbance. There will also be shortage of food. The animals are therefore likely to invade cultivated lands and human habitation which will result in man-animal conflict and revengeful attitude of the people. Steps need to be taken to reduce

man animal conflict and ameliorate the revengeful attitude.

b) Strategies to mitigate and minimize adverse impacts:

The strategies for preparation of Wildlife Conservation Plan will therefore be as follows:

1. Project area: - The project area will normally not be a suitable habitat for large and medium animals. However, some small animals and birds will still continue to stay within the area. Besides steps are to be taken for protection of straying animals.
2. Impact Zone: - Within the Impact zone safe habitat needs to taken for all the available animals which are either existing within the Impact Zone or migrating from the project area. Therefore, habitat development, protection and reduction of man-animal conflict will be given due importance.

The strategies to be adopted for mitigation & minimizing the adverse impact of mining & other allied activities have been discussed in chapter – 4 & 5

CHAPTER –4

PROPOSED MANAGEMENT STRATEGIES WITHIN PROJECT SITE

(To be implemented by the project proponent)

Due operation of various mining activities the Wildlife present within the lease area will be threatened. Besides the Wildlife habitat is reduced to the extent of forest area (126.401 ha) involved. The Wildlife Management Plan therefore aims at providing safe passage to the existing wild animals in the lease area to the nearby forest areas. In spite of the project activities some small animals will continue to live in the project area. Certain measures are therefore required to be under taken within the mining area.

The Environmental Management Plan prescribes certain control measures for conservation of Flora & Fauna. These are:

- Enhancement of Forest area due to biological reclamation, arboriculture/afforestation, green belt / avenue plantation.
- Water body created in the mine pits.
- Zero discharge or release of treated water.
- Afforestation within the project area.

This aspect is kept in view while preparing the current Wildlife Management Plan.

a) Interventions to be implemented by the project authorities inside the project area with suitable justifications

Basing on the perceived threats to wildlife as per the foregoing chapter, the Management Plan is prepared to address almost all such threats. The mining area as well as the Impact Zone will be treated for habitat improvement so that, more fodder and water will be available for the wild animals.

Safe passage to Existing Wildlife

It is very important to save the existing wild animals available within the lease area and to divert them to safer locations. It can be possible to achieve such objective by commencing the mining activities from locations situated away from the Forest areas and allowing these animals to shift to the adjoining forest areas. There are several Reserved Forests within the Zone of Influence. Hence the Wild animals present within the Lease area will find their way to nearby Forest areas.

Restoration of habitat:

Total 131.812 ha of land for mining and ancillaries activities will be disturbed. The

original shape and vegetation during the mining operation from the allotted mining lease area will be changed. However the Safety zone along the Lease Boundary and existing roads outside the project area will remain unchanged. The proposed Reclamation and Afforestation will be carried out in phased manner over 131.812 ha disturbed area. Besides the gap plantation program will be carried out in the safety zone area along the mine boundary and village road over 6.755 ha of forest and non-forest land. It has been proposed to take up gap plantation in the safety zone area from the starting year of the mine operation and reclamation and afforestation will be start from the 6th year of the mine operation in mine pit area. Out of 131.812 ha, 40.081 ha will be proposed to be back filled and then after afforestation will be carried out and 42.761 ha will be proposed to be bench plantation using surface layer of benches top cover of benches by 6" top soil. Further in the mined out area the surface layer will be covered with topsoil stored elsewhere and planting will be done with care to achieve good percentage of survival. In order to rehabilitate the area to appropriate wildlife habitat, gradual development of the area is necessary, so that, after the mine closure the area can be developed in to a good wildlife habitat.

In order to rehabilitate the area to appropriate wildlife habitat, gradual development of the area is necessary, so that, after the mine closure the area can be developed in to a good wildlife habitat.

