ମହାନଦୀ କୋଲଫିଲ୍ଡସ୍ ଲିମିଟେଡ୍
महानदी कोलफील्डस लिमिटेड
Mahanadi Coalfields Limited
(A subsidiary of Coal India Limited)

Office Of The Project Officer,
Kulda OCP, Basundhara Area
A/PO:-Balinga-770076
Dist:-Sundargarh (Orissa)
FAX: 06621-286144

MCL

Ref.No.: MCL/BA/PO/KOCP/F&F/2024-25/ 431 **Date: 26.07.2024**

To

The Divisional Forest Officer,Sundargarh Division, Sundargarh

Subject: Proposal for seeking prior approval of the Central Government under Section 2 of the Van (Sanrakshan Evam Samvardhan) Adhniyam, 1980 for non-forestry use of 134.69 ha of forest land for the Expansion of Kulda Opencast Coal Mining Project of Basundhara Area of Mahanadi Coalfields Limited in Sundargarh District under Sundargarh Forest Division.

Ref – 1.) Letter Ref.no. 8-7/2024-FC Dated 11.06.2024 from MoEF&CC, GoI (FC Division)
2) Your Letter Ref.no.3353/4F(Misc)/Dated 26.06.2024.

Respected Sir,

With reference to the letter cited above. the short coming observed in the subject diversion proposal for 134.69 Ha of forest land has been complied herewith. The details furnished are given below:

i) 7306 trees has been reported as project affected trees in the online proposal while the inspection report of the DFO mention the same as 30441. The same needs to be rectified by the user agency by providing the correct number of trees invlolved in the project.

In compliance to the above this is to confirm that Tree enumeration of the complete expansion area of 295.62 Ha has been done in which a total of **30441 nos**. of trees has been enumerated in both forest and non-forest land. The details are as mentioned in the table below:

Table : 01

Sl.no.	Type of Land		No. of trees enumerated
01.	Forest Land	1) Reserve Forest	20912
		2) Revenue Forest	2723
02.	Non Forest Land	1) Govt. Non Forest land	363
		2) Private land	6443
Total			**30441**

The number 7306 trees seems to be arriving out of the table mentioned in the Point No. 4 (ii) Species-wise local/scientific names and girth-wise enumeration of trees of Part-II submitted by DFO Sundargarh.

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ii) Compensatory afforestation, as per the provisions of the Van (Sanrakshan Evam Samvardhan) Rules 2023, should be raised over non-forest / revenue forest land or the lands accredited under ACA can also be swapped in lieu of CA. The state government may, therefore, inform the details of mined out and reclaimed non-forest lands available with M/s. MCL and possibility of using them as CA.

In compliance to the above, this is to submit that the land for Compensatory Afforestation in the form of non forest land / revenue forest land is being searched for and will be submitted as soon as it is obtained. An undertaking to this affect is being submitted herewith.

The status of Mined out Area / Reclaimed Area / Area available for ACA of MCL as on 31.03.2024 is as mentioned in the table below :

Total Excavated Area	Area Backfilled and technically reclaimed	Area Backfilled and Biologically reclaimed	Area of Non Forest land available for ACA
7377.40 Ha	2039.05 Ha	1198.34 Ha	167.827 Ha

iii) As per analysis of the land use details given in the proposals following discrepancies have been observed and same be clarified:

a) State Government's forwarding letter mentions total forest area involved in the Kulda OCP as 354.06 ha while from the perusal of approval granted in the past, the total forest area comes out to be 362.58 ha (227.89 + 134 69). The State Government therefore, while rectifying this discrepancy should clarify the exact involvement of forest area in the extant proposals as well as in the approvals granted in the past.

In compliance to the above, this is to state that the total area of forest land involved in Kulda OCP, at present is **354.06 Ha.** From the area of 227.89 Ha, which was earlier diverted for Kulda OCP vide no. – F.No.-8-176/1997-FC, Date –08.08.2007, an area of **8.52 Ha** has been re-diverted for Basundhara Washery, vide no.- 8-176/1997-FC (Vol.), date – 11.03.2019 (Copy of both approvals enclosed in **Annexure-II**). Hence the resulting area of forest land for Kulda OCP as per the current mining plan will be **(227.89-8.52) + 134.69 = 354.06 Ha**

b) As per detail provided in the Mining Plan (Page-1 of Chapter-2), the total lease area has been revised to 921.305 ha from the 634.20 ha used in Phase-I i.e. additional increase of 287.10 ha is involved in the phase-II. R&R Plan indicates the total area involved in the expansion project as 284.10 ha while as per proposal submitted online and approved Mining Plan, the total incremental area is indicated as 295.62 ha. Discrepancy may be rectified by the State.

In compliance to the above this is to state that the total incremental area for

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the expansion project is **295.62 Ha**. The details provided in the mining plan is correct and is as mentioned in the table below :

Table : 02

		APPROVED LAND OF KULDA OCP 21 MTY, REVISION-3			INCREMENTAL LAND REQUIRED FOR KULDA EXPN OCP, 21 MTY			APPROVED LAND OF KULDA OCP 21 MTY, (REVISION-3) + INCREMENTAL LAND REQUIRED FOR KULDA EXPN OCP, 21 MTY			TOTAL LAND AS PER MP&,MCP OF KULDA EXPANSION OCP (REVISION-4) = APPROVED LAND OF KULDA OCP 21 MTY(REVISION-3) + INCREMENTAL LAND REQUIRED FOR KULDA EXPN OCP 21 MTY - 8.52 HA REDIVERTED FOREST LAND FROM INFRASTRUCTURE AREA OF KULDA		
		A			B			A + B			(A + B) - 8.52		
Sl. No.	Particulars	Land in ha			Land in ha			Land in ha			Land in ha		
		Forest	Non-forest	Total	Forest	Non-forest	Total	Forest	Non-forest	Total	Forest	Non-forest	Total
A.	**MINE LEASE AREA**												
1	Quarry excavation area	187.16	134.755	321.91	110.92	107.15	218.07	298.075	241.905	539.98	298.075	241.905	539.98
2	Infrastructure including Safety zone (7.5m around mine boundary),road/nallah diversion, Embankment.	36.615	115.178	151.793	9.84	49.28	59.12	46.455	164.458	210.913	(46.455-8.52) =37.935	164.458	202.393
3	External OB dump	4.12	156.382	160.502	13.93	4.5	18.43	18.05	160.882	178.932	18.05	160.882	178.932
	Total Mine Lease area required	**227.89**	**406.315**	**634.205**	**134.69**	**160.93**	**295.62**	**362.58**	**567.245**	**929.825**	**354.06**	**567.245**	**921.305**
B.	**OUTSIDE M.L AREA**												
1	Residential colony	0	37.5	37.5	0	0	0	0	37.5	37.5	0	37.5	37.5
2	Rehabilitation site	0	22.9	22.9	0	0	0	0	22.9	22.9	0	22.9	22.9
	Total Outside Mine Lease Area	**0**	**60.4**	**60.4**	**0**	**0**	**0**	0	60.4	**60.4**	0	60.4	**60.4**
	Total Project area	**227.89**	**466.715**	**694.605**	**134.69**	**160.93**	**295.62**	**362.58**	**627.645**	**990.225**	**354.06**	**627.645**	**981.705**

This clearly shows that the only difference that is arising, is because of re-diversion of 8.52 Ha out of 227.89 Ha in the existing land use of Kulda OCP for Basundhara Washery thereby decreasing the total area from 634.205 Ha to 625.685 Ha and with an increment of 295.62 Ha, the total mining lease area will be 625.685 + 295.62 i.e. **921.305 Ha.**

It is further submitted that at the time of preparation of R&R plan, the total expansion area was taken to be 284.10 Ha as per the initial authenticated land schedule, however due to some boundary adjustments and addition of plots the total area was increased to 295.62 Ha, which eventually did not affect the number of families to be rehabilitated as MCL has a policy of providing R&R to the complete villages coming in the project area.

c) ***An area of 8.52 ha from the already diverted forest land of 227.89 ha is also being used in the extant expansion proposal, which amounts to modification of approval dated 08.08.2007. The State Government therefore, needs to provide a KML file of the already approved area and area being utilized in the extant extension proposal. Change in the land use of other components of the existing project. If any also be informed by the State Government.***

In compliance to the above this is to state that from the area of 227.89 Ha, which was earlier diverted for Kulda OCP vide no. – F.No.-8-176/1997-FC, Date –

08.08.2007, an area of **8.52 Ha** has been re-diverted from Infrastructure Area of Kulda OCP for Basundhara Washery, vide no.- 8-176/1997-FC (Vol.), date – 11.03.2019. The change in land use after the re-diversion is as mentioned in the table below:

Table : 03

Purpose	Break up of existing land use (Ha)				Break up of diverted forest land after re-diversion (change in land use) (Ha)			
	Revenue Forest	Classified Forest	Reserve Forest	Total	Revenue Forest	Classified Forest	Reserve Forest	Total
Mining	136.435	45.71	5.01	187.155	136.435	45.71	5.01	187.155
OB Dump	4.12	0	0	4.12	4.12	0	0	4.12
Infrastructure	21.837	0	0	21.837	13.317	0	0	13.317
Embankment	10.408	0	0	10.408	10.408	0	0	10.408
Road Diversion	3.436	0	0	3.436	3.436	0	0	3.436
Nallah Diversion	0.935	0	0	0.935	0.935	0	0	0.935
Total	**177.171**	**45.71**	**5.01**	**227.891**	**168.651**	**45.71**	**5.01**	**219.371**

As desired, the KML files in respect of already approved area and the extension area and area diverted for washery is being submitted herewith in CD form.

iv) Examination of the cost benefit analysis revealed that the loss of the EG&S has been estimated by taking the NPV value corresponding to the lower canopy vegetation density. The DFO in Part-II indicated the canopy density of RF and of Revenue Forests as 0.6 and 0.4 respectively while the corresponding values taken for the estimation of loss of EG&SS are 0.5 and 0.3 respectively. As estimation of most of the parameters is based on the value of NPV, it will therefore, be appropriate that entire CB analysis may be revisited by taking into account the correct canopy density as mentioned in the online Part-II.

In compliance to the above the desired changes have been incorporated in the Cost Benefit Analysis and the same has been attached herewith in **Annexure-III**.

v) The State Government in its forwarding letter, adverting to submission made by the DFO, mentioned the peak rated capacity of the mine is 21 MTPA while approval dated 10.06.2020 of the Board of Directors of the MCL for Mining Plan, submitted online, mentioned the capacity as 18.75 MTPA. The State Government may therefore confirm if any revised approval for enhancing the capacity of the mine to 21 MTPA conveyed by the BOD of MCL.

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In compliance to the above this is to state that the Mining Plan of Kulda Expansion OCP has been revised from 18.75 MTPA to 21.00 MTPA, as the existing Kulda OCP has already obtained an Environmental Clearance for a capacity of 21.00 MTPA, issued by MoEF&CC vide no. – F No. J- 11015/10/1995-IA-II(M), Date – 24.05.2022, (copy enclosed in **Annexure-IV**). The copy of revised and authenticated Mining Plan (21.00 MTPA Revision-4) was already submitted along with EDS reply Ref. No.: MCL/BA/PO/KOCP/E&F/2022-23/74 Date: 03.10.2022, however the same is again being submitted in. **Annexure-V.**

vi) It is observed that proposed project is in the proximity of the Basundhara river and its tributaries such as Chattajor nallah. Impact of the proposed expansion of mining on Chattajor nallah and mitigation measures, if any, needed to be undertaken needs to be informed by the State.

In compliance to the above, this is to state that as per the EC conditions of all the running projects coming in Basundhara Coalfields like Siarmal OCP, Kulda OCP & Garjanbahal OCP, a river conservation plan for Basundhara river along with all its rivulets like Chhattajor nallah for a span of 25 kms considering the impacts of all the coal mines in the area, has already been prepared and has been approved by State water works department, Govt. of Odisha in Sep'2022. Accordingly, the complete work of conservation of Basundhara River and its rivulets has been agreed to be carried out by the State Water Works Department in a phase wise manner on deposit basis, against which a DPR is expected to be submitted by State Water Works Department in July'2024. The conservation plan covers the following activities at an approximate cost of Rs. 261 Crores :

1. Construction of embankment along the river
2. Providing Geo-mattress on river side slopes for slope protection along with launching apron
3. Providing dub grass turfing on country side slopes for slope protection.
4. Providing Bathing ghats on the banks of Basundhara river.

The copy of River Conservation plan is attached herewith as **Annexure-VI.**

vii) The measures proposed by the user agency for the transportation of the excavated coal from the mines to the nearest road / rail head also needs to be furnished by the State.

In compliance to the above, this is to state that a Coal evacuation plan has been prepared for Kulda as well as complete projects of Basundhara Coalfields considering all the future expansions as well, which has been attached herewith as **Annexure-VII.**

viii) A monitoring report on the status of compliance of conditions, stipulated in the approval dated 8.08.2007 granted over 227.89 ha of forest land.

In reference to the above, the compliance of FC conditions stipulated in the approval dated 08.08.2007 granted over 227.89 ha of forest land for Kulda OCP is attached herewith as **Annexure-VIII** for further needful action from your end.

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ix) Proposal involves rehabilitation of 975 families while the R&R Plan submitted online is already being implemented. The State Government may therefore inform if the Plan submitted along with the proposal include the 975 families also and the status of approval of the R&R Plan by the competent authority whether obtained or yet to be obtained.

In compliance to the above, this is to state that the Rehabilitation and Resettlement benefits of the complete villages under Kulda Project i.e. Bankibahal, Kulda, Balinga, Tumulia, Siarmal as well as 09 other villages have already been undertaken by the Claims Commission, set up by the Hon'ble Supreme Court of India in SLP© 6933 of 2007. The R&R benefits to the affected families of Bankibahal & Balinga have been already provided under Orissa R&R Policy 1998 and they have been resettled and for rest of the villages i.e. Kulda, Tumulia, Siarmal & some left out cases of village Bankibahal & Balinga has been undertaken under Orissa R&R Policy 2006.

The number of families affected due to current expansion of Kulda project is 975 families particularly in the villages of Tumulia and Kulda.

The approval of R&R plan by the competent authority has been sought for and is still to be obtained. An undertaking to this affect is being attached herewith as **Annexure-IX.**

This is for your kind information and onward transmission for grant of final approval from MoEF&CC under Section-2 of the Forest (Conversation) Act, 1980.

Yours Sincerely,

26/7/2024

Project Officer
Kulda OCP,
Basundhara Area, MCL

Annexure - 'I'

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MCL

Ref.No. : MCL/GM/BA/KOCP/

Dated : 26.07.2024

UNDERTAKING

I do hereby undertake the responsibility of ensuring compensatory afforestation on Non-forest land / Revenue Forest land as per the guidelines and directives issued by the Ministry of Environment, Forest and Climate Change, Government of India.

It is undertaken that the process of identifying the appropriate non-forest land / revenue forest land for compensatory afforestation is underway and the same will be submitted before Stage-II approval of the Forest diversion proposal.

26/7/2024

Project Officer
Kulda OCP
Basundhara Area, MCL

Annexure - II

FOR : RD. CMDA

F. No. 8-176/1997-FC
Government of India
Ministry of Environment & Forests
(FC Division)

Paryavaran Bhawan, CGO Complex,
Lodhi Road, New Delhi - 110003

Dated: 08th August 2007

To

The Principal Secretary (Forests),
Government of Orissa,
Bhubaneshwar.

Sub: **Diversion of 227.89 ha of forest land (as against initially proposed 280.86 ha) for Kulda OCP of Mahanadi Coalfields Limited in Sundergarh district in Orissa.**

Sir,

I am directed to refer to State Government's letter no. 10.F. (Cons) / 54 / 1997 / 8908 / F&E dated 09.05.1997 and no. 10.F. (Cons) / 54 / 1997 / 23070 / F&E dated 10.11.1998 on the subject cited above seeking prior approval of the Central Government under the Forest (Conservation) Act, 1980. After careful consideration of the proposal by the Forest Advisory Committee constituted under Section-3 of the said Act, **in-principle approval** for the said Mining Lease was granted vide this Ministry's letter of even number dated 25.07.2001 and 22.01.2002 subject to fulfillment of certain conditions. The State Government has furnished compliance report in respect of the conditions stipulated in the in-principle approval and has requested the Central Government to grant final approval.

2. In this connection, I am directed to say that on the basis of the compliance report furnished by the State Government vide letter no.10.F. (Cons) / 59 / 2004 / 6910 / F&E dated 05.05.2007, approval of the Central Government is hereby granted under Section-2 of the Forest (Conservation) Act, 1980 for diversion **227.89 ha of forest land (as against initially proposed 280.86 ha) for Kulda OCP of Mahanadi Coalfields Limited in Sundergarh district in Orissa** subject to fulfillment of the following conditions:

1. Legal status of the diverted forest land shall remain unchanged.

2. (i) Compensatory afforestation shall be raised and maintained by the State Forest Department at the project cost.

(ii) Fencing, protection and regeneration of the safety zone area (7.5 metres strip all along the outer boundary of the mining lease area) shall be done at the project cost. Besides this, afforestation on degraded forest land, to be selected elsewhere, measuring one and a half times the area under safety zone, shall also be done at the project cost.

(iii) Wherever possible and technically feasible, the User Agency shall undertake

afforestation measures in the blanks within the lease area, as well as along the roads outside the lease area diverted under this approval, in consultation with the State Forest Department at the project cost.

3. Following activities shall be undertaken by the State Forest Department at the project cost:

   (i) Proper mitigative measures to minimize soil erosion and choking of streams shall be prepared and implemented.

   (ii) Planting of adequate drought hardy plant species and sowing of seeds to arrest soil erosion.

   (iii) Construction of check dams, retention/toe walls to arrest sliding down of the excavated material along the contour.

4 The period of diversion under this approval shall be twenty (20) years subject to possession of valid lease by User Agency under the MMDR Act, 1957.

5. (i) The User Agency shall take up planting work on the static dumps during the advance mining operations.

   (ii) All the dumps shall be fully reclaimed by afforestation immediately after closure of the mine in the shortest possible period under supervision of the State Forest Department.

6. Any tree felling shall be done only when it is absolutely necessary and unavoidable, and that too under strict supervision of the State Forest Department.

7. The User Agency shall ensure that no damage to the flora and fauna of the area is caused.

8. Reclamation Plan shall be strictly implemented which shall be monitored regularly by the State Forest Department. The User Agency shall submit progress report of reclamation works top the State Forest Department and the Regional Office, Bhubaneswar.

9. It shall be ensured that no labour camps are set up inside the forest area.

10. The mining lease area shall be demarcated on ground at the project cost, using four feet high RCC pillars, with each pillar inscribed with the serial number, forward and backward bearings and distance between two adjacent pillars.

11. The forest land shall not be used for any purpose other than that specified in the proposal.

12. The forest land thus diverted shall be non-transferable. Whenever and whatever extent of forest land is not required by the User Agency, it shall be surrendered to the state Forest Department after proper rehabilitation under intimation to this Ministry.

13. Any other condition that the CCF (Central), Regional Office, Bhubaneswar, may impose

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from time to time for protection and improvement of flora and fauna in the forest area, shall also be applicable.

Yours faithfully,

(C.D. Singh)
Assistant Inspector General of Forests

Copy to :-

1. The Principal Chief Conservation of Forests, Government of Orissa, Bhubaneshwar.
2. The Nodal Officer, O/o the PCCF, Government of Orissa, Bhubaneshwar.
3. The Chief Conservator of Forests (Central), Regional Office, Bhubaneswar.
4. User Agency.
5. Guard file.
6. Monitoring Cell of FC Section.

(C.D. Singh)
Assistant Inspector General of Forests

Addn. C.C.F (Nodal), BBSR
0674 Fax - 2300049

File No. 8-176/1997-FC (Vol.)
Government of India
Ministry of Environment, Forest and Climate Change
(FC Division)
***

Indira Paryavaran Bhawan,
Jor bagh Aliganj Road,
New Delhi – 110003.
Dated: January, 2019.

To,

The Principal Secretary (Forests),
Government of Odisha,
Bhubaneswar.

Sub: Diversion of 29.41 ha of forest land (20.89 ha fresh forest land and 8.52 ha of forest land for re-diversion out of already diverted forest area of 227.89 ha for Kulda OCP of Mahanandi Coalfields Ltd.) in Sundargarh Forest Division of Sundargarh District, Odisha for construction of Basundhara Coal Washery (10 MTY) by M/s Mahanadi Coalfields Limited.

Sir,

I am directed to refer to the State Government's letter No. 10F(Cons)91/2016/16137/F&E dated 29.08.2016 on above mentioned subject seeking prior approval of the Central Government under Section-2 of the Forest (Conservation) Act, 1980 and to say that the proposal has been examined by the Forest Advisory Committee constituted by the Central Government under Section-3 of the said Act.

After careful examination of the proposal of the State Government and on the basis of the recommendations of the Forest Advisory Committee, the Central Government hereby conveys its *'in-principle'* approval for diversion of 29.41 ha of forest land (20.89 ha fresh forest land and 8.52 ha of forest land for re-diversion out of already diverted forest area of 227.89 ha for Kulda OCP of Mahanandi Coalfields Ltd.) in Sundargarh Forest Division of Sundargarh District, Odisha for construction of Basundhara Coal Washery (10 MTY) by M/s Mahanadi Coalfields Limited under Forest (Conservation) Act, 1980 subject to fulfilment of the following conditions: -

(i) Legal status of the diverted forest land shall remain unchanged;

(ii) Compensatory afforestation shall be raised over the non-forest land equal in extent to the forest land being diverted within three years of Stage –II Clearance and maintained thereafter by the State Forest Department at the cost of the User Agency and at least 1000 plants per hectare shall be planted over identified non- forest land. If it is not possible to plant so many saplings in the area identified for CA, the balance saplings will be planted in any other forests as per prescriptions of approved working plan with provision for ten years on subsequent maintenance;

(iii) 25% of CA cost will be deposited extra by the user agency for soil and moisture conservation (SMC) activities on the CA land;

(iv) The admissible identified non-forest land for raising compensatory afforestation shall be transferred and mutated in favour of the State Forest Department before issue of the Stage-II clearance and the same shall be notified by the State Government as RF under Section-4 or PF under Section-20 of the Indian Forest Act, 1927 or under the relevant Section(s) of the local Forest Act, as the case may be, within a period of six months. The Nodal Officer (Forest Conservation) shall report compliance in this regard;

(v) The land identified for the purpose of CA shall be clearly depicted on a Survey of India topo sheet of 1:50,000 scale;

(vi) The User Agency shall transfer the cost of raising and maintaining the **compensatory afforestation** at the current wage rate in consultation with State Forest Department in the account of CAMPA of the concerned State **through online portal**. The scheme may include appropriate provision for anticipated cost increase for works scheduled for subsequent years;

(vii) The User Agency shall transfer the funds for **the Net Present Value (NPV)** of the forest land being diverted under this proposal from the User Agency as per the orders of the Hon'ble Supreme Court of India dated 28.03.2008, 24.04.2008 and 09.05.2008 in Writ Petition (Civil) No. 202/1995 and the guidelines issued by this Ministry vide its letter No. 5-3/2007-FC dated 05.02.2009 **through online portal** of CAMPA account of the State Concerned;

(viii) At the time of payment of the Net Present Value (NPV) at the present rate, the user agency shall furnish an undertaking to pay the additional amount of NPV, if so determined, as per the final decision of the Hon'ble Supreme Court of India;

(ix) User Agency should ensure that the Compensatory levies (CA cost, NPV, etc.) are deposited through challan generated online on web portal and deposited in appropriate bank online only. Amount deposited through other mode will not be accepted as compliance of the Stage-I clearance;

(x) State Government shall complete settlement of rights, in term of the Scheduled Tribes and Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, if any, on the forest land to be diverted and submit the documentary evidence as prescribed by this Ministry's letter No. 11-9/1998-FC (Pt.) dated 03.08.2009 read with 05.07.2013, in support thereof;

(xi) **Since an area of 8.52 ha of forest land is being re-diverted from already diverted forest area of 227.89 ha for Kulda OCP of Mahanandi Coalfields Ltd.) in Sundargarh Forest Division of Sundargarh District, Odisha for construction of Basundhara Coal Washery (10 MTY) by M/s Mahanadi Coalfields Limited, therefore, the land use plan and mining plan shall be got approved before Stage-II Clearance and a copy of the same be submitted to this Ministry for record;**

(xii) The user agency shall prepare and implement Risk Management Plan and the user agency shall take all necessary measures to prevent fire hazards;

(xiii) Period of diversion of the said forest land under this approval shall be for a period co-terminus with the period of the mining lease proposed to be granted under the Mines and Minerals (Development and Regulation) Act, 1957, as amended and the Rules framed there-under;

(xiv) The User Agency shall obtain the Environment Clearance as per the provisions of the

Environmental (Protection) Act, 1986, if required;

(xv) No labour camp shall be established on the forest land and the User Agency shall provide fuels preferably alternate fuels to the labourers and the staff working at the site so as to avoid any damage and pressure on the nearby forest areas;

(xvi) The boundary of the diverted forest land shall be demarcated on ground at the project cost, by erecting four feet high reinforced cement concrete pillars, each inscribed with its serial number, distance from pillar to pillar and GPS co-ordinates;

(xvii) The forest land shall not be used for any purpose other than that specified in the proposal and the forest land proposed to be diverted shall under no circumstances be transferred to any other agency, department or person without prior approval of the Central Government;

(xviii) No damage to the flora and fauna of the adjoining area shall be caused;

(xix) The user agency shall explore the possibility of translocation of maximum number of trees identified to be felled and shall ensure that any tree felling shall be done only when it is unavoidable and that too under strict supervision of the State Forest Department;

(xx) The User Agency shall submit the annual self -compliance report in respect of the above stated conditions to the State Government, concerned Regional Office and to this Ministry by the end of March every year regularly;

(xxi) Any other condition that the concerned Regional Office of this Ministry may stipulate with the approval of competent authority in the interest of conservation, protection and development of forests & wildlife; and

(xxii) The user agency shall comply all the provisions of the all Acts, Rules, Regulations, Guidelines, Hon'ble Court Order (s) and NGT Order (s) pertaining to this project, if any, for the time being in force, as applicable to the project.

After receipt of the compliance report on fulfilment of the above conditions from the State Government, formal approval will be considered under Section-2 of the Forest (Conservation) Act, 1980. The transfer of forest land to the User Agency shall not be affected by the State Government till formal orders approving the diversion of forest land are issued by the Central Government.

Yours faithfully,

(Sandeep Sharma) 11.3.15
Asstt.Inspector General of Forests

Copy to:

1. The Principal Chief Conservator of Forests, Government of Odisha, Bhubaneshwar.
2. The Nodal Officer, O/o the PCCF, Government of Odisha, Bhubaneshwar.
3. The Addl. PCCF (Central), Regional Office, Bhubaneshwar
4. Monitoring Cell, FC Divisions, MoEF&CC
5. Guard File

(Sandeep Sharma) 11.3.15
Asstt. Inspector General of Forests (FC)

Annexure-III

COST BENEFIT ANALYSIS

Cost benefit Analysis in respect of Diversion of 134.69 Ha of Forest Land for Kulda Expansion OCP of Mahanadi Coalfields Limited having mine lease area of 921.305 Ha for supply of coal produced from open cast coal mine (Proposal No. 50293/2020. State Serial No. OR-050/2021 dated 08/07/2021)

Table – B Estimation of Cost of Forest Division			
S.No.	**Parameters**	**Remarks**	**Cost (in Rs.)**
1	Ecosystem Service loss due to proposed forest division.	Economic Value of loss of ecosystem services due to proposed diversion of Forest – NPV amount of forest land being diverted as prescribed by Central Government (MoEF&CC)	Ecosystem Services losses due to proposed forest diversion- NPV as per guidelines dt. 06.01.2022 of MoEF&CC NPV of the forest land being diverted i.e. Reserved Forest (Eco Class II having density of 0.5-0.6) 83.24 Ha @ Rs. 15.958 lac (A) = Rs. 1328.34 Revenue Forest (Eco Class II having density of 0.3-0.4) 51.45 Ha @ Rs. 14.37 lac (B) = Rs. 739.34 lac **Total (A+B) = 2067.68 lac**
2	Loss of animal husbandry productivity including loss of fodder.	To be quantified and expressed in monetary term or 10% of NPV applicable whichever is maximum	**Rs. 206.77 Lakh**
3	Cost of Human Resettlement.	To be quantified and expressed in monetary term as per approved R&R Plan	Budgeted cost of human settlement for 975 families: **Rs. 5635.50 Lakh** (As per the R&R Plan submitted with Form-A Part-I)
4	Loss of public facilities and administrative infrastructure (roads, building, schools, dispensaries, electric	To be quantified and expressed in monetary terms on actual cost basis at the time of diversion	There is no public facilities and administrative infrastructure on the forest land to be diverted. Hence, there is no loss of public facilities.

	lines, railway etc.) on forest land, which would require forest land if these facilities were diverted due to project.		
5	Possession value of the forest land diverted.	30% of environment cost (NPV) due to loss of forest or circle rate of adjoining area in the district should be added as a cost component as possession value of forest land whichever is maximum	**Rs. 620.30 Lakh**
6	Cost of suffering to outsees	The social cost of rehabilitation of outsees (in additional to the cost likely to be incurred in providing residence, occupation, and social services as per R&R Plan) be worked out as 1.5 times of what outsees should have earned in two years had he not been shifted.	975 person x Rs. 450/- per day x 2 years (730 days) x 1.5 times = **Rs. 4804.31 Lacs**
7	Habitat Fragmentation Cost	While the relation between fragmentation and forest goods and services is complex, for the sake of simplicity the cost due to fragmentation has been pegged at 50% of NPV applicable as a thumb rule.	**Rs. 1033.84 Lakh**
8	Compensatory afforestation and soil moisture conservation cost	The actual cost of compensatory afforestation and soil and moisture conservation and its maintenance in future at present discounted value	**Rs. 543.31 Lakh**
Total cost due to diversion of forest land: (Rs. **2067.68** Lakh + Rs. **206.77** Lakh + Rs. **5635.50** Lakh + Rs. **620.3** lakh + Rs. **4804.31** Lakh + Rs. **1033.84** Lakh + Rs. **543.31** Lakh) **B. Total Cost to the society = Rs. 13877.87 Lakh**			

Table – C Existing guidelines for estimating benefits of forest – diversion			
1	Increase in productively attribute to the specific project	To be quantified & expressed in monetary terms avoiding double counting.	The NPV obtained from selling of coal as per the Project Report of the Project at 100% production level is **Rs. 83490 Lakh** (cost base Jan' 14). Refer Annexure-II for NPV
2	Benefits to economy due to the specific project	The incremental economic benefit in monetary terms due to the activities attributed to the specific project	Royalty @ Rs. 106.12/Ton for 339,560,000 T (Total extractable reserve of coal) **Rs. 360,341.07 Lakh**
			NMET Fund i.e., 2% of royalty **Rs. 7206.82 Lakh**
			DMF, i.e., 30% of royalty **Rs. 108102.32 Lakh**
			CGST @ 2.5% of Rs. 659.08-Ton x 339,560,000 Ton **Rs. 55949.30 Lakh**
			SGST @ 2.5% of Rs. 659.08-Ton x 339,560,000 Ton **Rs. 55949.30 Lakh**
			Total: Rs. 587548.81 Lakh
3	No. of population benefited due to specific project		The average population benefited due to this project is about 5000. Assuming a family of four, total number of family benefited: 5000/4 = 1250 Benefit= 1250 x Rs. 5772/month x 12 months x 11 years (life of the mine) = Rs. **9523.80** lakh (as per MGNREGA rates Rs.222 per day and in a month 26 days is equal to Rs.5722) Refer Annexure-III for MGNREGA rate.
4	Economic benefits due to direct and indirect employment due to the project		The employment potential of the project is 522 persons per day (as per Project Report of the project). The average wages to the employees @ (EMS Rs. 2597.57 (As per the Project report of the project) per person x 26 days per month x 12 months) per year will be Rs.4230.51 Lakh Total for 11 years; Rs. **46535.61 Lakh** Refer Annexure-II for daily rated

			manpower requirement and EMS
5	Economic benefits due to Compensatory afforestation	Benefits from such compensatory forestation accruing over next 50 years monetized and discounted to the present value should be included as benefits of compensatory afforestation.	Rs. 15.95 lac x 286.96 ha (as per Guideline issued by MoEF vide letter No. F.No.5-3/2011_FC (Vol-I) dt. 06.01.2022) = **Rs. 4577.01 lacs**
Total benefits due to diversion of forest land for non-forest activity: (**Rs. 83490 Lakh** +**Rs. 587548.81 Lakh** + **Rs. 9523.80 lakh** +**46535.61 Lakh** +**Rs. 4577.01 Lakh**) **C. Total Benefit to the society = Rs. 731675.23 Lakh**			

Total Cost to the Society: Rs. 13877.87 Lakh

Total Benefits to the Society: Rs. 731675.23 Lakh

Cost Benefit ratio = 1:52.72

26/7/2024

26/07/2024

Project Officer
Kulda OCP
Basundhara Area, MCL

Annexure - IV

ENVIRONMENTAL CLEARANCE

PARIVESH

(Pro-Active and Responsive Facilitation by Interactive, and Virtuous Environment Single-Window Hub)

Government of India
Ministry of Environment, Forest and Climate Change
(Impact Assessment Division)

To,

The ProjectOfficer
KULDA EXPANSION OCP MAHANADI COALFILEDS LIMITED
Project Office, Kulda Expansion OC Project, P. O.-Basundhara, Dist.-Sundergarh, State-Orissa,,Sundargarh,Orissa-770076

Subject: Grant of Environmental Clearance (EC) to the proposed Project Activity under the provision of EIA Notification 2006-regarding

Sir/Madam,

This is in reference to your application for Environmental Clearance (EC) in respect of project submitted to the Ministry vide proposal number IA/OR/CMIN/271821/2022 dated 13 May 2022. The particulars of the environmental clearance granted to the project are as below.

1.	**EC Identification No.**	**EC22A042OR116159**
2.	**File No.**	J-11015/10/1995-IA-II(M)
3.	**Project Type**	Expansion7
4.	**Category**	A
5.	**Project/Activity including Schedule No.**	1(a) Mining of minerals
6.	**Name of Project**	Kulda Expansion Opencast Project
7.	**Name of Company/Organization**	KULDA EXPANSION OCP MAHANADI COALFILEDS LIMITED
8.	**Location of Project**	Orissa
9.	**TOR Date**	N/A

The project details along with terms and conditions are appended herewith from page no 2 onwards.

Date: 25/05/2022

(e-signed)
Lalit Bokolia
Scientist F
IA - (Coal Mining sector)

Note: A valid environmental clearance shall be one that has EC identification number & E-Sign generated from PARIVESH.Please quote identification number in all future correspondence.

This is a computer generated cover page.

F No. J- 11015/10/1995-IA-II(M).
Government of India
Ministry of Environment, Forest and Climate Change
(Impact Assessment Division)
*****

2nd Floor Vayu Wing,
Indira ParyavaranBhawan,
Jorbagh Road, N Delhi – 3
Email: lk.bokolia@nic.in Tel: 011-20819417

Dated: 24th May, 2022

To

The Project Officer
M/s The Mahanadi Coalfields Limited
Kulda OCP Basundhara area PO- Balinga,
Tehsil- Hemgir, Sundargarh, Odisha-770076
Email: pokuldaexpansionmcl@gmail.com

Sub: Expansion of Kulda Opencast Coal Mine Project from 19.6 MTPA to 21 (increase of 10% w.r.t 14 MTPA) in an ML area of 634.205 ha M/s Mahanadi Coalfields Limited, located at village Balinga, Tumulia, Siarmal, Kulda & Bankibahal, Tehsil: Hemgir, District Sundargarh (Odisha) - Environmental Clearance under OM vide no. F. No. IA3-22/10/2022-IA.III 07.05.2022- [Availing total 50% relaxation of OM dealing with exemption of public hearing under clause 7 (ii) of EIA notification].

Sir,

This has reference to your online proposal No. IA/OR/CMIN/271821/2022 dated 13th May, 2022 submitted to this Ministry for grant of Environmental Clearance (EC) in terms of the provisions with MoEF & CC's Office Memorandum vide no. F. No. IA3-22/10/2022-IA.III (E 177258) dated 11.04.2022 & 07.05.2022 and as per EIA Notification, 2006) of the Environment Impact Assessment (EIA) Notification, 2006 under the Environment (Protection) Act, 1986 for Expansion of Expansion of Kulda Opencast Coal Mine Project from 19.6 MTPA to 21 (increase of 10% w.r.t 14 MTPA) in an ML area of 634.205 ha M/s Mahanadi Coalfields Limited, located at village Balinga, Tumulia, Siarmal, Kulda & Bankibahal, Tehsil Hemgir, District Sundargarh (Odisha).

2. Earlier, Environment Clearance (EC) was accorded by Ministry on 24.12.2002 for 10 MTPA in an ML area of 878.29 ha. Further, proposal was granted EC for production capacity of 14 MTPA in ML area of 634.205 Ha dated 10.01.2020. Later, EC was granted for expansion under Clause 7 (ii) of EIA notification, 2006 as per O.M. dated 15.09.2017 for 20% expansion each (total 40%) i.e. 16.80 MTPA &19.6 MTPA on 02.03.2021 & 14.02.2022 respectively. Presently the proposal is considered by the Ministry at central level in view of the exigency, as per the provisions of O.M. F. No. IA3-22/10/2022-IA.III dated 07.05.2022.

3. Based on the submission of Project Proponent, Ministry hereby grants approval to Expansion of Kulda Opencast Coal Mine Project from 19.6 MTPA to 21 (increase of 10% w.r.t 14 MTPA) in an ML area of 634.205 ha M/s Mahanadi Coalfields Limited, located at village Balinga, Tumulia, Siarmal, Kulda & Bankibahal, Tehsil: Hemgir, District Sundargarh (Odisha), under the provisions of OM vide no. F. No. IA3-22/10/2022-IA.III 07.05.2022, under the Environment Impact Assessment

(EIA) Notification, 2006 and subsequent amendments/circulars thereto subject to the compliance of the following terms & conditions / specific conditions for environmental safeguards as stated below:-

i. PP shall submit Certified Compliance Report of the EC vide No. F. No. No. J- F No. J-11015/10/1995-IA-II(M) dated 14th February, 2022 granted for total 40% expansion, along with EIA/EMP report, prepared based on standard ToRs for the additional capacity of 10% on PARIVESH portal within six months of enhancement of production beyond 40%.

ii. In view of above para (i), Ministry shall ascertain the adequacy of the proposed environmental safeguards and stipulate necessary conditions, if required, which shall be monitored as a part of the EC compliance monitoring.

iii. PP shall obtain necessary prior consent for enhanced capacity from State Pollution Control Board under Air and Water Act.

iv. Environmental quality parameters arising out of proposed expansion shall be within the prescribed norms and the same shall be maintained as per prescribed norms.

v. Hon'ble Supreme Court in an Writ Petition(s) Civil No. 114/2014, Common Cause vs Union of India & Ors vide its judgement dated 8th January, 2020 has directed the Union of India to imposea condition in the mining lease and a similar condition in the environmental clearance and the mining plan to the effect that the mining lease holders shall, after ceasing mining operations, undertake re-grassing the mining area and any other area which may have been disturbed due to their mining activities and restore the land to a condition which is fit for growth of fodder, flora, fauna etc. Compliance of this condition after the mining activity is over at the cost of the mining lease holders/Project Proponent".

vi. All other terms and conditions as prescribed in Ministry's letter dated 10.01.2020 02.03.2021 & 14.02.2022 shall remain the same and this enhancement shall be read with EC dated 14.02.2022, which needs to be complied by PP.

This issues with the approval of the competent Authority

(Lalit Bokolia)
Director

Copy to:

1. The Secretary, Ministry of Coal, Shastri Bhawan, New Delhi.
2. The APPCF, Regional office (EZ), Ministry of Environment, Forest and Climate Change, A-31, Chandrashekhapur, Bhubaneshwar-751023 (Odisha)
3. The Secretary, Department of Environment & Forests, Government of Orrisa, Secretariat Bhubaneshwar (Odisha)
4. The Chairman, Orissa State Pollution Control Board, Parivesh Bhawan, A/118 Nilkanthnagar, Unit VIII, Bhubaneshwar-751012 (Odisha)
5. The Chairman, Central Ground Water Authority, Jamnagar House, 18/11, Man Singh Road Area, New Delhi, Delhi 110001
6. The District Collector, Sundergarh, Government of Odisha
7. Monitoring File /Record File /PARIVESH Portal

(Lalit Bokolia)
Director

Signature Not Verified
Digitally signed by Lalit Bokolia
Scientist F
Date: 5/25/2022 11:46:05 AM

MINING PLAN AND MINE CLOSURE PLAN FOR KULDA EXPANSION OCP (21Mty)

[EXPANSION IN AREA FROM 694.605 Ha TO 981.705 Ha]

(REVISION - 4)

Modified Mining Plan seeking approval under Rule 22E of MCR, 1960

Coal Block Name : Kulda Coal Block

Area in hectare (ha): Block Area - 584.00 ha
Mining Lease Area - 921.305 ha
Project Area - 981.705 ha

IB VALLEY COALFIELD, BASUNDHARA AREA,

Himgir tehsil, Dist. Sundergarh, State: Odisha

Applicant: GENERAL MANAGER, BASUNDHARA AREA
MAHANADI COALFIELDS LIMITED, ODISHA
Email – gm-basundhara.mcl@coalindia.in

Targeted Capacity:

(a) Rated capacity: 21.00 Million Tonnes per year (Mty)

Name of the Accredited Mining Plan Preparing Agency (MPPA) preparing the mining plan with details:

cmpdi
A Mini Ratna Company

JULY, 2022

CENTRAL MINE PLANNING & DESIGN INSTITUTE LIMITED
(A Subsidiary of Coal India Ltd.)
REGIONAL INSTITUTE-VII
Plot – E, 4; At: Samantapuri, P.O. – RRL; Bhubaneswar – 751013.

MINING PLAN & MINE CLOSURE PLAN
OF
KULDA EXPANSION OCP (REVISION - 4), 21.0 MTY

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8	Annexure - VIII	Revision of M.L area and Re-diversion of Forest land	AN8

GENERAL INFORMATION

1	NAME AND ADDRESS OF THE APPLICANT	:	MAHANADI COALFIELDS LIMITED, JAGRUTI VIHAR, BURLA, SAMBALPUR-768020 (ORISSA)
2	STATUS OF THE APPLICANT	:	CENTRAL PUBLIC SECTOR UNDERTAKING (A SUBSIDIARY OF COAL INDIA LTD.) A GOVT. OF INDIA UNDERTAKING REGISTERED UNDER COMPANIES ACT, 1956
3	MINERAL WHICH THE APPLICANT INTENDS TO MINE	:	COAL
4	NAME, ADDRESS OF PERSON WHO PREPARED MINING PLAN	:	GUNTUR SRINIVAS CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED, REGIONAL INSTITUTE-VII, PLOT NO. E4 NEAR GANDHI PARK, SAMANTAPURI, BHUBANESWAR-751013 (ODISHA). RQP REF.NO.-No. 34012/1/2015-CPAM, DTD. 05.10.2017
5	NAME AND ADDRESS OF PROSPECTING AGENCY	:	CENTRAL MINE PLANNING & DESIGN INSTITUTE LIMITED, REGIONAL INSTITUTE-VII, PLOT NO. E4 NEAR GANDHI PARK, SAMANTAPURI, BHUBANESWAR-751013 (ODISHA).

