

|   |  |   |
|---|--|---|
|  <p>एक महारत्न कंपनी<br/>A Maharatna Company</p> | <p><b>CENTRAL COALFIELDS LIMITED</b><br/>(Govt. of India Undertaking)<br/>A miniratna Cat-I Company<br/>Darbhanga House, Ranchi-834001</p> |  |
|---|--|---|

पत्रांक: GM/E&F/2022/249

दिनांक: 19.04.2022

To,  
**Member Secretary (Coal Mining)**  
**Ministry of Environment Forest and Climate Change,**  
**Govt. of India**  
**Indira Paryavaran Bhawan**  
**3<sup>rd</sup> Floor, Vayu Wing, Jor Bagh Road**  
**New Delhi-03**

**Subject: Submission of Additional Details Sought (ADS) for considering the proposal for Environmental Clearance for Kathara Opencast Project (1.9 MTPA) in an area of 773.23 Ha of M/s Central Coalfields Limited; located in village: Kathara, Block- Bermo, District- Bokaro, Jharkhand – Reg.**

**Ref No: 1) Proposal No: IA/JH/CMIN/179534/2020**  
**2) MoM of 27<sup>th</sup>(A) EAC (Coal Mining Projects) held on 03.03.2022**

Respected Sir,

This has reference to the above subject. The proposal of Environmental Clearance of Kathara Opencast Project was submitted vide proposal no: IA/JH/CMIN/179534/2020 and it was considered in the 27<sup>th</sup> (A) EAC (Coal Mining Projects) held on 03.03.2022. The Expert Appraisal Committee (EAC) has sought additional details in respect of the proposal as per the minutes issued on 13.03.2022

The reply of additional details of Kathara OCP is being submitted along with all relevant annexures & photographs for further consideration and perusal.

As such, it is requested to accept the reply to the additional details sought and consider the proposal in the ensuing EAC meeting scheduled on 25-26.04.2022.

**Enclosed: Detailed reply of additional details along with relevant annexures & photographs**

Yours faithfully,

  
(Soumitra Singh)

GM(E&F)

Central Coalfields Limited  
Ranchi

**Reply to the observation of EAC in respect of Kathara OCP as sought during EAC meeting held on 03.03.2022**

| SN | OBSERVATION of EAC  | COMPLIANCE   |
|----|---|--|
| i  | PP shall revise damage assessment and its remedial action plan for violation on account of excess production on following points:   | The damage assessment and its remedial action plan has been revised and the point-wise compliance is submitted below:  |
| a. | PP has obtained EC for this project on 8/01/2014 for an ML area of 798.21 ha which was valid upto 07/01/2017 and whereas the present proposal is for 773.23 ha. It needs proper explanation for the reduced area. | <ol style="list-style-type: none"> <li>1. The prior environment clearance of Kathara OCP was issued on 08.01.2014 for an area of 792.81 Ha. As per the EC letter, the existing washery was included in the Infrastructure head of EC granted to the Kathara OCP.</li> <li>2. Subsequently, a fresh proposal of setting up of New Kathara Coking Coal Washery was submitted to MoEF&amp;CC on 12.10.2018. Accordingly, ToR was issued on 15.03.2019.</li> <li>3. During appraisal of the proposal of New Kathara Coking Coal Washery, Expert Appraisal Committee (EAC), MoEF&amp;CC directed that area proposed for washery shall be kept outside the mine plan of Kathara OCP.</li> <li>4. Accordingly, a revised mining plan and mine closure plan of Kathara OCP in an area of 773.23 Ha was prepared excluding the area of existing and New Kathara Washery. The revised mine plan &amp; mine closure plan was approved on 04.05.2020. MoM of EAC &amp; approval of mining plan is enclosed at <b><u>Annexure-I.</u></b> MoEF&amp;CC has granted EC to New Kathara Coking Coal Washery on 15.01.2021.</li> <li>5. As per the direction of MoEF&amp;CC, a fresh proposal for consideration of Kathara OCP for ToR was made on 17.10.2020 on the basis of the revised mine plan &amp; mine closure plan in an area of 773.23 Ha only.</li> </ol> <p>As such the area of the project is revised from earlier 792.81 Ha to 773.23 Ha.</p> |
| b. | The total production under violation shall be considered from 08/01/2017 to January 2022 and accordingly damage calculation to be revised.  | The damage calculation has been revised considering the total production under violation during the period-08.01.2017 to January 2022. The revised DAR and NCRAP is being attached as <b><u>Annexure-II.</u></b>   |
| c. | Economic benefit accrual shall be revisited and certified by finance department.  | The certified copy of Economic benefit accrual is enclosed as <b><u>Annexure-III.</u></b>  |
| d. | Air Environment-Damage: The emissions shall be considered for all the violation years, without comparison/base year and shall be revised accordingly.   | The emission & damage calculation has been revised for all the violation years and is provided in Section: 13.3.3.2 of the revised DAR and NCRAP at <b><u>Annexure-II.</u></b>   |
| e. | Water: The rates for GW shall be revised as per CGWA Notification of Sept 2020 for abstraction as well as compensation.   | The rate for GW has been revised as per CGWA Notification of Sept 2020 for abstraction as well as compensation. The details are provided in Section:13.3.3 of the revised DAR and NCRAP at <b><u>Annexure-II.</u></b>  |
| f. | Surface water rates shall be revised as per the deficiency in provision of SW structures.   | The surface water rates has been revised as per the deficiency in provision of SW structures. The details are provided in Section:13.3.3 of the revised DAR and NCRAP at <b><u>Annexure-II.</u></b>  |
| g. | The activities enumerated under Remediation, NRAP and CRAP shall be revised based on the need based survey and further shall be specific, monitor-able besides revising the target period for two years.          | 1. The activities under Remediation, NRAP and CRAP has been revised & is made specific along with monitorable timelines. The activity proposed are based on the socio-economic assessment carried out  |

| SN | OBSERVATION of EAC | COMPLIANCE   |
|----|--------------------|--|
|    |                    | <p>during Baseline data generation, issues raised during public hearing and consultation with local stakeholders.</p> <p>2. The proposed activities shall be completed in three years.</p> |



**Meeting with Mukhiya of nearby villages**

|    |   |  |
|----|---|--|
| h. | Water balance for STP and ETP shall be revised and submitted and water conservation plan to be drawn. | <ol style="list-style-type: none"> <li>1. The water balance for STP &amp; ETP has been revised and resubmitted at <b><u>Annexure-IV.</u></b></li> <li>2. The water conservation plan is provided in the revised EIA/EMP.</li> </ol>  |
| i. | Provision of RWH structures in the colony shall be submitted  | <ol style="list-style-type: none"> <li>1. Roof top rain water harvesting system has been provided at P.O. Office of Kathara OCP and in about 100 quarters in the residential colonies of Kathara area.</li> <li>2. Moreover, it has been proposed in the EIA-EMP to construct 03 additional RWH structures worth Rs. 25 Lakh at 03 locations (Pit Office, Mine Rescue Station and Kathara Rest House). The proposed action plan is given below:</li> </ol> |

| SN | Work                  | Location   | Tentative Cost (in Rs Lakhs) | Expected Date of start of Work | Expected Date of completion of Work |
|----|-----------------------|--|------------------------------|--------------------------------|-------------------------------------|
| 1  | Rain Water Harvesting | <ol style="list-style-type: none"> <li>1. Pit Office</li> <li>2. Mine Rescue Station</li> <li>3. Kathara Rest House</li> </ol> | 25                           | June-22                        | Sep-22                              |



**Rain Water Harvesting system at Kathara PO Office**

|    |   |  |
|----|---|--|
| j. | Compliance status of municipal solid waste generated, as per SWM Rules 2016, shall be | a) The CCL colonies and establishments fall under bulk waste generator or waste generator category. At |
|----|---|--|

| SN | OBSERVATION of EAC | COMPLIANCE  |
|----|--------------------|---|
|    | submitted.         | <p>present, total waste is being collected through an outsourcing agency for disposal at a landfill site.</p> <p>b) A vermi-composting plant for treatment of bio-degradable waste generated from colonies &amp; nearby habitations is proposed under NCRAP at a cost of Rs 45 Lakhs.</p> <p>c) It is proposed to carry out awareness programs for disposal of e-waste in command area of Kathara.</p> <p>d) The tentative waste generated from the colonies of CCL is given below:</p> |

| Location   | Total No. of Houses/<br>office Buildings | Estimated<br>no.of People | Per capita MSW to be<br>generated in kg/head/day | Total Waste to be<br>generated in<br>kg/day |
|--|--|---------------------------|--|---|
| Residential Colony   | 794                                      | 3176                      | 0.3 kg/capita/day                                | 952.8                                       |
| Office   | 3  | 750                       | 0.5 kg/day/employee                              | 375   |
| <b>Total MSW to be Generated in kg/day</b>                       |  |                           |  | <b>1327.8</b>                               |
| <i>Source: Municipal Solid Waste Management Manual By CPHEEO</i> |  |                           |  |   |

|     |   |  |
|-----|---|--|
| k.  | Cost saved due to the above a/c for the violation years shall be added to CRAP and likewise cost saved EMP also.  | Assessment of EMP cost saved during the period of violation has been assessed and 3% of the total cost saved has been accounted in CRAP. Revised DAR and NCRAP is being attached as <b>Annexure-II.</b>  |
| i.  | Penalties as per SOP of violation shall be submitted apart from damage assessment and natural remediation measures.   | <ol style="list-style-type: none"> <li>It is submitted that the project has not exceeded the EC capacity of 0.96 / 1.9 MTPA till 2016-17 since grant of EC or coal production of 1993-94 (0.9 MTPA) afterwards. The mine was also operated within the same project area of 773.23 Ha.</li> <li>The Form-I of Kathara OCP was submitted on 17.10.2020 &amp; ToR of Kathara OCP was issued on 27.04.2021. Accordingly, it is submitted that the process of regularization of violation of Kathara OCP has started prior to the issuance of SOP of violation.</li> <li>Also, the coal production of the mine is stopped since 01.01.2022 due to non-renewal of CTO as per the ToR letter issued on 27.04.2021.</li> <li>It is therefore requested that penalty as per SOP of violation may be waived for this specific case.</li> </ol> |
| ii  | The total damage cost mentioned in the EIA report is 359.59 Lakhs; Total fund proposed for remediation measures 34,799,000, Total cost proposed for Natural & Community Resource Augmentation Measures is 7,200,000, which is to be revised as per recommendation mentioned above | The activities under Remediation, NRAP and CRAP has been revised as per the recommendation. Revised DAR and NCRAP is being attached as <b>Annexure-II.</b>   |
| iii | PP shall submit Status of Credible action taken by Project Proponent by State Government.   | <ol style="list-style-type: none"> <li>Jharkhand State Pollution Control Board (JSPCB) has been requested vide letter no: HOD(Env.)/2021/1097 Dated: 15.11.2021 for taking necessary action in this regard.</li> <li>Member Secretary, JSPCB has directed Regional Officer, Dhanbad to take necessary action. The letter is attached at <b>Annexure-V.</b></li> </ol>  |
| iv  | PP also to provide IRO Certified Compliance Report of previous EC dated 08 January, 2014  | The office of IRO, MoEF&CC, Ranchi was requested vide letter no GM-Env & Forest/2022/209 dated 01.04.2022 to carry out inspection and provide certified compliance report. The letter is attached at <b>Annexure-VI.</b> Inspection is expected shortly.   |
| v   | Status of Wild Life Conservation approval may be  | 1. The wild-life conservation plan of Kathara OCP has  |

| SN | OBSERVATION of EAC  | COMPLIANCE   |
|----|---|--|
|    | providing along with clarification of budget reflected in Form-2 @ Rs.80 lacs vs Rs.34 lacs given presentation. | <p>been submitted to Divisional Forest Officer, Bokaro. The receiving of Wildlife Conservation Plan for Schedule-I species is enclosed at <b>Annexure-VII.</b></p> <p>2. As per Form-II uploaded earlier on 26.10.2021, the total fund provision of Rs 85 Lakhs has been made. However, the fund provision was revised and in the Form-II uploaded on 28.02.2022, a capital cost of Rs 15 Lakhs &amp; revenue cost of Rs. 19 Lakhs/year for the balance life of the project was proposed.</p> <p>3. The breakup of proposal activities along with budgetary provisions is given below:</p> |

| SN       | Description   | Amount in Lakhs (Rs) |
|----------|---|----------------------|
| <b>A</b> | <b>Capital cost</b>   |                      |
| 1        | Afforestation program   | Covered in EIA & EMP |
| 2        | Artificial nests, feeding and watering arrangement for birds                                    | 5.00                 |
| 3        | Construction of water holes & check dams etc.   | 10.00                |
|          | <b>Sub Total amount</b>   | <b>15.00</b>         |
| <b>B</b> | <b>Revenue expenditure / Year</b>   |                      |
| 1        | Afforestation program   | Covered in EIA & EMP |
| 2        | Food facility for animals (Grass land development)  | 2.00                 |
| 3        | Drinking water arrangement by tanker  | 2.00                 |
| 4        | Protection arrangements for animals (Fencing, alongwith operation and maintenances)             | 3.00                 |
| 5        | Training program for villagers  | 2.00                 |
| 6        | Awareness program, Sign boards, cultural program to create awareness for flora & fauna          | 1.00                 |
| 7        | Rescue center for animals   | 1.00                 |
| 8        | Man Power for protection (4 persons)  | 3.00                 |
| 9        | Financial assistance for wild animals' health care  | 1.00                 |
| 10       | Artificial nests, feeding & watering arrangement (Pots)for birds                                | 2.00                 |
| 11       | Habitat for grazing animals will be developed at suitable location in consultant with Panchayat | 2.00                 |
|          | <b>Sub Total amount</b>   | <b>19.00</b>         |
|          | <b>Grand total</b>  | <b>34.00</b>         |

|    |  |  |
|----|--|--|
| vi | PP shall submit action plan for plantation along peripheral boundary with allocated budget and timeline. | <p>1. Plantation of approx. 140.6 Ha has been carried out on vacant/undisturbed land in the past including 20 Ha of green belt &amp; Safety zone has been carried out till date.</p> <p>2. The action plan for plantation along peripheral boundary &amp; other areas is given below with allocated budget &amp; timeline.</p> <p>3. The proposed green belt plan is attached at <b>Annexure-VIII.</b></p> |
|----|--|--|



| Year                             | Green Belt & Safety Zone | Backfilled Area | External Dump | Reclaimed OB dump and Embankment | Vacant/ Undisturbed Land* | Total     |             | Cost to be incurred in Rs. Lakhs |
|----------------------------------|--------------------------|-----------------|---------------|----------------------------------|---------------------------|-----------|-------------|----------------------------------|
|                                  | Area (Ha)                | Area (Ha)       | Area (Ha)     | Area (Ha)                        | Area (Ha)                 | Area (Ha) | Trees (000) |                                  |
| Plantation carried out till date | 20                       | 0               | 5             | 50                               | 65.6                      | 140.6     | 351500      |                                  |
| Y1                               | 12.5                     | 0               | 0             | 0                                | 0                         | 12.5      | 31250       | 375                              |

| SN  | OBSERVATION of EAC |              |               |              | COMPLIANCE  |               |                |                |  |
|---|--------------------|--------------|---------------|--------------|-------------|---------------|----------------|----------------|--|
| Y2  | 12.5               | 0            | 0             | 0            | 0           | 12.5          | 31250          | 375            |  |
| Y3  | 0                  | 0            | 0             | 12           | 0           | 12            | 30000          | 42             |  |
| Y4  | 0                  | 0            | 0             | 12.09        | 0           | 12.09         | 30225          | 42.315         |  |
| Y5  | 0                  | 0            | 15            | 0            | 0           | 15            | 37500          | 52.5           |  |
| Y6  | 0                  | 0            | 15            | 0            | 0           | 15            | 37500          | 52.5           |  |
| Y7  | 0                  | 0            | 0             | 0            | 0           | 0             | 0              | 0              |  |
| Y8  | 0                  | 0            | 0             | 0            | 0           | 0             | 0              | 0              |  |
| Y9  | 0                  | 20           | 0             | 0            | 0           | 20            | 50000          | 70             |  |
| Y10                                       | 0                  | 20           | 15            | 0            | 0           | 35            | 87500          | 122.5          |  |
| Y11                                       | 0                  | 20           | 15            | 0            | 0           | 35            | 87500          | 122.5          |  |
| Y12                                       | 0                  | 25           | 0             | 0            | 0           | 25            | 62500          | 87.5           |  |
| Post Closure Y1                           | 0                  | 25           | 0             | 0            | 0           | 25            | 62500          | 87.5           |  |
| Post Closure Y2                           | 0                  | 25           | 20            | 0            | 0           | 45            | 112500         | 157.5          |  |
| Post Closure Y3                           | 0                  | 25.9         | 24.53         | 0            | 0           | 50.43         | 126075         | 176.505        |  |
| <b>Total Plantation to be carried out</b> | 25                 | 160.9        | 104.53        | 24.09        | 0           | 314.52        | 786300         | 1763.32        |  |
| <b>Grand Total</b>                        | <b>45</b>          | <b>160.9</b> | <b>109.53</b> | <b>74.09</b> | <b>65.6</b> | <b>455.12</b> | <b>1137800</b> | <b>1763.32</b> |  |



**Plantation carried out on peripheral boundary & Road side plantation**

|     |   |   |
|-----|---|---|
| vii | PP to give proof of grievance cell like creation link in web portal and whatsapp number for local people. Awareness program to be done in this regard among the local people. | <p>a) A grievance cell has been created in CCL. The link is given below:<br/> <a href="https://www.centralcoalfields.in/ccl_cmplnt/">https://www.centralcoalfields.in/ccl_cmplnt/</a></p> <p>b) For registering complaint in Samadhan, Whatsapp no.</p> |
|-----|---|---|

| SN   | OBSERVATION of EAC  | COMPLIANCE   |
|------|---|--|
| viii | PP shall provide proof of installation of CAAQMS with picture and online data linked with CPCB and SPCB and further data of piezometer should be shown.   | is 7091093753 and Toll free no. is 18003456501<br>CAAQMS & piezometer has been installed & the photographs are shown below:  |
|      |   |    |
|      | <b><u>Installed CAAQMS at Kathara</u></b>   | <b><u>Piezometer at Kathara Colliery</u></b>   |
| ix   | PP shall provide drone survey to substantiate environment compliance  | Drone Survey to substantiate environment compliance has been carried out. The details are being submitted separately through electronics means.  |
| x    | PP shall provide the receiving of Wildlife Conservation Plan for Schedule-I species and breakup of the proposed activities with budgetary provision submitted to the DFO.   | Compliance submitted in reply of Point No: v   |
| xi   | PP to provide Protection measures for the streams/nallahs from the lease area to Damodar river. The PP must take inputs by other consultant (third party) regarding the river conservation plan of Damodar River. | The detailed river & stream conservation plan is enclosed at <b><u>Annexure-IX.</u></b>  |
| xii  | Time bound action plan with budgetary provision for commitment made on the issues raised during public hearing in EIA EMP report also   | The time-bound action plan with budgetary provisions for commitment made on the issues raised in Public Hearing is enclosed at <b><u>Annexure-X.</u></b>   |
| xiii | Plan of action and allocated fund for maintenance and services to provide drinking water pipeline with fittings to the nearby villages with installed RO for 10 years.  | <p>The time-bound action plan to provide drinking water pipeline with fittings to the nearby villages with installed RO is given below:</p> <ol style="list-style-type: none"> <li>Construction of borewells with solar power operated submersible pumpset, pump house, recharge pit etc for drinking water at Asnapani.<br/><b>(Work Awarded: Timeline- FY 22-23)</b></li> <li>Construction of Bore Wells each with Solar Power operated Submersible pump set, pump house, Recharge Pit etc. for drinking water in Khetko, Hazari, Sadam Purvi, Pipra Tola<br/><b>(Work Awarded: Timeline- FY 22-23)</b></li> <li>Construction of Bore Wells each with Solar Power operated Submersible pump set, pump house, Recharge Pit etc. for drinking water in different locations of Kathara Area.<br/><b>(Under Tender Stage: Timeline – FY22-23)</b></li> <li>Construction of borewells with solar power operated submersible pumpset, pump house, recharge pit etc for drinking water at Bandh Basti<br/><b>(Under Tender Stage: Timeline – FY 22-23)</b></li> </ol> <p>c) 2 pumps of 1000 GPM capacity are deployed for</p> |


| SN  | OBSERVATION of EAC  | COMPLIANCE   |
|-----|---|--|
|     |   | <p>domestic water to Jhirki, Yadav tola, Asna pani and Bandh Basti located near project. The annual cost of operation, repair &amp; maintenance of water supply system is approximately 56 Lakhs/annum.</p> <p>e) Water filter plants for the purpose of water supply to nearby villages is already under construction under DMFT scheme by State Govt.</p> <p>The copy of NIT &amp; workorders are enclosed at <b><u>Annexure-XI.</u></b></p> |
| xiv | PP must provide the plan of action and allocated fund for maintenance and services to provide solar street light in the nearby villages and village roads | <p>1. 60-watt LED street light (250 numbers) have been installed at various junctions and community centers in nearby villages in FY 2021-22. The copy of workorder is enclosed at <b><u>Annexure-XII.</u></b></p> <p>2. Additional Provision for providing solar lights in nearby villages under CSR for FY 2022-23 has been made. The action plan is given below:</p>  |

| SN | Work  | Location                    | Tentative Cost (in Rs Lakhs) | Expected Date of start of Work | Expected Date of completion of Work |
|----|---|-----------------------------|------------------------------|--------------------------------|-------------------------------------|
| 1  | Solar lights lights in nearby villages under CSR for FY 2022-23 | Bandh Basti<br>Jhriki Basti | 9                            | Aug-22                         | Oct-22                              |



**60-watt LED street light installed near Kathara OCP**

| xv  | PP must furnish the photograph of road constructed from Muslin Tola to Yadav Tola.   | The road from Muslim Tola to Yadav Tola is under construction for for a length of approximately 1.1 KM.   |                              |                                |                                     |
|-----|--|---|------------------------------|--------------------------------|-------------------------------------|
| SN  | Work   | Length (in meter)   | Tentative Cost (in Rs Lakhs) | Expected Date of start of Work | Expected Date of completion of Work |
| 1   | Construction of Road from Muslim Tola to Yadav Tola  | 1100  | 23                           | April-22                       | June-22                             |
| xvi | Time bound action plan with budgetary provision for commitment for the construction of new bridge at Swang which has been damaged due to which the local persons have to take a diversion of 2 KM. | The iron bridge at Swang has been repaired at a cost of Rs 1.53 Lakhs. The workorder is enclosed at <b><u>Annexure-XIII.</u></b> The photograph is shown below: |                              |                                |                                     |

| SN   | OBSERVATION of EAC  | COMPLIANCE  |
|--|---|---|
|  |                    |   |
| <b>Iron Bridge repaired near Swang at an cost of Rs 1.53 Lakhs in April-22</b> |   |   |
| xvii   | PP to submit the revised EIA/ EMP report with revised Form-2 by breakup of activity proposed in CER | The text of EIA/EMP report & Form-II is enclosed at <b><u>Annexure-XIV &amp; Annexure-XV.</u></b> |

# Annexure-I

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 MoEFCC.

### **Additional Specific as the area falls under Severely Polluted Areas (SPAs)**

- (xxx) CTE/CTO for the project shall be obtained from the SPCB as required under the Air (Prevention and Control of Pollution) Act, 1981 and the Water (Prevention and Control of Pollution) Act, 1974, and the SPCB shall follow the mechanism/protocol issued by the Ministry vide letter no. Q-16017/38/2018-CPA dated 24<sup>th</sup> October, 2019 while issuing the CTE/CTO for the project, for improvement of environmental quality in the area.
- (xxxi) The green belt of at least 5-10 m width shall be developed in more than 40% (*in place of EAC recommended 33%*) of the total project area, mainly along the plant periphery, in downward wind direction, and along road sides etc. Selection of plant species shall be as per the CPCB guidelines in consultation with the State Forest Department.
- (xxxii) In addition, the project proponent shall develop greenbelt outside the plant premises such as avenue plantation, plantation in vacant areas, social forestry etc.
- (xxxiii) Monitoring of compliance of EC conditions may be submitted with third party audit every year.
- (xxxiv) The percentage the CER may be atleast 1.5 times the amount given in the OM dated 1<sup>st</sup> May, 2018 recommended by the EAC and item-wise details along with time bound action plan shall be prepared and submitted to the Ministry's Regional Office.

### **Agenda No. 53.2**

#### **New Kathara Coking coal washery of 3 MTPA capacity in an area of 11.30 ha of M/s Central Coalfields Limited located in village Bandh Tehsil Gomia District Bokaro (Jharkhand) - For Environmental Clearance – reg**

#### **[Proposal No. IA/JH/CMIN/77799/2018; F.No. IA-J-11015/98/2018-IA-II(M)]**

**53.2.1** The proposal is for environmental clearance for New Kathara Coking coal washery of 3 MTPA capacity in an area of 11.30 ha of M/s Central Coalfields Limited located in village Bandh Tehsil Gomia District Bokaro (Jharkhand).

**53.2.2** Details of the proposal, as ascertained from the proposal documents and as revealed from the discussions held during the meeting, are given as under:

- (i) The project area is covered under Survey of India Topo Sheet No. 73E/13 and is bounded by the geographical coordinates ranging from 23.75108 to 23.75527 N and longitudes 85.86821 To 85.87401 E
- (ii) Coal linkage of the project is proposed for Washed Coal(Power) Clean Coal, Reject

use for various destination.

- (iii) Proposed linkage for washed coal – SAIL, RINL- BSCS(Bokaro), DSP (Durga), RSP(Rourkela steel plant ), Bhilia steel plant, V.S.P.S(Visakhapatnam steel plant) etc. Proposed linkage for washed Coal Power DVC, SAIL, NTPC- C.T.P.S (chandrapura), K.P.S.h(Koderma), BPSCL (SAIL-DVC), TANDA(NTPC), UCR (Uchahar-NTPC), DADRI(NTPC), DSP(DURGAPUR), Bhilai Steel plant, R.S.P etc.
- (iv) Joint venture cartel has been formed- No.
- (v) Project does not fall in the Critically Polluted Area (CPA), where the MoEF&CC's vide its OM dated 13th January, 2010 has imposed moratorium on grant of environment clearance.
- (vi) Employment generation: to 1320 persons will be provided from the project.
- (vii) The project is reported to be beneficial in terms of Social, Environment, and Financial
- (viii) This is new project for which fresh Environment Clearance has been applied with proposal no. IA/JH/CMIN/77799/2018
- (ix) The plan for washery has been approved by CCL board 469<sup>th</sup> (No. 1 of 2019) meeting held on 01&02/02/2019. And communicated vide no. CS/BM/469/2019/151 dtd. 05/03/2019.
- (x) The land usage pattern of the project is as follows:

Pre-mining (Washery) land use details

(Area in Ha)

| <b>S. No.</b> | <b>Land Use</b>                   | <b>Within ML Area</b> | <b>Outside ML Area</b> | <b>Total</b> |
|---------------|-----------------------------------|-----------------------|------------------------|--------------|
| 1             | Agricultural Land                 | 2.97                  | 0.00                   | 2.97         |
| 2             | Forest Land                       | 0.00                  | 0.00                   | 0.00         |
| 3             | Wasteland                         | 8.36                  | 0.00                   | 8.36         |
| 4             | Grazing Land                      | 0.00                  | 0.00                   | 0.00         |
| 5             | Surface Water Bodies              | 0.00                  | 0.00                   | 0.00         |
| 6             | Settlements                       | 0.00                  | 0.00                   | 0.00         |
| 7             | Others (Specify)                  | 0.00                  | 0.00                   | 0.00         |
|               | Old Excavation Area (East Quarry) | 0.00                  | 0.00                   | 0.00         |
|               | Old Excavation Area (West Quarry) | 0.00                  | 0.00                   | 0.00         |
|               | Old OB Dumps                      | 0.00                  | 0.00                   | 0.00         |
|               | Roads & Mine Infrastructure       | 0.00                  | 0.00                   | 0.00         |
|               | R & R Colony                      | 0.00                  | 0.00                   | 0.00         |
|               | Staff Colony                      | 0.00                  | 0.00                   | 0.00         |
|               | Green Belt                        | 0.00                  | 0.00                   | 0.00         |
|               | Balance Area                      | 0.00                  | 0.00                   | 0.00         |
|               | <b>Total Project Area =</b>       | <b>11.33</b>          | <b>0.00</b>            | <b>11.33</b> |

- (xi) Life of mine (Washery) is 18 years.
- (xii) Transportation of coal for raw coal has been proposed from Kathara OCP, Govindpurph-II proposed washery.
- (xiii) Land use of New Kathara Coking Coal Washery Contains 0.66 Ha of green belt a part from 4.99 Ha of main plant, 5.68 Ha of stock Pile, loading bunker , dumping

reject site, slurry pond etc. Block Plantation will be developed around the Washery area of a strip of 3 m. Plantation will be done in consultation with State Forest Department.

| S. No  | Total Area | Total No. of saplings required | Average rate of 1 to 2 year old saplings (Rs.) | Total cost of saplings @ Rs. 2200 per sapling including maintenance for 4 years |
|--|------------|--------------------------------|--|---|
| <b>Green Belt Development</b>                                    |            |                                |  |   |
| <b>Roadside Plantation upto 3 kms from the proposed washery:</b> |            |                                |  |   |
| 1  | 3 Kms      | 2X300=600                      | 2150   | 12,90,000   |
| <b>Block Plantation around washery:</b>                          |            |                                |  |   |
| 2  | 0.66 Ha    | 1650                           | 110  | 1,81,500  |
| <b>Total</b>   |            |                                |  | 14,71,500 say 15 Lakhs  |

- (xiv) The amount Rs.15 Lakh has been allocated as green belt development in Air pollution control measure head. Time line: green belt is proposed to be developed within 4 years.
- (xv) No forest land is involved
- (xvi) No National Parks, Wildlife Sanctuaries and Eco-Sensitive Zones have been reported with 10 km boundary of the project.
- (xvii) The ground water level has been reported to be varying between 5.6 m to 11.54 m during pre-monsoon and between 1.48 m to 6.9 m during post-monsoon. Total water requirement for the project is 1869 KLD.
- (xviii) Application for obtaining the approval of the Central Ground Water Authority for New Kathara Coking Coal Washery has been submitted on 11<sup>th</sup> February, 2020.
- (xix) Public hearing for the project of 3 MTPA capacity in an area of 11.33 ha was conducted on 16/10/2019 at Officer Club Kathara Area, CCL, PO-Kathara District Bokoro. Major issues raised in the public hearing include employment, Electricity, Pollution control, drinking water, health etc.
- (xx) This is a new project. Consent to operate will be applied after issuance of Environment Clearance.
- (xxi) No River/nalla is flowing within boundary of lease.
- (xxii) Regular monitoring of ambient air quality is being carried out on fortnightly basis.
- (xxiii) No court cases, violation cases are pending against the project of the PP.
- (xxiv) The project does not involve violation of the EIA Notification, 2006 and amendment issued thereunder. The coal production from the washer is yet to start.
- (xxv) The project involves no project affected families. No R&R of the PAPs will be required.
- (xxvi) Total cost of the project is ₹ 26950 lakhs. Cost of production is ₹ 2978/- per tonne., CSR cost is ₹ 2 per tonne, R & R cost is Rs Nil. Environment Management Cost is Rs. 1.7 crores (Capital); Rs. 0.5 Crores (Recurring) and Corporate Environment Responsibility (CER) is Rs. 4.04 Crores.

**53.2.3** The EAC during deliberation noted the following: -

The proposal is for environmental clearance for New Kathara Coking coal washery of 3 MTPA capacity in an area of 11.30 ha of M/s Central Coalfields Limited located in village Bandh Tehsil Gomia District Bokaro (Jharkhand).

Public hearing for the project of 3 MTPA capacity in an area of 11.33 ha was conducted on 16/10/2019 at Officer Club Kathara Area, CCL, PO-Kathara District Bokoro. The PH was chaired by Director, District Village Development Board, Bokaro.

There is no forest land involved in the project area. PP committed to plant 1 lakh trees in next 10 years and submitted the undertaking for the same.

The proposed site of washery is in the mining lease of Kathara Opencast Mining Project of the same project proponent and the linkage of coal (input coal) is from Kathara OCP and Govindpur Ph II OCP.

Values of PM10 are reported to be high. PP has presented mitigation measures to reduce PM10 in details. The Committee deliberated the issues.

**53.2.4** The EAC, after deliberation observed that there are various lacunae in the proposal in submission of project proponent and details in Form#2 on parivesh portal is not being filled properly. The EAC, after detailed deliberations **decided to return the proposal in its present form** and have asked for clarification/inputs, in respect of the following:-

- (i). Either PP shall either revise the Mine Plan of Kathara OCP and shall be valid environmental clearance as the proposed site is in OCP itself or area proposed for washery shall be kept outside Mine Plan of Kathara OCP and demarcated properly.
- (ii). Brief Compliance of each ToR conditions and further referencing for details of compliance shall be provided correctly.
- (iii). Form#2 on Parivesh should be filled with all details and correct information. For example, total wastewater generation is 70000 KLD and recycling is also 7000 KLD. Manpower requirement is 1 Lakh which seems to be incorrect as this project is only a washery. Correct figure should be incorporated in Form#2.
- (iv). Provide fresh /latest characteristics of raw coal sample analysis (% of ash/moisture etc) as data of 2015 is enclosed in EIA/EMP Report.
- (v). Traffic Assessment study with photographs of road and air pollution modelling due to increase traffic along with present of habitation shall be produced before EAC. High tonnage trucks should be considered to reduce the number of trucks.
- (vi). Values of PM10 are reported to be high. PP shall be present mitigation measures to reduce PM10 in details accordingly.
- (vii). Explore the possibility of conveyor belt for transportation of coal from mine pit to washery.
- (viii). Ground Water Recharge Estimation of buffer zone shall be done as per guidelines of GEC 2015 instead of 1997 guidelines.
- (ix). Air Quality modelling of pollutant PM2.5, SOx and NOx shall be submitted vis-à-vis its impacts/mitigation measures.
- (x). Permission of extraction of ground water intersection/extraction from Central Ground Water Authority shall be taken.

- (xi). Details of hazardous waste generation (if any) during washery operations and further handling/disposal shall be provided in details.
- (xii). Proposed plan for development of green belt shall be provided with fund allocated and year wise plantation plan.
- (xiii). Utilization of washery rejects in power plant shall be proposed accordingly plan for utilisation should be provided. EAC insisted that PP must follow up Ministry of Coal for finalisation of coal washery rejects policy.
- (xiv). Surface water quality of stored mine water shall be analysed and to be presented.
- (xv). Water balance considering usage of only stored mine water shall be presented. No other surface or ground water shall be used.
- (xvi). The activities and fund provisions for CER shall be made as per the guidelines issued by the ministry regarding CER on 1<sup>st</sup> May, 2018.

The proposal was accordingly **returned** in its present form.

### **Agenda No.53.3**

**Ramagundam Opencast-III Expansion-II Coal Mine Project from 6.30 (Peak 6.80) MTPA to 8.82 (Peak 9.52) MTPA in mine lease area of 2070.10 ha M/s Singareni Collieries Company Limited located near Jallaram Village Mandal Kamanpur District Peddapalli (Telangana) - Environmental clearance under the provision of clause 7(ii) of EIA Notification, 2006 - reg.**

#### **[Proposal No. IA/TG/CMIN/120211/2019;F.No.J-11015/43/2014-IA.II (M)]**

**53.3.1** The proposal is for grant of Environmental Clearance Ramagundam Opencast-III Expansion-II Coal Mine Project from 6.30 (Peak 6.80) MTPA to 8.82 (Peak 9.52) MTPA in an ML area of 2070.10 ha M/s Singareni Collieries Company Limited located near Jallaram Village Mandal Kamanpur District Peddapalli (Telangana), under the provision of clause 7(ii) of EIA Notification, 2006

**53.3.2** Details of the proposal, as ascertained from the proposal documents and as revealed from the discussions held during the meeting, are given as under:

- (i) The project area is covered under Survey of India Topo Sheet No. 56N/10 and is bounded by the geographical co-ordinates ranging from North latitude 18°40'57" to 18°42'46" and East Longitude 79°29' 58" to 79°34'15".
- (ii) Coal linkage of the mine is proposed as per 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's vide its OM dated 13<sup>th</sup> January, 2010 has imposed moratorium on grant of environment clearance.
- (v) Employment generation, Permanent / Contractual employment to about 2330 persons out of which about 1780 permanent and 550 contractual (men on roll) will be provided from the project
- (vi) The project is reported to be beneficial in terms of socio-economic and improving living standards.
- (vii) Earlier, Environment clearance to the Mine: Environmental Clearance was obtained from MoEF&CC vide Lr. No J-11015/43/2013-1A.II(M), dated 11<sup>th</sup> May,2015 for a rated capacity of 6.30 MT( 6.8 MT peak) in mine lease area of 2070.10 ha.

**CENTRAL COALFIELDS LIMITED**  
**DARBHANGA HOUSE: RANCHI**

**Sub: Forwarding Minutes of the 485<sup>th</sup> (No. 05 of 2020)  
Meeting of the Board of Directors held on 04.05.2020.**

Extract from the minutes of the above meeting, in respect of following item, is appended below:

**Item No. 485.4(7): Proposal seeking approval of Mining Plan and Mine Closure plan of Kathara OCP (Capacity 1.9MTPA) with Project Area of 773.23Ha and mine closure cost of 7129.13 Lakhs.**

The Board was apprised of the subject proposal of Mining Plan and Mine closure Plan of Kathara OCP (1.9 MTPA) with project area of 773.23 Ha and mine closure cost of Rs. 7129.13 Lakhs, which is required for obtaining extension of validity of EC from MOEF&CC

After detailed deliberations, the Board approved the subject proposal as brought out in agenda note.

*Submitted for immediate necessary action to ensure compliances of the directives of the Board. ATR, may please be submitted within 08 days, so that it can be placed before the Board at least 07 days in advance of the next Board Meeting.*

  
Company Secretary

**D(T/P&P)**

**HOD(E&F)**

**Ref No. CS/BM/485/2020/214**

**Date: 29.05.2020**

## Annexure-II

## Chapter 13

# Remediation Plan and Natural & Community Resource Augmentation Plan

### 13.1 Brief Description

Kathara OCP is a brownfield project located in the East Bokaro Coalfields, Bermo CD block, Bokaro Dist. of Jharkhand. This project was started way back in 1944 by M/s Anderson Wright and Company on behalf of M/s Kathara Coal Company. This block was acquired by Govt. of India under the coal bearing area (acquisition and development) Act 1957 vide declaration SRO No.3810 dt. 23.11.57.

The project obtained Environment Clearance for capacity (0.960/1.90 MTPA) vide no. J-11015/482/2008-IA.IIM dated 08.01.2014 with project area of 792.81 Ha. The life of mine as per the EC obtained was 03 years.

The details of coal production from Kathara OCP since 1993-94 is given in the table below.

**Table 13.1 Year Wise Production Details**

| Financial Year | Coal Production (MTPA) | EC Capacity in MTPA |
|----------------|------------------------|---------------------|
| <b>1993-94</b> | <b>0.90</b>            | -                   |
| 1994-95        | 0.834                  | -                   |
| 1995-96        | 0.60                   | -                   |
| 1996-97        | 0.57                   | -                   |
| 1997-98        | 0.746                  | -                   |
| 1998-99        | 0.359                  | -                   |
| 1999-00        | 0.295                  | -                   |
| 2000-01        | 0.505                  | -                   |
| 2001-02        | 0.513                  | -                   |
| 2002-03        | 0.409                  | -                   |
| 2003-04        | 0.420                  | -                   |
| 2004-05        | 0.470                  | -                   |
| 2005-06        | 0.620                  | -                   |
| 2006-07        | 0.833                  | -                   |
| 2007-08        | 0.960                  | -                   |
| 2008-09        | 0.468                  | -                   |
| 2009-10        | 0.501                  | -                   |
| 2010-11        | 0.450                  | -                   |
| 2011-12        | 0.211                  | -                   |
| 2012-13        | 0.217                  | -                   |
| 2013-14        | 0.465                  | (0.960/1.90 MTPA)   |
| 2014-15        | 0.658                  | (0.960/1.90 MTPA)   |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|                |              |                   |
|----------------|--------------|-------------------|
| 2015-16        | 0.923        | (0.960/1.90 MTPA) |
| 2016-17        | 0.937        | (0.960/1.90 MTPA) |
| <b>2017-18</b> | <b>0.493</b> | -                 |
| <b>2018-19</b> | <b>0.733</b> | -                 |
| <b>2019-20</b> | <b>0.132</b> | -                 |
| <b>2020-21</b> | <b>0.200</b> | -                 |
| <b>2021-22</b> | <b>0.136</b> | -                 |

As detailed in the above table, the project has produced 0.90 MTPA in 1993-94 and operated with a valid EC during the period 2013-14 to 2016-17 (upto 8/01/2017). The project has gone into violation during the period 2016-17 (From 08/01/2017) to 2021-22 due to continuing the operation without a valid EC.

However, it is to be noted that, the project has never exceeded the 1993-94 production of 0.90 MTPA during the period of violation i.e., 2017-18 to 2020-21.

### 13.2 Economic Benefit Accrued During Period of Violation

Economic benefit calculations due to production of excess coal in the years of violations are as given below.

**Table 13.2 Economic benefits Accrued Due to Violation**

| S.No         | F.Y     | Total Months of Operation during violation | Actual Coal Prod. (Te) | EC Capacity | Excess Production in TPA | Profit in Rs.    | Loss             |
|--------------|---------|--|------------------------|-------------|--------------------------|------------------|------------------|
| 1            | 2016-17 | 3 months                                   | 386000                 | -           | 386000                   | 176400000        |                  |
| 2            | 2017-18 | 12 months                                  | 493000                 | -           | 493000                   | 82500000         | -                |
| 3            | 2018-19 | 12 months                                  | 733000                 | -           | 733000                   | 37100000         | -                |
| 4            | 2019-20 | 12 months                                  | 132000                 | -           | 132000                   | 136000000        | -                |
| 5            | 2020-21 | 12 months                                  | 200000                 | -           | 200000                   | -                | -141100000       |
| 6            | 2021-22 | 9 months                                   | 136000                 | -           | 136000                   | -                | -294700000       |
| <b>Total</b> |         |  | <b>2080000</b>         | <b>-</b>    | <b>2080000</b>           | <b>432000000</b> | <b>435800000</b> |

As summarized in the above table, as per the data provided by the project, the project has earned a total profit of Rs. 43.20 Cr. in the financial years 2016-17, 2017-18, 18-19 and 2019-20. Whereas, the project has run into loss of Rs. 43.58 cr. in the FY: 2020-21 and 21-22. Thus, there is a net loss of Rs. 0.38 Crs. during the period of violation i.e. 2016-17 to 2021-22. The signed copy of financial calculation of profit accrued during the period of violation has been enclosed as annexure XV.

### 13.3 Assessment of Ecological Damage Due to Violation

As per the condition no (xix) of ToR issued by the MoEF&CC, the assessment of damage caused due to the mining activity involving violation of regulatory frameworks is to be carried out.

The details of violation involved in Kathara OCP and the economic benefit accrued due to violation have already been discussed in the above sections.

The damage caused to different environmental attributes like air, water, land, flora and Fauna, socio economic and occupational health etc are quantified as given below.

### 13.3.1 Damage on Land and Ecology

As Kathara OCP has been in operation since pre nationalization era, majority of the project area is in utilization for mining and allied activities. It has been assessed that during the period of violation (2017 (Jan) to 2021-22), minor land use change has taken place. The landuse change during this period has been studied using the Satellite based imagery (IRS LISS-IV).

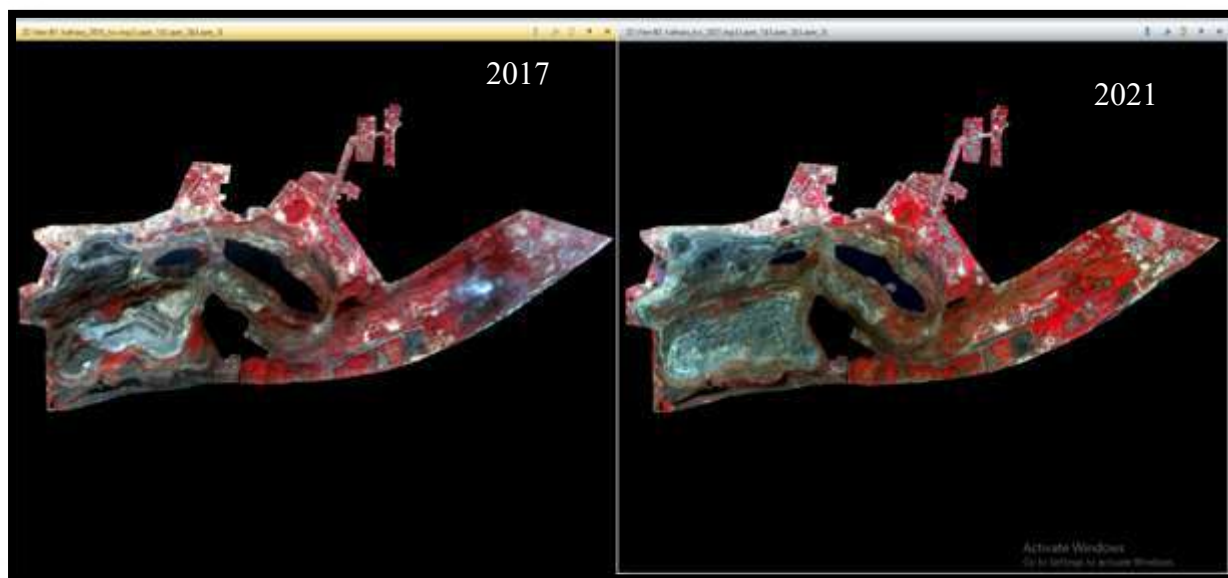


Fig. Satellite imagery (False Color Composite) showing Surface features of Kathara OCP during before and after violation (2017 and 2021)

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

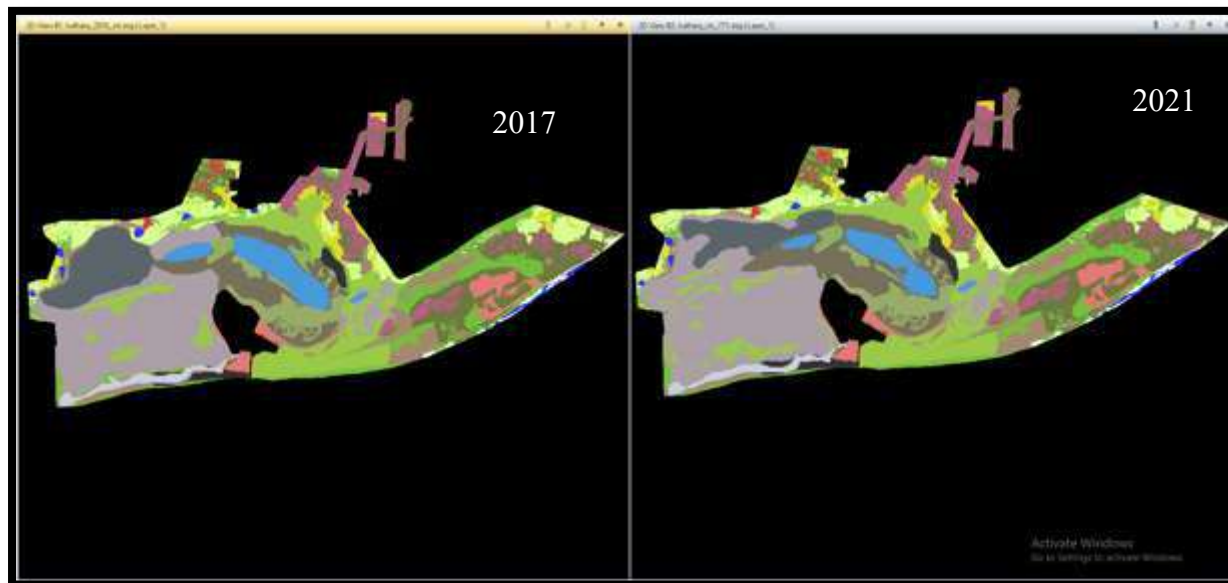


Fig. Land use map of Kathara OCP during before and after violation (2017 and 2021)

**Table 13.3 Land Use Change Analysis of Kathara OCP during period of Violation**

| Classes        | Colour       | Area (2021)   |               | Area (2017)   |               | Change %<br>Year<br>(2021-2017) | Change<br>(Area)<br>Year<br>(2021-2017) |
|----------------|--------------|---------------|---------------|---------------|---------------|---------------------------------|---|
|                |              | Area<br>(Hec) | % of<br>Total | Area<br>(Hec) | % of<br>Total |                                 |   |
| Level-I        |              |               |               |               |               |                                 |   |
| Forest Area    |              | 0.00          | 0.00          | 0.00          | 0.00          | 0.00                            | 0                                       |
| Scrubs         |              | 53.19         | 6.88          | 70.10         | 9.07          | -2.19                           | -16.91                                  |
| Plantation     |              | 212.50        | 27.48         | 206.54        | 26.71         | 0.77                            | 5.96                                    |
| Agriculture    |              | 67.19         | 8.69          | 64.74         | 8.37          | 0.32                            | 2.45                                    |
| Waste Land     |              | 59.02         | 7.63          | 57.41         | 7.42          | 0.21                            | 1.61                                    |
| Mining<br>Area |              | 308.04        | 39.84         | 303.55        | 39.26         | 0.58                            | 4.49                                    |
| Settlements    |              | 68.73         | 8.89          | 66.13         | 8.55          | 0.34                            | 2.60                                    |
| Water Body     |              | 4.56          | 0.59          | 4.76          | 0.62          | -0.03                           | -0.20                                   |
|                | <b>Total</b> | <b>773.23</b> | <b>100.00</b> | <b>773.23</b> | <b>100.00</b> |                                 |   |

It has assessed that, degradation of land of around 6.1 Ha. (increase of 4.9 Ha and 1.61 Ha in active mining area and waste land respectively) took place during period of violation, suggesting an impact of violation on land environment. It can also be observed that the land which got damaged due to mining were of scrub type.

The damage costs on land environment has been calculated as given below:

| Land Degradation Due to Mining | Quantity of Land Affected (Ha) | Type of Land | NPV Rate# (Rs.) | Environmental Price of land degradation (Rs.) |
|--------------------------------|--------------------------------|--------------|-----------------|---|
|                                |                                | 6.1          | Scrub*          | 64,595/Ha.                                    |

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

---

\*As per the Remote Sensing based land use.

#NPV rate for has been considered for OF as per "Revision of Rates of NPV Applicable for Different Class/Category of Forests-2014", CESM & IIFM Bhopal, in collaboration of FSI, Dehradun.

Therefore, the total estimated damages due to violation on the land is around **Rs. 3,94,029.5**.

Further, around 140 Ha. of project area has already been reclaimed with dense plantation. It is evident from the baseline Flora Fauna Study that several species including a few **Schedule-I** species viz. Python, Monitor Lizard and Peafowl have been sighted in the reclaimed areas of core zone, indicating a healthy on going eco restoration. Therefore, no significant impact can be identified on the Biological regime of the Environment.

***Mitigation Measures***

Following measures are proposed as a part of DRP & Natural and Community resource augmentation plan.

- Development of ecological park (creation and maintenance) in 19.10 ha at Kathara Area.
- Distribution of fruit bearing Saplings like Amla, Guava, Mango, Lichi etc. to nearby villagers.
- Providing colour coded bins (30 L) in 35 schools, 7 hospitals in buffer zone.
- Awareness programme for conservation of flora-fauna.

**13.3.2 Air Environment**

During the period of violation i.e. from 2016-17 to 2020-21, the details of coal and OB production are as given below.

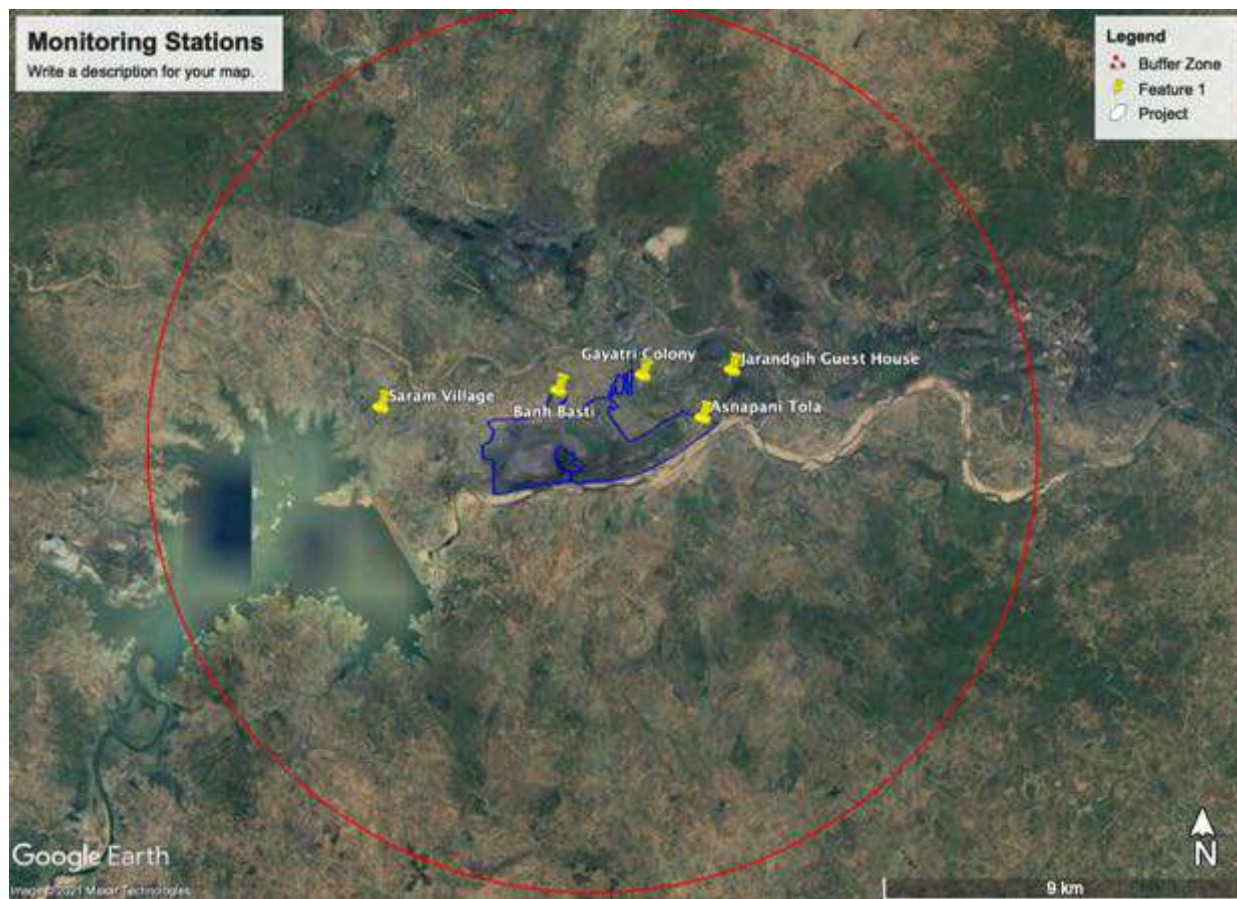
| Year                      | Coal (MT)    | OB (M.Cum)   |
|---------------------------|--------------|--------------|
| <b>1993-94</b>            | <b>0.904</b> | <b>4.601</b> |
| 2016-17<br>(Jan to March) | 0.386        | 1.304        |
| 2017-18                   | 0.493        | 4.862        |
| 2018-19                   | 0.733        | 4.898        |
| 2019-20                   | 0.132        | 3.519        |
| 2020-21                   | 0.2          | 0.956        |
| 2021-22                   | 0.136        | 0.805        |

The maximum production during the period of violation was 0.733 Mte in 2018-19, which is less than the rated capacity of previous EC i.e., 1.90 MTPA as well as 1993-94 production of 0.90 MTPA, suggesting that the impact of violation activities likely to have been below than that of 1993-94 production limits.

***Damage Assessment***

The impact of mining and allied activities on the air environment during the period of violation has been studied using the routine monitoring data generated during the period of violation.

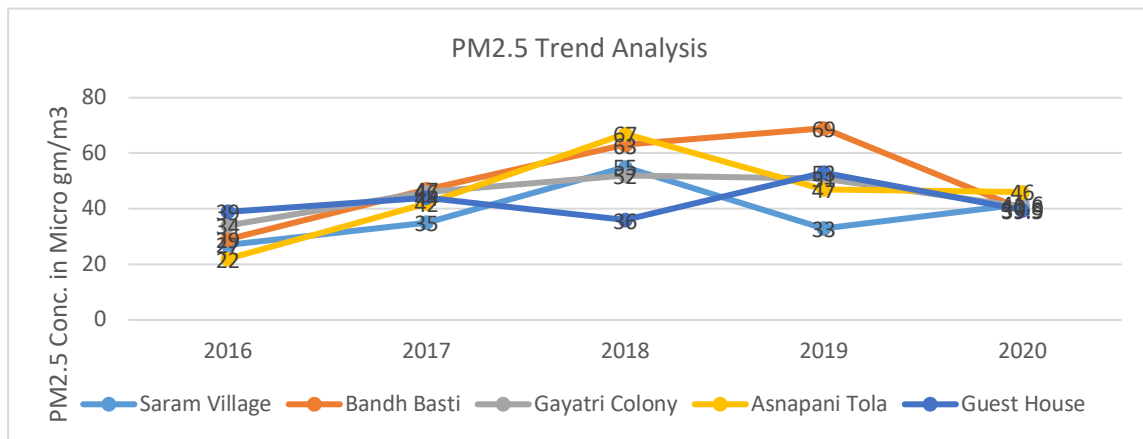
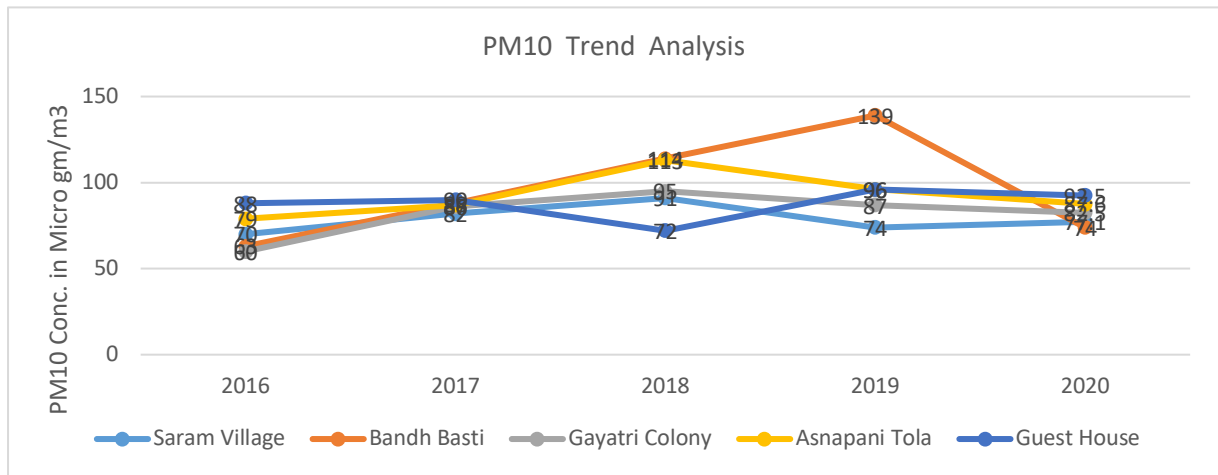
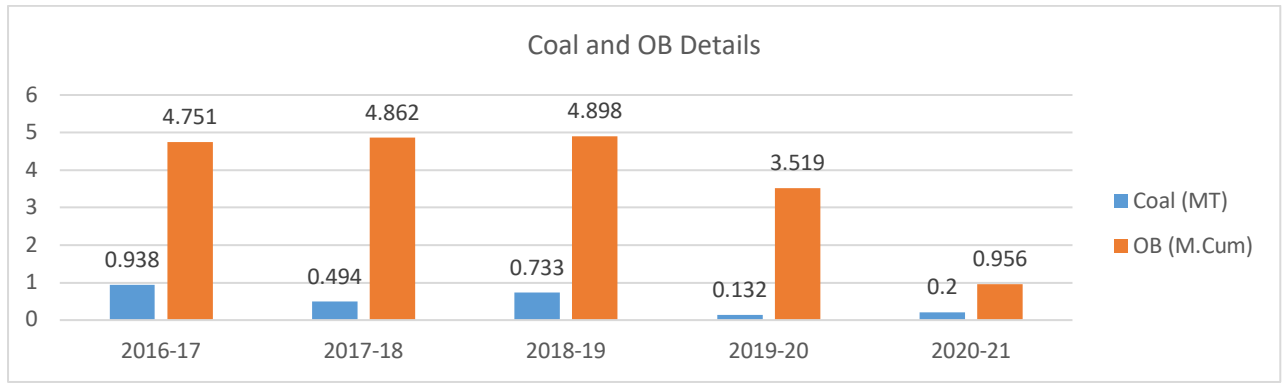
**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**



| Location       | Period of Non-Violation |       | Violation Period |       |      |       |      |       | No Production |       |
|----------------|-------------------------|-------|------------------|-------|------|-------|------|-------|---------------|-------|
|                | 2016                    |       | 2017             |       | 2018 |       | 2019 |       | 2020          |       |
|                | PM10                    | PM2.5 | PM10             | PM2.5 | PM10 | PM2.5 | PM10 | PM2.5 | PM10          | PM2.5 |
| Saram Village  | 70                      | 27    | 82               | 35    | 91   | 55    | 74   | 33    | 77.1          | 41.6  |
| Bandh Basti    | 63                      | 29    | 88               | 47    | 114  | 63    | 139  | 69    | 74            | 39.9  |
| Gayatri Colony | 60                      | 34    | 86               | 46    | 95   | 52    | 87   | 51    | 82.5          | 40.8  |
| Asnapani Tola  | 79                      | 22    | 87               | 42    | 113  | 67    | 96   | 47    | 87.6          | 46    |
| Guest House    | 88                      | 39    | 90               | 44    | 72   | 36    | 96   | 53    | 92.5          | 39.5  |

Source: Routine Environmental Monitoring Data of Kathara OCP in the Post-Monsoon Season

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**



PM<sub>10</sub> and PM<sub>2.5</sub> concentrations for the period 2016 to 2020 presented above depicts the comparison of 3 scenarios i.e. period of non-violation (2016), period of violation (2017-2020) and period of non-operation (Post-Monsoon 2020).

