

SCHEME FOR COMPENSATIONARY AFFORESTATION

OVER

340.00 Ha OF DEGRADED FOREST LAND IN PHULJHARI RF

UNDER KANIHA RANGE, ANGUL

FOR DIVERSION OF 169.1779 HA OF FOREST LAND

FOR

UTKAL-E OPEN CAST COAL MINE PROJECT

IN TALCHER COAL FIELD OF CHHENDIPADA TAHASIL, DIST. ANGUL (ODISHA)

OF

M/S. NATIONAL ALUMINIUM COMPANY LIMITED

NALCO BHAWAN, BHUBANESWAR (ODISHA)

SUTABILITY CERTIFICATE

Certified that an area of Degraded Forest land 151.03 Ha in compartment No. II & 243.577 ha = 340.00 Ha. of Degraded Forest Land (ANR with gap) is available in Phuljhari RF for raising compensatory Afforestation in lieu of 169.1779 of forest land for diversion of Utkal-E Open Cast Coal Mine Project by M/S NATIONAL ALUMINUM COMPANY LTD. NALCO in Angul Dist. Of Odisha.


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Divisional Forest Officer
Angul Forest Division

Divisional Forest Officer
Angul, Division

SCHEME FOR COMPENSATORY AFFORESTATION OVER 340.00 HA. IN DEGRADED FOREST LAND AT PHULAJHARI RESERVE FOREST IN KANIHA RANGE OF ANGUL FOREST DIVISION, ANGUL DISTRICT OF ODISHA.

01. INTRODUCTION:

National Aluminum Company Limited (NALCO) is a Navaratna CPSE under Ministry of Mines. It was established on 7th January, 1981 with its registered office at Bhubaneswar, the company is a group 'A' CPSE, having integrated and diversified operation in mining, metal and power. NALCO is one of the largest integrated Bauxite-Alumina-Aluminum-Power Complex in the country. The plant was commissioned in 1987.

The coal mine is to be used as the captive source for the expansion of power plant of NALCO in Angul District i.e. 9th & 10th units of 120 MW each. The grade of coal is expected to be 'G'. The annual requirements of coal will be 2.00 million tonnes at 90% PLF of the power plant.

Govt. of India Ministry of Coal had allotted Utkal-D & Utkal-E Coal Block in Talcher Coalfield to M/s NALCO vide allotment Order No. F.No.103/34/2015/NA, dated 02.05.2016. The block is located in the South-Central part of Talcher Coalfield in between Utkal - F Coal Block in the West & Utkal-D Coal Block in the East. Utkal - E Coal Mine spans over an area of 4.60 sq. km between Latitude 20°56'57" and 20°58'58" N and Longitude 84°55'49" and 84°56'37" E. administratively it is under the jurisdiction of Chhendipada Tahsil, Angul district. Utkal -E Coal Mine is covered under Survey of India Toposheet No. 73 D/13 on RF 1:50,000 (2 cm to 1 km) and special toposheet No. L2 on RF 1:10,000 (10 cm to 1 km) and falls within Angul district of Odisha. Utkal-E Coal Mine comprises an area of 523.7357 Ha out of which 169.1779 Ha areas is of Revenue Forest land which is required to be diverted under Forest Conservation Act 1980. The remaining area 142.6900 Ha is Govt. Non forest land and 211.8678 Ha is Pvt. Land. Hence degraded forest area of $(169.1779 \times 2) = 340$ Ha is required towards (C.A) for processing the diversion of 169.1779 Ha forest land situated in the Utkal- E Coal Mine.

The General Manager, M/s. NALCO has requested vide his letter No.179/2018 dt. 29.5.2018 that previously 382.44 ha degraded forest land in Comptt.III & IV of Phulajhari RF was identified under Kaniha Range for raising Compensatory Afforestation in lieu of 191.2184 Ha forest land earlier decided for diversion of Utkal-E Open Cast Mines project. Now the User Agency has applied for identification of 340 Ha of degraded forest land for Compensatory Afforestation as the required forest land to be diverted reduced to 169.1779 Ha.