List of Abbreviations used:

- MoC : Ministry of Coal
- MoEF : Ministry of Environment and Forest
- EC : Environmental Clearance
- FC: Forestry Clearance
- CMPDIL : Central Mine Planning and Design Institute Limited.
- MCL : Mahanadi Coalfields Limited.
- NCDC: National Coal Development Corporation.
- OC : Opencast
- IBM : Indian Bureau of Mines
- MECL: Mineral development Corporation Limited
- RH- Relative Humidity
- UHV- Useful Heat Value
- PR : Project Report
- CBA (A&D) Act- Coal Bearing Areas (Acquisition & Development) Act.
- Yr 1,2,- Production year 1,2
- Mt- Million tonnes
- Mty- Million tonnes per year
- OB- Overburden
- TPD- Tonnes per day
- kW- kilo watt
- kV-kilo volt
- FLP- Flame Proof
- lps-liters per second
- CO- Carbon Monoxide
- CH_4- Methane
- CHP- Coal Handling Plant
- MTK room- Mine Time Keeper Room
- RPM- Rounds per Minute
- SPM- Suspended Particulate Matter
- NO_X- Nitrogen Oxide/s
- EMP- Environmental Management Plan

SUMMARISED DATA

PROJECT INFORMATION		
1.1	**INTRODUCTION**	
1.1.1	Name of Coal/Lignite Block	Kulda Block
1.1.2	Name of the Coalfield/ Lignite Field	**IB valley coalfield**
1.1.3	Base date of Mining Plan/ Mine Closure Plan	Costbase of mine closure : June 2022
1.1.4	Linked End Use Plant	This mine has been planned to meet the demand of the present & future thermal power stations (basket linkage).
1.1.5	Distance of End use Plant from the pit head of the projection in "km"	NA
1.1.6	Mode of Coal Transport	1) **Within the Mine:** Truck transportation from mine face to pit top. 2) **Surface Coal Transport:** The entire blast free coal will feed to proposed Silos to be located at Barpali loop except around 2.0Mty conventionally produced will be catered by the existing Feeder breaker circuits. However, till the commissioning of the proposed MGR Loop at Barpali yard the entire coal will be dispatched through Kanika and Sardega sidings as well as road sale.
1.2	**LOCATION, TOPOGRAPHY AND & COMMUNICATION**	
1.2.1	Location of coal deposit (District and State)	Himgir tehsil, **Dist.** Sundergarh, **State**: Odisha
1.2.2	Communication: PWD roads, railway lines, Air	▪ Sundargarh-Raigarh all weather road is passing through the block. ▪ Sundergarh, district HQ is on State Highway-10 (Sambalpur to Rourkela), is at a distance of about 40 km. ▪ The block is also connected with two important towns of Orissa namely Rourkela at 145 km and Jharsuguda at 75 km. ▪ Nearest rail head Himgir - 36 km by road (SE Rly.); Jharsuguda railway station - 75 km from the block. ▪ The nearest port at Bay of Bengal - Paradip (at a distance of about 600 km. from the block) ▪ The nearest airport from the block - Jharsuguda Airport.
1.2.3	Availability of power supply, water, etc.	Power from existing 220/33 kV substation at Garjanbahal.
1.2.4	Prominent physiographic features,	▪ The topography of the block is rugged with steep rise and fall. ▪ The central and south eastern part lie at a comparatively higher elevation.

<table>
<tr><td></td><td>drainage pattern, natural water courses, rainfall data</td><td>▪ Altitude of the block : 254 m to 320 m
▪ Basundhara river flows along northwest and northern boundary of the block.
▪ The ground slopes generally towards west and north and ground water is collected by Chattajhor nallah being fed by streamlets, which in turn feeds to river Basundhara.
▪ Sub-tropical warm temperature
The average annual rainfall is 1413 mm as measured at IMD Jharsuguda for the last 24 years.</td></tr>
<tr><td>1.2.5</td><td>Land use and ownership/ occupancy & involvement of forest land</td><td>
<table>
<tr><th rowspan="2">Sl.</th><th rowspan="2">Particulars (ML-mining lease)</th><th colspan="3">Total Area in ha</th></tr>
<tr><th>Forest</th><th>Non-forest</th><th>Total</th></tr>
<tr><td>1.</td><td>Quarry excavation area</td><td>298.075</td><td>241.905</td><td>539.98</td></tr>
<tr><td>2.</td><td>Infrastructure including Safety zone (7.5m around mine boundary) and Embankment</td><td>37.935</td><td>164.458</td><td>202.393</td></tr>
<tr><td>3.</td><td>External OB dump</td><td>18.05</td><td>160.882</td><td>178.932</td></tr>
<tr><td></td><td>Total ML area</td><td>354.06</td><td>567.245</td><td>921.305</td></tr>
</table>
</td></tr>
<tr><td>1.2.6</td><td>Important surface features within the project area and major diversion or shifting involved</td><td>Sundargarh-Raigarh all weather road is passing through the block (diverted).
Basundhara river & Chattajor nallah around periphery of block.</td></tr>
<tr><td colspan="3">1.3 DETAILS OF THE ALLOTTMENT AGREEMENT</td></tr>
<tr><td>1.3.1</td><td>Name of the Alottee</td><td>MAHANADI COALFIELDS LIMITED (MCL)</td></tr>
<tr><td>1.3.2</td><td>Status of the Applicant Company</td><td>Central Public Sector Undertaking
(A Subsidiary of Coal India Ltd.)
A Govt. of India Undertaking
Registered Under Companies Act, 1956</td></tr>
<tr><td>1.3.3</td><td>Details of allotment/ vesting order</td><td>NA</td></tr>
<tr><td>1.3.4</td><td>Name and address of the applicant</td><td>Mahanadi Coalfields Limited
Jagruti vihar, Burla
Dist: Sambalpur (Odisha) - 768020</td></tr>
<tr><td>1.3.5</td><td>Relationship between the applicant and allottee company</td><td>MCL is a subsidiary of Coal India Ltd. which is a Govt. of India Undertaking.</td></tr>
<tr><td>1.3.6</td><td>Name of the previous alottee of the Block</td><td>NA</td></tr>
<tr><td>1.3.7</td><td>Starting date of the mine as per CMDPA</td><td>NA</td></tr>
<tr><td>1.3.8</td><td>Rated capacity</td><td>21.0 Mty</td></tr>
</table>

	as per CMDPA	
1.3.9	Production schedule as per opening permission (meeting provisions of CMDPA if any)	
1.3.10	End Use of Coal/Lignite as per allotment order if any	▪ To satisfy needs of different present & future customers of MCL
1.4	**DETAILS OF THE PREVIOUS APPROVAL OF MINING PLAN**	
1.4.1	Date of Approval	Mining Plan/Mine Closure Plan of Kulda Expansion OCP (21 Mty), Revision-3 was approved by MCL Board ref no: MCL/SBP/CS/BD-248/Exct/2022/12600 dated 20/22.06.2022.
1.4.2	Conditions, if any	
1.4.3	Scheduled year of start of production	This is a running mine.
1.4.4	Proposed year of achieving the targeted production	Year-1
1.4.5	Date of actual commencement of mining operations, if operations already started	2007-08
1.4.6	Likely date of mining operations, if operations not yet started & reasons for non-commencement of operations	NA
1.4.7	Planned production and actual levels achieved in **last 3 years** (Coal in Mte, OB in MM^3, SR in M^3/te)	O/CAST: COAL (Mt): OB (Mcum) 2019-20: 13.63: 8.34 2020-21: 15.73: 16.59 2021-22: 18.50: 15.37
1.4.8	Reasons for difference between the planned and actual production levels	Due to delay in forestry clearance & land acquisition.

1.5 PARAMETERS OF APPROVED MINING PLAN VIS-À-VIS PROPOSED MINING PLAN

		Approved Mining Plan	Proposed Mining Plan
1.5.1	Block Area in "Ha"	584	584
1.5.2	Block Area Projected "Ha"		
1.5.3	Lease area "Ha"	634.205	921.305
1.5.4	Project Area "Ha"	694.605	981.705
1.5.5	Life of the Project "Yrs"	3	11
1.5.6	Minimum and Maximum Depth of working "m"	Minimum - 10 m Maximum - 200 m	Minimum - 10 m Maximum - 238 m
1.5.7	Net Geological Block "Ha"	584	584
1.5.8	Production Target "MTPA"	21.0	21.0
1.5.9	Seams Available "As per GR"	**3 seams**	**3 seams**
1.5.10	Seams not considered for Mining with Reasons	Reserves have been estimated for all coal seams. Ib seam in certain patches are not considered where it is found non workable.	Reserves have been estimated for all coal seams. Ib seam in certain patches are not considered where it is found non workable.
1.5.11	Net Geological Reserve "Mt" (without barrier & slope)	438.90 (Total) 245.71 (Phase-I)	438.90
1.5.12	Blocked Reserve "Mt"	73.22	78.45
1.5.13	Mineable Reserve "Mt"	172.49 (Phase-I)	360.45
1.5.14	Extractable Reserves "Mt"	172.49 (Phase-I)	339.56
1.5.15	% of Extraction/recovery	70.20	77.37
1.5.16	Reserve Depleted (till the base date) Reserves "Mt"	120.93 till 31.03.2022	120.93 till 31.03.2022
1.5.17	Balance Extractable reserve "Mt"	**51.56 (Phase-I) As on 01.04.2022**	**218.627 As on 01.04.2022**
1.5.18	Average Grade	Range: D to G Mean: F	Range: D to G Mean: F
1.5.19	OB in MM^3	55.72 (Phase-I)	243.006
1.5.20	SR MM^3/te	1.08	1.11
1.5.21	Mining Technology	Shovel-Dumper in OB & Surface miner-front end loader-dumper in coal	Shovel-Dumper in OB & Surface miner-front end loader-dumper in coal
1.5.22	Coal Beneficiation envisaged	**Not applicable**	**Not applicable**
1.5.23	Handling of Rejects	**Not applicable**	**Not applicable**
	Land use pattern "Ha"		
1	Excavation Area	321.91 (Phase-I)	539.98
2	Infrastructure including Safety zone (7.5m around mine boundary) and Embankment	151.793	202.393
3	External OB dump	160.502	178.932
	Total Lease area	**634.205**	**921.305**
	Residential colony	37.5	37.5
	Rehabilitation site	22.9	22.9

	Total Outside Mine Lease Area	**60.4**	**60.4**
	Total Project area	**694.605**	**981.705**
1.5.25	Reasons for revision	• **Increase in area.** • **Change in mineable reserve & stripping ratio** • **Change in mine life**	

2.Exploration, Geology, Seam Sequence, Coal Quality and Reserve

2.1	**DETAILS OF THE BLOCK**				
2.1.1	Particulars of adjacent blocks: North, South, East, West	**North:** Basundhara East block (exhausted) separated by Basundhara river / Nala.	**South:** Garjanbahal block	**East:** No Blocks.	**West:** Siarmal & Siarmal Extension.
2.1.2	Location of the Block District/State	Himgir tehsil, Sundergarh district, **Odisha**			
2.1.3	Area of the Block "Ha"	584 ha			
2.1.4	Area of the geological block projectised "in Ha" (Area of the geological block considered for liquidation of coal reserve)	584 ha			
2.1.5	Balance area yet to be projectised "Ha"	Nil			
2.1.6	Likely Reserve in the area yet to be projectised "Mte"	**NA**			
2.1.7	Co-ordinates of the Block Boundary	**Co-ordinates of the Block Boundary** ID: 1 — Latitude: 22°01'02" N — Longitude: 83° 43'28" E ID: 2 — Latitude: 22°03'03" N — Longitude: 83°45'35" E			
2.1.8	The project area, lease area and geological block area in "Ha" shall also be envisaged.	Geological block area: 584 Ha Lease area: 921.305Ha Project area : 981.705Ha			
2.1.9	KML file of the proposed lease and geological block	Will be provided by MCL AutoCAD file with WGS84 system with marked coordinate grid values is provided in this report.			
2.1.10	Whether the proposed project area is confined within the allotted block boundary, if not, the reason for deviation from allotted block boundary, may be given	External Dump No.2 falls under coal bearing area towards dip side of Kulda block which belongs to MCL. Infrastructure is on non coal bearing area towards rise side of the block. Colony & resettlement area is outside block area.			
2.1.11	If the project area extends outside the allotted block boundary, confirmation about	Some of the coal dispatch infrastructure are located in outside coal block which are non-coal bearing on the rise side as per coalfield geological plan. However external			

	non-occurrence of coal/lignite in the area under reference needs to be furnished	overburden dump no. 2 is on coal bearing area on the dip side of the block. Dipside block belongs to MCL only & the dump will be rehandled if this dipside area will be mined in future.
2.1.12	Type of the project (Operating/under Implementation) and year of starting	Kulda OCP is an operating mine. Base year of this Mining plan is 2022-23.
2.2	**EXPLORATION, GEOLOGY AND ASSESSMENT OF RESERVE**	
2.2.1	Regional geological set up of the area, local geology, structure, stratigraphic sequence, characteristics of the litho-logical units (coal seams/partings/overburden	The IB Valley coalfield forms a half elliptical basin. It is closed towards south-east and open towards north-west. The basin has normal contact with the metamorphics in the north-western, northern, north-eastern, eastern and south-eastern part. It has a faulted contact with the metamorphics in the south-western boundary where younger formations viz. Raniganj and Barren Measure occur in juxtaposition with the metamorphic. In this coalfield the prominent geological formations are pre-cambrian as base over which Talchir, Karharbari and Barakar formations were deposited. The pre-cambrian rocks are exposed along the basin margin above which Talchir, Karharbari and Barakar rest successively as per the depositional sequence. Barakar and Karharbari are the two potential coal bearing formations in IB Valley coalfield with Barakar being the store house of majority of coal seams.(details in Chapter-4)
2.2.2	Local geology, structure, stratigraphic sequence, characteristics of the litho-logical units (coal seams/ partings/ overburden)	Detailed exploration in this block has established the existence of Barakar and Karharbari Formations under thin blanket of soil, sub-soil and laterite. The geological structure of the area has been interpreted on the basis of surface and sub-surface data obtained from boreholes. Strike of the strata is roughly NW-SE. The dip is generally 7° towards southwest. Dip is slightly higher in southern part and near faults compared to rest of the area. Existence of 3 no faults has been interpreted on the basis of borehole data. Three coal seams viz. Ib, Rampur and Lajkura seams have been proved in this block under report. Ib seam is the bottom most coal seam and is splitted in to 3 sections viz. Ib Top, Ib Middle & Ib Bottom. Rampur seam is splitted into five sections namely Rampur-I, Rampur-II, Rampur-III Top,

		Rampur-III bot., Rampur-IV and Rampur-V. Lajkura is also a thick seam and splitted into 4 sections viz; Lajkura-I, Lajkura-II, Lajkura-III and Lajkura-IV. Ib and Rampur seams occur covering almost entire block, whereas occurrence of Lajkura seam is restricted to the western half of the block. (details in Chapter-4)
2.2.3	Geological Block Area "Ha"	584 ha
2.2.4	Status of Exploration of the block	Kulda block has been explored in detail and geological reports are available for the blocks.
2.2.5	Area covered by 'detailed' exploration within the block (sq.km)	5.84 sq.km.
2.2.6	Whether entire lease area has been covered by 'detailed' exploration	**Yes**
2.2.7	No. of boreholes drilled within the block	130 boreholes;
2.2.8	Whether any further exploration/study is required or suggested and time frame in which it is to be completed	No
2.2.9	Year wise future programme of exploration	NA
2.2.10	Overall borehole density within the block (no./sq.km) approx.	22.3 boreholes/sq.km.
2.2.11	No of seams available as per GR (Geological Report)	3 seams
2.2.12	Seams not considered for Mining with Reasons	Reserves have been estimated for all coal seams. Ib seam is excluded in some small patches where it is found less than workable thickness.
2.2.13	Dip of the seam	• The strata generally dips 7° towards southwest.
2.2.14	Seam wise thickness	

Coal seams	Thickness (m)
Lajkura-IV	12.42 - 14.39
Lajkura-III	2.02 - 4.89
Lajkura-II	30.05 - 34.07
Lajkura-I	12.09 - 14.43
Rampur-V	1.94 - 6.40

		Rampur-IV	12.33- 21.58
		Rampur-III(Top)	2.97 - 11.92
		Rampur-III(Bot.)	0.16- 3.73
		Rampur-II	0.91 - 6.31
		Rampur-I	0.06 - 5.03
		IB (Top)	0.12 - 1.84
		IB(Middle)	0.30 - 4.28
		IB(Bottom)	0.22 - 3.28
2.2.15	Methodology of reserves estimation (also mention if any software package has been used).	**Basic Assumptions & Norms Followed :** 1) In seam dirt bands of 1m and above thickness have been excluded from the thickness of the coal seams and considered as Intra-seam burden for which separate Iso-dirt bands have been drawn in respective seam Folio plans for estimating volume of in seam overburden. 2) Coal seam having minimum 1m thickness & consistent development has been considered for reserves estimation. 3) Seams/sections having less than (<)1m thickness have been accounted for OB above the corresponding seam. 4) Normally, two coal seams or splits are considered separate if the intervening parting is 1m and more. However, depending upon regional continuity of the intervening parting the splits having even < 1m. parting (at places) has also been considered as separate seams..	
2.2.16	Net Geological Reserve of the block “Mte”	**438.90**	
2.2.17	Mineable Reserve of the block “Mte”	**360.45**	
2.2.17	Blocked Reserve “Mte”	78.45	
2.2.20	Corresponding extractable reserve of the block “Mte”	**339.56**	
2.2.21	Percentage of Extraction	**77.36**	
2.2.22	Reserve already depleted (Base date of Mining Plan)	120.93 till 31.03.2022	
2.2.23	Balance Reserve (as on Base Date)	**218.627 as on 01.04.2022**	

3.1	**MINING METHOD**	
3.1.1	Existing method of mining if the mine is under operation	Shovel dumper mining system in overburden and Surface Miner (windrowing), loader and dumper for coal extraction
3.1.2	Proposed method of mining with justification on	The prevalent mining and geological conditions comprise of the followings:

	suitability of method of mining	i) Presence of 3 nos. thick coal horizons namely, (a) Ib (8 m), (b) Rampur (45 m), (c) Lajkura (50 m). ii) The above coal horizons contain multiple coal sections with intervening partings. Thickest coal seams/sections are Rampur (IV+V) (25 m) and Lajkura II (31 m). iii) Gradient of the seams (5° to 8°). iv) Low average stripping ratio of 1.11 cum per tonne as on 01.04.2022 Considering the above prevalent mining and geological conditions, shovel dumper mining system in overburden and Surface Miner (windrowing), loader and dumper for coal extraction has been suggested.
3.1.3	Coal production capacity proposed "Mtpa"	**21.0 Mtpa**
3.1.4	Justification for optimization Coal production capacity	Considering available strike length, thickness of seams & dumping requirement capacity of 21.0 Mty is justified.
3.1.5	Calendar year from which the production will start	Kulda OCP is an operating mine.
3.1.6	Year of Achieving rated production	**Year-1**
3.1.7	Coal production plan "MT"	OC (opencast mining) - Proposed , UG (Underground mining) – Not proposed

Year		Coal Production Schedule			OB "MM³"	SR
Year of Operation	Calendar Year	UG	OC	Total		
Y-1	2022-2023		21	21	23.52	1.12
Y-2	2023-2024		21	21	23.73	1.13
Y-3	2024-2025		21	21	23.73	1.13
Y-4	2025-2026		21	21	23.73	1.13
Y-5	2026-2027		21	21	24.15	1.15
Y-6	2027-2028		21	21	24.15	1.15
Y-7	2028-2029		21	21	24.15	1.15
Y-8	2029-2030		21	21	24.15	1.15
Y-9	2030-2031		21	21	24.15	1.15
Y10	2031-2032		21	21	23.52	1.12
Y-11	2032-2033		8.627	8.627	4.026	0.47

	TOTAL			**218.627**	**218.627**	**243.006**	**1.11**

3.1.8	Peak/Rated Capacity	
	- By OC	**21.0**
	- By UG	NA
	- Overall	**21.0**
3.1.9	Life of the mine:	
	- By OC	11
	- By UG	NA
	- Overall	**11**
3.1.10	Whether the proposed external OB dump site is coal/lignite bearing: If so, whether coal/lignite below waste disposal area is extractable	External overburden dump No. 2 area is on coal bearing area on the dip side of the block. Dipside block belongs to MCL only & the dump will be rehandled if this dipside area will be mined in future.
3.1.11	Whether negative proving for coal/lignite in the proposed site for OB dump/ infrastructure has been done	Some of the coal dispatch infrastructure are located in outside coal block which are non-coal bearing on the rise side as per coalfield geological plan. However external overburden dump No 2 is on coal bearing area on the dip side of the block. Dipside block belongs to MCL only & the dump will be rehandled if this dipside area will be mined in future.
3.1.12	Results of any investigation carried out for scientific mining, conservation of minerals and protection of environment; future proposals	No

3.1.13	Type of Equipment/ HEMM proposed	

Equipment	Size/Specification	Total No
OVERBURDEN		
HYDRAULIC BACKHOE [660-760 HP]	5.9-6.1 cum.	10
ELECTRIC ROPE SHOVEL [6.6 kv]	10 Cum.	4
REAR DUMPER	100 T	34
REAR DUMPER	60 T	75
ELEC. R.B.H. DRILL TALL MAST	250 mm	6
R.B.H. DRILL	160 mm	6
DOZER	410 H.P.	10
RIPPER DOZER	850 HP	3
COAL		
SURFACE MINER (WINDROW)	900-1100 HP	6
HYDRAULIC BACKHOE [660-760 HP]	5.9-6.1 cum.	2
FRONT END LOADER [~500 HP]	5.5-6.0 cum	9
REAR DUMPER	60 T	63
DOZER	410 H.P.	5

4.1	**SAFETY AND MANAGEMENT**	
4.1.1	Important safety aspects: Major Risks and uncertainties to the project viz. Proximity to river, adjacent working, geo-mining disturbances, slope stability and remedial measures suggested. It should also include proposed overall slope of the quarry and OB dump, dump height, strata control, fire and spontaneous heating, gas monitoring, disaster management, danger from inrush of water etc.	➢ Mine working & waste dump slope failure. ➢ Dangers due to handling and use of explosives and accidents due to fly-rocks following a faulty heavy blast. ➢ Hazards associated with use of electricity ➢ Accidents due to unruly operation of HEMM ➢ Dust hazards ➢ Fire hazards due to spontaneous heating of coal in stockpiles and exposed benches. ➢ Fire hazards in stores & workshops where inflammable & highly inflammable materials are stored or used. ➢ Danger of inundation from surface and/or ground water Major threat of Inundation is from Basundhara river/nala & Chattajhor nallah, which flows along the northern and western boundary of the block. Embankment with a height

		of three meter above the HFL has been proposed against Basundhara river.
4.2.2	A commitment from the Company Board that entire mining operation will be carried out as per the Statutory provision given under Mines Act 1952, Coal mine Regulation 2017 and wherever specific permission will be required the company will approach the concerned authorities.	Will be provided by MCL
5.1	**INFRASTRUCTURE FACILITIES**	
5.1.1	Mine infrastructure required e.g. Equipment maintenance planning, Office buildings, Workshop, Power supply arrangement, Water supply etc.	• E&M WORKSHOP • STORES • COLONY • PROJECT SUBSTATION • CHP SUBSTATION • PROJECT & SITE OFFICE • WATER SUPPLY ARRANGEMENT • ETP & STP PLANT
5.1.2	Power supply	Main power supply is from 220KV Main sub-station at Garjanbahal which was charged in October 2012. Power is transmitted to 2x5 MVA, 33/6.6 KV substation near existing mine. (details in chapter 8)
5.1.3	Coal Handling Arrangement: Brief detail of the CHP/ Mode of Dispatch, Coal quality and Coal staking and handling arrangement	(details in chapter 7)

<table>
<tr><td>5.1.4</td><td>Coal washing and the proposed handling/ disposal of rejects</td><td>Not applicable</td></tr>
<tr><td>6.1</td><td colspan="2">LAND REQUIREMENT</td></tr>
<tr><td>6.1.1</td><td>Total Land requirement for the mine in “Ha”</td><td>921.305 Ha for Mining Lease
981.705 Ha Total lease</td></tr>
<tr><td>6.1.2</td><td colspan="2">During mining Land use details:
<table>
<tr><th rowspan="2">Type</th><th rowspan="2">Land use (Pro posed)</th><th colspan="6">Land Use (Post Closure)</th></tr>
<tr><th>Plantation</th><th>Water Body</th><th>Pubic/ Company use</th><th>Forest land (Returned)</th><th>Undist urbed</th><th>Total</th></tr>
<tr><td>Excavation Area</td><td>539.98</td><td>393.94</td><td>15.76</td><td></td><td>130.28</td><td></td><td>539.98</td></tr>
<tr><td>Backfilled Area</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Excavated Void</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>External dump</td><td>178.932</td><td>178.932</td><td></td><td></td><td></td><td></td><td>178.932</td></tr>
<tr><td>Infrastructure including Safety zone (7.5m around mine boundary) and Embankment</td><td>202.393</td><td>60.718</td><td></td><td>125.484</td><td></td><td>16.191</td><td>202.393</td></tr>
<tr><td>Total Lease area</td><td>921.305</td><td>633.59</td><td>15.76</td><td>125.484</td><td>130.28</td><td>16.191</td><td>921.305</td></tr>
<tr><td>colony</td><td>37.5</td><td>7.5</td><td></td><td>30</td><td></td><td></td><td>37.5</td></tr>
<tr><td>Resettlement</td><td>22.9</td><td>4.5</td><td></td><td>18.4</td><td></td><td></td><td>22.9</td></tr>
<tr><td>Total outside area</td><td>60.4</td><td>12</td><td></td><td>48.4</td><td></td><td></td><td>60.4</td></tr>
<tr><td>Total Project area</td><td>981.705</td><td>645.59</td><td>15.76</td><td>173.884</td><td>130.28</td><td>16.191</td><td>981.705</td></tr>
</table>
Area outside lease area is indicative & may vary as per actual implementation of the project.</td></tr>
<tr><td>6.1.3</td><td>Surface features over the block area</td><td>State highway from Sundergargh to Raigarh (diverted)</td></tr>
<tr><td>6.1.4</td><td>Proposed rehabilitation programme</td><td>R & R benefits including well developed rehab site & other cash compensation will be given to PAF as per R & R policy of MCL & norms of state Govt. of Odisha</td></tr>
<tr><td>6.2</td><td colspan="2">DETAILS OF LEASE</td></tr>
<tr><td>6.2.1</td><td>Status of Lease</td><td></td></tr>
<tr><td>6.2.2</td><td>Existing Lease Area “Ha”</td><td>634.205</td></tr>
<tr><td>6.2.3</td><td>Period for which Mining Lease has been granted/ is to be renewed/ is to be applied for</td><td>NA</td></tr>
<tr><td>6.2.4</td><td>Date of expiry of earlier Mining Lease, if any</td><td>NA</td></tr>
<tr><td>6.2.5</td><td>Whether the lease boundary/ required boundary is same as mentioned in the allotment order</td><td>mine excavation area falls within geological block but other infrastructure & external dumps are located outside geological block</td></tr>
<tr><td>6.2.6</td><td>Lease Area (applied/ required) as per the Mining Plan under consideration (Ha)</td><td>Total Mining Lease Area = 921.305 Ha

Total Project Area = 981.705 Ha</td></tr>
<tr><td>6.2.7</td><td>Whether the applied lease area falls within the allotted block</td><td>Major part of lease area falls within geological block, Mine excavation area falls within allotted block, however external overburden dump No 2 has been located on dip side of the block which also belongs to MCL, some more land also is</td></tr>
</table>

		required outside block for locating infrastructure/office and despatch arrangement.
6.2.8	Area (Ha) of lease which falls outside the delineated block/sub-block	337.305 Ha of additional land will be required outside block area which will be used for infrastructure, Ext. OB dump etc. (Excl. land for colony, R&R)
6.2.9	Details of outside area:	
	□ Whether forms part of any other coal block □ Whether it contains any coal/lignite reserves □ Purpose for which it is required, e.g. roads/ OB dumps/ service buildings/ colony/safety zone/ others (specify)	External dump No. 2 is proposed in dipside of Kulda block, which is dipside of present geological block and is owned by MCL only. Dumps will have to be rehandled while extending the mine into dipside block area or during final mine closure. Other infrastructure are located in non-coal bearing area which does not belong to any coal block
6.2.10	Whether some part(s) of the allotted block has not been applied for mining lease	Total of geological block has been applied for mining.
	- Total area in Ha of such part(s) - Total reserves in such part(s) (Mt) - Brief reasoning for leaving such part(s)	NA
7.1	**ENVIRONMENTAL MANAGEMENT**	
7.1	Commitment from the project proponent that the company will comply Environment and Forest Condition stipulated in the respective clearances	Will be provided by MCL

8.1	**PROGRESSIVE & FINAL MINE CLOSURE PLAN**
8.1.1	Land Degradation and Technical Reclamation (Cumulative Area "Ha")

Stage/ Year		Land Degraded (ha)				Technically Reclaimed Area (ha)			
		Excv.	Dump (Extn + Top soil)	Infra/ others	Total	Backfill	Dump (Extn + Top soil)	Others	Total
		(A)	(B)	(C)	(D=A+B+C)	(E)	(F)	(G)	(H=E+F+G)
Upto Base year (31.3.22)*		291.00	88.96	151.793	531.753	172.55	88.96	20.00	281.51
Y-1	22-23	313.63	106.96	177.093	597.683	193.55	106.96	25	325.51
Y-3	24-25	358.89	142.96	202.393	704.243	235.55	142.96	30	408.51
Y-5	26-27	404.15	178.932	202.393	785.475	277.55	178.932	40	496.482
Y-11	32-33	539.98	178.932	202.393	921.305	393.94	178.932	60.72	633.592
Post Closure									
Y-14	35-36	539.98	178.932	202.393	921.305	539.98	178.932	202.393	921.305

8.1.2 Biological Reclamation (Cumulative in "Ha")

Stage/ Year		Biologically Reclaimed Area						Undisturbed/ to be left for public/com use	Total
		Agri-culture	Plantation/Grass carpetting	Water Body	Public/ Company Use	Forest land (Return)	Total		
Upto Base Year (31.03.2022)			281.51				281.51		
Y-1	22-23		302.91				302.91		
Y-3	24-25		345.71				345.71		
Y-5	26-27		388.51				388.51		
Y-11	32-33		516.95				516.95		
Post Closure									
Y-14	35-36		**633.59**	**15.76**	**125.484**	**130.28**	**905.114**	**16.191**	**921.305**

Out of additional area of 60.4 Ha(for colony, R&R), 12 Ha will be covered with plantation & remaining 48.4 Ha will be for public/company use.

8.2	Post closure water quality management:	Details given in Chapter-11
8.3	Post Closure Air Quality management	Details given in Chapter-11

8.4 Waste Management (Figures in MM^3)

(All Figures are Cumulative and in MM^3)

		OB Removal (Cumulative)			External Dump (Cumulative)		Internal Backfilling (Cumulative)		Embankment (Cumulative)	
		Top soil	OB	Total	Top soil	OB	Top soil	OB	Top soil	OB
		(A)	(B)	(C=A+B)	(D)	(E)	(F)	(G)	(H)	(I)
Upto Base Year(31.3.2022)		0.83	86.05	86.88	0.27	38.06	0.09	47.33		1.11
Y-1	22-23	0.9	109.5	110.4	0.32	44.94	0.18	62.08		1.11
Y-3	24-25	1.05	156.81	157.86	0.42	58.73	0.36	95.8		1.11
Y-5	26-27	1.19	204.55	205.74	0.52	72.48	0.54	131.63		1.11
Y-11	**32-33**	**1.62**	**328.27**	**329.89**	**0.52**	**72.48**	**1.1**	**254.68**		**1.11**

Note: (Column C= D+E+F+G+H+I)

8.5 **Top soil Management – (Including Action Plan for Top Soil Management)**

(All Figures are Cumulative and in MM^3)

Year/ Stage	Top Soil Removal (Cumulative) "in MCum"	Spreading Over Embank-ment	Spreading over the backfilled area	Spreading over External OB dump area	Total utilised Topsoil	Temp. Top soil storage
Upto 31.3.2022	0.83		0.09	0.27	0.36	0.47
Upto Yr-1	0.9		0.18	0.32	0.50	0.40
Upto Yr-3	1.05		0.36	0.42	0.78	0.27
Upto Yr-5	1.19		0.54	0.52	1.06	0.13
Upto Yr-11	1.62		1.1	0.52	1.62	0

8.6	Management of Coal Rejects	Not Applicable
8.7	Restoration of Land used for Infrastructure	Details given in chapter-11 (Mine closure). Following items will be dismantled. • Service building & administrative offices • Weighbridge • Roads
8.8	Disposal of Mining Machinery	Details given in chapter-11 (Mine closure). Following items will be dismantled & disposed off or will be transferred. • HEMM • BELT CONVEYOR & CHP • Sub-station & Power lines
8.9	Safety & Security	Details given in para 11.4.7 in chapter-11 (Mine closure).
8.10	Abandonment Cost and Financial Assurance	
8.10.1	Abandonment Cost: Cost of Activities to be taken up for closure of the mine Details of item wise cost of progressive & final closure will be assessed during & before starting of mining operations & while preparation of final mine closure plan. However a broad guideline has been detailed below:	

S.No	ACTIVITY	Mine Closure Cost (percentage weightage)	Remarks
A	**Dismantling of Structures**		To be included in final mine closure plan
	Service Buildings	0.2	
	Residential Buildings	2.67	
	Industrial structures like CHP, Workshop, field sub-station, etc.	0.3	
B	**Permanent Fencing of mine void and other dangerous area**		To be included in final mine closure plan
	Random rubble masonry of height 1.2 metre including leveling up in cement concrete 1:6:12 in mud mortar	1.5	
C	**Grading of high wall slopes**		To be included in final mine closure plan
	Levelling and grading of high wall slopes	1.77	
D	**OB Dump Reclamation**		
	Backfilling and Technical Reclamation (50%) + Handling/Dozing of OB Dump (50%).	88.66	71% for progressive and 17.66% for final mine closure.
E	**Landscaping**		
	Landscaping of the open space in leasehold area for improving its esthetics an eco-value	0.3	Equal weightage throughout the life of the mine.
F	**Plantation**		
	Plantation over cleared area obtained after dismantling	0.5	To be included in final mine closure plan
	Plantation around the quarry area and in safety zone	0.22	Equal weightage throughout the life of the mine.
	Bio-reclamation including plantation and post care	0.4	Equal weightage throughout the life of the mine.
G	**Post Closure Env. Monitoring / testing of parameters for three years**		For three years after mine closure
	Air Quality	0.22	
	Water Quality	0.2	
H	**Entrepreneurship Development (Vocational/skill development training for sustainable income of affected people**	0.26	Equal weightage throughout the life of the mine.
I	**Miscellaneous and other mitigative measures**	2.0	Equal weightage throughout the life of the mine.
J	**Post Closure Manpower cost for supervision**	0.8	To be included in final mine closure plan
	TOTAL	**100.00**	

8.10.2	Financial Assurance: Amount to be deposited in Escrow account as a security against the mine

activities to be carried out for the closure of the mine.

WPI as on	April-2019	121.10
WPI as on base data	June-2022	154.0

	UG	OC
Base Rate of Closure Cost "Rs. Crs./Ha"	0.01	0.06
Closure cost "Rs. Crs/Ha" (Revised)	0.015	0.09
Project Area in Ha		981.705
Closure cost "Rs. Crs/Ha" (As per WPI as on June-2022)		0.11445
Total Amount to be deposited into Escrow Account "Rs. In Cr.		112.356

Amount already deposited into Escrow Account "Rs. In Cr.		42.7206
Net Amount to be deposited into Escrow Account "Rs. In Cr.(from 2022-23 onwards)		69.6355

Rate of compounding of Annual Closure Cost		5.00%
Balance life of the project "In yrs"		11
Annual Closure Cost in Crores		6.3305
Total Amount to be deposited into Escrow Account after compounding @ of 5% "Rs. In Crs." (for 11 years of mine life)		89.936

*Base year 2022-23 and Life of the mine considered is 11 years.

Amount to be deposited in to Escrow Accounts annually (in Lakh)

Year	OC	Year	UG	Total
Yr 1 (2022-23)	633.05		-	633.05
Yr 2	664.703		-	664.703
Yr 3	697.938		-	697.938
Yr 4	732.835		-	732.835
Yr 5	769.477		-	769.477
Yr 6	807.951		-	807.951
Yr 7	848.349		-	848.349
Yr 8	890.766		-	890.766
Yr 9	935.304		-	935.304
Yr 10	982.069		-	982.069
Yr 11	1031.172		-	1031.172
Total	**8993.614**		-	**8993.614**

PREPARED BY

CMPDI, RI-VII, BHUBANESWAR

GUNTUR SRINIVAS
CHIEF MANAGER (MINING)
TECHNICAL QUALIFIED PERSON on behalf of CMPDI

Chapter – 1
INTRODUCTION

1.1 PREAMBLE

MAHANADI COALFIELDS LIMITED is a subsidiary of COAL INDIA LIMITED formed in 03.04.1992. It is the one of the largest coal producing company in Coal India Limited which has been already awarded Mini Ratna, Cat-I status. It has ten areas in two coalfields of Odisha with 6 underground and 16 opencast mines. Total coal production of the company is 168.168 Mt in 2021-22 which was 23.14 Mt in 1992-93. Kulda opencast mine is an existing opencast mine in Basundhara area of Ib valley coalfield.

The Ib River coalfield lies in between latitude 21°31' to 22°14' North and longitude 83°32'00" to 84°10'00" East and falls mainly in Sundergarh, Jharsuguda and Sambalpur districts of Odisha. Coal reserves of this coalfield are about 28.07 billion tonnes (as on 1.4.2018) of which about 16.56 billion tonnes lie within a depth range of 300m. Quality of coal varies from grade C to G (largely F), suitable for power generation.

Gopalpur tract in general and Kulda and Garjanbahal blocks in particular gained importance as M/s MAPL (Mirant Asia Pacific Ltd.), formerly M/s CEPA/SEAP were interested to install 6x660MW capacity power plant adjacent to Hirakud water reservoir near Jharsuguda township at Hirma in the fringe of the coalfield. Subsequently coal linkages granted to M/s MAPL were cancelled due to uncertainty and slow progress of their IPP. Subsequently M/s. NTPC (National Thermal Power Corporation) and M/s NLC (Neyveli Lignite Corporation) showed interest to install their thermal power plant in Ib-valley coalfield. However, during initial stages alternate customers based on the linkage granted by SLC (Long Term) were identified and the project is having basket linkages.

The Gopalpur tract in which Kulda OCP is located has favourable geomining characteristics. However, due to its remoteness from the existing mine field and absence of rail link, the development of large scale mining activities in this sector is

linked to establishment of pit-head power stations in this region. Rail link from Jharsuguda to this area has already started it's operation.

This sector has been number of geological blocks (ref. Plate Gen-II) which are under different stages of exploration. All of them are virgin except Basundhara, Kulda & Garjanbahal blocks. At Basundhara coal production had commenced in 96-97 in Basundhara (East) OC project which was exhausted in 06-07. Mining operations in Basundhara (W) OC project have also started after the approval of the PR in October 2003. Mining operations in Kulda OC project have started it's coal production in 07-08 after approval of the PR in January 2005. Mining operations in Garjanbahal OC project have started in 2018-19.

1.2 KULDA OCP & IT'S LINKAGE

Gopalpur sector of Ib-valley coalfield forms the north western part of Ib River coalfield which is a greenfield area with huge mining potential. Detailed exploration was undertaken by CMPDI to assess the quarriable potentiality of coal seams with primary view of opening up of new mining projects to the extent possible. This sector has high potential for opencast mining operations including the proposed project namely Kulda Opencast Project.

Coal demand from Ib-valley coalfield has increased many fold due to its strategic location with Howrah-Mumbai railway line passing through the coalfield. Coal of this coalfield is suitable for thermal power plants.

Many pit head power plants and other coal based plants have come up due to easy availability of coal and water. The southern, western & central India power stations have to depend on Ib valley coalfield for their growth. The Howrah-Mumbai line passes through the coalfield. So coal can move from this coalfield to western India power houses via rail route. Coal to Tamil Nadu Electricity Board is also supplied via rail-cum-sea route through Vishakhapatnam and Haldia ports. Coal can

easily move from this coalfield to Eastern India and Northern India as well. Necessary infrastructures like rail and port facilities are being developed/ augmented in the region.

The proximity of Ib-valley coalfield to Hirakud reservoir has generated a lot of opportunities for setting-up super thermal power stations in the vicinity of the coalfield.

Power Houses of Punjab State Electricity Board, Haryana State Electricity Board have also been linked to MCL and will be supplied coal from this coalfield. The New Power houses of TNEB, KPCL, WBPDCL, CESC and DVC are also linked to the coalfield.

The consumers of MCL are linked to the company and not to any specific coalfield. The actual supply from any coalfield of MCL will depend upon the production and transport logistics. This project will help MCL to meet huge demand from Ib-valley coalfield.

1.3 STATUS OF KULDA OCP

The Advance Action Proposal (AAP) of the project was sanctioned by Govt. in October 1995 for a capital investment of Rs.8.624 crores.

PROJECT REPORT

Project Report (PR) was approved by MCL Board in March 1995 and subsequently by CIL Board in May 1995. The PR could not be processed further due to lack of forestry clearance and EMP clearance. Later project report was revised with different size of HEMM. This proposal was approved by MCL Board on 24.11.2001 and by CIL Board on 6.3.2002. Finally the proposal of Kulda OCP (UCE-August,2004 cost base) was sanctioned by CCEA in January,2005 for coal and OB outsourcing variant (enclosed as Annexure-II).

The Project Report for Kulda Expansion OCP (Normative capacity 15.00 Mty; 5.00 Mty incremental) (Peak Capacity 18.75 Mty) was approved by MCL Board in its 159th meeting held on 25.06.2014 at an additional capital investment of Rs. 289.03 crore up to target year and Rs. 30.22 crore beyond target year to be implemented in incremental coal and incremental OB both by outsourcing (enclosed as Annexure-III).

MINING PLAN

Mining Plan for Kulda OCP (10.0 Mty) was approved by MoC, Govt. of India vide letter no: 34012/(4)/2011-CPAM dated 1st July 2011 for total project area of 990 ha including Lalma RF area.

Mining Plan/Mine Closure Plan of Kulda Expansion OCP (Revision-1) (Expansion from 10 Mty to 15 Mty) was approved by MoC, Govt. of India vide letter no: 34012/(4)/2011-CPAM dated 26th December 2016 (enclosed as Annexure-IV) for total project area of 694.605 ha (ML area 634.205 ha) excluding Lalma RF area.

Mining Plan/Mine Closure Plan of Kulda Expansion OCP (Expansion from 15 Mty to 18.75 Mty) was approved by MCL Board ref no: MCL/SBP/CS/CR-19/2020-21/10992 dated 10.06.2020 for total project area of 981.705 ha including Lalma RF area.

Mining Plan/Mine Closure Plan of Kulda Expansion OCP (19.6 Mty) was approved by MCL Board ref no: MCL/SBP/CS/CR-42/2020-21/11330 dated 30.11.2020 excluding Lalma RF area.

MCL desired 50% enhancement of production over EC capacity (14 Mty) to achieve 21 Mty from Kulda OCP. EMP clearance of Kulda Expn. OCP for capacity 14 Mty is based on Mining Plan/Mine Closure Plan of Kulda Expansion OCP (Revision-2) (Expansion from 15 Mty to 19.6 Mty) for total project area of 694.605 ha (ML area 634.205 ha) excluding Lalma RF area.

MP/MCP of Kulda Expansion OCP (Revision-3) (21.0 Mty) for total project area of 694.605 ha excluding Lalma RF area is based on previous MP/MCP of Kulda Expansion OCP (Revision-2) (Expansion from 15 Mty to 19.6 Mty) for total project area of 694.605 ha (ML area 634.205 ha) excluding Lalma RF area (Ref:Annexure-VI).

Subsequently, MCL directed CMPDI to Prepare this Mining Plan & Mine Closure Plan of Kulda Expansion OCP (Revision-4) for a Capacity of 21 MTPY including the 134.69 ha of forest land from Lalma RF With a total Project Area of 981.705 Ha. This MP&MCP report has been prepared due to expansion in area from 694.605 Ha to 981.705 Ha.

STATUS OF EMP

EMP clearance for Kulda OCP (10.00 Mty) has been received vide letter No.J/11015/10/95-IA.II(M) dated 24.12.2002 .Total mine lease area was 929.60 Ha inclusive of 279.20 Ha of forest land. But EMP clearance has been accorded for 878.29Ha inclusive of 227.89 Ha of forestland. EMP clearance for Expansion of Kulda OCP from 10 Mtpa to 14 Mtpa has been received vide letter No.J/11015/10/1995-IA.II(M) dated 22.03.2018. EMP clearance has been accorded for 634.205 Ha including 227.89 Ha of forest land (excluding Lalma forest area). Subsequently Environmental clearance for ML area of 634.205 Ha for 19.6 Mty capacity has been obtained in February-2022 (Annexure- VII).

