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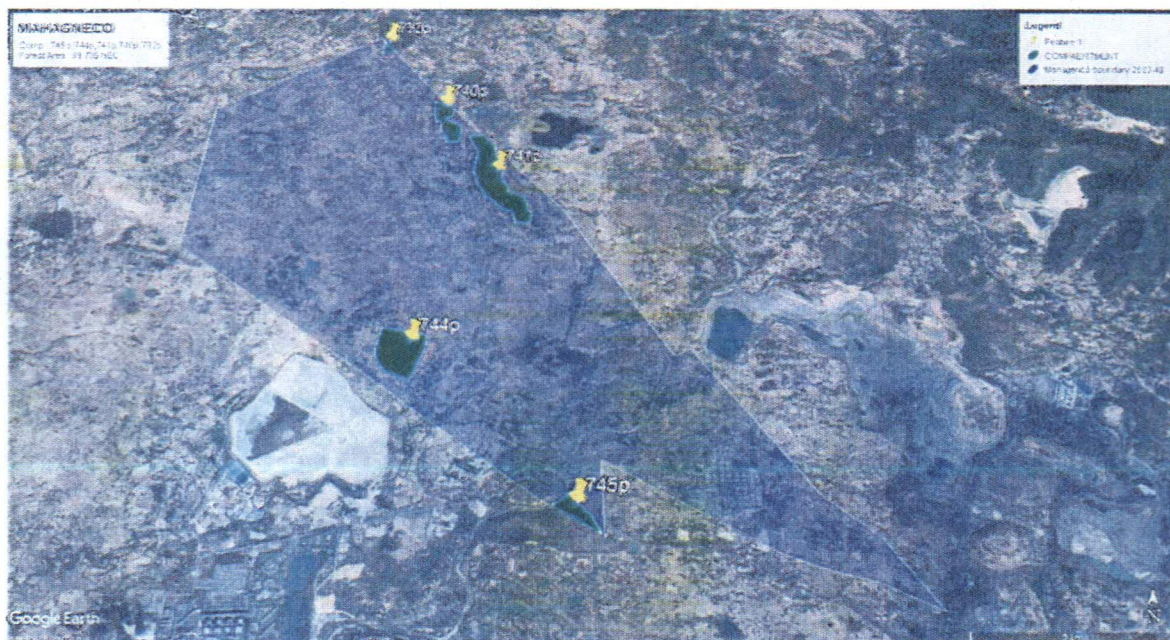
कास्ट / बेनिफिट एनालिसिस

**MAHARASHTRA STATE POWER GENERATION COMPANY LIMITED**

**2<sup>nd</sup> Floor Prakashgad Building, G-9**

**Prof. Anantkanekar Marg bandra (E) Mumbai-400051**

# **COST BENEFIT ANALYSIS**



**FOR GARE PALMA SECTOR-2, COAL BLOCK -II,  
TAMNAR, RAIGARH C.G.**



**Learn Nature Consultants**

**Engineers, Architects & Planners**

**LNC, D8 Sector 2, Avanti Vihar, Raipur-492006 Chhattisgarh IND,**

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## Cost Benefit Analysis Report

### Name of Forest Proposal

Gare Palma sector -II Coal block Raigarh

### Area

214.869

### Introduction:

The Gare Palma Sector II coal block is located in Tamnar Tehsil of Raigarh district of the state of Chhattisgarh. It has been allocated to M/S Maharashtra State Power Generation Company limited vide vesting order No. 103/30/2015/NA, dated 31st August 2015. To meet the coal requirement of their three thermal power projects: Chandrapur Thermal power station (Unit 8 & 9) 1000MW, Koradi Thermal Power Station (Unit 8, 9 & 10) 1980 MW and Parli Thermal Power Station (Unit 8) 1000 MW located in Chandrapur, Nagpur and Beed Districts of Maharashtra.

The total geological reserves of the Gare Palma Sector II coal block are 1059.30 MT (736.105 OC + 323.193 UG) and the total mineable reserves are 655.1 53 MT (553.178 OC + 101.975 UG). The estimated life of the mine is 77 years. Total 2583.487 Ha of land is proposed to be acquired for the coal mining project of 23.6 MTPA (22.0 MTPA OC & 1.6 MTPA UG). The coal will be extracted through both Open cast and underground mining method. Out of the total 2583.487 Ha, 214.869 Ha of Forest land is proposed to be diverted for non-forest use purposes. As per FCA guidelines, Cost benefit analysis has to be prepared for project feasibility and calculation of the same is furnished below:

### 2.0 Purpose for Cost benefit analysis:

Cost benefit report is required for making on line application in Part 1, G.i.a. The report has been prepared on the basis of MoEFCC circular no. 7-69/2011-FC(Pt.) dated. 01 August, 2017. (copy Attached as Annexure A).