From the above data, it can be observed that particulate matter concentrations have exceeded the NAAQS limits at the location Bandh basti during 2018 and 2019, and at location Asnapani Tola in the year 2018. This is due to the fact both the locations fall within the core zone and, during the period of violation, mining has progressed towards north in close proximity to the village Bandh Basti.

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

**Damage Quantification**

In order to quantify the damages due to violation on air environment, operations carried out during the 2017 (January) to 2021-22 has been considered. The details are as follows.

**Table 13.4 Pollutant Emission Quantification during Violation**

|                                       | 2017<br>(Jan to March) | 2017-18       | 2018-19       | 2019-20       | 2020-21      | 2021-22      |
|---------------------------------------|------------------------|---------------|---------------|---------------|--------------|--------------|
| <b>Coal in Mte</b>                    | <b>0.386</b>           | <b>0.494</b>  | <b>0.733</b>  | <b>0.132</b>  | <b>0.2</b>   | <b>0.136</b> |
| <b>OB in Mm3</b>                      | <b>1.304</b>           | <b>4.862</b>  | <b>4.898</b>  | <b>3.519</b>  | <b>0.956</b> | <b>0.805</b> |
| <b>Sources</b>                        | <b>PM10</b>            |               |               |               |              |              |
| Total Pit Emissions                   | 72.10                  | 68.01         | 69.92         | 50.46         | 16.65        | 14.03        |
| Coal & OB Transportation on Haul Road | 113.17                 | 97.65         | 102.71        | 93.99         | 28.56        | 27.80        |
| Emissions from OB Dump                | 19.49                  | 19.64         | 19.71         | 17.20         | 12.54        | 12.27        |
| Stock Yard                            | 6.75                   | 2.94          | 3.93          | 1.45          | 1.73         | 1.46         |
| <b>Total Emissions in kg/day</b>      | <b>211.51</b>          | <b>188.25</b> | <b>196.27</b> | <b>163.10</b> | <b>59.48</b> | <b>55.56</b> |
| <b>Sources</b>                        | <b>PM2.5</b>           |               |               |               |              |              |
| Total Pit Emissions                   | 13.46                  | 12.76         | 13.10         | 9.38          | 3.09         | 2.59         |
| Coal & OB Transportation on Haul Road | 23.99                  | 20.69         | 21.77         | 19.92         | 7.11         | 5.86         |
| OB Dump                               | 2.81                   | 2.83          | 2.84          | 2.42          | 1.64         | 1.59         |
| Stock Yard                            | 1.16                   | 0.48          | 0.66          | 0.21          | 0.26         | 0.21         |
| <b>Total Emissions in kg/day</b>      | <b>41.42</b>           | <b>36.76</b>  | <b>38.37</b>  | <b>31.93</b>  | <b>12.10</b> | <b>10.25</b> |
| <b>Sources</b>                        | <b>SOX</b>             |               |               |               |              |              |
| Openpit                               | 28.350                 | 31.39         | 32.02         | 23.51         | 9.86         | 8.24         |
| OB Dumps                              | 0.816                  | 0.82          | 0.82          | 0.82          | 0.82         | 0.82         |
| Coal Stockyard                        | 0.816                  | 0.82          | 0.82          | 0.82          | 0.82         | 0.82         |
| Coal Transportation on Haul Road      | 0.139                  | 0.16          | 0.16          | 0.11          | 0.03         | 0.02         |

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

| <b>Total Emissions in kg/day</b> | <b>30.12</b>  | <b>33.18</b>  | <b>33.81</b>  | <b>25.25</b>  | <b>11.53</b>  | <b>9.90</b>   |
|----------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|
| <b>Sources</b>                   | <b>NOX</b>    |               |               |               |               |               |
| Openpit                          | 137.55        | 145.46        | 147.79        | 120.89        | 120.89        | 74.47         |
| OB Dumps                         | 13.65         | 13.65         | 13.65         | 13.65         | 13.65         | 13.65         |
| Coal Stockyard                   | 13.65         | 13.65         | 13.65         | 13.65         | 13.65         | 13.65         |
| Coal Transportation on Haul Road | 7.53          | 4.77          | 5.13          | 4.39          | 5.24          | 1.14          |
| <b>Total Emissions in kg/day</b> | <b>172.39</b> | <b>177.52</b> | <b>180.22</b> | <b>152.58</b> | <b>153.43</b> | <b>102.91</b> |

*\*The Emission Factors used in the quantification are taken from the S&T study titled, "Development of emission factors for various mining machineries & operations in opencast coal mines (EE-27)" was carried out by CMPDI (HQ) during 2002 to 2008.*

Damages caused due to the mining and allied operations on air environment due to violation have been quantified as per the following methodology.

***Damage to Air Quality in Monetary Terms /Environmental Price Rs. /day:***

$$\text{Damage}_{AQ} (\text{Rs/day}) = (\text{Load}_{PM10} \times EP_{PM10}) + (\text{Load}_{PM2.5} \times EP_{PM2.5}) \quad \text{Eq (1)}$$

In the above formula, Load<sub>PM10</sub> represents the PM10 load in kg/day and EP<sub>PM10</sub> represents the environmental price for the particulate emissions PM<sub>10</sub>.

The environmental prices considered have been obtained from EAC Violation committee guidelines. The environmental prices for different pollutants are as given below.

**Table 13.5 Environmental Prices of Air Pollutants**

| Pollutant         | Environmental Price of avg. atmospheric emission in Rs./kg |
|-------------------|--|
| PM <sub>10</sub>  | 340  |
| PM <sub>2.5</sub> | 524  |
| SO <sub>x</sub>   | 165  |
| NO <sub>x</sub>   | 96   |

Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited

**Table 13.6 Financial Evaluation of Damages to Air Environment**

| FY  | Coal in Mte | OB in Mm3 | Emissions in kg/day |                 |               |               | Environmental Cost in Rs./day |               |              |            | Total in Rs./day | Total Rs./year   | Total Rs.          |
|---|-------------|-----------|---------------------|-----------------|---------------|---------------|-------------------------------|---------------|--------------|------------|------------------|------------------|--------------------|
|   |             |           | PM10 in kg/day      | PM2.5 in kg/day | SOX in kg/day | NOx in kg/day | PM10 @ 340/kg                 | PM2.5 @524/kg | SOx@ 165 /kg | NOx@ 96/kg |                  |                  |                    |
| 2017<br>(Jan to March)  | 0.386       | 1.034     | 211.51              | 41.42           | 30.12         | 172.39        | 71913.4                       | 21704.08      | 4969.8       | 16549.44   | 115136.7         | <b>9556347.8</b> | <b>116074774.1</b> |
| 2017-18   | 0.494       | 4.862     | 188.25              | 36.76           | 33.18         | 177.52        | 64005                         | 19262.24      | 5474.7       | 3185.28    | 91927.22         | <b>30335983</b>  |                    |
| 2018-19   | 0.733       | 4.898     | 196.27              | 38.37           | 33.81         | 180.22        | 66731.8                       | 20105.88      | 5578.65      | 3245.76    | 95662.09         | <b>31568490</b>  |                    |
| 2019-20   | 0.132       | 3.519     | 163.1               | 31.93           | 25.25         | 152.58        | 55454                         | 16731.32      | 4166.25      | 2424       | 78775.57         | <b>25995938</b>  |                    |
| 2020-21   | 0.2         | 0.956     | 59.48               | 12.1            | 11.53         | 153.43        | 20223.2                       | 6340.4        | 1902.45      | 1106.88    | 29572.93         | <b>9759066.9</b> |                    |
| 2021-22   | 0.136       | 0.805     | 55.56               | 10.25           | 9.9           | 102.91        | 18890.4                       | 5371          | 1633.5       | 950.4      | 26845.3          | <b>8858949</b>   |                    |
| The compensation rate for the same has been taken as ₹ 340/kg/day for PM <sub>10</sub> , ₹ 524/kg/day for PM <sub>2.5</sub> , ₹ 165/kg/day for SOx and ₹ 96/kg/day for NOx as provided by EAC (Violation) |             |           |                     |                 |               |               |                               |               |              |            |                  |                  |                    |

Therefore, the total estimated damages due to violation on the air environment is around Rs. 11.61 Crores.

**Mitigation Measures**

As a part of Damage remediation plan and Natural and Community Resource Augmentation Plan in respect of Air environment, following measures are proposed.

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

- Monthly Health Camps to monitor the respiratory and E&T health status in villages Jhirki Basti, Bandh Basti and Asnapani Tola
- Additional avenue Plantation (creation and maintenance) along with gabion protection on village roads connecting Jhirki and Bandh Basti, Asnapani and Kathara Basti (Total length 4.50 kms).
- Repair and periodic maintenance of public roads near Bandh Basti, Asnapani tola and Kathara Basti.

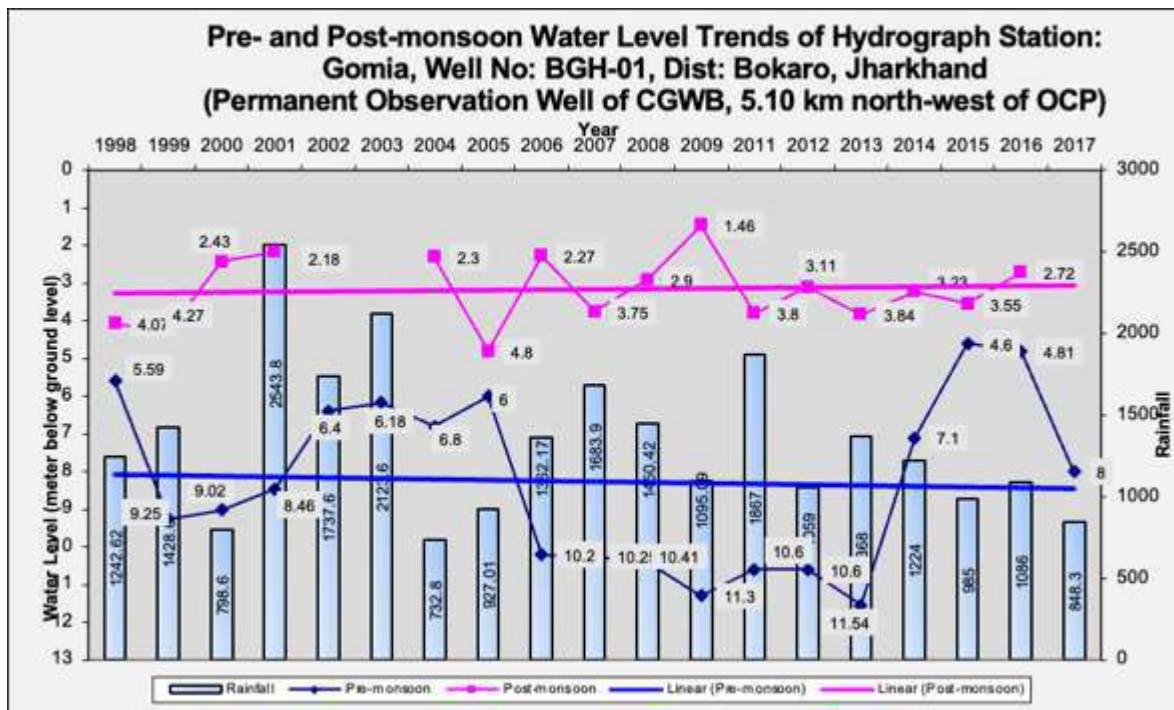
### 13.3.3 Water Environment

The impact of mining activities have been assessed for both surface and ground water regimes.

#### **Ground Water**

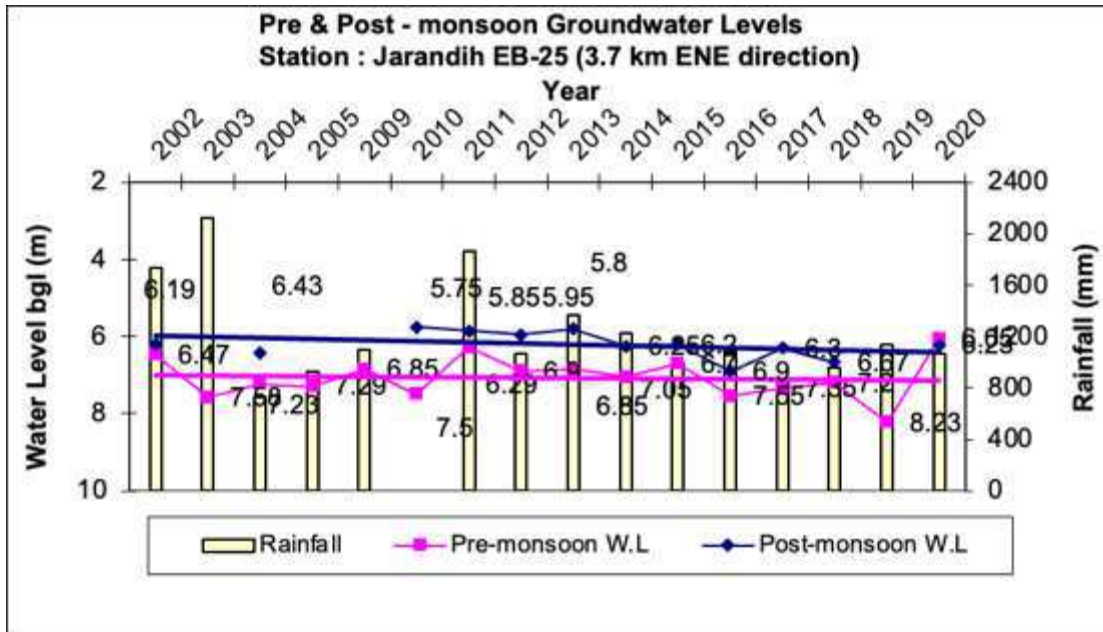
In order to understand the impact on ground water level due to the mining activity, long term ground water levels from nearby observation wells of CGWB has been referred.

Ground water level by Permanent Observation Well (PoW) of the area is continuously monitored by CMPDI and CGWB. There is a permanent observation well of CGWB in Gomia (Well No.: BGH-01). The pre-monsoon and post monsoon historical groundwater levels for the last few years (1998 to 2017) recorded by CGWB at the nearest permanent hydrograph stations at Gomia (Well No.: BGH-01). The pre-monsoon and post monsoon historical groundwater levels for the last few years recorded by CMPDI at the nearest permanent hydrograph stations like at Jarandih (Well No.: EB-25), Jhikri basti (EB-53) and Kathara (Well No.: EB-26) were collected and are given below.

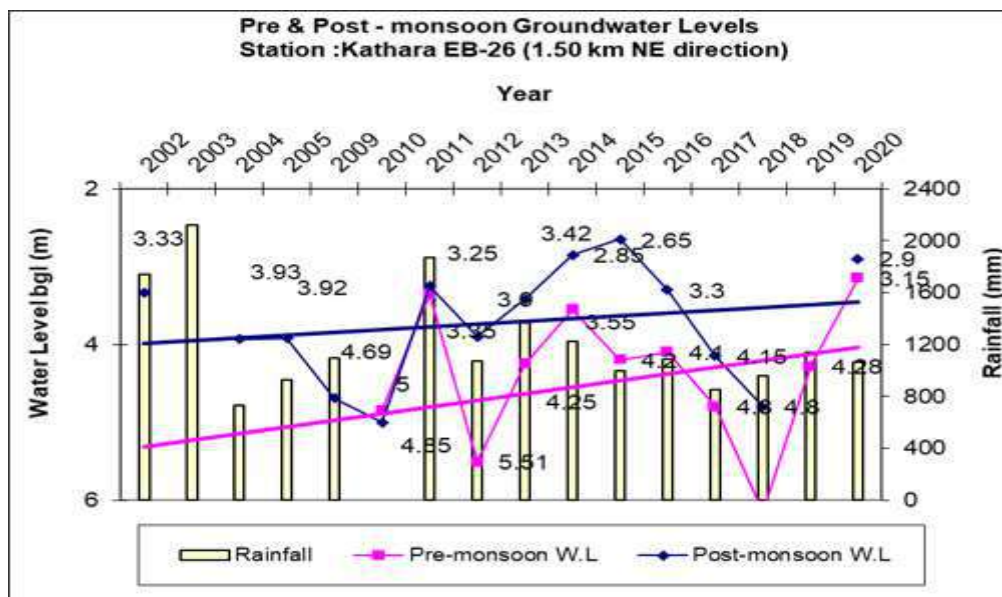


**Fig: Water level trend of CGWB Well, Gomia (BGH-01)**

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

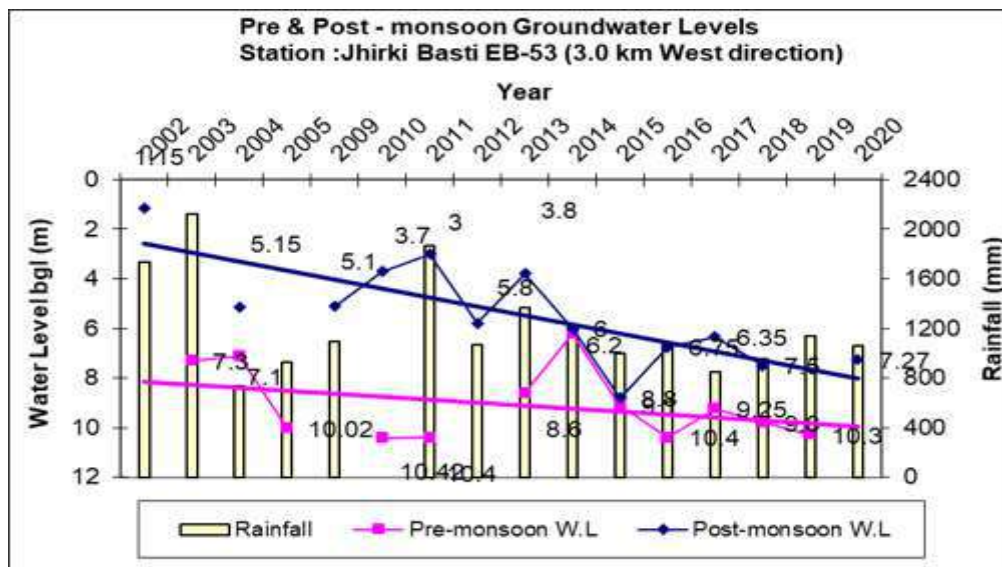


**Fig: Hydrograph station at Jarandih (Well No.: EB-25)**



**Fig: Hydrograph station at Kathara (Well No.: EB-26)**

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**



**Fig: Hydrograph station at Jhirki Basti (Well No.: EB-53)**

The average water level trends of the Hydrograph stations show declining trend at Jhirki Basti and Jarandgih both in Pre and Post-monsoon seasons, whereas in Kathara Basti has been showing the increasing trend.

Overall groundwater utilization with the increasing population and Industrial demand and less recharge by rainfall has in recent past years, may be affected the local groundwater regime.

**Damage Assessment**

During the period of violation i.e., from Jan’ 2017 to 2021-22, the project was in operation without obtaining NoC from CGWB. Hence, the cost of ground water extraction during the period of violation can be treated as the damage cost on ground water regime.

The assessment has been made for abstraction as well as compensation. For abstraction, rates have been obtained from CGWA notification of Sept. 2020, and for quantification of compensation due to violation, the methodology developed by CPCB for “Environmental Compensation in Case of Illegal Extraction of Ground Water” has been adopted.

**Environmental Compensation**

To quantify these damages, the methodology developed by CPCB for “Environmental Compensation in Case of Illegal Extraction of Ground Water” has been adopted.

As per this methodology, the formula proposed by CPCB for calculation of Environmental Compensation ( $EC_{GW}$ ) is as given below.

|           |   |   |
|-----------|---|---|
| $EC_{GW}$ | = | Water Consumption per Day x No. of Days x Environmental Compensation Rate for illegal extraction of ground water ( $ECR_{GW}$ ) |
|-----------|---|---|

The Environmental Compensation Rate for Illegal extraction of Ground Water ( $ECR_{GW}$ ) given by CPCB for mining, infrastructure and dewatering projects is as given below.

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

| Sl. No.                                      | Area Category  | Water Consumption (m <sup>3</sup> /day)                                   |              |               |              |
|--|----------------|---|--------------|---------------|--------------|
|  |                | <200  | 200 to <1000 | 1000 to <5000 | 5000 & above |
|  |                | Environmental Compensation Rate (EC <sub>GW</sub> ) in Rs./m <sup>3</sup> |              |               |              |
| 1  | Safe           | 15  | 21           | 30            | 40           |
| 2  | Semi critical  | 30  | 45           | 60            | 75           |
| 3  | Critical       | 45  | 60           | 85            | 115          |
| 4  | Over-exploited | 60  | 90           | 120           | 150          |
| <b>Minimum EC<sub>GW</sub>=Rs 1,00,000/-</b> |                |   |              |               |              |

The cost of ground water extracted by Kathara OCP during the period of violation is calculated as given below.

**Table 13.7 Cost of Compensation for Ground water Extraction**

| Year                           | Production in Mte | OB Removal in Mm3 | Discharge in m3/day | EC <sub>GW</sub> rate (Rs/-) | Environmental Price for ground water in rs./yr |
|--------------------------------|-------------------|-------------------|---------------------|------------------------------|--|
| 2016-17<br>Jan to mar'<br>2017 | 0.386             | 1.034             | 203                 | 90                           | <b>1498140</b>                                 |
| 2017-18                        | 0.494             | 4.862             | 259                 |                              | 7692300  |
| 2018-19                        | 0.733             | 4.898             | 385                 |                              | 11434500                                       |
| 2019-20                        | 0.132             | 3.519             | 69                  | 60                           | 1366200  |
| 2020-21                        | 0.2               | 0.956             | 105                 |                              | 2079000  |
| 2021-22                        | 0.136             | 0.805             | 71                  |                              | 1405800  |
| <b>Total</b>                   | <b>2.081</b>      | <b>16.074</b>     |                     |                              | <b>25475940</b>                                |

Thus, the compensation cost of ground water extracted during violation has been calculated as Rs. **2,54,75,940/-**.

***Cost of Abstraction***

Rates of ground water abstraction charges for mining, which are drawing ground water in safe, semi-critical, critical assessment and over exploited units as mentioned in the "Guidelines to regulate and control ground water extraction in India, published vide S.O. no. 3289 (E) Dt. 24.09.2020" are as given below.

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

| S.No. | Category of area<br>↓<br>Ground water use → | Quantum of ground water withdrawal |                                  |                                   |                                    |
|-------|---|------------------------------------|----------------------------------|-----------------------------------|------------------------------------|
|       |   | < 200 m <sup>3</sup> /day          | 200 to <1000 m <sup>3</sup> /day | 1000 to <5000 m <sup>3</sup> /day | 5000 m <sup>3</sup> /day and above |
| 1.    | Safe  | 1.00                               | 2.00                             | 2.50                              | 3.00                               |
| 2.    | Semi-critical                               | 2.00                               | 2.50                             | 3.00                              | 4.00                               |
| 3.    | Critical                                    | 3.00                               | 4.00                             | 5.00                              | 6.00                               |

| S.No. | Category of area<br>↓<br>Ground water use → | Quantum of ground water withdrawal |                                  |                                   |                                    |
|-------|---|------------------------------------|----------------------------------|-----------------------------------|------------------------------------|
|       |   | < 200 m <sup>3</sup> /day          | 200 to <1000 m <sup>3</sup> /day | 1000 to <5000 m <sup>3</sup> /day | 5000 m <sup>3</sup> /day and above |
| 1.    | Over-exploited                              | 4.00                               | 5.00                             | 6.00                              | 7.00                               |

The cost of ground water extraction during the period of violation is calculated as given below.

**Table 13.8 Cost for Ground water Abstraction**

| Year                           | Total coal production (MTe) | Mine Seepage in KLD | Extraction Rate in Rs. /m <sup>3</sup> /day | Total Cost in Rs. |
|--------------------------------|-----------------------------|---------------------|---|-------------------|
| 2016-17<br>( Jan to Mar' 2017) | 0.386                       | 203                 | 5   | 83230             |
| 2017-18                        |                             |                     |   |                   |
| 2018-19                        | 0.494                       | 259                 | 5   | 427350            |
| 2019-20                        | 0.733                       | 385                 | 5   | 635250            |
| 2020-21                        | 0.132                       | 69                  | 4   | 91080             |
| 2021-22                        | 0.2                         | 105                 | 4   | 138600            |
|                                | 0.136                       | 71                  | 4   | 93720             |
| <b>Total Cost in Rs.</b>       |                             |                     |   | <b>1469230</b>    |

Thus, the cost of ground water abstraction during violation has been calculated as Rs. **14,69,230/-**.

**Surface Water**

For economical evaluation of impact due to violation on surface water bodies, cost saved due to deficiency in provision of SW structures as per the previous EC has been considered. The details are as given below.

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

| S.No | Measures for protection and conservation of Surface water bodies   | Estimated Cost in Rs. |
|------|--|-----------------------|
| 1    | Stone revetment to provided upto HFL level in the portion where loose material was visible (50-100 m length) | 40                    |
| 2    | Toe walls with provision of weep holes along foot of external dump on the river side (1.5 km)                | 50                    |
|      | <b>Total Amount in Rs.</b>   | <b>90,00,000</b>      |

Thus, the cost due to loss in surface water run-off during violation has been calculated as Rs. **90,00,000/-**.

### ***Mitigation Measures***

As a part of Damage Remediation Plan and Natural and Community Resource Augmentation Plan, following mitigation measures are proposed.

1. Toe walls with provision of weep holes along foot of external dump on the river side (approx. 1.5 km)
2. Cleaning and restoration of wells, ponds and other water bodies in nearby villages.
3. Gabion type 3-tier gap plantation along the banks of River Damodar in consultation with Forest Department.

### **13.3.4 Socio-Economic Impact**

Kathara OCP is a very old mine operating since pre-nationalization era. Therefore, no R&R is involved in the project. Further, this project has been a source of direct employment to around 794 persons and indirect employment to the nearby villagers.

CSR activities are carried out continuously under Kathara OCP. More emphasis of CSR is in drinking water, infrastructure, sanitation, education, skill development, social empowerment, water management, environment, sports and health.

**Table 13.9 CSR Activities in Previous Years**

| Sector                                       | 2018-19      | 2019-20      | 2020-21      | 2021-22       | Grand Total<br>(Rs. Lakh) |
|--|--------------|--------------|--------------|---------------|---------------------------|
| <b>Drinking Water &amp; Water Management</b> | 11.87        | 28.59        | 55.97        | 138.5         | <b>234.93</b>             |
| <b>Education</b>                             | 3.31         | 5.57         | 1.88         |               | <b>10.76</b>              |
| <b>Health</b>                                |              |              | 10.94        |               | <b>10.94</b>              |
| <b>Infrastructure</b>                        |              | 8.81         | 6.83         | 18.00         | <b>33.64</b>              |
| <b>Sanitation</b>                            | 7.19         |              |              | 13.75         | <b>20.94</b>              |
| <b>Skill Development</b>                     |              |              | 6.50         | 2.00          | <b>8.5</b>                |
| <b>Sports</b>                                |              | 2.02         | 1.92         | 5.00          | <b>8.94</b>               |
| <b>Grand Total</b>                           | <b>22.37</b> | <b>44.99</b> | <b>84.04</b> | <b>177.25</b> | <b>328.65</b>             |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

**Mitigation Measures**

Following measures are proposed as a part of Damage Assessment Plan & Natural and Community resource augmentation plan.

- Skill development training program including Motor Driving, Sewing, Nursing & skill development programmed by Central Institute of Plastics Engineering & Technology (CIPET).
- Scheme for providing of solar lights to nearby villages.

**13.3.5 Occupational Health and Safety**

To examine the health status of workmen who are exposed to extreme working conditions, periodic Medical Examination (PME) have been taken up. The details are as given below.

**Table 13.10 IME and PME Details**

| <b>Year</b>       | <b>PME</b> | <b>IME</b> |
|-------------------|------------|------------|
| 2016              | 198        | 22         |
| 2017              | 190        | 30         |
| 2018              | 172        | 39         |
| 2019              | 162        | 29         |
| 2020              | 192        | 00         |
| 2021              | 233        | 05         |
| 2022 (Till March) | 168        | 00         |

PME report suggests that, no adverse health impact on workmen due to dust. The details of health camps conducted during the previous years is as given below.

**Table. 13.11 Details of Health Camps**

| <b>Details</b>                | <b>2018-19</b>     |                    | <b>2019-20</b>     |                    | <b>2020-21</b>     |                    | <b>20221-22</b>    |                    |
|-------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
|                               | <b>No.of Camps</b> | <b>Beneficiary</b> | <b>No.of Camps</b> | <b>Beneficiary</b> | <b>No.of Camps</b> | <b>Beneficiary</b> | <b>No.of Camps</b> | <b>Beneficiary</b> |
| Village Health Camp           | 41                 | 893                | 39                 | 925                | 19                 | 551                | 16                 | 314                |
| HTN & Diabetic Detection Camp | 1                  | 26                 | 1                  | 160                | -                  | -                  | 1                  | 144                |
| Anemia Camp                   | 1                  | 72                 | 1                  | 96                 | 2                  | 214                | 1                  | 240                |
| CSR Dispensary                | Everyday           | 4300               | Everyday           | 4441               | Everyday           | 7182               | Everyday           | 7343               |
| School Health Camp            | 15                 | 600                | 10                 | 575                | -                  | -                  | -                  | -                  |

Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited

---

The major diseases reported were body aches, Anemia, Dermatitis, chest infection etc. and there was no instance of occupational diseases such as pneumoconiosis.

### 13.3.6 Summary

The estimated environmental damage costs due to violation on land, air, water, flora fauna and socio economics are as given below.

**Table 13.12: Summary of Assessment of Damages**

| <b>S.no</b>                     | <b>Particulars</b>          | <b>Estimated Damage Cost in Rs. Lakhs</b> |
|---------------------------------|-----------------------------|---|
| 1                               | Land and Ecosystem Services | 3.94                                      |
| 2                               | Air Environment             | 1160.74                                   |
| 3                               | <b>Water Environment</b>    |   |
|                                 | Ground Water                | 269.45                                    |
|                                 | Surface Water               | 90.00                                     |
| 4                               | Flora and Fauna             | Nil                                       |
| 5                               | Socio-Economis              | Nil                                       |
| <b>Grand Total in Rs. Lakhs</b> |                             | <b>1524.13</b>                            |

## 13.4 Proposed Remediation Plan and Natural & Community Resource Augmentation Plan (NCRAP)

The proposed fund allocation for remediation plan and Natural Resource Augmentation Plan are as given below.

**Table 13.13 Table Proposed budgetary provisions for Damage Remediation Plan**

| Remediation plan & budgetary provisions |                           |  |                    | Action Plan       |                    |                    |
|---|---------------------------|--|--------------------|-------------------|--------------------|--------------------|
| SI NO                                   |                           | Activity Proposed  | Total              | Year 01           | Year 02            | Year 03            |
| 1                                       | <b>Water Environment</b>  | <b>Protection &amp; Development of Damodar River bank:</b>   | 30000000.00        | 5000000           | 15000000           | 10000000           |
|   |                           | Development & Beautification of Damodar River Banks along with construction of picnic spots, approach road & pathways, chath ghat, shed, river side plantation etc.  |                    |                   |                    |                    |
| 2                                       |                           | Additional Water Sampling and analysis of Ground water and Surface water quarterly at 6 locations (4 Ground water at Bandh Basti, Jhirki Basti, Asnapani Tola and Kathara Basti and 2 surface water locations- u/s and d/s of Damodar River) | 500000             | 160000            | 170000             | 170000             |
| <b>Total Water Environment</b>          |                           |  | <b>30500000.00</b> | <b>5160000.00</b> | <b>15170000.00</b> | <b>10170000.00</b> |
| 1                                       | <b>Land &amp; Ecology</b> | Development of ecological park (creation and maintenance) in 19.10 ha at Kathara Area  | 92000000           | 10000000          | 41000000           | 41000000           |
| 2                                       |                           | Distribution of fruit bearing Saplings like Amla, Guava, Mango, Lichi etc. to nearby villagers.  | 150000             | 0                 | 150000             | 0                  |
| 3                                       |                           | Providing colour coded bins (30 L) in nearby schools & hospitals in buffer zone.   | 400000             | 0                 | 400000             | 0                  |
| 4                                       |                           | Setting up of Vermi composting plant for treating Bio-degradable waste generated from nearby habitation  | 4500000            | 0                 | 4500000            | 0                  |

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|  |                                    |  |                     |                    |                    |                    |
|--|------------------------------------|--|---------------------|--------------------|--------------------|--------------------|
| 5  |                                    | Awareness programme for conservation of flora-fauna & e-waste disposal   | 450000              | 150000             | 150000             | 150000             |
| <b>Total Ecological Environment</b>        |                                    |  | <b>97500000</b>     | <b>10150000</b>    | <b>46200000</b>    | <b>41150000</b>    |
| 1  | <b>Air &amp; Noise Environment</b> | Periodic Health Camps to monitor the respiratory and E&T health status in villages Jhirki Basti, Bandh Basti and Asnapani Tola   | 11000000            | 3000000            | 4000000            | 4000000            |
| 2  |                                    | Additional avenue Plantation (creation and maintenance) along with gabion protection on roads from filter plant to Asnapani More via khetko (Total length 1.50 kms)          | 2500000             | 500000             | 1000000            | 1000000            |
| 3  |                                    | Repair and periodic maintenance of public roads near Bandh Basti, Asnapani tola and Kathara Basti.   | 5000000             | -                  | 2500000            | 2500000            |
| <b>Total Air Environment</b>               |                                    |  | <b>18500000</b>     | <b>3500000</b>     | <b>7500000</b>     | <b>7500000</b>     |
| 1  | <b>Socio-Economic</b>              | Skill development training program including Motor Driving, Sewing, Nursing & skill development programmed by Central Institute of Plastics Engineering & Technology (CIPET) | 3000000             | 1000000            | 1000000            | 1000000            |
| 2  |                                    | Fogging machine in nearby villages of command area of CCL  | 900000              | 300000             | 300000             | 300000             |
| 3  |                                    | Organizing Training Sessions for sports and conducting Gramin Football League  | 3000000             | 1000000            | 1000000            | 1000000            |
| 4  |                                    | Additional awareness programs on Environmental protection  | 300000              | 100000             | 100000             | 100000             |
| <b>Total Socio-Economic Environment</b>    |                                    |  | <b>7200000</b>      | <b>2400000</b>     | <b>2400000</b>     | <b>2400000</b>     |
| <b>Total Fund for remediation measures</b> |                                    |  | <b>153700000.00</b> | <b>21210000.00</b> | <b>71270000.00</b> | <b>61220000.00</b> |

**Table 13.14 Details of EMP Cost saved during period of violation**

=====

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

| S.No   | EMP/EC Measures Supposed to be Implemented   | Capital Cost Saved in Rs. Lakhs (approx.) | Revenue Cost Saved in Rs. Lakhs (approx.) |
|--|--|---|---|
| 1  | PCC Topping of Permanent Hual road (1.6 km)  | 250                                       | -   |
| 2  | Strengthening of slopes by stone in wire mesh in certain portions of dumps (30-40 m length)                  | 30  | -   |
| 3  | Stone revetment to provided upto HFL level in the portion where loose material was visible (50-100 m length) | 40  | -   |
| 4  | Toe walls with provision of weep holes along foot of external dump on the river side (1.5 km)                | 50  | -   |
| 5  | Handling and Management of Municipal Solid Waste   | -   | 20  |
| <b>Total Cost Saved in Rs. Lakhs</b>   |  | <b>370</b>                                | <b>20</b>                                 |
| <b>Provision for CRAP= 3% of total EMP Cost saved during violation period in Rs. Lakhs</b> |  |   | <b>11.7</b>                               |

**Table 13.15 Proposed budgetary provisions for Natural and Community Resource Augmentation Plan**

| SN | Particular                           | Activity Proposed   | Total     | Action Plan |          |          |
|----|--------------------------------------|---|-----------|-------------|----------|----------|
|    |                                      |   |           | Year 01     | Year 02  | Year 03  |
| 1  | <b>Natural Resource Augmentation</b> | Total 05 nos. of Rainwater Harvesting cum Groundwater recharge structures to be installed on rooftop of public buildings in Bandh Basti, Jhirki Basti and Kathara Basti | 18,00,000 | 6,00,000    | 6,00,000 | 6,00,000 |

=====

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|   |  |  |                  |                  |                  |                  |
|---|--|--|------------------|------------------|------------------|------------------|
| 2   |  | Distribution of Solar Lantern in command areas of CCL (500 numbers)  | 10,00,000        | --               | 10,00,000        | -                |
| <b>Total Proposed Budget under NRAP (in Rs.Lakh)</b>                        |  |  | <b>28,00,000</b> | <b>6,00,000</b>  | <b>16,00,000</b> | <b>6,00,000</b>  |
| 1   | <b>Community Resource Augmentation</b> | Procurement, operation & maintaince of High Speed Fully Automatic Sanitary Pad Making Machine for nearby villages in command area of Kathara | 15,00,000        | -                | 10,00,000        | 5,00,000         |
| 2   |  | Battery Operated Handicapped Tricycle distribution to Divyangs of command area of Kathara (20 Numbers)                                       | 10,00,000        | -                | 10,00,000        | -                |
| 3   |  | Distribution of Bench, Desk, Table, Chair, Books and Almirah etc. to various schools of Kathara Area   | 15,00,000        | -                | 7,50,000         | 7,50,000         |
| 4   |  | Special vaccination drives for children vaccines, Covid vaccine etc. in nearby villages in collaboration with state govt.                    | 5,00,000         | 1,00,000         | 2,00,000         | 2,00,000         |
| 5   |  | Providing smart classes at DAV Schools (Swang & Kathara)   | 12,00,000        | 4,00,000         | 4,00,000         | 4,00,000         |
| <b>Total Proposed Budget under CRAP (in Rs.Lakh)</b>                        |  |  | <b>57,00,000</b> | <b>5,00,000</b>  | <b>33,50,000</b> | <b>18,50,000</b> |
| <b>Total cost of Natural &amp; Community Resource Augmentation Measures</b> |  |  | <b>85,00,000</b> | <b>11,00,000</b> | <b>49,50,000</b> | <b>24,50,000</b> |

=====

Prepared by CMPDI, RI-III, Ranchi


## Annexure-III

CENTRALCOALFIELDS LIMITED  
OFFICE OF THE GENERAL MANAGER(KTA), KATHARA

STATEMENT OF ECONOMIC BENEFIT FOR THE PERIOD 01.01.2017 TO 31.12.21 OF KATHARA COLLIERY

| SL.NO | TENURE/PERIOD            | TOTAL MONTHS | PRODUCTION | CPT     | SALE PRICE | PROFIT/LOSS | REMARKS   |
|-------|--------------------------|--------------|------------|---------|------------|-------------|---|
|       |                          |              |            |         |            |             |   |
| 1     | 01.01.2017 TO 31.03.2017 | 3            | 3.86       | 1819.46 | 2259.88    | 17.64       | Only three months CPT has been considered   |
| 2     | 01.04.2017 TO 31.03.2018 | 12           | 4.94       | 2641.02 | 2696.50    | 8.25        | CPT is less due to higher production  |
| 2     | 01.04.2018 TO 31.03.2019 | 12           | 7.33       | 2956.00 | 2957.78    | 3.71        | CPT is less due to higher production  |
| 3     | 01.04.2019 TO 31.03.2020 | 12           | 1.32       | 6575.53 | 3053.36    | 13.60       | CPT is higher due to less production, impact of OBR adjustment & fixed cost(salary wages) of same line of % |
| 4     | 01.04.2020 TO 31.03.2021 | 12           | 2.00       | 5317.08 | 3210.04    | -14.11      | CPT is higher due to less production but fixed cost(salary wages) is on same line of %                      |
| 5     | 01.04.2021 TO 31.12.2021 | 9            | 1.36       | 5489.24 | 3082.98    | -29.47      | CPT is higher due to less production but fixed cost(salary wages) is on same line of %                      |

note: Profit/Loss includes store impacts & other extra ordinary items.

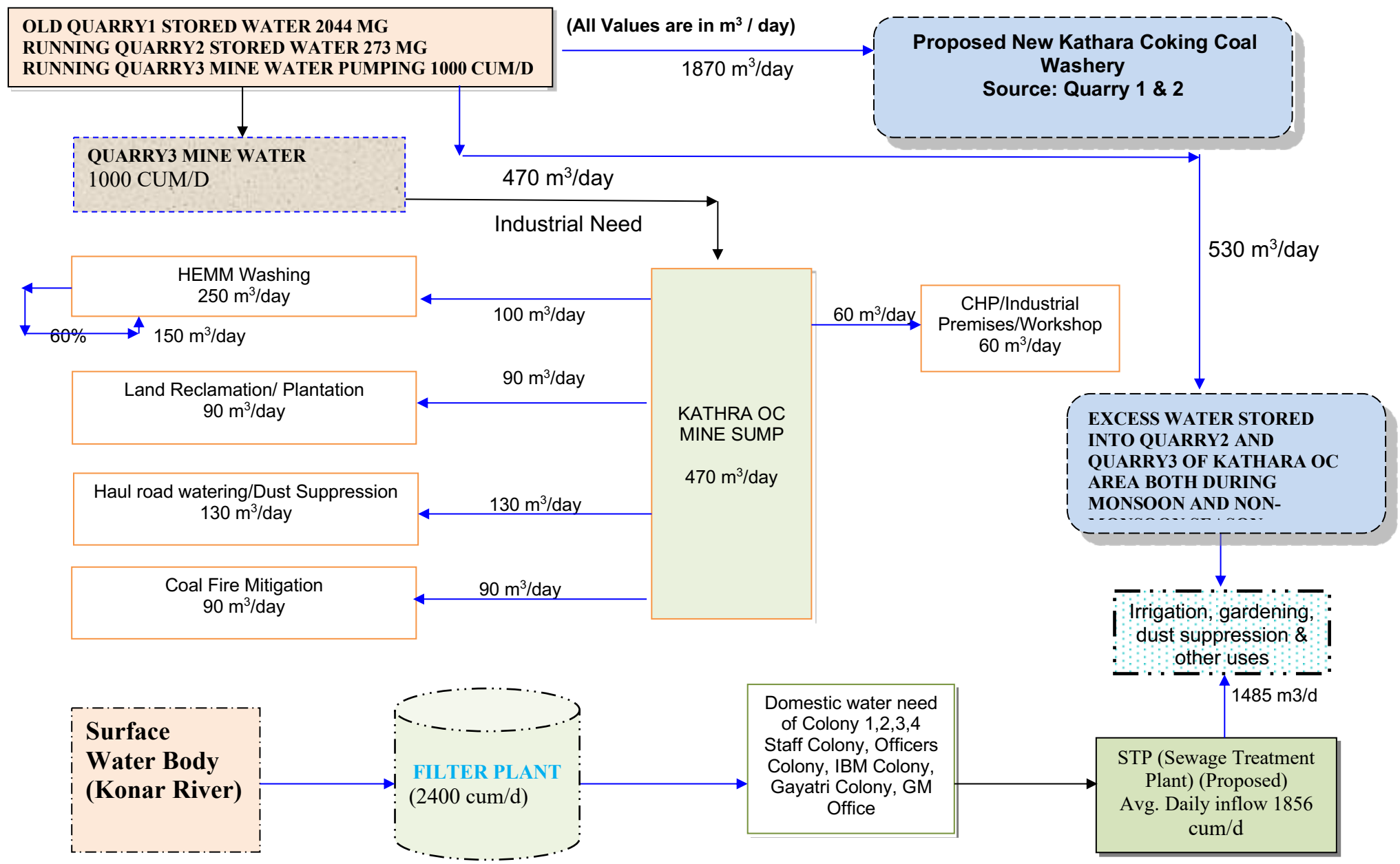
  
 AREA FINANCE MANAGER(KTA)  
 KATHARA

7/4/22

## Annexure-IV

| Waste Water Management (During Operation) |  |                           |  |                  |  |                        |
|---|--|---------------------------|--|------------------|--|------------------------|
| Type / Source                             | Quantity of Waste Water Generated (m3/d) | Treatment Capacity (m3/d) | Treatment Method   | Mode of Disposal | Quantity of Treated Water Used in Recycling / Reuse (m3/d) | Quantity of Discharged |
| Industrial                                | 200                                      | 250                       | Oil & Grease and sequential settling ponds                         | -                | 150<br>(Considering 20% losses)                            | Nil                    |
| Domestic                                  | 1856                                     | 2400<br>(Proposed)        | STP with Sedimentation, Biological treatment(ASP) and disinfection | -                | 1485<br>(Considering 20% losses)                           | Nil                    |
| a.  | Total Waste Water Generation             |                           |  | :                | 2056 KLD   |                        |
| b.  | Total Discharged Water                   |                           |  | :                | 0 KLD  |                        |
| c.  | Total Reused Water                       |                           |  | :                | 1635 KLD   |                        |

PLATE XVIA PROPOSED WATER USAGE DIAGRAM OF KATHARA WASHERY & OC MINE, KATHARA AREA, EBCF, CCL



## Annexure-V



# झारखण्ड राज्य प्रदूषण नियंत्रण पर्वद JHARKHAND STATE POLLUTION CONTROL BOARD

T.A. DIVISION BUILDING (GROUND FLOOR), H.E.C., DHURWA, RANCHI - 834004

Phone: 0651-2400851/2400852/2400979/2401847. Fax-0651-2400850/138.

Web site: www.jspcb.nic.in, e-mail: ranchijspcb@gmail.com

पत्रांक: B-2300

रॉची, दिनांक- 27/12/20

प्रेषक,

यतीन्द्र कुमार दास  
सदस्य सचिव

सेवा में,

क्षेत्रीय पदाधिकारी,  
क्षेत्रीय कार्यालय,  
झारखण्ड राज्य प्रदूषण नियंत्रण पर्वद, धनबाद।

विषय:- M/s. Kathara OCP, 1.9 MTPA, Area- 773.23 ha, At- Kathara Block, Bermo, Distt.-  
Bokaro के विरुद्ध सक्षम न्यायालय में शिकायतवाद दायर करने के संबंध में।

उपरोक्त विषयक सूचित करना है कि उपरोक्त इकाई द्वारा पर्यावरण एवं वन मंत्रालय, भारत सरकार से पर्यावरणीय स्वीकृति प्राप्त किए बिना कोयले का उत्पादन किए जाने के कारण इकाई के विरुद्ध पर्यावरण (संरक्षण) अधिनियम, 1986 की धारा 15 के अन्तर्गत सक्षम न्यायालय में कानूनी कार्यवाई करने के लिए अधिकृत किया जाता है।

अतः आपसे अनुरोध है कि शिकायतवाद दायर करने हेतु तथ्य कथन तैयार कर प्रारूप सभी अनुलग्नों सहित सक्षम प्राधिकार के अनुमोदनार्थ मुख्यालय को उपलब्ध करावें।

अनु० यथो०।

विश्वासभाजन

(यतीन्द्र कुमार दास)  
सदस्य सचिव



एक भारतीय कंपनी  
A Maharatna Company

**CENTRAL COALFIELDS LIMITED**

(Govt of India Undertaking)  
A Miniratna Cat-I Company  
Darbhanga House, Ranchi-834001  
Environment Department



पत्रांक : एच.ओ.डी./पर्या./2021/ 1097

दिनांक: 15/11/2021

To,

**Member Secretary**

**Jharkhand State pollution Control Board**

H.E.C, Dhurwa, Ranchi-834004

Jharkhand

**Sub: Compliance of conditions of Terms of Reference (ToR) of Kathara Opencast Coal Mine Project of M/s CCL – Reg.**

**Ref No:** 1) Standard Terms of Reference issued vide No:IA/JH/CMIN/11566/2008 Dated: 22.11.2020

2) Terms of Reference issued vide F. J-11015/482/2008-IA.II (M) Dated: 27.04.2021

Respected Sir,

Kathara Opencast Coal Mine Project of Central Coalfields Limited was appraised before the Expert Appraisal Committee on 27.10.2021. The standard Terms of Reference was issued on 22.11.2020 & specific terms of reference was issued on 27.04.2021.

Your kind attention is drawn towards Point no: 6(i) of the specific ToR letter issued on 27.04.2021, for Kathara Opencast Coal Mine Project.

You are requested to take necessary action in this regard.

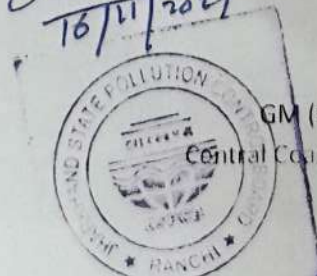
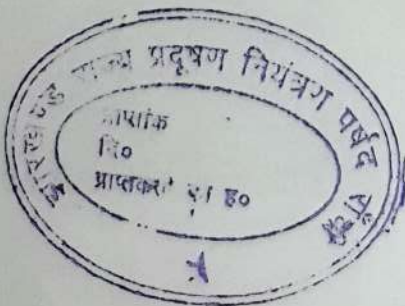
Enclosed: 1) ToR letter of Kathara OCP issued vide F. J-11015/482/2008-IA.II (M) Dated: 27.04.2021

Ry

Budrao  
16/11/2021

Yours faithfully

GM (Env & Forest),  
Central Coalfields Limited  
15.11.2021



## Annexure-VI



एक महारत्न कंपनी  
A Maharatna Company

**CENTRAL COALFIELDS LIMITED**  
(Govt of India Undertaking)  
A Maharatna Cat-I Company  
Darbhanga House, Ranchi-834001  
Environment Department



Date-01.04.2022

Ref- GM/Env & Forest/2022/ 209

To

Deputy Director General of Forest ,  
Integrated Regional Office,  
Ministry of Environment, Forest and Climate Change (MoEF&CC),  
2nd Floor, Headquarter- Jharkhand State Housing Board,  
Harmu Chowk,  
Ranchi, 834002

Ref: MoEF&CC F.No. J-11015/482/2008.IA.II(M) dated 08.01.2014 of Kathara OCP (1.90 MTPA).

Respected Sir,

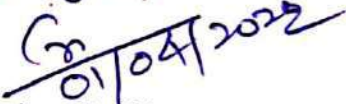
Kathara Open Cast Project is situated in Kathara Area of Central Coalfields Limited in Bokaro district. The project was granted Environment Clearance vide MoEF&CC F. No: J-11015/482/2008.IA.II(M) on 08.01.2014 with a life of 3 years. Now a fresh proposal for EC with life of 12 years was submitted to Ministry of Environment, Forest & Climate Change (MoEF&CC) on 28.02.2022.

During consideration of the proposal in Expert Appraisal Committee (EAC) meeting held on 03.03.2022, MoEF&CC directed to submit certified compliance report of previous EC. Minutes of the meeting enclosed herewith for kind consideration.

In view of above, it is requested that site inspection of Kathara OCP be undertaken so that the project may be considered by EAC, MoEF&CC for Environmental Clearance.

Encl- Minutes of the EAC meeting held on 03.03.2022

Yours faithfully



(Soumitra Singh)

GM(Environment)/HOD (E&F)

Central Coalfields Limited

महाराष्ट्र (पर्यावरण एवं वन)  
General Manager (Env. & Forest)  
CCL, HQ, Ranchi

## Annexure-VII



CENTRAL COALFIELDS LIMITED  
(A MINIRATNA CAT-1 COMPANY)  
(GOVT. OF INDIA UNDERTAKING)  
OFFICE OF THE GENERAL MANAGER  
KATHARA AREA  
PO:-KATHARA, DIST:-BOKARO,(JHARKHAND)  
JHARKHAND-829116



Ref. No. : G M / KTA / PS / 22 / 2022 / 02

Dated: 04/04/22

To,  
The Divisional Forest Officer  
Bokaro, Jharkhand

Sub:- Submission and approval of wildlife conservation plan for the compliance of 27<sup>th</sup> (A) MoM of EAC, Delhi in respect of Kathara OCP, Kathara Area.

Dear Sir,

As per Minutes of 27<sup>th</sup> (A) meeting of the EAC was held on 3<sup>rd</sup> March 2022 vide S.No (X) that "Project Proponent shall provide the receiving of Wildlife Conservation Plan for Schedule-I species and breakup of the proposed activities with budgetary provision submitted to the DFO"

Therefore, a conservation plan for observed schedule-I species has been prepared by Wolkem India limited under supervision of CMPDI and submitted to your good office for kind approval.

Thanking You

Encl:- As above

Yours faithfully,

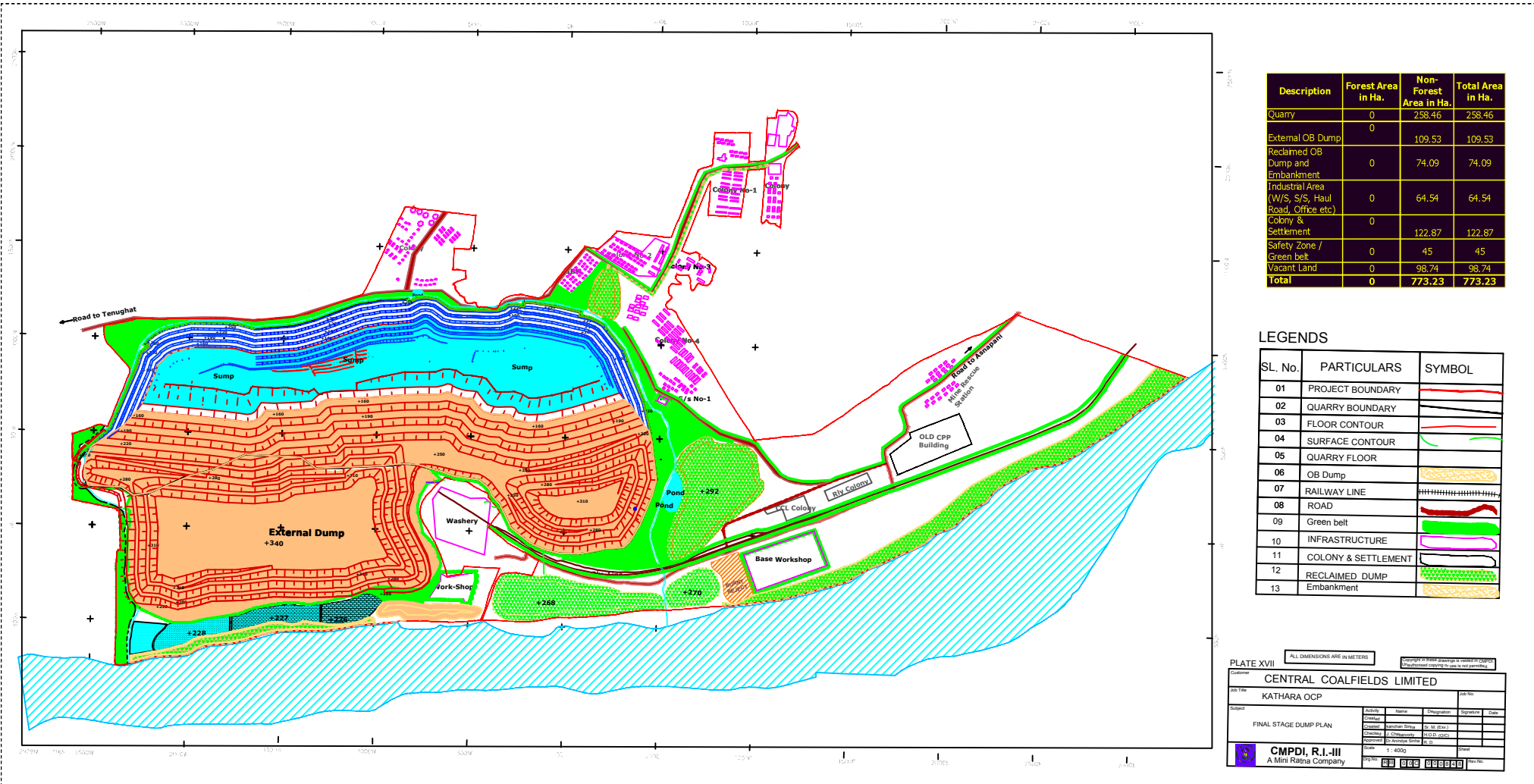
7/4/22  
General Manager  
Kathara Area

Copy to:

1. Project Officer, Kathara OCP
2. Staff Officer (P&P), Kathara Area
3. Staff Officer (Env), Kathara Area
4. Office Copy

Fiber  
05/4/22

## Annexure-VIII



| Description                                       | Forest Area in Ha. | Non-Forest Area in Ha. | Total Area in Ha. |
|---|--------------------|------------------------|-------------------|
| Quarry  | 0                  | 258.46                 | 258.46            |
| External OB Dump                                  | 0                  | 109.53                 | 109.53            |
| Reclaimed OB Dump and Embankment                  | 0                  | 74.09                  | 74.09             |
| Industrial Area (W/S, S/S, Haul Road, Office etc) | 0                  | 64.54                  | 64.54             |
| Colony & Settlement                               | 0                  | 122.87                 | 122.87            |
| Safety Zone / Green belt                          | 0                  | 45                     | 45                |
| Vacant Land                                       | 0                  | 98.74                  | 98.74             |
| <b>Total</b>                                      | <b>0</b>           | <b>773.23</b>          | <b>773.23</b>     |

**LEGENDS**

| SL. No. | PARTICULARS         | SYMBOL                      |
|---------|---------------------|-----------------------------|
| 01      | PROJECT BOUNDARY    | Red line                    |
| 02      | QUARRY BOUNDARY     | Black line                  |
| 03      | FLOOR CONTOUR       | Black dashed line           |
| 04      | SURFACE CONTOUR     | Green dashed line           |
| 05      | QUARRY FLOOR        | Blue hatched area           |
| 06      | OB Dump             | Yellow hatched area         |
| 07      | RAILWAY LINE        | Black line with cross-ticks |
| 08      | ROAD                | Red line with cross-ticks   |
| 09      | Green belt          | Green hatched area          |
| 10      | INFRASTRUCTURE      | Purple hatched area         |
| 11      | COLONY & SETTLEMENT | Pink hatched area           |
| 12      | RECLAIMED DUMP      | Blue hatched area           |
| 13      | Embankment          | Orange hatched area         |

ALL DIMENSIONS ARE IN METERS

Copyright in these drawings is vested in the copyright proprietor and no part of them is to be reproduced or used in any manner without the written consent of the copyright proprietor.