STATUS OF FORESTRY CLEARANCE

Stage-I forestry clearance was received for land required for a period of 20 years from MOEF in two stages for 50.72ha on 25.07.2001 and 177.17ha on 22.01.2002 respectively. Stage-II clearance was obtained on 08.08.2007 for 227.89 ha of land for 20 years of mine workings.

1.4 PRESENT STATUS

Kulda Expansion OCP is a running project and has obtained all statutory clearances. Kulda OCP started it's mining operations in 2007-08. Coal extracted till 31.3.2022 is 120.9 Mt and OB removed till 31.3.2022 is 86.884Mcum.

Actual production details:

YEAR	COAL (in Mt)	OB (in Mcum)
2007-08	0.15	0.29
2008-09	2.47	1.48
2009-10	3.43	0.90
2010-11	5.02	5.80
2011-12	5.54	5.33
2012-13	5.50	2.71
2013-14	5.27	2.08
2014-15	4.80	5.71
2015-16	8.02	2.79
2016-17	9.99	5.31
2017-18	10.07	8.22
2018-19	12.81	5.95
2019-20	13.63	8.34
2020-21	15.733	16.598
2021-22	18.5	15.376
Total upto 31.03.2022	**120.9**	**86.884**

1.5 PRESENT REVISION OF MINING PLAN

Mining Plan for Kulda OCP (10.0 Mty) was approved by MoC, Govt. of India vide letter no: 34012/(4)/2011-CPAM dated 1st July 2011 for total project area of 990 ha including Lalma RF area.

Mining Plan/Mine Closure Plan of Kulda Expansion OCP (Revision-1) (Expansion from 10 Mty to 15 Mty) was approved by MoC, Govt. of India vide letter no: 34012/(4)/2011-CPAM dated 26th December 2016 for total project area of 694.605 ha (ML area 634.205 ha) excluding Lalma RF area.

In earlier approved Mining Plan of Kulda Expn. OCP (Revision-2) (15 Mty to 19.6 Mty), mining operation was carried out in two phases. In Phase-I, surface boundary was restricted within notified lease area for which forest clearance has

been obtained by the project authority i.e. excluding Lalma Forest. In Phase-II, remaining part of the block was to be worked after obtaining forest clearance for this area. Mining Plan/Mine Closure Plan of Kulda Expansion OCP (19.6 Mty) was approved by MCL Board ref no: MCL/SBP/CS/CR-42/2020-21/11330 dated 30.11.2020 excluding Lalma RF area

Mining Plan/Mine Closure Plan of Kulda Expansion OCP (Expansion from 15 Mty to 18.75 Mty) has been prepared in January ,2020 and was approved by MCL Board ref no: MCL/SBP/CS/CR-19/2020-21/10992 dated 10.06.2020 for total project area of 981.705 ha including Lalma RF area.

MCL desired 50% enhancement of production over EC capacity (14 Mty) to achieve 21 Mty from Kulda OCP. EMP clearance of Kulda Expn. OCP for capacity 14 Mty is based on Mining Plan/Mine Closure Plan of Kulda Expansion OCP (Revision-2) (Expansion from 15 Mty to 19.6 Mty) for total project area of 694.605 ha (ML area 634.205 ha) excluding Lalma RF area.

Hence, MP/MCP of Kulda Expansion OCP (Revision-3) (21.0 Mty) for total project area of 694.605 ha excluding Lalma RF area is based on previous MP/MCP of Kulda Expansion OCP (Revision-2) (Expansion from 15 Mty to 19.6 Mty) for total project area of 694.605 ha (ML area 634.205 ha) excluding Lalma RF area.

In this present MP&MCP of Kulda Expn. OCP (Revision-4) for 21Mty, total area including Lalma forest has been considered for mining operations. This report (Revision-4) has been prepared due to expansion in area w.r.t Approved MP&MCP of Kulda Expn. OCP (Revision-3).

1.6 DIFFICULTIES AND CONSTRAINTS IN MINING WITH ASSOCIATED RISK

Following constraints are envisaged and should be considered while implementation of the report:

a) Land acquisition and rehabilitation of the villagers.

Chapter – 2

DETAILS OF EARLIER APPROVAL OF MINING PLAN

2.1 STATUS

Mining Plan for Kulda OCP (10.0 Mty) was approved by MoC, Govt. of India vide letter no: 34012/(4)/2011-CPAM dated 1st July 2011 for total project area of 990 ha including Lalma RF area.

Mining Plan/Mine Closure Plan of Kulda Expansion OCP (Revision-1) (Expansion from 10 Mty to 15 Mty) was approved by MoC, Govt. of India vide letter no: 34012/(4)/2011-CPAM dated 26th December 2016 for total project area of 694.605 ha (ML area 634.205 ha) excluding Lalma RF area.

Mining Plan/Mine Closure Plan of Kulda Expansion OCP (19.6 Mty) (Revision-2) was approved by MCL Board ref no: MCL/SBP/CS/CR-42/2020-21/11330 dated 30.11.2020 excluding Lalma RF area.

MP/MCP of Kulda Expansion OCP (Revision-3) (21.0 Mty) for total project area of 694.605 ha excluding Lalma RF has been prepared and approved by MCL Board (ref no: MCL/SBP/CS/BD-248/Exct/2022/12600 dated 20/22.06.2022).

Meanwhile, Mining Plan/Mine Closure Plan of Kulda Expansion OCP (Expansion from 15 Mty to 18.75 Mty) has been prepared in January ,2020 and was approved by MCL Board ref no: MCL/SBP/CS/CR-19/2020-21/10992 dated 10.06.2020 for total project area of 981.705 ha including Lalma RF area.

2.2 REASON FOR REVISION OF MINING PLAN

Due to increase in demand, MCL desired to enhance the mine capacity to 21.0Mty. With due regards to safety and to minimize the operational difficulties expansion in the excavation area (including Lalma forest area) is highly required.

Hence, In this Mining Plan, total area including Lalma forest is considered with enhanced production of 21.0 Mty.

Sl. No.	Particulars	REVISION 3 (as on 31.03.2022)	PRESENT MINING PLAN (as on 31.03.2022) (REVISION-4)
1	RESERVE (in Mt)	51.56	218.627
2	OB (in Mcum)	55.72	243.006
3	Life (in years)	3	11
4	Capacity (in Mty)	21.0	21.0
5	Excavation area (Ha)	321.91	539.98
6	Mine lease area (Ha)	634.205	921.305
7	Forest Area (Ha)	227.89	354.06
8	Total Project Area (Ha)	694.605	981.705

Chapter - 3

LOCATION, COMMUNICATION, TOPOGRAPHY, DRAINAGE, CLIMATE AND RAINFALL

3.1 LOCATION

Kulda geological block is located in the north-western part of Ib valley coalfield in Sundergarh district in the state of Odisha. It is situated between latitudes 22°01'02" to 22°03'03" North and longitudes 83°43'28" to 83°45'35" East (refer Plate no. Gen-I & Gen-II).

The block boundary is defined by the following :

North	-	Basundhara River
West	-	Chattajhor nallah, tributary of Basundhara River.
East	-	Metamorphic exposure.
South & South east	-	Line joining boreholes CMHG-103,129,123, 139 & 138 & adjacent Garjanbahal block.

The area of the block under consideration is 5.84 sq.km. out of which coal bearing area is 5.30 sq.km.

3.2 COMMUNICATION

District headquarter Sundergarh, on State Highway-10 (Sambalpur to Rourkela), is at a distance of about 40 km. from the blocks. The Sundergarh (Odisha) – Raigarh (Chattisgarh) all weather road passes through the blocks. The blocks are also connected by black top road with two important towns of Orissa namely Rourkela at 145 km and Jharsuguda at 75 km. The block comes under Himgir Tahsil and Balinga police station in the district of Sundergarh, Odisha.

The block is connected by road to the state capital Bhubaneswar through State Highway-10 and National Highway-42, with a total distance of around 450 km. The block is well connected with MCL HQ at Sambalpur situated at a distance of about 100 km.

Nearest railhead is Himgir on Mumbai-Howrah Broad Gauge of South Eastern Railway at a distance of about 36 km from the blocks. Jharsuguda railway station on Jharsuguda-Sambalpur-Bhubaneswar rail line of East Coast Railway is at a distance of about 75 km. The nearest port at Bay of Bengal is Paradip and situated at a distance of about 600 km. from the block.

3.3 TOPOGRAPHY

The topography of the block is rugged with steep rise and fall. The central and south eastern part lie at a comparatively higher elevation being dotted with hillocks.

The minimum and maximum elevations of the area are 254m and 320m respectively above the mean sea level.

3.4 DRAINAGE

The ground slopes generally towards west and north and ground water is collected by Chattajhor nallah being fed by streamlets, which in turn feeds to river Basundhara.

River Basundhara flows along northwest and northern boundary of the block.

3.5 CLIMATE & RAINFALL

The climate is sub-tropical. Temperature varies from 9.3°C (winter season) to 44.1°C (in pre-monsoon cyclone season).

The average annual rainfall is 1413 mm as measured at IMD Jharsuguda for the last 24 years

The general wind direction is NW and the average wind speed is 10.93km/hr. The relative humidity during April to July varies from 59% to 92%.

Chapter - 4

GEOLOGY

4.1 GENERAL

The geological information in this chapter has been compiled from "Geological Report on Kulda Block, Ib River Coalfield" prepared by CMPDI in Feb.'1994. A total of 130 boreholes, have been drilled with a total meterage of 14858.35m covering an area of 5.84 sq.km. coal bearing area is 5.30 sq.km.

The borehole density is about 22.3 boreholes/sq.km.

4.2 GEOLOGICAL SUCCESSION OF THE IB RIVER COALFIELD

The geological succession of the coalfield as established by G.S.I. during regional exploration is given in table-4.1.

Table- 4.1

Age	Formation	Lithology
Recent to sub-recent	-	Alluvium, laterite, gravels and conglomerate.
Upper Permian	Kamthi(Upper)	Pebbly sandstone, ferruginous sandstone and red shales
	Kamthi (Middle) = Raniganj	Fine grained sandstone, silt stone and coal seams.
	Kamthi(Lower) = Barren Measures	Grey shale, carbonaceous shale, sandstone and clay ironstone nodules.
Lower Permian	Barakar	Grey sandstone, carbonaceous shale, siltstone with thick coal seams and fire clay.
	Karharbari	Black carbonaceous sandstone with pebble bed and coal seams.
Upper Carboni-ferous	Talchir	Diamictite, greenish sand stone, olive and chocolate shales, rhythmites.
---------- Unconformity ----------		
Pre-Cambrian	Metamorphics	Granite, gneisses, schists etc.

4.3 GEOLOGY OF THE AREA EXPLORED

Kulda block spreading over an area of 5.843 sq.km., forms the northern part of the coalfield. The topographical plan showing incrops of coal seams have been given in Plate No. G-I. The stratigraphic sequence as depicted on the basis of surface mapping and sub-surface data is furnished in table-4.2. Surface mapping has been given in the geological plan (Plate no. G-2).

Table- 4.2
Stratigraphic succession, Kulda Block

Age	Formation	Lithology	Thickness (m)
Recent/ sub-resent	-	Soil, Alluvium	0.00-17.00
Lower Permian	Barakar	Fine to coarse grained sandstone micaceous at places, burnt ferruginous sand-stone/shale, car-bonaceous shale grey shale, fine clay sandy-shale with thick coal seams.	0.77-236.55
	Karharbari	Carbonaceous medium grained sandstone with undecomposed feldspar, coarse grained to pebbly and gritty sand-stone with impersistent coal seam.	16.04-20.70
Upper Carboni-ferrous	Talchir	Fine to medium grained greenish sandstone & greenish shale.	2.30-54.10
---------- Unconformity ----------			
Precambrian		Granite, mica schists & gneisses	3.12-18.30

Pre-cambrians are exposed in the east of the block.

4.4 STRUCTURE

The geological structure of the area has been interpreted on the basis of surface and sub-surface data obtained from boreholes. Floor contours & geological

cross sections are given in plate nos. VII,VIII,X,XI, XIV,XVI,XVII. Lithologs and seam structures of representative boreholes have been given in plate no. IV H to V.

4.5 BEDDING ATTITUDE

Strike of the strata is roughly NW-SE. The dip is generally 7º towards southwest. Dip is slightly higher in southern part and near faults compared to rest of the area.

4.6 FAULTS

Existence of 3 no faults has been interpreted on the basis of borehole data. Details of faults are given in table-4.3.

Table-4.3
Description of faults

Fault No.	Location	Trend	Throw	Evidences
F1-F1	Central part of the block continues beyond the block boundary in the south.	NW-SE	0-8m with hade towards NE	1) Part of Rampur-IV seam missing in BH No. CMHG-324. Rampur-V and part of Rampur-IV seam is missing BH No.CMHG-310 2) Repetition of Lajkura-I seam.
F2-F2	Central part of the block	NW-SE	0-12m with hade towards NE	Parting between Rampur-I, II faulted in borehole CMHG-98 and Rampur-V and part of Rampur IV seam is missing in borehole CMHG-223.
F3-F3	Central part of the block abuts against fault F2-F2 in the north and dies out in the south within the block	NW-SE	01-15m with hade towards NE	Rampur-V and part of Rampur-IV seams are missing in BH No. CMHG-121&273.

4.7 COAL HORIZONS

Three coal seams viz. Ib, Rampur and Lajkura seams have been proved in this block under report. Ib seam is the bottom most coal seam and is splitted in to 3 sections viz. Ib Top, Ib Middle & Ib Bottom. Rampur seam is splitted into five sections namely Rampur-I, Rampur-II, Rampur-III Top, Rampur-III bot., Rampur-IV and Rampur-V. Lajkura is also a thick seam and splitted into 4 sections viz; Lajkura-I, Lajkura-II, Lajkura-III and Lajkura-IV. Ib and Rampur seams occur covering almost entire block, whereas occurrence of Lajkura seam is restricted to the western half of the block.

Lajkura seam is extensively burnt in the incrop region as indicated in the geological plan. Burning may be responsible for hardening and making weathering resistant of the overlying ferruginous sandstone so as to stand out as a ridge. Incrop of Rampur seam has also been affected by burning at places to a small extent. The description of the coal seams in ascending order is mentioned in the paragraphs below :

It may be mentioned here that results of gross calorific value have been obtained for a few selected number of samples whereas results of UHV are available practically for all borehole samples. Hence, the two figures are not strictly comparable.

4.8 IB BOTTOM SEAM

It is the bottom most seam overlain by Ib middle seam with a parting of 0.13m to 5.10m. The parting between the two coal seams i.e. Ib-bottom and middle is less than 1m in the northern and southern part where the two coal seams have been considered as combined. The thickness of Ib-bottom seam varies from 0.22m to 3.28m. Average thickness ranges from 1.00m to 2.25m. Combined thickness of Ib-bottom & middle varies from 1.60m-7.13m. Quality parameters of Ib bottom seam/Ib combined seam are given in table-4.4.

Table- 4.4
Quality of Ib Bottom/Ib (Mid+Bot) seam

Thickness (m)	Type of sample	Proximate analysis on 60% RH and 40°C			G.CV in k.cal/kg.	UHV in K.cal/kg	Grade
		M%	Ash%	VM%			
A)	**Ib Bottom Seam**						
1.08-2.11	Bcs	4.6-7.2	19.4-27.4	20.0-29.0	-	4084-5367	C-E
1.00-2.25	I_{100}	4.6-7.7	18.9-40.1	24.4-29.0	4710-5519	2662-5367	C-F
B)	**Ib (Mid+Bot) seam**						
2.62-6.32	Bcs	2.8-7.6	23.9-40.5	22.0-30.4	4920-5307	2925-4691	D-F
1.60-7.13	I_{100}	3.0-7.6	20.4-46.0	18.3-30.4	4350-5218	1931-5105	C-G

Summary of results of ultimate analysis, HGI and AFT have been given in table-4.5.

Table-4.5

HGI, AFT and Ultimate analysis

Thickness (m)	Type of sample	HGI	Ash fusion temp.°C under MRA			Ultimate analysis on dmf basis %				
			IDT	HT	FT	C	H	N	S	O
A)	**Ib Bottom seam**									
1.00-2.25	Bcs	58	-	-	-	79.00-81.40	4.68-4.79	1.85-1.88	0.81-0.88	11.05-13.66
2.25	I_{100}	58	-	-	-	-	-	-	-	-
B)	**Ib (Mid+Bot) seam**									
2.62-5.24	Bcs	55-57	-	-	-	82.12-82.15	5.2	1.91-1.98	0.56-0.81	9.89-10.18
2.62-5.24	I_{100}	60	1250	1300	+1400	-	-	-	-	-

Ash analysis of Ib (Mid+Bot) seam is given below :

Table-4.6
Ash analysis Ib(Mid+Bot) seam

BH.No.	Type of sample	Constituents	Percentage
CMHG-246	I_{100}	SiO_2	63.47
		Al_2O_3	26.17
		Fe_2O_3	3.87
		TiO_2	1.79
		P_2O_5	0.57
		SO_3	0.49
		CaO	0.96
		MnO	Trace
		MgO	0.62
		K_2O	1.42
		Na_2O	0.64

4.9 IB MIDDLE SEAM

It is underlain by Ib bottom seam with a parting of 0.13m to 5.1m and is overlain by Ib top seam with a parting of 0.33m to 8.53m. It is occurring as a narrow strip in the central part and as combined with Ib bottom in the north and southern part of the block.

Thickness of the seam varies from 0.32m to 4.28m. The thickness of the seam gradually increases from 1m to 5m along the dipside.

The grade of the seam is mostly D-E and the various quality parameters have been given in the table-4.7.

Table-4.7
Quality of Ib Middle Seam

Thickness (m)	Type of sample	Proximate analysis on 60% RH and 40°C			G.CV in k.cal/kg.	UHV in K.cal/kg	Grade
		M%	Ash%	VM%			
1.32-2.67	Bcs	2.9-6.7	24.9-43.1	20.6-27.9	4800-5500	2455-4787	D-F
1.16-6.03	I_{100}	2.9-7.5	20.5-41.3	17.5-28.0	4750-5435	2621-5243	C-F

The HGI on I100 is 57 - 61 and the IDT, HT, FT on I100 sample are 1250-1260, 1320-1340 and >1400^{O}C respectively.

4.10 IB TOP SEAM

It is the uppermost split of Ib seam. The thickness varies from 0.12m to 1.84m. It has been encountered in 17 boreholes only and the workable thickness of 1m and above is restricted to dipside of the block and is encountered in few boreholes. In the dipside area in few boreholes it is merged with Ib middle seam with a parting of <1m. Wherever it is merged with Ib middle seam the section is considered as Ib middle seam and in the rest of the boreholes it is considered as OB. As the seam is not viable from mining point of view, no detailed exercise has been done for this seam.

4.11 RAMPUR-I SEAM

This is the bottom most split of Rampur seam overlain by Rampur-II seam with a parting of 0.12m to 10.75m. It has been encountered in 107 boreholes.

The thickness of the seam varies from 0.06m - 5.03m. Thickness is less than 1m in the eastern and northeastern part of the block and also along the E-W strip in the southern part of the block. It occurs as combined seam with the overlying Rampur-II seam in the northern part and in a small patch in the central part of the block.

The summarised quality parameters of Rampur-I/Rampur(I+II) seams are given below in tables 4.8, 4.9 and 4.10.

Table-4.8
Quality of Rampur-I/I+II seam

Thickness (m)	Type of sample	Proximate analysis on 60% RH and 40°C			G.CV in k.cal/kg.	UHV in K.cal/kg	Grade
		M%	Ash%	VM%			
A)	**Rampur-I seam**						
1.85-3.99	Bcs	3.0-5.8	26.2-37.3	25.8-28.2	4000-5315	3173-4484	D-F
1.02-5.03	I_{100}	3.3-4.9	28.6-45.8	17.7-26.3	2920-4407	2083-4277	D-G

B)	**Rampur(I+II) seam**						
6.16-7.59	Bcs	6.4-7.1	32.7-34.5	27.2-27.3	4330	3256-3408	E-F
5.65-9.12	I_{100}	4.4-5.6	35.2-49.0	22.3-25.9	3150	1489-3270	F-G

Table-4.9
HGI, AFT and Ultimate analysis of Rampur-I/(I+II) seam

Thickness (m)	Type of sample	HGI	Ash fusion tem.°C under MRA			Ultimate analysis on dmf basis %				
			IDT	HT	FT	C	H	N	S	O
A)	**Rampur-I seam**									
1.86-5.33	Bcs	-	-	-	-	78.12-79.01	4.66-4.68	0.64-1.01	1.78-1.85	13.82-14.43
3.99-5.33	I_{100}	61	1260-1290	1320 +1400	+1400	-	-	-	-	-
B)	**Rampur-I+II seam**									
7.59	Bcs	-	-	-	-	76.95	4.65	0.67	1.84	15.89
	I_{100}	60	1290	1340	+1400	-	-	-	-	-

Table-4.10
Ash analysis of Rampur-I Seam on I100 sample

Constituent	Percentage
SiO_2	61.12-63.74
Al_2O_3	25.84-28.74
Fe_2O_3	2.84
TiO_2	1.47- 1.85
P_2O_5	0.42- 0.49
SO_3	0.37- 0.47
CaO	1.81- 1.84
MnO	Trace
MgO	1.17- 1.22
K_2O	1.19- 1.24
Na_2O	0.62- 0.72

4.12 RAMPUR-II SEAM

The seam is underlain by Rampur-I with a parting of 0.12m to 10.75m and overlain by Rampur-III bot. seam with a parting of 0.17m to 8.21m. The seam is exposed in the northeastern part of the block along Basundhara river.

Although it is merged with Rampur III bot. seam in the south central part but has been treated as a separate seam.

Thickness of the coal seam varies from 0.91m to 6.31m.

Details of quality parameters have been furnished in tables below.

Table-4.11
Quality of Rampur-II seam

Thickness (m)	Type of sample	Proximate analysis on 60% RH and 40°C			G.CV in k.cal/kg.	UHV in K.cal/kg	Grade
		M%	Ash%	VM%			
1.19-5.56	Bcs	3.0-6.8	31.1-39.60	18.6-31.9	3810-4160	2028-3877	E-G
1.16-6.31	I_{100}	3.2-5.9	22.5-49.90	20.8-29.7	3230-4160	1517-4981	C-G

Table-4.12
HGI, AFT and Ultimate analysis of Rampur-II seam

Thickness (m)	Type of sample	HGI	Ash fusion tem.°C under MRA			Ultimate analysis on dmf basis %				
			IDT	HT	FT	C	H	N	S	O
2.71-4.08	Bcs	-	-	-	-	76.00-78.94	4.64-4.67	0.92-0.95	1.83-1.85	13.59-16.61
2.71-4.08	I_{100}	57	1280	1340	+1400	-	-	-	-	-

Table-4.13
Ash analysis of Rampur-II seam

Thickness(m)	Type of sample	Constituents	Percentage
4.08	1_{100}	SiO_2	61.21
		Al_2O_3	29.12
		Fe_2O_3	3.92
		TiO_2	1.59
		P_2O_5	0.47
		SO_3	0.43
		CaO	0.82
		MnO	Trace
		MgO	0.58
		K_2O	1.11
		Na_2O	0.84

4.13 RAMPUR-III BOTTOM SEAM

This is underlain by Rampur-II seam with a parting of 0.17m-8.21m and is overlain by Rampur-III Top with a parting of 0.30m-6.75m. The seam is not well developed in the northern part of the block and along southwestern boundary, where the thickness is <1m. In the southern part the seam is merged with Rampur-III Top seam where the parting is <1m in between Rampur-III Bot. & III Top seams. Thickness of the coal seam varies from 0.16m to 3.73m and in the southern part of the block, the combined thickness of Rampur-III Bot. + III Top varies from 6.33m to 11.98m.

Although, it has attained workable thickness in 2-3 boreholes in the northern part of the block because of the patchy occurrence, its reserve has not been estimated.

The quality parameters of the seam have been given in table below :

Table-4.14
Quality of Rampur-III Bot./III (Bot+Top) seam

Thickness (m)	Type of sample	Proximate analysis on 60% RH and 40°C			G.CV in k.cal/kg.	UHV in K.cal/kg	Grade
		M%	Ash%	VM%			
A)	**Rampur-III Bottom seam**						
1.18-3.60	I_{100}	4.3-6.8	17.7-44.9	-	-	2110-5519	C-G
B)	**Rampur-III (Bot+Top) seam**						
6.33-11.98	I_{100}	3.9-5.8	27.6-48.3	23.50-23.70	-	1696-4291	D-G

4.14 RAMPUR-III TOP SEAM

This seam underlies Rampur-IV seam with a parting of 0.89m to 7.27m. It is well developed over the area, however in the south central part it is merged with Rampur-III bottom seam. This seam is affected by surface burning at two places in the incrop region as localised patches.

Thickness of the coal seam varies from 2.97m to 11.92m. The general thickness is of the range in between 5m to 9m.

The quality parameters of the seam have been given in tables below :

Table-4.15
Quality of Rampur-III Top seam

Thickness (m)	Type of sample	Proximate analysis on 60% RH and 40°C			G.CV in k.cal/kg.	UHV in K.cal/kg	Grade
		M%	Ash%	VM%			
6.96-9.76	Bcs	4.6-6.8	27.0-31.3	26.5-29.0	4630-4870	3891-4277	D-E
2.97-11.92	I_{100}	4.0-6.2	24.2-43.5	23.8-28.2	3670-4670	2345-4705	D-G

Table-4.16
HGI, AFT and Ultimate analysis of Rampur-III Top seam

Thickness (m)	Type of sample	HGI	Ash fusion tem.°C under MRA			Ultimate analysis on dmf basis %				
			IDT	HT	FT	C	H	N	S	O
8.47-9.76	Bcs	56-58	-	-	-	79.00-79.06	4.69-5.01	0.65-0.74	1.80-1.85	13.50-13.77
	I_{100}	55-59	1270-1290	1320-1360	+1400	-	-	-	-	-

Table-4.17
Ash analysis of Rampur-III(T) seam

Thickness(m)	Type of sample	Constituents	Percentage
8.47-9.76	I_{100}	SiO_2	58.94-61.84
		Al_2O_3	27.07-28.94
		Fe_2O_3	4.01- 4.12
		TiO_2	1.74- 1.92
		P_2O_5	0.31- 0.52
		SO_3	0.42- 0.47
		CaO	1.27- 1.94
		MnO	Trace
		MgO	0.67- 1.59
		K_2O	1.17- 1.47
		Na_2O	0.74- 0.82

4.15 RAMPUR-IV SEAM

Rampur-IV seam is underlain by Rampur-III Top seam with a parting of 0.89m to 7.27m. It is overlain by Rampur-V seam with a parting of 0.39m to 5.10m. In southwestern part parting between Rampur-IV & Rampur-V seam reduces to <1m thickness. As such the coal seams have been considered as combined.

The stratigraphic thickness of the Rampur-IV seam ranges from 12.33m to 21.58m. In the southwestern part where Rampur-IV and Rampur-V seams have merged together, the effective thickness on exclusion of more than 1m dirt bands ranges from 20.42m to 27.13m.

The quality parameters of the seam have been mentioned in tables below :

Table-4.18
Quality of Rampur-IV & Rampur-(IV+V) seam

Thickness (m)	Type of sample	Proximate analysis on 60% RH and 40°C			G.CV in k.cal/kg.	UHV in K.cal/kg	Grade
		M%	Ash%	VM%			
A)	**Rampur-IV seam**						
17.31-20.44	Bcs	4.0-5.3	35.4-38.2	25.8-26.2	-	3118-3463	E-F
12.33-20.48	I_{100}	3.10-4.80	34.7-50.90	21.3-23.0	-	1448-3448	E-G
B)	**Rampur(IV+V) seam**						
19.77-25.20	Bcs	4.8-7.2	32.4-34.9	26.2-28.0	4320-4410	3380-3435	E
22.58-27.13	I_{100}	3.6-4.5	38.7-48.7	22.3-23.4	3270-3820	1683-2938	F-G

Table-4.19
HGI, AFT and Ultimate analysis of Rampur-(IV+V) seam

Thickness (m)	Type of sample	HGI	Ash fusion tem.°C under MRA			Ultimate analysis on dmf basis %				
			IDT	HT	FT	C	H	N	S	O
19.77-25.20	Bcs	56-59	-	-	-	78.55-79.00	4.70-5.00	0.78-0.92	1.80-1.88	13.41-14.04
22.58-27.13	I_{100}	58-60	1190-1250	1320-1330	+1400	-	-	-	-	-

Table-4.20
Ash analysis of Rampur-(IV+V) Seam

Thickness(m)	Type of sample	Constituents	Percentage
19.77-25.20	I100	SiO_2	58.79-63.00
		Al_2O_3	26.02-29.74
		Fe_2O_3	4.62- 5.60
		TiO_2	1.62- 1.87
		P_2O_5	0.37- 0.61
		SO_3	0.28- 0.39
		CaO	0.97- 2.40
		MnO	Trace
		MgO	0.44- 1.00
		K_2O	1.11- 1.21
		Na_2O	0.64- 0.84

4.16 RAMPUR-V SEAM

This is the top most seam of Rampur group of coal seams. It is overlain by Lajkura-I seam with a parting of 31.33m to 46.18m. Incrop of the coal seam is thinning down in the northern part and southern extremity in the incrop region.

The coal seam thickness ranges from 1.94m-6.40m. However, the seam thickness in general is 3m to 4m. It is free of dirt bands except in CMHG-336, where the thickness of dirt band is 1.09m.

The details of quality are given in table 4.21.

Table-4.21
Quality of Rampur-V seam

Thickness (m)	Type of sample	Proximate analysis on 60% RH and 40°C			G.CV in k.cal/kg.	UHV in K.cal/kg	Grade
		M%	Ash%	VM%			
1.94-6.40	Bcs	4.7-5.5	29.1-33.1	26.8-28.3	-	3642-4263	D-E
	I_{100}	3.6-5.4	29.7-48.7	23.1-25.8	-	1683-4056	E-G

4.17 LAJKURA-I SEAM

This is the bottom most seam of Lajkura group of coal seams. It is overlain by Lajkura-II seam with a parting of 1.25m to 2.79m. The coal seam is burnt almost entirely along the incrop zone excepting in the northern extremity.

Thickness of the coal seam varies from 12.09m - 14.43m. The effective thickness ranges from 11-13m.

The quality parameters of Lajkura-I seam have been given below :

Table-4.22
Quality of Lajkura-I Seam

Thickness (m)	Type of sample	Proximate analysis on 60% RH and 40°C			G.CV in k.cal/kg.	UHV in K.cal/kg	Grade
		M%	Ash%	VM%			
112.55-13.25	Bcs	4.7-6.0	28.5-33.7	26.5-28.4	3980-4780	3449-4236	D-E
12.09-14.43	I_{100}	3.9-5.20	29.00-44.50	23.60-26.40	3740-4180	2221-4180	E-G

Table-4.23
HGI, AFT and Ultimate analysis of Lajkura-I seam

Thickness (m)	Type of sample	HGI	Ash fusion tem.°C under MRA			Ultimate analysis on dmf basis %				
			IDT	HT	FT	C	H	N	S	O
12.78-12.98	Bcs	56-57	-	-	-	79.06-78.00	4.85-4.50	0.76-0.85	1.85-1.66	13.48-14.99
	I100	59	1270-1290	1340 +1400	+1400	-	-	-	-	-

Table-4.24
Ash analysis of Lajkura-I Seam

Thickness(m)	Type of sample	Constituents	Percentage
12.78-12.98	I100	SiO_2	61.32-61.87
		Al_2O_3	26.47-27.84
		Fe_2O_3	3.17- 5.32
		TiO_2	1.64- 1.74
		P_2O_5	0.44- 0.54
		MnO	Trace
		MgO	0.87- 1.08
		CaO	1.16- 1.55
		SO_3	0.37- 0.47
		K_2O	1.07- 1.41

	Na_2O	0.69- 0.98

4.18 LAJKURA-II SEAM

The seam is overlain by Lajkura-III seam with a parting of 0.95m to 2.21m. The coal seam is burnt along the incrop excepting at the northern end.

The thickness of the seam varies from 30.50m to 34.07m. The effective thickness in general ranges from 27m to 30m.

The quality parameters have been detailed in tables below :

Table-4.25
Quality of Lajkura-II seam

Thickness (m)	Type of sample	Proximate analysis on 60% RH and 40°C			G.CV in k.cal/kg.	UHV in K.cal/kg	Grade
		M%	Ash%	VM%			
31.30-33.90	Bcs	5.2-6.6	28.5-28.8	27.2-27.9	4770	4056-4208	D-E
30.05-34.07	I_{100}	4.6-5.7	30.00-36.80	25.90-26.30	4180-4210	3132-3973	E-F

Table-4.26
HGI, AFT and Ultimate analysis of Lajkura-II seam

Thickness (m)	Type of sample	HGI	Ash fusion tem.°C under MRA			Ultimate analysis on dmf basis %				
			IDT	HT	FT	C	H	N	S	O
31.60-32.09	Bcs	55-57	-	-	-	78.94-79.00	4.70-4.98	0.67-0.83	1.84-1.85	13.56-13.63
30.05-34.07	I_{100}	58-59	1250-1270	1320-1340	+1400	-	-	-	-	-

Table-4.27
Ash analysis of Lajkura-II Seam

Thickness(m)	Type of sample	Constituents	Percentage
31.60-32.09	I100	SiO_2	59.84-60.92
		Al_2O_3	26.84-28.34
		Fe_2O_3	4.17- 4.32
		TiO_2	1.74- 1.82
		P_2O_5	0.47- 0.64
		MnO	Trace
		Mgo	1.00- 1.17
		CaO	1.54- 2.35
		SO_3	0.42- 0.54
		K_2O	1.04- 1.14

	Na_2O	0.82- 0.88

4.19 LAJKURA-III SEAM

The seam is overlain by Lajkura-IV seam with a parting of 2.14m to 6.71m. Due to burning the depth of occurrence of the coal seam has been increased upto 36.95m.

Thickness of the seam ranges from 2.02m - 4.89m. The general thickness is mostly 3m.

Quality parameters of the seam have been furnished in tables below:

Table-4.28
Quality of Lajkura-III Seam

Thickness (m)	Type of sample	Proximate analysis on 60% RH and 40°C			G.CV in k.cal/kg.	UHV in K.cal/kg	Grade
		M%	Ash%	VM%			
4.57-4.89	Bcs	5.4-6.5	31.1-33.3	26.4-27.6	4380-4500	3449-3711	E
3.10-4.89	I_{100}	5.4-6.70	23.80-37.00	26.40-27.20	4380-4500	3049-4691	D-F

Table-4.29
HGI, AFT and Ultimate analysis of Lajkura-III seam

Thickness (m)	Type of sample	HGI	Ash fusion tem.°C under MRA			Ultimate analysis on dmf basis %				
			IDT	HT	FT	C	H	N	S	O
4.72-4.89	Bcs	57-58	-	-	-	78.94-79.04	4.65-4.85	0.73-0.78	1.85-1.86	13.53-13.77

4.20 LAJKURA-IV SEAM

This is the top most seam occurring within the area of Kulda block. This seam is burnt in the incrop region to a large extent.

Thickness of the seam varies from 12.42m to 14.39m. Thickness of <13m is however, restricted in a very limited area in the southern part besides the incrop.

The quality parameters have been mentioned in the tables 4.30, 4.31 and 4.32 below :

Table-4.30
Quality of Lajkura-IV Seam

Thickness (m)	Type of sample	Proximate analysis on 60% RH and 40°C			G.CV in k.cal/kg.	UHV in K.cal/kg	Grade
		M%	Ash%	VM%			
13.07-14.39	Bcs	6.4-8.2	27.8-33.0	26.2-29.2	4370-4510	3270-4015	E-F
13.07-14.39	I_{100}	6.1-8.2	26.20-39.07	25.80-28.90	4270-4510	2667-4222	D-F

Table-4.31
HGI, AFT and Ultimate analysis of Lajkura-IV seam

Thickness (m)	Type of sample	HGI	Ash fusion tem.°C under MRA			Ultimate analysis on dmf basis %				
			IDT	HT	FT	C	H	N	S	O
13.07-13.98	Bcs	-	-	-	-	78.50-76.53	4.60-4.85	0.63-0.71	1.80-1.85	14.17-16.36
13.07	I_{100}	56	1260	1320	+1400	-	-	-	-	-

Table-4.32
Ash analysis of Lajkura-IV Seam

Thickness(m)	Type of sample	Constituents	Percentage
13.07	1100	SiO_2	59.84
		Al_2O_3	28.81
		Fe_2O_3	5.12
		TiO_2	1.62
		P_2O_5	0.49
		MnO	Trace
		MgO	0.64
		CaO	1.46
		SO_3	0.37
		K_2O	1.01
		Na_2O	0.64

Succession and quality of coal seams are given in table 4.33.

4.21 COAL RESERVES

The coal bearing area in Kulda block is 5.306 sq.km. leaving 60m barrier zone within coal bearing area along Basundhara river and Chattajhore nallah. The block is bounded by metamorphics in the east, Basundhara river in the north and Chattajhore nallah in the west and boreholes CMHG-283,337,279 in south.

PROCEDURE OF RESERVE ESTIMATION

Isochores have been drawn for all the seams excluding 1m and above dirt bands. The quality calculated after excluding 1m and above dirt bands has been used for drawing isograd lines.

Areas enclosed by various intersections of isochores and isogrdes have been separately measured with planimeter. Measurement of area has been done excluding the barrier zone. Volume of coal has been obtained by multiplying the area with average thickness of two concerned isochores. The product obtained, in turn has yielded gross reserve on multiplication with the specific gravity assumed for that grade. Specific gravity taken for different grades is as follows :

Grade	Special gravity
C	1.50
D	1.55
E	1.61
F	1.68
G	1.75

A 10% deduction has been made from the gross reserve to arrive at the net geological reserve. Reserves in the incrop zone have been estimated separately.

All the reserves have been placed in proved category. In all 438.90 Mt coal has been estimated within the block, out of which 26.06 Mt is locked up within 60m

barrier zone and 412.84Mt lies beyond barrier zone. Seamwise, gradewise reserves are given in tables 4.34 and 4.35.

4.22 OVERBURDEN

Area enclosed between two iso-overburden lines has been measured with planimeter with due regard to barrier zone. Average value of the two nearly iso-OB contours on multiplying with the area calculated has yielded the volume of overburden.

A total of 377.363 Mcum of overburden has been estimated for the entire block over Ib bottom seam. Out of this 21.690 Mcum lies in the barrier zone and 355.673 Mcum beyond the barrier zone. Seamwise, barrierwise coal:OB stripping ratio has been given in the table 4.36.

Table-4.33
Succession and Quality of Coal Seams

Coal seams	Parting (m)	Thickness (m)	M%	Ash%	VM%	UHV (K.cal/kg)	Grade
Lajkura-IV		12.42-14.39	6.1-8.2	26.2-39.07	25.8-28.9	2667-4222	D-F
	2.14-6.71						
Lajkura-III		2.02-4.89	5.4-6.7	23.8-37.0	26.4-27.2	3049-4691	D-F
	0.95-2.21						
Lajkura-II		30.05-34.07	4.6-5.7	30.0-36.8	25.9-26.3	3132-3973	E-F
	1.25-2.79						
Lajkura-I		12.09-14.43	3.9-5.2	29.0-44.5	23.6-26.4	2221-4180	E-G
	31.33-46.18						
Rampur-V		1.94-6.40	3.6-5.4	29.7-48.7	23.1-25.8	1683-4056	E-G
	0.39-5.10						
Rampur-IV		12.33-21.58	3.1-4.8	34.7-50.9	21.3-23.0	1448-3448	E-G
	0.89-7.27						
Rampur-III(Top)		2.97-11.92	4.0-6.2	24.2-43.5	23.8-28.2	2345-4705	D-G
	0.30-6.75						
Rampur-III(Bot.)		0.16-3.73	4.3-6.8	17.7-44.9	-	2110-5519	C-G

Coal seams	Parting (m)	Thickness (m)	M%	Ash%	VM%	UHV (K.cal/kg)	Grade
	0.17-8.21						
Rampur-II		0.91-6.31	3.2-5.9	22.5-49.9	20.8-29.7	1517-4981	C-G
	0.12-10.75						
Rampur-I		0.06-5.03	3.3-4.9	28.6-45.8	17.7-26.3	2083-4277	D-G
	1.53-11.39						
IB (Top)		0.12-1.84	-	-	-	-	-
	0.33-8.53						
IB(Middle)		0.30-4.28	2.9-7.5	20.5-41.3	17.5-28.0	2621-5243	C-F
	0.13-5.10						
IB(Bottom)		0.22-3.28	4.6-7.7	18.9-40.1	24.4-29.0	2662-5367	C-F

Table-4.34
Seamwise/Gradewise net proved geological reserve within Barrier zone, Kulda Block

(In Mt.)

Seam	Grade					
	C	D	E	F	G	Total
Lajkura-IV	-	-	1.9023	0.2105	-	2.1128
Lajkura-III	-	0.0040	0.8107	-	-	0.8147
Lajkura-II	-	-	3.2617	1.0012	-	4.2629
Lajkura-I	-	-	0.0584	3.5072	0.0412	3.6068
Total		0.0040	6.0331	4.7189	0.0412	10.7972
Rampur-V	-	-	-	0.2635	0.6710	0.9345
Rampur-IV	-	-	-	0.1508	3.2823	3.4331
Rampur(IV+V)	-	-	-	2.2283	1.8010	4.0293
Rampur-III Top	-	0.0946	2.0277	0.7033	-	2.8256
Rampur-III Bot	-	-	-	0.0370	0.1213	0.1583
Rampur(IIIT+IIIB)	-	-	-	0.0435	-	0.0435
Rampur-II	-	-	0.5067	0.3405	0.0246	0.8718
Rampur-I	-	-	0.5155	0.6436	-	1.1591
Rampur (I+II)	-	-	-	0.2988	-	0.2988
Total :		0.0946	3.0499	4.7093	5.9002	13.7540
IB (Mid)	-	-	0.3465	-	-	0.3465
IB (Bot)	-	0.0650	0.0487	-	-	0.1137
IB (Mid+Bot)	-	0.2247	0.3026	0.5189	-	1.0462

Total :	-	0.2897	0.6978	0.5189	-	1.5064
Grand Total :		0.3883	9.7808	9.9471	5.9414	26.0576

Table-4.35
Seamwise/Gradewise net proved geological reserve beyond Barrier zone, Kulda Block

(In Mt.)