The Range Officer, Kaniha Range has reported vide memo No. 273 dt. 5.2.2019 that an area of degraded forest land 151.03 Ha in compartment No.II & 243.577 Ha in compartment No.III = 394.607 Ha out of which 340.00 Ha of degraded forest land has been allotted in Phulajhari RF by DFO, Angul to raise Compensatory Afforestation (ANR with gap) in lieu of 169.1779 ha forest land for diversion of Utkal -E Open Cast Mines project by M/s NALCO.

The survey and demarcation of boundary by erecting RCC pillars in the field is completed in the above mention Reserve Forest required for Compensatory Afforestation.

DFO, Angul has approved the degraded forest of different RF as detailed below.

Sl. No.	Name of the RF	Name of the Range	Name of the Section	Area identified in Ha
1.	Phulajhari	Kaniha	Angul	340.00
	Total :			340.00

02. DETAILS OF THE SITE SELECTED

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

(a) Crop Composition:

The main species noticed around the RF are Sal (*Shorea robusta*), Asan (*Terminalia alata*), Dharua (*Anogeissus latifolia*), Moi (*Lannea coromandelica*), Salai (*Boswellia serrata*), Kendu (*Dyospyros melanoxylon*), Simal (*Bombax ceiba*), Karada (*Cleistanthus collinus*), Kangada (*Xylocarpus*), Tangan (*Albizia lebbek*), Char (*Buchanania lanzan*), and Salia Bamboo (*Dendocalamus strictus*) with shrubs and herbs of profound importance to maintain the Bio diversity.

(b) Temperature:

The average annual temperature varies from 10⁰C to 45⁰C the minimum being in December – January and the maximum in May- June.

(c) Rain Fall:

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

(d) Climate:

The climate of this area is characterized by a hot dry summer and well distributed rainfall by the South-West monsoon season. The hot seasons starts from March and continues till June, which is the hottest month of the year with mean daily maximum temperature of 49⁰C and the mean daily minimum temperature of 35⁰C. The rainy season starts from July to September, August being the month with the heaviest shower. Relative humidity is high in the South-West monsoon season.

The rainfall is fairly uniform throughout the Division. Storms and depressions from the Bay of Bengal during the monsoon season pass across the Division causing rainfall and strong wind. The winter starts from November to February.

03. SPECIAL OBJECTS OF MANAGEMENT:

- i) To replenish the forest growth through ANR plantation over the area.
- ii) To facilitate the boosting of natural regeneration and ensure their establishment.
- iii) To restrict the degradation by controlling the biotic interference to barest minimum and reverse the trend towards the process of restoration of vegetation.
- iv) To develop the forest by providing site-specific silvicultural treatment.
- v) To take up appropriate Soil Moisture Conservation (SMC) measures to improve the soil and moisture regime.
- v) To improve the bio-diversity of these blocks.
- vi) To meet the need of the local villagers with regard to fire wood and small timber depending upon the productivity (from silvicultural operations like thinning, subsidiary Silvicultural operation, climber cutting, cutting of high stumps, double shoot cutting etc.)

04. ITEM OF WORK TO BE TAKEN UP:

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

i) Survey and Demarcation of Boundary:

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

ii) Fencing:

As the area is nearer to the habitation and lies adjacent to the agricultural land and there is every chance of biotic interference to the plantation area, therefore it has been proposed to provide barbed wire fencing all along the boundary approaching to human habitation.

iii) Soil Moisture Conservation:

As per Officer Order No.1044/10F (CAMPA)-54/2017 dated 13th October 2017 of the Principal CCF, Odisha Soil and Moisture Conservation Structure has to be reflected at the sites keeping in view the gradient and aspect. In addition to that at the foot hill side concrete masonry check dams with diaphragm wall to be constructed to arrest flow of water resulting increase in water table and soil moisture regime of the locality.

iv) Protection Measure:

The identified site of Phulajhari RF is having thin forest cover with a few scattered trees of miscellaneous species and Sal crop at sparse. Due to biotic interference and to save the area from damage and further degradation, the following protection measures have been prescribed.

