OFFICE OF THE PRINCIPAL CHIEF CONSERVATOR OF FORESTS & HOFF,ODISHA
ARANYA BHAWAN, CHANDRASEKHARPUR, BHUBANESWAR

Letter No. 103 /9F (MG)-377/2019
Dated, Bhubaneswar, the 01st January, 2022 ~~December, 2021~~

To

The Inspector General of Forests, Government of India
Ministry of Environment, Forests & Climate Change (FC Division)
Indira Paryavaran Bhawan, Jor Bagh Road
Aliganj, New Delhi-110003

Sub: Proposal for non-forestry use of 66.20 ha of forest land (including safety zone area 1.899 ha) under Section-2 (ii) of the Forest (Conservation) Act, 1980 in respect of Jindal Chromite Mines of M/s Jindal Stainless Limited in village Kaliapani and Forest Block No.27 of Mahagiri DPF in Sukinda Tahasil of Jajpur District under Cuttack Forest Division

Ref: F.No.8-68/2000-FC (pt.) dated 11.10.2021 of GoI, MoEF & CC (FC Division) New Delhi

Sir,

In inviting reference to the above mentioned subject, this is to inform that Government of India, Ministry of Environment, Forest & Climate Change (FC Division), New Delhi have made certain observations vide letter under reference in respect of proposal for non-forestry use of 66.20 ha of forest land (including safety zone area 1.899 ha) under Section-2 (ii) of the Forest (Conservation) Act, 1980 in respect of Jindal Chromite Mines of M/s Jindal Stainless Limited in village Kaliapani and Forest Block No.27 of Mahagiri DPF in Sukinda Tahasil of Jajpur District under Cuttack Forest Division. The User Agency has complied all the observations raised by Govt. of India, MoEF & CC, New Delhi. The point wise compliance has been prepared basing on the reports of DFO Cuttack Forest Division and the RCCF, Angul Circle is as mentioned below:

(i) Online proposal contains CA scheme only in respect of 43.98 ha (30.86 ha+13.12 ha) only, site specific scheme prepared for Badabahal and Gunthapada may be uploaded online, along with requisite supporting details:

Compliance: The RCCF Angul Circle has reported that the CA land over 65.645 ha of non-forest Government land have been identified in village Seranda, Khamar, Badabahal, Gunthapada and Luhamunda under Kishorenagar Tahasil of Handpa Range of Athmallik Forest Division under Angul District.

The detail land schedule village wise is furnished below:

Name of the Village	Khata No.	Plot No.	Kisam	Proposed Area for CA (in ha)
Serenda	77	212 (P)	Pahada	6.30
		214 (P)	Pahada	3.99
		307 (P)	Patharbani	2.83
			Total	**13.12 ha**
Khamar	53	1 (P)	Patharbani	15.40
		5 (P)	Parbat/II	3.12
		7 (P)	Parbat/II	0.20
		29 (P)	Patharbani	3.84
		44 (P)	Patharbani	8.30
			Total	**30.86 ha**
Badabahal	92	117 (P)	Parbat/II	7.657
		135 (P)	Parbat/II	1.372
			Total	**9.029 ha**
Gunthapada	37	70 (P)	Parbat/II	4.229
		115 (P)	Parbat/II	2.061
			Total	**6.290 ha**
Luhamunda	333	1579 (P)	Parbat/II	6.346
			Total	**6.346 ha**
			Grand Total (in ha)	**65.645 ha**

The Compensatory Afforestation (CA) scheme has been prepared @ wage rate of Rs.311/- per manday with 10 years maintenance and the scheme has been approved by the Chief Conservator of Forests (Forest Diversion & Nodal Officer, FC Act). The scheme with financial outlay is enclosed herewith as **Annexure-I of the compliance report.** The CA scheme over 65.645 ha has been uploaded in Parivesh Portal.

(ii) State Government in its forwarding letter mentioned that a Site Specific Wildlife Management Plan has also been approved by the PCCF(Wildlife) CWLW. However, copy of the Site Specific Wildlife Management Plan has not been submitted. The same needs to be submitted:

Compliance: The approved Site Specific Wildlife Conservation Plan in respect of Kaliapani Chromite Mines of M/s Jindal Stainless Steel Ltd. communicated to Nodal Officer vide Memo No.7226/WL dated 12.09.2016 of PCCF (WL) & CWLW, Odisha with a financial outlay of Rs.584.1312 Lakh. The copy of the scheme is enclosed herewith as **Annexure-II of the compliance report.** The Site Specific Wildlife Conservation Plan has been uploaded in Parivesh Portal.

(iii) Complete copy of mining plan may be uploaded online by the User Agency. Complete copy of the same needs to be uploaded online:

Compliance: The approved Mining Plan has been uploaded in Parivesh Portal. The hard copy of the Mining Plan is enclosed herewith as **Annexure-III in the compliance report.**

(iv) Detail pertaining to the proposal dated 16.05.2016 of the state for change in the name of user agency could not be traced in the Ministry. The State Government is, therefore, requested to submit a copy of the same and confirm if the proposal is in accordance with Para-5.2 of the Handbook i.e. change in the name of the user agency without change in the shareholding pattern:

Compliance: The RCCF Angul Circle has reported that the proposal is in accordance with Para-5.1 (Transfer of User Agency) not in accordance with Para-5.2 of Chapter-5 of Handbook. The Government of Odisha, Department of Steel & Mines in Proceedings No.8379 dated 28.09.2007 have considered the case of transfer of ML and other pending MC, application filed by M/s Jindal Strips Ltd. to M/s Jindal Stainless Steel Ltd. Now, therefore, the State Government have been pleased to allow transfer of the above granted and executed ML and pending MC application filed by M/s Jindal Strips Ltd. to the name of M/s Jindal Stainless Steel Ltd. which is enclosed herewith as **Annexure-IV.** The copy of the recommendation of Government of Odisha, F&E Department regarding transfer of lease (Forest Clearance) as per Para-2.8 of Forest (Conservation) Act, Rules, Guidelines & Clarifications is enclosed as **Annexure-IV A.** The copy of the Transfer Feess of Rs.1,00,000/- is enclosed as **Annexure-IV B.** All the above documents have been uploaded in Parivesh Portal.

(v) The State Government has considered the working over 61.16 ha of forest land without prior approval under FC Act, 1980 as a violation of the Act. Action, if any, taken by the State Government on the reported violation of the FC Act may be intimated to the Ministry:

Compliance: The RCCF Angul Circle has reported that working over 61.16 ha of forest land was continued as per the Government Hal records which was non-forest land. Later on, as per guidelines issued vide letter dated 10.03.2015 and 01.04.2015 of GoI, MoEF & CC, it was found that the land was forest land as per sabik records. As per guidelines of MoEF & CC, the user agency has applied for forest diversion proposal over 66.20 ha (including Safety Zone of 5.04 ha). In this context, the DFO, Cuttack Division has issued letter vide his Memo No.7593 dated 06.08.2016 to discontinue the mining operation in broken-up forest area with effect from 06.08.2016 which is enclosed herewith as **Annexure-V.** The user agency has filed W.P.(C) No.4146 of 2016 in the Hon'ble High Court of Orissa, Cuttack challenging the guideline issued by Government of India, MoEF & CC dated 10.03.2015. The Hon'ble High Court Odisha issued interim order No.3 dated 04.03.2016 to maintain status-quo as on date with regards to the operation of the mines in question shall be maintained till 10th March 2016. Copy of the Writ Application and Interim Order enclosed as **Annexure-V A** & **Annexure-V B** respectively. Further, the Hon'ble High Court Orissa

Cuttack vide order No.25 dated 03.12.2019 has directed that the interim order passed earlier shall continue till 17.12.2019 which is enclosed herewith as **Annexure-V C.** The matter is sub-judice in the Hon'ble High Court of Orissa, Cuttack.

Further, the RCCF Angul Circle has reported that a copy of guideline dated 29.01.2018 of Government of India, MoEF & CC is submitted by the User Agency that as per Point No.3 E of the guidelines: *"In cases where forest land has been changed to 'non-forest land' in Government records: if the violation is not attributable to the user agency, no penalty shall be imposed." The copy of the above guidelines is enclosed as* ***Annexure-V D.***

(vi) Relevant documents* pertaining to FRA, 2006 *i.e. certificate dated 03.05.2016 along with supporting documentary evidences and letter of user agency requesting the District Collector to submit the compliance of balance area of 1.899 ha have not been uploaded online. The same needs to uploaded online:

Compliance: The RCCF Angul Circle has reported that the FRA certificate issued by District Collector Jajpur dated 03.05.2016 has been uploaded with supporting document in Parivesh portal. Further, the request letter to the Collector & DM, Jajpur for issue of FRA Certificate for the balance area 1.899 ha is also uploaded in the Parivesh portal. The copy of FRA certificate and request letter for issue of balance area of 1.899 ha are enclosed as **Annexure-VI & Annexure-VI A** respectively. The User Agency has submitted an undertaking to furnish the FRA certificate, 2006 of balance area of 1.899 ha before Stage-II approval which is enclosed as **Annexure-VI B.**

The compliance to the observations of the GoI, MoEF & CC, New Delhi is sent herewith along with the annexures and supporting documents as above for favour of kind information and necessary action.

Yours faithfully,

Encl: **Compliance report**

31/12/21

Principal Chief Conservator of Forests
Forest Diversion & Nodal Officer, FC Act

Memo No. 104 /Dt. 01.01.2022

Copy along with one set of Compliance report forwarded to the Additional Chief Secretary to Government in FE&CC Department, Odisha for kind information and necessary action.

31/12/21

Principal Chief Conservator of Forests
Forest Diversion & Nodal Officer, FC Act

Memo No. 105 /Dt. 01.01.2022
Copy forwarded to the RCCF, Angul Circle for information and necessary action.

31/12/21
Principal Chief Conservator of Forests
Forest Diversion & Nodal Officer, FC Act

Memo No. 106 /Dt. 01.01.2022
Copy forwarded to the Divisional Forest Officer, Cuttack Forest Division for information and necessary action.

31/12/21
Principal Chief Conservator of Forests
Forest Diversion & Nodal Officer, FC Act

ANNEXURE - I

SCHEME FOR COMPENSATORY AFFORESTATION OVER AN AREA OF 65.645 HA. OF NON-FOREST GOVT. LAND PROPOSED IN VILLAGE SERENDA, KHAMARA, BADABAHAL, GUNTHAPADA AND LUHAMUNDA UNDER KISHORENAGAR TAHASIL OF HANDAPA RANGE OF ATHMALLIK FOREST DIVISION OF ANGUL DISTRICT.

IN LIEU OF

DIVERSION OF FOREST LAND FOR JINDAL CHROMITE MINES, KALIAPANI IN SUKINDA TAHASIL UNDER JAJPUR DISTRICT OF M/s JINDAL STAINELESS LIMITED.

ELEMENTS OF THE SCHEME FOR COMPENSATORY AFFORESTATION

SUITABILITY CERTIFICATE

This is to certify that 108.68 Ac. or 43.98 Ha. of Non-Forest Govt. land have been identify in Plot No. 212(P), 214(P), 307(P) of Khata No.77 of Village – Seranda and Plot no.1(P), 5(P), 7(P), 29(P), 44(P) of Village – Khamara of RI Circle – Angapada of Kishorenagar Tahasil in Handapa Range under Athmallik Forest Division of Angul District are fourd suitable for the purpose of Compensatory Afforestation in lieu of Forest land to be diverted for used by M/s Jindal Chromite Mines, Kaliapani in Sukinda Tahasil Dist- Jajpur of M/s Jindal Stainless Ltd.

Divisional Forest Officer,
Athmallik Division.
Divisional Forest Officer
Athmallik Division

AGM (Mines)
Jindal Chromite Mines
M/s. Jindal Stainless Ltd.

(ii)

SUITABILITY CERTIFICATE

This is to certify that 53.535 Ac. or 21.665 Ha. of Non-Forest Govt. land have been identify in Plot No.117(P), 135(P) of Khata No.92 of Village– Badabahal of RI Circle– Handapa and Plot no.70(P), 115(P), of Khata No.37 of Village– Gunthapada, Plot no.1579(P) of Khata No.333 of Village– Luhamunda of RI Circle– Boinda of Kishorenagar Tahasil in Handapa Range under Athmallik Forest Division of Angul District are found suitable for the purpose of Compensatory Afforestation in lieu of Forest land to be diverted for used by M/s Jindal Chromite Mines, Kaliapani in Sukinda Tahasil Dist-Jajpur of M/s Jindal Stainless Ltd.

Divisional Forest Officer,
Athmallik Division.
Divisional Forest Officer
Athmallik Division

(xii)

REPORT OF JOINT VERIFICATION HELD ON DATED 29.09.18 OVER AN AREA OF NON FOREST GOVT. LAND. , 32.43 ACRE IN VILLAGE SERANDA AND 76.25 ACRE IN VILLAGE KHAMARA , RI CIRCLE ANGAPADA, TAHASIL KISHORENAGAR DISTRICT ANGUL MADE BY REVENUE AND FOREST OFFICIALS WITH USER AGENCY (M/S JINDAL STAINLESS LTD.) FOR RAISING COMPENSATORY AFFORESTATION IN LIEU OF FOREST DIVERSION PROPOSAL FOR JINDAL CHROMITE MINES , KALIAPANI IN TAHASIL SUKINDA, DISTRICT JAJPUR

Date of Joint Verification: 29.09.2018

Background:

The land proposed over an area of 32.43 Acre in village Seranda and an Area of 76.25 Acre of in village Khamara Angapada RI circle under Kishorenagar Tahasil was Jointly verified by Forest and Revenue official on Dated 29.09.2018 and found suitable for Compensatory Afforestation.

Observation:

uring Joint Verification, all the plots under consideration were examined by the members in the field and observations are as follows.

i. **Location : Plots are coming under**

Village: Seranda and Khamara — Forest Range: Handapa
RI Circle: Angapada — Forest Division: Athamallik
Tahasil: Kishore Nagar
Type of Land-Abad Ajogya Anabadi
Land Map Enclosed

ii. **Land schedule /Area suitable for compensatory Afforestation.**

Name of Village	Khata No.	Plot No.	Kisam	Area as per RoR (in Acre)	Area Proposed for Compensatory Afforestation (After Joint Verification)in Acre
Seranda	77	212	Pahada	15.80	15.56
		214	Pahada	10.35	9.87
		307	Patahrbani	8.20	7.00
	Sub-Total			**34.35**	**32.43**
Khamara	53	1	Patharbani	75.10	38.06
		5	Parbat-II	23.75	7.71
		7	Parbat-II	24.75	0.49
		29	Patharbani	22.08	9.48
		44	Patharbani	28.75	20.51
	Sub-Total			**174.43**	**76.25**
Grand Total				**208.78**	**108.68Acre. or 43.98Ha.**

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(iv)

iii. **Feasibility**

A. Certified that the above mentioned (32.43 Acre + 76.25Acre)= 108.68 Acre /43.98Ha. non-forest government land are in compact patch, having adequate soil depth and suitable for Compensatory Afforestation with other forestry activity as per scheme.

B. The area proposed for Compensatory Afforestation is free from encroachment and encumbrances.

C. The land is not covers under DLC report and do not belong to Forest Kisam as on 25.10.1980.

D. The land is previously not allotted for any other purpose.

E. The prescribed RCC pillar to be posted on the demarcated boundary.

27/09/2018

Representative
User Agency

Revenue Inspector
Angapada

Revenue Inspector
Angapada

Forester
Urukula section

Forester
Urukula Section

Range Officer
Handapa Range

Range Officer
Handapa Range

Tahsildar, Kishorenagar
29-09-18

TAHASILDAR
KISHORENAGAR

Divisional Forest Officer
Athmallik Division

(vi)

REPORT OF JOINT VERIFICATION HELD ON DATED 04.08.2020 OVER AN AREA OF NON FOREST GOVT. LAND , 31.224 ACRE (12.636Ha.) IN VILLAGE-LUHAMUNDA 15.682 ACRE AND, IN VILLAGE GUNTHAPADA 15.542 ACRE,RI CIRCLE - BOINDA , TAHASIL –KISHORENAGAR, DISTRICT-ANGUL MADE BY REVENUE AND FOREST OFFICIALS WITH USER AGENCY (M/S JINDAL STAINLESS LTD.) FOR RAISING COMPENSATORY AFFORESTATION IN LIEU OF FOREST DIVERSION PROPOSAL FOR JINDAL CHROMITE MINES, KALIAPANI SUKINDA , DISTRICT JAJPUR IN TAHASIL

Date of Joint Verification: 04.08.2020

Background:

The land proposed over an area of 15.682 Acre in village Luhamunda and 15.542 Acre in Gunthapada, Boinda RI circle under Kishorenagar Tahsil was Jointly verified by Forest and Revenue official on Dated 04.08.2020 and found suitable for compensatory Afforestation .

Observation:

During Joint verification, all the plots under consideration were examined by the members in the field and observations are as follows.

iv. **Location:** Plots are coming under
Village: Luhamunda , Gunthapada
RI Circle: Boinda
Tahasil: kishorenagar
Type of Land-Abad Ajogya Anabadi
Land Map Enclosed
Forest Range: Handapa
Forest Division: Athmallik

v. **Land schedule/Area suitable for compensatory Afforestation.**

Name of Village	Khata No.	Plot No.	Kisam	Area as per RoR(in Acre)	Area proposed for Compensatory afforestation (in Acre)
Gunthapada	37	70(P)	Parbat II	12.100	10.449
	37	115(P)	Parbat II	8.420	5.093
	Sub Total			**20.520**	**15.542**
Luhamunda	333	1579(P)	Parbat II	18.950	15.682
Total				**39.470**	**31.224**

vi. **Feasibility**

A. Certified that the above mentioned(31.224 Acre or 12.636 Ha. Non forest government land are in compact patch , having adequate soil depth and suitable for compensatory Afforestation with other forestry activity as per scheme.
B. The area proposed for compensatory afforestation is free from encroachment and encumbrances.
C. The proposed land is not covered under DLC report and do not belong to forest Kisam as on 25.10.1980.
D. The proposed land is previously not allotted for any other purpose.
E. The proposed area is not coming under 4(1) notification.
F. The prescribed RCC pillar to be posted on each side of the demarcated boundary by the user agency.

Revenue Inspector
Boinda

Forest Range Officer
Handapa Range

TAHASILDAR
KISHORENAGAR

Divisional Forest Offic
Athmallik Division

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(V)

REPORT OF JOINT VERIFICATION HELD ON DATED 05.08.2020 OVER AN AREA OF NON FOREST GOVT. LAND, 22.311 ACRE (9.029Ha.) IN VILLAGE BADABAHAL,RI CIRCLE -HANDAPA ,TAHASIL -KISHORENAGAR,DISTRICT-ANGUL MADE BY REVENUE AND FOREST OFFICIALS WITH USER AGENCY (M/S JINDAL STAINLESS LTD.) FOR RAISING COMPENSATORY AFFORESTATION IN LIEU OF FOREST DIVERSION PROPOSAL FOR JINDAL CHROMITE MINES,KALIAPANI IN TAHASIL SUKINDA ,DISTRICT JAIPUR

Date of Joint Verification: 05.08.2020

Background:

The land proposed over an area of 22.311 Acre (9.029Ha.) in village Badabahal, Handapa RI circle under Kishorenagar Tahsil was Jointly verified by Forest and Revenue official on Dated 02.09.2018 and found suitable for compensatory Afforestation.

Observation:

During Joint verification,all the plots under consideration were examined by the members in the field and observations are as follows.

i. **Location:** Plots are coming under
Village : Badabahal
RI Circle: Handapa
Tahasil : kishorenagar
Type of Land - Abad Ajogya Anabadi
Land Map Enclosed
Forest Range: Handapa
Forest Division: Athmallik

II. **Land schedule/Area suitable for compensatory Afforestation.**

Name of Village	Khata No.	Plot No.	Kisam	Area as per RoR (In Acre)	Area proposed for Compensatory afforestation (In Acre)
Badabahal	92	117	Parbat-II	19.150	18.920
		135	Parbat-II	3.440	3.391
	Total			22.590	22.311

iii. **Feasibility**

A. Certified that the above mentioned 22.311 Acre or 9.029 Ha. Non forest government land are in compact patch , having adequate soil depth and suitable for compensatory Afforestation with other forestry activity as per scheme.
B. The area proposed for compensatory afforestation is free from encroachment and encumbrances.
C. The proposed land is not covered under DLC report and does not belong to forest Kisam as on 25.10.1980.
D. The proposed land is previously not allotted for any other purpose.
E. The proposed area is not coming under 4(1) notification.
F. The prescribed RCC pillar to be posted on each side of the demarcated boundary by the user agency.

Forest Range Officer
Handapa Range

TAHASILDAR
KISHORENAGAR

Divisional Forest Officer
Athmallik Division

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CHAPTER- 1

BRIEF NOTE ON THE PROPOSED FOREST DIVERSION PROPOSAL

Jindal Chromite Mine lease of M/s Jindal Stainless Ltd. at Kalinga Nagar Industrial Complex at Jajpur district of Odisha registered under Indian Companies Act, is carrying open cast method of mining for exploitation of chromite ore occurring in the Mining Lease (ML) area over 89.00 Ha in village Kaliapani and in forest Block No.-27 (Mahagiri Demarcated Protected Forest) under Cuttack Forest division.

The ML area is situated between the Latitudes: North 21^0 01' 4.04" to North 21^0 02' 3.53" and Longitude: East 85^0 45' 18.17" to East 85^0 46' 31.70" in village Kaliapani as indicated in Toposheet No.-73 G/16 /73 F45N16.

The Present diversion proposal prepared for forest area in Cuttack forest division for the purpose of Chromite mines has been taken and applied to MoEF& CC, GOVT.of India for the diversion of forest land.

In lieu of the proposed diversion of forest land, 65.645 ha. of non-forest land has been identified in Plot no.212, 214, 307 of Khata No.77 of village Seranda, Plot no.1, 5, 7, 29, 44 of Khata no.53 of village khamar, Plot no.117, 135 of Khata No.92 of village Badabahal, Plot no.70, 115 of Khata No.37 of village Gunthapada, Plot no.1579 of Khata No.333 of village Luhamunda under Tahasil- Kishorenagar of Athmallik Forest Division of District-Angul for Compensatory Afforestation as per MoEF& CC guideline No. F-11-423/211-FC dated 08.11.2017

Accordingly the scheme has been prepared for Compensatory Afforestation purpose by carrying out the plantation work by planting 1000 seedlings/ha.

CHAPTER- II

DETAILS OF LAND PROPOSED FOR COMPENSATORY AFFORESTATION

A. - LAND IDENTIFICATION AND JOINT VERIFICATION.

Land indentified in village Seranda, Khamara, Badabahal, Gunthapada and Luhamunda under Kishorenagar Tahasil in Handapa Range of Athmallik Forest Division over 65.645 Ha. has been Jointly verified in presence of Revenue Official, Kishorenagar Tahasil, Forest official, Handapa Range alongwith User agency on dt.29.09.2018, 04.08.2020 & 05.08.2020.

B. - INFORMATION ON NON-ENCROACHMENT AND NON-ENCUMBRANCE.

The Tahasildar, Kishorenagar has certified regarding non-encroachment and non-encumbrance of the identified non-forest land for raising Compensatory Afforestation in the joint verification report.

C. - INFORMATION ON LAND STATUS.

The land schedule and land status, identified and allotted for Compensatory Afforestation, is furnished hereunder :-

Name of Village	Khata No.	Plot No.	Kisam	Area as per RoR (in Acre)	Area Proposed for C. A. (in Acre)
Seranda	77	212	Pahada	15.80	15.56
		214	Pahada	10.35	09.87
		307	Patabrbani	08.20	07.00
			Total	*34.35*	*32.43*
Khamara	53	01	Patharbani	75.10	38.06
		05	Parbat-II	23.75	07.71
		07	Parbat-II	24.75	0.49
		29	Patharbani	22.08	09.48
		44	Patharbani	28.75	20.51
			Total	*174.43*	*76.25*
Sub Total				208.78 Ac.	**108.68 Ac. or 43.98 Ha.**
Badabahal	92	117	Parbat-II	19.150	18.920
		135	Parbat-II	03.440	03.391
			Total	*22.590*	*22.311*
Gunthapada	37	70	Parbat-II	12.100	10.449
		115	Parbat-II	08.420	05.093
			Total	*20.520*	*15.542*
Luhamunda	333	1579	Parbat-II	18.950	15.682
			Total	*18.950*	*15.682*
Sub Total				62.060	53.535 Ac. or 21.665 Ha.
Grand Total					162.215 Acre. or **65.645Ha.**

The village maps and Toposheet showing the proposed Compensatory Afforestation area along with GPS coordinates are verified by concerned Revenue and Forest official which is enclosed. (Annexure-A)

D.-SUITABILITY OF THE IDENTIFIED SITE FOR COMPENSATORY AFFORESTATION-

The identified land is free from encroachment and encumbrance, neither covered under Section-4(i) of Orissa Forest Act, 1972 nor included in DLC report. The status of the identified land is not forest as on 25.10.1980.

The non-forest Govt. land identified in village Seranda, Khamara, Badabahal, Gunthapada & Luhamunda are compact patch. The area is having scattered tree growth having misc. crops and seasonal shrubs.

The identified area is consist of open forest having Crown Density less than 40% with slope in between 20°. The plantation area is having good depth of soil which is suitable for plantation in certain areas patchy rocky outcrops forms clear spaces between the monsoon vegetation. The average temperature varies from 13.5^0 C minimum and December to 45 ^{0}C maximum in May. The annual rainfall varies from 1200 mm to 1500 mm. The maximum rainfall is received during the rainy season from July to September. The identified 65.645 Ha. of non-forest government land is verified and found suitable, henceforth, suitability certificate for Compensatory Afforestation was issued by the Divisional Forest Officer, Athmallik Division. The proposed CA land over an area of 65.645 Ha. is therefore taken up for Compensatory Afforestation for planting 1000 seedlings / ha.

CHAPTER-III

DELINEATION OF PROPOSED AREA ON SUITABLE MAP

GPS COORDINATES AND GPS MAP OF THE COMPENSATORY AFFORESTATION SITE

The area has been demarcated on revenue map showing latitude and longitude of each point and bearing is enclosed in the map prepared. (Annexure -A)

CHAPTER- IV

AGENCY RESPONSIBLE FOR COMPENSATORY AFFORESTATION

(A) - AGENCY RESPONSIBLE FOR PLACEMENT OF FUNDS

The user agency shall provide funds for raising Compensatory Afforestation as per approved scheme.

(B) - AGENCY RESPONSIBLE FOR EXECUTION OF COMPENSATORY AFFORESTATION

The Territorial Wing of the Forest Department i.e. Divisional Forest Officer, Athmallik Division will be assigned with the task for execution of the Compensatory Afforestation.

CHAPTER- V

DETAILS OF WORK SCHEDULE PROPOSED FOR COMPENSATORY AFFORESTATION

A. PLANTING PLAN

Planting Plan reflects the species specific treatment of the identified site. Choice of species is based on the geo-morphology of the site, soil-texture, structure, fertility and depth, proneness of the site to water logging etc.

Species to be planted:-

1. *Syzygium cumini* (Jamu)
2. *Acacia catechu* (Khair)
3. *Dalbergia sissoo* (Sissoo)
4. *Azadirachta indica* (Neem)
5. *Gmelina arborea* (Gambhari)
6. *Terminalia bellirica* (Bahada)
7. *Emblica officinalis* (Amla)
8. *Mangifera indica* (Mango)
9. *Tectona grandis* (Teak)
10. *Dandrocalmus stictus* (Salia Bamboo)
11. *Artocarpus heterophyllus* (Jackfruit)
12. *Albizia Lebbeck* (Siris)
13. *Ficus bengalensis* (Bara)

B. PRE-PLANTING OPERATION

(I) RAISING OF PLANTATION STOCK- NURSERY-

Nursery will be raised for preparing 6 months old seedlings @ 1100 seedlings per ha including seedlings for 10% causality replacement respectively.

(II) SURVEY, DEMARCATION & PILLAR POSTING, DGPS READING WITH MAPPING-

The proposed area has been surveyed and demarcated with four feet height RCC pillars at inter visible distance (as per the direction of the Forest Range officer, Handapa Range) with GPS coordinates, pillar No. and distance between pillars inscribed in it. A GPS map in the scale of 1:4000 has been prepared alongwith, and pillar numbers reflected in the map. A sign board has been erected at a conspicuous location with name of the site, scheme, area etc. depicted on it. The DGPS survey will be conducted and accordingly User Agency advised to do the same at an early date.

(III) SITE PREPARATION AND SILVICULTURAL OPERATION INCLUDING CLEARANCE OF WEED, CLIMBER CUTTING, HIGH STUMP CUTTING, SINGLING OF SHOOTS.

The clearing of the site involving removes of invasive weeds, bushes, climbers, high stumps and singling of shoots without disturbing the regeneration of valuable species. The cleaning work will be taken up preferably by the end of February and latest by the end of March. Pits of the dimension 30 x 30 x 30 cm. will be dug @1000 per ha. in the available gaps preferably 2 months before planting the seedlings.

C. PLANTING OPERATION.

Planting of seedlings will be taken up in the month of July. The polythene covering of the balls of earth will be carefully removed before planting. Care will be taken to see that the ball of earth is not broken while doing so. The seedling with the ball of earth will then be placed firmly in the pit and buried at such a depth that the root collar is well below the surface of the soil. The soil around the plant will be well compacted with the heal as a final step so that there is a proper bond between the ball and the surrounding soil. The earth close to the collar will be slightly elevated so that rain water does not accumulate very close to the plant.

D. POST PLANTING OPERATION

(1) CASUALTY REPLACEMENT

The entire area will be gone over in the same order as plantation was carried out and casualties, if any, will be replaced as soon as the main plantation operation is over.

(2) WEEDING AND SOIL WORKING

Regular and efficient weeding will start immediately after sprouting of the stumps is complete or after the seedlings have started throwing up new buds.

(3) MANURING AND INSECTICIDE APPLICATION

On degraded sites vermicompost / farmyard manure wherever available will be added to the soil while refilling the pits. As regards chemical fertilizer, the required dose @ 50gms. / plant like NPK will be applied to each plant as basal dose. Chemical fertilizer like Urea will be applied to each plant 70gms per plant in two split doses one in August and other in September.

(4) PROTECTION AGAINST FIRE AND BIOTIC INTERFERENCE

It is proposed to protect the Compensatory Afforestation area from grazing by domestic animals using ~~Barbed wire fencing (2 strands)~~. The total length of such identified areas for ~~barbed wire fencing~~ comes to ~~10.00~~ km. (~~10000~~ mtr.). Fire line tracing will be ensured to protect the plantation from fire and watch & ward will be provided as per approved norm for protecting the plantation from grazing.

(5) SOIL MOISTURE CONSERVATION MEASURES

Special Soil Moisture Conservation Measures will be taken up through Construction of LBCD structure and staggered trenches and the cost will be 25% of the total plantation cost.

(6) ESCALATION COST

Escalation cost 20% calculated of the entire plantation, Barbed wire fencing and SMC.

(7) INFRASTRUCTURE DEVELOPMENT

There is a provision of infrastructure development (in kind) such as office modernization, monitoring and evaluation.

SCHEME FOR BLOCK PLANTATION OVER 65.645 HA. IN VILLAGE SERANDA AND KHAMARA OF ANGAPADA RI CIRCLE, VILLAGE BADABAHAL OF HANDAPA RI CIRCLE, VILLAGE GUNTHAPADA AND LUHAMUNDA OF BOINDA RI CIRCLE OF KISHORENAGAR TAHASIL IN HANDAPA RANGE UNDER ATHAMALLIK FOREST DIVISION OF ANGUL DISTRICT.

Name of the Scheme	COMPENSATORY AFFORESTATION
Name of the Project	Proposal for C.A. over 65.645 Ha. of Non-Forest Govt. land in village Seranda, Khamara, Badabahal, Gunthapada and Luhamunda of Kishorenagar Tahasil under Angul District in respect of diversion of Forest land of Jindal Chromite Mines, Kaliapani in Sukinda Tahasil under Jajpur district by M/s Jindal Stainless Ltd.
Name of Implementing Agency:-	Divisional Forest Officer, Athmallik Forest Division.

MODEL	BLOCK PLANTATION
NO. OF PLANTS PER HA.	1000/Ha.
TOTAL AREA TO BE PLANTED (In HA.)	65.645 Ha.
TOTAL NOS. OF PLANTS TO BE PLANTED	65645 seedlings
WAGE RATE	RS. 308/MAN-DAY

COST NORM FOR BLOCK PLANTATION @1000 PLANTS PER HECTARE.
WAGE RATE Rs.308/- PER DAY.

Sl. No.	Item of Work	Period of Execution	Person days	Labour Cost (Rs.)	Material Cost (Rs.)	Total Cost (Rs.)
1	2	3	4	5	6	7
	0th year (Advance work) pre-planting operation.					
1	Survey, Demarcation & Pillar posting	Nov/Dec	2	616.00	0	616.00
2	Site Preparation	Nov/Dec	8	2464.00	0	2464.00
3	Alignment and Stacking of pits	Jan/Feb	2	616.00	0	616.00
4	Digging of pits (30cm cube)	Feb/Mar	25	7700.00	0	7700.00
5	Nursery cost (6 months old seedling) part @ Rs.13.46/- seedling (Rs.9.37 in 0th year + Rs.4.09 in 1st year) for 1100 seedlings (1000+100)	Jan-March	27.5	8470.00	1837	10307.00
	Sub-total		64.50	19866.00	1837	21703.00
6	Monitoring & Supervision charges 5% of the total cost					1085.15
	Total		**64.50**	**19866.00**	**1837**	**22788.15**

COST NORM FOR BLOCK PLANTATION @ 1000 PLANTS PER HECTARE (without fencing)						
WAGE RATE Rs 308/- PER DAY						
Sl.No	Items of work	Preferable Period of Execution	Person days	Labour cost @ Rs. 308/- per day	Material cost (Rs)	Total cost (Rs.)
1	2	3	4	5	6	7
	0th year (Advance work) pre-planting operation					
1	Survey,demarcation and pillar posting	Nov/Dec	2	616.00	0	616.00
2	Site preparation	Nov/Dec	8	2464.00	0	2464.00
3	Alignment and stacking of pits	Jan/Feb	2	616.00	0	616.00
4	Digging of pits (30 cm cube)	Feb/Mar	25	7700.00	0	7700.00
5	Nursery cost (6 months old seedling)part @ Rs.13.47 per seedling (Rs 9.37 in 0th year + Rs 4.10 in 1st year) for 1100 seedlings (1000+100)	Jan-Mar	27.5	8470.00	1837	10307.00
	Total		64.50	19866.00	1837.00	21703.00
6	Monitoring & Supervision charge 5% of the total cost					1085.15
	Grand Total		64.50	19866.00	1837.00	22788.15
	1st year/planting Year					
7	Nursery cost (6 months old seedling) balance @ Rs 4.10 for 1100 seedlings	Apr-Jul	13.0	4004.00	506.00	4510.00
8	Carriage & planting, Casualty Replacement and application of insecticides, manure etc.	Jul/Aug	13	4004.00	0	4004.00
9	Cost of insecticide and fertilizer (a)NPK @ 50 gms/plant as basal dose =50kg @ Rs 24/- per kg = Rs.1200.00 (b) Urea @ 70 gms/plant in two subsequent doses @ Rs.6/- per kg = Rs.420.00 (c) Granular insecticide(Themet, Forate etc.) @ 5 gms/plant @ Rs.80/- per kg = Rs 400.00		0	0.00	2020.00	2020.00
10	1st weeding (complete weeding)	Aug/Sep	5	1540.00	0	1540.00
11	Manuring Urea 35 gm	Aug/Sep	4	1232.00	0	1232.00
12	2nd Weeding (complete weeding)	Sep/Oct	4	1232.00		1232.00
13	Soil working (50 cms. Radius around plants) & manuring Urea 35gms per plant	Sep/Oct	5	1540.00	0	1540.00
14	Soil conservation measures in the form of straggerd trenches of size 2 m X 0.5 m X 0.5 m @ 30 nos per ha	Sep/Oct	10	3080.00	0	3080.00
15	Fire line tracing & inspection path	Feb/Mar	3	924.00	0	924.00
16	Watch & Ward	Aug-Mar	7	2156.00	0	2156.00
	Total		64.0	19712.00	2526.00	22238.00
17	Monitoring & Supervision charge 5% of the total cost					1111.90
	Grand Total		64.0	19712.00	2522.10	23349.90
	2nd Year Maintenance					
18	Casualty replacement (10%) with Nursery cost	Jul/Aug	2.5	770.00	1347.00	2117
19	Weeding (complete weeding)	Sep/Oct	4	1232.00	0	1232.00
20	Cost of fertilizer (NPK @70 gms/plant for 1000 plants) (Rs 24/- per kg & Insecticide @5 gms/plant for 100 plants 500 gms @ Rs.80/- per kg)		0	0.00	1720.00	1720.00
21	Soil working (50 cms. Radius around plants)	Oct/Nov	5	1540.00	0	1540.00
22	Application of fertilizer & insecticide	Sep/Oct	2.5	770.00	0	770.00
23	Fire line tracing (2 m. wide fire line over 400 m long)	Feb/Mar	3	924.00	0	924.00
24	Watch & Ward	Apr-Mar	15	4620.00	0	4620.00
	Total		32	9856.00	3067.00	12923.00
25	Monitoring & Supervision charge 5% of the total cost					646.15
	Grand Total		32	9856.00	3067.00	13569.15

Sl.No	Items of work	Preferable Period of Execution	Person days	Labour cost @ Rs. 308/- per day	Material cost (Rs)	Total cost (Rs.)
1	2	3	4	5	6	7
	3rd year maintenance					
26	Weeding and application of fertilizer	Aug/Sep	5	1540.00	0	1540.00
27	Cost of fertilizer (NPK @ 50 gms/plant) @ Rs.24/-per kg		0	0.00	1200	1200.00
28	Soil working (50 cms. Radius around plants) & applicaton of fertilizer	Oct/Nov	5	1540.00	0	1540.00
29	Fire line tracing (2 m. wide fire line over 400 m length)& cultural operation	Feb/Mar	3	924.00	0	924.00
30	Watch & Ward	Apr-Mar	15	4620.00	0	4620.00
	Total		28	8624.00	1200.00	9824.00
31	**Monitoring & Supervision charge 5% of the total cost**					491.20
	Grand Total		28	8624.00	1200.00	10315.20
	4th year maintenance					
32	Fire line tracing (2 m. wide fire line over 400 m length) & cultural operation	Feb/Mar	3	924.00	0	924.00
33	Watch & Ward	Apr-Mar	15	4620.00	0	4620.00
	Total		18	5544.00	0	5544.00
34	**Monitoring & Supervision charge 5% of the total cost**					277.20
	Grand Total		18	5544.00	0	5821.20
	5th Year Maintenance					
35	Fire line tracing (2 m. wide fire line over 400 m length) & cultural operation	Feb/Mar	3	924.00	0	924.00
36	Watch & Ward	Apr-Mar	15	4620.00	0	4620.00
	Total		18	5544.00	0	5544.00
37	**Monitoring & Supervision charge 5% of the total cost**					277.20
	Grand Total		18	5544.00	0	5821.20
	6th Year Maintenance					
38	Fire line tracing (2 m. wide fire line over 400 m length) & cultural operation	Feb/Mar	3	924.00	0	924.00
39	Watch & Ward	Apr-Mar	15	4620.00	0	4620.00
	Total		18	5544.00	0	5544.00
3	**Monitoring & Supervision charge 5% of the total cost**					277.20
	Grand Total		18	5544.00	0	5821.20
	7th Year Maintenance					
41	Fire line tracing (2 m. wide fire line over 400 m length) & cultural operation	Feb/Mar	3	924.00	0	924.00
42	Watch & Ward	Apr-Mar	15	4620.00	0	4620.00
	Total		18	5544.00	0	5544.00
43	**Monitoring & Supervision charge 5% of the total cost**					277.20
	Grand Total		18	5544.00	0	5821.20
	8th Year Maintenance					
44	Fire line tracing (2 m. wide fire line over 400 m length) & cultural operation	Feb/Mar	3	924.00	0	924.00
45	Watch & Ward	Apr-Mar	15	4620.00	0	4620.00
	Total		18	5544.00	0	5544.00
46	**Monitoring & Supervision charge 5% of the total cost**					277.20
	Grand Total		18	5544.00	0	5821.20

Sl.No	Items of work	Preferable Period of Execution	Person days	Labour cost @ Rs. 308/- per day	Material cost (Rs)	Total cost (Rs.)
1	2	3	4	5	6	7
	9th Year Maintenance					
47	Fire line tracing (2 m. wide fire line over 400 m length) & cultural operation	Feb/Mar	3	924.00	0	924.00
48	Watch & Ward	Apr-Mar	15	4620.00	0	4620.00
	Total		18	5544.00	0	5544.00
49	Monitoring & Supervision charge 5% of the total cost					277.20
	Grand Total		18	5544.00	0	5821.20
	10th Year Maintenance					
50	Fire line tracing (2 m. wide fire line over 400 m length) & cultural operation	Feb/Mar	3	924.00	0	924.00
51	Watch & Ward	Apr-Mar	15	4620.00	0	4620.00
	Total		18	5544.00	0	5544.00
52	Monitoring & Supervision charge 5% of the total cost					277.20
	Grand Total		18	5544.00	0	5821.20

Abstract

No	Year	No. person days	Labour cost @ Rs.308/- per day	Material	Monitoring & Supervision charge 5% of the total cost	Total cost (Rs.)
1	0th year	64.50	19866.00	1837.00	1085.15	22788.15
2	1st year	64	19712.00	2526.00	1111.90	23349.90
3	2nd year	32	9856.00	3067.00	646.15	13569.15
4	3rd year	28	8624.00	1200.00	491.2	10315.20
5	4th year	18	5544.00	0	277.2	5821.20
6	5th year	18	5544.00	0	277.2	5821.20
7	6th year	18	5544.00	0	277.2	5821.20
8	7th year	18	5544.00	0	277.2	5821.20
9	8th year	18	5544.00	0	277.2	5821.20
10	9th year	18	5544.00	0	277.2	5821.20
11	10th year	18	5544.00	0	277.2	5821.20
	Total:	314.50	96866.00	8630.00	5274.80	110770.80

CHAPTER-VII

Detail Estimate for G.I. Chain Link Mess Fencing for 1.0 Km.

Sl. No	Description of items	No	Length	Breadth /dia	Height	Qty	Unit	Rate	Amount
1	Site Clearance over length 1.0Km & with 2.0mtr. And removed the unsalable materials outsides 22 nos mulias @ 308/- per day		1km	2mtr		22	man-days	308	6776.00
2	Cost of R.C.C. finishing post of size 6'- 6" x 0'- 5" x 0'- 4" with "T" bottom of size (1'- 0" x 0'- 4" x 0' x 4") including steel work shuttering, carriage, loading & unloading at work site on Ls over 365nos R.C.C. pillar @ 381.36/- each Rs. 139,196.4 CGST 9% - Rs. 12527.67 OGST 9% - Rs. 12527.67 Rs. 1,64,251.75 or 164250 **(330 main pillar and 35 stay pillar)**					365	nos	450	164250.00
3	Digging of pits of size 0.46 x 0.46 x 0.46 x 365nos pits = 35.53cum @ 135.52/cum Rs. 4815.02 for (330 main pillar and 35 stay pillar)	365	0.46	0.46	0.46	35.53	cum	135.52	4815.02
4	Fixing of R.C.C. post with plain cement concrete (1:1.5:3) using 12mm B.H.G chips with short carriage manually from truck able point to work site of R.C.C post including Cost of material, labour, Royalty watering, etc for 330 main pillar and 35 stray pillar 365 nos. x .46 x .46 x .46 = 35.53 Cum for 1/2 pits 17.76 Cum @ Rs. 6552.47/ Cum.	365	0.46	0.46	0.46	17.76	cum	6552.47	116371.86
5	Cost of G.I chain- link mess 4" x 4" x 8 gauge With 1.8mtr with delivery at work site including OGST & CGST. 1000mtr x 1.8mtr = 1800sqmtr @ 318.00/Sqm.		1000		1.8	1800	sqm	318	572400.00

6	P.C.C. Work in fixing between the fix R.C.C pillar for fixing G.I chain link mesh and MS rod with ground 330 nos. x 0.2x 0.2 x 0.2 x 2 sides = 5.28 cum @ 6552.47	330	0.2	0.2	0.2	5.28	cum	6552.47	34597.04
7	Distribution of G.I chain-link mesh over 1.0 Km & tying with R.C.C. post by G.I binding wire embedding the MS ROD by digging of 6" depth channel along the boundary line with fixing net hooks at in interval 128 nos of adult male mulias @ 308/- each					128	man-days	308	39424.00
8	Cost of MS rod 2.5 quintal @ 5108.09 / Qntl.					2.5	qtl	5108.09	12770.22
9	Miscellaneous expenditure i.e. Binding Wires 8 Kg @ Rs. 80/- Kg.					8	kg	80	640.00
								Total-	952044.14
10	Labour Cess.....1%								9520.44
								Total-	961564.58

Expenditure per 1 Km. G.I. Chain Link Mess Fencing
(Rupees Nine lakh Sixty two thousand five hundred Sixty five only.

Total cost for G.I. Chain Link Mess Fencing 10.200 Km. X @ 9,61,565/- = Rs 98,07,963/-

(Rupees Nigety eight Lakh Sixteen thousand eight hundred Sixty Seven) only.

Divisional Forest Officer,
Athmallik Division
Divisional Forest Officer
Athmallik Division

Analysis

Sl. No.	Description	Quantity required	Unit	Type of unit	Rate in Rs.	Amount in Rs.
1	**Earth work in slushy soil with initial lead 50 mtr & initial lift 1.5 mtr etc. all complete for 100 cum**					
	DATA FOR 100 CUM					
	LABOUR					
	Man Mulia	21.00	Nos.	Each	311.00 (308.00)	6531.00 (6468.00)
	Women Mulia	23.00	Nos.	Each	311.00 (308.00)	7153.00 (7084.00)
					Total-	13684.00 (13552.00)
					Per 1 cum	136.84 (135.520)
2	**Cement concrete (1:1.5:3) with 12 mm size hard granite chips including cost, conveyance, royalty, taxes, watering and curing etc. complete.**					
	DATA FOR 1 CUM					
	LABOUR					
	Man Mulia	3.20	Nos.	Each	311.00 (308.00)	995.20 (985.60)
	Women Mulia	1.40	Nos.	Each	311.00 (308.00)	435.40 (431.20)
	Mason 2nd class	0.68	Nos.	Each	401.00 (398.00)	272.68 (270.64)
	MATERIAL					
	H.B. granite stone	0.90	cum	cum	1445.08	1300.57
	Sand	0.45	cum	cum	1111.40	265.07
	Cement	4.29	Qtl.	Qtl.	784.60	3299.39
					Total-	(6552.47)

6568.31

LEAD STATEMENT FOR G I CHAINLINK MESS FENCING

Sl no	Description of materials	Unit	Basic Cost	Lead in K.M.	Cost of lead	Royalty	Total of lead & royalty	Sources	Total cost (basic rate+ Lead+ Royalty)
1	2	3	4	5	6	7	8(6+7)	9	10(4+6+7)
1	Sand for mortar	Cum.	52.38	45	501.67	35.00	536.67	Mahanadi	589.05
2	C/B chips of 12mm size	Cum.	1103.81	12	211.27	130.00	341.27	Katada	1445.08
3	Cement	1qntl	720.00	45	49.09	-	49.09	Angul	769.09
4	Steel HYSD (FE-415)	1qntl	5059.00	45	49.09	-	49.09	Angul	5108.09

CHAPTER-VIII

TOTAL FINANCIAL OUTLAY OF THE C.A. SCHEME

1	Plantation Cost for 65.645 Ha.	Rs.1,10,759.25 per Ha.	Rs. 72,70,791.00
2	Soil Moisture Conservation	LBCD =14,12,584/- Staggered Trench = 4,34,701/-	Rs. 18,47,285.00
3	G.I. Chain link Mess Fencing for 10.200 km.	Rs.9,61,565.00 per Km.	Rs. 98,07,963.00
4	Weed Eradication and lantana removal for 65.645 Ha. X 2 years. (4th year and 7th year)	Rs.8850.00 per Ha.	Rs. 11,61,916.00
		Sub-total	Rs.2,00,87,955.00
5	Escalation	20% of the entire cost	Rs. 40,17,591.00
		Total	Rs.2,41,05,546.00
6	Infrastructure (In Kind) for office modernization and monitoring and evaluation.	Cost of (i) One Solar Power Plant @Rs.7,50,000/- (ii) Vehicle mounted LED wall for awareness @Rs.2,50,000/- (iii) office modernization @Rs.20,00,000/-	Rs. 30,00,000.00
		Grand Total	Rs. 2,71,05,546.00 or Rs.2,71,05,550/-

PROVISION OF FUNDS AND FUND UTILIZATION.

Rs.2,71,05,550.00 (Two Crore Seventy-one Lakh five Thousand five Hundred fifty) only shall be deposited by the User Agency M/s Jindal Stainless Ltd. on approval of the Compensatory Afforestation Scheme, in the Ad-hoc CAMPA Account and the funds utilized for raising Compensatory Afforestation by the Divisional Forest Officer, Athmallik Forest Division on allotment by the Principal Chief Conservator of Forest, Odisha, Bhubaneswar.

Divisional Forest Officer,
Athmallik Forest Division

Divisional Forest Officer
Athmallik Division

Financial Outlay for **Compensatory Afforestation Scheme** over an area of **65.645** ha of non-forest Government land identified in village Serenda, Khamara, Badabohal, Gunthapada and Luhamunda under Kishore Nagar Tahasil of Handapa Range of Athmallik Forest Division of Angul District in lieu of diversion of Lamra PRF of Jamankira (WL) Range of Bamra (WL) Division under Sambalpur District in lieu of diversion of forest land for Jindal Chromite Mines, Kaliapani in Sukinda Range under Jajpur District of **M/s Jindal Stainless Steel Ltd.**

(Wage Rate @ Rs.311/- per MD)

Sl. No.	Description	Amount (Rs.)
A.	**PLANTATION ACTIVITIES:** **(To be deposited in Adhoc-CAMPA)**	
1.	Cost of Block Plantation @ 1000 plants per ha over 65.645 ha @ Rs.1,53,933.15 per ha without provision of fencing with 10 years maintenance (1 years 6 months old seedling)	1,01,04,942.00
2.	Cost of GI Chain Link Mesh fencing over 10.2 Km @ Rs.9,62,435/- per RKM	98,16,837.00
3.	Soil Conservation Measures:	
	i. Cost of staggered trench of size 2.5 mt X 0.5 mt. X 0.5 mt @ 100 nos. per ha @ Rs.62.20 per staggered trench over 65.645 ha	4,08,312.00
	ii. Cost of LBCD with size 10'X10'X5' (Procured from quarry) for 163 nos. @ Rs.880.05 per Cum X 9.90 Cum= Rs.8712.50 each over 65.645 ha	14,20,138.00
	Total (SMC)	**18,28,450.00**
	Total (1+2+3)	**2,17,50,229.00**
4.	Add Escalation Cost (20%)	43,50,046.00

Your Signature will appear here

	Total (A)	2,61,00,275.00 Or rounded off to 2,61,00,300.00
B.	**INFFRASTRUCTURE (To be provided in kind):**	
5.	Cost of one Solar Plant	7,50,000.00
6.	Vehicle mounted LED wall for awareness	2,50,000.00
	Total (B)	**10,00,000.00**
	Grand Total (A+B)	**2,71,00,300.00**

(Rupees Two Crore seventy one lakh three hundred) only

Technically Approved

Chief Conservator of Forests

Forest Diversion & Nodal Officer, FC Act

Chief Conservator of Forests
Forest Diversion & Nodal Officer,FC Act.

CHAPTER-IX

DETAILS OF PROPOSED MONITORING MECHANISM

Compensatory Afforestation will be taken up in identified site by the Range Officer Handapa Range of Athmallik Forest Division. The Forest Range Officer Handapa will undertake field check of the works undertaken at the identified site and will be crossed checked by the Assistant Conservator Forest and Divisional Forest Officer, Athmallik Forest Division. GPS Co-ordinates along with other required information's of Compensatory Afforestation will be uploaded e-Green watch Portal of NIC, MoEF, Govt. of India for the purpose of online monitoring. Annual progress of plantation involving growth of planted seedlings, survival percentage etc. will be monitored and recorded in the plantation journal by the field staff of Handapa Range and reported to the Divisional Forest Officers for necessary action. The same thing will be reported to the Regional Chief Conservator Forests, Angul Circle and Chief Conservator of Forests (PP&A), O/o the Pr. Chief Conservator of Forests, Odisha, Bhubaneswar and necessary corrective measures will be followed if required so.

Divisional Forest Officer
Athmallik Forest Division

(16)
CHAPTER-X

CO ORDINATES OF PROPOSED C.A LAND AREA. SERANDA VILLAGE					
SL.NO	POINT ID	EASTING	NORTHING	LONGITUDE	LATITUDE
1	1	249607.197	2314102.195	E84° 35' 33.700"	N20° 54' 37.200"
2	2	249586.742	2314132.852	E84° 35' 32.977"	N20° 54' 38.186"
3	3	249580.260	2314119.755	E84° 35' 32.759"	N20° 54' 37.758"
4	4	249552.214	2314133.646	E84° 35' 31.782"	N20° 54' 38.195"
5	5	249563.194	2314156.135	E84° 35' 32.150"	N20° 54' 38.932"
6	6	249544.541	2314177.567	E84° 35' 31.494"	N20° 54' 39.619"
7	7	249527.211	2314199.924	E84° 35' 30.883"	N20° 54' 40.337"
8	8	249512.791	2314220.826	E84° 35' 30.373"	N20° 54' 41.009"
9	9	249487.656	2314222.678	E84° 35' 29.503"	N20° 54' 41.057"
10	10	249466.013	2314243.342	E84° 35' 28.743"	N20° 54' 41.718"
11	11	249412.831	2314286.734	E84° 35' 26.881"	N20° 54' 43.103"
12	12	249404.100	2314257.497	E84° 35' 26.595"	N20° 54' 42.148"
13	13	249358.988	2314279.326	E84° 35' 25.023"	N20° 54' 42.836"
14	14	249357.666	2314298.243	E84° 35' 24.967"	N20° 54' 43.450"
15	15	249354.491	2314320.204	E84° 35' 24.846"	N20° 54' 44.162"
16	16	249279.613	2314367.300	E84° 35' 22.232"	N20° 54' 45.656"
17	17	249274.586	2314345.207	E84° 35' 22.069"	N20° 54' 44.936"
18	18	249264.929	2314324.834	E84° 35' 21.746"	N20° 54' 44.269"
19	19	249244.821	2314318.219	E84° 35' 21.054"	N20° 54' 44.044"
20	20	249201.125	2314325.890	E84° 35' 19.539"	N20° 54' 44.272"
21	21	249178.053	2314326.102	E84° 35' 18.740"	N20° 54' 44.267"
22	22	249166.573	2314296.865	E84° 35' 18.359"	N20° 54' 43.312"
23	23	249159.429	2314261.940	E84° 35' 18.150"	N20° 54' 42.173"
24	24	249143.554	2314154.387	E84° 35' 17.637"	N20° 54' 38.670"
25	25	249128.473	2314117.874	E84° 35' 17.134"	N20° 54' 37.476"
26	26	249090.770	2314066.677	E84° 35' 15.856"	N20° 54' 35.794"
27	27	249088.786	2314051.596	E84° 35' 15.790"	N20° 54' 35.302"
28	28	249081.642	2314029.768	E84° 35' 15.560"	N20° 54' 34.590"
29	29	249073.578	2313994.452	E84° 35' 15.290"	N20° 54' 33.438"
30	30	249212.018	2313972.743	E84° 35' 20.100"	N20° 54' 32.800"
31	31	249263.279	2313969.443	E84° 35' 21.874"	N20° 54' 32.718"
32	32	249276.213	2313986.905	E84° 35' 22.313"	N20° 54' 33.292"
33	33	249285.357	2313995.848	E84° 35' 22.630"	N20° 54' 33.587"
34	34	249317.624	2313978.227	E84° 35' 23.749"	N20° 54' 33.030"
35	35	249342.865	2313981.561	E84° 35' 24.620"	N20° 54' 33.150"
36	36	249362.392	2313980.926	E84° 35' 25.296"	N20° 54' 33.139"
37	37	249368.265	2313960.447	E84° 35' 25.510"	N20° 54' 32.477"
38	38	249387.633	2313950.922	E84° 35' 26.184"	N20° 54' 32.177"
39	39	249405.486	2313954.452	E84° 35' 26.800"	N20° 54' 32.300"
40	40	249446.185	2313969.226	E84° 35' 28.200"	N20° 54' 32.800"
41	41	249515.928	2313992.795	E84° 35' 30.600"	N20° 54' 33.600"
42	42	249541.022	2314037.496	E84° 35' 31.445"	N20° 54' 35.065"
43	43	249562.944	2314044.769	E84° 35' 32.199"	N20° 54' 35.312"
44	44	249583.682	2314074.715	E84° 35' 32.901"	N20° 54' 36.295"
45	45	249514.932	2314065.913	E84° 35' 30.528"	N20° 54' 35.976"
46	46	249454.493	2314068.327	E84° 35' 28.436"	N20° 54' 36.025"
47	47	249448.574	2314111.422	E84° 35' 28.209"	N20° 54' 37.422"
48	48	249518.848	2314103.590	E84° 35' 30.643"	N20° 54' 37.202"
49	49	249553.038	2314041.482	E84° 35' 31.858"	N20° 54' 35.200"
50	50	249510.888	2314060.222	E84° 35' 30.391"	N20° 54' 35.789"
51	51	249507.558	2314066.192	E84° 35' 30.286"	N20° 54' 35.982"

ACM (Mines)
Jindal
M/s. Jindal

CO ORDINATES OF PROPOSED C.A LAND AREA. KHAMARA VILLAGE					
SL.NO	POINT ID	EASTING	NORTHING	LONGITUDE	LATITUDE
1	1	248153.0729	2314676.119	E84° 34' 43.106"	N20° 54' 55.141"
2	2	248217.6368	2314674.887	E84° 34' 45.240"	N20° 54' 55.133"
3	3	248264.733	2314737.196	E84° 34' 46.936"	N20° 54' 57.181"
4	4	248239.098	2314798.555	E84° 34' 46.017"	N20° 54' 59.162"
5	5	248288.046	2314843.534	E84° 34' 47.687"	N20° 55' 0.648"
6	6	248350.630	2314805.764	E84° 34' 49.871"	N20° 54' 59.484"
7	7	248356.265	2314818.988	E84° 34' 50.059"	N20° 54' 59.884"
8	8	248389.010	2314850.309	E84° 34' 51.176"	N20° 55' 0.918"
9	9	248436.477	2314882.535	E84° 34' 52.801"	N20° 55' 1.988"
10	10	248393.751	2314911.534	E84° 34' 51.308"	N20° 55' 2.910"
11	11	248375.090	2314948.603	E84° 34' 50.643"	N20° 55' 4.106"
12	12	248385.409	2315039.091	E84° 34' 50.953"	N20° 55' 7.051"
13	13	248439.566	2315038.565	E84° 34' 52.826"	N20° 55' 7.061"
14	14	248500.233	2314964.491	E84° 34' 54.963"	N20° 55' 4.683"
15	15	248627.034	2314966.885	E84° 34' 59.348"	N20° 55' 4.823"
16	16	248681.803	23'5062.929	E84° 35' 1.192"	N20° 55' 7.971"
17	17	248563.137	2315162.545	E84° 34' 57.036"	N20° 55' 11.151"
18	18	248547.514	2315205.654	E84° 34' 56.473"	N20° 55' 12.544"
19	19	248495.476	2315184.438	E84° 34' 54.684"	N20° 55' 11.829"
20	20	248487.538	2315204.282	E84° 34' 54.399"	N20° 55' 12.470"
21	21	248341.969	2315110.445	E84° 34' 49.413"	N20° 55' 9.349"
22	22	248268.879	2315065.796	E84° 34' 46.908"	N20° 55' 7.862"
23	23	248214.375	2315024.455	E84° 34' 45.037"	N20° 55' 6.492"
24	24	248104.653	2315049.899	E84° 34' 41.236"	N20° 55' 7.265"
25	25	248114.574	2314994.336	E84° 34' 41.608"	N20° 55' 5.464"
26	26	248062.319	2314928.852	E84° 34' 39.835"	N20° 55' 3.310"
27	27	247978.314	2314905.7	E84° 34' 36.941"	N20° 55' 2.517"
28	28	247896.693	2314923.049	E84° 34' 34.109"	N20° 55' 3.039"
29	29	247794.864	2314973.445	E84° 34' 30.560"	N20° 55' 4.628"
30	30	247901.182	2315121.807	E84° 34' 34.160"	N20° 55' 9.502"
31	31	247842.903	2315179.214	E84° 34' 32.116"	N20° 55' 11.339"
32	32	247678.240	2315083.98	E84° 34' 26.470"	N20° 55' 8.098"
33	33	247531.726	2315058.498	E84° 34' 21.414"	N20° 55' 7.263"
34	34	247519.159	2314961.263	E84° 34' 21.030"	N20° 55' 4.093"
35	35	247469.382	2314912.434	E84° 34' 19.334"	N20° 55' 2.485"
36	36	247321.708	2314894.648	E84° 34' 14.256"	N20° 55' 1.835"
37	37	247236.323	2314896.093	E84° 34' 10.936"	N20° 55' 1.835"
38	38	247164.881	2314844.716	E84° 34' 8.856"	N20° 55' 0.135"
39	39	247174.854	2314743.023	E84° 34' 9.236"	N20° 54' 56.835"
40	40	247228.142	2314634.521	E84° 34' 11.136"	N20° 54' 53.335"
41	41	247347.753	2314586.515	E84° 34' 15.298"	N20° 54' 51.833"
42	42	247368.479	2314581.456	E84° 34' 16.018"	N20° 54' 51.679"
43	43	247403.271	2314581.193	E84° 34' 17.221"	N20° 54' 51.688"
44	44	247437.613	2314682.051	E84° 34' 18.356"	N20° 54' 54.982"
45	45	247510.514	2314842.773	E84° 34' 20.793"	N20° 55' 0.242"
46	46	247634.926	2314920.636	E84° 34' 25.056"	N20° 55' 2.835"
47	47	247755.740	2314916.849	E84° 34' 29.236"	N20° 55' 2.835"
48	48	247853.643	2314892.753	E84° 34' 32.636"	N20° 55' 2.035"
49	49	247971.547	2314850.97	E84° 34' 36.736"	N20° 55' 0.735"
50	50	248016.511	2314819.094	E84° 34' 38.308"	N20° 54' 59.721"

AGM (Mines)
Jindal Chromite Mines
M/s. Jindal Stainless Ltd.

CO-ORDINATES OF PILLARS BADABAHAL

POINT ID	EASTING	NORTHING	LONGITUDE	LATTITUDE	POINT ID	EASTING	NORTHING	LONGITUDE	LATTITUDE
1	256026.3638	2315161.079	84°39'15.19452"	20°55'14.70540"	29	256066.8561	2314780.329	84°39'16.78788"	20°55'02.34994"
2	255958.8594	2315150.389	84°39'12.86496"	20°55'14.32272"	30	256069.3611	2314786.814	84°39'16.52544"	20°55'02.55684"
3	255886.9439	2315146.522	84°39'10.37916"	20°55'14.16576"	31	256035.7086	2314793.852	84°39'15.70356"	20°55'02.77428"
4	255855.4546	2315125.684	84°39'09.30060"	20°55'13.47384"	32	256047.9861	2314828.879	84°39'16.11072"	20°55'03.91872"
5	255864.7563	2315051.347	84°39'09.65988"	20°55'11.06220"	33	256084.2587	2314835.812	84°39'17.36172"	20°55'04.16136"
6	255894.9352	2315049.464	84°39'10.70460"	20°55'11.01504"	34	256100.4376	2314824.683	84°39'17.92692"	20°55'03.80712"
7	255895.2872	2315034.823	84°39'10.72260"	20°55'10.53948"	35	256121.8108	2314849.457	84°39'18.65376"	20°55'04.62252"
8	255880.9758	2315015.035	84°39'10.23912"	20°55'09.88968"	36	256135.1976	2314865.24	84°39'19.10880"	20°55'05.14200"
9	255868.5363	2315011.87	84°39'09.81072"	20°55'09.78096"	37	256141.5984	2314874.723	84°39'19.32552"	20°55'05.45304"
10	255879.2194	2314951.86	84°39'10.21068"	20°55'07.83552"	38	256156.3014	2314867.173	84°39'19.83780"	20°55'05.21472"
11	255893.6038	2314954.53	84°39'10.70676"	20°55'07.92912"	39	256167.2117	2314881.419	84°39'20.20824"	20°55'05.68308"
12	255901.6015	2314933.969	84°39'10.99872"	20°55'06.93948"	40	256168.437	2314889.465	84°39'20.24640"	20°55'05.94516"
13	255887.0386	2314917.233	84°39'10.49868"	20°55'06.71376"	41	256179.831	2314895.766	84°39'20.63736"	20°55'06.15540"
14	255900.532	2314901.251	84°39'10.97352"	20°55'06.29076"	42	256183.2541	2314909.964	84°39'20.74860"	20°55'06.61836"
15	255901.9936	2314867.622	84°39'11.04084"	20°55'05.10852"	43	256186.6455	2314922.479	84°39'20.15792"	20°55'07.01724"
16	255910.474	2314867.325	84°39'11.33460"	20°55'05.10276"	44	256165.1913	2314938.489	84°39'20.10960"	20°55'07.53528"
17	255916.215	2314805.632	84°39'11.56428"	20°55'03.10044"	45	256202.265	2314937.435	84°39'21.39228"	20°55'07.52016"
18	255949.1342	2314798.919	84°39'12.70620"	20°55'02.89812"	46	256214.4468	2314926.922	84°39'21.81888"	20°55'07.18428"
19	255956.8827	2314805.967	84°39'12.97080"	20°55'03.13068"	47	256207.111	2314913.71	84°39'21.57192"	20°55'06.75156"
20	255985.3707	2314795.681	84°39'13.96260"	20°55'02.74476"	48	256229.7295	2314911.509	84°39'22.35564"	20°55'06.69072"
21	256014.5091	2314778.321	84°39'14.97816"	20°55'02.25948"	49	256231.8917	2314885.217	84°39'22.44348"	20°55'05.83716"
22	256040.1512	2314776.892	84°39'15.86592"	20°55'02.22528"	50	256245.9183	2314879.503	84°39'22.93164"	20°55'05.65824"
23	256054.1045	2314759.561	84°39'16.35732"	20°55'01.66872"	51	256241.9969	2314900.782	84°39'22.78512"	20°55'06.34764"
24	256066.5574	2314747.036	84°39'16.79436"	20°55'01.26768"	52	256228.5788	2314941.377	84°39'22.30056"	20°55'07.66092"
25	256095.2168	2314759.151	84°39'17.77968"	20°55'01.67484"	53	256200.7143	2314970.647	84°39'21.32208"	20°55'08.59872"
26	256101.7069	2314775.304	84°39'17.99604"	20°55'02.20296"	54	256163.8524	2315006.009	84°39'20.02788"	20°55'09.79572"
27	256092.6075	2314783.9	84°39'17.67672"	20°55'02.47800"	55	256142.7805	2315041.796	84°39'19.28196"	20°55'10.98364"
28	256074.8409	2314778.64	84°39'17.06508"	20°55'02.29872"	56	256074.2509	2315119.288	84°39'16.87212"	20°55'13.36980"

CO-ORDINATES OF PILLARS AT CHAMUNDA AND GUNTAPADA

POINT ID	EASTING	NORTHING	LONGITUDE	LATTITUDE
1	262814.0000	2317764.0000	84°43'08.71500"	20°56'42.48960"
2	262791.0000	2317768.0000	84°43'07.91724"	20°56'42.60876"
3	262763.4178	2317777.4904	84°43'07.65048"	20°56'42.91368"
4	262785.6659	2317795.4553	84°43'07.72082"	20°56'43.43352"
5	262796.5805	2317836.7651	84°43'08.07672"	20°56'44.84652"
6	262784.9974	2317859.7878	84°43'07.66452"	20°56'45.59820"
7	262829.9430	2317899.4721	84°43'09.19992"	20°56'46.89996"
8	262842.2677	2317915.0529	84°43'09.61860"	20°56'47.41224"
9	262846.1872	2317910.9531	84°43'09.75648"	20°56'47.28084"
10	262857.0046	2317904.1569	84°43'10.13412"	20°56'47.06520"
11	262882.8798	2317905.7778	84°43'11.02836"	20°56'47.12928"
12	262919.9088	2317887.9845	84°43'12.31824"	20°56'46.56768"
13	262823.5562	2317903.9781	84°43'12.43668"	20°56'47.08968"
14	262946.1422	2317940.8914	84°43'13.19988"	20°56'48.30000"
15	262978.1909	2317958.8954	84°43'14.30004"	20°56'48.90012"
16	262996.2291	2318007.8654	84°43'14.90016"	20°56'50.49996"
17	263054.1963	2318015.3473	84°43'16.89996"	20°56'50.89992"
18	263076.5783	2318007.7489	84°43'17.68008"	20°56'50.53944"
19	263085.5691	2317998.9980	84°43'17.93652"	20°56'50.18820"
20	263092.6193	2317989.1215	84°43'18.24708"	20°56'49.74360"
21	263100.0230	2317981.9463	84°43'18.50412"	20°56'49.70544"
22	263104.7960	2317974.4710	84°43'18.67080"	20°56'49.46460"
23	263099.9147	2317914.0752	84°43'18.53364"	20°56'47.48936"
24	263119.1166	2317911.0653	84°43'19.19964"	20°56'47.41044"
25	263141.4544	2317910.6259	84°43'19.97256"	20°56'47.40648"

POINT ID	EASTING	NORTHING	LONGITUDE	LATTITUDE
26	263196.8013	2317908.0612	84°43'21.88884"	20°56'47.34996"
27	263200.1062	2317957.3236	84°43'21.97860"	20°56'48.93516"
28	263148.7952	2317971.4450	84°43'20.19648"	20°56'49.38684"
29	263145.7265	2318032.1264	84°43'20.06076"	20°56'51.35784"
30	263172.9586	2318033.0187	84°43'20.99184"	20°56'51.39888"
31	263273.1815	2317945.8032	84°43'24.51288"	20°56'48.61068"
32	263295.7002	2317910.5842	84°43'25.30920"	20°56'47.47668"
33	263280.8873	2317852.8273	84°43'24.82536"	20°56'45.59568"
34	263254.3271	2317850.8955	84°43'23.90736"	20°56'45.51720"
35	263251.0843	2317771.0235	84°43'23.83356"	20°56'42.91980"
36	263245.0317	2317716.0491	84°43'23.65212"	20°56'41.13024"
37	263191.0000	2317673.0000	84°43'21.80352"	20°56'39.70608"
38	263117.0000	2317666.0000	84°43'19.24680"	20°56'39.44436"
39	263025.0000	2317656.0000	84°43'16.06368"	20°56'39.40188"
40	263003.0000	2317664.0000	84°43'15.30972"	20°56'39.32664"
41	262979.2211	2317662.7601	84°43'14.48148"	20°56'39.27516"
42	262968.0515	2317666.9177	84°43'14.09304"	20°56'39.40512"
43	262955.7600	2317672.3148	84°43'13.66500"	20°56'39.57504"
44	262952.5834	2317664.3742	84°43'13.55916"	20°56'39.31548"
45	262930.5488	2317669.5432	84°43'12.79416"	20°56'39.47316"
46	262935.6349	2317695.4445	84°43'12.95724"	20°56'40.31736"
47	262865.0000	2317704.0000	84°43'10.50924"	20°56'40.56288"
48	262850.9567	2317706.7783	84°43'10.02180"	20°56'40.64676"
49	262812.0000	2317722.0000	84°43'08.66676"	20°56'41.12940"
50	262813.0000	2317748.0000	84°43'08.68836"	20°56'41.96904"

Financial Outlay for **Compensatory Afforestation Scheme** over an area of **65.645 ha** of non-forest Government land identified in village Serenda, Khamara, Badabahal, Gunthapada and Luhamunda under Kishore Nagar Tahasil of Handapa Range of Athmallik Forest Division of Angul District in lieu of diversion of Lamra PRF of Jamankira (WL) Range of Bamra (WL) Division under Sambalpur District in lieu of diversion of forest land for Jindal Chromite Mines, Kaliapani in Sukinda Range under Jajpur District of **M/s Jindal Stainless Steel Ltd.**

(Wage Rate @ Rs.311/- per MD)

Sl. No.	Description	Amount (Rs.)
A.	**PLANTATION ACTIVITIES:** **(To be deposited in Adhoc-CAMPA)**	
1.	Cost of Block Plantation @ 1000 plants per ha over 65.645 ha @ Rs.1,53,933.15 per ha without provision of fencing with 10 years maintenance (1 years 6 months old seedling)	1,01,04,942.00
2.	Cost of GI Chain Link Mesh fencing over 10.2 Km @ Rs.9,62,435/- per RKM	98,16,837.00
3.	Soil Conservation Measures:	
	i. Cost of staggered trench of size 2.5 mt X 0.5 mt. X 0.5 mt @ 100 nos. per ha @ Rs.62.20 per staggered trench over 65.645 ha	4,08,312.00
	ii. Cost of LBCD with size 10'X10'X5' (Procured from quarry) for 163 nos. @ Rs.680.05 per Cum X 9.90 Cum= Rs.8712.50 each over 65.645 ha	14,20,138.00
	Total (SMC)	**18,28,450.00**
	Total (1+2+3)	**2,17,50,229.00**
4.	Add Escalation Cost (20%)	43,50,046.00

Your Signature will appear here

	Total (A)	2,61,00,275.00 Or rounded off to 2,61,00,300.00
B.	**INFFRASTRUCTURE (To be provided in kind):**	
5.	Cost of one Solar Plant	7,50,000.00
6.	Vehicle mounted LED wall for awareness	2,50,000.00
	Total (B)	10,00,000.00
	Grand Total (A+B)	2,71,00,300.00

(Rupees Two Crore seventy one lakh three hundred) only

Technically Approved

Chief Conservator of Forests

Forest Diversion & Nodal Officer, FC Act

Chief Conservator of Forests
Forest Diversion & Nodal Officer, FC Act

O/C

ANNEXURE-II

OFFICE OF THE PRINCIPAL CHIEF CONSERVATOR OF FORESTS (WILDLIFE) & CHIEF WILDLIFE WARDEN, ODISHA, BDA APARTMENT, 5TH FLOOR, PRAKRUTI BHAWAN, NILAKANTHA NAGAR, BHUBANESWAR-12

Ph. No.0674-2564587, FAX No.0674-2565062

(Website: odishawildlife.org, E-mail: odishawildlife@yahoo.co.in)

Memo No. 7224 /1WL-SSP-34/2016

Dated, Bhubaneswar, the 12th Sept, 2016

To

The Principal Chief Conservator of Forests, Odisha, Bhubaneswar

Sub: ***Site Specific Wildlife Conservation Plan in respect of Kaliapani Chromite Mines of M/s Jindal Stainless Ltd. in Jajpur District***

It is to inform that M/s Jindal Stainless Ltd. have to implement a Site Specific Wildlife Conservation Plan for their Kaliapani Chromite Mines in Jajpur District in compliance to the Specific condition No.(xxvi) of the Environmental Clearance granted by Govt. of India, MoEF&CC in their letter in F.No. J-11015/369/2009.IA-II(M) dt 24.02.2016.