**PLATE XVII**

**CENTRAL COALFIELDS LIMITED**

Job Title: **KATHARA OCP**

Subject: **FINAL STAGE DUMP PLAN**

| Author          | Drawn           | Engineered      | Checked         | Date |
|-----------------|-----------------|-----------------|-----------------|------|
| Dr. M. Srinivas | Dr. M. Srinivas | Dr. M. Srinivas | Dr. M. Srinivas |      |
| Dr. M. Srinivas | Dr. M. Srinivas | Dr. M. Srinivas | Dr. M. Srinivas |      |
| Dr. M. Srinivas | Dr. M. Srinivas | Dr. M. Srinivas | Dr. M. Srinivas |      |

**CMPDI, R.I.-III**  
A Mini Rathi Company

Scale: 1:4000

Sheet No: 0000000000

## Annexure-IX



# Conservation & Management Plan of

## Damodar River

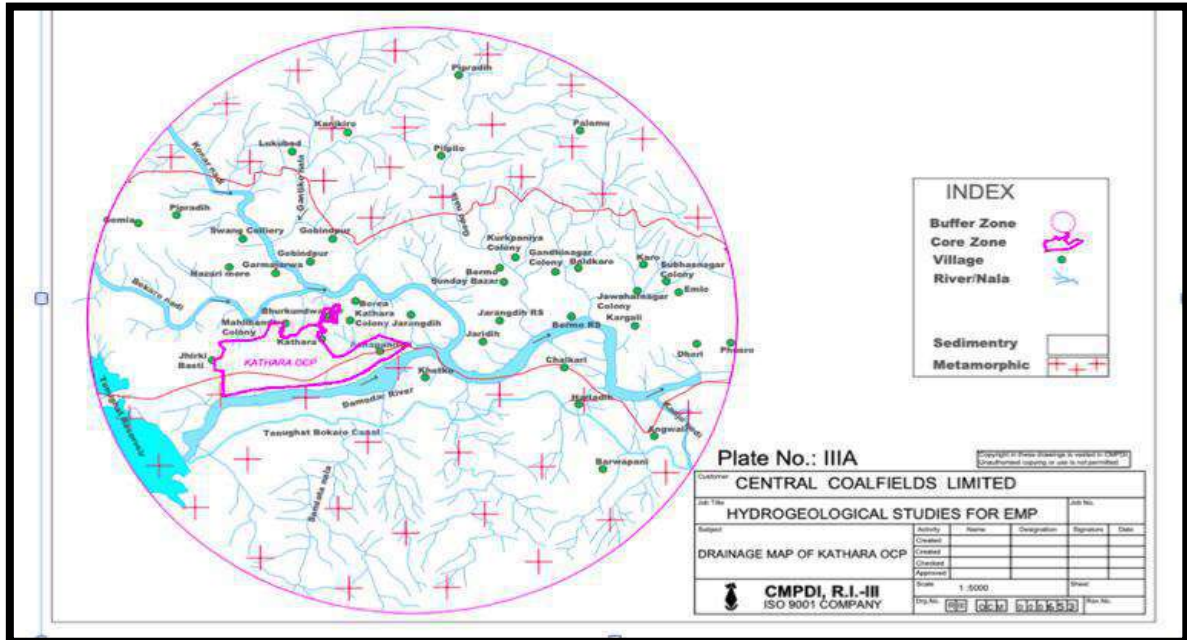
Kathara OCP

(Kathara Area)

(Project Area: 773.23 Ha)

Capacity: 1.90 MTPA)

**CENTRAL COALFIELDS LIMITED**  
(A Subsidiary of Coal India Limited)



April 2022

# CONTENTS

|   |           |
|---|-----------|
| <b>Contents.....</b>  | <b>2</b>  |
| <b>Chapter 1 Introduction .....</b>                             | <b>3</b>  |
| 1.1 Background of the Project                                   | 3         |
| 1.2 Brief Description of Nature and Size of the Project         | 3         |
| 1.3 Location Details  | 3         |
| 1.3.1 <i>General Location</i>                                   | 3         |
| 1.3.2 <i>Specific Location:</i>                                 | 4         |
| 1.3.3 <i>Project Boundary &amp; Project Site Layout:</i>        | 4         |
| <b>Chapter 2 Description of Water Environment .....</b>         | <b>6</b>  |
| 2.1 Watershed Description                                       | 6         |
| 2.1.1 <i>General Topography</i>                                 | 6         |
| 2.1.2 <i>Drainage Pattern of the Study Area</i>                 | 6         |
| <b>Chapter 3 Impact of Mining on Surface Water Bodies .....</b> | <b>8</b>  |
| 3.1 Watershed Description                                       | 8         |
| 3.2 Impact of Mining Activity                                   | 10        |
| 3.2.1 <i>Quantitative Impact</i>                                | 10        |
| 3.2.2 <i>Qualitative Impact</i>                                 | 16        |
| <b>Chapter 4 Conservation and Management Plan.....</b>          | <b>23</b> |
| 4.1 Existing Control Measures                                   | 23        |
| 4.2 Proposed Water Conservation Measures:                       | 29        |
| <b>Chapter 5 Concluding Remarks.....</b>                        | <b>30</b> |

# Chapter 1

## Introduction

### 1.1 Background of the Project

Kathara OCP is a brownfield project operating since pre-nationalization era. This project falls in the CD block Bermo in Bokaro District of Jharkhand, administratively under Kathara Area of CCL. This project has obtained Environmental clearance for 0.96/1.90 MTPA under EIA Notification, 2006 vide letter no: J-11015/482/2008-IA-II (M) dt. 08.01.2014.

The life of mine as per the calendar plan of previous EC was 03 years. Meanwhile, a revised cost estimate (RCE) Project Report of Kathara OCP was prepared for balance mineable reserve of 26.80 MT with mine life 15 years and rated capacity of 1.90 MTPA, and approved by CCL Board on 01.10.2012. Kathara OCP has obtained ToR for 1.90 MTPA vide letter no. F.J-11015/482/2008-IA-II dt. 27.4.2021. Public Hearing of the project was held on 31.08.2021.

The proposal for issuance of fresh EC to Kathara OCP (1.90 MTPA) within the project area of 773.23 Ha was submitted to MoEFCC as per EIA Notification, 2006.

### 1.2 Brief Description of Nature and Size of the Project

Kathara OCP is an existing opencast coal-mining project. The proposed project will run with a rated capacity of 1.90 MTPA within the project area of 773.23 Ha and a mine life of 12 years.

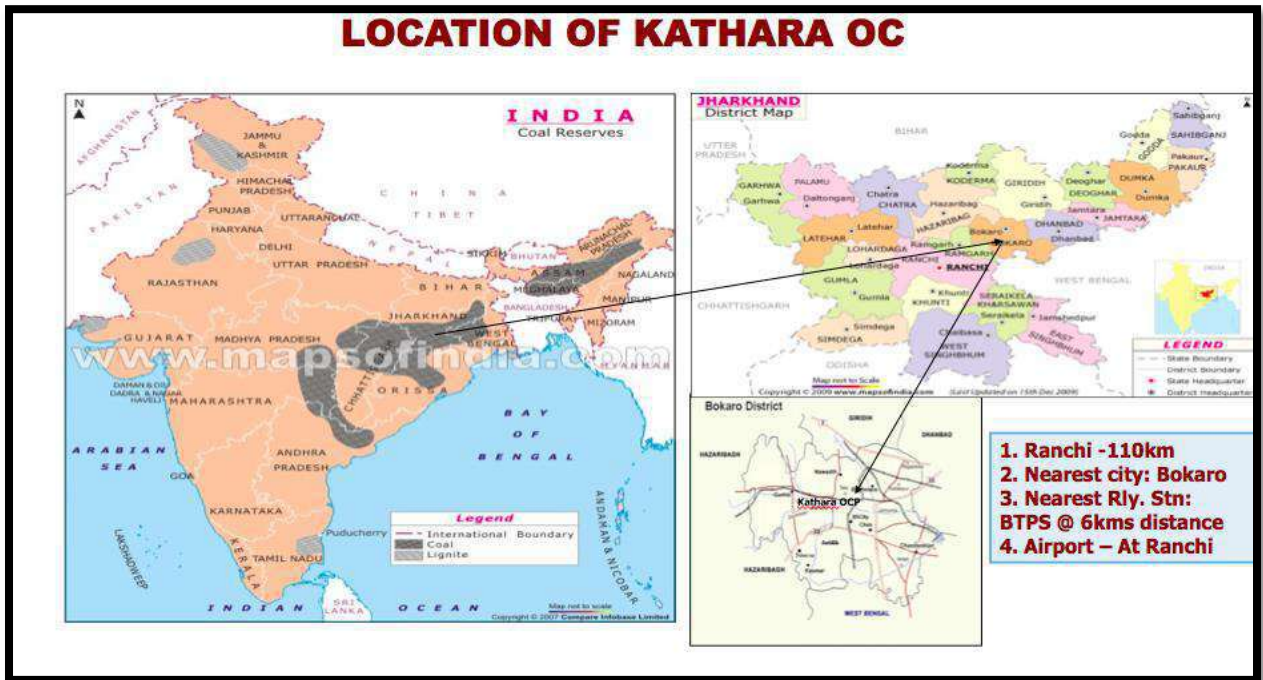
### 1.3 Location Details

#### 1.3.1 General Location

Kathara Opencast Project lies in the South-Western part of the East Bokaro Coalfields in Bokaro District of Jharkhand, administratively falls within Kathara area of Central Coalfields Limited, Jharkhand.

=====

Conservation and Management Plan of Damodar River  
Kathara OCP, (Kathara Area)



**1.3.2 Specific Location:**

Kathara OCP falls in the Kathara Block East Bokaro Coalfields, Bermo CD Block located in Bokaro District of Jharkhand. This project is covered by the Survey of India Toposheet no: 73E/13 & 73 E/14, enclosed by Latitude: 23°44'47.26"N to 23°46'26.11"N and Longitude: 85°50'59.89"E to 85°54'25.91"E.

**1.3.3 Project Boundary & Project Site Layout:**

**a) Northern Boundary**

The northern surface boundary has been fixed along a safe distance of 45 m from existing road (going to Tenughat and partly diverted).

**b) Eastern Boundary**

Earlier quarry floor boundary was fixed along the fault F2F2. Eastern side of the mine is Colony no 4 of CCL and external dump.

**c) Southern Boundary**

Along the incrop of Kargali Bottom/combined seam (fixed earlier). Here quarry boundary is limited by central dump and washery site.

**d) Western Boundary**

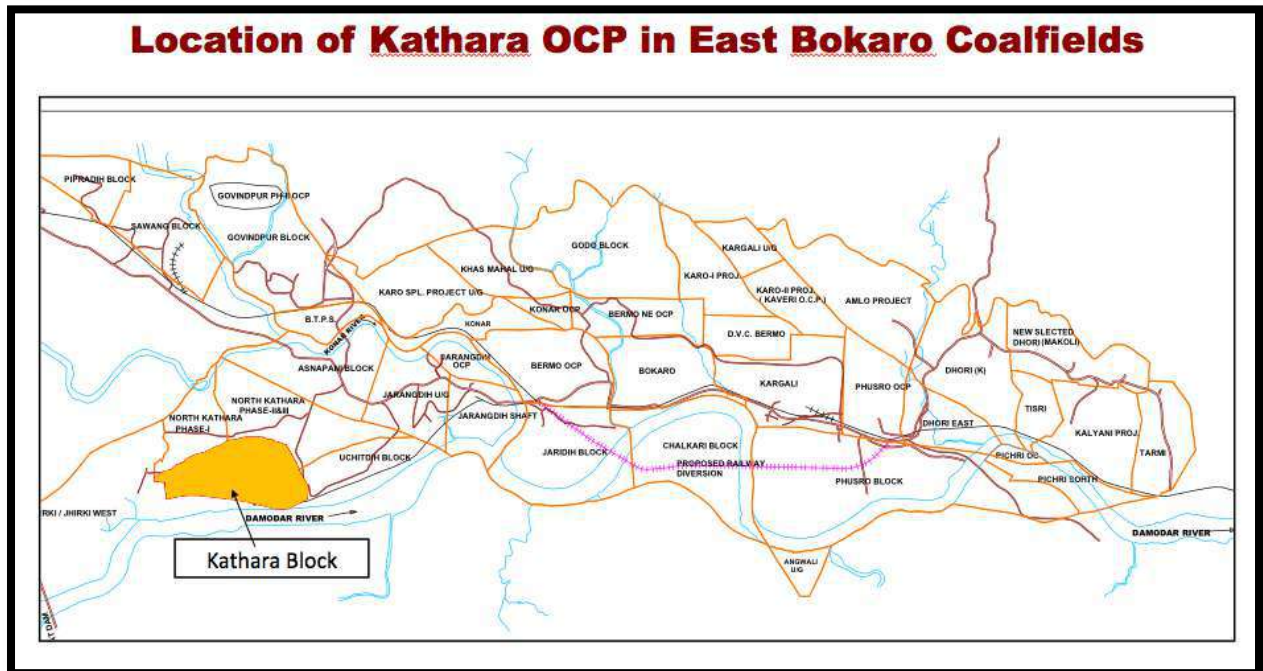
The western boundary is fixed at 60 m distance from land acquired boundary. West side of the mine is JhirkiTola.

**Conservation and Management Plan of Damodar River  
Kathara OCP, (Kathara Area)**

As per the Approved Mining Plan of Kathara OCP (1.9 MTPA), the total land requirement is 773.23 Ha. consisting of 258.46 Ha of quarry area and 109.53 Ha of active external dump. The details of land use during mining is as given below.

**Table 1 Proposed Land Use Plan**

| Description                                       | Forest Area in Ha. | Non-Forest Area in Ha. | Total Area in Ha. |
|---|--------------------|------------------------|-------------------|
| Quarry  | 0                  | 258.46                 | 258.46            |
| External OB Dump                                  | 0                  | 109.53                 | 109.53            |
| Reclaimed OB Dump and Embankment                  | 0                  | 74.09                  | 74.09             |
| Industrial Area (W/S, S/S, Haul Road, Office etc) | 0                  | 64.54                  | 64.54             |
| Colony & Settlement                               | 0                  | 122.87                 | 122.87            |
| Safety Zone / Green belt                          | 0                  | 45                     | 45                |
| Vacant Land                                       | 0                  | 98.74                  | 98.74             |
| <b>Total</b>                                      | <b>0</b>           | <b>773.23</b>          | <b>773.23</b>     |



## Chapter 2

# Description of Water Environment

## 2.1 Watershed Description

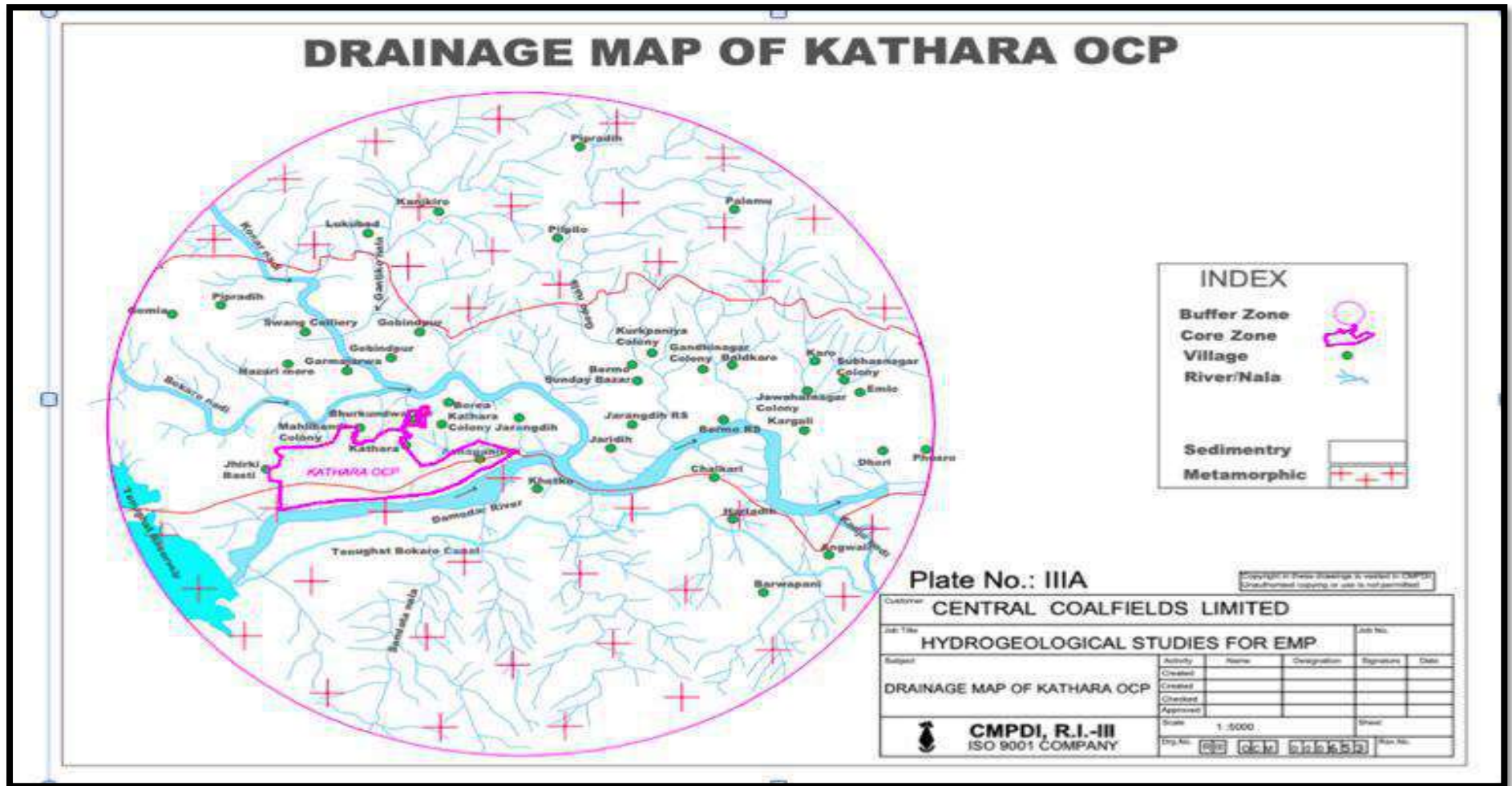
### 2.1.1 General Topography

Undulating terrain sloping towards South and South-East direction of Damodar River basin. General elevation ranges from 220 m (in the eastern most part near Damodar River) to 441 m above msl (in the northern part near dense mixed jungle of Taraberapahar). Several hillocks are present in the buffer zone. Some of the hillocks with highest peak of 441 m above msl are present in the dense mixed jungle of Taraberapahar at about 7 to 8 km north-east of the project and another hill about 437 m above msl is present in the dense mixed jungle of Kuripahar around 5 to 6 km north-east of the project. Hillock having peak of 323 m above msl is present in the dense mixed jungle around 4 to 5 km south-east of the project. In general, north of the study area is dominated by several hillocks as compare to south.

### 2.1.2 Drainage Pattern of the Study Area

The general surface slopes towards the Damodar River, the master drainage in the area. The drainage of the area is controlled by Damodar River, Bokaro River and Konar River. Bokaroriver and Konar river which flows from north-west to south-east and joins in Damodar River. Damodar River located south of the project flowing towards east. No nala diversion is required for this project. The HFL of the Damodar River as recorded in the vicinity of the project is 221.64 m above MSL (as on 11.08.1935) (nearby RL of project is 227.0 m). The drainage pattern of the area is mostly dendritic.

**Conservation and Management Plan of Damodar River  
Kathara OCP, (Kathara Area)**



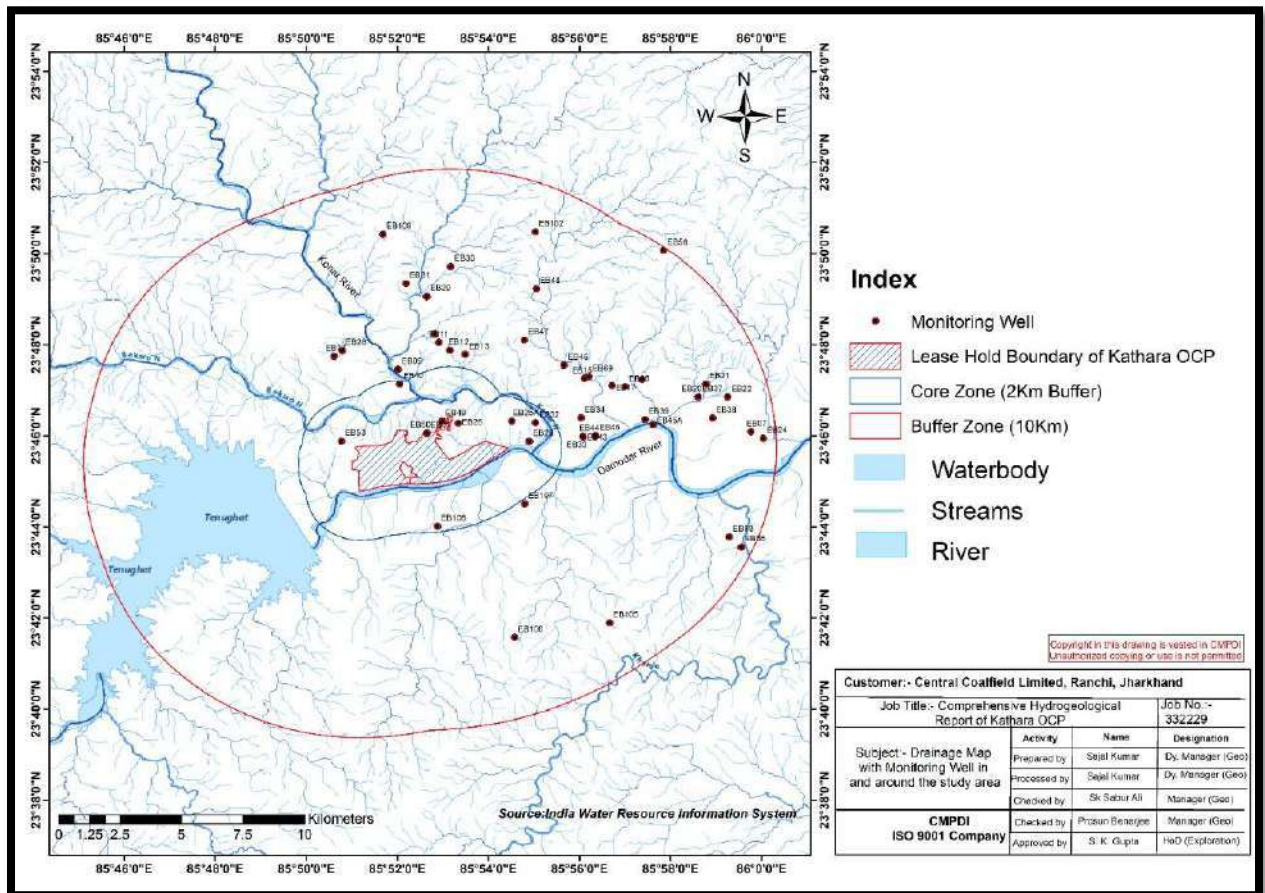
**Fig: Drainage Map Of Kathara OCP**

## Chapter 3 Impact of Mining on Surface Water Bodies

### 3.1 Watershed Description

The study area lies in the watershed area of the Damodar River. The entire project area of Kathara OCP i.e. 773.23 ha falls in the catchment area of Damodar River which also includes the Tenughat Reservoir/Dam (i.e. less than 0.5% of total catchment area of Damodar River).

The project area of Kathara OCP is 7.7323 sq.km (773.23 Ha) whereas the quarriable area is about 2.5848 sq.km (258.48 ha). Total excavated (mining) area of the Kathara OCP (2.5848 sq.km) is significantly small as compared to the catchment area of the Damodar River. Moreover, the present proposal involves mining activity within the already broken/damaged land thus, not having any further impact on the topography and drainage catchment of river Damodar.



**Fig: Watershed Map of Damodar River**

## 3.2 Impact of Mining Activity

The identified impacts of mining activity on Damodar River are as given below:

| SN | Particulars         | Details   |
|----|---------------------|---|
| 01 | Quantitative Impact | <ul style="list-style-type: none"><li>• Impact due to change in the Topography and drainage of the watershed due to mining activity</li></ul>   |
| 02 | Qualitative Impact  | <ul style="list-style-type: none"><li>• Mine and workshop effluent</li><li>• Surface run off/ storm water run-off from the mine and industrial area</li><li>• Sewage Effluent from site</li></ul> |

### 3.2.1 Quantitative Impact

#### ***Impact Due to Change in Topography and Drainage:***

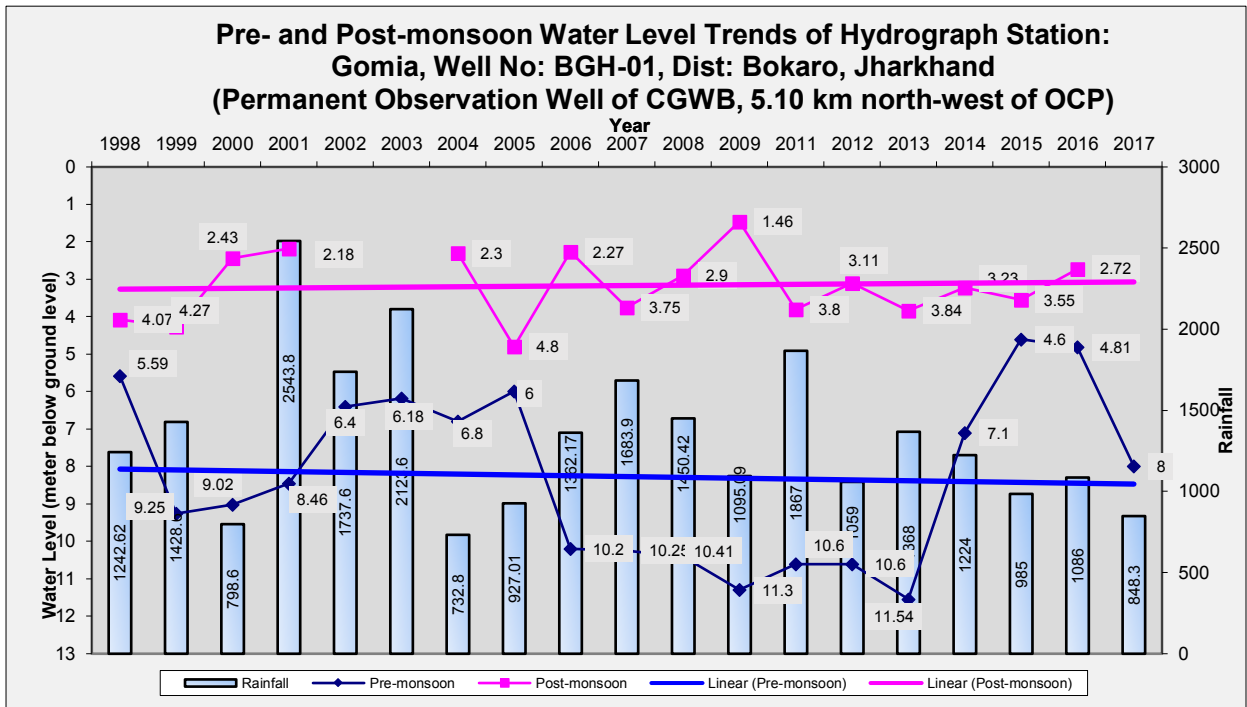
Mining of coal by **open cast method** causes changes in topography. The change of ground relief in a mine area influences the local drainage. This may alter the drainage at the micro level. Care is taken during mining activity to avoid any serious damage to surface water bodies. The drainage of the area is controlled by Damodar River, Bokaro River and Konar River. Bokaro River and Konar River which flows from north-west to south-east and joins in Damodar River. Damodar River located south of the project flowing towards east. No nala diversion is required for this project. The HFL of the Damodarnadi as recorded in the vicinity of the project is 221.64 m above MSL (as on 11.08.1935) (nearby RL of project is 227.0 m). The distance of the Kathara OCP (quarry) from Damodar River ranges from around 500 m to 1000 m.

#### ***Impact on Ground Water:***

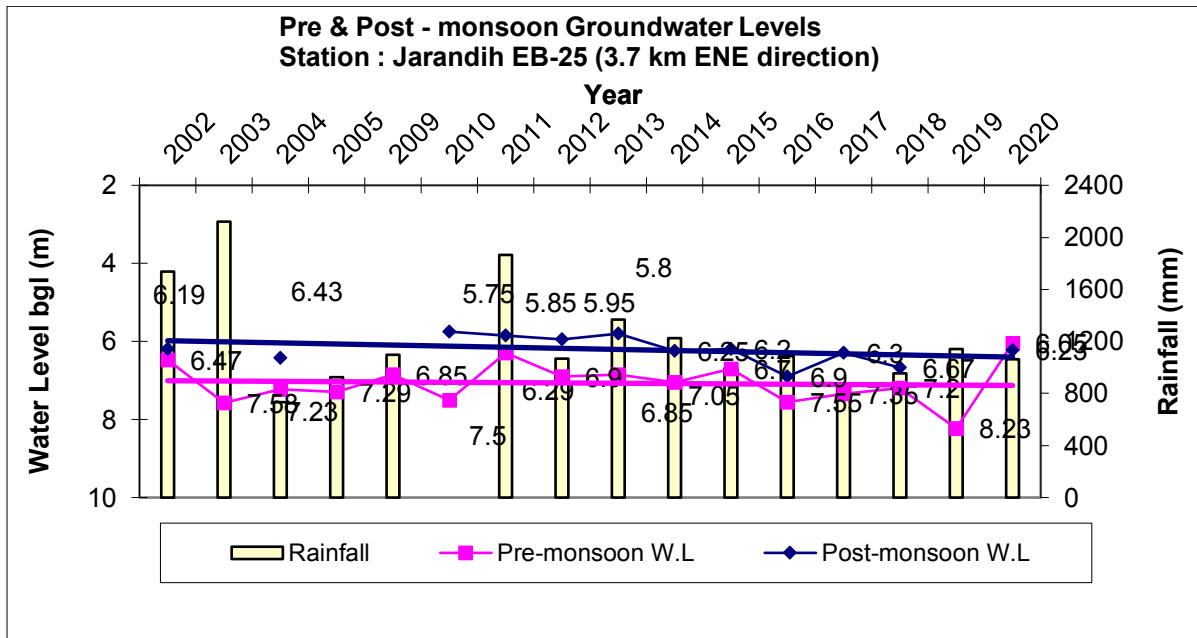
Ground water level by Permanent Observation Well (PoW) of the area is continuously monitored by CMPDI and CGWB. There is a permanent observation well of CGWB in Gomia (Well No.: BGH-01). The pre-monsoon and post monsoon historical groundwater levels for the last few years (1998 to 2017) recorded by CGWB at the nearest permanent hydrograph stations at Gomia (Well No.: BGH-01). The pre-monsoon and post monsoon historical groundwater levels for the last few years recorded by CMPDI at the nearest permanent hydrograph stations like at Jarandih (Well No.: EB-25) and Kathara (Well No.: EB-26) were collected and are given below:

=====

**Conservation and Management Plan of Damodar River  
Kathara OCP, (Kathara Area)**

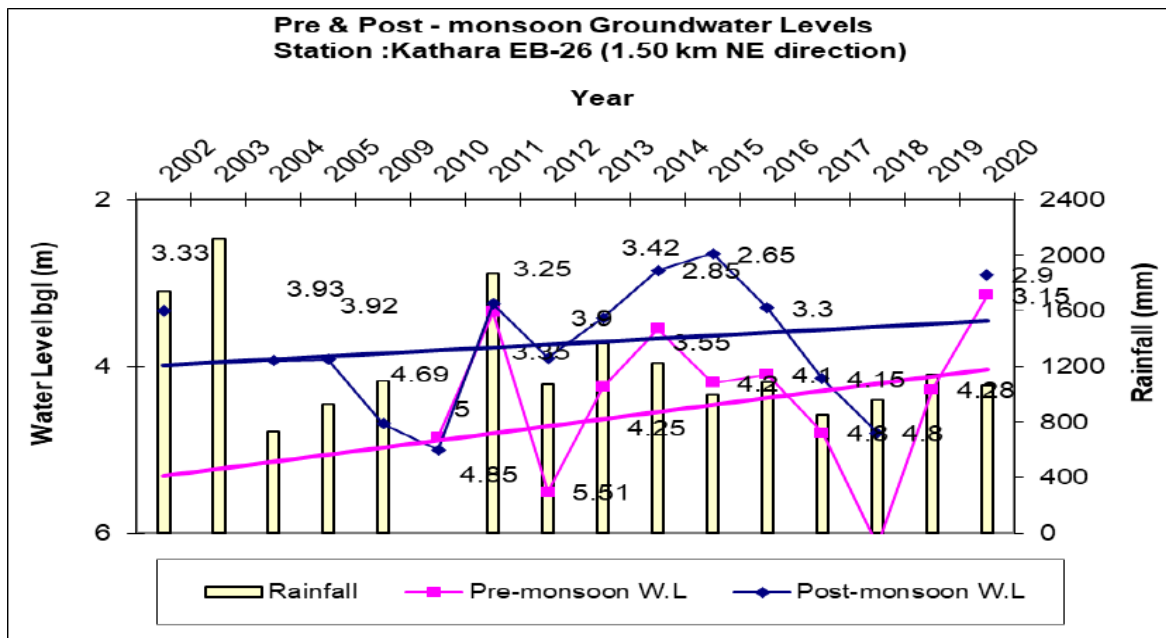


**Fig 1 (a): Water level trend of CGWB Well, Gomia (BGH-01)**

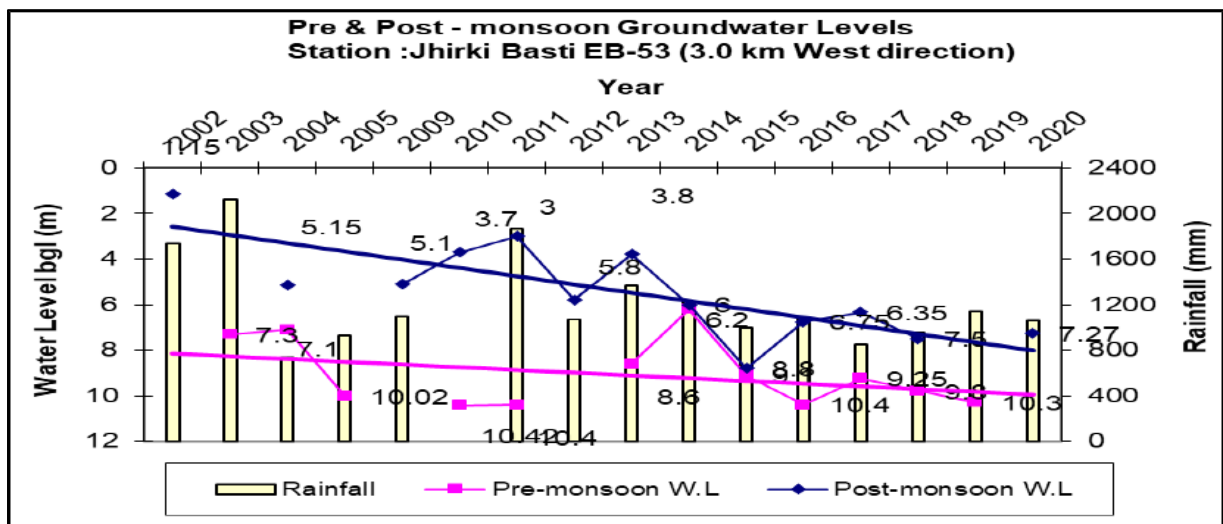


**Fig 1 (b): Hydrograph station at Jarandih (Well No.: EB-25)**

**Conservation and Management Plan of Damodar River  
Kathara OCP, (Kathara Area)**

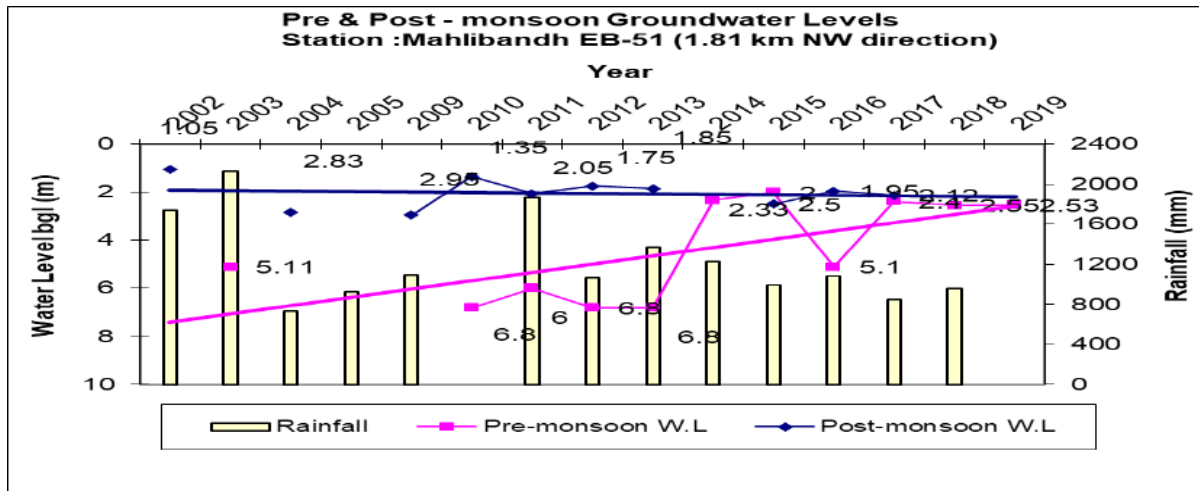


**Fig 1 (c): Hydrograph station atKathara (Well No.: EB-26)**

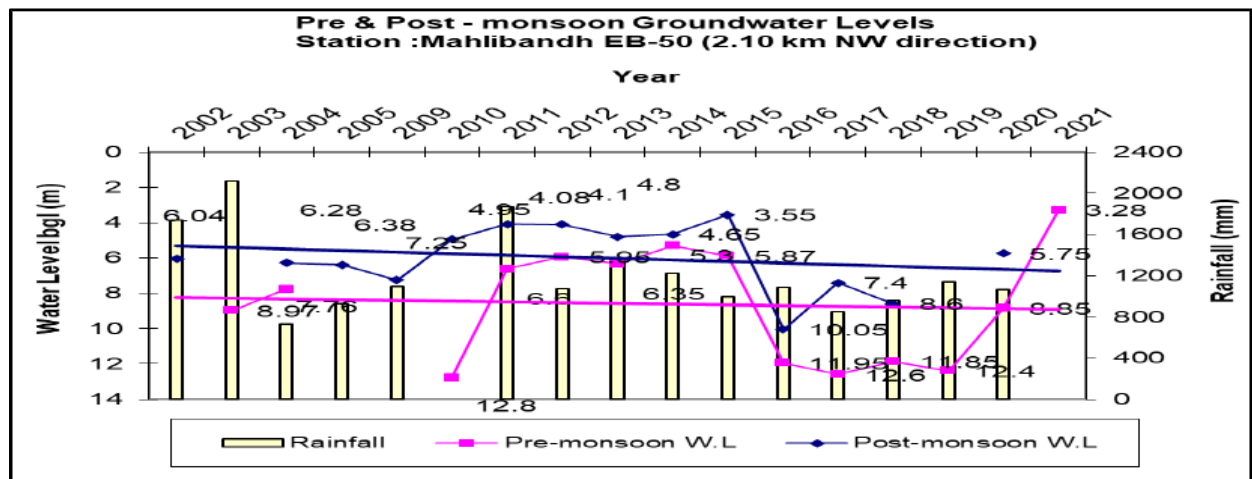


**Fig 1 (d): Hydrograph station at JhirkiBasti (Well No.: EB-53)**

**Conservation and Management Plan of Damodar River  
Kathara OCP, (Kathara Area)**



**Fig 1 (e): Hydrograph station at Mahliband (Well No.: EB-51)**



**Fig 1 (f): Hydrograph station at Mahliband (Well No.: EB-50)**

The above data shows that the pre-monsoon water levels vary from 1.23 m (2015 at ED-25, Jarangdih) to 12.60 m (2017 at ED-50, mahlibandh) with an average of 5.55 m and the post-monsoon water levels vary from 1.28 m (2015 at ED-25A) to 10.05 m (2016 at ED-50) with an average of 3.90 m.

The water level fluctuation varies from 0.10 m to 7.40 m with an average fluctuation of 1.60 m in the area.

Overall groundwater utilisation with the increasing population and Industrial demand and less recharge by rainfall has in recent past years, may be affected the local groundwater regime. Studies reveal that the general water table gradient for the top aquifer in the buffer zone is around  $1.5 \text{ to } 3.30 \times 10^{-3}$  towards Damodar River.

**Conservation and Management Plan of Damodar River  
Kathara OCP, (Kathara Area)**

---

**Mine water inflow and disposal for Kathara OCP:**

Type of mine: Open Cast

Elevation of Water Table: 255m (AMSL)

Lowest Elevation of mine pits: 50m (AMSL) at final stage of quarry.

Mine seepage has been predicted based on Darcy's equation for the exposure of formations/aquifers of Kathara OCP as per predicted mine progress upto 5th year since the resumption of the mine operation. This is appropriate to mention here that monsoon period has been included in postmonsoon period for estimation of water inflow in the mine for next five years after the reopening of mine operation. Hydraulic Conductivity (K) value of 1.0 m/day is considered for the top unconfined aquifer whereas for semiconfined aquifer it is 0.38 m/day. The shale and coal layers in this region have been considered as aquiclude.

The details estimate of the yearly mine seepage has been furnished considering 120 days for pre-monsoon and 245 days for post-monsoon period for unconfined and semiconfined aquifers from the face walls of mine.

The seepage from the bottom of the mine pit is considered nil as coal formation in the working bench acts as aquiclude.

The estimated value depicts that daily mine seepage will reach at its maximum value in the 4th year 1176 m<sup>3</sup>/day during monsoon season whereas it will reach 1092m<sup>3</sup>/day during non-monsoon period.

Yearly mine seepage during pre-monsoon as well as in post-monsoon period has been summarized below-

| <b>Year</b> | <b>Period</b> | <b>Annul Mine Seepage (Cub m/Year)</b> |
|-------------|---------------|--|
| Year 1      | Pre monsoon   | 229320                                 |
|             | Post monsoon  | 246960                                 |
| Year 2      | Pre monsoon   | 229320                                 |
|             | Post monsoon  | 246960                                 |
| Year 3      | Pre monsoon   | 229320                                 |
|             | Post monsoon  | 246960                                 |
| Year 4      | Pre monsoon   | 267540                                 |
|             | Post monsoon  | 288120                                 |
| Year 5      | Pre monsoon   | 267540                                 |
|             | Post monsoon  | 288120                                 |

=====

**Conservation and Management Plan of Damodar River  
Kathara OCP, (Kathara Area)**

---

However, the estimate mine seepage may deviate due to presence of hydrogeological barriers, enhanced aquifer properties due to mining activity or any spatial variation of aquifer parameters.

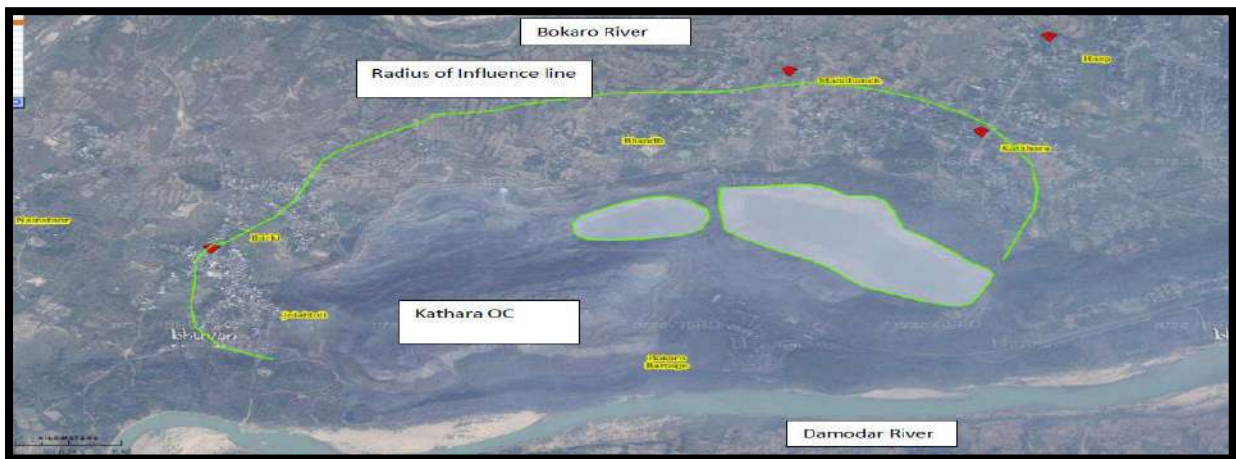
The project area of Kathara OCP is 7.7323 sq.km (773.23 Ha) whereas the quarriable area is about 2.5848 sq.km (258.48 ha). Total excavated (mining) area of the Kathara OCP (2.5848 sq.km) is significantly small as compared to the catchment area of the Damodar River. Moreover, the present proposal involves mining activity within the already broken/damaged land thus, not having any further impact on the topography and drainage catchment of river Damodar.

| SN | River         | Length along the project |
|----|---------------|--------------------------|
| 1  | Damodar River | 6 km                     |

**Radius of Influence**

Considering the dewatering of unconfined aquifer in the immediate mine area and permeability 1.0 m/d, by using the Sichardt formula [  $R = C*(H - h_w)*\sqrt{k}$  ], the radius of influence for Kathara Expansion OCP has been estimated.

| Sl.No | Project     | Final Mine Depth (m) | Probable drawdown (m) | Radius of Influence (m)            |
|-------|-------------|----------------------|-----------------------|------------------------------------|
|       |             |                      |                       | K= 1.0 (unconfined aquifer)        |
| 1     | Kathara OCP | 150                  | 25.0 to 50.0          | 250m to 485m(i.e 250 mt to 500 mt) |



**Fig: Radius of Influence- Kathara OCP**

The projected radius of influence due to Kathara OCP on groundwater has been estimated at about 250m to 485m from the mine periphery and the impact zone is restricted due to

**Conservation and Management Plan of Damodar River  
Kathara OCP, (Kathara Area)**

---

presence of Bokaro River in the North direction, by Damodar River in the Southern part and by Quarry in the eastern part of the area.



**Fig: View of Damodar River (As on 18.04.2022)**

**3.2.2 Qualitative Impact**

Likely sources of pollution from this project along with the type of pollutants are as follows:

**Sources of Water pollution**

|       |   |                                    |
|-------|---|------------------------------------|
| (i)   | Mine Discharge                                    | Suspended solids of coal and clay. |
| (ii)  | Workshop Effluent                                 | Suspended solids and Oil & Grease. |
| (iii) | Domestic waste water                              | BOD and TSS.                       |
| (iv)  | Surface run-off passing through coal stockpiles,  | Suspended solids.                  |
| (v)   | Storm water from leasehold area and built-up area | Suspended solids.                  |

**Conservation and Management Plan of Damodar River  
Kathara OCP, (Kathara Area)**

**Mine discharge and Workshop Effluent**

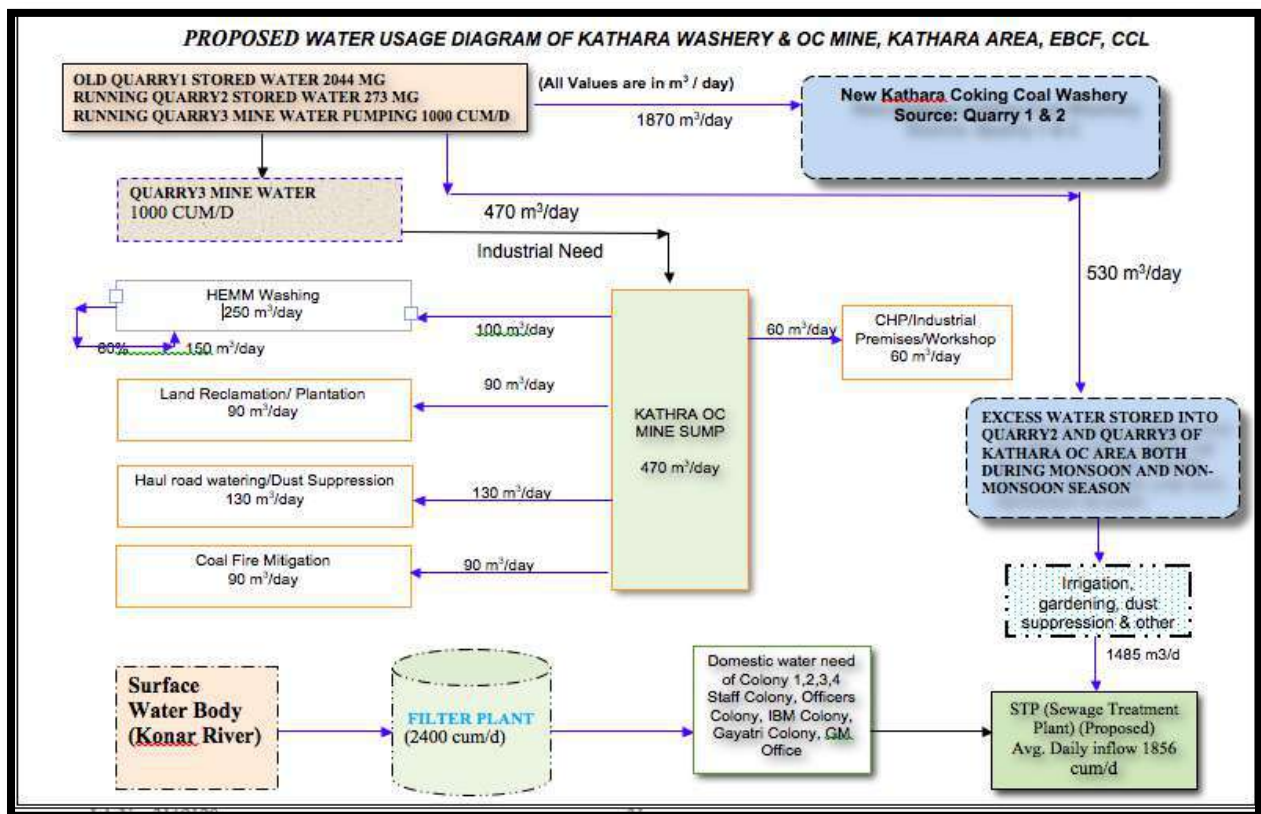
Maximum mine discharge during premonsoon period i.e. 1000 m<sup>3</sup>/day will be achieved on complete exposure of the aquifers over the bottom most coal seam Kargali Bottom & Top Combined in the 4<sup>th</sup> year of mine resumption. The mine discharge is proposed to be collected in a sump located at the bottom of the mine surface from where it will be pumped out to satisfy water requirement of the project after sedimentation to arrest suspended solids.

Initially water collected and stored in sumps, where maximum settlement of suspended solids takes place. Water from workshops is circulated through oil and grease trap and reused for same purpose before letting out into the local drainage network or before its storing in abandoned mines. Hence chance of pollution or contamination of ground water due to coal mining is very less.

1. Workshop discharge → O&G Trap → Settling tank → Reuse
2. Mine Discharge → Mine Sumps for TSS removal → Reuse
3. Domestic effluent → Sewage Treatment Plant.

Thus, both Mine discharge and workshop effluent are treated in a closed-circuit system, leading to no direct impact on the riverine ecosystem.

The detailed water balance is given in the figure below-



**Fig:Water Usage Diagram of Kathara OCP**

**Conservation and Management Plan of Damodar River  
Kathara OCP, (Kathara Area)**

---

In order to assess the impact of proposed working on the surface water quality & ground water quality, water quality analysis has been carried out. The monitoring locations are shown below in the plan:



**Fig. Schematic Diagram showing monitoring locations for surface water quality in the study area**

**Conservation and Management Plan of Damodar River  
Kathara OCP, (Kathara Area)**

**Table -1 Water Quality Assessment of Major Surface Bodies in the Buffer Zone.**

| Sl. No | Parameter       | Unit           | Locations     |               |               |               |               |
|--------|-----------------|----------------|---------------|---------------|---------------|---------------|---------------|
|        |                 |                | A             | B             | C             | D             | E             |
| 1.     | pH              | --             | 7.40          | 7.46          | 6.72          | 7.23          | 7.47          |
| 2.     | Temperature     | °C             | 26.2          | 26.2          | 26.3          | 25.2          | 26.2          |
| 3.     | B.O.D           | mg/L           | BQL<br>(QL=2) | 2.0           | BQL<br>(QL=2) | 2.1           | BQL<br>(QL=2) |
| 4      | C.O.D           | mg/L           | BQL<br>(QL=5) | 10            | BQL<br>(QL=5) | 10            | BQL<br>(QL=5) |
| 5      | D.O.            | mg/L           | 7.6           | 6.6           | 6.8           | 6.0           | 7.5           |
| 6      | T.S.S           | mg/L           | 11.0          | 19.0          | 16.8          | 17.3          | 20            |
| 7      | T.D.S           | mg/L           | 202.4         | 246.8         | 168.7         | 194.6         | 165.5         |
| 8      | Chloride        | mg/L           | 30.0          | 30.0          | 24.0          | 30.0          | 20.0          |
| 9      | Fluoride        | mg/L           | 0.88          | 0.98          | 0.73          | 0.78          | 0.86          |
| 10     | Sulphate        | mg/L           | 63.9          | 76.9          | 31.2          | 40.4          | 57.4          |
| 11     | Nitrate         | mg/L           | 4.3           | 5.3           | 4.1           | 6.1           | 7.0           |
| 12     | Oil & Grease    | mg/L           | BQL<br>(QL=1) | BQL<br>(QL=1) | BQL<br>(QL=1) | BQL<br>(QL=1) | BQL<br>(QL=1) |
| 13     | Total Coliform  | MPN/10<br>0 ml | 30            | 42            | 26            | 42            | 52            |
| 14     | Faecal Coliform | MPN/10<br>0 ml | Absent        | 16            | Absent        | 12            | Absent        |

**Ground Water Quality**

Presence of multiple coal mining projects and thermal project in the region have surely impacted the groundwater regime of the buffer zone. An effort has been made to assess and map the groundwater quality in the region.

| ID | Location             | Falling under Impact Zone of |
|----|----------------------|------------------------------|
| A  | BandhBasti           | Kathara OCP                  |
| B  | Kathara Bazar        | Kathara OCP, Jaragdih OC     |
| C  | KhetkoBasti          | None                         |
| D  | Subhash Nagar Colony | Karo OCP, Kargali OCP        |
| E  | Shiv mandir, Bermo   | Kargali OC, kargaliWashery   |

**Conservation and Management Plan of Damodar River  
Kathara OCP, (Kathara Area)**

---



**Fig. Schematic Diagram showing monitoring locations for ground water quality in the study area.**

**Table-1 Ground Water Quality Assessment in the Buffer Zone.**

| Sl. No. | Parameter   | Unit | Locations |       |       |       |       | Permissible Limit |
|---------|-------------|------|-----------|-------|-------|-------|-------|-------------------|
|         |             |      | A         | B     | C     | D     | E     | IS:10500          |
| 1.      | pH          | --   | 7.13      | 6.67  | 7.18  | 6.87  | 6.64  | No relaxation     |
| 2.      | Temperature | °C   | 24.3      | 26.3  | 26.0  | 24.5  | 25.3  | -                 |
| 3       | T.D.S       | mg/L | 528.0     | 384.6 | 323.7 | 755.2 | 743.5 | 2000              |
| 4       | Chloride    | mg/L | 44.0      | 54.0  | 24.0  | 158.0 | 92.0  | 1000              |
| 5       | Fluoride    | mg/L | 0.85      | 0.69  | 0.49  | 0.60  | 0.74  | 1.5               |
| 6       | Sulphate    | mg/L | 102.3     | 47.7  | 73.9  | 122.6 | 120.1 | 400               |
| 7       | Nitrate     | mg/L | 1.7       | 14.5  | 11.2  | 20.4  | 23.1  | No relaxation     |

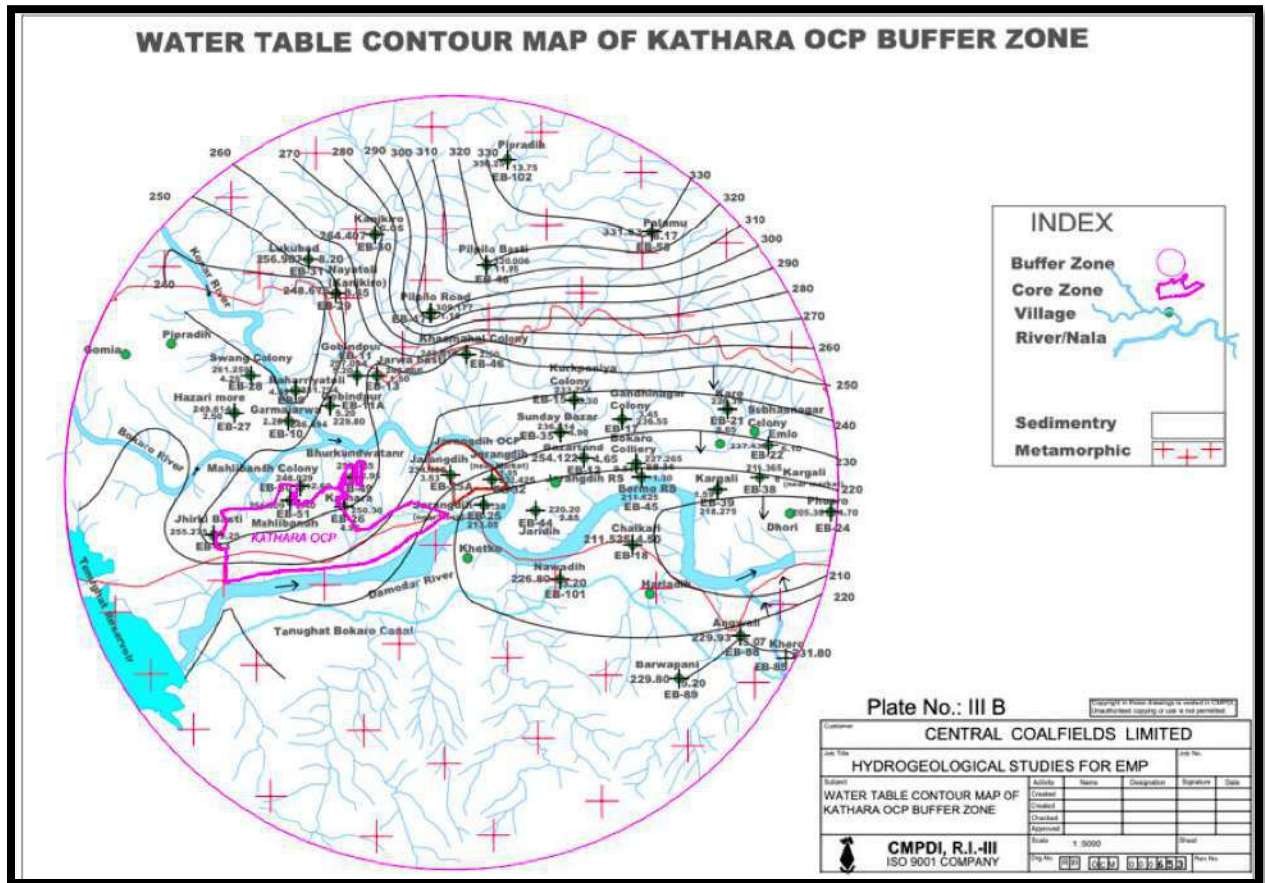
**Conservation and Management Plan of Damodar River  
Kathara OCP, (Kathara Area)**

|    |  |      |                   |                   |                   |                   |                   |               |
|----|--|------|-------------------|-------------------|-------------------|-------------------|-------------------|---------------|
| 8  | Alkanity as CaCO <sub>3</sub>          | mg/L | 300.0             | 144.0             | 144.0             | 288.0             | 420.0             | 600           |
| 9  | Total Hardness as CaCO <sub>3</sub>    | mg/L | 370.0             | 224.0             | 188.0             | 520.0             | 452.0             | 600           |
| 10 | Calcium as Ca                          | mg/L | 92.2              | 83.4              | 57.7              | 131.5             | 85.0              | 200           |
| 11 | Iron (as Fe)                           | mg/L | 0.97              | 0.23              | BQL<br>(QL=0.05)  | BQL<br>(QL=0.05)  | 0.78              | No relaxation |
| 12 | Zinc (as Zn)                           | mg/L | 0.20              | BQL<br>(QL=0.02)  | BQL<br>(QL=0.02)  | 0.02              | 0.08              | 15            |
| 14 | Manganese (as Mn)                      | mg/L | 1.44              | 0.42              | BQL<br>(QL=0.05)  | BQL<br>(QL=0.05)  | 0.18              | 0.3           |
| 15 | Arsenic (as As)                        | mg/L | BQL<br>(QL=0.005) | BQL<br>(QL=0.005) | BQL<br>(QL=0.005) | BQL<br>(QL=0.005) | BQL<br>(QL=0.005) | 0.05          |
| 16 | Hexavalent Chromium as Cr <sup>+</sup> | mg/L | BQL<br>(QL=0.01)  | BQL<br>(QL=0.01)  | BQL<br>(QL=0.01)  | BQL<br>(QL=0.01)  | BQL<br>(QL=0.01)  | -             |

**Surface Run-Off/ Storm Water Run-Off from the Mine and Industrial Area**

Surface run-off from the mine and industrial area generally contain suspended particles of coal, silt, and occasionally oil and grease. When this surface run-off directly enters the natural drainage, it can have several adverse impacts like increased silt load on river bed, depleting the water quality etc.

