

Sub: Diversion of balance forest land of 401.7824 ha including 7.2807 ha of safety zone out of total forest land of 519.7472 ha within total mining lease area of 618.576 ha for Iron Ore Mining in Gandhamardan (Block-A) mining lease in Keonjhar District, Odisha of M/s Odisha Mining Corporation Ltd. during 2nd renewal of mining lease period (likely to extended up to 31.03.2020 as per amended provision of MMDR Act, 2015)

1. The State Government of Odisha vide their letter No. 10F (Cons) 158/2015/6513/F&E dated 07.04.2016 submitted a proposal for prior approval of Central Government under Forest (Conservation) Act, 1980.
2. The facts related to the proposal as contained in the State Government's letter dated 07.04.2017 are given below in the form of fact sheet:

FACT SHEET

1.	Name of the Proposal	Diversion of balance forest land 401.7824 ha including 7.2807 ha of safety zone out of total forest land of 519.7472 ha within total mining lease area of 618.576 ha for Iron Ore Mining in Gandhamardan (Block-A) mining lease in Keonjhar District, Odisha of M/s Odisha Mining Corporation Ltd. during 2 nd renewal of mining lease period.
2.	Location (i) State (ii) District	Odisha Keonjhar
3.	Particulars of Forests: (i) Name of Forest Division and Forest area involved. (ii) Legal status/Sy.No.	Keonjhar Forest Division 401.7824 ha Proposed Reserved Forest 375.5607 ha Village Forest 26.2217 ha Total 401.7824 ha
4.	Vulnerability to erosion	Not given
5.	(i) Vegetation (ii) Density (iii) No. of trees enumerated/to be actually felled	-- The forest land applied for diversion involves Gandhamardan Proposed Reserved Forest and Village Forest land. Gandhamardan Proposed Reserved Forest comes under 3C/C _{2e} (ii) moist peninsular low level Sal Forest type under Champion & Seth classification with site quality-IV. The prevailing vegetation consists of Sal and its associates like <i>Pterocarpus marsupium</i> , <i>Terminalia alata</i> , <i>Emblicoeffcnalis</i> , <i>brideliaretusa</i> , <i>Gmelinaarborea</i> , <i>Cleisanthuscollinus</i> , <i>Diospirosmelanoxylon</i> etc. The crop canopy density varies from 0.3 to 0.4 87,591 number of trees above 30 cm girth and 2,054 number of poles have been enumerated over the applied forest area
6.	Whether area is significant from wildlife point of view	No rare or endangered flora & fauna is noticed in this area but however, movement of mega fauna like elephant is

		often noticed in the fringe area. <u>The area comes under the elephant habitat zone-2 of ORSAC, Bhubaneswar.</u>
7.	Whether forms part of National park, Wildlife Sanctuary, Biosphere Reserve, Tiger Reserve, Elephant Corridor, etc. (if so, details of the area and comments of the Chief Wildlife Warden	The applied area does not form part of any National park, Wildlife Sanctuary, Biosphere Reserve, Tiger Reserve, Elephant Corridor, etc. However, movement of wild elephants is often noticed in the fringe areas. The area comes under the elephant habitat zone-2 of ORSAC, Bhubaneswar.
8.	Whether any RET species of flora and fauna are found in the area. If so details thereof	No
9.	Approximate distance of the proposed site for diversion from boundary of forest.	Not given
10.	Whether any protected archaeological/ heritage site/defence establishment or any other important monuments is located in the area.	No
11.	Whether any work of in violation of the Forest (Conservation) Act, 1980 has been carried out (Yes/No). If yes details of the same including period of work done, action taken on erring officials. Whether work in violation is still in progress.	<p>Violation:</p> <p>(i) Illegal dumping of ores on forest land (Gandhamardan PRF) extracted from adjoining lease Block-B in the lease hold area of Block-A of dimension 200 mt x 40 mt (approx. 3.00 ha) at the common boundary with GPS location.</p> <p>Latitude : N 21⁰ 37'04.5"</p> <p>Longitude : E85⁰ 30'47.2"</p> <p>(ii) 2 ha. of forest land (Gandhamardan PRF) has been illegally used for road in Block-A without approval in violation of the FC Act, 1980.</p> <p>Action taken:</p> <p>(i) Show Cause notice has been issued to the Regional Manager, Gandhamardan Iron ore mines, M/s OMC Ltd. vide letter No. 9513 dated 19.12.2011.</p> <p>(ii) OR Case No. 23 of 2015-16 has been booked and action is being taken for sanction and submission of prosecution in the Hon'ble Court of SDJM, Keonjhar.</p> <p>Present status:</p> <p>(i) Removal of dump from the OB dump site in Block-A is under progress, as per the direction of the Hon'ble Supreme Court of India vide their order dated 16.04.2012 and subsequent direction of Steel and Mines Department, Govt. of Odisha.</p> <p>(ii) The lessee has represented and submitted a proposal for use of the road under question which is under consideration at the level of MoEF&CC, Govt. of India</p>

12.	Whether the requirement of forest land as proposed by the user agency in col. 2 of Part-I is unavoidable and barest minimum for the project, if no recommended area item-wise with details of alternatives examined.	Yes
13.	Whether clearance under the Environment (protection) Act, 1986 is required?	Yes, (Pg-393-401/c) User Agency has accorded Environment clearance vide Ministry's letter no. J-11015/1088/2007-IA.II (M) dated 16.01.2009
14.	Compensatory Afforestation	
	(i) Details of non-forest area/degraded forest area identified for CA, its distance from adjoining forest, number of patches, size of each patches.	329.7743 ha of non-forest Govt. land identified in village Khamarpadar under ThuamulrampurTahasil in Kalahandi District. (Pg-282-301/)
	(ii) Map showing non-forest/degraded forest area identified for CA and adjoining forest boundaries.	Submitted
	(iii) Detailed CA scheme including species to be planted, implementing agency, time schedule, cost structure, etc.	Detailed CA scheme is given and placed in file at Pg-282-301/c.
	(iv) Total financial outlay for CA	Rs. 3,19,61,400.00 (Pg-301/c)
	(v) Certificate from the competent authority regarding suitability of the area identified for CA and from management point of view.	Land Suitability certificate has been given by DFO, Kalahandi South Division Pg-45/c
15.	Catchment Area Treatment	NA
16.	Rehabilitation of Oustees a) No of families involved b) Category of families c) Details of rehabilitation plan	No Nil Nil
17.	Employment likely to be generated a) Whether the project is likely to generate employment b) Permanent/ Regular Employment (Number of person) c) Temporary Employment (Number of person-days)	Yes 377 2000
18.	Compliance of Scheduled Tribe and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006	District Collector, Keonjhar has issued certificate regarding compliance of Scheduled Tribe and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 for 519.7472 ha of forest land. (Pg-309-372/c) But only photocopyis submitted.
19.	Site Inspection Report by RCCF	Pg-81-84/c