2. The Site Specific Wildlife Conservation Plan in respect of the above project has been approved by the undersigned with financial forecast of **₹584.1312 lakh** (Rupees five crore eighty-four lakh thirteen thousand one hundred twenty) only for the following activities.

a.	For activities to be implemented by the user agency in project area	₹145.032 lakh
b.	For activities to be implemented by DFO, Cuttack Division in project impact area	₹439.0992 lakh
	Grand Total:	**₹584.1312 lakh**

3. Various activities in the lease hold area will be executed by the Project proponent under the guidance of the Divisional Forest Officer, Cuttack Division. A sum of ₹439.0992 lakh only will be deposited by the User Agency in the CAMPA fund for implementation of various activities within the project impact area by the Forest Deptt. as envisaged in the plan.

4. The User Agency may be advised to note the following conditions for future compliance.

- This Plan may be revisited after 5 years and the User Agency will give an undertaking to contribute towards the revised cost of the conservation plan, if necessary.

P.T.O.

- The project proponent has to prepare and submit the Conservation Plan for the next 10 years. If there would be need for Site Specific Wildlife Conservation Plan after expiry of the present plan period, the user agency will have to submit another such plan at least one year before the expiry of the present Conservation Plan and deposit the outlay amount upon its approval. In case of delay, it will be dealt as per law for violations of Forest Conservation Act, 1980 and Environment (Protection) Act, 1986.
- The project proponent has to give an undertaking to bear the differential cost in case of enhancement of wage rate during the time of implementation of this plan.

Encl: 2 copies of approved site specific WL Conservation Plan

Principal Chief Conservator of Forests (WL)
& Chief Wildlife Warden, Odisha

Memo No. 9227 /date 12.09.16

Copy forwarded for information and necessary action to

1. Special Secretary to Govt. of Odisha, F&E Deptt., Bhubaneswar
2. Regional Chief Conservator of Forests, Angul Circle with reference to his memo No.3866 dt.06.08.2016
3. Divisional Forest Officer, Cuttack Division with reference to memo No.3867 dt. 06.08.2016 of the RCCF, Angul Circle alongwith a copy of the approved site specific wildlife conservation plan
4. M/s Jindal Stainless Ltd., 6th Floor, IDCO Tower, Janpath, Bhubaneswar, Odisha-751022 alongwith a copy of the approved site specific wildlife conservation plan

Principal Chief Conservator of Forests (WL)
& Chief Wildlife Warden, Odisha

SITE SPECIFIC WILDLIFE CONSERVATION PLAN

FOR

JINDAL CHROMITE MINES - KALIAPANI OVER 89.00 HA IN JAJPUR DISTRICT OF CUTTACK FOREST DIVISION

M/S Jindal Stainless Limited

Prepared by

Centre For Envotech and Management Consultancy Pvt. Ltd.

AN ISO: 9001: 2008 and BS OSHAS 18001: 2007 certified company,
Empanelled with OCCL, Govt. Of Odisha, OSPCB as Category "A" Consultant Organization,

Accredited by NABET, Quality Council of India for EIA studies As Category "A" Consultant Organization. Accredited consultant for preparation of Good Quality Site Specific Wildlife Conservation Plan vide Chief Wildlife Warden Odisha Letter no. 6584 dt.28/07/2015.

CEMC

gd. Off: N5/305, IRC Village, Bhubaneswar, Odisha Tele: 0674 - 2360344,

CONTENTS

PREFACE

From: Suraj Kumar Dash
CEMC Pvt.Ltd.Bhubaneswar

Jindal Chromite Mining Lease of M/s JSL Limited over 89 ha in Jajpur District of Cuttack Forest Division was granted to Jindal Strips Limited in the year 2001 vide order no. **9837** Dt. 06.08.2001 of Government of India, Steels and Mining Dept. This lease was executed on 04-01-2002 for a period of 20 year ending 03.01.2022. The lease includes Forest Block no 27 of Sukinda Range in Cuttack Forest Division & found in Survey of India Topo Map-73G/16 in Jajpur District, Odisha. Initially the lease area of 89 ha included 24.24 ha of forest land and 64.76 ha of Non forest land. MoEF has granted Environmental Clearance for 22.80 ha in 2001. But according to the Sabak Kissam of Forest Land as on 25.10.1980 of Jajpur Dist. the non forest land of 64.76 ha was considered as forest land. Hence, the lessee has applied for diversion of the remaining forest land over 64.76ha to MoEF.

In the year 2008 the name of the company was changed from Jindal Strips Limited to Jindal Stainless Limited. Accordingly, MoEF transferred the EC to JSl Limited vide their letter no J-11015/12/2000-IA.II (M) (Pt.) dated 16-11-2009 and the SPCB, Odisha granted Consent to operate in favour of Jindal Stainless Limited vide their letter no. 5671/IND-I-CON-2562 dt.30-03-2015. Again Govt. Of India MoEF vide their letter no J-11015/369/2009.IA-II (M) DT.24-02-2016 granted Environmental clearance to M/S JSL Ltd. for enhancement of its beneficiation plan from 36000TPA to 60000 TPA with **xxviii** no of conditions. As per condition no **xxvi** of the above letter (J-11015/369/2009.IA-II (M) DT.24-02-2016), the User Agency has intended to preparation of Site Specific Wildlife Conservation Plan by CEMC Pvt. Ltd. BBSR.

We feel obliged to D.F.O., Cuttack Forest Division for guiding us in preparation of this Plan. We feel also obliged to Range Officer, Sukinda and their staff for providing us field data for strengthening this plan. We are thankful to the AGM and Surveyor of the Jindal Stainless Limited for providing us documents and accompanying during field visits which has given fruitful inputs to this Plan.

Your's faithfully

Suraj Kumar Dash

Suraj Kumar Dash, M. Sc.

(Wildlife & Biodiversity conservation)

Executive summary

I Jindal Chromite Mining Lease of M/s JSL Limited over 89 ha in Jajpur District of Cuttack Forest Division was granted to Jindal Strips Limited in the year 2001 vide order no 9837 of Government of India Steels and Mining Dept. Accordingly the lease was executed on 04-01-2002 for a period of 20 years. The Mining plan was approved by IBM vide their letter no 314 (3)/99-MCCM (C) MP-7 dt. 28-12-1999. Collector Jajpur granted Surface Right vide letter no 553/ 2002- mining dt. 24-02-2002.

II The lease is located in Sukinda Tahasil of Jajapur District and coming under Forest Block no 27 of Sukinda Range in Cuttack Forest Division. This lease is located in Survey of India Topo Maps-F45N16 (73G/16) and bounded by latitude 21°01'12" to 21°02'46" North and longitude 85°45'42" to 85°47'16" East and the altitude ranges from 310 MSL to 116 MSL The total forest land involved in this project is 89 ha which is located in Mahagiri DPF and Forest Kissam Land under Sukinda Range.

III MoEF has granted Stage II approval for diversion of 22.80 ha of forest land vides their letter No. 8-68/2000-FC/2327 Dt.5.7.2001. Now the Project Proponent is preparing to submit proposal for diversion of balance forest land over 66.20 ha.

IV Damsala nalla, Pandra nala and other small nalas / wetlands are present in the buffer zone being the major drainages system of this area. No natural drainage is present in the core zone of the project. Besides, within the radius of 10 km of the project area there are other 11 Chromite mines are in operation.

V There are 39 villages located in the buffer zone of this project area in which most of the people belong to SC & ST category. They mostly depend on cultivation for their livelihood. Khariff is the major crop in this area, where as other vegetables and paddy also grown in rabi season. They also depend on the nearest forest area for different purpose like collection of NTFP and collection of small timber etc.

VI The Railway station "Sukinda Road" is the nearest one and NH 200 is the nearest roadways. Bhubaneswar International Airport is the nearest Airport to this Mine.

VII According to 'India State of Forest Report -2015' Jajpur District has only 297 sq km of forest area. This includes 6 km^2 of very dense forest, 72 km^2 of moderately dense forest and 219 km^2 of open forest. It is remarked that the forest area of this district has increased to 297 km^2 from 296 km^2 as on the report of 2014-15. According to the approved Working Plan of Cuttack forest Division the forest types of this area is an admixture of Dry Peninsular Sal Forest, Dry Deciduous Shrub Forest and Southern Moist Mixed Deciduous Forest. Accoridng to Champian & Seths classification they are 5B/C1, 5DS1 and 3B/C2.

VIII According to the survey report of flora and fauna there are 25 species of trees, 12 shrub, 5 herb, 5 mammals, 3 reptiles and 25 species birds are found in the core

zone of this project. Likewise in the buffer zone 105 species of tree, 19 shrub, 3 herb, 15 mammals, 5 reptiles and 24 species of birds are found. As far as the field observation there is no endemic species found either in the core or in the buffer zone of this project. But Schedule-I species like Elephant, Bear, Ratel, Pangolin and Python are noticed. Basing upon the elephant census report 2015, there are 35 elephant present in the Forest Division, which includes 12 male, 13 female9 young and 1 unknown..

IX Out of the total area of 89.00 ha of this lease - 87.56 ha has been broken leaving aside 01.44 ha as Safety Zone. Except a 7.5m barrier of safety zone all Chromite lying in the area have to be excavated up to a depth of 58m from surface level in quarry I and in case of quarry II the depth is up to 55m by open cast mining method. The most common type of explosive which is readily available is Nitroglycerine based gelatinous explosive & Ammonium nitrate fuel oil mixture (ANFO) which is being used for blasting.

X The anticipated degradation due to this mining project are Air pollution, Noise pollution, Accidental death of wildlife, Litter generation, Habitat degradation and Fragmentation of habitat etc. In view of these, mitigation measures like Improvement and Protection to Habitat, Awareness promotion, Protection to Animals by creating Anti-Depredation Squad and infrastructure are provided in the core area of this project. Where as in the buffer area mitigation measures like Wildlife Habitat Improvement, Fire protection Measures, Wildlife Protection, Anti-depredation and Compassionate grant have been proposed. The total cost of this plan is Rs. **584.1312**lac including cost escalations of 20% over a Plan period of 10 years. Out of this Rs. **145.032** lac is for core zone and Rs **439.0992** for the buffer zone.

XI CEMC Pvt. Ltd. is an accredited consultant for preparation of Site Specific Wildlife Conservation Plan by the Chief Wildlife Warden Odisha. The Experts visited the Project area in months of January and February to the site for collection of field data and interacting to the Mine Management, Local people vis-avis forest field executives.

Unit Manager
Kalapani Chromite Mines
M/s Jindal Stainless Ltd
Kalapani

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IX Out of the total area of 89.00 ha of this lease - 87.56 ha has been broken leaving aside 01.44 ha as Safety Zone. Except a 7.5m barrier of safety zone all Chromite lying in the area have to be excavated up to a depth of 58m from surface level in quarry I and in case of quarry II the depth is up to 55m by open cast mining method. The most common type of explosive which is readily available is Nitroglycerine based gelatinous explosive & Ammonium nitrate fuel oil mixture (ANFO) which is being used for blasting.

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XI The total cost of this plan is Rs. **580.2912** lac including cost escalations of 20% over a Plan period of 10 years. Out of this Rs. **142.5120** lac is for core zone and Rs **437.7792** for the buffer zone.

XII CEMC Pvt. Ltd. is an accredited consultant for preparation of Site Specific Wildlife Conservation Plan by the Chief Wildlife Warden Odisha. The Experts visited the Project area in months of January and February to the site for collection of field data and interacting to the Mine Management, Local people vis-avis forest field executives.

Manager
Kaliapani Chromite Mine
M/s Jindal Stainless Ltd
Kaliapani

CHAPTER-1

a) Location of the Project and its impact area around with reference to forest block, beat, forest range etc. Extent of project area and land schedule, proposed land use pattern of the project area. Location of the project area should be shown with reference to latitude and longitude. Status of Forest Diversion Proposal (if any) and Environmental Clearance should be mentioned.

Introduction:

The commitment to Industrial development of the State of Odisha is focused through the exploitation of rich mineral resources. A substantial industrial base already exists for value addition to mine minerals comprising of large, medium and small-scale enterprises in Iron, Manganese, Chrome, Bauxite, Dolomite, Coal etc. The thrust is on processing of mine minerals. Odisha is one of the country's richest state in mineral reserves and contributes almost 30% of the country's reserves. The mineral belt of Odisha is spread over more than an area of 6,000 sq km. The major minerals found in the state are Iron (33%), Coal (24%), Bauxite (60%), Manganese (28%), Nickel (92%), **Chromite (98%)**, Lime stone (01%), Dolomite (09%), Graphite (65%), decorative stones and beach sand (all % are against the reserve of the country's total and are in nearest approximate). Out of the total 213 million tonnes of Chromite reserve in the country, Odisha's contribution is 203 million tonnes. The harvest of Chromite in the State started since 1942 and at present the total output is around 4 million tonnes (2006-07 figures) that is around 99% of the country's total production. The Chromite belt of the State is mostly located in and around Jajpur-Dhenkanal Districts (as Sukinda Ultramafic Belt) and in Keonjhar District (as Boula-Nuasahi Igneous Complex). The present Chromite mine "Jindal Chromite Mines." of **M/s Jindal Stainless Ltd** is located in Village Kaliapani in Sukinda Tahasil of Jajpur District of the State. The mining lease area comes under the jurisdiction of Cuttack Forest Division.

Mining is the most important part of industry, which act as a vital support to the backbone of not only the country's economic condition but also to its development. But during the process there are some unwanted pollutants arises which play significant role for pollution of our environment. Hence, sustainable development is the key issue that to be concerned during the process of mining.

The Jindal Chromite Mine over 89.00 ha was granted to **M/s Jindal Strips Ltd** by Govt. of Orissa in Steel & Mines Dept. vide Proceeding No.III (G)SM-13/2001-9837/SM Dt.06.08.2001 (**Annexure-I**), which was executed on 04.01.2002 for a period of 20 years. Subsequently the lease was transferred to **M/s Jindal Stainless Ltd.** and lease Deed executed on 26.12.2007. The targeted capacity of the mine was

0.10 million tones/Annum as mentioned in the Mining Plan approved by IBM vide their letter No.314 (3)/99 Dt.29.12.2000.

Forest Block, Beat, Forest Range etc.:

The lease area is located in Sukinda valley of Jajpur District of Odisha in Forest Block No.27 of Sukinda Range, Ransol Section and Ransol of Cuttack Forest Division. This lease area find place in Survey of India Topo Sheet No. F45N16 (73G/16), and bounded by latitude 21°01'12" to 21°02'46" North and longitude 85°45'42" to 85°47'16"East. The area is well connected with Duburi and Sukinda town by an all-weather road. Through Railways, Sukinda-road is the nearest Railway station. It is at a distance of 45 km from the mines. The nearest Airport is Biju Pattanik International Airport, Bhubaneswar which is around at a distance of 250 km from the project. Two Demarcated Protected Forest i .e. Mahagiri DPF, Daitari DPF and two Reserve Forest i.e. Dhalpara RF & Birasal RF are present within 10 km radius of the project. In between these Mahagiri DPF and Daitari DPF are present in the Cuttack Forest Division. No National Park, Wildlife Sanctuary, Natural Heritage or Natural Monument is located within 10 km radius of this cluster of mines. But a proposed Tiger corridor is passing through Daitari DPf over 22.72 sq km (2272Ha) Within 10 K.M. radius, there exist another 11 Chromite mines i.e. B.C.Mohanty-107.240 ha, MML-246.958 ha, OMC-Sukrangi-382.709 ha, OMC-South Kaliapani-552.457 ha, ICCL-73.777 ha, IMFA-116.760 ha, TISCO-406.0 ha, OMC Kaliapani-936.220 ha, ICCL-26.622 ha, FACOR-72.843 ha, IDC-65.683 ha.

Extent of Project area

The total area involved in this lease is 89.00 ha. The entire area of this project is forest land. The land Schedule has been furnished in **Annexure –II**.

Land schedule of the project area:

Abstract of the land scheduled for 89.00 ha of the M.L. is furnished below

Sl No.	Plot No.	Khata No.	Tenant	Area in Acre	Kissam
1	884(P0)	55	Abada Jogya Anabadi	21.01	Patharabani
2	887(P0)	55	-Do-	28.46	-Do-
3	888(P)	55	-Do-	18.63	-Do-
4	889(p)	55	-Do-	6.00	-Do-
5	890(p)	55	-Do-	39.09	-Do-
6	891(p)	55	-Do-	7.56	-Do-
7	892(p)	55	Sarba Sadharana	1.13	Road
8	893(p)	55	Abada Jogya Anabadi	29.40	Patharabani
9	894(p)	55	-Do-	8.74	-Do-
Total				160.02 ac or 64.760 ha	
10	Forest block No. 27			59.90 ac or 24.240 ha	
Grand Total				**219.920 ac Or 89.00 ha**	

N:B:- The non-forest land of this lease has been treated as forest in the DLC report of Jajpur District.

Land Use Pattern of the Project Area:

According to the mining plan, land use pattern of 89.00 ha of the mining lease is furnished below:

Sl. No.	Head	Area put on use at start of proposed scheme period(ha)	Land use of the proposed scheme period (ha)	Land use at the end of proposed conceptual period (ha)
1.	Area under mining	23.692	28.692	33.883
2.	Storage for Top Soil	0.000	0.000	0.000
3.	Waste Dump Site	27.594	28.782	36.398
4.	Back Filling	8.240	8.240	8.240
5.	Mineral Storage	2.831	2.831	2.331
6.	Infrastructure (Workshop, Admin, Building etc.)	1.560	1.560	1.560
7.	Roads	2.668	2.668	1.919
8.	Railways	0.000	0.000	0.000
9.	Green belt/Safety zone	5.040	4.275	1.899
10.	Tailing point	0.700	0.700	0.700
11.	Effluent treatment	0.100	0.600	0.600
12.	Mineral Separation Plan	1.470	1.470	1.470
	Grand Total	**73.895**	**79.818**	**89.000**

Part of Safety zone area (0.765 in scheme period & 3.141 ha) shall be used for joint mining & dumping and the balance area of 4.275ha and 1.899 ha shall be left as green belt.

Status of Forest Diversion Proposal and Environmental Clearance:

The area involved in this mining project (89.000) ha is coming under forest category. This lease was granted on 06.08.2001 when 22.80 ha was forest land and the remaining non forest. Subsequently in 1998 the non forest land of the lease area was found Forest Kissam in Sabak record included Jajpur District (Old Cuttack District). MoEF vide their letter no 8-68/2000-FC/2327 dt. 05-07-2001 **(Annexure- III)** granted diversion over 22.80 ha. Accordingly the lease was executed on 04-01-2002.Now the lessee is

preparing proposal for diversion of balance forest land measuring of 66.20 ha which will be submitted to MoEF & CC for approval as per Guideline issued by MoEF vide their letter No.11-362/2012-FC Dt.01.02.2013.

Government of India, MoEF has already granted Environmental Clearance to M/s Jindal Strips Ltd vide their Letter No. J-11015/12/2000-IA.II (M) on dated 13-02-2001 for 89 ha (**Annexure-IV**). On date 31-11-2008 the name of the company was changed to M/S Jindal Stainless Steel Ltd. from M/S Jindal Strips Ltd. vide letter no. VSL-59/04 (Pt.I) by Dept. of Steel and Mines. Hence, as per the application of M/S JSL Ltd, MoEF Government of India has transferred the Environmental clearance to M/S Jindal Stainless Steel Ltd. vide letter no. J-11015/12/2000-IA.II (M) (Pt.) dated 16-11-2009 (**Annexure-V**). Again as per the application of M/S JSL Ltd., Government of India MoEF vide their letter no. J-11015/369/2009.IA-II (M) DT.24-02-2016 (**Annexure-VI**) has granted Environmental clearance for enhancement of the beneficiation plant from 36000TPA to 60000 TPA with xxviii No. of conditions. According to the condition no. XXVI, this Site Specific Wildlife Conservation plan has been prepared.

b) Villages and habitation within the project area and the project impact area of 10 km radius. Demographic & occupational profile of these villages along with existing cropping pattern adopted by the villagers. on the study area especially on the forest growth. Number of family depending on the NTFP collection, the method of collection, and its impact on the wildlife of the area. The extent of biotic pressure by these villagers. Information about the cattle population and dependency on the forest for grazing.

Villages and habitation profile: According to human census report 2011 there are 39 villages located within the 10 km periphery of the mining lease. The list is furnished below.

Sl. No.	Village Name	No. of House holds	Population									Literacy			Worker		
			Total	Male	Female	SC			ST								
						Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
1.	Kamarda	152	697	339	358	51	25	26	485	234	251	242	156	86	285	150	55
2.	Rankia	371	1946	928	1018	0	0	0	1338	631	707	642	363	279	1031	514	517
3.	Pimpudia	508	2461	1272	1189	29	15	14	1205	620	585	1148	700	448	1155	704	451
4.	Bambilo	392	2117	1102	1015	247	132	115	374	192	182	1444	830	614	593	544	49
5.	Giringamala	440	2404	1199	1205	56	28	28	1222	608	614	1039	617	422	916	556	360
6.	Jemadeipur	94	395	195	190	176	89	87	0	0	0	201	129	72	97	90	7
7.	Bambilo	392	2117	1102	1015	247	132	115	374	192	182	1444	830	614	593	544	49
8.	Gantayatkateni	89	461	232	229	0	0	0	416	208	208	172	115	57	229	123	106
9.	Kakudia	135	643	323	320	5	2	3	508	256	252	365	212	153	290	176	114
10.	Ransol	199	926	461	465	69	31	38	97	48	49	637	348	289	348	265	83
11.	Kusumundia	130	653	377	326	52	26	26	555	279	276	344	209	135	84	73	11
12.	Kaliapani (CT)	1142	5028	2666	2362	351	191	160	2005	1014	991	3175	1892	1283	1777	1433	344
13.	Kaliapani (CT) WARD NO. 0001	1142	5028	2666	2362	351	191	160	2005	1014	991	3175	1892	1283	1777	1433	344
14.	Deogan	124	735	363	372	0	0	0	686	344	342	101	75	26	336	185	151
15.	Saruabil	317	1542	789	753	48	25	23	879	440	439	811	505	306	564	386	178
16.	Patana	82	471	224	247	113	59	54	309	142	167	228	137	91	119	96	23
17.	Gurujanga	236	1115	576	539	42	22	20	615	313	302	516	342	174	347	273	74
18.	Gurujanga Pal	105	512	265	247	13	6	7	409	211	198	79	64	15	148	113	35
19.	Sukarangi	97	471	243	228	14	5	9	326	164	162	230	135	95	106	98	8
20.	Talangi	133	636	298	338	0	0	0	580	270	310	245	161	84	131	114	17
21.	Ostapal	192	969	478	491	3	1	2	585	283	302	399	246	153	278	216	62
22.	Ragada	460	2180	1117	1063	1147	590	557	974	495	479	1005	600	405	907	594	313
23.	Kalarangiata (CT)	1256	5505	2882	2623	153	85	68	2068	1017	1051	3610	2058	1552	1764	1454	310
24.	Kansa	212	1144	581	563	0	0	0	1106	565	541	267	167	100	361	284	77
25.	Nuadihi	121	671	328	343	36	18	18	51	23	28	452	245	207	212	185	27
26.	Saruabil	317	1542	789	753	48	25	23	879	440	439	811	505	306	564	386	178
27.	Chingudipur	36	178	100	78	16	12	4	0	0	0	139	78	61	51	50	1

28.	Dhalapada	188	747	386	361	1	0	1	239	113	126	573	307	266	242	212	30
29.	Baruan	290	1323	669	654	326	147	179	5	3	2	1101	576	525	400	378	22
30.	Khoksa(L)	71	296	157	139	32	16	16	93	51	42	236	138	98	97	92	5
31.	Khoksa(R)	92	333	180	153	0	0	0	0	0	0	259	149	110	110	107	3
32.	Anala	360	1487	766	721	215	107	108	80	41	39	1112	627	485	489	446	43
33.	Kanhepal	396	1875	955	920	221	105	116	747	375	372	1352	776	576	668	528	140
34.	Konapal	190	1087	506	581	87	18	69	656	319	337	721	383	338	488	298	190
35.	Maruabili	393	2119	1008	1111	315	150	165	698	286	412	1411	738	673	1053	610	443
36.	Kharakhari	197	991	511	480	17	11	6	595	306	289	506	328	178	474	258	166
37.	Kampulei	222	939	470	469	65	31	34	296	147	149	535	308	227	512	338	174
38.	Katoni No-02	17	59	31	28	0	0	0	10	5	5	37	22	15	35	17	18
39.	Sendhasar	337	1507	770	737	31	14	17	1034	521	513	773	472	301	580	409	171

Demographic Profile: The villages located adjoining to the mining is thickly populated with pre-dominance of tribal, as Sukinda, Duburi, etc. are mostly tribal belts. The Demographic Profile has been furnished in the given table.

Occupational Profile: As the peoples are mostly SC & ST, the literacy rate is low. Main workers are mostly male and marginal workers largely female. The main occupation of the people of this area is cultivation. But after establishment of industries like TATA STEEL, Jindal, Visa etc. villagers are mostly interested to work in the plant than to work for agriculture.

Existing Cropping Pattern: In this area basically people used to depend on Kharif in which most of the land is rain-fed and extensive irrigation facilities are not available. Paddy is the main crop. In high land finger millet and maize are grown. Vegetable like pumpkin, snake gourd, ridge gourd, bitter gourd, tomato, radish, French bean, cabbage and onion are grown in pockets for their domestic use.

Extent of biotic pressure of villages on Forest resources: During last one decade a number of steel plants and ancillary plants have come up in the Kalinga Nagar area like TATA Steel, B.R.P.L., Mid-East, Jindal, Visa, Dinabandhu Steel, MIL, Rehab, Uttam Galva, and NINL. The workers mostly depend on adjoining Forests for collection of firewood for their bonafied use.

The villages adjoining to the project area are thickly populated with cattle. The village cattle herd normally visit daily to the adjoining forest area. Their trampling effect cause damage to the regeneration of prominent species like Sal (*Shorea robusta*- Diptrocarpaceae), Bija (*Pterocarpus marsupium*- Favaceae). So the Forest now existing is gradually loosing the proportion of commercial species like Sal. The cattle that visit to Forest for grazing every morning mostly suffer from seasonal disease like FMD. This disease possibly may contaminate to hoof Wildlife like Chital, Gaur, Sambar, Wild boar etc.

NTFP Collection (Method of Collection and Impact on Wildlife): As per recent policy of the State Govt., collection and marketing of NTFP like Amla, Kusum seeds, Myrabolans, Creepers, Tamarind etc. (39 species) have been handed over to the concerned Gram Panchayats so that the rural poor particularly the tribal get the benefit at their door step. The tribal who normally collect NTFP do not follow the scientific method of collection rather prefer to cut the young tree or brake the branches of the tree for collection. This result in reduction of proportion of NTFP species in the Forest area and wildlife are deprived of their food like nuts and fruits of various edible species.

Number of families depending on NTFP collection

Mostly SC & S.T. population comprising major proportion of the total population in the ZoI are in habit of collecting NTFP like Sal seed/ leaf, Mahua flower during winter, Myrabolans (Amla, Harida & Bahada) during summer, Siali leaves throughout the year for preparation of leaf plates, Siali fiber mostly for tying the Fuel-Wood collected from the Forests and Suamalol for thatching hutments.

Method of NTFP collection: NTFP collectors follow the age old methodology like sweeping the surrounding of the floor of the tree from where fruits, nuts etc. of the plant to be collected for the commercial purpose and set fire to the derbies. These methods are very harmful for the forest as the fire spread to an extent where large chunk of Forest areas are damaged and as a result the herbivore suffer from deficiency of food. Besides, they prefer to fell the young trees and collect NTFP mostly Amla.

Impact on Wildlife: Large scale collection of NTFP for commercial purpose affects the food requirement of wildlife. Sometimes to collect honey small trees are cut. These are harmful practices affecting Forest cover and destroying perch / nest of birds. Therefore, such un-scientific method of collection of NTFP adversely affects habitats of wildlife.

Cattle Population and Grazing Habit: The last census of cattle in the State was done by Animal Husbandry Dept. during 2007. Experts tried to collect the village wise cattle population from the local Veterinary Assistant Surgeon but he could not provide the data. Therefore, we contacted the District Veterinary Officer, Jajpur who could provide us District wise data and expressed that though village wise data was collected but not readily available.

Name of the District	Description of Cattle	Indigenous Breed	Total
Jajpur	Buffalo	15994	15994
	Cattle	636847	636847
	Sheep	68474	68474
	Goat	257687	257687
	Poultry	821667	821667
	Pig	10575	10575

Local variety cattle, Buffalo, Sheep and Goat mainly depend on adjoining forest for grazing. The rest are stall-fed excepting pigs. Therefore, it is evident that dependency of cattle on the forest is almost assured.

c) Description of topography, natural drainage lines, whether the particular landscape is the source of origin of any stream/river presence of water bodies, if any in the study area:

The lease area is situated in a valley and is largely covered with alluvium and thick horizon of laterite. The valley lies in between Mahagiri DPF on southern side and Daitari DPF in northern side. The topographical pattern of both the area is partly hillock on the northern aspect and plain on the southern aspect. The maximum elevation of this area is 310 MSL on the southern side and the minimum elevation is 116 MSL is on northern side.

In the buffer zone of the project the major natural drainages are Damsala Nala and Pandra Nala. Besides there are other small wetlands like pond, water reservoir and tributaries of Nalas like Langalkantia nala, Karchamula nala etc. are present within the periphery of the project. Damsala Nala and Pandra Nala are the main perennial Nalas. Damsala Nala flows in the south west direction and located towards the northern side of the project whereas Pandra Nala is present in the south side of the project. But in the core zone no natural drainage exists.

d) The details of linear infrastructures such as Roads, Rail Lines, Water ways and Canals and other developmental structures developed in the Project Impact Zone and adversely affecting the movement of mega fauna in the area and possible ameliorating measures.

i. The major water ways like Damsala Nala and Pandra nala are present in the buffer zone of the mining area. In addition other small nalas like Langalkantia nala, Karchamula nala are also present in the buffer zone.

ii. In addition 11 Chromite mines i.e. B.C.Mohanty-107.240 ha, MML-246.958 ha, OMC-Sukrangi-382.709 ha, OMC-South Kaliapani-552.457 ha, ICCL-73.777 ha, IMFA-143.382 ha, TISCO-406.0 ha, OMC Kaliapani-936.220 ha, FACOR-112.161 ha, IDC-65.683 ha and Balasore alloys-100.065 are located within the periphery of the mining project.

By summarizing the above infrastructure there are 11 other mines and four nalas present within the ZoI of the project.

e) Description of flora and fauna of the project area as well as project impact area of 10 kms or more radius showing the details of endemic, threatened, and schedule species. Old records including the working plans must be referred to.

As per the field study the list of the flora and fauna observed in the core zone as well as in the buffer zone of the study area are listed below.

List of flora in the core zone:

Sl. No.	Local Name	Scientific Name	Family
01	Baruna	*Crateva magna*	Capparidaceae
02	Char	*Bucahnania lanzan*	Anacardiaceae
03	Chakunda	*Cassis siamea*	Caesalpiniaceae
04	Chhatian	*Alstonia scholaris*	Apocynaceae
05	Dhaura	*Anogeissus latifolia*	Combretaceae
06	Jamu	*Syzygium cumini*	Myrtaceae
07	Kalicha	*Diospyros sylvatica*	Ebenaceae
08	Kusuma	*Scleichera oleosa*	Sapindaceae
09	Kendu	*Diospyros melanoxylon*	Ebenaceae
10	Kochila	*Strychnos nuxvomica*	Loganiaceae
11	Kumbhi	*Careya arborea*	Lecythidaceae
12	Kasi	*Bridelia retusa*	Euphorbiaceae
13	Kurum	*Adina cordifolia*	Myrsinaceae
14	Kangara	*Xylia xylocarpa*	Mimosaceae
15	Mahul	*Madhuca indica*	Sapotaceae
16	Moi	*Lanea coromandelica*	Anacardiaceae
17	Neem	*Azadirachta indica*	Meliaceae
18	Palas	*Butea monosperma*	Fabaceae
19	Jack Fruit	*Artocarpus heterophyllus*	Moraceae
20	Sal	*Shorea robusta*	Dipterocarpaceae
21	Sidha	*Lagerstroemia parviflora*	Lythraceae
22	Simili	*Bombax ceiba*	Bombocaceae
23	Tamarind	*Tamaridus indica*	Caesalpiniaceae
24	Jari	*Ficus virens*	Moraceae
25	Dimiri	*Ficus lanceolata*	Moraceae
		Shrub	
1	Ankukhuli	*Carissa apaca*	Apocynaceae
2	Ankul	*Alangium salvifolium*	Alangiaceae
3	Arakha	*Calotropis gigantea*	Asclepiadaceae
4	Asadhua	*Capparis zeylanica*	Capparaceae
5	Atundi	*Combretum decandrum*	Combretaceae
6	Bichhuati	*Mucuna purita*	Fabaceae
7	Baidhanka	*Mucuna monosperma*	Fabaceae
9	Chadeigudi	*Vitex peduncularis*	Varbenaceae
10	Chakunda	*Cassia tora*	Caesalpiniaceae
11	Dhatuki	*Woodfordia fruticosa*	Lythraceae
12	Gaigutia	*Dimorhocalyx glabellus*	Euphorbiaceae
		Herbs	
1	Basanga	*Adhatoda vasia*	Acanthaceae
2	Chirelta	*Andrographis paniculata*	Acanthaceae
3	Lajakuli	*Mimosa pudica*	Mimosaceae

4	Shialkanta	*Argemone mexicana*	Papavaraceae
5	Salaoarni	*Desmodium gangeticum*	Fabaceae
		Grass & Epiphytes	
1	Salia – Bans	*Dendrocalamus strictus*	Poaceae
2	Duba	*Cynodon dactylon*	Poaceae
3	Malanga	*Loranthus excels*	Loranthaceae
4	Rasna	*Vanda roxburghii*	Lamiaceae

Fauna in Core Zone:

Sl.No	Local Name	English Name	Scientific Name	Schedule
		Mammal		
1.	Neula	Common Mongoose	*Herpestres edwardsii*	IV
2.	Bilua	Jackal	*Canis aureus*	II
3.	Thekua	Indian Hare	*Lepus nigricollis*	IV
4.	Jhinka	Indian Porcupine	*Hystrix indica*	IV
5.	Gundichi Musa	Squirrel	*Funambulus pennanti*	IV
		Reptiles		
6.	Chandra Boda	Russels' Viper	*Vipera russelli*	II
7.	Gokhra, Tampa	Cobra	*Naja naja*	II
8.	Dhamena	Rat Snake	*Ptyas mucosus*	II

List of Birds observed in the core zone of the lease area:

Sl. No.	Local Name	English Name	Scientific Name	Schedule
1	Chilla	Pariha Kite	*Milvus mirgans*	IV
2	Patikau	Common Crow	*Corvus splendens*	V
3	Gharachatia	House Sparrow	*Passer domesticus*	IV
4		Wagtail	*Motacilla spp.*	IV
5	Sua	Rose Ringed Parakeet	*Psittacula krameri*	IV
6	Bani	Common mynah	*Acridotheres tristis*	IV
8	Gai Baga	Cattle Egret	*Bubulcus ibis*	IV
9	Kanti Bag	Pond Heron	*Ardeola grayii*	IV
10	Kilchia Baga	Little Egret	*Egretta garzetta*	IV
11	Kajalapati	Drongo	*Dicrurus adsimilis*	IV
12	Kumbhatua	Cow Pheasant	*Centropus sinensis*	IV
13	Kopata	Doves	*Streptopelia spp.*	IV
14	Bhadabhadalia	Indian Roller	*Coracias benghalensis*	IV
15	Gobara	Red Vented Bulbul	*Pycnonotus cafer*	IV
16	Koili	Koel	*Eudynamis scolopacea*	IV
17	Bai chadhei	Tailor Bird	*Orthotomus sutorius*	IV
18	Dahial	Magpie Robin	*Copsychus saularius*	IV
19	Chumki	Purple Sunbird	*Nectarinia asiatica*	IV
20	Endua Khai	Tree Pie	*Dendrocitta vagabunda*	IV
21	Haladibasanta	Black headed Oriole	*Oriolus xanthomus*	IV
22	Deulipara	Blue Rock Pegion	*Columba livia*	IV
23	Kunda Chadei	Jungle Babbler	*Turdoides striatus*	IV
25	Pecha	Spotted Owlet	*Athene brama*	IV

Buffer zone:

List of flora found in the Buffer zone of the project.

Sl. No.	Local Name	*Scientific name*	Family
1.	Acacia	*Acacia auriculiformis*	Mimosaceae
2.	Amba	*Mangifera indica*	Anacardiaceae
3.	Ambada	*Spondias binnata*	Anacardiaceae
4.	Amaralata	*Bauhinia racemosa*	Fabaceae
5.	Asan	*Terminalia alata*	Combretaceae
6.	Arjuna	*Terminalia arjuna*	Combretaceae
7.	Achu	*Morinda pubescens*	Rubiaceae
8.	Anla	*Emblica officinalis*	Eophorbiaceae
9.	Asoka	*Saraca indica*	Fabaceae
10.	Aswasth	*Ficus religiosa*	Moraceae
11.	Babul	*Acacia nilotica*	Fabaceae
12.	Bada Hatikana	*Litsea nitida*	Lauraceae
13.	Badhial	*Anona squamosa*	Annonaceae
14.	Baghamari	*Bauhinia retusa*	Fabaceae
15.	Bahada	*Terminalia bellirica*	Combretaceae
16.	Bandhan	*Ougeinia oojeinensis*	Fabaceae
17.	Bana Kapasia	*Kydia calycina*	Malvaceae
18.	Bara	*Ficus bengalensis*	Moraceae
19.	Baruna	*Crateva megna*	Capparaceae
20.	Batra	*Melia composite*	Meliaceae
21.	Bel	*Aegle marmelos*	Rutaceae
22.	Bhalia	*Semecarpus anacardium*	Anacardiaceae
23.	Bheru	*Chloroxylon swietiana*	Meliaceae
24.	Bija / Piasal	*Pterocarpus marsupium*	Fabaceae
25.	Bilati Kayan	*Pithecellobium dulce*	Mimosaceae
26.	Bualu	*Chordia dichotoma*	Fabaceae
27.	Chakundi	*Cassia siamia*	Caeselpiniaceae
28.	Char	*Buchanania lanzan*	Anacardiaceae
29.	Chauli	*Cassia glauca*	Celastraceae
30.	Chauldhua	*Glycosmis pentaphylla*	Rutaceae
31.	Chhatian	*Alstonia scholaris*	Apocynaceae
32.	Damkurdu	*Gardenia latifolia*	Rubiaceae
33.	Dhauranje	*Holoptelia integrifolia*	Ulmaceae
34.	Dhaman	*Grewia tiliaefolia*	Tiliaceae
35.	Dhaura	*Anogeissus latifolia*	Combretaceae
36.	Dhatuki	*Woodfordia fructicosa*	Lythraceae
37.	Galgutia	*Dimorphocalyx glabellus*	Eophorbiaceae
38.	Gambhari	*Gmelina arborea*	Verbenaceae
39.	Genduli	*Cochlospermum gossypium*	Bixaceae
40.	Gohira	*Acacia leucophloea*	Mimosaceae
41.	Ghanta	*Ziziphus zylopara*	Fabaceae
42.	Gibri	*Indigofera pulchella*	Fabaceae
43.	Giridhini	*Sterculia urens*	Sterculiaceae
44.	Giringa	*Prerospermum heyneamum*	Sterculiaceae
45.	Gopa Kahnu	*Cryptolepsis buchanani*	Periplocaceae
46.	Gurudu	*Gardenia gummifera*	Rubiaceae
47.	Halda	*Dispyros Montana*	Ebenaceae
48.	Harida	*Terminalia chebula*	Combretaceae
49.	Hinjal	*Barringtonia acutangula*	Lecythidaceae

50.	Jamun	*Syzygium cumini*	Mytaceae
51.	Kadamb	*Neolamarckia cadamba*	Rubiaceae
52.	Kaitho	*Limonia acidissima*	Rutaceae
53.	Kangada	*Xylia xylocarpa*	Fabaceae
54.	Kansa	*Hymenodictyon excelsum*	Rubiaceae
55.	Kalicha	*Diospyros sylvatica*	Ebenaceae
56.	Karada	*Cleistanthus collinus*	Euphorbiaceae
57.	Karanja	*Pongamia pinnata*	Fabaceae
58.	Kamalagunid	*Mallotus phillipinensis*	Euphorbiaceae
59.	Kasi	*Bridelia retusa*	Euphorbiaceae
60.	Kendu	*Diospyros melanoxylon*	Ebenaceae
61.	Kochila	*Strychnos nux-vomica*	Loganiaceae
62.	Kumbhi	*Careya arborea*	Barringtoniaceae
63.	Kurei	*Holarrhena antidysenterica*	Apocynaceae
64.	Kurum	*Adina cordifolia*	Rublaceae
65.	Kusum	*Schleichera oleosa*	Sapindaceae
66.	Lemoura	*Protium serratum*	Burseraceae
67.	Lodha	*Symplocus racemosa*	Symplocaceae
68.	Malanga	*Loranthus excels*	Loranthaceae
69.	Moi	*Lannea coromandelica*	Anacardiaceae
70.	Mahalimba	*Ailanthus excels*	Simarubaceae
71.	Mankarkendu	*Diospyros embryopteris*	Ebenaceae
72.	Mahul	*Madhuca indica*	Sapotaceae
73.	Mundi	*Mitragyna parvifolia*	Rubiaceae
74.	Mukha	*Schrebera swietenioides*	Oleaceae
75.	Nalbeli	*Cipadessa fruticosa*	Meliaceae
76.	Neem	*Azadirachta indica*	Meliaceae
77.	Palas	*Butea monosperma*	Fabaceae
78.	Paldhua	*Erythrina indica*	Fabaceae
79.	Panas	*Artocarpus integrifolia*	Moraceae
80.	Panigamdhari	*Trewia nudiflora*	Euphorbiaceae
81.	Panipatuli	*Lagerstroemia speciosa*	Lythraceae
82.	Patuli	*Stereospermum chelonoides*	Bignoniaceae
83.	Patalagaruda	*Rouvolfia serpentina*	Apocynaceae
84.	Pitamio	*Garuga pinnata*	Burseraceae
85.	Poichandia	*Putranjiva roxburghii*	Euphorbiaceae
86.	Rai	*Dillenia pentagyna*	Dilleniaceae
87.	Rohini	*Soymida febrifuga*	Meliaceae
88.	Sahada	*Streblus asper*	Moraceae
89.	Sal	*Shorea robusta*	Dipterocarpaceae
90.	Salai	*Boswellia serrata*	Burseraceae
91.	Sajana	*Moringa tinctoria*	Palmaceae
92.	Sidha	*Lagerstroemia parviflora*	Lythraceae
93.	Semul	*Bombax ceiba*	Bombacaceae
94.	Siris	*Albizzia lebbek*	Mimosaceae
95.	Sisso	*Dalbergia sisso*	Fabaceae
96.	Sunari	*Cassia fistula*	Fabaceae
97.	Saguan	*Tectona grandis*	Verbenaceae
98.	Tal	*Borassus flabellifer*	Palmaceae
99.	Telkuruma	*Ixora arborea*	Rubiaceae
100.	Tentra	*Albizzia procera*	Mimosaceae
101.	Tentuli	*Tamarindus indica*	Fabaceae

102.	Thelku	*Randia malabarica*	Rubiaceae
103.	Telguina	*Clerodendron viscosum*	Verbenaceae
104.	Jari	*Ficus lutescens*	Moraceae
105.	Dimiri	*Ficus racemosa*	Moraceae
		Shrubs	
1	Asadhua	*Capparis zeylanica*	Meliaceae
2	Atundi	*Combretum decandrum*	Combretaceae
3	Bichhuati	*Mucuna prurita*	Fabaceae
4	Biadanka	*Mucuna monosperma*	Fabaceae
6	Barkoli	*Zizyphus mauritiana*	Fabaceae
7	Begunia	*Vitex negundo*	Vitaceae
8	Chadeigudi	*Vitex peduncularis*	Vitaceae
9	Chakunda	*Cassia tora*	Caesalpiniaceae
10	Dhatuki	*Woodfordia fruticosa*	Lythraceae
11	Gaigutia	*Dimorphocalyx glabellus*	Euphorbeaceae
12	Gangashiuli	*Nyctanthes arbotristis*	Oleaceae
13	Gulmari	*Gymnema sylvastris*	Asclepiadaceae
14	Kantikoli	*Zizyphus oenipila*	Vitaceae
15	Khirkole	*Manikikara hexandea*	Fabaceae
16	Murumuri	*Helicteres isora*	Sterculiaceae
17	Pitakarichi	*Wrigtia tomentosa*	Apocynaceae
19	Siju	*Euphorbia nivulia*	Euphorbeaceae
		Herbs	
1	Lajakuli	*Mimosa pudica*	Mimosaceae
2	Shialkanta	*Argemone Mexicana*	Papavaraceae
3		*Desmodium spp.*	Fabaceae
		Climbers	
1	Anantamuli	*Hemidesmus indicus*	Apocynaceae
2	Gilo	*Etada scandens*	Fabaceae
3	Handiphutanai	*Butea parviflora*	Fabaceae
4	Lata Palasa	*Butea superb*	Fabaceae
5	Muturi	*Smilax macrophylla*	Smilacaceae
6	Pitalu	*Dioscorea bulbifera*	Dioscoreaceae
7	Siali	*Bauhinia vahlii*	Fabaceae
		Epiphyte	
1	Malanga	*Loranthus excels*	Loranthaceae
2	Rasna	*Vanda roxburghii*	Lamiaceae

List of Mammals observed in the Buffer Zone

Sl.No	Local Name	English Name	Scientific Name	Schedule
1.	Hati	Indian Elephant	*Elephas maximus*	I
2.	Bajra kapta	Pangolin	*Manis crassicaudata*	I
3.	Gada bhalu	Ratel	*Mellivora capensis*	I
4.	Bhalu	Sloth Bear	*Melursus ursinus*	I
5.	Bana Biradi	Jungle Cat	*Felis chaus kutas*	II
6.	Bilua	Jackal	*Canis aureus*	II
7.	Neula	Indian Mongoose	*Herpestes edwardsi*	II
8.	Barha	Wild Boar	*Sus scrofa cristatus*	III
9.	Heta	Striped Hyena	*Hyaena hyaena*	III

10.	Kutra	Barking Deer	*Muntiacus muntjak*	III
11.	Miriga	Spotted Deer	*Axis axis*	III
12.	Sambar	Sambar	*Cervus unicolor*	III
13.	Thekua	Indian hare	*Lepus nigricollis*	IV
14.	Jhinka	Indian Porcupine	*Hystrix indica*	IV
15.	Musa	Common Rat	*Rattus rattus*	V

List of Reptiles with English and Local Name (Buffer Zone):

Sl.No	Local Name	English Name	Scientific Name	Schedule
1.	Ajagar	Python	*Python molurus*	I
2.	Ahiraj	Kingg cobra	*Ophiophagus hannah*	II
3.	Chandan Boda	Russell's Viper	*Daboia russelii*	II
4.	Dhamana	Rat snake	*Ptyas mucosus*	II
5.	Gokhara , Tampa	Cobra	*Naja naja*	II
6.	Rana	Banded Krait	*Bungarus fasciatus*	II
7.	Godhi	Monitor lizard	*Varanus sp.*	II
8.	Bahurupi endua	Chameleon	*Chameleon calcaratus*	II

List of Birds with English and Local Name (Buffer Zone):

Sl.no.	Local name	English name	Scientific name	Schedule
1.	Mayura	Indian peafowl	Pavo cristatus	I
2.	Bani	Indian Myna	*Acridotheres tristis*	IV
3.	Bhadabhadalia	Indian Roller	*Coracias benghalensis*	IV
4.	Chitra Kapta	Spotted Dove	*Streptopelia chinensis*	IV
5.	Chumki	Purple Sunbird	*Nectarinia asiatica*	IV
6.	Dahial	Oriental Magpie Robin	*Copsychus saularis*	IV
7.	Damra Kau	Jungle Crow	*Corvus macrorhynchos*	V
8.	Darzi Chadhei	Tailor Bird	*Orthotomus sutorius*	IV
9.	Endua Khai	Indian Tree Pie	*Dendrocitta vagabunda*	IV
10.	Gai Baga	Cattle Egret-	*Bubulcus ibis*	IV
11.	Gharchatia	House Sparrow	*Passer domesticus*	IV
12.	Ghumura Para-	Blue Rock Pigeon	*Columba livia*	III
13.	Haladi Basanta	Black Headed Oriole	*Oriolus xanthornus*	IV
14.	Kajjalpati	Black Dronge	*Dierurus macrocercus*	IV
15.	Kanti Bag	Indian Pond Heron	*Ardeola grayii*	IV
16.	Kau	House Crow	*Corvus splendens*	V
17.	Koili	Asian Koel	*Eudynamys scolopacea*	IV
18.	Kumbhatua	Coucal	*Centropus sinensis*	IV
19.	Maccha Ranka	White Breasted King Fisher	*Halcyon smyrnensis*	IV
20.	Soubhagya Pakhi	Common Iora	*Aegithina tiphia*	IV

21.	Sua	Rose Ringed Parakeet	*Psittacula krameri manillensis*	IV
22.	Bana Kukuda	Red Jungle Fowl	*Gallus gallus*	IV
23.	Bana Kukuda	Grey Jungle Fowl	*Gallus sonnerati*	II
24.	Deuli Para	Blue Rock Pigeon	*Columba livia*	IV
25.	Kundachadei	Jungle Babbler	*Turdoides striatus*	IV
26.	Pecha	Spotted Owlet	*Athene brama*	IV

As per the field observation, there is no endemic animal found either in the core or in the Buffer zone of this project area. But schedule-I fauna like Elephant, Ratel, Pangolin, Sloth bear, Python and Indian peafowl are noticed in the buffer zone of the mining area. In between those species elephant and pangolin are found endangered.

f) Description of Forest and habitat condition, Wildlife scenario of the study area (census result if any)

The lease area involves Mahagiri DPF and Daitari DPF of Cuttack Forest Division. The present Working Plan is valid up to 2016 – 17.

According to the allocation of forest blocks to different Working Circles, out of the total area of Daitari DPF -4812.08 ha of is coming under Selection Working Circle and 2886.52 ha under Rehabilitation Working Circle. The density of forest cover in this working circle (Selection Working Circle) is very poor, in which 75% area has the forest canopy density more than 25% and 44% area having open forest cover of (10-40) % canopy density. The vegetation mainly found in this region are Sal (*Shorea robusta*) and its associates like Asan (*Terminalia tomentosa*), Dhaura (*Anogeissus latifolia*), Kangada (*Xylia xylocarpa*) etc. Sal is the pre-dominant species. The Special Objectives are as follows:-

1. To conserve and improve the forest cover by soil and water conservation.
2. To maintain and improve the biodiversity of the forest block.
3. To build up the growing stock and improve stand structure by silvicultural operation.
4. To establish natural regeneration of indigenous species.
5. To obtain the yield on sustainable basis to cater the need of the people subject to silviculture availability.

Similarly Mahagiri DPF and balance part of Daitari DPF is coming under Rehabilitation Working circle. In this working circle area, the forest area is in various stages of degradation due to unrelenting biotic interference like illicit felling repeated fire, grazing of cattle, encroachment of adjoining villagers and inadequacy of coppice regeneration. The top soil has already washed away in some of the place resulting exposure of rocks. Some of these forests contain sufficient rootstock, which if tended and protected has the probability to convert to high forest. *Xylia Xylocarpa* is the pre

dominant species of this area where as the other co-dominant species are *Pterocarpue marsupium, Terminalia belerica, Adina cordifolia* etc. In case of the forest cover, this area having 27% is of dry scrub forest and the percentage of open forest (canopy density 10%-25%) is 37.

The special objectives of this Working Circle are as follows:-

1. To induce natural regeneration and improve the condition of existing forests through protection against grazing fires and illicit felling.
2. To enhance soil productivity through soil and moisture conservation measures.
3. To regulate surface water runoff through to enhance percolation and water availability down the stream.
4. To restock barren area through artificial regeneration with most desirable indigenous species.
5. To partner the local community in protection and management of the forest.
6. To restore and improve the micro climate and micro edaphic condition.
7. To increase the biodiversity and heterogeneity in the forest crop by encouraging natural regeneration.
8. To increase the water retaining capacity of the soil.

From the visual perception, it is inferred that, the number of trees are more in the interior forest areas than the areas close to roads, peripheral villages. The regeneration condition of Sal on the forest floor as seen during field visit is excellent. All species present in this block are given due importance for conservation of species biodiversity and development of balanced forest in which the natural selection of the species will be encouraged. Fruit bearing species like Mohula (*Madhuca Indica*), Amla (*Emblica Officinalis*), Char (*Buchanania Lanzan*), Kendu (*Diospyros Melanoxylon*), Bahada (*Terminalia Belerica*), Harida (*Terminalia Chebula*) and Bel (*Aegle Marmelos*) are not to be felled. These species will be better used by herbivores.

During felling, no species will be marked for felling whose removal may create a permanent gap in the canopy and affect the regeneration and thus affect the fauna. But all climbers are to be cut to allow growth increment of the species. No felling shall be done between 1st June and 30th September (close season).

Grass planting is considered as a preferred treatment for exposed soils in eroded areas. The important grass species found in this area are *Aristida setacea, Arundinella bengalensis, Cenchrus ciliavis, Chrysopogon aciculatus, Cymbopogon coloratus, Cynodon dactylon, Eulaliopsis binata and Heteropogon contortus.*

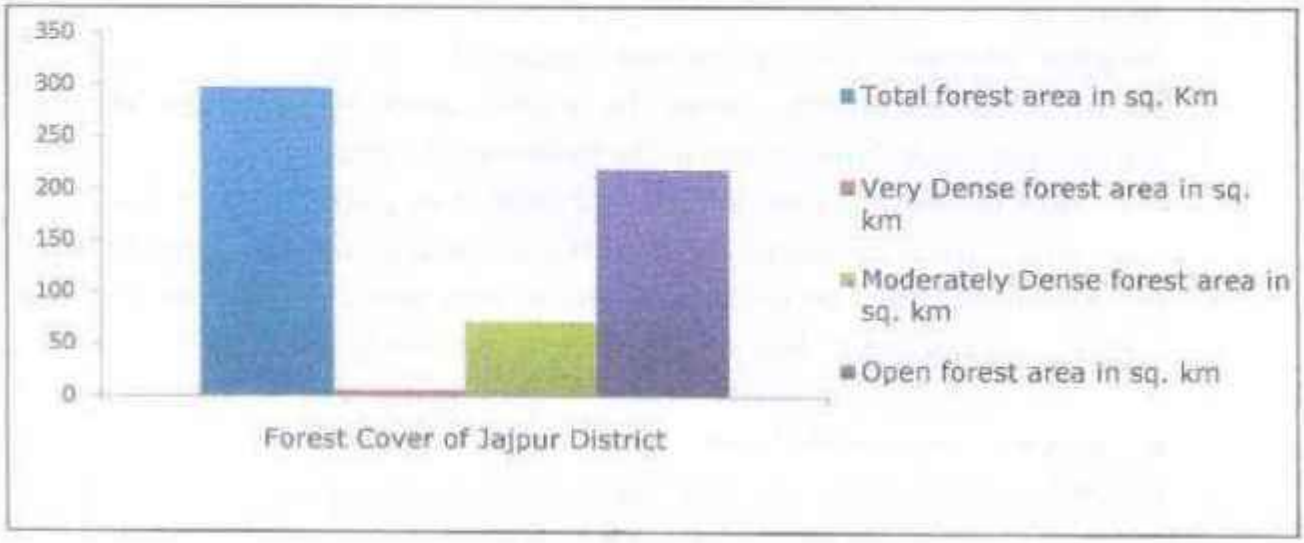
Description of Forest present in the study area

Forest Type: According to Champion and Seth's 'Classification of Revised forest types of India'.the forests of Cuttack Forest Division has been classified in the

Working Plan as Northern Tropical Dry Deciduous Forest and South Indian Moist Deciduous Forest. Northern Tropical Dry Deciduous Forest is further sub divided in to Dry Peninsular Sal Forest (5B/C1) and Dry Deciduous Shrub Forest (5DS1). Similarly in case of South Indian Moist Deciduous Forest it is alienated in to Southern Moist Mixed Deciduous Forest (3B/C2). The forest of Mahagiri DPF and Daitari DPF is classified as Dry Peninsular Sal Forest (5B/ C1).

Forest Condition According to FSI Report: According to the 'India State of Forest Report -2015' Jajpur District has only 297 sq km of forest area. In comparison with the total geographical area of the district (2899 km^2) the forest area is 10.24 %. Further the total forest area of the district is classified in to its sub class like very dense, moderately dense and open forest. Hence, with respect to the subclass of the forest there are 6 km^2 of very dense forest, 72 km^2 of moderately dense forest and 219 km^2 of open forest present in the district. It is remarked that the forest area of this district has been increased to **297 km^2 from 296 km^2** as on the report of 2014-15. The details of this forest area have been furnished below.

District	Total forest in km^2	% of Very Dense forest	% of Moderately Dense forest	% of Open forest
Jajpur	397	2.02	24.24	73.74



Forest Cover of Jajpur District

Wildlife habitat and prevailing wildlife scenario:

The habit and habitats of particularly Schedule-I species are narrated below-

Elephant (*Elephas maximus*):

Ecology and behaviour

Elephants are social animal and live in herds, which vary between 3–6. The Elephants are matriarchal and the herd is led by the oldest female. Herd usually break into clans and rejoin again. For long distance movement some time a few herd mix and form a big group which is coordinated by the oldest female for searching of better habitat – food and water. Several herds maintain contact through sub-sonic vocalization according to findings on work with African Elephants. Adult males remain away from herd and occasionally join with the herd when females are in oestrous. They are polygamous. Only dominant males have the chances to mate with the females. Old males usually lead solitary life, while sub-adult males some time form an unstable group of 2 to 7 animals. Such group is known as *Muljuria* group. Elephants are very sensitive to hot and prefer shady moist area during noon time. The matriarch herds as well as males are long ranging. Their home Range varies between 150 and 1200 sq km, depending on the habitat condition. An Elephant may run at a speed of 45 km per hour for a short distance for two to five minutes. Their average life span is same as human being, and around 70 years. In Elephant there is no seasonality in oestrous cycle, and the inter birth interval varies from 3 to 5 years, depending on the habitat quality. The gestation period is 18 to 22 months and suckling period is around one and half years. Young claves start taking grass from 6 months onwards. Mother continues to bestow maternal care to their offspring for several years after weaning. The sense of touch and hearing is well developed in Elephant but its eye sight is poor. Most males have prominent tusks, while some time some female have tushes which is hardly visible from outside. Male Elephants some time have only one tusk (known as *Ganesh*), or even without tusk (known as *Makhna*). They have 6 sets of molar teeth, of which only one set is in use at a given time. With the loss of last set of molar teeth they are deprived from taking any food and eventually do not survive. The unique identity of Elephant is his trunk with a single finger like tip at the end and it has versatile utility, used in eating, drinking, smelling, breathing, touching, washing & dusting of the body, fighting and vocalizing. Mud wallowing is fun for the Elephants, though it protects them from insects and sun.

Diet: Elephants are classified as mega herbivores and consume up to 150 kg (330 lb) of plant matter per day. They are generalist feeders, and both grazers and browsers. Elephants were recorded to feed on 112 different plant species, most commonly of the order Malvales, and the legume, palm, sedge and true grass families. They graze on the tall grasses, but the portion consumed varies with season. When the new flush appears in April, they remove the tender blades in small clumps. Later, when grasses are higher than 0.5 m (1.6 ft), they uproot entire clumps, dust them skillfully and consume the fresh leave tops, but discard the roots. When grasses are mature in autumn, they clean and consume the succulent basal portions with the roots, and discard the fibrous blades. From the bamboos, they eat seedlings, culms and lateral shoots. During the dry season from January to April, they mainly browse on both leaves and twigs preferring the fresh foliage; and consume thorn bearing shoots of acacia species without any obvious discomfort. They feed on the bark of white thorn and other flowering plants, and consume the fruits of wood apple, tamarind, kumbhi and date palm. In Odisha it is observed that major plant species like Simili (*Bombax ceiba*), Kasi (*Bridelia retusa*), Anla (*Emblica officinalis*), Panasa (*Pterocarpus heterophyllus*), Bara (*Ficus benghalensis*), Dimiri (*Ficus glomeruta*), Asawsatha (*Ficus religiosa*), Jari (*Ficus ritusa*) Bela (*Aegle marmelos*) Kaitha (*Limonia assidisma*) etc. are mostly adopted by the Indian elephant for its diet.

Habitat:

Indian elephants are native to mainland Asia: India, Nepal, Bangladesh, Bhutan, Myanmar, Thailand, etc. They inhabit grasslands, dry deciduous, moist deciduous, evergreen, and semi-evergreen forests. Elephants are well established in dry deciduous forests to moist ever green forests. On an average they take 150 kg of vegetation and 100 litre of water per day. The efficiency of digestion is poor (40 to 45%) with the symbiotic bacteria in the stomach. They are in constant move while feeding and generally cover 15 to 20 km in a day

Threat:

The pre-eminent threats to Asian elephants today are habitat loss, degradation, and fragmentation, which are driven by an expanding human population, and lead in turn to increasing conflicts between humans and elephants when elephants eat or trample crops. Loss of significant extents of elephant range and suitable habitat continues; their free movement is impeded by reservoirs, hydroelectric projects and associated canals, irrigation dams, numerous pockets of cultivation and plantations, highways, railway lines, mining and industrial development. Elephant calves are vulnerable to predation. Poaching of elephants for ivory is a serious threat in some parts of Asia. Poaching of tuskers impacts on sex ratios that become highly female biased; genetic variation is reduced, and fecundity and recruitment may decline. Poaching has dramatically skewed adult sex ratios in the Periyar Tiger Reserve, where between 1969 and 1989 the adult male:female sex ratio changed from 1:5 to 1:122

Conservation Status:

Due to the above importance of the animal there are some measures taken for the conservation of this umbrella species. In the wild life protection act, 1972 it is listed as schedule 1. It also declared as an endanger species by the IUCN and listed in the appendix 1 of CITES.

Indian Pangolin (*Manis rassicaudata*):

Ecology and behaviour

Indian Pangolin is 45-75 cm long. They have small triangular shaped head. Their tongue is 23- 25.5 cm long and its tail is 33 – 45 cm long. They do not have teeth. They have bad listening power and have bad eyesight. Each limb has powerful five claws. They are covered with the horny scales which protect their body. Males are heavier than the females. Lifespan of Indian Pangolin is more than 13 years. They are found in almost all the parts of India. They are nocturnal animals that use their well-developed sense of smell to find insects. The long-tailed pangolin is also active by day, while other species of pangolins spend most of the daytime sleeping, curled up into a ball. Arboreal pangolins live in hollow trees, whereas the ground dwelling species dig tunnels underground, to a depth of 3.5 metres (11 ft). Pangolins are also good swimmers.

The gestation period lasts for 65-70 days. Females give birth to single offspring. Young ones weigh between 200 -500 gm. New born is carried on mother's tail for several weeks. They are weaned at three months of age.

Diet:

Pangolins are insectivorous. Most of their diet consists of various species of ants and termites and may be supplemented by other insects, especially larvae. They have a very poor sense of vision, and therefore rely heavily on smell and hearing. After locating their prey, they tear open the anthills or termite mounds with their powerful front claws they are somewhat particular and tend to consume only one or two species of insects, even when many species are available to them. A pangolin will consume an average of 140 to 200 g (4.9 to 7.1 oz) of insects per day.

Habitat:

The Indian pangolin has been recorded from various forest types, including Sri Lankan rainforest and plains to middle hill levels. The animal can be found in grasslands and secondary forests, and is well adapted to desert regions as it is believed to have a tolerance to dry areas, but prefers more barren, hilly regions.

Threat and conservation:

It is believed that the scale of this species is used in preparation of medicines. Hence, it is captured for trading in the market. Besides, large scale destruction of its habitat is also a major threat for decreasing of its number.

For conservation purpose, Indian pangolin is declared as endengered species from the year 2012 by the International Union for Conservation of Nature (IUCN) and is listed as schedule I in Wildlife Protection Act,1972.

Sloth Bear (*Melursus ursinus*):

Ecology and behaviour:

Adult sloth bears may travel in pairs, with the males being gentle with cubs. They may fight for food. They walk in a slow, shambling motion, with their feet being set down in a noisy, flapping motion. They are capable of galloping faster than running humans. Although they appear slow and clumsy, sloth bears are excellent climbers, including cubs.

They climb to feed and rest, though not to escape enemies, as they prefer to stand their ground. Sloth bear mothers carry cubs up to 9 months-old on their backs instead of sending their cubs up trees as the primary defense against attacks by predators, such as tigers, leopards, and other bears. They are capable of climbing on smooth surfaces and hanging upside down like sloths. They are good swimmers, and primarily enter water to play. To mark their territories, sloth bears will scrape trees with their forepaws, and rub against them with their flanks. Sloth Bear have long snout and lips are detached from the gum and are well adapted to the forceful intake and expulsion of air. The absence of middle pair of incisors in the upper jaw permits passage of air freely. Tongue is large protractible. Long claws of the fore limbs (longer than hind limbs) are good instrument of digging. The animal produces enough suction force to suck out termites from mounds. They are omnivorous in nature. They feed on tubers, roots, grubs, various fruits, various insects, honey, termites, flowers (mahua, simul, etc.). It also damage sugar cane crop, maize etc.

Bears are nocturnal in habit, their sense of smell is well developed than their sight and hearing. During accidental encounter with human being they cause severe damage to the human or even death. They have a specific breeding season. Mating takes place in June of July and they give birth to cubs in caves during December and January. Litter varies between 1 and 3 cubs. Parental care lies with mother only. Their average life span is around 40 years.

Habitat:

It has been distributed throughout the Odisha except a few areas of the coastal District. They are in good number in drier and secondary Forests, are also found in dense Forests. Their home Range is limited and restricted. In quest of food they may travel several kilometres. It is believed that their gall bladder and bile have medicinal properties and hence they are exposed to poaching, particularly due to demand of these parts in China and other South East Asian countries.

Threat and Conservation:

The majority of sloth bears killed in forests were due to chance encounters with them during hunts for other game. But now days large scale deforestation resulting destruction of forest habitat rapidly which is also a major threat for this animal.

IUCN estimates that less than 20,000 sloth bears survive in the wilds of the Indian subcontinent and Sri Lanka. Hence, it listed it as a vulnerable species. The sloth bear is also listed in Schedule I of the Indian Wildlife Protection Act, 1972, which provides for legal protection of sloth bears. International trade of the sloth bear is prohibited as it is listed in Appendix I of the Convention on International Trade in Endangered Species

Ratel (*Mellivora capensis*):

Ecology and behaviour

Ratel lives in the desert and in the dry and moist deciduous zones, avoiding regions of heavy rainfall. They prefer hilly broken country where shelter is easier to find, and when living in the plains choose the banks of streams or river where burrows are easily dug. It prefers to occupy a convenient hole and to sleep under dense cover. Ratel resembles bear with a habit of digging great holes to live. They have squat bear-like body, stumpy legs and long powerful claws, snout like a pig, and short ear. The colour is mixture of black and white. Particularly the dorsal part is white. The rattle preys on mammals, birds, reptiles and insects with fruit and honey. Mostly they live in pairs in a litter two are usually produced and the period of gestation. Although mostly solitary, honey badgers may hunt together in pairs during the May breeding season. Little is known of the honey badger's breeding habits. Its gestation period is thought to last six months, usually resulting in two cubs, which are born blind. They vocalise through plaintive whines. Its lifespan in the wild is unknown, though captive individuals have been known to live for approximately 24 years.