Soil and water conservation

As the mining activities involve digging of large pits, there will be substantial loss of moisture. There will also be large scale soil erosion due to mining activity. Most of the area will be covered for mining activity and mining pit will be dug excluding the safety Zone. It is not practicable to take up any Soil and Water conservation activity within the mining area. However in the safety zone the rain water will be diverted in easy gradient channels to the settling tanks to cause minimum soil erosion. This provision has been made in the Mining Plan as well as Environment Management Plan. Hence no separate provision is being made for this. The OB dumps where soil erosion rate is anticipated to be very high will be stabilised by planting of trees and grass. Such provision is being made in the Mining Plan; hence no separate provision is made in this plan.

There is a provision of Plantation of 14000 indigenous tall seedlings in blanks areas @ 2800 plants per year in urban plantation mode to increase green cover in lease area. **The estimated**

cost is Rs 71.442 Lakhs.

Apart from the above there will be distribution of seedlings to adjacent villagers / VSS to increase green cover @ 10000 nos. per year for 10 years. **The budget provision is Rs 10.00 lakhs.**

Control of Dust

Spreading of huge amounts of dust causes air pollution which affects more to the human beings and the workers engaged in the mining activity, besides creating problems for the wild animals. Therefore, dust control is a major activity in the mining process. Dust generation cannot be completely eliminated, but attempt is to be made to reduce the quantum of dust in the mining process. The steps proposed for control of dust are:

- All the drills will be provided with well-designed dust extraction/suppression system and wet drilling practice is to be adopted.
- Blasting operation will be designed to produce minimum dust.
- Use of optimum amount of explosive so as to produce minimum dust.
- Use of sprinklers and dust suppression units at the time of loading, transportation and handling of ore and over burden.
- Regular maintenance of HEMMs and other equipments.
- Green belt to be provided around the quarry, workshop complex, residential colony and avenue plantation to be taken up along the haul roads and other roads apart from the safety zone.

Dust control measures have been proposed as compliance to Environmental Impact Assessment and therefore special provision is not being made for this.

Control of water pollution.

Water pollution is the most important factor in mining process. Huge quantities of water will be generated every day along with slurry which is to be removed from the mining pits. In addition large quantities of contaminated water due to cleaning of vehicles and machineries, dumping of Garbage etc. will also be generated.

The water pollution will be controlled by treatment of water before releasing the same in to the natural drainage system. The discharged water will be collected in sump pits and channelled to sedimentation pond and effluent treatment plant. Treated water will be used for dust suppression on haul roads, washing of dumpers and drozers etc. The following steps are taken to control water pollution:

- Waste water generated in the work-shop and vehicle servicing/machinery servicing units will be channelled through oil & grease tap and settling tanks.
- Provision of septic tanks, soak pits and Sewage Treatment plant installed for domestic effluents.
- Mine discharge water will be treated and re-used.
- Garland drains will be provided around OB dumps and the water channelled through settling tanks.
- Regular monitoring will be done and corrective steps shall be taken when required.

Oil and Grease recovered manually will be stored in drums and auctioned. Surface runoff will be channelled through sedimentation ponds to settle the suspended materials. The treated water will be diverted to the natural drainage system.

All these measures have been proposed in the Environment Management Plan and therefore special provision is not made for this.

Noise control

The following measures will be taken to keep the noise at the minimum possible level:

- Proper designing of plant & machinery by providing in-built mechanisms like silencers, mufflers and enclosures for noise generating parts and shock absorbing pads at the foundation of vibrating equipment.
- Silencers provided where necessary.
- Routine maintenance of equipment,
- Enclosures for crusher house, etc.
- Rational deployment of noise generating plant and machinery.
- Greenbelts are created around the quarry, infrastructure sites, service building area and avenue plantation along the haul roads to absorb Noise.
- HEMMs are installed/ kept with sound proof cabins.
- Provision of isolation for vibrating equipments (both fixed and mobile).
- Blasting is restricted to a particular time during the day (preferably shift change time) so as to cause minimum panic to wild animals. Night blasting will be avoided.
- Regular monitoring of noise levels at various points.