20.	Cost Benefit Ratio	1:13.60(Pg-251-253)
21.	Total Cost of the Project	Rs 10962.3135 (Rupees in Lakh)
22.	Total period for which the forest is proposed to be diverted (In years)	5 years
23.	<p>Recommendation</p> <p>i. DFO</p> <p>ii. RCCF</p> <p>iii. PCCF/Nodal Officer</p> <p>iv State Government</p>	<p>The DFO, Keonjhar intimated that the applied diversion proposal over 401.7824 (375.5607 ha Gandhamardan proposed reserved forest and 26.2217 ha village forest) is under 2nd RML with effect from 21.05.2013 for a period of 20 years with validity up to 20.05.2033. However, the validity of the lease has to be appraised in the light of MMDR (amendment) Act, 2015. The proposed areas is unavoidable and the barest minimum for the purpose of mining. There is no sign of prevalence of endangered, threatened and vulnerable wild fauna in the said area except movement of wild elephant often noticed in the fringe areas. The proposed land use plan for the said forest land does not have adequate safe guard measures for maintaining ecological stability. Thus, it is suggested that the lessee may be stipulated to take up intensive SMC measures to arrest plausible soil erosion and ensuring conservation of the run off. In addition, it is also suggested that the lessee may be stipulated to earmark proportionate area as deemed fit for the purpose of stacking of top soil in the proposed land use plan. The proposed diversion of forest land will not attract displacement of people.</p> <p>The said proposal is therefore submitted for necessary approval under section 2 (ii) of FCA, 1980 taking the aforesaid facts into consideration.(Pg-80/c)</p> <p>The RCCF intimated that the project may be considered for approval as per provision under section 2 (ii) of Forest (Conservation) Act, 1980, 1980 (Amended), on its own merit with the suggestion that condition may be imposed on the User Agency to take up intensive Soil & Moisture Conservation Measures in the lease area and to stack top soil separately in an earmarked area within the area proposed for dumping of overburden.(Pg-84/c)</p> <p>Recommended (Pg-85/c)</p> <p>Recommended (Pg-86/c)</p>

24.	District Profile	
	(i) Total Geographical area of the district/division	830300.00 ha
	(ii) Total Forest area/ Divisional Forest area	336615.6293 ha
	(iii) Total area diverted since 1980	10102.8195 ha (in 71 nos. of cases)
	(iv) Total CA stipulated since 1980 (Forest land)	C. A. 1669.6180 ha
	a. Forest land including penal CA	P. C. A. 4994.8675 ha
	b. Non Forest Land	C. A. 7247.7931 ha
	(v) Progress of Compensatory Afforestation	C.A. 1152.58 ha
	a. Forest land	P.C.A 2996.34 ha
	b. Non Forest land	C.A. 5983.9016 ha

3. SITE INSPECTION REPORT OF THE REGIONAL OFFICE, BHUBANESWAR: The SIR has been carried by Shri R. K. Samal, IFS, Conservator of Forest © for this proposal on 28.07.2017 with the officials of State Forest Department and representatives of the User Agency. Regional Office, Bhubaneswar vide their letter no. 5-ORA 052/2007-FCE dated 30.10.2017 has submitted Site Inspection Report (SIR). The SIR is reproduced below:

1. Legal status of the forest land proposed for diversion

Proposed Reserve Forest-375.5607 ha.
Village Forest - 26.2217 ha.
Total - 401.7824 ha

2. Item-wise break-up details of the forest land proposed for diversion:

Purpose of utilisation	Forest area in Ha. (virgin)		Forest area in Ha. (pre-80 broken)	Total forest land in Ha.
	PRF	VF		
Mining	306.2866	12.3715	19.51	338.1681
Dumping of overburden	3.5016	0	3.97	7.4716
Stacking of ore	0.4280	4.3597	0	4.7877
Sub-grade ore stacking	11.1385	0	0	11.1385
Processing and stacking	24.9305	3.9962	0	28.9267
Safety zone area of magazine (3.0 MT capacity)	4.0091	0	0	4.0091
Safety zone of the mining lease	1.7864	5.4943	0	7.2807
Total	352.0807	26.2217	23.48	401.7824

3. Whether proposal involves any construction of buildings (including residential) or not. If yes, details thereof:

No. Does not involve construction of buildings including residential areas.

4. Total cost of the project at present rates:

Rs.109.62 crores

5. Wildlife:

Whether forest area proposed for diversion is important from wildlife point of view or not:

No rare or endangered flora and fauna is noticed in this area but movement of mega fauna like elephant is often noticed in the fringe area. The area comes under the elephant habitat Zone-2 of ORSAC, Bhubaneswar. Apart from elephant, sloth bear and spotted deer are also seen in the area. **Earlier there has been report about death of two elephants by falling into the pits of Gandhamardan-B mine during July ,2005.**

6. Vegetation:

The applied forest land is a part of Gandhamardan PRF which comes under the type 3C/C_{2e} (ii) Moist Peninsular low level Sal forest type under Champion & Seth classification with canopy density 0.3 to 0.4 at the lower reaches and little higher at higher reaches and with site quality-IV.

(a) Total number of trees to be felled.

As per the sample plot estimation an estimated 87,591 number of trees above 30 cm girth and 2,054 number of poles have been enumerated over the applied forest area, which include 86,100 number of trees and 1,804 number of poles over virgin forest land of 378.3024 ha and 1,491 trees and 250 number of poles over broken up forest land of 23.48 ha.

Effect of removal of trees on the general ecosystem in the area:

The hills are having steep slopes and the area contains a lot of biodiversity and is very fragile. There will be loss of biodiversity as well as soil erosion.

(b) Important species:

The prevailing vegetation consists of Sal and its associates like Bija (*Pterocarpus marsupium*), Asan (*Terminalia alata*), Amla (*Emblica officinalis*), Kasi (*Brideliaretusa*), Gambhar (*Gmelinaarborea*), Karada (*Cleistanthuscollinus*), Kumbhi (*Careyaarboria*), Kendu (*Dispyrosmelanoxylon*), etc. The main climbers associated with Sal (*Shorearobusta*) in these areas are Atundi (*Combretumdecandrum*), Latapalash (*Butea superb*), Siali (*Bauhinia vahlii*), *Smilax tetraphylla*, etc. The important grass species are Sinkula (*Heteropogoncontortus*), *Aplidamutica*, *Dicanthiumcarricosum*, Duba (*Cynodondactylon*), *Chrysopogonaciculatus*, etc.

Number of trees of girth below 60 cm.

As reported by DFO Keonjhar the total Number of trees below 60 cm to be felled is 71,191.

Number of trees of girth above 60 cm.

As reported by DFO Keonjhar the total Number of trees above 60 cm to be felled 18,454.

7. **Background note on the proposal:**

The mining lease was granted for a period of 30 years in the name of Gandhamardan (Block-A) iron mines in favour of M/s OMC Ltd. for exploration of iron ore over an area of 618.5760 ha. in the revenue villages of Suakati&Daonra and Gandhamardan proposed reserved forest under BanspalTahasil of Keonjhar district, Odisha vide letter No.III (A) A-11/13 dated 21st May, 1963, Mining & Geology Deptt., Govt. of Odisha. Thus, original mining lease was valid till 20.05.1993. The first renewal of mining lease application was filed by the lessee for iron ore over 618.5760 ha on 04.04.1992 i.e. one year prior to the expiry of lease. However, the renewal could not be obtained till the year 2012 and in the meantime the 2nd RML application was filed on 01.05.2012 for another period of 20 years.