Table 1(a) :

Breakup of Land

SN	Village	Forest area Detail		
		Compartment Area	Total Area (Ha)	PF (Ha)
1	2	3	4	5
1	पाता	744P	29.89	29.891823
2	ढोलनारा	732P	22.85	2.1834414
3	सराईटोला/ मुरागांव	741P	45.830	45.1513475
4	मुरागांव	740P	15.095	14.8964524
5	झिकाबहाल	745P	116.67	7.6121815
TOTAL				99.73589315



SN	Village	Revenue Forest area (Ha)	Forest area (Ha)	Total Area of the Village (Ha)
1	भालुमुड़ा	1.214	0.000	23.658
2	चितवाही	0.000	0.000	160.257
3	डोलेसरा	0.000	0.000	21.161
4	ढोलनारा	8.139	2.183	78.987
5	गारे	2.159	0.000	187.997
6	झिंकाबहाल	0.000	7.612	9.073
7	लिबरा	13.216	0.000	147.125
8	रोडोपाली	0.125	0.000	392.647
9	टिहलीरामपुर	0.000	0.000	224.847
10	सारसमाल	15.887	0.000	95.542
11	मुड़ागांव	8.216	48.515	375.132
12	सराईटोला	18.729	11.533	206.426
13	पाता	17.259	29.892	401.941
14	कुंजेमुरा	30.190	0.000	258.694
	योग	115.134	99.735	2583.48

**Table A: Category of proposals for which cost Benefit Analysis are applicable at Gare Palma Sector II Coal Block, Tehsil Tamnar Forest Division, Raigarh, Chhattisgarh.**

	Nature of Proposal	Application/Not Application	Remarks
01	All categories of proposals involving forest land up to 20 hectares in plains and up to 5 hectares in hills	Not Applicable	NIL
02	Proposal for defense installation purposes and oil prospecting (prospecting only)	Not Applicable	NIL
03	Habitation, establishment of industrial units, tourist lodges/complex and other building constructions	Not Applicable	NIL
04	All other proposals involving forest land more than 20 Ha in plains and more than 5 ha in hills including roads, transmission lines, minor medium and major irrigation projects, hydro projects, mining activities, Railway lines, location specific installations like micro-wave station, auto repeater center, TV towers, etc.	Applicable	These are cases where a cost benefit analysis is necessary to determine when diverting the forest land to non-forest use in the overall public interest.





**CALCULATION AS PER MOEFCC CIRCULAR NO. 7-69/2011-FC(PT.) Ddt. 01**

**AUGUST, 2017.**

**I. Estimation of cost of forest diversion**

**1. Ecosystem services losses due to proposed forest diversion**

Economic value of loss of eco-system services due to diversion of forests shall be the net present value (NPV) of the forest prescribed by the Central Government (MOEF & CC).

Therefore, Ecosystem Service Losses due to proposed diversion in **15.22 Crores**  
Rs. Crores [ (Ref Table - 2 (c))]

**2. Loss of animal husbandry productivity, including loss of fodder**

As per guidelines issued by MoEFCC, Loss of animal husbandry productivity, including loss of fodder is to be quantified and expressed in monetary terms or 10% of NPV applicable whichever is maximum.

Assuming no. of husbandry as 4 per family and factor of husbandry as 60 then, IF REQUIRED.

2a. As per the calculation, Loss of animal husbandry productivity including loss of fodder is Rs. 0.29 Crores.

((1) Estimated Quantity of fodder/ grasses = Average production fodder / grasses in M.T. x Area Applied (based on the assumption that on closer an area is capable of yielding an average 2 to 4 MT of grass per ha. (MT):  $3MT \times 214.869 = 644.607$  M.T. (average fodder is 3 MT/Hectare is considered)

b) Value of fodder = Estimated quantity x market rate =  $644.607$  MT X Rs. 4500/MT = Rs. 0.29 Crores)

2b. Considered 10% NPV which is maximum: Rs. 15.22 crore x 0.1 (10%) = Rs. 1.52 Crores  
Since 10% NPV is more than calculated value. 4

Thus, as per guideline Loss of animal husbandry productivity,  
including loss of fodder in Rs. Crores = **1.52 Crores**

**3. Cost of human resettlement**

As per MoEFCC guidelines the cost of human settlement is to be quantified and expressed in monetary terms. The different components that has been considered are as follows:

Though there are no human resettlement in Forest land, Cost of Human resettlement (R&R) in Tenancy land is included in Project cost estimates.