Lighting

The core area of the mining activity will be sufficiently illuminated. Such illumination detracts the animals from the core mining area, which would otherwise be dangerous to their lives.

The use of vehicular headlights which disturb the animals is restricted and only dippers are allowed within the mining area.

These activities have been included in the mining process and hence no special funds are required.

Over burden Management

The top soil and other mine waste constitute the overburden. These materials will stored separately for back filling of mine pits as per mine closure plan. The OB dumps will surrounded by retaining walls followed by Garland drains. Washing away of the top soil will controlled by providing retaining wall around the dump and adopting dump stabilisation methods. The back filled area will be technically and biologically reclaimed. The steps taken in this regard are as follows:

- Overburden will be dumped at designated location.
- Loose soil and Overburden will be promptly lifted to the designated location.
- Proper Terracing will be done keeping in view the angle of Repose.
- Dump stabilisation will be done by planting of grasses and other suitable species.
- The dumps will be surrounded by retaining walls to control washing away of soil.
- Garland drains will be provided around the retaining walls leading to settling tanks, to settle the washed away soil/silt etc.
- Check dams to be provided along the natural drainage system to control soil erosion.
- The size of the garland drains will be 1m wide and 0.5m deep. The water percolated through the wastes will be drained to the garland drains and then to settling tanks.

Physiographic change of Habitat (Land Management)

Some physiographic change is bound to take place after the closure of mine. The available top soil and overburden will not be sufficient to fill up the mine pits. In order to address this problem, a systematic procedure will be adopted at the time of back filling.

- Refilling with the available OB should be done in a sequential manner. Only after one pit is refilled completely, refilling of the next pit will be taken up. Partial refilling is to be

avoided.

- One of the exhausted pits will be used as storage area for tailings from beneficiation plant.
- Some of the mine pits will have to be left as such which can serve the purpose of water body. In such cases the gradient of the pit wall will be kept at 15° slope or 1:6. This will help the animals to use the water body. One passage of gentle slope will be done in each water body for easy movement of wild animals. Besides, the water body will be used for development of aquatic fauna.

Garbage Management

Since Garbage not only creates problems for the wild life but it also creates problems for mining activity. Particularly non-degradable materials like polythene bags etc. pose a lot of problem for the machineries as well as Wild animals. Hence proper garbage management is also an important activity in mining process. Some of the steps to be taken within the mining area have been indicated under water pollution.

The additional steps which are to be taken for Garbage management are as follows.

(a) Entry of non-degradable materials which are likely to produce garbage such as polythene bags, aluminium foils, tin foils etc. are restricted in to the Mining area.

(b) Un-avoidable generation of hazardous materials such as used oils, parts of machineries and equipments are promptly collected and kept at secluded places for disposal.

The oily sludge generated will be stored or transported in leak proof containers. The area over which oil/grease is handled will be kept effectively impervious. Any wash off from the oil/grease handling area or workshop will be drained through impervious drains, collected in specially constructed pit and treated appropriately before releasing it to the natural drains.

(c) The non-degradable materials if any are sent for recycling.

(d) The Garbage generated in the Mining area are regularly collected and segregated in-to Bio-degradable and non-degradable materials.

(e) The Bio-degradable substances are put in the Compost pits for conversion in-to manure. The Manure obtained from these pits will be utilised for plantation purpose.

Garbage management is an important activity as per provisions of Environmental Management Plan. Hence no separate provision is made for this.

Fall of animals in the mining pits.

In order to prevent accidental fall of animals in the mine pits the following steps shall be taken.

(a) The Executives and the Supervising staff will be educated and motivated to collect information regarding presence of wild animals in the mining area. In case any such animal is noticed it will be driven away to the nearest forest.

(b) There will be large scale activities within the mining area and it will be sufficiently illuminated with bright light so that the wild animals will avoid the area.

(c) In-spite of the precautions taken, in case of accidental fall of any wild animal in the mining pit, the workers will be educated to rescue the animal immediately and further inform the local Forest authorities for their advice.