The total mining lease area of Gandhamardan (Block-A) iron ore mines of M/s OMC Ltd. is 618.5760 ha. which involves 486.1340 ha. Proposed Reserved Forest, 33.6132 ha of Village Forest Land, 85.5772 ha non-forest Government land and 13.2516 ha non-forest tenanted land. The mining lease area is located within latitude 21^o 36' 08.58286"N to 21^o 37'41.89734"N and longitude 85^o 29' 13.06230" E to 85^o 31' 16.78446" E of Survey of India toposheet No.73 G/6 and 73 G/10. The northern ML boundary of Gandhamardan Block-A Iron Ore Mines of M/s OMC Ltd. is common with the southern boundary of Gandhamardan Block –B Iron Ore Mines of M/s OMC Ltd.

The extent of land broken prior to 1980 in this lease is 73.291 ha. that includes 64.7242 ha. of forest land (57.3327 ha. PRF and 7.3915 ha. village forest) and 8.5672 ha of non-forest land. During 1st RML period, the State Government vide its letter dated 11.05.2007 had recommended for diversion of 117.9648 ha. of forest land (virgin forest land 76.7206 ha. and broken up forest land of 41.2442 ha.) out of 216.3617 ha of forest land proposed for diversion by the user agency considering wildlife concerns especially movement of elephants in the area. MoEF&CC, Government of India vide letter dated 17.02.2009 accorded State-I approval under Section-2 (ii) of FC Act, 1980 over 117.9648 ha. Now MOEF, Govt of India has accorded stage-II clearance for 41.2442 Ha of broken up forest land only a d to consider the balance 76.7206 ha of virgin forest land after getting the carrying capacity study report is available. Besides the above the User agency needs 2.270 Ha of area for making a haulage road for carrying of materials from Top Quarry of Gandhamardan -B

OMC Ltd. had earlier approached the Hon'ble Supreme Court in IA No.3402/2012 with the prayer to restore the entire Gandhamardan-A mining lease in their favour and diversion of balance forest land in the lease taking note of Wildlife Institute of India vetting the required Wildlife Management Plan. On the basis of Hon'ble Supreme court order dated 16.04.2012 the user agency has filed forest diversion proposal for the remaining forest land i.e. 401.7874 ha. (total forest land 519.7472 ha – 117.9648 ha. already agreed for diversion in principle. The proposed forest land for diversion of 401.7824 ha. now consists of virgin PRF-352.0807 ha., Virgin VF-26.2217 and 23.48 ha. pre-1980 broken up forest land.

8. **Compensatory afforestation:**

Total forest land involved in this mining lease:	519.7472 ha.
(-) Forest land for which Stage-I approval order has been accorded and CA cost deposited:	117.9648 ha.
(-) Forest land broken up prior to 1980 for CA is not required:	64.7274 ha.
(-) Forest land coming within safety zone for which CA is not required:	7.2807 ha.
Non-forest land required for compensatory afforestation:	329.7743 ha.

329.7743 ha. has been identified in village Khamarpadar under Thuamul Rampur Tahasil of Kalahandi district in Kalahandi (South) Forest Division.

- (a) **Whether land for compensatory afforestation is suitable from plantation and management point of view or not:**

Yes. Suitability certificate given by Forest and Revenue authorities.

- (b) **Whether land for compensatory afforestation is free from encroachment/other encumbrances:**

Yes.

- (c) **Whether land for compensatory afforestation is important from Religious/Archaeological point of view:**

No.

- (d) **Land identified for raising compensatory afforestation is in how many patches, whether patches are compact or not:**

Land identified for raising CA is in 3 patches. The patches are compact.

- (e) **Map with details:**

Enclosed in the diversion proposal.

- (f) **Total financial outlay:**

The approved CA scheme has provisions for barbed wire fencing, special soil conservation measures, etc. tree species to be planted under the scheme are Teak (*Tectonagrandis*), Karanj (*Pongamiapiñnata*), Neem (*Azadiractaindica*), Amla (*Emblica officinalis*), Bahada (*Terminalia belerica*), Mahul (*Madhucaindica*) and Sisoo (*Dalbergiasisoo*), etc. Total cost of CA is Rs. 3,19,61,400/-.

9. **Whether proposal involves violation of Forest (Conservation) Act, 1980 or not. If yes, a detailed report on violation including action taken against the concerned officials:**

Violation:

- (iii) Illegal dumping of ores on forest land (Gandhamrdan PRF) extracted from adjoining lease Gandhamrdan Block-B in the lease hold area of Gandhamardan Block-A having dimension 200 mt x 40 mt (approx. 3.00 ha) at the common boundary with GPS location.

Latitude : N 21° 37' 04.5"

Longitude : E 85° 30' 47.2"

- (iv) 2 ha. of forest land (Gandhamardan PRF) has been illegally used for road purpose in Gandhamardan Block-A without approval in violation of the FC Act, 1980.

Action taken:

- (iii) Show cause notice has been issued to the Regional Manager, Gandhamardan Iron ore mines, M/s OMC Ltd. vide letter No. 9513 dated 19.12.2011 by DFO Keonjhar.
- (iv) OR Case No. 23BJ of 2015-16 has been booked. Prosecution sanctioned and submitted vide PR No.12 of 2016-17 in the Court of SDJM, Keonjhar by DFO Keonjhar.

Present status:

- (iii) Removal of dump from the OB dump site in Block-A is under progress as per the direction of the Hon'ble Supreme Court of India vide their order dated 16.04.2012 and subsequent direction of Steel and Mines Department, Govt. of Odisha.

(iv) The lessee has represented and submitted a proposal for use of the road under question which has been furnished to MoEF&CC, Govt. of India for consideration.

10. Whether proposal involves rehabilitation of displaced persons. If yes, whether rehabilitation plan has been prepared by the State Government or not :

No.

11. Reclamation plan:

Details and financial allocation:

Reclamation will be carried after exhaustion of the mined out areas as per the mining plan.

12. Details on catchment and command area under the project:

Not applicable. However, it contains the Gandhamardan hills which are steep hills.

Catchment area treatment plan to prevent siltation of reservoir:

Not applicable.

13. Cost benefit ratio:

1:13.60

14. Recommendations of the Principal Chief Conservator of Forests/State Government:

Yes. Recommended.

15. Recommendations of Addl. Principal Chief Conservator of Forests (Central) along with detailed reasons:

The site inspection report of CF (Central) for the proposal of application for diversion of balance forest land of 401.782 ha including 7.2807 ha of safety zone out of total forest land of 519.7472 ha within total mining lease area of 618.576 ha for iron ore mining in Gandhamardan (Block-A) mining lease in Keonjhar District, Odisha of M/s Odisha Mining corporation Ltd. is forwarded for consideration of the Ministry.

The proponent has one mine adjacent to this proposed site and both the sites are situated in the Gandhamardan hills, which is a pristine forest ecosystem of the State. Which is a habitat of wildlife including the flagship species, the elephants. **There had been alarming incidence of elephants death due to drowning in the dangerously exposed mining pits of OMC.**

Gandhamardan hills also cater to river Baitarani, through the feeder streams, which shall also be affected by mining activities. The Ministry may keep in mind these serious issues while considering this proposal.

16. Conservator of Forests shall give detailed comments on whether there are any alternative routes/alignment for locating the project on the non-forest land:

It is site specific and it cannot be shifted to any other forest or non-forest land.

17. Utility of the project:

It has been stated by the project authorities that about 377 people will get direct and 2000 people will get indirect employment.

Numbers of Scheduled Caste/Scheduled Tribes to be benefited by the project:

The area has a lot of Scheduled Tribes population and is expected many of them to be benefited directly and indirectly.

18.

(a) Whether land being diverted has any socio-cultural/ religious value:

Not reported.