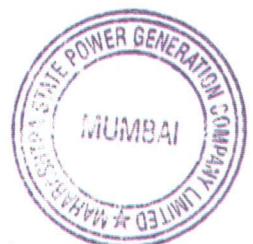
Thus, the cost due to human resettlement = **Nil**

**4. Loss of public facilities and administrative infrastructure:**

Though there are no Loss of public facilities & administrative infrastructure on forest land but cost of Public facilities & administrative infrastructure in Government land in outside the forest area is included in project cost estimates.

Loss of public facilities and administrative infrastructure **Nil**







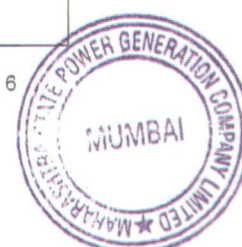
of forest land diverted, Cost of suffering of oustees, Habitat Fragmentation cost and Compensatory afforestation and soil & moisture conservation cost. Accordingly,

**Total estimated Cost due to diversion of forest in Rs. Crores** **1823.79**

**Table B: Estimation of Benefits of forest diversion**

Life of Project: : 77 Years (29 years OC and 66 years UG)

SL	Parameters	Calculations / Particulars					Remarks
01	Increase in productivity attribute to the Gare Palma Sector II Coal Mine	SL	Parameters	Rate (Rs)	Unit	Amount (Rs. Cr)	Minable Reserves 655.153 MT
		I	Gross revenue from ROM Coal for life 77 years of Mine life (G12 - G7 Grade) 655.153 MT @ 1055/tonne	1055	Rs/T	69118.64	
		II	Tentative Operation Cost including depreciation, interest on loan payment & tax liability ... etc for 77 years @ (655.153MT x Rs 700 /Tonne)	700	Rs/T	45860.71	
			Net Revenues (Benefits) due to Coal (I-II)			23257.93	
02	Benefits to economy due to the Project:	SL	Parameters	Rate (Rs)	Unit	Amount (Rs. Cr)	
		III	Royalty	146.70	Rs/T	9611.27	
		IV	Infrastructure Tax	11.25	Rs/T	737.05	
		V	Environment Tax	11.25	Rs/T	737.05	
		VI	Forest Tax	15.00	Rs/T	81.62	
		VII	DMF (District Mineral Fund)	14.67	Rs/T	961.11	
		VIII	NMET ( National Mineral Exploration Trust)	0.29	Rs/T	19.00	
		IX	Reserve Price	100.00	Rs/T	6651.53	
		X	Compensation Cess	400.00	Rs/T	26206.12	
		XI	GST @ 18%		%	12441.36	
			TOTAL			57446.11	
03	No of population benefited due to the Project	As per project report					4194 persons
04	Economic benefits due to direct & Indirect employment due to the project	Benefits due to direct employment of 4194 persons.					2517.60
		Benefits due to indirect employment of 5000 persons					4500.00
05	Economic benefits due to	Benefits from Compensatory Afforestation (CA) accruing over next 50 year and					161.69



Compensatory Afforestation	discounted to present Value. Benefits of CA, the guidelines of Ministry for NPV estimation is considered Total Benefits (1+2+3+4+5) =	87883.33
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The Cost benefit ratio is the ratio of estimated cost and estimated. The cost benefit ratio for this forest proposal comes out as under:

Total Cost of Forest Diversion	Total Benefits: Benefits of Forest diversion	Hence, Benefit / Cost Ratio
Rs. 1823.79 crores	Rs. 87883.33 crores	1:48.2

Thus, the project gives positive Benefit / cost ratio. The monetary returns of the Project are positive over the environment losses.

महाराष्ट्र शासन  
राज्य सरकार

*(Signature)*





Annexure – A  
Copy of  
MoEFCC circular no.  
7-69/2011-FC(Pt.)  
Dtd. 01 August, 2017.



No. 7-69/2011-FC(Pt.)  
Government of India  
Ministry of Environment, Forest & Climate Change  
(Forest Conservation Division)

Indira Paryavaran Bhawan,  
Jorbagh Road, Aliganj,  
New Delhi-110003.  
Dated: 01<sup>st</sup> August, 2017.

To

The Principal Secretary (Forests)  
All States / Union Territories Governments.