**Conservation and Management Plan of Damodar River  
Kathara OCP, (Kathara Area)**



**Fig: Plan Showing Water Table Contour Plan**

To minimize the surface run-off, Mine Sumps have been provided. Workshop effluent is being treated at ETP consisting of Oil and grease trap and Sequential Settling ponds. 0.70 MGD filter plant has been installed to provide treated drinking water to different colonies in Kathara area. Around 5.5 km of garland drain along with sequential settling ponds have been provided all around the mine periphery to treat surface run-off and prevent soil erosion. The detailed conservation and management plan is discussed in Chapter-4.

## Chapter 4

# Conservation and Management Plan

### 4.1 Existing Control Measures

- a) Mine Sumps have been provided for collection and treatment of Mine Seepage water.
- b) Workshop effluent is being treated at ETP consisting of Oil and greese trap and Sequential Settling ponds.
- c) 0.70 MGD filter plant has been installed to provide treated drinking water to different colonies in Kathara area.
- d) Around 5.5 km of garland drain along with sequential settling ponds have been provided all around the mine periphery to treat surface run-off and prevent soil erosion.
- e) Rain water harvesting system has been provided at P.O. Office of Kathara OCP and in about 100 residential quarters of Kathara Area.
- f) 03 no. of ponds were constructed in nearby villages.
- g) A Piezometer installation in Kathara OCP under process to check the level of ground water

**Conservation and Management Plan of Damodar River  
Kathara OCP, (Kathara Area)**

---

Photographs showing the water conservation measures are as given below:



**Rain Water Harvesting System at Kathara OCP**



**Piezometer at Kathara OCP**



**Deep Borewell at Kathara OCP**

Conservation and Management Plan of Damodar River  
Kathara OCP, (Kathara Area)



**Effluent Treatment Plan at Kathara OCP Workshop**



**Sedimentation Pond near Quarry-1**

Conservation and Management Plan of Damodar River  
Kathara OCP, (Kathara Area)

---



**Sedimentation Pond near MuslimTola**



**Mine Void at Quarry-2**

---

Conservation and Management Plan of Damodar River  
Kathara OCP, (Kathara Area)

---



**Mine water of Quarry-2 is utilized for irrigation purpose**



**Pond near Muslim Tola**

**Conservation and Management Plan of Damodar River  
Kathara OCP, (Kathara Area)**

---

## 4.2 Proposed Water Conservation Measures:

| Activity  | Details   | Total Cost in Rs. Lakhs | Timeline of Completion |
|---|---|-------------------------|------------------------|
| Sewage Treatment Plant at the existing colony                             | Existing colonies at Kathara colliery with 794 quarters will be provided with an integrated sewage treatment plant.         | 500                     | Mar' 2023              |
| Embankment with a catch drain along Damodar River                         | Embankment along with catch drain of 4000 m along Damodar River.  | 400                     | Dec' 2022              |
| Additional Rain Water Harvesting System                                   | Roof top rain water harvesting system at Workshop and Pit Office  | 25                      | Dec' 2022              |
| Toe wall and garland drain/ catch drain                                   | Toe wall, garland drain and catch drains around the active and stabilized OB Dumps, quarry and other industrial settlements | 200                     | Oct' 2022              |
| Sedimentation Tank  | 02 Nos. of Sedimentation tank to arrest run-off before discharge of water into Damodar                                      | 30                      | Pre-monsoon 2022       |
| Piezometers   | Additional 2 no.ofPoezometers in upstream and Downstream of the project.  | 50                      | Oct' 2022              |
| <b>Total Cost of proposed Water Pollution &amp; Conservation Measures</b> |   | <b>1205</b>             |                        |

## Chapter 5

# Concluding Remarks

- From the present study, it is concluded that there is no water drawl from the surface water regime around the mining area. Thus, there is no direct impact on the supportive carrying capacity of the riverine system.
- The likely sources of pollution of the riverine ecosystem from Kathara OCP are surface run-off from mine, workshop effluent, and mine water from the mine.
- Adequate water pollution control measures have been taken to prevent pollution from the mine.
- The excess mine water discharge from the mines is discharged into surface water regime which helps in rejuvenation of the riverine ecosystem.
- For further conservation of river, several measures including construction of embankment & sewage treatment plant is proposed in FY 2022-23. The total cost of proposed measures is approximately Rs1205 Lakhs.
- Periodic Monitoring of surface water at several locations have been proposed for determining the quality of the surface water and if required, additional protection measures will be undertaken by the CCL.
- Any other measures proposed by MoEF&CC, JSPCB & other regulatory bodies shall also be undertaken in addition to the above measures.

## Annexure-X

**Action Plan with Budgetary Provision for compliance of issues raised during  
Public Consultation of Kathara OCP dt. 31.10.2021**

**A. Brief Overview of the Issues Raised**

| SN | Category of Issues Raised                                    | Frequency | Concerned Village/ Person   |
|----|--|-----------|---|
| 1  | Land, Compensation and Employment                            | 9         | Jhirki, Bandh Basti, Choudhari Tola   |
| 2  | Water supply and sanitation                                  | 9         | Jhirki, Asnapani, Kathara Basti, Bandh Basti, Jarangdih, Sri. Rajesh Kumar Pandey |
| 3  | Improvement in Basic Facilities under CSR in nearby villages | 8         | Jhirki, Bandh Basti, Asnapani, Choudhari Tola, Kathara Basti                      |
| 4  | Education & Skill Development and related services           | 4         | Jhirki, Bandh Basti, Sri. Rajesh Kumar Pandey                                     |
| 5  | Repair and maintenance of roads and bridges                  | 3         | Jhirki, Swang North Panchayat, Bandh Basti  |
| 6  | Medical and Health Facilities                                | 3         | Jarangdih, Kendua Tola, Jhirki  |
| 7  | Damage due to blasting                                       | 2         | Bandh Basti   |
| 8  | Pollution and Mitigation Measures                            | 2         | Jhirki, Bandh Basti   |
| 9  | Plantation   | 1         | Jhirki  |
| 10 | Others   | 1         | Kathara Basti   |

**B. Action Plan with Budgetary Provision :**

| S.No. | Category of Issues Raised         | Issues in Details   | Action Plan with Budgetary Provision  | Cost (in Rs. Lakh) |
|-------|-----------------------------------|---|---|--------------------|
| 1     | Land, Compensation and Employment | i. Compensation against Land<br>ii. Employment for locals | i. CCL provides employment to all land losers at one employment per 02 Acre of tenancy land.<br>ii. 100 employment already provided for land acquired under CBA in 1979. Employment to local villagers is being provided as per their skill in civil, electrical maintenance, workshops, washeries and other different contractual work like coal transportation, supply of spares, small capital and revenue nature of work.<br><b>Compensation and Employment to be provided to concerned as per the Company rules.</b> | --                 |

| 2  | Water supply and sanitation                                  | <p>i. Mine water and pond construction for agriculture and domestic use</p> <p>ii. Water tanker facility (Jhirki)</p> <p>iii. Water Supply</p> <p>iv. Filter Plant maintenance</p> <p>v. Wastewater from Colony and Mosquito issue</p> | <p>i. State Govt has been contacted for preparation of scheme for utilization of mine water in Kathara Area as per MoU signed between CIL &amp; State Govt, Jharkhand. 03 no. of ponds have been constructed in nearby villages. They are routinely cleaned.</p> <p>ii. Also, Deepening &amp; cleaning of pond (at three locations near Bandh Basti &amp; Kathara Basti) is under process for the purpose of agriculture &amp; Other Usage use. (Photographs enclosed)<br/><b>(Timeline: FY 22-23)</b></p> <p>iii. 2 pumps of 1000 GPM capacity are deployed for domestic water to Jhirki, Yadav tola, Asna pani and Bandh Basti located near project. The annual cost of operation, repair &amp; maintenance of water supply system is approximately 36 Lakhs/annum.<br/><b>(Ongoing Activity)</b></p> <p>iv. A water filter plant for the purpose of water supply to nearby villages is already under construction under DMFT scheme by State Govt.</p> <p>v. The site was inspected by CCL and the damaged part of drain repaired.<br/><b>(Work Completed)</b></p> <p>vi. Fogging to eliminate mosquito menace has been carried in past years and it will be done in future as well.</p> <p>vii. In addition to this, 3 numbers of fresh ponds have been constructed with Ghat in last two in command areas of Kathara area under CSR at a cost of Rs 20 Lakhs.</p>   | <p>--</p> <p>5</p> <p>108</p> <p>--</p> <p>--</p> <p>--</p> <p>--</p> |                        |         |         |         |                        |  |       |       |       |       |               |                  |      |      |      |  |              |               |  |  |       |  |              |                       |  |      |      |       |              |                   |      |  |  |       |              |                          |  |  |      |      |            |               |  |      |      |      |             |                    |              |              |              |               |               |           |
|--|--|--|--|---|------------------------|---------|---------|---------|------------------------|--|-------|-------|-------|-------|---------------|------------------|------|------|------|--|--------------|---------------|--|--|-------|--|--------------|-----------------------|--|------|------|-------|--------------|-------------------|------|--|--|-------|--------------|--------------------------|--|--|------|------|------------|---------------|--|------|------|------|-------------|--------------------|--------------|--------------|--------------|---------------|---------------|-----------|
| 3  | Improvement in Basic Facilities under CSR in nearby villages | <p>i. Better water supply/electricity/other basic facilities in villages as per CSR and Govt. schemes.</p>   | <p>i. Different basic facilities are extended to the nearby villages under CSR scheme of CCL. This includes health, education, infrastructure, water supply road sanitation and environment.</p> <table border="1"> <thead> <tr> <th>Sector</th> <th>2018-19</th> <th>2019-20</th> <th>2020-21</th> <th>2021-22</th> <th>Grand Total (Rs. Lakh)</th> </tr> </thead> <tbody> <tr> <td><b>Drinking Water &amp; Water Management</b></td> <td>11.87</td> <td>28.59</td> <td>55.97</td> <td>138.5</td> <td><b>234.93</b></td> </tr> <tr> <td><b>Education</b></td> <td>3.31</td> <td>5.57</td> <td>1.88</td> <td></td> <td><b>10.76</b></td> </tr> <tr> <td><b>Health</b></td> <td></td> <td></td> <td>10.94</td> <td></td> <td><b>10.94</b></td> </tr> <tr> <td><b>Infrastructure</b></td> <td></td> <td>8.81</td> <td>6.83</td> <td>18.00</td> <td><b>33.64</b></td> </tr> <tr> <td><b>Sanitation</b></td> <td>7.19</td> <td></td> <td></td> <td>13.75</td> <td><b>20.94</b></td> </tr> <tr> <td><b>Skill Development</b></td> <td></td> <td></td> <td>6.50</td> <td>2.00</td> <td><b>8.5</b></td> </tr> <tr> <td><b>Sports</b></td> <td></td> <td>2.02</td> <td>1.92</td> <td>5.00</td> <td><b>8.94</b></td> </tr> <tr> <td><b>Grand Total</b></td> <td><b>22.37</b></td> <td><b>44.99</b></td> <td><b>84.04</b></td> <td><b>177.25</b></td> <td><b>328.65</b></td> </tr> </tbody> </table> <p><b>For FY 2022-23, a budget of Rs. 194.50 Lakhs has been provisioned to carry out various activities under CSR in Kathara Area.</b></p> | Sector  | 2018-19                | 2019-20 | 2020-21 | 2021-22 | Grand Total (Rs. Lakh) | <b>Drinking Water &amp; Water Management</b> | 11.87 | 28.59 | 55.97 | 138.5 | <b>234.93</b> | <b>Education</b> | 3.31 | 5.57 | 1.88 |  | <b>10.76</b> | <b>Health</b> |  |  | 10.94 |  | <b>10.94</b> | <b>Infrastructure</b> |  | 8.81 | 6.83 | 18.00 | <b>33.64</b> | <b>Sanitation</b> | 7.19 |  |  | 13.75 | <b>20.94</b> | <b>Skill Development</b> |  |  | 6.50 | 2.00 | <b>8.5</b> | <b>Sports</b> |  | 2.02 | 1.92 | 5.00 | <b>8.94</b> | <b>Grand Total</b> | <b>22.37</b> | <b>44.99</b> | <b>84.04</b> | <b>177.25</b> | <b>328.65</b> | <p>--</p> |
| Sector                                       | 2018-19  | 2019-20  | 2020-21  | 2021-22   | Grand Total (Rs. Lakh) |         |         |         |                        |  |       |       |       |       |               |                  |      |      |      |  |              |               |  |  |       |  |              |                       |  |      |      |       |              |                   |      |  |  |       |              |                          |  |  |      |      |            |               |  |      |      |      |             |                    |              |              |              |               |               |           |
| <b>Drinking Water &amp; Water Management</b> | 11.87  | 28.59  | 55.97  | 138.5   | <b>234.93</b>          |         |         |         |                        |  |       |       |       |       |               |                  |      |      |      |  |              |               |  |  |       |  |              |                       |  |      |      |       |              |                   |      |  |  |       |              |                          |  |  |      |      |            |               |  |      |      |      |             |                    |              |              |              |               |               |           |
| <b>Education</b>                             | 3.31   | 5.57   | 1.88   |   | <b>10.76</b>           |         |         |         |                        |  |       |       |       |       |               |                  |      |      |      |  |              |               |  |  |       |  |              |                       |  |      |      |       |              |                   |      |  |  |       |              |                          |  |  |      |      |            |               |  |      |      |      |             |                    |              |              |              |               |               |           |
| <b>Health</b>                                |  |  | 10.94  |   | <b>10.94</b>           |         |         |         |                        |  |       |       |       |       |               |                  |      |      |      |  |              |               |  |  |       |  |              |                       |  |      |      |       |              |                   |      |  |  |       |              |                          |  |  |      |      |            |               |  |      |      |      |             |                    |              |              |              |               |               |           |
| <b>Infrastructure</b>                        |  | 8.81   | 6.83   | 18.00   | <b>33.64</b>           |         |         |         |                        |  |       |       |       |       |               |                  |      |      |      |  |              |               |  |  |       |  |              |                       |  |      |      |       |              |                   |      |  |  |       |              |                          |  |  |      |      |            |               |  |      |      |      |             |                    |              |              |              |               |               |           |
| <b>Sanitation</b>                            | 7.19   |  |  | 13.75   | <b>20.94</b>           |         |         |         |                        |  |       |       |       |       |               |                  |      |      |      |  |              |               |  |  |       |  |              |                       |  |      |      |       |              |                   |      |  |  |       |              |                          |  |  |      |      |            |               |  |      |      |      |             |                    |              |              |              |               |               |           |
| <b>Skill Development</b>                     |  |  | 6.50   | 2.00  | <b>8.5</b>             |         |         |         |                        |  |       |       |       |       |               |                  |      |      |      |  |              |               |  |  |       |  |              |                       |  |      |      |       |              |                   |      |  |  |       |              |                          |  |  |      |      |            |               |  |      |      |      |             |                    |              |              |              |               |               |           |
| <b>Sports</b>                                |  | 2.02   | 1.92   | 5.00  | <b>8.94</b>            |         |         |         |                        |  |       |       |       |       |               |                  |      |      |      |  |              |               |  |  |       |  |              |                       |  |      |      |       |              |                   |      |  |  |       |              |                          |  |  |      |      |            |               |  |      |      |      |             |                    |              |              |              |               |               |           |
| <b>Grand Total</b>                           | <b>22.37</b>   | <b>44.99</b>   | <b>84.04</b>   | <b>177.25</b>   | <b>328.65</b>          |         |         |         |                        |  |       |       |       |       |               |                  |      |      |      |  |              |               |  |  |       |  |              |                       |  |      |      |       |              |                   |      |  |  |       |              |                          |  |  |      |      |            |               |  |      |      |      |             |                    |              |              |              |               |               |           |

|   |  |  |  |   |
|---|--|--|--|---|
|   |  | <p>ii. To ensure proper street lighting.</p>   | <p>ii. 30 numbers of 60-Watt LED lights along washery roads have been installed. In addition, around 250 numbers of 60-watt LED street light have also been installed at various junctions and community centers in nearby villages under CSR at a cost of Rs 3 Lakhs</p> <p>iii. Construction of 1 number of community hall within the command area of Kathara<br/><b>(Timeline: FY 23-24)</b></p>  | <p>--</p> <p>150</p>                          |
| 4 | Education & Skill Development and related services | <p>i. Exemption/Lower school fee in DAVs for displaced and economically poor families</p> <p>ii. Extension of school bus service upto Jhirki</p> <p>iii. Skill Development</p> | <p>i. Fee waiver (ranging from 50 %- 100 %) has been provide to eligible students of weaker economic sections at DAV Kathara and DAV Swang. (Approximately 50 beneficiaries each year). The annual cost of fee waiver is approximately 4 Lakhs/annum.<br/><b>(Ongoing Activity)</b></p> <p>ii. 4 number of school buses deployed for nearby colony and bastis including Jhirki, Yadav Tola,Bandh Basti, Yadav Tola, Kathara Basti, Asnapani, Railway Colony etc. In addition to this , 6 more numbers of bus are catering the welfare activities of nearby command area villages like Khetko, Piparadih , Karmatiya and Swang etc. The annual cost of operation, repair &amp; maintenance of 4 numbers of school buses are approximately 48 Lakhs/annum.<br/><b>(Ongoing Activity)</b></p> <p>iii. Training is provided to local persons through CIPET to about 100 dependents of villagers for gainful employment in CCL. Further, various courses like sewing, beautician, computer, food processing are arranged regularly under CSR. The same will continue in future as well.</p> | <p>12</p> <p>144</p>                          |
| 5 | Repair and maintenance of roads and bridges        | <p>i. Repair of road from Muslim Tola to Yadav Tola</p> <p>ii. Repair of Iron Bridge at Swang</p> <p>iii. Construction of road near Mahabir Sthan, Swang</p>                   | <p>i. Road from Muslim Tola to Yadav Tola (1100 meter x 4 meter x .3 meter) has been repaired departmentally. <b>(Work under progress) (Timeline: June-2022)</b></p> <p>ii. The iron bridge over Montico Nala at Swang has repaired.<br/><b>(Work Completed)</b></p> <p>iii. Strengthening &amp; widening of main road from Kathara More to Kathara outpost (1450 meter) in FY 21-22 at a cost of Rs 96.89 Lakhs.</p> <p>iv. Construction of PCC road from Asnapani Mod to CPP Rly. Crossing<br/><b>(Timeline: FY 23-24)</b></p>   | <p>23</p> <p>1.50</p> <p>--</p> <p>200.00</p> |
| 6 | Medical and Health Facilities                      | <p>i. Health Facility at Hospital, Ambulance Services</p>  | <p>i. Already 3 dispensaries and 1 regional hospital with 5 ambulances cater to the needs of employees and villagers. Kathara Regional Hospital having facilities for outdoor and indoor treatment, radiology, ENT. Other patients are referred to Regional Hospital Dhori at about 10 km.</p>   | <p>--</p>                                     |

|  |                                   |   |  | 2018-19                       |             | 2019-20      |             | 2020-21      |             | 2021-22      |             |               |
|--|-----------------------------------|---|--|-------------------------------|-------------|--------------|-------------|--------------|-------------|--------------|-------------|---------------|
|  |                                   |   |  | No. of Camps                  | Beneficiary | No. of Camps | Beneficiary | No. of Camps | Beneficiary | No. of Camps | Beneficiary |               |
|  |                                   |   |  | Village Health Camp           | 41          | 893          | 39          | 925          | 19          | 551          | 16          | 314           |
|  |                                   |   |  | HTN & Diabetic Detection Camp | 1           | 26           | 1           | 160          | -           | -            | 1           | 144           |
|  |                                   |   |  | Anemia Camp                   | 1           | 72           | 1           | 96           | 2           | 214          | 1           | 240           |
|  |                                   |   |  | CSR Dispensary                | Everyday    | 4300         | Everyday    | 4441         | Everyday    | 7182         | Everyday    | 7343          |
|  |                                   |   |  | School Health Camp            | 15          | 600          | 10          | 575          | -           | -            | -           | -             |
|  |                                   | ii. Medical Bill of retired personnel                                       | ii. The medical bills of retired persons will be resolved as and when submitted for reimbursement.   |                               |             |              |             |              |             |              |             |               |
| 7  | Damage due to blasting            | i. Damage of houses due to blasting   | i. Controlled Blasting using electronic detonator is carried out at specified timings to control ground vibration as per the DGMS guidelines. The vibration parameters during blasting has been found with safe limits. (Enclosed as Annexure)   | --                            |             |              |             |              |             |              |             |               |
| 8  | Pollution and Mitigation Measures | i. Coal stock fire causing pollution<br>ii. Slurry ponds of Kathara Washery | i. Coal stock fire whenever detected is controlled by firefighting team and extinguished.<br>ii. The washery is located at about 80 to 100 meters from Damodar River. In Kathara Washery 2 no. of thickeners and 5 no. of Slurry Ponds having a composite volume of 463000 cu.m are used to treat effluent and water from pond no. 5 is recycled into washing circuit. The old slurry at washery is being evacuated. 33000 tonne of slurry was sold vide e-auction on 16.11.2021. The local sale of slurry will resume shortly after due permission from State Govt. | --                            |             |              |             |              |             |              |             |               |
| 9  | Plantation                        | i. Requested to carryout additional plantation in nearby villages.          | i. Plantation is carried out by State Forest Department. Till now, 140.60 Ha. have been reclaimed and a total 3,51,500 trees have been planted.<br>ii. Additional Plantation has been proposed under EIA/EMP & NCRAP in project boundary & nearby villagers.   | --                            |             |              |             |              |             |              |             |               |
| 10   | Others                            | i. Unauthorised occupation of quarters.                                     | i. A committee has been constituted to identify unauthorized occupants and they will be evicted with the help of District Administration.  | --                            |             |              |             |              |             |              |             |               |
| <b>Total Cost Proposed under CER for Compliance of PH Issues (in Rs Lakhs)</b> |                                   |   |  |                               |             |              |             |              |             |              |             | <b>643.50</b> |

## Annexure-XI

Award of work

No. GM(KTA)SO(C)/AOW/2021-22/ 1480

Dated ... 24.03.2022

JAWAHAR LAL YADAV

At: Singh Nagar

PO: Phusro Bazar

Dist: Bokaro (829144)

Email Id- jlyadavphusro@gmail.com

Mob. No91-9431510564

|       |   |
|-------|---|
| Sub:  | Construction of deep borewell with solar power operated submersible pump set , pump house, Recharge pit etc. for drinking water at Khetko of Kathara area under CSR scheme 21-22 of CCL, Kathara area.                                  |
| Ref.: | E-Tender Notice No. NIT- 04(CSR) of 2021-22 vide e-tender notice no GM (KTA)/SO(C)/E-Tender/2021-22/1145 dt. 14.01.2022 Bid submission end date on 25.01.2022 and Date of opening of tender on 26.01.2022 (Tender Id 2022_CCL_229684_1) |

Dear Sir,

In response to your tender for the subject work mentioned above, this is to inform you that your offer for a contract amount of **Rs. 849742.70 (Rupees Eight lakh forty nine thousand seven hundred forty two & paise seventy) only** exclusive of GST amount of Rs. Rs. nil [**Cost to company amount of Rs. 849742.70 (as Input Tax Credit is not available)**] undertake the work has been accepted by CCL, subject to the following stipulations / conditions which are supplementaries / complementaries to the conditions of the tender documents: –

1. GST is not payable for this work as per CA certificate furnished by you. However, if any GST & GST compensation cess becomes payable due to change of your GST status, the same shall be payable by you for which no reimbursement shall be made to you by CCL. The payment of GST and GST compensation cess is responsibility of the contractor.
2. The period of completion of work shall be **75 (Seventy five)** days from expiry of 10 (Ten) days from the issue of this award of work or within 07 (Seven) days of handing over of the site, whichever is later.
3. The earnest money amounting to Rs. **13500.00** deposited online through Axis Aggregator vide Bank/UTR No.98928481 and Ref. no 236917773466 has been retained by the company (CCL) as part of Performance Security Money.
4. You are further required to deposit **Rs. 11992.00 (Rupees Eleven thousand nine hundred ninety two)** only with the company in the form of a Bank Guarantee (if applicable) or Govt. Securities or FDR duly pledged in favour of **Central Coalfields Limited Kathara** or demand draft in favour of **Central Coalfields Limited Kathara** from any Scheduled Bank payable at SBI Kathara within **21 (Twenty one)** days of issuance of this letter thus making the total performance security money amount to **Rs.25492.00 (Rupees Twenty five thousand four hundred ninety two)** only i.e. 3% of the contract amount. If you fail to deposit the above amount within the prescribed time, the Award of Work shall be cancelled. Additionally, the company shall ban such defaulting contractor for a period of 02 (two years) from being eligible to submit Bids in CIL and its subsidiaries from the date of issue of such letter.
5. A copy of Bill of Quantity (BOQ) is enclosed for ready reference.

There is no Abnormally Low Rate (ALR) or Abnormally High Rate (AHR) item in this work as it is percentage rate quotation

6. All running on A/c bills shall be paid at 95% of the work value. The 5% deduction towards retention money will form Second Part of Security deposit and shall be refunded after issue of no defect certificate.
7. You shall comply with Contract Labour (Regulation and Abolition) Act and make payments to your workmen accordingly. In case you engage 10 & above labourers in the work on any working day you shall be required to submit registration certificate under the B.O.C.W. (RE&CS) Act 1996 and in case you engage 20 (Twenty) or more labourers in the work on any working day you shall be required to submit Labour license under Contract Labour (Regulation & Abolition) Act 1970 for the same.

24/03/2022

Award of work

No. GM (KTA) S O (C)/AOW/2021-22/ 1481

Dated 24.03.2022

SRISHTI POLYTECH

Pandey Niwas Gopal Nagar

Manaitand

Dist: Dhanbad

Jharkhand (826001)

Email Id- srishtipolytech@gmail.com

Mob. No91-7004471859

|       |   |
|-------|---|
| Sub:  | Construction of deep bore well with solar power operated submersible pump set, pump house, Recharge pit etc. for drinking water in Pipra Tola, Mahli Bandh of Kathara area under CSR scheme 21-22 of CCL, Kathara area.,              |
| Ref.: | E-Tender Notice No. NIT- 05(CSR) of 2021-22 vide e-tender notice no GM (KTA)/SO(C)/E-Tender/2021-22/1146 dt. 14.01.2022 Bid submission end date .25.01.2022 and Date of opening of tender on 26.01.2022 (Tender Id 2022_CCL_229690_1) |

Dear Sir,

In response to your tender for the subject work mentioned above, this is to inform you that your offer for a contract amount of Rs. 895626.98 (Rupees Eight Lakhs ninety five thousand six hundred twenty six & paise ninety eight) only inclusive of GST amount of Rs. Rs. 136621.06 only and Rs. 759005.92 (Rupees seven Lakhs fifty nine thousand five & paise ninety two) only exclusive of GST amount only [Cost to company amount of Rs. 895626.98 as Input Tax Credit is not available] to undertake the work has been accepted by CCL, subject to the following stipulations / conditions which are supplementaries / complementaries to the conditions of the tender documents: –

The payment of GST and GST Compensation Cess by the service availer (i.e. CCL) to bidder/ contractor (If GST payable by bidder/ contractor) would be made only on the latter submitting a Bill/Invoice in accordance with the provision of relevant GST Act and the rules made there under and after online filing of valid return on GST portal. The payment of GST and GST Compensation Cess is responsibility of the Contractor.

1. The period of completion of work shall be 75 (Seventy five) days from expiry of 10 (Ten) days from the issue of this award of work or within 07 (Seven) days of handing over of the site, whichever is later.
2. The earnest money amounting to Rs. 13500.00 deposited online through Axis Aggregator vide Bank/UTR No. 98906721 and Ref. No. 236922773402 has been retained by the company (CCL) as part of Performance Security Money.
3. You are further required to deposit Rs. 13369.00 (Rupees thirteen thousand three hundred sixty nine) only with the company in the form of a Bank Guarantee (if applicable) or Govt. Securities or FDR duly pledged in favour of Central Coalfields Limited Kathara or demand draft in favour of Central Coalfields Limited Kathara from any Scheduled Bank payable at SBI Kathara within 21 (Twenty one) days of issuance of this letter thus making the total performance security money amount to Rs. 26869.00 (Rupees twenty six thousand eight hundred sixty nine) only i.e. 3% of the contract amount. If you fail to deposit the above amount within the prescribed time, the Award of Work shall be cancelled. Additionally, the company shall ban such defaulting contractor for a period of 02 (two years) from being eligible to submit Bids in CIL and its subsidiaries from the date of issue of such letter.
4. Further you have to deposit Rs. Nil (Rupees Nil) only as Additional performance security as per clause no. 4.8 of GTC of Conditions of Contract of tender documents along with Performance Security in form of a Bank Guarantee (if applicable) or Govt. Securities or FDR duly pledged in favour of Central Coalfields Limited Kathara or demand draft in favour of Central Coalfields Limited Kathara from any Scheduled Bank payable at SBI Kathara (if applicable)
5. A copy of Bill of Quantity (BOQ) is enclosed for ready reference.

There is no Abnormally Low Rate (ALR) or Abnormally High Rate (AHR) item in this work as it is percentage rate quotation.

↓  
24/03/2022

Award of work

No. GM (KTA) S O (C)/AOW/2021-22/ 1482

Dated ..... 24.03.2022

M/S MD ERFAN AHMAD

Asnapani, Kathara

Dist: Bokaro

Jharkhand (829116)

Email Id- erfana29116@gmail.com

Mob. No91-8340112518

|       |  |
|-------|--|
| Sub:  | Construction of deep borewell with solar power operated submersible pump set , pump house, Recharge pit etc. for drinking water at Asnapani of Kathara area under CSR scheme 21-22 of CCL, Kathara area                              |
| Ref.: | E-Tender Notice No. NIT- 07(CSR) of 2021-22 vide e-tender notice no GM (KTA)/SO(C)/E-Tender/2021-22/1160 dt. 17.01.2022 Bid submission end date 28.01.2022 and Date of opening of tender on 29.01.2022 (Tender Id 2022_CCL_229867_1) |

Dear Sir,

In response to your tender for the subject work mentioned above, this is to inform you that your offer for a contract amount of Rs. 1156500.73 (Rupees Eleven Lakhs fifty six thousand five hundred & paise seventy three) only inclusive of GST amount of Rs. Rs. 176415.37 only and Rs. 980085.36 (Rupees nine Lakhs eighty thousand eighty five & paise thirty six) only exclusive of GST amount only [Cost to company amount of Rs. 1156500.73 as Input Tax Credit is not available] to undertake the work has been accepted by CCL, subject to the following stipulations / conditions which are supplementaries / complementaries to the conditions of the tender documents: -

The payment of GST and GST Compensation Cess by the service availer (i.e. CCL) to bidder/ contractor (If GST payable by bidder/ contractor) would be made only on the latter submitting a Bill/Invoice in accordance with the provision of relevant GST Act and the rules made there under and after online filing of valid return on GST portal. The payment of GST and GST Compensation Cess is responsibility of the Contractor.

1. The period of completion of work shall be 75 (Seventy five) days from expiry of 10 (Ten) days from the issue of this award of work or within 07 (Seven) days of handing over of the site, whichever is later.
2. The earnest money amounting to Rs. 13500.00 deposited online through Axis Aggregator vide Bank/UTR No. 98875210 and Ref. No. 237110773084 has been retained by the company (CCL) as part of Performance Security Money.
3. You are further required to deposit Rs. 21195.00 (Rupees twenty one thousand one hundred ninety five) only with the company in the form of a Bank Guarantee (if applicable) or Govt. Securities or FDR duly pledged in favour of Central Coalfields Limited Kathara or demand draft in favour of Central Coalfields Limited Kathara from any Scheduled Bank payable at SBI Kathara within 21 (Twenty one) days of issuance of this letter thus making the total performance security money amount to Rs. 34695.00 (Rupees thirty four thousand six hundred ninety five) only i.e. 3% of the contract amount. If you fail to deposit the above amount within the prescribed time, the Award of Work shall be cancelled Additionally, the company shall ban such defaulting contractor for a period of 02 (two years) from being eligible to submit Bids in CIL and its subsidiaries from the date of issue of such letter.
4. Further you have to deposit Rs. Nil (Rupees Nil) only as Additional performance security as per clause no. 4.8 of GTC of Conditions of Contract of tender documents along with Performance Security in form of a Bank Guarantee (if applicable) or Govt. Securities or FDR duly pledged in favour of Central Coalfields Limited Kathara or demand draft in favour of Central Coalfields Limited Kathara from any Scheduled Bank payable at SBI Kathara (if applicable)
5. A copy of Bill of Quantity (BOQ) is enclosed for ready reference.

24/03/2022

Award of work

No. GM(KTA)SO(C)/AOW/2021-22/ 1532

Dated .....30.3.2022

NARSINGH YADAV

At: Kathara

PO: Kathara, Gomia

Dist: Bokaro (829116)

Email Id- ny829116@gmail.com

Mob. No91-9263932623

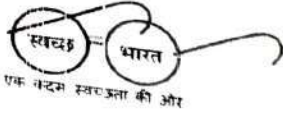
|       |   |
|-------|---|
| Sub:  | Construction of deep bore well with solar power operated submersible pump set , pump house, Recharge pit etc. for drinking water at Sadam Purvi of Kathara area under CSR scheme 21-22 of CCL, Kathara area.                            |
| Ref.: | E-Tender Notice No. NIT- 03(CSR) of 2021-22 vide e-tender notice no GM (KTA)/SO(C)/E-Tender/2021-22/1143 dt. 14.01.2022 Bid submission end date on 25.01.2022 and Date of opening of tender on 26.01.2022 (Tender Id 2022_CCL_229681_1) |

Dear Sir,

In response to your tender for the subject work mentioned above, this is to inform you that your offer for a contract amount of **Rs. 878097.94 (Rupees eight lakh seventy eight thousand ninety seven & paise ninety four)** only exclusive of GST amount of **Rs. Rs. nil [Cost to company amount of Rs. 878097.94 (as Input Tax Credit is not available)]** undertake the work has been accepted by CCL, subject to the following stipulations / conditions which are supplementaries / complementaries to the conditions of the tender documents: –

1. GST is not payable for this work as per CA certificate furnished by you. However, if any GST & GST compensation cess becomes payable due to change of your GST status, the same shall be payable by you for which no reimbursement shall be made to you by CCL. The payment of GST and GST compensation cess is responsibility of the contractor.
2. The period of completion of work shall be **75(Seventy five)** days from expiry of 10 (Ten) days from the issue of this award of work or within 07 (Seven) days of handing over of the site, whichever is later.
3. The earnest money amounting to **Rs. 13500.00** deposited online through Axis Aggregator vide Bank/UTR No.98914041 and Ref. no 236913773448 has been retained by the company (CCL) as part of Performance Security Money.
4. You are further required to deposit **Rs. 12843.00 (Rupees twelve thousand eight hundred forty three)** only with the company in the form of a Bank Guarantee (if applicable) or Govt. Securities or FDR duly pledged in favour of **Central Coalfields Limited Kathara** or demand draft in favour of **Central Coalfields Limited Kathara** from any Scheduled Bank payable at SBI Kathara within **21 (Twenty one)** days of issuance of this letter thus making the total performance security money amount to **Rs.26343.00 (Rupees Twenty six thousand three hundred forty three)** only i.e. 3% of the contract amount. If you fail to deposit the above amount within the prescribed time, the Award of Work shall be cancelled Additionally, the company shall ban such defaulting contractor for a period of 01 (one years) from being eligible to submit Bids in CIL and its subsidiaries from the date of issue of such letter.
5. A copy of Bill of Quantity (BOQ) is enclosed for ready reference.  
There is no Abnormally Low Rate (ALR) or Abnormally High Rate (AHR) item in this work as it is percentage rate quotation
6. All running on A/c bills shall be paid at 95% of the work value. The 5% deduction towards retention money will form Second Part of Security deposit and shall be refunded after issue of no defect certificate.
7. You shall comply with Contract Labour (Regulation and Abolition) Act and make payments to your workmen accordingly. In case you engage 10 & above labourers in the work on any working day you shall be required to submit registration certificate under the B.O.C.W. (RE&CS) Act 1996 and in case you engage 20 (Twenty)

30/03/2022



# CCL

A subsidiary of Coal India Company

सेंट्रल कोलफील्ड्स लिमिटेड  
(कोल इंडिया की अनुषंगी इकाई)  
दरभंगा हाउसरांची- 834 029  
**CENTRAL COALFIELDS LIMITED**  
(A Subsidiary of Coal India Limited)  
**CIVIL ENGINEERING DEPARTMENT**  
Kathara Area, Bokaro, Jharkhand-829116  
वेबसाइट/Website : <https://www.centralcoalfields.in>  
E-mail Id. : [socivilkathara@gmail.com](mailto:socivilkathara@gmail.com)

Ref No :- GM(KTA)/SO(C)/E-Tender/2021-22/1412

Dated :- 10.03.2022

निविदा सूचना

Notice Inviting Tender

NIT No: 15 (CSR) of 2021-22

1. Tenders are invited on-line under single cover system on the website <https://coalindiatenders.nic.in> from the eligible bidders having Digital Signature Certificate (DSC) issued from any agency authorized by Controller of Certifying Authority (CCA), Govt. of India and which can be traced up to the chain of trust to the Root Certificate of CCA, for the following work:

| Description of work   | Location | Estimated Cost of Work (Including GST) (In Rs.) | Earnest Money (In Rs.) | Period of Completion (In Days) |
|---|----------|---|------------------------|--------------------------------|
| Construction of deep bore wells each with solar power operated submersible pump set, pump house, Recharge pit etc. for drinking water in different location of Kathara area under CSR scheme 21-22 of CCL, Kathara area | Kathara  | 4316040.50                                      | 54000                  | 45                             |

- (i). For Site visit of location of work, the prospective bidder(s) may contact

| Tender inviting authority                                | Contact Person(s)             |
|--|-------------------------------|
| Staff Officer (Civil), Kathara<br>Mob No:- +918709366019 | PE(C), Mob No:- +918986862301 |

2. Time Schedule of Tender:

| Sl. No | Particulars                                  | Date       | Time        |
|--------|--|------------|-------------|
| a.     | Tender e-Publication date                    | 11.03.2022 | 18.00 Hours |
| b.     | Document download start date                 | 12.03.2022 | 10.00 Hours |
| c.     | Document download end date                   | 28.03.2022 | 15.00 Hours |
| d.     | Bid Submission start date                    | 12.03.2022 | 10.00 Hours |
| e.     | Bid submission end date                      | 28.03.2022 | 15.00 Hours |
| f.     | Start date for seeking Clarification on-line | 12.03.2022 | 10.00 Hours |
| g.     | Last date for seeking Clarification on-line  | 21.03.2022 | 17.00 Hours |
| h.     | Bid Opening date                             | 29.03.2022 | 16.00 Hours |

10/3/2022  
Staff Officer(Civil), CCL  
Kathara area

92

|   |  |                                  |                      |                              |   |
|---|--|----------------------------------|----------------------|------------------------------|---|
| <b>Work Description</b>                     | Construction of deep bore wells each with solar power operated submersible pump set , pump house, Recharge pit etc. for drinking water in different location of Kathara area under CSR scheme 21-22 of CCL, Kathara area |                                  |                      |                              |   |
| <b>Pre Qualification Details</b>            | Please refer Tender documents.   |                                  |                      |                              |   |
| <b>Independent External Monitor/Remarks</b> | NA   |                                  |                      |                              |   |
| <b>Show Tender Value in Public Domain</b>   | Yes  |                                  |                      |                              |   |
| <b>Tender Value in ₹</b>                    | 43,16,040  | <b>Product Category</b>          | Civil Works - Others | <b>Sub category</b>          | NA                                      |
| <b>Contract Type</b>                        | Tender   | <b>Bid Validity(Days)</b>        | 120                  | <b>Period Of Work(Days)</b>  | 45                                      |
| <b>Location</b>                             | Kathara  | <b>Pincode</b>                   | 829116               | <b>Pre Bid Meeting Place</b> | NA                                      |
| <b>Pre Bid Meeting Address:</b>             | NA   | <b>Pre Bid Meeting Date</b>      | NA                   | <b>Bid Opening Place</b>     | Office of Staff officer(Civil), Kathara |
| <b>Should Allow NDA Tender</b>              | No   | <b>Allow Preferential Bidder</b> | No                   |                              |   |

**Critical Dates**

|  |                      |  |                      |
|--|----------------------|--|----------------------|
| <b>Publish Date</b>                        | 11-Mar-2022 06:00 PM | <b>Bid Opening Date</b>                  | 29-Mar-2022 04:00 PM |
| <b>Document Download / Sale Start Date</b> | 12-Mar-2022 10:00 AM | <b>Document Download / Sale End Date</b> | 28-Mar-2022 03:00 PM |
| <b>Clarification Start Date</b>            | 12-Mar-2022 10:00 AM | <b>Clarification End Date</b>            | 21-Mar-2022 05:00 PM |
| <b>Bid Submission Start Date</b>           | 12-Mar-2022 10:00 AM | <b>Bid Submission End Date</b>           | 28-Mar-2022 03:00 PM |

**Tender Documents**

| NIT Document | S.No | Document Name      | Description | Document Size (in KB) |
|--------------|------|--------------------|-------------|-----------------------|
|              | 1    | Tendernotice_1.pdf | NIT         | 2894.55               |

| Work Item Documents | S.No | Document Type | Document Name  | Description | Document Size (in KB) |
|---------------------|------|---------------|----------------|-------------|-----------------------|
|                     | 1    | BOQ           | BOQ_246421.xls | BOQ         | 333.00                |

**View GTE Details**

| S.No | Particulars  | Expected Value | Mandatory |
|------|--|----------------|-----------|
| 1.0  | Does the bidder possess and is submitting documents in respect of the Legal Status of the Bidder as per NIT.   | Yes            | Yes       |
| 2.0  | Does the bidder possess and is submitting the documents in respect of GST status of bidder as per NIT.   | Yes            | Yes       |
| 3.0  | Does the Bidder possess and is submitting the relevant document i.e. Self-Certification or Certification from Chartered Accountant as applicable to satisfy the Percentage of Local content.                                   | Yes            | Yes       |
| 4.0  | Does the bidder possess and is submitting valid Permanent Account Number (PAN) issued by income tax department, Govt. of India as per NIT.   | Yes            | Yes       |
| 5.0  | Has the Bidder gone through all clauses of UNDERTAKING and agrees to upload duly filled-in and signed copy of these documents in the prescribed Format as per Annexure XVIII of NIT (as applicable).                           | Yes            | Yes       |
| 6.0  | Has the Bidder gone through and unconditionally ACCEPT all clauses of Letter of Bid (Annexure-I) and Undertaking (Annexure-II).  | Yes            | Yes       |
| 7.0  | Whether the Digital Signature Certificate (DSC) holder bidding online, is the Bidder himself or is having Power of Attorney (PoA) or any sort of legally acceptable document for the authority to bid on behalf of the Bidder. | Yes            | Yes       |

(71)

**Auto Extension Corrigendum Properties for Tender**

| Iteration | No. of bids required for bid opening a tender | Tender gets extended to No. of days |
|-----------|---|-------------------------------------|
| 1.        | 3   | 4                                   |

**Bid Openers List**

| S.No | Bid Opener Login Id        | Bid Opener Name      | Certificate Name     |
|------|----------------------------|----------------------|----------------------|
| 1.   | gmoprnhazaribagh@gmail.com | CHANDRA BHANU TIWARY | CHANDRA BHANU TIWARY |
| 2.   | pritamica@gmail.com        | PRITAM KUMAR         | Pritam Kumar         |
| 3.   | sumankathara@gmail.com     | SUMAN KUMAR          | Suman Kumar          |

**Tender Properties**

|                                 |        |                                    |     |
|---------------------------------|--------|------------------------------------|-----|
| Auto Tendering Process allowed  | No     | Show Technical bid status          | Yes |
| Show Finance bid status         | Yes    | Show Bids Details                  | Yes |
| BoQ Comparative Chart model     | Normal | BoQ Compative chart decimal places | 2   |
| BoQ Comparative Chart Rank Type | L      | Form Based BoQ                     | No  |

**Tender Inviting Authority**

|         |   |
|---------|---|
| Name    | Staff Officer(Civil)  |
| Address | Office of General Manager, Kathara Area, Bokaro, Jharkhand 829116 |

**Tender Creator Details**

|              |                      |
|--------------|----------------------|
| Created By   | SUMAN KUMAR          |
| Designation  | SR. MANAGER          |
| Created Date | 10-Mar-2022 12:12 PM |

## Annexure-XII

| Organisation Details |                            | Buyer Details |  |
|----------------------|----------------------------|---------------|--|
| Type:                | Central PSU                | Name:         | Syed Shah Sharfuddin   |
| Ministry:            | Ministry of Coal           | Designation:  | SO MM  |
| Department:          | Materials Management       | Contact No.:  | -  |
| Organisation Name:   | Central Coalfields Limited | Email ID:     | ss.sharfuddin@nic.in   |
| Office Zone:         | Central Coalfields Limited | GSTIN:        | -  |
|                      |                            | Address:      | Regional Stores Jarandih Kathara Area CCL District Bokaro, BOKARO, JHARKHAND-829113, India |

| Financial Approval Detail               |                              | Paying Authority Details |  |
|---|------------------------------|--------------------------|--|
| IFD Concurrence:                        | No                           | Name:                    | Sushil Kumar Sinha   |
| Designation of Administrative Approval: | General Manager Kathara      | Designation:             | Senior Manager   |
| Designation of Financial Approval:      | Area Finance Manager Kathara | Email ID:                | sk.sinha9293@nic.in  |
|   |                              | GSTIN:                   | 20AAACC7476RHZT  |
|   |                              | Address:                 | Central Coalfields Limited, Darbhanga House, Ranchi, RANCHI, JHARKHAND-834001, India |

| Seller Details |  |
|----------------|--|
| Company Name:  | PHOTRONIX LED LIGHTS PRIVATE LIMITED                                 |
| Contact No.:   | 09423074306  |
| Email ID:      | photonixled@gmail.com  |
| Address:       | 11-12,BABA FARID NAGAR,ZINGABAI TAKLI, NAGPUR, MAHARASHTRA-440030, - |
| MSME verified: | Yes  |
| GSTIN:         | 27AAJCP3282D1ZE  |

| Product Details            |                  |  |                    |                             |                  |        |  |
|----------------------------|------------------|--|--------------------|-----------------------------|------------------|--------|--|
| #                          | Item Description | Category Name                              | Model              | HSN Code                    | Ordered Quantity | Unit   | Price (Inclusive of all Duties and Taxes in INR) |
| 1                          | 60W Street Light | LED Luminaire (For Road and Street Lights) | Photronix PLLSL60W | HSN not specified by seller | 2,000            | pieces | 1,160,000  |
| Total Order Value (in INR) |                  |  |                    |                             |                  |        | 1,160,000  |

| Consignee Detail |   |                  |         |          |                      |                             |  |
|------------------|---|------------------|---------|----------|----------------------|-----------------------------|--|
| S.No             | Consignee   | Item             | Lot No. | Quantity | Delivery Start After | Delivery To Be Completed By |  |
| 1                | Name: Syed Shah Sharfuddin<br>Designation: -<br>Email ID: ss.sharfuddin@nic.in<br>Contact: -<br>GSTIN: -<br>Address: Regional Stores Jarandih Kathara Area CCL District Bokaro, BOKARO, JHARKHAND-829113, India | 60W Street Light | -       | 2,000    | 29-Oct-2020          | 28-Nov-2020                 |  |

| Product Specification for 60W Street Light |  |       |
|--|--|-------|
| Specification                              | Sub-Spec   | Value |
|  | LED Luminaire conformity to IS:10322/Part 5/Section 3/2012 latest and IS: 16107 (Part 2/Sec 1):2012 latest | Yes   |
|  | Photo biological safety of LEDs used shall be as per IS:16108/2012 (exempt group)                          | Yes   |

|                       |  |  |
|-----------------------|--|--|
| STANDARDS             | Types of LED Luminaire as per the IS: 16107(Part-2/ Sec.-1)/2012   | Type B   |
|                       | Types of LED Modules as per the IS:IS: 16103(Part-2)/2012  | Type 3   |
|                       | LED Rating (in Watts)/System Wattage/Rated Power   | 60W  |
|                       | Luminaire System Efficacy (Lumen/watt)   | >= 100 Lm/Watt   |
|                       | Ingress Protection (IP Rating) as per IS:10322 (Part 1):1982 latest  | IP66   |
|                       | Warranty for free replacement (in years)   | 3  |
| ELECTRICAL EFFICIENCY | Input operating Voltage range and frequency  | 140 to 270 V olts AC at 50 Hz+/-2 with auto cutt off at below 120V |
|                       | Automatic Higher Cut off voltage above 300 volt  | Yes  |
|                       | Rated voltage  | 230 V AC 50 Hz   |
|                       | AC Power Factor at full load   | ? 0.95   |
|                       | Driver Efficiency (in%age) Upto 100W: ?85%, Above 100W: >/=90%   | Yes  |
|                       | Total Harmonics Distortion   | ? 10   |
|                       | "The total circuit power shall not be more than 110 percent of the value declared by the manufacturer (as per Cl. 8 of IS:16104:2012 lates)" | Yes  |
| OPTICAL               | LED chip Efficacy  | ?130 Lm/Watt   |
|                       | Colour temperature   | 6000+/-500K  |
|                       | Working life for LED (Minimum 50,000 burning hours as per LM-80 and LM 21 reports)   | Yes  |
|                       | Colour Rendering Index(CRI)  | ?70  |
|                       | LED Beam Angle   | ?120   |
|                       | Optic lense materal (UV stabilised)  | Poly carbonate lense   |
| THERMAL MANAGEMENT    | Heat sink should be die-cast aluminium along with sufficient heat sink fins to dissipate heat effectively                                    | Yes  |
|                       | Junctiojn / Soldering point temperature shall not exceed 85 deg.c as per LM 80 report  | Yes  |
|                       | Capacitor shall be rated for a temperature of 105 deg. celsius or better   | Yes  |
|                       | Operating temperature range  | -10 deg C to +55 deg C   |
|                       | Operating Humidity Range   | 10 % to 95% RH   |
| PROTECTION            | Short circuit Protection   | Yes  |
|                       | Over load protecton  | Yes  |
|                       | Over Voltage protection  | Yes  |
|                       | Reverse polarity   | Yes  |
|                       | High voltage test (1.5 KV for one minute between supply terminals and body of the unit)  | Yes  |
|                       | Insulation resistance between earth and current carrying part  | >100 M Ohm   |
|                       | The luminaire shall be protected against surges and transients ( Internal)   | >/=5KV   |
|                       | The luminaire shall be protected against surges and transients of >/=10KV (External)   | Yes  |
|                       | The Luminaires casing/housing (single piece housing) shall be pressure die casted aluminium alloy with higher thermal conductivity           | Yes  |
|                       | The luminaire body must be corrosion resistant powder coated   | Yes  |
|                       | All fastners must be of stainless steel  | Yes  |
|                       | Protection of the entire housing (both LED section and driver section) as per  |  |

|                            |   |  |
|----------------------------|---|--|
| CONSTRUCTIONAL             | IS:10322 (Part 1):1982 latest   | IP66   |
|                            | Extruded silicon loop gasket shall be provided in the lantern body to ensure a weather proof seal between the UV Glass cover and the metal housing to exclude the entry of the dust, water, insects etc.,   | Yes  |
|                            | Luminaries light transparency should be of Toughened glass  | Yes  |
|                            | Toughned transparent glass cover thickness  | >/=4 mm  |
|                            | Toughned Glass shall not get discoloured shall not suffer degradation due to heat and ageing within warranty period   | Yes  |
|                            | Number of electronic control gear (power supplies)  | 1 No.  |
|                            | Light Source  | SMD LED Chip as per LM 80/IS16106  |
|                            | Driver components shall be industrial grade or above  | Yes  |
|                            | PCB shall be FR4 grade minimum 0.8 to 1.0 mm thick or more  | Yes  |
|                            | The Luminaires works on single phase three wires system (Phase, Neutral and Earth)  | Yes  |
|                            | Suitable connector shall be provided for LED connection between driver output and LED   | Yes  |
|                            | Length of ISI marked three core wire (shall be provided along with supply of material)  | 50 cm  |
| MARKING                    | "Manufactures Name and and brand on the aluminium die cast body "   | Engraved/Embossed  |
|                            | Manufacturer's name, model number, serial number  | Yes  |
|                            | Date of manufacture (month-year), and lot number as identification mark inside each unit and the outside of each packaging box  | Yes  |
|                            | The operation characteristics voltage and power be marked inside of each LED luminaire unit   | Yes  |
|                            | Diameter of pole Luminiare suitable for: (upto 45W Pole OD: shall be 40mm), (>45W <120W Pole OD: Shall be 50 mm), (above 120W: OD shall be 60 mm for which luminiare is suitable  | Yes  |
| Reports And Certifications | LED Make  | OSRAM / NICHIA / CREE / SAMSUNG / SEOUL / LUMILEDS / PHILIPS / SYSKA / LUMENMAX / EVERLIGHT / EDISON / BRIDGELUX / NATIONSTAR / REFOND |
|                            | System must have EMI/EMC compliance as applicable (Test reports shall be furnish to the buyer / consignee on demand)  | Yes  |
|                            | LM 79 (Photometry) (Ref.IS:16106:2012) report from Central Government Lab /NABL/ILAC accredited lab. Reports shall be furnish to the buyer / consignee on demand (LM-79 report shall have total lumen output, power, PF, Current in Amps, CRI & CCT etc., | Yes  |
|                            | LM 80 & TM 21 (Ref. IS:16105:2012) Report and Photo biological report for LED report from Central Government Lab /NABL/ILAC accredited lab. Reports shall be furnish to the buyer / consignee on demand (LM-80 report shall have the Photo Biological re  | Yes  |
|                            | Availability of test Report from Central Government Lab /NABL/ILAC accredited lab to Indian Standrad IS:10322/part 5/sec-3/2012 and IS 16107 (Part 2/Sec 1) : 2012  | Yes  |
|                            | Seller shall furnish the Type test reports to the buyer / consignee on demand   | Yes  |
|                            | DC or AC supplied electronic control gear for LED Module shall comply as per IS:15885 (Part 2/Sec.13)   | Yes  |
|                            | LED Luminaire for road and street lighting shall comply with Complusory Registration(CRS) of BIS for safety as per IS 10322 (Part 5/Section 3): 2012 as applicable on date  | Yes  |

# Terms and Conditions

## 1. General Terms and Conditions

**1.1** This Contract between the Seller and the Buyer, is for the supply of the Goods and/ or Services, detailed in the schedule above, in accordance with the General Terms and Conditions (GTC) as available on the GeM portal (unless otherwise superseded by Goods / Services specific Special Terms and Conditions (STC) and/ or BID/Reverse Auction Additional Terms and Conditions (ATC), as applicable

**1.2 Terms of delivery:** Free Delivery at Site including loading/unloading. In respect of items requiring installation and / or commissioning and other services in the scope of supply (as indicated in respective product category specification / STC / ATC), and the cost of the same is also included in the Contract price.

**1.3 Delivery period:** The Delivery Period/Time shall be essence of the Contract and delivery must be completed not later than such date(s). Any modification thereto shall be mutually agreed and incorporated in the Contract as per the provisions of the GTC.

**1.4 Performance Security:** If the Seller fails or neglects to observe or perform any of his obligations under the contract it shall be lawful for the Buyer to forfeit either in whole or in part, the Performance Security furnished by the Seller.

**1.5 Taxes and Duties:** Contract Prices are all inclusive i.e. including all taxes, duties, local levies / transportation / loading-unloading charges etc. Break up of GST shall be indicated by the Seller while raising invoice / bill on GeM. While submitting the bill / invoice Seller shall undertake that the Goods and Services Tax (GST) charged on this bill is not more than what is payable under the provision on the relevant Act or the Rules made there under and that the Goods on which GST has been charged have not been exempted under the GST Act or the Rules made there under and the charges on account of GST on these goods are correct under the provision of that Act or the rules made there under.

**1.6 Octroi Duty and / or other local taxes:** Contract Prices are all inclusive hence no reimbursement over and above the contract price(s) shall be allowed to seller towards payment of local taxes (such as levy of town duty, Octroi Duty, Terminal Tax and other levies of local bodies etc).

**1.7 Limitation of Liability:** The provisions of limitation of liability between Buyer and Seller as given in the GTC shall be applicable here.

**1.8 Resolution of disputes:** The provisions of DISPUTE RESOLUTION BETWEEN BUYER AND SELLER as given in the GTC shall be applicable here.

**1.9 Liquidated Damages:** If the Seller fails to deliver any or all of the Goods/Services within the original/re-fixed delivery period(s) specified in the contract, the Buyer will be entitled to deduct/recover the Liquidated Damages for the delay, unless covered under Force Majeure conditions aforesaid, @ 0.5% per week or part of the week of delayed period as pre-estimated damages not exceeding 10% of the contract value without any controversy/dispute of any sort whatsoever. In case, Service Level Agreement (SLA) is applicable the same shall be applicable for the Contract.