Seam	Grade					
	C	D	E	F	G	Total
Lajkura-IV	-	-	18.7925	5.4283	-	24.2208
Lajkura-III	-	1.4538	6.7808	1.1530	-	9.3876
Lajkura-II	-	-	56.4565	23.3390	2.3310	82.1265
Lajkura-I	-	-	2.3432	42.9437	4.2471	49.5340
Total		1.4538	84.3730	72.8640	6.5781	165.2689
Rampur-V	-	-	0.4520	11.7141	5.1081	17.2742
Rampur-IV	-	-	-	9.5575	58.4829	68.0404
Rampur(IV+V)	-	-	-	14.0870	37.6963	51.7833
Rampur-III Top	-	2.1233	21.5841	16.7282	-	40.4356
Rampur-III Bot.	0.0281	0.2641	0.8646	1.1503	0.1202	2.4273
Rampur(IIIT+IIIB)	-	-	3.0290	10.0334	1.4667	14.5291
Rampur-II	0.0060	0.3792	5.6920	12.9605	1.6079	20.6456
Rampur-I	-	0.1509	1.5194	5.8218	0.5079	8.0000
Rampur (I+II)	-	-	-	2.2963	0.3112	2.6075
Total :	0.0341	2.9175	33.1411	84.3491	105.3012	225.7430
IB (Mid)	0.2885	2.2301	4.2693	0.2099	-	6.9978
IB (Bot.)	0.3650	2.6185	0.7581	0.1356	-	3.8772
IB (Mid+Bot.)	0.1220	5.1809	2.2859	3.1282	0.2413	10.9583
Total :	0.7755	10.0295	7.3133	3.4737	0.2413	21.8333
Grand Total :	0.8096	14.4008	124.8274	160.6868	112.1205	412.8452

Table-4.36
Seamwise/Barrierwise Coal:OB Stripping Ratio, Kulda Block
(For one seam and Immediate OB only)

Zone/Seam	Reserve in Million Tonnes	Immediate Overburden (In M.cum)	Stripping Ratio (Volume of OB in M^3 for 1 t. of Coal)
Beyond Barrier			
Lajkura-IV	24.221	42.439	1.752
Lajkura-III	9.388	8.534	0.909
Lajkura-II	82.127	29.743	0.362
Lajkura-I	49.534	15.582	0.315
Sub-total :	165.269	96.298	0.583
Rampur-V	17.274	142.396	8.243
Rampur-IV (Inc. V+IV)	119.8232	19.882	0.166
Rampur-III Top	40.436	14.181	0.351
Rampur-III Bottom Inc. (III Top+III Bot.)	16.956	1.862	0.110
Rampur-II	20.646	21.785	1.055
Rampur-I Inc. (I+II)	10.608	6.063	0.572
Sub-total :	225.7432	206.169	0.913
IB Middle	6.998	45.831	6.831
IB Bot/IB (Mid+Bot.)	14.835	7.375	0.497
Sub-total :	21.833	53.206	2.437
Total :	412.8452	355.673	0.862
Within Barrier			
Lajkura-IV	2.113	3.186	1.508
Lajkura-III	0.814	0.828	1.016
Lajkura-II	4.263	0.944	0.221
Lajkura-I	3.607	0.537	0.149
Sub-total :	10.797	5.495	0.509
Rampur-V	0.934	10.248	10.960
Rampur-IV/Rampur (V+IV)	7.462	1.068	0.143
Rampur-III Top	2.826	0.796	0.282
Rampur-III Bot/ Rampur (III Top+III Bot.)	0.202	0.103	0.510
Rampur-II	0.872	1.311	1.503
Rampur-I/Rampur (I+II)	1.458	0.685	0.470
Sub-total :	13.755	14.211	1.033
IB Middle	0.347	1.803	5.200
IB Bot/IB (Mid.+Bot.)	1.160	0.181	0.156
Sub-total :	1.506	1.984	1.317
Total :	26.057	21.69	0.832
Grand Total :	438.902	377.363	0.860

Chapter - 5

MINING TECHNOLOGY

5.1 GENERAL

Kulda block is bounded by Basundhara River in the north, Chattajhor nallah in the west, Garjanbahal block on the east and south-east. Basundhara west Expn. and Basundhara east OCPs which are planned in Basundhara block are situated to the northwest of this block on the other side of Basundhara river.

5.2 DEPOSIT CHARACTERISTICS

Geological features of the block are explained in detail in Chapter-4. Three coal seams namely Ib seam, Rampur seam and Lajkura seam occur in this area. These three coal seams altogether occur in 12 split sections, leaving mergers & sub-splits.

Ib seam occurs in three sections. Ib bottom seam, which is the lowest coal section, is not workable in the northern part of the block. Ib middle section which overlies Ib bottom section is also not workable in the northern part. These two sections are combined over major part of the block. Ib top section is not workable over major part of the block and is not considered in quarriable reserves.

Rampur seam occurs in five sections. Rampur-I seam which overlies Ib middle section is not workable in the northern, southern & south eastern parts. It is combined with overlying Rampur-II seam over a long narrow strip in the western half of the block. The workable section of Rampur-I occurs at a minimum depth of about 34m in the region of borehole CMHG-118 while Rampur-II seam occurs in the entire block as workable coal section. Rampur-III bottom is not workable in the northern half of the block whereas other split sections overlying Rampur-III bottom are workable in the area of occurrence.

Lajkura horizon occurs in four sections and all coal sections are workable in the area of occurrence. Out of these four sections Lajkura-II seam is the thickest with a maximum thickness (including all bands) of 34.07m.

The parting between Ib middle seam and Rampur horizon varies from 3.79 to 13.62m. The parting is thicker where Rampur I is not workable. The parting between Rampur horizon and Lajkura horizon is thickest with thickness ranging from 31m to 47m. Except these two partings other intervening partings between split sections are generally thin.

5.3 CHOICE OF TECHNOLOGY

The proposed mining block represents presence of moderately flat multiple coal seams with intermediate varying parting. Thick seams occur at shallow depth in wide area having power grade coal reserve. So this will make the project most viable by adopting opencast mining method.

5.4 MINE BOUNDARIES

Kulda geological block contains about 438.90 Mt of net geological reserves (vertical) with an overall vertical stripping ratio of 0.86 cum/t. The maximum depth upto floor of Ib bottom seam is about 238m. The entire reserves are quarriable.

As already mentioned, the geological block is bounded by Basundhara river, incrop of Rampur seam on the north/north eastern side and Chattajhor nallah on the western side. Chattajhor nallah has a meandering course giving rise to irregular block boundary. Therefore it is proposed to straighten nallah course at two places near boreholes CMHG-227 and CMHG-216. Surface boundary is arrived after leaving a surface barrier against nallah and the river.

In earlier approved Mining Plan of Kulda Expn. OCP (Revision-3) (21 Mty), mining operation was carried out in two phases. In Phase-I, surface boundary was restricted within notified lease area for which forest clearance has been obtained by the project authority i.e. excluding Lalma Forest. In Phase-II, remaining part of the block was to be worked after obtaining forest clearance for this area.

In this Mining Plan, capacity remain same (21Mty) as in Revision-3, However, total area of Phase-I and II are considered for mining operations..

As explained in Chapter-IV, Ib bottom, Ib middle and Rampur-I seams are not workable on northern side. Even after, Ib bottom seam attains workable thickness of 1m, incremental thickness ratio is adverse due to inconsistent development of Ib middle seam and Rampur-I seam. Hence, it is proposed to adopt Rampur-II floor as the mine floor upto 185m/190m floor contour of Rampur-II seam and thereafter deepen the mine floor to floor of Ib bottom seam floor.

Mine boundaries adopted in this mining plan are summarized below.

North : Floor boundary is arrived after leaving surface barrier of about 60m against river. Quarry slope is about 37^0.

East : Roof incrop of Rampur-II seam.

South : Geological boundary is adopted as surface boundary.

West : Floor boundary is marked after leaving a surface barrier of about 60m against Chattajhor nallah and its straightened part.

5.5 RESERVES AND STRIPPING RATIO

Kulda OCP is operating since 2007-08. About 120.9 Mt of coal and 86.88 M.cum of OB has been extracted till 31.03.2022. It is estimated that 218.627 Mt of mineable coal would be available for extraction within mine boundaries as on 01.04.2022

The total overburden to be removed is estimated as 243.006 Mcum as on 01.04.2022. Thus as on 01.04.2022 overall stripping ratio works out to 1.11 cum/t.

Table 5.1 gives seamwise, gradewise details of mineable coal. Details of Parting/overburden are given in table 5.2. **(As on 01.04.2022)**

Table - 5.1
Seamwise, Gradewise Mineable Coal
(Figs. in Mt.)

	SeamName/Grade	C	D	E	F	G	Grand Total
1	**Ib-bottom**	0.02	0.34	0.2	0.04	0	**0.6**
2	**Ib-middle**	0	0.47	1.08	0.02	0	**1.57**

3	**Ib-combined**	0.09	3.39	1.42	1.25	0.15	**6.3**
4	**Rampur-I**	0	0	0.3	2.1	0	**2.4**
5	**Rampur-II**	0	0.17	2.04	5.29	1.05	**8.55**
6	**Rampur-I+II**	0	0	0.01	0.81	0.21	**1.03**
7	**Rampur-III bottom**	0	0.03	0.75	0.37	0.31	**1.46**
8	**Rampur-III Top**	0	1.07	9.24	7.67	0	**17.98**
9	**Rampur-III Comb.**	0	0	0.39	6.05	0.45	**6.89**
10	**Rampur-IV**	0	0	0	6.04	21.517	**27.557**
11	**Rampur-IV+V**	0	0	0	4.13	20.7	**24.83**
12	**Rampur-V**	0	0	0.4	7.18	2.95	**10.53**
13	**Lajkura-I**	0	0	1.83	23.25	0.71	**25.79**
14	**Lajkura-II**	0	0	36.69	18.02	2.49	**57.2**
15	**Lajkura-III**	0	1.07	5.03	0.13	0	**6.23**
16	**Lajkura-IV**	0	0	16.48	3.23	0	**19.71**
		0.11	**6.54**	**75.86**	**85.58**	**50.537**	**218.627**

Table - 5.2
Details of overburden and partings (Fig. in Mcum)

A.	**Partings**	**OB as on 01.04.2022**
1	PARTING BET. IB-BOT & IB-MID.	**1.38**
2	PARTING BET. IB-MID & RAMPUR-I	**12.09**
3	PARTING BET IB-MID & RAMPUR-II	**9.37**
4	PARTING BET RAMPUR-I & RAMPUR-II	**2.72**
5	PARTING BET RAMPUR-II & RAMPUR-III BOT	**1.7**
6	PARTING BET RAMPUR-II & RAMPUR-III TOP	**11.57**
7	PARTING BET RAMPUR-III BOT & RAMPUR-III TOP	**2.1**
8	PARTING BET RAMPUR-III TOP & RAMPUR-IV	**14.05**
9	PARTING BET RAMPUR-IV & RAMPUR-V	**4.73**
10	PARTING BET RAMPUR-V & LAJKURA-I	**68.93**
11	PARTING BET LAJKURA-I & LAJKURA-II	**4.17**

12	PARTING BET LAJKURA-II & LAJKURA-III	**5.57**
13	PARTING BET LAJKURA-III & LAJKURA-IV	**4.33**
	SUB-TOTAL (PARTINGS)	**142.71**
B.	**overburdens**	
14	OVERBURDEN ABOVE RAMPUR-II	**0.61**
15	OVERBURDEN ABOVE RAMPUR-III BOT	**0.15**
16	OVERBURDEN ABOVE RAMPUR-III TOP	**1.03**
17	OVERBURDEN ABOVE RAMPUR-IV	**2.14**
18	OVERBURDEN ABOVE RAMPUR-V	**28.986**
19	OVERBURDEN ABOVE LAJKURA-I	**6.42**
20	OVERBURDEN ABOVE LAJKURA-II	**15.58**
21	OVERBURDEN ABOVE LAJKURA-III	**2.61**
22	OVERBURDEN ABOVE LAJKURA-IV	**42.77**
	SUB-TOTAL (OVERBURDEN)	**100.296**
	TOTAL (OVERBURDEN & PARTING)	**243.006**

SPECIFIC GRAVITY

As already mentioned, gradewise specific gravities are adopted for calculation of coal quantity and are detailed in table 5.3.

Table - 5.3
Gradewise specific gravity of coal

Grade	Specific Gravity (t/cum)
C	1.50
D	1.55
E	1.61
F	1.68
G	1.75

MINING LOSSES

Seamwise mining losses are calculated based on average thickness and presence of thick dirt bands. Based on these assessed losses, deduction has been made from net

geological coal to arrive at mineable coal. Details of mining losses calculated for various seams are given in table 5.4.

Table - 5.4
Seamwise mining losses

Sl.No.	Seam Description	Mining Loss (%)
1.	Ib-bottom	21
2.	Ib-middle	13
3.	Ib-combined	9
4.	Rampur-I	17
5.	Rampur-II	12
6.	Rampur-III bottom	12
7.	Rampur-III top	7.5
8.	Rampur-III combined	4
9.	Rampur-IV	8
10.	Rampur-IV+V	4.5
11.	Lajkura-I	4.5
12.	Lajkura-II	5.5
13.	Lajkura-III	8
14.	Lajkura-IV	3

5.6 ANNUAL TARGET AND LIFE

An annual target of 21.0 Mt is proposed. Mine life at this target works out to 11 years as on 31.03.2022.

5.7 GEO-MINING CHARACTERISTICS

Geo-mining characteristics of the proposed quarry are given in table 5.5.

Table - 5.5
Geo-mining Characteristics

Sl.No.	Particulars	Unit	Total
1.	Floor area	ha	397.95
2.	Surface area	ha	539.98
3.	Mineable reserves	Mt	218.627*
4.	Waste volume	Mcum	243.006*
5.	Stripping ratio	m^3/t	1.11*
6.	No. of seams/sections		3/16**
7.	Capacity	Mty	21.0
8.	Life	Yrs	11
9.	Average gradient R-II as floor	1 in 10.05	

	Ib-Bottom as floor	1 in 11.33	
10.	Strike length (along floor)		
	Maximum	m	2300
	Minimum	m	500
11.	Strike length (along surface)		
	Maximum	m	2430
	Minimum	m	820
12.	Depth		
	Maximum	m	238
	Minimum	m	10
13.	Perimeter	m	9630

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* Balance as on 01.04.2022

** This includes split and combined sections.

5.8 OPENING OF DEPOSIT AND SEQUENCE OF WORKING

This project is an operating mine. Present access trench is being used to reach the lowest workable seam as proposed in the original P.R. and is proposed to continue for balance project life. Another exit is proposed at the south-east corner for carrying upper seam coal along southern batter.

At present, mining activities are confined to southern part of the strike length. The availability of land is restricted by limit of working as per forest approval (Lalma forest)

The mine can be expanded to its full strike width and haul road can be maintained in desired direction once getting the forestry clearance.

Barring three strike faults of up to 15m throw in the central part, the property is mostly undisturbed. There are hillocks in the south-central part for which additional capacity of OB removal is required. However, the rate of OB removal has been kept moderately uniform with little advance stripping.

After excavating mine floor for a width of about 550m, mine floor changes from Rampur-II to IB Bottom. A ramp has been provided along the line of different mine floors to reach the IB Bottom seam. Moreover, the faults die out before this ramp.

During the same period when mine floor is deepened to reach IB Bottom seam, Lajkura seam is encountered. Composite thickness is about 60m with thin intervening partings. All benches of mining operation are to be advanced as a single quarry towards dip.
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5.9 MINING SYSTEM

The prevalent mining and geological conditions comprise of the followings:

i) Presence of 3 nos. thick coal horizons namely, (a) Ib (8 m), (b) Rampur (45 m), (c) Lajkura (50 m).

ii) The above coal horizons contain multiple coal sections with intervening partings. Thickest coal seams/sections are Rampur (IV+V) (25 m) and Lajkura II (31 m).

iii) Gradient of the seams (5° to 8°).

iv) Low average stripping ratio of 1.06 cum per tonne.

Considering the above prevalent mining and geological conditions, shovel dumper mining system in overburden and Surface Miner (windrowing), loader and dumper for coal extraction has been suggested.

The external overburden and the thick parting between Rampur and Lajkura seam horizons are proposed to be worked by horizontal slices, whereas all the coal seam sections and the intervening partings in Ib, Rampur and Lajkura seams are envisaged to be worked by inclined slices considering the moderate gradient.

5.10 EXCAVATION & TRANSPORT

The prevalent thickness of various coal seam sections and partings within the Kulda quarry area are given in table no.5.6.

Table - 5.6

Sl. No.	Particular	Maximum	Minimum	Average
1.	Top overburden	65.00	2.81	-
2.	Lajkura IV seam	14.47	12.42	13.63
3.	Ptg. bet. Lajkura IV & III	6.71	1.84	4.31
4.	Lajkura III seam	4.89	3.10	4.34
5.	Ptg.bet. Lajkura III & II	2.21	1.01	1.56
6.	Lajkura II seam	34.07	30.05	31.44

7.	Parting bet. Lajkura II & I	2.85	1.20	1.86
8.	Lajkura I seam	14.55	11.56	13.78
9.	Parting bet. Lajkura I & Rampur V	43.60	31.33	35.78
10.	Rampur V seam	7.42	1.94	4.03
11.	Parting bet. Rampur V & IV	4.40	1.04	2.33
12.	Rampur IV seam	22.18	12.25	17.14
13.	Ptg. bet. Rampur IV&III top	7.27	1.10	2.37
14.	Rampur III top seam	11.92	2.97	8.33
15.	Ptg. bet. Rampur III top & Rampur III bottom	2.58	1.18	1.73
16.	Rampur III bottom seam	3.73	1.03	1.97
17.	Ptg. bet. Rampur III bot. & Rampur II	5.28	1.13	2.68
18.	Rampur II seam	6.31	1.16	4.44
19.	Ptg. bet. Rampur II & I	5.12	1.11	2.29
20.	Rampur I seam	5.33	1.02	2.29
21.	Ptg. bet. Rampur II & Ib middle	17.83	8.66	14.15
22.	Ptg. bet. Rampur I & Ib middle	13.62	3.79	10.00
23.	Ib middle seam	4.28	1.16	2.45
24.	Ptg. bet. Ib middle & Ib bottom	4.52	1.03	2.29
25.	Ib bottom seam	4.40	1.00	1.47

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Project report for the existing mine has been approved in both outsourcing variant for target production of 15 Mty. Accordingly coal extraction & overburden removal & transport are presently being done by outsourcing agencies. Same system of mining will be continued for mining operations for 21 Mty.

For the above geomining conditions following is the optimum choice of equipment if the mine is operated departmentally.

i) The soil analysis data available for adjacent Basundhara block reveals that the thickness of top soil varies from 250 to 300 mm. As the major part of the area is covered with dense vegetation, the soil should be ripped, dozed and loaded after clearing vegetation.

ii) Elect. Rope shovels of 10 cum. working in conjunction with rear dumpers 85T / 100T are envisaged for the top overburden and the thick parting (35 m) between Rampur and Lajkura horizons.
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iii) Moderately thick to thin partings are suggested to be removed by 5-7 cum hydraulic shovel/ backhoes with 85/100 T rear dumper.

iv) Thin inseam parting & bands can be removed by using high capacity ripper-dozer without blasting.

v) Surface miner, loader and rear dumper can be deployed for extraction of coal seams by blast free method. 5-7 cum. hydraulic shovels/ backhoe along with 85/100t dumper can be deployed in part coal production where surface miner cannot be deployed.

In the approved outsourcing variant similar size of HEMM are preferred to avoid excessive HEMM population.

At the full development stage of the mine, number of working overburden benches will be about 10 and total number of benches including parting and top overburden may be about 15. In addition to overburden benches, there are 11 nos. of coal horizons. Therefore, it is required to organize the transport system which will offer necessary connections to all horizons during mine development. Considering these requirements, it is envisaged to develop peripheral horizontal roads and a road at 6% gradient connecting these horizontal roads. There will be two such roads, one to serve northern & western side and another connecting eastern, south eastern flank roads (**ref. Plate MIN-I**).

Transport route for OB would be along working benches and to nearest flank level haul road through temporary ramps. From flank roads it will be hauled either to internal or external dumps. Coal from lower horizons would be transported through haul road on the mine floor whereas coal from upper horizons would be through flank haul roads.

5.11 DUMPING

It is estimated that about 73 Mcum of overburden is to be dumped outside the quarry. Due to surface constraints of Chattajhor nallah, adjoining Garjanbahal block and forest lands, there is acute shortage of land for external dumping. Area immediate rise side of incrop is not considered due to presence of forest land and also proposed location of mine infrastructure like CHP, workshop and substation. Therefore, the area on immediate rise side of adjoining Garjanbahal block is considered as one of the dump sites (External dump no 1 of

original Mining plan). In the existing mine major quantity of the overburden is being transported to this above mentioned external dump. About 38.33 Mcum has already been dumped as on 31.03.2022 in external dump no 1 located on the rise side of the Garjanbahal block. The proposed external dump no 2 is on the dip side of Kulda block. Dump no 2 (capacity 31.94 Mcum) has not been started. Additionally, 1.11 Mcum is dumped along Chattajhor nallah and Basundhara river to form embankment. However, MCL proposed to integrate both Kulda and Garjanbahal mines including dip side blocks, in such case the proposed quantity of external dump may be changed in future.

Backfilling has already been started in the existing mine. It is proposed to increase the internal dumping when sufficient advance is made on lower most seam floor. MIN-V shows the position of external and internal dumps at final stage of mining operations.

Table - 5.7
External and Internal Dumping

YEAR	EXTERNAL DUMP-1	EXTERNAL DUMP-2	EMBANKMENT	INTERNAL DUMP	TOTAL OB REMOVED
TILL 31.3.2022	38.33		1.11	47.44	86.88
Yr-1 (2022-23)	2.73	6.15		14.64	23.52
Yr-2		6.51		17.22	23.73
Yr-3		7.23		16.5	23.73
Yr-4		5.67		18.06	23.73
Yr-5		6.38		17.77	24.15
Yr-6				24.15	24.15
Yr-7				24.15	24.15
Yr-8				24.15	24.15
Yr-9				24.15	24.15
Yr-10				23.52	23.52
Yr-11				4.026	4.026
TOTAL	**41.06**	**31.94**	**1.11**	**255.78**	**329.89**

South-eastern slope of the mine adjacent to Lalma forest is being partially filled by overburden generated by Phase-I mining operation. This overburden will have to be rehandled while advancing this area towards south during Phase-II mining operation. Alternatively this overburden can be dumped in area of external dump-2 as per earlier approved mining plan. This external dump area is on coal bearing area towards dip side property. The non-forest area has already been notified by project authority.

5.12 DRILLING AND BLASTING

Overburden is mostly required to be loosened by drilling and blasting before excavation. There is wide variation in thickness of coal sections being worked. Blasting will be mostly avoided in coal seams due to deployment of surface miner. Ripping and dozing may be adopted in coal sections of thickness less than 2 m, depending upon situation.

It is envisaged to deploy 250 mm dia electric blasthole drills in top overburden and thick partings. 160 mm dia drills are provided to deal with other partings. As per standardization adopted in MCL only two types of drills are adopted. Powder factor of 0.35 kg/cum and 0.2 kg/cum have been adopted for overburden and coal respectively for estimating explosive requirement.

Blasting pattern will have to be established after conducting a series of field trials. Considering that the mine infrastructure and bridge across Basundhara River is located close to the quarry, it is important to determine charge per delay and other blasting parameters. However following tentative blasting pattern is suggested:

Table - 5.8
Proposed Blasting Pattern

Description	Overburden			Coal	
Bench height (m)	15	10	5	10	5
Blast hole diameter (mm)	250	250	115	160	115
Spacing x burden (mxm)	9.5x8	9x7.5	5x4	7.5x6	5.5x4.5

5.13 CALENDAR PROGRAMME OF EXCAVATION

Calendar programme of Yearwise quantities of coal, volume of overburden and corresponding stripping ratio is given in Table 5.9. Final Stage Excavation Plan is shown in plate MIN-1.

Table 5.9
PROGRAMME OF COAL EXTRACTION AND OB REMOVAL
KULDA EXPANSION OC PROJECT

YEAR	COAL (Mt)	OB (Mcum)	S.R (Cum/Te)
YR-1 (2022-23)	21	23.52	1.12
YR-2	21	23.73	1.13
YR-3	21	23.73	1.13
YR-4	21	23.73	1.13
YR-5	21	24.15	1.15
YR-6	21	24.15	1.15
YR-7	21	24.15	1.15
YR-8	21	24.15	1.15
YR-9	21	24.15	1.15
YR-10	21	23.52	1.12
YR-11 (2032-33)	8.627	4.026	0.47
TOTAL	**218.627**	**243.006**	**1.11**

5.14 REQUIREMENT OF HEMM

Project report of Kulda OCP (10 Mty) was approved for both coal & OB outsourcing variant. Kulda OCP (15 Mty; 5 Mty incremental) has been approved for incremental coal & incremental OB both by outsourcing. In sanctioned outsourcing variant equipment requirement and its phasing will depend on the outsourcing agency. But the optimum choice of equipment as per departmental variant has also been assessed, total requirement and its phasing have been calculated based on the calendar plan of operations, revised productivity of HEMM and possible physical deployment of equipment in various horizons for extraction for 21 Mty coal and corresponding OB.

Requirement of HEMM (in case the mine is operated departmentally) is given in Table 5.10.

Table 5.10
Requirement of HEMM

	Equipment	Size/Specification	Total No.
A.	***OVERBURDEN***		
1.	HYDRAULIC BACKHOE [660-760 HP]	5.9-6.1 cum.	10
2.	ELECTRIC ROPE SHOVEL [6.6 kv]	10 Cum.	4
3.	REAR DUMPER	100 T	34
4.	REAR DUMPER	60 T	75
5.	ELEC. R.B.H. DRILL TALL MAST	250 mm	6
6.	R.B.H. DRILL	160 mm	6
7.	DOZER	410 H.P.	10
8.	RIPPER DOZER	850 HP	3
B.	***COAL***		
1.	SURFACE MINER (WINDROW)	900-1100 HP	6
2.	HYDRAULIC BACKHOE [660-760 HP]	5.9-6.1 cum.	2
3.	FRONT END LOADER [~500 HP]	5.5-6.0 cum	9
4.	REAR DUMPER	60 T	63
5.	DOZER	410 H.P.	5
C.	***COMMON***		
1	LATTICE BOOM CRAWLER MOUNTED CRANE	75 tonne	1
2	ROUGH TERRAIN CRANE	40 tonne	2
3	HYDRAULIC MOBILE CRANE	10 tonne	2
4	SERVICE CRANE	8 tonne	3
5	HYDRAULIC BACKHOE	1.5-1.6 cum	4
6	FRONT END LOADER	3.0 cum	4
7	TYRE HANDLER	FOR 60T TRUCK	3
8	MULTIPURPOSE HANDLING EQUIPMENT		1
9	GRADER	280 HP	4
10	WATER SPRINKLER	28 KL	8
11	MAINTENANCE VAN		3
12	FUEL BOWSER	20 KL	3
13	FIRE TRUCK		2
14	VIBRATORY COMPACTOR		2
15	WATER FOG SYSTEM	1200 PSI	4
16	TRUCK MOUNTED MIST CANNON		4
17	ROAD SWEEPER MACHINE		2

Chapter - 6

MANPOWER, SAFETY AND SUPERVISION

6.1 REQUIREMENT OF MANPOWER

COAL & OB OUTSOURCING (APPROVED VARIANT)

Manpower for OB removal, coal extraction together with common services and land reclamation considering 330 working days and 16.5% absenteeism in a year as per approved Mining Plan is given below in table 6.1.

6.1.1 REQUIREMENT ON VARIOUS WORKING HEADS AS PER APPROVED MINING PLAN FOR COAL & OB OUTSOURCING VARIANT

The group wise manpower requirement as per approved Mining Plan is given in table no.6.1 below :

Table - 6.1
Groupwise manpower requirement

Sl. No.	Particulars	No. of persons (upto target year)	No. of persons (beyond target year)
1	Executives	77	-
2	Monthly rated	248	-
3	Daily rated (Category)	332	3
4	Daily rated (Excavation)	153	3
	Total	**810**	**6**

Manpower requirement as per approved Mining Plan for various activities is given in table no. 6.2 below :

Table No. 6.2

Sl. No.	Particulars	No. of persons (upto target year)	No. of persons (beyond target year)
1	Coal	44	-
2	OBR	167	6
3	Common	571	-
4	Environment & land	28	28
	Total	**810**	**34**

6.1.2 ADDITIONAL REQUIREMENT FOR INCREMENTAL PRODUCTION ON VARIOUS WORKING HEADS FOR COAL & OB OUTSOURCING VARIANT.

The group wise additional manpower requirement is given in table no.6.3 below :

Table - 6.3
Groupwise additional manpower requirement

Sl. No.	Particulars	No. of persons (upto target year)	No. of persons (beyond target year)
1	Executives	-	-
2	Monthly rated	7	-
3	Daily rated (Category)	3	-
4	Daily rated (Excavation)	81	-
	Total	**91**	**-**

Additional manpower requirement for various activities is given in table no. 6.4 below:

Table No. 6.4

Sl. No.	Particulars	No. of persons (upto target year)	No. of persons (beyond target year)
1	Coal	68	-
2	OBR	-	-
3	Common	-	-
4	Environment & land	23	-
	Total	**91**	**-**

6.2 SAFETY AND SUPERVISION

Opencast mining operation in general is associated with a number of hazards/risks.

The various anticipated sources of danger are enumerated as under:

- Slope failure.

- Dangers due to handling and use of explosives and accidents due to fly-rocks and air-blasts following a faulty heavy blast.
- Hazards associated with use of electricity.
- Accidents due to unruly operation of HEMM
- Dust hazards.
- Fire hazards due to spontaneous heating of coal in stock piles and exposed benches.
- Fire hazards in stores & workshops where inflammable & highly inflammable materials are stored or used.
- Danger of inundation from surface and/or ground water.
- Accumulation of noxious gases/fumes in deep pits.

Adequate provisions have been made for safe working of the mine in form of design of operational systems, provision of safety measures for safe use of explosives, electricity and HEMM etc. Sufficient financial provisions have been made under different heads for procurement of necessary safety equipments.

Adequate skilled & trained manpower has also been provided, for compliance of safety provisions. Regular training/refresher courses, "on job" training shall be conducted & mock rehearsals shall be made to make the manpower conversant with various rules, regulations, methods of prevention & combat with hazards.

6.3 SAFETY MANAGEMENT

6.3.1 SLOPE STABILITY

COAL/OB BENCHES

The exposed ends of the coal seams and OB shall be left with a safe slope to avoid slope failure and collapse of benches. Similarly, at the end of mining operation, safe terminal pit slope is provided to avoid pit failure. Detailed site specific tests for slope stability shall be carried out and site specific parameters determined. Present provision is a broad guideline.

All the working benches shall be under the direct supervision of Overman/ Mining sirdar and all necessary precautions shall be taken to make the workings safe. Any rehandling to expose coal should be done with all safety measures and norms. Width and height of working coal benches will depend on machinery /HEMM deployed by the outsourcing agency and safety should be properly ensured by the competent authority as per provisions of existing safety norms by DGMS or other agencies.

Considering the gradient of coal seam about 5^{o}-6^{o} in this project area, it is proposed to excavate top OB, thick parting between Rampur and Lajkura seams and thick coal seam sections by horizontal slices. All other partings and coal sections are proposed to be worked by inclined slices. Based on the above consideration, the following pit design parameters have been adopted in the PR.

FOR COAL SEAMS

	5.5Cum EHS	**Surface Miner**
Max. bench height	10 -12m	15m
Working bench width	24-45m	50m
Bench slope	70^{o}	64^{o}

FOR OB

	5.5Cum EHS/10Cum. ERS
Bench height (max.)	10m (for 5.5 cum EHS)
Bench height (max.)	15m (for 10 cum ERS)
Working bench width	37m/50m
Bench slope	70^{o}

OB DUMP

Due to presence of Basundhara River on north & presence of reserve forest on east, there is acute shortage of external dumping area. The southern side is also constrained because of presence of coal bearing areas of Garjanbahal & Meenakshi blocks.

At present Internal backfilling has started and entire overburden generated will be dumped internally. Both internal & external dumps will be formed in 30m tiers with an overall slope of about 26^{o}, angle of individual dump tier will be around 37^{0} depending on angle of repose of material and there should be horizontal berm of width 30m in between the individual 30 m dump tiers. Height of each dump may even be kept at a lesser height where the dump is near any road or locality. Berm between each dump tier should be properly graded and drains should be provided at toe with proper gradient. Fencing may be done near bottommost tier to stop unauthorized entry near the dump, adequate safety distance on surface from dump toe should be maintained to avoid any accident due to slope failure.

For better stability of internal dumps it is suggested to rip the mine floor in strips before backfilling. It is suggested to level the dumps and grade them outward properly to obviate water accumulation.

HAZARD AND RISK ASSESSMENT OF OB DUMPS

Hazard of OB dump failure is mainly governed by following factors:

1. Height of benches.
2. Slope of benches.
3. Nature of material.
4. Slope of foundation rock.
5. Nature of foundation rock.
6. Drainage of foundation.
7. Depth of ground water table.

The following precautions will be taken to reduce the risk of dump failure.

1. OB benches will be made of <30m ht in each tier.
2. The angle of repose of OB benches will be around 37^{o}.
3. Soil should be scraped separately, so that it is not mixed in OB rock.

4. The slope of ground is kept mild so that it will not have any adverse effect.
5. The soil from the foundation ground should be scrapped before starting of OB dumping.
6. The natural angle of repose shall be maintained.
7. A suitable fence shall be erected at the toe of every OB dump to prevent unauthorized person from approaching the OB dump.
8. The backfilled area shall be kept benched and the distance of active mine workings (faces) from the toe of the bottom most backfilled face (bench) shall not be less than 100m.
9. Garland drain to be made around OB dump area to avoid water flow during monsoon below the OB dump.
10. Ground water table is generally 3-5m below ground level hence may have no adverse impact.
11. Leveling, grading and drainage arrangement for top of OB dumps will be done.
12. Technical & Biological reclamation will be done.
13. Sufficient clearance as per DGMS regulations or any other statutory law should be maintained between toe of the dump and nearby road/village/infrastructure to avoid any accident or slope failure.

6.3.2 SAFE USE OF EXPLOSIVES

Site mixed slurry (SMS) has been proposed to be used for good fragmentation and obviate storage of bulk quantum of explosives. However, for storage of explosives meant for priming, detonating fuse and detonators, two explosive magazines of 20 tonnes each have been provided in this report.

For transportation of explosives, explosive van of approved type is also envisaged.

For proper blasting and minimizing the adverse side effects due to blasting viz. noise, ground vibration back-breaks, air blast and fly rocks etc., the optimal blast

design parameters are suggested to be used, after field trials. A tentative drilling and blasting pattern is given in Mining Technology chapter (Chapter-V).

Provision has been made in the PR for qualified blasting-in-charge with requisite number of assistants. Adherence to relevant statutory safety provisions as stipulated by DGMS, Chief Controller of Explosives and others shall be made.

A safety zone of 300m radius beyond the quarry limit is envisaged to be acquired for the project from safety considerations. It is suggested to resort to controlled blasting near built-up areas and surface features, if any, within the safety zone.

6.3.3 USE OF ELECTRICITY

To prevent shock hazards, in use of electricity, proper earthing system has been envisaged. It has been proposed to use restricted earthed neutral system of power supply and adoption of fail-safe electronic relays to minimise shock hazards.

Moving towers/posts shall be provided for mine illumination in addition to fixed towers.

It is suggested to strictly comply with the relevant provisions of Indian Electricity Rules, 1956 to obviate hazards due to use of electricity. 6 nos. of Electrical Supervisors have been provided in the manpower requirement to fulfill the statutory needs as per the rules, regulations pertaining to mining industry.

6.3.4 USE OF HEMM

Based on the excavation requirement of the mine and envisaged calendar programme, adequate number of HEMM has been envisaged in the PR with due regard to stand-bye provisions for proper maintenance of the same.

A well equipped workshop is suggested in the PR to cater to the maintenance needs of HEMM and other equipments besides provision of necessary

maintenance crew. A project store is provided for storage of slow and fast- moving spares and other necessary spares of vital importance.

Adequate number of trained/skilled operators and maintenance crew are provided in the PR with due consideration of leave/sick provisions.

Properly designed haul roads are envisaged in the PR, away from the general and traffic congestion. The traffic rules as enforced by the DGMS shall be strictly followed by the operators of mobile equipments like rear dumpers, water sprinklers, tippers and other light motor vehicles. All mobile equipments shall be provided with audio-visual alarms.

Safety devices like fire alarm and control, operated by sensors should be inbuilt in the equipment/HEMM. Flashers should be fitted in relevant HEMM. The haul roads should be sufficiently wide to prevent accidents.

Inter-locking of starting with normal positioning of dumper body should be provided, so that dumper cannot be started when the body is in lifted position beyond a certain limit.

Provision for proper illumination of quarry faces, haul roads and other working places have also been made as per the statutory guidelines. The details are given in Chapter-VII.

6.3.5 **DUST**

Inventory of dust generation sources

The likely dust generation sources due to various mining operations in the project are envisaged as under:

- Drilling, blasting, excavation and transportation of overburden material ;

- Drilling, blasting, excavation, crushing and transportation of run-of-mine (ROM) coal ;
- Construction and demolition activities like land clearing, material/debris storage and handling, etc.;
- Loading of coal at stockpile, reclaiming from pile and movement of vehicle and loading equipment ;
- Wind erosion ;
- Movement of vehicles on haul roads (black topped and non-black topped) for transportation of coal and overburden.

DUST POLLUTION CONTROL MEASURES

Systematic and regular air quality monitoring is necessary to examine objectively the status of compliance with the statutory standards and for making a real assessment of ambient air quality.

The following measures are suggested in the PR to contain the pollution arising out of dust emission, within the limits :

- All the drills are provided with well designed dust extraction/suppression system ;
- Blasting operations are designed in such a way so that these produce minimum dust;
- Effective use of sprinklers and dust suppression units during loading, transportation and handling of ROM/processed coal and overburden;
- Dust extraction/suppression system is installed in coal handling plant;
- Provision of greenbelt around quarry, industrial and residential areas and avenue plantation along the haul roads on surface;
- Black-topping of permanent service roads besides proper maintenance. Wetting of the surface by deploying water tankers/sprinklers to reduce dust generation from haul roads.

6.3.6 FIRE DUE TO SPONTANEOUS HEATING IN COAL BENCHES & GROUND STOCKS

The following measures will be taken to avoid spontaneous heating.

a) coal bench slopes and seam outcrops will be overlain with a thin layer of inert rock so as to form a impervious layer.
b) treatment of exposed coal seams & outdoor coal stocks with antipyrogenic substances.
c) wider exposure of coal benches for long time shall be avoided.

6.3.7 FIRE IN PROJECT STORES & WORKSHOPS

Sufficient provision has been made in the PR for the prevention & control of fire in the project store, both E&M & HEMM workshops & sub-stations by way of installing fire extinguishers of right type & size. Timely inspection & refilling of fire extinguishers will be done.

Systematic layout of both stores & workshops has been made so that inflammable & highly inflammable materials do not come in contact with any spark or flame. Adequate number of cautions in the form of hoardings will be displayed near such places.

6.3.8 INUNDATION

Due care has been taken while formulating the PR to prevent water ingress during mining operations from the higher ground through local streams.

a) It has been proposed to straighten Chatta jhor nallah for convenience of mine operation. Adequate precaution shall however, be taken at the four diversion points so that water in-rush through old river-course to the mine workings does not take place.

b) In rainy season, water from the mining area flows down to Chattajhor nallah and Basundhara river by means of small streams. Mining operation will disrupt the existing drainage system. Garland drains around the periphery have therefore been provided.

c) Possible overflow of water during rainy season, from Chattajhor nallah and Basundhara river to mine workings will be guarded against by formation of embankment alongside the water courses.

Height of embankment shall be kept three meter above HFL. The width at top of the embankment will be 20m with slopes on both sides. The slope facing nallah will be stone pitched. Provision has been made for this in the PR. During implementation, design of the embankment should be properly done considering actual site conditions.

d) A careful assessment is to be made against the danger from surface water before on the onset of rainy seasons. The necessary precautions should be clearly laid down and implemented. A garland drain needs to be provided to drain away the surface rainwater from coming into the mine.

e) Inspections for any accumulation of rainwater, obstruction in normal drainage and weakening in embankment.

f) Standing order; for withdrawal of working persons in case of apprehended danger.

g) During heavy rain inspection of vulnerable points is essential. In case of any danger persons are to be withdrawn to safer places.

h) Nallah or water inlets may be diverted or isolated by embankments/if so required.

6.3.9 VENTILATION OF DEEP BENCHES

The ventilation units like truck mounted auxiliary fans will be provided towards the end of mine life to improve the working environment when the maximum depth of quarry reaches more than 200m depending upon existing conditions.

6.4 CONSERVATION

Opencast method provides maximum conservation.

Chapter - 7

COAL HANDLING PLANT AND MODE OF DESPATCH

7.1 INTRODUCTION

The PR of Kulda Expansion OCP was planned to handle the total production of 15.0 Mty and the same will be enhanced up to 21.00 Mty. Presently, the mini CHP is having 2 nos. feeder breakers of 200 to 300 tph (approx.) capacity and dispatch the coal through the existing truck loading hoppers to nearby siding. The entire blast free coal will feed to proposed Silos to be located at Barpali loop except conventionally produced will be cater by the existing Feeder breaker circuits.

However, till the commissioning of the proposed MGR Loop at Barpali yard the entire coal will be dispatched through Sardega RLS (U/C) or Kanika and Sardega sidings as well as road sale.

7.2 COAL HANDLING ARRANGEMENTS

A common CHP is being planned to handle entire blast free coal of Kulda and Garjanbahal with three number of SILOs, Overhead bunker and associated infrastructure. The coal handling arrangement feeding the coal to Silo at Barpali loop shall have the following provisions for receiving at Kulda OCP considering the entire coal will be produce by surface miner (Blast free):

- Fourteen numbers of reclaim feeders or equivalent number of Truck receiving Hoppers located at a suitable position near the mine access trench to receive the blast free coal to handle 21.00 Mty capacity.
- The entire 21.00 Mty coal reclaimed by the reclaim feeders or Vibro feeders in case of Truck receiving Hoppers and transported up to an Over ground Bunker and finally feed to the proposed Silo at Barpali Loop by sets of belt conveyors.

7.3 BASIC PARAMETERS

The basic parameters considered for the planning of the coal handling plant will be as under:

Capacity (Max.)	21.00 Mty
No. of working days	330 (For designing purpose)
No. of shifts/day	3
No. of hours/shift	8 (For designing purpose)
No. of effective hours of work of CHP/shift	5 (For designing purpose)

7.4 DESCRIPTION OF COAL TRANSPORTATION UPTO SILO

(Refer Dwg No. Plate no **Engg.-I**)

The blast free coal (by surface miner) brought to the reclaim feeder complex or Truck Receiving Hoppers from quarry and dumped over reclaimer feeder or stacked on ground/ Truck receiving Hoppers of suitable capacity. Dozers or Pay loaders are used to channelizing the coal from ground to Fourteen numbers of reclaim feeders (0-750tph variable capacity each) and the reclaim feeders reclaims the coal/vibro feeders reclaims coal from hoppers and feed into sets of conveyors. The coal reclaimed by the reclaim feeders/vibro feeders collected and transported up to the proposed over ground bunker and finally feed to Silo to be located at MGR loop on Barpali yard by series of conveyors. However , MCL proposed to integrate both Kulda and Garjanbahal mines annexing dip side blocks. In such case with due regards to environment total coal will be transported by belt conveyor from pit bottom to SILO.

Misc. items like dust suppression, firefighting, chutes with liners, tools and tackles etc. will be provided for the proposed coal handling system.

7.6 ELECTRICAL SYSTEM

7.6.1 POWER SUPPLY ARRANGEMENT TO CHP & SILO

Power at 6.6 kV for CHP is proposed to be received from the proposed 33/6.6 kV CHP main substation at Kulda-Garjanbahal OCP through 6.6 kV double circuit overhead transmission line. One of the two overhead transmission line will normally be kept able to cater entire load of CHP during emergency. It is proposed to establish required numbers of 6.6 kV substations in a suitable location near CHP and SILO to cater to the power requirement for different equipment of CHP & SILO.

7.6.2 POWER DISTRIBUTION ARRANGEMENT

For supplying power to different equipment at CHP, required numbers of 6.6 kV substations are required to be installed near load centers of CHP and SILO. The 6.6 kV substations shall consists of 6.6 kV switchboard panel, MCC, 6.6/0.415 kV distribution transformers, 6.6/0.230 kV (L-L) lighting transformers, capacitor bank etc. The reclaim feeders, feeder breakers, firefighting system, dust suppression system, sampling system and other LT loads will receive power at 415 V from MCC of 6.6 kV substations. All motors above 110 kW shall get power at 6.6 kV. All motors of 110 kW & below shall get power at 415 V. All the lighting loads shall get power at 230V. The power factor of the plant has improved to a level above 0.98 lagging at the 6600 volts switch board of 6.6 kV substations. The sufficient capacity of capacitor bank with automatic power factor correction relay have been provided at existing 6.6 kV substations. The area covered along the conveyors, substation yard, substation building and other areas will be illuminated by light fittings, which will get power from the secondary of 6.6/0.230 (L-L) kV lighting transformer installed at each 6.6 kV substation.

All the incoming 6.6 kV panels will be provided with over load, short circuit, and earth fault and earth leakage protection. All the outgoing panels supplying power to HT motors will be provided with motor protection relay (MPR) and all the panels supplying power to transformer or to any substation or capacitor bank will be provided with over load and short circuit protection. All the 415V incoming panels will

be provided with over load, short circuit and earth leakage protection as per requirement.