(d) Solar electric fencing along the mine pit boundary over 2.529 kms @ 5.93 lakh/km with maintenance. Estimated cost is around 15.0 Lakhs and an amount of Rs.5.00lakhs is provided for maintenance. **Total cost Rs.20.00 lakhs.**

Creation of Awareness

The user agency will create awareness in the villages around the mining area. The following activities will be undertaken.

- Distribution of Leaflets.
- Organization of Padayatra.
- Essay, Debate & Drawing competition in Schools & Colleges.
- Street plays/Dance Drama.
- Hoardings will be fixed at prominent place with illustration of this precautionary measures.

The user agency will incur expenditure of aprox. **Rs.10.00 lakhs (Rs.1.0 lakh annually**) for the purpose during the life of the mine.

Skill development of Local Youth

There is a provision of skill development of local youth on elephant depredation and wildlife protection by engaging experts from forest & wildlife department. It is proposed to keep a provision of **Rs.10.00 lakh for the purpose**.

Assistant to local VSS

Provision of **Rs.20.00 lakh** to assist the local VSS for their livelihood activities.

Remuneration of Site Manager for Khandadhar Eco-Tourism Site for 10 years

There is a provision of **Rs 30.00 lakhs** towards Remuneration of Site Manager for Khandadhar Eco-Tourism Site for 10 years

Rescue Van

There is a provision towards supply of Rescue van having **cost Rs 25.00 Lakhs** & Provision for Driver, Fuel and Maintenance **for 10 years is around Rs 22.00 Lakhs.**

Vehicle for RCCF, Rourkela

For the monitoring purpose one four wheel vehile will be provided to RCCF, Rourkela having estimated **cost of Rs 25.00 lakhs**. There is a provision of **Rs 40.00 Lakhs** towards fuel & maintenance for 10 Years

Contingency

This fund is for any emergency like situation. It is proposed to keep a provision of **Rs.7.00** lakh for the purpose.

Total Financial provision for the project proponent for the period of 10 years is indicated below.

B. FINANCIAL FORECAST

The cost estimate for different activities for the project area is given below:

Sl. No.	Particulars	Estimated cost (In lakhs)
1.	Plantation of 14000 indigenous tall seedlings in blanks areas @ 2800 plants per year in urban plantation mode to increase green cover in lease area. @5,10,300/- per 1000 plants	71.442
2.	Distribution of seedlings to adjacent villagers / VSS to increase green cover @ 10000 nos. per year for 10 years.	10.00
3	Solar electric fencing along the mine pit boundary over 2.529 kms @ 5.93 lakh/km with Maintenance.	20.00
4	Creation of Awareness for conservation of forest and wildlife.	10.00
5	Assistance to local VSS for livelihood activities	20.00
6	Remuneration of Site Manager for Khandadhar Eco-Tourism Site for 10 years.	30.00
7	Skill development of local youth on elephant depredation and wildlife protection @1.00 Lakh X 10 years.	10.00
8	Supply of Rescue Van. Provision for Driver, Fuel and Maintenance for 10 years.	25.00 22.20
9	Supply of 1 four wheel vehicle for use of RCCF, Rourkela for monitoring purpose. Provision for Fuel and Maintenance for 10 years.	25.00 40.00
10	Contingency	7.00
	Total :-	**290.642**
11	20% escalation	58.128
	Total	**348.770**

These activities will be taken up by the project proponent. The expenditure on other activities such as Dust control, Noise control, Water treatment, lighting, Waste Management, general watch and ward etc. have been provided either in the Mining Plan or in the Environmental Impact Assessment & Environmental Management Plan, hence those expenditures are not included in this estimate.

b) Locations (preferable with GPS coordinates) of the proposed interventions and maps overlaid in the proposed land use plan map

The location of proposed interventions particularly location of solar electric fencing has been indicated in the land use Map (Plate No -IV).

c) Relevant provision of environment management plan for the project and the interventions overlapping in nature are to be specified.