### 1.10 Financial Certificate:

**1.10.1** The expenditure involved for this purpose has received the Sanction of the competent financial authority.

**1.10.2** The funds are available under the proper head in the sanction budget allotment for the concern financial year.

**1.10.3** I have been fully authorized by the department to sign the supply order or incur the liability of the Goods being ordered.

**1.11** The bidder should submit a self declaration to the effect in bidder's official letter head that their agency have not been black listed by any Agency whatsoever till date.

## 2. Additional Terms and conditions

**2.1** Scope of supply (Bid price to include all cost components) : Only supply of Goods

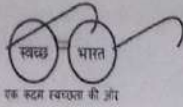
**2.2** Availability of Service Centres: Bidder/OEM must have a Functional Service Centre in the State of each Consignee's Location in case of carry-in warranty. (Not applicable in case of goods having on-site warranty). If service center is not already there at the time of bidding, successful bidder / OEM shall have to establish one within 30 days of award of contract. Payment shall be released only after submission of documentary evidence of having Functional Service Centre.

**2.3** Timely Servicing / rectification of defects during warranty period: After having been notified of the defects / service requirement during warranty period, Seller has to complete the required Service / Rectification within 7 days time limit. If the Seller fails to complete service / rectification with defined time limit, a penalty of 0.5% of Unit Price of the product shall be charged as penalty for each week of delay from the seller. Seller can deposit the penalty with the Buyer directly else the Buyer shall have a right to recover all such penalty amount from the Performance Security (PBG). Cumulative Penalty cannot exceed more than 10% of the total contract value after which the Buyer shall have the right to get the service / rectification done from alternate sources at the risk and cost of the Seller besides forfeiture of PBG. Seller shall be liable to re-imburse the cost of such service / rectification to the Buyer.

**2.4** ISO 9001: The bidder must have ISO 9001 certification.

Note: This is system generated file. No signature is required. Print out of this document is not valid for payment/ transaction purpose.

## Annexure-XIII



**CCL**

*A miniratna cat-I company*

सेंट्रल कोलफील्ड्स लिमिटेड

(कोल इंडिया की अनुबंधी इकाई)

दरभंगा हाउस रांची- 834 029

**CENTRAL COALFIELDS LIMITED**

(A Subsidiary of Coal India Limited)

**CIVIL ENGINEERING DEPARTMENT**

DARBHANGA HOUSE, RANCHI 834 029

दूरभाष/Phone : 0651-2360129, 0651-2365511

वेबसाइट/Website : <https://www.centralcoalfields.in>

Email Id- gmcivil2@gmail.com

No. CCL/Kathara/GVP UG/Civil/AOW/21-22/

Dated .....

Registered post/ Speed Post

To,  
M/S Anup Kumar,  
Vill-Hazari, PO: Sawang  
Dist: Bokaro  
Jharkhand (829128)  
Email Id- [prasadshekhar715@gmail.com](mailto:prasadshekhar715@gmail.com)  
Mob. No. 91-8210376932.

|      |   |
|------|---|
| Sub. | Award of work for "Urgent repair maintenance of Loha Pul under GVP UG Project". |
| Ref. | NIQ No. CCL/Kathara/GVP UG/Civil/NIQ/21-22/1020 Dated 23.03.2022                |

Dear Sir,

In response to your tender for the subject work mentioned above, this is to inform you that your offer for a contract amount of **153416.31 (Rupees one lakh fifty-three thousand four hundred sixteen and paise thirty-one)** only inclusive of GST amount of **23402.49 (Rupees twenty-three thousand four hundred two and paise forty-nine)** and **130013.82 (Rupees one lakh thirty thousand thirteen and paise eighty-two)** only exclusive of GST amount [Cost to company amount of **153416.31** as Input Tax Credit (ITC) is available / not available] to undertake the work has been accepted by CCL, subject to the following stipulations / conditions which are supplementaries / complementaries to the conditions of the quotation documents: –

1. The payment of GST and GST Compensation Cess by the service availed (i.e. CCL) to bidder/ contractor (If GST payable by bidder/ contractor) would be made only on the latter submitting a Bill/Invoice in accordance with the provision of relevant GST Act and the rules made there under and after online filing of valid return on GST portal. The payment of GST and GST Compensation Cess is responsibility of the Contractor.
2. The period of completion of work shall be 07 (seven) days from expiry of 10 (Ten) days from the issue of this award of work or within 07 (Seven) days of handing over of the site, whichever is later.
3. (a) The earnest money amounting to 2000/- (Rupees one thousand four hundred) deposited by you vide BD No. 825144 Dt- 25.03.2022 Name of Bank has been retained by the company (CCL) as part of Performance Security Money.  
  
(b) You are further required to deposit 2602/- (Rupees two thousand six hundred two) only with the company in the form of a Govt. Securities or FDR duly pledged in favour of Central Coalfields Limited or demand draft in favour of Central Coalfields Limited from any Scheduled Bank payable at Kathara/Bokaro Thermal within 21 (Twenty one) days of issuance of this letter thus making the total performance security money amount to 2602/- (Rupees two thousand six hundred two) only i.e. 3% of the contract amount. If you fail to deposit the above amount within the prescribed time, the Award of Work may be cancelled and Earnest Money will be forfeited. In addition to the above penal measures, you will not be allowed to participate in the re-tendering process. You may also be banned from participating in future tenders in the subsidiary for a minimum period of one year.  
  
(c) Further you have to deposit Nil (Rupees Nil) only as Additional performance security as per clause no. 4.8 of Standard General terms and conditions of Conditions of contract of CCL for civil contracts in form of Govt. Securities

## Annexure-XIV



सीएमपीडीआई  
*cmpdi*

*A Mini Ratna Company*

**FINAL ENVIRONMENTAL IMPACT ASSESSMENT  
&  
ENVIRONMENTAL MANAGEMENT PLAN**

**(As per EIA Notification, 2006)**

(Based on ToR issued by MOEFCC letter No. J-11015/482/2008-IA-II(M) Dt.  
27.04.2021.)

OF

**KATHARA OCP  
(773.23 Ha./ 1.90 MTPA)  
(Kathara Area, C.D. Block: Bermo, Dist. Bokaro,  
State: Jharkhand)**

**CENTRAL COALFIELDS LIMITED  
(A Subsidiary of Coal India Limited)**



**APRIL 2022**

**Central Mine Planning and Design Institute Limited  
Gondwana Place, Kanke Road, Ranchi**

CMPDI/EIA/CCL/2021-22/October/311864/03

=====

Prepared by CMPDI, RI-III, Ranchi

**ANNEXURE – VII**

**DECLARATION BY EXPERTS CONTRIBUTING TO THE EIA of “KATHARA OCP (1.9 MTPA)”**

I, hereby, certify that I was a part of the EIA team in the following capacity that developed the above EIA.

Name of EIA Coordinator Mr. D.P.Singh

Signature: \_\_\_\_\_

*D.P. Singh*

Date: \_\_\_\_\_

Period of involvement: October 2020- till Date

Contact information:

Mobile:

, Email:

**FUNCTIONAL AREA EXPERTS:**

| S. NO | FUNCTIONAL AREAS | NAME OF THE EXPERT/S           | INVOLVEMENT<br>(October 2020- Till Date)  | SIGNATURE         |
|-------|------------------|--------------------------------|---|-------------------|
| 1     | AP               | FAE- <i>Devendra Singh</i>     | <ul style="list-style-type: none"> <li>➤ Designing Air Quality Monitoring Network for various pollutants and meteorological parameters-sampling locations, frequency and number of samples</li> <li>➤ Identification of sources of Air Pollution, its impact, and most suitable control devices and mechanisms</li> <li>➤ Preparing cost estimates for pollution control devices and suggesting measures for post closure environmental monitoring</li> </ul>   | <i>D.P. Singh</i> |
| 2     | WP               | FAE- <i>Devendra Pra Singh</i> | <ul style="list-style-type: none"> <li>➤ Designing sampling network for water and waste water and inspecting Baseline Data Generation for water related samples.</li> <li>➤ Water Budgeting, optimising use of water for various sources of demand, suggesting measures for water conservation, recycling and reuse.</li> <li>➤ Suggesting water treatment systems, drainage facilities</li> <li>➤ Evaluating probable impacts of effluent/waste water discharges in to the receiving environment/water bodies and suggesting control measures.</li> <li>➤ Preparing cost estimates for structures for treatment of wastewater like ETP/STP/Oil and Grease Trap/Settling tank and suggesting</li> </ul> | <i>D.P. Singh</i> |

|   |     |   | measures for post closure environmental monitoring   |            |
|---|-----|---|--|------------|
| 3 | SHW | FAE-  | <ul style="list-style-type: none"> <li>➤ Source of generation of non-hazardous solid waste and hazardous waste</li> <li>➤ Quantification of volume of non-hazardous solid waste and hazardous waste</li> <li>➤ Management, handling and disposal techniques of non-hazardous solid waste and hazardous waste</li> <li>➤ Suggesting measures for minimization of generation of waste and how it can be reused/recycled.</li> </ul>  | Dpsingh    |
| 4 | SE  | FAE- Shailesh Chandra                           | <ul style="list-style-type: none"> <li>➤ Associated with Baseline data generation for Socio-Economic.</li> <li>➤ Interpretation of primary and secondary data to derive the socio-economic status of PAFs/PAPs and all related stakeholders.</li> <li>➤ Assessment of social changes arising out of the project and impact on the people, suggesting mitigation measures.</li> <li>➤ Development of R &amp; R plan and suggesting measures to enhance the socio economic status of the people living in and around the project.</li> </ul> | Shailesh   |
| 5 | EB  | FAE- Nirbhay Bhatnagar                          | <ul style="list-style-type: none"> <li>➤ Associated with Baseline data generation for Flora and Fauna.</li> <li>➤ Biodiversity management and identification of species labelled as rare, endangered and threatened as per IUCN list.</li> <li>➤ Impact of the project on flora and fauna.</li> <li>➤ Suggesting species for Road Plantation, soil and slope stabilization, greenbelt development.</li> </ul>  | Nirbhay    |
| 6 | HG  | FAE- Debasin Banerjee<br>Team: Vikas kr. Singh. | <ul style="list-style-type: none"> <li>➤ Designing of ground water table measurement and monitoring network, computation of ground water recharge, flow rate and direction.</li> <li>➤ Analysis and description of aquifer characteristics</li> <li>➤ Preparation of water budget for an area.</li> <li>➤ Determining the impact on groundwater table due to the project and suggesting artificial groundwater recharge and augmentation measures.</li> </ul>  | Debasin    |
| 7 | GEO | FAE R.P Singh                                   | <ul style="list-style-type: none"> <li>➤ Geology and Geo morphological analysis/description and Stratigraphy/Lithology.</li> <li>➤ Developing geological maps.</li> <li>➤ Development of Mining plan incorporating environmental aspects like top soil preservation, waste dump management,</li> </ul>   | R.P. Singh |

|    |    |   |  |  |
|----|----|---|--|--|
|    |    |   | <ul style="list-style-type: none"> <li>reclamation/rehabilitation of mined out areas, run off management etc.</li> <li>➤ Environmental impacts of 3 phases of mining – exploration, exploitation and post mining stages</li> </ul>   |  |
| 8  | SC | FAE-  | <ul style="list-style-type: none"> <li>➤ Associated with Baseline data generation for soil-Sampling, analysis and characterization of soil</li> <li>➤ Assessment of fertility/productivity of soil, nutrient availability</li> <li>➤ Assessment of impact of gaseous, liquid and solid pollutants on soil.</li> <li>➤ Controlling degradation of soil/soil conservation</li> <li>➤ Suggesting top soil conservation measures, storage and reuse technology.</li> </ul>   |  |
| 9  | AQ | <p>FAE- <i>Abhishek Kumar</i></p> <p><i>Team Members :-</i><br/><i>Aditya Sheeshkar</i></p> | <ul style="list-style-type: none"> <li>➤ Associated in Baseline data generation for developing micro meteorological data for use in modeling</li> <li>➤ Collecting and using secondary data on meteorology like cloud cover, inversion related data, mixing heights etc., for modeling</li> <li>➤ Application of AERMOD air quality models in prediction of dispersion of pollutants, plotting of isopleths of GLCs representing incremental pollution levels, worst case scenarios on suitable maps showing both, the sources of pollution as well as the environmentally sensitive receptors.</li> </ul> | <p><i>3/4/15</i></p> <p><i>2/10/15</i></p> |
| 10 | NV | FAE-  | <ul style="list-style-type: none"> <li>➤ Associated in Baseline data generation for noise quality.</li> <li>➤ Sources of noise and vibration in the project</li> <li>➤ Probable impacts of noise on communities and of vibration on buildings, structures, archaeological monuments etc</li> <li>➤ Control of noise emanating from mining operations and suggesting control devices</li> </ul>   |  |
| 11 | LU | FAE- <i>Harish Lal B.</i>   | <ul style="list-style-type: none"> <li>➤ Development of Landuse Map</li> <li>➤ Impact of project on surrounding land use</li> <li>➤ Integration of land use related data/ information for assessing environmental impacts of developmental projects.</li> <li>➤ Suggesting post closure sustainable land use and mitigative measures for preventing degradation of land.</li> </ul>  | <i>henlon</i>                              |
| 12 | RH | FAE-  | <ul style="list-style-type: none"> <li>➤ Identification of hazards and hazardous substances</li> <li>➤ Risks and consequences analysis</li> <li>➤ Preparation of impact diagrams</li> <li>➤ Vulnerability assessment</li> <li>➤ Preparation of Emergency Preparedness Plan</li> </ul>  |  |

**Declaration by the Head of the Accredited Consultant Organization/ Authorized Person**

I, \_\_\_\_\_, hereby, confirm that the above mentioned experts prepared the EIA of Kathara OCP (1.9 MTPA). I also confirm that the consultant organization shall be fully accountable for any mis-leading information mentioned in this statement.

Signature:

 26/10/21

Name:

क्षेत्रीय निदेशक  
Regional Director

Designation:

के.के. 3, सी.एम.पी.डी.बाई रांची-5  
RI-3. C.M.P.D.I., Ranchi E

Name of the EIA consultant organization: CMPDIL

NABET Certificate No. & Issue Date: NABET/EIA/1720/SA 0108 dated 14.08.2020

# CONTENTS

|   |           |
|---|-----------|
| <b>Chapter 1 Introduction .....</b>                     | <b>14</b> |
| 1.1 Purpose of the report                               | 14        |
| 1.2 Identification of Project and Project Proponent     | 14        |
| 1.3 Brief Description of Nature and Size of the Project | 15        |
| 1.3.1 Location  | 15        |
| 1.3.2 Importance of project to Country, Region          | 15        |
| 1.4 Scope of the Study                                  | 15        |
| <b>Chapter 2 Project Description .....</b>              | <b>31</b> |
| 2.1 Type of Project                                     | 31        |
| 2.2 Need for the Project                                | 31        |
| 2.3 Location Details                                    | 31        |
| 2.3.1 General Location                                  | 31        |
| 2.3.2 Specific Location                                 | 31        |
| 2.3.3 Connectivity                                      | 33        |
| 2.3.4 Physiography, Drainage and Communication          | 34        |
| 2.3.5 Project Boundary                                  | 34        |
| 2.3.6 Project Site Layout                               | 35        |
| 2.4 Geology   | 36        |
| 2.4.1 Exploration Status                                | 36        |
| 2.4.2 Sequence of Coal Seams                            | 37        |
| 2.4.3 Quality Parameters                                | 39        |
| 2.5 Mine Planning                                       | 40        |
| 2.5.1 Mineable Reserves                                 | 40        |
| 2.5.2 Method of Mining                                  | 41        |
| 2.5.3 Choice of Technology                              | 41        |
| 2.5.4 Mining Parameters                                 | 41        |
| 2.5.5 Size and Magnitude of operation                   | 42        |
| 2.5.6 Summarised Calendar Programme                     | 43        |
| 2.5.7 Drilling and Blasting                             | 43        |
| 2.5.8 Dumping Strategy                                  | 43        |
| 2.5.9 Coal Handling and Dispatch                        | 44        |
| 2.5.10 HEMM Scheduling                                  | 45        |
| 2.6 Infrastructure                                      | 47        |
| 2.6.1 Buildings   | 47        |
| 2.6.2 Roads & Culverts                                  | 47        |
| 2.6.3 Workshop & store                                  | 47        |
| 2.6.4 Power Supply and Consumption                      | 47        |
| 2.6.5 Water supply and Sewerage                         | 48        |
| 2.7 Manpower Requirements                               | 48        |

|   |           |
|---|-----------|
| <b>Chapter 3 Description of Environment.....</b>                                    | <b>50</b> |
| 3.1 General   | 50        |
| 3.2 Meteorological Study  | 53        |
| 3.2.1 Macro- Meteorological Study   | 53        |
| 3.2.1.1 Micro-meteorological Study  | 53        |
| 3.2.2 Data presentation & analysis  | 53        |
| 3.3 Air Environment   | 54        |
| 3.3.1 Sampling Locations, Parameters and Frequency of Sampling                      | 55        |
| 3.3.2 Results   | 57        |
| 3.4 Noise Environment   | 62        |
| 3.4.1 Introduction  | 62        |
| 3.4.2 Methodology   | 62        |
| 3.4.3 Sampling Locations  | 62        |
| 3.5 Water Environment   | 63        |
| 3.5.1 Topography  | 63        |
| 3.5.2 Drainage Pattern of the Study Area  | 64        |
| 3.5.3 Aquifer Description   | 64        |
| 3.5.4 Ground Water Level  | 65        |
| 3.5.5 Water Quality   | 68        |
| 3.6 Soil Quality Status   | 74        |
| 3.6.1 Methodology   | 74        |
| 3.6.2 Sampling Locations  | 75        |
| 3.6.3 Observations  | 75        |
| 3.7 Biological Environment  | 78        |
| 3.7.1 Methodology   | 78        |
| 3.7.2 Environmental Setting of the Study Area                                       | 78        |
| 3.8 Socio-Economic Study  | 89        |
| 3.8.1 Sampling  | 90        |
| 3.8.2 Socio-Economic Profile of the Study Area                                      | 90        |
| 3.8.3 Observation and Discussion  | 91        |
| 3.8.4 Occupational Health Survey:   | 92        |
| 3.9 Land Use Pattern  | 92        |
| <b>Chapter 4 Anticipated Environmental Impacts and Mitigation Measures .....</b>    | <b>94</b> |
| 4.1 Introduction  | 94        |
| 4.2 Cumulative Impact Assessment & Pollution Control Measures for Air               | 94        |
| 4.2.1 Inventory of Air Pollution Sources  | 94        |
| 4.2.2 Air Quality Impact Prediction   | 97        |
| 4.2.3 Air Pollution Control Measures  | 108       |
| 4.3 Cumulative Impact Assessment & Pollution Control Measures for Water Environment | 110       |
| 4.3.1 Water Quality   | 110       |
| 4.3.2 Water Demand  | 113       |
| 4.3.3 Impact on Ground Water Regime   | 114       |
| 4.3.4 Impact on Surface Water Regime  | 119       |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

---

|   |            |
|---|------------|
| 4.3.5 Sources of water pollution                              | 119        |
| 4.3.6 Treatment Technology                                    | 119        |
| 4.3.7 Water Pollution Control Measures                        | 119        |
| 4.4 Impact Assessment & Control Measures for Noise & Blasting | 120        |
| 4.5 Impact on Land Resource and Its Management                | 121        |
| 4.5.1 Present Land Use  | 121        |
| 4.5.2 Landuse During Mining                                   | 121        |
| 4.5.3 Dump Management Plan                                    | 122        |
| 4.5.4 Land Reclamation  | 122        |
| 4.5.5 Topsoil Management                                      | 126        |
| 4.5.6 Biological Reclamation of Mined Out Area                | 126        |
| 4.6 Solid Waste Management                                    | 127        |
| 4.6.1 Municipal Solid Waste Management                        | 127        |
| <b>Quantum of Waste Generation:</b> .....                     | <b>127</b> |
| 4.6.2 Hazardous Waste Management                              | 128        |
| 4.7 Impact on Flora and Fauna                                 | 129        |
| 4.7.1 Impact on Flora & Fauna                                 | 130        |
| 4.7.2 Conservation plan for flora & fauna                     | 130        |
| 4.7.3 Recommendations for Mitigation Measures                 | 131        |
| 4.7.4 Protection of drainage course in the lease area-        | 132        |
| 4.8 Socio-Economic Impact                                     | 133        |
| 4.8.1 Negative Impact   | 133        |
| 4.8.2 Positive Impact   | 133        |
| 4.8.3 Recommendations for mitigation measures                 | 133        |
| 4.9 Effects on Traffic Movement                               | 134        |
| 4.9.1 Traffic Desity Impact Study                             | 134        |
| 4.10 Visual/Aesthetic Effects                                 | 135        |
| 4.11 Impact on local population and R&R Action Plan           | 135        |
| <b>Chapter 5 Analysis of Alternative</b> .....                | <b>136</b> |
| 5.1 Introduction  | 136        |
| 5.2 Alternative for Techonology                               | 136        |
| 5.2.1 Method of Mining  | 136        |
| 5.2.2 Dumping Pattern   | 137        |
| 5.2.3 Coal Transportation                                     | 137        |
| <b>Chapter 6 Environmental Monitoring Programme</b> .....     | <b>138</b> |
| 6.1 Introduction  | 138        |
| 6.2 Monitoring of Environmental Control Measures              | 138        |
| 6.3 Monitoring of Environmental parameters                    | 139        |
| 6.3.1 Ambient Air, Noise& Water Monitoring                    | 139        |
| 6.3.2 Measurement Methodologies                               | 139        |
| 6.3.3 Plantation  | 141        |
| 6.3.4 Health  | 141        |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

---

|  |            |
|--|------------|
| 6.4 Emergency Procedures   | 141        |
| 6.5 Environmental Budget   | 141        |
| <b>Chapter 7 Additional Studies .....</b>                                      | <b>143</b> |
| 7.1 Public Consultation  | 143        |
| <i>7.1.1 Minutes of Public Hearing</i>   | 145        |
| <i>7.1.2 Action Plan for compliance of issues raised in the Public Hearing</i> | 152        |
| 7.2 Natural and Community Resource Augmentation Plan (NCRAP)                   | 160        |
| 7.3 Safety & Risk assessment   | 160        |
| <i>7.3.1 Safety Aspects for Outsourcing/Hiring of HEMM/Equipment</i>           | 160        |
| <i>7.3.2 Stability of Benches, Quarry High walls and Spoil Dumps</i>           | 161        |
| <i>7.3.3 Precautions against Danger of Inundation from Surface Water</i>       | 162        |
| <i>7.3.4 Prevention of Flooding of Equipment Deployed at Bottom Horizons</i>   | 162        |
| <i>7.3.5 Prevention of Electric Shocks:</i>                                    | 162        |
| <i>7.3.6 Dust Suppression &amp; Dilution of Exhaust Fumes:</i>                 | 163        |
| <i>7.3.7 Measures to be taken for Fire Fighting and Fire Prevention:</i>       | 163        |
| <i>7.3.8 Measures to be taken while Drilling &amp; Blasting:</i>               | 164        |
| 7.4 Energy Conservation  | 164        |
| <i>7.4.1 Managerial Control</i>  | 164        |
| <i>7.4.2 Energy Audit</i>  | 164        |
| <i>7.4.3 Maintenance</i>   | 164        |
| <i>7.4.4 Distribution Network</i>  | 165        |
| <i>7.4.5 Lighting</i>  | 165        |
| 7.5 Flora & Fauna Conservation Plan  | 165        |
| 7.6 Social Impact Assessment   | 165        |
| <i>7.6.1 Introduction</i>  | 165        |
| <i>7.6.2 Methodology</i>   | 165        |
| <i>7.6.3 Impact Assessment</i>   | 166        |
| <i>7.6.4 Conclusion</i>  | 171        |
| 7.7 Corporate Social Responsibility (C.S.R)                                    | 173        |
| <i>7.7.1 Introduction</i>  | 173        |
| <i>7.7.2 Scope of work under CSR</i>   | 173        |
| <i>7.7.3 Allocation of fund for CSR</i>  | 174        |
| <i>7.7.4 Implementation of CSR Activities</i>                                  | 174        |
| <i>7.7.5 Sustainable Development</i>   | 174        |
| <i>7.7.6 Action plan for CSR</i>   | 175        |
| <b>Chapter 8 Project Benefits .....</b>  | <b>177</b> |
| 8.1 Introduction   | 177        |
| 8.2 Improvements in Physical Infrastructure & Community Development            | 177        |
| 8.3 Improvements in Social Infrastructure & Quality of Life of People          | 178        |
| 8.4 Employment Potential   | 179        |
| 8.5 Other Tangible Benefits  | 179        |

|  |            |
|--|------------|
| <b>Chapter 9 Environmental Cost Benefit Analysis .....</b>                                     | <b>180</b> |
| <b>Chapter 10 Environment Management Plan.....</b>   | <b>184</b> |
| 10.1 Introduction  | 184        |
| 10.2 Implementing Organisation   | 184        |
| <i>Compensation to land losers</i>   | 185        |
| <i>Pollution Control Measures</i>  | 185        |
| <i>Plantation/Green Belt Development</i>   | 185        |
| <i>Land Restoration</i>  | 186        |
| 10.3 Monitoring & Control  | 186        |
| 10.3.1 <i>Monitoring Schedule</i>  | 186        |
| 10.3.2 <i>Plantation Monitoring</i>  | 186        |
| 10.3.3 <i>Action Plan for Land Reclamation and Plantation</i>                                  | 186        |
| 10.3.4 <i>Health Monitoring</i>  | 187        |
| 10.4 Cost of Environmental Control Measures  | 187        |
| 10.4.1 <i>Capital Cost of Environmental Control Measures</i>                                   | 187        |
| 10.4.2 <i>Proposed Revenue Cost of Environmental Control Measures</i>                          | 190        |
| 10.4.3 <i>Mine Closure Details</i>   | 190        |
| 10.4.4 <i>Fund Allocation for Compliance of Issues Raised in PH/ CER</i>                       | 191        |
| <b>Chapter 11 Summary and Conclusion .....</b>   | <b>193</b> |
| 11.1 Introduction  | 193        |
| 11.2 Project Description   | 193        |
| 11.3 Description of Environment  | 194        |
| 11.4 Anticipated Environmental Impacts and Mitigation Measures                                 | 195        |
| <i>Air Pollution Control Measures</i>  | 195        |
| <i>Impact Assessment &amp; Pollution Control Measures for Water</i>                            | 196        |
| <i>Sources of water pollution</i>  | 196        |
| <i>Treatment Technology</i>  | 196        |
| <i>Water Pollution Control Measures</i>  | 196        |
| <i>Impact on land use pattern</i>  | 197        |
| <i>Impact on Flora and Fauna</i>   | 197        |
| 11.5 Project Benefits  | 198        |
| 11.6 Environment Management Plan   | 198        |
| <b>Chapter 12 Disclosure of Consultants Engaged .....</b>                                      | <b>199</b> |
| 12.1 About CMPDI   | 199        |
| 12.1.1 <i>Brief resume of the consultant</i>   | 200        |
| <b>Chapter 13 Remediation Plan and Natural &amp; Community Resource Augmentation Plan.....</b> | <b>202</b> |
| 13.1 Brief Description   | 202        |
| 13.2 Economic Benefit Accrued During Period of Violation                                       | 203        |
| 13.3 Assessment of Ecological Damage Due to Violation  | 203        |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

---

|  |     |
|--|-----|
| <i>13.3.1 Damage on Land and Ecology</i>   | 204 |
| <i>13.3.2 Air Environment</i>  | 206 |
| <i>13.3.3 Water Environment</i>  | 213 |
| <i>13.3.4 Socio-Economic Impact</i>  | 218 |
| <i>13.3.5 Occupational Health and Safety</i>   | 219 |
| <i>13.3.6 Summary</i>  | 220 |
| 13.4 Proposed Remediation Plan and Natural & Community Resource<br>Augmentation Plan (NCRAP) | 221 |

## ANNEXURES

| S. NO. | ANNEXURES   |
|--------|---|
| I      | Terms of Reference  |
| II     | Previous EC Letter  |
| III    | Approval copy of Mining Plan & Mine Closure Plan          |
| IV     | Copy of Affidavit   |
| V      | Application for NoC for Ground Water Extraction from CGWB |
| VI     | Conservation Plan   |
| VII    | DGMS Permission   |
| VIII   | Corporate Environmental Policy of CCL                     |
| IX     | Minutes of Public Hearing                                 |
| X      | Authenticated Production Summary                          |
| XI     | Letter to DFO for Clarification                           |
| XII    | Authenticated Summary of Health Camps                     |
| XIII   | QCI Accreditation   |
| XIV    | Land Acquisition Documents                                |
| XV     | Signed copy of Benefit Accrued due to violation           |

## LIST OF PLATES

|  |     |
|--|-----|
| Plate I A&B Location Plan .....  | 13  |
| Plate II Core and Buffer Zone of study area on Topo Sheet.....           | 13  |
| Plate III A Drainage Map.....  | 32  |
| Plate III B Water table contour Plan.....                                | 32  |
| Plate IV Proposed Landuse Plan.....                                      | 32  |
| Plate V Geological Plan .....  | 34  |
| Plate VI Seasonal Windrose .....   | 42  |
| Plate VII Location of Air & Noise Monitoring stations .....              | 43  |
| Plate VIII Location of Water and Soil sampling stations .....            | 58  |
| Plate IX Land Use of Core and Buffer Zone by Remote Sensing .....        | 81  |
| Plate X-A Cumulative Impact- Isopleth PM10 Uncontrol.....                | 96  |
| Plate X-B Cumulative Impact- Isopleth PM10 with Control Measure.....     | 96  |
| Plate XI-A Cumulative Impact- Isopleth PM2.5 Uncontrol .....             | 96  |
| Plate XI-B Cumulative Impact- Isopleth PM2.5 with Control Measure .....  | 96  |
| Plate XII-A Cumulative Impact- Isopleth SO2 .....                        | 96  |
| Plate XII-B Cumulative Impact- Isopleth NO2.....                         | 96  |
| Plate XIII-A Standalone Impact- Isopleth PM10 Uncontrol.....             | 96  |
| Plate XIII-B Standalone Impact- Isopleth PM10 with Control Measure.....  | 96  |
| Plate XIV-A Standalone Impact- Isopleth PM2.5 Uncontrol .....            | 96  |
| Plate XIV-B Standalone Impact- Isopleth PM2.5 with Control Measure ..... | 96  |
| Plate XV-A Standalone Impact- Isopleth SO2 .....                         | 96  |
| Plate XV-B Standalone Impact- Isopleth NO2 .....                         | 96  |
| Plate XVIA Proposed Water Usage Diagram .....                            | 101 |
| Plate XVIB Ground Water Usage Diagram .....                              | 104 |
| Plate XVII Final Stage Dump Plan.....                                    | 110 |
| Plate XVIII Post Mining Landuse Plan .....                               | 111 |

## LIST OF TABLES

|   |           |
|---|-----------|
| Table 2.1 Specific location of the project  | 32        |
| Table 2.2 Accessibility of Site   | 33        |
| Table 2.3 Proposed Land Use Plan  | 35        |
| Table 2.4 Exploration Status  | 36        |
| Table 2.5 Sequence of Coal Seams with Partings  | 37        |
| Table 2.6 Geological reserves in the seams considered   | 38        |
| Table 2.7 Quality Parameters  | 39        |
| Table 2.8 Mineable Reserves   | 40        |
| Table 2.9 Coal Production Programme   | 43        |
| Table 2.10 Dumping Strategy   | 43        |
| Table 2.11 Water usage Details  | 48        |
| Table 2.12 Manpower Requirement   | 48        |
| Table 3.1 References of baseline data   | 50        |
| Table 3.2 Sampling Location for Air Quality Monitoring  | 55        |
| Table 3.3 Measurement Techniques  | 56        |
| Table 3.4 Ambient Air Quality Results ( <i>Period: 02.03.2020 to 15.05.2020</i> )             | 57        |
| Table 3.5 Concentration of critical pollutants and Heavy Metals in Ambient Air                | 58        |
| Table 3.6 Source Receptor Mapping   | 60        |
| Table 3.7 List of noise monitoring stations   | 62        |
| Table 3.8 Noise monitoring data   | 63        |
| Table 3.9 Hydrogeological units developed in Kathara OCP                                      | 64        |
| Table 3.10 Location of water Quality Sampling Stations  | 69        |
| Table 3.11 Surface Water Monitoring Stations  | 69        |
| Table 3.12 Surface water Quality  | 70        |
| Table 3.13 Ground Water Quality   | 71        |
| Table 3.14 Effluent Water Quality   | 73        |
| Table 3.15 Soil Monitoring at Station S1  | 75        |
| Table 3.16 Soil Monitoring at Station S2  | 76        |
| Table 3.17 Soil Monitoring at Station S3  | 76        |
| Table 3.18 List of Floral Species Observed in Core Zone                                       | 79        |
| Table 3.19 List of Floral Species Observed in Buffer Zone                                     | 80        |
| Table 3.20 Phytoplankton Observed in Buffer Zone  | 84        |
| Table 3.21 Macrophytes observed in Buffer Zone  | 84        |
| Table 3.22 Fauna in Core Zone   | 85        |
| Table 3.23 Fauna in Buffer Zone   | 86        |
| Table 3.24 Village wise Demographic Profile at Core and Buffer Zone                           | 89        |
| Table 3.25 Details of Household sampling  | 90        |
| Table 3.26 Caste Structure at Surveyed Areas  | 90        |
| Table 3.27 Type of Dwellings at Surveyed Area   | 90        |
| Table 3.28 Religion Distribution  | 91        |
| <b>Table 4.1 Details of air pollution sources in the buffer zone</b>                          | <b>95</b> |
| Table 4.2 Emission Factors for Air Pollution Sources  | 97        |
| Table 4.3 Details of calculated emission factors for air pollution sources in the buffer zone | 99        |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|   |            |
|---|------------|
| -----   |            |
| Table 4.4 Cumulative Impact - Predicted Concentrations of PM <sub>10</sub>                    | 102        |
| Table 4.5 Cumulative Impact - Predicted Concentrations of PM <sub>2.5</sub>                   | 103        |
| Table 4.6 Cumulative Impact - Predicted Concentrations of NO <sub>2</sub> and SO <sub>2</sub> | 104        |
| Table 4.7 Standalone Impact - Predicted Concentrations of PM <sub>10</sub>                    | 105        |
| Table 4.8 Standalone Impact - Predicted Concentrations of PM <sub>2.5</sub>                   | 106        |
| Table 4.9 Standalone Impact - Predicted Concentrations of NO <sub>2</sub> and SO <sub>2</sub> | 107        |
| Table 4.10 Proposed Air Pollution Control Measures  | 109        |
| Table 4.11 Water Quality Assessment of Major Surface Bodies in the Buffer Zone.               | 111        |
| Table 4.12 Ground Water Quality Assessment in the Buffer Zone.                                | 112        |
| Table 4.13 Peak Industrial and Domestic Water Demand  | 113        |
| Table 4.14 Summary of Groundwater Extraction/ Draft in Buffer Zone                            | 114        |
| Table 4.15 Summary of Recharge from other sources   | 115        |
| Table 4.16 Net Annual Groundwater Availability in Buffer Zone                                 | 116        |
| Table 4.17 Groundwater Balance of Core Zone   | 117        |
| Table 4.18 Sources of Water pollution   | 119        |
| Table 4.19 Proposed Land Use Plan   | 121        |
| Table 4.20 Post-Mining Land Use Plan  | 122        |
| Table 4.21 Municipal Solid Waste Quantification   | 127        |
| Table 4.22 Quantification of Waste Load   | 128        |
| Table 6.1 Details of Environmental Monitoring Stations  | 139        |
| Table 6.2 Measurement methodologies for Air Quality Monitoring                                | 140        |
| Table 6.3 Sampling Analytical equipments used for environmental monitoring                    | 140        |
| Table 6.4 Proposed Environmental Monitoring Cost  | 141        |
| Table 7.1 CSR expenditure in Kathara Area   | 175        |
| Table 7.2 Proposed CSR action plan  | 175        |
| Table 9.1 Environmental Costs   | 180        |
| Table 9.2 Assessment of Benefits to Environment   | 181        |
| Table 10.1 Estimated Capital Cost of Environmental Control Measures                           | 188        |
| Table 10.2 Estimated Revenue Cost of Environmental Control Measures                           | 190        |
| Table 10.2 Proposed Activities for Compliance of Issues Raised in PH                          | 191        |
| Table 12.1 Consultants Engaged  | 199        |
| Table 13.1 Year Wise Production Details   | 202        |
| Table 13.2 Economic benefits Accrued Due to Violation   | 203        |
| Table 13.3 Land Use Change Analysis of Kathara OCP during period of Violation                 | 205        |
| Table 13.4 Pollutant Emission Quantification during Violation                                 | 209        |
| Table 13.5 Environmental Prices of Air Pollutants   | 211        |
| Table 13.6 Financial Evaluation of Damages to Air Environment                                 | 212        |
| Table 13.7 Cost of Compensation for Ground water Extraction                                   | 216        |
| Table 13.7 Cost for Ground water Abstraction  | 217        |
| Table 13.8 CSR Activities in Previous Years   | 218        |
| Table 13.9 IME and PME Details  | 219        |
| Table. 13.10 Details of Health Camps  | 219        |
| <b>Table 13.11: Summary of Assessment of Damages</b>  | <b>220</b> |
| Table 13.12 Table Proposed budgetary provisions for Damage Remediation Plan                   | 221        |
| Table 13.13 Details of EMP Cost saved during period of violation                              | 222        |
| =====   |            |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

Table 13.14 Proposed budgetary provisions for Natural and Community Resource Augmentation Plan

223

| #  | Observations (MoM)   | Compliance (Revision in EIA-EMP)   |
|----|--|--|
| i. | PP shall revise damage assessment and its remedial action plan for violation on account of excess production on following points:  |  |
| b. | The total production under violation shall be considered from 08/01/2017 to January 2022 and accordingly damage calculation to be revised.   | The damage calculation has been revised considering the total production under violation during the period- 08/01/2017 to January 2022.<br>Refer Chapter-13 Pg no: 203   |
| c  | Economic benefit accrual shall be revisited and certified by finance department.   | The details of economic benefit accrual has been revised by PP and the duly certified copy of the same by finance department is enclosed as Annexure- XV   |
| d  | Air Environment-Damage: The emissions shall be considered for all violation years, without comparison/base year and shall be revised accordingly.  | The damage calculation has been revised considering the total production under violation during the period- 08/01/2017 to January 2022 without considering base year comparison. A total damage cost of ₹ 1160.7 Lakh has been assessed for Air-Environment.<br>Refer section 13.3.2 at pg.207                                     |
| e  | Water: The rates for GW shall be revised as per GGWA Notification of Sept 2020 for abstraction as well as compensation.  | Damage estimation for GW has been revised based on the total production under violation period (January 2017 to January 2022) and considering abstraction and compensation rate as per the CGWA Notification of September 2020. A total damage cost of ₹ 277.49 Lakh has been estimated for GW.<br>Refer Section 13.3.3. Pg no 214 |
| f  | Surface water rates shall be revised as per the deficiency in provisions of SW structures.   | A revised damage of ₹ 90 Lakh has been assessed for Surface water, based on the deficiency in provisions of SW structures during the period of violation.<br>Refer Section 13.3.3. Pg no 218   |
| g. | The activities enumerated under Remediation, NRAP and CRAP shall be revised based on the need based survey and further shall be specific, monitor-able besides revising the target period for two years. | Provision of activities for Remediation, NRAP and CRAP has been revised. The proposed activities will cover specific needs of the neighbourhood and will be completed within two years. The total amount proposed under the Remediation Plan is ₹ 1537.00 Lakh and ₹ 85 Lakh for   |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

| #    | Observations (MoM)   | Compliance (Revision in EIA-EMP)   |
|------|--|--|
|      |  | NRAP & CRAP respectively.<br>Refer section 13.4 at pg. 222   |
| h    | Water balance for STP and ETP shall be revised and submitted and water conservation plan to be drawn.  | Water Balance has been updated in the Section 4.3.2 and Plate XVIA.<br>The details of existing and proposed water conservation measures have been detailed in the section 4.3.6<br>Refer section 4.3.6 pg no: 121  |
| i    | Provision of RWH structures in the colony shall be submitted.  | Roof top rain water harvesting system already exists at P.O. Office of Kathara OCP and in about 100 quarters in the residential colonies of Kathara area. Moreover, it has been proposed in the EIA-EMP to construct 03 additional RWH structures worth Rs. 25 Lakh at 03 locations (Pit Office, Mine Rescue Station and Kathara Rest House).<br><br>Refer section 4.3.6 at pg.121 |
| k    | Cost saved due to the above a/c for the violation years shall be added to CRAP and likewise cost saved EMP also.   | Assessment of EMP cost saved during the period of violation has been assessed and 3% of the total cost saved has been accounted in CRAP.   |
| ii.  | The total damage cost mentioned in the EIA report is 359.59 Lakhs; Total fund proposed for remediation measures 34,799,000, Total cost proposed for Natural & Community Resource Augmentation Measures is 7,200,000, which is to be revised as per recommendation mentioned above. | The Damage Assessment and Remediation Plan & NCRAP have been revised as per the recommendations of EAC and incorporated in the Chapter XIII of the report.<br><br>Refer section 13 at pg. 203  |
| xii  | Time bound action plan with budgetary provisions for commitment made on the issues raised during public hearing in EIA-EMP report.   | Updated time bound action plan with budgetary provisions for commitment made on the issues raised during public hearing has been incorporated in the EIA-EMP report.<br>Refer section 7.1.2 at pg. 153   |
| xvii | PP to submit revised EIA/EMP report with revised Form-2 by breakup of activity proposed in CER.  | This EIA/EMP report has been revised as per the recommendations of EAC as mentioned in above points.   |

# Chapter 1

## Introduction

### 1.1 Purpose of the report

Kathara OCP is a brownfield project operating since pre-nationalization era. This project falls in the CD block Bermo in Bokaro District of Jharkhand, administratively under Kathara Area of CCL. This project has obtained Environmental clearance for 0.96/1.90 MTPA under EIA Notification, 2006 vide letter no: J-11015/482/2008-IA-II (M) dt. 08.01.2014.

The life of mine as per the calendar plan of previous EC was 03 years. Meanwhile, a revised cost estimate (RCE) Project Report of Kathara OCP was prepared with balance mineable reserve of 26.80 MT with mine life 15 years and rated capacity of 1.90 MTPA, and approved by CCL Board on 01.10.2012.

Based on the RCE, updated Form-I for amendment of EC was submitted online on 01.02.2019 with balance mineable reserve of 22.16 MT and balance life of 12 years. EAC, MoEF&CC appraised the project on 25.06.2019 and 29.05.2020, and directed to submit a fresh application in form-I for obtaining Environmental Clearance as per EIA Notification, 2006.

CCL has submitted fresh Form-I application in respect of Kathara OCP (1.90 MTPA/ 773.23 Ha) as per EIA Notification, 2006 on 17.10.2020.

In the Minutes of meeting of EAC (Coal), MoEFCC held on 27<sup>th</sup> October 2020, the committee has confirmed that this project falls into the violation category and therefore, granted specific Tor for violation along with the standard ToR for opencast coal mining vide letter no. F.J-11015/482/2008-IA-II dt. 27.4.2021. enclosed as Annexure-I.

The Mining Plan and Mine Closure Plan of Kathara OCP (1.90 MTPA/773.23 Ha.) has been approved by the CCL Board in its 485<sup>th</sup> meeting held on 29.05.2020.

Purpose of this EIA/EMP of Kathara OCP is to carryout impact assessment studies and propose suitable management plan based on the the ToR Prescribed by the MoEFCC.

### 1.2 Identification of Project and Project Proponent

**Central Coalfields Limited (CCL)**, a subsidiary of Coal India Limited is a prime producer of coking & non-coking coal in the country. It operates coalmines in the state of Jharkhand. Its operation spread over 2600 km<sup>2</sup> in the districts of Ramgarh, Hazaribagh, Bokaro, Giridih, Palamu, Chatra, Latehar, Deoghar and Koderma. Mining operation spread over six coalfields i.e North Karanpura, South Karanpura, East Bokaro, West Bokaro, Ramgarh and Giridih Coalfields. CCL has been playing a pivotal role in fulfilling the energy needs of the country. This subsidiary of Coal India Limited has produced 62.58 Mt. of coal during 2020-21 and is planning to produce 74 MTPA in 2021-22 to meet the energy demands of the country.

The project under consideration, i.e. Kathara OCP (1.90 MTPA/773.23 Ha) falls under East Bokaro Coalfields of CCL headed by General Manager, Kathara Area. The address for correspondence is as given below.

Address:

Project Officer,  
Kathara OCP,  
Kathara Area, Central Coalfields Limited,  
PO-Kathara, Dist-Bokaro, Jharkhand.  
PIN- 829116

## 1.3 Brief Description of Nature and Size of the Project

Kathara OCP is an existing opencast coal mining project with proposed capacity of 1.9 MTPA and within a project area of 773.23 Ha. Estimated life of mine is 12 years.

### 1.3.1 Location

Kathara OCP falls in the Kathara Block East Bokaro Coalfields, Bermo CD Block located in Bokaro District of Jharkhand. Refer **Plate-I A & B** for location plan of the project. This project is covered by the Survey of India Toposheet no: 73E/13 & 73 E/14, enclosed by Latitude: 23°44'47.26"N to 23°46'26.11"N and Longitude: 85°50'59.89"E to 85°54'25.91"E.

**Refer Plate-II** for Location of the project on Topo Sheet.

### 1.3.2 Importance of project to Country, Region

This proposal is significant as Central Coalfields Limited is facing increasing demand of coal from industry and power sector. Enhancing coal production from the mines of CCL will help to bridge the gap of demand and supply of coal in India, especially in power and steel sectors.

Also, this mine produces high grade coking coal and is linked to existing and proposed Kathara coking coal washery. This project shall act as a major source of direct or indirect employment, which will in turn help in uplifting the socio-economic status of villagers living in the core and buffer zone. Further, several community development activities to be carried out as a part of CSR and other heads. This project will help in developing the supporting infrastructure of nearby villages like roads, railway line, power transmission line, water supply etc.

## 1.4 Scope of the Study

This EIA/EMP has been prepared as per EIA notification, 2006 and conditions prescribed as per the standard Terms of Reference (ToR) recommended by MoEFCC by incorporating one season baseline data generated in core and buffer zone.

The compliance of Standard TOR in this report is provided herewith:

| Sl.No | Tor Condition   | Compliance  | Reference |
|-------|---|---|-----------|
| 1     | An EIA-EMP Report shall be prepared for.....MTPA within the project area of.....Ha. based on the generic structure specified in Appendix III of the EIA | EIA-EMP of Kathara OCP (1.90 MTPA/773.23 Ha.) has been prepared as per the generic structure of EIA/EMP as specified in the Appendix III of EIA |           |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|   | Notification, 2006  | Notification 2006   |                              |
|---|---|---|------------------------------|
| 2 | An EIA-EMP Report would be prepared for.....MTPA rated capacity to cover the impacts and management plan for the project specific activities on the environment of the region, and the environmental quality encompassing air, water, land, biotic community, etc. through collection of data and information, generation of data on impacts including prediction modeling for .....MTPA of coal production based on approved project/Mining Plan for.....MTPA. Baseline data collection can be for any season except monsoon.  | EIA-EMP of Kathara OCP has been prepared for the proposed capacity of 1.90 MTPA within the project area of 773.23 Ha.<br><br>Baseline data has been generated in the Post-Monsoon season of 2020 (01/10/2020 – 24/12/2020) covering all the environmental parameters and presented in the Chapter III of this EIA-EMP<br><br>The impact of proposed activities on all environmental parameters have been quantified and suitable mitigation measures have been proposed and presented in chapter IV of this report. | Refer Chapter-III at Page 50 |
| 3 | A map specifying locations of the State, District and Project location should be provided.  | This project located in the CD block Bermo of Bokaro Dist., Jharkhand.<br><br>Refer Plate-I for Location Plan of the project.   | Refer Section 2.3 at Pg.31   |
| 4 | A Study area map of the core zone and 10 km area of the buffer zone (1: 50,000 scale) clearly delineating the major topographical features such as the land use, surface drainage pattern including rivers/streams/nullahs/canals, locations of human habitations, major constructions including railways, roads, pipelines, major industries/mines and other polluting sources. In case of ecologically sensitive areas such as Biosphere Reserves/National Parks/WL Sanctuaries/ Elephant Reserves, forests (Reserved/Protected), migratory corridors of fauna, and areas where endangered fauna and plants of medicinal and economic importance found in the 15 km study area should be given. | The study area is covered by Survey of India Topo Sheet No. 73E/13 & 73 E/14(RF 1:50000).<br><br>Refer Plate-II for Location of the project on the Survey of India Topo Sheet.  | Refer Section 2.3 at Pg. 31  |
| 5 | Land use map (1: 50,000 scale) based on a recent satellite imagery of the study area may also be provided with explanatory note on the land use.  | The land use pattern of core and buffer zone studied through satellite imagery data is as as shown in the Plate IX at Section. 3.9 of this report.<br><br><b>Core Zone:</b> Around 308 Ha. of the core zone is being used for mining and other  | Refer section 3.9 at pg.92   |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|                         |  | <p>purposes. Most of the remaining land is either plantation, or scrubs or settlements. There has been less agricultural land (67 Ha which has been observed as per the satellite imagery study.</p> <p><b>Buffer Zone:</b> Buffer zone largely consists of agricultural land (14,141 Ha – 37.80 %) and Scrubs (8011 Ha- 21.41%).</p> <p>Refer <b>Plate IX</b> for detailed land use plan.</p>   |                                     |              |             |   |        |     |   |                            |        |                         |  |               |                                    |
|-------------------------|--|--|-------------------------------------|--------------|-------------|---|--------|-----|---|----------------------------|--------|-------------------------|--|---------------|------------------------------------|
| 6                       | <p>Map showing the core zone delineating the agricultural land (irrigated and un-irrigated, uncultivable land as defined in the revenue records, forest areas (as per records), along with other physical features such as water bodies, etc should be furnished.</p>  | <p>Total core zone/Project area of the proposed project is 773.23 Ha.,</p> <table border="1"> <thead> <tr> <th>Sl.no</th> <th>Type of Land</th> <th>Area in Ha.</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Forest</td> <td>NIL</td> </tr> <tr> <td>2</td> <td>Non-Forest (GMK + Tenancy)</td> <td>773.23</td> </tr> <tr> <td colspan="2"><b>Total Area in Ha</b></td> <td><b>773.23</b></td> </tr> </tbody> </table> <p>Refer to Plate IV and Section 2.6 of this report for proposed land use plan along with the revenue details.</p> | Sl.no                               | Type of Land | Area in Ha. | 1 | Forest | NIL | 2 | Non-Forest (GMK + Tenancy) | 773.23 | <b>Total Area in Ha</b> |  | <b>773.23</b> | <p>Refer section 2.6 at pg. 45</p> |
| Sl.no                   | Type of Land   | Area in Ha.  |                                     |              |             |   |        |     |   |                            |        |                         |  |               |                                    |
| 1                       | Forest   | NIL  |                                     |              |             |   |        |     |   |                            |        |                         |  |               |                                    |
| 2                       | Non-Forest (GMK + Tenancy)   | 773.23   |                                     |              |             |   |        |     |   |                            |        |                         |  |               |                                    |
| <b>Total Area in Ha</b> |  | <b>773.23</b>  |                                     |              |             |   |        |     |   |                            |        |                         |  |               |                                    |
| 7                       | <p>A contour map showing the area drainage of the core zone and 25 km of the study area (where the water courses of the core zone ultimately join the major rivers/streams outside the lease/project area) should also be clearly indicated in the separate map</p>  | <p>Damodar River marks the southern boundary of the project, flowing in west to east direction. Konar River flows from north-west to south-east direction of the project. Konar River drains finally joins Damodar River at distance of 1 km from the project boundary</p> <p>Refer Plate- IIIA, IIIB for Drainage Map and Water Contour Map of the area.</p>  | <p>Refer Section 2.3.4 at pg.34</p> |              |             |   |        |     |   |                            |        |                         |  |               |                                    |
| 8                       | <p>A detailed Site plan of the mine showing the proposed break-up of the land for mining operations such as the quarry area, OB dumps, green belt, safety zone, buildings, infrastructure, CHP, ETP, Stockyard, township/colony (within and adjacent to the ML), undisturbed area -if any, and landscape features such as existing roads, drains/natural water bodies to be left undisturbed along with any natural drainage adjoining the lease /project areas, and modification of thereof in terms of construction of embankments/bunds, proposed</p> | <p>Total Project area of Kathara OCP is 773.23 Ha. Of which, quarry is proposed in 258.46 Ha., external dumping is proposed in 109.53 Ha., Reclaimed OB Dump &amp; Embankment in 41.38 Ha and 64.54 Ha of industrial area. Total green belt has been proposed in 45.00 Ha.</p> <p>Refer Plate IV for detailed landuse plan.</p>  | <p>Refer Section 2.3.6 at pg.33</p> |              |             |   |        |     |   |                            |        |                         |  |               |                                    |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|                         | diversion/re-channelling of the water courses, etc., approach roads, major haul roads, etc should be indicated.  |  |                               |              |             |   |        |     |   |                            |        |                         |  |               |                               |
|-------------------------|--|--|-------------------------------|--------------|-------------|---|--------|-----|---|----------------------------|--------|-------------------------|--|---------------|-------------------------------|
| 9                       | In case of any proposed diversion of nallah/canal/river, the proposed route of diversion /modification of drainage and their realignment, construction of embankment etc. should also be shown on the map as per the approval of Irrigation and flood control Department of the concerned state. | No Nala Diversion Involved.  |                               |              |             |   |        |     |   |                            |        |                         |  |               |                               |
| 10                      | If the project involves diversion of any road/railway line passing through the ML/project area, the proposed route of diversion and its realignment should be shown in the map.  | Not Applicable.  |                               |              |             |   |        |     |   |                            |        |                         |  |               |                               |
| 11                      | Break up of lease/project area as per different land uses and their stage of acquisition should be provided.   | <p>Total project area of the proposed project is 773.23 Ha. This land has been acquired under CBA act.</p> <p>Total core zone/Project area of the proposed project is 773.23 Ha.,</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Sl.no</th> <th style="text-align: center;">Type of Land</th> <th style="text-align: center;">Area in Ha.</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">Forest</td> <td style="text-align: center;">NIL</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">Non-Forest (GMK + Tenancy)</td> <td style="text-align: center;">773.23</td> </tr> <tr> <td colspan="2" style="text-align: center;"><b>Total Area in Ha</b></td> <td style="text-align: center;"><b>773.23</b></td> </tr> </tbody> </table> | Sl.no                         | Type of Land | Area in Ha. | 1 | Forest | NIL | 2 | Non-Forest (GMK + Tenancy) | 773.23 | <b>Total Area in Ha</b> |  | <b>773.23</b> | Refer Section 2.3.6 at pg. 35 |
| Sl.no                   | Type of Land   | Area in Ha.  |                               |              |             |   |        |     |   |                            |        |                         |  |               |                               |
| 1                       | Forest   | NIL  |                               |              |             |   |        |     |   |                            |        |                         |  |               |                               |
| 2                       | Non-Forest (GMK + Tenancy)   | 773.23   |                               |              |             |   |        |     |   |                            |        |                         |  |               |                               |
| <b>Total Area in Ha</b> |  | <b>773.23</b>  |                               |              |             |   |        |     |   |                            |        |                         |  |               |                               |
| 12                      | Break-up of lease/project area as per mining operations should be provided.  | <p>Total Project area of Kathara OCP is 773.23 Ha. Of which, quarry is proposed in 258.46 Ha., external dumping is proposed in 109.53 Ha., Reclaimed OB Dump &amp; Embankment in 41.38 Ha and 64.54 Ha of industrial area. Total green belt has been proposed in 45.00 Ha.</p> <p>Refer Plate IV for detailed landuse plan.</p>  | Refer Section 2.3.6 at pg. 35 |              |             |   |        |     |   |                            |        |                         |  |               |                               |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|    |  |   |  |
|----|--|---|--|
| 13 | Impact of changes in the land use due to the project, if much of the land being acquired is predominantly agricultural land/forestland/grazing land.   | In order to restore the land degraded due to the proposed mining activity, around 455.12 Ha of project area is proposed to be biologically reclaimed in the post mining stage.<br><br>The detailed land restoration plan detailed in the section 4.5.4 of this report.  | Refer section 4.5.4 at pg.123                  |
| 14 | One-season (non-monsoon) primary baseline data on environmental quality - air (PM10, PM2.5, SOx, NOx and heavy metals such as Hg, Pb, Cr, As, etc), noise, water (surface and groundwater), soil - along with one-season met data coinciding with the same season for AAQ collection period should be provided.  | One season (non-monsoon) environmental baseline data in respect of Kathara OCP was generated in the post-monsoon season 2020 (01/10/2020 – 24/12/2020).<br><br>Refer to Chapter III of this EIA EMP for baseline data.  | Refer Chapter-III at pg.50                     |
| 15 | Map of the study area (1: 50, 000 scale) (core and buffer zone clearly delineating the location of various sampling stations superimposed with location of habitats, other industries/mines, polluting sources should be provided. The number and location of the stations in both core and buffer zones should be selected on the basis of size of lease/project area, the proposed impacts in the downwind (air)/downstream (surface water)/groundwater regime (based on flow). One station should be in the upwind/upstream/non-impact/non-polluting area as a control station. The monitoring should be as per CPCB guidelines and parameters for water testing for both ground water and surface water as per ISI standards and CPCB classification wherever applicable. Values should be provided based on desirable limits. | Location of Air, water, noise and soil monitoring stations in have been selected selected as per the CPCB and MoEFCC guidelines and marked on the Survey of India Toposheet.<br><br>(Refer Plate VII and Plate VIII).   | Refer section 3.3, 3.4, 3.5, 3.6<br><br>Pg: 54 |
| 16 | Study on the existing flora and fauna in the study area (10km) should be carried out by an institution of relevant discipline. The list of flora and fauna duly authenticated separately for the core and study area and a statement clearly specifying whether the study area forms a part of the migratory corridor of any endangered fauna should be given. If the study area has endangered flora and  | Study on the flora and fauna in the study area (10km) has been carried out by Wolkem India Pvt. Ltd. in the Post-monsoon period of 2020.<br><br>The list of flora and fauna duly authenticated separately for the core and study area has also been detailed in the Section 3.7 of this report<br><br>In the Core and Buffer zone, as per the | Refer section 3.7 at pg. 78                    |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|    |   |   |                                |
|----|---|---|--------------------------------|
|    | fauna, or if the area is occasionally visited or used as a habitat by Schedule-I fauna, or if the project falls within 15 km of an ecologically sensitive area, or used as a migratory corridor then a Comprehensive Conservation Plan should be prepared and submitted with EIA-EMP Report; and comments from the CWLW of the State Govt. should also be obtained and furnished.   | interaction with local stakeholders and reference of forest working plan, Peacock, Python and Monitor Lizard of Schedule I species are occasionally sighted. The conservation plan for the schedule I species has been obtained from the project proponent and enclosed as Annexure VI.                                       |                                |
| 17 | Details of mineral reserves, geological status of the study area and the seams to be worked, ultimate working depth and progressive stage-wise working scheme until the end of mine life should be provided on the basis of the approved rated capacity and calendar plans of production from the approved Mining Plan. Geological maps and sections should be included. The Progressive mine development and Conceptual Final Mine Closure Plan should also be shown in figures. | The balance mineable reserves of Kathara OCP within the quarry area of 258.46 Ha is 22.16 Mte for life of 12 years. Detailed project description has been included as Chapter II in this EIA EMP report.  | Refer section 2.5<br>Pg no: 40 |
| 18 | Details of mining methods, technology, equipment to be used, etc., rationale for selection of specified technology and equipment proposed to be used vis-à-vis the potential impacts should be provided.  | Considering the mining and geological conditions, the method of mining adopted to extract coal and OB is horizontal slicing by Shovel-dumper operation.<br><br>Detailed Mining methodology incorporated in the section 2.5.2 of this report.  | Refer section 2.5.2 at pg. 41  |
| 19 | Impact of mining on hydrology, modification of natural drainage, diversion and channeling of the existing rivers/water courses flowing through the ML and adjoining the lease/project and the impact on the existing users and impacts of mining operations thereon.  | The detailed impact study on water regime (Ground water and Surface water) has been carried out and presented in the section 4.3 of this report.<br><br>Stage of groundwater development for buffer zone of the project area determined is about 77.61%, which is also under 'Critical' category as per GEC-2015 methodology. | Refer section 4.3 at pg. 110   |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|    |  |  |                                |
|----|--|--|--------------------------------|
| 20 | Detailed water balance should be provided. The break-up of water requirement for the various mine operations should be given separately  | The peak industrial water demand for Kathara OCP was projected as 470 cum/day. The domestic water demand (colony + industrial buildings) was projected as 2400 cum/day. Thus, the total water requirement is 2870 cum/day.<br><br>The details of peak water demand of the project are presented in Plate XII and section 4.3.2 of this report. | Refer section 4.3.2 at pg. 113 |
| 21 | Source of water for use in mine, sanction of the competent authority in the State Govt. and impacts vis-à-vis the competing users should be given.   | Total mine water requirements will be fulfilled by the mine discharge itself. Application for NOC from CGWB submitted vide application number: 21-4/837/JH/MIN/2022 Dt. 27.03.2022   | Refer Annexure V               |
| 22 | Impact of mining and water abstraction use in mine on the hydrogeology and groundwater regime within the core zone and 10 km buffer zone including long-term monitoring measures should be provided. Details of rainwater harvesting and measures for recharge of groundwater should be reflected in case there is a declining trend of groundwater availability and/or if the area falls within dark/grey zone.   | The detailed impact on water regime (Ground water and Surface water) has been carried out and presented in the section 4.3.3 of this report.   | Refer section 4.3.3 at pg. 119 |
| 23 | Impact of blasting, noise and vibrations should be given.  | Impact of blasting, noise and vibrations have been discussed in the Section 4.4 of this report.  | Refer section 4.4 at pg. 121   |
| 24 | Impacts of mining on the AAQ and predictions based on modeling using the ISCST-3 (Revised) or latest model should be provided  | AQIP has been carried out using AERMOD software version. 9.4.0. and incorporated in Section 4.2 of this report. The assessment of predicted impact on air quality has been carried out for PM <sub>10</sub> , PM <sub>2.5</sub> , NO <sub>2</sub> and SO <sub>2</sub> .  | Refer section 4.2 at Pg no: 94 |
| 25 | Impacts of mineral transportation within the mining area and outside the lease/project along with flow-chart indicating the specific areas generating fugitive emissions should be provided. Impacts of transportation, handling, transfer of mineral and waste on air quality, generation of effluents from workshop, management plan for maintenance of HEMM, machinery, equipment should be given. Details of various facilities such as rest areas and | The coal transportation route to adjoining Kathara Washery is a dedicated mine road for coal transportation, free from any kind of public commutation. Thus, there is no impact on the traffic movement.<br><br>Impact of transportation has been discussed in the section 4.9 of this report.   | Refer section 4.9 at pg. 134   |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|    |   |   |                                |
|----|---|---|--------------------------------|
|    | canteen for workers and effluents/pollution load emanating. from these activities should also be provided.  |   |                                |
| 26 | Effort be made to reduce/eliminate road transport of coal inside and outside mine and for mechanized loading of coal through CHP/ Silo entirely wagons and into trucks/tippers.   | The coal transportation route to adjoining Kathara Washery is a dedicated mine road (approx. 3 km from face to washery) for coal transportation, free from any kind of public commutation.  | Refer section 4.9 at pg. 134   |
| 27 | Details of waste OB and topsoil generated as per the approved calendar programme, and their management shown in figures as well explanatory notes tables giving progressive development and mine closure plan, green belt development, backfilling programme and conceptual post mining land use should be given. OB dump heights and terracing based on slope stability studies with a max of 28° angle as the ultimate slope should be given. Sections of final dumps (both longitudinal and cross section) with relation to the adjacent area should be shown. | Total overburden quantity estimated for Kathara Opencast Project is 76.4 Mcum all of which has been proposed to be dumped externally and internally.<br><br>A detailed dump management plan and top soil management plan has been incorporated in Section 4.5.3 & 4.5.4 of this report. | Refer section 4.5.3 at pg. 122 |
| 28 | Efforts be made for maximising progressive internal dumping of O.B., sequential mining, external dump on coal bearing area and later rehandling into the mine void.--to reduce land degradation.  | Dump management has been planned in such a way that the max. OB is proposed to be backfilled in the mine void.  | Refer section 4.5.3 at pg.122  |
| 29 | Impact of change in land use from mining operations and whether the land can be restored to agriculture use post mining.  | Land reclamation and enrichment through plantation will be done to bring back the land-use as similar as possible to the pre-mining land use. For this purpose, efforts will be made to bring approximately 455.12 Ha area to bring under plantation.                                   | Refer section 4.5.4 at pg. 123 |
| 30 | Progressive Green belt and ecological restoration /afforestation plan (both in text, figures and in the tabular form as per the format of MOEF given below) and selection of species (native) based on original survey/landuse should be given.   | It has been proposed to develop greenbelt in 45 Ha of project area.   | Refer section 4.5.4 at pg. 123 |
| 31 | Conceptual Final Mine Closure Plan and post mining land use and restoration of land/habitat to the status pre- mining   | Refer to Section 4.5.4 for detailed land reclamation plan.  | Refer section                  |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|    |   |   |                                  |
|----|---|---|----------------------------------|
|    | should be provided. A Plan for the ecological restoration of the minedout area and post mining land use should be prepared with detailed cost provisions. Impactand management of wastes and issues of rehandling (wherever applicable) and backfillingand progressive mine closure and reclamation should be detailed. |   | 4.5.4 at pg. 123                 |
| 32 | Flow chart of water balance should be provided. Treatment of effluents from workshop, township, domestic wastewater, mine water discharge, etc. should be provided. Details of STPin colony and ETP in mine should be given.  | Detailed water consumption along with water balance diagram incorporated in the Section 4.3.2 and Plate XII of this report.   | Refer section 4.3.2 at pg.113    |
| 33 | Occupational health issues. Baseline data on the health of the population in the impact zoneand measures for occupational health and safety of the personnel and manpower in the mines should be given.   | Socio-economic study and Occupational health survey of core and buffer zone of Kathara OCP was carried out as a part of baseline data generation.<br><br>IME before employment and PME for 1/4 <sup>th</sup> work-force is regularly done for keeping OHS surveillance. | Refer section 3.8.4 at pg no: 92 |
| 34 | Risk Assessment and Disaster Preparedness and Management Plan should be provided.   | The operations of the Kathara OCP has been proposed to be in conformation with the prevailing statutory provisions for safety in opencast mines.<br><br>A detailed Safety & Risk Assessment has been incorporated in Section 7.3 of this report.                        | Refer section 7.3 at pg. 160     |
| 35 | Integration of the Env. Management Plan with measures for minimising use of natural resources- water, land, energy, etc. should be carried out.   | Measures for energy conservation like periodical maintenance, energy audits, optimization of distribution networks etc.,are being implemented in the project. Action plan for Energy Conservation has been incorporated in Section 7.4 of this report.                  | Refer section 7.4 at pg. 164     |
| 36 | Cost of EMP (capital and recurring) should be included in the project cost and for progressive and final mine closure plan.   | Total proposed Capital cost of EMP is <b>3833.32</b> Lakhs Detailed EMP Cost is presented in the Section 10.4 of this report.   | Refer section 10.4 at pg. 187    |
| 37 | Details of R&R. Detailed project specific R&R Plan with data on the existing socio-economic status of the population  | No R&R is involved.   |                                  |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|    |  |   |                                |
|----|--|---|--------------------------------|
|    | (including tribals, SC/ST, BPL families) found in the study area and broad plan for resettlement of the displaced population, site for the resettlement colony, along with the schedule of the implementation of the R&R Plan should be given. |   |                                |
| 38 | CSR Plan along with details of villages and specific budgetary provisions (capital and recurring) for specific activities over the life of the project should be given.  | As per the CSR Policy of CCL, the fund for the CSR should be allocated based on 2% of the average net profit of the Company for the three immediate preceding financial years or Rs. 2.00 per Tonne of Coal Production of previous year whichever is higher.<br><br>The detailed action plan of CSR for the proposed project has been incorporated in the section 7.7.6 of this report. | Refer section 7.7.6 at pg. 175 |
| 39 | Corporate Environment Responsibility   |   |                                |
| a. | The Company must have a well laid down Environment Policy approved by the Board of Directors.  | Central Coalfields Limited has adopted the corporate Environmental Policy laid down by the parent Company Coal India Limited(CIL) through a board approval as item no: 480.3(4) of 480 <sup>th</sup> Board meeting held on 16.11.2019.  | Refer Annexure VIII            |
| b. | The Environment Policy must prescribe for standard operating process/procedures to bring into focus any infringements/deviation/violation of the environmental or forest norms/conditions.   | CIL is committed to promote sustainable development by protecting the environment through integrated project planning & design, prevention / mitigation of pollution, conservation of natural resources, restoration of ecology & biodiversity, recycling/ proper disposal of wastes, addressing climate change and inclusive growth.   | Refer Annexure VIII            |
| c. | The hierarchical system or Administrative Order of the company to deal with environmental issues and for ensuring compliance with the environmental clearance conditions must be furnished.  | Central Coalfields Limited (CCL) has a well-defined hierarchical system for monitoring and implementation of environmental issues for necessary compliance.   | Refer section 10.2 on pg. 184  |
| d. | To have proper checks and balances, the company should have a well laid down system of reporting of non-compliances/violations of environmental norms to the Board of Directors of the company and/or shareholders or                          | Central Coalfields Limited, the owner of this project has already set-up an Environmental Cell headed by General Manager at its HQs.<br><br>The responsibility for implementing Environmental Management Plan rests   | Refer section 10.2 on pg.184   |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|    |  |   |                               |
|----|--|---|-------------------------------|
|    | stakeholders at large.   | with the General Manager / Chief General Manager of the Project, who gets proper assistance by a team of qualified and trained personnel.   |                               |
| 40 | Details on Public Hearing should cover the information relating to notices issued in the newspaper, proceedings/minutes of public hearing, the points raised by the general public and commitments made by the proponent and the action proposed with budgets in suitable time frame. These details should be presented in a tabular form. If the Public Hearing is in the regional language, an authenticated English Translation of the same should be provided. | The project area of Kathara OCP falls in Bokaro district of Jharkhand. Accordingly, public consultation of Kathara OCP (1.90 MTPA/773.23Ha) was conducted Bokaro Dist. (31.08.2021) as per the EIA Notification 2006 and Terms of Reference (ToR) granted by the MoEFCC.  | Refer section 7.1 at pg. 143  |
| 41 | In built mechanism of self-monitoring of compliance of environmental regulations should be indicated.  | Central Coalfields Limited, the owner of this project has already set-up an Environmental Cell headed by General Manager at its HQs.<br><br>The responsibility for implementing Environmental Management Plan rests with the General Manager / Chief General Manager of the Project, who gets proper assistance by a team of qualified and trained personnel.<br><br>Refer Section 10.2 of this report. | Refer section 10.2 on pg.184  |
| 42 | Status of any litigations/ court cases filed/pending on the project should be provided.  | NIL   |                               |
| 43 | Submission of sample test analysis of Characteristics of coal: This should include details on grade of coal and other characteristics such as ash content, S and heavy metals including levels of Hg, As, Pb, Cr etc.  | The grade of output coal Washery Grade-III.<br><br>Ash content in the output coal varies from 15% to 25.6% and the Sulfur content varies from 0.48% to 0.68%.   | Refer section 2.4.3 at pg. 39 |
| 44 | Copy of clearances/approvals such as Forestry clearances, Mining Plan Approval, mine closer plan approval. NOC from Flood and Irrigation Dept. (if req.), etc. wherever applicable.  | Enclosed as Annexures with this EIA EMP report.   | Refer Annexures.              |