Threats and conservation:

The main threat to this species is degradation of forest and its habitat as a result the number is rapidly decreasing. For conservation of this species it is listed in schedule 1 of Wildlife Protection Act, 1972.

Indian Rock Python (*Python molurus*):

Ecology and Behaviour

This is a non venomous snake and can grow up to 4m and weigh 45 kg. The colour is dark brown to yellowish white in a blotched pattern. They are very good swimmers and take to water when disturbed but on land, they hiss and remain motionless. Like all snakes, Indian pythons are strict carnivores and feed on mammals, birds and reptiles indiscriminately, but seem to prefer mammals. Roused to activity on sighting prey, the snake will advance with quivering tail and lunge with open mouth. Live prey

largest and heaviest representatives of the Phasianidae. Their size, colour and shape of crest make them unmistakable within their native distribution range. Downy young are pale buff with a dark brown mark on the nape that connects with the eyes. Young males look like the females but the wings are chestnut coloured.

The most common calls are a loud pia-ow or may-awe. The frequency of calling increases before the Monsoon season and may be delivered in alarm or when disturbed by loud noises. In forests, their calls often indicate the presence of predators such as the tiger. Peafowl are best known for the male's extravagant display feathers which, despite actually growing from their back, are thought of as a tail. The "train" is in reality made up of the enormously elongated upper tail coverts. The tail itself is brown and short as in the peahen. The colours result not from any green or blue pigments but from the micro-structure of the feathers and the resulting optical phenomena. Peafowl forage on the ground in small groups, known as musters that usually have a cock and 3 to 5 hens. After the breeding season, the flocks tend to be made up only of females and young. They are found in the open early in the mornings and tend to stay in cover during the heat of the day. They are fond of dust-bathing and at dusk, groups walk in single file to a favourite waterhole to drink. When disturbed, they usually escape by running and rarely take to flight

Habitat.

The Indian peafowl is a resident breeder across the Indian subcontinent and is found in the drier lowland areas of Sri Lanka. In South Asia, it is found mainly below an altitude of 1,800 metres (1.1 mi) and in rare cases seen at about 2,000 metres (1.2 mi). It is found in moist and dry-deciduous forests, but can adapt to live in cultivated regions and around human habitations and is usually found where water is available. In many parts of northern India, they are protected by religious practices and will forage around villages and towns for scraps.

Threat and Conservation:

Indian peafowl are widely distributed in the wild across South Asia and protected both culturally in many areas and by law (Wildlife protection Act, 1972) in India. However the main threats to this animal is Poaching for their meat and feathers.

Prevailing Wildlife Scenario and Wild Life Census Result:-

As per Elephant **Census -2015** the numbers of Elephants present in Cuttack Forest Division is 35. Out of those 35, 12 are found adult Male, 13 Adult Female, 9 are Calf and 1 is unknown sex. Except Elephant census report no other reports are available for the said forest Division. But during the field study presence of other wildlife like Indian Python,

is constricted and killed. One or two coils are used to hold it in a tight grip. The prey, unable to breathe, succumbs and is subsequently swallowed head first, prey cannot escape because of inward bent teeth. After a heavy meal, they are disinclined to move. If forced to, hard parts of the meal may tear through the body. The species in oviparous and lay up to 100 eggs in a clutch protected and incubated by the female. Being exothermic, python basks in open but can also raise body temperature by muscular contraction.

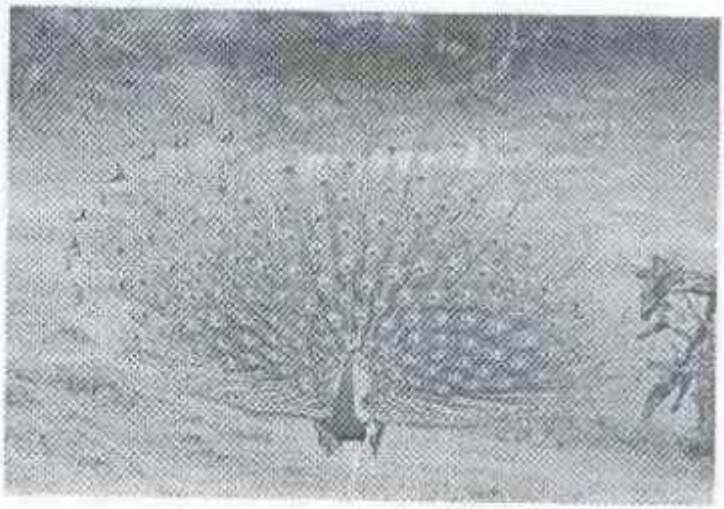
Habitat: Python occurs in wide Range of habitats viz. rocky foot hills, grass lands, marshes, swamps, wood lands, open jungle. As it depends on a permanent source of water it is reported nearer to the water body. At times, they take refuge in mammal burrows, hollow trees etc. It has also been reported close to habitation and crop fields.

Threat and Conservation:

It is listed as one of the Lower Risk /Near Threatened species according to IUCN and find place in the list of Schedule 1 of the Wildlife Protection Act, 1972. It indicates that, attention should be given for its conservation. Otherwise it will go for threatened.

Indian peafowl (*Pavo cristatus*)

Ecology and Behaviour



Peacocks are a larger sized bird with a length from bill to tail of 100 to 115 cm (39 to 45 in) and to the end of a fully grown train as much as 195 to 225 cm (77 to 89 in) and weigh 4–6 kg (8.8–13.2 lb). The females, or peahens, are smaller at around 95 cm (37 in) in length and weigh 2.75–4 kg (6.1–8.8 lb). Indian peafowl are among the

Pangolin, Ratel, Fox, Indian Monitor lizard, king cobra, Indian peafowl etc. are noticed in the ZoI of the mining area.

g) Movement of mega Wildlife in the impact area for the last 3 completed financial years and for the current year should be depicted on a map and data be submitted. Recorded data and the village level survey may be relied upon in this regard.

In Cuttack Division two house damage cases have yet been recorded, one in 2006 and the other in 2009. In both the cases compensation has been paid to the victims.

So far human kill is concerned, 01 cases have been reported in 2004-05 one case each in 2012-13 and 2013-14. Compensation has been paid to the victims. So far human injury is concerned, two cases have been reported in 2009-10 and 4 cases in 2013-14 by wild bear. In all the cases compensation has been paid.

From 2003-04 to 2014-15 six elephants have died due to Human Elephant conflict i.e. two in 2005-06, one in 2007-08, one In 2008-09 and two in 2010-11. However, from 2011-12 to 2014-15 no Elephant death has been reported in Cuttack Forest Division.

h) Man-animal conflict and depredation caused by the wild animals in the study area. Data on human kill/ injury, Cattle kill and Crop Damage, in the area and also the data on animal kill due to various reasons will also be analyzed and mentioned. The Data may be depicted on the map with geo coordinates and be attached. Also the extent of human-wild animal conflict and the trend of change due to the Project implementation should be assessed and recorded.

As per 2015 census there are 35 Elephants in this Division consisting of 12 male, 13 female, 1 unknown and 9 young. It is interesting to note that, till 2006 there was no existence of Elephants in this Division. However during 2007 census 08 Elephants were noticed and the number increased to 14 in 2010 census, further it increased to 22 in 2012 census and ultimately to 35 in 2015 census.

As per Divisional Record, the house damage were occurred in two villages i.e. in Rankia on 06.03.2006 and Dankrisahi on 03.01.2009 where full compensation has been paid to the affected farmers, and four cases crop damage were reported. In total 6 villagers have been victimized to death by Elephant i.e. two in 2004-05, two in 2009-10, one in 2012-13 and one in 2013-14. Full compensation to the victim was paid. From 2003-04 to 2014-15 six Elephants were died i.e. 2 in 2005 including 1 tusker, 1male Elephant in 2007-08 one Elephant 2008-09, two Elephant in 2010-11, However with the active participation of the V.S.S and active support of the affected villagers there is no Elephant causality recorded from 2011-12 to 2014-15.

i) Survey of Working Plan Prescription for management of Forest and Wildlife of the study area, if in vogue, and its status of implementation in consultation with the DFO concerned.

The present approved Working Plan of Cuttack Forest Division is valid up to 2016-2017. The working plan prescription for management of Forests and wildlife of the Division including the study area is in practice. The analysis of the prescriptions indicates that there has been considerable degradation of the natural Forest, which has impacted the bio-diversity in the Division. The main reasons for such degradation are anthropogenic pressure. The thrust of the management strategy has been to conserve and restore the Forest cover for maintaining ecological balance with active participation of the people (VSS/ JFM) in regard to regeneration, protection, conservation and development of the Forests.

To achieve the objectives, the working plan has recommended 06 Nos. of Working Circles. According to the recommendation and provision of the National Working plan Code, 2004, RF/PRF/DPF block areas have been distributed to different Working Circles as per the field realities. The DPF and RF present in the buffer zone of this project has been allocated to Selection/ Rehabilitation working circles. The detail of these working circles and their special objectives of management has been described in detail in point **'f'** above.

j) Indicative plan showing location of other project utilising forest lands or otherwise in the zone of impact (10 km radius or more as the case may be) of the present project. The mitigative measure proposed in the conservation plan of such projects (within project impact area), prepared if any, are to be summarised and compared with proposal with the present plan. Consultant may furnish the details in consultation with Divisional Forest Officer and Range Forest Officer concerned.

The buffer zone of this mining lease has another 11 Chromite mining leases and all these are in cluster. The area is blessed with the deposit of the Chromite ore and Iron ore also (Daitari Mines of OMC). The list of mining with its forest area involvement is furnished below:-

Sl no	Name of mines	Total area in ha	Forest area diverted
1.	M/S Tisco	406.00	73.697
2.	M/S Imfa	143.382	26.620
3.	M/S ICCL	73.777	63.910
4.	M/S OMC Ltd.	552.457	146.047
5.	M/S OMC Ltd.	382.709	146.130
6.	M/S OMC Ltd.	936.220	142.730
7.	M/S B.C Mohanty & Sons	107.240	87.440
8.	M/S IDC	155.537	17.483
9.	M/S MML	246.958	224.630
10.	M/S Balasore Alloys	100.065	35.600
11.	M/S Facor	112.161	72.843
	Total	3216.506	1037.130

The mitigative measure proposed in the conservation plan of other project

In general, provision of habitat improvement, fire protection, soil conservation measures, anti depredation squad and corpus fund has been furnished in the conservation plan approved for the adjoining leases. This plan provides mitigative measures which are not in sharp variance with such measures provided in the conservation plan of other mines in this locality. In addition we have provided Rain water management programme in Mahagiri DPF, conveyance facility to Forest staffs Awareness Promotion, Immunisation to cattle of adjoining villages and Health camp for better hygienic condition of the surrounding villages.

K. The list of experts involved in the study and their visit in the area and the methodology and sampling procedure adopted in arriving at the facts and findings:

Sl. No.	Name	Expertise	Years, of Experience
1.	Mr. L. K. Das, IFS (Retd.)	Forest, Biodiversity & Wildlife	36 years
2.	Mr. Siba Kumar Mohanty, OFS (Retd.)	Forest & Wildlife	30 years
3.	Dr. Bidyut Kumar Patra	Environment	12 years
4.	Dr. Nihar Ranjan Das	Socioeconomic & Land use	13 years
5.	Dr. Rabi Kumar Mishra	Flora & Fauna	14 years
6.	Mr. Debashis Mohanty	Coordination	14 years
7.	Mr. Debashish Mishra	Environment, Flora & Fauna	13 years

8.	Miss. Tamishree Behera	Environment	1year
9.	Mrs. Lipika Patra	Socioeconomic	2 years
10.	Mr. Satya Siva Mohanty	Forest Survey	12 years
11.	Mr. Susanta Mohapatra	Auto CAD, map preparation	10 years
12.	Mr. Suraj Kumar Dash	Wildlife & Biodiversity Conservation	01 year

The above personnel conducted the study being assisted by local Forest Officers Sri Soubaghya Sahu, Range Forest Officer, Sukinda and his field staff.

Period of visit to the mining and its surrounding area was 16-01-2016 to 20-01-2016, 30-01-2015 and 20-02-2016.The flora available in the study area was listed through field observations synchronizing with the list given in the Working Plan. In course of study, dropping of wild animals, pug marks, burrows, nests, scratching, scat/dung and physical presence on ground, tress bushes were identified and recorded

Methodology and sampling procedure:

- The study is based on Survey of India Topo Maps-73G/16, 73G/12, 73H/9 and 73H/13
- The Village list and demographic composition has been collected from 2011 Census Report.
- Conflict data collected from the Cuttack Forest Division.
- Active search method applied for listing of the flora and fauna. Villagers were shown photographs from a book compiled by Sri N.C.Mohanty, IFS (Retd.) to identify the faunal species for confirmation.

Findings: In the Project area the Scheduled (I) species like Asiatic Elephant, Indian Pangolin, Honey Badger (Ratel), Sloth Bear, Indian python, Indian peafowl and scheduled (II) species like Jungle cat, Russel's viper, King cobra, Chameleon etc. are commonly found. Similarly scheduled III and IV species like Wild Boar, Barking Deer, Spotted Deer and Mongoose are also found.

CHAPTER-2

THE PERCEIVED IMPACTS OF THE PROJECT ON THE ENVIRONMENT

a.) Study report on impact of the Project on the environment in general and on the soil, vegetation, water regime of the landscape and air over the area in specific.

Any mining project has its impacts on the biotic, physical and socio-economic environment. Some are beneficial to the society some are not. Evaluating these impacts, all projects are implemented. This Mine is not left untouched in these aspects. When certain impacts are disasters, it necessitates mitigating such problem with established technology and scientific study. Such negative impacts are discussed here to help in implementing mitigative measures. This mining lease certainly displaced wild animals and flora and restricts the use of habitat within the lease. All the species from the area of mine are either extinct or displaced. Mining have long term adverse impacts on wildlife, including impairment of its habitat or native environment. Many animal species cannot adjust to the changes brought on by the land disturbances due to mining. Important habitats such as primary breeding ground may lead to elimination of species. The unique habitat of old forest growths may be impossible to restore even after proper reclamation of the mined out areas. The exodus of animals from the lease area will force animals to move into safer habitats, putting extra pressure there on existing resources and also they may move into human habitation, leading to more conflict with human.

A fully mechanized mine ore is excavated by blasting. Drilling of blast hole is by wagon drills. Drilling by Jack Hammers is also adopted for secondary blasting of boulders that generates from wagon drill holes. The quantity of boulders will be to the tune of 5% to 10%. Blasting is on average 05m deep bore-holes. Holes are drilled consists of 04m bench height and 1m sub-grade drilling. Diameter of the hole is 85mm. The burden and spacing holes are maintained at 2.5 m x 3.0 m. ANFO & High explosives is used loaded by deck charging. The stemming length is proposed to be one third of the whole depth. The ratio of high explosive to ANFO has been kept at 1:4. The explosive column will be blasted under 'V' type blasting pattern initiated by detonator & safety fuse or detonating fuse. During the mining process Excavator, JCB Loader, Wagon Drill & Compressor, Dumper and Water tanker are in use. The process of drilling and blasting as narrated above will disturb the movement of wild animals and may compel them to shift to the adjoining area. In this case due to presence of mines in cluster, the wildlife now present may prefer to leave the entire mining belt and move into adjoin forest of Mahagiri / Daitari DPF.

Before any attempt is made to reduce various stressors and to avoid/minimize or mitigate their adverse impacts, it is necessary to identify various factors that have negative influence on the bio-diversity (flora and fauna). These are specified below considering the terms of reference for the preparation of Site Specific Wildlife Conservation Plan.

Impact on soil: Land degradation is the main impact of the mining. The Overburden generated in the mines may impact the productivity of the adjacent land, if not properly biologically reclaimed. During the plan period the amount of top soil along with the over burden will be generated which will be stored at an area of 2.634 ha and 41.872 ha for future use during reclamation. If not properly stored, the top soil may erode and thereby affect the soil of the periphery and introduce toxic materials to the soil.

Geomorphic changes: This is a long term impact in which the original surface is disturbed, removed and redistributed. Origin of nalas or nala heads is obliterated. Top of the hill is sliced and altitude altered. The soil of underground layers is piled up on the surface. These changes are so severe, quick and systematically drastic that it usually leads to extinction or displacement of species in areas of excavation and soil piling. Ungulates and those having large home ranges leave the area. Reptiles, burrowing rodents and small mammals like porcupine and hare may extinct.

Soil erosion: Mining strips away top soil. It brings about underground material/rocky patches to surface. When exposed to weathering condition, these start eroding with run off. Haul roads are also vulnerable to erosion as these are on slopes exceeding 1/20 slope. The soil erosion is accentuated by the velocity of water flow. If the speed is doubled, the sourcing capacity is increased to 4 times and carrying power of sediment 32 times. Speed of water increases with the degree of slope in roads and dumps. The depth of soil and its nutrient status is reflected in plant vigour and animal abundance and their relative presence. The loss of soil irreversibly impoverishes the site and excludes the future option of restoration of the habitat to its original level.

Moisture loss: Blasting on hill slope, extension of mining pits without adequate safeguards or process failure may result in silting up of nalas by heavy sediment loads. Moisture retention in soil will be low due to loss of vegetation and humus. Erosion and high rate of soil loss will curtail infiltration of water to lower soil horizon and low retention of soil moisture. Under such circumstances, re-establishment of vegetation is delayed and difficult, if not impossible. Constant input of imported

materials like fertilizers, organic manure, water and regular attention escalates the cost of reforestation in such refractory area.

Impact on Vegetation: The deforestation of 89.00 ha, without proper biological reclamation will have a huge ecological / biodiversity loss, if not followed up by a proper conservation management plan. Apart from the loss of forest in the mining, there is infrastructure development for mining, establishment of township and the subsequent population pressure certainly put a huge pressure on the vegetation directly and indirectly.

Habitat loss: This is a long term impact of mining activity. Deforestation precedes mining in opencast method. This alters or removes conditions needed for plants or animals to survive. Natural habitat is rendered functionally unable to support the species. Plants and animals, which previously used the site are either displaced or extinct. Habitat loss is not confined to the area of deforestation only. The adjacent areas also exposed to the ripple effects of deforestation, result in reduced carrying capacity and hence, the viability of the ecosystem will unbalance. The habitat requirements of many animal species do not permit them to adjust to changes created by such landscape modification. The degree to which an animal tolerates human induced disturbance and human competition for space varies. Some species tolerate very little disturbance. Where a particular critical habitat is restricted, e.g. rocky outcrops, den, riverine habitat, nursery ground of particular character and the species may be eliminated. Revamping lost vegetation takes several decades to be attractive for animals again. The habitat loss is not only limited within the loss of area alone, but also attributed to the fragmentation of the habitat.

Impact on Water Regime: The surface water of this region is carried through Dhamsala nalla, Pandra nalla and their streamlets. The ground water level of the area is recorded in bore hole and dug well. The water level is at depth of 5 to 9 mtrs during rainy season, and during summer the ground water level goes down to a depth of 11-20 mtrs (According to the mining plan page no 69). The local inhabitants depend on the dug wells for drinking purposes. The water quality is quite potable whereas the Dhamsala Nallah water needs treatment. Since the water table is lying much below the proposed quarry floor so there will be no impact of the water regime. Also there is no pumping or industrial use of water so the impact on the water is nil.

Water pollution: The water environment of an area get affected mostly in two ways:

i. Effect on the ground water
ii. Effect on the surface run of water.

The Damsala nallah and Pandra nallah form the prominent drainage system of the area. These are all seasonal ones. Except rainy season the quantity of water flow in the nallah is scanty. The mining methods suggested for this area will neither obstruct the nallah nor their proposal for diversion of the same. This will cause the silting of the water in addition to run off water being affected by the polluting agents of the water to be discharged into the original nalas. Due to impervious nature of the rocks of this area, dewatering of the mine pit will cause only local effects of lowering the water table. So far no toxic substance has been delineated which may cause adverse effect to the ground water. Accordingly, it has been decided to use the accumulated mine water for watering the afforestation area. However, five large diameter bore holes have been proposed to be drilled at different locations to study the effect of mining on ground water. Accordingly, preventive measures will be taken after detail observation is made by testing the ground water level from these observation bore holes. The discharged water from the applied lease hold area not requires special attention, as it will get seeped in to the sub soil because of its negligible quantity. No cause of water for industrial purposes exists. There is no chance of contamination. There is no presence of toxic element. So no special treatment of disposal water is required.

Impact on Air

In the mining area and its surroundings is affected by the following ways:

Dust pollution: Drilling, blasting and haul roads including loading and unloading locations are the sources of dust production. Dust is particularly segregated in dry season. The effect depends on a number of variables like concentration of particles, deposition rates, characteristics of vegetation, leaf surface, roughness and wetness of leaf surface, wind direction, size of particles and dust chemistry. Physical effects may be blockade and damage to stomata, shading and screening from sunlight, abrasion of leaf surface and cumulative effect of stress. The broad impacts of dust pollution are:

- Reduced photosynthesis leading to reduced growth rates.
- Increased incidences of plant pests and diseases from both fungi and insects.
- Reduced seeding, less viable seeds and hence, lowered or absence of regeneration.

The normal wind direction during different months of the year is East-North-East. Due to heavy mining activities surrounding to the project area, this region is not free from air pollution. The open cast mining will generate the fine particles which will ultimately pollute atmosphere. Due to destruction of vegetation growth by active mining and mining work, the carbon dioxide and oxygen balance in the air

environment will be affected. Beneficiation of ores may generate some dust in the process which will pollute the air.

Noise pollution: This is one of the factors contributing to displacement of species, even large ones like Deer and elephants. Adverse effects of noise are.

- Hearing impairment.
- Signal masking i.e. inability to hear important environmental clues and alarm, distress and mating calls of con specifics for survival.
- Increased heart beat respiration and stress reaction.
- Loss of fecundity or inability to litter or increase in abortion.
- Erosion of faculty to suckle young and successful rearing of the brood.
- Decline in bird population due to muffling of mating calls.

Light pollution: All animals are adapted to rhythm of solar light and darkness and accordingly remain passive or active depending on their nature (diurnal, crepuscular or nocturnal). Lighting of mine pits, ore stacks, machineries and office buildings disturbs the animals. Lighting is of 3 types, direct sudden glare, chronically high illumination and sky glow. These disorient animals, stress the normal physiology and put a curb on their activity cycle. Animals, adapted to constant phase of light, when changes happen, they move to area of their choice. Sudden lighting, off and on after evening hours by the moving vehicles is harmful. At times, animals are unable to escape and get blinded by the glare. Animals exposed to light exhibit erratic behaviour pattern, expressed in their deflected movement and aggressive behaviour.

b.) Quantum of pollutants that may be produced by the project and effect on soil, water, air, vegetation and animals.

According to the mining plan of the project, overburden with some other waste materials will be generated during the mining activity, which may pollute the air as well as soil. This can be minimized by adopting proper mitigation measures. Similarly during mining process the operation of HEMM may be the reason for both air and noise pollution due to production of obnoxious gas and high decibel irritating sound.

JSL has already being operating a chrome ore beneficiation plant since 2003 with an annual production of 36000 tone of chrome concentrate and had accumulated considerable quantity of tailing assaying around 20% cr2 o3. During the mining a considerable quantity of very low grade material containing cr2o3 around 15% is produced incidentally and stacked separately. Keeping on view JSL Ltd. has intended to enhance the capacity of this present plant from 36000 TPA to 60000 TPA. Hence, this sub-grade of the chrome ore will be beneficiate in the

Chrome ore beneficiation plant which is present inside the mining area. During this process the wastage release will be discharged to the existing dump or partly back filled to the mined out quarry. Hence it may not affect significantly to the soil, water, air, vegetation or animals of the surrounding.

c.) Degradation anticipated on account of the project implementation in quantified terms on appropriate models to be explained. Qualitative change in the Wildlife habitat pattern in the study also area due to project implementation should be detailed in the plan.

Direct degradation is observed in the form of loss of forest growth over ۸۶.۵۷ ha as breaking area of mining. This complete erase of forest displaced the wildlife of that area. Due to direct absorption of 500 people in the project and indirect employment of around 1000 people put huge stress on surrounding forest habitat.

Habitat fragmentation: This is the result of clearance of native vegetation either by mining or by allied development activities in the midst of hilly forested area. Habitats, once contiguous, become divided into separate fragments. After clearance, separate fragments tend to be small units or is-lands isolated spatially. Habitat fragmentation involves some habitat impairment of the is-land units as well. Fragmentation involves increase in edge habitats and decrease in interior habitats. Biodiversity of each of the fragments get reduced for the above reason. Habitat fragments are rarely representative samples of the initial landscape. Species like elephants, deer, move between the fragments and make use of both. Small species having no ability to move between fragments must make do with what is available in the single isolated habitat.

Habitat fragmentation leads to edge effect. Microclimate changes alter ecology of interior and exterior habitats. Species adapted to interior habitats are less likely to survive in an edge habitat of smaller units. Smaller units support smaller population with reduced carrying capacity. Small population face decreased heterozygosis, increase in inbreeding and possibly inbreeding depression. If there is no migration between populations and genetic exchange, genetic drift sets in. This means, directional selection for advantageous alleles can cause certain alleles to become fixed in a population, thereby decreasing variation. Such loss of diversity, however, will not affect elephants, as movement path of elephant changes with available alternatives. But, species with low cruising radius will be affected. No elephant movement path from one habitat to another is located in this area, but this area forms a part of the larger habitat of Keonjhar elephants, within the buffer zone.

Loss of biodiversity: In the buffer zone of this mining lease area, only a few species, e.g. Sal, Dhaura, Asan, Chara, Mohul etc. represent dominance in number and height growth in the Daitari DPF and Mahagiri DPF. Majority of other species are represented by lesser number of individuals and covering middle storey, field and ground level. The latter gives rise to species diversity. More the species diversity more is the interaction between species and development in complex food chains. Animals are adapted to different layers of vegetation, different tropic levels and micro habitats and a large number of niches develop. Populations vary as each is bestowed with number of variations. There are variations in genetic level also. This diversity is life and blood of sustenance and long term viability of the ecosystem and gives stability to it. Such a system is less affected by external perturbations. The habitat losses in the heart of the forest area induce fragmentation, pollution, fire, grazing etc. and the resultant affect is biodiversity loss. It has been found world over that population level biodiversity is disappearing at a greater rate than that of the species level, threatening disruption of ecological services and closing all options for future utilization of this unique gift of nature.

Habitat destruction by illicit felling: Illicit felling is a common feature around Daitari, sukinda and Mahagiri area all in buffer habitats. Haphazard felling lead to canopy openings and species like giant squirrels, monkeys and variety of birds are affected. Elephants are also affected as the habitat is rendered sub-optimal due to loss of cover and reduction in variety and quality food. In such gaps, climbers and weeds are getting foothold. Vegetation is also degraded by activity of encroachers. These changes reduce living space, reduce range essentials and restrict critical habitat for survival. Where a critical habitat such as cave, physiographic depression, riverine vegetation, climber thickets, wallows, grass land, nursery ground, continuity in canopy, hollow trees, down logs etc., is restricted or obliterated, a species could be eliminated.

Habitat destruction by Grazing and transmission of disease: Tribal households have average 3-5 cattle which are let loose in the forest un-accompanied by a cow-herd. Cattle are reared for dung and milk in local villages. They return to the village after grazing themselves. Cattle are considered a sign of wealth by a tribal. Uncontrolled grazing has created sub-optimal habitats around habitations and has introduced agricultural weeds in forest areas. The field and ground level vegetation has thinned out. Movement of cattle deep inside the forest has another threat of transmitting cattle borne disease pathogens to water holes and ground level vegetation. Wild animals like chital and barking deer are susceptible to pathogens of FMD (Foot and mouth Disease), R.P. (Rinderpest) & B.Q (Black Quarter -Septicaemia) transmitted by grazing cattle.

Forest fire:

Forest fire Within core zone of the ML area: Around 450 workers and 50 staffs are working in the area. Besides, many outside entries and exits will certain to happen. These large intrusions of labour force may pose serious threat of forest fire. Slight undisciplined behaviour on the part of labourers may result in serious conflagration. Such fires can cause irreversible damage to plants and animals that may choose to colonize the area. Ground nesting birds, their broods, slow moving reptiles and animals like porcupine which cannot move fast, are destroyed. If not controlled, it can spread to adjoining buffer area, fanned by wind. Fires usually char to death small animals and young ones who cannot escape as fast as its spread. Fire not only destroys plants and displaces animals; it also impacts the soil properties and increases run-off and soil erosion and moisture content. Post fire scenario usually shows temporary increase in forage of fire hardy coarse material. Repeated fires of high intensity, however, change the species composition of ground flora, lower the browse and forage volume, destroy tender plants. These affect grazing food chain. Ultimately, life support system gets damaged and there appears a definite sign of site impoverishment.

Forest fire in buffer Zone of the Mining Lease : Forest fire is common in this belt. Sometimes it is accidental but mostly deliberate for hunting and collection of NTFP (Mohua flowers, Sal seeds and honey). Fires, year after year, lit a multiple number of times every year, has brought about some changes in species of plants and animals. Fire tolerant species have increased in number at the expense of species tender to fire. Extent of change in habitat structure & composition is likely to impact wildlife communities. Species like elephant, sloth bear, Ratel, python, birds are all affected by fire. They suffer emigration and injury. Fires favour raptors by destruction of ground cover. Post fire scenario always has increase in number of insects and insect eating birds. Fires do permanent & irreversible damage by altering physical properties of soil, such as structure, texture, permeability and water holding capacity. High intensity fires usually decrease nutrient pools that lowers site productivity. Restoration of vegetation in severely burnt sites is slow. Repetitive fires create perfect ground condition for invasion of exotic weeds like *Chromolaena odorata* and *Lantana camara*.

These degradations and repeated fire can change the forest type of from 5B/C2 (Northern Dry Mixed Deciduous Forest) to degraded one with 5/DS1 (Moist Mixed Shrub Deciduous Forest).

d.) Nature of threats to the flora and fauna on account of the project implementation and increased human presence.

Habitat loss, habitat fragmentation, fire, discussed above, there are other threats also emerges due to degradation of forests and those are mentioned below.

Encroachment: In the recent past the Maoists invaded in to this lease area and encouraged the villagers to encroach forest land. Their campaign material says we demand humanity for poverty stricken masses, self-respect, humanity, sense of justice and the struggle for a decent existence. Though nobody has any qualms to such demands, but have different opinion to the violent methods of achieving their goals. In the fear, forest officials do not venture in to forests. Such openings in the canopy for cultivation, adds to habitat loss and fragmentation. Such openings deep inside forests are open invitation to elephants and wild boar for good forage, water and wallow.

Accidental fall of animals in pits: As the mining progresses the depth of pit will expand both in length, width and depth. All these pits are highly hazardous for movement of medium & large sized animals. Any unintentional entry into these pits can be fatal or injurious to animals, sometimes may act as a trap for animals.

Litter generation: Labourers generate much litter in shape of polythene wrappers; carry bags, paper wrappers, leaf plates and left- over food. This is not only is obtrusive to sight but can attract animals like pigs and jackals. Ingestion of indigestible polythene can lead to blockade of gut and eventual death of these animals. The workshop will produce mobile cans, plastic jars, spent mobile and grease. The canteen and office will also produce various wastes. Litters strewn all over not only destroy aesthetic appeal but are injurious to plant and animal life in many other respects.

Pollution of Surface runoff: The nearby waters are draining through the Dhamsal nala, which is the major drainage on the northern boundary of the mining lease area. It is possible, that the water will carry toxic heavy metals in suspended form. Such water will be unsuitable for animals to drink and even for bathing of human. This may kill aquatic weeds and aquatic small animals hence, it is essential to maintain the quality of nala water suitable for wildlife consumption.

Road Accident: The minerals extracted from the mines are transported to the industry through Railways and roadways. For transporting minerals from mining pit to the Railway station (Sukinda), numbers of heavy vehicles are deployed. These vehicles run to the station through Tomka - Mangalpur road over a distance of 45 km. These are busy roads from the point of view of mineral transportation by hundreds of tipper. Such heavy traffic not only keeps the area disturbed by their repelling noise and dust but also pose threat from accidents. The road network

within the mining lease area and around may further extend with the development of mine. A total of 35 transport trucks of 20 ton capacity will be in operation for the entire mining lease of 89.000 ha daily. Hence, there will be proportional pressure of transport trucks on the lease area. Incoming dumpers to quarry descend and being empty, come in comparatively higher speed than loaded ones. These may run over slow moving animals like lizard, python, porcupine, civet and hare etc.

e.) Probable increase in the vehicular traffic and its impact.

Presently ore is being extracted only from 22.80 ha diverted area. The total lease area is 89.0 ha and the Project Proponent is in the process of filling proposal for diversion of the balance forest land over 66.20 ha. Besides the lessee has also applied to MoEF to increase the production from 0.1 million ton to 0.215million ton per annum. This will increase the vehicular movement 03 times. In the cluster there are 11 mines more. When all the mines will be in full swing the vehicular movement will be many fold. Such a practice will increase dust pollution, noise pollution and may lead to many accidents also.

f.) Noise Pollution, Air and underground pollutions etc. and it's probable impact on flora and fauna:

These are discussed in details in this chapter in Section **(a)** above.

g.) Study techniques adopted and observations of the experts in the field giving details of visits, areas visited, observations, records referred to, sampling methods adopted and justification in extrapolation:

During field survey, we visited the mining area in both the pits and nalas. We have collected much information from villagers. We discussed the details of the project and its surrounding forest covers with Mr. Surendra Kumar Sahoo (Asst. General Manager), Sri Jayaram Panda (Surveyor) of JSL Ltd. and Sri Soubhagya Kumar Sahu Range Forest Officer, Sukinda.

Records Referred:

Details of the reference are given below.

1.Champion H G. and Seth S K. (1968). *A revised survey of forest types of India.* Govt. of India: New Delhi.

2.Flora of Onssa-Bihar, Saxena & Brahman.

3.District Gazetteer Cuttack District.

4.E.I.A. & E.M.P. report of JSL Mines.

5.Mining Plan of JSL mines.

6.Right of Passage-elephant corridors of India - Wildlife Trust of India.

7.Sar C. K. and Lahiri-Choudhury D.K. (2009).Project: Elephant – Human Conflict in Asia, Report on Orissa, India (Part-I), State Report. Education Centre, Kolkata.

8.Sar C K & Lahiri-Choudhury D K. (1999). Project: Elephant - Human Conflict in Asia, Report on Orissa - India (Pt.-II-a), Athgarh Forest Division, Cuttack and Jajpur District (1992- July 1997). Asian Elephant Research and Conservation Centre, Bangalore.

9.Sar C K & Lahiri-Choudhury D K. (2002). Project: Elephant - Human Conflict in Asia, Report on Orissa - India (Pt.-II-e), Keonjhar Forest Division, Keonjhar District (1992- April 2000). Kolkata.

10. State of India's Forest Report (2015-16). Forest Survey of India. Derha Dun.

Sampling Method adopted: The methods of the sampling is described in details in Section **(k) of Chapter -1**.

Justification in Extrapolation:

The study was conducted by our team members by following the methodology of direct observation and indirect evidence from the field. They had also discussed with the local villagers and the Forest Staffs regarding the forest and the flora, fauna.

The study of topographical feature, natural drainages pattern of the mining area and its buffer zone were conducted with help of the Topo Map (1:50,000) scale which was prepared by Survey of India. Similarly other important data about the mines was collected from the mining plan which was approved by the IBM Nagpur vide their Letter No.314 (3)/99 Dt.29.12.2000. Hence, it is justified that, no exemption has been made by the Project Authority as well as the experts involved in the field study.

CHAPTER-3

OBJECTIVES OF MANAGEMENT AND MITIGATION STRATEGIES

a.) Objectives of management to address the issue of wildlife conservation against the project implementation.

The main objective of this plan is to reduce various stress begin due to the working of the mine in this particular locality having wildlife importance. The Site Specific Wildlife Conservation Plan will suggest measures to mitigate such stress and if possible how to avoid certain activities which could reduce the negative influence of the mining activity. Wildlife management consists of promoting welfare factors, arresting or reducing the impacts of decimating factors and neutralizing harmful effects of limiting factors that keep the animal population lower than the carrying capacity of the area. It also aims at management of human dimensions relating to regulation of habitat use, sufferance from animal damages, livelihood issues and taking people as partners in conservation management. Such concerns are reflected in the prescriptions. The management of the mining lease area will aim for maintenance of habitat for smaller animals that used to live and share habitat with mining activity. At the same time, the virgin area will nurture as a part of the larger habitat for wild animals that may come over. The management of Buffer Zone will target optimization and maintenance of wildlife habitat and bio-diversity, involving local people as far as practicable and aim to avoid / minimise or mitigate the adverse impacts of the mining activity. The buffer zone of the mining lease area has full of forest growth. Besides small animals larger ones like deer and elephants make use of the area regularly, as the area is undisturbed. Large animals will be displaced from the area once the mining commences with full vigour. The displaced animals should not be left as refugee. Their rehabilitation would be the major objective of the plan. To fulfil all these requirements, the plan focused on improving forage and browse volume by increasing food plant diversity with vertical and horizontal cover. These will arrest habitat destruction and fragmentations also prevent soil erosion and loss of bio-diversity. Keeping natural water resource free from negative impact of the mining activity will also be targeted.

Objective of management to mitigate the threats to the wildlife is covering the following aspects.

i. Maintain/enhance food and cover values in buffer habitats while counterbalancing decimating factors.

a. Control depredation by wild animals to generate public support in conservation management and build up synergy in conjunction with regular protection set up.

b. Undertake appropriate attentive measures in mine working so as to avoid/minimise or mitigate the adverse impacts on wildlife in and around the mine.

c. Initiate studies on habitat utilization pattern of the Umbrella Species 'elephant' and other wildlife with a view to strengthen and secure the critical habitat.

Strategies to mitigate and minimise adverse impacts: Keeping the above objectives in view, followings are suggested.

a.) Core Zone

a.1) Free Distribution of Seedlings

The first step in successful restoration of the habitat to meet the requirement of the stake holders in order to reduce pressure for collection of forest produce for domestic use so that the forest will grow to meet the food, cover and shelter of the wildlife. Therefore, it has been suggested that, the User Agency should make a Provision for distributing every year 10,000 seedlings preferable of fruit bring like Mango, Jack Fruit, Amla etc. to the stake holders of the adjoining villages for planting in their back ward and/or vacant places which in future will meet their demand.

a.2) Fire Watchers: 5 nos. of watchers will be engaged selected from local villages on the suggestion of Gram Sabha or VSS for a period of 5 months (February to June). It will be better that the fire watcher should either be linked earlier with poaching / illegal collection of forest produce or they have working knowledge of forest tracts, path and routes, willingness to work in forest, ability to move on foot /cycle. The involved personnel deployed should be well trained by the forest Staff for prevention of fire. They should be equipped with two fire blower for quick action in vulnerable area and mobile phone, other communicating device for instant contact to the forest officials or fire personnel when the fire is out of control to them. The fire watchers engaged will be answerable to the area forester and take instructions from him daily in the morning. They will organize villagers in dousing of any accidental fire seen without prior instruction of the forester.

It is also proposed to pay incentive to the adjoining villagers for co-operating forest field executives in detecting illicit felling, poaching, in fire fighting measures and anti depredation of wildlife coming out of their home range to vicinity of villages.

a.3) Promotion of awareness: Strong awareness will be built up among Villagers of adjacent area of the mine, School children and Forest Staffs working in mining belts about working ethics in a forest area. They will be told to keep the noise levels to the barest minimum, take all precaution against fire, damage to trees etc. Drivers will be educated to control speed so as not to run over slow moving creatures. Behavioural change will be expected from each worker on the above points and use of garbage bins. Any sick and injured animal will have to be rescued and given first-aid and water. Such animal is to be subsequently handed over to the nearest forest official and with their consent released in the forest.

It is suggested to hold meetings in Schools inviting Resource Personnel to appraise the Students regarding need of the day so far conservation of forest is concerned. Meetings should also be held in adjacent Villages to convince the Stake holders that without their co-operation hand in hand, only forest staff may not be able to protect forests. Forest Staffs working in particularly Mining Belts should be taken for exposure visit to exemplary forest areas where by the support of villagers/ VSS members and Forest staffs, the degraded forest has been rejuvenated and gradually herbivores have started living in.

a.4) Immunisation to Cattle

The village cattle mostly depend on Mahagiri DPF for grazing. Cattle are ungulates. In the forest also ungulates lives like Sambar, Spotted deer, Barking deer, and Wildboar. The village cattle suffer from, FMD, Rinderpest, and Anthrax. When these infected cattle visit forest area the disease may contaminate to ungulates. In order to act as a remedial measure, periodical vaccination top village cattle is essential.

Hence, the village cattle will be regularly immunised by the local Veterinary Asst. Surgeon, Sukinda against F.M.D (Foot and Mouth Disease) to prevent spread of cattle borne diseases in the forest and affect wild animals particularly ungulates.

a.5) Protection To support and accelerate effective movement of the DFO for protection both to forest and wildlife, prevent poaching, supervise compensatory afforestation and wildlife depredation in general with particular reference to the disturbances caused by mega fauna, User Agency will procure one vehicle (Scorpio) and supply to D.F.O., Cuttack Division.

a.6) Cost of Driver and Fuel to DFO's Vehicle It is proposed to provide the cost of Fuel and Driver of the vehicle to be used by DFO for anti-depredation, anti-poaching operations.

In order to provide electronic facility to the Range level field executives, one laptop, with accessories will be procured by the User Agency and supplied to the Range Officer, Sukinda

a.7) Health safety User Agency will conduct regular health camp may be once in a month. They will invite local Doctor on payment of part time remuneration. Such camps should be arranged preferably on Sunday or local market day when weekly market assembles, so that villagers will avail the benefit of the camp. The User Agency has to bear the cost of such camps and supply of medicine to the tune possible. For further diagnosis and costly medicines, Doctors will refer the patients to the nearest Govt. Dispensary/ P.H.C. / Hospitals. Provision should be made for

deployment of a Pharmacist and a Staff Nurse to assist the Doctor. Such camps should be arranged preferably on morning hours.

b) Strategies to mitigate and minimise the adverse impact so observed in the field. (Buffer Zone)

b.1) Block plantation in bald hill model: The first step in successful plantation over 40.00 ha in bald hill model is to have a quality seedling bank of indigenous species suitable to the site and interventions proposed. The choice of species can be decided in consultation with local forest officers but shall be quick growing, less exacting in respect of nutrient requirement, have more or less evergreen foliage, drought resistant and be of utility as food and cover for variety of wildlife. Besides being indigenous to the area a few plants which are preferred by birds like Semul, Neem, Banyan, Baul, Paldhua and Palas etc for feeding and nesting should be selected for plantation..

The second step, simultaneously to be taken is site preparation. As the site is high in C/N ratio, level of N, P, micro nutrients and organic matter is low. Special steps shall be taken to improve the organic matter and nutrient level of the soil for optimal growth and survival of the plants. Pit size will be 45 cm^3.

Site preparation will be taken up in the winter preferable one year prior to the year of actual plantation. This consists of removal of weeds, control burning and pitting 45cm^3 pits at 2.5 x 2.5 m spacing. A basketful of FYM (farm yard manure) or valley soil will be added to the pit and the soil allowed for withering. Therefore, the dug up earth from the pits should be heaped on the northern side of the pit to allow sunlight throughout the day to be focused inside the pit.

Early monsoon planting of poly pot seedlings will be done. During planting 50 gm of NPK, 30 gm. Neem oil cake and pinch of bio-fertilizer will be added to each pit. Seedlings will be of proper size of 1m ± 0.10 m to withstand extremes of environment and put on proper growth.

Half moon trench by heaping the dug up earth pilled up on uphill side will be made to tap moisture and allow rainwater to be deposited in the half moon pit to which the root of the plant can draw by capillary system as and when necessary. Weeding & soil workings will be done as per requirement. The plantation will be guarded against fire & grazing. A well planned reclamation and plantation regime will also address the issue of land configuration changes to a large extent.

b.2) Urban Plantation Raising Urban Plantation 10,000 no. in Sukinda and Tomka range

b.3) Creation of Water Hole Due to irregular rain fall and climate change it has become a common phenomenon that the natural water whole exiting in side Forest

areas especially during summer i.e. from Feb. - June mostly the mega fauna and herbivores like Chital, Barking Deer, Wild boar etc. are very often coming out of the forest area to approach village ponds to quench their thirst. To mitigate this short coming, it is proposed to construct 2 water holes in Sukinda Range.

b.4) Fire Line: Similarly as in the core area 10.0 km long fire-line shall be maintained in 10m width inside protected forest which is most fire prone in the buffer zone of this project. All trees below 30 cm girth and shrubs will be felled. The resultant poles and brush-wood will be piled every 100m in a dome/cone shaped structure in the centre of the line. This will act as a refuge, nesting place for gallinaceous birds and small mammals alike. Rest of the materials will be burnt after dried up. Fire line will be kept periodically from February till end of June so that there is no inflammable material left there in.

b.5) Fire Watchers: 10 nos. of watchers will be engaged selected from a local village on the suggestion of Gram Sabha or VSS. The fire watcher selection criteria will be working knowledge of the forest tracts, path and routes, willingness to work in forest, ability to move on foot /cycle. Fire watcher will be engaged every year for 5 months from February to June. He will be answerable to the area forester and take instructions from him. He will be expected to identify fire prone areas, keep liaison with villages close to the vulnerable area and enlist their support in fire prevention. He will organize villagers in dousing of any accidental fires seen without prior instruction of the forester. For quick action in the vulnerable area two firefighting equipment shall be provided by the User Agency to the watcher engaged.

b.6) Anti – depredation Squad: To identify the movement pattern of the wildlife especially elephant 10 nos. of anti- depredation squads will be engaged. Not only they will follow the movement pattern but also they also visit nearby village especially depredated area by elephant. They will be involved for depredation of elephant from village by scientific methods demonstrated by Forest Officials. Whenever the situation will be out of their control, immediately they will inform nearby forest officer for taking immediate action towards the uncontrolled situation.

b.7) compassionate payment grant (Emergency funding): Very often the Elephant herd visit adjoining villages of their natural habitat villages around Mahagiri DPF for crop raiding. They damage acres of paddy field which needs to be compensated by Forest Dept. @ Rs.10, 000/ per acre. Therefore, it is proposed to create a compassionate fund with DFO, Cuttack from which at the time of exigency, he can immediately pay to the victims.

b.8) Rain Water Management

Rain Water Management is concept of controlling, conserving and effectively utilizing the total precipitation falling in a watershed. Ultimate source of all water we see in rivers, tanks and wells is the rain. Apart from its large quantum, the significant fact about it is that its home is the cloud which keeps floating overhead to cover every inch of land. It comes down during monsoon months and falls as droplets and does so everywhere without any discrimination. It falls on hilltops, roof tops as well as the crop fields. This is the basic advantage of trying to utilize it where it falls. In addition to minimizing the chance of avoidable losses one saves the trouble of conveying the water from one place to other.

It is proposed to develop this program over 50 ha area in the Mahagiri hill of Mahagiri DPF of Sukinda Range for the benefit of both flora and fauna living there. By this programme the ground below the hill slopes will be fully recharged with rain water and other benefits except the above are follows.

1) The existing plantation and the proposed ones will get sufficient water for survival and growth.
2) Dead springs will come alive
3) Farm lands below will get sufficient water to prevent drought in Khariff
4) Water will be available throughout the year in the wells and ponds dug below the forest boundary.
5) This will ensure Rabi and summer crops along with facility for bathing and use by domestic and wild animals.
6) The environment will become favourable for plants, humans and animals.

Items of work

The work will be taken up in two phases. Necessary guidance during execution shall be provided by a group of Agricultural Engineers (retired from government service) working for promotion of ground water recharge under the banner of Green Water. The item of work or the interventions are the following two.

1. Graded Earthen Guide Bund: Earthen bunds shall be erected on the low slope (<5%) forest and pediments of hills. These bunds would be 1.5 meter high (minimum) and follow a longitudinal slope of 0.2% to 0.5%. The purpose of these bunds is to guide the runoff along a longer path to increase time of concentration and promote infiltration. Preferably burrow pits to be located on the upstream side.

2. Loose Boulder Drop Structures: Loose Boulder Structures are essentially surplus escape drop structures made of collected/broken stones. They will be used for safe discharge of runoff and control of gradient of streams. Their height will be limited to one meter. The headwall will have top width of 1m with upstream slope of 1:1 and downstream slope of 1:3.

b.9) Infrastructure: Infrastructures like GPS (Gramin ETrex) (04 No.), Digital Camera (04 No.), Binocular(02 No.), Camera Trap (06 No.), Night Vision Binocular (01 No.),Night Vision Goggles (02 No.), Mobiles(5 No.) and Rescue equipments like Iron Cage, Rope, Chain, Net etc. need to be purchased for rescue operation of destitute wildlife or wildlife causing havoc in villages.

b.10) Protection Shed In order to provide accommodation to the anti-depredation squad within the Range Office Campus at Sukinda to avail their service at the time of exigencies, it has been proposed to construction one Protection Shed over 1400 sq.feet with all facilities for their living.

Asst. Conservator of Forests
Cuttack Forest Division.

Divisional Forest Officer
Cuttack Forest Division

CHAPTER-4

MANAGEMENT STRATEGIES WITHIN THE PROJECT AREA WITH FINANCIAL FORECAST

a) Interventions to be implemented by the project Authority inside the project area with Justification. All measures are discussed in Chapter – **3.** The financial requirement of various interventions suggested in the plan as per current costs is given in flowing table for the plan period of 10 years and annual cash flow for mining lease area. All activities within the mining lease area will be implemented by the lessee.

Financial provision of works in ML area

Sl. No.	Para Ref	Management interventions	Estimated Cost (in Lakh)
		Habitat Improvement	
1	**3a.1)**	Free distribution of seedling 10,000/ year (fruit bearing species like Mango, Jackfruit, Amla etc.) to the stake holders @ Rs. 26.76 per seedling including monitoring.	26.76
		Habitat Protection	
3	**3a.2)**	1) Fire watcher (5) for 5 months Feb-June @ Rs.6000/- per month for 10 years to be used in mines as and when required by RO Sukinda	15.00
		2) Fire Fighting Equipments (2 Blower @ 55,000 each)	1.10
		3) Incentive to villagers (10,000 per year x 10 year)	1.00
		Awareness Promotion	
4	**3a.3)**	Meeting in Schools, Villages to aware them regarding necessity of tree planting and need of the day. Exposure Visit for VSS members and Forest Staff to sites to appraise the role of VSS in rehabilitation of degraded forest, Protection and Fire emission in forest areas.	15.00
		Protection to Animals	

5	3a.4)	Immunisation to Cattle of adjoining villages of the M.L. area.	6.00
Infrastructure			
6	3a.5)	One Vehicle (Scorpio) to be procured and supplied to D.F.O., Cuttack Division for protection of forest and wildlife	15.00
7	3a.6)	Cost of Driver and fuel for One vehicle (to be supplied by User Agency) of DFO, Cuttack	36.00
8	3a.7)	Mega health Camp to be organised in the adjoining villages at definite interval.	5.00
Total			**120.86**
+ 20 % Escalation			**24.172**
Grand Total			**145.032**

b) Location of the proposed intervention and maps overlaid in the proposed land use plan map

The map showing the intervention implemented inside the project area by the project authority has been furnished in **chapter 6** of this plan.

Approved

Principal Chief Conservator of Forests
(Wildlife) & Chief Wildlife Warden
Odisha, Bhubaneswar

Mines Manager
Kaliapani Chromite Mines
M/s Jindal Stainless Ltd
Kaliapani

Divisional Forest Officer
Cuttack Forest Division

e) Annual Work Programme:

Details of the flow of funds for different years of the plan for ML area are given below: (Rs. In Lakhs)

Sl. No.	Para Ref	Type of interventions	y1	y2	y3	y4	y5	y6	y7	y8	y9	y10	Total
1	3.a.1)	Free distribution of 5000 seedling / year to the stake holder for 10 years.	2.676	2.676	2.676	2.676	2.676	2.676	2.676	2.676	2.676	2.676	26.76
2	3.a.2)	Fire watcher (5) for 5 months Feb-June	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	15.00
		Fire Fighting Equipments (2 Blower @ 55,000 each)	1.10	-	-	-	-	-	-	-	-	-	1.10
		Incentive to villagers (10,000 per year x 10 year)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.00
3	3.a.3)	Awareness promotion & Exposure Visit for VSS members and Forest Officials	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	15.00

4	3a.4)	Immunisation to Cattle	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	6.00
5	3a.5)	One Vehicle (Scorpio) to D.F.O., Cuttack	15.00	-	-	-	-	-	-	-	-	-	15.00
6	3a.6)	Cost of Driver and fuel	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	36.00
7	3a.7)	Mega health Camp	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	5.00
		Total	25.376	10.376	10.376	10.376	10.376	10.376	10.376	10.376	10.376	10.376	**120.86**
		20 % escalation	5.0752	2.0752	2.0752	2.0752	2.0752	2.0752	2.0752	2.0752	2.0752	2.0752	**24.172**
		Grand Total	30.4512	12.4512	12.4512	12.4512	12.4512	12.4512	12.4512	12.4512	12.4512	12.4512	**145.032**

Mines Manager
Kaliapani Chromite Mines
M/s Jindal Stainless Ltd
Kaliapani

CHAPTER- 5

MANAGEMENT STRATEGIES WITHIN THE BUFFER ZONE OF THE MINING LEASE WITH FINANCIAL FORECAS

Financial Provision of Works in ZoI: The financial requirement of various interventions suggested in the plan as per current costs is given in following table for the plan period of 10 years and annual cash flow for the buffer zone of the mining lease area. All activities in the buffer zone will be implemented by the Divisional Forest Officer concerned (Cuttack Forest Division). The total amount estimated for ZoI, will be deposited to DFO, Cuttack.

Sl. No.	Para Ref.	Description of work	Amount in lac	Total Cost in lac
		Wildlife Habitat Improvement		
1	**3b.1)**	Habitat Restoration by Block Plantation (in Bald Hill Mode) over 40.00 ha with 1600 plant/ha in Tomka/Sukinda/Dalijora Range, Forest and Non-Forest land.	81.688	
	3b.2)	Raising Urban Plantation 10,000 no. in Sukinda and Tomka range at the rate Rs3,35,480.00/1000=Rs335.48 per plant + Rs253.00 gabion cost=Rs588.48 X 10,000 plants=Rs58,84800.00 with 4 year maintenance	58.848	**156.536**
2	**3b.3)**	Creation of Water hole 2 Nos. in Sukinda Range @ 5.00 lakh each.	10.00	
		Renovation of existing water hole 4 nos. in Sukinda and Tomka Range at the rate Rs.1.5 lac each	6.00	
		Fire protection Measures		
3	**3b.4)**	Fire line creation over 10.00 Km in Mahagiri PF of Sukinda Range Rs.20,000/- per km and Rs. 10,000/- per km for maintenance for 9 years.	11.00	

4	3b.5)	Fire watcher 10 nos to be deployed in Sukinda Range @ 6,000/- per watcher x 5 months x 10 years.	30.00	**42.100**
		Firefighting equipment (2 Blower @ 55,000 each)	1.10	
		Wildlife Protection &Anti-depredation		
5	3b.6)	Engagement of 10 man power @ Rs. 6,000/- for Anti-depredation squad, equipment and uniform	72.00	
		Execution of Soil Moisture conservation in Daltari DPF in Tomka and Sukinda Range	10.00	
6	3b.7)	Compassionate payment (Emergency Funding) to be granted	10.00	
7	3b.8)	Rain water management program over 50 ha @ Rs. 28559.38/ ha	14.28	**142.28**
8	3b.9)	Modern wildlife monitoring equipments like GPS (Garmin-E Trax Vista), Digital Camera, Binocular, Mobile, Night Vision Goggles, Night Vision Binocular, Laptop, VHP installation/ maintenance	20.00	
		Rescue Equipment Cost of Cage, Rope, Chain, Net etc.	6.00	
		Contingency/ Unforeseen	5.00	
		Signage/ Awareness promotion	5.00	
9	3b.10)	Construction of Protection Shed over 14,00 sq ft within the Campus of Sukinda range Office	25.00	25.00
		Total of ZoI		**365.916**
		Cost escalation 20%		**73.1832**
		Grand Total of ZoI		**439.0992**

Approved

Principal Chief Conservator of Forests
(Wildlife) & Chief Wildlife Warden
Odisha, Bhubaneswar

a) **Location of the Proposed Interventions:** Location of the above mentioned intervention are marked in enclosed map and given in **Plate *IV***

b) **Monitoring committee**: There shall be a monitoring committee for proper implementation, planning, sorting out road blocks, site selection, and approval of rates of work and providing guidance. The committee will be headed by the DFO Cuttack, Forest Division with representative of mine, Gram Pradhans (or EDC Presidents), RO Sukinda, Foresters as members. ACF (HQ) will be the member Secretary of the committee. As far as practicable made with total involvement of villagers for transparency and to build up the capacity of village.

c) **Plan period:** The plan is for 10 years from 2016-17 to 2026-27, in consonance with accepted norm and as prevalent for forest working plan. The intermediate revision is not foreseen unless the mine increases in size or closed down or there is slump in market or departure of present Government policy for forest management.

Mines Manager
Kaliapani Chromite Mines
M/s Jindal Stainless Ltd
Kaliapani

Divisional Forest Officer
Cuttack Forest Division

f) Annual Work Programme:
Details of the flow of funds for different years of the plan for ZoI area are given below (Rs. In Lakhs)

Sl. No.	Para Ref	Type of interventions	y1	y2	y3	y4	y5	y6	y7	y8	y9	y10	Total
1	3b.1)	Block plantation (Bald Hill Mode)	58.634	11.534	6.04	5.48	-	-	-	-	-	-	81.688
	3b.2)	Urban Plantation	(15.28+25.30)= 40.58	10.308	4.24	3.72	-	-	-	-	-	-	58.848
2	3b.3)	Creation of 2 Water hole	10.00	-	-	-	-	-	-	-	-	-	10.00
		Renovation of Water hole	6.00	-	-	-	-	-	-	-	-	-	6.00
3	3b.4)	Fire line creation over 10 Km and its maintenance for 9 years	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	11.00
4	3b.5)	Fire watcher 10 nos.	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	30.00
		Fire Fighting Equipments (2 Blower @ 55,000 each)	1.10	-	-	-	-	-	-	-	-	-	1.10
5	3b.6)	Engagement of 10 man power for the purpose of Anti-depredation squad	7.20	7.20	7.20	7.20	7.20	7.20	7.20	7.20	7.20	7.20	72.00

		Execution of Soil Moisture conservation in Daitari DPF in Tomka and Sukinda Range	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	10.00
6	**3b.7)**	Compassionate grant (Emergency Funding)	10.00	-	-	-	-	-	-	-	-	-	10.00
7	**3b.8)**	Rain Water Management over 50 ha @ Rs 28559.38 on Mahagiri hill	8.31	5.97	-	-	-	-	-	-	-	-	14.28
8	**3b.9)**	Modern wildlife monitoring equipments like GPS (Gramin E Trex), Camera, Binocular Laptop, VHP installation /maintanance	20.00	-	-	-	-	-	-	-	-	-	20.00

		Rescue Equipment / relocation of wild animals (A) Cost of Cage, Rope, Chain, Net etc.	6.00	-	-	-	-	-	-	-	-	-	6.00
9		Contingency/ Unforeseen	5.00	-	-	-	-	-	-	-	-	-	5.00
10		Signage/ Awareness promotion	5.00	-	-	-	-	-	-	-	-	-	5.00
	3b.9)	Protection Shed over 14,00 sq ft.	25.00	-	-	-	-	-	-	-	-	-	25.00
		Total	207.724	40.012	22.48	21.4	12.2	12.2	12.2	12.2	12.2	12.2	**365.916**
		20% escalation	41.5448	8.0024	4.496	4.28	2.44	2.44	2.44	2.44	2.44	2.44	**73.1832**
		Grand Total	249.2688	48.0144	26.976	25.68	14.64	14.64	14.64	14.64	14.64	14.64	**439.0992**

Mines Manager
Kaliapani Chromite Mines
M/s Jindal Stainless Ltd
Kaliapani

Final Cost Abstract of this plan including both Project area and ZoI

Intervention Cost in lac	
Intervention Cost in Project area including 20% escalation	145.032
Cost of intervention in ZoI including 20% escalation	439.0992
Grand Total	584.1312

Mines Manager
Kaliapani Chromite Mines
M/s Jindal Stainless Ltd
Kaliapani

Divisional Forest Officer
Cuttack Forest Division

CHAPTER-6

Annexure and Maps

a) Land use plan maps of the project. ***(Plate-1)***

b) Location map showing other lease and forest diversions in the project impact area giving details of project. ***(Plate-2)***

c) Location map with respect to protected areas, elephant corridors and elephant reserves this map should also show other. ***(Plate-3)***

d) Map showing interventions implemented by the project authority. ***(Plate-4)***

e) **Annexure I:** Grant of Mining Lease Dt.06.08.2001.

f) **Annexure II:** Authenticated Land Schedule of the Lease area.

g) **Annexure III:** Copy of letter dt 05.07.2001 of MoEF granting Stage II approval.

h) **Annexure IV:** Environmental clearance Dt. 13.02.2001 granted by MoEF.

i) **Annexure V:** Transfer of EC by MoEF to JSL Ltd Dt 16-11-2009.

j) **Annexure VI** Letter of MoEF dt. 24-02-2016.

k) **Annexure VII:** Approved Cost Norms of seedlings for free distribution 2 years old.

l) **Annexure VIII:** Approved Cost Norms of Bald Hill Plantation.

m) **Annexure IX:** Approved Cost norms for Avenue Plantation

n) **Annexure X:** Approved Cost norms for Rain Water Management.

Government of Orissa
Department of Steel and Mines
...

No. 9837 /S., Bhubaneswar, the 6.8.2001
III(C)-M-13/2001

PROCEEDINGS

Sub : Grant of Mining Lease in the district of Jajpur.

Read : Application presented on 5.8.94 by M/s. Jindal Strips Ltd. for grant of Mining Lease for Chromite over an area of 1261.476 hects. in village Kalarangiatta, Ransol etc. of Sukinda Tahasil in the district of Jajpur.

Order :

Whereas M/s. Jindal Strips Ltd. have applied to the State Government for grant of a Mining Lease by their application read above ;

Whereas the mineral in the land in respect of which the Mining Lease has been applied for belongs to Government and the land is at their disposal ;

Whereas the applicant being a Limited Company, is incorporated or registered in India ;

Whereas the applicant by themselves or with any person joint in interest with them do not in respect of Chromite or related group of minerals hold such area in the State as with the area over which the Mining Lease has now been applied for will exceed ten square kilometres in the aggregate ;

Whereas the Government of India in their letter No. 5/37/97-M.IV, dated 16.4.99 have conveyed their approval to the grant of Mining Lease under Section 5(1) of the M.M.(D&R) Act, 1957 over 89.00 hects. and they have also in exercise of the powers conferred by Sec. 30 of the said Act directed the State Government to take into consideration of this Mining Lease and pass orders thereon on merits;

Whereas the party was asked in this Department letter No. 3924/M, dated 24.5.99 to accept the terms and conditions on which the mining lease was proposed to be considered for grant and the party in their letter No. Nil, dated 26.5.99 accepted those conditions ;

Therefore, the State Government are hereby pleased to order that a Mining Lease in respect of the area over 89.00 hects. in village Kalarangiatta, Ransol etc. in the district of Jajpur be granted to M/s. Jindal Strips Ltd. for a period of 30(thirty) years subject to the conditions laid down in the above cited letter No. 3924/M, dated 24.5.99 and further condition that the party will obtain the approval of Ministry of Environment & Forest for the extended period of thirty years before execution of the Mining Lease. The party should comply with all the terms and conditions including furnishing of a surveyed map and description within 3(three) months from the date of this order to the Collector, Jajpur.

By order of the Governor

P. K. Patnaik

Memo No. 9838 /M, Bhubaneswar, the 6.8.2001

Copy forwarded to M/s. Jindal Strips Ltd., Plot No.426, Jayadev Nagar, Nageswar Tangi, Bhubaneswar- 751002.

Addl. Secretary to Government

Memo No. _____ /M, Bhubaneswar, the

Copy forwarded to the Collector, Jajpur for information and necessary action. On receipt of all documents in full compliance of the terms and conditions laid down in Govt. letter No. 3924/M, dated 24.5.99, he will please forward the same to Government with a report about security deposit and any other matter which the Collector might consider necessary to bring to the notice of Government.

Addl. Secretary to Government

Memo No. _____ /M, Bhubaneswar, the

Copy forwarded to the Director of Mines, Bhubaneswar/ Deputy Director of Mines, Jajpur Road, Jajpur for information and necessary action.

Addl. Secretary to Government

Memo No. /-

20 Rs.

LAND SCHEDULE OF THE M.L.AREA OVER 89.00 HECTS OR 219.920 ACRES GRANTED IN FAVOUR OF M/S. JINDAL STRIPS LIMITED, FOR CHROMITE IN VILL-KALIAPANI & FOREST BLOCK NO.- 27, UNDER SUKINDA TAHASIL IN JAJPUR DISTRICT OF ORISSA, UNDER SUB REGISTRAR OFFICE, SUKINDA

LAND SCHEDULE

Revenue Village: Kaliapani

Sl.no	Khata no.	Tenant	Plot no.	Kissam	Area in Acres
1.	55	Abada jogya Anabadi	884(P)	Patharabani	21.01
			887(P)	-do-	28.46
			888(P)	-do-	18.63
			889(P)	-do-	06.00
			890(P)	-do-	39.09
			891(P)	-do-	07.56
			893(P)	-do-	29.40
			894(P)	-do-	08.74
2.	56	Sarba sadharana	892(P)	Road	01.13
				Total	160.02
Forest Block No.27 (Sukinda Range, Athagarh Division)					59.90
Total					219.920 acres or 89.000 hect.

Hereinafter referred as "said lands" The original document attached herewith.

12/12

S.K.SINGH,IAS
Collector & District Magistrate
Jajpur

No. 8-68/2000-FC / 12329 (F)

Government of India
Ministry of Environment & Forests
(F.C. Division)

Paryavaran Bhawan, CGO Complex,
Lodhi Road, New Delhi – 110 003.

Dated the 5th July, 2001.

To

The Secretary (Forests),
Government of Orissa,
Bhubaneswar.

Sub: Diversion of 22.80 ha. of forest land in Mahagiri D.P.F. for Chromite Mining in village Kaliapani under Sukinda Tahsil of Jajpur district by M/s. Jindal Strips Ltd.

Sir,

I am directed to refer to your letter No. 10713/10F(Cons)48/2000/F&E dated 12th July, 2000 and No. 10F(Cons)48/2000 9298/F&E dated 12.06.2001 on the above mentioned subject seeking prior approval of the Central Government in accordance with Section-2 of the Forest (Conservation) Act, 1980 and to say that the proposal has been examined by the Advisory Committee constituted by the Central Government under Section-3 of the aforesaid Act.

2. After careful consideration of the proposal of the State Government and on the recommendations of the above mentioned Advisory Committee, the Central Government hereby conveys its approval under Section-2 of the Forest (Conservation) Act, 1980 for diversion of of 22.80 ha. of forest land for Chromite Mining in village Kaliapani under Sukinda Tahsil of Jajpur district by M/s. Jindal Strips Ltd. subject to fulfillment of following conditions :-

i) Legal status of forest land shall remain unchanged.

ii) Compensatory afforestation shall be carried out over 21.62 ha. of non-forest land identified at villages – Radhakrishnapur and Mahalaxmipur in Athagarh tehsil at the project cost and the area shall be declared as Protected Forest/Reserve Forest under the Indian Forest Act, 1927.

iii) Mining shall be done as per the approved mining plan. The reclamation of mined out areas will be done concurrently in consultation with the State Forest Department at the project cost. The progress of reclamation shall be assessed by the State Forest Department and the Regional Office, Bhubaneswar periodically.

iv) The user agency will transfer the cost of fencing, protection, regeneration and maintenance of the safety zone area and afforestation over one and half times of safety zone area in degraded forest land else where (revised as on date to incorporate existing

Contd on page 2

wage structure) in favour of the State Forrest Department and the State Government will place this fund with the DFO/DCF responsible for implementing the above-mentioned conditions.

v) Demarcation of mining lease area will be done on the ground at the project cost using four feet high reinforced cement concrete pillars with serial numbers, forward & back bearings and distance from pillar to pillar.

vi) No felling of trees shall be done within the lease area unless it is really warranted for mining and such felling should be done with the prior permission and the conditions imposed by the concerned DFO.

vii) The user agency will make arrangements for free supply of fuel wood preferably alternate energy source to labourers and staff working on the project site so as to avoid any pressure on the adjacent forest areas.

viii) The period of permission under the Forest (Conservation) Act, 1980 will be for 20 years w.e.f. the date of issue of this order subject to Environmental Clearance under the Environment (Protection) Act, 1986, if applicable.

ix) The area will not be used for any other purpose other than that specified in the proposal.

x) Any other condition that the State Government or the Chief Conservator of Forests (Central), Regional Office, Bhubaneswar may impose from time to time in the interest of afforestation, conservation and management of flora and fauna of the area.

Yours faithfully,

(J.P. Misra)
Assistant Inspector General of Forests

Copy to:-

1. The Principal Chief Conservator of Forests, Government of Orissa, Bhubaneswar.
2. The Nodal Officer, Forest Department, Government of Orissa, Bhubaneswar.
3. The Chief Conservator of Forests (Central), Regional Office, Bhubaneswar.
4. The Regional Office (Hq), New Delhi.
5. The User agency.
6. Guard file.

(J.P. Misra)
Assistant Inspector General of Forests

No.J-11015/12/2000-IA. II (M)
Government of India
Ministry of Environment & Forests
I.A. Division

Email: kamleshkjain@yahoo.com
kkjain@menf.delhi.nic.in
Tele No. 436 4968
Paryavaran Bhawan,
C.G.O. Complex, Lodi Road,
New Delhi – 110 003

February 13, 2001

To

Shri M. Malu,
Executive Director,
M/s Jindal Strips Ltd.
Jindal Centre,
12, Bhikaji Kama Place,
New Delhi – 110 066

Subject: Mining of chromite ore in village Kaliapani, tehsil Sukhinda, district Jajpur Orissa of M/s Jindal Strips Ltd.- environmental clearance reg.

Sir,

This has reference to Department of Steel and Mines, Government of Orissa's letter No.7914/SM/VI-SM-108/99 (pt.I) dated 18.07.2000 and your letter No. JSL/BHB/2000/051 dated 09.06.2000; and subsequent communications dated the 26.08.2000, 25.09.2000, 18.11.2000, 23.11.2000 and 19.01.2001 on the subject mentioned above. The Ministry of Environment and Forests has examined the application. It has been noted that the total lease area of 89.00 ha. includes 24.24 ha. of forest land. Mine is semi-mechanized. Mining would be restricted to 30.363 ha. Targeted production capacity of the mine is 0.10 million tonnes/annum. During the first four years chromite production will be 20,000 TPA. It will be increased to 80,000 tonnes in the 5th year and 6th year onwards production will be 1,00,000 TPA. The project does not involve displacement of people. Approvals from the Orissa Pollution Control Board and IBM have been obtained. Public hearing was held on 14.03.2000 and the proponent has agreed to implement adequate environmental protection measures and make available adequate funds for improvement of the condition of the area and peripheral area development.