Proper earthing and lightning protection arrangement for the plant has to be provided as per I.E Rules. As per amended CMR, restricted earthed neutral system has been envisaged for the said installations. An earthing grid shall have to be developed around the periphery of 6.6 kV substations as well as along the CHP. In addition all the motors will be earthed through the armoring of the connecting cable.

The control scheme of CHP along with sequencing shall be done through dual redundant hot standby microprocessor based programmable logic controller (PLC) suitable for industrial control system. The communication system, pressurization system, CCTV etc. systems shall also be proposed for this CHP.

Chapter - 8

INFRASTRUCTURE FACILITIES PROPOSAL AND THEIR LOCATION

8.1 INTRODUCTION

The PR of Kulda Expansion OCP is planned to handle the total production of 15.0 Mty and the same will be enhanced up to 21.0 Mty.

Presently coal and OB are being extracted by outsourcing agencies as per approved project report. No departmental HEMM will be deployed as per approved report except some auxiliary equipment. Hence, the HEMM workshop has not been envisaged for this variant. There is a provision of small E&M workshop and store.

HEMM workshop will be constructed & maintained by outsourcing agency as per their requirement.

8.2 POWER SUPPLY

Main power supply is from 220KV Main sub-station at Garjanbahal which was charged in October 2012. Power is transmitted to 2x5 MVA, 33/6.6 KV substation near existing mine.

8.3 EXISTING INFRASTRUCTURE

- Construction of several residential quarters are under progress
- Office buildings at Kulda are existing.
- Two feeder breakers are existing
- Sardega siding /RLS

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Chapter - 9

LAND REQUIREMENT AND SURFACE REORGANISATION

9.1 LAND REQUIREMENT

9.1.1 EXISTING APPROVAL OF LAND

Existing approved land requirement for Kulda OCP,(21Mty) Revision-3 under various heads are as given below. In present MP&MCP (Revision-4), it is proposed to enhance the area by keeping the capacity same as 21 Mty.

APPROVED LAND OF KULDA OCP (21 MTY), REVISION-3

Sl. No.	Particulars	Land in ha		
		Forest	Non-forest	Total
A.	**MINE LEASE AREA**			
1	Exacvation Area	187.155	134.755	**321.910**
2	OB dump Area	4.120	156.382	**160.502**
3	Infrastructure	21.837	104.320	**126.157**
4	Embankment	10.408	7.151	**17.559**
5	Other area incl safety zone & Road/Nallah Diversion	4.370	3.707	**8.077**
	Total Mine Lease Area	**227.89**	**406.315**	**634.205**
B.	**OUTSIDE MINE LEASE AREA**			
1	Residential colony	0	37.5	37.5
2	Rehabilitation site	0	22.9	22.9
	Total Outside Mine Lease Area	**0**	**60.4**	**60.4**
	Total Project area	**227.89**	**466.715**	**694.605**

9.1.2 INCREMENTAL LAND REQUIREMENT

Incremental land requirement over and above existing approved mining plan (Revision - 3) is given below:

INCREMENTAL LAND REQUIRED FOR KULDA EXPN OCP 21 MTY, REVISION-4

Particulars	Land in ha		
	Forest	Non-forest	Total
MINE LEASE AREA			
Quarry excavation area	110.92	107.15	218.07
Infrastructure including Safety zone (7.5m around mine boundary) and Embankment	9.84	49.28	59.12
External OB dump	13.93	4.5	18.43
Total mine lease area required	**134.69**	**160.93**	**295.62**
OUTSIDE MINE LEASE AREA			
Residential colony	0	0	0
Rehabilitation site	0	0	0
Total Outside Mine Lease Area	**0**	**0**	**0**
Total Project area	**134.69**	**160.93**	**295.62**

9.1.3 TOTAL LAND REQUIREMENT

Total land requirement is summation of approved land of Kulda OCP 21 Mty, Revision-3 and incremental land requirement for Kulda Expansion OCP 21 Mty. An area of 8.52 ha of forest land is being re-diverted from already diverted forest area of 227.89 ha for Kulda OCP for construction of Basundhara Coal washery (10 Mty). Hence, 8.52 ha has been subtracted from infrastructure area of this mining plan.

As per present mining plan of the block, total mine lease area is 921.305 Ha which excludes 60.4 Ha for colony and R&R. OB dumps will require about 178.932 ha of land. Land required for Infrastructures, Safety zone (7.5m around mine boundary) and embankments against water courses and road, nallah diversion is 202.393 ha. Land for Rehabilitation site will be about 22.90 ha. Tentative infrastructures and other complexes have been located avoiding as far as possible forest land. Total land requirement is 981.705 ha (Ref GEN-VII).

		APPROVED LAND OF KULDA OCP 21 MTY, REVISION-3			INCREMENTAL LAND REQUIRED FOR KULDA EXPN OCP, 21 MTY			APPROVED LAND OF KULDA OCP 21 MTY, (REVISION-3) + INCREMENTAL LAND REQUIRED FOR KULDA EXPN OCP, 21 MTY			TOTAL LAND AS PER MP&,MCP OF KULDA EXPANSION OCP (REVISION-4) = APPROVED LAND OF KULDA OCP 21 MTY(REVISION-3) + INCREMENTAL LAND REQUIRED FOR KULDA EXPN OCP 21 MTY - 8.52 HA REDIVERTED FOREST LAND FROM INFRASTRUCTURE AREA OF KULDA		
		A			B			A + B			(A + B) - 8.52		
Sl. No.	Particulars	Land in ha			Land in ha			Land in ha			Land in ha		
		Forest	Non-forest	Total	Forest	Non-forest	Total	Forest	Non-forest	Total	Forest	Non-forest	Total
A.	**MINE LEASE AREA**												
1	Quarry excavation area	187.16	134.755	321.91	110.92	107.15	218.07	298.075	241.905	539.98	298.075	241.905	539.98
2	Infrastructure including Safety zone (7.5m around mine boundary),road/nallah diversion, Embankment.	36.615	115.178	151.793	9.84	49.28	59.12	46.455	164.458	210.913	(46.455-8.52) =37.935	164.458	202.393
3	External OB dump	4.12	156.382	160.502	13.93	4.5	18.43	18.05	160.882	178.932	18.05	160.882	178.932
	Total Mine Lease area required	**227.89**	**406.315**	**634.205**	**134.69**	**160.93**	**295.62**	**362.58**	**567.245**	**929.825**	**354.06**	**567.245**	**921.305**
B.	**OUTSIDE M.L AREA**												
1	Residential colony	0	37.5	37.5	0	0	0	0	37.5	37.5	0	37.5	37.5
2	Rehabilitation site	0	22.9	22.9	0	0	0	0	22.9	22.9	0	22.9	22.9
	Total Outside Mine Lease Area	**0**	**60.4**	**60.4**	**0**	**0**	**0**	0	60.4	**60.4**	0	60.4	**60.4**
	Total Project area	**227.89**	**466.715**	**694.605**	**134.69**	**160.93**	**295.62**	**362.58**	**627.645**	**990.225**	**354.06**	**627.645**	**981.705**

TOTAL LAND REQUIRED FOR KULDA EXPN OCP (21 MTY)
(REVISION-4)

Particulars	Land in ha		
	Forest	Non-forest	Total
MINE LEASE AREA			
Quarry excavation area	298.075	241.905	539.98
Infrastructure including Safety zone (7.5m around mine boundary),road/nallah diversion, Embankment.**	37.935	164.458	202.393
External OB dump	18.05	160.882	178.932
Total Mining Lease Area required (A)	**354.06**	**567.245**	**921.305**
OUTSIDE MINE LEASE AREA			
Residential colony	0	37.5	37.5
Rehabilitation site	0	22.9	22.9
Total Outside Mine Lease Area (B)	0	60.4	**60.4**
Total Project area (A+B)	**354.06**	**627.645**	**981.705**

**** 8.52 ha forest land re-diverted from existing Kulda OCP to Basundhara washery. Hence, 8.52 ha has been subtracted from infrastructure area of this Mining Plan.**

Data Source: MCL vide Letter No.: MCL/GM/BA/E5-43/2019-20/386 DTD 09.12.2019 , Annexure-VIII.

9.2 VILLAGES AFFECTED

The incremental land (295.62 ha) comprises of villages & Reserve Forest, namely Kulda, Bankibahal, Balinga, Tumulia, Siarmal, and Lalma RF. Out of these only habitats of Kulda, Bankibaahal, Balinga, and Siarmal(Partly) falls in core zone. Tenancy land under village Balinga and Bankibahal area mostly under possession.

9.3 PROPOSED SURFACE REORGANISATION

a) Infrastructural facility and dumps have been located as far as possible within the 300 m Blasting Danger zone of the mining excavation.

Surface master plan is given in Plates No. Gen-VI.

b) A proper resettlement and rehabilitation (R&R) plan is to be drawn up in consultation with the state govt. and project affected persons (PAPs) taking into consideration the existing norms of State/Central Govt.

c) Suitable provision for compensatory afforestation, arboriculture and technical as well as biological reclamation have been made as per latest guidelines of EAC. Govt. land shall be chosen for compensatory afforestation and resettlement of PAPs.

d) It has been proposed to straighten Chattajhor nallah for convenience of mine operation. Adequate precaution shall however, be taken at the four diversion points so that water in-rush through old river-course to the mine workings does not take place.

e) In rainy season, water from the mining area flows down to Chattajhor nallah and Basundhara river by means of small streams. Mining operation will disrupt the existing drainage system. Garland drains around the periphery have therefore been provided.

f) Possible overflow of water during rainy season, from Chattajhor nallah and Basundhara river to mine workings will be guarded against by formation of embankment alongside the water courses.

Height of embankment shall be kept at least 1.5 meter above HFL. The width at top of the embankment will be 20m with slopes on both sides. The slope facing nallah will be stone pitched. Provision has been made for this in the PR.

g) Diversion of Raigarh-Sundergarh state highway crossing through the mining area is completed. Alternative diversion road has been provided on the top of the embankment provided against Basundhara river and Chattajhor nallah.

h) Besides above, road and power supply lines adjoining villages will also undergo reorganization.

Chapter - 10

ENVIRONMENTAL MANAGEMENT

10.1 GENERAL

Kulda geological block is located in the north-western part of Ib valley coalfield in Sundergarh district in the state of Odisha. It is situated between latitudes 22°01'02" to 22°03'03" North and longitudes 83°43'28" to 83°45'35" East (refer plate no. Gen-I & Gen-II).

The block boundary is defined by the following:

North	-	Basundhara River
West	-	Chattajhor nallah, tributary of Basundhara River.
East	-	Metamorphic exposure.
South & South east	-	Line joining boreholes CMHG-103,129,123, 139 & 138 & adjacent Garjanbahal block.

The area of the block under consideration is 5.84 sq.km., out of which coal bearing area is 5.30 sq.km.

10.2 PROJECT PROFILE

The mineable reserve is 218.627 Mt with corresponding overburden of 243.006 Mcum. The production capacity is 21.0 Mty total. The balance life of the mine is 11 years.

10.3 CLIMATE

The area experiences a sub-tropical warm temperature. About 80% of rainfall occurs during rainy season i.e. June to Sept. The highest rainfall occurred in the month of August,2020 is 146.4 mm and a mean rainfall of 6.1mm as measured at IMD Jharsuguda. The temperature varies from 8.4°C to 44.2°C for the year 2020. The predominant wind direction is SW to NE.

10.4 ENVIRONMENTAL IMPACT & MANAGEMENT

10.4.1 IMPACT ON AIR QUALITY AND ITS MANAGEMENT

The mining and its related activities will cause ambient air pollution. The ambient air will be polluted due to presence of SPM, PM_{10}, $PM_{2.5}$, SO_2 & NO_x which will be generated due to various activities related to the project. The concentration of pollutants will vary depending upon micro-meteorological parameters of area.

Appropriate air pollution control measures have been taken so that the ambient air quality is maintained within stipulated standards. Both preventive and suppressive measures which have been taken are elaborated below:

- **DRILLING OPERATION**

- Presently All the drills have wet-drilling arrangements along with the NVE extractors. The same arrangement will continue.
- Coal production has been done by Surface Miners and the same will continue.
- Proper maintenance and handlings of drilling units are getting done.

- **BLASTING OPERATION**

Blasting is to be done in a proper way to minimize the generation of fugitive dust. Proper burden/spacing of blast holes are to be maintained.

- **LOADING AND TRANSPORT**

* The haul roads are to be sprayed regularly with water.
* All service roads are to be blacktopped.
* Provision of greenbelts around the quarry, industrial area, service building area and colony site are to be made.

➢ **COAL HANDLING PLANT (CHP)**

* Provision of covers on the conveyor belts, unloading/transfer points to prevent access of wind.
* Existing CHP has been provided with dust suppression system, 48 numbers of Fixed water sprinklers (Foggers) have been installed in 400T CHP Circuit and an additional of six fixed sprinklers (Rain Gun) in CHP ramp & 8 Nos. in CHP site have been installed.
* Suppression of coal dust at transfer points and at other points in the coal flow circuit by provision of water jets and mist formation system.
* At railway siding coal will be loaded to wagons by SILO and proper dust control measures has been provided at all transfer points.
* Minimization of the height of coal-fall at transfer points to reduce the dust generation and if necessary, provision of dust suppression measures.
* Improved maintenance of plant and machinery including provision of condition monitoring instruments like vibration meter, etc.

➢ **FIRE AT COAL FACES & COAL STOCKYARDS**

* Provision of adequate firefighting arrangements including storage of sufficient quantity of water at all critical points.
* Semi-consolidated coal stack of height not more than 8m with strict supervision.
* Careful removal of all loose coal from the abandoned coal faces.

10.4.2 IMPACT ON WATER QUALITY AND ITS MANAGEMENT

The likely sources of water pollution from this project are as follows:

* Sanitary (Domestic) wastewater.
* Industrial wastewater from workshop.
* Mine discharge water.
* Surface run-off passing through coal stockpiles and OB dump.

* Storm water from leasehold and built-up areas.

The impact of mining at this project on both surface water source and ground water resource has been assessed as follows:

➢ **SURFACE WATER SOURCES**

* Disruption of natural drainage pattern in the core zone.
* Deterioration of water quality & pollution of water bodies.
* Siltation and choking of water courses causing scarcity of surface water and flooding problem in the area.

➢ **GROUND WATER RESOURCE**

* Due to excavation, ground water aquifers are disrupted.
* Due to pumping of mine water, the water table of the region may get lowered.

Effective water pollution control measures will be taken for this project. The water pollution control measures to be adopted are:

* A sedimentation pond constructed near CHP and is being maintained as per standards. An ETP has also been constructed during 2014-15 and is in working condition.
* Oil and grease traps construction work is completed which is then channeled to settling pond for further treatment.
* The domestic wastewater will be treated for bio-chemical oxygen demand (BOD) and total suspended solids (TSS) through STP.
* Garland drains with settling tanks for surface run-off.

10.4.3 NOISE ABATEMENT AND BLASTING VIBRATION CONTROL

(a) NOISE POLLUTION ABATEMENT MEASURES

The adverse effect of high noise level like health effect (both auditory and non- auditory), masking effect, sleep interference, change in personal behaviour, etc. are well known.

The following abatement measures (suppressive and preventive) are to be adopted:

* Proper designing of plant & machinery by providing inbuilt mechanism like silencers, mufflers and enclosures for noise generating parts and shock absorbing pads at the foundation of vibrating equipment.
* Greenbelts around infrastructure site, service building area and township.
* Adoption of personal protective devices like earplugs, etc.

(b) **BLASTING VIBRATION CONTROL MEASURES**

* Proper quantity of explosive, suitable stemming materials and appropriate delay system are to be adopted for safe blasting.
* A safe blasting zone are kept around the periphery of the quarry.

10.4.4 FLORA & FAUNA

Safety zone plantation is already completed. Arboriculture and avenue plantation is being done along haul road and Coal transportation road. Further plantation will be carried out in the infrastructure and colony area.

10.4.5 SOCIO-ECONOMIC IMPACTS

The mine will have beneficial impact on socio-economic front by providing direct employment to the local people. The project will further boost the economy of the area and provide secondary and tertiary employment to the local people. There will be a positive change in the social infrastructure facilities of the area also.

10.4.6 LAND RESOURCE MANAGEMENT

The most significant adverse impact of opencast coal mining is the change in land use pattern. So reclamation of mined out land will be given due importance as a step for sound land resource management.

For backfilling and technical reclamation, required number of dozers and graders has been provided. After technical reclamation, the area will be further biologically reclaimed. (Ref MIN-VI for Final mine closure plan).

10.4.7 RESETTLEMENT AND REHABILITATION

This is a running mine and the R&R is already in advance stage. The R&R is being carried out under the direction of “Claims Commission” set up by Hon’ble Supreme Court for the purpose. Resettlement colony has been provided in Barapalli-I with all infrastructure facilities like roads, dug wells, tube wells, playground, schools, community center, dispensary, shopping center, etc.

10.5 ENVIRONMENTAL MANAGEMENT SYSTEM

The success of environmental management depends on deep involvement of personnel at all levels and also on the creation of an effective implementation organisation. To carry out various pollution control measures and compliance of statutory regulations of existing project, project level environmental organisation has already been established. The manpower required for the project for environmental management has been provided.

Chapter – 11

MINE CLOSURE PLANNING

11.1 INTRODUCTION

Mining Plan/Mine Closure Plan of Kulda Expansion OCP (21 Mty), Revision-3 was approved by MCL Board ref no: MCL/SBP/CS/BD-248/Exct/2022/12600 dated 20/22.06.2022.

- All coal mines shall adopt Mine Closure Plan comprising progressive closure plan and final closure plan duly approved by the competent authority as per circular No.55011-01-2009-CPAM, Govt. of India, Ministry of Coal, dated 27th August, 2009 and subsequent updation latest dated 07.01.2013.
- Coal projects who has been accorded approval of Mining Plan / Project Report without mine closure plan are required to prepare and obtained the approval of Mine closure plan within a period of 1 year as per the circular.

❖ OBJECTIVES OF MINE CLOSURE PLANNING

- To allow a productive and sustainable after-use of the site which is acceptable to the mine owner and the regulatory authority;
- To protect public health and safety;
- To alleviate or eliminate environmental damage and thereby encourage environmental sustainability;
- To minimize adverse socio-economic impacts.

❖ VARIOUS ASPECTS OF MINE CLOSURE PLANNING

The mine closure planning broadly involves the following aspects:

(a) Technical aspects;
(b) Environmental aspects;
(c) Social aspects;
(d) Safety aspects;
(e) Financial aspects.

❖ OBLIGATION/LEGISLATION

Environmental clearance of development projects including mining is done by government with the following objective:

"Optimal utilization of finite natural resources through use of better technology & management package and increasing suitable remedial measures".

The policy statement of pollution issued by MoEF, Govt. of India in 1992, provides an instrument in the form of legislation and regulation, fiscal incentives, educational programme, etc. The establishment and functioning of any industry including mining will be governed by the following environmental acts/regulation:

There is a need to define the liabilities, responsibilities and authorities of the mine management, other regulatory bodies, Central and State Governments after mine closure. Some obligations relating to the mine management are as follows:

(a) **Health & Safety**: Regulation Nos. 6, 61, 106, 112 of Coal Mines Regulations, 1957 and its related DGMS Circulars;

(b) **Environment**

(i) Water (Prevention & Control of Pollution) Act, 1974;
(ii) Air (Prevention & Control of Pollution) Act, 1981;
(iii) Environmental (Protection) Act, 1986 and Environmental Protection (Amendment) Rule, 2000;
(iv) DGMS Directives on Noise & Ground Vibration;

(v) Water (Prevention & Control of Pollution) ; cess Act 1977 as amended (watr cess Act)

(vi) Wild life protection Act, 1972

(c) **Forest**

Forest (Conservation) Act, 1980.

(d) **Rehabilitation**

CIL's Policy and Orissa State Govt. Policy. Latest Policy / Norms of Govt. of Orissa is followed for this project.

11.1.1 TYPES OF MINE CLOSURE PLAN

There are two types of mine closure plan :

- Progressive mine closure plan
- Final mine closure plan

PROGRESSIVE MINE CLOSURE PLAN

This is a progressive plan for the purpose of providing protective reclamation and rehabilitation measures in a mine or part there of.

FINAL MINE CLOSURE PLAN

This plan means for the purpose of decommissioning rehabilitation and reclamation in the mine or part there of after cessation of mining and its related activities that has been prepared in the manner to address all environmental aspects taking into consideration.

The final mine closure activities would start towards the end of mine life, and may continue even after the reserves are exhausted and / or mining is discontinued till the mining area is restored to an acceptable level to create a self sustained ecosystem.

11.1.2 TECHNICAL ASPECT

- **REASON FOR CLOSURE**

i) Coal will be exhausted during the mine life.
ii) All overburden removed will either be backfilled or will be dumped externally.

- **MINING METHOD**

- Shovel dumper system for overburden removal.
- Surface miner and Payloader for coal extraction.

11.1.3 CLOSURE PLAN PREPARATION

Closure planning is a life time of mine exercise that begins with the commencement of mining operations and continues till post closure. The dynamic nature of closure planning requires regular and critical review to reflect changing cicumstances as a result of any operational change, new regulation, new technology and remain flexible enough to cope with unexpected events.

The final mine closure plan will be submitted to Ministry of Coal for approval at least five years before the intended final closure of the mine The final mine closure plan consists of cost estimates and time bound schedules for various mine closure activities and details of the escrow account.

11.2 MINE DESCRIPTION

11.2.1 PHYSIOGRAPHY & DRAINAGE OF THE AREA

Details are furnished in Chapter – 3.

11.2.2 GEIOLOGY

The geological details of the block are based on 14858.35 metres of drilling in 130 boreholes over 5.84 Sq.km. The borehole density is 22.3 boreholes/sq.km.

Details are furnished in Chapter-4.

11.2.3 MINING

Details are furnished in chapter-5

11.2.4 COAL HANDLING & DESPATCH

Details are furnished in Chapter-7.

11.3 PROGRESSIVE MINE CLOSURE

Mine closure operation is a continuous series of activities starting from day one of the initiation of mining project. Therefore, progressive mine closure plan will be a continuous process throughout the life of mine which will be reviewed periodically. This includes various land reclamation activities to be done continuously and sequentially during the entire life of the mine. This is a life time of mine process which starts from of commencement of mining operations and leads to the final closure of the mine.

11.3.1 ACTIVITIES OF PROGRESSIVE MINE CLOSURE PLAN

- **OB DUMP RECLAMATION**
  - Handling & dozing of OB dumps & backfilling
  - Technical and Bio-reclamation including plantation
- Landscaping of the open space in leasehold area for improving its esthetics an eco value
- Grass carpeting/ Plantation around the quarry area and in safety zone
- Grass carpeting/ Plantation over the external OB Dump
- Entrepreneurship Development (Vocational/skill development training for sustainable income of affected people
- Miscellaneous and other mitigative measures

Progressively mine will be advanced with increase in depth and excavation area. Mine stage plans are included in this report showing status of excavation and backfilling. Part of this excavation area will be backfilled and grass carpeted. Similarly all the activities associated with this backfilling like levelling, compaction, spreading of top soil and grass carpeting and maintaining the same throughout the mine life should be properly monitored. A suitable action plan and activity implementation schedule should be formed by company to

implement and monitor the same. Provision of fund can be utilized from mine closure fund which will be returned to company from time to time. Rehabilitation of displaced manpower, training for them who are eligible for employment should also be carried out as per schedule.

Total mine lease area is 921.305 Ha (Total Project area is 981.705 Ha inclusive of 60.4 Ha of land for R&R site and colony). Presently internal dumping has been started, external dumping is also continued. In future years more internal dumping space will be generated and major part of overburden will be backfilled. The bacfilled area of the quarry & external dump will be technically and biologically reclaimed and grass plantation will be done on this reclaimed area.

Land Degradation and Technical Reclamation (Cumulative Area in "Ha")

Stage/ Year		Land Degraded (ha)				Technically Reclaimed Area (ha)			
		Excv.	Dump (Extn + Top soil)	Infra/ others	Total	Backfill	Dump (Extn + Top soil)	Others	Total
		(A)	(B)	(C)	(D=A+B+C)	(E)	(F)	(G)	(H=E+F+G)
Upto Base year (31.3.22)*		291.00	88.96	151.793	531.753	172.55	88.96	20.00	281.51
Y-1	22-23	313.63	106.96	177.093	597.683	193.55	106.96	25	325.51
Y-3	24-25	358.89	142.96	202.393	704.243	235.55	142.96	30	408.51
Y-5	26-27	404.15	178.932	202.393	785.475	277.55	178.932	40	496.482
Y-11	32-33	539.98	178.932	202.393	921.305	393.94	178.932	60.72	633.592
Post Closure									
Y-14	35-36	539.98	178.932	202.393	921.305	539.98	178.932	202.393	921.305

* Data taken from Approved MP&MCP OF KULDA OCP, 21 Mty, without Lalma RF.

11.3.2 MANAGEMENT OF WASTES

- **NON-TOXIC SOLID WASTE**

Kulda OCP will have a life of 11 years. The total overburden generated at the end of mine is 329.89 Mcum.

Waste Management

(All Figures are Cumulative and in MM^3)

		OB Removal (Cumulative)			External Dump (Cumulative)		Internal Backfilling (Cumulative)		Embankment (Cumulative)	
		Top soil	OB	Total	Top soil	OB	Top soil	OB	Top soil	OB
		(A)	(B)	(C=A+B)	(D)	(E)	(F)	(G)	(H)	(I)
Upto Base Year(31.3.2022)		0.83	86.05	86.88	0.27	38.06	0.09	47.33		1.11
Y-1	**22-23**	0.9	109.5	110.4	0.32	44.94	0.18	62.08		1.11
Y-3	**24-25**	1.05	156.81	157.86	0.42	58.73	0.36	95.8		1.11
Y-5	**26-27**	1.19	204.55	205.74	0.52	72.48	0.54	131.63		1.11
Y-11	**32-33**	1.62	328.27	329.89	0.52	72.48	1.1	254.68		1.11

Note: (Column C= D+E+F+G+H+I)

Backfilled area will be technically & biologically reclaimed. Backfilled area will be reclaimed with endemic species and mixed culture.

- **TOXIC WASTE**

Toxic wastes like used oil, used batteries, oily sludge, besides filter and filter materials containing oil during maintenance of vehicles will be generated from this project.

Used oil will be stored in drums safely in store either for disposal through auction to the authorized reprocessors or for use as lubricant in UG mines. Used batteries will be stored safely for auction to the authorized reprocessors. As regards oily sludge besides filter and filter materials, the same will be disposed off in impervious layer lined pits without causing environmental hazards.

11.3.3 TOP SOIL MANAGEMENT

Topsoil shall be progressively and concurrently utilized during physical/ technical reclamation of ext. OB dumps and backfilled area, thus obviating the necessity of storage of topsoil separately. However, during initial years, topsoil will be stored temporarily with proper preservation measures for utilization during technical reclamation of external OB dump areas and backfilled areas.

Depth of top soil depends on following:

i) Physiography.
ii) Climatic conditions like temperature, rainfall etc.
iii) The uses to which the land has been put before.

In a mining block it is necessary to have a close soil survey to determine its depth. From the soil analysis available the approximate depth of the topsoil of various mining blocks of Ib Valley Coalfield varies from 200-300 mm.

11.3.3.1 **STORAGE AND PRESERVATION OF TOPSOIL**

(A) Topsoil undergo many changes during preservation. These are changes in topsoil due to storage.

i) Stockpiling has profound affects on the physicochemical and biological properties.
ii) Biological activity deteriorates after 3 to 6 months of storage.
iii) Stockpiling reduces organic content and affects the organic compound on cerned in soil aggravation.
iv) Aggregate stability is reduced to some extent due to storage.
v) Following three zones are developed in the topsoil mound during storage:
   - Aerobic zones: Soil is active in this zone
   - Transition zone: Fluctuates between predominantly aerobic and anaerobic status.
   - This zone is inactive and low in biological activity as well as organic content.

(B) Methology of Stripping: The method of stripping should be normally by the scrappers/ small excavators only. The routing of scrappers/excavators during this operation must be planned to mininmise the travel of machines to avoid compaction and damage of soil structure. Further careful control of operation is necessary to ensure

planned stripping depths of the topsoil and sub-soil. These soils should be stripped and stored separately. Intermingling of these soils during stripping must be avoided.

(C) It is essential that topsoil stripping should be carried out when it is dry as far as possible to reduce the risk of compaction and damage to the soil structure by smearing and remoulding. Prolonged rainfall is unsuitable. The best part of the year is when evapo-transportation exceeds precipitation i.e during the months of March-September.

(D) Geometry of Topsoil Heap: The heap should be constructed to facilitate the following:

- To provide the maximum surface area for mantaining greater level of Biological activity.
- To have slopes capable of sustaining vegetation to avoid erosion and gully formation.

Space constraints imposed by the site factors and soil texture would generally dictate the overll size and shape of the heap.

As a rule of the thumb, the following stack geometry may be mantained as far as possible to preserve the topsoil and increase the shelf life.

a) Height:

i) 4.0m (Max) for sand soil

ii) 2.0 to 3.0 for loamy soil

iii) 1.0 for heavy clayey soil

iv) 0.5 to 1.0 for intermediate soil texture.

b) Slope:

Wide slope of 1 in 3 (i.e 18.50 degree to the horizontal)

If there is constraint in the availability of area, one or both of the following strategies can be adopted:

ALT-I

An acoustic barrier of topsoil may be constructed in the safety zone near the working face. When the working face advances, the embankment away from it may be reclaimed and respread over the subsoil of the technically reclaimed area. This would abate the noise pollution besides preservation of topsoil and reduction of the demand on the land requirement.

ALT-II

Initial topsoil may be spread over the area to be mined. When the scope for progressive reclaimation is available, the respread topsoil along with the insitu one may be stripped carefully and utilised. This method would also preserve the topsoil and reduce the demand on landintake.

a) It is advisable to avoid the topsoil storage, specifically the longterm one. However if storage is unavoidable upon completion of the surface of the heap, the following steps are to be followed to keep the soil in good health and to increase its shelf life :
b) Surface ripping with suitable sub-soiling machine for the purpose of aeration and relieving surface compaction.
c) Immediate cultivation of suitable low maintanance species like dwarf grasses to prevent erosion and guily formation.
d) Maintenance of surface vegetation actively by seeding, mowing, and weed control operation.

11.3.3.2 **TOPSOIL CARPETING**

The following golden rules need to be observed:

i) Overburden, sub-soil and topsoil should be respread to correct sequence putting the topsoil on the top of the back filled area.

ii) Top soil should be respread over the restoration area at an even depth so as to achieve the final level and suitable configuration for drainage.

iii) As far as possible progressive top soil reclaimation technique should be practised. The topsoil from the area lying just ahead of the advancing

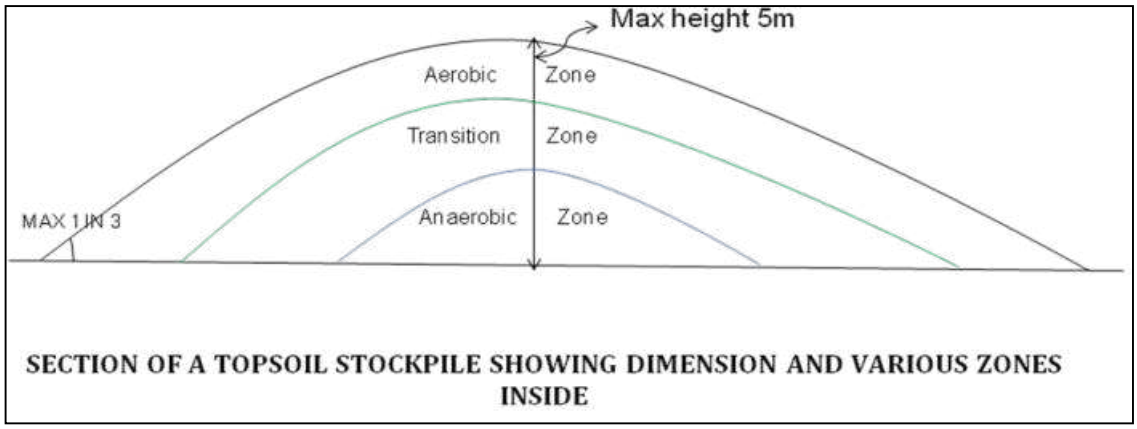
opencast mine edge should be scrapped off by scrapper and immediately placed over the technically reclaimed area.

iv) Compaction of topsoil after respreading over reclaimed area should be avoided by properly planning the movement of Earth Moving Machinery and carrying out the operation in dry period only.

v) If topsoil is to be reclaimed from the heap for spread in the backfilled area and OB dump area, the reclaimation should be planned in such a way that materials from aerobic, transition and anaerobic zones are taken simultaneously. The above zones should not be taken out separately as it is essential to use the active surface layer as 'inoculum' during soil respreading to recover the inactive portion of the mound as quickly as possible.

vi) Revegetated topsoil dumps with legumas (Stylosanthus) and grasses, which not only protect the stockpiles from wind and water erosion, but also maintain active soil micribes population and help restoring the nutrient cycling.

vii) Mulching: If possible, after the application of topsoil, a layer of mulch(2-3" or 5-8 cm thick) may apply to cover topsoil and provides organic matter initially. The mulch layer will prevent soil to dry out and crusted, reduce evaporation, ameliorate extreme temperature, prevent erosion and creates congenial microhabitat for soil biological community.



SECTION OF A TOPSOIL STOCKPILE SHOWING DIMENSION AND VARIOUS ZONES INSIDE

DETAILS OF TOP SOIL REMOVAL & USE

Year/ Stage	Top Soil Removal (Cumulative) "in MCum"	Spreading Over Embank-ment	Spreading over the backfilled area	Spreading over External OB dump area	Total utilised Topsoil	Temp. Topspoil storage
Upto 31.3.2022	0.83		0.09	0.27	0.36	0.47
Upto Yr-1	0.9		0.18	0.32	0.50	0.40
Upto Yr-3	1.05		0.36	0.42	0.78	0.27
Upto Yr-5	1.19		0.54	0.52	1.06	0.13
Upto Yr-11	1.62		1.1	0.52	1.62	0

The above figures are tentative and derived after calculations based on working plan provided by project authorities and stage plans. Actual figures may vary as per ground realities and requirement.

11.3.4 MANAGEMENT OF AIR QUALITY

Details of existing air quality controls measures are described in chapter-10 which are summarized below:

DETAILS OF CONTROL MEASURES

- Dust extraction in drill machines
- Fixed water sprinklers at CHP, haul road
- Mist spraying in feeder breakers at CHP.
- Mobile water sprinkler for haul roads, transportation roads
- Black topping roads, colony roads, approach road to service buildings and to projects
- Greenbelt cover development

11.3.5 WATER QUALITY MANAGEMENT

Detailed water quality management are described in chapter-10 which are summarized below:

DRAINAGE ARRANGEMENT FOR EXTERNAL OB DUMP

- **CATCH DRAIN**

An open drain of appropriate size is provided on all terraces at the foot of next bench to receive the storm water from upper benches. This is then discharge to the lower benches through masonry chute, thus minimizing gully formation in the slope of external dump.

- **FOOT DRAIN**

A foot drain of proper size is provided around the external OB dump (portion exposed to outside only). This drain collects run-off from dump and direct it to settling tank/sedimentation pond before discharge to nearby natural watercourses.

DRAINAGE ARRANGEMENT FOR INTERNAL OB DUMP

- During working stage, the run-off is collected from internal dump by foot drain for diverting to mine sump for pumping.
- In the post-mining period, the drainage pattern of the reclaimed area will be such that the run-off will be diverted to final void of the quarry as a measure for water harvesting.

MEASURES FOR CONTROL OF POLLUTION (DETAILS FOR POLLUTION CONTROL ARRANGEMENT)

The details of water pollution control measures are described in chapter-10.

11.3.6 DIFFERENT ACTIVITIES TO BE MONITORED DURING PROGRESSIVE MINE CLOSURE

Major activities for the project during mine closure should be decided in detail by project auyhority, some of these activities are described below:

- Backfilling

- Levelling
- Land scaping
- Spreading of top soil
- Biological reclamation
- Grass carpeting/ tree plantation (if the dumps are rehandled during mine closure the same should be grass carpetted instead of bigger size tree plantation)
- Fencing, supervision of the reclaimed area
- Rehabilitation of displaced families, skill development programme for elligible persons.

11.4 FINAL MINE CLOSURE

11.4.1 MANAGEMENT OF WASTE

At the end of mine life, major part of the excavation area will be backfilled and biologically reclaimed. Post mining land use pattern is given below:

Post-mining land use (at the end of mining activity)							
Sl. No.	Category	Land use (in ha)					
		Plantation/ grass carpeting	Water body	Dip side slope & haul road	Undis-turbed	Pubic/ Company use	Total
1	Excavation	393.94	15.76	130.28			539.98
2	Infrastructure including Safety zone (7.5m around mine boundary) and Embankment	60.718			16.191	125.484	202.393
3	External OB dump	178.932					178.932
Total		**633.59**	**15.76**	**130.28**	**16.191**	**125.484**	**921.305**

After end of mining activity there can be two situations.

Option 1: Mine will be integrated with Garjanbahal OCP and will extend towards dip side, which is coal bearing, so internal dumping will be continued.

Option 2: Mine will be closed at this stage, so all the external dumps and the internal dumps of the proposed mine which are above ground level will be rehandled back to the available voids of the mine. There will be no external dump after mine closure.

Biological Reclamation **(Cumulative in "Ha")**

Stage/ Year		Biologically Reclaimed Area						Undisturbed/ to be left for public/com use	Total
		Agri-culture	Plantation /Grass carpetting	Water Body	Public/ Company Use	Forest land (Return)	Total		
Upto Base Year (31.03.2022)			281.51				281.51		
Y-1	22-23		302.91				302.91		
Y-3	24-25		345.71				345.71		
Y-5	26-27		388.51				388.51		
Y-11	32-33		516.95				516.95		
Post Closure									
Y-14	35-36		**633.59**	**15.76**	**125.484**	**130.28**	**905.114**	**16.191**	**921.305**

Out of additional area of 60.4 Ha(for colony, R&R), 12 Ha will be covered with plantation & remaining 48.4 Ha will be for public/company use.

11.4.2 UNDERGROUND WATER/QUARRY WATER MANAGEMENT AFTER CLOSURE (SPECIFY ITS USAGE LIKE DOMESTIC WATER SUPPLY, IRRIGATION, PISCICULTURE OR STABILIZING THE GROUND WATER REGIME)

Maximum effort are being made and will be made to recycle or reuse the treated effluents totally to the extent possible by keeping the make of water in different sumps or low lying areas of the mine. The final voids of the quarries will be left as a water reservoir for **water harvesting** and also recharging the aquifer in the surrounding area which will serve following purposes :

- Source of supply of water for industrial and fire fighting purposes of near by mines.
- Source of supply of potable water after necessary treatment.
- Pisciculture.
- For recharging the aquifer in the area.

In the post-mining period, the drainage pattern of the reclaimed area will be such that the run-off will be diverted to final void of the quarry which will be developed as a water reservoir for **water harvesting** and also recharging the aquifer in the surrounding area.

All these activities will have to be continued till the area will be mined again for extraction of lower seams.

11.4.3 WATER QUALITY MONITORING FOR THREE YEARS AFTER CLOSURE THE SAMPLING STATIONS SHALL BE ONE NO. MINE WATER WITH FORTNIGHTLY FREQUENCY AND TWO NUMBERS GROUND WATER SAMPLES IN CORE AND BUFFER ZONE WITH MONTHLY FREQUENCY

At present water samples covering surface water, ground water and effluent are being analysed in the core and buffer zones of the project. Out of the above, three sample points will be utilized for Water quality monitoring for three years after closure of the mine.

11.4.4 DETAILS OF SURFACE STRUCTURES PROPOSED FOR DISMANTLING

All equipment and buildings erected on site for the mining operation should be dismantled and removed as part of the reclamation process, unless they form part of the future land use infrastructure

BUILDINGS/ ADMINISTRATION OFFICES

Buildings shall be constructed to last depending on the anticipated life of the mine operation. Buildings for short term use should preferably be prefabricated structures that can be easily dismantled at the time of closure and reclamation. Such structures should be totally removed from the site and may be disposed of at an approved facility or reused elsewhere. Foundations comprised of concrete should be broken up, buried or removed in accordance with applicable waste management regulations.

WEIGHBRIDGE

Fixed equipment and structures such as weigh scales may also have concrete pads or footings and these should be broken up, buried on site or removed in accordance with applicable waste management regulations.

SUB STATIONS/POWER LINES

All power lines, cables, towers and guy wires should be removed as well as any concrete footings or slabs where appropriate. If access roads were necessary for construction or decommissioning of power lines, they should be ripped and revegetated.

ROADS

Access and on-site roads should be properly designed and constructed as part of the initial operating plan to minimize adverse environmental effects and facilitate reclamation.

In the operating plan, roads should fit the topography to minimize unnecessary earth moving for road cuttings and embankments. All culverts and drains should be removed and original drainage restored as much as possible in accordance with future land use planning.

11.4.5 DISPOSAL OF PLANTS & MACHINERIES

All the P&M will be reused in dipside mine or other projects of the company after the mine closure , in case not useful for company then Possibility shall be explored for handing over to state Govt. (including residential & non-residential buildings) for the benefit of local villagers and strengthening the area infrastructures. The end use of these facilities shall be decided by State Govt. with the help of local Govt. and village Panchayat.

a) DISPOSAL OR REUSE OF EXISTING HEMM, CHP AND WORKSHOP

HEMMs which will have balance life may be deployed in dipside mine or some other project of the company if possible, or otherwise will be disposed off. CHP, workshop at the end of mine life will be dismantled and disposed off. Every effort will be made to restore the area to economic utilisation value as per the mine closure plan.

b) DISPOSAL OR REUSE OF TRANSMISSION AND SUBSTATION

The transmission line and substation will be used by neighbouring mines or local community. The transmission line and transformers will be dismantled and removed from the site if not required for purposeful use by the local community or nearby mines.

11.4.6 CONTROL MEASURES TO RESTORE LAND USE & LANDSCAPE

- The face slopes of the dump will be maintained at the natural angle of repose of the material and at overall slope angle of 26^{o}.
- The newly backfilled area may be covered with suitable grass plants, plantation for bigger trees should be avoided as all these dumps will be rehandled while extraction of lower seams.
- Suitable drainage arrangement for smooth disposal of storm water.
- Appropriate garland drain is to be provided to collect run-off.
- Topsoil shall be progressively and concurrently utilized during physical/ technical reclamation of external OB dumps and backfilled area, thus obviating the necessity of storage of topsoil separately.
- Arboriculture carried out in the vacant areas which will not be mined in future.

- Proper grass carpeting/afforestation/plantation is carried out for greenbelt development.

11.4.7 SAFETY AND SECURITY ARRANGEMENT

a) DETAILS OF FENCING AROUND ABANDONED QUARRY INDICATING THE LENGTH OF THE FENCING

Fencing around abandoned quarry will be done as per details given in D.G.M.S Circulars.

b) MINE ENTRY SEALING ARRANGEMENTS AND SUBSIDENCE MANAGEMENT FOR UG MINES

Not Applicable.

c) PROVIDING ONE TIME LIGHTING ARRANGEMENT

Sufficient lighting as per standard will be provided at all the required places, i.e. working faces, OB dump area, haul road, coal transfer points, loading points, CHP, workshop, etc., to avoid accidents and to create efficient working conditions.

After closure of the mine, the lighting arrangements will be kept maintained at all locations which are not required to be demolished or dismantled like sub-stations, transformers, community services, pump-houses, water-treatment/ filtration plants, waterlines, power lines, roads etc. to be utilized for the neighbouring projects and at critical places for safety point of view.

The guidelines/instructions from DGMS will be followed in case of discontinuance of mine operation, if any.

d) SLOPE STABILITY ARRANGEMENT FOR HIGH WALL AND BACKFILLED DUMPS

During the process, the geometrical shape of the dumps is altered to make it amenable to effective biological reclamation and also to provide safety and stability & high wall will be maintained and stabilized as per norms.