(b) Whether any sacred grove or very old growth trees/forests exist in the areas proposed for diversion:

Yes, the area contain old growth trees existing in the natural state.

(c) Whether the land under diversion forms part of any unique eco-system:

Yes, the area exhibits an undulated topography with varying elevations from 620 to 1009 metre above mean sea level. This is the southward extension of the North-South trending Gandhamardan hill and is a prominent physiographic unit with highest elevation 1061 metre above mean sea level occurring towards north of this area. It is stated that the local population depend this forest for various herbs and shrubs and firewood for meeting their day to day lives.

19. Situation with respect to any Protected Area:

There is no protected area nearby. Similipal Tiger Reserve is around 60 km away.

20. Any other information relating to the project:

The validity of the lease is till 31st March, 2020. The lease is adjacent to another lease of the same agency i.e. Gandhamardan-B. Total area of the Gandhamardan-B lease is 1590.87 ha. containing 1409.649 ha of forest area and out of this forest clearance has been given for 232.438 ha. and Stage-I clearance has been given for balance area of this lease. **The ecosystem of Gandhamardan hills will be severely damaged if mining is also taken up in the hill tops of the Gandhamardan-A area, rather the foot hills of Gandhamardan-A lease is covered with Lantana and Eupatorium weeds and mining has already been done and being used for storage of ore.** This also includes the roads that lead to Gandhamardan-B lease. For storage of iron ore and proper transportation from Gandhamardan-B mines the remaining broken up forest land prior to 1980 i.e. 23.48 ha. along with 2.270 ha for construction of haulage road will be sufficient for meeting the needs of the user agency as on date. **The balance virgin areas with natural forests may be kept intact and shall be operated once the Gandhamardan-B lease is exhausted of the stock of iron ore and progressively reclaimed. This will ensure containing the damage to the environment in this area and meeting the needs of the local people.** The mitigative measures proposed in the Wild Management Plan prepared by user agency and vetted by Wildlife Institute of India will reduce the ill-effects for movement of elephants and other wildlife in the region. The DSS report of the proposed mine is enclosed.

- 4. It is imperative to mention that in-principal approval for diversion of 117.9648 ha in Gandhmardan Block A was granted on 17.02.2009 subject to certain conditions prescribed therein including the condition No (6) which states that the approval under FCA, 1980 is restricted to 117.9648 ha & the possession of the balance forest area shall**

be taken over by the Forest Department before grant of the formal approval. However, this condition was waived off by the competent authority while issue of stage-II clearance for diversion of broken –up forest land of 41.2442 ha on 24.04.2017. The copies of in-principle approval dated 17.02.2009 and 24.04.2017 are placed at F/X.

5. The above facts along-with SIR was considered by the **Forest Advisory Committee (FAC) in its meeting held on 16.11.2017.** Meantime, State Government vide their letter No. 10F (Cons) 158/2015/23350/F&E dated 14.11.2017 informed the Ministry to defer the proposal on the request of the OMC Ltd till the NIT Rourkela submits its final report to State Government on Biodiversity Conservation Plan of Gandhamardan Region of Keonjhar district. Accordingly, on the request of the State Government the FAC decided to defer the project proposal till the submission of approved Biodiversity Conservation Plan of Gandhamardan Region by the State Government.
6. Now, the State Government vide their letter no. 10F (Cons) 50/2018/17632/F&E dated 10.08.2018 informed that the Department of Biotechnology & Medical Engineering, National Institute of Technology, Rourkela, who was entrusted by the State Government with the responsibility of undertaking study of biodiversity and its conservation plan of the Gandhamardan Region at project cost in compliance to the additional condition stipulated by the Eastern Regional Office vide their letter No. 5-ORA014/2005-BHU dated 18.10.2007 for diversion of forest in Gandhamardan-B Mining lease, have also submitted their report on *Scientific study on Biodiversity and its conservation for forest land around Gandhamardan Region in Keonjhar district.*
7. It is informed by the State Govt. and the mitigative measures suggested in the Conservation Plan includes **measures on revegetation/regeneration, faunal diversity, SMC etc in the region.** In order to implement the suggested measures, the Divisional Forest Officer, Keonjhar Division had furnished the financial outlay which has also been technically approved by PCCF, Odisha for an estimated outlay of Rs.9,54,17,000/-. The Biodiversity Conservation as well as the approved financial outlay for implementing the suggested measures have been accepted. A copy of ‘Scientific study on Biodiversity and its conservation for forest land around Gandhamardan Region in Keonjhar district’ prepared by NIT, Rourkela along with a copy of approved financial outlay by PCCF thereof is given . The user agency vide their letter dated 03.08.2018 intimated to have deposited the approved cost of implementing the mitigative measures to the tune of Rs. 9,54,17,000/- through e-portal of MoEF&CC vide UTR No. ANDBH 1821446246 dated 02.08.2018.
8. The said Scientific study (**Pg-705-821/c**) on Biodiversity and its conservation for forest land around Gandhamardan Region in Keonjhar district was conducted in four phases. The finding of the study are as follows:

THREATS TO BIO DIVERSITY AND ACTION PLAN FOR STRATEGIC MANAGEMENT

Prior to 1896, no record of systematic Forest Conservation and Management of any kind is available. The then Maharaja of Keonjhar introduced certain rules to regulate the disposal of forest produce from 1st April 1896. Prior to this, the tenants of Keonjhar used to get their requirement free from any part of the ex-state. The rules provided the rights to tenants to collect forest produce within a radius of four miles from their homes in case of large villages and two miles in case of small hamlets. Permission was required for collection of forest produce from forests located at a greater distance. The Bhuyans and Juangs, people of very primitive instinct, with cravings for hunting unfettered freedom, used the practice “Jhum” (shifting cultivation) as a traditional custom.

The First Agency Forest Officer, Mr. A.N. Grieve foresaw the evil effects of shifting cultivation during 1911 and pleaded for creation of some reserved forests. According to his advice, reservation of a number of forest blocks was taken up. But in the hill tracts, constituting the settlements, Bhuyans and Juangs, no forest law or rules of the Ex-Durbar administration could be enforced with the result that no forest area in these "Pirhs" could be brought under reservation even up till now. Attempts at various times to win over them and to prevent them from the pernicious practice - C shifting cultivation, totally failed during all these years. The practice is still in vogue to a limited extent in some of the remote parts of the region.

In fact, Gandhamardan Region comes under the present Bhuyan-Juang Pirha (BIP) Range of Keonjhar Division where major portion of the forest area (7690.3796 ha, out of a total of 8883.4582 ha. or 86.57%) still continue as PRF or DPF. As such, these areas have not yet been included in the working plans for systematic management of forests and wild life. Only five forest blocks viz, Anjar, Khajurimundi, Jagar, Mundula and Gadgadei covering a total area of 1183.0786 ha have been notified as RF between 2003 and 2005. These five blocks have been covered in the recently revised working plan of Keonjhar Division (not yet approved by Central Govt.) and have been allotted to Rehabilitation and Wildlife Conservation Working Circle.