The interventions undertaken as per the environment management plan have been described as above. The relevant provisions are indicated below.

1. Soil & water conservation (described in Chp. no - 4 of the Environment Management Plan)
2. Control of dust (described in Chp. no - 4 of the Environment Management Plan)
3. Control of water pollution (described in Chp. no - 4 of the Environment Management Plan)
4. Noise control (described in Chp. no - 4 of the Environment Management Plan)
5. Overburden management (described in Chp. no - 4 of the Environment Management Plan)
6. Garbage Management (described in Chp. no - 4 of the Environment Management Plan)

d) Proposed Plan period

This plan is proposed for a period of 10 years. However if necessary, interim revision of this plan can be taken up depending on the actual requirement. The proposed mitigation measures are therefore:

CHAPTER – 5

PROPOSED MANAGEMENT STRATEGIES WITHIN THE PROJECT IMPACT ZONE

The project area involves diversion of 126.401 ha forest area for mining and ancillary's purpose. The project impact could extend to the areas lying beyond the other mining areas. Therefore, the congregation of wild animals is likely to increase within the surrounding Reserve Forest areas. These animals will therefore be susceptible to greater threats. The Management Plan therefore aims at reducing such threats.

Although the impact zone is normally considered as the area situated within 10.00 km radius, due to presence of other mines along this project area the Impact Zone may be slightly more than the standard Impact Zone.

The management strategy for the impact zone will therefore be as follows.

- Habitat Improvement.
- Reducing man-animal conflict.
- Habitat/Forest protection.
- Reducing Forest dependence.
- Others.

Interventions to be adopted by the Divisional Forest Officer in the project impact area (buffer zone of about 12.70 KM or beyond around the project boundary). This will include the habitat improvements measures to reduce/ameliorate the human animal interface conflict & the measures to facilitate the movement of mega fauna across the manmade linear infrastructures causing hindrance in their movement

The project area adjoins 71 no's of working & none working mines and there for the impact area has been estimated to be with radius of 12.70 Km & accordingly this plan has been prepared.

i)Habitat Improvement

It is proposed to improve the wild life habitat within the Impact Zone with the following activities.

(a) Improvement of Forest area: - The Forests are gradually getting depleted and the cover for Wildlife is getting reduced. It is necessary that, the Forest cover is improved so as to provide proper habitat for the wild animals and also to produce adequate fodder.

Selection of site for such habitat improvement is very important. It is proposed to develop the habitat over 200 ha. area with suitable ANR plantation activities in RF / PRF of Koira range.

The Working Plan prescriptions for Improvement Working Circle is:

As the crop is immature and in pole stage, it is recommended that giving adequate protection against illicit removal, fire and grazing would help it to establish in to good mature stock in future. Therefore, only basic minimum inputs and tending operations are required without any commercial activity. No felling of trees of any species shall be carried out. The following interventions are proposed:

(i) ANR: Planting of fruit bearing trees within gaps @ 200 seedlings per Ha. is proposed. Showing of fodder/ non-fodder grasses along with other soil and moisture conservation measures is prescribed. The budget towards ANR Plantation @200 plants / hectare over 200 ha. @ Rs.42,266/- per ha is **Rs.84.532** Lakhs.

(ii) Bamboo Plantation: Further Bamboo Plantation @400 plants / hectare over 100 ha. @80,136/- per ha. The total budget for this purpose will be **Rs.80.136** Lakhs.

(iii) Soil & Moisture Conservation: SMC measures with top to bottom approach with Staggered trench / LBCD / Percolation Pit over 30 ha. is around **Rs.21.716** Lakhs.