2. The Ministry of Environment and Forests hereby accords environmental clearance to the above chromite mining project for 0.10 million tonnes/annum production capacity under the provisions of the Environmental Impact Assessment Notification, 1994 as amended on 04.05.1994 and 10.04.1997 subject to the compliance of the terms and conditions mentioned below:

A. Specific conditions

(i) A comprehensive environmental impact assessment study should be carried out after getting scope of the study vetted by MoEF. Report should be submitted to the Ministry within 2 years.

(ii) Run-off from the OB dumps should be analysed for Cr^{+6} and in case its concentration is found higher than the permissible limit, the water should be treated using appropriate proven technology before discharge. Priority should be given for utilization of this treated water for plantation and dust suppression.

(iii) The nature of the deposit is such that finalisation of mining of deeper portion cannot be decided immediately. The present reclamation plan is therefore only conceptual. The proponent should submit a detailed reclamation plan within 5 years of the start of mining and get the same approved. In case, there is change in scope of mining plan including possible underground mining, the proponent should approach MoEF for fresh clearance.

(iv) A detailed greenbelt development plan indicating year-wise plantation scheme, area to be covered (peripheral, roads, OB dumps, township) and type of nature plant species should be submitted to MoEF within 3 months.

(v) Top soil should be stacked properly with adequate measures at earmarked site. It should be used for reclamation and rehabilitation of mined out area.

(vi) OB dumps should be stacked at earmarked dumpsite (s) only and should not be kept active for longer period. The overall slope of the dump(s) should not exceed 28°.

(vii) Drills should be operated with dust extractors or only wet drilling should be adopted.

(viii) Controlled blasting should be carried out.

(ix) Check dam and siltation ponds of appropriate size should be constructed to arrest silt and sediments flows from OB and mineral dumps. The water so collected should be utilized for watering mine area, roads, greenbelt etc. The drains should be regularly desilted and maintained properly.

(x) While mining operation is on, regular monitoring of ground water level and quality should be carried out by establishing a network of existing wells and constructing new piezometers. Monitoring should be done four times a year – pre-monsoon April / May),

monsoon (August), post-monsoon (November) and winter (January). Data thus collected should be sent at regular intervals to MoEF & Central Ground Water Board.

(xi) A detailed mine decommissioning plan should be submitted to MoEF 5 years in advance for approval.

(xii) The proponent should obtain permission from other concerned authorities, if any.

A. GENERAL CONDITIONS

(i) No change in mining technology and scope of working should be made without prior approval of the Ministry of Environment and Forests.

(ii) No change in the calendar plan including excavation, quantum of chromite ore, waste/ OB dumps should be made.

(iii) Four Ambient air quality monitoring stations should be established in the core zone as well as buffer zone for SPM, RPM, SO2, NOx and CO monitoring. Location of the ambient air quality stations should be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive targets in consultation with the State Pollution Control Board.

(iv) Data on ambient air quality should be regularly submitted to the Ministry including its Regional Office at Bhubaneshwar and the State pollution control Board/ Central pollution Control Board once in six months.

(v) Adequate measures for control of fugitive emissions should be taken during drilling and blasting operations, loading and transportation of minerals etc.

(vi) Adequate measures should be taken for control of noise levels below 85 db in the work environment.

(vii) Personnel working in dusty areas should wear protective respiratory devices and they should also be provided with adequate training and information on safety and health aspects.

Occupational health surveillance programme of the workers should be undertaken periodically to observe any contractions due to exposure to dust and take corrective measures, if needed.

(viii) The funds earmarked for Environmental Protection measures should be kept in separate account and not diverted for other purpose. Year-

wise expenditure should be reported to the Ministry of Environment & Forests.

(ix) The Regional Office of this Ministry located at Bhubaneshwar shall monitor compliance of the stipulated environmental safeguards. The project authorities should send one set of EIA/EMP report and mining plan to them and extend full cooperation to the officer(s) of the Regional Office by furnishing the requisite data/information/monitoring reports.

(x) The project authority should inform to the Regional Office located at Bhubaneshwar as well as to the Ministry of Environmental & Forests regarding date of financial closures and final approval of the project by the concerned authorities and the date of start of land development work.

(xi) A copy of the clearance letter will be marked to concerned Panchayat/ local NGO, if any, from whom any suggestion/ representation has been received while processing the proposal.

(xii) Orissa Pollution Control Board should display a copy of the clearance letter at the Regional office, District Industry Centre and Collector's office/ Tehsildar's Office for 30 days.

[xiii] The project authorities should advertise at least in two local newspapers widely circulated around the project, one of which shall be in the vernacular language of the locality concerned informing that the project has been accorded environmental clearance and a copy of the clearance letter is available with the State Pollution Control Board and may also be seen at web site of the Ministry of Environment & Forests at **http://envfor.nic.in**.

3. The Ministry or any other competent authority may stipulate any further condition for environmental protection.

4. Failure to comply with any of the conditions mentioned above may result in withdrawal of this clearance.

5. The above conditions will be enforced, *inter alia*, under the provisions of water (Prevention & Control of Pollution) Act, 1974, Air (Prevention & Control of Pollution) Act, 1981, Environment (Protection) Act, 1986 and Public Liability Insurance Act, 1991 along with their amendments and rules.

(K. K. JAIN)
ADDITIONAL DIRECTOR

No. J-11015/12/2000-IA.II(M)(Pt)
Government of India
Ministry of Environment & Forests

Paryavaran Bhavan,
C.G.O. Complex, Lodi Road,
New Delhi-110 003.

Dated the 16th November, 2009

To

M/s JSL Limited
6th Floor, IDCO Tower,
Janpath,
Bhubaneswar,
Orissa
E-mail: jsl@bbs.jindalsteel.com

Subject: Mining of Chromite Ore in Village Kaliapani, Tehsil Sukinda, District Jajpur Orissa of M/s Jindal Strips Ltd.- Transfer of Environmental Clearance in the name of M/s JSL Limited regarding.

Sir,

This has reference to your letter No. JSL/Mines /MoEF/09-2009/01 dated 18.09.2009 regarding above mentioned subject. The Ministry of Environment and Forests has examined your request. It has been noted that the Chromite Ore Mining Project of M/s Jindal Strips Limited located in Village Kaliapani, Tehsil Sukinda, District Jajpur, Orissa was accorded environmental clearance by this Ministry vide letter No. J-11015/12/2000-IA.II(M) dated 13.02.2001 for production capacity of 0.10million tonnes per annum of chrome ore over the total lease area of 89ha. Further, the mine lease hold rights of the said mine has been executed in the name of M/s Jindal Stainless Steel Limited.

2. The name of M/s Jindal Stainless Limited has been further changed to M/s JSL Limited w.e.f. 23.09.2008. In support of this a certificate bearing No. SRN A45026549 dated 23rd September, 2008 was issued by the Registrar of Companies, National Capital Territory of Delhi and Haryana. The Government of Orissa had accepted the change in name of company vide letter No. VSL-59/04(Pt.I)7493/SM Bhubaneswar dated 3rd November, 2008 from M/s Jindal Stainless Limited to M/s JSL Limited. Accordingly, in partial modification to this Ministry's letter number J-11015/12/2001-IA.II(M) dated 13.02.2001, Ministry has decided to transfer the environmental clearance in the name of M/s JSL Limited subject to stipulation of following additional environmental safeguards:

A. Additional Specific Conditions

(i) The project proponent shall obtain prior approval of the Indian Bureau of Mines for transferring the mining plan and scheme of mining in the name of M/s JSL Limited.

...2/-

(ii) The Provision shall be made for the housing of construction labour within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, crèche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.

(iii) The critical parameters such as SPM, RSPM, NO_x in the ambient air within the impact zone, peak particle velocity at 300m distance or within the nearest habitation, whichever is closer shall be monitored periodically . Further, quality of discharged water shall also be monitored [(TDS, DO, PH, Cr^{+6} and Total Suspended Solids (TSS)]. The monitored data shall be uploaded on the website of the company as well as displayed on a display board at the project site at a suitable location near the main gate of the Company in public domain. The circular No. J-20012/1/2006-IA.II(M) dated 27.05.2009 issued by Ministry of Environment and Forests, which is available on the website of the Ministry www.envfor.nic.in shall also be referred in this regard for its compliance.

B. Additional General Conditions

(i) The project proponent shall submit six monthly reports on the status of compliance of the stipulated EC conditions including results of monitored data (both in hard copies as well as by e-mail) to the Ministry of Environment and Forests, its Regional Office Bhubneswar, the respective Zonal Office of CPCB and the SPCB. The proponent shall upload the status of compliance of the EC conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of the Ministry of Environment and Forests, Bhubneswar, the respective Zonal Officer of CPCB and the SPCB.

(iii) The environmental statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of EC conditions and shall also be sent to the Regional Office of the Ministry of Environment and Forests, at Bhubneswar by e-mail.

3. All other conditions of the above referred environmental clearance letter shall remain unchanged.

4. The Ministry or any other competent authority may alter/modify the above conditions or stipulate any further condition in the interest of environment protection.

1.3/-

5. Failure to comply with any of the conditions mentioned above may result in withdrawal of this clearance and attract action under the provisions of the Environment (Protection) Act, 1986.

6. The above conditions will be enforced inter-alia, under the provisions of the Water (Prevention & Control of Pollution) Act, 1974, the Air (Prevention & Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986 and the Public Liability Insurance Act, 1991 along with their amendments and rules made thereunder and also any other orders passed by the Hon'ble Supreme Court of India/ High Court of Orissa and any other Court of Law relating to the subject matter.

16/4/07

(SATISH C. GARKOTI)
Additional Director (S)

Copy to:

(i) The Secretary, Ministry of Mines, Government of India, Shastri Bhawan, New Delhi.

(ii) The Secretary, Department of Environment, Government of Orissa, Secretariat, Bhubaneswar.

(iii) The Secretary, Department of Mines and Geology, Government of Orissa, Secretariat, Bhubaneswar.

(iv) The Secretary, Department of Forests, Government of Orissa, Secretariat, Bhubaneswar.

(v) The Chief Wildlife Warden, Government of Orissa, Bhubaneswar.

(vi) The Chairman, Central Pollution Control Board, Parivesh Bhawan, CBD-cum-Office Complex, East Arjun Nagar, Delhi-110032.

(vii) The Chief Conservator of Forests, Regional Office (EZ), Ministry of Environment and Forests, A-3 Chandrashekharpur, Bhubaneshwar-751023.

(viii) The Chairman, Orissa State Pollution Control Board, Parivesh Bhawan, A/118 Nilakantha Nagar, Unit-VIII, Bhubaneshwar-751012.

(ix) The Member Secretary, Central Ground Water Authority, A2, W3 Curzon Road Barracks, K.G. Marg, New Delhi-110001.

(x) The District Collector, Jajpur District, Government of Orissa.

(xi) EI Division, Ministry of Environment & Forests, EI Division, New Delhi.

(xii) Monitoring File.

(xiii) Guard File.

(xiv) Record File.

16/4/07

(SATISH.C.GARKOTI)
Additional Director(S)

By Speed Post

F. No. J-11015/369/2009.IA-II (M)
Government of India
Ministry of Environment, Forest & Climate Change
Impact Assessment Division

3rd Floor, Vayu Wing,
Indira Paryavaran Bhawan,
Jorbagh Road, Aliganj,
New Delhi-110 003
E-mail: sridhar-mef@nic.in
Tele: 011-24695304

Dated: 24th February, 2016

To,

M/s Jindal Stainless Ltd
6th Floor, IDCO Tower, Janpath,
Bhubaneswar, Odisha -751022
Fax No. 0674-2546147
E-mail: kiran.goswami@jrd.jindalsteel.com

Subject: Enhancement of Beneficiation Plant of M/S JSL Ltd., located at village - Kaliapanim, District Jajpur, Odisha (89.00ha) (enhancing the capacity of COBP plant from 36,000 TPA to 60,000 TPA)-Environmental Clearance regarding.

Sir,

This has reference to your letter No. JSL/mines/MoEF/09-2009/01 dated 18.09.2009 on the subject mentioned above and subsequent letters dated 29.10.2010, 17.09.2013, 03.07.2014, 30.12.2014 and 02.02.2015. The project was appraised in the Meeting of the Expert Appraisal Committee (Mining) held during January, 20-22, 2010 and TORs were prescribed to the project for undertaking detailed EIA study for the purpose of obtaining environmental clearance. Accordingly, the TORs were prescribed to the project vide letter no. J-11015/369/2009-IA.II (M) dated 15.02.2010. The proponent submitted the EIA/EMP and public hearing documents which was considered by Expert Appraisal Committee in its meeting held during January 19 -21, 2011 and re-considered during February 24-25, 2014, 25-26 September 2014 and March 16-18, 2015. The Committee recommended the proposal for grant of environmental clearance.

2. The Proposal is for enhancement of production capacity of Chrome Ore Beneficiation Plant (COBP) from 36,000 TPA to 60,000 TPA by M/s Jindal Stainless Limited, located at village Kaliapani & Forest Block 27, Tehsil Sukinda, District Jajpur, Odisha. The Latitudess and Longitudes of the site are 21° 01' 12" N to 21° 02' 46" N and 85° 45' 42" E to 85° 47' 16" E, respectively. The proposal of enhancement of production capacity from 0.1 to 0.215 million TPA of chrome ore was withdrawn by the project proponent.

3. The mine lease area is 89.00 ha, which include 24.24 ha of forestland. 22.80 ha of forest land was diverted vide letter no.8-68/2000-FC/2327(F), dated 5th July,2001 from MoEF (F C Division). The Mining Scheme is approved by IBM vide Letter No. 314(3)/2011-MCCM(CZ)/MS-58, dt. 02.05.2012 and is valid till 31st March, 2017. The earlier EC was granted by MoEF for production capacity of

0.10 MTPA of chrome ore vide letter no. J-11015/12/2000-IA.II(M) dated 13.02.2001 and further additional conditions were stipulated to the Project vide letter dated 16.11.2009.

4. JSL has already been operating a chrome ore beneficiation plant since 2003, with an annual capacity of producing 36,000 tonnes of chrome concentrate and had accumulated considerable quantity of tailing assaying around 20% Cr2O3. During the mining of the ferruginous chromite ore having Cr2O3 of around 28-30% (for the existing beneficiation plant) a considerable quantity of very low grade material containing Cr2O3 of around 15% is produced incidentally and staked separately. Keeping in view the conservation of mineral, JSL approached Institute of Mineral and Material Technology (IMMT), Bhubaneswar, to develop a commercially viable beneficiation technology to recover the chrome values from such very low grade ore/tailings.

5. Based on the laboratory investigations carried out by IMMT, Bhubaneswar during 2007, on the COBP tailings and very low grade ore, a common process flow-sheet was developed. The developed beneficiation technology includes both tabling and froth flotation processes. The new Plant (COBP2) will run at a feed rate of 20 TPH and a feed grade of 17 to 19% Cr2O3. The output (Chrome Concentrate) will be 4 TPH. The concentrate and tailing grade will be +46% and less than 10% Cr2O3 respectively.

6. Solid waste generation will be 43,36,225 Cum during the current mining scheme period, tailings with less than the threshold value will be 2,25,000 Cum. The solid waste and tailings will be dumped in the existing dump and or partly backfilling of the mined out quarry. Water requirement for both COBP1 and COBP2 will be 600 M^3/day, which will be met with from the pit water. 85 m^3/day of fresh water will be required for which, approval from Central Ground Water Authority has been sought.

7. In accordance with the TOR issued by MoEF, baseline studies were carried out during winter season from December, 2009 to February, 2010. The Public Hearing was conducted at Kaliapani Village on 31.08.2010. The PH was presided over by Sri Srikanta Nayak, Additional District Magistrate, Jajpur. The issues raised during Public Hearing were also considered and discussed during the Meeting, which inter-alia, included that there should be an ETP of adequate size, prevention of pollution caused due to dust from the mining activity, use of mine discharge water for cultivation purpose after treatment (instead of directly discharging to the Nallah), Regular Water Sprinkling for dust suppression at haulage roads and approach to the Mine, Provision of Common fund for health care / hospital facilities / Ambulance for the local people, Priority to Local people for Employment in Mines, Infrastructural development facilities for nearby Anganbadi school, etc., Construction of Pucca Road /Repair of Roads near the mine. As per the villager's requirements, it was informed by the PP that they would give preference to local employment and take initiatives for peripheral development, occupational health and other issues concerning environment.

8. The estimated capital cost of the Project is Rs 13.25 crores. There is no court case/litigation pending against the Project and no violation.

9. The Ministry of Environment, Forest & Climate Change has examined the application in accordance with the EIA Notification, 2006 and hereby accords environmental clearance under the provisions thereof to the above mentioned proposal of enhancement of Beneficiation Plant of M/S JSL Ltd., located at village - Kaliapanim, District Jajpur, Odisha (89.00ha) (enhancing the capacity of COBP plant from 36,000 TPA to 60,000 TPA) subject to implementation of the following conditions and environmental safeguards.

A. Specific Conditions

(i) Continuous monitoring of Mine water should be done and reports furnished.
(ii) Continuous monitoring of all drinking water sources for Cr(VI) of Mine water should be done and reports furnished.
(iii) Morbidity pattern which is a sensitive indicator of ill health with regard to Cr related diseases need to be done.
(iv) Mine water discharge and/or any waste water shall be properly treated in an ETP/s for the removal of hexavalent chromium and to meet the prescribed standards before reuse/discharge. The run off from OB dumps and other surface run off shall be analyzed for hexavalent chrome and in case its concentration is found higher than the permissible limit, the waste water should be treated before discharge/reuse.
(v) The project proponent shall obtain Consent to Establish and Consent to Operate from the State Pollution Control Board, Odisha and effectively implement all the conditions stipulated therein.
(vi) Traffic density on the route of mineral transportation shall be regularly monitored and report shall be submitted along with compliance report.
(vii) As part of ambient air quality monitoring during operational phase of the project, the air samples shall also be analysed for their mineralogical composition and records maintained.
(viii) Mineral handling plant shall 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 arrangements. These should be properly maintained and operated.
(ix) Effective safeguard measures such as conditioning of ore with water, regular water sprinkling shall be carried out in critical areas prone to air pollution and having high levels of particulate matter such as around crushing and screening plant, loading and unloading point and transfer points. It should be ensured that the Ambient Air Quality parameters conform to the norms prescribed by the Central Pollution Control Board in this regard.
(x) The project authority shall implement suitable conservation measures to augment ground water resources in the area in consultation with the Regional Director, Central Ground Water Board.
(xi) Regular monitoring of ground water level and quality shall be carried out in and around the mine lease by establishing a network of existing wells and installing new piezo meters. The periodic monitoring [(at least four times in a year- pre-monsoon (April-May), monsoon (August), post-monsoon (November) and winter (January); once in each season)] shall be carried out in consultation with the State Ground Water Board/Central Ground Water Authority and the data thus collected may be sent regularly to the Ministry of Environment, Forest & Climate Change and its Regional Office Bhubaneswar, the Central Ground Water Authority and the Regional

Director, Central Ground Water Board. If at any stage, it is observed that the groundwater table is getting depleted due to the activity; necessary corrective measures shall be carried out.

(xii) The project proponent shall regularly monitor the flow rate of the natural water streams flowing adjacent to the mine lease and maintain the records.

(xiii) The reclaimed and rehabilitated area shall be afforested. Monitoring and management of rehabilitated areas shall continue until the vegetation becomes self-sustaining. Compliance status shall be submitted to the Ministry of Environment, Forest & Climate Change and its Regional Office located at Bhubaneswar on six monthly basis.

(xiv) Dimension of the retaining wall at the toe of temporary over burden dumps and OB benches within the mine to check run-off and siltation shall be based on the rain fall data.

(xv) Plantation shall be raised in the specified including a 7.5m wide green belt in the safety zone around the mining lease, backfilled and reclaimed area, around the higher benches of excavated void to be converted in to water body, roads etc. by planting the native species in consultation with the local DFO/Agriculture Department. The density of the trees should be around 2500 plants per Ha.

(xvi) Effective safeguard measures such as regular water sprinkling shall be carried out in critical areas prone to air pollution and having high levels of SPM and RPM such as haul road, loading and unloading point and transfer points. It shall be ensured that the Ambient Air Quality parameters conform to the norms prescribed by the Central Pollution Control Board in this regard.

(xvii) Process water discharge and/or any waste water shall be properly treated to meet the prescribed standards before reuse/discharge. The runoff from temporary OB dumps and other surface run off shall be analyzed for iron and in case its concentration is found higher than the permissible limit, the waste water should be treated before discharge/reuse.

(xviii) The decanted water from the beneficiation plant and slime/tailing pond shall be re-circulated within the mine and there shall be zero discharge from the mine.

(xix) Regular monitoring of the flow rate of the springs and perennial nallahs shall be carried out and records maintained.

(xx) Regular monitoring of water quality, upstream and downstream of natural water bodies shall be carried out and record of monitoring data should be maintained and submitted to Ministry of Environment, Forest & Climate Change, its Regional Office, Bhubaneswar, Central Groundwater Authority, Regional Director, Central Ground Water Board, State Pollution Control Board and Central Pollution Control Board.

(xxi) Suitable rainwater harvesting measures on long term basis shall be planned and implemented in consultation with Regional Director, Central Ground Water Board.

(xxii) Vehicular emissions shall be kept under control and regularly monitored. Measures shall be taken for maintenance of vehicles during transportation of mineral from mine face to the beneficiation plant. The vehicles shall be covered with a tarpaulin and shall not be overloaded.

(xxiii) Sewage treatment plant shall be installed for the colony. ETP shall also be provided for workshop and wastewater generated during operation.

(xxiv) Digital processing of the entire lease area using remote sensing technique shall be carried out regularly once in three years for monitoring land use

pattern and report submitted to Ministry of Environment, Forest & Climate Change and its Regional Office, Bhubaneswar.

(xxv) Pre-placement medical examination and periodical medical examination of the workers engaged in the project shall be carried out and records maintained. For the purpose, schedule of health examination of the workers should be drawn and followed accordingly.

(xxvi) The project proponent shall take all precautionary measures during operation for conservation and protection of endangered fauna spotted in the study area. Action plan for conservation of flora and fauna shall be prepared and implemented in consultation with the State Forest and Wildlife Department. Necessary allocation of funds for implementation of the conservation plan shall be made and the funds so allocated shall be included in the project cost. All the safeguard measures brought out in the Wildlife Conservation Pan so prepared specific to the project site shall be effectively implemented. A copy of action plan shall be submitted to the Ministry of Environment, Forest & Climate Change and its Regional Office, Bhubaneswar.

(xxvii) A Final Mine Closure Plan along with details of Corpus Fund shall be submitted to the Ministry of Environment & Forests 5 years in advance of final mine closure for approval.

(xxviii) The project proponent shall undertake all the commitments made during the public hearing and effectively address the concerns raised by the locals in the public hearing as well as during consideration of the project, while implementing the project.

B. General Conditions

(i) No change in chrome Ore Processing/Beneficiation technology and scope of working should be made without prior approval of the Ministry of Environment & Forests.

(ii) No change in the calendar plan including Processing/Beneficiation of mineral iron ore and waste should be made.

(iii) At least four ambient air quality-monitoring stations should be established in the core zone as well as in the buffer zone for RSPM (Particulate matter with size less than 10 micron i.e., PM_{10}) and NO_x monitoring. Location of the stations should be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive targets and frequency of monitoring should be undertaken in consultation with the State Pollution Control Board. The data so recorded should be regularly submitted to the Ministry including its Regional office located at Bhubaneswar and the State Pollution Control Board / Central Pollution Control Board once in six months.

(iv) Measures should be taken for control of noise levels below 85 dBA in the work environment. Workers engaged in operations of HEMM, etc. should be provided with ear plugs / muffs.

(v) There will be zero waste water discharge from the plant.

(vi) Personnel working in dusty areas should wear protective respiratory devices and they should also be provided with adequate training and information on safety and health aspects.

(vii) Occupational health surveillance program of the workers should be undertaken periodically to observe any contractions due to exposure to dust and take corrective measures, if needed.

(viii) A separate environmental management cell with suitable qualified personnel should be set-up under the control of a Senior Executive, who will report directly to the Head of the Organization.

(ix) The funds earmarked for environmental protection measures should be kept in separate account and should not be diverted for other purpose. Year wise expenditure should be reported to the Ministry and its Regional Office located at Bhubaneswar.

(x) The project authorities should inform to the Regional Office located at Bhubaneswar regarding date of financial closures and final approval of the project by the concerned authorities and the date of start of land development work.

(xi) The Regional Office of this Ministry located at Bhubaneswar shall monitor compliance of the stipulated conditions. The project authorities should extend full cooperation to the officer (s) of the Regional Office by furnishing the requisite data / information / monitoring reports.

(xii) The project proponent shall submit six monthly reports on the status of compliance of the stipulated environmental clearance conditions including results of monitored data (both in hard copies as well as by e-mail) to the Ministry of Environment, Forest & Climate Change its Regional Office Bhubaneswar, the respective Zonal Office of Central Pollution Control Board and the State Pollution Control Board. The proponent shall upload the status of compliance of the environmental clearance conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of the Ministry of Environment, Forest & Climate Change, Bhubaneswar, the respective Zonal Officer of Central Pollution Control Board and the State Pollution Control Board.

(xiii) A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, Zila Parisad/ Municipal Corporation, Urban Local Body and the Local NGO, if any, from whom suggestions/ representations, if any, were received while processing the proposal. The clearance letter shall also be put on the website of the Company by the proponent.

(xiv) The State Pollution Control Board should display a copy of the clearance letter at the Regional office, District Industry Centre and the Collector's office/ Tehsildar's Office for 30 days.

(xv) The environmental statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of environmental clearance conditions and shall also be sent to the respective Regional Office of the Ministry of Environment, Forest & Climate Change, Bhubaneswar by e-mail.

(xvi) The project authorities should advertise at least in two local newspapers of the District or State in which the project is located and widely circulated, one of which shall be in the vernacular language of the locality concerned, within 7 days of the issue of the clearance letter informing that the project has been accorded environmental clearance and a copy of the clearance letter is available with the State Pollution Control Board and also at web site of the Ministry of Environment, Forest & Climate Change at **http://envfor.nic.in** and a copy of the same should be forwarded to the Regional Office of this Ministry located at Bhubaneswar.

10. The Ministry or any other competent authority may alter/modify the above conditions or stipulate any further condition in the interest of environment protection.

11. Concealing factual data or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may result in withdrawal of this clearance and attract action under the provisions of Environment (Protection) Act, 1986.

12. The above conditions will be enforced inter-alia, under the provisions of the Water (Prevention & Control of Pollution) Act, 1974, the Air (Prevention & Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986 and the Public Liability Insurance Act, 1991 along with their amendments and rules made there under and also any other orders passed by the Hon'ble Supreme Court of India/ High Court of Odhisa and any other Court of Law relating to the subject matter.

13. Any appeal against this environmental clearance shall lie with the National Green Tribunal, if preferred, within a period of 30 days as prescribed under Section 16 of the National Green Tribunal Act, 2010.

(Dr. U. Sridharan)
Scientist 'C'

Copy to:

(i) The Secretary, Ministry of Mines, Government of India, Shastri Bhawan, New Delhi.
(ii) The Secretary, Department of Environment, Government of Odhisa, Secretariat, Bhubaneswar.
(iii) The Secretary, Department of Mines and Geology, Government of Odhisha, Secretariat, Bhubaneswar.
(iv) The Secretary, Department of Forests, Government of Odhisha, Secretariat, Bhubaneswar.
(v) The Chairman, Central Pollution Control Board, Parivesh Bhawan, CBD-cum-Office Complex, East Arjun Nagar, Delhi-110032.
(vi) The Additional Principal Chief Conservator of Forests, Regional Office (EZ), Ministry of Environment, Forest & Climate Change, A-3 Chandrashekharpur, Bhubaneshwar-751023.
(vii) The Chairman, Odhisa State Pollution Control Board, Parivesh Bhawan, A/118 Nilakantha Nagar, Unit-VIII, Bhubaneshwar-751012.
(viii) The Controller General, Indian Bureau of Mines, Indira Bhavan, Civil Lines, Nagpur-440 001.
(ix) The Member Secretary, Central Ground Water Authority, A2, W3 Curzon Road Barracks, K.G. Marg, New Delhi-110001.
(x) The District Collector, Jajpur District, Government of Odhisa.
(xi) Record File.
(xii) MoEF Website

(Dr. U. Sridharan)
Scientist 'C'

ANNEXURE vii

COST NORM FOR RAISING 1000 SEEDLINGS WITH MAINTENANCE UPTO TWO YEARS

Wage rate @ Rs.200/- per day

Sl	Item of Work	Period of execution	Unit	Unit Cost	No. / Quantity	Labour Cost (Rs)	Material Cost (Rs)	Total Cost (Rs.)
	A. COSTS FOR 6 MONTHS OLD SEEDLINGS							
1	Cost of Polythene(8" *15"*200 400 Nos/ Kg = 2.5 kg		Kg.	170	2.5	0	425	425
2	Potting Mixture (Soil,sand and COM in ratio 2:1:1)							
	(i) Soil@8/cft		Cft	8	22	0	176	176
	(ii) Sand@12/cft		Cft	12	11	0	132	132
	(iii) COM@15/cft		Cft	15	12	0	180	180
	(iv)Insecticide(Thermet) 2 kg @ 80/kg		Kg	80	3	0	160	160
3	Preparation of soil Mixture including pulverization and sieving	November - December	MD	400	1	400	0	400
4	Filling & sieving	November - December	MD	200	2	400	0	400
5	Collection of seed grading & treatment	December	MD	200	2	400	0	400
6	Preparation of germination bed, dibbling/transplanting and provision of shed (including cost of straw, bamboo split etc.)	January	MD	200	2	400	200	600
7	Watering (Jan to March)	Jan March	MD	200	9	1800	0	1800
8	Maintenance of Nursery including Fencing upto March	Jan March	MD	200	8	1600	400	2000
9	Watering for 3 months (April to June)	April-June	MD	200	9	1800	0	1800
10	Sorting, weeding, grading and resetting	May-June	MD	200	3	600	0	600
11	Application of insecticides	May-June	MD	200	0.25	50	0	50
12	Contingencies (Water can, Buckets, Nursery shed etc.)					0	827	827
					Total	7450	2000	9450
	B. COST UPTO END OF FINANCIAL YEAR							
1	Watering (October to March)	October - March	MD	200	19	3800	0	3800
2	Sorting, Weeding, grading and resetting over one year period	October - November	MD	200	9	1800	0	1800
3	Application of Insecticides (Cost)	November - December	MD	200	0.3	60	60	70
4	Contingencies						330	330
	Total					5660	390	6230
	C. COST DURING SUBSEQUENT FINANCIAL YEAR							
1	Poly pot (12"x8" K200 gauge)		Kg	170	12.5	0	2125	2125
2	Potting mixture							0
	(i) Soil @ Rs.8/cft		cft	8	55	0	440	440
	(ii) Sand @ Rs.12/cft		cft	12	22	0	264	264
	(iii) COM @ Rs.15/cft		cft	15	28	0	420	420
	(iv) Insecticide (Thermet) - 2 kg @ Rs.80/kg		Kg	80	2	0	160	160
3	Preparation of potting mixture including pulverization and straining	January	MD	200	3	600	0	600
4	Filling of polythene bag including mounting and setting	March	MD	200	20	4000	0	4000
5	Watering for 3 months (April to June)	April-June	MD	200	10	2000	0	2000
6	Weeding, Shifting and grading through out the year	May-June	MD	200	2	400	0	400
7	Application of insecticides	May-June	MD	200	0.5	100	100	200
8	Contingencies						421	421
Total						7100.00	3990	11090
	ABSTRACT							
A	COSTS FOR 6 MONTHS OLD SEEDLINGS					7450	2000	9450
B	COST UPTO END OF FINANCIAL YEAR					5660	390	6230
C	COST DURING SUBSEQUENT FINANCIAL YEAR					7100	3990	11090
	Total					20210	6370	26580

Wage rate @ Rs.200/- per mandays

(A) Cost for 6 months old seedlings= Rs.9.45

(B) Cost for 1 year and 6 months old seedlings= Rs.21.75

Annexure- VIII

COST NORM FOR BALD HILL PLANTATION @ 1600 PLANTS PER HECTARE
(Labour cost @ ₹ 200/- per manday)

Sl. No	Items of work	Preferable period of Execution	Manday	Labour Cost @₹ 200/- Per day	Material Cost per hectare in (₹)	Total Cost per hectare in (₹)
1	2	3	4	5	6	7
	PREPARATORY OPERATION (0TH YEAR)					
1	Survey and demarcation	June	2	400	0	400
2	Fencing (i) For an average of 126 meters/ ha @ ₹ 56.57/ per meter for bamboo twigs and bamboo thorn fencing (L:M=40:60)	June-Sept	19	3800	4280	8080
	(ii) To be strengthened by planting of bamboo and other seedlings in two rows. Bamboo to be planted at 2 meters spacing in staggered manner on the two rows, and the rest of the species to be planted at 1/2 meter spacing along the two rows, the rows being 2m apart. Thus 500 plant (125 bamboo and 375 others) to be planted in two rows to cover 126 m of periphery/Ha by the vegetative fence (Bamboo seedlings @ ₹ 9.45per seedling X 125 = ₹ 1181.00, Agave seedling @ ₹ 3.50 per seedling X 375 = ₹ 1312.00)	June-Sept	11	2200	2493	4693
3	Pitting (1600 per ha) each pit 45 cm3	Nov-Dec	128	25600	0	25600

4	**Soil and water conservation measures** (a) Staggered trench along the contour @ 300 per ha (2.5mx0.5 m x0.5m); digging of percolation pits @ 600 per ha in lieu of staggered trenches, gully plugging and Drainage line treatment, half moon trench on the uphill side of each planting pit (100 MD for staggered trench / percolation pits and 30 MD for gully plugging, drainage line treatment and half moon trench)	Sept-Nov	130	26000	0	26000
	(b) Site clearance- 8 MD, alignment and staking of contour lines on ground, planting pits, contour trenches / percolation pits and check dam sites, etc. 2 MD	July-Aug	10	2000	0	2000
5	**Raising** of seedlings in poly bags (minimum 60 cm high) @ ₹ 9.45/ seedling (₹ 6.67 in 0th year) Part (1760 saplings to be raised for one hectare from January March @ ₹ 11739/-)	Oct-Mar	44	8800	2939	11739
	TOTAL 0th year		**344**	**68800**	**9712**	**78512**
	PLANTING OPERATION (1ST YEAR)					
1	Cost of sapling (balance) from April June/July @ ₹ 2.78 per seedling for 1760 seedlings = ₹ 4893/-	April-July	21.5	4300	593	4893
2	Freshening of pits 64 MD, filling with fertile soil and farm yard manure (FYM) 24 MD, application of insecticide and planting of bit c/s tall saplings including carriage of plants 21 MD	June-July	109	21800	0	21800

3	Cost of Fertile Soil 0.25 cft @ ₹ 8 per cft/FYM 0.25 cft @ ₹ 15 per cft per pit		0	0	9200	9200
4	Sowing of seeds on dug out earth of trench	June	6	1200	200	1400
5	Carriage-6 MD, Planting including Casuality replacement-6 MD, fertilizer application- 5 MD, 1st weeding-7 MD, 2nd weeding -5 MD, soil working- 7 MD	July-Aug	36	7200	0	7200
6	cost of Fertilizer and insecticide (Granular Insecticide @ 5 gms/ plant @₹ 80/- per kg = ₹640.00, NPK 100 gms/plant in two doses @ ₹ 24 per kg = 3840		0	0	4480	4480
7	Repair and maintenance of bamboo fence including material cost	Aug- Oct	15	3000	2540	5540
8	Maintenance of soil and Moisture Conservation measures (20% of cost)	Oct-Dece	26	5200	0	5200
9	Closure to grazing fire and other biotic interference by engaging watch & ward	April-Mar	30	6000	0	6000
10	Fire tracing and control, display board construction, painting / writing, other miscellaneous cost	Jan-Feb	10	2000	360	2360
	TOTAL 1st Year		**253.5**	**50700**	**17373**	**68073**
	MAINTENANCE OPERATION (2ND YEAR)					
1	Casualty replacement- 5 MD including seedling cost @₹ 9.45 per seedling and its transportation	June-July	10	2000	1512	3512
2	Soil working- 7 MD, 1st weeding-5 MD, 2nd weeding -5 MD and fertilizer application -4 MD	Augt-Oct	23	4600	0	4600

3	Cost of fertilizer @ 50 gms NPK per plant @ ₹ 24/- per kg for 1600 plants = ₹ 1920.00 Insecticide @ 5 gm per plant for 160 nos. of plants @ ₹ 80 per KG = ₹ 64.00		0	0	1984	1984
4	Repair and maintenance of bamboo fence including material cost	Aug-Oct	15	3000	2540	5540
5	Maintenance of Soil and Moisture Conservation measures (20% of cost)	Aug Oct	26	5200	0	5200
6	Fire tracing and control and other miscellaneous cost	Feb-Mar	10	2000	0	2000
7	Closure to grazing, fire and other biotic interference by engaging watch and ward	April-Mar	30	6000	0	6000
	TOTAL 2nd Year		**114**	**22800**	**6036**	**28836**
MAINTENANCE OPERATION (3RD YEAR)						
1	Repair and maintenance of fence-15 MD/ (in case of barbed wire fencing ₹ 9000/- for repair), SMC measures (Renovation) 26 MD and maintenance of plantation-14 MD as per requirement	April-Mar	55	11000	500	11500
2	Closure to grazing, fire and other biotic interference by engaging watch and ward	April Mar	18	3600	0	3600
	TOTAL 3rd Year		**73**	**14600**	**500**	**15100**
MAINTENANCE OPERATION (4TH YEAR)						
1	Repair and maintenance of fence-13 MD / no maintenance in case of barbed wire fencing, SMC measures - 21 MD and maintenance of plantation-14 MD	April-Mar	48	9600	500	10100

2	Closure to grazing, fire and other biotic interference by engaging watch and ward	April- Mar	18	3600	0	3600
	Total 4th Year		66	13200	500	13700

ABSTRACT

Sl. No	Year	Manday	Labour Cost (₹)	Material Cost (₹)	EPA Cost (₹)	Total (₹)
1	0th Year	344	68800	9712		78512
2	1st Year	253.5	50700	17373		68073
3	2nd Year	114	22800	6036		28836
4	3rd Year	73	14600	500		15100
5	4th Year	66	13200	500		13700
	TOTAL	**850.5**	**170100**	**34121**		**204221**

In case of Bald Hill Plantation, the hills having more than 30% slope and completely devoid of vegetation including rooted waste will quality for Bald Hill Plantation norm. In remaining areas of the hill, cost norm for normal plantation @ 1600 plants per hectare will be applicable. In case of highly refractory sites having rocky out crop having less than 30% slope, the concerned CFs/RCCFs I/C circlw will have to certify specifically about the Bald Hill characteristics of the site. In case of high hills, the upper portion may quality for Bald Hill Cost Norm and the foot hill with normal soil depth may be taken up at per with norms applicable for normal plantation. But the provision of fencing Bald Hill Plantation Norms will be available for the entire plantation in such case also.

Annexure- IX

COST NORM FOR URBAN PLANTATION FOR 1000 SAPLINGS
(Tall seedling plantation of six months old)
(Labour cost @ ₹ 200/- per manday)

Avenue Plantation: 4mx 4m Block Plantation: 2.5m x 2.5m

Sl. No	Items of work	Preferable period of Execution	Person days	Labour Cost@ ₹ 200/- Per day	Material in (₹)	Total
1	2	3	4	5	6	7
	0TH YEAR OPERATION					
1	Nursery Cost (6 months old seedlings) part @ ₹ 9.45 per seedling (₹ 6.67 in 0th year + ₹ 2.78 in 1st year) for 1100 seedlings (1000+100)	Jan-Mar	27	5400	1937	7337
	1ST YEAR OPERATION					
1	Nursery Cost (6 months old seedling) balance @ ₹ 2.78 for 1100 seedling	April June	12	2400	658	3058
2	Alignment & stacking at 4M spacing including clearance sites in avenue & 2.5m x 2.5m in case of block plantation	Apr-May	15	3000	0	3000
3	Excavation of pits 45cm x 45cm x 45cm in hard soil with vertical cut edges to make an uniform cube & heaping the excavated soil out side the pits	May June	52	10400	0	10400
4	Refilling of pits with excavated soil after breaking the clods completely	June	8	1600	0	1600
5	Carriage and transport of saplings from Nursery site to plantation site over an average lead of 10kms @ ₹ 6 per seedling for 1100 nos	July	0	0	6600	6600

26(a)

6			0	0	0	
	(a) Cost of FYM @ 25 CFT per plant @ ₹ 15 per cft for 250 cft		0	0	3750	3750
	(b) Cost of Vermicompost 250gm per plant@ ₹20 per kg for 250kg		0	0	5000	5000
	(c) Cost of NPK 50 gm per plant as basal dose @ ₹24 per kg for 50 kg		0	0	1200	1200
	(d) Cost of Granular Insecticide 10gm per plant @ ₹ 80 per kg for 10 kg		0	0	800	800
7	Planting of sapling including mixing of FYM, Vermicompost, Granular Insecticide & Scooping the soil to required depth & pressing the soil around the plants.	July	25	5000	0	5000
8	Cost of chemical fertilizer (Urea/DAP/NPK etc.)		0	0	1200	1200
9	1st weeding around the plant to a radius of 45 cm,application of fertilizer	August	25	5000	0	5000
10	2nd weeding around the plant to a radious of 50 cms	Sept Oct	20	4000	0	4000
11	Soil working around 0.5 Mt radious of the plant & application of fertilizer, mulching with available materials	Sept-Oct	32	6400	0	6400
12	Watering for 5 months, 10 days per month- from Nov. to March, including cost of water, labour & Transportation through tractor/ tanker @ ₹ 60 per seedlings for 1000 nos	Nov-Mar	0	0	60000	60000
13	Watch & ward for 9 months from July to March 270 Days	July Mar	140	28000	0	28000
14	Contingency Expenditure		0	0	455	455
	TOTAL		329	65800	79663	145463

2ND YEAR MAINTENANCE OF PLANTATION						
1	Cost of sapling - 6months old for casualty replacement @ ₹ 9.45 per 100 seedlings		0	0	945	945.00
2	Carriage and transport of saplings from Nursery site to plantation site over an average lead of 10kms @ ₹ 6 per seedling for 100 nos	July	0	0	600	600.00
3	Replacement of casualty after reopening the pits & planting of sapling 100 nos. with application of FYM, Vermicompost and granular insecticides	July Aug	4	800	0	800.00
4	(a) Cost of FYM 0.25 CFT per plant @₹ 15 per cft for 25cft		0	0	375	375.00
	(b) Cost of Granular Insecticide 10gm per plant @ ₹ 80 per kg for 1 kg		0	0	80	80.00
	(c) Cost of chemical fertilizer (Urea/DAP/NPK etc.)		0	0	1200	1200.00
	(d) Cost of Vermicomost 250 gm per plant@₹ 20 per kg for 25kg		0	0	500	500.00
5	1st weeding around the plant to a radius of 30 cm application of fertilizer	August	20	4000	0	4000.00
6	Soil working around 0.5MT radius & application of fertilizer. Moisture conservation & mulching	Aug-Sept	24	4800	0	4800.00
7	2nd weeding around the plant to radius of 0.5 MT.	Octo-Nov	16	3200	0	3200.00
8	Watering for eight months 5 days per month incuding cost of water carriage & transportation through tractor tankers (April to June & Nov to March)@ ₹ 48 per plant for 1000 nos	April-June Nov-Mar	0	0	48000	48000.00

9	Watch & ward for 12 months from April to March (365 days)	Apr-Mar	186	37200	0	37200
10	Contingency Expenditure		0	0	1380	1380.00
	TOTAL		250	50000	53080	103080
	3RD YEAR MAINTENANCE					
1	Weeding, Soil working & Manuring	Sept-Oct	20	4000	0	4000
2	Cost of chemical fertilizer (Urea/DAP/NPK etc.)		0	0	1200	1200
3	Watch & ward for 12 months from April to March 365 Days	April-Mar	186	37200	0	37200
	TOTAL		206	41200	1200	42400
	4TH YEAR MAINTENANCE					
1	Watch & ward for 12 months from April to March 365 Days	April-Mar	186	37200	0	37200
	TOTAL		186	37200	0	37200

ABSTRACT

Sl. No	Year	Person days	Labour cost @ ₹ 200/- per day	Material in ₹	Total Cost
1	0TH YEAR OPERATION	27	5400	1937	7337
2	1ST YEAR OPERATION	329	65800	79663	145463
3	2ND YEAR MAINTENANCE	250	50000	53080	103080
4	3rd YEAR MAINTENANCE	206	41200	1200	42400
5	4th YEAR MAINTENANCE	186	37200	0	37200
	TOTAL	998	199600	135880	335480

*Gabion Cost @ ₹ 253.00 per plant extra

GREEN WATER
(Expert group on rain water management)

RAIN WATER MANAGEMENT PROJECT FOR MAHAGIRI PF, SUKINDA

Rain Water Management is concept of controlling, conserving and effectively utilising the total precipitation falling in a watershed. Ultimate source of all water we see in rivers, tanks and wells is the rain. Apart from its large quantum, the significant fact about it is that its home is the cloud which keeps floating overhead to cover every inch of land. It comes down during monsoon months and falls as droplets and does so everywhere without any discrimination. It falls on hilltops, roof tops as well as the crop fields. This is the basic advantage of trying to utilise it where it falls. In addition to minimising the chance of avoidable losses one saves the trouble of conveying the water from one place to other.

A portion (50 Ha) of southern part of the Mahagiri Protected Forest is proposed to be developed for the benefit of the Giridharidahi village and the wild animals and birds. Soil is eroding from the hill rapidly exposing the rocks. There is a plantation on the southern side. But the space between the toe of the hill and plantation is barren and needs to be covered. A tank/pond has been dug for the use by wild animals but remains dry most of the time. Unless the runoff from the hill is fully managed, it will not be possible to prevent soil erosion and create condition for both the new and old plantations to grow and become fully effective.

It is proposed to take up Rain Water Management (Soil Moisture Conservation) on the southern side of the hill (21° 02' 15" N, 85° 54' 24" E) where some activities have already been initiated. The ground below the hill slopes will be fully recharged with rain water which will have the following benefits.

1) The existing plantation and the proposed ones will get sufficient water for survival and growth.
2) Dead springs will come alive
3) Farm lands below will get sufficient water to prevent drought in Khariff
4) Water will be available throughout the year in the wells and ponds dug below the forest boundary.
5) This will ensure Rabi and summer crops along with facility for bathing and use by domestic and wild animals.
6) The environment will become favourable for plants, humans and animals.

Items of work

The work will be taken up in two phases (i.e. two consecutive years). The plantation work can be started from the first year. On the first year, Graded Earthen Guide Bund will be taken up and in the subsequent year, the Secondary Bunds will be completed. Necessary guidance during execution shall be provided by a group of

GREEN WATER

(Expert group on rain water management)

Agricultural Engineers (retired from government service) working for promotion of ground water recharge under the banner of Green Water. The items of work or the interventions are the following.

1. Graded Earthen Guide Bund: Earthen bunds shall be erected on the low slope (<5%) forest and pediments of hills. These bunds would be 1.5 meter high (minimum) and follow a longitudinal slope of 0.2% to 0.5%. The purpose of these bunds is to guide the runoff along a longer path to increase time of concentration and promote infiltration. Preferably burrow pits to be located on the upstream side.
2. Secondary Graded Bund: This bund is one meter high. It will be used to regulate the runoff generated within the plantation area and the spill over from the primary bunds. The spacing of the bund would be limited to 50cm vertical or 45meter horizontal interval whichever less is.
3. Loose Boulder Drop Structures: Loose Boulder Structures are essentially surplus escape drop structures made of collected/broken stones. They will be used for safe discharge of runoff. Their height will be limited to one meter. The headwall will have top width of 1m with upstream slope of 1:1 and downstream slope of 1:3.
4. LDPE Lining to Existing Pond: The lower portion of the pond will be lined with LDPE sheets with a protective layer of silt brought from old tank bottom.

Cost of Project

Year	Item of Work	Unit cost	Quantity	Amount
2016-17	G G B Graded Earthen Guide Bund	1047	670	701490
	L B S Loose Boulder drop structure	15000	6	90000
	Cost of Works			791490
	Contingency	1%		7915
	Cost of Supervision	4%		31660
	Total			831065
2017-18	S G B Secondary Graded Bund	208	1291	268528
	Tank Improvement	300000		300000
	Cost of Works			568528
	Contingency	1%		5685
	Cost of Supervision	4%		22741
	Total			596954
	Grand Total			**1428019**
	Or say			**Rs.14,28,000/-**

21/4/18

(Er. Bimal Chandra Sahu)
Retd. Executive Engineer
Govt. of Odisha

Plot No: 211/1239, Satyanagar, Bhubaneswar – 751007 Mob: 9437113855 / 9938056120

Detailed Estimates and Drawing

GRADED GUIDE BUND
cost per metre

Sl. No.	Item of Work	Qty	Unit	Rate Rs.	Amount Rs.
1	Triangular or square section of 0.15m trench cutting for alignment and demarcation purpose of dug belling 10cm to 15cm				
	2 x 1m	2	m	3.28	6.56
2	Excavation in all kinds of soil including moorum, stony earth, gravel etc. excepting all kinds of rock & boulders exceeding 0.014cum in volume for dam base stripping, cut-off trenches, outfall drains and stripping in borrow areas including rough dressing and dumping the excavated materials away from work site manually within 50m initial lead and 1.5m initial lift as per the direction of Engineer-in-charge including stacking of useful materials as directed				
	1 x 2.70 sqm	2.70	sqm	94.80	255.96
3	Earth Work in stony earth and gravels mixed with stone and boulders not exceeding .014cum in volume within 50m Initial lead and 1.5m Initial lift including rough dressing and breaking clods etc. complete.				
	1 x 2.925 m	2.925	cum	134.12	392.30
	Add 10% extra for undulations & gully filling	0.2925	cum	134.12	39.23
5	Fine dressing earth work in ordinary or hard soil in embankment formation according to the direction of Engineer-in-charge including cutting or filling earth up to 0.15meter depth of surface.				
	1 x 3.304 m	3.304	sqm	2.00	6.61
6	Dry stone masonry or rough stone dry masonry for guard walls and retaining walls with hard granite stones				
	1 x0.375	0.375	cum	922.60	345.98
	TOTAL				**1046.64**
	say				**1047.00**

SECONDARY GUIDE BUND

Sl. No.	Item of Work	Qty	Unit	Rate Rs.	Amount Rs.
1	Earth Work in stony earth and gravels mixed with stone and boulders not exceeding .014cum in volume within 50m Initial lead and 1.5m Initial lift including rough dressing and breaking clods etc. complete.				
	½ (1.0 +2.0) ×1 = 1.50sqm	1.5	CUM	134.12	201.18
2	Fine dressing earth work in ordinary or hard soil in embankment formation according to the direction of Engineer-in-charge including cutting or filling earth up to 0.15meter depth of surface.				
	2×1.118 = 2.236sqm 1× 1.0 = 1.0sqm	3.236	SQM	2.00	6.47
	TOTAL				207.65 208.00

LOOSE BOULDER SURPLUS (3M)
cost of each

Sl. No.	Item of Work	Qty	Unit	Rate Rs.	Amount Rs.
1	Triangular or square section of 0.15m trench cutting for alignment and demarcation purpose of dug belling 10cm to 15cm				
	2 x (3.6+4.6)	16.40	rm	3.28	53.81
2	Earth Work in foundation in stony earth and gravels mixed with stone and boulders not exceeding .014cum in volume within 50met. Initial lead and 1.5met. Initial lift including rough dressing and breaking clods etc. complete.				
	1 x 4.6m x 3.6m x 0.3m	4.97	cum	160.94	8.00
3	Dry stone masonry or rough stone dry masonry for guard walls and retaining walls with hard granite stones				
	Foundation: 4.6m x3.6m x 0.3m = 4.97 cum Headwall: 1 × 3m × 2.6m² = 7.80cum Sidewall: 2 × 0.3m × 3.9m² = 2.34cum	15.11	cum	922.60	13940.49
4	Add Extra for 100m Head Load	15.11	cum	71.00	1072.81
	TOTAL **say**				**15075.10** **15000.00**

21/4/16

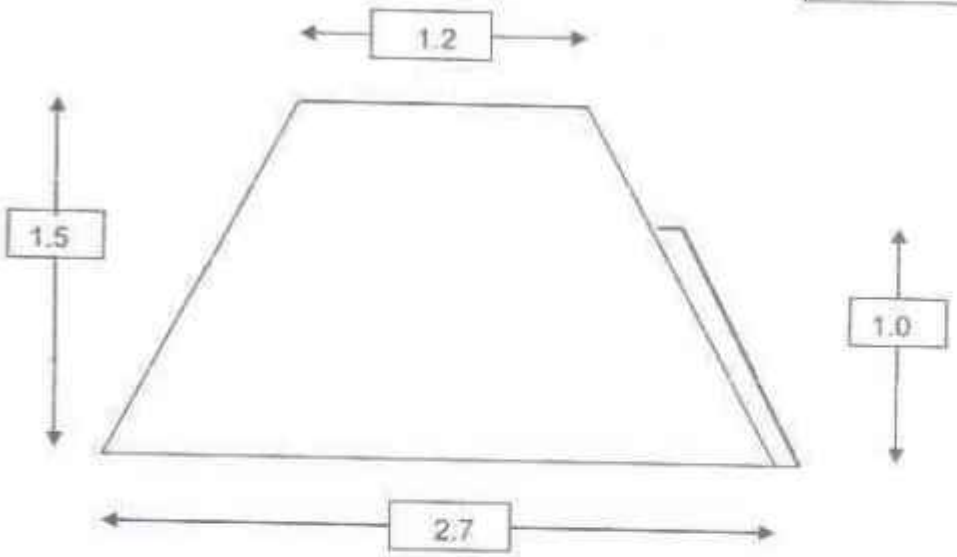
Analysis of Rates 2016, Cuttack

Sl. No.	Description		Qty Reqd.	Rate Rs.	Amount Rs.
1	Triangular or square section of 0.15m trench cutting for alignment and demarcation purpose of dug belling 10cm to 15cm (Data for 304.80 R.M.)	M.Mulia	3	200	600.00
		W.Mulia	2	200	400.00
		OHC	10%		
		T&P	2%		
		Rate per 304.8m			1000.00
		Rate per RM			**3.28**
2	Excavation in all kinds of soil including moorum, stoney earth, gravel etc. excepting all kinds of rock & boulders exceeding 0.014cum in volume for dam base stripping, cut-off trenches, outfall drains and stripping in borrow areas including rough dressing and dumping the excavated materials away from work site manually within 50m initial lead and 1.5m initial lift as per the direction of Engineer-in-charge including stacking of useful materials as directed	M.Mulia	0.237	200	47.40
		W.Mulia	0.237	200	47.40
		OHC	10%		
		Rate per Sqm			**94.80**
3	Earth Work in stony earth and gravels mixed with stone and boulders not exceeding .014cum in volume within 50met. Initial lead and 1.5met. Initial lift including rough dressing and breaking clods etc. complete.	M.Mulia	33.53	200	67.06
		W.Mulia	33.53	200	67.06
		Rate per cum			**134.12**
		OHC	10%		
		T&P	2%		
		Add 20% for Foundation			26.82
		Rate per cum			**160.94**
4	Fine dressing earth work in ordinary or hard soil in embankment formation according to the direction of Engineer-in-charge including cutting or filling earth up to 0.15meter depth of surface.	M. Mulia	1	200	200.00
		ohc	10%		
		T&P	2%		
		Rate for 100 sqm.			**200.00**
		Rate for 1 sqm.			**2.00**
5	Dry stone masonry or rough stone dry masonry for guard walls and retaining walls with hard granite stones	**Materials:-**			
		Rough stone	1	236	236.00
		Labour:-			
		Mason II class	0.52	240	124.80
		Semi Mulia	0.52	220	114.40
		M.Mulia	0.52	200	104.00
		W.Mulia	0.35	200	70.00
		ohc	10%		
		Carriage			
		Truck Load 5km	1	156	156.00
		Cart Load 1 km	1	67	67.00
		Royalty	1	50.4	50.40
		Rate per	**cum**		**922.60**

21/4/16

GRADED GUIDE BUND

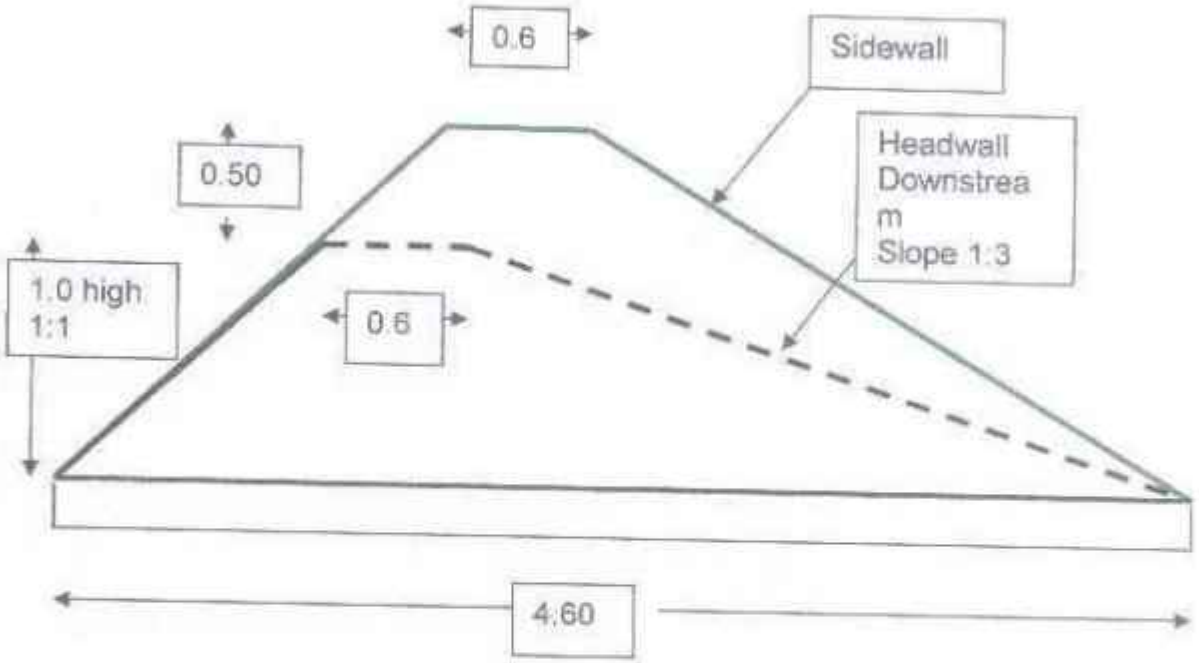
Drawing Not to Scale
All dimensions in Meters



Dimensions per meter length	
Base Stripping	2.70 sq m
C.S. Area of Graded Bund	½ (1.2+2.7) ×1.5 = 2.925 sq m
Fine Dressing Area per meter	1× (1.677+0.427+1.2) = 3.304 sq m
Stone Packing per meter	1 × 0.30 × 1.25 = 0.375 cum

LOOSE BOULDER SURPLUS

(All dimensions in meters)



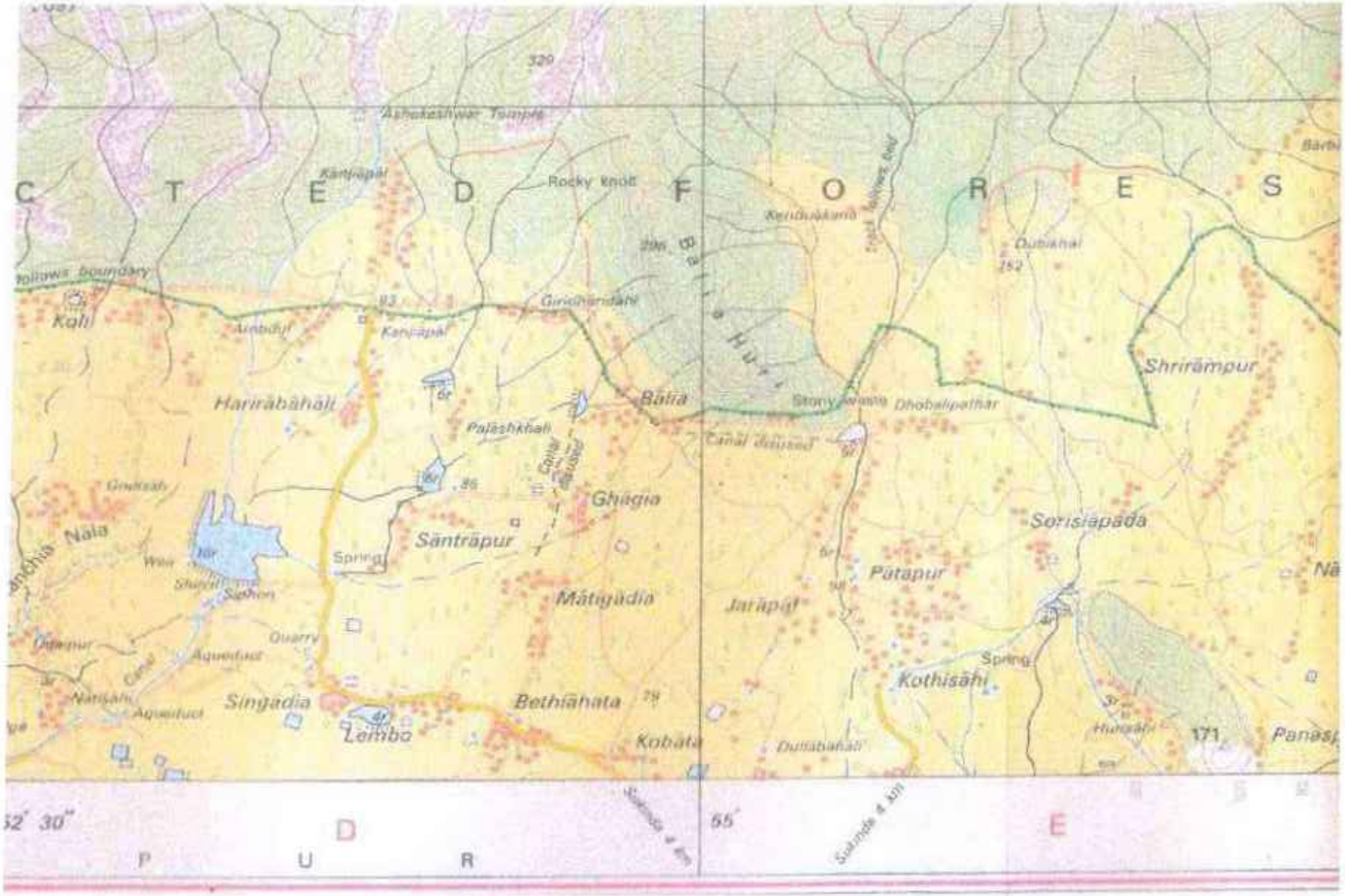
Area, Headwall
½ (0.6+4.6) ×1.0
= 2.60 sqm

Area, Sidewall
½(0.6+4.6) ×1.5
= 3.90 sqm

Foundation: 4.6 x (0.3+3.0+0.3) x 0.3 = 4.97 cum
Headwall: 1 × 3m × 2.6m² = 7.80cum
Sidewall: 2 × 0.3m × 3.9m² = 2.34cum
TOTAL 11.22 cum

bake
21/4/16

Topo SHEET NO- 64 5 N16 (73 G/16)



ANNEXURE – III

REGD. PARCEL
E- mail: ro.bhubaneshwar@ibm.gov.in

भारत सरकार
खान मंत्रालय
भारतीय खान ब्यूरो
क्षेत्रीय खान नियंत्रक का कार्यालय

No. MS/FN/13-ORI/BHU/2016-17 /7787

Plot No. 149, Pokharipur
Bhubaneswar – 751 020
Date: 29.12.2016

To

Shri Subrat Bhattacharya, Director
M/s Jindal Stainless, Ltd.
At/PO- Kalinganagar,
Dist – Jajpur – 755047, Odisha.

Sub: Approval of Review of Mining Plan of Jindal Chromite Mine along with Progressive Mine Closure Plan (PMCP) over an area of 89.00 ha in Jajpur district of Odisha State, submitted by M/s Jindal Stainless Ltd. under Rule 17 of Mineral Concession Rules, 2016.

Ref: - i) Your letter No. JSL/KLPN/2016/295 dated 25.11.2016.
ii) This office letter of even no. dated 28.11.2016.
iii) This office letter of even no dated 28.11.2016 addressed to Director of Mines, Government of Odisha copy endorsed to you.
iv) This office letter of even no. dated 01.12.2016.
v) Your letter No. JSL/KLPN/2016/306 dated 14.12.2016.
vi) E-mail to Bank regarding BG conformation dated 14.12.2016.

Sir,

In exercise of the power delegated to me vide Gazette Notification No. S.O. 1857(E) dated 18.05.2016, I hereby **Approve** the Review of Mining Plan including Progressive Mine Closure Plan of Jindal Chromite Mine over an area of 89.00 ha of M/s Jindal Stainless Ltd in Jajpur district of Odisha State submitted under Rule 17 of Mineral Concession Rules, 2016. This approval is subject to the following conditions:

I. The Review of Mining Plan is approved without prejudice to any other law applicable to the mine area from time to time whether made by the Central Government, State Government or any other authority and without prejudice to any order or direction from any court of competent jurisdiction.

II. The proposals shown on the plates and/or given in the document is based on the lease map/sketch submitted by the applicant/ lessee and is applicable from the date of approval.

III. It is clarified that the approval of aforesaid Review of Mining Plan does not in any way imply the approval of the Government in terms of any other provision of Mines & Minerals (Development & Regulation) Act, 1957, or the Mineral Concession Rules, 2016 and any other laws including Forest (Conservation) Act, 1980, Environment (Protection) Act, 1986 or the rules made there under, Mines Act, 1952 and Rule & Regulations made there under.

Jindal Stainless Limited
Authorised Signatory

AGM (Mines)
Jindal Chromite Mines
M/s. Jindal Stainless Ltd.

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IV. Indian Bureau of Mines has not undertaken verification of the mining lease boundary on the ground and does not undertake any responsibility regarding correctness of the boundaries of the leasehold shown on the ground with reference to lease map & other plans furnished by the applicant / lessee.

V. At any stage, if it is observed that the information furnished, data incorporated in the document are incorrect or misrepresent facts, the approval of the document shall be revoked with immediate effect.

VI. If this approval conflicts with any other law or court order/ Direction under any statute, it shall be revoked immediately.

VII. Validity of this document shall expire on 31.03.2022.

VIII. Next Financial Assurance shall be due for submission on 31.03.2022.

भवदीय / Yours faithfully,

Encl: - One copy of approved
Review of Mining Plan

(HARKESH MEENA)
क्षेत्रीय खान नियंत्रक / Regional Controller of Mines

Copy for kind information to:-

1. Shri P S Acharya & Shri S M Patra, M/s GEMTECH Consultants Pvt Ltd, K-8/625, Kalinga Nagar, Ghatikia, Bhubaneswar- Odisha 751029
2. The Director of Mines, Directorate of Mines, Government of Odisha, Heads of the Department Building, New Capital, Bhubaneswar- 751001, Odisha along with one copy of Review of Mining Plan by **REGISTERED PARCEL.**

(HARKESH MEENA)
क्षेत्रीय खान नियंत्रक / Regional Controller of Mines

AGM (Mines)
Jindal Chromite Mines
M/s. Jindal Stainless Ltd.

Jindal Stainless Limited
Authorised Signatory

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JINDAL CHROMITE MINES

Over 89.00 Ha area

(In village Kaliapani & Forest Block-27, Jajpur District, Odisha)

M/s Jindal Stainless Ltd.

P.O. Kaliapani, Dist.: Jajpur-755 047, Odisha

Forest – 24.24 Ha & N.F. 64.76 Ha (as per HAL settlement)
Forest – 89.00 Ha & N.F. Nil Ha (as per sabik settlement)

Mining Lease Period – 04.01.2002 to 03.01.2022
Lease period deemed to have been extended up to 03.01.2052
(As per section 8A(3) of MM(D&R) Amendment Act'2015)

REVIEW OF MINING PLAN

(For the Period from 01.04.2017 to 31.03.2022)

(Under Rule 17(2) of MCR 2016)

&

PROGRESSIVE MINE CLOSURE PLAN

(Under Rule 23 of MCDR 1988)

Volume – 1 (Text)

Mine Category – "A (Fully Mechanized)"

Prepared by

P. S. Acharya,
Qualified Person

S. M. Patro,
Qualified Person

GEMTECH Consultants Pvt. Ltd.,
K-8/625, Kalinga Nagar, Ghatikia, Bhubaneswar – 751 029
Tel No – 9437008179 (M); **Tel No – 9861093020 (M);**

November – 2016

INDEX

P. S. Acharya S. M. Patro
Qualified Persons

INTRODUCTORY NOTES

(A) Lease Matters

(i). The mining lease over 89.00 Ha in village Kaliapani & forest block – 27 for chrome ore was executed in favour of M/s Jindal Strips Ltd on 04.01.2002 for 20 years w. e. from 04.01.2002 to 03.01.2022 **(Annexure-1A)**. Subsequently the name of the lessee M/s Jindal strips Ltd. was changed to M/s Jindal Stainless Limited and accordingly supplementary mining lease deed was executed in favour of M/s Jindal Stainless Ltd. on 26.12.2007 w. e. from 01.04.2002 after obtaining necessary permission from the State Government. Copy of the transfer lease deed executed on 26.12.2007 is at **Annexure – 1B**. As per section 8A(3) of the MM(D&R) Amendment Act'2015, the mining lease period has now deemed to have been extended for a period of 50 years i.e. up to 03.01.2052.

अनुमोदित
APPROVED

(ii) The mining lease was granted to M/s Jindal Stainless Ltd. for supply of chrome ore to meet the captive requirement of Ferro Chrome Plant of M/s Jindal Steel & Power Ltd, situated at Raigarh (Chhattisgarh) along with the two units of M/S Jindal Stainless Ltd., at Kothavalsa (Andhra Pradesh) and Hissar (Haryana). Subsequently Govt. of Odisha, Steel & Mines Department has allowed M/s Jindal Stainless Ltd., to supply chrome ore from the leasehold area to their plant at Kalinganagar Industrial Complex in Jajpur district of Odisha for captive purpose. Hence the mining lease was amended on 20.03.2015 **(Annexure – 1C)**.

(B) Approval of Mining Plan and Schemes

(i) The mining plan for the granted mining lease was approved vide IBM letter No 314 (3)/99/MCCM (CZ)/MP-7 dated 29.12.2000 under Rule 22 of MCR-1960 **(Annexure – 2A)**. After obtaining all statutory clearances, mining in the leasehold area commenced since 28.01.2002. First year of mining plan is considered w. e. from the FY 2002-03. Development and production of ore for first five years of the mining plan was from the FY 2002-03 to 2006-07. The above mining plan was modified and the modification to the approved Mining Plan under Rule 10 of MCDR-1988 was approved vide IBM letter No 314 (3)/99/MCCM (CZ)/MP-8 dated 28.01.2005. The modification was for the FY 2004-05 to 2006-07 **(Annexure – 2B)**.