The compliance of Specific TOR conditions as specified by EAC is provided herewith:

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

| <b>Sl. No</b> | <b>Tor Condition</b>  | <b>Compliance</b>   | <b>Reference</b>             |
|---------------|---|---|------------------------------|
| 1             | Public Consultation, including public hearing, shall be conducted through concerned SPCB as per the provisions/procedure contained in the EIA Notification, 2006 for information of the stakeholders about the present coalmining operations inviting comments and their redressal. | The project area of Kathara OCP falls in Bokaro district of Jharkhand. Accordingly, public consultation of Kathara OCP (1.90 MTPA/773.23Ha) was conducted Bokaro Dist. (31.08.2021) as per the EIA Notification 2006 and Terms of Reference (ToR) granted by the MoEFCC.  | Refer section 7.1 at pg. 143 |
| 2             | Cumulative Impact Assessment Study of the area shall be carried over by project proponent.  | Cumulative Impact Assessment of the study area has been carried out considering all industrial activities within 10 km of buffer zone.  | Refer Chapter IV. Pg no: 94  |
| 3             | Clarification from District Forest Officer that mine does not fall under corridors of any National Park and Wildlife Sanctuary.   | As per the Flora-Fauna Baseline Study carried out in post-Monsoon season of 2020, the mine does not fall under corridors of any National Park and Wildlife Sanctuary.<br><br>The application seeking clarification from District Forest Officer is enclosed as Annexure XI in the report.   | Refer Annexure-XI            |
| 4             | PP shall prepare Mine Plan including Mine Closure Plan for Peak production capacity as per latest guidelines of Ministry of Coal.   | The Mine Plan including Mine Closure Plan of Kathara OCP has been prepared for peak production of 1.90 MT and was approved in 485th CCL Board held on 04.05.2020.   | Refer Annexure-III           |
| 5             | PP shall construct embankment leaving 100 m away from HFL of river or based on the scientific study by reputed institutes and the same shall be taken prior approval from DGMS. Study shall be carried out for safety of villagers due to embankment construction.                  | An embankment of length 2.13 km has already been constructed with the top R.L. of +240m.<br><br>Further, an embankment of total length of approx.. 4 km has been proposed along the damodar bank.<br><br>No habitation exist nearby the banks of river Damodar, and hence no issue of safety arises.<br><br>Construction of an embankment along the Damodar river has been proposed in the EIA-EMP. | Refer 4.3.6 at pg no: 120    |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|    |  |   |   |
|----|--|---|---|
| 6  | Proper Drainage system shall be prepared to avoid seepage of mining water to water bodies and seepage to ground water.   | The project consists of an existing drainage system to avoid seepage of mine water to water bodies and seepage to ground water. 5.5 km of garland drain along with sequential settling ponds has been provided all around the mine periphery.<br><br>Additional measures to strengthen the drainage system has been proposed. | Refer section 4.3.6 at pg. 120              |
| 7  | No OB Dumping shall be undertaken in forest land, near the river and villages.   | No OB Dumping has been proposed over Forest Land and in proximity to river and villages.  | Refer Section 4.5 of this report at pg: 121 |
| 8  | Wind rose pattern in the area should be reviewed and accordingly location of AAQMS shall be planned by the collection of air quality data. Monitoring locations for collecting baseline data should cover overall 10 km buffer zone i.e. dispersed in 10 km buffer area. | The ambient air monitoring locations for baseline data collection has been planned in such a way to cover overall 10 km Buffer zone.  | Refer Section 3.3 at pg. 54                 |
| 9  | Inpit conveyor belt with silo loading should be proposed and installed for transportation of coal till railway siding.   | The transportation of coal from mine face to Kathara washery is being done through tipping trucks on dedicated coal transport road within the project boundary. Silo Loading of coal is present at Kathara Washery.   |   |
| 10 | PP shall explore the possibilities of utilization of OB material for different purposes (in construction of roads, manufacture of artificial sand, aggregates, use for farmers etc.) and accordingly Plan shall be included in EIA-EMP report.                           | A total of 76.4 Mcum of OB is expected to be generated in the present proposal. It is proposed to dump total OB into existing external dump and mine void.<br><br>However, possibility of generating sand from Over Burden material is being explored by CCL for utilization in the adjacent underground mines.               |   |
| 11 | Project Proponent to prepare Environmental Cost Benefit Analysis for the project in EIA/EMP Report.  | Environmental Cost Benefit Analysis for the present proposal has been incorporated as Chapter-9 in this EIA-EMP report.   | Refer Chapter-IX at pg. 180                 |
| 12 | Permission from ground water withdrawal shall be obtained from Central Ground Water Authority (CGWA), if applicable.   | Appllication for NOC from CGWB submitted vide application number: 21-4/837/JH/MIN/2022 Dt. 27.03.2022   | Refer Annexure-V                            |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|    |   |  |                                |
|----|---|--|--------------------------------|
| 13 | Impact of proposed project/activity on hydrological regime of area shall be assessed and report be submitted.   | Impact of proposed Kathara OCP (1.90 MT) on hydrological regime has been assessed.   | Refer section 4.3.3 at pg. 114 |
| 14 | Heavy metal analysis including other parameters in surface water quality (also of Ghagri river) shall be analyzed and provided in EIA Report.   | Heavy Metal Analysis including other parameters in surface water quality has been analyzed for Damodar River.  | Refer Section 3.5.5 at pg. 68  |
| 15 | The parameters Arsenic, Lead and Silica shall also be analyzed in ambient air quality.  | The parameters viz.-Arsenic, Lead and Silica has been analysed in ambient air quality along with other critical pollutants.  | Refer Section 3.3.2 at pg. 58  |
| 16 | PP shall provide an integrated mine production and mine reclamation plan of which the systematic and post-mining land form management / land scapce management of mining area, internal, and external dump area will be integral. Both internal and external dumps shall be regraded and reshaped to reduce its height as close to the original surface level as possible for better land use post mining activities.   | The details of mining, dumping pattern and post-mining reclamation & associated land use has been provided.  | Refer Section 4.5 at pg. 121   |
| 17 | The State Government/ SPCB to take action against the project proponent under the provisions of section 19 of the Environment (Protection) Act, 1986, and further no consent to operate for expansion project to be issued till the project is granted EC for the expansion.  | The issue has been brought to the notice of JSPCB. The matter lies with Jharkhand State Pollution Control Board.   |                                |
| 18 | The project proponent shall be required to submit a bank guarantee equivalent to the amount of remediation plan and natural and community resource augmentation plan with SPCB prior to the grant of EC. The quantum shall be recommended by the EAC and finalized by the regulatory authority. The bank guarantee shall be released after successful implementation of the EMP, followed by recommendations of the EAC and approval of the regulatory authority. | The NCRAP has been prepared and a bank guarantee equivalent to the amount of remediation plan and natural and community resource augmentation plan will be submitted to the SPCB upon its approval by CCL Board & MoEF&CC. | Refer Chapter-13 at pg: 202    |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|    |   |  |                                |
|----|---|--|--------------------------------|
| 19 | Assessment of ecological damage with respect to air, water, land and other environmental attributes. The collection and analysis of data shall be done by an environmental laboratory duly notified under the Environment (Protection) Act, 1986, or an environmental laboratory accredited by NABL, or a laboratory of a Council of Scientific and Industrial Research (CSIR) institution working in the field of environment. | <p>The NCRAP has been prepared as Chapter-13. The collection and Analysis of data for assessment of ecological damage with respect to air, water, land and other environmental attributes has been done by Go Green Mechanisms Pvt. Ltd., Ahmedabad for ambient air, water), noise and soil during Post-Monsoon 2020. Baseline study for flora-fauna and socio-economic was conducted by Wolkem India Ltd., Rajasthan and Environmental Technical Services Pvt. Ltd., New Delhi respectively.</p> <p>The assessment of ecological damage based on this data has been done by CMPDI, which is a NABET accredited consulting organisation.</p> | Refer Chapter-13 at page 202   |
| 20 | Preparation of EMP comprising remediation plan and natural and community resource augmentation plan corresponding to the ecological damage assessed and economic benefits derived due to violation.   | The EMP encompassing remediation plan and natural and community resource augmentation plan corresponding to the ecological damage assessed and economic benefits derived due to violation is provided in a separate Chapter <i>i.e.</i> Chapter-13   | Refer Chapter-13 at pg. 202    |
| 21 | The remediation plan and the natural and community resources augmentation plan to be prepared as an independent chapter (13) in the EIA report by the accredited consultants.   | Remediation plan & Natural and Community Resource Augmentation Plan has been prepared and is being submitted as a separate Chapter 13 in EIA/EMP report for approval.  | Refer Chapter-13 at pg. 202    |
| 22 | Details of plantation already done/ proposed to take up as per the statutory requirements along with the photographs and Budgetary provisions (year wise) to be provided.   | The details of plantation already done/proposed to take up as per the statutory has been incorporated in Section 4.5.6 of this report.   | Refer section 4.5.6 at pg: 126 |
| 23 | In case of violation of undertaking by the way of affidavit to comply with all the statutory requirements and judgement of Hon'ble Supreme Court dated, the ToR/Environmental clearance shall be liable to be terminated forthwith.   | The affidavit of undertaking has already been submitted to MoEFCC. The same has been enclosed as <b>Annexure-IV</b> .  | Refer Annexure-IV              |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|    |   |  |                               |
|----|---|--|-------------------------------|
| 24 | Budget of remediation plan and natural and community resource augmentation plan corresponding to the ecological damage shall be completed within three years and to prepare accordingly.  | Remediation plan & Natural and Community Resource Augmentation Plan has been prepared with the provision for completion within 3 years period and is being submitted as a separate Chapter 13 in EIA/EMP report. | Refer section 13.4 at pg. 221 |
| 25 | The Action Plan on the compliance of the recommendations of the CAG as per Ministry's Circular No. J-11013/71/2016-IA.I (M), dated 25.10.2017 needs to be submitted at the time of appraisal of the project and included in the EIA/EMP report. | This EIA EMP has been prepared in compliance with the recommendations of the CAG as per Ministry's Circular No. J-11013/71/2016-IA.I (M), dated 25.10.2017   |                               |
| 26 | Detailed R&R plan is to be submitted in the EIA report.   | No R&R involved.   |                               |
| 27 | Details of toe wall and garland drain to be constructed along the OB dump.  | Details of existing & proposed toe wall and garland drains has been provided in Chapter 4.   | Refer section 4.3.6 pg. 120   |
| 28 | Reclamation to be done using geo-texturing technique of the dumps close to habitation and a cause of visual intrusion.  | Reclamation of dumps using geo-texturing technique has been proposed.  | Refer section 4.5.4 pg 123    |
| 29 | Details of Water spraying (static water sprinklers) at coal stock yard and along the permanent haul road.   | Details of existing & proposed water spraying arrangements has been provided in Chapter 4.   | Refer section 4.3.6 pg: 120   |
| 30 | Details of black topping of permanent haul roads.   | Black topping of permanent haul road has been proposed.  | Refer section 4.2.3 Pg: 108   |
| 31 | Minimum 100 m distance to be maintained from dumps to habitation and three-tier belt to be developed.   | Sufficient distance will be maintained from dumps to habitation. Green belt is proposed to be developed in the spaces in 3-tier belt.  | Refer section 4.5. Pg: 121    |

## Chapter 2

# Project Description

### 2.1 Type of Project

Kathara OCP is a brownfield opencast coal mining project falling in the East Bokaro Coalfields, Bermo CD block, Jharkhand. This project was started wayback in 1944 by M/s Anderson Wright and Company on behalf of M/s Kathara Coal Company. This block was acquired by Govt. of India under the coal bearing area (acquisition and development) Act 1957 vide declaration SRO No.3810 dt. 23.11.57.

### 2.2 Need for the Project

Kathara OCP is a brown field project which has been under operation prior to pre-nationalization era. The balance mineable reserves available in Kathara OCP is around 22.16 MT which is a high grade coking coal of washery grade-III. Extracting coal from this mine would help in bridging gap between the energy needs and the supply of coal.

This project has been a major economical source to the nearby villagers. This project, when in operation, provides direct employment to around 750 people and indirect employment to several local villagers. Thus this project has been playing a major role in the socio-economic upliftment of the nearby villagers.

Further, this project has been effectively contributing to the developmental activities in nearby vilages through CSR and other means.

### 2.3 Location Details

#### 2.3.1 General Location

Kathara Opencast Project lies in the South-Western part of the East Bokaro Coalfields in Bokaro District of Jharkhand, administratively falls within Kathara area of Central Coalfields limited, Jharkhand.

Refer **Plate-IA,B** for Location Plan of the project.

#### 2.3.2 Specific Location

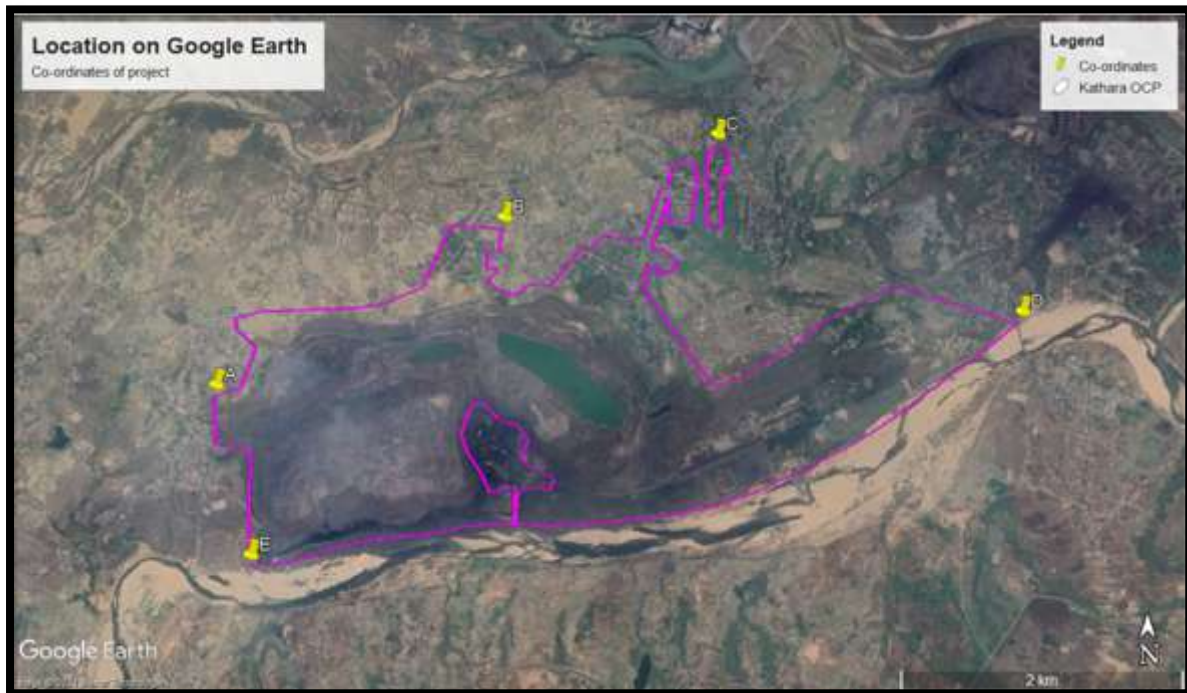
Kathara OCP falls in the kathara Block East Bokaro Coalfields, Bermo CD Block located in Bokaro District of Jharkhand. This project is covered by the Survey of India Toposheet no: 73E/13 & 73 E/14, enclosed by Latitude: 23°44'47.26"N to 23°46'26.11"N and Longitude: 85°50'59.89"E to 85°54'25.91"E.

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

---

**Table 2.1 Specific location of the project**

| <b>Point</b> | <b>Latitude (°N)</b> | <b>Longitude(°E)</b> |
|--------------|----------------------|----------------------|
| <b>A</b>     | 23°45'26.39"         | 85°50'59.89"         |
| <b>B</b>     | 23°46'6.07"          | 85°52'12.93"         |
| <b>C</b>     | 23°46'26.11"         | 85°53'8.29"          |
| <b>D</b>     | 23°45'43.60"         | 85°54'25.91"         |
| <b>E</b>     | 23°44'47.26"         | 85°51'10.00"         |



**Fig. Specific Location of the project on Google Earth**

By road, the project is about 110.00 Km North-East of Ranchi, the capital city of Jharkhand. The project is connected by NH-2 road at Bagodar (30Km) away. The Ramgarh-Dhanbad road is also connected by 20 Km. metalled road. It is also connected with Bokaro Thermal Power Station on Barkakana- Gomoh Loop Line. The nearest railway station from the project is Bokaro Thermal Power Station of SE Railway, 6.0 Km towards north-east on

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

Gomoh-Barkakana loop line. However, the Kathara block has its own Railway Siding. **Refer Plate-II** for Location of the project on Topo Sheet.

Palamu ESZ and Parasnath ESZ exists at a distance of 38.1 km and 18.1 km respectively from the Buffer Zone of Kathara OCP.

**Fig. Location of nearby Eco-sensitive Zone from Study Area**



### 2.3.3 Connectivity

The project is located in Bokaro District of Jharkhand. By road, the project is about 110.00 Km North-East of Ranchi, the capital city of Jharkhand. The project is connected by NH-2 road at Bagodar (30Km) away. The Ramgarh-Dhanbad road is also connected by 20 Km. metalled road. It is also connected with Bokaro Thermal Power Station on Barkakana-Gomoh Loop Line. The nearest railway station from the project is Bokaro Thermal Power Station of SE Railway, 1.5 Km towards north-west on Gomoh-Barkakana loop line. However, the Kathara block has its own Railway Siding.

**Table 2.2 Accessibility of Site**

| S.No | Item              | Particulars | Approximate Distance   |
|------|-------------------|-------------|------------------------|
| 01   | Nearest Town      | Bokaro      | Approx. 40 kms by Road |
| 02   | National Highways | NH 32       | 30 kms by Road         |

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|    |                           |   |                         |
|----|---------------------------|---|-------------------------|
| 03 | State Capital             | Ranchi  | 110 kms by Road         |
| 04 | Nearest Railhead          | Bokaro Thermal Railway Station  | Approx. 4 kms by Road   |
| 05 | Commercial Airport        | Ranchi  | Approx. 110 kms by Road |
| 06 | Nearby/Adjoining Projects | Kathara Washery (adjoining), Bokaro Thermal Power Plant (0.9 km), Jarangdih OCP (around 1.5 km), Govindpur Ph.II OCP (3.2 km) |                         |

### 2.3.4 Physiography, Drainage and Communication

#### ***Physiography***

The project area is moderately undulating with a small hillock. The general surface slopes towards the Konar River, garlanding the property in the North and East.

#### ***Drainage***

The general surface slopes towards the Damodar River, the master drainage in the area. The drainage of the area is controlled by Damodar River, Bokaro River and Konar River. Bokaro river and Konar river which flows from north-west to south-east and joins in Damodar River. Damodar River located south of the project flowing towards east. No nala diversion is required for this project. The drainage pattern of the area is mostly dendritic.

Refer **Plate- IIIA, IIIB** for Drainage Map and Water Contour Map of the area.

#### ***Climate and Rainfall Data***

As per the annual temperature map of India (National Atlas), the area falls within the daily mean temperature zone 22.5<sup>o</sup> C to 25.0<sup>o</sup> C. The summers as well as winters are extreme.

The rainy season in this area starts from June and continues till September. However, pre-monsoon showers are experienced in May. Showers have been witnessed in the area throughout the year though rains during December had been nominal (about 4 mm). The months April, November and December are the driest. Annual rainfall expected is about 1200mm with highest monthly rains of 350 mm in the months of July-August. Consistent with temperature and rainfall, the relative humidity is lowest during March-April and highest during July to September. The maximum and minimum relative humidity expected are 86% and 27% respectively.

### 2.3.5 Project Boundary

#### **a) Northern Boundary**

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

The northern surface boundary has been fixed along a safe distance of 45 m from existing road (going to Tenughat and partly diverted).

**b) Eastern Boundary**

Earlier quarry floor boundary was fixed along the fault F2F2. Eastern side of the mine is Colony no 4 of CCL and external dump.

**c) Southern Boundary**

Along the incrop of Kargali Bottom/combined seam (fixed earlier). Here quarry boundary is limited by central dump and washery site.

**d) Western Boundary**

The western boundary is fixed at 60 m distance from land acquired boundary. West side of the mine is Jhirki Tola.

**2.3.6 Project Site Layout**

As per the Approved Mining Plan of Kathara OCP (1.9 MTPA), the total land requirement is 773.23 Ha. consisting of 258.46 Ha of quarry area and 109.53 Ha of active external dump. The details of land use during mining is as given below. **Refer Plate IV** for Proposed Land Use Plan showing type of land.

**Table 2.3 Proposed Land Use Plan**

| Description                                       | Forest Area in Ha. | Non-Forest Area in Ha. | Total Area in Ha. |
|---|--------------------|------------------------|-------------------|
| Quarry  | 0                  | 258.46                 | 258.46            |
| External OB Dump                                  | 0                  | 109.53                 | 109.53            |
| Reclaimed OB Dump and Embankment                  | 0                  | 74.09                  | 74.09             |
| Industrial Area (W/S, S/S, Haul Road, Office etc) | 0                  | 64.54                  | 64.54             |
| Colony & Settlement                               | 0                  | 122.87                 | 122.87            |
| Safety Zone / Green belt                          | 0                  | 45                     | 45                |
| Vacant Land                                       | 0                  | 98.74                  | 98.74             |
| <b>Total</b>                                      | <b>0</b>           | <b>773.23</b>          | <b>773.23</b>     |

This project doesnot involve any forest land within the project boundary. The nature of land within the project area i.e., 773.23 Ha. is as given below.

| S.No | Type of Land | Area in Ha. |
|------|--------------|-------------|
| 1    | Tenancy Land | 320.33      |
| 2    | GMA Land     | 8.64        |
| 3    | GMK Land     | 444.26      |

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|   |                   |        |
|---|-------------------|--------|
| 4 | Forest Land       | 0      |
|   | Total Area in Ha. | 773.23 |

The project area of Kathara OCP has been acquired under CBA vide following letters:

- S.O. no: 1070 Dt. 8/5/1959
- S.O. no: 699(E) Dt. 8/10/1996
- S.O. no: 2772 Dt. 12/12/1959
- S.O. no: 2771 Dt. 11/12/1959
- S.O. no: 3810 Dt. 23/11/1959
- S.O. no: 1070 Dt. 8/12/1951.

## 2.4 Geology

The Kathara block lies on the southern limb of the main synclinal basin of the East Bokaro Coalfield, the axis of which runs in almost E-W direction. The southern limb of the coalfield is not well preserved excepting in the Kathara and adjacent block where sedimentary sequence is represented by rocks of Barakar and Karharbari Formations attaining a thickness of about 800m and 70m respectively. All the thick and major potentials seams from Karo V and above (Karo VI to X comb., Bermo, Kargali, Uchitdih, Kathara, Sawang 'C' & Jarangdih are preserved in Barakar Formation. Karo-I to IV seams are deposited in Karharbari Formation.

### 2.4.1 Exploration Status

The Kathara block referred to in the GR of Kathara Block (Nov.,'83) consists of Kathara quarry area, part of Uchitdih Zone-1, west of Uchtdih Zone-1 and north of Quarry No.3. The area of the block is approx. 4.0 sq.km., which includes 0.86 Sq.Km. area covered by quarries and 3.14 sq.km. area to be quarried. A total of 22,972.13 m of drilling in 139 boreholes has been done in this block by IBM (KT Series), NCDC 9NCBU & NCBJ-D Series) and CCL (CCKT Series) as shown in Table 4.1. The density of boreholes is 35 B.H./Sq.Km.

**Table 2.4 Exploration Status**

| Sl. No. | Drilling Agency | No. of<br>B.H | Meterage Drilled<br>(m) |
|---------|-----------------|---------------|-------------------------|
| 1       | By I.B.M.       | 115           | 16780.98                |
| 2       | By NCDC         | 16            | 5280.66                 |
| 3       | By CCL          | 6             | 910.49                  |
|         | Total           | 139           | 22972.13                |

Prepared by CMPDI, RI-III, Ranchi

### 2.4.2 Sequence of Coal Seams

Seams of the Barakar Formation are well preserved in Kathara block. Sequence of coal seams and their intervening parting as established from the borehole records of IBM, NCDC and CCL is given below.

**Table 2.5 Sequence of Coal Seams with Partings**

| Coal seams/Parting | Thickness Range (m) | Borehole Intersection | Remarks       |
|--------------------|---------------------|-----------------------|---------------|
| Jarangdih          | 2.89                | 1                     |               |
| Parting            | 11.02               |                       |               |
| Jarangdih New      | 1.78                | 1                     | In two splits |
| Parting            | 22.17               |                       |               |
| Jarangdih 6'       | 2.11-3.02           | 2                     | -             |
| Parting            | 15.18-17.18         |                       |               |
| Jarangdih 'A'      | 0.99                | 2                     | -             |
| Parting            | 44.46-44.69         |                       |               |
| Swang 'A'          | 0.20-0.89           | 3                     | -             |
| Parting            | 18.08-21.53         |                       |               |
| Sawang 'B'         | 0.30-1.01           | 6                     | -             |
| Parting            | 38.45-51.99         |                       |               |
| Sawang 'C'         | 0.50-2.59           | 19                    |               |
| Parting            | 27.30-53.48         |                       |               |
| Upper Kathara      | 0.11-3.85           | 21                    |               |
| Parting            | 34.49-76.44         |                       |               |
| Kathara            | 1.22-6.18           | 63                    |               |
| Parting            | 14.75-38.71         |                       |               |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

| <b>Coal seams/Parting</b> | <b>Thickness Range (m)</b> | <b>Borehole Intersection</b> | <b>Remarks</b> |
|---------------------------|----------------------------|------------------------------|----------------|
| Uchitdih                  | 0.74-3.10                  | 61                           |                |
| Parting                   | 4.34-28.88                 |                              |                |
| Uchitdih 'A'              | 0.24-2.44                  | 46                           |                |
| Parting                   | 31.57-38.94                |                              |                |
| Kargali (Comb.)           | 24.25-50.59                | 30                           |                |
| Parting                   |                            |                              |                |
| Kargali Top               | 8.42-29.54                 | 50                           |                |
| Parting                   | 1.15-38.14                 |                              |                |
| Kargali Bot.              | 6.38-27.76                 | 53                           |                |
| Parting                   | 20.89-57.45                |                              |                |
| Bermo                     | 7.93-26.37                 | 42                           |                |
| Karo Gr. of Seams         | Not correlated             |                              |                |

\*Refer **Plate V** for Geological Plan.

Out of these seams, this proposal envisages the working of Kathara to Kargali seams.

**Table 2.6 Geological reserves in the seams considered**

| <b>Seams</b>                | <b>Geological Reserve(MT)</b> |
|-----------------------------|-------------------------------|
| Kathara                     | 13.236                        |
| Parting                     |                               |
| Uchitdih                    | 6.378                         |
| Parting                     |                               |
| Uchitdih A                  | 3.377                         |
| Parting                     |                               |
| kargali Combined            | 71.461                        |
| Parting                     |                               |
| Kargali Top                 | 48.054                        |
| Parting                     |                               |
| Kargali Bottom              | 42.508                        |
| <b>Total Reserves in MT</b> | <b>185 MTe</b>                |

Prepared by CMPDI, RI-III, Ranchi

2.4.3 Quality Parameters

**Table 2.7 Quality Parameters**

| Analytical Parameter      | Kathara                 | Uchitdih             | Uchitdih A       | Kargali Comb.        | Kargali Top         | Kargali Bot.        |
|---------------------------|-------------------------|----------------------|------------------|----------------------|---------------------|---------------------|
| <b>Proximate Analysis</b> |                         |                      |                  |                      |                     |                     |
| M%                        | 1.1-2.6                 | 1.0-2.5              | 1.3-2.0          | 0.6-1.9              | 0.7-2.1             | 0.7-2.1             |
| Ash%                      | 15.0-25.6<br>(16.7-2.2) | 13.4-20.2            | 13.0-22.6        | 16.7-25.2<br>(25.6-  | 15.3-22.5<br>(18.6- | 19.9-25.5<br>(22.8- |
| VM%                       | 27.9-32.1               | 26.1-31.6            | 26.8-30.4        | 26.3-31.1            | 28.7-31.2           | 24.0-29.0           |
| <b>Ultimate Analysis</b>  |                         |                      |                  |                      |                     |                     |
| VM (dmmf)                 | 33.4-35.9               | 31.3-34.6            | 34.2-37.1        | 31.5-36.4            | 33.6-36.6           | 29.6-35.7           |
| C%                        | 65.69-<br>68.29         | 69.72-70.6<br>(84.9- | (84.3-           | 62.7-67.1<br>(85.1-  | 63.3-69.8<br>(85.4- | 63.2-67.0<br>(86.3- |
| H%                        | 3.78-4.02<br>(4.8-5.0)  | 4.0-4.9<br>(4.8-5.0) | (4.8-4.9)        | 3.6-4.0<br>(4.9-5.2) | 3.8-4.4<br>5.0-5.4  | 3.6-4.0             |
| N%                        | 1.76                    | 1.69                 |                  | 1.5                  | 1.6                 | 1.6                 |
| S%                        | 0.48-0.62               | 0.5-0.6              | 0.6-0.68         | 4.8                  | 0.4-0.6             | 0.5-0.8             |
| CV(Kcal/Kg)               |                         |                      |                  | 6090-<br>6585        | 6215-<br>6920       | 6215-<br>6365       |
| CI                        | 19/11-                  |                      |                  | 10/12-               | 12/14-              | 12/14-              |
| CT                        |                         |                      |                  | E-G/G1               | E-G/G1              | E/F-G/G1            |
| GRADE                     | SG II-<br>WG IV         | SG I –WG<br>I        | SG I –<br>WG III | WG III-IV            | WG I-IV             | WG II-IV            |

The general composition of trace elements (expressed in ppm) in the Coal Seams of adjacent Jarangdih OCP has been mentioned below:

*(conc. in ppm)*

| Coalfields    | As   | Hg   | Cd   | Ni | Co   | Cr   | Cu   | Zn   | Mn   | V    | Pb   |
|---------------|------|------|------|----|------|------|------|------|------|------|------|
| Jarangdih OCP | 17.2 | 0.52 | 2.20 | ND | 27.0 | 40.0 | 18.2 | 41.0 | 58.0 | 28.8 | 15.0 |

*(Source: Trace Metals in Indian Coals, NN.Banerjee, B.Ghosh, A.Das, Central Fuel Research Institute, Dhanbad)*

Mining Method

## 2.5 Mine Planning

### 2.5.1 Mineable Reserves

The total mineable reserves as per the approved Mining Plan is as below.

**Table 2.8 Mineable Reserves**

| Seams                   | MineableRes.<br>(Mte) | Particulars           | OBR<br>(Mcum) |
|-------------------------|-----------------------|-----------------------|---------------|
|                         | Total                 |                       | Total         |
| Kathara                 | <b>2.48</b>           | TopOB                 | <b>44.04</b>  |
| Uchitdih                | <b>1.22</b>           | Partbet.KATH&UCHIT    | <b>10.50</b>  |
| Uchitdih A              | <b>0.70</b>           | Part bet.UCHIT&UCHITA | <b>5.85</b>   |
| KargaliTop              | <b>10.86</b>          | Part bet.UCHITA&KART  | <b>24.49</b>  |
| Kargali<br>Bottom/Comb. | <b>11.54</b>          | Partbet.KART&KARB     | <b>7.56</b>   |
| <b>Total</b>            | <b>26.80</b>          | <b>Total</b>          | <b>92.44</b>  |
| <b>SR</b>               | <b>3.45</b>           |                       |               |

The production figures for the project since 2011-12 (year of approval of RCE) is given below:

| S.No         | Year    | Production(MT) |
|--------------|---------|----------------|
| 1.           | 2011-12 | 0.211          |
| 2.           | 2012-13 | 0.217          |
| 3.           | 2013-14 | 0.465          |
| 4.           | 2014-15 | 0.658          |
| 5.           | 2015-16 | 0.923          |
| 6.           | 2016-17 | 0.937          |
| 7.           | 2017-18 | 0.493          |
| 8.           | 2018-19 | 0.733          |
| <b>Total</b> |         | <b>4.637</b>   |

About 4.637 MT of coal and 16.04 M.cum of OB has already been mined out. Thus the balance reserve in mine is about 22.16 MT and accordingly the mine life will be about 12 years at a capacity of 1.90 MTY.

### **2.5.2 Method of Mining**

The method of mining to extract coal and OB in Kathara Opencast mine is with shovel-dumper combination, considering the geo-mining characteristics of this area.

Average grade of coal produced from this quarry is expected to be Washery Grade III. Quarriable reserves are there in the dip side of mine so it has been planned to expand the quarry in dip direction up to optimized surface boundary to evacuate the Washery grade coal. Feasibility of extracting coal upto 200 to 225 m depth by opencast method is studied and it is found technically feasible to continue the opencast mine upto seam Kargali Bottom/combined in dip direction.

### **2.5.3 Choice of Technology**

Considering the geo-mining conditions shovel-dumper combination with drilling and blasting has been proposed for mining the quarry. Other technologies like Dragline, Bucket Wheel Excavator, Surface miners are ruled out for this quarry.

The equipment selection process is the most critical part of the project planning. The following selection criteria have been considered for selecting the size and type of the equipment:

- The strike length of the mine
- Annual rate of advance/deepening
- Total volume of overburden and coal to be handled annually
- The individual thickness of coal seam and partings
- The geo-mining condition of the mine.
- The type of mining system to be used like Inclined Slicing or Horizontal Slicing.
- The intuitive economics of the mine
- Presence of geological disturbances like faults, intrusions etc.

Keeping in view of the Geological and Mining parameters of Kathara OCP mining area i.e. steep gradient of the seam ( $12^{\circ}$ - $25^{\circ}$ ), rated output of 1.9 MTPA, Shovel-dumper mining system with horizontal slicing has been envisaged for the quarry.

### **2.5.4 Mining Parameters**

| <b>Sl. No</b>               | <b>Seam/parting</b> | <b>Unit(m)</b> | <b>Amount</b> |
|-----------------------------|---------------------|----------------|---------------|
| <b>A.CoalSeamsThickness</b> |                     |                |               |
|                             | Kathara Seam        | m              | 4.0           |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|                            |  |        |                        |
|----------------------------|--|--------|------------------------|
| 1                          | Uchitdih                                     | m      | 2.0                    |
|                            | UchitdihA                                    | m      | 1.0                    |
|                            | KargaliBottom/Top/Combined                   | m      | 34.0                   |
| 2                          | <b>Dip of Seam</b>                           | degree | 12-25 degree           |
| 3                          | <b>Sp Gravity of Seam</b>                    |        |                        |
| 4                          | <b>Kathara Seam</b>                          | t/cum  | 1.48                   |
|                            | <b>Uchitdih</b>                              | t/cum  | 1.45                   |
|                            | <b>Uchitdih A</b>                            | t/cum  | 1.46                   |
|                            | <b>Kargali Bottom/Top/Combined</b>           | t/cum  | 1.55                   |
| 5                          | <b>Drilling Category</b>                     |        | VIII                   |
| 6                          | <b>Excavation Category</b>                   |        | Cat III                |
| <b>B.Overburden</b>        |  |        |                        |
| 1                          | Top OB aboveKathara Seam                     | m      | 40                     |
|                            | Parting between Kathara and Uchitdih Seam    | m      | 25                     |
|                            | Parting between Uchitdih and Uchitdih A Seam | m      | 6                      |
|                            | Parting between Uchitdih A and Kargali Seam  | m      | 60                     |
| 2                          | OverburdenVolume Wt                          | t/cum  | 2.4                    |
| 3                          | Drilling category                            |        | X                      |
| 4                          | ExcavationCategory                           |        | CatIII50%<br>+CatIV50% |
| <b>C.Quarry parameters</b> |  |        |                        |
| 1                          | Maximum length of Quarry                     | km     |                        |
|                            | At Surface                                   |        | 3.4                    |
|                            | At floor                                     |        | 3.0                    |
| 2                          | Maximum width of Quarry along dip            | m      |                        |
|                            | At surface                                   |        | 1230                   |
|                            | At floor                                     |        | 1000                   |
| 3                          | Maximum depth of quarry                      | m      | 210                    |
| 4                          | Area of excavation at the surface            | Sq.km  | 2.58                   |

### 2.5.5 Size and Magnitude of operation

Proposed capacity of Kathara OCP is 1.9 MTPA. As per the Mining Plan, total mineable reserves have been estimated as 22.16 M.tonne corresponding to a volume of OBR of 76.4 Mm<sup>3</sup> at an average stripping ratio of 3.45 M<sup>3</sup> per tonne. Total estimated life of mine is 12 years.

### 2.5.6 Summarised Calendar Programme

The balance mineable reserves of Kathara OCP is 22.16 Mte for life of 12 years. The detailed calendar plan for the proposed working is as given below :

**Table 2.9 Coal Production Programme**

| SN | Year         | Coal Production<br>(in MTPA) | OB Generation<br>(in Mcum) | Stripping<br>Ratio |
|----|--------------|------------------------------|----------------------------|--------------------|
| 1  | Year 1       | 1.41                         | 5.55                       | 3.94               |
| 2  | Year 2       | 1.90                         | 6.55                       | 3.45               |
| 3  | Year 3       | 1.90                         | 6.55                       | 3.45               |
| 4  | Year 4       | 1.90                         | 6.55                       | 3.45               |
| 5  | Year 5       | 1.90                         | 6.55                       | 3.45               |
| 6  | Year 6       | 1.90                         | 6.55                       | 3.45               |
| 7  | Year 7       | 1.90                         | 6.55                       | 3.45               |
| 8  | Year 8       | 1.90                         | 6.55                       | 3.45               |
| 9  | Year 9       | 1.90                         | 6.55                       | 3.45               |
| 10 | Year 10      | 1.90                         | 6.55                       | 3.45               |
| 11 | Year 11      | 1.90                         | 6.55                       | 3.45               |
| 12 | Year 12      | 1.75                         | 5.35                       | 3.06               |
|    | <b>Total</b> | <b>22.16</b>                 | <b>76.4</b>                | <b>3.45</b>        |

### 2.5.7 Drilling and Blasting

The blasthole drilling will be done in patterns decided in advance depending on the strata hardness and as per the conditions laid down by DGMS. Blasthole drills of 250/160 mm diameter will be used for drilling in OB/ partings and coal benches.

The standard practice involving the electric detonators for the initiation of detonating cord, detonating relays to achieve hole-to-hole delays, use of Heavy ANFO, slurry or emulsion explosives as the column charge will be used for blasting.

### 2.5.8 Dumping Strategy

Total overburden quantity estimated for Kathara Opencast Project is 76.4 M.cum. all of which has been proposed to be dumped externally and internally. Height of proposed external dump will be +340 m (Around 90 m AGL) and the top R.L of internal dump will be +310 m (Around 30 m AGL).

**Table 2.10 Dumping Strategy**

| SN | Dump          | Details                 |
|----|---------------|-------------------------|
| 1  | Internal Dump | Area of Dump: 160.90 Ha |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

---

|    |               |   |
|----|---------------|---|
|    |               | Top RL +310 m. (30m above G.L)                            |
| 2. | External Dump | Area of Dump: 109.53 Ha<br>Top RL +340 m. (90m above G.L) |

### 2.5.9 Coal Handling and Dispatch

Coal produced from the Kathara OCP is transported to Kathara Washery, which is located on the pit head of the mine and outside the project boundary. The coal transportation route to adjoining Kathara Washery is a dedicated mine road for coal transportation, free from any kind of public commutation.

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

---

**2.5.10 HEMM Scheduling**

| Particulars   | Size / Capacity |   |    |    |    |    |    |    |    |    |    |    |    |
|---|-----------------|---|----|----|----|----|----|----|----|----|----|----|----|
|   |                 | 1 | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 |
| <b>OB</b>   |                 |   |    |    |    |    |    |    |    |    |    |    |    |
| Electric Rope Shovel  | 10Cum           | 1 | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  |
| Rear Dumper   | 100 T           | 8 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 |
| RBH Drill -High Mast  | 250 mm          | 1 | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  |
| Dozer   | 410HP           | 2 | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  |
| <b>Coal and Mixed Benches</b>                               |                 |   |    |    |    |    |    |    |    |    |    |    |    |
| Diesel Hydraulic shovel with backhoe                        | 5.5 cum         | 1 | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| Rear Dumper   | 100 T           | 5 | 5  | 5  | 5  | 5  | 5  | 5  | 5  | 5  | 5  | 5  | 5  |
| RBH Drill -High Mast  | 250 mm          | 1 | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| Dozer with Ripper Attachment                                | 410HP           | 2 | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  |
| <b>Common (including Fire Fighting and Dump Rehandling)</b> |                 |   |    |    |    |    |    |    |    |    |    |    |    |
| Diesel Hydraulic shovel with backhoe                        | 2.5 Cum         | 2 | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  |
| Cable Handler   |                 | 1 | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| Dump Truck  | 10T             | 2 | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  |
| Grader  | 280HP           | 2 | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  |
| RT crane  | 8T              | 1 | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| RT crane  | 20T             | 1 | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| RT crane  | 50T             | 1 | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| FE Loader   | 5-6 Cum         | 2 | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  |
| Wagon Drill   | 100-120mm       | 1 | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| Tyre Handler  | 35kN            | 1 | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| Water Sprinkler (wide spray system)                         | 28KL            | 3 | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  |
| Wheel Dozer   | 460 HP          | 2 | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  |
| Vibratory Compactor   | 30T             | 2 | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  |
| Fuel Truck(Diesel browser)                                  | 16KL            | 1 | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |

---

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|                                     |        |   |   |   |   |   |   |   |   |   |   |   |   |   |
|-------------------------------------|--------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fire Truck                          |        | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| <b>Reclamation</b>                  |        |   |   |   |   |   |   |   |   |   |   |   |   |   |
| F E Loader                          | 5-6Cum |   | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Water Sprinkler (wide spray system) | 28 KL  |   | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Dozer                               | 410 HP |   | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |

Prepared by CMPDI, RI-III, Ranchi

## 2.6 Infrastructure

### 2.6.1 Buildings

Several industrial infrastructure like Workshop, Store, substation, FBC etc. and residential buildings, service buildings, embankments already exists.

### 2.6.2 Roads & Culverts

As Kathara OCP is an existing project, necessary roads, culverts, transmission lines has been already existing. Further, as per the ToR condition XXX, permanent haul roads shall be covered with black topping/ PCC.

### 2.6.3 Workshop & store

A Base workshop exists for the repair and maintenance of HEMM deployed in KatharaOCP. This workshop is not sufficient for the maintenance of HEMM. So, a Field workshop has been proposed, as per the Approved RCE of Kathra OC, and the existing workshop will be utilized as Base workshop. In the Field workshop, only Excavation workshop has been provided for the running repair & maintenance of HEMM deployed in the mine.

A Light vehicle repair shop is existing at the base workshop. There is no separate E&M Workshop. The E&M Workshop is dependent on existing base workshop for the repair & maintenance of E&M equipment deployed in the project such asPumps, Electrical etc.

A full-fledged project store already exists in this project to meet the total requirement ofproposed workshop as well as additional requirement of the project.

### 2.6.4 Power Supply and Consumption

Kathara Regional substation is a 33/11/3.3 kV outdoor substation situated at the load centre of the East Bokaro Coalfield. It receives power from BTPS unit of DVC by means of two nos. single circuit 33 kV overhead line feeders with ACSR DOG conductor. These feeders originate from BTPS substation in single line and splits into two lines before crossing the Bokaro River. Presently, Kathara opencast project receives power at 11 kV from existing Kathara Regional Substation. Approximate distance of Kathara OCP from Kathara Regional Substation is 2 km. For distribution of power to different equipment / load centres of Kathara OCP, a separate substation called Substation no.2 has been established near the quarry. This substation receives power from Regional substation, Kathara through a 1x3 MVA, 33 /11kV transformer. This transformer feeds power to

- Kathara OCP through 11 kV OHL feeder

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

- 4 no. colony through a 3.3 kV OHL feeder energized by a 2 MVA, 11/ 3.3kV transformer, installed at the secondary of the 3 MVA transformer.

The estimated annual energy consumption is around 20 MkWh.

### 2.6.5 Water supply and Sewerage

The proposed water demand of Kathara OCP is as given below.

**Table 2.11 Water usage Details**

| Purpose  | Peak Demand<br>(m <sup>3</sup> /day) |
|--|--------------------------------------|
| <b>A. Mine site</b>  |                                      |
| HEMM Washing ( Excluding 60% recycle)  | 100                                  |
| Land reclamation & Plantation  | 90                                   |
| Dust suppression on Haul Road  | 130                                  |
| Coal Fire Mitigation   | 90                                   |
| Dust Suppression at Workshop   | 60                                   |
| <b>Total (A)</b>   | <b>470</b>                           |
| <b>B. Township</b>   |                                      |
| Housing  | 1720                                 |
| Process & Loss   | 80                                   |
| Other (Service Building like GM office, Guest house, Hospital, Club, School etc) | 600                                  |
| <b>Total (B)</b>   | <b>2400</b>                          |
| <b>Grand Total (A+B)</b>   | <b>2870</b>                          |

The industrial needs of Kathara OCP will be fulfilled by the mine water and domestic needs will be fulfilled by drawing water from Konar River. Refer Plate XII for the proposed water usage diagram of Kathara OCP.

### 2.7 Manpower Requirements

The estimated manpower requirement is as given below.

**Table 2.12 Manpower Requirement**

| SI No | Manpower Particulars | Category            | Estimated Manpower |
|-------|----------------------|---------------------|--------------------|
| 1     | Unskilled            | I                   | 112                |
| 2     | Semi skilled         | II, E               | 52                 |
| 3     | Skilled              | C, D, III,IV, V, VI | 157                |
| 4     | Highly skilled       | A, B                | 142                |
| 5     | Monthly Paid         |                     | 194                |

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

---

|   |                       |  |            |
|---|-----------------------|--|------------|
| 6 | Officers              |  | 38         |
| 7 | <b>Total Manpower</b> |  | <b>722</b> |
| 8 | OMS                   |  | 10.01      |
| 9 | EMS                   |  | 2437.11    |

Total existing manpower in Kathara OCP is 777. Surplus manpower (if any) may be transferred to neighbouring mines for better economics of proposed Kathara OCP.

## Chapter 3

# Description of Environment

### 3.1 General

In order to have comprehensive understanding of present environmental situation in proposed project area, a detailed study of micro meteorology, ambient air quality, water, noise, soil, socio-economy, flora-fauna and land use pattern have been done.

Study area, as framed in standard ToR for coal mining, is 10 km radius from the periphery of the project. Baseline data in respect of Kathara OCP was generated for the Post-monsoon season 2020. This report has been prepared by incorporating three-month baseline data generated during the period 01/10/2020 – 24/12/2020. The references of studies and data collected for baseline data generation are as given below.

**Table 3.1 References of baseline data**

| S. No. | Nature of Study                    | Name of the Agency   |
|--------|------------------------------------|--|
| 1      | Geological Report                  | Central Mine Planning and Design Institute (CMPDI), a subsidiary of Coal India Ltd., is a premier consultancy organization engaged in mineral exploration, land resource management through remote sensing survey, coal petrography, mine planning, coal preparation & utilization, design of coal handling plants, environmental management of coal projects etc. |
| 2      | Project report                     |  |
| 3      | Land-use study                     |  |
| 4      | Hydro-geological Study             |  |
| 5      | Seasonal Ambient Air Quality Study | M/s Go Green Mechanisms Pvt Ltd., Ahmedabad.   |
| 6      | Ambient Noise Level Study          |  |
| 7      | Water Quality study                |  |
| 8      | Soil Quality study                 |  |
| 9      | Socio- Economic Study              | M/s Environmental Technical Services Pvt. Ltd.   |
| 10     | Flora & Fauna study                | M/s Wolkem India Pvt. Ltd., Rajasthan  |

Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited

Fig. Photographs showing environmental baseline data collection (Post-Monsoon 2020)



Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

---



---

Prepared by CMPDI, RI-III, Ranchi

## **3.2 Meteorological Study**

### **3.2.1 Macro- Meteorological Study**

As per the annual temperature map of India (National Atlas), the area falls within the daily mean temperature zone 22.50 C to 25.00 C. The summers as well as winters are extreme.