(iv) Creation of Water bodies:- In order to contain the wild animals in a safe habitat, it is proposed to make provision for availability of water during summer season. It is proposed to create Eight numbers of water bodies at strategic locations @4.50lakh each. Total cost of **Rs.36.00** lakhs. Size 60m x 40m x 3 m. Coordinate of the proposed water bodies are 21° 58' 44.099"N - 85° 20' 00.96"E and 21° 55' 44.852"N - 85° 17' 07.169"E.

ii) <u>Wildlife Protection</u>:

(a) **Construction of Watch Tower**:

Watch tower with provision of tube well/ bore well and solar light system to be provided in the strategic location to know the movement of wild animals. Budget for this facility is **Rs.14.740** Lakhs**.**

(b) **Permanent Protection Camp**:

Construction of permanent protection camp with deep tube well / bore well, solar light system and digging of EPT (200 feet) around the protection camp along with fixing Iron Gate. Budget towards this facility is **Rs.10.100** Lakhs.

(c) **Anti-poaching-cum-Anti-depredation Squad:**

In order to augment the present anti-poaching mechanism it is proposed to form an anti-poaching-cum- anti-depredation squad with 10 no's of ex-military /ex-Police personnel along with departmental staff. This squad will act as Strike Units to curb poaching of wild animals and attend to all animal depredation cases. The project proponent will bear the wages of the squad for 10 years @13,80,360/- per year, total amounting to **Rs.138.035** lakhs.

(d) **Hiring of Vehicle for the Squad:**

Besides **Rs.36.00** lakhs, @Rs.3.60lakhs per year is provided for other logistics such as hiring of vehicles & fuel.

(e) **Equipments for the Squad:**

Further search lights, weapons, Camping materials etc. will cost around **Rs 5.00** Lakhs.

iii) <u>Reducing Man-animal conflict</u>.

Most important man-animal conflict is Man-Elephant conflict. The following steps will be taken to reduce such conflict.

(a) **Solar Electric Fencing/Solar Lighting**:

It is proposed to erect Solar Electric Fencing around the villages which experience frequent elephant depredation. Similarly in order to scare the elephants solar lights will be provided in the villages in which elephant depredation is anticipated. An amount of **Rs.80.00 lakhs** is proposed for these activities.

(b) **Elephant Tracker/Motivator**:

The people in the forest fringe villages will be educated about the behaviour of the animals and the procedure to tackle the emergency. The people can also be motivated to change their cropping habits from paddy to oilseeds, Chillies, Turmeric, Zinger and other cash crops which do not attract elephants. It is proposed to engage two persons who will act as Motivators as well as Elephant Trackers for a period of ten years. The cost on this account will be (2x11,503/-x12x10=) **Rs.27.607** lakhs.

(c) **Equipments to drive away Elephants**:

Mega phone /Spot light/ Crackers etc. will be provided to the villages frequented by elephants. It is proposed to contribute **Rs.5.00** lakhs for the purpose.

iv) Forest Fire prevention

Forest fire is the greatest threat, not only to the wild life but also to the forest itself. Repeated forest fire destroys the ground vegetation and the humus. The wild animals do not get adequate food and cover due to such repeated forest fire.

The Wildlife Management Plan therefore lays maximum emphasis on prevention of forest fire. The following measures are therefore proposed to be taken to prevent forest fire:

- **Engagement of Fire watchers**.

Fire watcher shall be engaged in the area from the month of March to June every year for a period of 10 years. The lessee proposes to bear the cost of 10 (ten) nos. of fire watchers for the adjoining forest areas during the summer months every year during the proposed period. The total cost on this account will be (10 x 8,400/- x 5mt x 10=) **Rs.42.000** lakhs**.**

- **Fire fighting Equipments:**

These Fire watchers will also be equipped with certain tools to attend to emergencies. The user agency therefore proposes to contribute **Rs.8.500** lakh for such fire fighting equipment.

- **Hiring of vehicle:**

A vehicle needs to be hired during the summer season to be deployed in fire fighting activities. The proposed expenditure is @33000/- per month and the total cost is **Rs. 16.500** lakhs.

- **Provision of incentive to Forest fringe villages**.