The details of the final Mine Closure plan alongwith the details of the updated cost estimates for various mine closure activities and the Escrow account already set up shall be submitted to the Ministry of Coal for final approval at least five years before the intended final closure of the mine.

11.5 ECONOMIC REPERCUSSIONS OF CLOSURE OF MINE

Many infrastructures like roads, power line etc have been developed and the local people have gained out of it. Educational institutes owned by MCL are accessible to local population. Healthcare facilities (dispensaries/hospitals) have been provided in this project. The coal company has a number of healthcare centres including a specialised **"referral"** hospital in the coalfield area at Brajrajnagar. The local people can also avail these healthcare facilities. As part of peripheral development, MCL has widened and strenghened the existing roads with better connectivity with district HQ (Sundargarh) and Brajrajnagar and Jharsuguda.

Overall there has been positive impact in socio-economic area due to increased economic activities, creation of new employment opportunities, infrastructural development and better educational and healthcare facilties. Even after closure of the mine , these facilities will continue.

There has been creation of direct and indirect employment opportunities due to working of this mine. After closure, these people will be engaged in upcoming any oyher mines of MCL.

IMPLEMENTATION SCHEDULE FOR MINE CLOSURE OF KULDA EXPN. OCP, 21MTY (LIFE OF THE MINE : 11 YRS)

Sl. No	Activity	Time Frame	Year-1 to year-4	Year-5 to year-8	Year-9 to year-11	Post Closure		
						PC1	PC2	PC3
A	**Dismantling of Structures**							
	Service Buildings	2 years						
	Residential Buildings	2 & ½ years						
	Industrial structures like CHP, Workshop, field sub-station, etc.	2 & ½ years						
B	**Permanent Fencing of mine void and other dangerous area**							
	Random rubble masonry of height 1.2 metre including leveling up in cement concrete 1:6:12 in mud mortar	2 years						
C	**Grading of highwall slopes**							
	Levelling and grading of highwall slopes	2 years						
D	**OB Dump Reclamation**							
	Handling/Dozing of OB Dump and backfilling	Throughout the life of the mine including 3 years after cessation of mining operation						
	Technical and Bio-reclamation including plantation and post care	Throughout the life of the mine including 3 years after cessation of mining operation						
E	**Landscaping**							
	Landscaping of the open space in the leasehold area to improve esthetics and eco value	Throughout the life of the mine including 3 years after cessation of mining operation						
F	**Plantation**							
	Plantation over cleared area obtained after dismantling	2 years						
	Plantation around the quarry area and in safety zone	Throughout the life of the mine including 3 years after cessation of mining operation						

Sl. No	Activity	Time Frame	Year-1 to year-4	Year-5 to year-8	Year-9 to year-11	Post Closure		
						PC1	PC2	PC3
	Plantation over the external OB Dump	Throughout the life of the mine						
G	**Post Closure Env Monitoring / testing of parameters for three years**							
	Air Quality	3 years						
	Water Quality	3 years						
H	**Entrepreneurship Development (Vocational/skill development training for sustainable income of affected people**	Throughout the life of the mine						
I	**Miscellaneous and other mitigative measures**	Throughout the life of the mine including 3 years after cessation of mining operation						
J	**Post Closure Manpower cost for supervision**	3 years						

PC1 : Post Closure Year 1
PC2 : Post Closure Year 2
PC3 : Post Closure Year 3

Progressive and Final Mine Closure cost distribution of OC Coal & Lignite mines for reimbursement against progressive/final mine closure activities is given in table below:

Table 11.7

Sl. No.	Activity	Mine Closure Cost (Percentage weightage)	Remarks	Equivalent % converting to 100% for Progressive claims of eligible amount	Equivalent % converting 100% for Final claims of eligible amount
A	Dismantling of Structures (Future utilization should be evaluated on case to case basis as per para 3.7 of the annexure of mine closure plan guidelines dated 07th Jan.,2013)		To be included in final mine closure plan		
	Service Buildings	0.2			0.69
	Residential Buildings	2.67			9.21
	Industrial structures like CHP, Workshop, field substation etc.	0.3			1.03
B	Permanent fencing of mine void and other dangerous area		To be included in final mine closure plan		
	Random rubble masonry of height 1.2 meter including levelling up in cement concrete 1:6:12 in mud mortar or any other approved design	1.5			5.17
C	Grading of high wall slopes		To be included in final mine closure plan		
	Levelling and grading of high wall slopes	1.77			6.10
D	OB Dump Reclamation		71% for progressive and 17.66% for final mine closure		
	Backfilling and Technical Reclamation (50%) + Handling/Dozing of OB Dump (50%). (Note: Drilling & Blasting cost shall be excluded. For backfilling with dragline, bucket wheel excavator and spreader etc. separate calculation sheet is to be maintained)	88.66		95.71	60.90
E	Landscaping		Equal weightage throughout the life of the mine		
	Landscaping of the open space in leasehold area for improving its esthetics and eco value	0.3		0.40	1.03
F	Plantation & Bio-Reclamation				
	Plantation over cleared area obtained after dismantling	0.5	To be included in final mine closure plan		1.72
	Plantation around the quarry area and in safety zone and over external OB dump	0.22	Equal weightage throughout the life of the mine	0.30	0.76
	Bio-reclamation including plantation and post care	0.4	Equal weightage throughout the life of the mine	0.54	1.38
G	Post closure Env. Monitoring/testing of parameters for three years		For three years after mine closure		
	Air Quality	0.22			0.76

Sl. No.	Activity	Mine Closure Cost (Percentage weightage)	Remarks	Equivalent % converting to 100% for Progressive claims of eligible amount	Equivalent % converting 100% for Final claims of eligible amount
	Water Quality	0.2			0.69
H	Entrepreneurship Development (Vocational/skill development training for sustainable income of affected people). It should not be covered in CSR activities. It is also to be clarified that vocational/skill development is given to PAP and cost of training is not recovered.	0.26	Equal weightage throughout the life of the mine	0.35	0.90
I	Miscellaneous and other mitigative measures. (Including progressive environment monitoring and other activities as decided by Third Party government Institution while auditing	2.0	Equal weightage throughout the life of the mine	2.70	6.90
J	Manpower cost for supervision	0.8	To be included in final mine closure plan		2.76
	TOTAL	**100.00**		**100.00**	**100.00**

Manpower requirement depends up on the method and machinery engaged for progressive and final closure activities.

(iii) Mine closure cost

As per estimate and guidelines of Ministry of Coal the closure cost of open cast Mine has been calculated at Rs.9 Lakhs per hectare at the declared price level (as on 01.04.2019) for the whole project area (which includes Mining Lease area, area covered by external overburden dumps, Pit head Mine Infrastructures). The April 2019 wholesale price index for all commodities was 121.1 based on base year of 2011-12. Present WPI for month of June 2022 is 154.0 with base year 2011-12. The base price of Rs.9 Lakhs per hectare is updated as per guidelines provided in above circular.

Updated cost of mine closure on June 2022 cost base (WPI: 154.0) is estimated to be Rs. 11.445 Lakh/Ha.

Total Project area involved	: 981.705 Ha
Mine closure cost/Ha (June 2022 cost base)	: Rs.11.445 lakh
Total Mine closure cost (June 2022 cost base)	: Rs 11235.614 lakh
Fund already deposited in Escrow Account	: Rs 4272.06 lakh
Balance mine Closure Cost	: Rs 6963.554 lakh

PHASING OF MINE CLOSURE COST

The annual closure cost is to be computed considering the total leasehold area (Total project area) and dividing the same by the life of the mine. An amount equal to the annual cost is to be deposited each year throughout the mine life compounded @5% annually.

Balance mine closure cost estimated : Rs. 6963.554 lakhs
Balance life of the project as on 1.4.2022 : 11 years

For annual cost calculations 11 years period has been considered:

Annual mine closure amount to be deposited with Coal Controller :

6963.554 lakhs/11 years = 633.05 lakhs for 1st year.
Yearly phasing of mine closure cost is as below:

(Yr-1 is considered as 2022-23)

Year	Mine closure cost(Rs. in lakh)
Yr-1	633.05
Yr-2	664.703
Yr-3	697.938
Yr-4	732.835
Yr-5	769.477
Yr-6	807.951
Yr-7	848.349
Yr-8	890.766
Yr-9	935.304
Yr-10	982.069
Yr-11	1031.172
TOTAL	**8993.614**

Balance estimated mine closure cost compounded @5% annually for 11 years is : Rs. 8993.614 lakhs.

The mine closure cost deposited and amount released to mine owner/lease holder will be as per guidelines issued by Ministry of Coal vide letter no.55011-01-2009-CPAM, Dt.7/1/2013.

11.6 RISK ASSESSMENT AND MANAGEMENT

Keeping in view the three basic principles i.e. prevention, preparedness (both pro-active and reactive) and mitigation of effect through rescue, recovery, relief and rehabilitation; a comprehensive blue print for risk assessment and management has been drawn-up for the project incorporating the following :

- Identification and assessment of risks.
- Recommendation of measures to prevent damage to life and property against such risks.

◈ IDENTIFICATION OF RISK

- Slope failure in mine pit
- Slope failure in OB dumps (internal and external).
- Blasting
- Explosive handling
- Mine inundation
- Fire
- Road accident

❖ RECOMMENDATION OF MEASURES

- Follow statutory mine safety rules administered by the DGMS and Chief Controller of Explosives.
- Creating safety awareness.
- Proper illumination and communication.
- Proper maintenance for avoiding accidents for heavy vehicles.
- Proper training to workers.

Annexure-I

ମହାନଦୀ କୋଲ୍ ଫିଲ୍ଡସ୍ ଲିମିଟେଡ୍
महानदी कोलफील्डस लिमिटेड
Mahanadi Coalfields Limited
(A subsidiary of Coal India Limited)

Office of the Company Secretary
At/Po. Jagruti Vihar, Burla, MCL
Dist. Sambalpur – 768020 (Odisha)
CIN: U10102OR1992GOI003038
TeleFax No. 06632542977
Email id: cosecymcl@gmail.com
Website: www.mahanadicoal.in

Ref. No. MCL/SBP/CS/CR-42/2020-21/ 11330 Date: 30.11.2020

गोपनीय/CONFIDENTIAL

सेवा में,
महाप्रबंधक (P&P)
महानदी कोलफील्ड्स लिमिटेड
सम्बलपुर-768020

विषय: **Circular Resolutions under Section 175 of the Companies Act, 2013 – Approval for Mining Plan and Mine Closure Plan for Kulda Expansion OCP (Expansion from 15.00 to 19.6 MTY) Revision-2 with a total closure cost of Rs.4042.76 lakhs compounded @ 5% annually over a period of 5 years (Balance mine life @ 19.6 MTY).**

Dear Sir,

Reproduced below is the resolution approved by the majority of Members of MCL Board by way of Circulation under Section 175 of the Companies Act, 2013. The same is forwarded herewith for your information and further necessary action.

Quote

The Board considered the proposal sent in circulation and based on the facts brought out in the agenda note, approved the proposal by passing the following resolution:

"Resolved that the Mining Plan and Mine Closure Plan for Kulda Expansion OCP (Expansion from 15.00 to19.6 MTY) be and is hereby approved with a total closure cost of Rs.4042.76 lakhs compounded @ 5% annually over a period of 05 years (Balance mine life @ 18.75 MTY) Rev-2 as per the details brought out in the agenda note"

Unquote

भवदीय,

कंपनी सचिव

Annexure-II

PROJECT REPORT APPROVAL (10 MTY)

Mahanadi Coalfields Limited

(A Subsidiary of Coal India Limited)

OFFICE OF THE CHIEF GENERAL MANAGER (CP&P)

AT/PO : JAGRITI VIHAR, BURLA

Dist. SAMBALPUR - 768 020 (ORISSA)

Tel – 0663 – 2542808 (O) 2542767 (Fax)

Ref. No: MCL/SAMB/CGM (CP&P)/ 2005/ 1297 Date : 20.01.2005
21

SANCTION ORDER

Sub: Approval of the Project Report of Kulda Open Cast Project (10.00 Mty) at a capital investment of Rs. 302.96 crores

The Project Report of Kulda Opencast Project for an annual coal production of 10.00 Mty, at a capital investment of Rs.302.96 Crores (Rs. Three hundred and two crores and ninety six lakh only) [(including AAP and initial exploration)] and a completion cost of Rs. 354.47 Crores has been approved by the Government of India in pursuance of Article 38 of the Articles of Association of Coal India Limited, as communicated by Shri Shyam Sunder, Under Secretary to the Govt. of India, (for & on behalf of the President of India), Ministry of Coal New Delhi vide Sanction Order No. 43011/12/2002-CPAM dated 12th January, 2005. The project will be funded entirely from the internal resources of the company.

The break-up of the estimated capital investment of the project and other parameters have been given in the sanction order of Ministry of Coal. (Copy enclosed)

The zero date of monitoring of the project will be from the date of issue of the letter. The monthly monitoring report should be sent to this office by 10th of every month for onward submission to CIL & Ministry. This is for kind information and necessary action.

Chief General Manager (CP&P)

Distribution :

1. CMD, MCL
2. D (T) / D(F)/ D(P), MCL
3. CVO., MCL
4. Adviser (Projects), GOI, MOC, New Delhi
5. CGM (CP&PMD), CIL, Kolkata
6. GME (CP) / GME (PMD), CIL, Kolkata
7. Company Secretary, MCL
8. All HODs, MCL Hq.
9. CGM (S&R), MCL Hq.
10. All CGMs/GMs. of Area
11. CGM., Grajanbahal Area : with a copy of Sanction Letter (UCE already sent)
12. GM (Envt), MCL Hq.
13. Conservator of Forests, MCL Hq.
14. RD, CMPDI, RI-VII, Bhubaneswar : with a copy of Sanction Letter
15. Project Officer, Kulda OCP
16. Sri P.N. Sahu, SOM, CP&P Deptt.
17. Sri G.K. Mishra, Supdt. Geologist, CP&P Deptt.
18. Sri S. Mazumdar, SOM (SG), CP&P Deptt
19. Kulda OCP File
20. Project Sanction file

Project sanction order

No. 43011/12/2002-CPAM
Government of India
Ministry of Coal
CPAM - Section

New Delhi, the 12th January,2005

To

The Chairman
Coal India Limited
10-Netaji Subhas Road
KOLKATA - 700 001.

(with 10 spare copies)

Subject:- Kulda Opencast Project of MCL – Sanction for.

Sir

In pursuance of Article 38 of the Articles of Association of Coal India Limited, the President is pleased to approve the Kulda Opencast Project , Mahanadi Coalfields Limited, (a subsidiary of Coal India Limited) for a targeted production of 10.00 million tonnes of coal per annum and a cabital investment of Rs. 302.96 crores [(Rupees three hundred and two crores and ninety six lakh only) (including AAP and initial exploration)] and a completion cost of Rs.350.47 crores (Rupees three hundred and fifty four crores and forty seven lakh only). The project will be funded entirely from the internal resources of the company.

The break up of the estimated capital investment of the project is given as under :-

S.No	Particular	Capital Estimates (August, 2004 price level) (Rs. in lakhs)
1.	Land	1408.50
2.	Buildings	
	(a) Residential	1493.40
	(b) Service	1063.85
3.	Plant & Machinery	
	(a) HEMM	2919.07
	(b) Others	[illegible]
4.	Furniture & Fittings	63.25
5.	Railway Sidings	345.00
6.	Vehicles	204.19
7.	Exploration	208.80
8.	Development	
	8.1 Capital outlay	4742.23
	8.2 Roads & Culverts	2375.17
	8.3 Water supply & Sewerage	703.75
	8.4 Scientific research	29.50
	8.5 PR preparation cost	146.02

MAHANADI COALFIELDS LTD. No. 2354 Dt. 13/1/05 HQ. SECTT. SAMBALPUR

cc:
- FDS
- CVO

9	Revenue Expenditure capitalised (Coal & OBR-DRE)	1990.00
10	Less depreciation capitalised in development period	-1013.00
11	HEMM for land reclamation	496.78
	Total	30296.39

2. The parameters of Kulda OCP are as under:-

Target Output	:	10.00 mtpa
Manpower (Nos.)	:	810
O.M.S. (tonnes)	:	46.76 tonnes
Year of achieving target output	:	7 th year

3. As regards the housing component of the project cost estimate, instructions contained in this Ministry's letter No.10(16)/Fin/76 dated 26.07.1977 and CPP-43011/33/76 dated 31.01.1978 are to be strictly adhered to.

4. Commencing from the next month, this project should be included in the progress reports to be submitted by the company to the Ministry and other agencies as part of the Management Information System.

5. The present approval is based on the Cost Estimates submitted by the Coal Company for consideration, to the Ministry and as per the decision taken by the Public Investment Board in its meeting held on 30.8.2004. The guidelines contained in Ministry of Finance O.M. No.1(2)/PF-II/2003 dated 7.5.2003 circulated vide this Ministry's letter No.43011/13/2003-CPAM dated 29.9.2003 are to be strictly adhered to.

6. When 50% of the capital investment sanctioned is incurred, Mandatory review of the project is to be done to examine if proposal of RCE need to be submitted.

7. This issues with the concurrence of I.F. Wing vide their U.O No 9/DS(F)/05 dated 11.1.2005.

Yours faithfully,

(Shyam Sunder)
Under secretary to the Govt. of India
(for & on behalf of the President of India)

Annexure-III

महानदी कोलफील्डस लिमिटेड
Mahanadi Coalfields Limited
Office of the General Manager (CP&P)
P.O. Jagruti Vihar, Burla
Dist. Sambalpur, Odisha 768020
Ph: +91 (663) 254 2832
Fax: +91 (663) 254 2797
e-mail: gm_cpp.mcl@coalindia.in

No : MCL HQ Sambalpur GM/CP&P/14/

Dated:

Subject: **Approval of Project Report for Kulda Expansion Opencast Project (Normative Capacity 15.00Mty; 5.00Mty incremental) (Peak Capacity 18.75Mty)**

The Project Report for Kulda Expansion Opencast Project (Normative capacity 15.00Mty; 5.00 Mty incremental) (Peak Capacity 18.75 Mty) of Basundhara-Garjanbahal Area has been approved by MCL Board in its 159th meeting held on 25.06.2014 at an additional capital investment of ₹ 289.03 crore up to target year and ₹ 30.22 crore beyond target year to be implemented in incremental coal and incremental OB both by outsourcing.

The Board further approved the proposal for getting EMP clearance for peak coal production level of 18.75 Mty.

The zero date of monitoring of the project will be from the date of issue of this letter. The monthly monitoring report should be sent to this office by 10th of every month for onward transmission to CIL/Ministry. This is for kind information and necessary action.

24/7/14

(**B. N. Shukla**)
General Manager (CP&P)

Distribution:
1. CMD, MCL
2. Advisor (Projects), GoI, MoC, New Delhi-with a copy of MCL Board Resolution.

Annexure-IV

No. 34012/(04)/2011-CPAM
Government of India
Ministry of Coal

New Delhi, the 26th December, 2016

To

Shri S.K. Kundu,
General Manager (Projects & Planning),
Mahanadi Coalfields Limited,
P.O. Jagruti Vihar, Burla,
Distt. SAMBALPUR-768020(ODISHA)(e-mail:mlprajapati5@gmail.com)

Subject Mining Plan/Mine Closure Plan of Kulda Expansion OCP (Revision 1) (Expansion from 10 MTY to 15 MTY) Dated September, 2016.

Sir,

I am directed to refer to MCL's letter No MCL/HQ/Sambalpur/General Manager (Projects & Planning)/16/1495 dated 08.11.2016 on the above cited subject and to forward herewith 04 copies of Mining Plan/Mine Closure Plan of Kulda Expansion OCP (Revision 1) (Expansion from 10 MTY to 15 MTY) Dated September, 2016 of Mahanadi Coalfields Limited duly approved and signed on all pages by Adviser (Projects), Ministry of Coal.

Yours faithfully,

26/12/16

(A.K. Mandal)
Under Secretary to the Govt. of India

Encl: As above.

No.J-11015/10/1995-IA.II(M)
Government of India
Ministry of Environment, Forest & Climate Change
IA-II (Coal Mining) Division

Indira Paryavaran Bhawan,
Jorbagh Road, N Delhi - 3
Dated: 22nd March, 2018

To,

The Chief General Manager (CP&P)
M/s Mahanadi Coalfields Limited
PO - Jagruti Vihar, Burla,
Sambalpur - 768 020 **(Odisha)**
E-mail: cgmenvt2014@gmail.com; gmenvt_mcl@yahoo.co.in

Sub: Expansion of Kulda OCP from 10 MTPA to 14 MTPA of M/s Mahanadi Coalfields Limited in ML area of 634.205 ha located in Tehsil Himgir, District Sundergarh (Odisha) - Environmental Clearance reg.

Sir,

This has reference to your letter No.MCL/HQ/(ENVT)/Kulda OCP/17-18/2832 dated 2nd February, 2018 along with online proposal No.IA/OR/CMIN/61822/2017 dated 15th February, 2018 and subsequent letters dated 05.02.2018, 13.02.2018, 15.02.2018, 19.02.2018 and 27.02.2018 on the above mentioned subject.

2. The Ministry of Environment, Forest and Climate Change has considered the proposal for grant of environmental clearance to the project for expansion of Kulda OCP from 10 MTPA to 15 MTPA of M/s Mahanadi Coalfields Limited in a total area of 694.605 ha (mine lease area of 634.205 ha) located in Tehsil Hemgir, District Sundargarh (Odisha).

3. The proposal was considered by the Expert Appraisal Committee (EAC) in the Ministry for Thermal & Coal Mining Sector in its 27th meeting held on 27th February, 2018. The details of the project, as per the documents submitted by the project proponent, and also as informed during the meeting, are reported to be as under:-

(i) The project was accorded EC vide letter no. J-11015/10/95-IA.II(M) dated 24-12-2002 for 10.0 MTPA in an ML area of 878.29 ha [(929.60 – 51.31 = 878.29 ha) i.e. EC is only granted for 878.29 as out of 279.20 ha total Forest Land, FC is available only for 227.89 ha (FC is not available for 279.20 – 227.89 = 51.31 ha)].
(ii) ToR for the project was granted vide letter dated 18th May,2017.
(iii) The latitudes and longitudes of the project are 21°42'00" to 21° 44'30" N and 83°43'00" to 83°46'30" E respectively.
(iv) Coal Linkage: Thermal Power Plant & Basket Linkage
(v) Employment generated / to be generated: 385 numbers (direct employment)
(vi) Benefits of the project: (a) Improvement in physical infrastructure, (b) Improvement in social infrastructure, (c) Increase in employment potential, (d) Contribution to the exchequer (both State and Central Govt.), (e) Post-mining enhancement of green cover, (f) Improvement of electrical power generation and availability of electricity for 24x7 in rural areas, (j) overall economic growth of the country.
(vii) There is no additional land involved in the Project. The total land area is 694.605 ha. Mining lease area as per the approved Mining Plan is 634.205 ha.

(viii) The land usage of the project will be as follows:

Pre-Mining:

Sl.	Type of Land	Within ML area (ha)		Outside ML area (ha)		Total Area (ha)	
		Existing	Proposed	Existing	Proposed	Existing	Proposed
1.	Agricultural/Tenancy	455.790	259.794	37.500	37.500	493.290	297.294
2.	Waste land	194.610	146.521	22.900	22.900	217.510	169.421
3.	Forest Land	279.200*	227.890	0.000	0.000	279.200	227.890
4.	Grazing	0.000	0.000	0.000	0.000	0.000	0.000
5.	Surface water bodies	0.000	0.000	0.000	0.000	0.000	0.000
	Total:	**929.600**	**634.205**	**60.400**	**60.400**	**990.000**	**694.605**

Note: Instead of 929.60 ha, EC is only granted for 878.29 ha; as out of *279.20 ha Forest Land, FC is available only for 227.89 ha (FC not available for 279.20 – 227.89 = 51.31 ha).

Post- Mining:

Sl.	Land Use during Mining (Core Zone)	Land-Use (ha)					
		Plantation/ grass carpeting	Water Body	Dip side slope & haul road	Un-disturbed	Built-up area	Total
1.	Excavation Area	211.470	17.64	92.80	--	--	321.910
2.	OB dump Area	160.502	--	--	--	--	160.502
3.	Infrastructure	25.230	--	--	--	100.927	126.157
4.	Embankment	3.510	--	--	--	14.049	17.559
5.	Other Area including Safety Zone & Road/ Nullah Diversion	8.077	--	--	--	--	8.077
	Total	**408.789**	**17.64**	**92.80**	--	**114.976**	**634.205**

Core Area:

Particulars	Existing (ha)			Proposed (ha)		
	Forest	Non-Forest	Total	Forest	Non-Forest	Total
Excavation Area	241.700	294.300	536.000	187.155	134.755	321.910
Infrastructure/Embankment and Other Area including Safety Zone	32.900	189.930	222.830	36.615	115.178	151.793
External OB Dumps	4.600	166.170	170.770	4.120	156.382	160.502
Mine Lease Area	**279.200***	**650.400**	**929.600**	**227.890**	**406.315**	**634.205**
Residential Colony	0.000	37.500	37.500	0.000	37.500	37.500
Rehabilitation Site	0.000	22.900	22.900	0.000	22.900	22.900
Outside Lease Area	**0.000**	**60.400**	**60.400**	**0.000**	**60.400**	**60.400**
Total	**279.200**	**710.800**	**990.000**	**227.890**	**466.715**	**694.605**

Note: Instead of 929.60 ha, EC is only granted for 878.29 ha; as out of *279.20 ha Forest Land, FC is available only for 227.89 ha (FC not available for 279.20 – 227.89 = 51.31 ha).

(ix) The total geological reserve is 438.90 MT. The mineable reserve 245.71 MT, extractable reserve is 122.29 MT. The percent of extraction would be 70.20%.
(x) The coal grade is G-11 (average). The stripping ratio is 0.90 Cum/tonne. The gradient varies from 5° to 8°. There are three major seams with thickness ranging upto 34.07 m.
(xi) The total estimated water requirement is 4083 m3/day. The level of ground water ranges from 0.30 m to 8.42 m below ground level.
(xii) The method of mining would be Opencast.
(xiii) There are two external OB dumps with quantity of 30.26 Mm3 in an area of 160.502 ha with the height of 90 meter above the surface level and two internal dump with quantity of 112.32 Mm3 in an area of 211.47 ha.
(xiv) The final mine void would be in 34.05 ha with depth varying from 30 m to 40 m and the total quarry area is 469.80 ha. Backfilled quarry area of 435.75 ha shall be reclaimed with plantation. A void of 17.64 ha with depth upto 200 m (max.) which is proposed to be converted into a water body.
(xv) The seasonal data for ambient air quality has been documented and all results at all stations are within the prescribed limits.
(xvi) The life of mine is 9 Years.
(xvii) Transportation: In pit: by trucks. Surface to Siding: Present:- Kanika siding (31 km) by truck, JSPL Raigarh by truck & Road Sale by tarpaulin-covered truck. Proposed:- Sardega Siding (6.0 Km) by truck, JSPL Raigarh by Pipe Conveyor & Road Sale by tarpaulin-covered truck.Siding to Loading: by pay loader into wagons.
(xviii) There is no additional R&R involved.
(xix) Cost: Total capital cost of the project is Rs.622.21 Crores. CSR Cost is 2% of the average net profit of the company for the three immediate preceding financial years. Environmental Management Cost Rs.87.28 Crores.
(xx) Water body: Chattajor nallah passing through the mine lease area, Basundhara river flows at a distance of 70 m, Bhaina Jor is at a distance of 0.5 km.
(xxi) Approvals: Board's approval obtained in the 182nd Board Meeting held on 22-10-2016. Mining plan has been approved by MoC vide letter no. 34012/(04)/2011-CPAM dated 26-12-2016. Mine closure plan is an integral part of mining plan.
(xxii) Wildlife issues: There are no National Parks, Wildlife Sanctuary, Biosphere Reserves found in the 10 km buffer zone.
(xxiii) Forestry issues: Total forest land is 227.89 ha in ML area of 634.205 ha, Forest clearance hass been obtained vide letter no. F.No.8-176/1997-FC dated 8th August, 2007.
(xxiv) Total afforestation plan shall be implemented covering an area of 211.47 ha at the end of mining and green belt over an area of 8.077 ha has also been proposed having density of tree plantation 2500 trees/ha..
(xxv) There are no court cases/violation pending with the project proponent for the proposed expansion.
(xxvi) The public hearing was held on 10th January, 2018 for expanded capacity of 15 MTPA. The issues raised during the public hearing included control of air pollution, water pollution, supply of drinking water, employment, etc.
(xxvii) Base line data was generated during the pre-monsoon season, March to June, 2017.
(xxviii) The Cumulative Impact Assessment Study has been done considering nearby running and upcoming mines namely, Kulda Expansion OCP, Garjanbahal OCP, Basundhara OCP and Basundhara (W) Extn. OCP for incremental capacity of 23.25 MTPA, and it has been observed that after replacement of road transportation by rail and conveyors, the absolute predicted values of PM_{10} will be within the permissible limit at all the locations.
(xxix) The monitoring report on compliance status of EC conditions has been forwarded by the Eastern Regional Office of the Ministry at Bhubaneswar vide letter dated 25th September, 2017.

The action taken report on observations of the Regional Office was submitted vide letter dated 24th October, 2017 & 1st February, 2018.

(xxx) Kulda OC is catering to most of the critical and super critical thermal power plants and at the present level of production it has already achieved its production capacity of 10 MTPA and is under non-producing state for the want of EC for higher production capacity.

4. The Expert Appraisal Committee in its 27th meeting held on 27th February, 2018 has recommended the project for grant of environmental clearance for a period of one year. Based on recommendations of the EAC, the Ministry of Environment, Forest and Climate Change hereby accords environmental clearance to the project for **expansion of Kulda Opencast Coal Mine from 10 MTPA to 14 MTPA of M/s Mahanadi Coalfields Ltd in a total area of 694.605 ha (mine lease area 634.205 ha) located in Tehsil Hemgir, District Sundargarh (Odisha), for a period of one year only** i.e. up to 31st March, 2019, under the provisions of the Environment Impact Assessment Notification, 2006 and subsequent amendments/circulars thereto subject to the compliance of the terms & conditions and environmental safeguards mentioned below:

(i) The project proponent shall collect and analyze one season base line data for environmental parameters, preferably during April-June, 2018, and submit for consideration of the EAC before 31st December, 2018.

(ii) The project proponent shall submit the details regarding action taken on different observations of the Regional Office before 31st December, 2018, for the Committee to examine adequacy and efficacy of the pollution control measures and its impact on ambient air quality and to make recommendations for continuance of the project thereafter.

(iii) To control the production of dust at source, the crusher and in-pit belt conveyors shall be provided with mist type sprinklers.

(iv) Mitigative measures shall be undertaken to control dust and other fugitive emissions all along the roads by providing sufficient numbers of water sprinklers. Adequate corrective measures shall be undertaken to control dust emissions as presented before the Committee, which would include mechanized sweeping, water sprinkling/mist spraying on haul roads and loading sites, long range misting/fogging arrangement, wind barrier wall and vertical greenery system, green belt, dust suppression arrangement at railway siding, etc.

(v) Persons of nearby villages shall be given training on livelihood and skill development to make them employable.

(vi) To ensure health and welfare of nearby villages, regular medical camps shall be organized at least once in six months.

(vii) Thick green belt of 75 m width at the final boundary in the down wind direction of the project site shall be developed to mitigate/check the dust pollution.

(viii) A third party assessment of EC compliance shall be undertaken once in 03 year through agency like ICFRI /NEERI/IIT or any other expert agency identified by the Ministry.

4.1 The grant of EC is further subject to compliance of the generic conditions as under:

(a) Mining

(i) Mining shall be carried out under strict adherence to provisions of the Mines Act 1952 and subordinate legislations made there-under as applicable.

(ii) No change in mining method i.e OC to UG, calendar programme and scope of work shall be made without obtaining prior approval of the Ministry of Environment, Forest and Climate Change (MoEFCC).

(iii) Mining shall be carried out as per the approved mining plan(including Mine Closure Plan) abiding by mining laws related to coal mining and the relevant circulars issued by Directorate General Mines Safety (DGMS).

(iv) No mining shall be carried out in forest land without obtaining Forestry Clearance as per Forest (Conservation) Act, 1980 and also adhering to The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 read with provisions of Indian Forest Act, 1927.

(b) Land reclamation and water conservation

(i) Digital Survey of entire lease hold area/core zone using Satellite Remote Sensing survey shall be carried out at least once in three years for monitoring land use pattern and report in 1:50,000 scale shall be submitted to Ministry of Environment, Forest and Climate Change/Regional Office (RO).

(ii) The surface drainage plan including surface water conservation plan for the area of influence affected by the said mining operations, considering the presence of river/rivulet/pond/lake etc, shall be prepared and implemented by the project proponent. The surface drainage plan and/or any diversion of natural water courses shall be as per the approved Mining Plan/EIA/EMP report and with due approval of the concerned State/GoI Authority. The construction of embankment to prevent any danger against inrush of surface water into the mine should be as per the approved Mining Plan and as per the permission of DGMS.

(iii) The final mine void depth should preferably be as per the approved Mine Closure Plan, and in case it exceeds 40 m, adequate engineering interventions shall be provided for sustenance of aquatic life therein. The remaining area shall be backfilled and covered with thick and alive top soil. Post-mining land be rendered usable for agricultural/forestry purposes and shall be handed over to the respective state government as specified in the guidelines for Preparation of Mine Closure Plan issued by the Ministry of Coal dated 27th August, 2009 and subsequent amendments.

(iv) The entire excavated area, backfilling, external OB dumping (including top soil) and afforestation plan shall be in conformity with the "during mining"/"post mining" land-use pattern, which is an integral part of the approved Mining Plan and the EIA/EMP submitted to this Ministry. Progressive compliance status vis-a-vis the post mining land use pattern shall be submitted to the Ministry of Environment, Forest and Climate Change/Regional Office on six monthly basis.

(v) The top soil shall temporarily be stored at earmarked site(s) only and shall not be kept unutilized for long. The top soil shall be used for land reclamation and plantation purposes. Active OB dumps shall be stabilised with native grass species to prevent erosion and surface run off. The other overburden dumps shall be vegetated with native flora species. The excavated area shall be backfilled and afforested in line with the approved Mine Closure Plan. 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 and Climate Change/ Regional Office on six monthly basis.

(c) Emissions, effluents, and waste disposal

(i) Transportation of coal, to the extent permitted by road, shall be carried out by covered trucks/conveyors. Effective control measures such as regular water/mist sprinkling/rain gun etc shall be carried out in critical areas prone to air pollution (with higher values of $PM_{10}/PM_{2.5}$) such as haul road, loading/unloading and transfer points. Fugitive dust emissions from all sources shall be controlled regularly. It shall be ensured that the Ambient Air Quality parameters conform to the norms prescribed by the Central/State Pollution Control Board.

(ii) Greenbelt consisting of 3-tier plantation of width not less than 7.5 m shall be developed all along the mine lease area in a phased manner. The green belt comprising a mix of native species shall be developed all along the major approach/ coal transportation roads.

(iii) The transportation of coal shall be carried out as per the provisions and route proposed in the approved Mining Plan. Transportation of the coal through the existing road passing through any village shall be avoided. In case, it is proposed to construct a 'bypass' road, it should be so constructed so that the impact of sound, dust and accidents could be appropriately mitigated.

(iv) Vehicular emissions shall be kept under control and regularly monitored. All the vehicles engaged in mining and allied activities shall operate only after obtaining 'PUC' certificate from the authorized pollution testing centres.

(v) Coal stock pile/crusher/feeder and breaker material transfer points shall invariably be provided with dust suppression system. Belt-conveyors shall be fully covered to avoid air borne dust. Side cladding all along the conveyor gantry should be made to avoid air borne dust. Drills shall be wet operated or fitted with dust extractors.

(vi) Coal handling plant shall be operated with effective control measures viz. bag filters/water or mist sprinkling system etc to check fugitive emissions from crushing operations, conveyor system, transfer points, etc.

(vii) Ground water, excluding mine water, shall not be used for mining operations. Rainwater harvesting shall be implemented for conservation and augmentation of ground water resources.

(viii) Catch/garland drains and siltation ponds of appropriate size shall be constructed around the mine working, coal heaps & OB dumps to prevent run off of water and flow of sediments directly into the river and water bodies. Further, dump material shall be properly consolidated/ compacted and accumulation of water over dumps shall be avoided by providing adequate channels for flow of silt into the drains. The drains/ ponds so constructed shall be regularly de-silted particularly before onset of monsoon and maintained properly. Sump capacity should provide adequate retention period to allow proper settling of silt material. The water so collected in the sump shall be utilised for dust suppression measures and green belt development. Dimension of the retaining wall constructed, if any, at the toe of the OB dumps within the mine to check run-off and siltation should be based on the rainfall data. The plantation of native species to be made between toe of the dump and adjacent field/habitation/water bodies.

(ix) Industrial waste water generated from CHP, workshop and other waste water, shall be properly collected and treated so as to conform to the standards prescribed under the Environment (Protection) Act, 1986 and the Rules made there under, and as amended from time to time. Oil and grease trap shall be installed and maintained fully functional with effluents

discharge adhering to the norms. Sewage treatment plant of adequate capacity shall be installed for treatment of domestic waste.

(x) Adequate groundwater recharge measures shall be taken up for augmentation of ground water. The project authorities shall meet water requirement of nearby village(s) in case the village wells go dry due to dewatering of mine.

(d) Illumination, noise & vibration

(i) Adequate illumination shall be ensured in all mine locations (as per DGMS standards) and monitored weekly. The report on the same shall be submitted to this ministry & its RO on six-monthly basis.

(ii) Adequate measures shall be taken for control of noise levels below 85 dB(A) in the work environment. Workers engaged in blasting and drilling operations, operation of HEMM, etc shall be provided with personal protective equipments (PPE) like ear plugs/muffs in conformity with the prescribed norms and guidelines in this regard. Adequate awareness programme for users to be conducted. Progress in usage of such accessories to be monitored.

(iii) Controlled blasting techniques shall be practiced in order to mitigate ground vibrations and fly rocks as per the guidelines prescribed by the DGMS.

(iv) The noise level survey shall be carried out as per the prescribed guidelines to assess noise exposure of the workmen at vulnerable points in the mine premises, and report in this regard shall be submitted to the Ministry/RO on six-monthly basis.

(e) Occupational health & safety

(i) The project proponent shall undertake occupational health survey for initial and periodical medical examination of the workers engaged in the project and maintain records accordingly as per the provisions of the Mines Rules, 1955 and DGMS circulars. Besides regular periodic health check-up, 20% of the workers identified from workforce engaged in active mining operations shall be subjected to health check-up for occupational diseases and hearing impairment, if any.

(ii) Personnel (including outsourcing employees) working in dusty areas shall wear protective respiratory devices and shall also be provided with adequate training and information on safety and health aspects.

(iii) Skill training as per safety norms specified by DGMS shall be provided to all workmen including the outsourcing employees to ensure high safety standards in mines.

(f) Ecosystem and biodiversity conservation

(i) The project proponent shall take all precautionary measures during mining operation for conservation and protection of endangered flora/fauna, if any, spotted/reported in the study area. The Action plan in this regard, if any, shall be prepared and implemented in consultation with the State Forest and Wildlife Department.

(g) Public hearing, R&R and CSR

(i) Implementation of the action plan on the issues raised during the public hearing shall be ensured. The project proponent shall undertake all the tasks/measures as per the action plan submitted with budgetary provisions during the public hearing. Land oustees shall be compensated as per the norms laid down in the R&R policy of the company/State Government/Central Government, as applicable.

(ii) The project proponent shall ensure the expenditure towards socio-economic development in and around the mine, in every financial year in pursuance of the Corporate Social Responsibility Policy as per the provisions under Section 135 of the Companies Act, 2013

(iii) The project proponent shall follow the mitigation measures provided in this Ministry's OM No.Z-11013/5712014-IA.I1 (M) dated 29th October, 2014, titled 'Impact of mining activities on habitations-issues related to the mining projects wherein habitations and villages are the part of mine lease areas or habitations and villages are surrounded by the mine lease area'.

(iv) The project proponent shall make necessary alternative arrangements, if grazing land is involved in core zone, in consultation with the State government to provide alternate areas for livestock grazing, if any. In this context, the project proponent shall implement the directions of Hon'ble Supreme Court with regard to acquiring grazing land.

(h) Corporate environment responsibility

(i) The Company shall have a well laid down environment policy duly approved by Board of Directors. The environment policy should prescribe for standard operating procedures to have proper checks and balances and to bring into focus any infringements/deviation/violation of the environmental or forest norms/conditions. Also, the company shall have a defined system of reporting of non-compliances/violations of environmental norms to the Board of Directors and/or shareholders/stakeholders.

(ii) The hierarchical system or Administrative Order of the company to deal with environmental issues and for ensuring compliance with the environmental clearance conditions should be displayed on website of the Company.

(iii) A separate environmental management cell both at the project and company headquarter level, with suitable qualified personnel shall be set-up under the control of a Senior Executive, who will report directly to the Head of the Organization.

(iv) Action plan for implementing EMP and environmental conditions shall be prepared and shall be duly approved by competent authority. The year wise funds earmarked for environmental protection measures shall be kept in separate account and not to be diverted for any other purpose. Year wise progress of implementation of action plan shall be reported to the Ministry/Regional Office along with the Six Monthly Compliance Report.

(v) Self environmental audit shall be conducted annually. Every three years third party environmental audit shall be carried out.

(i) Statutory Obligations

(i) The environmental clearance shall be subject to orders of Hon'ble Supreme Court of India, Hon'ble High Court, NGT and any other Court of Law from time to time, and as applicable to the project.

(ii) This environmental clearance shall be subject to obtaining wildlife clearance, if applicable, from the Standing Committee of National Board for Wildlife.

(iii) The project proponent shall obtain Consent to Establish/Operate under the Air Act, 1981 and the Water Act, 1974 from the concerned State Pollution Control Board.

(iv) The project proponent shall obtain the necessary permission from the Central Ground Water Authority (CGWA).

(j) Monitoring of project

(i) Adequate ambient air quality monitoring stations shall be established in the core zone as well as in the buffer zone for monitoring of pollutants, namely PM_{10}, $PM_{2.5}$, SO_2 and NO_x. Location of the stations shall be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive targets in consultation with the State Pollution Control Board. Online ambient air quality monitoring stations may also be installed in addition to the regular monitoring stations as per the requirement and/or in consultation with the SPCB. Monitoring of heavy metals such as Hg, As, Ni, Cd, Cr, etc to be carried out at least once in six months.

(ii) The Ambient Air Quality monitoring in the core zone shall be carried out to ensure the Coal Industry Standards notified vide GSR 742 (E) dated 25.9.2000 and as amended from time to time by the Central Pollution Control Board. Data on ambient air quality and heavy metals such as Hg, As, Ni, Cd, Cr and other monitoring data shall be regularly reported to the Ministry/Regional Office and to the CPCB/SPCB.

(iii) The effluent discharge (mine waste water, workshop effluent) shall be monitored in terms of the parameters notified under the Coal Industry Standards vide GSR 742 (E) dated 25.9.2000 and as amended from time to time by the Central Pollution Control Board.

(iv) The monitoring data shall be uploaded on the company's website and displayed at the project site at a suitable location. The circular No. J-20012/1/2006-IA.11 (M) dated 27.05.2009 issued by Ministry of Environment, Forest and Climate Change shall also be referred in this regard for its compliance.

(v) Regular monitoring of ground water level and quality shall be carried out in and around the mine lease area by establishing a network of existing wells and constructing new piezometers during the mining operations. The monitoring of ground water levels shall be carried out four times a year i.e. pre-monsoon, monsoon, post-monsoon and winter. The ground water quality shall be monitored once a year, and the data thus collected shall be sent regularly to Ministry of Environment, Forest and Climate Change/Regional Office.

(vi) Monitoring of water quality upstream and downstream of water bodies shall be carried out once in six months and record of monitoring data shall be maintained and submitted to the Ministry of Environment, Forest and Climate Change/Regional Office.

(vii) The project proponent shall submit six monthly reports on the status of the implementation of the stipulated environmental conditions to the Ministry of Environment, Forest and Climate Change/Regional Office. For half yearly monitoring reports, the data should be monitored for the period of April to September and October to March of the financial years.