REGIONAL CONTROLLER OF MINES
INDIAN BUREAU OF MINES

(ii) The scheme of mining for the period from 2007-08 to 2011-12 was approved vide IBM letter No 314 (3)/99/MCCM (CZ)/MS-11 dated 14.06.2007 under Rule 12 of MCDR-1988 **(Annexure – 2C)**. The same was modified and modification to the approved scheme of mining for the period of 2009-10 to 2011-12 under Rule 10 of MCDR-1988 was approved vide IBM letter

No 314 (3)/99/MCCM (CZ)/MS-38 dated 24.06.2010. A COB Plant is operating in the lease area with production capacity of 36000 t/y. An additional COB Plant with a capacity of 24,000 t/year was included in the modified scheme to upgrade the sub grade and tailings of existing COB Plant which has been installed within the lease. Change in production of ROM from quarry – 2 of ore Band –VI was also proposed in the modified scheme of mining **(Annexure – 2D)**.

(iii) Scheme of mining for period of 2012-13 to 2016-17 was approved vide IBM letter No 314 (3)/2011/MCCM (CZ) / MS-58 dated 02.05.2012 under Rule 12 of MCDR-1988 **(Annexure – 2E)**. The approved scheme of mining was subsequently modified on 13.06.2016 vide letter No. MSM/FM/24-ORI/BHU/2015-16 for the period of 2016-17 **(Annexure – 2F)** under rule 10 of MCDR, 1988 as well as the provisions envisaged under rule 17(3) of MCR, 2016, keeping in view of changes in the business environment facilitating increase in production capacity and in the interest of safe and scientific mining, conservation and utilization of blocked mineral resources and for protection of environment.

(C) Statutory clearances

(i) Forest Clearance

Forest clearance for the project was issued by MoEF, New Delhi vide their letter dated 05.07.2001 for the forest area within the lease over 22.80 Ha excluding the safety zone area of 1.44 Ha vide letter no 8-68/2000-FC/2327(F) **(Annexure – 3A)**. As per the recent directives of the State Government, the land classification of the mining lease area for the purpose of forest diversion is required to be done as existed prior to 25.10.1980 i.e. as per the old Sabik settlement **(Annexure-3B)**. Accordingly, the forest land in the lease area has been changed from 24.240 Ha to 89.00 Ha. The lessee has submitted diversion proposal for the balance forest land of 64.760 Ha, which is under process.

(ii) Environmental clearance

Environmental clearance for the project was issued by MoEF, New Delhi vide their letter dated 13.02.2001 with an annual production capacity of 0.10 MTPA of Chrome ore by opencast mechanized mining method **(Annexure – 4)**. An additional COB Pant with a capacity of 24000 t/year has been proposed as at Para 'D' above. Environmental clearance for installation of the second COB Plant has been obtained from MOEF & Climate change, New Delhi on 24.02.2016 vide their letter No. J-11015/369/2009.IA-II(M) **(Annexure – 5A)**. Application for environmental clearance & TOR for enhanced production of 215,000 tonnes per annum by mining of blocked

mineral resources of Band-I and regular mining from Band-VI has been submitted with MOEF and the proposal has been considered by the Expert Appraisal Committee of MOEF & CC on 21.07.2017 in their 8th meeting. Clarifications sought by the Hon'ble EAC for prescribing TOR have been submitted by the lessee on 13.10.2016(**Annexure-5B**).

(iii) Consent to operate & Consent to establish

Consent to operate the mine for opencast mining has been obtained from SPCB Odisha **(Annexure – 6A)** for production of Chrome ore and concentrate of 1 LTPA (including COBP-2 operation) vide their letter No. 14775/IND-I-CON-2562 dated 01.10.2016 & letter No. 15742/ IND-I-CON-2562 dt. 26.10.2016, valid till 31.03.2017. The lessee has also obtained consent to establish for production of 215,000 tonnes of chrome ore from SPCB, Odisha vide letter No. 20031/IND-II-NOC-5299 dt. 30.11.2011 which is valid till 29.11.2016 **(Annexure – 6B).**

(iv). Surface right

Concerned Authority issuing Surface Right	Letter No & Date	Area over which SR is Granted	Annexure
District Collector, Jajpur	553/2002 – Mining dated 24.01.2002	87.101 Ha (excluding 0.459 Ha of Road Kisam in Plot No 892 (P) and 1.440 Ha of land for development of safety zone within mining lease of 89.00 Ha.	**Annexure-7**

(D) Other mining leases of the company

The company does not have any other executed mining lease in the State of Odisha or country as on date.

(E) The last approved Scheme of Mining of the area was for the period from 2012-13 to 2016-17. Subsequently, the scheme of mining was modified for the period of 2016-17 under Rule 10 of MCDR-1988 on 13.06.2016. The validity of the approved scheme of mining and its modification expires on 31.03.2017. The lessee is presently submitting a Review of Mining Plan for the period from 2017-18 to 2021-22 under rule 17(2) of Minerals (Other than Atomic and Hydro Carbons Energy Minerals) Concession Rules, 2016 for approval of the authorities.

1.0 GENERAL

(a)	Name of applicant	Sri Subrata Bhattacharya, Whole time Director, M/s Jindal Stainless Ltd. (Board resolution and list of Directors with their addresses and working/interest in other firms/ Company are at **Annexure – 8).** ID proof of Mr Subrata Bhattacharya is at **Annexure – 9.**	
	Registration no. with mine code u/r 45 of MCDR,1988	Regn. No. IBM/1129/2011,Mine Code: II ORI-19015.	
	Address	Jindal Chromite Mines, M/s Jindal Stainless Ltd. Post – Kaliapani. Address proof at **Annexure – 10.**	
	District	Jajpur,	
	State	Odisha.	
	Pin code	755 047	
	Phone	-	
	Mobile No	09938250387	
	Email id.	Jindal_mines@yahoo.com	
(b)	Status of applicant/lessee	Public Limited Company	
(c)	Mineral(s) which is / are included in the prospecting license (For Fresh grant)	Not applicable	
(d)	Mineral(s) which is / are included in the letter of Intent / lease deed	Not applicable	
(e)	Mineral(s) which is the applicant / lessee intends to mine	Chrome Ore	
(f)	Name of Qualified Person under rule 15 of MCR,2016 preparing the Review of Mining Plan (Annexure-11A)		
	Name of Qualified Persons	P. S. Acharya	S. M. Patro
	Address	Gemtech Consultants Pvt. Ltd. K-8/625, Kalinga Nagar, Ghatikia, Bhubaneswar-751 029 (Odisha)	
	Phone	(0674) 2552054	
	Mobile No	+91 9437008179	+91 9861093020
	Email id.	Gemtech_consultant@yahoo.co.in	
	Annexure	Annexure-11A	

2.0 LOCATION & ACCESSIBILITY

a) Lease Details (Existing Mine)	
Name of mine	Jindal Chromite Mine
Lat/long of any boundary point	854530.76E/210203.53N (Pillar J1)
Date of grant/ execution of lease	Granted on 06.08.2001 & executed on 04. 01.2002
Period/Expiry Date	03.01.2022.
Name of lease holder	M/s Jindal Stainless Ltd.
Postal Address	Jindal Chromite Mines, M/s Jindal Stainless Ltd. Post – Kaliapani, Jajpur Dist (Odisha)
Phone	-
Mobile No	9938250387
Email id	Jindal_mines@yahoo.com
b) Details of lease area with location map of the lease area	
Forest	**Non forest**
89.00 Ha (as per sabik settlement) 24.24 Ha (as per Hal settlement)	Nil (as per sabik settlement) 64.76 Ha (as per Hal settlement) **(Annexure-3B)**
Total lease area	89.00 Ha
District & State	Jajpur (Odisha) PIN - 755047
Taluka	Sukinda
Village	Kaliapani
Whether the area falls under Coastal Regulation Zone (CRZ)? if yes, details	No
Existence of public road/railway line, if any nearby and approximate distance	The Tomka-Mangalpur public road passes adjacent to northern boundary of the lease area. Lease area is situated at a distance of 35 km from Duburi that lies on the Daitari-Paradeep NH 200. The nearest Railhead is at Tomka, about 30 km from the lease area and is well connected by road.
Toposheet No. with latitude & longitude of all corner boundary point/pillar	Survey of India Toposheet No 73 G/16. Latitude – N21°01'04.39824" to N21°02'03.53184" &. Longitude – E85°45'18.17352" to 85°46'31.69704" E.
(c) Attach a general location map showing area and access routes. It is preferred that the area be marked on a Survey of India topographical map or a cadastral map or forest map as the case may be. However, if none of these are available, the area may be shown on an administrative map.	**Plate No – 1** (key Plan) and **Plate No – 2** (lease plan) Attached.

(d) Geo-reference mining lease map and ML boundary pillars as per CCOM circular No. 2/2010 and its addendum:

As per CCOM, Circular No 2/2010 and its addendum regarding geo-reference mining lease map and ML boundary pillars is being conducted by ORSAC and shall be implemented after receiving the same. Undertaking in this regard is given in consent letter. Boundary pillars have been erected as per the addendum of Circular No. 2/2010 dt. 06.04.2010. The co-ordinates of all the boundary pillars as per DGPS readings are as below.

SL. No.	Lease Pillar No.	Longitude	Latitude	Easting	Northing
1	J1	E85°45'30.76020"	N21°02'03.53184"	370998.968	2326446.996
2	J2	E85°45'18.17352"	N21°01'56.10432"	370633.840	2326221.444
3	J3	E85°45'29.13624"	N21°01'39.80028"	370946.410	2325717.656
4	J4	E85°45'50.06628"	N21°01'52.37472"	371553.628	2326099.610
5	J5	E85°46'22.37448"	N21°01'04.39824"	372474.970	2324617.242
6	J6	E85°46'31.69704"	N21°01'09.93252"	372745.427	2324785.340
7	J6-C	E85°46'15.70188"	N21°01'33.76560"	372289.279	2325521.710
8	J7	E85°45'57.09528"	N21°02'01.48668"	371758.714	2326378.213
9	J7-B	E85°45'44.30016"	N21°01'53.59836"	371387.463	2326138.522
10	J8	E85°45'39.48048"	N21°01'50.68092"	371247.639	2326049.899

3.0	**Details of approved mining plan / scheme of mining (if any)**		
3.1	Date and reference of earlier approved mining plan and scheme of mining and their modifications		
	Mining Plan with development & production planning for 5 years under Rule 22 of MCR-1960, for execution.	Approved vide IBM letter No 314 (3)/99/MCCM (CZ)/MP-7 dated 29.12.2000 under Rule 22 of MCR-1960. Period considered for 2002-03 to 2006-07 as mining started in the year 2002-03.	Annexure – 2A
	Modification to the approved Mining Plan under Rule 10 of MCDR-1988 for the period from 2004-05 to 2006-07.	Approved vide IBM letter No 314 (3)/99/MCCM (CZ)/MP-8 dated 28.01.2005.	Annexure – 2B
	Scheme of Mining for period of 2007-08 to 2011-12 under Rule 12 of MCDR-1988.	Approved vide IBM letter No 314 (3)/99/MCCM (CZ)/MS-11 dated 14.06.2007.	Annexure – 2C
	Modification to the approved Scheme of Mining for the period of 2009-10 to 2011-12 under Rule 10 of MCDR-1988.	Approved vide IBM letter No 314 (3)/99/MCCM (CZ)/MS-38 dated 24.06.2010.	Annexure – 2D
	Scheme of Mining for period of 2012-13 to 2016-17 under Rule 12 of MCDR-1988	Approved vide IBM letter No 314 (3)/2011/MCCM (CZ) / MS-58 dated 02.05.2012.	Annexure – 2E

3.2 Details of last modifications if any (for the previous approved period) of approved MP/ SOM, indicating date of approval, reason for modification

Modification to the approved Scheme of Mining for the period of 2016-17 under Rule 10 of MCDR-1988 was approved vide IBM letter No MSM/FM/24-ORI/BHU/2015-16 dated 13.06.2016 **(Annexure – 2F)**, keeping in view of changes in the business environment facilitating increase in production capacity and in the interest of safe and scientific mining, conservation and utilization of blocked mineral resources and for protection of environment.

3.3 Review of earlier approved proposal in respect of exploration, excavation, reclamation etc.

Earlier approved proposal in respect of exploration, excavation, reclamation vis-à-vis respective achievement are reviewed para wise as below.

(i) **Exploration (Approved Scheme of Mining for 2012-13 to 2016-17 – Approved on 02.05.2012)**

Copy of Form "J" & "K" are placed at **Annexure -12 & 13.**

Proposal

Approved SoM Period	Year of proposal	Location	Number of boreholes with inclination	Proposed Depth in all holes in aggregate (m)	For proving upto depth (mRL)
Scheme of Mining for period of 2012-13 to 2016-17 & modification of approved SoM for 2016-17, approved on 02.05.12 & 13.06.16.	2012-13	No proposal			
	2013-14	Ore Band – I	2 nos.@ 80° incl.	400 m	(-) 100mRL (each hole)
	2014-15	Ore Band – I	2 nos.@ 80° incl.	400 m	(-) 110mRL (each hole)
	2015-16	Ore Band- VI	3 nos.@ 45° incl.	600 m	20, 40 and 42 mRL
	2016-17	Ore Band-I Ore Band-VI Non mineralized area	4 nos. @45° incl. 3 nos. @45° incl. 4 nos. @45° incl.	800 m 600 m 400 m	(-) 110 mRL 20, 40 and 42 mRL ——

Achievement

Approved SoM Period	Year of proposal	Location	Number of boreholes with inclination	Proposed Depth in all holes in aggregate (m)	For proving upto depth (mRL)
Scheme of Mining for period of 2012-13 to 2016-17 & modification of approved SoM for 2016-17, approved on 02.05.12 & 13.06.16.	2012-13	No proposal			
	2013-14	No Drilling			
	2014-15	Ore Band – I	7 numbers	481 m	At different levels
	2015-16	No Drilling			
	2016-17	No Drilling as on 31.09.2016 (Order for drilling work placed on 28.10.2016 and work has been started from 09.11.2016)			

Reason for deviation, if any

There was no proposal of drilling in the first year of the scheme period (2012-13) and as such no hole has been drilled during 2012-13. Against the proposal of completing 2 holes with 400 m aggregate depth during 2nd year (2013-14), no drilling has been done due to non availability of drilling agency. Against the proposal of completing 2 holes with 400 m aggregate depth during

3rd year (2014-15) of the scheme period, 7 holes have been drilled. Reason for drilling more bore holes was to prove the ore body in the safety zone area (east boundary of M/s JSL and west boundary of M/s BAL), in order to have joint mining in the area by recovering locked up ore in both the cases as per the joint mining proposal accepted by both the lessees (**Annexure - 14**).

Boreholes proposed to be drilled during 2015-16 (3 nos. in Band-VI) have not been completed due to non availability of drilling agency. These pending bore holes along with the proposed 11 nos. of boreholes during 2016-17 are planned to be drilled during current year i.e. 2016-17. 'J' form for the bore holes to be drilled is at **Annexure-12** and copy of LOI issued to M/S Geo Exploration India on 28.10.2016 is at **Annexure – 15B.**

(ii) Mine development and ROM production (Scheme of Mining for 2012-13 to 2016-17 – approved on 02.05.2012 and modification of approved scheme of mining approved on 13.06.2016)

A. Proposal of OB/SB/IB development (in CuM) and achievement during the scheme period

Year	Proposal as per Approved scheme of Mining (CuM)	Achievement as per mine record (CuM)	Deviation (%)
2012-13	1271385	785931	(-) 38.18%
2013-14	655020	565416	(-) 13.68%
2014-15	696820	630014	(-) 9.59%
2015-16	821100	683,145	(-) 16.80%
2016-17 (up to 30.09.16)	1179266	251,171	(-) 47.09%
2016-17 (01.10.16 to 31.03.17-Planned)		372,751	
Total	**46,23,591**	**32,88,428**	**(-) 28.88%**

Reason for deviation, if any

Development from both the quarries in the lease area during the completed years of the scheme period is less by around 28.88% due to less demand from Lessee's plant as well as certain ground difficulties including delay in obtaining environmental clearance for enhanced production during 2016-17.

B. Proposal for ROM production (in tonnes) and achievement during the scheme period

Year	Proposal of Production as per Approved scheme of Mining (Tonnes)			Production achieved as per mine record (Tonnes)			Deviation (%)
	10 to 40% Cr2O3 (MR)	>40% Cr2O3 (Ore)	Total	10 to 40% Cr2O3 (MR)	>40% Cr2O3 (Ore)	Total	
2012-13	41570	56149	97719	33478.912	62543.71	96022.622	(-) 1.74%
2013-14	47074	50996	98070	64086.842	0.000	64086.842	(-) 34.65%
2014-15	47124	51051	98175	68373	925	69298	(-) 29.41%
2015-16	47376	51324	98700	88246	0.000	88246	(-) 10.59%
2016-17 (up to 30.09.16)	215729	—	215729	40,106	0.000	40,106	(-) 58.51%
2016-17 (01.10.16 to 31.03.17-Planned)				49,431	0.000	49,431	
Total	398873	209520	608393	343721.754	63468.71	407190.464	(-) 33.08%

Reason for deviation, if any

Production of ROM from both the quarries in the lease area was 33.08% less during the completed years of the scheme period than the projected production due to less demand from Lessee's plant as well as certain ground difficulties including delay in obtaining environmental clearance for enhanced production during 2016-17.

(iii) Reclamation

Proposal

Band - II beyond the present 78 mRL cannot be further mined, as ore above the current threshold value (10%Cr2O3) has not been intersected in the boreholes and also with the provision of opencast mining. Owing to constraints for the area for dumping, it was proposed to dump the waste material of quarry – 1 / Band – I over Band - II in southern side. It is proposed to utilize 2.24 Ha during 2013-14 and 3.20 Ha area during 2014-15 for such dumping. It was also proposed to take up plantation on the matured dumps, haulage road, office sites and colony etc. Ore deposits on Band – I is not going to be exhausted. It was also proposed that the upper four benches of north side will be rehabilitated by planting suitable trees all through during the close part of opencast mining i.e. after 4th year of scheme period. Similarly lower benches shall be planted all along in subsequent years. Quarry – I / Band – I has reached ultimate level due to constraints of lease boundary in west (M/s TISCO) and in east (M/s BAL).

Achievement

As per proposal the voids of quarry – 1 / Band – I have been reclaimed w.e.f. 2013-14 put on an area over 8.24 Ha. About 20,66,216 CuM waste has been put on voids of Band – I/quarry – 1 till end of Sept 2016 and reclamation is going on. About 3000 trees have been planted on first bench by end of Sept 2016.

Reason for deviation, if any

No deviation

3-4 Violations received from IBM authority and compliances

Details	Violations Received during 2011-12		
	IBM Letter reference	JSL Reply reference	Annexure
Violations raised by the Dy. Controller of Mines, Bhubaneswar office on Rules 13 (1)	IBM Letter No ORI/JJP/MCDR-14/BBS Dated 09.10.2013	Compliance report of the violation was submitted by JSL vide letter No JCM/KLPN/2013/199 Dated 25.10.2013	16A
Violations raised by the Dy. Controller of Mines, Bhubaneswar office on Rules 13 (1) and 23 (E) (2).	IBM Letter No ORI/RECL/BBS-2014 /2028 Dated 01.09.2014	Compliance report of the violation was submitted by JSL vide letter No JCM/KLPN/2014/180 Dated 14.10.2014	16B
Violations raised by the Sr. Asst. Controller of Mines, Bhubaneswar office on Rules 13 (1) and 45(7).	IBM Letter No ORI/CR/JJP/MCDR-13/BBS/1653 Dated 21.08.2015	Compliance report of the violation was submitted by JSL vide letter No JSL/KLPN/2015/198 Dated 30.09.2015	16C
Show cause notice by the Sr. Asst. Controller of Mines, Bhubaneswar office on Rules 13 (1) and 45(7).	IBM Letter No ORI/CR/JJP/MCDR-14/BBS/2261 Dated 05.11.2015	Compliance report of the violation-cum-show cause notice was submitted by JSL vide letter No JSL/KLPN/2015/241 Dated 03.12.2015	16D
Violation cum Show cause notice by the Dy. Controller of Mines, Bhubaneswar office on Rules 45(7).	IBM Letter No ORI/IRON/KJR/MCDR -24/BBS/2671 Dated 02.12.2015	Compliance report of the violation-cum-show cause notice was submitted by JSL vide letter No JSL/KLPN/2015/267 Dated 30.12.2015	16E
Violation by the Regional Controller of Mines, Bhubaneswar office on Rules 13(1) and 33(5).	IBM Letter No ORI/CR/JJP/MCDR-14/BBS/3700 Dated 03.03.2016	Compliance report of the violation notice was submitted by JSL vide letter No JSL/KLPN/2016/105 Dated 15.04.2016.	16F
Show cause notice by the Regional Controller of Mines, Bhubaneswar office on Rules 13 (1) and 33(5).	IBM Letter No ORI/CR/JJP/MCDR-14/BBS/Vol-II/212 Dated 03.05.2016.	Compliance report of the show cause notice was submitted by JSL vide letter No JSL/KLPN/2016/142 Dated 20.05.2016.	16G
Violation by the Asst. Controller of Mines, Bhubaneswar office on Rules 13(1).	IBM Letter No ORI/CR/JJP/MCDR-14/BBS/1988 Dated 02.11.2016	Compliance report of the violation notice has been submitted by JSL vide letter No JSL/KLPN/2016/300 Dated 07.12.2016.	16H

3.5 Indicate and give details of any suspension/ closure/ prohibitory order issued by any Government agency under any rule or Court of law:

Mining operation in the leasehold area was discontinued w.e.f. 06.08.2016 by the Divisional Forest Officer, Cuttack Forest Division vide letter No. 7593/5F(Misc) (**Annexure-17A**) due to non submission of diversion proposal for the balance 64.76 Ha non forest area which was recorded as forest land prior to 25.10.1980. The mine was reopened on 08.09.2016 as per lessee's letter No. JSL/KLPN/2016/232 (**Annexure-17B**) pursuant to Hon'ble High Court of Odisha interim order dt. 29.08.2016.

3.6 In case the MP/SOM is submitted under rules 9 and 10 of MCDR'88 or under rule 22(6) of the MCR, 1960 for approval of modification, specify reason and justification for modification under these rules:

Review of Mining Plan is being submitted for the period from 2017-18 to 2021-22 under rule 17(2) of Minerals (Other than Atomic and Hydro Carbons Energy Minerals) Concession Rules, 2016 for approval of the authorities.

3.7 Other Information

3.7.1 DGPS Survey

Description as per the DGPS survey conducted by the lessee through ORSAC in partial fulfillment of Circular No 2/2010 and its addendum of IBM is yet to be received from ORSAC.

PART - A

1.0 GEOLOGY AND EXPLORATION

(a.i) Physiography

The chromite lease area of JSL is situated in a flat valley with part of Mahagiri hill range and is largely covered with Alluvium and thick horizon of laterite. The valley lies between the Mahagiri hill (707.69m) on the south and Daitari range (782.42m) on the north side. The area exhibits peneplained topography marked by linearly disposed mounds of low relief. The maximum elevation in the area is 310 MRL on the southern side while the minimum elevation is 116 MRL on the north-western portion of the area. The overall slope of the area is from SE to NW.

(a.ii) Drainage

Damsala nala is the main perennial nala which flows in the south west direction and is located towards the northern side of the leasehold at a distance of 0.6 km away from the northern boundary (Plate-V). Various tributaries and small nalas both from the northern and southern slopes of Mahagiri and Daitary hill range join on to the Damsala nala which finally discharge in to the Brahmani river.

(a.iii) Communication

Tomka-Mangalpur road is the only road for transportation and communication to Jajpur-Keonjhar road railway station and Paradeep port. The area has a tropical to subtropical climate with rainfall during the monsoon months of June to September. The maximum rainfall recorded is in the order of 759 mm during the mouth of June. The temperature varies between 8/9° c in winter to 46/47° c in summer.

(a.iv) Drainage Pattern of the area

The southern part of the area is bounded by a dry nala. The drainage pattern of the buffer zone has natural drainage such as Damsal nala in the near vicinity of the leasehold. The dry nala in the southern part carries the surface run-off during monsoon and ultimately converge with Damsal nala towards north-western part of the lease hold.

(a.v) Vegetation of the area

The prevailing vegetative cover over the area is mainly of tropical dry deciduous forest type. The forest community in the area is dominated by Shorea robusta, Terminlia belerica, Terminalia tomentosa, Adina cordifolia, Anogeissus latifolia, Madhuca latifolia, Lagerstroemia flosreginae and Holarrhena antidysenterica. It has been observed that the relative frequency of Shorea robusta is maximum at 15% while that of Bambusa arundinacea is minimum at 1%.

(a.vi) Meteorological Condition

Climatic condition

The M.L area falls within the administrative jurisdiction of Jajpur district of Orissa. The climate of the area exhibits tropical to sub-tropical. It is hot and humid climate with rainfall during the month of June to October. This area experiences annual rainfall between 1200 mm to 1800 mm. The daily temperature varies from 15.0°C to 32 °C during winter season and in summer temperature rises up to 48°C. The autumn lasts from mid October to mid November, with pleasant weather having temperature between 18°C to 33°C. The area is humid during the monsoon, the relative humidity goes upto 93%. However the annual average humidity is around 77%. The wind speed is generally light to moderate. An abstract of meteorological data of the Sukinda region is given below :

Season	Temperature °C		Relative Humidity %	
	Max	Min	Max	Min
Winter	33.0	8.0	75	22
Summer	47.0	22.0	86	48
Monsoon	41.0	23.0	98	56
Post Monsoon	38.0	17.5	89	44

It is observed that the area experience predominantly wind direction of flow from NE to SE during winter, SW-NW during summer, SW-NE during monsoon and NE during Post monsoon season.

Temperature - The average high and low temperatures recorded during different months of the year along with the precipitation in the district can be tabulated below:

Months	Temperature (° C)	
	Average High (°C)	Average High (°C)
January	29.2	15.2
February	32.3	18.7
March	35.4	22.6
April	37.0	25.0
May	37.5	26.2
June	34.7	26.1
July	32.3	25.5
August	31.8	25.3
September	32.3	25.0
October	32.0	23.3
November	30.7	19.1
December	29.0	15.0

Relative humidity

The mean monthly morning RH in the district varies from 63% in April-May to 84% in August. The afternoon mean monthly RH varies from 54% in January to 81% in August. The RH reaches as high as 93% and often above 80% in monsoon period.

Rainfall

The rainfall does not show any cyclic occurrences but shows erratic variations. The monsoon season spreads over the months from June to October. The maximum rainfall of 887 mm in a month was recorded in July, 2009. The monthly rainfall (mm) of Sukinda block during last 10 years is given below:

Monthly Rainfall (mm) of Sukinda Block

Y/M	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	TOTAL
2006	0	0	64	35	131	567	358	691	713	29	103	0	2691
2007	0	126	0	9	80	575	346	574	701	130	0	0	2541
2008	120	10	8	44	148	516	377	424	727	65	0	0	2439
2009	0	0	0	0	125	88	887	579	281	329	13	0	2302
2010	0	0	16	32	253	321	232	245	380	157	14	73	1723
2011	0	30	50	69	83	742	211	732	618	18	0	0	2553
2012	234	0	0	14	116	192	407	362	194	122	58	0	1699
2013	20	0	46	31	92	264	253	152	281	566	0	0	1705
2014	0	54	45	62	88	151	422	366	186	115	0	0	1489
2015	2	7	0	78	12	226	405	275	127	23	0	28	1183
Av.	37.6	22.7	22.9	37.4	112.8	364.2	389.8	440.0	420.8	155.4	18.8	10.1	2032.5

Wind Speed and Direction

Generally, light to moderate winds prevails throughout the year. Winds are light and moderate particularly during the morning hours while during the afternoon hours, the winds are stronger. The wind data of Jajpur has been used to establish the wind condition for the project area. The predominant wind directions are generally from south westerly direction during the months from June to October with northerly swing from October to December. During the months of

January to March, the predominant wind direction is from north and north-eastern directions. During evening hours directions are south-westerly for the whole of the year. Many low pressure depressions occur during the transition periods.

(b) Brief description of Regional Geology with reference to location of lease area:

(i) The Jindal Chromite Mines forms a part of famous chromite bearing Sukinda ultramafic complex. The Sukinda ultramafics belong to the metamorphosed rocks of Pre-Cambrian age. The rocks of the area are associated with six sedimentary sequences separated by unconformities. The Sukinda ultramafics belong to the second sequence of the succession from a major intrusive into the older rocks and occur as intrusive. The stratigraphic succession of the region as described by Dunn is given in the following Table.

Sixth Sequence	Granite
	Intrusive Contact
	Shales Carbonatites
	Shale lava and tuffs conglomerates
Fifth Sequence	Gabbros. Ultrabasics and dyke
	Swarms Guartzites
	Conqlomerates
Fourth Sequence	Basal Granite
	Intrusive Contact
	Managanese bearing Shales
"Iron Ore staqe of Dunn"	Banded Hematite Jasper Shale
----------Unconformity----------	
Third Sequence	Gabbro and Ultrabasics (intrusive)
	Lavas and interbedded qrits
	Conqlomerates qrits, Sandstone
----------Unconformity----------	
Second Sequence	Granite and granite gneiss (intrusive) Granophyre (intrusive) Gabbro and Ultrabasic with chroimite lodes (intrusive) Branded Hematite quartzite Banded Hematite Jasper Conglomerate, ferruginous shale and phyllites
First sequence	Metavolcanics chlorite schist Guartzites, BHG, Banded ferruqinous Quartzite, Mica Schists. Fuchsite

The ultramafics suite of rocks of Sukinda area is a layered complex of alternate bands of Chromite, Dunite, Peridotite and Orthophyroxinite. The dunite peridotites are completely serpentinised. The presence of numerous Chert bands in association with Chromite bands is the characteristics feature of the area. The lower sequence of Iron Ore Super Group of the region has been folded into syncline with gentle plunge to the WSW direction. The ultramafics are intrusive

into older sequence and subsequently co-folded. The chrome ore mineralization is mainly restricted to the ultramafics and occurs at six different stratigraphic levels.

(ii) Stratigraphic sequence of different Litho units as established from field observation and drill hole data are as follows:

- Alluvium and Laterite
- Pyroxenite
- Yellow limonite with goethite
- Limonite with chromite disseminations
- Friable chromite
- Cherty limonite

Top soil of 10 cm thick occurs in this zone and ranges from yellowish brown to reddish brown colour, while the texture ranges from clayey loam to sand. Lateritic soil follows the top soil for about 5 meter. Colour of the lateritic soil ranges from dark brown to blackish brown. The placement of pyroxenite-dunite suite (now altered to limonite) is still genetically debatable.

(iii) The target area forms a part of the chromite rich Sukinda Ultramafic Complex which covers an area of about 50 Sq.kms. extending from the South-West corner of the Survey of India Toposheet No. 73G/16 to South-East corner of 73G/12 bounded by the latitudes N 21°01' and 21° 05' and longitudes 85° 40' and 85° 43'. The center of this laccolith is occupied by an amygdaloidal basaltic lava flow with plagioclase or olivine as phenocrysts, overlapping the ultramafics and occasionally containing inclusions of ultramafic rocks. The lithological constituents are ultramafic intrusives or dunite-pyroxenite-peridotite and acid differentiates of granite and granophyre. All these rocks are traversed by a swarm of dolerite dykes which have not only cut across the rocks but also have displaced the ore bands at many places.

(iv) Mode of Occurrence

The chromite ore seams of the Sukinda ultramafic complex occur as 6 to 7 distinct stratigraphic levels and are more or less continuous throughout the ultramafic body as parallel bands in serpentinite. The chromite bands belonging to the Northern limb of the fold exhibit E-W strike having dip of 25° to 50° due South where as the southern limb displays NE-SW strike having a dip of 45°–70° due south. The chromite bands are separated by dunite/peridotite/pyroxenite lease and are intermittently exposed in the quarries, though the major portions of these bands are concealed under lateritic cover.

The occurrence of chromite ores is mostly associated with laterite, altered ultramafic rocks, nickeliferous limonite and talc-serpentine schist and at few places with dunite and peridotite. The ortho-pyroxenites are however devoid of economic chrome ore. The ultramafics bearing the chromite seams are highly limonitised and at places chertified.

The ultramafics exhibit presence of numerous chert veins which lie close to the chromite bands and cut across the ultramafic rocks and the ore bands with it in all possible directions Mostly, however, the chert occurs as alternate layers within the ultramafic body, the latter being completely weathered into a mass of talc-limonite rock and might have been originated during serpentinisation or due to differential weathering.

(v) Local Geology

The project area exposes different litho-units. The local stratigraphic sequence is established as follows:

Soil & Alluvium
Laterite
Pyroxenite
Chromiferous ultramafics
Yellow limonite with Geothite
Limonite with chromite disseminations
Cherty limonite
Quartzite

(c) Detailed description of geology of the lease area such as shape and size of the mineral / ore deposit, disposition of various litho-units indicating structural features if any etc. (Applicable for Mining plan for grant & renewal and not for scheme of Mining / Modification in the approved Mining Plan / Scheme of Mining)

The proposal submitted is Review of Mining Plan for the period of 2017-18 to 2021-22. So, this para is not applicable.

(d) Name of prospecting /exploration agency

In-house Geology Division having one geologist, one surveyor and one chemist, headed by Sri Sanjiw Kumar Vaidya. Address - Kaliapani Chromite Mines, M/s Jindal Stainless Ltd. Post – Kalarangiatta, Jajpur, Dist (Odisha), **phone / Fax no** +919938250389, Email id: jindal_mines@yahoo.com. Drilling of bore holes is being carried out through drilling agencies under the supervision of the Geology division of the lessee. During the present scheme period, core drilling

has been carried out by M/s Maheswari Mining (P) Ltd in 2014-15 and by M/S Geo Exploration India in 2016-17 which is continuing.

(e) Details of prospecting/exploration already carried out

(i) Number of pits and trenches indicating dimensions, spacing etc along and across the strike/foliation with reference to geological plan

Mining in the lease area commenced in the year 2002. During earlier part, few pits and trenches were done which were developed in to working pits. The data of these exploratory pits and trenches are not available. During last 10 years, no pit or trenches are done. For exploration only geological mapping with systematic exploratory holes are being drilled phase-wise.

(ii) Number of boreholes indicating type (Core/RC/DTH), diameter, spacing, inclination, Collar level, depth etc with standard borehole logs duly marking on geological plan/sections.

Year	No of boreholes/ DTH holes	Ore Band	Type of hole	Core Size	Meterage of drilling	Spacing (m)	Bearing/Angle (degree)	Remarks
2004-07	4	Band I	DTH	---	60.00	100	Vertical	BHs utilized for reserve assessm in last Scheme o mining.
	2	Band II	DTH	---	60.00	100	Vertical	
	15	Band VI	Core	NQ	1129.50	50 to 100	Angular (45-65°)	
	2	Band I	Core	NQ	200.00	50 to 100	Angular (50°)	
	2	Dump area	Core	NQ	240.00	50 to 100	Angular (45°)	
2011-12	4	Band I	Core	NQ	336.00	50 to 100	Angular (50-66°)	
	2	Band II	Core	NQ	167.00	50 to 100	Angular (66°)	
2014-15	7	Band I	Core	NQ	481.00	25 to 50	Angular (63°-Vertical)	Used for reassessment of Band I blocked o

Copies of Form J and logs of the holes drilled during 2004-07, 2011-12 & 2014-15 (Form K) are submitted as **Annexure-12 & 13**. During this period in Band I, a total of 13 BHs and 4 DTH holes were drilled with running meterage of 1017m and 60m respectively. In Band – II, two core bore holes and two DTH holes were drilled with cumulative meterage of 167 m & 60 m respectively and in Band – VI, fifteen (15) core drill holes were completed with 1129.50 m drilling. Beside these holes, 2 BHs with 240 m of drilling were completed in dump area to prove the absence of ore bodies. All the above bore hole and drill hole logs drilled so far including those drilled during the present scheme period (7 nos.), the data of which has been used for reassessment of blocked resources are at **Annexure – 13.**

Exploration proposed during 2015-16 & 2016-17 has been taken up now and drilling of bore holes has been commenced on 10.11.2016 by M/S Geo Exploration India. Form J for the exploration work is attached as **Annexure-12.**

(iii) Details of samples analysis indicating type of sample (surface/sub-surface from pits/trenches/borehole etc) Complete chemical analysis for entire strata for all radicals may be undertaken for selected samples from a NABL accredited Laboratory or Government laboratory or equivalent. Entire mineralized area may be analyzed meter wise with 10% of check samples. (At least for 10% of total samples may be analyzed in accordance to BIS and reports from NABL accredited/other government laboratory).

Core & DTH drilling has been undertaken through drilling agencies during 2004-15. Detailed basic data of the above completed holes are given below:

Details of Basic Data of all completed bore holes								
BH no	Band	Location Co-ordinate (GPS Co-ordinates)		Collar RL (m)	Angle of drilling with azimuth	Total Depth of hole (m)	Ore at 10% Cr2O3 cut off starts and ends at (m) (RoM)	
		Easting	Northing				Starts	Ends
Bore holes/ Drill holes during 2004-07								
DTH-1	Band-I	370852	2326120	106.26	Vertical	15.00	0.00	15.00
DTH-2	Band-I	370808	2326121	106.00	Vertical	15.00	0.00	15.00
DTH-3	Band-I	370770	2326115	106.00	Vertical	15.00	0.00	15.00
DTH-4	Band-I	370724	2326113	105.96	Vertical	15.00	0.00	15.00
DTH-1	Band-II	370932	2325838	124.00	Vertical	30.00	0.00	30.00
DTH-2	Band-II	370750	2325813	124.00	Vertical	30.00	0.00	30.00
BH-01	Band-VI	370807	2324989	183.00	60°N	75.00	No ore	
BH-02	Band-VI	370788	2324956	173.85	50°S	43.00	No ore	
BH-03	Band-VI	370868	2324970	181.00	65°N	40.00	6.00	9.00
BH-04	Band-VI	370853	2324949	176.00	45°S	41.00	No ore	
BH-05	Band-VI	370753	2325008	166.65	45°S	101.00	No ore	
BH-06	Band-VI	370771	2325057	160.58	45°S	75.00	No ore	
BH-07	Band-VI	370683	2325014	166.00	45°S	110.00	94.00	110.00
BH-08	Band-VI	370784	2324982	172.00	45°S	110.00	100.00	110.00
BH-09	Band-VI	370819	2324970	178.00	45°S	82.50	32.00	55.00
BH-10	Band-VI	370812	2324955	171.02	45°S	100.00	48.50	95.00
BH-11	Band-VI	370810	2324939	182.77	45°S	98.00	66.50	98.00
BH-12	Band-VI	370890	2324957	190.45	45°S	110.00	76.00	86.00
BH-13	Band-VI	370898	2324926	182.11	45°S	46.00	3.00	40.00
BH-14	Band-VI	370938	2324940	183.11	45°S	46.00	12.50	16.50
BH-15	Band-VI	370922	2324937	186.61	45°S	52.00	24.50	45.00
BH-15	Band-I	370744	2326150	106.60	50°S	100.00	35.00	73.00
BH-16	Band-I	370846	2326156	112.76	50°S	100.00	32.00	83.00
BH-17	Dump area	370842	2325643	144.26	45°S	120.00	No ore	
BH-18		370837	2325532	145.11	45°S	120.00	No ore	
Bore holes during 2011-12								
BH-01/11	Band-I	370926	2326148	120.97	66°/N120°	100.50	No ore	
BH-1(A)/11	Band-I	370926	2326148	120.97	50°/N120°	75.00	No ore	
BH-02/11	Band-I	370924	2325981	121.60	66°/N110°	101.50	51.50	94.50
BH-2(A)/11	Band-I	370924	2325981	121.60	50°/N110°	59.00	41.00	53.00
BH-03/11	Band-II	370928	2325875	122.00	66°/N160°	122.00	No ore	
BH-04/11	Band-II	370746	2325849	109.00	66°/N165°	45.00	0.00	36.10
Bore holes during 2014-15								
BH-1/14	Band-I	371934	2326076	140.32	-63°/N 148°	92.00	45.00	69.00
BH-2/14	Band-I	371905	2326028	109.08	-65°/N 148°	65.00	15.00	50.50
BH-2A/14	Band-I	371907	2326032	109.09	-65°/N 148°	65.00	14.00	48.00

BH-4/14	Band-I	371919	2326067	111.00	-75°/N 148°	111.00	49.80 108.00	96.00 111.00
BH-5/14	Band-I	371936	2326037	127.40	-90°/0	43.00	33.00	43.00
BH-6/14	Band-I	371892	2326027	91.39	-75°/N 148°	51.00	15.00	51.00
BH-7/14	Band-I	371877	2326015	79.21	-75°/N 148°	54.00	17.00	54.00
Total Meterage						**2673.5**		

(iv) Core drilling during the period 2011-12 & 2014-15 has been undertaken through M/s Asian Oilfield Services Ltd & M/S Maheswari Mining (P) Ltd respectively. Copy of the work orders issued to the Parties for bore holes drilled during these periods is enclosed as **Annexure-15A.** During the current year (2016-17), exploration work has been awarded to M/S Geo Exploration India and work order for the same is at **Annexure-15B.** Subsurface samples from the completed borehole cores for the ore zone have been drawn meter wise by in house geology division and analyzed in the mine's laboratory for Cr2O3% and Fe%. A total of 7 numbers of boreholes have been drilled during present scheme period (up to September 2016) with running meterage of 481.0 m. 231 numbers of samples of the ore zone have been prepared and analyzed in the laboratory of the lessee. Assay values of each sample were incorporated in the section plans along the core lines and different bands and ore bodies were demarcated. 27 numbers of drill core samples (10% of total samples) were check analyzed for confirming the reliability of the results in Government Laboratory of the Deputy Director, Chemical Analysis, Jajpur Road. The analysis results are in **Annexure-18A.**

(v) Expenditure incurred in various prospecting operations.

A total of 6 core boreholes with running meter age of 500m and 7 core boreholes with 481 m have been drilled by M/S Asian Oilfield Services Ltd and M/s Maheswari Mining (P) Ltd during 2011-12 and 2014-15 respectively. The total operating expenditure incurred for the above exploration work was Rs. 22.06 lakhs and 26.77 lakhs. Copy of the work order issued to the Partis along with copies of all invoices for payment is enclosed as documentary evidence **(Annexure-15A).**

(f) The surface plan of the lease area may be prepared on a scale of 1: 1000 or 1: 2000 with contour interval of maximum of 10 m depending upon the topography and size of the area duly marked by grid lines showing all features indicated under Rule 28(1) (a) of MCDR 1988: Based on the topographical survey of the area, surface plan of the lease area has been prepared on 1:2000 scales with contour interval of 5 m and grid lines at 100 m interval. All surface features as indicated under rule 28(1) of MCDR, 1988 have been marked in the Surface plan **(Plate No - 3).**

(g) For preparation of geological plan, surface plan prepared on a scale of 1: 1000 or 1: 2000 scale specified under para 1.0 (f) of Part A of the format may be taken as the base plan. The details of exploration already carried out along with supporting data for existence of mineral, locations proposed exploration, various litho-units along with structural features, mineralized/ore zone with grade variation if any may be marked on the geological plan along with other features indicated under Rule 28 (1) (b) of MCDR 1988.

Geological plan of the lease area has been prepared on 1:1000 scale taking the surface plan as the base plan. The exploration already carried out, proposed exploration to be undertaken, litho units with structural features, ore zone etc have been marked on the geological plan along with other features indicated under rule 28(1) of MCDR, 1988 **(Plate- 4 & 4A).**

(h) Geological sections prepared on natural scale of geological plan at suitable interval across the lease area from boundary to boundary.

Nine numbers of geological cross sections of the acquired area within the mining lease have been prepared on 1:2000 scales at around 50 m interval from boundary to boundary. Two longitudinal sections have also been prepared in 1 : 2000 scales **(Plate- 5A,5B,5C & 5D).**

(i) Future program of exploration with due justification

Taking into account of the prospect of underground mining in Band VI during the review period, Band I in future and to prove the barrenness of the non mineralized area in between the ore bands, exploration proposal in the mineralized area has been given on a regular grid pattern in the review period for assessing the total reserves/ resources as per UNFC norms **(Plate- 4A).** The following inclined borcholes have been proposed in the lease area at 50-100 m interval during the first two years of review period to convert resources to G1 category and to know the depth ward continuity of ore. Additional bore holes if required are to be decided after getting the results of these bore holes.

Year	No. of boreholes (Core/ RC/ DTH)	Grid interval (m)	Total tentative meterage (m)	No. of Pits, dimensions and volume	No. of Trenches, dimensions and volume
2016-17 (P) & 2017-18	4 (core) in Band-I	50	840 m up to (-) 110 mRL	-	-
	6 (core) in Band-VI	100	2070 m from (+) 50 to (-) 350 mRL	-	-
	4 (core) in non-mineralized zone	50-100	300 m		
2018-19	4 (core) in Band-VI	100	2100 m from (-) 50 to (-) 450 mRL	-	-

Details of proposed bore holes with their bearings/ angle of drilling, anticipated depth with ore body intersection level are tabulated as below and shown in geological Plan (**Plate No. 4**).

Year	Ore band	PBH No.	Bearing/Angle of drilling	Collar mRL	Proposed depth (m)	Ore body intersection level
2016-17 (P) & 2017-18	Band I	PBH-1	137°/ 78°	69	190	(-) 110 mRL
		PBH-2	132°/ 60°	81	210	
		PBH-3	135°/ 60°	97	220	
		PBH-4	114°/ 60°	124	220	
	Sub Total				**840**	
	Non-mineralized zone	PBH-5	109°/ 56°	190	75	50m from SRL.
		PBH-6	109°/ 52°	166	75	
		PBH-7	109°/ 47°	168	75	
		PBH-8	109°/ 50°	172	75	
	Sub Total				**300**	
	Band-VI	PBH-9	160°/ 78°	200	320	(-) 100 mRL
		PBH-10	162°/ 77°	180	300	(-) 100 mRL
		PBH-11	163°/ 76°	200	270	(-)50 mRL
		PBH-12	179°/ 60°	200	180	(+) 50 mRL
		PBH-13	154°/ 84°	180	440	(-) 250 mRL
		PBH-14	126°/ 67°	156	560	(-) 350 mRL
	Sub Total				**2070**	
2018-19	Band-VI	PBH-15	163°/ 75°		460	(-) 200 mRL
		PBH-16	157°/ 81°		600	(-) 350 mRL
		PBH-17	153°/ 86°		660	(-) 450 mRL
		PBH-18	157°/ 82°		380	(-)1 50 mRL
	Sub Total				**2100**	
Total					**5310**	

(j) Reserves and Resources as per UNFC with respect to threshold value notified by IBM (Area explored under different level of exploration may be marked on the geological plan and UNFC code for area considered for different categories of reserve/resources estimation may also be marked on geological cross sections). Feasibility study report along with financial analysis for economic viability of the deposit as specified under the UNFC field guide lines is incorporated.

(j.1) Band – I /Quarry – 1: Re - estimation of Resources/Reserves section wise under UNFC classification was done for Band – I /Quarry – 1 by Transverse / Cross Sectional method and Longitudinal Section method in the last modification of scheme of mining approved on 13.06.2016. The resources/ reserves were estimated as on 01.04.2016 based on 7 numbers of boreholes drilled during 2014-15. The mineral Resources were estimated based on level of

exploration with reference to the threshold value of mineral declared by IBM. The geological resources were re estimated from available top level up to (+) 22 mRL under measured category since the bore holes have intersected ore body up to this level. Resources from (+) 22 mRL up to 0 mRL were kept under indicated and that between 0 to (-) 110 mRL under inferred category based on the data of GSI bore holes drilled in the past which has indicated continuity of ore body at depth.

Mineable Reserves for Band-I were also re estimated from available top level up to (+) 22 mRL under proved category up to the UPL for opencast mining in the same way as that of geological resources category based on the data of bore holes drilled. Calculations have been done by Transverse / Cross Sectional method and Longitudinal Section method. Resources blocked under safety zone and non mineable due to bench formation were not accounted in mineable reserves estimation.

Mining operation in Band-I/ Quarry-1 has not been commenced since last approval of modified scheme of mining due to delay in obtaining environmental clearance for the enhanced production. Therefore the resources/reserves estimated in the last approved modified scheme of mining has been kept same for the present scheme of mining.

(j.2) Band – VI /Quarry – 2: Reserves/resources as on 01.04.2016 were estimated in the last approved modification of scheme of mining by depleting the ore raised from the quarry during the completed period. Measured, Indicated and Inferred mineral resources were estimated up to floor RLs of 100 mRL, 50 mRL and 0 mRL respectively. Since no exploration has been carried out in Band – VI during 2016-17, the resources have been estimated by depleting the ore raised from the quarry during this period.

(j.3) Factors considered

a) Mining method, recovery factors, mining losses etc
b) Cutoff grade, ultimate pit depth proposed
c) Mineral/Ore blocked due to benches, barriers and pillars.

(j.4) Parameters considered

- As per guidelines of IBM threshold value of chrome ore is considered as 10% Cr_2O_3 and calculation of resources and reserves is done for 10-40% and > 40% as mineral reject and ore are considered respectively.
- Calculation of resources and reserves has been made by Transverse Section / Cross Section and Longitudinal Section method. As results by both the estimation are almost similar, cross sectional method of calculation has been considered to arrive at resources and reserves.

- Ore bands are connected to arrive sectional area in sq.m of mineralized zone.
- The sectional area in sq.m of that particular section multiplied with the influence between 2 conjugative sections (half way on either side of a section) the volume of ROM is arrived in CuM.
- To arrive at the quantity (tonnage) of ROM, bulk density/ tonnage factor (TCF) is accounted in ore resources / reserves calculation for ore zone. Bulk density for different types of chrome ore i.e. friable ore (+40% Cr_2O_3 & 10-40% Cr_2O_3) and lumpy ore has been determined by M/S Earth and Environment, a NABL accredited laboratory and the average values are considered for reserve estimation. Copy of the bulk density tests along with NABL accreditation of the Laboratory indicating the discipline are attached as **Annexure-18B**.
- **Approximate bulk density based on time series observation and sample test carried out by NABL laboratory has been assumed, which is indicative in nature for tentative reserve/resource calculation purpose.**

With the above parameters the following formula is adopted

Tonnage	=	SA x d x tcf
Where SA	=	Area of cross section (sq.m.)
D	=	Linear distance (i.e. influence of a particular section in m).
Tonnage factor	=	3.0 (CuM to tonnes) for >40% ore and 2.5 for 10 to 40% MR

(k) Detail calculation of reserves / resources section wise:

(k.1) Reserves & Resources of Band – I/Quarry-1

(i) Geological Resources (Transverse Section / Cross Section & Longitudinal Section) under Measured/Indicated/Inferred Category for Band-I

GEOLOGICAL MEASURED RESOURCES (T - SECTION) UPTO (+) 22mrl (331)						
CROSS SECTION	CS AREA (Sq.m.)	INFLU (m)	VOLUME (CuM)	Ore / MR (Ore >40% and MR 10 to 40% Cr_2O_3) CuM	TCF (Unit)	QUANTITY (Tonnes)
1	2	3	4 (2 x 3)	5	6	7 (4 x 6)
A A'	2532	60	151920	Ore	3.0	455760
B B'	1749	50	87450	Ore	3.0	262350
C C'	1255	50	62750	Ore	3.0	188250
D D'	1000	36	36000	Ore	3.0	108000
Sub Total of Ore			**338120**	**Ore**	**3.0 (Ore)**	**1014360**
E E'	1367	23	31441	MR	2.5	78603
F F'	1403	20	28060	MR	2.5	70150
G G'	1621	25	40525	MR	2.5	101313
H H'	2444	27	65988	MR	2.5	164970
I I'	2193	29	63597	MR	2.5	158993
Sub Total of MR			**229611**	**MR**	**2.5 (MR)**	**574029**
TOTAL of Ore & MR			**567731**	**Ore + MR**	**3.0 (ore); 2.5 (MR)**	**1588389**

GEOLOGICAL INDICATED RESOURCES (T - SECTION) (+) 22 to 0 mRL (332)						
CROSS SECTION	CS AREA (Sq.m.)	INFLU (m)	VOLUME (CuM)	Ore / MR (Ore >40% and MR 10 to 40% Cr_2O_3) CuM	TCF (Unit)	QUANTITY (Tonnes)
1	2	3	4 (2 x 3)	5	6	7 (4 x 6)
A A'	584	60	35040	Ore	3.0	105120
B B'	590	50	29500	Ore	3.0	88500
C C'	645	50	32250	Ore	3.0	96750
D D'	554	36	19944	Ore	3.0	59832
Sub Total of Ore			**116734**	**Ore**	**3.0 (Ore)**	**350202**
E E'	529	23	12167	MR	2.5	30418
F F'	480	20	9600	MR	2.5	24000
G G'	411	25	10275	MR	2.5	25688
H H'	667	27	18009	MR	2.5	45023
I I'	412	29	11948	MR	2.5	29870
Sub Total of MR			**61999**	**MR**	**2.5 (MR)**	**154999**
Total of Ore & MR			**178733**	**Ore + MR**	**3.0 (ore); 2.5 (MR)**	**505201**

GEOLOGICAL INFERRED RESOURCES (T - SECTION) 0 to (-) 110mRL (333)						
CROSS SECTION	CS AREA (Sq.m.)	INFLU (m)	VOLUME (CuM)	Ore / MR (Ore >40% and MR 10 to 40% Cr_2O_3) CuM	TCF (Unit)	QUANTITY (Tonnes)
1	2	3	4 (2 x 3)	5	6	7 (4 x 6)
A A'	3242	60	194520	Ore +MR	3	583560
B B'	3116	50	155800	Ore +MR	3	467400
C C'	3871	50	193550	Ore +MR	3	580650
D D'	2901	36	104436	Ore +MR	3	313308
E E'	2976	23	68448	Ore +MR	3	205344
F F'	2556	20	51120	Ore +MR	3	153360
G G'	2447	25	61175	Ore +MR	3	183525
H H'	4673	27	126171	Ore +MR	3	378513
I I'	2267	29	65743	Ore +MR	3	197229
Total of Ore			**1020963**	**Ore + MR**	**3.0 (ore)**	**3062889**

(ii) Mineable Reserves (Transverse Section / Cross Section wise Calculation) under Proved Category (111)

MINEABLE PROVED RESERVE (T - SECTION) UPTO (+) 22mRL (111)						
CROSS SECTION	CS AREA (Sq.m.)	INFLU (m)	VOLUME (CuM)	Ore / MR (Ore >40% and MR 10 to 40% Cr2O3) CuM	TCF (Unit)	QUANTITY (Tonnes)
1	2	3	4 (2 x 3)	5	6	7 (4 x 6)
D D'	837	36	30132	Ore	3.0	90396
Sub Total of Ore			30132	Ore	3.0	90396
E E'	1367	23	31441	MR	2.5	78603
F F'	1403	20	28060	MR	2.5	70150
G G'	1621	25	40525	MR	2.5	101313
H H'	2444	27	65988	MR	2.5	164970
I I'	1788	29	51852	MR	2.5	129630
Sub Total of MR			217866			544666
TOTAL			247998	Ore + MR	3.0 (ore); 2.5 (MR)	635062

(iii) Geological resources estimated by Longitudinal Section under Measured/Indicated Categories

GEOLOGICAL MEASURED RESOURCES (L – SECTION) UP TO (+) 22mRL (PROVED) (331)						
CROSS SECTION	CS AREA (Sq.m.)	INFLU (m)	VOLUME (CuM)	Ore / MR (Ore >40% and MR 10 to 40% Cr2O3) CuM	TCF (Unit)	QUANTITY (Tonnes)
1	2	3	4 (2 x 3)	5	6	7 (4 x 6)
J J'	10517	21	220857	MR	2.5	552143
Sub Total of MR			220857	MR	2.5 (MR)	552143
K K'	12306	26	319956	Ore	3.0	959868
Sub Total of Ore			319956	Ore	3.0 (Ore)	959868
Total MR & Ore			540813	Ore + MR	3.0 (ore); 2.5 (MR)	1512011
GEOLOGICAL INDICATED RESOURCES (L – SECTION) (+) 22 TO (+) 0 mRL (332)						
CROSS SECTION	CS AREA (Sq.m.)	INFLU (m)	VOLUME (CuM)	Ore / MR (Ore >40% and MR 10 to 40% Cr2O3) CuM	TCF (Unit)	QUANTITY (Tonnes)
1	2	3	4 (2 x 3)	5	6	7 (4 x 6)
J J'	2380	21	49980	MR	2.5	124950
Sub Total of MR			49980	MR	2.5 (MR)	124950
K K'	4030	26	104780	Ore	3.0	314340
Sub Total of Ore			104780	Ore	3.0 (Ore)	314340
Total			154760	Ore + MR	3.0 (ore); 2.5 (MR)	439290

(iv) Mineable Reserves estimated by Longitudinal Section under Proved Category (111)

MINEABLE PROVED RESERVE (L – SECTION) UP TO (+) 22mRL (111)						
CROSS SECTION	CS AREA (Sq.m.)	INFLU (m)	VOLUME (CuM)	Ore / MR (Ore >40% and MR 10 to 40% Cr_2O_3) CuM	TCF (Unit)	QUANTITY (Tonnes)
1	2	3	4 (2 x 3)	5	6	7 (4 x 6)
J J'	10202	21	214242	MR	2.5	535605
Sub Total of MR			214242	MR	2.5	535605
K K'	1080	26	28080	Ore	3	84240
Sub Total of Ore			28080	Ore	3	84240
Total of MR & Ore			242322	Ore + MR	3.0 (ore); 2.5 (MR)	619845

(v) Summary of geological resources by Transverse Section / Cross Section and Longitudinal Section wise Calculation

Section	Category	Volume (CuM)		Quantity (Tonnes)	
		Ore	MR	Ore	MR
T – Section	Geological Measured and Indicated Resources (331 +332)	454854	291610	1364562	729028
L - Section	Geological Measured and Indicated Resources (331+332)	424736	270837	1274208	677093
The above table shows that figures for Geological Measured and Indicated Resources in T – Section and L – Section well matches. Variation is within 6 to 7% Less in L – Section.					

(vi) Summary of Mineable reserves by Transverse Section / Cross Section and Longitudinal Section wise Calculation

Section	Category	Volume (CuM)		Quantity (Tonnes)	
		Ore	MR	Ore	MR
T – Section	Mineable Proved Reserves (111)	30132	217866	90396	544666
L - Section	Mineable Proved Reserves (111)	28080	214242	84240	535605
The above table shows that figures for Mineable Proved and Probable Reserves in T – Section and L – Section well match. Variation is within 2 to 6% Less in L – Section.					

Note

(1) It may not be possible to quantify grade wise reserves, as normally, there is considerable variation in size and grade distribution within the ore zone, which results variable recovery factor and bulk density. This tonnage arrived are tentative.

(2) For Production planning calculation of reserves by Transverse Section / Cross Section has been considered.

(vi) Calculation of Blocked Measured, Indicated Resources in BAND-I by Transverse Section / Cross Sectional Method out of total Measured Resources within 7.5 meter Safety Zone Boundary and non mineable part of resources due to development of benches.

RESOURCES	Volume (CuM)		QUANTITY (Tonnes	
	Ore (>40% Cr2O3)	MR (10 to 40% Cr2O3)	Ore (>40% Cr2O3) TCF – 3.0	MR (10 to 40% Cr2O3) TCF-2.5
Feasibility Mineral Resources (211)	307988	11745	923964	29363
Indicated Mineral Resources (332)	116734	61999	350202	154998
Inferred Mineral Resources (333)	1020963 (+10% Cr_2O_3)		3062889 (+10% Cr_2O_3)	

(k.2) Reserves & Resources of Band – VI/ Quarry-2

(i) The details of depleted resources as on 01.04.2017 are as below:

Lumpy Band - BAND – VI / Quarry – 2 - MINERAL RESOURCES/ RESERVES as on 01.04.2016

RESERVES / RESOURCES	Volume (CuM)		QUANTITY (Tonnes) TCF-3.5	
	Ore (>40% Cr2O3)	MR (10 to 40% Cr2O3)	Ore (>40% Cr2O3)	MR (10 to 40% Cr2O3)
Measured Mineral Resources (331)	242534	159158	848869	557053
Indicated Mineral Resources (332)	156260	144240	546910	504840
Inferred Mineral Resources (333)	156260	144240	546910	504840
Proved Mineral Reserves (111)	110402	37189	386407	130162
Feasibility Mineral Resources (211)	132132	121969	462462	426891

(ii) Reserves depleted from Band – VI / Quarry - 2 during 2016-17

Production in the scheme period		Volume (CuM)		Quantity (tonnes)	
Year	Tonnage factor	Ore	MR	Ore	MR
2016-17 (up to 30.09.2016)	3.5	0	11458.86	0	40,106
2016-17 (proposed up to 31.03.2017)		0	14123.14	0	49,431
Total	3.5	0	25,582.00	0	89,537

(iii) Updated Reserves/ Resources of Band – VI/Quarry - 2 after depletion as on 01.04.2017

RESERVES / RESOURCES	Volume (CuM)		QUANTITY (Tonnes) TCF-3.5	
	Ore (>40% Cr2O3)	MR (10 to 40% Cr2O3)	Ore (>40% Cr2O3)	MR (10 to 40% Cr2O3)
Measured Mineral Resources (331)	242534	143584	848869	467516
Indicated Mineral Resources (332)	156260	144240	546910	504840
Inferred Mineral Resources (333)	156260	144240	546910	504840

Proved Mineral Reserves (111)	110402	21615	386407	40625
Feasibility Mineral Resources (211)	132132	121969	462462	426891

(I) Mineral Reserves / Resources:

(1.1) Summary of the lease area explored as per UNFC norms indicating area covered under different levels is as below and the areas have been shown in geological plan and sections (**Plate Nos- 4 and 5**) . The area covered under different levels of exploration as per UNFC can be tabulated as below:

Item of information	Lease area explored as per UNFC norms (in ha) as on 01.04.2016 Total Lease area = A+B+C+D+E					Remarks/ Comments includi reasons for not carrying out t exploration as per UNFC norm
	G1 Level	G2 Level	G3 Level	Explored & found non-mineralized with level of exploration	Unexplored Lease area	
	A	B	C	D	E	
Lease area as per level of exploration	10.820	2.720	1.470	5.940	68.050	Regional exploration by G and detail geologic exploration by previo lessee M/S TISCO as w present lessee h established only three o bands in the area and maj part of the lease area is four to be non mineralized. T exploration has been carri out as per UNFC norms f estimation of reserv /resources of the chrome o available in the lease are Proposal has been given regular grid pattern f proving the non mineralize area between the ore ban during the review period.
No. of BHs drilled	38	-	-	14	-	
No. of BH considered for present resource estimation	24	-	-	-	-	
Metrage drilled	2673.5	-	-	1078.0		
Grid interval	50	50	-	100		
Scale of mapping	1:2000	1:2000	1:2000			
Reserve estimated after above exploration as on dt. 01.04.2017					1,062,123 tonnes	
Remaining resource after above exploration as on dt. 01.04.2017					7,514,270 tonnes	
Total Reserve / Resources after above exploration as on dt. 01.04.2017					8,576,393 tonnes	

(1.2) Mineral resources: Resources have been estimated based on level of exploration with reference to the threshold value of minerals declared by IBM. In the present case, the threshold value has been considered as 10% Cr_2O_3. The acceptable ore has been considered as +40% Cr_2O_3 while the ore with 10-40% Cr_2O_3 has been considered as mineral rejects and can be beneficiated to get the acceptable grade of ore. The resources based on level of exploration can be summarized below:

Level of exploration	Resources in tonnes			Grade
	Band-I (Qry-1)	Band-VI (Qry-2)	Total	
G1- Detailed exploration	1014360	848869	1863229	(>40% Cr2O3)
	574029	467545	1041574	(10 to 40% Cr2O3)
G2-General exploration	350202	546910	897112	(>40% Cr2O3)
	154999	504840	659839	(10 to 40% Cr2O3)
G3-Prospecting	3062889	546910	3609799	(>40% Cr2O3)
	—	504840	504840	(10 to 40% Cr2O3)
Total	**5,156,479**	**3,419,914**	**8,576,393**	**+10% Cr_2O_3**

(I.3) Reserves within the lease area

Reserves of chromite ore have been arrived after applying the results of feasibility study (**Annexure-19**) and economic evaluation of the deposit based on factors such as:

a) Mining method, recovery factor, mining losses, processing losses etc.
b) Cut off grade, Ultimate pit depth proposed.
c) Mineral/ ore blocked due to benches, barriers, road and other statutory barriers etc.
d) Assessment of IRR & NPV based on present market economics, real time operating cost & other statutory costs.

Based on these, the reserves and resources in the lease area as on 01.04.2017 have been categorized under UNFC code as below:

Classification	UNFC Code	Quantity in Million Tonnes			Grade
		Reserves/ Resources of Band-I (Qry-1)	Reserves/ Resources of Band-VI (Qry-2)	Total Reserves/ Resources	
A Total Mineral Reserves					
Proved Mineral Reserve	111	0.0904	0.3864	0.4768	>40% Cr_2O_3
		0.5447	0.0406	0.5853	10-40% Cr_2O_3
Probable Mineral Reserve	122	—	—	—	—
		—	—	—	—
		0.6351	**0.4270**	**1.0621**	**>10% Cr_2O_3**
B. Total Remaining Resources					
Feasibility Mineral Resource	211	0.9240	0.4625	1.3865	>40% Cr_2O_3
		0.0294	0.4269	0.4563	10-40% Cr_2O_3
Measured Mineral Resources	331	—	—	—	—
Indicated Mineral Resources	332	0.3502	0.5469	0.8971	>40% Cr_2O_3
		0.1550	0.5048	0.6598	10-40% Cr_2O_3
Inferred Mineral Resources	333	—	0.5469	0.5469	>40% Cr_2O_3
		3.0629	0.5048	3.5677	10-40% Cr_2O_3
Reconnaissance Mineral	334	—	—	—	—
Sub Total (B)		**4.5215**	**2.9928**	**7.5143**	**>10% Cr_2O_3**
Total Reserves + Resources		**5.1566**	**3.4198**	**8.5764**	**>10% Cr_2O_3 (Above Threshold value)**

* Tonnage of Chromite ore has been arrived by computing average bulk density of 2.5 and 3.0 for 10-40% Cr2O3 & +40% Cr2O3 ore of Band-I (Qry-1) while the bulk density for the ore (+10% Cr2O3) of Band-VI (Qry-2) has been considered as 3.5. These data are variable and may be established on time series. Thus the tonnages arrived are tentative.

(I.3) Justification of assigning codes under UNFC

(i) **Proved Mineral reserves (111)**

Classification/ UNFC Code	Economic Axis	Feasibility Axis	Geological Axis
Proved Mineral Reserves (111)	E1 (Economic)	F1 (Feasibility Study)	G1 (Detail exploration)
	1. Exploration is detailed. Mining Scheme for 2012-13 to 2016-17 has been approved. 2. Proved Mineral Reserves of 0.6351 million tonnes in Band-I and 0.4270 million tonnes in Band-VI with +10% Cr_2O_3 has been estimated in the mining lease area by detail exploration. 3. After obtaining all statutory clearances, mining in the leasehold area commenced since 28.01.2002.	1. Geology is detailed. Position and availability of surface as well as ground water has been studied (for Band – I and VI). 2. Feasibility Report is attached (for lease area). **(Annexure - 19).** 3. Land use pattern is detailed in the text. 4. There is no proposal for Reclamation & rehabilitation during the review Period. 5 Site services such as office, canteen, rest shelter etc. have been constracted. 6. Provisions under MCR, MCDR and recent Universal format for Mining Plan/Scheme has been followed. 7. Mine is being continued economically & profitably.	1. Geological mapping has been done on 1:1000 scale. 2. Geological plan has been prepared showing topographical and geological features, contacts of ore & number of ore zones, location of exploratory holes, quarry etc. 3. Geological sections have been prepared showing the mine developments and exploratory hole data. 4. Measured Mineral Reserves estimated for the ore proved at depth by drilling and considering 50 m grid density. Influence along strike from the sampling points i.e. exploratory hole up to 22 mRL (Band – I) and 100 mRL for Band – VI. 5. 231 no of core samples analyzed being drawn from 7 (seven) exploratory core bore holes. 27 samples have been analyzed in Government laboratory of the State Government **(Annexure – 18A).**

(ii) Feasibility Mineral Resources (211)

Classification/ UNFC Code	Economic Axis	Feasibility Axis	Geological Axis
Feasibility Mineral Resources (122)	**E1 (Economic)**	**F2 (Feasibility Study)**	**G2 (Detail exploration)**
	1. Exploration is detailed. Mining Scheme for 2012-13 to 2016-17 has been approved. 2. Feasibility resource of 0.9534 million tonnes in Band-I and 0.8894 million tonnes in Band-VI with +10% Cr_2O_3 which are part of measured mineral resource shall be blocked in safety zone and for bench formations and has been found to be presently not mineable. These ores may be economically viable subject to changes in technological, economic, environmental and/or other relevant conditions.	1. Geology is detailed. Position and availability of surface as well as ground water has been studied (for Band – I and VI). 2. Feasibility Report is attached (for lease area). **(Annexure -19).** 3. Land use pattern is detailed in the text. 4. There is no proposal for Reclamation & rehabilitation during the review Period. 5 Site services such as office, canteen, rest shelter etc. have been constructed. 6. Provisions under MCR, MCDR and recent Universal format for Mining Plan/Scheme has been followed. 7. Mine is being continued economically & profitably.	1. Geological mapping has been done on 1:1000 scale. 2. Geological plan has been prepared showing topographical and geological features, contacts of ore & number of ore zones, location of exploratory holes, quarry etc. 3. Geological sections have been prepared showing the mine developments and exploratory hole data.

(iii) Indicated Mineral Resources (332)

Classification/ UNFC Code	Economic Axis	Feasibility Axis	Geological Axis
Indicated Mineral Resources (332)	**E1 (Economic)**	**F1 (Feasibility Study)**	**G1 (Detail exploration)**
	1. The resources are estimated with reasonable level of confidence based on regional exploration of GSI and by extrapolation of drilling data. Mining Scheme for 2012-13 to 2016-17 has been approved. 2. Indicated Mineral Resource of 0.5052 million tonnes in Band-I and 1.0517 million tonnes in Band-VI with +10% Cr_2O_3 has been estimated in the mining lease area by general exploration.	1. Geology is detailed. Position and availability of surface as well as ground water has been studied. Economical feasibility of extraction of ore is not there due to safety & stability of UG operation. 2. Feasibility Report is attached **(Annexure – 19).** 3. Land use pattern is detailed in the text. 4. Provisions under MCR, MCDR and recent Universal format for Mining Plan/Scheme is followed.	1. Geological mapping has been done on 1:1000 scale. 2. Geological plan has been prepared showing topographical and geological features, contacts of ore & number of ore zones, location of exploratory holes, quarry etc. 3. Geological sections have been prepared showing the mine developments and exploratory hole data. 4. Indicated Mineral Resources estimated for the ore by extrapolating the ore body at depth from 22 mRL to 0 mRL for Band-I and from 100 mRL to 50 mRL for Band-VI considering 50 m grid density.

(iv) Inferred Mineral Resources (333)

Classification/ UNFC Code	Economic Axis	Feasibility Axis	Geological Axis
Inferred Mineral Resources (333)	**E1 (Economic)**	**F1 (Feasibility Study)**	**G1 (Detail exploration)**
	1. The resources are estimated with low level of confidence, inferred from geological evidence. Estimation is based on regional exploration of GSI and by extrapolation of drilling data. Mining Scheme for 2012-13 to 2016-17 has been approved. 2. Inferred Mineral Resource of 3.0629 million tonnes in Band-I and 1.0517 million tonnes in Band-VI with +10% Cr2O3 has been estimated in the mining lease area, inferred from geological evidences.	1. Geology is general. Position and availability of surface as well as ground water has been studied. Economical feasibility of extraction of ore is not there due to safety & stability of UG operation. 2. Feasibility Report is attached **(Annexure - 19).** 3. Land use pattern is detailed in the text. 4. Provisions under MCR, MCDR and recent Universal format for Mining Plan/Scheme is followed.	1. Geological mapping has been done on 1:1000 scale. 2. Geological plan has been prepared showing topographical and geological features, contacts of ore & number of ore zones, location of exploratory holes, quarry etc. 3. Geological sections have been prepared showing the mine developments and exploratory hole data. 4. Inferred Mineral Resources estimated for the ore by extrapolating the ore body at depth from 0 mRL to (-) 100 mRL for Band-I and from 50 mRL to 0 mRL for Band-VI considering 50 m grid density.