In some cases the protection of forest by the VSS in the area is very encouraging. The VSS/ Villagers will be encouraged to prevent Forest Fire through Incentive System. Awareness will be created among the forest fringe villages to prevent forest fire. The village which can successfully prevent forest fire in the specified patch of the forest near their village will be rewarded with incentive. The user agency proposes to bear the cost of incentive for 5 villages within the Impact Zone and the amount will be deposited with the D.F.O./Forest Department as the case may be. The cost will therefore be **Rs. 10.00 lakhs** @ Rs 20000/- per village/per year.

- **Fire lines**

Fire lines is an effective means to prevent spreading of Forest fire. The lessee

proposes to share the cost of 200 km of fire line @2800/- per km. i.e. Rs.5,60,000/- annually during the proposed period of ten years with a total cost of **Rs.56.000** lakh**.**

v) Cattle Immunization:

Cattles in village area used to face different type of Bacterial & viral disease throughout the year. The user agency has proposed **Rs. 10.00** Lakhs towards cattle immunization with provision of feeding to staff.

vi)Incentive to VSS

There is provision of incentive to Voluntaries @ Rs 20,000 per VSS for 5 best VSS. The budget provision is **Rs 10.00** Lakhs.

vii) Incentive/Rewards to informer

It is necessary to collect regular information regarding the poachers, smugglers and wildlife crime. The informers will be rewarded for their participation. It is proposed to keep a budget provision of **Rs. 10.00** Lakhs for the purpose.

viii) Supply of alternate fuel

There is a provision of supply of alternate fuel like LPG gas, Gobar gas to local inhabitants. The budget provision is **Rs 10.00** Lakhs @1.0 Lakh per year.

ix) Training for SHG

There is a provision of training to Self Help Group (SHG) for their skill development in the particular field. The budget provision is **Rs 10.00** lakhs @ Rs. 1.00 Lakhs per year.

x) Livelihood activities: Some of the families/local youths will be supported to adopt alternate livelihood activities, such as Apiculture, Poultry, Sericulture etc. Necessary training, Technical and Logistic support will be extended to them. The budget provision is **Rs 20.0** lakhs @ Rs. 2.0 Lakhs per year.

xi) Creation of awareness: Awareness programs will be organised in the villages as well as Schools. The user agency will contribute **Rs 10.0** lakhs @ Rs. 1.0 Lakhs per year for undertaking such activities.

xii) Monitoring and Evaluation

The implementation of this plan will have to be closely monitored and evaluated during

4th year and 8th year through independent person/agency. An amount of Rs.5.00 lakh is provided for the purpose.

xiii) Discretion of Forest Department

Although the above proposals are submitted for the mitigation of various threats to Wildlife and its habitat, the Forest Department is free to make alteration of the proposal or to divert the proposed activities to any other suitable locations.

xiv) Undertaking:

The project proponent undertakes to bear the cost of price escalation and/or differential wages in case of price rise or wage hike.

FINANCIAL FORECAST

Sl. No.	Particulars	Estimated cost (In lakhs)
	Habitat Improvement	
1.	Habitat Improvement through ANR Plantation @200 plants / hectare over 200 ha. @ Rs.42,266/- per ha.	84.532
2.	Habitat Improvement through Bamboo Plantation @400 plants / hectare over 100 ha. @80,136/- per ha.	80.136
3.	SMC measures with top to bottom approach: Staggered trench / LBCD / Percolation Pit over 135 ha. Staggered Trench @ Rs.53,076/- per ha. LBCD 3 Mt span @ Rs.16,744/- (30 nos.) Percolation Pit @ Rs.77/- per pit (1000 nos.)	21.716
4.	Creation of Eight Nos. of Water Body within the Treatment area @Rs.4.50 lakh	36.000
5.	Watch Tower with provision of tube well / bore well and Solar light system.	14.740
6.	Construction of permanent protection camp with deep tube well / bore well, solar light system and digging of EPT (200 feet) around the protection camp along with fixing Iron Gate.	10.100
7	Wildlife Protection Wages of Anti-depredation Squad, consisting of 10 members @13,80,360/- for 1 year. Hiring of vehicle @30,000/- per month Anti-depredation equipments for squad such as Search Lights, Camping materials etc.	138.036 36.000 5.000 **179.036**
8.	Solar Fencing, Solar Street light etc.	80.000
	Man-Animal Conflict	