(viii) The Regional Office of this Ministry 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.

(k) Miscellaneous

(i) Efforts should be made to reduce energy consumption by conservation, efficiency improvements and use of renewable energy.

(ii) The project authorities shall inform to the Regional Office regarding commencement of mining operations.

(iii) A copy of the environmental clearance shall be marked to concerned Panchayat. A copy of the same shall also be sent to the concerned State Pollution Control Board, Regional Office, District Industry Sector and Collector's Office/Tehsildar Office for information in public domain within 30 days.

(iv) The EC shall be uploaded on the company's website. The compliance status of the stipulated EC conditions shall also be uploaded by the project authorities on their website and updated at least once every six months so as to bring the same in public domain.

(v) The project authorities shall advertise at least in two local newspapers widely circulated, one of which shall be in the vernacular language of the locality concerned, within 7 days of the issue of this clearance, informing that the project has been accorded environmental clearance and a copy of the same is available with the State Pollution Control Board and also at website of the Ministry.

(vi) The environmental statement for each financial year ending 31 March in Form-V is mandated to be submitted by the project proponent for the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be uploaded on the Company's website along with the status of compliance of EC conditions and shall be sent to the respective Regional Offices of the MoEF&CC by e-mail. Concerns raised during public hearing.

(vii) 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 and any other orders passed by the Hon'ble Supreme Court of India/High Courts and any other Court of Law relating to the subject matter.

5. The proponent shall abide by all the commitments and recommendations made in the EIA/EMP report and also that during presentation to the EAC. All the commitments made on the issues raised during public hearing shall also be implemented in letter and spirit.

6. The proponent shall obtain all necessary clearances/approvals that may be required before the start of the project. The Ministry or any other competent authority may stipulate any further condition for environmental protection. The Ministry or any other competent authority may stipulate any further condition for environmental protection.

7. 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.

8 The coal company/project proponent shall be liable to pay the compensation against the illegal mining, if any, and as raised by the respective State Governments at any point of time, in terms of the orders dated 2nd August, 2017 of Hon'ble Supreme Court in WP (Civil) No.114/2014 in the matter of 'Common Cause Vs Union of India & othrs'.

9. The project proponent, without prejudice to this environmental clearance, shall be bound to comply with any other interpretation of the orders of Hon'ble Supreme Court also, in due course of time.

10. This environmental clearance supersedes the earlier one granted vide letter No.J-11015/10/1995-IA.II(M) dated 24th December, 2002 for a capacity 10 MTPA.

22/3/2018

(S. K. Srivastava)
Scientist E

Copy to:

1. The Secretary, Ministry of Coal, Shastri Bhawan, New Delhi
2. The APPCF, Regional office (EZ), Ministry of Environment Forests and Climate Change, A-31, Chandrashekarpur, Bhubaneswar - 751023
3. The Secretary, Department of Environment & Forest, Government of Odisha, Secretariat, Bhubaneswar
4. The Member Secretary, Central Ground Water Authority, Ministry of Water Resources, Curzon Road Barracks, A-2, W-3 Kasturba Gandhi Marg, New Delhi
5. The Member Secretary, CPCB, CBD-cum-Office Complex, East Arjun Nagar, Delhi -110032
6. The Member Secretary, Odisha State Pollution Control Board, Neelakanth Nagar, Unit-VIII, Bhubaneswar
7. The District Collector, Sundargarh, Government of Odisha
8. Monitoring File 9. Guard File 10. Record File 11. Notice Board

22/3/2018

(S. K. Srivastava)
Scientist E

ମହାନଦୀ କୋଲ୍ ଫିଲ୍ଡସ୍ ଲିମିଟେଡ୍
महानदी कोलफील्डस लिमिटेड
Mahanadi Coalfields Limited
(A subsidiary of Coal India Limited)

Office of the Company Secretary
At/Po. Jagruti Vihar, Burla, MCL
Dist. Sambalpur – 768020 (Odisha)
CIN: U10102OR1992GOI003038
TeleFax No. 06632542977
Email id: cosecymcl@gmail.com
Website: www.mahanadicoal.in

Ref. No. MCL/SBP/CS/BD-248/Exct/2022/ 12600 Date: 20.06.2022

गोपनीय/CONFIDENTIAL

To
The GM(P&P)
MCL HQs

Sub: Extract from the minutes of the 248th Board meeting of MCL held at 04.00 PM on Monday, the 23rd May, 2022 at the Registered Office of the Company, Jagruti Vihar, Burla, Sambalpur, Odisha-768020.

प्रिय महोदय,

आप के सूचनार्थ एवं उचित कार्यवाही हेतु एम.सी.एल. निदेशक मण्डल की 248 वी बैठक का उदधृत दिया जा रहा हैं।

248.C/4 Approval for Mining Plan and Mine Closure Plan for Kulda Expansion OCP (21 MTY) (Revision-3) with a total closure cost of Rs.3582.63 lakhs compounded @ 5% annually over a period of 3 years.

4.1 The Board deliberated on the proposal in detail and based on the clarifications offered by GM(P&P) approved the proposal for Mining Plan and Mine Closure Plan for Kulda Expansion OCP (21 MTY) (Revision-3) with a total closure cost of Rs.3582.63 lakhs compounded @ 5% annually over a period of 03 years as per the details brought out in the agenda note.

248.C/5 Approval of Mining Plan and Mine Closure Plan for Lakhanpur OC Expansion (Phase-II) (22.5 MTY) (Revision-2) with a total closure cost of Rs.19633.17 lakhs over a period of 08 years compounded @ 5% annually.

5.1 The Board deliberated on the proposal in detail and based on the clarifications offered by GM(P&P) approved the proposal for Mining Plan and Mine Closure Plan for Lakhanpur OC Expansion (Phase-II) (22.5 MTY) (Revision-2) with a total closure cost of Rs.19633.17 lakhs over a period of 08 years compounded @ 5% annually as per the details brought out in the agenda note.

भवदीय,

कंपनी सचिव

ENVIRONMENTAL CLEARANCE

PARIVESH

(Pro-Active and Responsive Facilitation by Interactive, and Virtuous Environment Single-Window Hub)

Government of India
Ministry of Environment, Forest and Climate Change
(Impact Assessment Division)

To,

The ProjectOfficer

KULDA EXPANSION OCP MAHANADI COALFILEDS LIMITED

Project Office, Kulda Expansion OC Project, P. O.-Basundhara, Dist.-Sundergarh, State-Orissa,,Sundargarh,Orissa-770076

Subject: Grant of Environmental Clearance (EC) to the proposed Project Activity under the provision of EIA Notification 2006-regarding

Sir/Madam,

This is in reference to your application for Environmental Clearance (EC) in respect of project submitted to the Ministry vide proposal number IA/OR/CMIN/246444/2021 dated 25 Dec 2021. The particulars of the environmental clearance granted to the project are as below.

1.	**EC Identification No.**	**EC22A042OR116018**
2.	**File No.**	J-11015/10/1995-IA-II(M)
3.	**Project Type**	Expansion7
4.	**Category**	A
5.	**Project/Activity including Schedule No.**	1(a) Mining of minerals
6.	**Name of Project**	Kulda Expansion Opencast Project
7.	**Name of Company/Organization**	KULDA EXPANSION OCP MAHANADI COALFILEDS LIMITED
8.	**Location of Project**	Orissa
9.	**TOR Date**	N/A

The project details along with terms and conditions are appended herewith from page no 2 onwards.

Date: 14/02/2022

(e-signed)
Lalit Bokolia
Scientist F
IA - (Coal Mining sector)

Note: A valid environmental clearance shall be one that has EC identification number & E-Sign generated from PARIVESH.Please quote identification number in all future correspondence.

This is a computer generated cover page.

F No. J- 11015/10/1995-IA-II(M)
Government of India
Ministry of Environment Forest and Climate Change
(Impact Assessment Division)
****

Indira ParyavaranBhavan,
JorBagh Road, New Delhi-110 003
Email: lk.bokolia@nic.in Tel: 01124695363

Dated: 14th February, 2022

To,

Project Officer
M/s The Mahanadi Coalfields Limited
Kulda OCP Basundhara area PO- Balinga,
Tehsil- Hemgir, Sundargarh-770076 (Odisha)
Email: pokuldaexpansionmcl@gmail.com

Sub: Expansion of Kulda Opencast Coal Mine Project from 16.8 MTPA to 19.6 in an ML area of 634.205 ha M/s Mahanadi Coalfields Limited, located at village Balinga, Tumulia, Siarmal, Kulda & Bankibahal, Tehsil: Hemgir, District Sundargarh (Odisha). under Ministry OM dated 15th September, 2017 [Second Stage]- reg.

Sir,

This has reference to your online proposal No.IA/OR/CMIN/246444/2021 dated 25th December, 2021 for grant of Environmental Clearance to the above project.

2. The Ministry of Environment, Forest and Climate Change has considered the application. It is noted that the proposal is for grant of Environmental Clearance to the project Expansion of Expansion of Kulda Opencast Coal Mine Project from 16.8 MTPA to 19.6 in an ML area of 634.205 ha M/s Mahanadi Coalfields Limited, located in IB Valley at village Balinga, Tumulia, Siarmal, Kulda & Bankibahal, Tehsil: Hemgir, District Sundargarh (Odisha).

The project/activity is covered under category 'A' of item 1(a) 'Mining of Minerals' the Schedule to the EIA Notification, 2006

3. The proposal was considered by the sectoral Expert Appraisal Committee (EAC) in its 25th EAC meeting on 18th -20th January, 2022. The details of the proposal, as ascertained from the proposal documents and as revealed from the discussions held during the meetings, are given as under:

(i) The project area is covered under Survey of India Topo-Sheet No. 64 N/12 & 64 N/16 (RF 1:50000) and is bounded by the geographical coordinates ranging from Latitude- 21o 42' 00" to 21o 44' 30" N and Longitude- 83o 43' 00" to 83o 46' 30" E

(ii) Coal linkage of the project: Power Plants and basket linkage.

(iii) Joint venture cartel has been formed: Not Applicable

(iv) Project does not fall in the Critically Polluted Area (CPA), where the MoEF&CC vide its OM dated 13thJanuary, 2010 has imposed moratorium on grant of environment clearance.

(v) Employment generation: Direct employment to 343 persons

(vi) The project is reported to be beneficial in terms of Contribution to the Exchequer (both State and Central Govt.), Improvement of Electrical Power Generation and availability of electricity in rural areas, Overall economic growth of the country.

(vii) Earlier, the environment clearance to the project was obtained under EIA Notification 2006 vide Ministry's letter no. No. J-11015/10/1995-IA. II (M) dated 02.03.2021 from 14 to 16.8 MTPA (1st Phase) in the mine lease area of 634.205 Ha under 7 (ii) clause of EIA notification 2006 and MoEF&CC's O.M dated 15.09.2017.

(viii) Total mining lease area as per block allotment is 634.205 ha. Mining plan (including Progressive Mine closure plan) has been approved by MCL Board on 30.11.2020.

(ix) The land usage pattern of the project is as under

Pre-mining Land use detail (Area in ha)

Sl. No.	Type of Land	Within ML area	Outside ML area	Total Area
1	Agricultural	259.794	37.500	494.54
2	Waste land	227.890	Nil	205.11
3	Forest Land	146.521	22.900	88.90
4	Grazing	Nil	Nil	Nil
5	Surface water bodies	Nil	Nil	3.84
6	Settlements	Nil	Nil	Nil
7	Others (specify) settlement	Nil	Nil	2.99
Total:		**653.83**	**634.205**	**60.400**

Post Mining:

Post Closure Land use status is furnished hereunder: (Area in ha)

Sl. No.	Category	Land use (in Ha)					
		Plantation / grass carpeting	Water body	Dip side slope & haul road	Undisturbed	Built-up area	Total
1	Excavation Area	211.47	17.64	92.80	-	-	321.91
2	OB dump Area (External)	160.502	-	-	-	-	160.502
3	Infrastructure	25.23	-	-	-	100.927	126.157
4	Embankment	3.51	-	-	-	14.049	17.559
5	Other area incl safety zone & Road/Nallah Diversion	8.077	-	-	-	-	8.077
	Total Mining Lease	**408.789**	**17.64**	**92.80**	**-**	**114.976**	**634.205**
6	Resettlement site	-	-	-	-	37.5	37.5
7	Rehabilitation Site	-	-	-	-	22.9	22.9
	Total Project Area	**408.789**	**17.64**	**92.80**	**-**	**175.376**	**694.605**

(x) Total geological reserve reported in the Kulda Geological Block is 245.71 MT with 172.49 MT (including the depleted reserve) as mineable reserves. 70.05 MT is available for extraction as on 01.04.2021. Percent of extraction is 70.20%.

(xi) 3 seams with thickness ranging from 0.12-1.84 m & 30.05 to 34.07 m are workable. Grade of Coal is G-14; Stripping ratio is 1.02 while gradient is 50 to 80.

(xii) Method of mining operations envisages by Opencast Mining by Shovel – Dumper/Ripper-dozer in OB/ parting; Surface miner, pay loader & tipper in coal.

(xiii) Life of mine is 4 years (from 2021-22)

(xiv) The project has only one external OB dump in an area of 69.04 ha with 80-90 m height and 37.33 Mm3 of OB and one internal OB in an area of 82.41 ha with 32.63Mm3 of OB is envisaged in the project.

(xv) Total quarry area is 321.91 ha out of which backfilling will be done in 211.47 ha. while final mine void will be created in an area of 17.64 ha of partially backfilled area will remain as final mine void with a maximum depth of 200 m. Backfilled quarry area of 211.47 ha shall be reclaimed with plantation/grass/agriculture. Final mine void will be converted into a water body.

(xvi) Transportation of coal has been proposed in mine pit to surface by tippers, from surface to siding by tippers and dumpers and at sidings by pay loader/railway rakes. Work order dt: 20-01-2021 issued for 20 MTPA Rapid Loading System with belt & surge bin adjacent to Sardega siding for Rs. 404.87 Cr.

(xvii) Reclamation Plan in an area of 420.789 ha, comprising of 160.502 ha of external dump, 211.47 ha of internal dump and 8.077 ha of green belt, etc.

(xviii) 227.89 ha of forest land have been reported to be involved in the project. Stage II FC obtained for 227.89 ha vide no.- F.No.8-176/1997-FC, Dt.- 08.08.2007.

(xix) No National Parks, Wildlife Sanctuaries and Eco-Sensitive Zones have been reported with 10 km boundary of the project.

(xx) The ground water level has been reported to be varying between1.15m to 8.42 m bgl. Total water requirement for the project is 3913 KLD.

(xxi) Approval of the Central Ground Water Authority has been submitted vides letter no. 21-4/2112/OR/MIN/2018, Dt: - 28.09.2018 for Ground water withdrawal and NoC from CGWA, New Delhi obtained on 09.12.2020.

(xxii) Public Hearing was held on date 10.01.2018 at 11 AM at Stadium field near Jagannath Mandir, Basundhara Area, Tikilipada of Hemgir Tahasil of Sundargarh District, Odisha for the Expansion of coal production capacity from 10.0 MTPA to 15.0 MTPA over an area of 634.205 Ha of Kulda OCP of M/s. Mahanadi Coalfields Limited.

(xxiii) Consent to Operate for the existing capacity has been obtained vide 5525/IND-I-CON-5125 Dt 31.03.2021 valid till 31.03.2022 from the State PCB, Odisha.

(xxiv) Chhatan Jhor is passing through mine lease area, hence, straightening of Jhor is required. The permission for straightening of Chhatan Jhor, has been granted from State Authority vide letter no.-2609/dt. -17.12.2019. The straightening work has been completed at the project cost of 33.83Lakh, and stone pitching as well as culverts has been provided to strengthen the embankment. Diversion of Raigarh-Sundergarh state highway crossing through the mining area is completed. Alternative diversion road has been provided on the top of the embankment provided against Basundhara river and Chattarjhor nallah.

(xxv) Regular monitoring of ambient air quality is being carried out on fortnightly basis. The documented report is submitted to Regional Office, MoEF&CC, and Bhubaneswar and also to MoEF&CC along with half yearly EC compliance report. In general, the results of ambient air quality monitoring data were found within prescribed limits except few aberrations which can be attributed to the specific local conditions during the day of sampling.

(xxvi) No court cases are pending in the court. However, the R&R of all the villages falling in this project area are being carried out under the direction of "Claims Commission" appointed by Hon'ble Supreme Court of India.

(xxvii) The project does not involve violation of the EIA Notification, 2006 and amendment issued there under. after obtaining EC for 10 MTPA in the year 2002, under the provisions of EIA Notification, 1994 as amended on 04.05.1997 and 10.04.1997. EC for 14MTPA was granted as per EIA Notification, 2006 and subsequent amendments/circulars. And under 7ii clause of

EIA notification 2006 and O.M dated 15.09.2017 of MoEF&CC, EC was granted for 16.8MTPA. The coal production from the mine was started from the year 2007 onwards

(xxviii) The project involves 572 project affected families. R&R of the PAPs is being done as per Orissa Rehabilitation and Resettlement Policy 2006.The R&R of all the villages falling in this project area are being carried out under the direction of "Claims Commission" appointed by Hon'ble Supreme Court of India.

(xxx) Total cost of the project is Rs. 622.21 Crs. Cost of production is Rs.255.59 per tonne, CSR cost is Rs.2 per tonne or 2% of the average net profit of the Company of the three immediately preceding financial years whichever is higher, R&R cost is Rs.63.40 Crs. Environment Management Cost is Rs 76.90 Crores.

4. The Expert Appraisal Committee (EAC) in its 25th EAC meeting held during 18 -20 January, 2022 has recommended the project for grant of Environment Clearance (EC). Based on recommendations of the EAC, Ministry of Environment, Forest and Climate Change hereby accords approval for Environment Clearance(EC) for 20% (Stage-2) Expansion under O.M. dated 15.09.2017 of Kulda Opencast Coal Mine Project from 16.8 MTPA to 19.6 in an ML area of 634.205 ha M/s Mahanadi Coalfields Limited, located in IB Valley at village Balinga, Tumulia, Siarmal, Kulda & Bankibahal, Tehsil Hemgir, District Sundargarh (Odisha), under 7(ii) clause of EIA Notification, 2006 and subsequent amendments/circulars thereto subject to the compliance of the following terms & conditions / specific conditions in addition to the standard environmental conditions notified by the Ministry for environmental safeguards as under:-

(i) PP shall obtain Consent to Establish/Operate for 19.6 MTPA capacity prior to production.

(ii) PP shall comply as per time bound action plan submitted with 17.59 Crore budget with activities such as sprinkler, fog cannon, wheel washing, wind barrier, plantation etc.

(iii) PP shall implement activities listed for plantation of Rs. 24 Crore within 3 years at external dump, backfilled area, safety zone and outside mile lease area.

(iv) PP to address the issues raised during public hearing with proposed respective budget like development of providing drinking facilities, control blasting, settling the land issues etc.

(v) PP shall implement in-pit conveyor system with silo loading facility till railway siding and No road transportation shall be allowed after December, 2022 and accordingly, SPCB shall not grant CTO for road transportation after December, 2022.

(vi) PP shall conduct carrying capacity assessment study within 1 year and submit to Ministry's IRO and further recommendation shall be complied with strict timeline.

(vii) PP shall engage third party independent expert agency for monitoring/auditing of compliance of EC conditions every year.

(viii) PP shall engage dedicated agency for plantation in mine site by April, 2022 instead of depending on State Forest Department. PP may seek inputs and expertise from forest department

(ix) PP should not transportation of coal through road passing through any village and further ensure that its consumers of coal are also not using village road and passing through any

sensitive location such as schools, hospitals etc. PP shall take legal undertaking from its consumers accordingly.

(x) PP had diverted a State highway so the plantation along the alternative diversion road provided on the top of the embankment against Basundhara river and Chattarjhor nallah to be taken up by PP, along with its proper maintenance. The detail of this alternative road (length, width, carrying capacity in respect to the State highway) with photographs to be furnished with six monthly compliance report of IRO and respective state pollution board.

(xi) PP in collaboration with CMPDI must develop a dedicated laboratory with NABL certification for measuring water quality, soil quality and heavy metals in water, air and soil etc at its operational place, which would also serve for other nearby mines of M/s MCL.

(xii) PP to develop one more plant nursery with 80 % dominance of Sal trees and 20 % other trees in 85 Ha scatter patch area located at south west and its detail with photographs to be provided to IRO, MoEF&CC and concerned pollution board in its six monthly compliance report of June 2022.

(xiii) PP also to provide drinking water facilities like installation of RO with proper water supply pipe fittings to nearby rural areas and also to install hand pumps by seeking consent from panchayat of the villages located within the study area of 10 km radius buffer zone within two years

(xiv) PP to install solar lights within 1 year from the grant of this EC along the road used for transportation of minerals to avoid the accidents at night and also seek its maintenance. PP is asked to also identify the rural areas for installation of solar light with its maintenance within the study area of 10 km radius buffer zone within one year

(xv) PP to provide bio toilets to the villages located within the study areas within 1 year from the grant of this EC.

(xvi) PP shall deploy only 40-50 tonnes covered trucks/dumper to reduce fleet size till Rapid loading system and conveyor belt system is commenced.

(xvii) PP shall obtain No Objection Certificate (NOC) for extraction of Ground Water from Central Ground Water Authority for expansion capacity.

(xviii) Adequate effectiveness of EMP should be analyzed from the offset/hike of air pollution data from continuous monitoring stations and quarterly report shall be generated and submitted with 6 monthly compliance report to RO, MoEF&CC.

(xix) PP to install 1 more continuous ambient air quality monitoring stations at suitable locations preferably village side and with consultation of SPCB. The real time data so generated shall be uploaded on company website. In addition, data should also be displayed digitally at entry and exit gate of mine lease area for public display.

(xx) PP shall conduct substantial (at least 50000 nos.) tree plantation at village namely Teleimal, Tumulia, Chakarpur and Kaletpani within 2 years and mark it for certification for any stautory authorities.

(xxi) PP shall install fixed fog cannon (mist sprayer) all along the haul road till CHP, Railway siding and OB Dump area and accordingly sufficient number of fog cannons (not less than

10 nos.) with 40 mts jet length shall be installed within 6 months. It should be ensured that air pollution level confirm to the standards prescribed by the MOEFCC/CPCB.

(xxii) Project proponent to plant 150,000 nos. of native trees with broad leaves along the transportation route in three years to prevent the effect of air pollution. After completion of tree plantation, number of trees shall be duly endorsed from District Forest Officer.

(xxiii) Continuous monitoring of occupational safety and other health hazards, and the corrective actions need to be ensured.

(xxiv) Project proponent shall supply clean drinking water and for domestic purpose for the people coming under the zone of influence of this mining activity.

(xxv) Proponent shall appoint an Occupational Health Specialist for Regular and Periodical medical examination of the workers engaged in the Project and maintain records accordingly; also, Occupational health check-ups for workers having some ailments like BP, diabetes, habitual smoking, etc. shall be undertaken once in six months and necessary remedial/preventive measures taken accordingly. The Recommendations of National Institute for ensuring good occupational environment for mine workers shall be implemented; The prevention measure for burns, malaria and provision of anti-snake venom including all other paramedical safeguards may be ensured before initiating the mining activities.

(xxvi) Persons of nearby villages shall be given training on livelihood and skill development to make them employable.

(xxvii) The illumination and sound at night at project sites disturb the villages in respect of both human and animal population. Consequent sleeping disorders and stress may affect the health in the villages located close to mining operations. Habitations have a right for darkness and minimal noise levels at night. PPs must ensure that the biological clock of the villages is not disturbed; by orienting the floodlights/ masks away from the villagers and keeping the noise levels well within the prescribed limits for day light/night hours

(xxviii)PP shall implement rain water harvesting mechanism in order recharge the ground water or as water conservation measure in addition to the proposed structure. PP shall carry out regular monitoring of Ground water level and quality.

(xxix) PP shall pay to farmers of agricultural land if there is any loss due to pollution found by concerned District Commissioner as per extent rules or norms.

(xxx) Hon'ble Supreme Court in an Writ Petition(s) Civil No. 114/2014, Common Cause vs Union of India & Ors vide its judgement dated 8th January, 2020 has directed the Union of India to impose a condition in the mining lease and a similar condition in the environmental clearance and the mining plan to the effect that the mining lease holders shall, after ceasing mining operations, undertake re-grassing the mining area and any other area which may have been disturbed due to their mining activities and restore the land to a condition which is fit for growth of fodder, flora, fauna etc. Compliance of this condition after the mining activity is over at the cost of the mining lease holders/Project Proponent". The implementation report of the above said condition shall be sent to the Regional Office of the MoEF&CC.

4.1 The grant of Environment Clearance (EC) is further subject to compliance of the Standard EC conditions as under:

(a) Statutory compliance

(i) The project proponent shall obtain forest clearance under the provisions of Forest (Conservation) Act, 1986, in case of the diversion of forest land for non-forest purpose involved in the project.

(ii) The project proponent shall obtain clearance from the National Board for Wildlife, if applicable.

(iii) The project proponent shall prepare a Site-Specific Conservation Plan / Wildlife Management Plan and approved by the Chief Wildlife Warden. The recommendations of the approved Site-Specific Conservation Plan/Wildlife Management Plan shall be implemented in consultation with the State Forest Department. The implementation report shall be furnished along with the six-monthly compliance report (in case of the presence of schedule-I species in the study area).

(iv) The project proponent shall obtain Consent to Establish/Operate under the provisions of Air (Prevention & Control of Pollution) Act, 1981 and the Water (Prevention & Control of Pollution) Act, 1974 from the concerned State Pollution Control Board/ Committee.

(v) The project proponent shall obtain the necessary permission from the Central Ground Water Authority.

(vi) Solid/hazardous waste generated in the mines needs to addressed in accordance to the Solid Waste Management Rules, 2016/Hazardous & Other Waste Management Rules, 2016.

(b) Air quality monitoring and preservation

(i) Continuous ambient air quality monitoring stations as prescribed in the statue be established in the core zone as well as in the buffer zone for monitoring of pollutants, namely PM_{10}, $PM_{2.5}$, SO_2 and NO_x. Location of the stations shall be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive targets in consultation with the State Pollution Control Board. Online ambient air quality monitoring stations may also be installed in addition to the regular monitoring stations as per the requirement and/or in consultation with the SPCB. Monitoring of heavy metals such as Hg, As, Ni, Cd, Cr, etc to be carried out at least once in six months.

(ii) The Ambient Air Quality monitoring in the core zone shall be carried out to ensure the Coal Industry Standards notified vide GSR 742 (E) dated 25th September, 2000 and as amended from time to time by the Central Pollution Control Board. Data on ambient air quality and heavy metals such as Hg, As, Ni, Cd, Cr and other monitoring data shall be regularly reported to the Ministry/Regional Office and to the CPCB/SPCB.

(iii) Transportation of coal, to the extent permitted by road, shall be carried out by covered trucks/conveyors. Effective control measures such as regular water/mist sprinkling/rain gun etc shall be carried out in critical areas prone to air pollution (with higher values of $PM_{10}/PM_{2.5}$) such as haul road, loading/unloading and transfer points. Fugitive dust emissions from all sources shall be controlled regularly. It shall be ensured that the Ambient Air Quality parameters conform to the norms prescribed by the Central/State Pollution Control Board.

(iv) The transportation of coal shall be carried out as per the provisions and route envisaged in the approved Mining Plan or environment monitoring plan. Transportation of the coal through the existing road passing through any village shall be avoided. In case, it is proposed to construct a 'bypass' road, it should be so constructed so that the impact of sound, dust and accidents could be appropriately mitigated.

(v) Vehicular emissions shall be kept under control and regularly monitored. All the vehicles engaged in mining and allied activities shall operate only after obtaining 'PUC' certificate from the authorized pollution testing centres.

(vi) Coal stock pile/crusher/feeder and breaker material transfer points shall invariably be provided with dust suppression system. Belt-conveyors shall be fully covered to avoid air borne dust. Side cladding all along the conveyor gantry should be made to avoid air borne dust. Drills shall be wet operated or fitted with dust extractors.

(vii) Coal handling plant shall be operated with effective control measures w.r.t. various environmental parameters. Environment friendly sustainable technology should be implemented for mitigating such parameters.

(c) Water quality monitoring and preservation

(i) The effluent discharge (mine waste water, workshop effluent) shall be monitored in terms of the parameters notified under the Water Act, 1974 Coal Industry Standards vide GSR 742 (E) dated 25th September, 2000 and as amended from time to time by the Central Pollution Control Board.

(ii) The monitoring data shall be uploaded on the company's website and displayed at the project site at a suitable location. The circular No. J-20012/1/2006-IA.11 (M) dated 27th May, 2009 issued by Ministry of Environment, Forest and Climate Change shall also be referred in this regard for its compliance.

(iii) Regular monitoring of ground water level and quality shall be carried out in and around the mine lease area by establishing a network of existing wells and constructing new piezometers during the mining operations. The monitoring of ground water levels shall be carried out four times a year i.e. pre-monsoon, monsoon, post-monsoon and winter. The ground water quality shall be monitored once a year, and the data thus collected shall be sent regularly to MOEFCC/RO.

(iv) Monitoring of water quality upstream and downstream of water bodies shall be carried out once in six months and record of monitoring data shall be maintained and submitted to the Ministry of Environment, Forest and Climate Change/Regional Office.

(v) Ground water, excluding mine water, shall not be used for mining operations. Rainwater harvesting shall be implemented for conservation and augmentation of ground water resources.

(vi) Catch and/or garland drains and siltation ponds in adequate numbers and appropriate size shall be constructed around the mine working, coal heaps & OB dumps to prevent run off of water and flow of sediments directly into the river and water bodies. Further, dump material shall be properly consolidated/ compacted and accumulation of water over dumps shall be avoided by providing adequate channels for flow of silt into the drains. The drains/ ponds so constructed shall be regularly de-silted particularly before onset of monsoon and maintained properly. Sump capacity should provide adequate retention period to allow proper settling of silt material. The water so collected in the sump shall be utilised for dust suppression and green belt development and other industrial use. Dimension of the retaining wall constructed, if any, at the toe of the OB dumps within the mine to check run-off and siltation should be based on the rainfall data. The plantation of native species to be made between toe of the dump and adjacent field/habitation/water bodies.

(vii) Adequate groundwater recharge measures shall be taken up for augmentation of ground water. The project authorities shall meet water requirement of nearby village(s) after due treatment conforming to the specific requirement (standards).

(viii) Industrial waste water generated from CHP, workshop and other waste water, shall be properly collected and treated so as to conform to the standards prescribed under the standards prescribed under Water Act 1974 and Environment (Protection) Act, 1986 and the Rules made there under, and as amended from time to time. Adequate ETP /STP needs to be provided.

(ix) The water pumped out from the mine, after siltation, shall be utilized for industrial purpose *viz.* watering the mine area, roads, green belt development *etc.* The drains shall be regularly desilted particularly after monsoon and maintained properly.

(x) The surface drainage plan including surface water conservation plan for the area of influence affected by the said mining operations, considering the presence of river/rivulet/pond/lake etc, shall be prepared and implemented by the project proponent. The surface drainage plan and/or any diversion of natural water courses shall be as per the approved Mining Plan/EIA/EMP report and with due approval of the concerned State/GoI Authority. The construction of embankment to prevent any danger against inrush of surface water into the mine should be as per the approved Mining Plan and as per the permission of DGMS or any other authority as prescribed by the law.

(xi) The project proponent shall take all precautionary measures to ensure riverine/riparian ecosystem in and around the coal mine up to a distance of 5 km. A rivarine/riparian

ecosystem conservation and management plan should be prepared and implemented in consultation with the irrigation / water resource department in the state government.

(d) Noise and Vibration monitoring and prevention

(i) Adequate measures shall be taken for control of noise levels as per Noise Pollution Rules, 2016 in the work environment. Workers engaged in blasting and drilling operations, operation of HEMM, etc shall be provided with personal protective equipments (PPE) like ear plugs/muffs in conformity with the prescribed norms and guidelines in this regard. Adequate awareness programme for users to be conducted. Progress in usage of such accessories to be monitored.

(ii) Controlled blasting techniques shall be practiced in order to mitigate ground vibrations, fly rocks, noise and air blast etc., as per the guidelines prescribed by the DGMS.

(iii) The noise level survey shall be carried out as per the prescribed guidelines to assess noise exposure of the workmen at vulnerable points in the mine premises, and report in this regard shall be submitted to the Ministry/RO on six-monthly basis.

(e) Mining Plan

(i) Mining shall be carried out under strict adherence to provisions of the Mines Act 1952 and subordinate legislations made there-under as applicable.

(ii) Mining shall be carried out as per the approved mining plan (including Mine Closure Plan) abiding by mining laws related to coal mining and the relevant circulars issued by Directorate General Mines Safety (DGMS).

(iii) No mining shall be carried out in forest land without obtaining Forestry Clearance as per Forest (Conservation) Act, 1980.

(iv) Efforts should be made to reduce energy and fuel consumption by conservation, efficiency improvements and use of renewable energy.

(f) Land reclamation

(i) Digital Survey of entire lease hold area/core zone using Satellite Remote Sensing survey shall be carried out at least once in three years for monitoring land use pattern and report in 1:50,000 scale or as notified by Ministry of Environment, Forest and Climate Change(MOEFCC) from time to time shall be submitted to MOEFCC/Regional Office (RO).

(ii) The final mine void depth should preferably be as per the approved Mine Closure Plan, and in case it exceeds 40 m, adequate engineering interventions shall be provided for sustenance of aquatic life therein. The remaining area shall be backfilled and covered with thick and alive top soil. Post-mining land be rendered usable for agricultural/forestry purposes and shall be diverted. Further action will be treated as specified in the guidelines for Preparation

of Mine Closure Plan issued by the Ministry of Coal dated 27th August, 2009 and subsequent amendments.

(iii) The entire excavated area, backfilling, external OB dumping (including top soil) and afforestation plan shall be in conformity with the "during mining"/" post mining" land-use pattern, which is an integral part of the approved Mining Plan and the EIA/EMP submitted to this Ministry. Progressive compliance status vis-a-vis the post mining land use pattern shall be submitted to the MOEFCC/RO.

(iv) Fly ash shall be used for external dump of overburden, backfilling or stowing of mine as per provisions contained in clause (i) and (ii) of subparagraph (8) of fly ash notification issued vide SO 2804 (E) dated 3rd November, 2009 as amended from time to time. Efforts shall be made to utilize gypsum generated from Flue Gas Desulfurization (FGD), if any, along with fly ash for external dump of overburden, backfilling of mines. Compliance report shall be submitted to Regional Office of MoEF&CC, CPCB and SPCB.

(v) Further, it may be ensured that as per the time schedule specified in mine closure plan it should remain live till the point of utilization. The topsoil shall temporarily be stored at earmarked site(s) only and shall not be kept unutilized. The top soil shall be used for land reclamation and plantation purposes. Active OB dumps shall be stabilised with native grass species to prevent erosion and surface run off. The other overburden dumps shall be vegetated with native flora species. The excavated area shall be backfilled and afforested in line with the approved Mine Closure Plan. 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 and Climate Change/ Regional Office.

(vi) The project proponent shall make necessary alternative arrangements, if grazing land is involved in core zone, in consultation with the State government to provide alternate areas for livestock grazing, if any. In this context, the project proponent shall implement the directions of Hon'ble Supreme Court with regard to acquiring grazing land.

(g) Green Belt

(i) The project proponent shall take all precautionary measures during mining operation for conservation and protection of endangered/endemic flora/fauna, if any, spotted/reported in the study area. The Action plan in this regard, if any, shall be prepared and implemented in consultation with the State Forest and Wildlife Department.

(ii) Greenbelt consisting of 3-tier plantation of width not less than 7.5 m shall be developed all along the mine lease area as soon as possible. The green belt comprising a mix of native species (endemic species should be given priority) shall be developed all along the major approach/ coal transportation roads.

(h) Public hearing and Human health issues

(i) Adequate illumination shall be ensured in all mine locations (as per DGMS standards) and monitored weekly. The report on the same shall be submitted to this ministry & it's RO on six-monthly basis.

(ii) The project proponent shall undertake occupational health survey for initial and periodical medical examination of the personnel engaged in the project and maintain records accordingly as per the provisions of the Mines Rules, 1955 and DGMS circulars. Besides regular periodic health check-up, 20% of the personnel identified from workforce engaged in active mining operations shall be subjected to health check-up for occupational diseases and hearing impairment, if any, as amended time to time.

(iii) Personnel (including outsourced employees) working in core zone shall wear protective respiratory devices and shall also be provided with adequate training and information on safety and health aspects.

(iv) Implementation of the action plan on the issues raised during the public hearing shall be ensured. The project proponent shall undertake all the tasks/measures as per the action plan submitted with budgetary provisions during the public hearing. Land oustees shall be compensated as per the norms laid down in the R&R policy of the company/State Government/Central Government, as applicable.

(v) The project proponent shall follow the mitigation measures provided in this Ministry's OM No. Z-11013/5712014-IA.I1 (M) dated 29th October, 2014, titled 'Impact of mining activities on habitations-issues related to the mining projects wherein habitations and villages are the part of mine lease areas or habitations and villages are surrounded by the mine lease area'.

(i) Corporate Environment Responsibility

(i) The company shall have a well laid down environmental policy duly approve by the Board of Directors. The environmental policy should prescribe for standard operating procedures to have proper checks and balances and to bring into focus any infringements/deviation/violation of the environmental/forest/wildlife norms/conditions. The company shall have defined system of reporting infringements/deviation/violation of the environmental/forest/wildlife norms/conditions and/or shareholders/stake holders.

(iii) A separate Environmental Cell both at the project and company head quarter level, with qualified personnel shall be set up under the control of senior Executive, who will directly to the head of the organization.

(iv) Action plan for implementing EMP and environmental conditions along with responsibility matrix of the company shall be prepared and shall be duly approved by competent authority. The year wise funds earmarked for environmental protection measures shall be kept in separate account and not to be diverted for any other purpose. Year wise progress of implementation of action plan shall be reported to the Ministry/Regional Office along with the Six Monthly Compliance Report.

(v) Self environmental audit shall be conducted annually. Every three years third party environmental audit shall be carried out.

(j) Miscellaneous

(i) The project proponent shall make public the environmental clearance granted for their project along with the environmental conditions and safeguards at their cost by prominently advertising it at least in two local newspapers of the District or State, of which one shall be in the vernacular language within seven days and in addition this shall also be displayed in the project proponent's website permanently.

(ii) The copies of the environmental clearance shall be submitted by the project proponents to the Heads of local bodies, Panchayats and Municipal Bodies in addition to the relevant offices of the Government who in turn has to display the same for 30 days from the date of receipt.

(iii) The project proponent shall upload the status of compliance of the stipulated environment clearance conditions, including results of monitored data on their website and update the same on half-yearly basis.

(iv) The project proponent shall monitor the criteria pollutants level namely; PM_{10}, SO_2, NOx (ambient levels) or critical sectoral parameters, indicated for the projects and display the same at a convenient location for disclosure to the public and put on the website of the company.

(v) The project proponent shall submit six-monthly reports on the status of the compliance of the stipulated environmental conditions on the website of the ministry of Environment, Forest and Climate Change at environment clearance portal.

(vi) The project proponent shall follow the mitigation measures provided in this Ministry's OM No. Z-11013/5712014-IA.II (M) dated 29th October, 2014, titled 'Impact of mining activities on habitations-issues related to the mining projects wherein habitations and villages are the part of mine lease areas or habitations and villages are surrounded by the mine lease area'.

(vii) The project proponent shall submit the environmental statement for each financial year in Form-V to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently and put on the website of the company.

(viii) The project authorities shall inform to the Regional Office of the MOEFCC regarding commencement of mining operations.

(ix) The project authorities must strictly adhere to the stipulations made by the State Pollution Control Board and the State Government.

(x) The project proponent shall abide by all the commitments and recommendations made in the EIA/EMP report, commitment made during Public Hearing and also that during their presentation to the Expert Appraisal Committee.

(xi) No further expansion or modifications in the plant shall be carried out without prior approval of the Ministry of Environment, Forests and Climate Change.

(xii) Concealing factual data or submission of false/fabricated data may result in revocation of this environmental clearance and attract action under the provisions of Environment (Protection) Act, 1986.

(xiii) The Ministry may revoke or suspend the clearance, if implementation of any of the above conditions is not satisfactory.

(xiv) The Ministry reserves the right to stipulate additional conditions if found necessary. The Company in a time bound manner shall implement these conditions.

(xv) The Regional Office of this Ministry 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.

(xvi) The above conditions shall 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, Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules, 2016 and the Public Liability Insurance Act, 1991 along with their amendments and rules made their under and any other orders passed by the Hon'ble Supreme Court of India / High Courts and any other Court of Law relating to the subject matter.

5. The proponent shall abide by all the commitments and recommendations made in the EIA/EMP report as well as during presentation to the EAC. All the commitments made on the issues raised during public hearing shall also be implemented by the EC in letter and spirit.

6. The proponent shall obtain all necessary clearances/approvals that may be required before the start of the project. The Ministry or any other competent authority may stipulate any further condition for environmental protection. The Ministry or any other competent authority may stipulate any further condition for environmental protection.

7. Any appeal against this Environment Clearance (EC) 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.

8. The coal company/project proponent shall be liable to pay the compensation against illegal mining, if any, and as raised by the respective State Governments at any point of time, in terms of the orders dated 2nd August, 2017 of Hon'ble Supreme Court in WP (Civil) No.114/2014 in the matter of 'Common Cause Vs Union of India & others.

9. The concerned State Government shall ensure no mining operations to commence till the entire compensation for illegal mining, if any, is paid by the project proponent through their

respective Department of Mining & Geology, in strict compliance of the judgment of Hon'ble Supreme Court.

10. This Environment Clearance (EC) shall not be operational till such time the project proponent complies with the above said judgment of Hon'ble Supreme Court, as applicable, and other statutory requirements.

11. All the conditions stipulated in Environment Clearance vide Ministry's letter No. J-11015/10/95-IA.II (M) dated 24th December, 2002, 22nd March, 2018, 28th March, 2019, 10th January, 2020 and 2nd March, 2021.

This issues with the approval of the competent Authority

(Lalit Bokolia)
Director

Copy to: -

1. The Secretary, Ministry of Coal, Shastri Bhawan, New Delhi
2. The APPCF, Regional office (EZ), Ministry of Environment, Forest and Climate Change, A-31, Chandrashekhapur, Bhubaneshwar-751023 (Odisha)
3. The Secretary, Department of Environment & Forests, Government of Orrisa, Secretariat Bhubaneshwar (Odisha).
4. The Chairman, Central Ground Water Board (CGWB), Jamnagar House, 18/11, Man Singh Road Area, New Delhi, Delhi 110001
5. The Member Secretary, Central Pollution Control Board, CBD-cum-Office Complex, East Arjun Nagar, Delhi - 32
6. The Chairman, Orissa State Pollution Control Board, Parivesh Bhawan, A/118 Nilkanthnagar, Unit VIII, Bhubaneshwar-751012 (Odisha)
7. The District Collector, Sundargarh, Government of Odisha
8. Monitoring File /Record File
9. PARIVESH Portal

(Lalit Bokolia)
Director

Signature Not Verified
Digitally signed by Lalit Bokolia
Scientist F
Date: 2/14/2022 4:50:54 PM

ମହାନଦୀ କୋଲଫିଲ୍ଡସ ଲିମିଟେଡ
महानदी कोलफील्ड्स लिमिटेड
Mahanadi Coalfields Limited
(A Subsidiary of Coal India Limited)

OFFICE OF THE GENERAL MANAGER
BASUNDHARA AREA
AT/PO BASUNDHARA - 770076, DIST SUNDARGARH (ORISSA)
06621-286133(O), 286166(R) PBX 286141 Fax- 286144
Email id cgm-basa mcl@nic in
Website www mcl gov in

कोल इण्डिया लिमिटेड
Coal India Limited

Ref.No. MCL/GM/BA/ES-43/2019-20/ 386 Date: 09.12.2019

To,

General Manager (P&P)
MCL HQ, SBP

Sub: **Revision of land details of Kulda Expansion OCP (18.75 MTY) in MP & MCP**

Dear Sir,

This is in continuation to letter no. MCL/GM/BA/ES-43/2019-20/271 dt. 11.09.2019, the following data is to be rectified in the Mining Plan for Kulda Expansion OCP 18.75 MTY :

Existing Mining Lease Area : 634.20 Ha (Phase-I)
Proposed Mining Lease Area : 921.30 Ha (Phase-II) – (**Excluding land diverted for Basundhara Washery i.e. 8.52 Ha of Forest Land.**)
Incremental Area : 295.62 Ha

Type of Land involved in the incremental area of 295.62 Ha
Forest Land : 134.69 Ha
Non Forest Land : 160.93 Ha

Details of changes in the new mining plan compared to earlier approval

		Old Plan	New Plan	Remarks
(i)	Non Forest Area (Ha)	406.31	567.24	
(ii)	Forest Area (Ha)	227.89	354.06	8.52 Ha rediverted for Basundhara Washery
(iii)	Lease Area (Ha)	634.20	921.30	

The copy of revised abstract of land duly authenticated by Tahasildar Hemgir is attached herewith.