2.0 MINING

A. Open cast Mining

(a) Existing as well as proposed method of excavation with all design parameters indicating on plans / sections

(i) Existing method for excavation (Band – I / Quarry – 1) and (Band – VI / Quarry – 2)

Band – I (Band – I / Quarry – 1)

During the present scheme period, mining continued during 2012-13 (1st year) and from 2013-14 onwards, it has been discontinued since the floor of the regular open pit (quarry) reached UPL due to constraints of lease boundary. Ore below in dip direction continues. In the last modification of Scheme of mining, it was proposed to develop jointly the eastern boundary of this pit with the neighboring lessee M/S Balasore Alloys Limited and produce around 50477 CuM of ROM ore (10-40% Cr_2O_3) up to 95 mRL with generation of 555344 CuM OB/SB. This however has not been taken up so far due to delay in obtaining environmental clearance for enhancement of production.

Band – VI (Quarry – 2)

The mining in the lease area during the scheme period i.e. 2012-13 to 2016-17 is being carried out by opencast method and fully mechanized means. Drilling and blasting is being carried out to disintegrate the hard ore and associated rock. At present the working bench is at 150 mRL and is in operation in the insitu zone, extending over a maximum working length of 306 m in E /W and 334 m in N/S direction following the southern boundary of the lease with top RL at 300 m in south and bottom RL at 152 m. The quarry has been mined out up to the grid lines bounded by co-ordinates S1453 – S1791 & E1286 – E1688. The dimension of the present quarry is around 379 m long (N-S) and 305 m (E-W) wide.

(ii) Salient features of the existing mining methods are given below

Since inception of mine from 2002, development and ore production from Band – I & VI with deployment of HEMM by opencast method of mining is being carried out strictly as per the approved mining plan, scheme of mining and their modifications from time to time.

Drilling & blasting in order to loosening of the hard rock is performed by 150 mm dia DTH drills associated with compatible size compressors. Non cap sensitive slurry of 83 mm dia cartridge like Nova Prime, Expo Prime, Power Gel-C etc as column charge is adopted. Height and width of benches are kept at around 8 m and 12 m respectively, with overall slope of the quarry proposed at about 30°. Ramps are provided for movement of man & machinery. Individual bench slope is kept at about 80° from horizontal. The required HEMM are in use in the mines for development and ore production from ore band – I & VI (Open Cast mining).

From the mines ore and waste are being transported to their ear-marked sites by 25 t tippers being loaded by 2.1 CuM, 2.45 CuM capacity excavators.

OB/waste is dumped on the selected location in advancing manner. Terraces are provided at every 20 m height with retaining wall, garland drain and check dams at the toe of dump. Overall slope of the dumps are kept at 28°. The ore (+40% Cr_2O_3) and mineral rejects (10-40% Cr_2O_3) are transported to respective stack yards by tippers from where the friable ore of +40% Cr_2O_3 as well as the lumpy ore of 10-40% Cr_2O_3 are dispatched to the Lessee's plant/railway siding by road after proper sorting and quality checks. The friable ore of 10-40% Cr_2O_3 are sent to the COB plant (COBP-1) of the lessee within the leasehold area for beneficiation. The concentrates from COB plant are dispatched to Lessee's captive plant for manufacture of ferro chrome while the tailings from COBP-1 are further processed at COBP-2. The final tailings after drying are stored in the earmarked dumps. Mine Development and production of ore shall be continued from 1st year of proposed review period i.e. 2017-18 to 5th year i.e. 2021-22. The salient features of the existing mining methods are as below:

Sl.No	Particulars	Band-I (Quarry-1)-Discontinued from 2013-14 & proposed to start from 2017-18	Band VI (Quarry-2)
1	Method of Mining	Opencast , category : A-FM.	Opencast , category : A-FM.
2	Type of ore	Friable Chromite ore with intermediate waste and overburden comprising of laterite, silicified chert and ultramafics etc.	Lumpy Chromite ore with intermediate waste and overburden comprising of Quartzite and ultramafics etc.
3	Means of raising	Excavator and dumper combination.	Excavator and dumper combination.
4	Bench height and width	Height of the benches are 8 m each with width 12 m.	Height of the benches are 8 m each with width 12 m.
5	Overall slope angle	< 30°	< 30°
6	Size / co-ordinate / floor mRL	Present Quarry- 410 m x 305 m /190S to 800S- 590E to 1050E, Top 160 mrl & bottom 57 mrl. Back filled area – 280m x 230m/ 558S to 850S-800E to 1120E, Top 130 mrl & bottom 70 mrl.	Present Quarry- 305 m x 379 m / S1453 to S1791 & E1285 to E1688, Top 300 mrl & bottom 150 mrl.
7	Number of ramps	Two (2) ramps in Q-1	Four (4) ramps in Q-2
8	Transportation of ore to stack yard/ COBP plant	By dumper / tipper through haul road at 1 : 16 gradient	By dumper / tipper through haul road at 1 : 16 gradient
9	Nature of overburden/waste	Soft consisting of laterite, silicified chert and ultramafics.	Hard consisting of Quartzite, silicified chert and ultramafics.
10	Blasting proposal	8.8 m holes by wagon drill machine of 150 mm hole dia. Nitrate mixture such as Powergel explosive was used for blasting.	8.8 m holes by wagon drill machine of 150 mm hole dia. Nitrate mixture such as Powergel explosive was used for blasting.

11	Total excavation including OB / SB / IB during completed years of scheme period i.e. 2012-13 to 2016-17(up to 30.09.2016) in CuM.	472269.17 CuM (443613 CuM of OB/IB & around 28656.17 CuM of ROM Ore)	2550867 CuM (2472064 CuM of OB/IB & around 78803 CuM of ROM Ore)
12	ROM (ore and mineral reject) produced during completed years of scheme period i.e. 2012-13 to 2016-17(up to 30.09.2016) in tonnes.	81372.71 tonnes	275808.754 tonnes

Beside the two numbers of quarries, two existing waste dumps i.e. Dump-1 & 2 are there in the leasehold area out of which, Dump-1 is in use presently for waste dumping. There are a number of mineral stack yards, sub grade mineral stacks and concentrate stacks within the lease hold area which are of temporary nature and shall be despatched for beneficiation or end use as and when required. The details of these stacks as on date are as below and shown in surface plan **(Plate-3)**:

Location of stack yard	Quantity stored as on 30.11.2016 (Tonnes)	Grade of material
Mineral stack on D-2	0.930	Lumpy ore (+40% Cr_2O_3)
Mineral stack on D-2	4458.00	Friable ore (+40% Cr_2O_3)
Concentrate yard	11477.40	Concentrate (44-46% Cr_2O_3)
Mineral Reject yard on D-2	3532.00	Lumpy ore (10-40% Cr_2O_3)
Mineral Reject yard on D-2 near Pillar J7.	7601.00	Mineral rejects (10-40% Cr_2O_3)
Mineral Reject yard on D-2 near Pillar J3/b.	43210.00	Mineral rejects (10-40% Cr_2O_3)
Mineral Reject yard on D-2 near Pillar J6/c.	300,000	Mineral rejects & tailings (10-40% Cr_2O_3)

(iii) Proposed method for excavation (Band – I / Quarry – 1) and Band – VI / Quarry – 2)

Band – I (Quarry – 1)

During the review period of 2017-18 to 2021-22, the proposal for development and production from the main quarry (Quarry-1), which was given in the last modification of approved scheme of mining, shall be continued in the safety zone area on a joint development programme with the adjacent mines of M/s Balasore Alloys Limited. The Lessee has discussed and entered in to an MOU with M/s BAL **(Annexure-14)** to excavate the common boundary by joint mining in order to produce the blocked chrome ore under safety zone keeping in view of safe and scientific mining and conservation and utilization of minerals. Both the lessees have already obtained permission from DMS, Bhubaneswar to carry out mining operations within the common boundary by joint mining in order to produce the blocked chrome ore under safety zone and joint waste dumping on waste dump-1 at the common boundary vide letter Nos.BJA/CH-2&12/P-111(3)/2015/1623-24 dt. 25.06.2015 & BJA/CH-2&12/P-111(3)/2015/1699-1700 dt 08.07.2015 **(Annexure-20A & 20B).**

The chromite ore zone has been targeted with a ROM production level of maximum 2,15,000 tonnes during the review period. Method of mining will be opencast under category "A" – Fully mechanized deploying drilling and blasting to loosen the strata and development and production by excavator-tipper combination has been proposed. Mining operation will be continued by both the lessees simultaneously. During the review period, M/s JSL shall depress the quarry upto 22 mRL, the top being at 160 mRL. In the process, 2383313 CuM OB/SB shall be developed during the said period. There will be no IB. Lock Stock Barrel product is MR containing 10 to 40% Cr_2O_3 and +40% Cr_2O_3. The quarry shall be in north-south direction. For the purpose of transportation of ROM, 25 tonne capacity tippers will be deployed. Haul road shall be developed wherever required at a gradient of 1:14.

Total ROM products of ore zone shall directly be transported to ore stack yards situated inside the lease area beyond working limit. The Stack yard – 1 is in between Co-ordinates S270/S138 to E652/E793 over 0.949 Ha, Stack yard – 2 is in between S415/S332 to E392/E482 over 0.508 Ha and Stack yard – 3 is in between S1213/S1071 to E1212/E482 over 1.376 Ha.

Band – VI (Quarry – 2)

During the review period, the development and production of lumpy chrome ore by opencast mining method has been proposed during the first year i.e. 2017-18 when the quarry floor shall reach 122 mRL. Since opencast mining beyond this level is not feasible, the lessee has proposed to undertake a detail feasibility study for underground mining in this quarry and prepare a detail project report for underground mining method. The review of mining plan shall be modified after getting the detail study for underground mining. The Method of opencast working, drilling and blasting, ore handling during 2017-18 shall be continued as of now. Refer para **Band – VI (Quarry – 2) Existing method for excavation** above.

(b) Year-wise tentative Excavation in CuM indicating development, ROM, pit wise for Band – I (Quarry – 1) and Band – VI (Quarry – 2)

I. Insitu Tentative Excavation

(i) Band – I (Quarry – 1) - Joint Mining with M/s BAL

Location	Total Tentative Excavation of ROM + OB/SB/IB (CuM)	Top Soil (CuM)	OB/SB/ IB (CuM)	ROM (CuM)		MR CuM	ROM CuM/ Waste CuM Ratio
				Ore* (>40% Cr2O3)	MR (10 to 40% Cr2O3)		
2017-18	585050	0	545079	—	39971	—	1 : 13.64
2018-19	1339651	0	1253909	—	85742	—	1 : 14.62
2019-20	389684	0	336796	33148	19740	—	1 : 6.37
2020-21	187151	0	149422	8094	29635	—	1 : 3.96
2021-22	125440	0	98107	10816	16517	—	1 : 3.59
Total	**2626976**	**0**	**2383313**	**52058**	**191605**	—	**1 : 9.78**

(ii) Band – VI (Quarry - 2)

Location	Total Tentative Excavation of ROM + OB/SB/IB (CuM)	Top Soil (CuM)	OB/SB/ IB (CuM)	ROM (CuM)		MR CuM	ROM CuM/ Waste CuM Ratio
				Ore* (>40% Cr2O3)	MR (10 to 40% Cr2O3)		
2017-18	486091	0	472234	0	13857	0	1 : 34.08
Total	**486091**	**0**	**472234**	**0**	**13857**	**0**	**1 : 34.08**

(iii) Summary of Year-wise tentative Excavation in CuM indicating development, ROM in the lease area

Location	Total Tentative Excavation of ROM + OB/SB/IB (CuM)	Top Soil (CuM)	OB/SB/ IB (CuM)	ROM (CuM)		MR CuM	ROM CuM/ Waste CuM Ratio
				Ore* (>40% Cr2O3)	MR (10 to 40% Cr2O3)		
2017-18	1071141	0	1017313	—	53828	0	1 : 18.90
2018-19	1339651	0	1253909	—	85742	—	1 : 14.62
2019-20	389684	0	336796	33148	19740	—	1 : 6.37
2020-21	187151	0	149422	8094	29635	—	1 : 3.96
2021-22	125440	0	98107	10816	16517	—	1 : 3.59
Total	**3113067**	**0**	**2855547**	**52058**	**205462**	**0**	**1 : 11.09**

* Tentative tonnage of the ore is arrived by computing approximate bulk density and recovery factor as these data are variable and can be established on time series.

अनुमोदित
APPROVED

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F. S. Acharya
Qualified Person

S. M Patro

(iv) Tentative tonnage of the ore as arrived by computing approximate bulk density and recovery factor based on time series data for the proposed review period 2017-18 to 2021-22 is summarized below. (Band – I/Joint Mining & Band – VI/Quarry – 2 opencast mining)

Year	ROM (CuM)				Tentative Quantity of Ore/ MR from ore zone (Tonnes)				Total Quantity (Tonnes)
	>40% Cr2O3		10 to 40% Cr2O3		>40% Cr2O3		10 to 40% Cr2O3		+40% & 10 to 40% Cr2O3
	C	D	E	F	G	H	I	J	K
	Band – I	Band - VI	Band – I	Band - VI	Band – I (B.D.3.0)	Band – VI (B.D.3.5)	Band – I (B.D.2.5)	Band – VI (B.D.3.5)	Band – I & VI
2017-18	0	0	39971	13857	0	0	99928	48500	148428
2018-19	0	0	85742	0	0	0	214355	0	214355
2019-20	33148	0	19740	0	99444	0	49350	0	148794
2020-21	8094	0	29635	0	24282	0	74088	0	98370
2021-22	10816	0	16517	0	32448	0	41292	0	73740
Total	52058	0	191605	13857	156174	0	479013	48500	683687

It may be noted that the tentative excavation vis-à-vis production of chrome ore from 3rd year onwards i.e. from 2019-20 to 2021-22 has been kept at a lower level due to limited availability of ore by opencast mining. The lessee has already initiated discussion with the neighboring lessee M/S TATA Steel for joint working and exploitation of blocked ore resources in Band I in the western side common boundary. The resources of ROM chrome ore blocked in this western boundary has been estimated to be around 0.9533 million tonnes up to 22 mRL. Besides, the lessee has already initiated the process of detail study for underground mining in both Band I & VI for exploitation of remaining resources of around 6.56 million tonnes occurring at depth. These studies may take around two years time. The excavation vis-à-vis production program shall be reviewed from 2019-20 onwards accordingly and a modification of the review of mining plan shall be submitted.

II. Dump re-handling (for the purpose of recovery of mineral) for Band – I and Band - VI

No proposal given for dump re-handling.

(c) Individual year wise development plans and sections showing pit layouts, dumps, stacks of mineral reject, if any, etc. ('A' category mines). (Band – I, Joint Mining with M/s BAL and Band – VI – regular fully mechanized open cast mining)

Year wise development plans and sections showing pit layouts, dumps, stacks of mineral reject have been prepared in 1 : 1000 Scale. **Refer Plate – 6A to 6E for Band – I and Plate – 6F for Band – VI.**

(d) Brief description on salient features of the proposed method of working indicating category of mine (Band – I, Joint Mining with M/s BAL and Band – VI – regular fully mechanized open cast mining)

(d.i) Band – I (Joint mining)

There is no topsoil with nutrient value in the lease area. Overburden and sideburden (OB/SB), as available shall be excavated separately to expose the ore zone to mine out the ROM. There will be no IB. Lock-stock and barrel the ROM shall be excavated deploying shovels and shall be loaded into the tippers and transported to mineral stacking yard. The materials shall be stacked quantity wise and grade wise for disposal. OB/SB will be transported to OB dump. Other parameters considered for mining activity for Band – I/Quarry – 1 are as follows.

- In joint mining area the top shall be depressed by 138 m (160 mRL to 22 mRL) by the lessee by the end of 2021-22. ROM, OB/SB shall be excavated jointly by M/s JSL and M/s BAL.
- Prior to excavation of the common boundary with M/S BAL, a haul road shall be developed in the western side of Qry-1 along the lease boundary with M/S TISCO from north to south. The RL of the haul road in northern side is 138 mRL while it is planned to extend up to 155 mRL in southern side to approach Dump-1 & Qry-2. Study has already been undertaken for laying of this haul road and shall be implemented during 2017-18 after obtaining necessary permission from the authorities. The proposed haul road has been shown in development plan **(Plate-6A to 6F).**
- 100% of the ore zone in Band – I shall be excavated and the total ROM is MR (10 to 40% Cr_2O_3) and ore (+40% Cr_2O_3) which will be produced by M/s JSL (Joint mining). No interburden (IB) is there which may have to be segregated separately in case of M/s JSL.
- Tentative tonnage of the ore shall be arrived by computing approximate bulk density and recovery factor as these data are variable and may be established on time series. However at present the bulk density (represented as tcf) is considered to be 2.5 for MR (10 to 40% Cr_2O_3) and 3.0 for ore (+40% Cr_2O_3).

The different design parameters of opencast working shall be as below during the review period.

Parameters	Existing Quarry	End of 2017-18	End of 2018-19	End of 2019-20	End of 2020-21	End of 2021-22
TOP mRL	160	160	160	160	160	160
Bottom mRL	57	57	57	42	34	22
Height of bench	8	8	8	8	8	8
Width of bench	12 mt	12 mt	12	12	12	12
Bench slope	75° to 80°	75° to 80°	75° to 80°	75° to 80°	75° to 80°	75° to 80°
No of bench	13	13	13	15	16	18
Overall pit slope	28° to 30°	28° to 30°	28° to 30°	28° to 30°	28° to 30°	28° to 30°
Haul road Gradient	1:16	1:16	1:16	1:16	1:16	1:16
No of ramp	2	1	1	1	1	1
Drain Dimension	1 m x 0.5 m	1 m x 0.5 m	1 m x 0.5 m	1 m x 0.5 m	1 m x 0.5 m	1 m x 0.5 m
Barrier Dimension	1.5 m x 1 m	1.5 m x 1 m	1.5 m x 1 m	1.5 m x 1 m	1.5 m x 1 m	1.5 m x 1 m

(d.2) Band - VI

There is no topsoil with nutrient value in the lease area. Overburden and sideburden (OB/SB), as available shall be excavated separately to expose the ore zone to mine out the ROM. There will be no IB. The ROM ore shall be excavated deploying shovels and shall be loaded into the tippers and transported to mineral stack yard. The materials shall be stacked quantity wise grade wise for disposal. OB/SB will be transported to OB dump. Other parameters to be considered for mining activity shall be as follows.

- Presently the deepest quarry floor is at 150 mRL and the top RL is at 300m. Regular opencast mining are shall be continued upto 122 mRL during the review period. Beside ROM, OB shall have to be excavated.
- 100% of the ore zone shall be excavated and the total ROM is MR (+10% Cr_2O_3). No interburden (IB) is there which may have to be segregated separately.
- Since the mining will be done by formation of regular benches and leaving the safety zone area, 100% geological resources cannot be recovered. There will be locked up ROM under the benches and safety zone area.
- Tentative tonnage of the ore shall be arrived by computing approximate bulk density and recovery factor as these data are variable and may be established on time series. However at present 3.5 as bulk density (represented as tcf) has been considered for the ore.

The different design parameters of opencast working shall be as below during the scheme period.

Parameters	Existing Quarry	End of 2017-18
TOP mRL	302	302
Bottom mRL	150	122
Working levels mRL	288 to 150	197 to 122
Height of bench	9 m	9 m
Width of bench	12mt above	12mt above
Bench slope	75° to 80°	75° to 80°
No of bench	17	20
Overall pit slope	**28° to 30°**	**28° to 30°**
Haul road Gradient	**1:16**	**1:16**
No of ramp	**4**	**4**
Drain Dimension	**1 m x 0.5 m**	**1 m x 0.5 m**
Barrier Dimension	**1.5 m x 1 m**	**1.5 m x 1 m**

(d.3) Slope stability study of both the Quarries

Considering the steep nature of the pit design, the lessee had carried out a bench slope stability study of both the friable and lumpy mines (Qry-1 &2) for safe and scientific mining through Central Mining Research Institute (CMRI). The study has recommended the following slope angles for both the quarries. (Study report with details of its recommendations is attached as **Annexure- 21A)**

- In Qry-1, the 83 m high southern and northern slopes (top at 140 mRL & bottom at 57 mRL) can have 38° overall slope angle.
- In Qry-2, the 160m high southern slope with pit bottom at 120 mRL and 65m high northern slope of the open pit may have an overall slope angle of 44° and 53° respectively.
- In case the working is exclusively limited to top weathered material in the southern slope of Qry-2, the mining should be done with the norms of friable ore quarry i.e. 38° overall slope angle.
- For safe and scientific mining, well developed drainage system with effective toe drains, pre split blasting (wherever applicable) of ultimate slope and slope monitoring system on a long term basis was recommended.

The lessee during the mining operation since last 10 years has maintained a slope angel of <30° with bench height and width kept at around 8m and 14m respectively. Regular monitoring of bench slopes by mapping of weak zones, faults, bedding planes etc is being carried out by the departmental geologist. Effective garland drains all around the existing pits and bench slopes to collect surface run off has been made and shall be regularly maintained to avoid any slope failure during mining operation. The bottom RLs of Qry-1 & Qry-2 are presently at 57 mRL & 150 mRL respectively and are planned to be worked at 22 mRL and 122 mRLs during the review period with bench slopes maintained at around 35° in Qry-1 and 30° in Qry-2. Though no slope failures have been reported so far during mining operation, the lessee shall take all precautions as advised in the CMRI report during the mining operation and shall arrange to

evaluate the geo-mining condition with the help CMRI during this scheme period for safe and economical mining.

(d.4) Extent of mechanization (Band – I / (Joint Mining) and Band – VI/Quarry - 2)

(i) Dozing

One dozer of 275 HP is now utilized in the mines for construction, leveling and compaction of haul road and waste dump. The same shall be continued in the review period in Band – I (Joint Mining) and Band – VI.

(ii) Drilling

Drilling of the blast holes is proposed to be done by Pneumatic DTH drill of 150mm dia holes in the chrome ore zone. Height of the bench is proposed to be kept at 8m in Qry-1 and 9m in Qry-2. The specifications of the DTH drill with compressor are as follows:

Drilling parameters

Parameters		Qry-1	Qry-2
Diameter of blast hole drill	:	150 mm	150 mm
Height of the bench	:	8 m	9 m
Additional drilling required (sub grade) (A)	:	0.8 m	0.9 m
Length of the hole (H + A)	:	8.8 m	9.9 m
Burden (B)	:	3.0 m	3.0 m
Spacing (S)	:	3.5 m	3.5 m
Volume of earth to be broken/loosen per hole	:	B x S x H=3.0 x 3.5 m x 8.8 m = 92.4 or 93 CuM	B x S x H=3.0 x 3.5 m x 9.9 m = 103.95 or 104 CuM

Meterage of drilling per drill for primary blasting in ore zone (Band – I & VI)			
Description		Band – I (Joint Mining) Qry-1	Band – VI Qry-2
Maximum volume of material in insitu zone including overburden during the review period (ROM & OB in CuM)	:	1339651 CuM	486091 CuM
Volume to be loosened through drilling & blasting (30% of the total excavation for Band – I and 70% for Band - VI)	:	401895.3 CuM	340263.7 CuM
Number of holes to be drilled	:	401895 ÷ 93 = 4321 numbers	340264 ÷ 104 = 3272 numbers
Number of holes to be drilled per day of 300 working days in a year	:	4321 ÷ 300 = 14.40 or 14 numbers	3272 ÷ 300 = 10.91 or 11 numbers
Total meterage of drilling per day (length of blast hole = 6.6 m)	:	14 x 8.8 = 123.2 m	11 x 9.9 = 108.9 m

Requirement of drills with inbuilt compressors			
Speed of the DTH drill	:	7 m / hr	7 m / hr
Effective drilling hr / Two shift (8 hrs shift of which effective working hrs = 7 hrs / shift)	:	14 hrs	14 hrs
Meterage of drilling to be effected / day	:	7 x 14 = 98 m	7 x 14 = 98 m
Number of drills required	:	123.2 ÷ 98 = 1.26 or 2 Nos.	108.9 ÷ 98 = 1.11 or 1 No.
Stand by drill to overcome break down		1 number	1 number

(iii) Blasting Practice

A scientific study on ground and air vibration due to blasting has been carried out by the lessee through ISM, Dhanbad by adopting different trial blastings. The study suggests to follow certain norms to control the ground vibration in the mine. These norms are being followed by the lessee during the blasting operations and shall be continued during scheme period.

As per the study report's recommendation, the suggested maximum charge per delay & per round is as below.

Suggested maximum charge per delay and per round in Jindal Chromite Mines of JSL.

Distance (m)	Maximum charge per delay-W (kg)		Total charge per round TW(kg)	
	Allowable PPV(10)	Allowable PPV(15)	Allowable PPV(10)	Allowable PPV(15)
10	0.1	0.2	0.6	1.16
20	0.3	0.9	2.3	4.65
30	0.8	2.0	5.2	10.46
50	2.2	5.6	14.5	29.07
75	4.9	12.7	32.6	65.40
100	8.7	22.5	57.9	116.27
150	19.5	50.7	130.3	261.60
200	34.7	90.2	231.6	465.06
300	78.2	202.9	521.0	1046.40
400	139.0	360.7	926.3	1860.26
500	217.1	563.7	1447.3	2906.66

As observed from the study report, the working quarry of Jindal Chromite Mines is situated beyond 500 mtr distance either from the lessee's plant or any dwellings. So considering 500 mtr distance & allowable PPV(15), maximum charge per delay can be 563.7 kg & total charge per round will be 2906.66 Kg.

Different drilling and blasting patterns are given in the Appendix II of Annexure-21B. The proposed blasting pattern with Nonel Initiation System & detonating fuse initiation system are at Pg.29/30 of **Annexure – 21B** and is attached.

Staggered and rectangular pattern of drilling and row to row sequence with the help of ordinary /electric delay detonators will be adopted for the blasting purpose. During blasting of multi-rows or more numbers of holes in a single row, provision of delay detonator, Cord Relay and NONEL/RAYDET shall be utilized in order to control ground vibration. Further as per Ground Vibration study report made by ISM, Dhanbad the following parameters are to be adopted.

Important information related to drilling & blasting.

Hole diameter	:	163 mm
Explosive & Primer	:	Cartridge type (Aquadyne),Expo prime, Nova Prime, Power Gel-C etc.
Size of explosive cartridge	:	83mm x 450mm (2.78kg)
Hole depth	:	8m to 10 m(including 10% sub grade drilling of depth)
Stemming length	:	2.85-3.75m
Burden & Spacing	:	Burden 2.0 to 3.0 m & spacing 2.5 to 3.5m and some cases considering the strata condition, 1:1 ratio can be maintained.
Drilling pattern	:	Rectangular
Initiation system	:	Non electric initiation with DF ,Cord relay with RD and NONEL and Electric dealy detonator of different sequence
Powder factor	:	9 t/ Kg

Secondary blasting

Secondary blasting is not proposed. The big size boulders will be fragmented with the help of rock breaker.

Type of explosive and detonator to be used

Nitrate mixture such as Power gel explosive will be used for blasting. Electric detonator and Nonel system will be used for initiation / ignition. The use of Nonel system of initiation will have the following advantages :

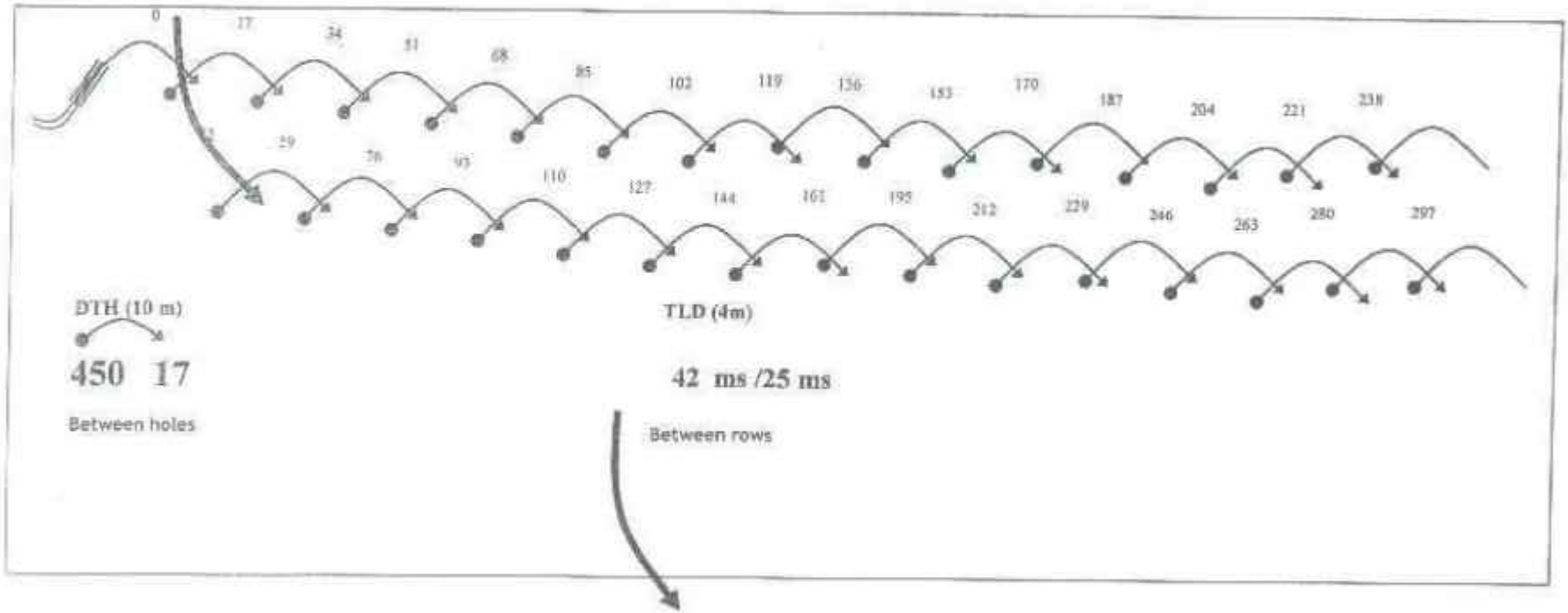
- ✓ High blasting efficiency
- ✓ Minimize ground vibration
- ✓ Control fly rocks
- ✓ Better fragmentation
- ✓ Safe to handle

Storage and transportation of explosives

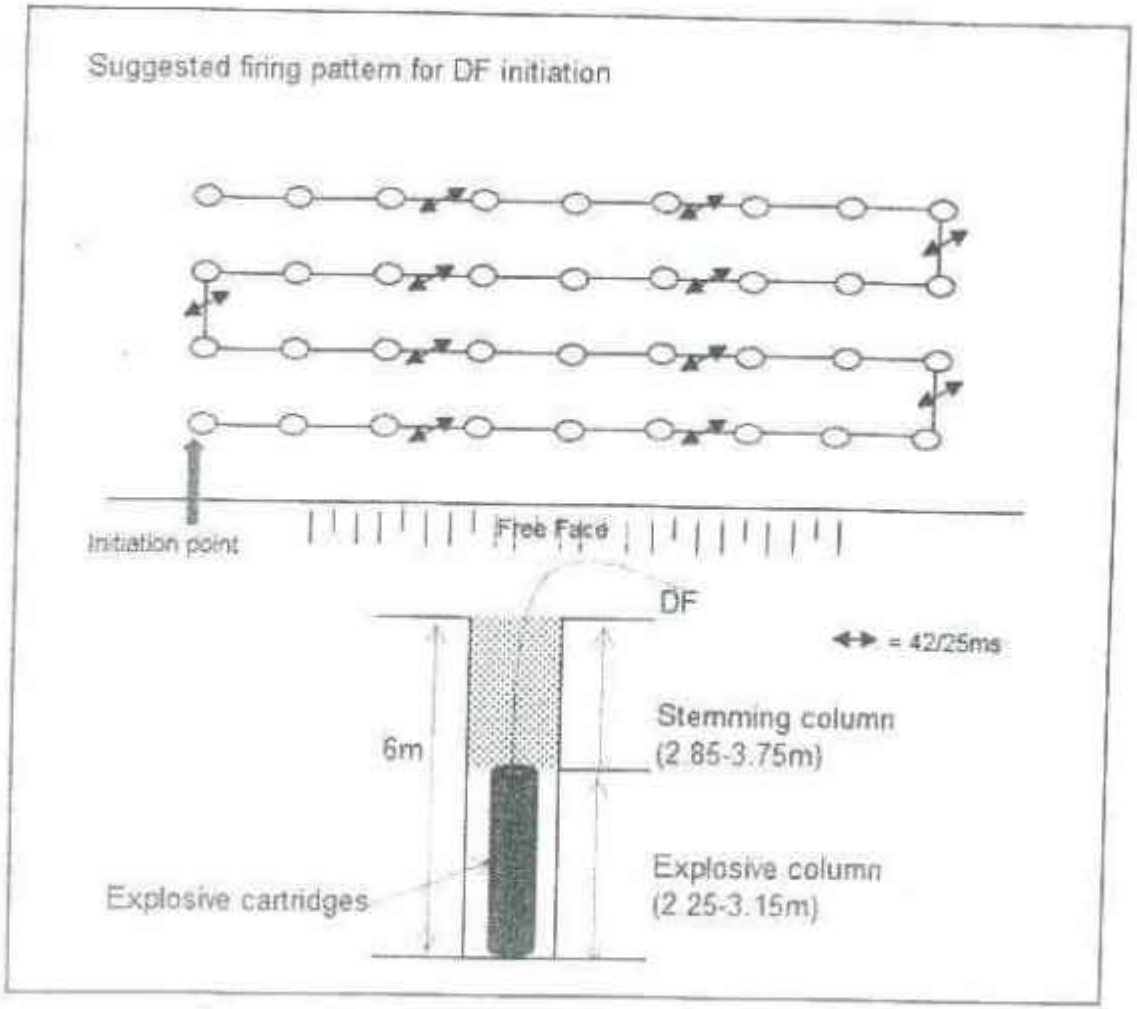
An approved and licensed magazine has already been established in the lease area. The licensed

SUGGESTED BLAST PATTERN

NONEL initiation systems: with bottom hole initiation



Blast Pattern with Detonating Fuse for initiation



capacity of the magazine is as below.

Particulars	Capacity
Nitrate mixture	300 Kg
Safety Fuse	500 m
Detonating Fuse	2500 m
Electronic & ordinary Detonator	2500 nos.
Cast Booster	100 Kgs

(iv) Excavations and Loading

ROM ore and waste will be excavated by 2.45 CuM capacity excavators. The detailed calculations are as follows:

Specification of excavators		
Bucket capacity (C)	:	2.45 CuM
Bucket fill factor (F)	:	0.9
Time cycle pass at 90° swing (T)	:	32 sec
Swell factor (S)	:	0.8
Production efficiency factor (e)	:	0.7
Job management factor (f)	:	0.9
Time scheduling		
Working days per year	:	300 days
Number of working shifts per day	:	2 shifts
Working hours per shift	:	8hrs
Effective working hours per shift	:	6 hrs
Effective working hours per tow shift	:	12 hrs
Seconds in hour	:	3600 sec
Output/2.1 CuM shovel/annum	:	[C x F x S x e x f x 3600 x 12 x 300] – T = [2.45 x 0.9 x 0.8 x 0.7 x 0.9 x 3600 x 12 x 300] ÷ 32 = 450084.6 or 450085 CuM in 2 shifts.

Number of excavators required			
		Band – I (Joint Mining)	**Band – VI**
Maximum excavation during review period	:	1339651 CuM	486091 CuM
Total excavation by one 2.45 CuM shovel per annum	:	450085 CuM	450085 CuM
Requirement of shovel	:	1339651 ÷ 450085 = 2.97 or 3 numbers	486091 ÷450085= 1.07 or 2 numbers
Stand by excavator required	:	1 number	1 number

(v) Transportation

Overburden shall be generated during the proposed review period for ore production. Calculation of Tippers for transportation of ore and overburden to their respective sites are based on 1.5 km hauling distance from either of the quarries within the leasehold area.

Loading time

Capacity of the Tipper (25 tonnes)	=	9 CuM loose materials
Rate of production of 2.45 CuM shovel per day	=	450085 CuM ÷ 300 = 1500.28 or 1500 CuM
Number of passes required for one tipper attached to 2.45 cu.m shovel	=	Tipper capacity ÷ [C x F x S] = 9 ÷ [2.45 x 0.9 x 0.8] = 5.1 or 5 passes
Hauling time for waste dump yard and ore stack yard	=	Average haul length to be covered by the loaded Tipper (1.5 km) ÷ Average speed of Tipper (15 kmph) = 6 min
Return time	=	Average speed of Tipper (empty) to be covered by empty Tipper (1.5 km) ÷ Average speed of Tipper (25 kmph) = 3.6 or 4 min
Tipper cycle time (waste dump yard and ore stack yard) = Loading time + hauling time + unloading time + return time + spotting time and waiting time	=	6 + 6 + 2 + 4 + 3 = 21
Working time per Tipper per day	=	12 hrs
Number of trips per Tipper per day	=	(12 x 60) ÷ 21 = 34.28 or 34
Volume per day per Tipper	=	34 x 9 = 306 CuM
Tipper requirement (attached to 2.45 CuM shovel)	=	1500 ÷ 306 = 4.9 or 5

		Band – I (Joint Mining)	Band VI
Requirement of Tippers			
2.45 CuM shovel requires	=	3 x 5 = 15 numbers of 25 tonne tippers	2 x 5 = 10 numbers of 25 tonne tippers
Stand by tipper (25 tonne) to overcome break down	=	1 number	1 number

(d.5) List of machinery proposed in the review period

Machinery	Band – I (Joint Mining)	Band VI
Drill (150 mm dia) with in built compressor (number/s)	3	2
Excavator (2.45 CuM) number/s	5	3
Tipper (25 tonner) number/s	16	11
Dozer (275 HP) number/s	1	Same dozer can be utilized
Water tanker (20 KL/12 KL) number/s	3	Same tanker can be utilized
Jeep (Scorpio or similar) number/s	4	Same jeeps can be utilized

The lessee intends to utilize higher capacity excavators/ dumpers as and when required for better efficiency of mine working.

(e) Layout of mine workings, pit road layout, layout of faces and sites for disposal of OB/ waste along with ground preparation prior to disposal of waste, rejects etc for Band – I and Band - VI.

Band – I (Joint Mining)

Regular opencast mining has been stopped at present. Opencast fully mechanized (category 'A') mining shall be adopted in slice cutting method for recovering ROM from the safety zone area up to 22 mRL during review period in Band – I under joint mining in the western boundary of the lease with M/s BAL.

Band – VI

Open cast fully mechanized (category 'A') system of mining is in practice to mine the ROM adopting a system of bench formation with deep hole blasting keeping in mind the quality, cost, safety and conservation of mineral for Band - VI. No change in present method of mining has been envisaged during the proposed review period. Deployment of machinery for development and production from the quarries are calculated in previous para. Details of mining operation are as below.

(e.1) Mine Details

Band – I (Joint Mining)

150 mm dia meter holes are drilled by operating the Hydraulic drills. The year wise layout of mine workings with other details is tabulated below with quarries extension, pit road, important installations and development / excavation and production of ROM in para 2.5.1.

Band - VI

150 mm dia meter holes are drilled by operating the Hydraulic drills. The year wise layout of mine workings with other details is tabulated below with quarries extension, pit road, important installations and development / excavation and production of ROM in para 2.5.2.

(e.1.1) Mine Development & ore production during proposed review period - 2017-18 to 2021-22 from Band – I

(A) Year – 2017 – 18 (Band – I) (Joint Mining) (Plate-6A)

Sl No	Description	2017-18
1	Co-ordinate	S200/S585 to E600/E1055
2	RL of quarry floor at the end of the year (mRL)	98 mRL (Joint mining)
3	Sections considered to be worked	AA' to II' (Serially)
4	No. of benches to be worked during the year	8
5	Bench levels to be worked (mRL)	160-154,154-146,146-138,138-130,130-122,122-114,114-106,106-98
6	Average thickness of excavation in diff. sections	9.8 m
7	Area of excavation (Ha)	3.774
8	Direction of advance at the end of year	West to East
9	Height of benches (m)	8 m
10	Width of the benches (m)	11.3 m
11	Overall slope of the pit	$<35^0$
12	Ramps connecting from bench to bench	One
Mine Development		
13	OB /SB Excavation as waste (<10% Cr_2O_3)	545079 CuM
ROM Excavation		
14	>40% Cr_2O_3 (Ore)	0
15	10 to 40% Cr_2O_3 (Mineral Reject) (MR)	39971 CuM
waste occurring from ore zone while mining		
16	<10% Cr_2O_3 (Inter burden) (IB)	0

Detailed Section Wise calculation of OB Development in 2017-18			
Cross Section	Area (Sq. m.)	Influence (m)	Volume (CuM)
1	2	3	4 (2 x 3)
A A'	238	52	12376
B B'	400	50	20000
C C'	401	50	20050
D D'	434	38	16492
E E'	412	24	9888
F F'	310	20	6200
G G'	2283	25	57075
H H'	6023	26	156598
I I'	8800	28	246400
Total			545079

Detailed Section Wise calculation of Excavation of Ore Zone with ROM (Ore + MR) and IB in 2017-18							
Cross Section	Area sq.m.	Influence (m)	Total Volume of Excavation (CuM) from ore zone	Volume of ore (>40% Cr_2O_3) CuM from the ore zone	Volume of MR (10 to40% Cr_2O_3) CuM from the ore zone	Volume of IB/Reject CuM from the ore zone	Tentative Quantity of Ore/MR (1:1.5 for Ore &2.5 for MR)
A	B	C	D	E	F	G	H
G G'	147	25	3675	0	3675	0	9188
H H'	500	26	13000	0	13000	0	32500
I I'	832	28	23296	0	23296	0	58240
Total			39971	0	39971	0	99928

(B) Year – 2018 – 19 (Band – I) (Joint Mining) (Plate 6B)

Sl No	Description	2018-19
1	Co-ordinate	S180/S585 to E538/E1058
2	RL of quarry floor at the end of the year (mRL)	58 mRL (Joint mining)
3	Sections considered to be worked	AA' to II' (Serially)
4	No. of benches to be worked during the year	5
5	Bench levels to be worked (mRL)	98-90,90-82,82-74,74-66,66-58
6	Average thickness of excavation in diff. sections	23
7	Area of excavation (Ha)	9.696
8	Direction of advance at the end of year	West to East
9	Height of benches (m)	8 m
10	Width of the benches (m)	11.3 m
11	Overall slope of the pit	$<35^0$
12	Ramps connecting from bench to bench	One
Mine Development		
13	OB /SB Excavation as waste (<10% Cr_2O_3)	1253909 CuM
ROM Excavation		
14	>40% Cr_2O_3 (Ore)	0
15	10 to 40% Cr_2O_3 (Mineral Reject) (MR)	85742 CuM
waste occurring from ore zone while mining		
16	<10% Cr_2O_3 (Inter burden) (IB)	0

Detailed Section Wise calculation of OB Development in 2018-19			
Cross Section	Area (Sq. m.)	Influence (m)	Volume (CuM)
1	2	3	4 (2 x 3)
A A'	2373	52	123396
B B'	1756	50	87800
C C'	974	50	48700
D D'	1553	38	59014
E E'	3731	24	89544
F F'	7068	20	141360
G G'	8105	25	202625
H H'	8559	26	222534
I I'	9962	28	278936
Total			1253909

Detailed Section Wise calculation of Excavation of Ore Zone with ROM (Ore + MR) and IB in 2018-19							
Cross Section	Area sq.m.	Influence (m)	Total Volume of Excavation (CuM) from ore zone	Volume of ore (>40% Cr2O3) CuM from the ore zone	Volume of MR (10 to40% Cr2O3) CuM from the ore zone	Volume of IB/Reject CuM from the ore zone	Tentative Quality of Ore/MR (TCF 3. for Ore & 2.5 fo MR)
A	B	C	D	E	F	G	H
F F'	512	20	10240	0	10240	0	25600
G G'	992	25	24800	0	24800	0	62000
H H'	1109	26	28834	0	28834	0	72085
I I'	781	28	21868	0	21868	0	54670
Total			85742	0	85742	0	214355

(C) Year – 2019 – 20 (Band – I) (Joint Mining) Plate-6C)

Sl No	Description	2019-20
1	Co-ordinate	S180/S585 to E538/E1058
2	RL of quarry floor at the end of the year (mRL)	50 mRL (Joint mining) & 42mRL ramp
3	Sections considered to be worked	CC' to II' (Serially)
4	No. of benches to be worked during the year	5
5	Bench levels to be worked (mRL)	82-74,74-66,66-58,58-50,50-42
6	Average thickness of excavation in diff. sections	22
7	Area of excavation (Ha)	9.696
8	Direction of advance at the end of year	West to East
9	Height of benches (m)	8 m
10	Width of the benches (m)	11.3 m
11	Overall slope of the pit	$<35^0$
12	Ramps connecting from bench to bench	One
Mine Development		
13	OB /SB Excavation as waste (<10% Cr2O3)	336796 CuM
ROM Excavation		
14	>40% Cr2O3 (Ore)	33148 CuM
15	10 to 40% Cr2O3 (Mineral Reject) (MR)	19740 CuM
waste occurring from ore zone while mining		
16	<10% Cr2O3 (Inter burden) (IB)	0

Detailed Section Wise calculation of OB Development in 2019-20			
Cross Section	Area (Sq. m.)	Influence (m)	Volume (CuM)
1	2	3	4 (2 x 3)
C C'	717	50	35850
D D'	1448	38	55024
E E'	1645	24	39480
F F'	2195	20	43900
G G'	1944	25	48600
H H'	2067	26	53742
I I'	2150	28	60200
Total			336796

Detailed Section Wise calculation of Excavation of Ore Zone with ROM (Ore + MR) and IB in 2019-20							
Cross Section	Area sq.m.	Influence (m)	Total Volume of Excavation (CuM) from ore zone	Volume of ore (>40% Cr_2O_3) CuM from the ore zone	Volume of MR (10 to40% Cr_2O_3) CuM from the ore zone	Volume of IB/Reject CuM from the ore zone	Tentative Quantity of Ore/MR (TCF 3.0 for Ore & 2.5 for MR)
A	B	C	D	E	F	G	H
C C'	271	50	13550	13550	0	0	40650
D D'	385	38	14630	14630	0	0	43890
E E'	216	23	4968	4968	0	0	14904
F F'	186	20	3720	0	3720	0	9300
G G'	156	25	3900	0	3900	0	9750
H H'	296	26	7696	0	7696	0	19240
I I'	158	28	4424	0	4424	0	11060
Total			52888	33148	19740	0	148794

(D) Year – 2020 – 21 (Band – I) (Joint Mining) (Plate 6D)

Sl No	Description	2020-21
1	Co-ordinate	S180/S585 to E538/E1058
2	RL of quarry floor at the end of the year (mRL)	34 mRL (Joint mining)
3	Sections considered to be worked	DD' to II' (Serially)
4	No. of benches to be worked during the year	2
5	Bench levels to be worked (mRL)	50-42, 42-34
6	Average thickness of excavation in diff. sections	9.75
7	Area of excavation (Ha)	9.696
8	Direction of advance at the end of year	West to East
9	Height of benches (m)	8 m
10	Width of the benches (m)	11.3 m
11	Overall slope of the pit	$<35^0$
12	Ramps connecting from bench to bench	One
Mine Development		
13	OB /SB Excavation as waste (<10% Cr_2O_3)	149422 CuM
ROM Excavation		
14	>40% Cr_2O_3 (Ore)	8094 CuM
15	10 to 40% Cr_2O_3 (Mineral Reject) (MR)	29635 CuM
waste occurring from ore zone while mining		
116	<10% Cr_2O_3 (Inter burden) (IB)	0

Detailed Section Wise calculation of OB Development in 2020-21			
Cross Section	Area (Sq. m.)	Influence (m)	Volume (CuM)
1	2	3	4 (2 x 3)
D D'	702	38	26676
E E'	1522	24	36528
F F'	964	20	19280
G G'	980	25	24500
H H'	971	26	25246
I I'	614	28	17192
Total			149422

Detailed Section Wise calculation of Excavation of Ore Zone with ROM (Ore + MR) and IB in 2020-21							
Cross Section	Area sq.m.	Influence (m)	Total Volume of Excavation (CuM) from ore zone	Volume of ore (>40% Cr2O3) CuM from the ore zone	Volume of MR (10 to40% Cr2O3) CuM from the ore zone	Volume of IB/Reject CuM from the ore zone	Tentative Quantity of Ore/MR (TCF 3. for Ore & 2.5 fo MR)
A	B	C	D	E	F	G	H
D D'	213	38	8094	8094	0	0	24282
E E'	433	23	9959	0	9959	0	24898
F F'	185	20	3700	0	3700	0	9250
G G'	150	25	3750	0	3750	0	9375
H H'	299	26	7774	0	7774	0	19435
I I'	159	28	4452	0	4452	0	11130
Total			37729	8094	29635	0	98370

(E) Year – 2021 – 22 (Band – I) (Joint Mining) (Plate 6E)

Sl No	Description	2021-22
1	Co-ordinate	S180/S585 to E538/E1058
2	RL of quarry floor at the end of the year (mRL)	22 mRL (Joint mining)
3	Sections considered to be worked	DD' to II' (Serially)
4	No. of benches to be worked during the year	3
5	Bench levels to be worked (mRL)	42-34,34-26,26-22
6	Average thickness of excavation in diff. sections	9.90
7	Area of excavation (Ha)	9.696
8	Direction of advance at the end of year	East to West
9	Height of benches (m)	8 m
10	Width of the benches (m)	11.3 m
11	Overall slope of the pit	$<35^0$
12	Ramps connecting from bench to bench	One
Mine Development		
13	OB /SB Excavation as waste (<10% Cr2O3)	98107 CuM
ROM Excavation		
14	>40% Cr2O3 (Ore)	10816 CuM
15	10 to 40% Cr2O3 (Mineral Reject) (MR)	16517 CuM
waste occurring from ore zone while mining		
16	<10% Cr2O3 (Inter burden) (IB)	0

Detailed Section Wise calculation of OB Development in 2021-22			
Cross Section	Area (Sq. m.)	Influence (m)	Volume (CuM)
1	2	3	4 (2 x 3)
D D'	380	38	14440
E E'	598	24	14352
F F'	1324	20	26480
G G'	1053	25	26325
H H'	299	26	7774
I I'	312	28	8736
Total			98107

Detailed Section Wise calculation of Excavation of Ore Zone with ROM (Ore + MR) and IB in 2021-22.							
Cross Section	Area sq.m.	Influence (m)	Total Volume of Excavation (CuM) from ore zone	Volume of ore (>40% Cr2O3) CuM from the ore zone	Volume of MR (10 to40% Cr2O3) CuM from the ore zone	Volume of IB/Reject CuM from the ore zone	Tentative Quantity of Ore/MR (TCL) for Ore & MR
A	B	C	D	E	F	G	H
D D'	212	38	8056	8056	0	0	24168
E E'	120	23	2760	2760	0	0	8280
F F'	201	20	4020	0	4020	0	10050
G G'	153	25	3825	0	3825	0	9562
H H'	228	26	5928	0	5928	0	14820
I I'	98	28	2744	0	2744	0	6860
Total			27333	10816	16517	0	73740

(e.1.2) Mine Development & ore production during proposed review period - 2017-18 from Band – VI (Plate 6F)

Sl No	Description	2017-18
1	Co-ordinate	S1328/S1617 to E1271/E1584
2	Top of the quarry	300 mRL
3	Existing bottom of the quarry as on 31.03.2017	144 mRL
4	RL of quarry floor at the end of the year (mRL)	122 mRL
5	Height of the quarry	178 m
6	Sections considered to be worked	BB' to II' (Serially)
7	No. of benches to be worked during the year	11
8	Bench levels to be worked (mRL)	220-210,210-198,198-189,189-179,179-170,170-161,161-152,152-143,143-134,134-125,125-122
9	Average thickness of excavation in diff. sections	16.5
10	Area of excavation (Ha)	5.79
11	Direction of advance at the end of year	South to North
12	Height of benches (m)	9 m
13	Width of the benches (m)	13 m
14	Overall slope of the pit	<39^0
15	Individual bench slope	85^0
16	Ramps connecting from bench to bench	4 numbers
17	Gradient of pit road and ramp	1 in 16
18	Barrier along pit road	752m long x 1.0 m wide x 0.8 m high
19	Dimension of the drain along mine road	376m long x 0.5 m wide x 0.5 m high
Mine Development		
20	OB /SB Excavation as waste (<10% Cr_2O_3)	472234 CuM
ROM Excavation		
21	>40% Cr_2O_3 (Ore)	0
22	10 to 40% Cr_2O_3 (Mineral Reject) (MR)	13857 CuM
waste occurring from ore zone while mining		
23	<10% Cr_2O_3 (Inter burden) (IB)	0

Detailed Section Wise calculation of OB Development in 2017-18			
Cross Section	Area (Sq. m.)	Influence (m)	Volume (CuM)
1	2	3	4 (2 x 3)
B B'	926	45	41670
C C'	2567	50	128350
D D'	2267	38	86146
E E'	1971	24	47304
F F'	2709	20	54180
G G'	2346	25	58650
H H'	1307	26	33982
I I'	784	28	21952
Total			472234

Detailed Section Wise calculation of Excavation of Ore Zone with ROM (Ore + MR) and IB in 2017-18							
Cross Section	Area (sq. m.)	Influence (m)	Total Volume of Excavation (CuM) from ore zone	Volume of ore (>40% Cr2O3) CuM from the ore zone	Volume of MR (10 to40% Cr2O3) CuM from the ore zone	Volume of IB/Reject CuM from the ore zone	Tentative Quantity of MR (10 to 40% Cr2O3) from ore zone
A	B	C	D	E	F	G	H
C C'	192	50	9600	0	9600	0	33600
D D'	76	38	2888	0	2888	0	10108
E E'	23	23	529	0	529	0	1852
F F'	56	15	840	0	840	0	2940
Total			13857	0	13857	0	48500

(e.1.3) Summary of Development, ROM (ore and MR) production and Waste (OB+ SB + IB) removed in proposed review period 2017-18 to 2021-22. (Band – I/Joint Mining & Band – VI/Quarry – 2 opencast mining)

Year	Volume of Total Excavation (CuM) ROM + OB/SB/IB		ROM (CuM)				Volume of IB CuM (Waste)		Volume of OB CuM (Waste)		Tentative Quantity of Ore/ MR from ore zone (Tonnes)	
			>40% Cr2O3		10 to 40% Cr2O3		<10% Cr2O3		<10% Cr2O3		+40% & 10 to 40% Cr2O3	
	A	B	C	D	E	F	G	H	I	J	K	L
	Band – I	Band - VI	Band – I	Band - VI	Band – I	Band - VI	Band – I	Band - VI	Band – I	Band - VI	Band – I	Band - VI
2017-18	585050	486091	0	0	39971	13857	0	0	545079	472234	99928	48500
2018-19	1339651	0	0	0	85742	0	0	0	1253909	0	214355	0
2019-20	389684	0	33148	0	19740	0	0	0	336796	0	148794	0
2020-21	187151	0	8094	0	39635	0	0	0	149422	0	98370	0
2021-22	125440	0	10816	0	16517	0	0	0	98107	0	73740	0
Total	2626976	486091	52058	0	191605	13857	0	0	2383313	472234	635187	48500

(e.1.4) Average grade of ore/ mineral rejects to be excavated

The average weighted grade of friable chrome ore which is being excavated since last few years is around 44-46% Cr_2O_3 while that of friable mineral rejects is around 18-20% Cr_2O_3. The average grade of lumpy mineral rejects has been found to be 26-28% Cr_2O_3. During the mining operation in the review period, the weighted average grade of ore and mineral rejects is likely to remain in these ranges.

(e.1.5) Use of waste

There is no use of waste. However out of 28,55,547 CuM waste to be generated during the review period (Ref: Table at e.1.3), about 10% i.e. 2,85,555 CuM shall be utilized for strengthening of haul road, filling the voids created by rain on the side walls of the dumps, berms on haul road and also in plantation areas. The balance 25,69,992 CuM waste shall be dumped on waste dump No – 1. It may be noted that the estimated waste generation of 372,751 CuM materials during the balance 6 months of current year i.e. 2016-17 shall be utilized for back filling of the southern part in quarry – 1. The dumping proposal of 25,69,992 CuM waste during review period are discussed in chapter – 4.

Existing environmental measures within the lease hold area:

Garland drains at various places: 2815 m

Retaining walls at various places: 633 m

Boulder walls around LG dumps: 348 m

Proposal for environmental protection during the review period:

Year	Garland Drain (m)			Retaining Wall (m)			Settling Pond (m)		
	Length	Width	Depth	Length	Width	Height	Length	Width	Depth
2017-18	Maintenance of existing drains			100	1.00	1.50	20	10	3
2018-19	Maintenance of existing drains			100	1.00	1.50	Maintenance		
2019-20	Maintenance of existing drains			Maintenance			Maintenance		
2020-21	Maintenance of existing drains			Maintenance			Maintenance		
2021-22	Maintenance of existing drains			Maintenance			Maintenance		

It has been proposed to construct a guard wall between toe of the dump – 1 and top of the back filled area to protect any loose dump material into the voids of quarry – 1.

(e.1.6) Land use at the start and end of proposed scheme period Band – I/Regular opencast mining now abandoned & proposed Joint Mining in the eastern boundary with M/s BAL & Band – VI/Quarry – 2 opencast mining.

Sl. No.	Head	Area put on use at start of proposed Review period (Ha)	Land use at the end of the proposed review period (Ha)
		Band - I/Quarry - 1 Band - VI/Quarry - 2	Band - I/Quarry – 1 Band - VI/Quarry – 2
1	Area under mining	28.332	29.756
2	Storage for top soil	0.000	0.000
3	Waste dump site	28.377	28.782
4	Backfilling	8.240	8.240
5	Mineral storage	2.831	2.831
6	Infrastructure (workshop, admin. Building,etc.	1.560	1.560
7	Roads	2.668	2.668
8	Railways	0.000	0.000
9	Green belt/safety zone	5.040	4.275*
10	Tailing pond	0.700	0.700
11	Effluent Treatment Plant	0.600	0.600
12	Mineral Separation Plant	1.470	1.470
Grand Total		**79.818**	**80.882**

* Part of safety zone area (0.765 Ha) shall be used for joint mining & dumping and the balance 4.275 Ha shall be left as green belt.

(f) Conceptual Mine planning upto the end of lease period taking into consideration the present available reserves and resources describing the excavation, recovery of ROM, Disposal of waste, backfilling of voids, reclamation and rehabilitation. Those are shown on a plan with relevant sections.

(f.1.1) Band - I & Band - VI

Out of the total lease hold area of 89 Ha about 28.332 Ha is quarried out in quarry 1 (Band - I) and 2 (Band – VI). By the end of proposed review period, it will be 29.756 Ha including joint mining in Band - I. Joint mining with M/S BAL in Qry-1 will go up to 34 mRL while regular mining will be up to 22 mRL. Mineable ROM reserves of Band – I is 0.6351 million tonnes & Band –VI is 0.4271 million tonnes (ROM). Thus totaling to about 1.0622 million tonnes of mineable reserves (ROM) has been assessed in both the bands. Out of this about 0.6837 million tonnes (ROM) shall be produced by end of review period leaving a balance of about 0.3785 million tonnes ROM. Mining in conceptual period can be done by depressing the joint mining area with M/S BAL, by undertaking joint mining of blocked ore in Band I in the western side common boundary with M/S TISCO and starting underground mining. At a rate of production

of 0.2157 million tonnes of ROM annually it will take about 2 years after the review period i.e. up to 2023-24 by opencast mining.

Beside the reserves, remaining resources (ROM) in both the bands are to the tune of 7.5143 million tonnes. It has been estimated that around 0.9533 million tonnes of ROM ore in Band I are blocked in the western side of the lease hold with common boundary with M/s TISCO up to 22 mRL. The lessee has already started discussion with M/s TISCO for joint working and exploitation of these resources which if materializes shall increase the life of mine by another 4 years for opencast mining. The remaining resources of around 6.561 million tonnes occurring at depth can be won by underground mining method, thereby increasing the life of the mine by another around 30 years.

(f.1.2) Band – II

Another ore band (Band – II) is there after about 70 m towards south of Band – I on which presently OB dump exists. Since the resources and reserves estimated are not much, the lessee had obtained permission from IBM for dumping of waste on this location. However, deep drilling may intercept ore which can be exploited by underground mining.

(f.2) Dumping of OB & waste

Capacity of Dump – 1 by common boundary working is estimated at 3,448,418 CuM up to 265 mRL. During proposed review period about 2,569,992 CuM waste shall be recovered from quarry – 1 and quarry – 2 after utilizing 10% of the waste for road development etc. These materials shall be kept on Dump-1. It has been estimated that around 8,78,426 CuM of waste can be accommodated in Dump-1 after the end of review period i.e. after 2021-22. The generation of OB/waste during the conceptual period by open cast mining has been estimated as below:

Quarry No.	Generation of OB/waste in conceptual period (m^3)
Qry-1	5,88,050 (by OC Jt. Mining with TISCO)
Qry-2	17,03,587
Total	**22,91,637**

As can be seen, the total generation of waste by opencast mining in conceptual period is 22,91,637 CuM out of which 8,78,426 CuM can be accommodated in Dump-1 up to 265 mRL. For dumping of the balance materials, it has been proposed to utilize the non mineralized area lying south of Dump-1, bounded by co-ordinates S970-1291 & E1040-1377, over an area of 4.55 Ha. Before extending the Dump-1 over this adjacent area, four nos. of boreholes are being

drilled during the current year to prove its barrenness. Since Dump-1 with its extension has been proposed to be heightened up to 265 mRL in the conceptual period, a study on slope stability and dump design is being carried out by Indian Institute of Technology (IIT), Kharagpur presently **(Annexure-21C)** in the interest of safe and scientific mining and protection of environment. Dumping during conceptual period in Dump-1 and its extension shall be done as per the advice of this study.

(f.3) Reclamation & Rehabilitation measures

(f.3.1) Band - I/Quarry - 1

Deepest level of Band – I / Quarry – 1 is at 57 mRL (Regular opencast mining) and with joint mining with M/S BAL, the quarry is proposed to be deepened further up to 22 mRL. The southern part of Quarry-1 has been started to be back filled / reclaimed by dumping the waste in the voids. As on date about 20,66,216 CuM waste have been put in the voids, where as the capacity of the voids is to cater about 22,95,000 CuM. The waste likely to be generated during the current year up to 31st March,2017 is proposed to be back filled in the balance space.

(f.3.2) Band - VI / Quarry - 2

The open cast mine planning in Band – VI/Quarry - 2 during the review period has been programmed up to 122 mRL though the existence of ore has been established up to a level of 50 mRL (Probable category). Opencast mining below 122 mRL would only be possible after obtaining data from proposed boreholes. Besides, detail slope stability study vis-à-vis economics of mining shall be undertaken and feasibility be established based on their recommendation by any institute of repute to extract deep seated ore body safely. Detail study for underground mining has already been initiated which shall be taken up within next 2-3 years time. Attempt should be taken to win the ores now blocked due to mining constraints. Therefore, it may not be feasible for backfilling of the quarry in view of production of the reserve below the present envisaged level. In case feasibility of mining up to the envisaged depth is not established, the exhausted voids will be reclaimed with available waste materials.

(f.4) Land use at the start, end of proposed scheme period and at the end of conceptual period.

Sl. No.	Head	Area put on use at start of proposed Review period (Ha)	Land use at the end of the proposed review period (Ha)	Land use at the end of proposed conceptual period (Ha)
1	Area under mining	28.332	29.756	33.883
2	Storage for top soil	0.000	0.000	0.000
3	Waste dump site	28.377	28.782	36.398
4	Back filling	8.240	8.240	8.240
5	Mineral storage	2.831	2.831	2.331
6	Infrastructure (workshop, admin. Building,etc.	1.560	1.560	1.560
7	Roads	2.668	2.668	1.919
8	Railways	0.000	0.000	0.000
9	Green belt/safety zone	5.040	4.275*	1.899*
10	Tailing pond	0.700	0.700	0.700
11	Effluent Treatment Plant	0.600	0.600	0.600
12	Mineral Separation Plant	1.470	1.470	1.470
Grand Total		**79.818**	**80.882**	**89.000**

* Part of safety zone area (0.765 Ha in scheme period & 3.141 Ha in conceptual period) shall be used for joint mining & dumping and the balance area of 4.275 Ha and 1.899 Ha shall be left as green belt.

3.0 MINE DRAINAGE

3(a) Minimum and maximum depth of water table based on observations from nearby wells and water bodies:

To evaluate the status of water table in the buffer zone moderately intensive well inventory has been carried out during Pre-monsoon (April) 2014 and Post-monsoon (November) 2014 period. The location of ground water monitoring wells is depicted in plate-10. The details of well inventory has been given in table below: The wells of GWS & I Govt. of Odisha and CGWB, Govt. of India falling around the buffer zone have been taken into account before preparing depth to water level and fluctuation maps.

Sl. No.	Location	Longitude	Latitude	Pre-monsoon	Post monsoon	Fluctuation (m)
				(m bgl)		
1	Bhimtanagar-Qry1	85.74814	21.03015	6.51	5.21	1.30
2	Birasal	85.67811	20.98762	6.31	4.39	1.92
3	Chirigunia-Qry 3	85.75744	21.04168	7.36	5.41	1.95
4	Deogaon	85.73265	21.09886	6.21	4.76	1.45
5	Dhalparha	85.78806	20.94704	7.69	3.36	4.33
6	Gandhapal	85.84462	20.97811	6.69	3.29	3.40
7	Kahneipal	85.72212	20.95037	8.42	5.06	3.36
8	Kalarangi-Qry - 2	85.73322	21.00534	5.89	4.65	1.24
9	Kaliapani-Qry - 4	85.77798	21.05177	8.44	6.47	1.97
10	Kandha	85.69295	21.08089	5.76	4.21	1.55
11	Kenduabandi	85.81561	20.99693	8.66	2.03	6.63
12	Kharkhari	85.72141	21.05243	5.97	4.61	1.36
13	Maruabil	85.71253	21.03380	5.89	4.63	1.26
14	Saruabil	85.82358	21.06181	9.77	6.71	3.06
	Minimum			**5.76**	**2.03**	**1.24**
	Maximum			**9.77**	**6.71**	**6.63**
	Average			**7.11**	**4.63**	**2.48**

Note 'm bgl'= meters below ground level 'Q-1'= samples collected for quality analysis from these wells

Pre-monsoon Depth to Water Level (April-2014) :

The depth to water level data and map shows that the pre-monsoon (April-2014) depth to water level in project area ranges between 5.7 mbgl at kandha to a maximum of 9.77 mbgl at Saruabil with the average being in the range of 7.11 mbgl.

Post monsoon Depth to Water Level (November-2014):

The data shows that depth to water level during post monsoon (November-2014) varies from 2.03 mbgl at Kenduabandi to a maximum of 6.71 mbgl at Saruabil with the average being in the range of 4.63 mbgl in the wells monitored.

Water Level Fluctuation (Between Pre and Post Monsoon-2014):

The perusal of data reveals that seasonal water level fluctuation varies from 1.24m at Kalarangi to a maximum of 6.63 m at Kenduabandi, with the average being in the range of 2.48 m.

Water Level in the Core Zone:

The working RL of the mine lease area is considered at 32 m for Band – I and 122 m for Band – VI AMSL. Twelve bore holes were drilled inside the lease area for mineral exploration purpose mainly. Water was struck at various depths within these bore holes. The water levels in these bore holes were measured regularly and the perusal of the periodical monitoring data shows that the depth to pre monsoon water level is around 33 mbgl which in the post monsoon period is around 27-29 mbgl.

Long term behavior of the ground water table:

The long term data of the central and state Government agencies as well as that of the in house monitoring shows no significant decline in depth to water level condition in either pre or post monsoon in either the core or the buffer zone area.

Rainfall :

Details of annual rainfall and the monthly variations of the rainfall as recorded at sukinda for the period of 2006-2015 are given in the table below:

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	TOTAL
2006	0	0	64	35	131	567	358	691	713	29	103	0	2691
2007	0	126	0	9	80	575	346	574	701	130	0	0	2541
2008	120	10	8	44	148	516	377	424	727	65	0	0	2439
2009	0	0	0	0	125	88	887	579	281	329	13	0	2302
2010	0	0	16	32	253	321	232	245	380	157	14	73	1723
2011	0	30	50	69	83	742	211	732	618	18	0	0	2553
2012	234	0	0	14	116	192	407	362	194	122	58	0	1699
2013	29	0	46	31	92	264	253	152	281	566	0	0	1705
2014	0	54	45	62	88	151	422	366	186	115	0	0	1489
2015	2	7	0	78	12	226	405	275	127	23	0	28	1183
Av.	37.6	22.7	22.9	37.4	112.8	364.2	389.8	440.0	420.8	155.4	18.8	10.1	2032.5

The average annual rainfall for the above period is 2032.5 mm and it was seen that more than 70% of the annual rainfall is received by the southwest monsoon between June to July to September, being the rainiest month of the year.

3 (b) Maximum and minimum depth of workings:

The general ground level in the lease area is 120 mRL. Maximum and minimum RLs of the two different quarries during the review period would be as below:

Particulars	Qry – 1 on Band - I	Qry – 2 on Band - VI
Top of Quarry (m)	150	305
Floor level of Quarry (m)	22	122

3(c) Quantity & Quality of water likely to be encountered, the pumping arrangements and places where the mine water is finally proposed to be discharged:

(i) Estimation of surface Run off water from mines

A comprehensive study on surface run off management of the existing quarry has been carried out by the lessee through M/S Healthy Enviro Solutions Pvt. Ltd, Bhubaneswar. Based on this study, the peak surface run off rate likely in the scheme period has been assessed based on the following formula and tabulated below:

Peak rate of runoff = Catchment area X Runoff co-efficient X Rainfall intensity

where average annual rainfall i.e. rainfall intensity is considered as 1593.8 mm.

Sl. No.	Mining features	Land use in review period (Ha)	Land use in m^2	Run off co-efficient	Volume in m^3
1	Area under mining	29.756	286920	0.1	45729.31
2	Storage for top soil	0.000	0	0.05	0.00
3	Waste dump site	28.782	287820	0.05	22936.38
4	Back filling	8.240	82400	0.05	6566.46
5	Mineral storage	2.831	28310	0.05	2256.02
6	Infrastructure (workshop, admin. Build.,etc.	1.560	15600	0.85	21133.79
7	Roads	2.668	26680	0.6	25513.55
8	Railways	0.000	0		0.00
9	Green belt including the area to be used for joint mining & dumping	4.275*	42750	0.05	3406.75
10	Tailing pond	0.700	7000	0.05	557.83
11	Effluent Treatment Plant	0.600	6000	0.6	5737.68
12	Mineral Separation Plant	1.470	14700	0.6	14057.32
13	Unused area	9.182	91820	0.15	21951.41
Total		**89.000**	**890000**		**169846.50**

(ii) Overall water balance

(a) Inflow : The inflow of water to the mine shall be from two sources i.e. surface run off and withdrawal of water through bore well which is around 35000 m^3 per annum. Thus the total inflow of water shall be 169846 + 35000 = 204846 m^3 per annum.