Sl. No.	Particulars	Estimated cost (In lakhs)
9	Engagement of Trackers (2x11503/-x12x10)	27.607
	Anti-depredation equipments such as supply of Mega Phone / Spot light/ Crackers etc.	5.000
		32.607
10	Prevention of Forest Fire	
	Wages of Fire Watchers 10 nos for 10 yrs, @8,400/- for 5 months/year	42.000
	Hiring of vehicle @33,000/- per month	16.500
	Fire Fighting Equipments	8.500
	Incentive to Forest Fringe Villages, 5 nos.	10.000
	Fire line maintenance @2243/- per km, (200 x 2800/- x 10yrs)	56.000
		133.000
11.	Cattle Immunization	10.000
12.	Incentive to VSS @20,000/- per VSS for 5 best VSS (1 Lakh X 10 years)	10.000
13.	Reward/Incentive to informer (1 Lakh X 10 years)	10.000
14.	Supply of alternate fuel to the local inhabitants (1 lakh X 10 years)	10.000
15.	Training to SHG for livelihood (1 lakh X 10 years)	10.000
16.	Alternate Livelihood support activities (2 Lakhs X 10 years)	20.000
17.	Creation of awareness	10.000
18.	Monitoring & evaluation	5.00
	TOTAL :-	**756.867**
19.	20 % extra for escalation	151.373
	G. TOTAL :-	**908.240**

The total estimate of this plan is therefore (Rs.**348.770** lakhs + 908.240 lakhs) = **Rs.1257.010 lakhs**. Out of this amount the project proponent will take up the activities for Rs. **348.770** lakhs and **908.240** lakhs will be deposited with the D.F.O/ Forest Department for taking up different activities within the Zone of Influence.

a) Locations (preferable with GPS coordinates) and Maps of areas of the proposed interventions. Such maps also show location of above man made infrastructures and the ameliorative measures such as under/over passes ramps etc.

The location of linear & man made infrastructure is indicated in plate no.

b) Monitoring & evaluation arrangement for the activities under taken

Provision has been kept in this plan for taking of monitoring & evaluation activities in the fourth year & eighth year during the plan period.

c) Plan Period:

This plan is proposed for a period of 10 years. However, if necessary, interim revision of this plan can be taken up depending on the actual requirement. The proposed mitigation measures are therefore:

CHAPTER –6

The Ten year cost schedules for project proponent & forest department is given below.

Year	Amount required in lakhs	
	Project proponent	**DFO/Forest Department**
1	73.624	171.8663
2	18.800	145.9773
3	44.060	95.5053
4	36.526	61.4883
5	23.876	45.3783
6	32.876	60.8783
7	15.220	42.8783
8	15.220	42.8783
9	15.220	42.8783
10	15.220	41.1423
Total	**290.642**	**756.867**
20%Escalation	**58.128**	**151.373**
Grand Total	**348.770**	**908.240**
COST OF THE PLAN	**Rs.1257.010 lakhs**	

Maps/appendices/plan

01	Location Map on Topo-sheet	Plate No. I
02	Location Map Showing Other Projects within the project impact Area	Plate No. II
03	Topo Map showing Linear Infrastructures	Plate No. III
04	Existing Land use plan of the project	Plate No IV
05	Proposed land use Plan	Plate No V
06	Topo Map showing Man-Animal Conflict	Plate No VI
07	Topo Map Showing Mega wild life Movement	Plate No VII
08	Location Map showing the distance of the Project Area from National parks, Sanctuaries and elephant/ Tiger reserve	Plate No VIII