This is for your kind information and necessary action.

Yours faithfully

General Manager
Basundhara Area, MCL

Copy to :

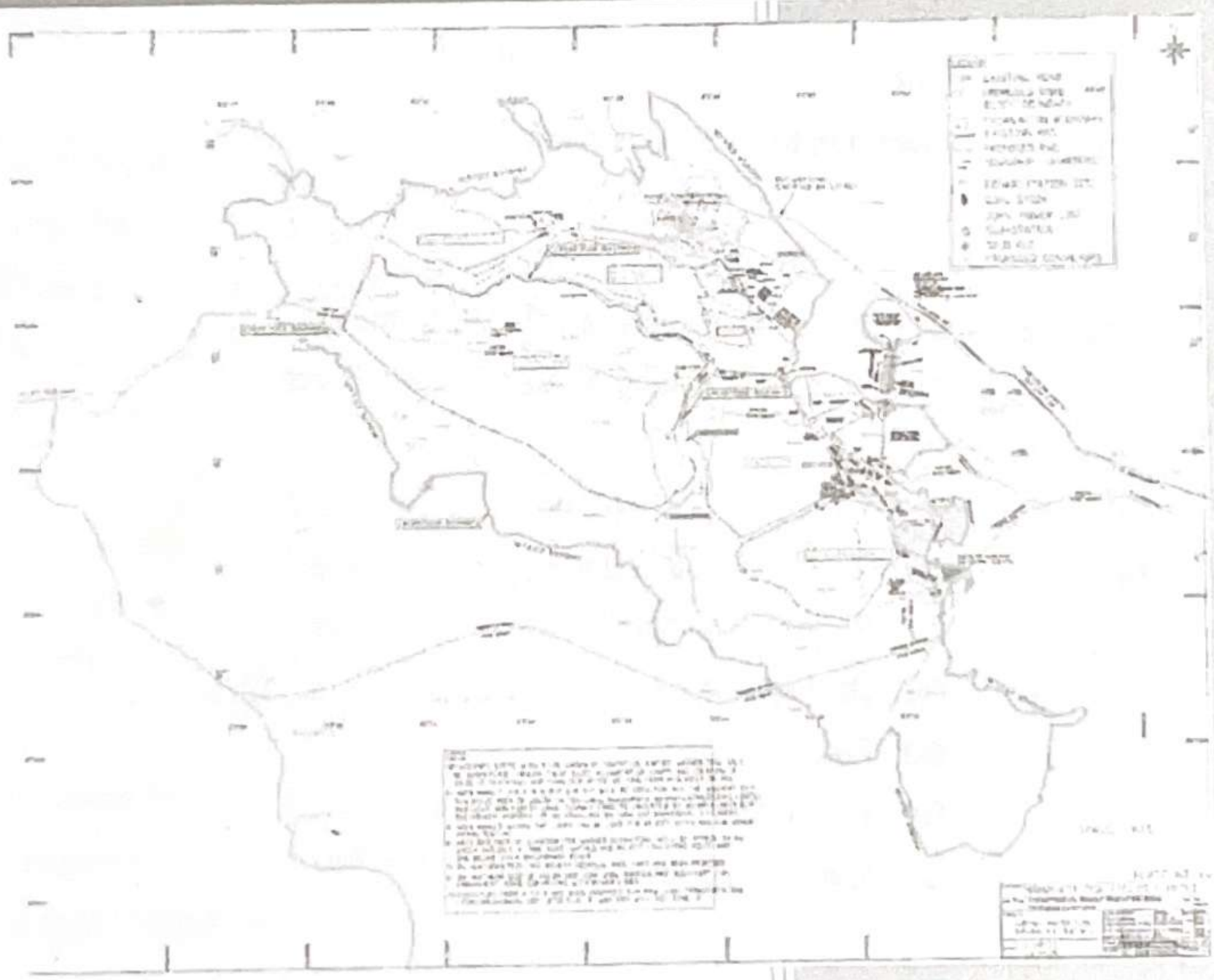
- TS to DT(P&P), MCL
- Project Officer, KOCP

Central Mine Planning and Design Institute Limited
(*A Subsidiary of Coal India Limited*)
Regional Institute – VII
Plot No.E-4, Opp. Gandhi Park, Samantapuri, P.O.:RRL,
Bhubaneswar – 751013, Odisha, India
Phone (+91-0674)2392627, 2394143 (EPBX) and 2393471
Fax(+91-0674)2394357
Cable MINEPLAN, E-Mail:ri7@cmpdi.co.in

Annexure - VI

BASUNDHARA RIVER MANAGEMENT PLAN

A Strategic Framework for conservation of Basundhara river from coal mining



Client :

DBL – Siarmal Coal Mines Pvt Ltd

Consultant:

Kalinga Commercial Corporation Limited,
C-112,Housing Board Colony,
Baramunda,
Bhubaneswar-751003

Objective :

The overall objective of Basundhara River Management Plan (BRMP) is to have a plan and vision to develop an integrated approach for the protection of the Basundhara river from the mining in both the left side and right side of the said river and its tributaries namely Chatudhara nalla and Chattajor nalla .

The BRMP will guide to implement the mitigating measures systematically to take care of the negative impacts of open cast coal mining along both the sides of Basundhara river and it's catchment for protection and conservation of Basundhara river system as a whole in a sustainable manner. The BRMP is embedded in the central idea pertaining to maintenance of river health standard which is crucial to enhance livability and productivity in the mining area.

Table of Contents :

Project Officer
Siarmal OCP
Mahanadi Coalfields Limited

KALINGA COMMERCIAL CORPORATION LTD. * BHUBANESWAR

A : River and Mining Development

The following coal mines are located adjacent to the Basundhara river system. Out of these, Siarmal open cast mine(OCP) and Basundhara (West) extension OCP are upcoming mines whereas the Basundhara (West) expansion OCP, Kulda OCP and Garjanbahal OCP are in operation .The date of opening of the mines in operation as well as other details are given in the **table-1**.

Table-1

Name of mine	Siarmal OCP	Basundhara (West) Expansion OCP	Basundhara (West) Extension OCP	Kulda OCP	Garjanbahal OCP
Mining lease area (ha)	2290.449	437.100	323.920	634.205	653.830
Date of opening	Upcoming	16.02.2004	Upcoming	07.12.2007	24.05.2018
Present level of production (in MT)	N.A.	0.94	N.A.	21.00	15.60
Average day production (in MT)	N.A.(50MT PA)	2575.34	N.A.(8.75 MTPA)	57534.25	42739.73
Location in respect to Basundhara river	Left side	Right side	Right side	Left side	Left side
Land use	Attached herewith	Attached herewith	Attached herewith	Attached herewith	Attached herewith

The index map is attached as **Drg.1**

Project Officer
Siarmal OCP
Mahanadi Coalfields Limited

KALINGA COMMERCIAL CORPORATION LTD. * BHUBANESWAR

B1 : Design philosophy of BRMP framework

In view of meeting the overall objective of Basundhara River Management Plan (BRMP) so as to protect Basundhara river from the ongoing and proposed mining adjacent to the river, the design philosophy of BRMP is to prepare a plan and vision to develop an integrated approach with suitable mitigating measures and interventions in a holistic manner for the protection of the Basundhara river from the mining in the open cast mines given in Table-1.

B2 : Impacts of Coal Mining on Basundhara River

1. Drying of the river
2. Decreasing the carrying capacity of the river
3. Breaching of river embankments
4. Change of course of the river
5. Change of quality of river water

B2.1 Drying of the river:

Due to open excavation of deep pits ,the water of the river may be diverted to such pits through seepage or leakage and may dry

Decreasing the carrying capacity of the river by reducing it's cross section ;

Overburden of organic material and soil overlie a mineral deposit. Overburden generation is denoted by stripping ratio which is the ratio of overburden that needs to be removed to the amount of ore removed .Low stripping ratio translates into low quantities of waste. Mining operation also results in excavation of large quantities of top soil. Poor storage of these overburden and top soil can lead to runoff and ultimately reaches the river and partly deposited inside the river reducing the cross section of the river thus reducing the carrying capacity of the river..

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Mahanadi Coalfields Limited

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B2.2 Breaching of river embankments

The presence of deep cuts/pits adjacent to the river embankments may endanger the stability of the embankments initiating slip circles on the country sides .The embankments may be more vulnerable to such breaching during floods due to high water level inside the river.

B2.3 Change of course of river

A number of open cast mines may create a continuous path for the flow of water leading to change of the course of the river.

B2.4 Change of quality of river water

I) Due to water;

Open cast mines involve the removal of top soils ,overburden and interburden between seams as well as stacking and transportation of coals. The surface water from precipitation and the runoff generated out of the precipitation comes in contact with the stacks of these top soil, overburden , interburden and coals in and around the mining area and get contaminated. The contaminated surface water finally enters into the river making the river water polluted.

II) Due to air;

Most of the mining operations such as Drilling, Blasting , Excavation, Collection ,Transportation and Handling of coal with vehicular movement on haul roads ,Screening, Sizing, Segregation and Storage etc. generate Fugitive Dust. A coal stack of 50000 tonnes can generate 250 tonnes of dust out of which around 1.25 tonne (@ 0.5%) is fugitive dust. The dusts will come in contact with river water creating pollution of water.

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Mahanadi Coalfields Limited

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Annexure-VIII

Cost estimation(approximate) for strengthening of Basundhara river,Chatudhara Nalla and Chattajor Nalla

Sl.No.	Name of stream	Length (m)	Height of left embankment (m)	Top width (m)	Slope of bank (for 1 m vertical)	Bottom width (m)	Quantity (cum)	River side slope length (m)	Slope surface area (sqm)	Country side slope length (m)	Slope surface area (sqm)
Left embankment											
1	Chatudhara Nalla	4535	3	5	1.5	14	129247.5	15.8	71653	5.408	24525.28
2	Chattajor Nalla	6014	3	5	1.5	14	171399	6.5	39091	5.408	32523.71
3	Basundhara river from RD 17.365km upto RD 20.865 km	3500	4	5	1.5	17	154000	22.2	77700	7.211	25238.5
4	Basundhara river from RD 20.865 km to 24.50 km	3635	4	5	1.5	17	159940	31.4	114139	7.211	26211.99
3	Basundhara river from RD 24.5 km to 31.05 km	6550	5	5	1.5	20	409375	32.3	211565	9.014	59041.7
Right embankment											
1	Chatudhara Nalla	4535	3	5	1.5	14	129247.5	9.5	43082.5	5.408	24525.28
2	Chattajor Nalla	6014	3	5	1.5	14	171399	7.5	45105	5.408	32523.71
3	Basundhara river from RD 17.365km upto RD 20.865 km	3500	3	5	1.5	14	99750	21.5	75250	5.408	18928
4	Basundhara river from RD 20.865 km to 24.50 km	3635	3	5	1.5	14	103597.5	30.5	110867.5	5.408	19658.08

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Siarmal OCP
Talabira Coalfields Limited

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3	Basundhara river from RD 24.5 km to 31.05 km	6550	3	5	1.5		14	186675	29.7	194535	5.408	35422.4
					Total	=		1714630.5		982988		298598.6

Sl.No	Item of work	Qty	Unit	Rate(Rs.)		Amount(Rs.)
1	Rate of earthwork in filling per cum with compaction upto 95% at OMC	1714631	Cum	350	=	600120675
2	Providing Geo mattress on river side slopes for slope protection alongwith the launching apron	982988	Sqm	2000	=	1965976000
3	Providing dub grass turfing on country side slopes for slope protection	298598.6	Sqm	70	=	20901905.43
4	Providing bathing ghats on the banks of Basundhara river	20	no	1000000	=	20000000
				Total	=	2606998580
					or say	261.00 Crores

Project Officer
Siarmal OCP
Hariadi Coalfields Limited

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Annexure - VII

COAL EVACUATION PLAN

In the proposed project all the coal has been planned to be dispatched through belt and further loading through SILO. For implementation of the same the dispatch arrangement is divided into three phases.

The details of the same along with timeline are given below:

PHASE	EVACUATION SYSTEM	STATUS
Phase - I	Commissioning of Sardega Rapid Loading System (RLS) (20.0 MTPA with 2.0 km Conveyor Belt)	Already started and is under trial and commissioning.
Phase-II	Commissioning of additional 5.42 Km pipe conveyor from Kulda-Garjanbahal to Sardega RLS (12.5 MTPA)	Under Tendering Stage. Expected to be commissioned By Dec-2025.
Phase-III	Commissioning of Barpalli Bulb loop with belt conyeying from inpit to Barpali Bulb (90 MTPA capacity SILOs / RLS with conveyor arrangement)	Under Tendering Stage. Expected to be commissioned By Dec-2025.
Phase-IV	Construction of Basundhara Washery of 15 MTPA and connecting it with Kulda-Barpali line.	Expected to be commissioned by Mar-2026.

Production Matrix

The PR capacity of Integrated Kulda-Garjanbahal OCP is 40 MTY. The Mining plan is under preparation and as per the guidelines for Mine Plan & Mine Closure Plan, the targeted capacity shall be 150% of the rated capacity i.e. 60 MTY. The Basundhara (W) extension OCP, for which EC/FC is under process, will require 8.75 MTY coal dispatch system through environment friendly method. In view of the above the overall production capacity of Integrated Kulda-Garjanbahal OCP and Basundhara (W) extension OCP stands at 68.75 MTY for which mechanized dispatch arrangements are to be planned.

Total Production Capacity=68.75 MTY.

Proposed Dispatch Arrangement

1. **Part-I:**
   A. **Raw Coal Circuit-** This circuit shall be planned to handle 28 MTY of raw coal consisting of the following provisions-
   - Independent Receiving Arrangements-TRH (28 MTY)
   - Truck Loading Station (4 MTY)
   - Overground bunker of 30,000-40,000 Te storage capacity

- Evacuation of raw coal through 2 nos. of 4000 te RCC SILOs to handle 24 MTY i.e. 2X12 MTY at Barpali bulb.
- The coal evacuation shall be done through 02 nos of parallel conveyor streams.

B. **Circuit for washery-** This circuit shall be planned to handle 15 MTY of raw coal consisting of the following provisions-

- Independent Receiving Arrangement-TRH (15 MTY)
- Overground bunker of 20,000 Te storage capacity
- Evacuation of washed coal through 1 no. of 4000 te RCC SILOs to handle washed coal of 12 MTY (approx.) at Barpali bulb.
- The coal evacuation shall be done through 02 nos of parallel conveyor streams.
- There will be provision for 02 nos of Transfer Houses, one for feeding raw coal of 15 MTY to proposed washery and other for receiving washed coal of 12 MTY (approx.). Hence, the circuit before tapping of raw coal to washery shall be designed for 15 MTY. The washed coal circuit from washery upto SILO shall be designed to handle 12 MTY (approx.) of coal.
- The arrangement shall be so designed that in case of non-operation/maintenance of washery, there shall be bypass arrangement so that this circuit can handle 12 MTY of raw coal from TRH to SILO.
- In case provision of Overhead ground Bunker is to be kept for washed coal storage i.e. after receipt of washed coal, then the capacity of individual raw coal feeding conveyor should be kept @70% of the total coal feeding qty in order to avoid commitment charges . Further two way chutes provision should be made for both raw coal feeding and Washed coal receiving arrangement at the transfer houses for increased system reliability.

- One no. of bridge of sufficient width along the side of Belt conveyor shall also be included in the scope this contract across Basundhara River.
- A separate substation 3X12.5MVA(tentative) 33/6.6KV and 33KV overhead line from 220/33 kv substation shall be planned to cater the power demands of the circuits mentioned at Part-I A & B.

2. **Part-II :**

Washery Unit - A washery to handle 15 MTY of raw coal is proposed with the following provisions-

- 02 nos of parallel conveyors shall tap raw coal from the transfer house as mentioned in Part 1.B to the washery before bunker. The scope of raw coal receiving conveyor from the Transfer house by two parallel conveyors and Discharge of Washed coal by two parallel conveyors and construction of transfer house for washed coal conveyors will be in the scope washery operator.

- Washery shall be constructed with sufficient capacity of raw coal bunker and Washed coal bunker inside the washery considering the capacity of washed coal bunker (20000 Te) in the CHP circuit.
- From the washery, 12MTY washed coal shall be delivered to the next transfer house for onward evacuation through SILO at Barpali bulb as mentioned earlier at Part 1.B. The feeding conveyor to washery and washed coal conveyor from washery shall be taken up in the scope of part-II.
- Additional provision of Truck Loading Station of 4 MTY shall be designed for unloading of washed coal onto trucks as per requirement.
- A separate substation 2X10 MVA(tentative) 33/6.6KV and a 33KV overhead line from 220/33 KV sub-station shall be planned to cater the power demands of the circuits mentioned at Part-II.
- This washery arrangement along with TLS deliberated under part-II will be dedicated for washery and may be taken up through a single comprehensive work by Washery Department.
- Necessary sampling and belt weigher arrangement is to be provided on the coal feeding conveyor to washery
- CMPDIL may explore Possibility for supply of raw coal from Raw Coal Circuit (A) 28 MTY to circuit for Washery 15 MTY by suitable means in case of emergency.

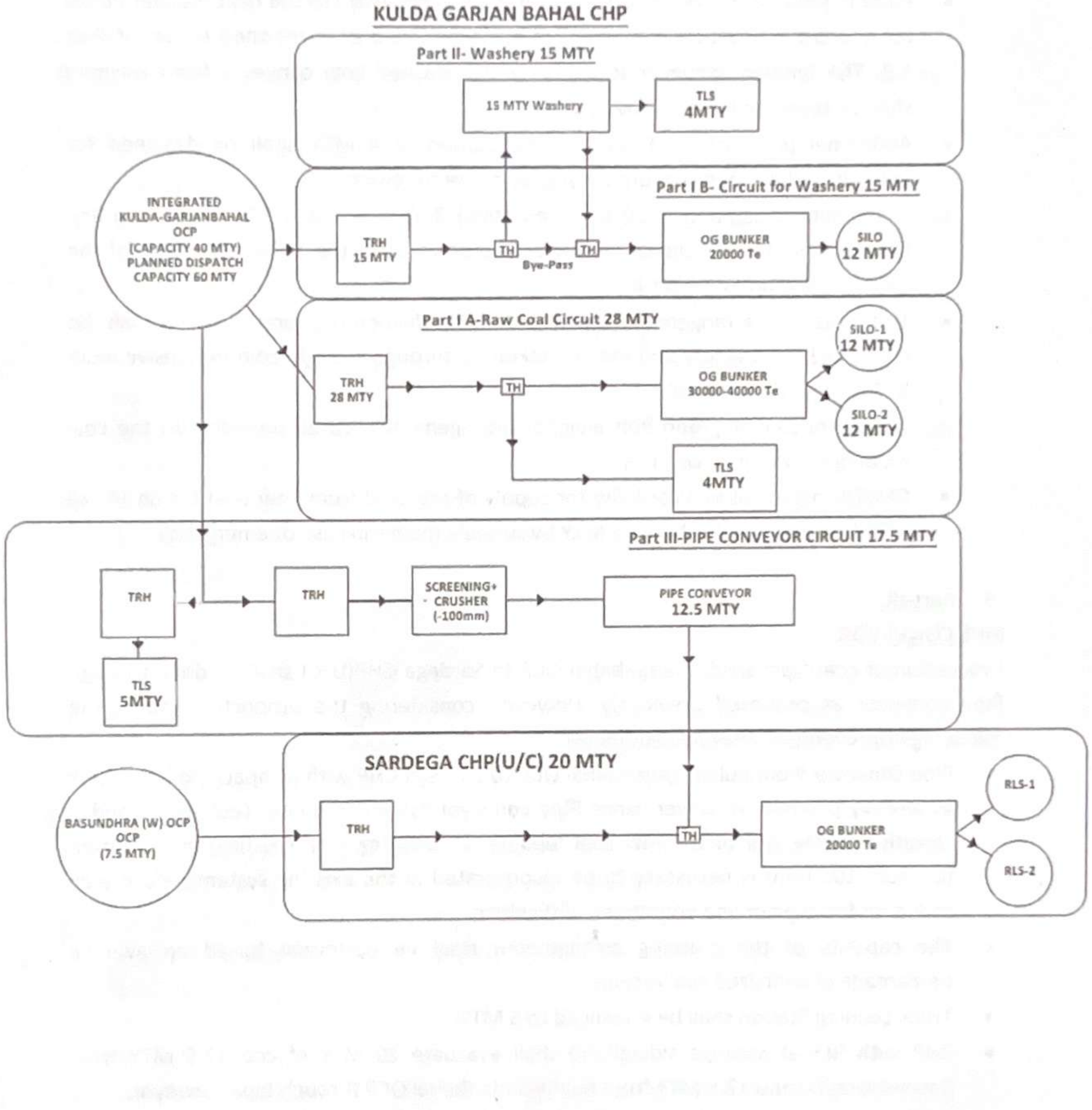
3. **Part-III:**

PIPE CONVEYOR:

Evacuation of coal from Kulda-Garjanbahal OCP to Sardega CHP(U/C) shall be done through Pipe conveyor as proposed previously. However, considering the production matrix the following improvements may be considered:

- Pipe conveyor from Kulda-Garjanbahal OCP to Sardega CHP with a capacity of 12.5 MTY as already planned. However, since Pipe conveyor System is a new Technology and is sensitive to the size of the raw coal feeding, a screening cum crushing arrangement (output=-100 mm) is necessary to be incorporated in the existing system before pipe conveyor for overcoming operational difficulties.
- The capacity of the crushing arrangement shall be optimized based on average percentage of oversized coal receipt.
- Truck Loading Station shall be enhanced to 5 MTY.
- CHP with RLS at Sardega siding(U/c) shall evacuate 20 MTY of coal (7.5 MTY from Basundhara(W) and 12.5 MTY from Kulda-Garjanbahal OCP through Pipe conveyor.
- A separate substation 2X5 MVA(tentative) 33/6.6KV and 33KV overhead line from 220/33 kv sub-station shall be planned to cater the power demands of the circuits mentioned at Part-III.

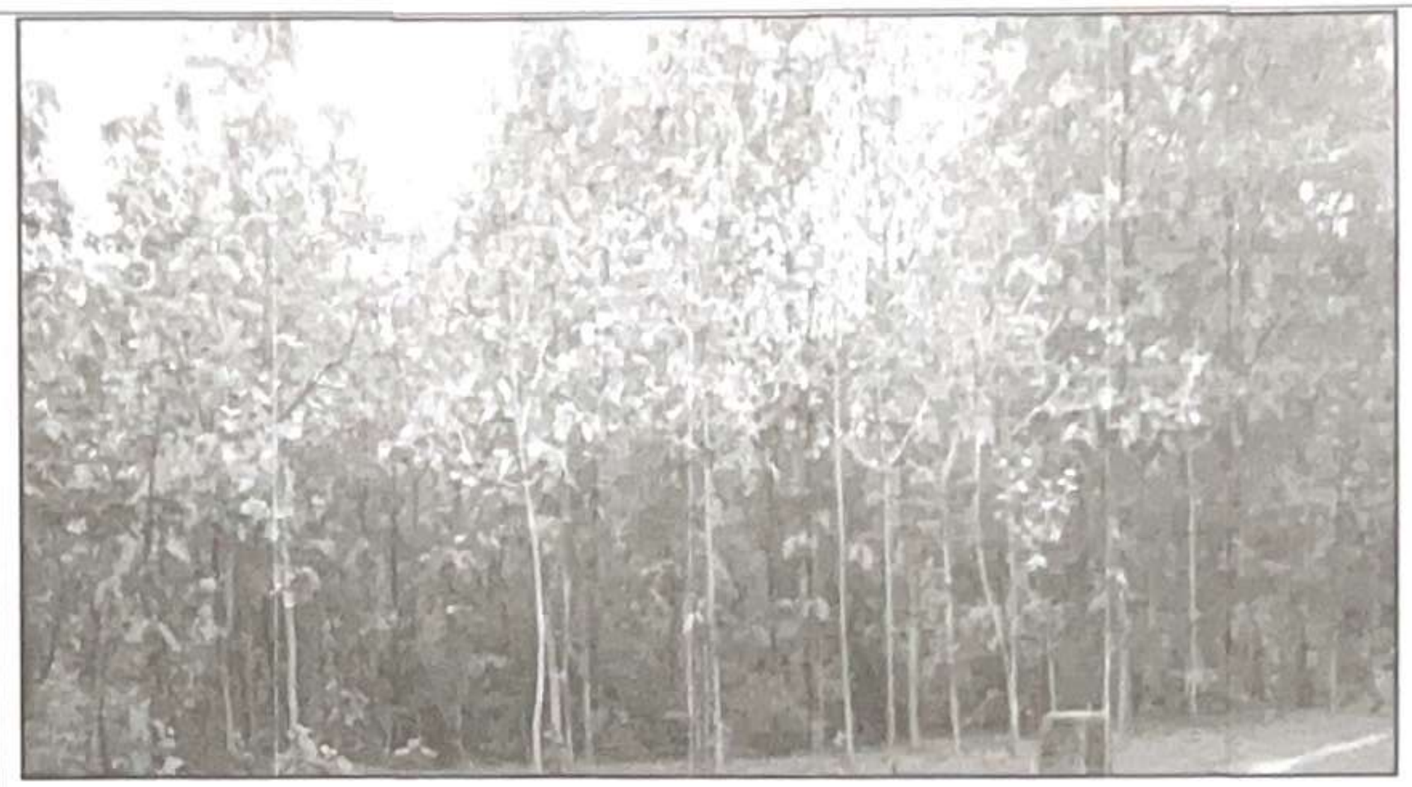
4. The tentative coal flow diagram of circuits mentioned at part-I A & B, Part-II & Part -III for a total evacuation capacity of 68 MTY mentioned above has been depicted below-



Compliance report of conditions laid down in FC Stage II with respect to Kulda OCP, issued vide no. – 8-176/1997-FC, Date – 08.08.2007

S. No	FC conditions (General, Specific & Others)	Compliance Report	Status
1	Legal status of the diverted forest land shall remain unchanged.	The legal status of the diverted forest land remains unchanged.	Complied
2	Compensatory afforestation shall be raised and maintained by the state forest department at the project cost. Fencing, protection and regeneration of the safety zone area (7.5 meters strip all along the outer boundary of the mining lease area) shall be done at the project cost. Besides this, afforestation on degraded forest land, to be selected elsewhere, measuring one and a half times the area under safety zone, shall also be done at the project cost. Wherever possible and technically feasible, the User Agency shall undertake afforestation measures in the blanks within the lease area, as well as along the roads outside the lease area diverted under this approval, in consultation with the state forest department at the project cost.	Compensatory Afforestation has been done already in an area of 459.01Ha at project cost (Kumkani R.F. & Dhangergudi R.F. (455.78 Ha + 3.23 Ha. (SZ)=459.01 Ha) in Ujalpur & Lephripada Range of Sundargarh Forest Division at a cost of Rs. 67.50 Lakhs.   	Being Complied

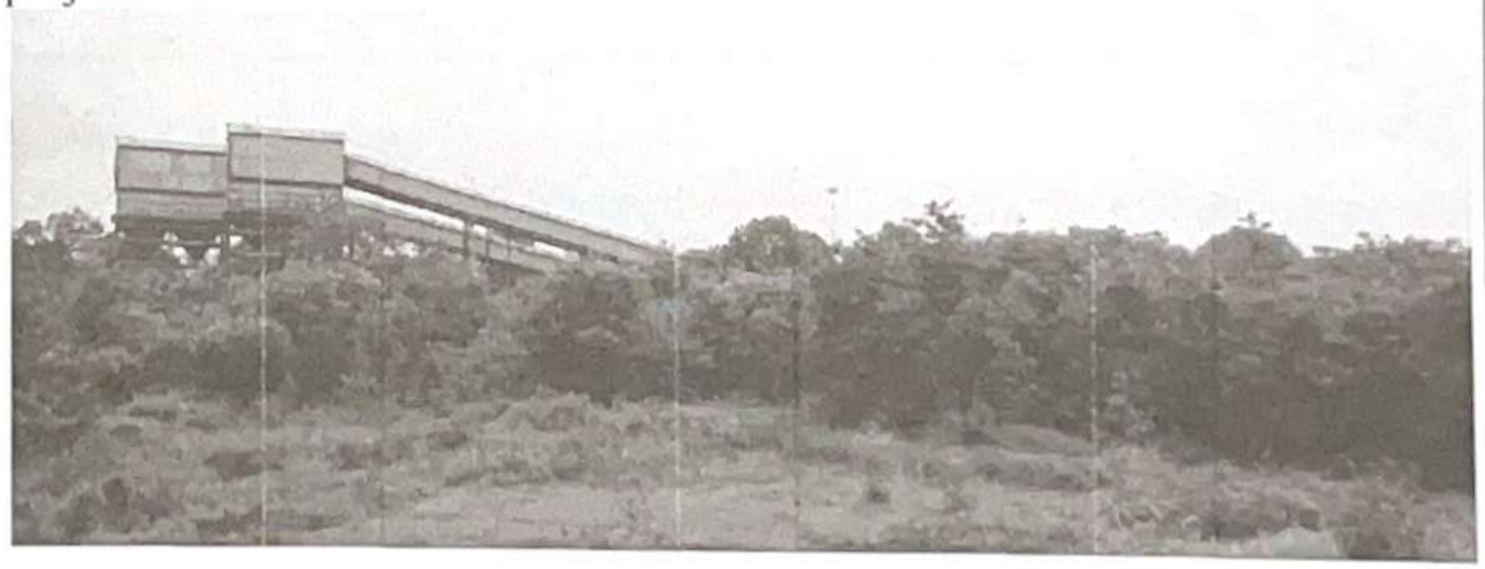
Annexure - VIII



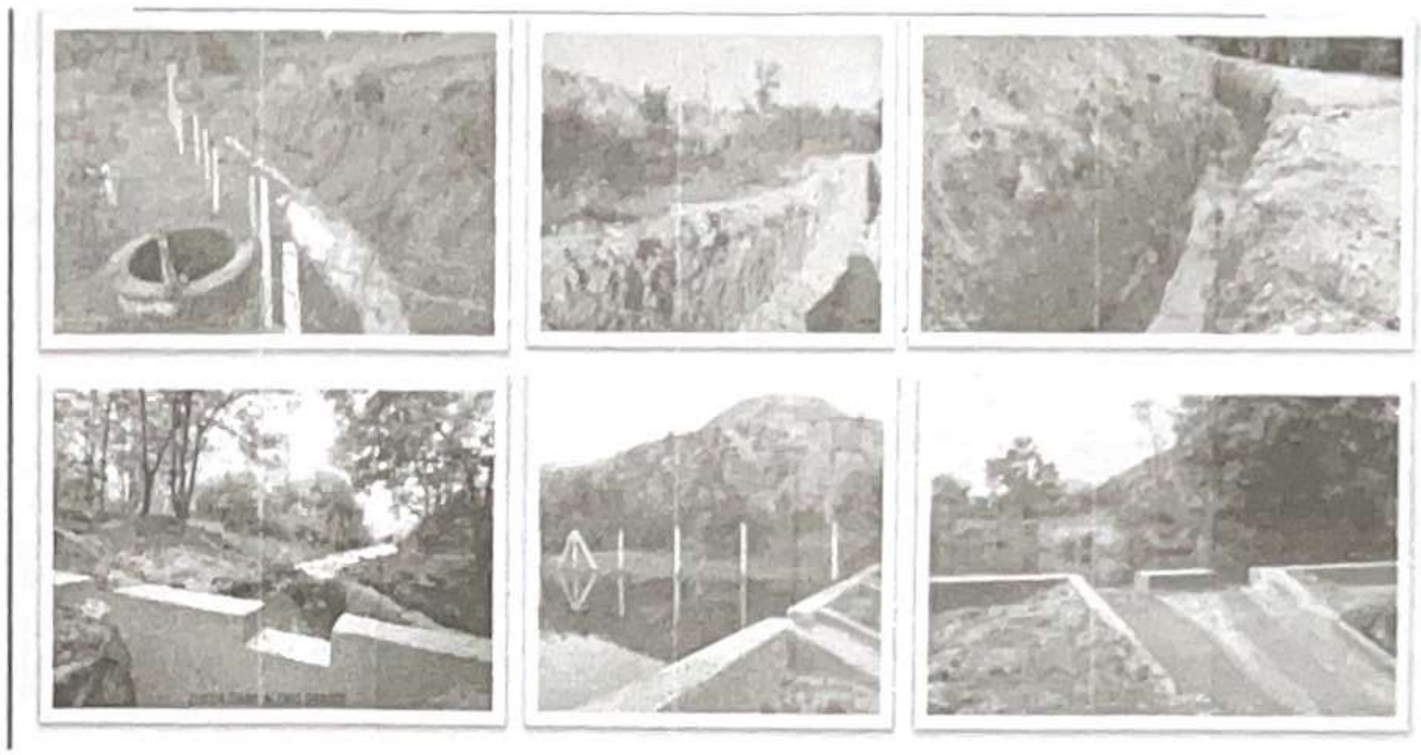
Apart from the above, Kulda has done the following external plantation works :

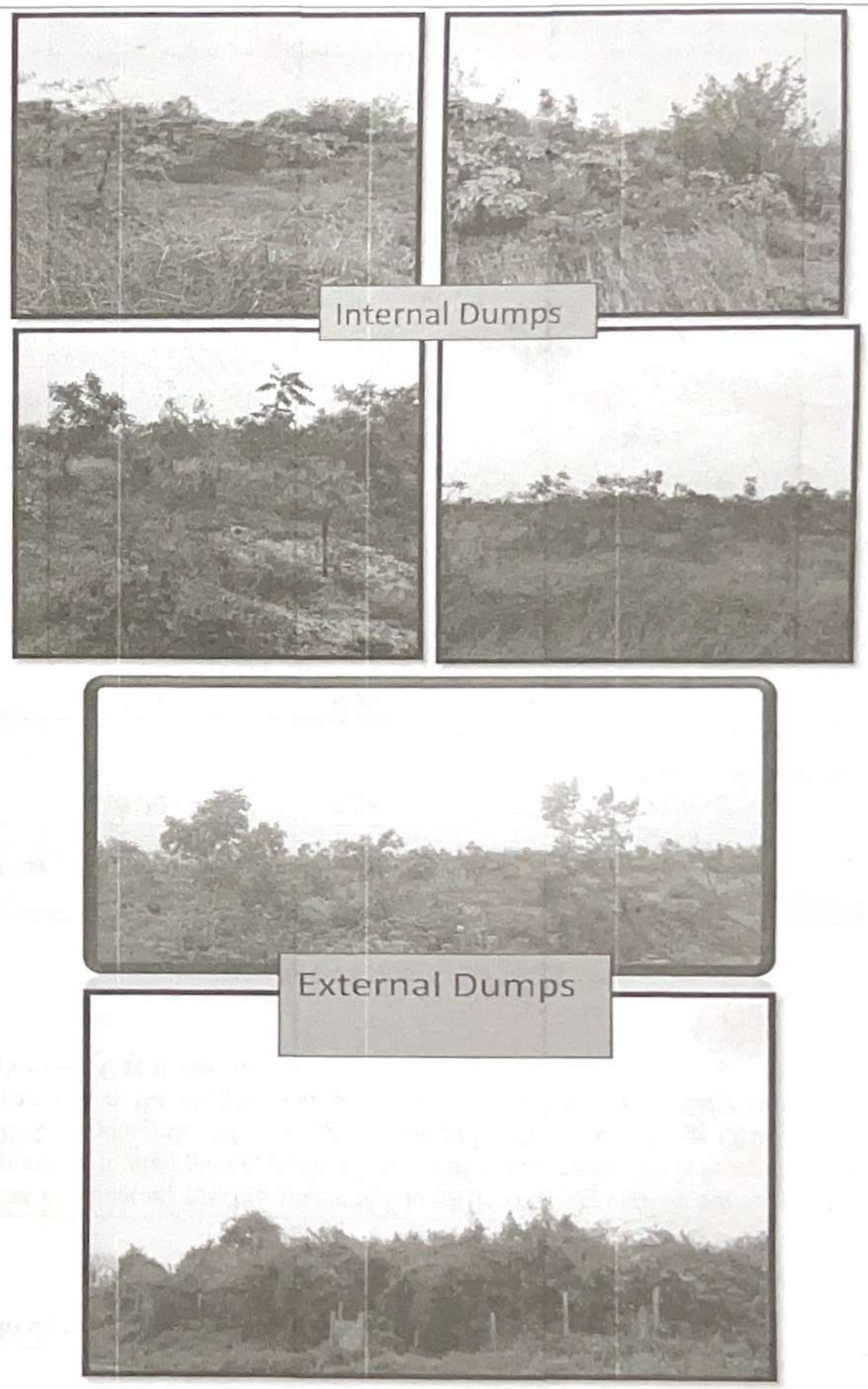
Location	Number of plants	Area	Cost Involved
Plantation in the villages Taparia, Kaletpani, Hemgir & Lephripada	1,00,000	62.5 Ha	3.32 Crores
Miyawaki Plantation at Sundargarh	80,000	10 Ha	5.70 Crores

Fencing, protection and regeneration of the safety zone area (7.5 meters strip all along the outer boundary of the mining lease area) has been done at the project cost.



			
3	Following activities shall be undertaken by the state forest government at the project cost: Proper Mitigative measures to minimize soil erosion and choking of streams shall be prepared and implemented. Planting of adequate drought hardy plant species and sowing of seeds to arrest soil erosion. Construction of check dams, retention walls/toe walls to arrest sliding down of the excavated material along the contour.	The total runoff generated over the overburden dumps is collected back in the mine sump inside the mine which acts as settling ponds. This water is reused for dust suppression. The drains are regularly de-silted and maintained. 5.81 km long garland drain with check dams has been constructed to channelize runoff from the dump to the groundwater recharge pit. RCC Retaining wall of length 604 m has been constructed at the foot of external OB Dump. Gabion wall of length 450m was constructed around internal dump. 	Complied

<table>
<tr><td></td><td></td><td> 
Fig : Garland Drains around Dumps with Check Dams</td><td></td></tr>
<tr><td>4</td><td>The period of diversion under this approval shall be twenty (20) years subjected to possession of valid lease by User Agency under the MMDR Act, 1957.</td><td>The project commenced on 2007 and the FC is valid till 2027.</td><td>Complied</td></tr>
<tr><td>5</td><td>The user agency shall take up planting work on the static dumps during the advance mining operations.
All the dumps shall be fully reclaimed by afforestation immediately after closure of the mines in the shortest possible period under supervision of the State Forest Department.</td><td>There is only one active external OB dump at present and reclamation of the same is under progress. Progressive reclamation is under progress in internal dumps as well. All the dumps will be fully reclaimed after closure of the mine.
<table><tr><td>Area of Internal Backfilled dump Technically Reclaimed till now</td><td>25.69 Ha</td></tr><tr><td>Area of Internal Backfilled dump Biologically Reclaimed till now</td><td>22.69 Ha</td></tr><tr><td>Area of External OB dump biologically reclaimed</td><td>33.18 Ha</td></tr></table></td><td>Assured to comply</td></tr>
</table>


Internal Dumps
External Dumps

<table>
<tr><td>6</td><td>Any tree felling shall be done only when it is absolutely necessary and unavoidable, and that too under strict supervision of the State Forest Department.</td><td>The tree felling has been done in 6 phases only when required, under the strict supervision of DFO, Sundargarh. The tree felling work has been executed by the OFDC as per the work order given by DFO Sundargarh.</td><td>Complied</td></tr>
<tr><td>7</td><td>The user agency shall ensure that no damage to the flora and fauna of the area is caused.</td><td>No damage to the flora and fauna of the area has been caused.</td><td>Complied</td></tr>
<tr><td>8</td><td>Reclamation plan shall be strictly implemented which shall be monitored regularly by the State Forest Department. The user agency shall submit progress report of reclamation works to the State Forest Department and the regional office, Bhubaneswar.</td><td>The reclamation process under Kulda OCP is being carried out as per the approved mining plan in progressive manner. The plantation is being done by DFO, Sundargarh and is being monitored by the Forest Range Officer. The progress in the reclamation work is being submitted to the regional of MoEF&CC at Bhubaneswar at a frequency of six months.

DETAILS OF PLANTATION DONE FOR RECLAMATION OF LAND
<table><tr><th>Year</th><th>Area</th><th>Number of Plants</th><th>Location</th></tr><tr><td>2019-20</td><td>3.36</td><td>8400</td><td>Internal Backfilled Area + External OB Dump</td></tr><tr><td>2020-21</td><td>5.23</td><td>13075</td><td>Internal Backfilled Area</td></tr><tr><td>2022-23</td><td>14.3</td><td>35780</td><td>Internal Backfilled Area</td></tr><tr><td>2023-24</td><td>22.4</td><td>56000</td><td>External OB Dump</td></tr></table>
PLANTATION PLANNED TO TAKEN UP IN 2024-25
<table><tr><th>Area</th><th>Number of Plants</th><th>Location</th></tr><tr><td>25.39 Ha</td><td>48476</td><td>Kulda External OB Dump Slope Plantation</td></tr><tr><td>6 Ha</td><td>15000</td><td>Kulda – Internal Dump (3.5 Ha),</td></tr></table></td><td>Being complied</td></tr>
</table>

				Ext Dump (2 Ha) & Slope (0.5Ha)	
		Total	**63476**		
9	It shall be ensured that no labour camps are set up inside the forest area.	No camps have been set up within the forest area.			Complied
10	The mining lease area shall be demarcated on ground at the project cost, using four feet high RCC pillars, with each pillar inscribed with the serial number, forward and backward bearings and distance between two adjacent pillars.	Complied			Complied
11	The forest land shall not be used for any purpose other than that specified in the proposal.	The Forest land of 8.52 Ha has been processed for re-diversion for Basundhara Washery and stage-I clearance has been obtained accordingly vide no. - 8-176/1997-FC (Vol.), date – 11.03.2019. And the remaining forest area of 219.37 Ha is only used for the purpose specified in the proposal.			Complied
12	The forest land thus diverted shall be non-transferable. Whenever and whatever extent of forest land is not required by the user agency, it shall be surrendered to the state forest department after proper rehabilitation under intimation to this ministry.	Shall be complied as per the progress of the mines.			Assured to comply
13	Any other condition that the CCP (central), Regional, Bhubaneswar, may impose from time to time for protection of flora and fauna in the forest area, shall also be applicable.	Noted and agreed to comply.			Assured to comply

26/7/2024

Project Officer
Kulda OCP
MCL, Basundhara Area

26/07/2024

Annexure - IX

महानदी कोलफील्डस लिमिटेड
Mahanadi Coalfields Limited
(A subsidiary of Coal India Limited)

Office Of The Project Officer,
Kulda OCP, Basundhara Area
At/PO:-Balinga-770076
Dist:-Sundargarh (Orissa)
FAX: 06621-286144

Ref.No. : MCL/GM/BA/KOCP/

Dated : 26.07.2024

UNDERTAKING

It is undertaken that, R&R in respect of all the villages Balinga, Bankibahal, Kulda, Siarmal, Tumulia and 09 other villages have already been undertaken by the Claims Commission, set up by the Hon'ble Supreme Court of India in SLP© 6933 of 2007.

The approval from Ministry of Tribal affairs, Government of India for Rehabilitation and Resettlement has been sought for and it is hereby undertaken that the same will be submitted as soon as it is obtained.

26/7/2024

Project Officer
Kulda OCP
Basundhara Area, MCL