Sub: **Guidelines for conducting Cost Benefit Analysis for projects involving diversion of forest land under the provisions of the Forest (Conservation) Act, 1980.**

Sir,

I am directed to inform that in supersession of all earlier orders / guidelines including that referred to at 2.6 of the Handbook of Forest (Conservation) Act, 1980 for conducting Cost Benefit Analysis of projects involving forest diversion, a revised set of guidelines has been prepared by the Ministry and shall be applicable for all projects involving diversion of forest land under the provisions of the Forest (Conservation) Act, 1980, which are required to be undertaken as per Table A of the new guidelines, from the date of issue of this letter. These guidelines will be applicable for all such projects which are yet to be recommended by the State Government on the date of issue of this guideline.

The guidelines for conducting Cost Benefit Analysis for projects involving forest diversion areas is enclosed herewith for further action.

This issues with the approval of competent authority.

Yours faithfully,

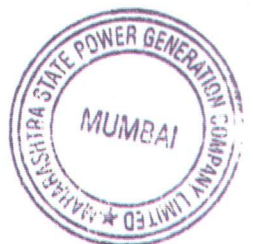
Encl: As above.

(Nishoeth Saxena)

Sr. Assistant Inspector General of Forests

Copy to:-

1. Prime Minister's Office (PMO)
2. Secretary, Ministry of Mines, Government of India
3. Secretary, Ministry of Coal, Government of India.
4. Secretary, Ministry of Steel, Government of India
5. Principal Chief Conservator of Forests, all States/UTs.





6. Nodal Officer, the Forest (Conservation) Act, 1980, all States/UTs.
7. All Regional Offices, Ministry of Environment, Forest and Climate Change (MoEF&C)
8. Joint Secretary, In-charge, Impact Assessment Division, MoEF&CC.
9. PS to the Hon'ble Minister of State (Independent Charge) for Environment, Forest and Climate Change.
10. Chairman, State Environment Impact Assessment Authority, all States/UTs.
11. Member-Secretary, State Environment Impact Assessment Authority, all States/UTs.
12. All Directors/Assistant Inspector General of Forests in Forest Conservation Division, MoEF&CC.
13. All Advisors/Directors/Dy. Directors in the Impact Assessment Division, MoEF&CC.
14. Director, Regional Office (Headquarters), MoEF&CC.
15. Sr. Director (Technical), NIC, MoEF&CC with a request to place a copy of this letter on website of this Ministry.
16. Sr. PPS to the Secretary, Ministry of Environment, Forest and Climate Change.
17. Sr. PPS to Director General of Forests and Special Secretary, Ministry of Environment, Forest and Climate Change.
18. Sr. PPS to Addl. Director General of Forests (Forest Conservation), Ministry of Environment, Forest and Climate Change.
19. PPS to IGF(FC), MoEF&CC.
20. Guard File.

(Nisheet Saxena)

Sr. Assistant Inspector General of Forests



Cost Benefit Analysis Guidelines for forest land diversion -2017

**Guidelines for conducting cost-benefit analysis for projects involving forest diversion**

- (i) While considering proposal for diversion of forest land for non-forestry use, it is essential that ecological and environmental losses and eco-economic distress caused to the people who are displaced are weighted against economic and social gains.
- (ii) Whenever the forest land is involved in the development projects, the cost of ecosystem services and fragmentation of habitat of wildlife and economic distress caused to people dependent on forests and the cost of settlement of people dependent on forest should also be added as the cost of forest diversion in addition to the standard project cost which would have been incurred by the user agencies without involvement of forest land while conducting the cost benefit analysis of the project. Similarly the benefits from the project accruing due to diversion of forest land and used in the project should also be accounted for in the benefits component in addition to the standard benefits of the project which would have been accrued without involvement of forest land while conducting the cost benefit analysis and determining the benefit and cost ratio (BC ratio).
- (iii) The cost of compensatory afforestation and its maintenance in future and soil & moisture conservation at present discounted value and future benefits from such compensatory forestation accruing over next 50 years monetised and discounted to the present value should be included as cost and benefits respectively of compensatory afforestation while conducting the cost benefit analysis and determining the benefit and cost ratio (BC ratio).
- (iv) **Table-A** lists the details the types of projects involving forest land for which cost-benefit analysis will be required. **Table-B** lists the parameters according to which the cost aspect of forest land diverted for the development projects will be determined, while **Table-C** lists the parameters for assessing the benefits accruing to the project using of forest land.
- (v) A cost-benefit analysis as above should accompany the proposals sent to the Central Government for forest clearance under the Forest Conservation Act.