The rainy season in this area starts from June and continues till September. However, pre-monsoon showers are experienced in May. Showers have been witnessed in the area throughout the year though rains during December had been nominal (about 4 mm). The months April, November and December are the driest. Annual rainfall expected is about 1200mm with highest monthly rains of 350 mm in the months of July-August. Consistent with temperature and rainfall, the relative humidity is lowest during March-April and highest during July to September. The maximum and minimum relative humidity expected are 86% and 27% respectively.

#### **3.2.1.1 Micro-meteorological Study**

Micrometeorological and microclimatic parameters for the post-monsoon season 2020 were recorded by installing a meteorological station at core zone of Kathara OCP. The station has been fixed as per the guidelines of CPCB and data for wind velocity, wind direction, ambient temperature, relative humidity, cloud cover and rainfall data were recorded at hourly intervals along with atmospheric pressure for one season (post-Monsoon).

### **3.2.2 Data presentation & analysis**

The micro meteorological status of the study area for post monsoon season is as given below.

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

| Particular                              | Unit       |                   | Month   |        |        |
|---|------------|-------------------|---------|--------|--------|
|   |            |                   | Octo'20 | Nov'20 | Dec'20 |
| Wind Speed                              | % Duration | <1                | 87.5    | 79.1   | 89.4   |
|   |            | 1 to 5            | 12.5    | 20.9   | 10.6   |
|   |            | >5                | 0.0     | 0.0    | 0.0    |
| Wind Speed                              | m/sec      | Minimum           | 0.0     | 0.0    | 0.0    |
|   |            | Maximum           | 3.1     | 4.0    | 4.3    |
|   |            | Average           | 0.4     | 0.5    | 0.4    |
| Ambient Temperature                     | °C         | Minimum           | 15      | 10     | 6      |
|   |            | Maximum           | 35      | 31     | 30     |
|   |            | Average           | 27      | 21     | 18     |
| Relative Humidity                       | %          | Minimum           | 21      | 22     | 29     |
|   |            | Maximum           | 96      | 93     | 94     |
|   |            | Average           | 75      | 65     | 68     |
| Max Rain Fall                           | mm         | Minimum           | 0.0     | 0.0    | 0.0    |
|   |            | Maximum           | 16.2    | 5.4    | 0.0    |
|   |            | Average           | 0.1     | 0.0    | 0.0    |
|   |            | No. of Rainy days | 04      | 02     | 00     |
| Sky Appearance                          | (%)        | 0 Oktas           | 48.9    | 67.2   | 51.0   |
|   |            | 1 Oktas           | 37.0    | 19.4   | 22.3   |
|   |            | 2 Oktas           | 0.7     | 6.9    | 18.2   |
|   |            | 3 Oktas           | 0.4     | 1.8    | 7.0    |
|   |            | 4 Oktas           | 1.3     | 0.7    | 1.2    |
|   |            | 5 Oktas           | 0.9     | 1.3    | 0.3    |
|   |            | 6 Oktas           | 1.5     | 0.6    | 0.0    |
|   |            | 7 Oktas           | 2.6     | 1.1    | 0.0    |
|   |            | 8 Oktas           | 6.7     | 1.0    | 0.0    |
| Atmospheric Pressure                    | mmHg       | (9) Obscured      | 0.0     | 0.0    | 0.0    |
|   |            | Minimum           | 731     | 725    | 738    |
|   |            | Maximum           | 740     | 732    | 744    |
| Predominant Wind Direction Blowing From |            | Average           | 735     | 728    | 741    |
|   |            |                   | W       | WNW    | W      |

The above represented met data has been compared with climate inventory data for Bokaro District of Jharkhand published by Indian Meteorological Department (IMD) for validation and observed that the above data represents the general meteorological pattern of this area in post-monsoon season. Refer **Plate-VI** for Wind Rose Diagram.

### 3.3 Air Environment

To evaluate the baseline ambient air quality status of the study area, baseline ambient air quality has been monitored at 11 locations in core and buffer zone of Kathara OCP in the post-monsoon period of 2020 (From 01.10.2020 to 24.12.2020).

### 3.3.1 Sampling Locations, Parameters and Frequency of Sampling

Eleven (11) Sampling locations for Air Monitoring in core and buffer zone were identified considering the micro meteorological data and terrain as per the guidelines of CPCB. The stations were chosen in such a manner to cover major human settlements in the prevailing direction of wind. The details of monitoring stations are as given below.

**Table 3.2 Sampling Location for Air Quality Monitoring**

| Station Code | Name of Station     | Latitude (N) | Longitude (E) | As per Wind Direction | Distance from Core Zone |
|--------------|---------------------|--------------|---------------|-----------------------|-------------------------|
| A1           | Workshop            | 23°45'02.65" | 85°52'15.18"  | Core Zone             | 0.00 KM                 |
| A2           | CPP Complex         | 23°45'14.71" | 85°53'06.03"  | Core Zone             | 0.00 KM                 |
| A3           | Kathara Sub-Station | 23°45'36.32" | 85°52'50.63"  | Core Zone             | 0.00 KM                 |
| A4           | Saram Village       | 23°45'37.16" | 85°49'43.21"  | Upwind (W)            | 1.82 KM                 |
| A5           | Bandh Basti         | 23°46'04.67" | 85°52'04.89"  | Crosswind (N)         | 0.12 KM                 |
| A6           | Govindpur Colony    | 23°47'34.41" | 85°52'51.58"  | Crosswind (NNE)       | 2.21 KM                 |
| A7           | GM Office           | 23°46'05.94" | 85°53'31.39"  | Downwind (ENE)        | 0.54 KM                 |
| A8           | Khetko Village      | 23°45'08.92" | 85°54'32.99"  | Downwind (E)          | 1.22 KM                 |
| A9           | Jaridih Basti       | 23°45'43.54" | 85°55'28.30"  | Downwind (E)          | 2.19 KM                 |
| A10          | Chalkari Basti      | 23°45'20.05" | 85°57'10.64"  | Downwind (E)          | 5.10 KM                 |
| A11          | Phusro Village      | 23°45'38.71" | 85°59'38.52"  | Downwind (E)          | 9.30 KM                 |

\*Refer **Plate- VII** for Location of Ambient Air& Noise Monitoring stations on Survey of India Toposheet

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

**Parameters**

Parameters monitored in the ambient air at 11 monitoring stations include Particulate Matter (PM<sub>10</sub> & PM<sub>2.5</sub>), Oxides of Sulphate and Nitrogen (SO<sub>x</sub> and NO<sub>x</sub>), Carbon monoxide, Ammonia, Benzene and heavy metals.

The techniques used for measurement of pollutants are summarized as under:

**Table 3.3 Measurement Techniques**

| Sl. No | Parameters   | Code Practice of            | Sampler                            | Instruments used for Analysis |
|--------|--|-----------------------------|------------------------------------|-------------------------------|
| 01     | PM <sub>10</sub>   | IS: 5182 (Part-23):2006     | RDS Sampler with Cyclone Separator | Micro-Balance, Desiccator     |
| 02     | PM <sub>2.5</sub>  | CPCB Guidelines             | Fine Dust Sampler                  | Micro-Balance, Desiccator     |
| 03     | SO <sub>x</sub>  | IS: 5182 (Part-2):2009      | RDS Sampler                        | Spectrophotometer             |
| 04     | NO <sub>x</sub>  | IS: 5182 (Part-6):2006      | RDS Sampler                        | Spectrophotometer             |
| 05     | Ozone (O <sub>3</sub> )  | IS: 5182 (Part-9):1974      | RDS Sampler                        | Spectrophotometer             |
| 06     | Ammonia (NH <sub>3</sub> )   |                             | RDS Sampler                        | Spectrophotometer             |
| 07     | Benzene  | IS: 5182 (P-11):2006        | RDS Sampler                        | GC/FID                        |
| 08     | Carbon Monoxide (CO)   | IS: 5182 (P-10):1999        | CO Analyzer                        | CO Analyzer                   |
| 09     | Lead (Pb)  | IS 5182 (P-22) RA 2009:1985 | RDS Sampler                        | ICP-OES                       |
| 10     | Mercury(Hg), Chromium (Cr), Cadmium (Cd), Nickel(Ni), Arsenic (As) | CPCB Guidelines (ICP-MS)    | RDS Sampler                        | ICP-OES                       |
| 11     | Free Silica in PM <sub>10</sub>                                    | FTIR Method                 | RDS Sampler                        | FTIR                          |

**Frequency**

|  |  |
|--|--|
| PM <sub>10</sub> , PM <sub>2.5</sub> , Oxides of Sulphur, Oxides of Nitrogen                   | Twice in a week for 24 weeks (03 months)     |
| Ozone, Ammonia, Carbon monoxide, Lead, Nickel, Arsenic, Benzene, Mercury, Chromium and Cadmium | Once in a month for 03 months (Oct-Dec 2020) |

Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited

3.3.2 Results

**Table 3.4 Ambient Air Quality Results (Period: 02.03.2020 to 15.05.2020)**

| Sl.No.                                | Parameter           | Code | PM <sub>10</sub> (µg/m <sup>3</sup> ) |      |      |             | PM <sub>2.5</sub> (µg/m <sup>3</sup> ) |      |      |             | SO <sub>2</sub> (µg/m <sup>3</sup> ) |         |      |             | NO <sub>x</sub> (µg/m <sup>3</sup> ) |         |      |             |
|---------------------------------------|---------------------|------|---------------------------------------|------|------|-------------|--|------|------|-------------|--------------------------------------|---------|------|-------------|--------------------------------------|---------|------|-------------|
|                                       | Locations           |      | Max.                                  | Min. | Avg. | 98% Per.    | Max.                                   | Min. | Avg. | 98% Per.    | Max.                                 | Min.    | Avg. | 98% Per.    | Max.                                 | Min.    | Avg. | 98% Per.    |
| <b>Core Zone</b>                      |                     |      |                                       |      |      |             |  |      |      |             |                                      |         |      |             |                                      |         |      |             |
| 1                                     | Workshop            | A1   | 96.8                                  | 67.9 | 84.2 | <b>96.1</b> | 54.0                                   | 37.7 | 46.9 | <b>53.8</b> | 25.2                                 | 13.3    | 18.9 | <b>25.2</b> | 33.1                                 | 20.1    | 26.4 | <b>32.3</b> |
| 2                                     | CPP Complex         | A2   | 87.8                                  | 71.3 | 80.0 | <b>87.6</b> | 46.2                                   | 37.2 | 42.0 | <b>46.0</b> | 15.9                                 | 7.2     | 12.0 | <b>15.7</b> | 24.6                                 | 13.6    | 18.8 | <b>23.8</b> |
| 3                                     | Kathara Sub-station | A3   | 88.5                                  | 59.0 | 70.9 | <b>86.7</b> | 46.9                                   | 32.0 | 38.7 | <b>44.9</b> | 15.3                                 | BQL(<5) | 10.6 | <b>15.0</b> | 22.2                                 | 7.8     | 15.2 | <b>20.2</b> |
| <b>Standards as per G.S.R 742 (E)</b> |                     |      | <b>300</b>                            |      |      |             | -                                      |      |      |             | <b>120</b>                           |         |      |             | <b>120</b>                           |         |      |             |
| <b>Buffer Zone</b>                    |                     |      |                                       |      |      |             |  |      |      |             |                                      |         |      |             |                                      |         |      |             |
| 4                                     | Saram Village       | A4   | 77.8                                  | 59.9 | 69.8 | <b>77.1</b> | 42.3                                   | 32.1 | 37.6 | <b>41.6</b> | 17.4                                 | 9.5     | 12.6 | <b>16.0</b> | 23.9                                 | 15.7    | 19.9 | <b>23.3</b> |
| 5                                     | Bandh Basti         | A5   | 76.1                                  | 55.7 | 65.3 | <b>74.0</b> | 40.9                                   | 29.5 | 35.0 | <b>39.9</b> | 12.2                                 | BQL(<5) | 8.1  | <b>11.1</b> | 13.5                                 | 6.7     | 10.0 | <b>13.3</b> |
| 6                                     | Govindpur Colony    | A6   | 70.4                                  | 51.5 | 61.8 | <b>69.0</b> | 38.8                                   | 28.5 | 33.8 | <b>37.5</b> | 18.3                                 | 9.9     | 14.2 | <b>18.2</b> | 24.5                                 | 17.0    | 20.7 | <b>24.3</b> |
| 7                                     | GM Office           | A7   | 89.2                                  | 48.7 | 68.3 | <b>82.5</b> | 41.3                                   | 16.1 | 31.1 | <b>40.8</b> | 19.3                                 | 8.2     | 13.2 | <b>18.0</b> | 15.1                                 | 11.8    | 17.9 | <b>23.9</b> |
| 8                                     | Khetko Village      | A8   | 81.4                                  | 61.1 | 73.3 | <b>79.6</b> | 41.8                                   | 29.2 | 37.8 | <b>41.4</b> | 12.5                                 | BQL(<5) | 9.5  | <b>12.0</b> | 19.7                                 | BQL(<5) | 13.5 | <b>18.7</b> |
| 9                                     | Jaridih Basti       | A9   | 78.9                                  | 63.5 | 71.6 | <b>78.8</b> | 38.9                                   | 26.2 | 33.1 | <b>38.6</b> | 17.2                                 | 7.5     | 12.4 | <b>16.5</b> | 23.2                                 | 12.8    | 17.4 | <b>22.5</b> |
| 10                                    | Chalkari Basti      | A10  | 74.5                                  | 54.1 | 65.5 | <b>73.6</b> | 40.8                                   | 29.5 | 36.0 | <b>40.3</b> | 15.1                                 | BQL(<5) | 9.9  | <b>13.8</b> | 22.3                                 | 10.1    | 21.8 | <b>26.9</b> |
| 11                                    | Phusro Village      | A11  | 78.3                                  | 59.6 | 68.1 | <b>76.1</b> | 42.8                                   | 32.6 | 37.3 | <b>41.4</b> | 15.2                                 | 7.5     | 11.4 | <b>14.5</b> | 23.2                                 | 12.1    | 18.8 | <b>23.0</b> |
| <b>NAAQS 2009</b>                     |                     |      | <b>100</b>                            |      |      |             | <b>60</b>                              |      |      |             | <b>80</b>                            |         |      |             | <b>80</b>                            |         |      |             |

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

In this study, monitoring of critical pollutants and heavy metals, which are Carbon Monoxide (CO), Ammonia (NH<sub>3</sub>), Benzene(C<sub>6</sub>H<sub>6</sub>), Ozone(O<sub>3</sub>), Lead (Pb), Cadmium (Cd), Chromium (Cr), Mercury (Hg), Nickel (Ni)& Arsenic (As), has been done to assess the existing levels of air pollutants as well as the background concentration of the region. The following tabulated pollutants were monitored once in a month.

**Table 3.5 Concentration of critical pollutants and Heavy Metals in Ambient Air**

| Location                          | Sampling Month | O <sub>3</sub>       | NH <sub>3</sub>      | CO                   | C <sub>6</sub> H <sub>6</sub> | Free Silica | As                   | Cd                   | Cr                   | Pb                   | Hg                   | Ni                   |
|-----------------------------------|----------------|----------------------|----------------------|----------------------|-------------------------------|-------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| Unit                              |                | (µg/m <sup>3</sup> ) | (µg/m <sup>3</sup> ) | (mg/m <sup>3</sup> ) | (µg/m <sup>3</sup> )          | %           | (ng/m <sup>3</sup> ) | (µg/m <sup>3</sup> ) | (µg/m <sup>3</sup> ) | (µg/m <sup>3</sup> ) | (ng/m <sup>3</sup> ) | (ng/m <sup>3</sup> ) |
| Quantification Limit(QL)          |                | 10                   | 5                    | 0.01                 | 2.5                           |             | 1                    | 0.001                | 0.001                | 0.001                | 1                    | 5                    |
| <b>Limit as per GSR 826 dt...</b> |                | <b>180</b>           | <b>400</b>           | <b>4</b>             | <b>5</b>                      | <b>-</b>    | <b>6</b>             | <b>-</b>             | <b>-</b>             | <b>1</b>             | <b>-</b>             | <b>20</b>            |
| Workshop                          | Oct'20         | 19.8                 | 16.7                 | BQL                  | BQL                           | 0.11        | BQL                  | BQL                  | BQL                  | BQL                  | BQL                  | BQL                  |
|                                   | Nov'20         | 20.1                 | 12.6                 | 0.9                  | BQL                           | 0.10        | BQL                  | BQL                  | BQL                  | BQL                  | 1.5                  | BQL                  |
|                                   | Dec'20         | 15.6                 | 8.4                  | 0.7                  | BQL                           | 0.08        | BQL                  | BQL                  | BQL                  | BQL                  | 1.1                  | BQL                  |
| CPP Complex                       | Oct'20         | 20.2                 | 18.3                 | 0.8                  | BQL                           | 0.14        | BQL                  | BQL                  | BQL                  | BQL                  | BQL                  | BQL                  |
|                                   | Nov'20         | 22.1                 | 12.3                 | 0.6                  | BQL                           | 0.11        | BQL                  | BQL                  | BQL                  | BQL                  | 1.0                  | BQL                  |
|                                   | Dec'20         | 18.4                 | 14.2                 | 0.7                  | BQL                           | 0.09        | BQL                  | BQL                  | BQL                  | BQL                  | 1.3                  | BQL                  |
| Kathara Sub-station               | Oct'20         | 19.8                 | 16.4                 | 0.8                  | BQL                           | 0.17        | BQL                  | BQL                  | BQL                  | BQL                  | BQL                  | BQL                  |
|                                   | Nov'20         | 17.9                 | 13.5                 | 0.9                  | BQL                           | 0.11        | BQL                  | BQL                  | BQL                  | BQL                  | 1.1                  | BQL                  |
|                                   | Dec'20         | 20.1                 | 14.8                 | 1.1                  | BQL                           | 0.15        | BQL                  | BQL                  | BQL                  | BQL                  | 1.6                  | BQL                  |
| Saram Village                     | Oct'20         | 20.1                 | 19.1                 | 0.9                  | BQL                           | 0.19        | BQL                  | BQL                  | BQL                  | BQL                  | 1.3                  | BQL                  |
|                                   | Nov'20         | 16.5                 | 15.6                 | 1.2                  | BQL                           | 0.09        | BQL                  | BQL                  | BQL                  | BQL                  | 1.2                  | BQL                  |
|                                   | Dec'20         | 18.4                 | 14.2                 | 0.8                  | BQL                           | 0.10        | BQL                  | BQL                  | BQL                  | BQL                  | 1.6                  | BQL                  |
| Bandh Basti                       | Oct'20         | 21.5                 | 15.8                 | 0.7                  | BQL                           | 0.19        | BQL                  | BQL                  | BQL                  | BQL                  | BQL                  | BQL                  |
|                                   | Nov'20         | 18.6                 | 13.2                 | 0.9                  | BQL                           | 0.17        | BQL                  | BQL                  | BQL                  | BQL                  | BQL                  | BQL                  |
|                                   | Dec'20         | 16.5                 | 17.4                 | 0.6                  | BQL                           | 0.16        | BQL                  | BQL                  | BQL                  | BQL                  | BQL                  | BQL                  |
| Govindpur Colony                  | Oct'20         | 19.3                 | 16.6                 | 1.2                  | BQL                           | 0.22        | BQL                  | BQL                  | BQL                  | BQL                  | 1.0                  | BQL                  |

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|                |        |      |      |     |     |      |     |     |     |     |     |     |
|----------------|--------|------|------|-----|-----|------|-----|-----|-----|-----|-----|-----|
|                | Nov'20 | 16.5 | 15.2 | 1.3 | BQL | 0.21 | BQL | BQL | BQL | BQL | BQL | BQL |
|                | Dec'20 | 14.8 | 17.5 | 0.9 | BQL | 0.16 | BQL | BQL | BQL | BQL | 1.1 | BQL |
| GM Office      | Oct'20 | 19.4 | 17.6 | 1.1 | BQL | 0.16 | BQL | BQL | BQL | BQL | 1.1 | BQL |
|                | Nov'20 | 17.4 | 18.4 | 1.2 | BQL | 0.12 | BQL | BQL | BQL | BQL | 1.2 | BQL |
|                | Dec'20 | 16.5 | 12.4 | 1.1 | BQL | 0.14 | BQL | BQL | BQL | BQL | 1.4 | BQL |
| Khetko Village | Oct'20 | 18.4 | 14.7 | 1.1 | BQL | 0.13 | BQL | BQL | BQL | BQL | BQL | BQL |
|                | Nov'20 | 15.6 | 13.5 | 1.0 | BQL | 0.15 | BQL | BQL | BQL | BQL | BQL | BQL |
|                | Dec'20 | 17.4 | 14.8 | 0.8 | BQL | 0.14 | BQL | BQL | BQL | BQL | BQL | BQL |
| Jaridih Basti  | Oct'20 | 21.7 | 13.9 | BQL | BQL | 0.14 | BQL | BQL | BQL | BQL | BQL | BQL |
|                | Nov'20 | 19.6 | 18.5 | BQL | BQL | 0.19 | BQL | BQL | BQL | BQL | BQL | BQL |
|                | Dec'20 | 20.1 | 15.2 | BQL | BQL | 0.16 | BQL | BQL | BQL | BQL | BQL | BQL |
| Chalkari Basti | Oct'20 | 16.4 | 16.5 | 0.8 | BQL | 0.12 | BQL | BQL | BQL | BQL | BQL | BQL |
|                | Nov'20 | 14.6 | 12.4 | 0.2 | BQL | 0.09 | BQL | BQL | BQL | BQL | BQL | BQL |
|                | Dec'20 | 13.5 | 16.5 | 0.6 | BQL | 0.10 | BQL | BQL | BQL | BQL | BQL | BQL |
| Phusro Village | Oct'20 | 18.7 | 15.1 | 0.9 | BQL | 0.18 | BQL | BQL | BQL | BQL | 1.0 | BQL |
|                | Nov'20 | 15.9 | 19.5 | 0.4 | BQL | 0.14 | BQL | BQL | BQL | BQL | BQL | BQL |
|                | Dec'20 | 13.4 | 16.5 | 0.8 | BQL | 0.13 | BQL | BQL | BQL | BQL | BQL | BQL |

From the above data, it can be concluded that the concentration of the said pollutants are within the prescribed limits.

#### Obersvation and Discussion

In order to understand the sources contributing to the ambient air emissions at 11 receptors, a detailed source apportionment study has been carried out as detailed in the table given below.

=====

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

**Table 3.6 Source Receptor Mapping**

| Sl.no | Station             | Location               | Distance from Core Zone | Impact of Proposed Project   | Other Industrial Sources                         | Domestic / Community Sources  |
|-------|---------------------|------------------------|-------------------------|--|--|---|
| 1     | Workshop            | Core Zone              | -                       | Major Impact.  | Significant Impact: Nearby Kathara Washery       | NIL   |
| 2     | CCP Colony          | Core Zone              | -                       | Major Impact.  | Significant Impact: Nearby Kathara Washery       | NIL   |
| 3     | Kathara Sub-Station | Core Zone              | -                       | Significant Impact. Down wind direction and proximity to the Source  | Significant Impact: Nearby Kathara Washery       | Significant Impact<br>Source: Cook Stoves and Domestic Activities & village roads   |
| 4     | Saram Village       | Buffer Zone-Upwind     | 1.82 km                 | Negligible Impact<br>Receptor falls in the upwind of the project.  | NIL  | Significant Impact<br>Source: Cook Stoves and Domestic Activities & village roads   |
| 5     | Bandh Basti         | Buffer Zone-Cross Wind | 0.12 km                 | Significant Impact<br>This location falls in the crosswind direction of all sources but is in close proximity to active mining operations. | NIL  | Significant Impact<br>Source: Cook Stoves and Domestic Activities & village roads   |
| 6     | Govindpur Colony    | Buffer Zone-Cross Wind | 2.21 km                 | Negligible Impact<br>This location falls in the crosswind direction of all sources   | Significant Impact : Govindpur Ph-II mine of CCL | Significant Impact<br>Source: Major road connecting Gumia and Bermo falling within 200 m radius of the receptor.<br>Cook Stoves and Domestic Activities |

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|    |                |                      |         |                     |   |   |
|----|----------------|----------------------|---------|---------------------|---|---|
| 7  | GM Office      | Buffer Zone-Downwind | 0.54 km | Significant Impact. | Minimal Impact:<br>Nearby Kathara Washery   | Significant Impact<br>Source: Major road connecting Gumia and Bermo falling within 200 m radius of the receptor.<br>Cook Stoves and Domestic Activities |
| 8  | Khetko Village | Buffer Zone-Downwind | 1.22 km | Minimal Impact.     | Significant Impact<br>Jarangdih OCP and railway siding at a distance of 1.5 km in crosswind direction | Significant Impact<br>Source: Unmetalled Village road falling within 150 m radius of the receptor<br>Cook Stoves and Domestic Activities                |
| 9  | Jaridih Basti  | Buffer Zone-Downwind | 2.19 km | Minimal Impact.     | Significant Impact<br>Jarangdih OCP of CCL at a distance of 1.9 km in regional upwind direction       | Significant Impact<br>Source: Cook Stoves and Domestic Activities & village roads   |
| 10 | Chalkari Basti | Buffer Zone-Downwind | 5.10 km | Negligible Impact   | NIL   | Significant Impact<br>Source: Cook Stoves and Domestic Activities & village roads   |
| 11 | Phusro Village | Buffer Zone-Downwind | 9.30 km | Negligible Impact   | Significant Impact<br>Kargali OCP of CCL at a distance of 1.76 km in regional upwind direction        |   |

From the above table, it may be observed that Kathara Sub-Station (A3) and Khetko Village (A8) were significantly impacted by the project activities. Further, Khetko Village (A8), Jaridih Basti (A9) and Phusro Village (A11) have been the hotspots of air pollution due to other industrial sources, domestic and community activities.

## 3.4 Noise Environment

### 3.4.1 Introduction

A preliminary reconnaissance survey has been undertaken to identify the major noise generating sources in the area. Noise monitoring locations have been identified based on the activities in the inhabited and mining areas.

The ambient noise quality monitoring stations were set up at 11 locations, three locations in core zone and eight locations in buffer zone.

Locations were selected for noise quality monitoring in study area with consent of customer. Ambient noise monitoring was done for 24 hours, twice a month during study period. Details of the selected locations are as follows:

### 3.4.2 Methodology

Noise Level Monitoring: "Protocol for Ambient Level Noise Monitoring, IS 9989: RA 2001" has been followed to monitor the Ambient Noise level surrounding the Project Site.

| Parameters | Standard Method   | Analytical Instrument |
|------------|-------------------|-----------------------|
| Leq        | IS: 9989: RA 2001 | Noise Level Meter     |

### 3.4.3 Sampling Locations

Details of sampling location and location map is shown in **Plate No. VII**

**Table 3.7 List of noise monitoring stations**

| Station Code       | Parameter           | Location  | Category    |
|--------------------|---------------------|-----------|-------------|
|                    | Locations           |           |             |
| <b>Core Zone</b>   |                     |           |             |
| N1                 | Workshop            | Core Zone | Industrial  |
| N2                 | CPP Complex         | Core Zone | Residential |
| N3                 | Kathara Sub-Station | Downwind  | Industrial  |
| <b>Buffer Zone</b> |                     |           |             |
| N4                 | Saram Village       | Upwind    | Residential |
| N5                 | Bandh Basti         | Crosswind | Residential |
| N6                 | Govindpur Colony    | Crosswind | Residential |
| N7                 | GM Office           | Downwind  | Commercial  |
| N8                 | Khetko Village      | Downwind  | Residential |
| N9                 | Jaridih Basti       | Downwind  | Residential |
| N10                | Chalkari Basti      | Downwind  | Residential |
| N11                | Phusro Village      | Downwind  | Residential |

**Table 3.8 Noise monitoring data**

| Sl. No.            | Parameter           | Location  | Noise Level Day Time (Leq) |      |                   | Noise Level Night Time (Leq) |      |                   |
|--------------------|---------------------|-----------|----------------------------|------|-------------------|------------------------------|------|-------------------|
|                    | Locations           |           | Max                        | Min  | Permissible Limit | Max                          | Min  | Permissible Limit |
| <b>Core Zone</b>   |                     |           |                            |      |                   |                              |      |                   |
| N1                 | Workshop            | Core Zone | 74.3                       | 65.8 | 75                | 62.7                         | 50.4 | 70                |
| N2                 | CPP Complex         | Core Zone | 54.2                       | 45.7 | 55                | 42.2                         | 35.9 | 45                |
| N3                 | Kathara Sub-Station | Core Zone | 73.5                       | 66.9 | 75                | 60.0                         | 50.2 | 70                |
| <b>Buffer Zone</b> |                     |           |                            |      |                   |                              |      |                   |
| N4                 | Saram Village       | Upwind    | 53.3                       | 43.0 | 55                | 43.4                         | 33.9 | 45                |
| N5                 | Bandh Basti         | Crosswind | 52.9                       | 45.3 | 55                | 42.2                         | 36.2 | 45                |
| N6                 | Govindpur Colony    | Crosswind | 53.7                       | 45.5 | 55                | 44.4                         | 37.8 | 45                |
| N7                 | GM Office           | Downwind  | 54.7                       | 43.5 | 65                | 44.8                         | 32.3 | 55                |
| N8                 | Khetko Village      | Downwind  | 53.7                       | 42.5 | 55                | 43.0                         | 40.1 | 45                |
| N9                 | Jaridih Basti       | Downwind  | 54.0                       | 45.5 | 55                | 43.5                         | 36.8 | 45                |
| N10                | Chalkari Basti      | Downwind  | 53.6                       | 50.4 | 55                | 43.0                         | 38.4 | 45                |
| N11                | Phusro Village      | Downwind  | 54.6                       | 50.8 | 55                | 42.3                         | 37.7 | 45                |

| Ambient Noise Standards as per 'The noise pollution (Regulation and Control), Rules,2000 |                                 |                                   |
|--|---------------------------------|-----------------------------------|
| Time Frame   | Limits in dB(A) Leq             |                                   |
|  | Day Time<br>6.00 AM to 10.00 PM | Night Time<br>10.00 PM to 6.00 AM |
| Industrial Area  | 75                              | 70                                |
| Commercial Area  | 65                              | 55                                |
| Residential area   | 55                              | 45                                |
| Silence Zone   | 50                              | 40                                |

From the above observations, it may be concluded that the Noise levels are in good compliance in Industrial and Residential areas as per Ambient Noise Standards as per 'The noise pollution (Regulation and Control), Rules, 2000.

## 3.5 Water Environment

### 3.5.1 Topography

#### *Regional Topography*

Undulating terrain sloping towards South and South-East direction, Damodar River basin. General elevation ranges from 220 m (in the eastern most part near Damodar River) to 441 m above msl (in the northern part near dense mixed jungle of Tarabera pahar). Several hillocks are present in the buffer zone. Some of the hillocks with highest peak of 441 m above msl are present in the dense mixed jungle of Tarabera pahar at about 7 to 8 km north-east of the project and another hill about 437 m above msl is present in the dense mixed jungle of Kuri pahar around 5 to 6 km north-east of the project. Hillock having peak of 323 m above msl is present in the dense mixed jungle around 4 to 5 km south-east of the project. In general, north of the study area is dominated by several hillocks as compare to south.

***Project area Topography***

The topography of the project area is moderately undulating with a small hillock. The general surface slopes towards the Konar River, garlanding the property in the North and East.

**3.5.2 Drainage Pattern of the Study Area**

The general surface slopes towards the Damodar River, the master drainage in the area. The drainage of the area is controlled by Damodar River, Bokaro River and Konar River. Bokaro river and Konar river which flows from north-west to south-east and joins in Damodar River. Damodar River located south of the project flowing towards east. No nala diversion is required for this project. The HFL of the Damodar nadi as recorded in the vicinity of the project is 221.64 m above MSL (as on 11.08.1935) (nearby RL of project is 227.0 m). The drainage pattern of the area is mostly dendritic. **Plate: III A for Drainage Plan**

**3.5.3 Aquifer Description**

Total 5 numbers of coal seams (quality, Washery Grade-III) are occurring within the study area. The thin alluvial formation comprising of soil, loose sand, weathered sandstone, poorly cemented thin shaly sandstone lies above the coal seam Jarangdih behaves as unconfined aquifer. The lower formations, consisting of compact fine to medium grained sandstone with lamination and intercalation with thin shale and carbonaceous shale bands with secondary porosity, behave as semi-confined in nature and are less potential. The deeper aquifers behave as an unconfined aquifer at the outcrop region. In the sandstone aquifer, groundwater moves laterally through the inter-granular pore spaces of the sandstone. The general Hydrogeological units developed in the project are as follows:

**Table 3.9 Hydrogeological units developed in Kathara OCP**

| Hydrogeological Unit  | Formations   | Thickness (in m.) |
|-----------------------|--|-------------------|
| Unconfined aquifer    | Loose alluvium soil, weathered sandstone followed by sandstones and shale. | 5-50 m            |
| Aquiclude             | Coal Seam Jarangdih  | 2.89 m            |
| Semi confined aquifer | Carb. Shale, Intercalation of shale and sandstone                          | 11-45 m           |
| Aquiclude             | Coal Seam Swang (A/B/C)  | 0.30-2.60 m       |
| Semi confined aquifer | Intercalation of shale and sandstone                                       | 18-52 m           |
| Aquiclude             | Coal Seam Kathara  | 0.11-6.18 m       |
| Semi confined aquifer | Intercalation of shale and sandstone                                       | 15-40 m           |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

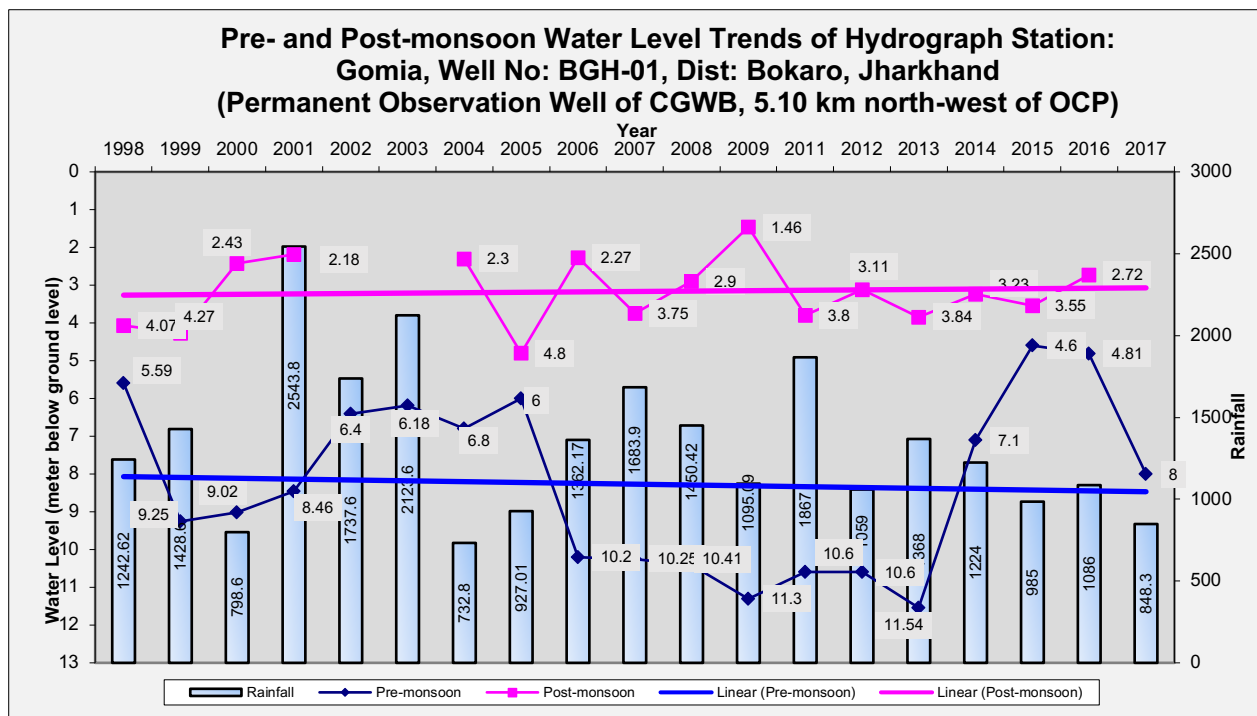
|                       |   |              |
|-----------------------|---|--------------|
| Aquiclude             | Coal Seam Uchitdih                                | 0.75-3.10 m  |
| Semi confined aquifer | Carb. Shale, Intercalation of shale and sandstone | 4-39 m       |
| Aquiclude             | Coal Seam Kargali (Top/Bottom/Combined)           | 8.42-29.54 m |

**Aquifer Parameters**

**3.5.4 Ground Water Level**

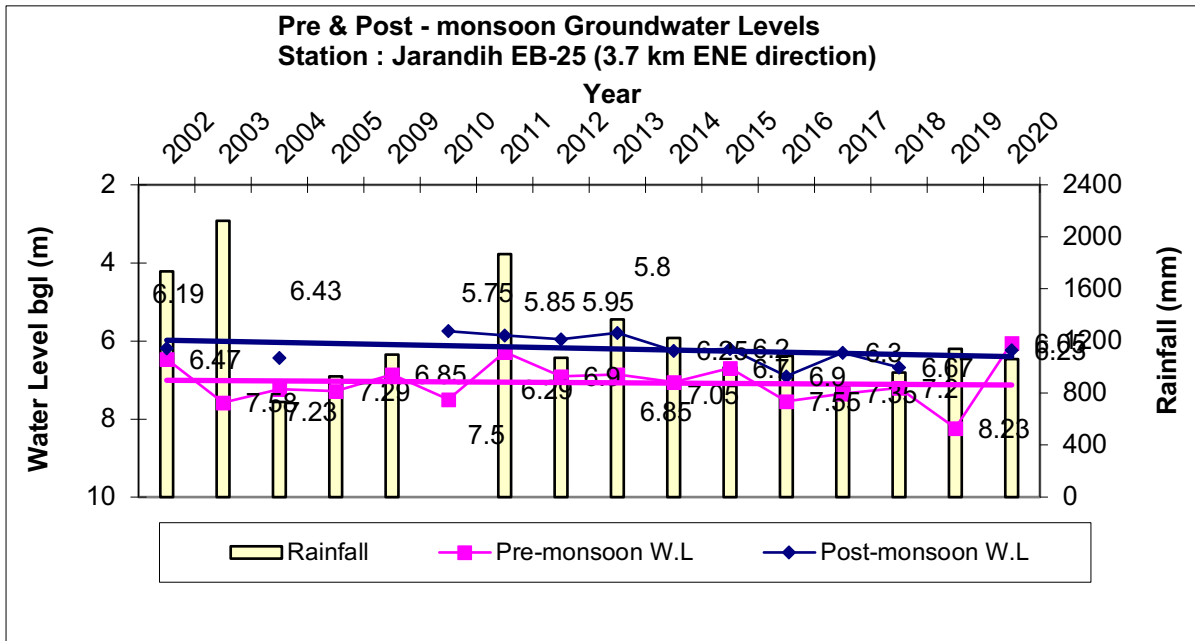
To assess the water table configuration, a network consisting 45 dug wells, covering most of the villages falling within the core and buffer zone, was established in the study area and water levels were monitored. The selected wells are mostly used for domestic purposes. Water table contour map of the buffer zone has been shown in **Plate III B**.

Ground water level by Permanent Observation Well (PoW) of the area is continuously monitored by CMPDI and CGWB. There is a permanent observation well of CGWB in Gomia (Well No.: BGH-01). The pre-monsoon and post monsoon historical groundwater levels for the last few years (1998 to 2017) recorded by CGWB at the nearest permanent hydrograph stations at Gomia (Well No.: BGH-01). The pre-monsoon and post monsoon historical groundwater levels for the last few years recorded by CMPDI at the nearest permanent hydrograph stations like at Jarandih (Well No.: EB-25) and Kathara (Well No.: EB-26) were collected and are given below:

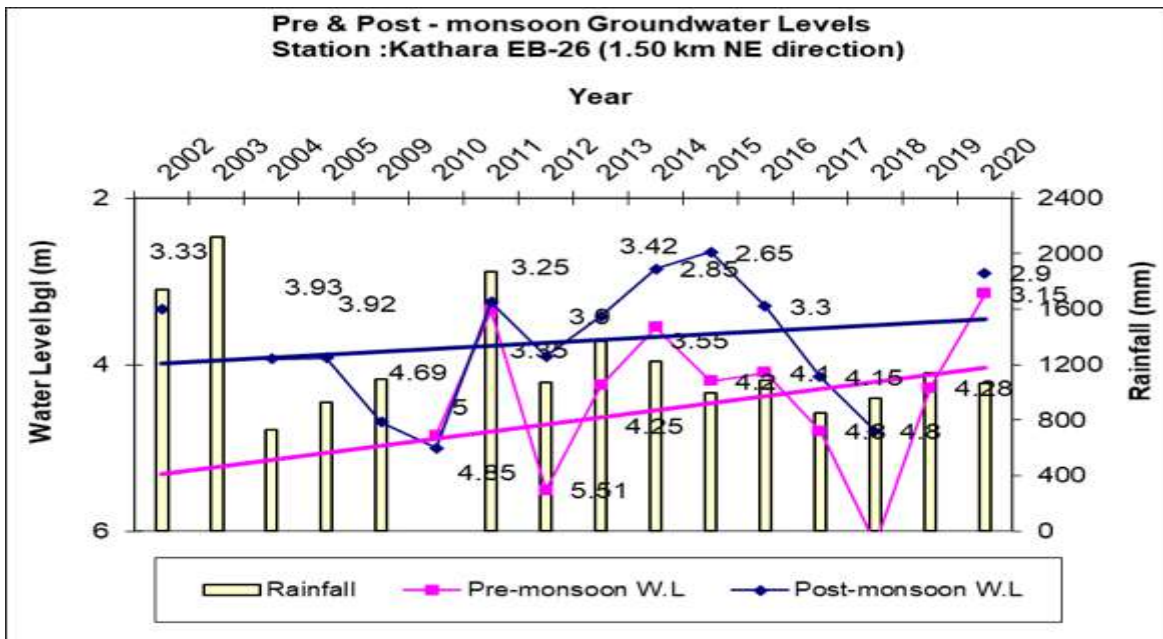


**Fig: Water level trend of CGWB Well, Gomia (BGH-01)**

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

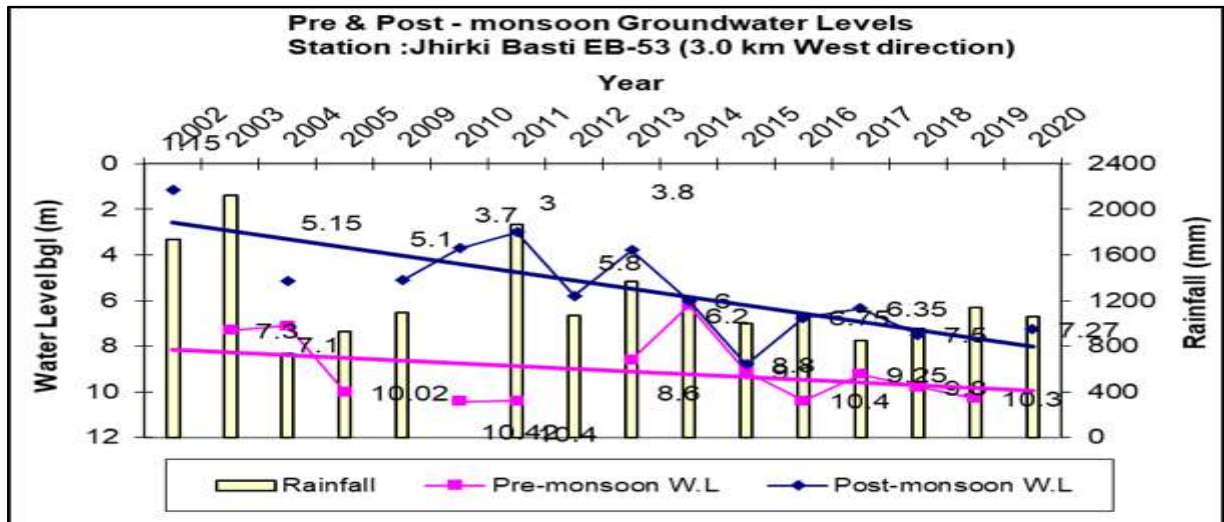


**Fig: Hydrograph station at Jarandih (Well No.: EB-25)**

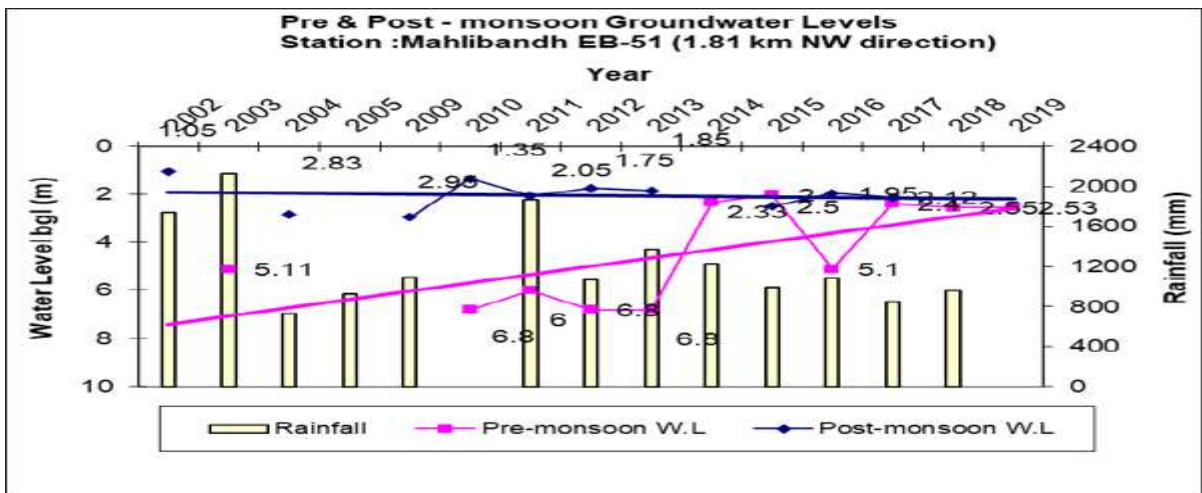


**Fig: Hydrograph station at Kathara (Well No.: EB-26)**

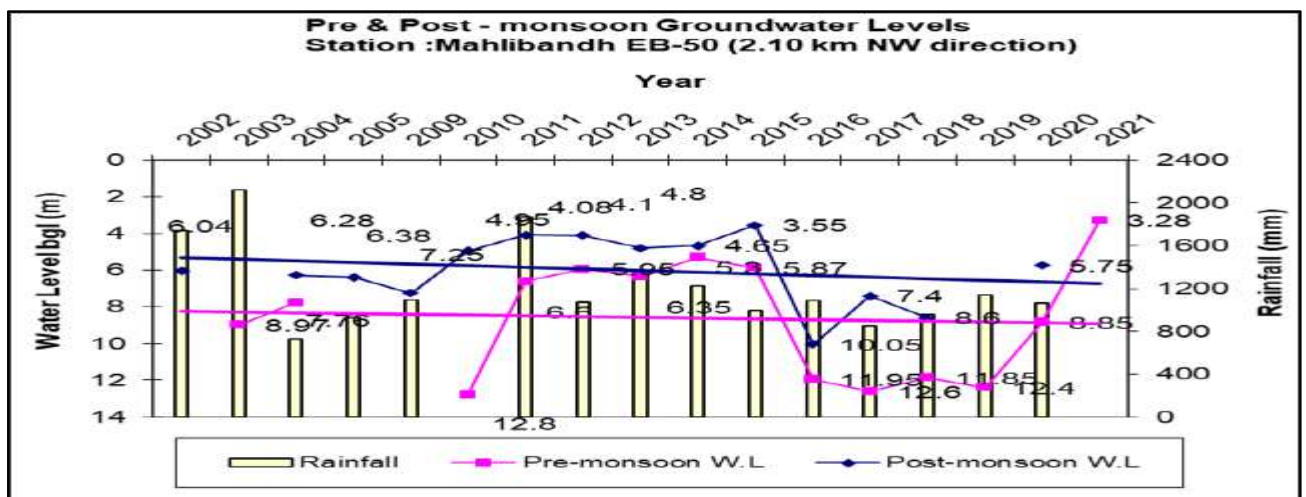
**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**



**Fig: Hydrograph station at Jhirki Basti (Well No.: EB-53)**



**Fig: Hydrograph station at Mahliband (Well No.: EB-51)**



**Fig: Hydrograph station at Mahliband (Well No.: EB-50)**

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

The above data shows that the pre-monsoon water levels vary from 2.40 m (2017 at EB-51, Mahilbandh) to 12.60 m (2017 at EB-50, mahlibandh) with an average of 5.55 m and the post-monsoon water levels vary from 1.28 m (2015 at EB-25A) to 10.05 m (2016 at EB-50) with an average of 3.90 m.

The water level fluctuation varies from 0.10 m to 7.40 m with an average fluctuation of 1.60 m in the area.

Overall groundwater utilisation with the increasing population and Industrial demand and less recharge by rainfall has in recent past years, may be affected the local groundwater regime. Studies reveal that the general water table gradient for the top aquifer in the buffer zone is around  $1.5 \text{ to } 3.30 \times 10^{-3}$  towards Damodar River.

### 3.5.5 Water Quality

The monitoring of water quality has been conducted by collecting water samples from ground water, surface water and mine water discharge / workshop discharge (if any) for the proposed project

#### **Methodology**

Grab sampling method was adopted for collection of ground water sample from hand-pump, waste water and surface water samples from different sources of water bodies.

| <b>Samples</b>                      | <b>Standard Methods</b>                   | <b>Analytical Instruments</b> |
|-------------------------------------|---|-------------------------------|
| pH                                  | IS 3025 (Pt 11): RA 2006                  | pH Meter                      |
| Temperature                         | APHA 23rd Edn 2017 2550 B                 | Thermometer                   |
| Taste                               | IS 3025 (Pt 08): RA 2006                  | -                             |
| Colour                              | IS 3025 (Pt 04): RA 2017                  | -                             |
| Odour                               | IS 3025 (Pt 05): RA 2006                  | -                             |
| Turbidity                           | APHA 23rd Edn 2017 2130 B                 | Turbidity Meter               |
| Total Dissolve Solid                | APHA 23rd Edn 2017 2540 C                 | Hot air Oven                  |
| Total Suspended Solid               | APHA 23rd Edn 2017 2540 D                 | Hot Air Oven                  |
| Alkalinity                          | APHA 23rd Edn 2017 2320 B                 | -                             |
| Total hardness (CaCO <sub>3</sub> ) | APHA 23rd Edn 2017 2340 C                 | -                             |
| Boron(B)                            | APHA 23rd Edn 2017 4500 B C               | Spectrophotometer             |
| Calcium(Ca)                         | APHA 23rd Edn 2017 3500 Ca B              | -                             |
| Chloride(Cl)                        | IS 3025 (Pt 32): RA 2007                  | -                             |
| Fluoride(F)                         | APHA 23rd Edn 2017 4500 F D               | Spectrophotometer             |
| Free Residual Chlorine              | APHA 23rd Edn 2017 4500 Cl B              | Chlorine Kit                  |
| Nitrate (NO <sub>3</sub> )          | IS 3025 (Pt 34): RA 2017                  | Spectrophotometer             |
| Phenolic Compounds                  | IS 3025 (Pt 43): RA 2003                  | Spectrophotometer             |
| Sulphate (SO <sub>4</sub> )         | APHA 23rd Edn 2017 4500 SO <sub>4</sub> E | Spectrophotometer             |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|                         |                                 |                       |
|-------------------------|---------------------------------|-----------------------|
| Cyanide (CN)            | APHA 23rd Edn 2017 4500 CN C ,E | Ion Chromatograph     |
| Selenium (Se)           | IS 3025 (Pt 56): 2003           | ICP-OES               |
| CrVI                    | APHA 23rd Edn 2017 3500 Cr B    | Spectrophotometer     |
| Total Faecal Coliform   | IS 1622: RA 2009                | Laminar Air Flow      |
| Magnesium (Mg)          | APHA 23rd Edn 2017 3500 Mg B    | -                     |
| Copper (Cu)             | APHA 23rd Edn 2017 3111 B       | ICP-OES               |
| Iron (Fe)               | APHA 23rd Edn 2017 3500 Fe B    | ICP-OES               |
| Manganese (Mn)          | APHA 23rd Edn 2017 3111 B       | ICP-OES               |
| Mercury (Hg)            | APHA 23rd Edn 2017 3112 B       | ICP-OES               |
| Lead (Pb)               | APHA 23rd Edn 2017 3111 B       | ICP-OES               |
| Arsenic (As)            | APHA 23rd Edn 2017 3111 B       | ICP-OES               |
| Cadmium (Cd)            | APHA 23rd Edn 2017 3111 B       | ICP-OES               |
| Zinc (Zn)               | APHA 23rd Edn 2017 3111 B       | ICP-OES               |
| Total Chromium(Cr)      | APHA 23rd Edn 2017 3111 B       | ICP-OES               |
| Total Kjeldahl Nitrogen | APHA 22nd Edn 2012 4500 NH3 B   | Kjeldahl Assembly     |
| Ammonical Nitrogen      | APHA 23rd Edn 2017 4500 NH3 C   | Distillation Assembly |
| Dissolved Oxygen        | IS 3025 (Pt 38): RA 2003        | DO Analyzer           |
| BOD                     | IS 3025 (Pt 44): RA 2009        | BOD incubator         |
| COD                     | APHA 23rd Edn 2017 5220 B       | COD Digester          |
| Oil & Grease            | IS 3025 (Pt 39):2009            | -                     |
| Sulfides                | APHA 23rd Edn 2017 4500 S2- F   | -                     |
| Phosphate (Ortho)       | IS 3025 (Pt.31):1988 RA 2003    | Spectrophotometer     |

**Sampling Locations**

Sampling location of water monitoring stations is given below and shown in **Plate VIII**.

**Table 3.10 Location of water Quality Sampling Stations**

| S.No | Source                 | Location                              |
|------|------------------------|---------------------------------------|
| 1    | <b>Surface Water</b>   | SW1 Damodar River U/S of Kathara OCP  |
|      |                        | SW2- Damodar River D/S of Kathara OCP |
| 2    | <b>Drinking Water</b>  | DW1- Borewell at Bandh Basti          |
|      |                        | DW2- Well at Khetko Village           |
| 3    | <b>Effluent Water:</b> | EW1. Mine Sump Effluent               |
|      |                        | EW2. Workshop Effluent                |

**Surface Water Quality**

Damodarriver is the major drainage of the project, which is flowing along the southern boundary of the project. Stabilised embankments are present between the project boundary and river flow. Old rejects of nearby Kathara Washery are also observed in the southern boundary of the project in proximity (above H.F.L) to the river. In order to assess the impact of proposed working on the surface water quality, water quality analysis has been carried out at two points. The details are as given under.

**Table 3.11 Surface Water Monitoring Stations**

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

| S.No | Source        | Location                              | Date of Sampling |
|------|---------------|---------------------------------------|------------------|
| 1    | Surface Water | SW1 Damodar River U/S of Kathara OCP  | 07.11.2020       |
|      |               | SW2- Damodar River D/S of Kathara OCP | 07.11.2020       |

**Results**

Surface water quality has been measured at 2 locations in the post monsoon period and the results are as given below.