Threats to Biodiversity

Degradation and fragmentation of habitats, decay of ecosystem, poaching, forest fires, encroachment for cultivation, uncontrolled grazing by domestic animals, electrocution by high tension power lines, man-animal conflict, dust pollution, water pollution, noise pollution, air pollution, soil erosion. Increasing vehicular traffic, water scarcity etc are some of the probable threats to wild life in mining activity areas which are described below:

- a. **Habitat loss:** The tree growth, shrubs and ground cover may be partly lost, due to mining pits, OB dumps, storage yard etc. This may adversely affect the species richness, cover and food value of wild animals.
- b. **Dust pollution:** Mining activity generates lot of dust, particularly in loading, unloading and during haulage. The suspended Particulate Matter (SPM) and Respirated Particulate Matter (RPM) may have a negative impact on optimal plant growth and also affect the respiration of small animals, which may either flee from the area or choked to death.
- c. **Noise pollution:** Blasting, excavation, loading, unloading, crushing, haulage and movement of people contribute to noise. Noise not only affect the tranquillity of the area but also affect the health and reproductive process of wild animals. Therefore, many of these emigrate and seek safe refuge away from source. Some of them also become victim to death and injury during emigration.
- d. **Water Pollution:** The water running off the O B dumps, ore stacks, roads and unused land surface carry red silt with iron fines which may contaminate the streams down below, affecting use of stream water by aquatic and terrestrial animals.
- e. **Soil Erosion:** During mining activity and laying of extraction path and other activities in the hilly terrain subject the hill slopes to soil erosion. This will denude the hill slopes which support vegetation for the sustenance of wild animals.
- f. **Accidental fall of animals:** From the inception of mining, the pit attains considerable size which is enlarged in wedge shape in course of mining. Such deep mining pits are dangerous for wild animals as any fall shall be fatal them. The fall may even cause serious injury making them invalid for rest of life.

Threats to Wild life and its habitat

Mining and its ancillary activities not only adversely impact wild life in the lease area, but also the Wildlife and their habitat in the surrounding. This also brings social, demographic and economic changes in the surrounding villages and forest areas and creates pronounced impact to the detriment of wild life and its habitat. It also disturbs the tranquillity and serenity of the area. Some of the adverse impacts which may happen on wildlife due to mining are given as under.

- a. **Loss of habitat quality:** The habitat is not merely the quantity and extent of cover, food and water, but a safe abode where wildlife mate, breed and take care of off spring and move freely without fear. The ground vegetation may be lost due to man-made fire, grazing by live stock, removal of fire wood/brushwood by villagers. The Nalah water shall get polluted with fine ore sediments from the mine. The foliage of trees, shrubs etc. will have a thick layer of dust, unsuitable for browsing by wild animals. As such the habitat shall deteriorate fast, resulting in thinning out of wild life population and affecting their behavioural pattern.
- b. **Depredation by wild animals:** With the reduction of forest areas, its density and habitat quality, different wild animals like Elephant, wild Boar sloth bear may visit the nearby villages and may attack standing crops, houses, grains and even people when confronted with. This will lead to 'man-animal' conflict.
- c. **Podu/shifting cultivation:** Destruction of forest lands through slash and burn was the practice over centuries, which has been contained to considerable extent in recent years. This has resulted in serious loss of ideal biodiversity, soil degradation by formation of gullies, ravines, surrounding seasonal nalas that restrict the natural regeneration and growth of existing vegetation.
- d. **Non-wood Forest Produce (NWP) collections:** People or the locality collect NWP for their bonafide consumption and trade. No specific schemes in this regard are in operation. NWP like Sal leaf, Sal seed, Mahua flower etc. are a source of income for the people. Collection of fruits, flowers, leaves from the forests by local people deprives wild fauna from food resulting in man-animal conflict.
- e. **Mining Leases:** There are about six mining leases for exploitation of Iron Ore are in existence in Gandhamardan PRF and adjoining area. These are Gandhamardan Block-A, Gandhamardan Block-B, of OMC Ltd. (1590.8673ha.), Gandhamardan Sponge Iron Ltd., Puthulpani (100.1632 ha.), RD. Agrawal, Urumunda (82.03

Ha.), D.M. Minerals (241.666 ha) and Narayan and Sons, Laupada (141.336 ha). All these mines together impact the bio-diversity and environment in general in Gandhamardan Region

- f. **Hunting:** In the past, hunting was practice of a pastime of primitive tribes like Bhuyan and Juang. Annual ritual hunting (Akhanda shikar) was also being practiced en-masse. But with dwindling herbivore population, the practice of mass hunting is losing popularity. Occasionally wild pigs are hunted by local residents.
- g. **Live stock grazing:** Grazing of live stock in any forest area is an age old practice, which continues unabated, posing a serious threat to wild life and regeneration of forests.
- h. **Wild fires:** Wild-fires continue to be a common phenomenon in the locality. In general repeated annual fires affect the Forests and Wildlife.
- i. **Insect attack and pathological problems:** Insect attack has never posed a problem in the locality, nor the pathogens. Attack by defoliators and Sal heart wood borers do take place oradically. Attack by fungi to Sal trees takes place at times. Fungal attack to Sal trees by species like Polyporous shorea, Fornes tricolor, Gonoderma lucidum etc. do take place occasionally. Fallen trees and branches are also affected by saprophytic fungi causing rapid decay.
- j. **Increased dependence of people on forests:** Although the mining will generate some employment to the local people, those of neighbouring areas, who do not get employment, particularly old, physically handicapped and women may depend on the forest for their livelihood that will adversely impact the quality of the habitat. Ancillary activities, such as setting up hotels, restaurants, tea stall, colonies and different other business etc., people is most likely will depend on the existing forest for meeting their fuel wood needs.

PROPOSED MITIGATION MEASURES (CONSERVATION) PLAN

Mitigative measures for floral species

-Revegetation/Regeneration

As a mitigatory measure, re-vegetation can play an important role in minimizing the impact of mining project on the floral diversity. Re-vegetation incorporates both landscaping and habitat rehabilitation. The objectives of these two forms of re-vegetation are different and call for different techniques and plant selection. Plant species used in landscaping will be mainly local native species but may also include various non-indigenous medicinal and ornamental species. However, no species which display characteristics of environmental weeds shall be used, and preference shall be given to endemic natives in each case. The overall objective of habitat rehabilitation will be to restore or recreate vegetation the same as originally occurring in the project area. Some of the plants mostly available in the proposed study area are suggested below for the plantation in the safety and possibly other peripheral zone, if any, of the proposed mining site.

Table 74: Choice of species for Re-vegetation

Sl. No	Botanical name	Common name	Family	Type of plant	Special Characterizes
1	<i>Madhuca indica</i>	Mahula	Sapotaceae	Tree	Large, shady and deciduous tree. Food for sloth bear & other animals, good source for bee hive, rich in medicinal values and commercially very important.
2	<i>Diospyros melanoxylon</i>	Kendu	Ebenaceae	Tree	Food for sloth bear, economically useful, can survive in harsh and dry environmental condition
3	<i>Delonix regia</i>	Krishnachura	Fabaceae	Tree	Fast growing, attractive to birds
4	<i>Ziziphus nummularia</i>	Kanteikoli	Rhamnaceae	Shrub	Fruits are food for sloth bear and birds, prevents soil erosion
5	<i>Butea monosperma</i>	Palash	Fabaceae	Tree	Attractive to birds and honey bees and animals, can absorb pollutant from air

6	<i>Cynodon dactylon</i>	Common grass	Poaceae	Creepers	Fast growing, drought tolerant, checks soil erosion
7	<i>Mangifera indica</i>	Ambo	Anacardiaceae	Tree	Fodder for animals including elephant and small amphibians, good source for bee hive, economically important
8	<i>Ficus religiosa</i>	Ashwattha	Moraceae	Tree	Food for sloth bear and birds, ornamental plant, checks soil erosion
9	<i>Alstonia scholaris</i>	Pulai	Apocynaceae	Shrub	Alstonia is evergreen fast-growing tree that grows up to 40 m tall. pollutant absorber, can withstand dry condition
10	<i>Artocarpus heterophyllus</i>	Phanas	Moraceae	Tree	Food for wild animals including elephant, pollution controller, source attractive to beehive, commercially important.
11	<i>Azadiracta indica</i>	Neem	Meliaceae	Tree	Medicinally important, survive easily, good soil holder.