(a) Watch and Ward:

The Compensatory area will have to be protected by engaging watchers for 10 years, i.e. till establishment of the planted trees and saplings. In addition at strategic locations entrance gate will be provided to check sudden trespass of cattle.

(b) Motivation of People:

As per Govt. Resolution of 1993, the nearby villagers have to be involved in protection of plantation raised under compensatory scheme. For this purpose meeting to be conducted and local V.S.S will be associated with the field work from very inception of the plantation.

Plantation activities will be executed with the full involvement of the local Van Sarakhyan Samitees (VSS). Standard Entry Point Activities (EPA) will be included to ensure their participation.

v) Plantation:

The area will be stocked by way of raising plantations @ 600 plants per ha in ANR model with the following species.

Common Name	Species Name
Teak	<i>Tectona grandis</i>
Sisoo	<i>Dalbergia latifolia</i>
Baheda	<i>Terminalia belerica</i>
Sisoo	<i>Dalbergia sissoo</i>
neem	<i>Azadiracta indica</i>
Amia	<i>Emblica officinalis</i>
Acacia	<i>Acacia auriculoformes</i>
Chakunda	<i>Casia siamea</i>
Bamboo	<i>Bambusa vulgaris</i>
khair	<i>Acacia catechu</i>
Mango	<i>Mangifera indica</i>
Mahul	<i>Madhuca indica</i>
Karanj	<i>Pongamia glabra/ pinnata</i>

Different operations those will be taken up for plantation are follows:

i) Raising of Nursery:

Seedling required for this plantation shall be raised at nearby Permanent nursery, at Phulajhari RF in close vicinity of the planting site with available infrastructure. Nursery work will start one year in advance to the year of plantation, so that one year old seedling will be available for plantation, seeds shall be collected from plus/selected trees and should be treated before dibbling. Poly-pot seedlings should be raised 10% extra than the actual requirement to compensate the casualties during nursery stage as well as planting time. Standard nursery practices will be followed for raising such nursery.

ii) Alignment and Pitting:

Alignment and Pitting will be taken up in the month of November-December at perceptible gaps and pits of size 30 cm x 30 cm x 30 cm with the dug maintaining a spacing of 2.5 mtr. x 2.5 mtr. And dug up earth will be piled preferably on the northern aspect.

iii) Planting:

The seedlings will be planted in the dugout pits with initial dose of manure. Plantation should be taken up after first regular shower of monsoon and should be completed by the end of July. Species should be planted as per the suitability of the soil condition. As per norm application of manure & fertilizer of desired dose must be applied. Anti termite insecticide should also be applied to each pit while planting casualties if any, noticed should be replaced with the excess seedling raised for the purpose. During second year also casualty replacement will be done for which seedling shall be raised.

iv) Weeding Soil Working & Manuring:

For establishment and better growth of the planted seedling, circular weeding, soil working and manuring are necessary. It is prescribed that two weeding; soil working and manuring will be done during the first year and second year of plantation & one weeding and soil working during third year. During the first year & second year, first weeding and manuring shall be carried out during August-September and the second one during October-November. First weeding shall be an entire area weeding (Scraping) and the second year will be a strip weeding which will be carried out during August.

v) Application of Insecticides:

In the plantation site after planting good healthy seedling may cause influx of insects, which usually eat and damage the roots of the plants. To get rid of such insects attack application of the insecticides will be taken up in required doses at desired intervals. Spraying of insecticides shall be done preferably in a sunny day in the afternoon.

vi) Post Planting Operation:

After care of plantations are mandatory for having a good stand of crop of much density. Time line study with benchmark evaluation to have a remarkable achievement on crop condition. Third party evaluation of the crop must be taken up and result there off to be reported.