(b) Outflow : The total outflow of mine is calculated as below:

Activity	Water used per annum (m^3)
Mining & Processing activities	213500
Domestic	35000
Green belt	59500
Other use	52500
Sub Total	**360500**
Evaporation & Tailing seepage loss (10% of water used in mining & processing activities	21350
Total	**381850**

(c) Water balance result: It is found from the above study that the quantity of outflow of mine is more at 177004 m^3/annum in comparison to quantity of inflow. This quantity is being adjusted from the seepage water from sump-1 generated due to ground water abstraction. The lessee has obtained permission for withdrawing 755 CuM /day (not exceeding 264250 CuM/year) from existing 5 bore wells and one mine pit sump (excluding 1030 CuM / day already accorded vided letter even no dated 03.11.2010) from Central Ground Water Authority, Ministry of Water Resources, Govt. of India Vide letter no. 21-4 (246)/SER/CGWA/2010 dt.05.07.2011 **(Annexure -22A).** The sump-1 of Qry-1 is being used as storage tank and required quantity of water shall be withdrawn through pumping.

(d) Dewatering of water and precautionary measures: Sufficient No. of pumps (3 nos. with capacity of 48.38 ltr/ sec each) have been provided for dewatering the water collected in the quarry - 2 during rainy seasons to keep the workings free from water. The pumped out water shall be discharged through drains/ channels. Network of open drains will be constructed and connected to the garland drains already constructed and to be constructed around Dump – 1. The dimension of the drains (width & depth) and its slope will be properly designed to carry the runoff. Some portion of de-watering water shall be used in chrome ore beneficiation plant, dust suppression and green belt development. Rest of the water shall be treated in the effluent treatment plant (ETP) which shall be commissioned as per the guide lines of State Pollution Control Board. The lessee has already initiated the process of construction of 250 m^3 capacity ETP and has issued a

letter of intent to M/S Qualicom Solutions Pvt. Ltd, Kolkata on 23.03.2016. The plant is being commissioned presently. Copy of the LOI, techno-commercial proposal with plot plan/ P&I etc are attached as **Annexure-23.** The civil work has already been started and the time bound proposal for completion of ETP is as below:

Sl.No.	Job/ Activity	Date of Completion
1.	Civil work completion	31.12.2016
2.	Equipment installation Completion	15.02.2017
3.	Online monitoring installation	15.03.2017
4.	Trial run completion & start of operation	31.03.2017

(iii) Quality of Run off water from mines

The runoff from mine was collected and analyzed accessing the quality. The result found is given below

Surface Run Off									
Period				Jul-2015		Aug-2015		Sept-2015	
Sl No.	Parameter	unit	Standard prescribed	SRF-1	SRF-2	SRF-1	SRF-2	SRF-1	SRF-2
1	Ph	.....	5.5-9.0	6.52	6.85	6.46	6.62	6.9	7.1
2	TSS	mg/L	100	92	87	81	93	78	88
3	Cr+6	mg/L	0.1	0.069	0.072	0.072	0.066	0.077	0.085

(iv) Leachate Study around the dumps inside Mine

In order to ascertain the leachate behavior, leachate analysis has been conducted collecting samples were from both dumps and analysis. The analysis report given below

Parameters	Dump-1	Dump-2	Protocol
pH	2.68	5.07	IS 3025(P-11)
Total hardness (as $CaCO_3$) mg/l	52	56	IS 3025(P-21)
Iron (as Fe), mg/l	0.33	0.16	IS 3025(P-53)
Nitrate Nitrogen, mg/l	2.15	10.52	APHA-4500 B
Phosphorous, mg/l	1.6	0.1	IS 3025(P-31)
Copper (as Cu)(as P), mg/l	0.0848	0.0109	IS 3025(P-2)
Nickel (as Ni), mg/l	0.0776	0.2771	IS 3025(P-2)
Cobalt (as Co), mg/l	0.0289	0.0438	IS 3025(P-2)
Chromium (as Cr), mg/l	0.0905	0.9113	IS 3025(P-2)
Lead (as Pb), mg/l	0.0530	BDL	IS 3025(P-2)
Zinc (as Zn), mg/l	0.4533	0.0394	IS 3025(P-2)
Aluminium (as Al), mg/l	8.299	0.3259	IS 3025(P-2)
Chromium (as Cr+6), mg/l	0.070	0.080	IS 3025(P-2)

The leachate analysis shows that there is no significant impact on strata.

3 (d) Regional and local drainage pattern, annual rain fall, catchment area and likely quantity of rain water to flow through the lease area, arrangement for arresting solid wash off etc.

The drainage pattern of the buffer zone has natural drainage such as Damsal nala 1.2 km away towards north-west of the leasehold. The dry nala in the south western part of buffer zone carries the surface run-off during monsoon and ultimately converge with Damsal nala towards north-western part of the lease hold without entering the leasehold area. Major part of the area in the lease hold is free from chrome mineral directly or indirectly and surface runoffs from this area are absolutely free from chrome mineral contamination. However, the surface run off from the mine is stored in the sump at the bottom of Quarry-1 from where it is pumped to a sump near the ETP and after treatment, the water is being utilized in the COB plant. Retaining walls and garland drains have been constructed at the toe of Dump-1 & 2 and the surface run off from these dumps is allowed to flow through garland drains and settling tanks and finally stored in the sumps. Similarly, the run off from office area and COBP area also flows in to the settling pit at North east side of lease boundary from where it is channelized to the settling pond. All the run off water shall be treated and used in the COB plants, ensuring that no surface runoff from this area shall go outside the lease area. A surface drainage plan with engineering details of arrangement for arresting solid wash off has been prepared **(Plate. No. 11).**

4.0 STACKING OF MINERAL REJECT /SUB GRADE MATERIAL AND DISPOSAL OF WASTE

(4.a.1) Nature and quantity of top soil, Overburden/ waste and mineral rejects to be disposed of during the proposed scheme period:

(i) Band – I & VI

Year	Topsoil (CuM)		Waste (OB/SB/IB)				Mineral Rejects (CuM)	
	Reuse/ spreading	Storage	Total Waste (CuM)	Back filling	Road strengthening (CuM)	Storage	Blending	Beneficiation
2017-18	0	0	1017313	---	101731	915582	13857	39971
2018-19	0	0	1253909	—	125391	1128518	-	85742
2019-20	0	0	336796	—	33680	303116		19740
2020-21	0	0	149422	—	14942	134480		29635
2021-22	0	0	98107	—	9811	88296		16517
Total	**0**	**0**	**2855547**	—	**285555**	**2569992**		**191605**

2855547 CuM waste are to be recovered during the review period from Band I (Qry – 1) and VI (Qry – 2). For road strengthening in Band I and VI areas, about 285555 CuM shall be used. Balance quantity shall be kept in Dump-1.

(iii) Topsoil

There is no topsoil available in the lease area as all most all the area has been degraded.

(4.a.2) Waste (OB/SB/IB)

(i) Nature and quality of OB/SB/IB & its disposal

Overburden (OB) occurs above the ore zone i.e. overburden capping waste, side burden (SB) is the non ore parts wastes on both hang wall and foot wall sides of ore body removed while making the benches and interburden (IB) are the wastes between ore bodies. These are all waste in regards to ROM ore. ROM in this area is overlain by laterite, silicified chert and others such as float ore, diorites and pyroxenites etc. The wall rock in the area is mainly laterite and weathered sepentinites. There will be recovery of OB & SB only during mine working in review period.

(ii) Reclamation & Rehabilitation measures

Band - I/Quarry - 1

Deepest level of Band – I / Quarry – 1 is at 57 mRL (Regular opencast mining) and the quarry has been proposed to be deepened to 34 mRL by joint mining. The southern part of quarry where no further mining has been envisaged is being back filled/ reclaimed. As on date about 20,66,216 CuM waste have been put in the voids in three terraces from 71 mRL to 150 mRL. The area already back filled is over 8.24 Ha. The capacity of the void available for back filling up to

160 mRL is about 22,95,000 CuM. The balance space shall be utilized by the materials to be generated during the remaining period of the present scheme period i.e. by 31st March,2017. Around 5000 saplings have already been planted in part of the back filled area and proposal has been given for coir matting over 2.608 Ha and plantation over it as shown in **Plate-8A,12 & 13.**

Band - VI / Quarry - 2

The open cast mine planning in Band – VI/Quarry - 2 during the review period has been programmed up to 122mRL though the existence of ore has been established up to a level of 50 mRL (Probable category). Opencast mining below 122 mRL would only be possible after obtaining data from proposed boreholes. Besides, detail slope stability study vis-à-vis economics of mining shall be undertaken and feasibility is established based on their recommendation by any institute of repute to extract deep seated ore body safely. Detail study for underground mining has already been initiated. Attempts are being taken to win the ores now blocked due to mining constraints. Therefore, it may not be feasible for backfilling of the quarry in view of production of the reserve below the present envisaged level. In case feasibility of mining up to the envisaged depth is not established, the exhausted voids will be reclaimed with available waste materials

(4.b) The proposed dumping ground within the lease area proved for presence or absence of mineral and be outside the UPL, unless simultaneous back filling is proposed or purely temporary dumping for a short period is proposed in mineralized area with technical constraints & justification.

(i) There are two waste dumps in the lease area out of which Dump-1 is active while Dump-2 is an old dump and presently not in use. Details of the two waste dumps are as below:

Particulars	Dump-1 (Active)	Dump-2 (Not in use)
Co-ordinate	S537/S870 to E800/E1128	S200/S680 to W290/E350
Dump Configuration (Av.)	350m x 280m x 80m	445m x 498m x 60m
Area (Ha)	11.848 Ha	16.529 Ha
Top & bottom RL (M)	160 m/ 240 m	130 m/ 190 m

(ii) The waste materials to be generated during the review period shall be stored in Dump-1 and the details of dumping are as below:

A	Co-ordinate of the area of quarry – 1 where back filling is being done and will be continued during present scheme period	:	S537/S870 to E800 to E1128
B	Co-ordinate of the area for joint dumping	:	S751 /S1282 to E900/E1286
C	Capacity of the joint dump to accommodate waste materials (up to 265	:	3448418 CuM (Section wise calculation is as below-Refer Dump Plan **Plate - 9.**

	mRL)		
D	Generation of OB/SB waste from joint mining and band – VI / quarry - 2 during review period	:	2855547 CuM Refer Para 4.a.1 (i) above
E	10% waste shall be used in haul road strengthening in Band I & VI		285555 CuM Refer Para 4.a.1 (i) above
F	Balance waste on dump		2569992 CuM
G	After accommodating the wastes of proposed review period, there will be space to accommodate further waste in joint dumping area (H - K)		878426 CuM (Can be utilized after the proposed modified scheme period)

DUMP-1 Capacity up to 265 mRL			
Cross Section	**Area (sq.m.)**	**Influence (m)**	**Volume (CuM)**
A A'	0	52	0
B B'	6854	50	342700
C C'	10097	50	504850
D D'	11733	38	445854
E E'	13530	23	311190
F F'	14610	20	292200
G G'	13154	25	328850
H H'	18865	34	641410
I I'	20763	28	581364
Total			3448418

(4.c) Manner of disposal of waste, configuration and sequence of year wise build up of dumps along with the proposal for protective measures

(4.c.1) Manner of disposal of wastes

It has been proposed to dump the wastes of proposed scheme period on the Dump – 1 in advancing manner. The present top RL of Dump-1 is 240 mRL. The dumping during the review period by joint dumping with M/S BAL has been proposed up to 240 mRL. Length of the dump will be 285 m and width will be 260 m. Co-ordinate of the dump will be S760-S1150/E900-E1260 within which the wastes shall be limited. There will be 2 terraces. Necessary permission under Reg.111(3) of the MMR,1961 for joint dumping within common boundary with M/S BAL has already been obtained from Director, Mines Safety vide their letter No. BJA/CH-2&12/P-111(3)/2015/1699-1700 dt. 08.07.2015 **(Annexure-20B)**. The lessee has undertaken a scientific slope stability & dump design study in the interest of safe & scientific mining and protection of environment by IIT, Kharagpur **(Annexure-21C)** and the recommendations shall be implemented after getting the study report during the present review period before lowering the pit level and increasing the dump height.

(4.c.2) Proposal for environmental protection

At present about 2815 m long garland drain with 633 m long retaining wall has been made within the lease hold area at various places along with two settling tanks (**Plate - 10**). Check dams intermittently in the garland drains to check and arrest sediments flowing with water has also been constructed. Retaining wall over 200m length shall be constructed during the review period by the side of M/s TISCO's dump in the south western side of the lease area. The proposals of environmental measures during the review period are as below:

Year	Garland Drain (m)			Retaining Wall (m)			Settling Pond (m)		
	Length	Width	Depth	Length	Width	Height	Length	Width	Depth
2017-18	Maintenance of existing drains			100	1.00	1.50	20	10	3
2018-19	Maintenance of existing drains			100	1.00	1.50	Maintenance		
2019-20	Maintenance of existing drains			Maintenance			Maintenance		
2020-21	Maintenance of existing drains			Maintenance			Maintenance		
2021-22	Maintenance of existing drains			Maintenance			Maintenance		

It has been proposed to construct a guard wall between toe of the dump – 1 and top of the back filled area to protect any loose dump material into the voids of quarry – 1.

(4.c.3) Waste dump management

Around the waste dumps, retaining wall of substantial strength has been constructed. Perforation (weep holes) are left at intervals to allow for passage of water. Adjacent to this, garland drain have been provided to prevent any wash off or leaching of dump materials during heavy rains. Individual slopes of the dump shall not exceed 37° and the overall shape of the dump shall be 28°. Catch drains shall be provided at the inward side of the terrace. Catch drains of the terrace shall be connected to the garland drain outside the periphery of the dump. These catch drains shall have concrete open pipes followed by settling tanks to avoid wash offs. Each terrace shall have provision of berms at the outer end to reduce gully formation due to rainwater wash offs. The waste dump (Dump-1) is now on 10.274 Ha which will be increased to 10.679 Ha by the end of proposed review period. Dump-2 is over 18.058 Ha which is not in use now. In course of time plantation on the dead end slopes of waste dumps with local species shall be done in consultation with forest authorities. The proposal has been shown in Environment Plan (**Plate No – 10**)

(4.c.4) Engineering details of retaining walls & Garland drains

Retaining Walls

Retaining boulder wall (1.5 m visible height and 1.0 m width) of substantial strength shall be constructed all along the lower slope of the dump-2 and between the sub grade stock & dump with locally available boulders mixed with sand and cement, to arrest any rolling down of the dump materials. Perforation shall be left at around 10 m intervals to allow for passage of water.

Garland drains

Garland drains of 1.0 m deep and 1.5 m wide shall be constructed all along the lower slope of the dump-2 and between the sub grade stock & dump, followed by the retaining wall to prevent any wash off or leaching of dump materials during heavy rains. Side walls and the base shall be pitched with locally available boulders. Joints shall be filled up with cement and sand mixture so that water cannot percolate.

(4.c.5) Surface & Rain water management

In the waste dump yard which is on the hill slopes proper garland drain followed by 1.5 m visible height x 1 m wide retaining walls having provision of drainage at regular interval shall be constructed at ultimate limit. As mentioned above garland drain followed with proper settling tanks for arresting any wash off shall be constructed before allowing the water to flow outside the lease area . Dumping of wastes shall be by retreating manner and dump slopes so created shall be stabilized by coir matting and vegetation.

(4.d) Stacking of Sub-grade (Mineral Reject) Minerals

(4.d.1) 10 to 40% Cr_2O_3 containing chrome ore which has no direct market at present, is considered as mineral reject (MR). During the proposed mine working about 191605 CuM MR from joint mining shall be recovered which is beneficiable. Besides, a quantity of 13857 CuM of MR is likely to be recovered during mine working from quarry – 2 / Band –VI which is blendable. The year wise generation of mineral rejects from Qry-1 shall be temporarily stacked in the earmarked stack yards and shall be beneficiated in the COB plant within the leasehold area. The beneficiated ore (concentrates) shall be dispatched to lessee's Ferro chrome plants for captive use. The mineral rejects from Qry-2 (lumpy ore) with average grade 26-28% Cr_2O_3 shall be sent to the lessee's plant directly for captive use after blending.

(4.d.2) Selection of Site for MR

Beside the two earmarked mineral reject stacks (stack No. 1&2), some mineral rejects/ tailings from the COB plant were stored near boundary pillar no. J6/c. The details of all the mineral reject stacks are as below:

Stack Yard No.	Location	Near	Dimension (Av. L x W x H) (m)	Area (Ha)	Approx. Quantity (T)	Remarks
1	S328/S262 to E652/E800	Pillar J7	159 x 70 x 1	0.949	7,601	MR/SG ore
2	S465/S340 to E300/E482	Pillar J3/b	69 x 84 x 5	0.508	43,210	MR/SG ore
3	S1210/S955 to E1172/E1360	Pillar J6/c	212 x 134 x 7	2.389	300,000	MR/tailings

In all the three stack yards, a total quantity of 359,478 MT of MR/ tailings are stored which are planned to be processed in the new COB plant (COBP-2) which is expected to be operative from January, 2017. The annual feed capacity of COBP-2 has been considered to be 120,000 tonnes and the stacked materials will be processed in this plant along with the tailings to be generated from COBP-1 during the review period. The proposed tentative schedule of disposal of MR/ tailings from these stack yards shall be as below:

Total Quantity of MR/tailings in Stack 2 & 3 (T)	Quantity of disposal (tonnes)				
	2017-18	2018-19	2019-20	2020-21	2021-22
359,478	60,000	35,000	90,000	75,000	95,000

As already discussed in Para 4.d.1, a total quantity of 191605 CuM of friable MR and 13857 CuM of lumpy MR shall be generated during the review period which shall be temporarily stacked in MR stack 1,2 & 4 as shown in **Plate No. 8C**. Details of these stack yards with their capacity are as below:

Particulars	MR stack-1	MR stack-2	MR stack-4 (on Dump-2)
Co-ordinate	S328/S262 to E654/E800	S470/S340 to E300/E485	S362/S547 to W24/E112
Approx. size (m)	162 x 70 x 2	69 x 84 x 10	109 x 116 x 0
Proposed Area (Ha)	0.949 Ha	1.568 Ha	1.37 Ha
Proposed Top & bottom RL (M)	143.7 m/ 142 m	172 m /162 m	190 m/ 185 m
Capacity of the stacks	69840 CuM	69250 CuM	91080 CuM

The aforesaid MR stacks are being maintained in a scientific and environment friendly manner. Environmental protection measures already carried out around MR/ tailing stacks for confinement of the stacks are as below:

Retaining Wall (m)			Garland Drain (m)			Material used
Length	Width	Height	Length	Width	Depth	
420	2.0	1.5	420	1.0	0.5	Quartzite boulders

(4.e) Beneficiation Studies

The results of input, output and recovery of tailings and their grade for 2015-16 is as follows.

MONTH	FEED QUANTITY (29 % Cr_2O_3)	PRODUCTION (41-44 % Cr_2O_3)	TAILINGS GENERATED (19.73% Cr_2O_3)
APRIL-15	5610	2305	3305
MAY-15	1510	620	890
JUNE-15	160	65	95
JULY-15	1815	730	1085
AUG-15	1345	535	810
SEP-15	3230	1315	1915
OCT-15	3810	1540	2270
NOV-15	2780	1140	1640
DEC-15	2305	935	1370
JAN-16	2670	1110	1560
FEB-16	2790	1155	1635
MAR-16	920	380	540
Total	**28945**	**11830**	**17115**

5.0 USE OF MINERAL AND MINERAL REJECT

(a) Requirement of end use industry specifically in terms of physical & chemical composition

ROM available in the lease area are both ore (>40% Cr2O3) and mineral reject (10 to 40% Cr2O3). Soft/fines chrome ore is available in Band – I/Quarry - 1 and hard lump chrome ore is available in Band VI/Quarry - 2.

(b) Requirement of intermediate industries involved in up-gradation of mineral before its end-use.

Since this is a captive lease allocated by Govt., chrome ore produced from the lease can only be used in captive chrome based plants. Besides Cr2O3 other components are suitable for ferro chrome/charge chrome/silico chrome plants. The chrome ore produced from the mine is presently being consumed by the ferro chrome plants of the lessee at Kothavalasa of Andhra Pradesh, Hissar of Haryana and the stainless steel plant at Duburi, Jajpur Road. Since these plants require high grade ore having around 46% to 48% Cr_2O_3, the ROM ore with around 44% Cr_2O_3 is sent to these plants while the ROM mineral rejects (10 to 40% Cr_2O_3) is stacked separately. A chrome ore beneficiation plant (COBP) is in existence within the leasehold area which is designed to process 10 - 12 tonnes of beneficiable grade ore (having 30-35% Cr_2O_3) per hour i.e. 6800 tonnes per month to produce around 2600 tonnes of concentrate at around 38% yield. A second COB plant (COBP-2) has been installed within the lease area to process the tailings generated from COBP-1 (with 16 -18% Cr_2O_3) which will be operational soon since the environmental clearance has been obtained from MoEF. This plant will be with a feed capacity 24,000 MT/year and yield of 20%.

(c) Requirements for other industries, captive consumption, export, associated industrial use etc. Requirement of other industries are

As stated in para (b) above the chrome ore is being used in captive consumption. Requirement of chrome ore with its specification for the end use industry of the lessee i.e. Kothavalasa in A.P. & Kalinga Nagar in Odisha are as below:

Particulars	Kothavalasa (A.P.)		Kalinga Nagar, Odisha
	Lumps	Fines	Lumps
Quantity of ore required (Tonnes)	14400	57600	120000
Grade of ore required (Cr_2O_3%)	32-38	44-48	32-38
Cr/Fe ratio required	2-2.2	2-2.1/1.9	2-2.2
Physical specifications if any	0-70mm	(-1)mm – 20 mm	0-70mm
Acceptable grade (Cr_2O_3%)	32-38	44-48	32-38
Quantity to be supplied from mine after processing / blending (Tonnes)	14400	50400	75600

(d) Precise physical and chemical specification stipulated by buyers

This para is not applicable since this is a captive lease.

(e) Processes adopted to upgrade the ROM to suit the user requirements.

The lessee has set up a chrome ore beneficiation plant (COBP) within the leasehold area to upgrade the MR out of the ROM. The average grade of the feed shall be of 28 to 30% Cr_2O_3. A total of 20 tonnes of MR per hour is being fed in COBP and the concentrate quantity would be about 4 tph/hr tonnes with 41 to 43% Cr_2O_3. As such yield is 20%. A second COB plant (COBP-2) has also been installed where the tailings from COBP-1 shall be fed separately. When tailing containing 18 to 20% Cr_2O_3 will be processed it will be divided in two circuits i.e. tabling and flotation circuits. From flotation circuit the production will be around 1.2 tph and from tabling the production will be around 2.8 tph with a total production of 4 tph. Feed rate is 20 tph. Concentrate grade is 46 to 47% Cr_2O_3.

6.0 PROCESSING OF ROM AND MINERAL REJECT

(6.a) If processing / beneficiation of the ROM or Mineral Reject is planned to be conducted, briefly describe nature of processing/ beneficiation. This may indicate size and grade of feed material and concentrate (finished marketable product), recovery etc.

Mining operations of Jindal Chromite Mines started in the year 2002. It was observed that the production of low grade ore i.e. 30 – 34% Cr_2O_3 was very high.

In order to make the ore usable for ferrochrome plant consumption, it was decided to install one 10 tph throughput plant for beneficiation by enriching the ore to 47 – 48% Cr_2O_3 having Cr : Fe 1.8 to 2.0. Accordingly one plant was constructed and commissioned during February 2003. Afterward, it was decided to increase the capacity of the plant to 15-16 tph. This modification was done during the year 2004 and the concentrate production capacity was enhanced from 30,000 tones to 40000 tone per annum.

Later on due to non-availability of the above grade feed, 28% Cr_2O_3 ore was fed to the COB plant resulting low recovery of the product with comparatively lower quality. To overcome the problem IMMT (RRL) Bhubaneswar was requested to study the problem and find out a solution. With the recommendation of RRL the plant production was optimized at 41% yield, production of concentrate having 46 – 47% Cr_2O_3 and plant production capacity was maintained at 36000 tonnes per annum.

(6.b) Material balance chart with flow sheet or schematic diagram of the processing procedure indicating feed, product, recovery and its grade at each stage of processing

(6.b.1) Beneficiation tests on sub-grade minerals/tailings.

In the meantime the quality of low grade ore in the mine was further deteriorated and the Cr_2O_3 analyzed 16 -18% which could not be processed in the plant. It was as good as the tailing quality. To over come this problem IMMT (RRL) Bhubaneswar was approached to conduct a feasibility test for recovering the Chrome values from the sub-grade ore as well as the tailings and encouraging results were obtained. Immediately IMMT, Bhubaneswar was entrusted to prepare DPR for setting up an additional facility for recovering the chrome values.

IMMT suggested for some modification in the beneficiation plant to add one new COB plant for processing the sub-grade ore with a facility for froth flotation. The proposal was for a feed capacity of 20 tph, for both the materials i.e sub-grade ore and the tailings. But both the materials shall be processed separately in the same plant. The plant shall be operated in all the three shifts and is expected to process 1, 28,000 tonnes per annum and can produce 25600 tonnes of chrome ore concentrate having 46 – 47% Cr_2O_3 with Cr : Fe at 1.8.

Keeping the above up-gradation into account for both sub-grade & tailing, the lessee has installed another COBP with a capacity 24,000 MT/year adjacent to existing one.

(6.b.2) Details of COBP - 1

The detail flow sheet of COB Plant for sub-grade & tailing is indicated in **Annexure -24A (COBP – 1) and annexure 24B (COBP-2)**. The gist of COBP for sub-grade & tailing are given below :

In this plant the sub-grade & tailing will be fed separately with the following data.

Feed grade	:	Having Cr_2O_3 18-19%
Feed rate	:	20 tph
Concentrate Production	:	4 tph (Approx.)
Concentrate Grade	:	46 – 47% Cr_2O_3
Yield	:	20%

(6.b.3) Details of COBP – 2

When tailing will be processed it will be divided in two circuits. i.e. tabling and flotation circuit. From flotation circuit, the production will be around 1.2 tph and from tabling the production will be around 2.8 tph with a total production of 4 tph. The data will be as follows :

Feed grade	:	Tailing having Cr_2O_3 17-18%
Feed rate	:	20 tph
Concentrate Production	:	4 tph
Concentrate Grade	:	46 – 47%

After processing of low grade ore 52% of the material (volume) is recovered and balance 48% (volume) (below 10% Cr_2O_3) will be dumped in the earmarked area in Dump-2. The detail flow sheet of COB Plant-2 is at **Annexure -24B.**

(6.c) Disposal method for tailings or reject from the processing plant.

(6.c.1) Details of tailing pond and its protective measures.

The tailings of COBP-1 from the tailing pond itself will be pumped to a classifier for dewatering and subsequently screening at 0.5 mm with the help of double deck vibrating screen and all the material to – 0.3 mm size by rod mill.

All coarse material i.e – 5 mm size will be tabled after treating in clusters of hydro cyclones and tailing from the tables which contain very fine size chromite particles shall be pumped to thickener. The sludge from the thickener will be pumped to flotation plant (COBP-2).

The sludge will be treated in series of conditioning tanks. In the first tank the sludge will be diluted and solution will be treated with sodium hydroxide for bringing the pH value to 7 of 8. Subsequently the diluted sludge will be treated with sodium silicate, CMC, oleic acid and pine oil in different stages and send to primary flotation cell for recovery of chromite, which floats out as overflow by froth flotation. The chromite thus obtained as overflow shall be cleaned in three stages to get chromite of 46-47 % Cr_2O_3 and at a yield of 20 %. The chromite particles being very fine particles, hence a belt filter is used to dewater the product. Rejects of primary flotation cell pass through one scavenger cell, where the residual chromite values can be recovered and the chromite thus obtained is relearned in the process. All flotation cells are provided with conditioning tanks before it for reconditioning the liquid. The residual of scavenger cell will be total waste and pumped to thickener will be recycled and reused in the process. Tailing produced from COB-2 is collected in the Tailing Pond and treated sufficiently by adding ferrous sulphate. It is kept for drying for few days. After drying these are being evacuated and disposed of in the tailing dump at mines with adequate protection.

Dried up tailings will be removed from these ponds at regular intervals in the subsequent month of its usage and unrecoverable size of fines will be disposed off at designated area as per approved modified Scheme of Mining for the year 2016-17. Co-ordinate of the area of disposal is S 380 to S 550 and W20 to W 180 and shall be provided with a impervious HDPE sheet lining. Thereafter, it will be covered with soil. This area is provided with adequate toe guard protection and garland drains all around, as being carried out in other material stack yard. Garland drain will be provided around the dumps and passive & stabilized slope will be developed with plantation. Sprinklers will be provided for continuous sprinkling to control fugitive dust emission.

(6.c.2)Tailing Pond Retention Capacity

The details of tailing pond are as follows.

COBP	Tailing Pond	Length (m)	Width (m)	Height (m)	Capacity of pond (MT)	Monthly generation of Tailings (MT/Month)	Disposal /Frequency of Removal of Tailings from pond.
COBP - 2	Tailing Pond -1	75.00	23.00	3.2	11,000	8000	Every 15-30 days
	Tailing Pond -2	75.00	20.00	3.2	10,000		Every 15-30 days

The tailing ponds are adequate in size to accommodate minimum 15 days of tailings and water. Since both the tailing ponds will be alternatively used each being used for one month and cleared in the immediate following month. Hence capacity of ponds will be more than adequate, with which proposed chrome ore beneficiation plant-2 can be operated without any difficulty. A high density polyvinyl (HDPE) sheet/layer has been provided in all sides of wall and floor of the tailing pond to make the pond impervious.

Technology adopted in the proposed COBP-2 will re-process the entire quantity of tailings generated from existing COBP-1 for recovering the chrome values from the tailings, Tailings of the existing pond of COBP- 1 (18-19% Cr_2O_3 content) will be further immediately reprocessed in proposed COBP-2 to be beneficiated to 46-47 % Cr_2O_3 concentrate by recovering the maximum possible chrome values from tailings.

(6.d) Quantity and quality of tailings /reject proposed to be disposed, size and capacity of tailing pond, toxic effect of such tailings, if any, with process adopted to neutralize any such effect before their disposal and dealing of excess water from the tailings dam

The quantity of tailings likely to be generated out of the MR recovered during remaining scheme period is estimated to be around 94655 tonnes from Band – I (Joint mining) materials with around <10% Cr2O3 content. These tailings are now proposed to be disposed directly to the earmarked area on Dump-2 by pipeline. Before discharge of these tailings, it shall be treated with Ferrous Sulphate and pumped to the tails collection pit through a Hydrocyclone. The under cyclone shall be solid waste and the overflow mainly contains water with slime which shall be treated for separation of slime collected in sump and will be recycled as process water. The

slimes settled in the tailing pond will be periodically pumped through a mud pump to solid waste pit. Flotex and fines spirals separator shall be used in tailing circuit to recover 40-45 micron particles.

(6.e) Specify quantity and type of chemicals if any to be used in the processing plant

The beneficiation process does not involve use of any chemicals.

(6.f) Specify quantity and type of chemicals to be stored on site / plant

Not applicable.

(6.g) Quantity (CuM per day) of water required for mining and processing and sources of supply of water, disposal of water and extent of recycling alongwith water balance chart.

The COB plant requires 200 CuM/ hr of water. Out of 200 Cum/ hr, process water is 169 CuM/hr which is recycled from tailing pond and 31 CuM/hr is taken from reservoir tank as make up water. The COB plant is a zero discharge plant. No effluent in any form is discharged out of the plant premises. Water balance of the chrome ore beneficiation plant (COBP-1 & COBP-2) is attached as **Annexure- 25A & 25B.**

7.0 OTHER Information

(a) Site Services

The various site services such as rest shed, blasting shed, site office, potable & duly purified drinking water, canteen serving hygienic food and first-aid center etc are existing within the lease area. Additional requirement, if any, shall be facilitated in as & when required.

(b) Employment Potential

Sl No	Designation	Qualification	Category	Numbers
1	AGM (Mines)	1st class Mine Manager's Certificate of Competency.	Managerial	1
2	Sr. Manager (Mines)	1st class Mine Manager's Certificate of Competency.	Managerial	1
3	Manager (Geology)	M. Sc in geology. (as per Rule 42 of MCDR 1988)	Managerial	1
4	Manager (COBP)	B. E. in Mining Engineering (as per Rule 42 of MCDR 1988)	Managerial	1
5	Asst. Manager (QC)	Graduate in Chemistry	Managerial	1
		Sub Total		5
6	Mines Forman	Forman Certificate of Competency.	Executive	2
8	Mining Mate	Mate's Certificate of Competency	Executive	2
		Sub Total		4
9	Drill Operator	Literate & Experienced	Highly Skilled	2
10	Excavator Operator	Literate & Experienced with valid licence	Highly Skilled	3
11	Tipper Operator	Literate & Experienced with valid licence	Highly Skilled	30
13	Blaster	Blaster's Certificate of Competency	Highly Skilled	1
		Sub Total		36
14	Administrative / technical staff	Graduates	Skilled	3
15	LVD	Literate & Licence Holder	Skilled	2
16	HVD (Water Tanker)	Literate & Licence Holder	Skilled	6
		Sub Total		11
17	Watch & Ward	Literate & Gun Licence Holder	Semi Skilled	33
18	Workers (Sorting & sizing, COB, loading, pumping, screening etc	Experienced with good health	Un-Skilled	306
		Sub Total		339
		Total		395

(c) Safety measures taken for miner's health

All workers are provided with safety equipments such as helmet, shoes, goggles, rope etc. It is ensured at the mines entry gate / time office that workers carry those materials with them. Drilling workers in addition to above be provided with nose mask, ear plug etc with special type of shoes. Vocational training is given to all workers in batches at regular interval to freshen their mind on their own responsibility during working in mines. Detergents are supplied with bananas and Molasses to the drilling crew. Health check up is done to all workers once in a year.

Nearby hospital facility are provided to workers and their dependents on necessity. Under emergencies they are shifted to specialized hospitals for treatment. Medicines are provided as per the prescription of the physician. A 24 hours ambulance van has been provided. Pure drinking water is provided to all workers and their dependents. For this tube wells have been sunk inside the lease area and nearby villages.

8.0 PROGRESSIVE MINE CLOSURE PLAN

8.1 Environment Base line information

The study of land environment forms the prime study since the changes brought in over this are permanent in nature and make visual effects which are easy to identify and recollect. For collecting the information over the land under reference, detailed study of topographical maps and village maps available over an area of about 89 Ha, about 300 sq.kms buffer area surrounding in the precincts of the mine and reconnaissance survey was undertaken. Information obtained from bore hole data were also correlated wherever necessary. From the above detailed studies, the following lead features have been recorded about the lease hold area in reference. The mining lease area is roughly a strip of land measuring approximately 2340 m in length and 360 in wide in average. Existing mining operations are concentrated on ore Band –I/Quarry-1 and Band – VI/Quarry - 2, approximately covering about 28.332 Ha area, which will be about 29.756 Ha by end of proposed review period. Band – I/Quarry – 1 has been suspended since 2013 due to lease boundary constraint and further deepening of the quarry is not possible. Now in the review period, it is proposed to produce locked ore in the eastern side safety zone with M/s BAL. Western boundary of M/s BAL is common to eastern boundary of M/s JSL. Since the Quarry – 1 on Band – II has been abandoned and no mining in future will be commenced by opencast method, reclamation has already been started. The void created in quarry – 1 (southern side) is being reclaimed since 2013. As on date about 20,66,216 CuM waste have already been refilled and during the current year i.e. 2016-17, about 2,28,784 CuM waste shall be refilled. Thus the voids of the quarry shall be completely filled up and rehabilitation shall be started from the year 2019-20 allowing 2 years time to settle down of loose materials. The surrounding area is having mining leases of other companies and all are actively operated now. General topography of the lease area represents a plain undulating terrain covered with reddish brown alluvium soil, sepentinites, pyroxenites and laterite etc.

8.1.1 A note on the status of baseline information with regard to existing land use pattern indicating the area already degraded due to mining, roads, processing plant, workshop, township etc in a tabular form.

Sl. No.	Head	Area put on use at start of proposed review period (Ha) Band - I/Quarry - 1 Band - VI/Quarry - 2
1	Area under mining	28.332
2	Storage for top soil	0.000
3	Waste dump site	28.377
4	Back filling	8.240
5	Mineral storage	2.831
6	Infrastructure (workshop, admin. Build.,etc.	1.560
7	Roads	2.668
8	Railways	0.000
9	Green belt	5.040
10	Tailing pond	0.700
11	Effluent Treatment Plant	0.600
12	Mineral Separation Plant	1.470
	Grand Total	**79.818**

8.1.2 Water regime, quality of air, ambient noise level, flora, climatic conditions

(a) Water regime

The Sukinda valley runs generally in a NE to SW direction closing towards east and fanning towards west. It is flanked by Daitari range on the North and Mahagiri range on the south. The altitude within the lease area ranges between 120 m to 305 m above mean sea level. The area represents an undulating topography, sloping towards the west. The bottom and top RL of the hillock in the southern portion of the lease area are 170 m and 305 m respectively. There are no stream, perennial nala or seasonal nala observed within the lease area. The land within the lease area is mostly covered with lateritic and wasteland with no settlements. The nearest habitation is the mine colony of TISCO on the west and Chirigunia camp of OMC on the north. Both are approximately 1.0 km away from the lease boundary. The major drainage system of the region is located NNW of lease area named as Damsal nala which originates from eastern part of Tungaisuni hill range, flows towards West in Sukinda Valley and then turns towards South and finally joins with Brahmani river. There is another seasonal major nala named as Kurchamula nala flows towards South from Daitari hill range and ultimately joins with Damsal nala through Kharkari Reservoir. Besides few more seasonal nalas named as Nadiabaroa nala,

Langalakanta nala and Petapeti nala flows from North to South and ultimately joins with Damsal nala. There are so many seasonal nalas originating from Daitari hills and flow towards South and those seasonal nalas originated from Mahagiri hills flow towards North and ultimately join with Damsal nala. There are two numbers of perennial nalas in the South Western part of buffer zone and known as Pandara nala and Dharainala originated from Mahagiri hills and flow towards South. Due to very gentle slope, there is no perennial or seasonal nala in the lease hold area. Damsal nala is the nearest water body at 1.0 km in NNW direction from the mining lease area. Garland drains have been constructed around waste dump and quarries for draining rain water. The working RL of the mine lease (Quarry – 2) area is at 160 m AMSL. Fourteen bore holes were drilled inside the lease area for mineral exploration purpose mainly. Water did not struck in any of these holes. Quarry – 1 on Band – I has attained a depth of 57 mRL. Water percolation started from 100 mRL. Seven number of holes sunk on the joint mining area upto 22 mRL. Periodical monitoring data is being collected from the lease area (both core & buffer zone) as per the guidelines of SPCB & MoEF.

(a.i) Drainage

Damsala nala is the main perennial nala which flows in the south west direction and is located towards the northern side of the leasehold at a distance of 2 km away from the northern boundary **(Plate-1)**. Various tributaries and small nalas both from the northern and southern slopes of Mahagiri and Daitari hill range join on to the Damsala nala which finally discharge in to the Brahmani river.

(a.ii) Maximum and minimum depth of Workings

At present the depth of the mining pit in Band – I has attained 57 mRL top being at 147 mRL in average. Band – VI has gone upto 150 mRL top being at 302 mRL. Quarry – 1 on Band – I has been stopped due to lease boundary constraints since 2013. During proposed review period, Joint mining with M/s BAL in the eastern side safety zone shall be done to recover the blocked resources. The joint mining will be from 160 mRL to 34 mRL by end of 2021-22 while the regular working in the lease hold area shall be up to 22 mRL. Band – VI/Quarry – 1 will reach 122 mRL by end of 2021-22.

(a.iii) Water quality Monitoring and management

Check dam, garland drain and settling tank are there wherever required and some more retaining walls are to be constructed around dump at its lower contour, for waste Dump - 1. Monsoon water to be let out is proposed to be collected in a settling tank, analyzed and compared with the norms of IS:2296 specified for its quality. Besides, regular monitoring of bore well water is being carried out by the lessee. Working benches will be kept free from loose

overburden/waste materials. Check dam will be constructed to prevent wash off of loose sediments. Surface water samples from the Damsal nala and ground water samples from the tube wells of nearby villages will be analyzed for their pollutant level which will help to decide the type of treatment required. Garland drains have been proposed around the dump and quarry to guide the surface run off to the nearby settling ponds from where the water will be utilized for plantation etc. There is no possibility of acid mine drainage.

Regular monitoring of environmental parameters of water quality, ambient air quality and noise are being carried out by M/S Inspectorate Griffith India Pvt. Ltd., Bhubaneswar, a NABL accredited laboratory for a duration of one month in every quarter. The results of water quality for first quarter of 2016-17 are at **Annexure – 26/A** which show the data collected are confirming to the guide lines of SPCB & MOEF.

(b) Quality of Air

There is no dearth of fresh and free air in this region because of very scanty population, cattle breed etc. After the start of the mines, pollution would have started to some extent, but due to the measures taken to suppress dust in the activity area, there is not much of a problem on this score. Air pollution is normally defined as the presence in the atmosphere of substances or conditions which adversely affect living organism or habitats. The condition of air is normally disturbed due to gaseous emanations from machineries, dust generated during drilling, blasting, movement of vehicles, loading and crushing operations in the mines. Effective control measures are taken to minimize the pollution due to this effect. Regular air monitoring are being carried out and existing level of air pollution in the area is below the permissible limits (National Ambient Air Quality norms) as it is revealed from the monitoring data generated. The details analysis are enclosed in **Annexure – 26/B.**

(c) Ambient noise level

The source of noise for the area was mainly from drills, compressors, tippers & excavators. There is no habitation in the vicinity of the area. Therefore, impact in this respect has been felt negligible. Regular monitoring of noise levels at different points in the mines is being carried out, the noise monitoring data is enclosed. **(Annexure – 26/C)**

(d) Climatic condition (Refer Chapter 1 Para (a.vi)

(e) Flora & fauna

The Floral assemblage within the core and buffer zones are more or less same, but due to broken areas within core zone, the density and distribution varies from the buffer zone. There is no elephant or tiger migratory corridor within the core and buffer zone of the project site. Impact of

the proposed plant will be minimal in nature. The major flora observed in study area are Karam, Semul, Kumbhi, Sunari, Kendu, Sidha, Mohula, Barakoli, Sal, Asan, Bahada, Jamun etc. Endangered and Endemic species were not found in the study area.

(f) Human settlements

There is no human settlement within the lease. Far away from the lease area there are small and big villages. Mining in the lease area never gives a negative effect to local residents; rather they are well benefitted directly and indirectly.

(g) Public buildings, places of worship and monuments

There are no Public buildings, places of worship and monuments within or within 1 km distance from the lease area.

(h) Any sanctuary located in the vicinity of the leasehold

No sanctuary is located in the vicinity of the leasehold

8.2 Impact Assessment

Description of Environmental Impact Assessment Statement on Impact on Mining and beneficiation on environment.

Advanced technological innovations and improvements have been brought in the exploration and exploitation of minerals in quick successions, on need base. However, the improve methods made available for the environmental preservation is rather slow. The environmental impact is defined as an alteration of environmental conditions or creation of environmental parameters those may upgrade or degrade the environment especially the land, water and air region of the area. The other connected aspects like noise, vibration and impacts on socio-economic considerations have also to be studied. A comprehensive analysis of the different environmental impacts due to mining is to be understood well. The physical, chemical and biological effects and their influences on national, social, cultural and aesthetic domains of the region should be considered. A careful evaluation of the impact will not only help in preventing unnecessary/unwanted damage to eco system but will also lead to planning and management of adopting proper environment restoration programs.

8.2.1 Land area indicating the area likely to be degraded due to quarrying, dumping, roads, workshop, processing plant, tailing pond/dam, township etc.

Sl. No.	Head	Land use at the end of the proposed review period (Ha)
1	Area under mining	29.756
2	Storage for top soil	0.000
3	Waste dump site	28.782
4	Back filling	8.240
5	Mineral storage	2.831
6	Infrastructure (workshop, admin. Build.,etc.	1.560
7	Roads	2.668
8	Railways	0.000
9	Green belt	4.275
10	Tailing pond	0.700
11	Effluent Treatment Plant	0.600
12	Mineral Separation Plant	1.470
Grand Total		**80.882**

8.2.2 Air quality

In mechanized opencast mine, mining operations such as mining extraction, loading and unloading, movement of dumpers on haul roads and external dumping and sizing of ore etc are expected to generate airborne fugitive dusts. Existing level of SO_2 and NO_x in the core zone area is almost less in all the readings and it is not expected to increase in future with the enhanced production. Comparatively higher level of SPM and RPM are expected due to fine particles, which becomes easily airborne after blasting and in haul roads. Due to coarse grained structure, compact nature and not friable, raising of dusts shall not be much. But excavated wastes shall raise the airborne dust level to some extent. As the fugitive pollution is localized, pollution transport from mining area to the villages shall be low. Further, dust generated, if any, in excavation area shall be suppressed through water sprinkling. While transporting chrome ore from mine to ferro chrome plant, as the ore is soft and friable in nature, substantial fugitive dust during transportation is expected. So, precautionary measures like covering the trucks containing ore shall be practiced.

8.2.3 Water quality

Mining is a physical process where water is mainly used for dust suppression and washing of heavy earth moving machines. Since no chemical transformation takes place and the ore is naturally occurring, there is no possibility of any chemical contamination in this waste water except an increase in suspended solids comprising ore particles, clay etc. During oil changes in equipment & other machinery in garage, the oil is mostly drained into containers and being sent to the General Stores for onward disposal to authorized re-processors. All the used filters are being destroyed in identified pit in store premises. Water contaminated with spilled oil & grease from service area is handled through oil separation system. Effluents from garage and workshop are carried to oil separation system and the oil free water is recycled. Thus there will be no discharge going out of the lease area and to any water body. From above it can therefore be concluded that no adverse effect is expected in water quality.

8.2.4 Noise levels

The existing noise level in the area closed to the mine site, as measured at work zone is 70 db (A) during day time and 64 dB (A) at night (Leq. values calculated). The noise level is regularly monitored in the respective area and data thus generated are recorded and maintained for effective control measures which has been dealt in subsequent paragraph.

8.2.5 Vibration levels (due to blasting)

The problem of ground vibration is associated with operations like drilling, blasting, loading, crushing and that of running machineries. But the most prominent one are the factors associated with blasting operations. To control the ground vibration due to blasting, Nonel is being used and multi delay in a hole is in practice to minimize noise, ground vibration and to restrict fly rock.

8.2.6 Water regime

During the course of mining, no nallah/streams has been diverted. The rain water and seepage water collected in the deep sumps, is being pumped out. The pumped out water passes through settlings tanks & long drainage system within the mining area where the suspended particulate matter, if any, gets settled and the clean water goes to the neighbouring agricultural land and are utilized for the cultivation purpose. Waste water & sanitary sewage from domestic use in the colony is being discharged to septic tank and soak pit and in no circumstances discharged to any water body. As estimated, the source of water for futuristic operations of the project shall be from quarry accumulated water and dug well. Maximum water demand to

satisfy the project requirement is 295 CuM/day (in peak summer). Out of 295 CuM, only 25 CuM water is drawn from ground water. The population is also low. As because water demand for industrial, domestic and irrigation is very low, drawl of 25 CuM/day (maximum) of water from the surface and ground source shall not cause any water deficit in the area. Moreover, a number of streams join after the water drawl point are acting as surface recharge sources and sufficiently compensating the drawl quantity.

8.2.7 Acid mine drainage : Not applicable

8.2.8 Surface subsidence : Not applicable

8.2.9 Socio-economics

The location of operational area under reference with respect to the villages or other human settlement and the scale of mining activities contemplated are observed not to cause any damage to the property. There are no amenities of any type, existing in and around the area to get affected by the mining operation. There are no major displacement of village and rehabilitation of land for bustees involved except in the danger zone of blasting, which is almost complete. This does not affect the basic life style, livelihood or culture. The continuance of mining has improved the socio-economic conditions of the people living around. Various direct and indirect benefits given to the mine employees are also extended to the villagers and the facilities are -

- Direct employment in the mines at much higher wages;
- Improved transport and communication facilities;
- Additional educational and medical facilities;
- Post office, bank and market facilities;
- Additional security measures adopted by company;
- Electricity and lighting facilities in the nearby villages; and
- Recreational facilities like club, sports and pastime, T.V., cinema etc., as entertainment facilities.

8.2.10 Historical monuments etc.

As explained in earlier paragraph, no natural park, wildlife sanctuary, forest, national monument or tourist interest do not exist in the lease area as well as in buffer zone also. Hence, impact assessment on this account does not required.

8.3 Progressive reclamation Plan

8.3.1 Part of the voids in quarry – 1 has been reclaimed up to 150 mRL as on date with 20,66,216 CuM waste material. Another 2,28,784 CuM waste shall be reclaimed during the current plan period up to 160 mRL.

8.3.2 Environmental aspects

(a) Efforts are being taken to restrict/ reduce the degradation of land in the coming years by limiting the activities by depth ward extension of mining. However, during the coming year of mining in the lease hold area, it has been projected that an additional area of 0.36 hectares of land will be degraded in quarry – 1 of Band – I and quarry – 2 of Band – VI for systematic development of the quarry during the review period and by end of conceptual period, a total area of 29.756 Ha of land will be degraded due to quarrying.

(b) The plantation program during the coming years is shown in the Conceptual Plan **Plate No. 08 (A)**. Continuous agaves or similar plantation will be done at the waste dumps and mined out areas.

(c) Environmental monitoring with respect to air, water, noise, etc will be continued as per norms and guidelines.

8.3.3 Land use pattern

The existing land use shall be changed during the scheme period and conceptual period since the quarries are to be extended and some fresh areas shall be utilized for mining and other activities. The present land use pattern vis a vis that in scheme period and conceptual period are tabulated below:

Sl. No.	Head	Area put on use at start of proposed Review period (Ha)	Land use at the end of the proposed review period (Ha)	land use at the end of the conceptual period (Ha)
1	Area under mining	28.332	29.756	33.883
2	Storage for top soil	0.000	0.000	0.000
3	Waste dump site	28.377	28.782	36.398
4	Back filling	8.240	8.240	8.240
5	Mineral storage	2.831	2.831	2.331
5	Infrastructure (workshop, admin. Build.,etc.	1.560	1.560	1.560
6	Roads	2.668	2.668	1.919
7	Railways	0.000	0.000	0.000
8	Green belt	5.040	4.275*	1.899*
9	Tailing pond	0.700	0.700	0.700
10	Effluent Treatment Plant	0.600	0.600	0.600
11	Mineral Separation Plant	1.470	1.470	1.470
Grand Total		**79.818**	**80.882**	**89.000**

* Part of safety zone area (0.765 Ha in scheme period & 3.141 Ha in conceptual period) shall be used for joint mining & dumping and the balance area of 4.275 Ha and 1.899 Ha shall be left as green belt.

8.3.4 Summary of Year-wise Proposal for Item No 8.3

Items	Details	Cumulative as on date	Proposed (Year)				
			2017-18	2018-19	2019-20	2020-21	2021-22
Dump management	Area afforested (Ha)	21.7 Ha inside ML	Gap plantation	On 1st year dump	On 2nd year dump	On 3rd year dump	On 4th year dump
	No of saplings planted	112000 (as on 30.09.16)	3000	3500	2500	3000	3000
	Cumulative no of plants	112000	115000	118500	121000	124000	127000
	Cost including watch and care during the year (Lakhs)	212 lakhs	-	-	-	-	-
Management of worked out benches	Area available for rehabilitation (Ha)	8.24 ha	-	-	-	-	-
	Afforestation done(ha)	2.8	-	-	-	-	-
	No of saplings planted in the year	-	500	500	500	500	500
	Cumulative no of plants	5000	5500	6000	6500	7000	7500
	Any other method of rehabilitation (specify)	-	-	-	-	-	-
	Cost including watch and care during the year (L)	-	1,00,000	1,00,000	1,00,000	1,00,000	1,00,000
Reclamation and Rehabili-tation by backfilling	Void available for Backfilling (L x B x D) pit wise /stope wise	265 x 311 x 93 (8.24 Ha)	-	-	-	-	-
	Void filled by waste /tailings	From 71 mRL to 150 mRL	-	-	-	-	-
	Afforestaion on the backfilled area	5000	-	-	-	-	-
	Rehabilitation by making water reservoir		-	-	-	-	-
	Any other means (specify)		-	-	-	-	-
Rehabili-tation of waste land within lease	Area available (ha)		-	-	-	-	-
	Area rehabilitated		-	-	-	-	-
	Method of rehabilitation		-	-	-	-	-
Others (specify)	Besides, retaining wall, garland drain, settling tank etc have been constructed and shall be re-constructed. Details are as follows.			-	-	-	-

Particulars	Already Constructed	To be constructed				
		2017-18	2018-19	2019-20	2020-21	2021-22
Retaining wall (m)	633	100	100	Regular maintenance		
Garland drain (m)	2815	Regular de-silting				
Boulder wall (m)	348	Regular maintenance				
Settling Pond	One	Regular de-silting				
Afforestation (Dump, lease boundary, office premises	21.7 Ha/112,000 nos	3000 (Gap plantation)	3500 (Gap plantation)	2500 (Gap plantation)	3000(Gap plantation)	3000(Gap plantation)
Construction of check Dam (No.)	----	As required				

8.4 Disaster Management and Risk Assessment

Action plan for high risk accidents like landslides, subsidence flood, fire, seismic activities, tailing dam failure etc. and emergency plan proposed for quick evacuation, ameliorative measures to be taken etc. The capability of lessee to meet such eventualities and the assistance to be required from the local authority are also described.

As far as the nature of deposit and method of mining (opencast) is concerned, there is no possibility of landslide, subsidence, flood, inundation, fire, seismic activity and tailing dam failure etc.

8.4.1 Measures taken for controlling any unforeseen disaster and risk etc

(i) Ultimate slope of the quarry is kept at ≤ 30° and the waste dump at ≤ 30°.

(ii) The nearest water body which controls the drainage system and receives the entire rain & run-off water is Damsala nala at a distance of 2 km from the mine towards north. There were no floods in the past & not expected in future too, as the area is located in higher altitudes.

(iii) Though earthquake is felt several times in Orissa, damage to man & material has not been severe till date.

(iv) One explosives magazines with total capacity of 600 Kgs have been constructed within the lease area for storage of explosives. Handling of explosives and blasting operations are done by qualified blasters and blaster helpers under the supervision of an Asst. Manager. The Asst. Manger is assisted with a qualified foreman to have effective supervision. To control fly rock fragments during blasting thereby creating problems to nearby men and machinery, precautionary measures are being adopted and shall be continued in future which are as below.

- Proper blast design results in lower ground vibrations and avoids the fly rock.
- Controlled blasting technique with SME/SMS (Nonel system of initiation).
- Drill holes will be located in weaker planes.
- No loose materials will be kept on the bench floors during blasting.
- Optimum stemming length and stemming material will be chosen.
- Safe ratio (stemming length to burden of hole) shall be kept at more than 0.6.
- Proper compaction of the stemming material will be undertaken before blasting.

(v) Safety Precautions are being practiced and are also proposed. Boards displaying (in Odiya & English) blasting time will be kept at the places where required. Blasting time will be fixed and intimated to all concerned. At the time of blasting, security guards will be deployed in order to block the vehicle movement on the public road. In order to indicate the blasting operation, red flags will be kept where ever required. A Siren will be blown at the beginning and end of the blasting operation.

(vi) Small-scale fire may occur, which will be extinguished by fire extinguisher. Sufficient quantity of sand and water are kept in the magazine premises.

(vii) Tailing ponds of the COB plant are built on impervious ground and the sides have been raised by putting embankments on all sides so that on surface water can enter in to it. Attempts are being made to directly shift the tailings to an earmarked area on Dump-2 by pumping after lining the area by HDPE as per the guidelines of State Pollution Control Board.

8.4.2 Care and maintenance during temporary discontinuance

An emergency plan for the situation of temporary discontinuance due to court order or due to statutory requirements or any other unforeseen circumstances may indicate measures of care, maintenance and monitoring of status of discontinued mining operations expected to re-open in near future.

(a) During temporary discontinuance due to unforeseen reasons such as court order, natural calamity, mine related accident, any type of failure in fulfillment of statutory requirement or local issues or any other unforeseen circumstances, slope failure etc shall have to be implemented forthwith.

(b) Emergency plan to be taken up, which will include the followings.

- Intimation to local mine and legal administrative authorities concerned (IBM, DGMS, Directorate of Mines, Circle Mining Office & others) regarding the temporary discontinuance.
- Explanation to the local community, on the cause of temporary discontinuance and possibility of reopening of mine in future.
- Listing and proper storing of machines, materials, assets and documents.
- Care and maintenance of machinery as per machine operating manuals.
- Tightening of security to keep the machine and materials safe & secured.
- Monitoring of status of unplanned discontinued mining operation in respect of bench height, width, individual bench slope angle, over hang, under cut, misfire or any other parameters, whose levels either in form of higher side or lower side, is dangerous for further mine working.
- Repair & maintenance of haul road.
- Regular monitoring of air, water, noise & others in the permitted area.

(c) Necessary plan & section at the time of discontinuance of mines are to be prepared and kept ready. Those are

- Projection of benches, in the plan and sections, which is safe for future working.
- Management of misfire. Fly rock movement, maintenance of machinery & others which are risk free and not dangerous for further working.
- Intimation to concerned authorities for reopening, once the mine is risk free.

8.4.3 Name of persons, designation with address and phone along with respective responsibilities detailed under disaster management para.

Sri S. S. Mohapatra, Sr. Manager (Mines), Kaliapani Chromite Mines, M/s Jindal Stainless Limited, At & Post –Kaliapani, District : Jajpur-755028 (Odisha).

8.6 Financial Assurance

The amount calculated for the purpose of Financial Assurance in the present review of mining plan is based on the CCOM's Circular no. 4 dated 2006 and is as below.

Sl. No.	Head	Area put on use at start of Scheme period (Ha)	Additional area (Ha) required	Land use at the end of the scheme period (Ha)	Area (Ha) considered as fully reclaimed & rehabilitated	Net area (Ha) considered for calculation
1	Area under mining	28.332	1.424	29.756	0.000	29.756
2	Storage for top soil	0.000	0.000	0.000	0.000	0.000
3	Waste dump site	28.377	0.405	28.782	0.000	28.782
	Back filling	8.240	0.000	8.240	0.000	8.240
4	Mineral storage	2.831	0.000	2.831	0.000	2.831
5	Infrastructure (workshop, admin. Build.,etc.	1.560	0.000	1.560	0.000	1.560
6	Roads	2.668	0.000	2.668	0.000	2.668
7	Railways	0.000	0.000	0.000	0.000	0.000
8	Green belt	5.040	(-)0.765	4.275	0.000	4.275
9	Tailing pond	0.700	0.000	0.700	0.000	0.700
10	Effluent Treatment Plant	0.600	0.000	0.600	0.000	0.600
11	Mineral Separation Plant	1.470	0.000	1.470	0.000	1.470
12	Others (if any) Specify	0.000	0.000	0.000	0.000	0.000
Grand Total		**79.818**	**1.064**	**80.882**	**0.000**	**80.882**
		A	**B**	**C (A+B)**	**D**	**E (C – D)**

The above mentioned actions have been stated clearly in the mine closure plan. Certificate duly signed by the lessee to the effect that said closure plan complies all statutory rules, regulations, orders made by the Central or State Government, statutory organizations, court etc. have been taken into consideration and has been submitted at Part-B, Para-9.0. The financial assurance in shape of a Bank Guarantee from a Scheduled Bank as stated in Rule 23(F) (2) of Mineral Conservation and Development Rules, 1988 for five years period expiring at the end of validity of the review period has been submitted amounting to Rs 20, 22,050/- (Rupees Twenty lakhs twenty two thousand fifty only) towards financial assurance in shape of bank guarantee **(Annexure-27)**.

अनुमोदित
APPROVED

क्षेत्रीय कार्यालय, भुवनेश्वर
REGIONAL CONTROLLER OF MINES
INDIAN BUREAU OF MINES

JINDAL STAINLESS

PART – B

A. CONSENT LETTER/ UNDERTAKING/ CERTIFICATE FROM THE APPLICANT

01. The Review of Mining Plan for the period from 2017-18 to 2021-22 in respect of Jindal Chromite Mine over an area of 89.000 Ha in village Kaliapani & Forest Block-27, P.O. Kalarangiatta, District Jajpur of Odisha State of M/s **Jindal Stainless Limited**, under rule 17(2) of Minerals (Other than Atomic and Hydro Carbons Energy Minerals) Concession Rules, 2016, has been prepared by the Qualified Persons (QPs) Sri P.S.Acharya and Sri S.M.Patro recognized under rule 15 of MCR,2016.

This is to request the Regional Controller of Mines, Indian Bureau of Mines, Bhubaneswar region (Odisha) to make any further correspondence regarding any correction of the Scheme of Mining with the said recognized persons at their addresses below:-

P. S. Acharya, Qualified Person	S. M. Patro, Qualified Person
GEMTECH Consultants Pvt. Ltd,	GEMTECH Consultants Pvt. Ltd,
K-8/625, 1st Floor, At - Kalinga Nagar, Post – Ghatikia,	
Bhubaneswar - 751029 (Odisha)	
Tel No – 9437008179 (M)	Tel No – 9861093020 (M);

We hereby undertake that all modifications/ updating as made in the said Review of Mining Plan by the said qualified persons be deemed to have been made with our knowledge and consent and shall be acceptable on us and binding in all respects.

02. It is certified that the **CCOM Circular No-2/2010** will be implemented and complied with by the authorized agency approved by the State Government.

03. We do hereby undertake to complete exploration in time bound manner in accordance with Ministry of Mines letter No. 10/75/2008-MV dated 23.10.2010.

04. It is certified that the Progressive Mine Closure plan of Roida II Iron Ore mine of M/S Jindal Stainless Limited over an area of 89.000 Ha complies with all statutory rules, Regulations, Orders made by the Central or State Government, Statutory organizations, Court etc which have been taken into consideration and wherever any specific permission is required, the lessee will approach the concerned authorities.

The information furnished in the **Progressive Mine Closure Plan** is true and correct to the best of our knowledge and records.

05. The provisions of **Mines Act, Rules and Regulations** made there under have been observed in the Review of Mining Plan over an area of 89.000 Hectares in Jajpur District in Odisha State belonging to **Jindal Chromite Mine**, and where specific permissions are required, the applicant will approach the **D.G.M.S.** Further, standards prescribed by D.G.M.S. in respect of miner's health will be strictly implemented.

Bhubaneswar
05.12.2016

(99)

(Subrata Bhattacharya)
Whole Time Director & Nominated Owner
Jindal Stainless Limited.

B. Certificate from Qualified Persons

The provisions of the Mineral Conservation and Development Rules, 1988 have been observed in the preparation of the review of Mining Plan for the period from 01.04.2017 to 31.03.2022 of Jindal Chromite Mine over an area of 89.00 Ha of M/s Jindal Stainless Limited, in villages Kaliapani Post office – Kaliapani District Jajpur of Odisha State and whenever specific permissions are required, the applicant will approach the concerned authorities of Indian Bureau of Mines.

The information furnished in the Review of Mining Plan is true and correct to the best of our knowledge.

Bhubaneswar
25.11.2016

P. S. Acharya S. M. Patro
Qualified Persons

10.0 List of the Plans and Sections submitted

Sl No	Plate No	Description	Scale
1	Plate No.1	Key Plan	1 : 50,000
2	Plate No.2	Authenticated Lease Plan	16" = 1 Mile
3	Plate No.3	Surface Plan	1 : 2000
4	Plate No.3(A)	Lease Land Use Plan	1 : 2000
5	Plate No.4	Geological Plan	1 : 2000
6	Plate No.4(A)	Geological Feature and Proposed Bore Hole Plan	1 : 2000
7	Plate No.5(A)	Geological Sections (A A' to C C')	1 : 2000
8	Plate No.5(B)	Geological Sections (D D' to F F')	1 : 2000
9	Plate No.5(C)	Geological Sections(G G' to I I')	
10	Plate No.5(D)	Geological L-Sections	1 : 2000
11	Plate No.6 (A)	Development Plan & sections (Quarry-1) 2017-18	1 : 2000
12	Plate No.6 (B)	Development Plan & sections (Quarry-1) 2018-19	1 : 2000
13	Plate No.6 (C)	Development Plan & sections (Quarry-1) 2019-20	
14	Plate No.6 (D)	Development Plan & sections (Quarry-1) 2020-21	1 : 2000
15	Plate No.6 (E)	Development Plan & sections (Quarry-1) 2021-22	1 : 2000
16	Plate No.6 (F)	Development Plan & sections (Quarry-2) 2017-18	1 : 2000
17	Plate No.7	Common boundary working Plan between JSL & BAL	1 : 2000
18	Plate No.8(A)	Dump Plan	1 : 2000
19	Plate No.8(B)	Dump Section	1:2000
20	Plate No.8(C)	Mineral Reject Plan and Section	1:2000
21	Plate No.9 (A)	Conceptual Plan (Quarry-1) & (Quarry-2)	1:2000
22	Plate no.9(B)	Conceptual Cross Section(Quarry-1) & Quarry-2)	1 : 2000
23	Plate no.9(C)	Conceptual L- Section(Quarry-1) & Quarry-2)	1 : 2000
24	Plate No.10	Environment Plan	1 : 5,000
25	Plate No.11	Management of Surface Runoff Water Plan	1 : 2000
26	Plate No.12	Reclamation Plan	1 : 2000
27	Plate No. 13	Financial Assurance Plan	1 : 2000

11.0 **List of Documents Annexed**

Annexure No	Contents	Page	
		From	To
Annexure - 1A	Copy of the Original lease deed executed on 04.01.2002	1A/1	1A/52
Annexure - 1B	Copy of the transfer lease deed executed on 26.12.2007	1B/1	1B/12
Annexure - 1C	Copy of the amended lease deed dt. 20.03.2015 allowing M/s Jindal Stainless Ltd. to supply chrome ore from the leasehold area to their plant at Kalinganagar Industrial Complex in Jajpur district of Odisha for captive purpose.	1C/1	1C/11
Annexure - 2A	Copy of the approval letter dt. 29.12.2000 of the mining plan for the granted mining lease.	2A/1	2A/2
Annexure - 2B	Copy of the approval letter dt. 28.01.2005 of modification to the approved Mining Plan under Rule 10 of MCDR-1988 for the FY 2004-05 to 2006-07.	2B/1	2B/2
Annexure - 2C	Copy of the approval letter of the scheme of mining dt. 14.06.2007 for the period from 2007-08 to 2011-12 under Rule 12 of MCDR-1988	2C/1	2C/2
Annexure - 2D	Copy of the approval letter on modification to the approved scheme of mining dt. 24.06.2010 for the period of 2009-10 to 2011-12 under Rule 10 of MCDR-1988, incorporating an additional COB Plant with a capacity of 24000 t/year	2D/1	2D/2
Annexure - 2E	Copy of approved scheme of mining dt. 02.05.2012 for period of 2012-13 to 2016-17 under Rule 12 of MCDR-1988.	2E/1	2E/2
Annexure - 2F	Copy of the approval letter on modification to the approved scheme of mining for the period 2016-17 under Rule 17 of MCR-2016 vide letter No. MSM/FM/24-ORI/BHU/2015-16 dt. 13.06.2016.	2F/1	2F/2
Annexure - 3A	Copy of the letter dt. 05.07.2001 issued by MoEF on Forest clearance for the project over 22.80 Ha excluding the safety zone area of 1.44 Ha.	3A/1	3A/2
Annexure - 3B	Copy of the correspondences from DFO, Cuttack and Tahsildar, Sukinda regarding classification of forest land on sabik settlement for the purpose of forest diversion and copy of application filed by lessee for diversion of balance forest land of 64.760 Ha.	3B/1	3B/8
Annexure - 4	Copy of the letter dt. 13.02.2001 issued by MoEF on environmental clearance of the project with an annual production capacity of 0.10 MTPA of Chrome ore by opencast mechanized mining method.	4/1	4/4
Annexure - 5A	Copy of Environmental clearance for installation of the second COB Plant from MOEF & Climate change, New Delhi vide letter No. J-11015/369/2009.IA-II(M) dt. 24.02.2016	5A/1	5A/7

Annexure - 5B	Copy of the Lessee's letter dt. 13.10.2016 submitted to the Hon'ble EAC w.r.t. clarifications sought by them for prescribing TOR for increase in production from 0.10 MT to 0.215 MT per annum.	5B/1	5B/1
Annexure - 6A	Copy of the Consent to operate the mine for opencast mining obtained from SPCB Odisha for production of chrome ore and concentrate of 1 LTPA (including COBP-2 operation) vide letters dt. 01.10.2016 and 26.10.2016.	6A/1	6A/10
Annexure - 6B	Copy of the Consent to establish for a production of 215,000 tonnes of chrome ore/ annum obtained from SPCB Odisha on 30.11.2011.	6B/1	6B/6
Annexure - 7	Copy of the letter dt. 24.01.2002 approving surface right over 87.101 Ha (excluding 0.459 Ha of Road Kisam in Plot No 892 (P) and 1.440 Ha of forestland for development of safety zone within mining lease of 89.00 Ha.	7/1	7/3
Annexure - 8	Copy of the Resolution of the Board appointing Sri Subrata Bhattacharya as the nominated owner of the lease along with list of Board of Directors with undertaking regarding working in other firms/Company/Organization.	8/1	8/3
Annexure - 9	Copy of the photo ID proof of Sri Subrata Bhattacharya, whole time Director, M/s Jindal Stainless Ltd.	9/1	9/2
Annexure - 10	Copy of the proof of address of the Jindal Chromite Mines	10/1	10/1
Annexure - 11A	Copy of the certificates of Qualification and experience of Qualified Persons Mr P.S.Acharya & Mr S.M.Patro.	11A/1	11A/4
Annexure - 11B	Copy of the certificate of certified surveyor.	11B/1	11B/2
Annexure - 12	Copy of the Form "J" submitted to IBM for conducting boreholes during the plan period.	12/1	12/4
Annexure - 13	Copy of the Form "K" with logs of bore holes drilled during present scheme period and earlier.	13/1	13/34
Annexure - 14	Copy of the MoU on joint mining proposal with M/s BAL and M/s JSL	14/1	14/4
Annexure - 15A	Copy of the work order issued to M/s Maheswari Mining (P) Ltd on 06.03.2014 and M/S Asian Oilfield Services Ltd on 27.06.2011 for conducting core drilling during the scheme period along with copies of all invoices for payment.	15A/1	15A/38
Annexure - 15B	Copy of the LOI dt. 28.10.2016 issued to M/s Geo Exploration India for conducting diamond core drilling.	15B/1	15B/1
Annexure - 16A	Copy of the violation Letter No ORI/CR/JJP/MCDR-14/BBS Dated 09.10.2013 issued by IBM & its reply by the lessee dt. 25.10.2013.	16A/1	16A/4
Annexure - 16B	Copy of the violation Letter No ORI/RECL/BBS-2014 /2028 Dated 01.09.2014 issued by IBM & its reply by the lessee dt. 14.10.2014.	16B/1	16B/5
Annexure - 16C	Copy of the violation Letter No ORI/CR/JJP/MCDR-13/BBS/1653 Dated 21.08.2015 issued by IBM & its reply by the lessee dt. 30.09.2015.	16C/1	16C/5
Annexure- 16D	Copy of the violation Letter No ORI/CR/JJP/MCDR-14/BBS/2261 Dated 05.11.2015 issued by IBM & its reply by the lessee dt. 03.12.2015.	16D/1	16D/7
Annexure -16E	Copy of the violation Letter No ORI/IRON/KJR/MCDR-24/BBS/2671 Dated 02.12.2015 issued by IBM & its reply dt. 30.12.2015.	16E/1	16E/3

Annexure - 16F	Copy of the violation vide letter No ORI/CR/JJP/MCDR-14/BBS/3700 dt.03.03.2016 issued by IBM & its reply dt.15.04.2016.	16F/1	16F/5
Annexure - 16G	Copy of the show cause notice vide letter No ORI/CR/JJP/MCDR-14/BBS/Vol-II/212 dt.03.05.2016 issued by IBM and its compliance dt. 20.05.2016.	16G/1	16G/4
Annexure - 16H	Copy of the violation letter No ORI/CR/JJP/MCDR-14/BBS/1988 dt.02.11.2016 issued by IBM and its compliance dt. 07.12.2016.	16H/1	16H/3
Annexure - 17A	Copy of letter No. 7593/5F(Misc) dt. 06.08.2016 from Divisional Forest Officer, Cuttack Forest Division for discontinuance of mining operations.	17A/1	17A/2
Annexure - 17B	Copy of lessee's letter No. JSL/KLPN/2016/232 dt.08.09.2016 to DFO, Cuttack for reopening of mining operation.	17B/1	17B/2
Annexure - 18A	Copy of the reports of 10% of total scheme period samples those were check analyzed for confirming the reliability of the results in Government Laboratory.	18A/1	18A/3
Annexure - 18B	Test report of bulk density of different ore types conducted by M/S Earth & Environment Laboratory, a NABL accredited laboratory along with its NABL certificate.	18B/1	18B/3
Annexure - 19	Feasibility report	19/1	19/24
Annexure - 20A	Permission from Director, Mines safety for mining in the common boundary with M/S BAL vide letter dt. 25.06.2015.	20A/1	20A/2
Annexure - 20B	Permission from Director, Mines safety for dumping in the common boundary with M/S BAL vide letter dt. 08.07.2015.	20B/1	20B/2
Annexure - 21A	Study report conducted by CMRI on bench slope stability study.	21A/1	21A/33
Annexure - 21B	Blasting Study report conducted by ISM, Dhanbad on vibration due to blasting.	21B/1	21B/36
Annexure - 21C	Copy of work order issued to IIT, Kharagpur for conducting geotechnical work related to slope stability study & their acceptance.	21C/1	21C/5
Annexure - 22A	Permission for withdrawing of ground water from CGWA	22A/1	22A/2
Annexure - 22B	Water balance diagram of the mining project with COB Plant	22B/1	22B/1
Annexure - 23	LOI to M/S Qualicom Solutions Pvt. Ltd, Kolkata for setting up ETP & techno-commercial proposal with plot plan/ P&I.	23/1	23/17
Annexure - 24A	The detail flow sheet of COB Plant – 1	24A/1	24A/1
Annexure - 24B	The detail flow sheet of COB Plant - 2	24B/1	24B/2
Annexure - 25A	Water balance chart for COBP – 1	25A/1	25A/1
Annexure - 25B	Water balance chart for COBP – 2 (Proposed)	25B/1	25B/1
Annexure - 26A	Results of monitoring of Water during Jun, 2016.	26A/1	26A/8
Annexure- 26B	Results of monitoring of Air, dust fall & fugitive emission during Jun, 2016.	26B/1	26B/6
Annexure - 26C	Results of monitoring of Noise & soil during Jun, 2016.	26C/1	26C/2
Annexure - 27	Copy of Bank guarantee dt. 09.12.2016 (extension of BG No. 01/12-13 for Rs.18,64,250/- and BG No. 08/16-17 for Rs. 1,57,800/- totaling Rs. 20,22,050/-)	27/1	27/7
Annexure - 28	Few photographs of the lease area.	28/1	28/4

Annexure-IV

Government of Orissa
Department of Steel & Mines

No. 5471 /SM, Bhubaneswar, the 25/11/04
IV(G)SM-11-06

PROCEEDINGS

Sub: Application dated 11.08.2003 of M/s Jindal Stainless Limited for transfer of ML for Chromite over 89.00 hects in villages Kaliapani and Mahagiri in the district of Jajpur.