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Cost Benefit Analysis Guidelines for forest land diversion -2017

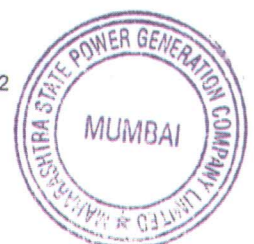
Table-A : Cases under which a cost-benefit analysis for forest diversion are required

No	Nature of proposal	Applicable/ not applicable	Remarks
1	All categories of proposals involving forest land upto 20 hectares in plains and upto 5 hectare in hills	Not applicable	These proposals may be considered on a case to case basis and value judgement
2	Proposal for defence installation purposes and oil prospecting (prospecting only)	Not applicable	In view of national Priority accorded to these sectors, the proposals would be critically assessed to help ascertain that the utmost minimum forest land is diverted for non-forest use
3	Habitation, establishment of industrial units, tourist lodges complex and other building construction.	Not applicable	These activities being detrimental to protection and conservation of forest, as a matter of policy, such proposals would be rarely entertained.
4	All other proposals involving forestland more than 20 hectares in plains and more than 5 hectares in hills including roads, transmission lines, minor, medium and major irrigation projects, hydro projects, mining activity, railway lines, location specific installations like micro-wave stations, auto repeater centres, TV towers etc.	Applicable	These are cases where a cost-benefit analysis is necessary to determine when diverting the forest land to non-forest use in the overall public interest.

Table-B: Estimation of cost of forest diversion

SN	Parameters	Remarks
1	Ecosystem services losses due to proposed forest diversion	Economic value of loss of eco-system services due to diversion of forests shall be the net present value (NPV) of the forest land being diverted as prescribed by the Central Government (MoEF& CC). <i>Note: In case of National Parks the NPV shall be ten (10) times the normal NPV and in case of Wildlife Sanctuary the NPV shall be five (5) times the normal NPV or otherwise prescribed by the ministry or any other competent authority</i>
2	Loss of animal husbandry productivity, including loss of fodder	To be quantified and expressed in monetary terms or 10% of NPV applicable whichever is maximum
3	Cost of human resettlement	To be quantified and expressed in monetary terms as per approved R&R plan
4	Loss of public facilities and administrative infrastructure (Roads, building, schools, dispensaries, electric lines, railways, etc.) on forest land, which would require forest land if these facilities were diverted due to the project	To be quantified and expressed in monetary terms on actual cost basis at the time of diversion

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Cost Benefit Analysis Guidelines for forest land diversion -2017

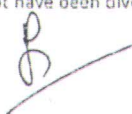
5	possession value of forest land diverted	30% of environmental costs (NPV) due to loss of forests or circle rate of adjoining area in the district should be added as a cost component as possession value of forestland whichever is maximum
6	Cost of suffering to oustees	The social cost of rehabilitation of oustees (in addition to the cost likely to be incurred in providing residence, occupation and social services as per R&R plan) be worked out as 1.5 times of what oustees should have earned in two years had he not been shifted.
8	Habitat Fragmentation Cost	While the relationship between fragmentation and forest goods and services is complex, for the sake of simplicity the cost due to fragmentation has been pegged at 50% of NPV applicable as a thumb rule.
	Compensatory afforestation and soil & moisture conservation cost	The actual cost of compensatory afforestation and soil & moisture conservation and its maintenance in future at present discounted value

Table-C - Existing guidelines for estimating benefits of forest-diversion in CBA

Sr. No.	Parameters	Remarks
1	Increase in productively attribute to the specific project	To be quantified & expressed in monetary terms avoiding double counting
2	Benefits to economy due to the specific project	The incremental economic benefit in monetary terms due to the activities attributed to the specific project
3	No. of population benefited due to specific project	As per the Detailed project report
4	Economic benefits due to of direct and indirect employment due to the project	As per the Detailed project report.
5	Economic benefits due to Compensatory afforestation	Benefits from such compensatory forestation accruing over next 50 years monetised and discounted to the present value should be included as benefits of compensatory afforestation. *For benefits of CA the guideline of the Ministry for NPV estimation may be consulted.

**Note-1: Net Present value (NPV) of environment and ecosystem services loss:**

The concept of Net Present value of the forest land diverted is a scientific method of calculating the environmental cost and other losses caused due to diversion of forest land for non-forestry purposes. The NPV represents the net value of various ecosystem services and other environmental services in monetary terms which the forest would have provided if the forest would not have been diverted.



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Cost Benefit Analysis Guidelines for forest land diversion -2017

**Note-2: Possession value of forest land diverted:**

The forest land diverted for the project such as irrigation, hydropower, railways, roads, wind, and transmission lines and mining etc are unlikely to be returned and remains in possession of the user agencies. Therefore 30% of the net present value (NPV) of forest land diverted or market rate of adjoining area in the district should be added as a cost component as "possession value of forest land" in addition to the environmental costs due to loss of forests.

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