05. INSPECTION, MONITORING & EVALUATION:

The planting activities starting from Nursery needs to be inspected regularly by Senior Forest Officers and appropriate direction given in the field. Besides regular monitoring and evaluation at frequent intervals (particularly quarterly) needs to be taken up and corrective/remedial measures taken for any problem which come to light at the time of such evaluation.

06. CONTROL:

The nursery journal, the plantation journal, micro planning with other records shall be maintained for each patch separately in accordance with the provision of "The Odisha Forest Plantation Manual 1977 indication the Physical and Financial achievements". Necessary entries with regard to plantation activities undertaken shall be entered in the journals and shall be produced before the inspecting officers. The date of inspection and comments of the visitor will also find place in the journal.

7. EXECUTIVE AGENCY:

The Divisional Forest Officer, Angul Forest Division through his staff will execute the scheme as per fund to be provided by the user agency.

8. FUNDING AGENCY:

THE NATIONAL ALUMINIUM COMPANY LTD.

9. TOTAL FINANCIAL OUTLAY FOR THE SCHEME:

The total financial outlay of the scheme is Rs. 3,13,08,049.32 (Rupees Three Crore Thirteen Lakhs Eight Thousand Nine Fourty Nine only).


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AIDED NATURAL REGENERATION @ 600 PLANTS / Ha OVER 340.00 HA.

(ANR)

ESTIMATE OF COST FOR 1.00 HA. UNDER ANR WITH GAP PLANTATION MODEL

Wage Rate - Rs. 298/Day

0th year (Advance work) Pre-planting operation.

Sl. No.	Item of Work	Person days	Labour (Rs)	Material (Rs)	Total (Rs)
1	Survey, Demarcation & Pillar Posting, GPS Reading with mapping	2	596	0	596
2	Site Preparation	2	596	0	596
3	Silvicultural Operation including clearance of weed, climber cutting, high stump cutting, singling of shoots	5	1490	0	1490
4	Raising Nursery @ 660 seedlings/ ha including 10% Casualty replacement) and watch & ward (part-1) @ 12.43	16.5	4917	1102	6019
5	Contingency and Unforeseen Expenditures	0	0	198	198
	Sub Total	25.5	7599	1300	8899
6	Monitoring & Supervision @5%				444.95
0th Year Grand Total		25.5	7599	1300	9343.95
1st Year Maintenance					
1	Maintenance of Nursery (Balance)	8	2384	241.50	2625.5
2	Pitting 30 cm cube size	18	5364	0	5364
3	Carriage and planting including casualty replacement	15	4470	0	4470
4	Complete weeding, Soil working, manuring	18	5364	0	5364
5	Cost of Vermi compost and Insecticide for plantation	0	0	2640	2640
6	Cost of Chemical Fertiliser	0	0	972	972

7	Fire line tracing and inspection path	3	894	0	894
8	Silvicultural Operation Involving clearance of weeds, cutting of climbers, singling of shoot etc.	15	4470	0	4470
9	Soil Conservation Measures	20	5960	0	5960
10	Watch & Ward	7	2086	0	2086
11	Contingency and Unforeseen Expenditures	0		353	353
	Sub Total	104	30992	4206.5	35198.5
12	Monitoring & Supervision @5%				1759.925
1st Year Grand Total		104	30992	4206.5	36958.425
2nd Year Maintenance					
1	Casualty Replacement including cost of seedling, carriage and planting.	3	894	745.80	1639.8
2	Complete weeding and pruning	6	1788	0	1788
3	Soil working and manuring	6	1788	0	1788
4	Cost of fertilizers and Insecticide	0	0	2424	2424
5	Fire line Tracing and Inspection path	1	298	0	298
6	Soil conservation measures	8	2384	0	2384
7	Watch & Ward (Whole Year)	7	2086	0	2086
8	Contingency and unforeseen expenditure	0	0	193	193
	Sub Total	31	9238	3362.8	12600.8
9	Monitoring & Supervision @5%				630.04
2nd Year Grand Total		31	9238	3362.8	13230.8
3rd Year Maintenance					
1	Complete weeding and cultural operations	3	894	0	894
2	Soil working	3	894	0	894
3	Fire line Tracing and Inspection path	1	298	0	298
4	Watch & Ward (Whole Year)	7	2086	0	2086