Note: The above suggested plants are mostly native to the area

During the study period some RET plant species like *Celastrus paniculatus* (Pingu), *Rauwolfia serpentina* (Sarpagandha), *Scindapsus officinalis* Roxb were found in the study area. Special attention must be given for their conservation by transferring and/or revegetating such plant species in the safety zone.

Soil and Moisture conservation

Loss of varied biodiversity may be attributed to soil loss due to mining activity. So, intensive soil and moisture conservation measures in degraded areas must be taken up to prevent soil loss and to foster natural regeneration and improvement of existing growing stock for protection of biodiversity and recharge of ground water table. This may be achieved through check damming on seasonal nail both by vegetative and masonry manner staggered trenching and contour bunding on slope areas.

Measures for faunal diversity

The following mitigation measures are suggested to be adopted by the company to minimise the adverse impact of the mining activity on faunal diversity in the lease mining area-

- (a) The mining site should be properly fenced to prevent any encroachment or crossing of both domestic and wild animals into the mining site. Proper demarcation of the mining area should be made which may be with solar fencing all around the mining area.
- (b) Movement patterns of many wildlife species are often associated with drainage lines or can be modified with mesh fencing to encourage small vertebrate species and amphibians to cross through it.
- (c) Mesh Fencing should cover with some climbers like *Dioscorea bulbifera*, *Dioscorea bulbifera*, and *Dioscorea puber* to avoid damage on wild animals. These plantation shall provide not only food but also to prevent their encroachment into the mining area and residential area (villagers).
- (d) Mitigatory measures for the **birds and other small reptiles** may be adopted by building of nests in the electric posts and nearby bushes in core zone to provide alternative shelters to destitute avifauna. Nesting boxes can be installed in tall trees like *Artocarpus heterophyllus*, *Delonix regia*. Marinating 5 snags trees per ha, protecting 5 snags recruits (dying trees) per ha. to provide nesting for birds (Armbruster, J. S. 1983).
The creation of such alternative habitat should be done in both buffer and core zone of the proposed mining site.

Some of the ten main types of bird nests found in India as listed below which is reported by The legendary ornithologist Salim Ali in his popular "Book of Indian Birds" may be chosen for implementation-

1. Simple scrapes
2. Twig nests
3. Nests in tree holes
4. Nests in excavated tunnels in earth banks
5. Nest build entirely of mud
6. Cup shaped nests of grass
7. Domed or Bell shaped nests
8. Pendant nests
9. Woven oblong pursenests
10. Nests in leaves stitched together.

Care should be taken to ensure that, the entrance/ exit hole of nest box is not blocked by any twig etc. Nest boxes have to be periodically monitored and maintained.

In addition to nest box, suitable water ditches (**so called bird bath**) are suggested to be created on suitable places at mining and adjoining site (like buffer zone) to provide the required water for birds, particularly in summer. However, as the weather hots up, the ditches may dry. Birds need small pools of water in summer to flap their wings to cool off, to preen their feathers and get rid of parasites. So it is proposed that bird bath in sufficient number and with appropriate size to be created and maintained properly to avoid contamination to provide clean water. Water may be filled in the bath by a hand operated tube well, which should be installed adjunct to bird bath. Accordingly, the site should be selected where ground water is most likely to be available. The bird bath should be disinfected by addition of KMnO4 solution soon after cleaning. Such bird baths, may also be used by other small animals e,g pigs in the area to quench their thirst.

- (e) General awareness programs should be conducted to create awareness among the local people on wild life and its conservation. The local must be motivated to participate in various awareness programmes on human-wildlife conflict. They must be advised not to explore the forests for collection of fuel-wood, bee hive, berry, bamboo, kendu leaves and other wild fruits.
- (f) *Elephas maximus* (Indian Elephant): During the study period, scat and foot marks of *Elephas maximus* (Indian Elephant) were found and there is no habitat of elephant. This implies the encroachment of elephant to the site in search food on seasonal basis like paddy, jackfruit and mango. This is also confirmed by the interaction with the local village peoples.
- (g) *Melursus ursinus* (Sloth Bear): No habitate of Sloth Bear was found during the survey in the study area, Evidences were found in two seasons. Their encroachment to the mining site may be from the nearby Reserve forest (Sundri) on occasional basis which is evident from mainly foot prints in some seasons which is in search of fruity food like *Ziziphus nummularia*, Kendu *etc*

Therefore, there is no concern for the encroachment of the above sch 1 species. However, plantation of some appropriate fruity plants may be done by the company for the welfare of the faunal species in the mining area. The following plants are suggested to be planted in safety which is lost due to mining activity and to preserve as it is existed in core area (office and residential location) to a possible extent.

Table 75: List of Fruit bearing Plants

SI. No.	Botanical name	Local name	Family
1	<i>Lantana camera</i>	Naga-airi	Verbinaceae
2	<i>Aegle Marmelos</i>	Belo	Rutaceae
3	<i>Diospyrus melanoxylon</i>	Kendu	Ebenaceae
4	<i>Madhuca indica</i>	Mahua	Sapotaceae
6	<i>Ziziphus nummularia</i>	Kantekuli	Rhamnaceae
7	<i>Holarrhena pubescens</i>	Keruan	kpocynaceae
8	<i>Ficus benghalensis</i>	Bara	Moraceae
9	<i>Ficus religiosa</i>	Ashwattha	Moraceae

10	<i>Syzygium cuminii</i>	<i>Jamun</i>	Myrtaceae
11	<i>Mangifera indica</i>	Amba	Anacardiaceae

In addition to the above mitigation measures suggested by NITR for the conservation of floral and faunal diversity based on the biodiversity study following work order/ToR in Gandhamardon Block B, the company (OMC) had also undertaken a separate study with the help of Wildlife Institute of India, Deheradun and planned for floral and wild life conservation measures in other region of Gandhamardan including Gandhamardan Block A, several village forests, DLC forests and community forests. As per OMC officials, pure plantations, Aided natural regeneration (ANR) with gap plantation and Block plantation under different schemes are being carried out in the entire region to create a dense green belt for the prevention of the impact of mining on the adjoining wild life habitats, food and water for the wild life and restoration of lost floral diversity. The selection of site is done by local forest Department considering all aspect of floral and faunal conservation. A tentative location has been marked on the map enclosed herewith as Plate No. -I which is incorporated in this present report.

Soil and Moisture Conservation Measures

Loss of biodiversity may cause soil loss due to mining activity. Besides, soil erosion on fragile steep hilly slope containing biodiversity may be alarming which may have siltation in surrounding nallas including in study area and streams which are tributary of river Baitarani. Therefore, soil conservation measures shall be taken up in the mining area to prevent siltation and thus restore the normal water flow. Much importance will be given for soil conservation which will ensure moisture conservation, improvement of status of ground flora, fauna and to raise regeneration capacity of natural vegetation. In addition, mining pits comparatively large one has to be retained as such after complete exploitation of mineral during conceptual stage for percolation of surface runoff during rainy season to recharge the ground water table and to ensure water flow in the streams and nallas of this region. The company has also prepared a plan for drainage pattern in Gandhamardon region as enclosed in Plate No. II.