Order:

Whereas, the above noted Mining Lease in the district of Jajpur was executed in favour of M/s Jindal Strips Limited for a period of 20 years with effect from 01.01.2002;

Whereas, M/s Jindal Stainless Ltd. has applied on 11.08.2003 to the State Government for transfer of the said M.L. & consider all the M.C. applications filed by M/s Jindal Strips Ltd. in favour of them ;

Whereas, by an order dated 30.05.2003 of the Hon'ble Punjab & Haryana High Court in company petition No.64 of 2003, the Hon'ble Court has directed that as per the scheme of arrangement and de-merger, among Jindal Strips Ltd. & Jindal Stainless Ltd. with effect from the appointed date i.e. 01.04.2002, the Stainless Steel Undertaking of Jindal Strips Ltd. with all the property, assets, rights and powers specified in Parts I, II & III of the schedule shall stand transferred to and vest in Jindal Stainless Ltd. without further act or deed, and accordingly the same shall pursuant to Section 394(2) of the Company Act, 1956;-

Whereas, M/s Jindal Stainless Ltd. have undertaken to accept all the conditions and liabilities which the lessee company is having in respect of the ML and the applications made for ML/PL in the State ;

Whereas, the M/s Jindal Stainless Ltd. has also undertaken to accept all the terms & conditions of the above mining lease which includes supply of chrome ore from this mining lease area of 89 hects to meet the captive requirement of the Ferro Chrome Plants of M/s Jindal Steel & Power Ltd. at Raigarh (Chhatishgarh) along with two units at Kothavalsa (AP) and Hisar (Haryana) of m/s Jindal Stainless Ltd. ;

Whereas, the State Government in compliance of the above order of the Hon'ble Punjab & Haryana High Court have considered the case of transfer of above ML & other pending M.C. applications filed by Jindal Strips Ltd. in favour of Jindal Stainless Ltd.;

Now, therefore, the State Government have been pleased to allow transfer of the above granted and executed M.L. and pending M.C. applications filed by M/s Jindal Strips Ltd. to the name of M/s Jindal Stainless Ltd.

Further, M/s Jindal Stainless Ltd. shall execute a supplementary lease deed incorporating all terms and conditions of the original deed of M/s Jindal Strips Ltd. and register the same within 3 months from the date of this order.

By order of the Governor

28.9.07

Joint Secretary to Government

Memo No. 8380 /SM, Bhubaneswar, the 28.9.07

Copy with copy of the model form of supplementary lease deed forwarded to the Collector, Jajpur for information and necessary action.

He is requested to ensure that the deed is executed & registered within three months from the date of this order observing all formalities. Arrear dues in respect of the ML in question may be realized before execution of the said deed.

After execution and registration, of the deed four copies of the supplementary deed may be furnished to this Department with a copy to the Director of Mines, Orissa, Bhubaneswar.

28.9.07

Joint Secretary to Government

ANNEXURE-IV A

Government of Odisha
Forest and Environment Department

10F (Cons) 322/2012/ 7301 /F&E dated 16-3-16

From

Shri Debidutta Biswal, IFS
Special Secretary to Government

To

The Assistant Inspector General of Forests,
Govt. of India, Ministry of Environment & Forest and Climate Change,
(F.C.Division), Indira Paryavaran Bhawan,
Jor Bagh, Aliganj Road,
New Delhi -110003

Sub: Change of name from M/s Jindal Strips Ltd. to M/s Jindal Stainless Ltd. pertaining to forest clearance for diversion of forest land in Kaliapani chromite mines in Jajpur district.

Sir,

I am directed to say that a mining lease over 89.00ha. for mining chromite ore in village Kaliapani and Mahagiri in the district of Jajpur(under the jurisdiction of Cuttack Forest Division) was earlier executed in favour of M/s Jindal Strips Limited for a period of 20 years w.e.f. 1.1.2002. The Mining lease area of 89ha. included then 24.24ha. of forest land and remaining non-forest land as per hal record. GoI, MoEF had also accorded final forest clearance for 22.80ha. of forest land in favour of M/s Jindal Strips Limited vide their letter No. 8-68/2000-FC dt. 5.7.2001 excluding 1.44ha. of forest land earmarked to be maintained as safety zone as per practice prevailing then.

In compliance to order dt. 30.5.2003 of the Hon'ble Punjab & Haryana High Court in Company Petition No. 64 of 2003 with regard to their approval of the scheme of arrangement and de-merger among Jindal Strips Ltd. and Jindal Stainless Ltd w.e.f appointed date 1.4.2002, the State Government in Steel & Mines Department vide Proceeding No. 8379 dt. 28.9.2007 have allowed transfer of the above granted and executed ML and pending M.C Applications filed by M/s Jindal Strips Ltd to the name of M/s Jindal Stainless Ltd.(Copy enclosed). The certificate of registration of orders of the Court confirming the scheme of arrangement and de-marger dt. 28.7.2003 issued by Asst. Registrar of Companies of NCT of Delhi and Haryana is enclosed herewith for reference. The new user agency, in compliance to MoEF&CC guidelines F.No. 8-78/1996-FC(pt.) dt. 19.2.2016, is taking steps for filing the forest diversion proposal

pertaining to 66.20ha. of sabik kisam forest land(status forest as on 25.10.1980 but later treated as non-forest land in hal record while processing the proposal under FC Act/MMDR Act). The PCCF, Odisha vide his letter No. 5760 dt. 21.3.2016 has reported about deposit of Rs. 1.00 lakh in Ad-hoc CAMPA Account in Corporation Bank, New Delhi by the applicant Company through RTGS mode vide UTR No. SBIN816046098727 on 15.2.2016. Copy of RTGS transaction document is enclosed . This is the transfer fee as per stipulation of MoEF, Government vide their guideline bearing F.No. 11-9/1998-FC dt. 3.5.2010.

In view of the above, Government of India, MoEF&CC may kindly consider the above and convey their order for transfer of lease(Forest clearance) as per provision of para 2.8 of FC Act guidelines in favour of M/s Jindal Stainless Ltd. for further necessary action at this end.

Yours faithfully

Special Secretary to Government

Memo No. 9302 /Dt. 16-5-16

Copy along with the copy of enclosures forwarded to the Addl. Principal Chief Conservator of Forests (Central), Government of India, Ministry of Environment & Forests and Climate Change, A/3, Chandrasekharpur, Bhubaneswar for information and necessary action.

Special Secretary to Government

Memo. 9303 /F&E dt. 16-5-16

Copy forwarded to the Steel & Mines Department for information and necessary action with reference to their letter No.3715 dt. 7.5.2016.

Special Secretary to Government

Memo. 9304 /F&E dt. 16-5-16

Copy forwarded to the PCCF, Odisha/PCCF(WL)&CWLW, Odisha for information and necessary action with reference to letter No.5760 dt. 21.3.2016 of PCCF, Odisha.

Special Secretary to Government

Memo. 9305 /F&E dt. 16-5-16

Copy forwarded to the RCCF, Angul/DFO, Cuttack for information and necessary action.

Special Secretary to Government

Memo. 9306 /F&E dt. 16-5-16

Copy forwarded to the M/s Jindal Stainless Ltd. , At/PO Kaliapani, Dist. Jajpur-755047 for information and necessary action with reference to their letter dt. 27.4.2016.

Special Secretary to Government

ANNEXURE P-3

COMPANY NO. 05-5456

CERTIFICATE OF REGISTRATION OF ORDERS OF COURT
Scheme of Arrangement & Demerger
CONFERMING ~~AMALGAMATION~~ OF COMPANIES.

Section 391(2) and 394 of the Companies Act, 1956.

Punjab & Haryana
I hereby Certified that the certified copy of the Delhi High Court
Order in C.P.No. 64 of 2003 & 135 of 2003 dated 30-5-2003 regarding
Scheme of Arrangement & Demerger
the ~~amalgamation~~ of undermentioned company/companies:-

Mk Jindal Strips Limited

With M/s. Jindal Stainless Limited

has been registered under the Companies Act, 1956.

Given under my hand at NEW DELHI this 28th day of
July Two Thousand Three.

(V. P. Rathee)
~~Dy~~ ASSTT. REGISTRAR OF COMPANIES
NCT OF DELHI & HARYANA

Certified to be true
For Jindal Stainless Limited
Director

ANNEXURE- IV B

State Bank of India

WHOMSOEVER IT MAY CONCERN

Certified that the following RTGS is made in favour of Ad- hoc Body of Compensatory Afforestation Fund Management and Planning Authority (CAMPA) corporation bank A/c No SB01025222 payable at New Delhi by debiting OD account No 31385694782 of JINDAL STAINLESS LIMITED

Favouring – Ad hoc Body of Compensatory Afforestation Fund Management and Planning Authority (CAMPA)

Date of payment	UTR No	Amount in Rs
15/02/2016	SBIN816046809872	1,00,000/-

(Rupees One lacs only)

Chapter 5

Transfer/Re-diversion

Any forest land diverted for a non-forest use with prior approval of GOI under FCA shall be used by the User Agency for the purpose for which it has been diverted.

However, transfer of user agency for same purpose, or re-diversion for another purpose by same or another user agency may be considered on following basis:

5.1 Transfer of User Agency:

The following procedure shall be followed:

(a) An application from the concerned State/Union Territory Government along with an undertaking from the new user agency shall be submitted.

(b) The undertaking shall state that the new user agency will abide by all conditions on which diversion of forest land was approved in favour of the previous user agency.

(c) Transfer of User Agency can be considered by the Central Government (MoEF&CC) for same use and on same conditions.

(d) The Central Government shall levy a transfer fee, to discourage middle men from processing applications and then selling it to other, @10% of NPV or Rs. 100,000 whichever is less.

(e) The transfer fee will not be applicable to change of UA associated with change in legal heir, and wind power generation projects involving of transfers.

(f) However, in case the transfer is from a Central Government Department/Central Government Undertaking (CPSU) to a User Agency other than Central Government Department /CPSU, the proposal will be examined by the Central Government afresh, and transfer can be agreed to with additional conditions so as to ensure that special concessions given to Central Government Department/CPSU while granting the approval are not extended to the new User Agency.

5.2 Change of the name of UA without any change in shareholding pattern

When change in the name of user agency without any change in its shareholding pattern becomes necessary, permission of the Central Government would be required. The State Govt., shall submit following documents within three months:

(a) no-objection certificate for such change by the State Government.

(b) A certified copy of fresh certificate of incorporation consequent upon change of name issued by the Registrar of Companies

(c) An explanatory statement from the user agency for such change.

Similarly, when change in the name of user agency due to inheritance (change in legal heirs) becomes necessary, permission of the Central Government would be required. For this purpose, the State Government, within three months from the date of issue of legal heir certificate shall submit documents as specified in para (b) and (c) above.

with the widening/modernization under intimation to the local State Forest Department and Central Government.

Clarification: This guideline is applicable to only such projects, where plantations have been raised on the lands acquired by the user agency and subsequently notified as Protected Forest. This guideline will not be applicable if the forest land involved is reserved/protected forests belonging to the Forest Department.

2.6. Cost-benefit Analysis

i) While considering proposals for dereservation or diversion of forest land for non-forest use, it is essential that ecological and environmental losses and socio-economic distress caused to the people who are displaced are weighed against economic and social gains.

ii) Annexure VI (a) details the types of projects for which cost-benefit analysis will be required. Annexure VI (b) lists the parameters according to which the cost aspect will be determined, while Annexure VI (C) gives the parameters for assessing the benefits accruing.

iii) A cost-benefit analysis as above should accompany the proposals sent to the Central Government for clearance under the Act.

2.7. Plan for Rehabilitation of Oustees

i) If the project involves displacement of people, a detailed Rehabilitation Plan shall be submitted along with the proposal for diversion of forestland. The Scheduled Tribe and Scheduled Caste population should be separately considered, and plan for their rehabilitation should be in consonance with their socio-economic, cultural and emotional lifestyle.

ii) The Government of India do not allow diversion of forest land for rehabilitation of people. However, such diversion may be considered as a special case, if diversion of forest land is essentially required for the rehabilitation of persons belonging to Scheduled Tribes, Scheduled Castes and other people who may have to be shifted from the zone of a national park or reserve.

2.8. Transfer of Lease

[35][Where transfer of lease on forest land, from one user agency to another for the same purpose for which the forest land was diverted, becomes necessary, prior permission of the Central Government would be required. For this purpose, the State Government and the original user agency is required to submit no-objection certificate for such transfer and; the new user agency has to submit an undertaking that they shall abide by all the conditions on which the forest land was leased to the original user agency and any other conditions which may be stipulated by the Central Government/ State Government in future.]

[35] Subs. vide F. No. 2-1/2003-FC dated: 20th October, 2003

[36][Provided that in case of 204 coal blocks whose allocation has been cancelled by the Hon'ble Supreme Court, no-objection certificate from the original user agency for such transfer is not required to be obtained. In such cases, Ministry of Coal is required to submit details of the new user agency along with an undertaking from the new user agency that they shall abide by all the conditions on which the forest land was leased to the original user agency and any other condition which may be stipulated by the Central Govt. /State Govt. in future.

Provided further that in case of these 204 coal blocks, reimbursement of amount paid by original user agency in compliance of conditions stipulated in approval accorded under the Forest (Conservation) Act, 1980 for use of forest land for non-forest purpose will be death with in the manner, as provided in the Coal Mines (Special Provisions) Second Ordinance, 2014 and the rules framed thereunder.]

[37][When change in the name of user agency without any change in its shareholding pattern becomes necessary, permission of the Central Government would be required. For this purpose, the State Government, within three months from the date of issue of fresh certificate of incorporation consequent upon change of name, is required to submit no-objection certificate for such change along with a certified copy of fresh certificate of incorporation consequent upon change of name issued by the Registrar of Companies and an explanatory statement from the user agency for such change.]

[38][Central Government to levy 10% Net Present Value (NPV) or Rs. 1,00,000/- whichever is less, as transfer fee to discourage middle man from processing proposals and then selling it to others under the provisions of the Forest (Conservation) Act, 1980. This, however, is not applicable in case of Wind Power Generation, which involves large number of transferees.]

2.9. Participation of private sector through involvement of NGOs & Forest Department in afforestation/rehabilitation of degraded forests

Detailed guidelines issued in this regard vide this Ministry's letter No. 8-21/96-FC dated 7.6.1999 shall be strictly followed. These are included in Annexure VIII.

2.10. Cluster mining

Detailed guidelines issued in this regard vide this Ministry's letter No. 11-8/2001-FC dated 15.11.2001 shall be strictly followed. These are included in Annexure – IX.

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[36] Inserted vide F. No. 11-584/2014-FC (pt.) dated: 31st March 2015
[37] Inserted vide F. No. 11-491/ 2013-FC dated: 7th February, 2014
[38] Inserted vide F- No. 11-9/1998-FCdated: 3rd May, 2010

ANNEXURE-(V)

OFFICE OF THE
DIVISIONAL FOREST OFFICER: CUTTACK FOREST DIVISION
AT:- GHATAKULA, NUAPADA, CUTTAK 753010
Tel:- 0671-2340443 FAX:- 0671-2347611 Email:- dfo cuttackforest division@yahoo.com

No 7593 /SF(Misc.)
Dated, Cuttack the 26 th August, 2016

To

The General Manager (Mines)
M/s Jindal Stainless Steel Ltd.
Kaliapani Chromite Mines.
At/PO. Kaliapani, Dist :- Jajpur.

Sub:- Guidelines regarding prior approval of Central Government under the Forest (Conservation) Act,1980 (FC Act) for areas falling in the mining leases which were or are recorded as 'forest' in the Government record on or after the day the FC Act came into force, but while processing and / or approving the proposals under the FC Act for use of forest land falling in such mining leases for mining purposes, such areas were treated as 'non forest' reg.

Ref :-
i) Memo No. 5417 dt. 30.03.2015 of the Govt. of Odisha, F & E Deptt.
ii) No. F.No. 8-78/1996-FC (pt.) dt.10.03.2015 of GoI, MoEF & CC.
iii) This office Letter No. 3353 dt. 09.04.2015, Letter No.4754 dt. 20.05.2015 & Letter No. 9952 dt. 28.11.2015
iv) F.No. 8-78/1996-FC (pt.) dt. 09.03.2016 of Govt. of India, MoEF & CC.
v) Letter No. 10F (con) 92/2015 (pt.) 4647/F&E dt. 10.03.2016 of Govt. of Odisha, F & E Deptt.

Sir,

With reference to the above correspondence it is to reiterate here that letter dt. 10.03.2015 of the Government of India, Ministry of Environment & Forest & Climate Change *inter-alia* states that State Governments may allow the concerned user agencies to continue, for a period not exceeding one year mining in such already broken forest areas, which were or are recorded as 'forest' in the Government record on or after 25th October 1980, but while processing and / or approving the proposals under the Forest (Conservation) Act, 1980 for use of forest land located in such mining leases for non-forest purpose, were treated as 'non-forest', provided the other statutory requirements and Rules are otherwise being complied with and NPV of such broken up areas has already been realized from the user agency.

As you are aware of the fact that the Govt. of India, MoEF have extended the period of stipulated one year (from 10.03.2015 to 09.03.2016) till 30th September,2016 vide their letter dt. 09.03.2016 provided the State Govt. submits complete proposal to seek prior approval of Central Govt. under the Forest (Conservation) Act for use of such already broken up forest land for mining and allied activities at least three month prior to the 30th September,2016 failing which mining in such broken up forest areas will be discontinued (copy enclosed-Annexure-A)

Contd.....P/2

In this regard it is observed that the proposal for diversion of such forest land measuring 64.76 ha. within the mining lease hold area of M/s Jindal Stainless Ltd. has neither been received in this office nor it has been filed online to the Addl. Principal Chief Conservator of Forests [Forest Diversion & Nodal Officer, FC Act], O/o the PCCF, Odisha

Hence, in view of the above guidelines you are hereby asked **to discontinue mining *in such broken up forest area* with effect from 06.08.2016** and report compliance.

Yours faithfully,

6/8/2016

Divisional Forest Officer,
Cuttack Forest Division.

Memo No. 7594 /dt. 06.08.16

Copy submitted to the Addl. Principal Chief Conservator of Forests [Forest Diversion & Nodal Officer, FC Act], O/o the PCCF, Odisha for favour of kind information and necessary action.

6/8/2016

Divisional Forest Officer,
Cuttack Forest Division.

Memo No. 7595 /dt. 06.08.16

Copy submitted to the Regional Chief Conservator of Forests, Angul for favour of kind information and necessary action.

6/8/2016

Divisional Forest Officer,
Cuttack Forest Division

Memo No. 7596 /dt. 06.08.16

Copy forwarded to the Deputy Director, Mines, Jajpur Road Circle, Jajpur Road for information and necessary action.

6/8/2016

Divisional Forest Officer
Cuttack Forest Division

Annexure R1

IN THE HON'BLE HIGH COURT OF ORISSA AT CUTTACK

(EXTRA ORDINARY WRIT JURISDICTION)

W.P.(C) NO. 4146 OF 2016

CODE NO 270000

In the matter of

An application under Arts. 14, 19, 21, 226, 227 & 300-A of the Constitution of India; and

In the matter of

An application under the Forest (Conservation) Act, 1980; and

In the matter of

An application challenging the Executive Instructions/ Guidelines issued by the OP No.1 Ministry of Environment, Forest and Climate Change (Forest Conservation Division) dated 10.03.2015; and

In the matter of

An application challenging the Executive Instructions/ Memo dated 30.03.2015 issued by the OP No.2 State of Odisha, Forest and Environment Department and letter dated 09.04.2015 issued by the OP No.7 Divisional Forest Officer, Cuttack Forest Division, Cuttack and the Order dated 22.06.2016 issued by the OP No.6; and

In the matter of

An application challenging the decision of the OP No.1, Union of India, Ministry of Environment

Jindal Stainless Limited

Authorised Signatory

Forest and Climate Change and subsequent memo of the OP No.2 the State of Odisha whereby the non forestry activities have been restricted to one year in order to obtain approval of the Central Government under the Forest (Conservation) Act, 1980 within the said period.

In the matter of

1. Jindal Stainless Ltd. (JSL Ltd.) (formerly Jindal Strips Ltd.) Kalinga Nagar Industrial Complex, PO- Danagadi, Duburi Dist. Jajpur also at Jindal Chromite Mines, At/Po-Kaliapani Dist-Jajpur, represented by its Director.
2. Subrata Bhattacharya, aged about 54 years, S/o S.K Bhattacharya, Shareholder and working as Director Jindal Stainless Limited, a company incorporated under Companies Act, 1956 having its Registered Office at O.P Jindal Marg, Hisar, Haryana and its factory and unit at Kalinga Nagar Industrial Complex, Danagadi, Jajpur Road Dist. Jajpur and Jindal Chromite Mine At/Po-Kaliapani, Dist Jajpur.

...Petitioners

-Versus-

1. Union of India represented through the Secretary to the Government of India, Ministry of Environment, Forest & Climate Change, Indira Paryavaran Bhawan, Jorbagh Road, New Delhi-110003.
2. State of Odisha represented through its Principal Secretary, Department of Forest & Environment, State Secretariat, Sachivalaya Marg, Bhubaneswar, Dist. Khurda.
3. State of Odisha represented through its Principal Secretary, Department of Revenue & Disaster Management, State Secretariat, Sachivalaya Marg, Bhubaneswar, Dist. Khurda.

Jindal Stainless Limited

Authorised Signatory

4. State of Odisha represented through its Principal Secretary, Department of Steel & Mines, State Secretariat, Sachivalaya Marg, Bhubaneswar, Dist. Khurda

5. Collector & District Magistrate, Jajpur, At/PO/Dist. Jajpur

6. Tahasildar, Jajpur, At/PO/Dist. Jajpur

7. Divisional Forest Officer, Cuttack Forest Division, Bhatakuta, Nuapada, Cuttack.

8. Deputy Director Mines, Jajpur Road Circle, Jajpur Road, Jajpur

.... Opp. Parties

Jindal Stainless Limited

Authorised Signatory

Annexure - VB.

W.P.(C) No.4146 of 2016

[O.H.C.-98]

Sl.No. of Order	Date of Order	ORDER WITH SIGNATURE	Office note as to action taken on Order
02.	04.03.2016	Heard. Issue notice. Learned counsel for the State accepts notice on behalf of opposite party nos.2 to 8. Seven extra copies of the brief be served on him by the learned counsel for the petitioner by tomorrow. So far as opposite party no.1 is concerned, Mr. A.K. Bose, learned Asst. Solicitor General accepts notice on behalf of opposite party no.1 – Union of India. Learned counsel for the petitioner is directed to serve an extra copy of the brief on him by tomorrow. List this matter on 10th March, 2016. Learned counsel for the State as well as the learned Assistant Solicitor General appearing for the Union of India shall take necessary instruction in the matter in the meantime.	

Misc. Case No.3819 of 2016

03.	04.03.2016	Heard. Notice as above. Accept one set of process fee. Considering the facts and submissions made, it is directed that status-quo, as on date, with regard to the operation of the Mines in question shall be maintained till 10th March, 2016. Issue urgent certified copy as per rules.	

Jindal Stainless Limited

Authorised Signatory

Comp. by

Annexure-VC

25. 03.12.2019 Learned counsel for the petitioners requests for time.

The matter to come up on 17.12.2019.

Interim order passed earlier shall continue till 17.12.2019.

.....
(K.S. Jhaveri)
Chief Justice

.....
(K.R. Mohapatra)
Judge

Jindal Stainless Limited
Authorised Signatory

1/2

F. No. 8-78/1996-FC (pt.)
Government of India
Ministry of Environment, Forests and Climate Change
(Forest Conservation Division)

Indira Paryavaran Bhawan,
Aliganj, Jorbagh Road,
New Delhi - 110 003
Dated: 10th March, 2015

To

The Principal Secretary (Forests),
All State /Union Territory Governments

Sub: Guidelines regarding prior approval of Central Government under the Forest (Conservation) Act, 1980 (FC Act) for areas falling in the mining leases which were or are recorded as 'forest' in the Government record on or after the day the FC Act came into force, but while processing and/or approving the proposals under the FC Act for use of forest land falling in such mining leases for mining purposes, such areas were treated as 'non-forest' - reg.

Sir,

I am directed to say that the Hon'ble Supreme Court in their Judgment dated 12th December 1996 in the Writ Petition (Civil) No. 202/1995 in the matter of T.N. Godavarman Thirumulpad versus Union of India and Others *inter-alia* directed as below:

> *"The Forests Conservation Act, 1980 was enacted with a view to check further deforestation which ultimately results in ecological imbalance and therefore, the provisions made therein for the conservation of forests and for matters connected therewith, must apply to all forests irrespective of the nature of ownership or classification thereof. The word "forest" must be understood according to its dictionary meaning. This description covers all statutorily recognized forests, whether designated as reserved, protected or otherwise for the purpose of Section 2 (i) of the Forest Conservation Act. The term "Forest land", occurring in section 2, will not only include "forest" as understood in dictionary sense, but also any area recorded as forest in the Government record irrespective of the ownership."*

2. The Hon'ble Supreme Court in their afore-mentioned Judgment made it clear that provisions of the Forest (Conservation) Act, 1980 (FC Act), extend to *inter-alia* all those areas which, on or after the day the FC Act came into force (*i.e.* 25th October 1980), were recorded as 'forest' in the Government record irrespective of ownership.

3. It has however, been observed that while processing and/or approving the proposals under the FC Act, substantial areas included in the mining leases which were recorded as forest in Government records on or after the day the FC Act came into force, have been treated as 'non-forest'. Prior approval of Central Government under the FC Act for use of such areas, for mining and the allied non-forest activities is required to be obtained.

4. After careful examination of the matter, I am directed to say that State Governments and Union territory administrations shall ensure that mining operations in all such virgin/unbroken areas falling in the mining leases which were or are recorded as 'forest' in the Government record on or after 25th October 1980, but while processing and/or

approving the proposals under the FC Act for use of forest land located in such mining leases for non-forest purpose, were treated as 'non-forest', is undertaken only if the prior approval of Central Government under the FC Act for use of such areas for mining purposes has been obtained or is obtained. However, keeping in view the peculiar circumstances under which while processing and/or approving the proposals under the FC Act for use of forest land falling in such mining leases for mining purpose, such areas were treated as 'non-forest', State Governments and Union territory administrations may allow the concerned user agencies to continue, for a period not exceeding one year from the date of issue of this letter, mining in such areas, which have already been broken up, provided the other statutory requirements and Rules are otherwise being complied with and NPV of such broken up areas has already been realised from the user agency. After one year, even in such broken up areas mining shall be allowed only if the prior approval of Central Government under the FC Act for use of such areas for mining purposes has been obtained or is obtained.

This issues with approval of the Hon'ble Minister of State (Independent Charge) for Environment, Forest and Climate Change.

Yours faithfully,

(H.C. Chaudhary)
Director

Copy to:-

1. Prime Minister's Office (*Kind attn.*: Shri Santosh D. Vaidya, Director).
2. Secretary, Ministry of Mines, Government of India.
3. Secretary, Ministry of Steel, Government of India.
4. Principal Chief Conservator of Forests, all State/UT Governments.
5. Nodal Officer, the Forest (Conservation) Act, 1980, all State/UT Governments.
6. All Regional Offices, Ministry of Environment, Forests and Climate Change (MoEFCC), GoI.
7. Joint Secretary in-charge, Impact Assessment Division, MoEFCC, GoI.
8. All Assistant Inspector General of Forests/ Directors in the Forest Conservation Division, MoEFCC, GoI.
9. Director Regional Office Headquarters Division, MoEFCC, GoI.
10. Sr. Director (Technical), NIC, MoEFCC with a request to place a copy of the letter on website of this Ministry.
11. Sr. PPS to the Secretary, Ministry of Environment, Forest and Climate Change.
12. Sr. PPS to the Director General of Forests & Special Secretary, MoEFCC, GoI.
13. Sr. PPS to the Addl. Director General of Forests (Forest Conservation), MoEFCC, GoI.
14. PS to the Inspector General of Forests (Forest Conservation), MoEFCC, GoI.
15. Guard File.

(H.C. Chaudhary)
Director

F. No. 11-599/ 2014-FC
Government of India
Ministry of Environment, Forest and Climate Change
(Forest Conservation Division)

Indira Paryavaran Bhawan
Aliganj, Jorbagh Road
New Delhi - 110 003
Dated: 1st April, 2015

To

The Principal Secretary (Forests)
All State / Union Territory Governments

Sub: Guidelines for diversion of forest land for non-forest purposes under the Forest (Conservation) Act 1980- Submission of proposals to obtain approval for diversion of entire forest land located within a mining lease.

Sir,

I am directed to refer to this Ministry's letter No. 11-362/2012-FC dated 1st February, 2013 on the above-mentioned subject, wherein this Ministry informed *inter-alia* that in case of mines where approval under the Forest (Conservation) Act, 1980 (FC Act) for diversion of only a part of forest land located within the mining leases has been obtained, after two years from the issue of the said letter mining will be allowed only if the user agency either obtains approval under the FC Act for the entire forest land located within the mining lease or surrenders such forest land for which approval under the FC Act has not been obtained and execute a revised mining lease for the reduced lease area.

2. This Ministry received representations wherein it has *inter-alia* been stated that it is practically not possible to obtain approval under the FC Act for diversion of the entire forest land in two years as the whole process takes more than two years. This Ministry was requested to issue the revised guidelines to prevent disruption in the ongoing mining operations.

3. This Ministry has examined the matter in consultation with the Department of Legal Affairs, Ministry of Law and Justice. After careful examination of the matter and the advice of the Department of Legal Affairs, Ministry of Law and Justice, this Ministry in supersession of the said letter No. 11-362/2012-FC dated 1st February, 2013, hereby decides as below:

(i) Henceforth, in case of mining leases, including those of Government Authorities, having forest land in part or in full, approval of Central Government under Section-2 (iii) of the FC Act for the entire forest land located within a mining lease shall be obtained before execution (including by way of renewal) of a mining lease in accordance with the provisions of the Mines and Minerals (Development and Regulation) Act, 1957 (MMDR Act) and the Rules framed thereunder.

(ii) User agencies while submitting application to obtain prior approval under Section 2 (iii) of the FC Act, if they so desire, may also seek prior approval of Central Government under Section 2 (ii) of the FC Act for use of the whole or a part of the forest land located within the mining lease for mining and allied non-forest activities. Area of forest land for which approval under Section 2 (ii) and 2 (iii) is sought shall separately be indicated in the proposals submitted by the user agencies. Where at the time of execution of the mining lease prior approval of Central Government under Section 2 (ii) to use the entire forest land falling in the mining lease for mining and allied non-forest activities is not obtained, the user agencies may submit proposal under Section 2 (ii) of the FC Act for the whole or a part of the remaining forest land falling within the mining lease, as and when such forest land is proposed to be utilised for mining and allied non-forest activities.

(iii) Central Government after examination of a proposal and after such other enquiry as it may consider necessary, may accord approvals under Section 2 (iii) and 2 (ii) of the FC Act for assigning on lease and to utilize for mining and allied non-forest activities respectively, such areas of forest land, as it may consider expedient, or reject the same.

(iv) Prior approval of Central Government under Section 2 (iii) of the FC Act shall be subject to payment of Net Present Value (NPV) of the forest land allowed to be assigned on mining lease. Similarly, prior approval of Central Government under Section 2 (ii) shall be subject to other usual conditions apart from realization of NPV of the forest land allowed to be utilised for mining and other allied non-forest activities.

(v) In case of existing mining leases having forest land in part or in full, where approval under Section 2 of the FC Act for a part of the forest land has only been obtained, Central Government hereby accords general approval under Section 2 (iii) of the FC Act for the remaining area of the forest land falling within such mining leases, subject to following conditions:

(a) State Government shall, within a period of one year from the date of issue of this letter, realize from the user agency, NPV of the entire forest land falling in the mining lease, in case NPV of such forest land has not already been realised;

(b) In case State Government fails to realize from the user agency, NPV of the entire forest land falling in a mining lease within a period of one year from the date of issue of this letter, this general approval in respect of such mining lease, shall be kept in abeyance, and shall be deemed to have been kept in abeyance, and all mining activities in such mining lease shall be stopped, till such time, the NPV of such forest land is realised by the State Government;

(c) The general approval shall be valid for a period co-terminus with the period of mining lease in accordance with the provisions of the Mines and Minerals (Development and Regulation) Act, 1957, as amended, and the Rules framed thereunder.

(d) This general approval does not, in any manner, exempt a user agency from obtaining prior approval under Section 2(ii) of the FC Act in regard to such area of forest land which is to be used for non-forest purpose;

(e) Grant of this general approval under Section 2 (iii) does not, in any manner, create any right or equity in favour of the user agency for grant of approval under Section 2 (ii) of the FC Act and decision on proposals under Section 2 (ii) will be taken purely on the merit of each case;

(f) This general approval will not be applicable to the forest land for which Central Government before the issue of this letter has already declined approval under Section 2 of the FC Act; and

(g) Grant of this general approval does not in any manner, exonerate the concerned authorities in the State Government or in any other Authority, from the proceedings under Section 3A and 3B of the FC Act, liable to be initiated for violation, if any, of the FC Act committed by them by assigning such forest land on mining lease without obtaining prior approval of Central Government under Section-2 of the FC Act.

(vii) The user agency shall be responsible for protection of the forest land located in a mining lease for which prior approval of Central Government under Section 2 (iii) of FC Act, including by way of the afore-mentioned general approval, has only been obtained. However, administrative and management control of such forest land will remain with State Forest Department or other forest land owning agencies and the forests will be managed in accordance with the approved management plan till such time it is not diverted for non-forest purpose, *i.e.*, mining and remains unbroken.

This issues with approval of the Hon'ble Minister of State (Independent Charge) for Environment, Forest and Climate Change.

Yours faithfully,

(H.C. Chaudhary)
Director

Copy to:-

1. Prime Minister's Office (*Kind attn.:* Shri Santosh D. Vaidya, Director).
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 (MoEFCC).
8. Joint Secretary, In-charge, Impact Assessment Division, MoEF.

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, MoEFCC.
13. All Advisors/ Directors/ Dy. Directors in the Impact Assessment Division, MoEFCC.
14. Director, Regional Office (Headquarters), MoEFCC.,
15. Sr. Director (Technical), NIC, MoEFCC 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. PS to Inspector General of Forests (Forest Conservation), Ministry of Environment, Forest and Climate Change.
20. Guard File.

(H.C. Chaudhary)
Director

OFFICE OF THE DIVISIONAL FOREST OFFICER: CUTTACK FOREST DIVISION
AT:- GHATAKULA, NUAPADA, CUTTAK 753010
Tel:- 0671-2957611 FAX:- 0671-2347611 Email:- dfocuttack-od@gov.in

No. 6559 / 5F (Forest Diversion) 61 /2018
Dated, Cuttack the 26, August, 2021.

To

The Mines Manager,
Jindal Chromite Mines,
M/s Jindal Stainless Ltd., Kaliapani, Odisha

Sub:- Diversion of forest land for non-forest purpose under Forest (Conservation) Act, 1980- Guidelines regarding extension of period of validity of approvals accorded under the Forest (Conservation) Act, 1980 for diversion of forest land for mining projects.

Ref:- Letter No. F No. 11-51/2015-FC dt. 01.01.2015 of Govt. of India, MoEF & CC.

Sir,

With reference to the letter cited above on the captioned subject, it is to inform that that the Govt. of India, MoEF & CC vide letter under reference have intimated for realization of NPV from the user agency pertaining to the Mines and Mineral (Development and Regulation) Amendment Ordinance 2015, period of validity of approvals accorded under Section-2 of the FC Act shall be extended, and shall be deemed to have been extended up to a period co-terminus with the period of mining lease in accordance with the Provisions of the MMDR Act,1957.

In this connection, for compliance of Condition No. (iii) of the above notification, it is requested to pay the Net Present Value (NPV) of Forest area that have already accorded stage-II approval under Section-2 of FC Act,1980 over an area of 22.80 Ha.

The NPV amount is calculated below:-

(i)	Total Mining lease area -89 Ha.	
(ii)	NPV paid for 1.44 Ha. For safety zone of diverted forest area over 22.80 ha	- Rs.10,51,200.00
(iii)	NPV paid for 64.301 Ha. of forest land as per Sabik record	-Rs. 4,69,39,730.00
(iv)	NPV Paid for 0.459 Ha. of forest land as per Sabik record	- Rs.3,35,070.00

As per site inspection report the condition of vegetation and type of forest in applied area is Eco- Value Class-I
Density of vegetation below 0.4
The NPV to be paid, for 22.80 Ha. @ Rs. 7,30,000/- per Ha = Rs. **1,66,44,000.00**
(**Rupees One Crore Sixty-six lakh forty-four thousand**) only.

(P.T.O.)

So, you are requested to make necessary arrangements for payment of the above amount through e-payment module & submit the receipt of the deposition as evidence with UTR No. & date to this office for reference & record.

Yours faithfully,

Divisional Forest Officer
Cuttack Forest Division

Memo No 6460 Date 03.09.21

Copy submitted to the Addl. Principal Chief Conservator of Forests (Forest Diversion & Nodal Officer, FC Act), O/o the Principal Chief Conservator of Forests, Odisha, Bhubaneswar for favour of kind information and necessary action.

Divisional Forest Officer
Cuttack Forest Division

Memo No 6461 Date 03.09.21

Copy submitted to the Regional Chief Conservator of Forests, Angul Circle, Angul for favour of kind information and necessary action.

Divisional Forest Officer
Cuttack Forest Division

Letter. No 451/JSLPH/2021/126 Date: 30.09.2021

To,
The DFO
Cuttack Forest Division
Cuttack

Sub: Submission of NPV amounting Rs. 1,66,44,000/- for forest area (22.80Ha.) for which approval already obtained under section-2 of FC Act 1980.

Ref: Letter No 6459/SF (Forest Diversion) 61/2018, Dated: 03.09.2021

Dear Sir,
In connection to the letter referred above, this is to inform your good office that in lieu of the Net Present Value (NPV) for forest area (22.80Ha.) that have already accorded Stage II approval under Section 2 of FC Act, 1980 in respect of Jindal Chromite Mines of M/s Jindal Stainless Limited amounting to Rs 1,66,44,000/- (One Crore Sixty Six Lakhs Forty Four Thousand only) has been paid in to the CAMPA Fund through e-payment module having DTR No. CNRBR52021092769119111, Dated 22.09.2021. Please find enclosed herewith the certified Challan copy issued by CANARA BANK, Jajpur Road.
This is being submitted for your kind information and record please.

Thanking you,
For Jindal Stainless Limited

(Sachchan Kumar)
Head (Mines)

Encl: As above

DFO Cuttack Forest Division

Jindal Stainless Limited
Jindal Chromite Mines
At / PO : Kaliapani 755 047, Dist. Jajpur, Odisha, India
T : +91 6726 268545 F : +91 6726 268515 E : jindal.mines@yahoo.com

AGENCY COPY

Union Bank

NEFT/RTGS CHALLAN for CAMPA Funds

Date: 22.09.2021

Agency Name	JINDAL STAINLESS LIMITED
Application No	SR41000045
MoEF/SG File No	NA
Location	ORISSA
Address	Jindal Stainless Limited, Kalinga Nagar Industrial Complex, Jajpur, Odisha 755 028 Jajpur
Amount(in Rs)	16534060/-

Amount in Words: [illegible] Thousand [illegible] Only

NEFT/RTGS to be made as per following details:

Beneficiary Name	ORISSA CAMPA
IFSC Code	UBIN0903710
Pay to Account No	15062581000045 Valid only for this challan amount
Bank Name & Address	Union Bank Of India, Lodhi Complex Branch, Block 11,CGO Complex, Phase I, Lodhi Road, New Delhi -110003

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

BANK COPY

Union Bank

NEFT/RTGS CHALLAN for CAMPA Funds

Date: 22.09.2021

Agency Name	JINDAL STAINLESS LIMITED
Application No	SR41000045
MoEF/SG File No	NA
Location	ORISSA
Address	Jindal Stainless Limited, Kalinga Nagar Industrial Complex, Jajpur, Odisha 755 028 Jajpur
Amount(in Rs)	16534060/-

Amount in Words: [illegible] Thousand [illegible] Only

NEFT/RTGS to be made as per following details:

Beneficiary Name	ORISSA CAMPA
IFSC Code	UBIN0903710
Pay to Account No	15062581000045 Valid only for this challan amount
Bank Name & Address	Union Bank Of India, Lodhi Complex Branch, Block 11,CGO Complex, Phase I, Lodhi Road, New Delhi -110003

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

After making successful payment, User Agencies may send a line of confirmation through Email: helpdeskcampa@corpbank.co.in

Note: After making the required payment through challan, if the payment status has not been updated even after 7 working days, then kindly mail a copy of your challan with transaction date to Email: ch0371@unionbankofindia.com

21 SEP 2021

JSL

JINDAL STAINLESS

Letter no ISL/KLPN/2016/205 Date.23/07/16.

To,

The Divisional Forest Officer,
Cuttack Forest Division,
Nuapada,
Cuttack.

Sub: Payment of Rs.3,35,070.00 towards NPV for forest area of 0.459 hectre inrespect of Jindal stainless limited,Kaliapani

Ref: Your office letter no.9952/SI/2014 dated 28/11/2015 and no.11224/SI(misc)/2015 dated 31/12/2015

Sir,

With reference to the above and subject mentioned,we are herewith submitting the payment details towards NPV of balance forest area of 0.459 hectre in respect of our Jindal Chromite Mines of Jindal stainless limited for your kind perusal.An amount of Rs.3,35,070.00 (Three lakh thirty thousand seventy only) has been paid to CAMPA.

Kindly acknowoledge the accepatace at your end please.

Thanking you,

Your's faithfully,

For Jindal Stainless limited,

S.K.Sahoo

Asst Gen.Manager

Enclos: Certificate of payment details.

Received on
23/7/16

Jindal Stainless Limited
Jindal Chromite Mines, Kaliapani 755017, Jajpur (Odisha), India
T: 06726 268545, F: 06726 268115, E: jindal_mines@yahoo.com
Corporate Office: Jindal Center, 12 Bhikaji Cama Place, New Delhi 110066, India
Registered Office: O.P.Jindal Marg, Hisar 125005, Haryana, India

Jindal

भारतीय स्टेट बैंक
State Bank of India
JAJPUR ROAD BRANCH (1820)
JAJPUR – 755019, ODISHA
Tel No (06726) 220 540,
Email id : sbi.01820@sbi.co.in

WHOMSOEVER IT MAY CONCERN

Certified that the following RTGS is made in favour of Ad- hoc Body of Compensatory Afforestation Fund Management and Planning Authority (CAMPA) corporation bank A/c No SB01025222 payable at New Delhi by debiting OD account No 31385694782 of JINDAL STAINLESS LIMITED

Favouring – Ad hoc Body of Compensatory Afforestation Fund Management and Planning Authority (CAMPA)

Date of Payment	UTR No	Amount in Rs
05/05/2016	SBINR52016050529438883	3,35,070.00

(Rupees Three Lakh Thirty Five Thousand Seventy only)

JINDAL STAINLESS

JSL/KLPN/2015/ 180
Date 31.08.2015

The Divisional Forest Officer
Cuttack Forest Division
At: Ghatakula, Nuapada
Cuttack-753 010
Odisha

Sub: NPV payment made for the forest kisam land on 25.10.1980 and treated as Non-Forest Hal settlement record in respect of Kaliapani Chromite Mines of M/s Jindal Stainless Ltd. Kaliapani, Jajpur

Ref: Your office Letter No 4754/SF(Misc)/ 2015 dated, Cuttack the 20th May, 2015 (copy enclosed)
Our mines letter No JSL/KLPN/2015/125 dt 17.06.2015
Our mines letter No JSL/KLPN/2015/ 162 dated 27.07.2015
Our mines letter No. No JSL/KLPN/2015/ 169 dated 13.08.2015

Sir,

We would like to inform you that we have paid an amount of Rs 3,69,39,786/- through RTGS today on 31.08.2015. Detail of payment given below:

31 Aug 2015	CHQ TRANSFER-RTGS SBINR52015083119407011 ADHOC BODY OF COMPENSA 752223	752223	1820	4,69,39,786.00

In the mean time, we are already in the process of preparing the Forest Diversion proposal for our 64.301 Ha area.

Thanking You,
Yours faithfully,

For Jindal Stainless Limited

(S. K. Sahoo)
AGM(Mines)

Received
11/9/15

4114
24-7-10

JSL/MINES/TD/P/01
Dt. 24th July,2010

To
The Divisional Forests Officer
Cuttack Forest Division
Chhatabata, Nuapatna
CUTTACK

Sub:- Diversion of Forest land for Chromite mining in Mahagiri D.P.F of M/s Jindal Stainless Ltd in Sukinda Tehsil of Jajpur District-Payment of differential amount of N.P.V at revised rate.

Ref:- **Your Memo/letter no.3318 dated.21.06.2010**

Sir,
With reference to the subject citied above , we are enclosing herewith the demand draft bearing no.444797 of State Bank of India-Jajpur Road dated 23.07.2010 Amounting of Rs.10,51,200/- (Rupees Ten lakh fifty one thousand two hundred only) payment towards N.P.V in respect of our Chromite Mining lease.

Thanking You
Yours Faithfully
For JSL Limited

Raideep Mohanty
Resident Director(Orissa Project)

Encl: Original Demand draft bearing no.444797 of State Bank of India-Jajpur Road dated 23.07.2010 Amounting of Rs.10,51,200/- (Rupees Ten lakh fifty one thousand two hundred only)

F. No. 11-42/2017 – FC
Government of India
Ministry of Environment, Forests and Climate Change
(Forest Conservation Division)

Indira Paryaravan Bhawan,
Aliganj, Jorbhagh Road,
New Delhi – 110003

Dated: 29th January, 2018

To

The Principal Secretary (forests)
All States/Union Territory Governments

Sub: Activities which constitutes violations of provisions of Forest Conservation Act 1980 and rules made thereof and guidelines issued in this behalf, by user agencies and quantum of penalty to be imposed –regarding common guideline to be followed by FAC/REC while considering the proposal under FC Act 1980.

Sir,

I am directed to invite your kind attention that the Forest Advisory Committee (FAC), constituted under Section 3 of the Forest Conservation Act 1980, while discussing proposals submitted under FC Act 1980, in its meeting held on 25.04.2017 noted with great concern somewhat inconsistent approach adopted by different Regional Empowered Committees of MoEF&CC and FAC itself in case of violations committed by user agencies of forest land in contravention of the provisions of Forest Conservation Act, 1980 and consequently recommending monitory penalty such as penal CA and penal NPV etc. in addition to mandatory compensatory levies. It was observed that the decisions to classify certain activities undertaken by the user agencies as violation and quantum of penalty imposed therein for the similar offence are different on different occasions due to absence of common guidelines.

2. It was, therefore, decided by the FAC to constitute a Committee of APCCF (central) Regional Offices, MoEF&CC and a member of the FAC to examine various aspects and different situations and activities which will constitute violations of provisions rules and guidelines issued under Forest Conservation act 1980 and suggest penalty in various situations, if the activities are treated as violation and thus as offence so as to dissuade the user agencies from committing such violations in future and compensate the loss caused due to such violation.

3. Accordingly on the recommendation of FAC, the following Committee was constituted vide this Ministry's letter of even number dated 05.06.2017.

i. Dr. Tejinder Singh, APCCF, Regional Office, Bhopal;	Chairman
ii. Dr. Sanjay Deshmukh, Member, FAC;	Member
iii. Sh. Kanwarjit Singh, APCCF, Regional Office, Nagpur;	Member
iv. Sh. MRG Reddy, APCCF, Regional Office, Chennai;	Member

4. The Committee submitted its recommendations to the Ministry on 15.05.2017 and the same was discussed in the Ministry and the final recommendation of the Committee was placed before the Forest Advisory Committee in its meeting dated 26.10.2017. The recommendation of the Committee was accepted and recommended by the FAC. The recommendations of FAC was placed before the competent authority in the Ministry. The

29.1.18

competent authority has accepted the report of the Committee on the recommendation of the FAC.

3. Accordingly, this Ministry has decided to adopt following guidelines while imposing penalty in various cases, on the recommendations of FAC/REC after due deliberation in its meeting, for use of forest land for non-forestry purposes in violation of the provisions of the Forest (Conservation) Act 1980, Rules made thereof and guidelines issued from time to time to implement FC Act and Rules:

A. In cases where the proposal under FC Act has not been submitted and forest land is diverted without FC:

i. Diversion of forest land for non-forestry purposes without the prior approval of the competent authority in the state will be dealt under the provisions of Indian Forest Act 1927 or State Forest Acts or any other State act dealing with such land as the case may be. The land in question will not be considered as diverted under FCA 1980 and the status of land shall continue to be Forest.

ii. If the permission for use of forest land for non-forestry purposes have been granted by the state authority without the prior approval of the central government under section 2 of the Forest Conservation Act 1980 then action under section 3A and /or 3B of FC Act, as may be applicable shall be taken against the authority causing the diversion. A report with full details of violation shall be submitted by the State Government on the recommendation of the Forest Department of the State to the Ministry of Environment, Forests & Climate Change Government of India, New Delhi and formal enquiry shall be conducted by the Regional Office of the MoEF & CC.

B. In cases where the proposal under FC Act is under consideration and forest land is diverted before grant of FC:

i. The penalty for violation shall be equal to NPV of forest land per hectare for **each year** of violation from the date of actual diversion as reported by the inspecting officer with maximum up to **five (5) times the NPV** plus 12 percent simple interest till the deposits is made.

ii. In case of public utility projects of the government the penalty shall be 20 % of the penalty proposed in para (i) above.

iii. State government will initiate disciplinary action against the official concerned for not being able to prevent use of forest land for non-forestry purpose without prior approval of Government of India.

iv. User agency responsible for violation shall be prosecuted under local Act of the state for unauthorized use of forest land without the permission of state authority.

C. Violation /non-compliance of any conditions imposed while granting approval under FC Act:

In such cases the penalty will be imposed on the recommendation of the APCCF Regional office in whose jurisdiction the alleged violation has occurred. The violation will be reported to REC/FAC and the committee will give time to comply the conditions within stipulated time:

i. In case the offence is proved then the penalty shall be imposed for violation committed over forest area without approval equal to twice the normal NPV.

ii. In case of public utility projects of the government the penalty shall be 20 % of the penalty proposed in para (i) above.

D. Violation on account of change of land use in the approved mining plan:

i. No penalty is to be imposed for such violation if the change is as per change in mining plan duly approved by competent authority. User agency shall intimate all approvals related to change in mining plan to the regional office within one month of approval. In other cases, change in land use plan shall not be carried out without prior approval of MoEF&CC under the provisions of FCA 1980.

ii. Any violation of change in land use (other than mining operations), penalty of two times the NPV plus simple interest 12 per cent from the date of actual violation committed will be imposed.

iii. In case the approved change in mining plan is not intimated within one month of the approval the same fine shall be imposed as in para D(ii).

E. In cases where 'Forest land' has been changed to 'non forest land' in government records: If the violation is not attributable to the user agency, no penalty shall be imposed.

This issue with the approval of the Competent Authority.

Yours faithfully,

29.1.16

(Sandeep Sharma)
Assistant Inspector General of Forests

Copy to:

1. Prime Minister's Office
2. Secretary, Ministry of Mines/Coal/Steel/Power, Government of India.
3. Principal Chief Conservator of Forests, All States/UTs.
4. Nodal Officers, the Forest (Conservation) Act, 1980 All States/UTs.
5. All Regional Offices, Ministry of Environment, Forests and Climate Change.
6. Joint Secretary in-charge, Impact Assessment Division, MoEF&CC, New Delhi.
7. PS to Hon'ble Minister of Environment, Forests and Climate Change and Minister of State for Environment, Forests and Climate Change.
8. Chairman, State Environment Impact Assessment Authority, All States/UTs.
9. Member Secretary, State Environment Impact Assessment Authority, All States/UTs
10. All Directors/Assistant Inspector General of Forest in Forest Conservation Division of MoEF&CC.
11. All Advisors/Directors/Dy Directors in Impact Assessment Division of MoEF&CC.
12. Sr. Director (Technical), NIC, MoEF&CC with a request to place a copy of the letter on website of this Ministry.
13. PPS to the Secretary for Environment, Forests and Climate Change, New Delhi.
14. PPS to the Director General of Forests & Special Secretary, MoEF&CC, GoI.
15. PPS to the Addl. Director General of Forests (Forest Conservation), MoEF&CC, GoI.
16. PPS to the Inspector General of Forests (Forest Conservation), MoEF&CC, GoI.
17. Guard File.

29.1.16

(Sandeep Sharma)
Assistant Inspector General of Forests

Annexure - VI

FORM-II

(for projects other than linear projects)

Government of Odisha

Office of the District Collector, Jajpur

No. 947 Date. 3.5.16

TO WHOMSOEVER IT MAY CONCERN

In compliance of the Ministry of Environment and Forests (MoEF), Government of India's letter No.11-9/98-FC (pt.) dated 3rd August 2009 wherein the MoEF issued guidelines on submission of evidence for having initiated and completed the process of settlement of rights under the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition Forest Rights) Act, 2006 ('FRA' for short) on the forest land proposed to be diverted for non-forest purposes, it is certified that **64.301** hectares of forest land proposed to be diverted in favour of **M/s. Jindal Stainless Ltd.** for **Jindal Chromite Mines** in Jajpur district falls within jurisdiction of Kaliapani village in Sukinda tahsil.

It is further certified that:

(a) the complete process for identification and settlement of rights under the FRA has been carried out for the entire **64.301** hectares of forest land proposed for diversion. A copy of records of all consultation and meetings of Forest Rights Committee, Gram Sabha (s), Sub-Division Level Committee and the District Level Committee are enclosed as Annexure- A to Annexure-C.

(b) the proposal for such diversion (with full details of the project and its implementations, in vernacular/local language) have been placed before each concerned Gram Sabha of forest-dwellers, who are eligible under FRA;

(c) the each of concerned Gram Sabhas, has certified that all formalities/processes under the FRA have been carried out, and that they have given their consent to the proposed diversion and the compensation and ameliorative measures, if any, having understood the purpose and details of proposed diversion. A copy of the

certificate issued by the Gram Sabha of Kaliapani village is enclosed (as mentioned above).

(d) the discussion and decisions on such proposals had taken place only when there was a quorum of minimum 50% of the members of the Gram Sabha present;

(e) the diversion of forest land for facilities managed by the Government as required under section 3 (2) of the FRA have been completed and the Gram Sabhas have given their consent to it;

(f) the rights of Primitive Tribal Groups and Pre-Agricultural Communities, where applicable have been specifically safeguarded as per Section 3 (1) (e) of the FRA.

31/5/16

Encl: As above

(Satya Kumar Mallick)
Collector & District Magistrate,
Jajpur

PROCEEDING OF THE MEETING OF THE SUB-DIVISIONAL LEVEL COMMITTEE ON DIVERSION OF FOREST LAND FOR NON-FOREST PURPOSE UNDER S.T & OTHER TRADITIONAL FOREST DEWELLERS (RECOGNITION OF FOREST RIGHTS) ACT, 2006 HELD ON 18.04.2016 IN THE OFFICE CHAMBER OF SUB-COLLECTOR, JAJPUR

* * * * * *

The Sub Divisional Level Committee meeting on Diversion of Forest Land for use of Non-Forest Land under Scheduled Tribe and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 of Jajpur was convened on 18.04.2016 at 4.00PM under Chairmanship of Sub-Collector, Jajpur.

The following members of the committee were present.

1. Sri Ajay Kumar Sahoo, OFS, ACF, Cuttack
2. Sri Kamadeba Dehuri, P.S Member of Sukinda P.S
3. Sri Pandu Tiyu, P.S Member of Badachana P.S
4. Smt. Sati Dehury, P.S. Member of Dharmasala P.S
5. Sri Debadutta Mahanta, OAS (I), BDO, Sukinda
6. Sri Nabakishna Jena, OAS (I), Tahasildar, Sukinda
7. Sri Padan Charan Jena, ADWO, Jajpur
8. Sri Surendra Ku. Sahoo, Rep. of M/s. Jindal Stainless Ltd.

At the outset, the Chairman welcomed all the members present and initiated the discussion and intimated that the Gram Sabha of Kaliapani G.P has recommended the proposal for diversion of Forest Land arounding 64.301 hec. for use of non-forest purpose by M/s. Jindal Stainless Ltd. for Jindal Chromite Mines before the SDLC for approval. The detailed village wise position is given below.

Name of the Agency	Name of the GP	Name of the Village	Area applied for
M/s. Jindal Stainless Ltd. (Jindal Chromite Mines)	Kaliapani	Kaliapani	64.301 Hec.

On verification of Grama Sabha proceedings forwarded by Block Development Officer, Sukinda, it is revealed that detail discussion was made in the Gram Sava/Palli Sava fegarding Forest Right Act., 2006 and implementation of displacement and its implication and rehabilitation was explained to them in odiya vernacular. Further, it is seen the people present in the Gram Sabha had agreed and

18.4.16

haven given their written consent with recommendation for diversion of forest land of above extent for non-forest use by the M/s. Jindal Stainless Ltd. The above areas has been verified by the Revenue Inspector, Kankadapal for determining the possession of actual extent of Forest land by the individuals and communities for giving safeguard and recognition of Forest Rights Act- 2006. Moreover, it was found that no individual and community are in possession of the above scheduled land. The same has been confirmed by the Revenue Inspector, Kankadapal through Tahasildar, Sukinda.

Hence the committee unanimously decided to send the diversion proposal of above said land for use of non forest purpose by M/S. Jindal Stainless Ltd. for the above mines to District Level Committee.

The Meeting ended with vote of thanks to the Chair.

18.4.16

Sub-Collector-Cum-Chairman, SDLC
Jajpur

Memo No. 774 / Date. 21.04.16
Copy forwarded to all members for information and necessary action.

18.4.16

Sub-Collector-Cum-Chairman, SDLC
Jajpur

Memo No. 775 / Date. 21.04.16
Copy to Tahasildar, Sukinda/BDO, Sukinda for information and necessary action.

18.4.16

Sub-Collector-Cum-Chairman, SDLC
Jajpur

Memo No. 776 / Date. 21.04.16
Copy submitted to the Collector, Jajpur for favour of kind information.

18.4.16

Sub-Collector-Cum-Chairman, SDLC
Jajpur

PROCEEDING OF THE DISTRICT LEVEL COMMITTEE MEETING HELD ON 29.04.2016 at 4.30 PM IN THE RESIDENTIAL OFFICE CHAMBER OF COLLECTOR, JAJPUR

* * * * * * * *

The District Level Committee meeting on diversion of Forest Land for use of non-forest purpose by M/s. Jindal Stainless Ltd. under ST and Other Traditional Forest Dwellers (Recognition) Act, 2006 was convened on 29.04.2016 at 4.30 PM under the Chairmanship of Collector. The following members of the committee were present.

1. Sri Sudarsan Behera, OFS- I , D.F.O, Cuttack
2. Sri Maheswar Panigrahi, OAS (S), Sub-Collector, Jajpur
3. Sri Nabakrishna Jena, OAS (I), Tahasildar, Sukinda
4. Smt. Tapaswini Malik, Z.P. Member, Zone No. 39
5. Smt. Sabita Behera, Z.P. Member, Zone No. 12
6. Sri Santosh Kumar Pati, WEO, Sukinda, Rep. of BDO, Sukinda
7. Miss Chetna Sethy, OWS, District Welfare Officer, Jajpur
8. Sri Padan Charan Jena, ADWO, Jajpur

At the outset, the Chairman welcomed all the members present and instructed the DWO to present the status of the diversion proposal. The DWO intimated the Committee members that a Palli Sabha was convened in Kaliapani village under Kaliapani GP on 03.02.2016 for diversion of Forest Land for use of non-forest purpose in connection with Jindal Chromite Mines of M/s. Jindal Stainless Ltd., Kaliapani on considering the guidelines of Forest Rights Act, 2006. The Palli Sabha of Kaliapani Village of Kaliapani GP has conclusively decided and recommended the proposal for diversion of forest land measuring 64.301 ha. for use of non-forest purpose by M/s. Jindal Stainless Ltd. for Jindal Chromite Mines. As per the report of R.I., Kankadapal GP, the user agency has applied for diversion of 64.301 ha. of forest land under the Jindal Chromite Mines for use of non-forest purpose (Mining purpose). The land schedule report, sabik and hal records of the proposed area were placed for scrutiny and discussion in the Palli Sabha Dt. 03.02.2016 convened at Kaliapani. The DWO apprised the committee that as per the Palli Sabha proceedings the total proposed area of the User Agency is 64.760 ha., out of

which an area of 0.459 ha (Ac. 1.13) is forest land as per hal RoR and the rest of the area i.e 64.301 is forest land.

The Palli Sabha members present during the meeting have agreed and given their written consent with recommendation for diversion of forest land of 64.301 ha. for non-forest use by M/s. Jindal Stainless Ltd. The Gram Sabha has also clarified that no individual and community belonging to the Scheduled Tribe Category or any Primitive Vulnerable Tribal Groups are residing or occupationally dependent on the proposed diversion area. The same has been confirmed by the report of R.I., Kankadapal GP.

After detail discussion on the matter, the Chairman of the Committee and D.F.O., Cuttack suggested the representative of the user agency who was present in the meeting to hold a separate Palli Sabha for diversion of the left over area measuring 0.459 ha. (Ac. 1.13) of forest land as per hal RoR. The D.F.O., Cuttack opined that since, the proposed diversion area alongwith the left over area is exclusively being used by the project proponent, it should be diverted under the guidelines of FRA, 2006 by convening a separate Palli Sabha.

The Chairman of the committee also instructed the user agency to find out compensatory aforestation land, against the proposed diversion area. He insisted upon the user agency to take urgent initiatives for the same.

Finally, the committee unanimously decided to approve the diversion proposal of 64.301 ha. for use of non-forest purpose by M/s. Jindal Stainless Ltd. for Jindal Chromite Mines as per the provisions of FRA, 2006.

The Meeting ended with vote of thanks to the Chair and the members present.

30/4/16

Collector-cum-Chairman,
Jajpur

Memo No. 940 /Date. 3/5/16

Copy forwarded to all members for information and necessary action.

3/5/16

Collector-cum-Chairman,
Jajpur

Memo No. 945 /Date. 3/5/16

Copy forwarded to P.D., DRDA, Jajpur/ Sub-Collector, Jajpur/ Block Development Officer, Sukinda/ Tahasildar, Sukinda for information and necessary action.

Collector-cum-Chairman,
Jajpur

Memo No. 946 /Date. 3/5/16

Copy forwarded to the Director (ST)-cum-Additional Secretary to Govt., ST & SC Development Department, Odisha, Bhubaneswar for information and necessary action.

Collector-cum-Chairman,
Jajpur

ANNEXURE-VII

JSL/KLPN/2021/154 Dated: 13/11/2021

To,
The Collector and District Magistrate,
Jajpur District,
Jajpur.

Sub: Issuance of Certificate over an area of 1.899 Ha under Forest Right Act, 2006 in connection with Jindal Chromite Mines of M/s. Jindal Stainless Limited.

Ref: 1. Your office letter No. 949, date: 03.05.2016

2. Letter No. 9686/SF (Mining & Misc.) 61/2018 Dated: 06.12.2019

Dear Sir,

With due respect, it is to inform your good office that the Jindal Chromite Mines of M/s Jindal Stainless Limited (having a Mining Lease area of 89 Ha), is located in village Kaliapani of Sukinda Tahasil in Sukinda Block of Jajpur district of Odisha.

As per ST & OTFD (RFR) Act, 2006 (FRA) "Gram Sabha" for an area of 64.301 Ha was held at village Kaliapani on 03.02.2016 and recommended by the "Gram Sabha." The same is communicated to Divisional Forest Officer, Cuttack Forest Division by your good office vide letter No. 949, dated: 03.05.2016 that the complete process for identification and settlement of rights under FRA has been carried out for the area over 64.301 Ha.

Earlier we had applied for FRA over 64.301 Ha for Forest land involved with Jindal Chromite Mines, Kaliapani of M/s. Jindal Stainless Limited. The Divisional Forest Officer, Cuttack Forest Division intimated vide their letter No. 9686/SF (Mining & Misc) 61/2018, dated: 06.12.2019 to submit the certificate pertaining to FRA, 2006 for **balance area of 1.899 Ha.**

In view of the above, we humbly submit and request your good office to kindly initiate the process and advise the Nodal Officer for implementation of the said Act & Rule for our Jindal Chromite Mines.

Yours faithfully

For Jindal Stainless Limited

Authorized Signatory

Encls: As above

Copy to: 1. The Divisional Forest Officer, Cuttack Forest Division

2. The Tahasildar, Sukinda Tahasil

Regard
15/11/2021
Collector Jajpur

Jindal Stainless Limited
Jindal Chromite Mines
At / PO : Kaliapani - 755 047, Dist. : Jajpur, Odisha, India
T : +91 6726 268545, F : +91 6726 268315, E : jindal_mines@yahoo.com
Registered Office : O.P. Jindal Marg, Hisar - 125 005 (Haryana) India
Corporate Office : Jindal Centre, 12, Bhikaiji Cama Place, New Delhi - 110 066, India
T : +91 11 26188345 - 60, F : +91 11 26170691; 26161271, E : info@jindalsteel.com; Website : www.jindalstainless.com

COLLECTORATE: JAJPUR

Ph. 06728-222001 (O). 222330 (R). Fax – 222087
E-mail: dm-jajpur@nic.in, Website: www.jajpur.nic.in
(ST & SC Dev. Section)

No. 948 / Date. 3.5.16

To

The Divisional Forest Officer.
Cuttack Forest Division, Ghatakul,
Nuapara, Cuttack.

Sub: Issuance of Certificate under Forest Right Act, 2006 in connection with Jindal Chromite Mines of M/s. Jindal Stainless Ltd.

Sir,

In inviting a reference to the letter on the captioned subject cited above, I am directed to enclose herewith the model certificate [64.301 hectares] in Form-II for projects other than liner projects under Forest Rights Act, 2006 in favour of M/s. Jindal Stainless Ltd. for Jindal Chromite Mines for taking further action at your end.

Yours faithfully,

Encl: As above

District Welfare Officer.
Jajpur

Memo No. 949 / Date 3.5.16

Copy forwarded to the Mines Manager, M/s. Jindal Stainless Ltd. At/Po- Kaliapani. 755047, Dist- Jajpur for information and necessary action.

District Welfare Officer.
Jajpur

JINDAL STAINLESS

Annexure – VIB

Full Title of the Project: **JINDAL CHROMITE MINING LEASE.**

File No.: **FP/OR/MIN/20736/2016**

Date of Proposal: **02.08.2016.**

UNDERTAKING TO OBTAIN FRA CERTIFICATE FROM COLLECTOR UNDER FRA,2006

I, **Sri Shib Sankarshan Mahanta, of M/s Jindal Stainless Limited,** hereby undertake to submit the FRA certificate for balance 1.899 Ha. under FRA, 2006 of forest land after issuance from District Collector, Jajpur District for JINDAL CHROMITE MINES before issuance of stage-II clearance.

Place: Bhubaneswar

Date: 10/11/21

For JINDAL STAINLESS LIMITED

Authorised Signatory

(Shib Sankarshan Mahanta)
Authorised Signatory
For Jindal Stainless Limited
Office Seal .....

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