	Sub Total	14	4172	0	4172
5	Monitoring & Supervision @5%				208.6
3rd Year Grand Total		14	4172	0	4380.6
4th Year Maintenance					
1	Fire line Tracing and Inspection path	1	298	0	298
2	Watch & Ward	2	596	0	596
	Sub Total	3	894	0	894
3	Monitoring & Supervision @5%				44.7
4th Year Grand Total		3	894	0	938.7
5th Year Maintenance					
1	Fire line Tracing and Inspection path	1	298	0	298
2	Watch & Ward	2	596	0	596
	Sub Total	3	894	0	894
3	Monitoring & Supervision @5%				44.7
5th Year Grand Total		3	894	0	938.7
6th Year Maintenance					
1	Fire line Tracing and Inspection path	1	298	0	298
2	Watch & Ward	2	596	0	596
	Sub Total	3	894	0	894
3	Monitoring & Supervision @5%				44.7
6th Year Grand Total		3	894	0	938.7
7th Year Maintenance					
1	Fire line Tracing and Inspection path	1	298	0	298
2	Watch & Ward	2	596	0	596
	Sub Total	3	894	0	894
3	Monitoring & Supervision @5%				44.7
7th Year Grand Total		3	894	0	938.7
8th Year Maintenance					
1	Fire line Tracing and	1	298	0	298

	Inspection path				
2	Watch & Ward	2	596	0	596
	Sub Total	3	894	0	894
3	Monitoring & Supervision @5%				44.7
8th Year Grand Total		3	894	0	938.7
9th Year Maintenance					
1	Fire line Tracing and Inspection path	1	298	0	298
2	Watch & Ward	2	596	0	596
	Sub Total	3	894	0	894
					44.7
9th Year Grand Total		3	894	0	938.7
10th Year Maintenance					
1	Fire line Tracing and Inspection path	1	298	0	298
2	Watch & Ward	2	596	0	596
	Sub Total	3	894	0	894
					44.7
10th Year Grand Total		3	894	0	938.7
	Grand Total	195.5	58259	8869.3	70485.42
			58259	8870	70485

ABSTRACT (Rs.)

Year	Person days	Labour	Material & Contingencies	Monitoring & Supervision	Total Rs.
0 th Year	25.50	7599.00	1300.00	444.95	9343.95
1 st Year	104	30992.00	4207.00	1759.925	36958.93
2 nd Year	31	9238.00	3363.00	630.04	13231.04
3 rd Year	14	4172.00	0	208.6	4380.60
4 th Year	3	894.00	0	44.7	938.70
5 th Year	3	894.00	0	44.7	938.70
6 th Year	3	894.00	0	44.7	938.70
7 th Year	3	894.00	0	44.7	938.70
8 th Year	3	894.00	0	44.7	938.70
9 th Year	3	894.00	0	44.7	938.70
10 th Year	3	894.00	0	44.7	938.70
Total	195.5	58259.00	8870	3356.415	70485.42

(Rupees Seventy Thousand Four Hundred Eighty Five Only)