Hence, intensive soil and moisture conservation measures in the degraded areas shall be taken up to prevent soil loss and to foster natural regeneration and improvement of existing growing stock for protection of biodiversity and recharge of ground water table. This may be achieved through check damming on seasonal nallas both by vegetative and masonry manner staggered trenching and contour bunding on slope areas. Planting of Agave on the bank of the nala situated in the mining lease area shall also arrest soil from being washed away during torrential rain/surface runoff.

OMC has already prepared an appropriate soil-moisture conservation measures plan which is enclosed in this report (Table-76). To this end, the erection of check dams of 1m, 2 m and 3 m size as per field requirements may be done. Contour bunding and staggered trenching will be constructed along the contours considering the site conditions on the slopes to prevent soil loss. In view of loss of biodiversity due to mining adequate steps shall be taken up to prevent soil erosion to conserve the biodiversity until biological reclamation is done after complete exploitation of ore to bring back the original biodiversity.

Table 76: Proposed plan for Soil Moisture Conservation Measures

S.No. No.	Name of the RF/PF	Check Dam in No.	Gully Plugging in no.	Contour bonding		ANR Plantation Area in ha	Block Plantation Area in ha
				No .	Length in Mtr		
1	NAYAGARH RF	4	-	-	-	-	14.865
2	GANDHAMARDA	4	-	2	2183.475	-	17.148
3	IC1-INDA RF	1	-	5	5101.078	60.273	43.893
4	JAGARA PF	1	-	1	153.555	10.823	6.018
5	KAIPUR RF	3	-	4	3890.925	60.567	27.118
6	KHEJURIMUNDI	1	-	1	160.74	-	-

7	RAIGURHA RF	3	-	2	4069.543	69.45	-
8	SIDDHAMATH RF	3	-			54.358	-
9	KUMUNDI PF	-	-	1	580.929	-	-
10	LUNGAR RF	-	-	1	408.807	-	18.691
11	MUNDULA RF	-	-	3	2001.922	44.529	-
12	SUAKATI RF	-	-	4	1308.248	-	22.267
13	AMJOR RF	-	2		-	-	-
14	Others	180	180	12	12738.094	-	-
Total		200	182	36	32597.32	300	150

The check dams are to be constructed accorss the nala at an interval of 100 m to 200 m considering the site condition and flow of the surface runoff. All gullies occurring inside the Gandhamardan Region are to be plugged with vegetative material or with stone pepples to prevent further soil erosion to invite natural regeneration".

The following impact of active mining to be considered for implementation in minimizing their adverse effect on biodiversity:

- (a) **Blasting** scares away wild animals, who may run out of the mining area to the villages and get killed. Therefore low noise muffled blasting technique or any other new technique should be adopted. Over charging of blast holes should be avoided. Controlled blasting technique using delay detonators may be applied. Blasting should be limited to minimum and where-ever possible ripping or use of surface miners should be deployed. Blasting should be carried out during day time only synchronising with the blasting timing of other nearby mines. PETN, if feasible, may be used. The drills shall either be operated with dust extractors or equipped with water injection system.
- (b) Dust is one of the major problems in mining areas, particularly during summer season. Mining activity, movement of earth movers and other vehicles, raises dust, which covers the leaf surface that affects photo synthesis. It also creates health problem for wild animals. The following steps may minimize dust emission.
 - i) Mineral handling areas is to be provided with adequate number of high efficiency dust extraction system. Loading and unloading areas including all the transfer points should also have efficient dust control arrangement along with proper maintenance and operation.
 - ii) Water spraying arrangements on all haul roads, loading, unloading and transfer points should be provided and properly maintained.
 - iii) Approach and main roads may be paved and spread with plastic granules.
 - iv) Heavy transport vehicles may be used to minimize the movements.
 - v) Extraction paths should be well planned to minimise the road length and movement.
 - vi) Ore, while being transported, should be covered.
- (c) **Noise** is irritating to wild life. All equipments at the mining site need to be eco-friendly and confirm to prescribe noise standards of below 85 DB. Properly designed silencers should be provided on all equipment and properly maintained. Effective equipment maintenance like periodic lubrication, replacement of gears and deducting, required to be done to prevent high noise generation during operation of equipments. Operation of such equipments shall be avoided. Blowing of horns while driving on roads through forest area, playing of musical instruments and loud speakers shall be avoided.
- (d) **Lighting** from the mine offices, colonies and vehicles likely to affect wild life, who like the darkness of night. Use of high intensity focusing lights should be avoided at the mine site. Localised lighting is to be provided on mine working faces, main mine head, roads and stockpile area. Suitable hoods is to be provided on all lights so as to direct the light towards the worksite. Dispersion of light shall be avoided. Tower lights shall not be used in the mining area.
- (e) **Air pollution** is a major environmental hazard, which affect all life forms both flora and fauna. Ambient air quality-monitoring stations is to be established in the core zone as well as buffer zone for RSPM, SPM, SO₂ & NOX monitoring. Overall, the vehicular emissions are to be kept under control and regularly monitored. Expert related to this area is to be consulted for advice and suggestion

Biological Reclamation of mined out pits for restoration of natural forest cover in the mining lease area to invite the floral and faunal diversity:

Reclamation, afforestation and biological reclamation of the mined out area may be done concurrently in phased manner by the company after complete exploitation of ore from the mining lease. The main objective of the scheme is to reclaim and stabilize the mined out undulating areas by taking up plantation with native and original species which will be lost due to mining along the benches and back filled areas with required soil and moisture conservation measures so as to avoid soil erosion and surface runoff as well as to enrich the reclaimed areas with green vegetation and to bring back original eco-system and biodiversity.

- a RECLAMATION:** The process of scientific reclamation of the mine void areas are-
- Dumping the overburden in the mined out area layer by layer.
 - Dozing it to make the flat terrain.
 - Spreading of fertile topsoil over the backfilled area, suitable soil treatment to regain the fertility of the land which is part of biological reclamation to allow germination of grasses, herbs and shrubs. This will add humus and other soil microorganism to the soil for natural germination and to make land suitable for afforestation.
- b AFFORESTRATION:** This is to be taken up in the backfilled areas by applying fertile soil, Farm yard manure and organic fertilizer to the plantation in phased manure with 10 years maintenance. For plantation in a complete barren land devoid of fertility, bald hill cost norm as approved by the PCCF, Odisha shall be adopted. Necessary soil and moisture conservation measures as prescribed in the cost norm shall be taken up for the success of plantation. The degraded soil needs to be enriched with humus content by defoliation of planted species year after year allowing the soil micro-organisms and regeneration of the under growth just like it was there before mining. Thereby the lost biodiversity shall be restored back.

Prevention of fall of wild animals in to the mining pit:

As the mining pits are normally deep and wedge shaped, there is possibility of fall of wild animals in to the pit in course of wandering. In addition to the fencing suggested above, it is proposed to provide photo voltaic (Solar powered) fencing around the mouth of the mining pits.

FIRE MANAGEMENT

Fire affects seriously the ecological status of the wildlife habitats and biodiversity in general. It is anthropogenic in origin. Repeated forest fires burns the sub-surface flora, fauna, soil microbial population and sets in retrogradation and deprives wildlife of their cover and food. Burning of subsurface flora also sets in soil erosion of different order over a period of time. Management of fire, is therefore assumes important consideration for the conservation of both floral & faunal diversity. Forest fires, that impacts bio-diversity are normally caused by local people in the process of collection of NTFP and shifting cultivation practices.

- a. Creation of awareness:** It is important that awareness about the adverse effects of fire should be created amongst the local people. It is also necessary to involve them in preventing and controlling fires.
- b. Incentive to local villagers:** The local villagers may be involved in firefighting, prevention of grazing, shifting cultivation, poaching etc. Local people involved for this purpose will be given incentive, may be in terms of cash award on annual basis as informed by OMC.
- c. Deployment of fire protection squad:** As proposed by OMC, a fire protection squad consisting of local young and energetic youths shall be constituted. They shall be provided with a hired vehicle, search lights, firefighting tools etc. to extinguish incidental fire as when and where required following guideline prescribed by CWLW, Odisha under the supervision of local forest staff.
- d. Provision for vehicle fitted with water tanker, pipes and fire blowers:** As Gandhamardan Block B even other surrounding forest areas are encircled by human habitations, there is every chance of incidental fires. Therefore it is required to provide a vehicle fitted with water tanker, fire blower etc. to the fire protection squad to extinguish the forest fire without causing any damage to the biodiversity of the zone.
- e. Deployment of biodiversity protection squad:** Similar to fire protection squad, a biodiversity protection squad shall be formed to protect the biodiversity of the study and its surrounding areas to act against any illegal activities like illicit felling, collection of uncontrolled fruits, flowers, leaves, buying of forest floor and more over shifting cultivation, that occurs in the biodiversity area by the local people.

Note: Fire Management expert is to be consulted for advice and suggestion

CAPACITY BUILDING PROGRAM

The company shall provide appropriate capacity building program to the local villagers who are forest dependent. Some of the program is suggested as - honeybee keeping, mushroom and vegetable cultivation, press khalli preparation, involvement of SHG in incense stick preparation and other cottage industry activities. These will also reduce forest dependence of the local villagers and thereby further degradation floral and faunal diversity can be avoided. Some of the capacity building activities are narrated below:

- a.** Vegetable and Mushroom cultivation: Since the villages in the mining site are in proximity of Keonjhar town and Joda-Barbil mining belt, the above products shall be always in demand. The product can be profitably grown, if proper seeds and training are given to the people. In this context, company has confirmed to collaborate with Horticulture Department.
- b.** Honey Bee keeping: The villagers are mostly tribal. Bee keeping shall be very much profitable to them, if they adopt such business. The District Small Scale Industries Centers may be requested to provide them necessary accessories, technical guidance and marketing facilities under some poverty eradication programme.
- c.** Poultry: Generally, there is good demand for poultry meat and eggs in mining and industrial areas. Some house hold poultry, broilers and layer bird farm may be set up by the local village people. For this, necessary training and support shall be provided by the District Animal Husbandry Department.
- d.** Manufacture of sal and siali leaf plates: This small scale industry is very much popular among the poor tribal by collecting leaves from the forests. Therefore, if financial and technical support are provided to them under the guidance of Small Scale Industries Department, the local people will be benefited from this industry.
- e.** Self Help Group: Women Self Help Groups are being encouraged in the State of Odisha in a big way to make them self-reliant. Some SHG groups are functioning in BJP range, located in Gandhamardan region. They are engaged in Vegetable cultivation, Poultry, Goatery, Fishery, Tamarind business etc. So the above activities and marketing of products shall be taken up through such groups. This will not reduce the forest dependence of the villagers but also uplift their economic status.
- f.** Farm Forestry and Institutional Planting: Indigenous plants can be planted on the farm bonds, village community land, avenues and different institutions existing in the proposed mining site. The species shall be fruit bearing like mango, panas, medicinal plants like Anla, Harida, Bahada, fodder species like Bada chakunda, Sirisa, Barakoli, Babul etc. and small timber species like Acassia, Eucalyptus, Sunder kania bamboos etc. So that villagers in addition to improving the environment they can also meet their need of forest materials. This shall be encouraged with funds available with DRDA and funds from Orissa Forestry Sector development programme or from CAMPA as suggested by OMC.
- g.** Vaccination of cattle: As the cattle of the area graze in the forest by tradition and come in contact with wild herbivores, any cattle born epidemic may affect wild animals. Hence, the cattle population should be immunized at regular intervals with the help of local veterinary Department. This will not only prevent spread of cattle borne diseases to wild animals but also raise the milk yielding capacity of the domestic cows.
- h.** Livestock grazing Control: Awareness program shall be organized time to time to refrain from grazing of livestock in the forest areas such practice. This will be done through the members of VSS (Van Sanrankshyan Samities) as informed by company (OMC).
- i.** Monitoring, Evolution Mechanism and Training: A monitoring cell is to be created at the Division Hqrs. headed by one of the Assistant Conservator of Forests working in the Division office. He will be assisted by one computer data operator. The criteria for evaluation of the outcome of this plan may be as follows.
 - i)** Level of human-elephant conflict indicators like quantum of crop damage, number of human injuries and death of humans in the zone of influence.
 - ii)** Incidence and extent of fire (indicator frequency, area burnt etc.).
 - iii)** Grazing pressure (No. of cattle being grazed in the area).
 - iv)** Illegal felling (No. of incidents/cases).

Base line data on all the four criteria shall be collected during the first year of implementation of the plan and there after done every year for monitoring changes/success. To begin with, base line data on the following indices will be collected through the range staff assisted by Forest protection squad. The efficacy of the management proposed in this plan to be assessed continuously through systematic observation of the changes which shall be recorded.

- i)** Vegetation indices
- ii)** Sign survey of herbivores and carnivores at half yearly intervals on fixed line transects
- iii)** Forest fire.
- iv)** Incidents of killing of animals and human beings, crop and house damages, removal of timber from forests, habitat destruction, straying of animals in to habitations etc.

Water flow regime and quality: This information shall be collected from the environment monitoring cell, who is supposed to function at the project site.

Training: Organization of short capsule courses in which experts may be invited in relevant fields and shall impart training to the Foresters/Forest Guard/V.S.S members and protection squads regarding elephant management, elephant tracking and driving from crop raiding, firefighting, census of animals and other protection aspects.

- k.** Inter-departmental co-ordination: Various Departments like Agriculture, Horticulture, Soil Conservation, Tribal Welfare, Rural Development, Education, Health and Family Welfare, Community Development, Panchayat Raj etc. are working in the zone of influence. Effective cross-sectoral coordination is required for synergy among various departments operating in the area. A District level Coordination Committee (DCC) under the Chairmanship of District Collector is already in existence. Implementation of various developmental activities as suggested in this plan, relating to departments like Veterinary, Health, Horticulture Small Industries etc. shall be reviewed in the DCC and appropriate measures taken for success of the programmes.

- 9.** The State Government now requested to consider the Bio-diversity Conservation Plan in respect of Gandhamardan Region and take further steps to place the matter before the Forest Advisory Committee for considering the proposal.

In view of above, the facts related to the proposal may be placed before FAC meeting scheduled to be held on 20th September, 2018 for their examination and appropriate recommendation.