**TOTAL COST/YEAR WISE COST FOR ANR WITH GAP PLANTATION OVER
340.00Ha.**

Year	Labour cost Rs.	Material Rs.	Monitoring Rs.	Total Rs.	Escalation Cost 20%	Grand Total Rs.
0 th Year	2583660	442000	151283	3176943.00	635388.6	3812331.60
1 st Year	10537280	1430380	598374.5	12566034.50	2513206.9	15079241.40
2 nd Year	3140920	1143420	214213.6	4498553.60	899710.72	5398264.32
3 rd Year	1418480	0	70924	1489404.00	297880.8	1787284.80
4 th Year	303960	0	15198	319158.00	63831.6	382989.60
5 th Year	303960	0	15198	319158.00	63831.6	382989.60
6 th Year	303960	0	15198	319158.00	63831.6	382989.60
7 th Year	303960	0	15198	319158.00	63831.6	382989.60
8 th Year	303960	0	15198	319158.00	63831.6	382989.60
9 th Year	303960	0	15198	319158.00	63831.6	382989.60
10 th Year	303960	0	15198	319158.00	63831.6	382989.60
Total	19808060	3015800	1141181.1	23965041.10	4793008.22	28758049.32

(Rupees Two Crore Eighty Seven Lakhs Fifty Eight Thousand Fourty Nine Only)

COST OF BAMBOO TWIG FENCING AROUND THE AREA

(Approx. 12500 mts)

Year	Particulars	Norm for 1 r.mt. in Rs.	Total cost for 12500 mt. In Rs.
1 st Year	Fencing cost	114	1425000
2 nd Year	Maintenance	40	500000
3 rd Year	Maintenance	50	625000
	Total	204	2550000

(Rupees Twenty Five Lakhs Fifty Thousand Only)

YEAR WISE REQUIRMENT OF FUNDS

Year	Cost for Plantation activities	Bamboo twig fencing	Total Rs.
0 th Year	3812331.60	0	3812331.60
1 st Year	15079241.40	1425000	16504241.40
2 nd Year	5398264.32	500000	5898264.32
3 rd Year	1787284.80	625000	2412284.80
4 th Year	382989.60	0	382989.60
5 th Year	382989.60	0	382989.60
6 th Year	382989.60	0	382989.60
7 th Year	382989.60	0	382989.60
8 th Year	382989.60	0	382989.60
9 th Year	382989.60	0	382989.60
10 th Year	382989.60	0	382989.60
Total	28758049.32	2550000	31308049.32

(Rupees Three Crore Thirteen Lakhs Twenty Eight Thousand Fourty Nine Only)

COST OF BAMBOO TWIG FENCING AROUND THE AREA

(Approx. 12500 mts)

Year	Particulars	Norm for 1 r.mt. in Rs.	Total cost for 12500 mt. In Rs.
1 st Year	Fencing cost	114	1425000
2 nd Year	Maintenance	40	500000
3 rd Year	Maintenance	50	625000
	Total	204	2550000

(Rupees Twenty Five Lakhs Fifty Thousand Only)

YEAR WISE REQUIRMENT OF FUNDS

Year	Cost for Plantation activities	Bamboo twig fencing	Total Rs.
0 th Year	3812331.60	0	3812331.60
1 st Year	15079241.40	1425000	16504241.40
2 nd Year	5398264.32	500000	5898264.32
3 rd Year	1787284.80	625000	2412284.80
4 th Year	382989.60	0	382989.60
5 th Year	382989.60	0	382989.60
6 th Year	382989.60	0	382989.60
7 th Year	382989.60	0	382989.60
8 th Year	382989.60	0	382989.60
9 th Year	382989.60	0	382989.60
10 th Year	382989.60	0	382989.60
Total	28758049.32	2550000	31308049.32

(Rupees Three Crore Thirteen Lakhs Eight Thousand Fourty Nine Only)

TOTAL COST OF PLANTATION IN 340.00 HA.

Plantation Cost:	Rs. 70,485.42/- x 340.00 Ha. =	Rs. 2,39,65,041.10/-
Cost of escalation:	@20%	Rs. 47,93,008.22/-
Bamboo Twig Fencing:	@ Rs. 204/- per r.mt.	Rs.25,50,000/-
TOTAL :		Rs. 3,13,08,049.32/-

(Rupees Three Crores Thirteen Lakhs Eight Thousand Fourty Nine Only)


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