**Table 3.12 Surface water Quality**

Period: Post-Monsoon 2020

| Sl. No | Parameter                           | Unit  | Locations               |                         |
|--------|-------------------------------------|-------|-------------------------|-------------------------|
|        |                                     |       | SW1 - Damodar River U/S | SW2 - Damodar River D/S |
| 1.     | pH                                  | --    | 7.40                    | 7.46                    |
| 2.     | Temperature                         | °C    | 26.2                    | 26.2                    |
| 3.     | Colour                              | Hazen | BQL(QL=1)               | BQL(QL=1)               |
| 4.     | Odour                               | --    | Agreeable               | Agreeable               |
| 5.     | B.O.D                               | mg/L  | BQL(QL=2)               | 2.0                     |
| 6.     | C.O.D                               | mg/L  | BQL(QL=5)               | 10                      |
| 7.     | D.O.                                | mg/L  | 7.6                     | 6.6                     |
| 8.     | T.S.S                               | mg/L  | 11.0                    | 19.0                    |
| 9.     | T.D.S                               | mg/L  | 202.4                   | 246.8                   |
| 10.    | Chloride                            | mg/L  | 30.0                    | 30.0                    |
| 11.    | Fluoride                            | mg/L  | 0.88                    | 0.98                    |
| 12.    | Sulphate                            | mg/L  | 63.9                    | 76.9                    |
| 13.    | Nitrate                             | mg/L  | 4.3                     | 5.3                     |
| 14.    | Total Hardness as CaCO <sub>3</sub> | mg/L  | 112.0                   | 140.0                   |
| 15.    | Calcium as Ca                       | mg/L  | 28.9                    | 27.3                    |
| 16.    | Magnesium as Mg                     | mg/L  | 9.72                    | 17.5                    |
| 17.    | Iron (as Fe)                        | mg/L  | BQL(QL=0.05)            | BQL(QL=0.05)            |
| 18.    | Zinc (as Zn)                        | mg/L  | BQL(QL=0.02)            | BQL(QL=0.02)            |
| 19.    | Lead (as Pb)                        | mg/L  | BQL(QL=0.005)           | BQL(QL=0.005)           |
| 20.    | Copper (as Cu)                      | mg/L  | BQL(QL=0.02)            | BQL(QL=0.02)            |
| 21.    | Mercury (as Hg)                     | mg/L  | BQL(QL=0.0005)          | BQL(QL=0.0005)          |
| 22.    | Manganese (as Mn)                   | mg/L  | BQL(QL=0.05)            | BQL(QL=0.05)            |
| 23.    | Selenium (as Se)                    | mg/L  | BQL(QL=0.005)           | BQL(QL=0.005)           |
| 24.    | Cadmium (as Cd)                     | mg/L  | BQL(QL=0.002)           | BQL(QL=0.002)           |

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|     |  |            |               |               |
|-----|--|------------|---------------|---------------|
| 25. | Arsenic (as As)                        | mg/L       | BQL(QL=0.005) | BQL(QL=0.005) |
| 26. | Cyanide                                | mg/L       | BQL(QL=0.025) | BQL(QL=0.025) |
| 27. | Hexavalent Chromium as Cr <sup>+</sup> | mg/L       | BQL(QL=0.01)  | BQL(QL=0.01)  |
| 28. | Oil & Grease                           | mg/L       | BQL(QL=1)     | BQL(QL=1)     |
| 29. | Phenolic Compounds                     | mg/L       | BQL(QL=0.001) | BQL(QL=0.001) |
| 30. | Total Coliform                         | MPN/100 ml | 30            | 42            |
| 31. | Faecal Coliform                        | MPN/100 ml | Absent        | 16            |

**Ground Water Quality Data**

In order to assess the ground water quality of the study area, two locations i.e., one at upstream and other at the downstream of the core zone. The results are as given below.

| S.No | Source         | Location                     | Date of Sampling |
|------|----------------|------------------------------|------------------|
| 2    | Drinking Water | DW1- Borewell at Bandh Basti | 26.11.2020       |
|      |                | DW2- Well at Khetko Village  | 26.11.2020       |

**Table 3.13 Ground Water Quality**

Period: Post-Monsoon 2020

| Sl. No. | Parameter         | Unit  | Locations                    |                             | As per IS 10500:2012 |                   |
|---------|-------------------|-------|------------------------------|-----------------------------|----------------------|-------------------|
|         |                   |       | DW1- Borewell at Bandh Basti | DW2- Well at Khetko Village | Acceptable Limit     | Permissible Limit |
| 1.      | pH                | --    | 7.13                         | 7.18                        | 6.8-8.5              | No relaxation     |
| 2.      | Temperature       | °C    | 24.3                         | 26.0                        | -                    | -                 |
| 3.      | Colour            | Hazen | BQL(QL=1)                    | BQL(QL=1)                   | 5                    | 15                |
| 4.      | Odour             | --    | Agreeable                    | Agreeable                   | Agreeable            | Agreeable         |
| 5.      | Taste             | --    | Agreeable                    | Agreeable                   | Agreeable            | Agreeable         |
| 6.      | Turbidity         | NTU   | BQL(QL=0.1)                  | BQL(QL=0.1)                 | 1                    | 5                 |
| 7.      | T.S.S             | mg/L  | BQL(QL=5)                    | BQL(QL=5)                   | -                    | -                 |
| 8.      | T.D.S             | mg/L  | 528.0                        | 323.7                       | 500                  | 2000              |
| 9.      | Chloride          | mg/L  | 44.0                         | 24.0                        | 250                  | 1000              |
| 10.     | Residual Chlorine | mg/L  | BQL(QL=0.05)                 | BQL(QL=0.05)                | 0.2                  | 1                 |
| 11.     | Fluoride          | mg/L  | 0.85                         | 0.49                        | 1                    | 1.5               |
| 12.     | Sulphate          | mg/L  | 102.3                        | 73.9                        | 200                  | 400               |
| 13.     | Nitrate           | mg/L  | 1.7                          | 11.2                        | 45                   | No relaxation     |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|     |  |            |                |                |        |               |
|-----|--|------------|----------------|----------------|--------|---------------|
| 14. | Alkanity as CaCO <sub>3</sub>          | mg/L       | 300.0          | 144.0          | 200    | 600           |
| 15. | Total Hardness as CaCO <sub>3</sub>    | mg/L       | 370.0          | 188.0          | 200    | 600           |
| 16. | Calcium as Ca                          | mg/L       | 92.2           | 57.7           | 75     | 200           |
| 17. | Aluminium (as Al)                      | mg/L       | BQL(QL=0.002)  | 0.029          | 0.03   | 0.2           |
| 18. | Iron (as Fe)                           | mg/L       | 0.97           | BQL(QL=0.05)   | 0.3    | No relaxation |
| 19. | Zinc (as Zn)                           | mg/L       | 0.20           | BQL(QL=0.02)   | 5      | 15            |
| 20. | Lead (as Pb)                           | mg/L       | BQL(QL=0.005)  | BQL(QL=0.005)  | 0.01   | No relaxation |
| 21. | Copper (as Cu)                         | mg/L       | BQL(QL=0.02)   | BQL(QL=0.02)   | 0.05   | 1.5           |
| 22. | Mercury (as Hg)                        | mg/L       | BQL(QL=0.0005) | BQL(QL=0.0005) | 0.001  | No relaxation |
| 23. | Boron (as B)                           | mg/L       | BQL(QL=0.05)   | BQL(QL=0.05)   | 0.5    | 1             |
| 24. | Manganese (as Mn)                      | mg/L       | 1.44           | BQL(QL=0.05)   | 0.1    | 0.3           |
| 25. | Selenium (as Se)                       | mg/L       | BQL(QL=0.005)  | BQL(QL=0.005)  | 0.01   | No relaxation |
| 26. | Cadmium (as Cd)                        | mg/L       | BQL(QL=0.002)  | BQL(QL=0.002)  | 0.003  | No relaxation |
| 27. | Arsenic (as As)                        | mg/L       | BQL(QL=0.005)  | BQL(QL=0.005)  | 0.01   | 0.05          |
| 28. | Cyanide                                | mg/L       | BQL(QL=0.025)  | BQL(QL=0.025)  | 0.05   | No relaxation |
| 29. | Hexavalent Chromium as Cr <sup>+</sup> | mg/L       | BQL(QL=0.01)   | BQL(QL=0.01)   | -      | -             |
| 30. | Phenolic Compounds                     | mg/L       | BQL(QL=0.001)  | BQL(QL=0.001)  | 0.001  | 0.002         |
| 31. | Total Coliform                         | MPN/100 ml | Absent         | Absent         | Absent | Absent        |
| 32. | Faecal Coliform                        | MPN/100 ml | Absent         | Absent         | Absent | Absent        |
| 33. | Detergents                             | mg/L       | BQL(QL=0.05)   | BQL(QL=0.05)   | 0.2    | 1             |

Above groundwater quality data shows that all values are well within the permissible limits as per IS 10500: 2012 drinking water standards. However, it is observed that the Manganese (Mn) and Iron (Fe) are found to be on higher side at Bandh Basti. There is no significant impact/relation can be drawn from monitored values of upstream and downstream locations w.r.t the mining activity.

***Effluent Water Quality***

The effluent water quality was assessed at two locations namely, mine sump effluent and workshop discharge.

| S.No | Source   | Location              | Date of Sampling |
|------|----------|-----------------------|------------------|
| 3    | Effluent | EW1-Workshop Effluent | 03.11.2020       |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|  |               |                        |            |
|--|---------------|------------------------|------------|
|  | <b>Water:</b> | EW2-Mine Sump Effluent | 03.11.2020 |
|--|---------------|------------------------|------------|

**Table 3.14 Effluent Water Quality**

Period: Post-Monsoon 2020

| Sl. No. | Parameter                             | Unit  | Locations        |                        | Norms (As per GSR No. 422 E) |
|---------|---------------------------------------|-------|------------------|------------------------|------------------------------|
|         |                                       |       | EW1-W/S Effluent | EW2-Mine Sump Effluent |                              |
| 1.      | pH                                    | --    | 7.41             | 7.56                   | 5.5-9.0                      |
| 2.      | Temperature                           | °C    | 26.5             | 26.5                   | NE 5°C receiving temp        |
| 3.      | Colour                                | Hazen | 12.0             | BQL(QL=1)              | 15                           |
| 4.      | Odour                                 | --    | Agreeable        | Agreeable              | -                            |
| 5.      | Turbidity                             | NTU   | 6.7              | 2.2                    | -                            |
| 6.      | C.O.D                                 | mg/L  | 40               | 10                     | 250                          |
| 7.      | B.O.D                                 | mg/L  | 9.2              | BQL(QL=2)              | 30                           |
| 8.      | T.S.S                                 | mg/L  | 27.0             | 11.0                   | -                            |
| 9.      | Ammonical Nitrogen as NH <sub>3</sub> | mg/L  | 7.28             | 2.24                   | 50                           |
| 10.     | Total Kjheldal Nitrogen as TKN        | mg/L  | 16.0             | 14                     | 100                          |
| 11.     | Chloride                              | mg/L  | 12.0             | 18.0                   | -                            |
| 12.     | Residual Chlorine                     | mg/L  | BQL(QL=0.1)      | BQL(QL=0.1)            | -                            |
| 13.     | Fluoride                              | mg/L  | 1.46             | 1.25                   | 2.0                          |
| 14.     | Sulphate                              | mg/L  | 301.3            | 737.6                  | -                            |
| 15.     | Sulphide                              | mg/L  | 1.2              | 0.8                    | 2.0                          |
| 16.     | Nitrate Nitrogen                      | mg/L  | 5.3              | 2.8                    | 10                           |
| 17.     | Oil & Grease                          | mg/L  | 2.2              | BQL(QL=2)              | 10                           |
| 18.     | Total Hardness as CaCO <sub>3</sub>   | mg/L  | 400.0            | 1020.0                 | -                            |
| 19.     | Calcium as Ca                         | mg/L  | 88.2             | 240.5                  | -                            |
| 20.     | Aluminium (as Al)                     | mg/L  | 0.21             | BQL(QL=0.1)            | -                            |
| 21.     | Nickel (as Ni)                        | mg/L  | BQL(QL=0.05)     | BQL(QL=0.05)           | 3.0                          |
| 22.     | Iron (as Fe)                          | mg/L  | BQL(QL=0.1)      | BQL(QL=0.1)            | 3.0                          |
| 23.     | Zinc (as Zn)                          | mg/L  | BQL(QL=0.05)     | BQL(QL=0.05)           | 5.0                          |
| 24.     | Lead (as Pb)                          | mg/L  | BQL(QL=0.02)     | BQL(QL=0.02)           | 0.1                          |
| 25.     | Copper (as Cu)                        | mg/L  | BQL(QL=0.1)      | BQL(QL=0.1)            | 3.0                          |
| 26.     | Mercury (as Hg)                       | mg/L  | BQL(QL=0.001)    | BQL(QL=0.001)          | 0.01                         |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|     |  |      |              |              |      |
|-----|--|------|--------------|--------------|------|
| 27. | Boron (as B)                           | mg/L | BQL(QL=0.1)  | BQL(QL=0.1)  | -    |
| 28. | Manganese (as Mn)                      | mg/L | BQL(QL=0.1)  | BQL(QL=0.1)  | 2.0  |
| 29. | Selenium (as Se)                       | mg/L | BQL(QL=0.02) | BQL(QL=0.02) | 0.05 |
| 30. | Cadmium (as Cd)                        | mg/L | BQL(QL=0.01) | BQL(QL=0.01) | 2.0  |
| 31. | Arsenic (as As)                        | mg/L | BQL(QL=0.02) | BQL(QL=0.02) | 0.2  |
| 32. | Vanadium (as V)                        | mg/L | BQL(QL=0.1)  | 0.18         | 0.2  |
| 33. | Cyanide                                | mg/L | BQL(QL=0.1)  | BQL(QL=0.1)  | 0.2  |
| 34. | Hexavalent Chromium as Cr <sup>+</sup> | mg/L | BQL(QL=0.05) | BQL(QL=0.05) | 0.1  |
| 35. | Total Cr                               | mg/L | BQL(QL=0.1)  | BQL(QL=0.1)  | 2.0  |
| 36. | Phenolic Compounds                     | mg/L | 0.14         | 0.11         | 1.0  |
| 37. | Orthophosphate                         | mg/L | BQL(QL=0.5)  | BQL(QL=0.5)  | 5.0  |

All the water quality parameters in the effluent water are well within the prescribed limits suggesting that the existing mine water sumps are being properly maintained and efficient enough.

### 3.6 Soil Quality Status

Soil is fundamental & ultimate natural resources that fulfill a number of functions & provide various services like agriculture, industrial construction & ecological habitat development etc. Some of the most significant impacts on this resource occur as a result of activities associated with the use of chemical fertilizers, unscientific construction activities, unplanned city design, unscientific land use pattern and land filling by toxic materials. Soil analysis can determine the fertility or the expected growth potential and the nutrient deficiency and potential toxicity which help in taking cost effective decision for the better soil management.

Accordingly, three soilsampling locations were fixed to represent the entire area and samples were collected in post-monsoon of 2020 from each location from three depths viz. 0-30, 30-60, 60-90cm.

#### 3.6.1 Methodology

Soil samples were collected from three identified locations around the study area during study period to generate primary information on soil quality prevailing in the study area. These samples were collected once during the study period and preserved in polythene bags / Pet jar having lock facility. The parameters tested and methodology adopted are as follows :

| Sl. No. | Parameter               | Unit  | Test Method       |
|---------|-------------------------|-------|-------------------|
| 1       | pH                      | -     | IS:2720 (Part 26) |
| 2       | Water Holding Capacity  | %     | USDA Method       |
| 3       | Electrical Conductivity | µS/cm | IS: 14767:2000    |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|    |                               |          |                        |
|----|-------------------------------|----------|------------------------|
| 4  | Available Nitrogen            | kg/ha    | TP/C/4.7               |
| 5  | Available Phosphorus          | kg/ha    | TP/C/4.5               |
| 6  | Available Potassium           | kg/ha    | TP/C/4.6               |
| 7  | Sodium absorption ratio (SAR) | -        | S.K. Maithi (Volume 2) |
| 8  | Available Organic Carbon      | %        | IS:2720 (PART 22)      |
| 9  | Cation exchange capacity      | meq/100g | TP/C/4.14              |
| 10 | Specific Gravity              | -        | IS:2720 (PART 3)       |
| 11 | Field Capacity                | %        | S.K. Maithi (Volume 2) |
| 12 | Wilting Coefficient           | %        | S.K. Maithi (Volume 2) |
| 13 | Texture                       | -        | IS:2720 (PART 4)       |
|    | a) Sand                       | %        | IS:2720 (PART 4)       |
|    | b) Silt                       | %        | IS:2720 (PART 4)       |
|    | c) Clay                       | %        | IS:2720 (PART 4)       |

### 3.6.2 Sampling Locations

Details of sampling location are shown on location map is shown in **Plate no. VIII**

| Station Code | Name of Station | Remarks           | Distance from Core Zone |
|--------------|-----------------|-------------------|-------------------------|
| S1           | Khetko Village  | Agricultural Land | 0.85 KM                 |
| S2           | Core Zone       | Barren Land       | 0.00 KM                 |
| S3           | Hazari More     | Forest Land       | 2.14 KM                 |

### 3.6.3 Observations

**Table 3.15 Soil Monitoring at Station S1**

| Location : S1- Khetko Village (Agricultural Land) |                          |           |                   |       |       |
|---|--------------------------|-----------|-------------------|-------|-------|
| Date of Sampling: 02.12.2020                      |                          |           |                   |       |       |
| Sl. No.   | Parameter                | Unit      | S 1 (Depth in cm) |       |       |
|   |                          |           | 0-30              | 30-60 | 60-90 |
| 1   | pH                       | -         | 6.2               | 6.3   | 6.88  |
| 2   | Organic Carbon           | %         | 0.67              | 0.31  | 0.16  |
| 3   | Available Phosphorus     | Kg/ha     | 14.6              | 13.3  | 10.3  |
| 4   | Electrical Conductivity  | mS/cm     | 0.39              | 0.35  | 0.38  |
| 5   | Water Holding Capacity   | %         | 42.7              | 35.3  | 14.8  |
| 6   | SAR                      | -         | 0.12              | 0.11  | 0.11  |
| 7   | Cation Exchange Capacity | Meq/100gm | 25.5              | 29.2  | 33.7  |
| 8   | Texture (Clay)           | %         | 18.2              | 17.4  | 12.2  |
| 9   | Texture (Sand)           | %         | 51.2              | 49.2  | 59.1  |
| 10  | Texture (Silt)           | %         | 30.6              | 33.4  | 28.7  |
| 11  | Specific Gravity         | -         | 2.59              | 2.58  | 2.65  |
| 12  | Field Capacity           | %         | 20.9              | 18.82 | 12.18 |
| 13  | Wilting Coefficient      | %         | 0.86              | 0.87  | 0.86  |
| 14  | Available Potash         | Kg/ha     | 251.0             | 230.3 | 263.8 |
| 15  | Available Nitrogen       | Kg/ha     | 520.8             | 397.6 | 302.4 |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

Soil sample has been collected at different depth (0-30, 30-60 and 60-90 cm) from agriculture land. As per the above table, the result of pH has been found out to be in the range of 6.2 to 6.88 which indicates that the soil is slightly acidic. The results of available nitrogen, available phosphorus and available potash has been found out to be moderate and the result of organic carbon is found out to be moderate but at the depth 30-60 and 60-90 cm, the results of organic carbon are found out to be lower side. The texture of soil has been found to be loam/sandy loam. The result of water holding capacity is found out to be low at the depth 60-90 cm because at this depth, the texture of soil has been found to be sandy loam quality which indicates that the soil have more content of sand. It is capable quickly drainage of water but cannot hold significance amount of water.

**Table 3.16 Soil Monitoring at Station S2**

| <b>Location : S2- Core Zone (Barren Land)</b> |                          |           |                   |       |       |
|---|--------------------------|-----------|-------------------|-------|-------|
| Date of Sampling: 02.12.2020                  |                          |           |                   |       |       |
| Sl. No.                                       | Parameter                | Unit      | S 2 (Depth in cm) |       |       |
|   |                          |           | 0-30              | 30-60 | 60-90 |
| 1   | pH                       | -         | 7.05              | 6.9   | 7.25  |
| 2   | Organic Carbon           | %         | 0.47              | 0.16  | 0.12  |
| 3   | Available Phosphorus     | Kg/ha     | 10.8              | 8.5   | 7.2   |
| 4   | Electrical Conductivity  | mS/cm     | 0.49              | 0.47  | 0.51  |
| 5   | Water Holding Capacity   | %         | 8.8               | 17.7  | 11.9  |
| 6   | SAR                      | -         | 0.12              | 0.11  | 0.12  |
| 7   | Cation Exchange Capacity | Meq/100gm | 34.9              | 30.6  | 28.6  |
| 8   | Texture (Clay)           | %         | 6.8               | 7.6   | 6.9   |
| 9   | Texture (Sand)           | %         | 66.6              | 67    | 65.7  |
| 10  | Texture (Silt)           | %         | 26.6              | 25.4  | 27.4  |
| 11  | Specific Gravity         | -         | 2.64              | 2.67  | 2.68  |
| 12  | Field Capacity           | %         | 6.7               | 10.46 | 7.64  |
| 13  | Wilting Coefficient      | %         | 0.46              | 0.38  | 0.36  |
| 14  | Available Potash         | Kg/ha     | 218.0             | 188.6 | 171.5 |
| 15  | Available Nitrogen       | Kg/ha     | 212.8             | 168.0 | 145.6 |

Soil sample has been collected at different depth (0-30, 30-60 and 60-90 cm) from mine area /core zone. The result of pH has been found out to be in the range of 6.9 to 7.25 which indicates that the soil type is normal to saline. The result of available nitrogen, available phosphorus and organic carbon has been found to be lower side and the result of available potash has been found to be moderate. The texture of soil has been found to be sandy loam. It indicates that the soil have more contains of sand which causes quickly drainage of water but cannot hold plenty amount of water and nutrients. Hence, the result of water holding capacity and nutrients has been found out to be lower side.

**Table 3.17 Soil Monitoring at Station S3**

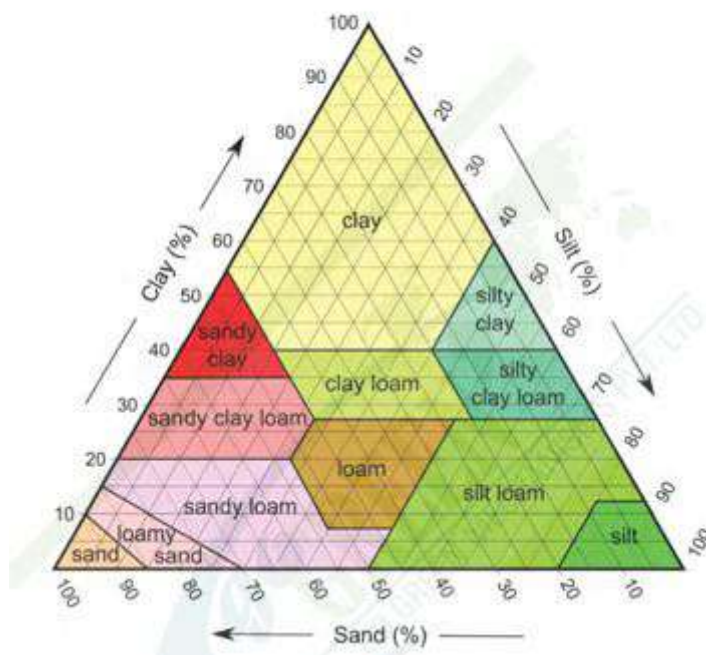
| <b>Location : S3- Hazari More (Forest Land)</b> |           |      |                   |       |       |
|---|-----------|------|-------------------|-------|-------|
| Date of Sampling: 02.12.2020                    |           |      |                   |       |       |
| Sl. No.   | Parameter | Unit | S 3 (Depth in cm) |       |       |
|   |           |      | 0-30              | 30-60 | 60-90 |
| 1   | pH        | -    | 6.73              | 7.0   | 7.18  |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|    |                          |           |       |       |       |
|----|--------------------------|-----------|-------|-------|-------|
| 2  | Organic Carbon           | %         | 2.72  | 1.80  | 0.80  |
| 3  | Available Phosphorus     | Kg/ha     | 12.9  | 10.2  | 9.1   |
| 4  | Electrical Conductivity  | mS/cm     | 0.48  | 0.43  | 0.40  |
| 5  | Water Holding Capacity   | %         | 38.0  | 32.3  | 28.3  |
| 6  | SAR                      | -         | 0.11  | 0.1   | 0.11  |
| 7  | Cation Exchange Capacity | Meq/100gm | 34.9  | 34.6  | 37.2  |
| 8  | Texture (Clay)           | %         | 17.4  | 15.6  | 12.2  |
| 9  | Texture (Sand)           | %         | 54    | 54.7  | 63.2  |
| 10 | Texture (Silt)           | %         | 28.6  | 29.5  | 24.6  |
| 11 | Specific Gravity         | -         | 2.62  | 2.64  | 2.71  |
| 12 | Field Capacity           | %         | 18.4  | 8.65  | 7.00  |
| 13 | Wilting Coefficient      | %         | 0.74  | 0.71  | 0.68  |
| 14 | Available Potash         | Kg/ha     | 233.2 | 214.2 | 203.1 |
| 15 | Available Nitrogen       | Kg/ha     | 392.0 | 285.6 | 207.2 |

Soil sample has been collected at different depth (0-30, 30-60 and 60-90 cm) from forest area. The results of pH are found out to be in the range of 6.73 to 7.18. It indicates that the soil type is normal to alkaline. The results of cation exchange capacity are higher side which depicts that the soil can hold more cation and contain more organic matter. The results of available of potash, available of nitrogen has been found to be moderate and the results of available phosphorus are found out to be lower side as per the rating chart for soil test data. The result of organic carbon has been found out be higher side. The texture of soil has been found out to be sandy loam quality which indicates that the soil have more content of sand. It can quickly drainage of water but cannot hold plenty amount of water.

**Soil Texture: Sand, Silt and Clay**



## 3.7 Biological Environment

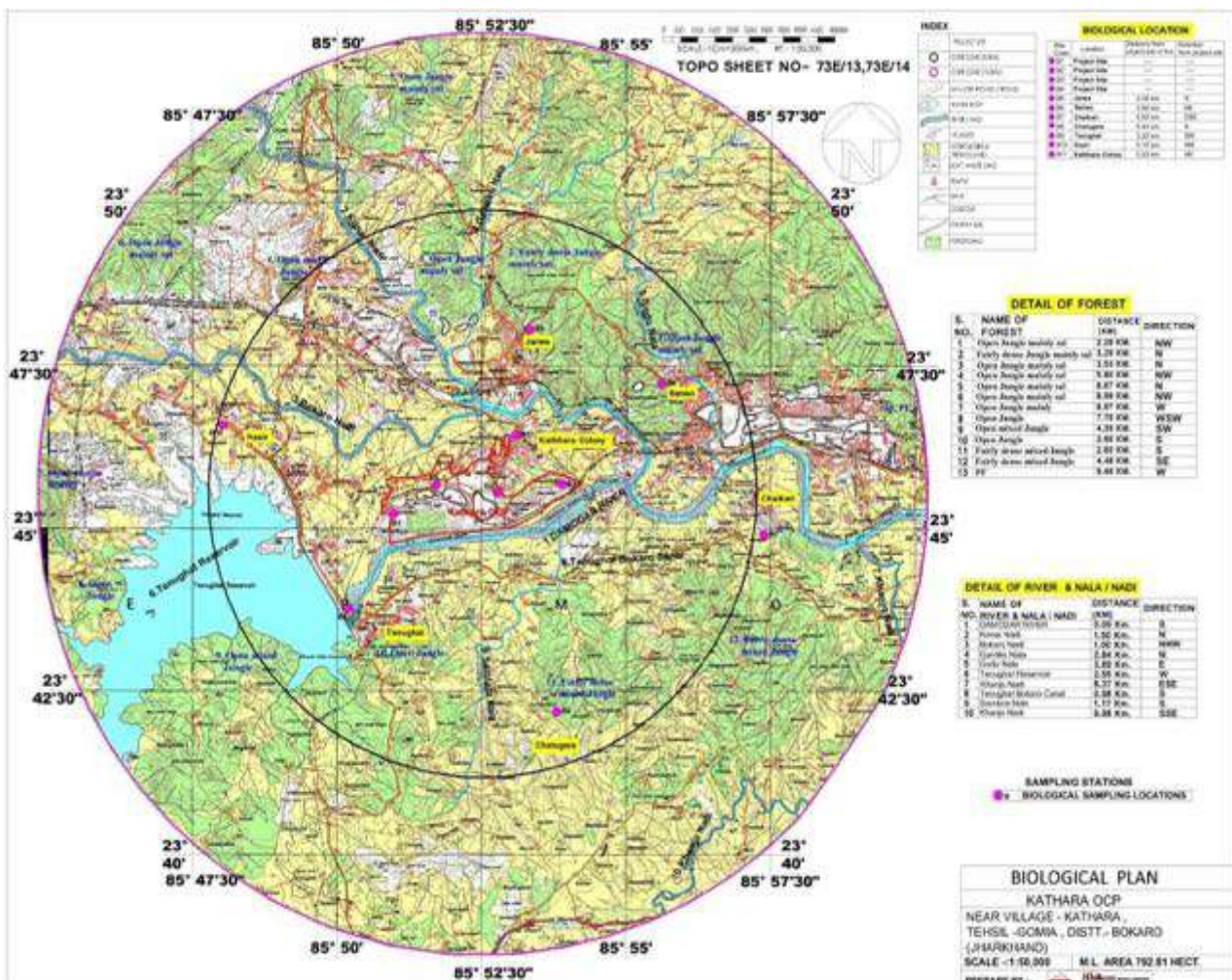
The data on flora & fauna was collected based on field survey in the core and buffer zone (10 KM radius) by Wolkem Indian Ltd. in the Post-monsoon period of 2020.

The general topography of the core area is generally undulating. Damodar River is passing outside the lease hold boundary. The buffer zone is covered by several patches of protected forest. Konar river drains the northern side of the block and joins river Damodar. Damodar river is located south of the project flowing towards east.

### 3.7.1 Methodology

The study area has been divided in core and buffer zone. For floral assessment, four (04) stations in core zone for quadrat study & in buffer zone seven (07) locations for quadrates study.

### 3.7.2 Environmental Setting of the Study Area



The observations of the Flora-Fauna Survey is as follows:

#### A. Flora

Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited

• **Core Zone**

**Table 3.18 List of Floral Species Observed in CoreZone**

| <b>S.No.</b>             | <b>BotanicalName</b>           | <b>Common/Hindi Name</b> | <b>Nameof class /family</b> | <b>IUCNstatus</b> |
|--------------------------|--------------------------------|--------------------------|-----------------------------|-------------------|
| 1.                       | <i>Acacia leucophloea</i>      | <i>Safedbabul</i>        | <i>Mimosaceae</i>           | --                |
| 2.                       | <i>Ailanthus excels</i>        | Adusa                    | <i>Simaroubaceae</i>        | Notevaluated      |
| 3.                       | <i>Ailanthus excels</i>        | <i>Adusa</i>             | <i>Simaroubaceae</i>        | Notevaluated      |
| 4.                       | <i>Bombax ceiba</i>            | Semal                    | <i>Malvaceae</i>            | --                |
| 5.                       | <i>Bombax ceiba</i>            | <i>Semal</i>             | <i>Malvaceae</i>            | --                |
| 6.                       | <i>Butea monosperma</i>        | Palas                    | <i>Leguminosae</i>          | Data deficient    |
| 7.                       | <i>Cassia siamea</i>           | Chirkundi                | <i>Mimosaceae</i>           | --                |
| 8.                       | <i>Cassia tora</i>             | Tarota/Takla             | <i>Caesalpinaceae</i>       | NotEvaluated      |
| 9.                       | <i>Diospyros melanoxylon</i>   | Tendu                    | <i>Ebenaceae</i>            | --                |
| 10.                      | <i>Lactuca virosa</i>          | <i>Wildlettuce</i>       | <i>Asteraceae</i>           | -                 |
| 11.                      | <i>Pongamia pinnata</i>        | <i>Karanj</i>            | <i>Leguminosae</i>          | Least Concern     |
| 12.                      | <i>Shorea robusta</i>          | Sal                      | <i>Depterocarpaceae</i>     | Least Concern     |
| 13.                      | <i>Tectona grandis</i>         | <i>Sagwan</i>            | <i>Verbenaceae</i>          | --                |
| 14.                      | <i>Zyziphus mauritiana</i>     | Ber                      | <i>Rhamnaceae</i>           | Least Concern     |
| <b>Shrub &amp; Herbs</b> |                                |                          |                             |                   |
| 15.                      | <i>Acanthospermum hispidum</i> | <i>Kanti</i>             | <i>Asteraceae</i>           | --                |
| 16.                      | <i>Acheranthus aspera</i>      | <i>Aghada</i>            | <i>Amaranthaceae</i>        | --                |
| 17.                      | <i>Amaranthus viridis</i>      | Janglicholai             | <i>Amaranthaceae</i>        | --                |
| 18.                      | <i>Argemone mexicana</i>       | Satyanashi               | <i>Papaveraceae</i>         | --                |
| 19.                      | <i>Calotropis procera</i>      | Aakra                    | <i>Asclepiadaceae</i>       | --                |
| 20.                      | <i>Cassia tora</i>             | Tarota/Takla             | <i>Caesalpinaceae</i>       | NotEvaluated      |
| 21.                      | <i>Celosia argentea</i>        | silver cock's comb       | <i>Amaranthaceae</i>        | -                 |
| 22.                      | <i>Chromolaena odorata</i>     | <i>Devil Weed</i>        | <i>Asteraceae</i>           | --                |
| 23.                      | <i>Corchorus trilocularis</i>  | Wild Jute                | <i>Tiliaceae</i>            | --                |
| 24.                      | <i>Datura metel</i>            | Datura                   | <i>Solanaceae</i>           | --                |
| 25.                      | <i>Echinopsechinatus</i>       | Unthkantali              | <i>Asteraceae</i>           | --                |

Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited

|                 |                                     |                           |                       |    |
|-----------------|-------------------------------------|---------------------------|-----------------------|----|
| 26.             | <i>Hygrophilaauriculata</i>         | <i>Gokulkanti</i>         | <i>Acanthaceae</i>    | -- |
| 27.             | <i>Ipomoeacarnea</i>                | <i>Besharam</i>           | <i>Convolvulaceae</i> | -- |
| 28.             | <i>Jatrophagossipifolia</i>         | Cotton-leaf               | <i>Euphorbiaceae</i>  | -- |
| 29.             | <i>Lantanacamara</i>                | Ghaneri                   | <i>Verbenaceae</i>    | -- |
| 30.             | <i>Leonotisnepetifolia</i>          | <i>lion'sear</i>          | <i>Lamiaceae</i>      | -- |
| 31.             | <i>Mesosphaerumsuaveolens</i>       | <i>JungliTulsi</i>        | <i>Lamiaceae</i>      | -- |
| 32.             | <i>Partheniumhysterophorus</i>      | Gajargrass                | <i>Asteraceae</i>     | -- |
| 33.             | <i>Pterisvittata</i>                | Chinesebrake              | <i>Pteridaceae</i>    |    |
| 34.             | <i>Solanumnigrum</i>                | Mokai                     | <i>Solanaceae</i>     | -- |
| 35.             | <i>Solanumsisymbriifolium Lamk.</i> | <i>litchitomato</i>       | <i>Solanaceae</i>     | -- |
| 36.             | <i>Tephrosiapurpurea</i>            | <i>Sharpunkha</i>         | <i>Fabaceae</i>       | -- |
| 37.             | <i>Tridaxprocumbens</i>             | Kambarmodi                | <i>Asteraceae</i>     | -- |
| <b>Grasses</b>  |                                     |                           |                       |    |
| 38.             | <i>Cenchrusetaceus</i>              | <i>Fountaingrass</i>      | <i>Poaceae</i>        | -  |
| 39.             | <i>Cynodondactylon</i>              | <i>Doob</i>               | <i>Poaceae</i>        | -- |
| 40.             | <i>Cyperusrotundus</i>              | <i>Motha</i>              | <i>cyperaceae</i>     | -- |
| 41.             | <i>Sacchahrammunja</i>              | <i>Munj</i>               | <i>Poaceae</i>        | -- |
| 42.             | <i>Vetiveriazizanioides</i>         | <i>Khas-Khas</i>          | <i>Poaceae</i>        | -- |
| 43.             | <i>Chrysopogonaciculatus</i>        | <i>lesser speargrass,</i> | <i>Poaceae</i>        | -- |
| <b>Climbers</b> |                                     |                           |                       |    |
| 44.             | <i>Abrusprecatorius</i>             | Gunja                     | <i>Fabaceae</i>       | -- |
| 45.             | <i>Cuscutareflexa</i>               | Amarbel                   | <i>Convolvulaceae</i> | -- |
| 46.             | <i>Zizyphusoenoplia</i>             | Makor                     | <i>Rhamnaceae</i>     | -- |

Source–Surveyteaminconsultationwithlocalpeopleandforest department

• **Buffer Zone**

Table 3.19 List of Floral Species Observed in Buffer Zone

| <b>S. No.</b> | <b>BotanicalName</b>        | <b>Common/Hindi Name</b> | <b>Nameofclass /family</b> | <b>IUCNstatus</b> |
|---------------|-----------------------------|--------------------------|----------------------------|-------------------|
| 1.            | <i>Acaciaauriculiformis</i> | Austrelianbabul          | <i>Fabaceae</i>            | Least Concern     |
| 2.            | <i>Acacialeucophloea</i>    | <i>Safedbabul</i>        | <i>Mimosaceae</i>          | --                |
| 3.            | <i>Acacianilotica</i>       | <i>Babool</i>            | <i>Mimosaceae</i>          | Least Concern     |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|     |  |                     |                              |                       |
|-----|--|---------------------|------------------------------|-----------------------|
| 4.  | <i>Acacianilotica</i>                    | <i>Desibabool</i>   | <i>Fabaceae</i>              | Least Concern         |
| 5.  | <i>Aeglemarmelos</i>                     | <i>Bel</i>          | <i>Rutaceae</i>              | Notevaluated          |
| 6.  | <i>Ailanthusexcels</i>                   | <i>Adusa</i>        | <i>Simaroubaceae</i>         | Notevaluated          |
| 7.  | <i>Albiziaprocera</i>                    | Mimosaceae          | <i>Tentela(sirish-Dhala)</i> | --                    |
| 8.  | <i>Albizziaamara</i>                     | <i>Siris</i>        | <i>Mimosoideae</i>           | --                    |
| 9.  | <i>Albizzialebeck</i>                    | <i>Sirish</i>       | <i>Mimosaceae</i>            | --                    |
| 10. | <i>Alstoniascholaris</i>                 | <i>Saptaparni</i>   | <i>Apocynaceae</i>           | <i>Least Concern</i>  |
| 11. | <i>Annonasquamosa</i>                    | <i>Sitaphal</i>     | <i>Annonaceae</i>            | <i>Not evaluated</i>  |
| 12. | <i>Anogeissuslatifolia</i>               | <i>Dhaura,</i>      | <i>Combretaceae</i>          | <i>Not evaluated</i>  |
| 13. | <i>Anthocephalus cadamba (Roxb.)Miq.</i> | <i>Kadamb</i>       | <i>Rubiaceae</i>             | --                    |
| 14. | <i>Artocorpusheterophyllus</i>           | <i>Jackfruit</i>    | <i>Moraceae</i>              | <i>Least Concern</i>  |
| 15. | <i>Azadirachtaindica</i>                 | <i>Neem</i>         | <i>Meliaceae</i>             | <i>Least Concern</i>  |
| 16. | <i>Bambusaarundinacea</i>                | <i>Katangbamboo</i> | <i>Poaceae</i>               | <i>Not Evaluated</i>  |
| 17. | <i>Bauhiniaracemosa</i>                  | <i>Apta</i>         | <i>Leguminosae</i>           | <i>Not evaluated</i>  |
| 18. | <i>BauhiniavariegataL.</i>               | <i>Kachnar</i>      | <i>Leguminosae</i>           | <i>Least Concern</i>  |
| 19. | <i>Bombaxceiba</i>                       | <i>Semal</i>        | <i>Malvaceae</i>             | --                    |
| 20. | <i>Bombaxmalabaricum</i>                 | <i>Semaltree</i>    | <i>Malvaceae</i>             | --                    |
| 21. | <i>Borassusflabellifer</i>               | <i>Nariyal</i>      | <i>Palmae</i>                | --                    |
| 22. | <i>Buteamonosperma</i>                   | <i>Palas</i>        | <i>Leguminosae</i>           | <i>Data deficient</i> |
| 23. | <i>Caryotaurens</i>                      | <i>Palmtree</i>     | <i>Arecaceae</i>             | <i>Least Concern</i>  |
| 24. | <i>Cassiafistula</i>                     | <i>Amaltas</i>      | <i>Caesalpinaceae</i>        | <i>Not evaluated</i>  |
| 25. | <i>Cassiasiamea</i>                      | <i>Chirkundi</i>    | <i>Mimosaceae</i>            | --                    |
| 26. | <i>Dalbergialatifolia</i>                | <i>Shisam</i>       | <i>Leguminosae</i>           | <i>Vulnerable</i>     |
| 27. | <i>Dalbergiasissoo</i>                   | <i>Shisam</i>       | <i>Leguminosae</i>           | --                    |
| 28. | <i>Delonixregia</i>                      | <i>Gulmohar</i>     | <i>Fabaceae</i>              | <i>Least Concern</i>  |
| 29. | <i>Dendrocalamusstrictus</i>             | <i>Bamboo</i>       | <i>Poaceae</i>               | --                    |
| 30. | <i>Diospyrosmelanoxylon</i>              | <i>Timru</i>        | <i>Ebenaceae</i>             | <i>Not evaluated</i>  |
| 31. | <i>Eucalyptusglobules</i>                | <i>Nilgiri</i>      | <i>Myrtaceae</i>             | <i>Least Concern</i>  |
| 32. | <i>Ficusbenghalensis</i>                 | <i>Vad</i>          | <i>Moraceae</i>              | --                    |
| 33. | <i>Ficusreligiosa</i>                    | <i>Pipal</i>        | <i>Moraceae</i>              | <i>Not evaluated</i>  |
| 34. | <i>Gmelinaarborea</i>                    | <i>Gambhari</i>     | <i>Verbenaceae</i>           | --                    |
| 35. | <i>Lagerstroemiaparviflora</i>           | <i>Sidha/Sudha</i>  | <i>Anacardiaceae</i>         | <i>Not Assessed</i>   |
| 36. | <i>Madhucaalongifolia</i>                | <i>Mohuatree</i>    | <i>Sapotaceae</i>            | <i>Least Concern</i>  |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|                        |                                     |                         |                         |                       |
|------------------------|-------------------------------------|-------------------------|-------------------------|-----------------------|
| <b>37.</b>             | <i>Magnifera indica</i>             | <i>Aam</i>              | <i>Anacardiaceae</i>    | <i>Data deficient</i> |
| <b>38.</b>             | <i>Meliaazedarach</i>               | <i>BukkamNeem</i>       | <i>Meliaceae</i>        | <i>Not evaluated</i>  |
| <b>39.</b>             | <i>Moringaolerifera</i>             | <i>Munga</i>            | <i>Moringanaceae</i>    | --                    |
| <b>40.</b>             | <i>Musaparadisiacal</i>             | <i>Banana</i>           | <i>Musaceae</i>         | --                    |
| <b>41.</b>             | <i>Neriumoleamder</i>               | <i>Kaner</i>            | <i>Apocynaceae</i>      | <i>Least Concern</i>  |
| <b>42.</b>             | <i>Phoenixsylvestris</i>            | <i>Datepalm</i>         | <i>Arecaceae</i>        | --                    |
| <b>43.</b>             | <i>Phyllanthusemblica</i>           | <i>Awla</i>             | <i>Euphorbiaceae</i>    | --                    |
| <b>44.</b>             | <i>Pisidiumguava</i>                | <i>Guava</i>            | <i>Myrtaceae</i>        | --                    |
| <b>45.</b>             | <i>Plumeriaacutifolia</i>           | <i>Champa</i>           | <i>Apocynaceae</i>      | <i>Not Evaluated</i>  |
| <b>46.</b>             | <i>Pongamiapinnata</i>              | <i>Karanj</i>           | <i>Leguminosae</i>      | <i>Least Concern</i>  |
| <b>47.</b>             | <i>Prosopisjuliflora</i>            | <i>Vilayatibabool</i>   | <i>Fabaceae</i>         | --                    |
| <b>48.</b>             | <i>Punicamalus</i>                  | <i>Anar</i>             | <i>Lythraceae</i>       | <i>Least Concern</i>  |
| <b>49.</b>             | <i>Sarracaindica</i>                | <i>Ashok</i>            | <i>Annonaceae</i>       | <i>Not evaluated</i>  |
| <b>50.</b>             | <i>Shorearobusta</i>                | <i>Sal</i>              | <i>Depterocarpaceae</i> | <i>Least Concern</i>  |
| <b>51.</b>             | <i>Syzygiumcumini</i>               | <i>Jamun</i>            | <i>Myrtaceae</i>        | --                    |
| <b>52.</b>             | <i>Tectonagrandis</i>               | <i>Sagwan</i>           | <i>Verbenaceae</i>      | --                    |
| <b>53.</b>             | <i>Terminaliaarjuna</i>             | <i>Arjun</i>            | <i>Combretaceae</i>     | <i>Not evaluated</i>  |
| <b>54.</b>             | <i>Terminaliachebula</i>            | <i>Harhar</i>           | <i>Combretaceae</i>     | <i>Not evaluated</i>  |
| <b>55.</b>             | <i>Zizyphusjube</i>                 | <i>Ber</i>              | <i>Rhamnaceae</i>       | <i>Least Concern</i>  |
| <b>56.</b>             | <i>Zyziphusmauritian<br/>a</i>      | <i>Ber</i>              | <i>Rhamnaceae</i>       | <i>Least Concern</i>  |
| <b>Shrub&amp;Herbs</b> |                                     |                         |                         |                       |
| <b>57.</b>             | <i>Acanthospermumh<br/>ispidium</i> | <i>Kanti</i>            | <i>Asteraceae</i>       | --                    |
| <b>58.</b>             | <i>Acheranthusasper<br/>a</i>       | <i>Aghada</i>           | <i>Amaranthaceae</i>    | --                    |
| <b>59.</b>             | <i>Antigonumleptopu<br/>s</i>       | <i>coralvine</i>        | <i>Polygonaceae</i>     | --                    |
| <b>60.</b>             | <i>Argemonemexican<br/>a</i>        | <i>Piladhtura</i>       | <i>Papaveraceae</i>     | -                     |
| <b>61.</b>             | <i>Baugainvelliaglabr<br/>a</i>     | <i>Paperflower</i>      | <i>Nyctaginaceae</i>    | --                    |
| <b>62.</b>             | <i>Calotropisprocera</i>            | <i>Aakra</i>            | <i>Asclepiadaceae</i>   | --                    |
| <b>63.</b>             | <i>Carissaspinarum</i>              | <i>Karunda</i>          | <i>Apocynaceae</i>      | <i>Least Concern</i>  |
| <b>64.</b>             | <i>Cassiaauriculata</i>             | <i>Tarwar</i>           | <i>Fabaceae</i>         | --                    |
| <b>65.</b>             | <i>Cassiatora</i>                   | <i>Tarota/Takla</i>     | <i>Caesalpinaceae</i>   | <i>NotEvaluated</i>   |
| <b>66.</b>             | <i>Celosiaargentea</i>              | <i>silvercock'scomb</i> | <i>Amaranthaceae</i>    | -                     |
| <b>67.</b>             | <i>Chenopodiumalbu<br/>m</i>        | <i>manureweed</i>       | <i>Amaranthaceae</i>    | <i>Notevaluated</i>   |
| <b>68.</b>             | <i>Chromolaenaodora<br/>ta</i>      | <i>DevilWeed</i>        | <i>Asteraceae</i>       | --                    |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|                |  |                           |                       |               |
|----------------|--|---------------------------|-----------------------|---------------|
| 69.            | <i>Cleomeviscosa</i>                   | <i>Pivalitilval</i>       | <i>Cleomaceae</i>     | --            |
| 70.            | <i>Commelinabenghalensis</i>           | <i>Bokna</i>              | <i>Commelinaceae</i>  | --            |
| 71.            | <i>Dalurametel</i>                     | <i>Dhotra</i>             | <i>Solanaceae</i>     | NotEvaluated  |
| 72.            | <i>Echinopsechinatus</i>               | <i>Unthkantali</i>        | <i>Asteraceae</i>     | --            |
| 73.            | <i>Ervatamiadivaricata</i>             | <i>Chandani</i>           | <i>Apocynaceae</i>    | --            |
| 74.            | <i>Euphorbiahirta</i>                  | <i>Mothidudhi</i>         | <i>Evphorbiaceae</i>  | NotEvaluated  |
| 75.            | <i>Ipomoeacarnea</i>                   | <i>Besharam</i>           | <i>Convolvulaceae</i> | --            |
| 76.            | <i>Jasminumsambac</i>                  | <i>Mogra</i>              | <i>Oleaceae</i>       | --            |
| 77.            | <i>Jatrophagossipifolia</i>            | <i>cotton-leaf</i>        | <i>Euphorbiaceae</i>  | --            |
| 78.            | <i>Lantanacamara</i>                   | <i>Ghaneri</i>            | <i>Verbenaceae</i>    | --            |
| 79.            | <i>Leonotisnepetifolia</i>             | <i>lion'sear</i>          | <i>Lamiaceae</i>      | --            |
| 80.            | <i>Mesosphaerumsua<br/>veolens</i>     | <i>JungliTulsi</i>        | <i>Lamiaceae</i>      | --            |
| 81.            | <i>Mimosapudica</i>                    | <i>ChuiMui</i>            | <i>Mimosaceae</i>     | Least Concern |
| 82.            | <i>Ocimumsanctum</i>                   | <i>Tulsi</i>              | <i>Labiatae</i>       | --            |
| 83.            | <i>Partheniumhystero<br/>phorus</i>    | <i>Gajargrass</i>         | <i>Asteraceae</i>     | --            |
| 84.            | <i>Pterisvittata</i>                   | <i>Chinesebrake</i>       | <i>Pteridaceae</i>    |               |
| 85.            | <i>Ricinuscommunis</i>                 | <i>Arand</i>              | <i>Euphorbiaceae</i>  | --            |
| 86.            | <i>Ricinuscommunis</i>                 | <i>castor oilplant</i>    | <i>Euphorbiaceae</i>  | --            |
| 87.            | <i>Solanumnigrum</i>                   | <i>Mokai</i>              | <i>Solanaceae</i>     | --            |
| 88.            | <i>Solanumsisymbrifo<br/>liumLamk.</i> | <i>litchitomato</i>       | <i>Solanaceae</i>     | --            |
| 89.            | <i>Solanumsurattens<br/>e</i>          | <i>Bhuiringani</i>        | <i>Solanaceae</i>     | --            |
| 90.            | <i>Tephrosiapurpurea</i>               | <i>Sharpunkha</i>         | <i>Fabaceae</i>       | --            |
| 91.            | <i>Tridaxprocumbens</i>                | <i>Kambarmodi</i>         | <i>Asteraceae</i>     | --            |
| 92.            | <i>wrightiaantidysent<br/>erica</i>    | <i>MilkyWay,</i>          | <i>Apocynaceae</i>    | --            |
| 93.            | <i>Xanthiumstrumariu<br/>m</i>         | <i>ChotaDhatura</i>       | <i>Asteraceae</i>     | --            |
| <b>Grasses</b> |  |                           |                       |               |
| 94.            | <i>Apludamutica</i>                    | <i>Mauntiangrass</i>      | <i>Poaceae</i>        | Least Concern |
| 95.            | <i>Apludamutica</i>                    | <i>Banjuragrass</i>       | <i>Poaceae</i>        | --            |
| 97             | <i>Brachiariamutica</i>                | --                        | <i>Poaceae</i>        | --            |
| 98             | <i>Chrysopogonacicul<br/>atus</i>      | <i>lesserspear grass,</i> | <i>Poaceae</i>        | --            |
| 99             | <i>Cynodondactylon</i>                 | <i>Doob</i>               | <i>Poaceae</i>        | --            |
| 100            | <i>Cyperusrotundus</i>                 | <i>Motha</i>              | <i>cyperaceae</i>     | --            |

Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited

|                 |                                    |                      |                       |               |
|-----------------|------------------------------------|----------------------|-----------------------|---------------|
| <b>101</b>      | <i>Dactyloctenium aegyptium</i>    | <i>Crowfootgrass</i> | <i>Poaceae</i>        | --            |
| <b>102</b>      | <i>Digitaria ternate</i>           | --                   | <i>Graminae</i>       | --            |
| <b>103</b>      | <i>Echinochloa colona</i>          | <i>Junglerice</i>    | <i>Poaceae</i>        | --            |
| <b>104</b>      | <i>Kyllingia tenuifolia</i>        | --                   | <i>Cyperaceae</i>     | Least Concern |
| <b>105</b>      | <i>Pennisetum purpureum</i>        | <i>Elephantgrass</i> | <i>Poaceae</i>        | --            |
| <b>106</b>      | <i>Saccharum spontaneum</i>        | <i>kans</i>          | <i>Poaceae</i>        | --            |
| <b>Climbers</b> |                                    |                      |                       |               |
| <b>107</b>      | <i>Abrus precatorius</i>           | <i>Gunja</i>         | <i>Fabaceae</i>       | --            |
| <b>108</b>      | <i>Celastrus paniculatus Willd</i> | <i>Kujari</i>        | <i>Celastraceae</i>   | --            |
| <b>109</b>      | <i>Cissampelos pareira</i>         | <i>Khariyalata</i>   | <i>Menispermaceae</i> | --            |
| <b>110</b>      | <i>Cuscuta reflexa</i>             | <i>Amarbel</i>       | <i>Convolvulaceae</i> | --            |
| <b>111</b>      | <i>Hemidesmus indicus</i>          | <i>Anantamul</i>     | <i>Apocynaceae</i>    | --            |
| <b>112</b>      | <i>Zizyphus oenoplia</i>           | <i>Makor</i>         | <i>Rhamnaceae</i>     | Least Concern |

**Source—Survey team in consultation with local people and forest department.**

**Table 3.20 Phytoplankton Observed in Buffer Zone**

| <b>S.No.</b> | <b>Scientific Name</b> | <b>Family</b>            |
|--------------|------------------------|--------------------------|
| 1            | <i>Ulothrix</i>        | <i>Ulothrixaceae</i>     |
| 2            | <i>Cyclotella</i>      | <i>Stephanodiscaceae</i> |
| 3            | <i>Spirogyra</i>       | <i>Zygnemataceae</i>     |
| 4            | <i>Chlorella</i>       | <i>Chlorellaceae</i>     |
| 5            | <i>Oedogonium</i>      | <i>Oedogoniaceae</i>     |
| 6            | <i>Desmidiium</i>      | <i>Desmidiaceae</i>      |
| 7            | <i>Volvox</i>          | <i>Volvocaceae</i>       |
| 8            | <i>Micrasterias</i>    | <i>Desmidiaceae</i>      |

**Table 3.21 Macrophytes observed in Buffer Zone**

| <b>S.No.</b> | <b>Scientific Name</b>        | <b>Family</b>           |
|--------------|-------------------------------|-------------------------|
| 1            | <i>Colocasia esculenta</i>    | <i>Araceae</i>          |
| 2            | <i>Ceratophyllum demersum</i> | <i>Ceratophyllaceae</i> |
| 3            | <i>Chara sp.</i>              | <i>Characeae</i>        |
| 4            | <i>Hydrilla verticillata</i>  | <i>Hydrocharitaceae</i> |
| 5            | <i>Schoenoplectus</i>         | <i>Cyperaceae</i>       |
| 6            | <i>Sparganium</i>             | <i>Typhaceae</i>        |

Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited

|    |  |                        |
|----|--|------------------------|
| 7  | <i>Polygonumhydropiper</i>             | <i>Polygonaceae</i>    |
| 9  | <i>Marsilea</i>                        | <i>Marsileaceae</i>    |
| 10 | <i>Alternantheraphiloxeroide<br/>s</i> | <i>Solanaceae</i>      |
| 11 | <i>Nelumbonucifera</i>                 | <i>Nelumbiaceae</i>    |
| 12 | <i>Scirpusarticulatus</i>              | <i>Cyperaceae</i>      |
| 13 | <i>Aponogetonnatans</i>                | <i>Aponogetonaceae</i> |

**B. Fauna**

• **Core Zone**

Table 3.22 Fauna in Core Zone

| S.N o.                              | Comm on Name             | ScientificName                    | Family             | Statusasper WPA-1972 | IUCNstatus           |
|-------------------------------------|--------------------------|-----------------------------------|--------------------|----------------------|----------------------|
| <b>Mammals</b>                      |                          |                                   |                    |                      |                      |
| 1.                                  | Fivestriped palmsquirrel | <i>Funambuluspennanti</i>         | Sciuridae          | ScheduleIV           | <i>Least Concern</i> |
| 2.                                  | Jackal                   | <i>Canisaurius</i>                | <i>Canidae</i>     | ScheduleII           | <i>Not evaluated</i> |
| 3.                                  | Common HouseRat          | <i>Rattusrattus</i>               | <i>Muridae</i>     | Schedule-V           | <i>Least Concern</i> |
| 4.                                  | Indian Fulvous Fruit-Bat | <i>Rousettuleschenaulti<br/>a</i> | Pteropodidae       | Schedule-V           | <i>Least Concern</i> |
| 5.                                  | IndianField Mouse        | <i>Musbooduga</i>                 | Muridae            | Schedule-V           | <i>Least Concern</i> |
| 6.                                  | Common HouseRat          | <i>Rattusrattus</i>               | Muridae            | Schedule-V           | <i>Least Concern</i> |
| 7.                                  | BandicootRat             | <i>Bandicotabengalensis</i>       | Muridae            | Schedule-V           | <i>Least Concern</i> |
| 8.                                  | IndianHare               | <i>Lepusnigricollis</i>           | <i>Leporidae</i>   | ScheduleIV           | <i>LeastConcern</i>  |
| 9.                                  | IndianGrey Mongoose      | <i>Herpestes edwardsi</i>         | <i>Herpestidae</i> | ScheduleII           | <i>LeastConcern</i>  |
| <b>Reptiles&amp;Amphibia<br/>ns</b> |                          |                                   |                    |                      |                      |
| 10.                                 | RatSnake                 | <i>Ptyasmucosa<br/>Linnaeus</i>   | <i>Colubridae</i>  | Schedule-II          | <i>NotEvaluated</i>  |
| 11.                                 | <b>Python</b>            | <b>Pythonmolurus</b>              | <b>Pythonidae</b>  | <b>Schedule-I</b>    | <i>Vulnerable</i>    |
| 12.                                 | <b>Monitor lizard</b>    | <b>Varanusbengalensis</b>         | <b>Varanidae</b>   | <b>Schedule-I</b>    | <i>LeastConcern</i>  |
| 13.                                 | Russell's Viper          | <i>Daboiarusselii</i>             | <i>Viperidae</i>   | ScheduleII           | <i>NotEvaluated.</i> |
| 14.                                 | Pitviper                 | <i>Crotolussp</i>                 | <i>Viperadae</i>   | Schedule-II          | <i>Leastconcern</i>  |
| 15.                                 | Common frog              | <i>Ranatemporaria</i>             | <i>Ranidae</i>     | Schedule-IV          | <i>NotEvaluated</i>  |
| 16.                                 | Kingcobra                | <i>Ophiophagushannah</i>          | <i>Elapidae</i>    | ScheduleII           | <i>Vulnerable</i>    |
| 17.                                 | Krait                    | <i>Bungaruscaeruelus</i>          | <i>Elapidae</i>    | Schedule-IV          | <i>NotEvaluated</i>  |

Prepared by CMPDI, RI-III, Ranchi

Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited

| <b>BIRDSPECIES</b> |                   |                                |                           |                   |               |
|--------------------|-------------------|--------------------------------|---------------------------|-------------------|---------------|
| 18.                | Crow              | <i>Corvus splendens</i>        | <i>Corvidae</i>           | Schedule V        | Least concern |
| 19.                | Little brown dove | <i>Spilopelia senegalensis</i> | <i>Columbidae</i>         | Schedule-IV       | Least concern |
| 20.                | Black drongo      | <i>Dicrurus adsimilis</i>      | <i>Dicruridae</i>         | Schedule-IV       | Least concern |
| 21.                | Myna              | <i>Acridotheres tristis</i>    | <i>Sturnidae</i>          | Schedule IV       | Least concern |
| 22.                | Red-vented bulbul | <i>Pycnonotus cafer</i>        | <i>Pycnonotidae</i>       | Schedule-IV       | Least concern |
| 23.                | <b>Peafowl</b>    | <b><i>Pavocristatus</i></b>    | <b><i>Phasianidae</i></b> | <b>Schedule I</b> | Least Concern |
| 24.                | Jal Murgi         | <i>Gallinula chloropus</i>     | <i>Rallidae</i>           | Schedule-IV       | --            |
| 25.                | Cattle egret      | <i>Bubulcus ibis</i>           | <i>Ardeidae</i>           | Schedule-IV       | --            |

• **Buffer Zone**

Table 3.23 Fauna in Buffer Zone

| S.No.          | Common Name                | Scientific Name                | Family                                 | Status as per WPA-1972 | IUCN status     |
|----------------|----------------------------|--------------------------------|--|------------------------|-----------------|
| <b>Mammals</b> |                            |                                |  |                        |                 |
| 1.             | Bandicoot Rat              | <i>Bandicota bengalensis</i>   | <i>Muridae</i>                         | Schedule-V             | Least Concern   |
| 2.             | Jackal                     | <i>Canis auratus</i>           | <i>Canidae</i>                         | Schedule II            | Not evaluated   |
| 3.             | Jungle cat                 | <i>Felis chaus</i>             | <i>Felidae</i>                         | Schedule II            | Not evaluated   |
| 4.             | Five striped palm squirrel | <i>Funambulus pennanti</i>     | <i>Sciuridae</i>                       | Schedule IV            | Least Concern   |
| 5.             | Indian Grey Mongoose       | <i>Herpestes edwardsi</i>      | <i>Herpestidae</i>                     | Schedule II            | Least Concern   |
| 6.             | Striped hyena              | <i>Hyaena hyaena</i>           | <i>Hyaenidae</i>                       | Schedule III           | Near Threatened |
| 7.             | Porcupine                  | <i>Hystrix indica</i>          | <i>Hystriidae</i>                      | Schedule I             | Least Concern   |
| 8.             | Indian Hare                | <i>Lepus nigricollis</i>       | <i>Leporidae</i>                       | Schedule IV            | Least Concern   |
| 9.             | Indian Field Mouse         | <i>Mus booduga</i>             | <i>Muridae</i>                         | Schedule-V             | Least Concern   |
| 10.            | Common langur              | <i>Presbytis entellus</i>      | <a href="#"><i>Cercopithecidae</i></a> | Schedule II            | Least Concern   |
| 11.            | Common House Rat           | <i>Rattus rattus</i>           | <i>Muridae</i>                         | Schedule-V             | Least Concern   |
| 12.            | Indian Fulvous Fruit-Bat   | <i>Rousettus leschenaultia</i> | <i>Pteropodidae</i>                    | Schedule-V             | Least Concern   |
| 13.            | Wild Boar                  | <i>Sus scrofa</i>              | <i>Suidae</i>                          | Schedule III           | Least Concern   |
| 14.            | Indian fox                 | <i>Vulpes bengalensis</i>      | <a href="#"><i>Canidae</i></a>         | Schedule II            | Least Concern   |

Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited

| <b>Reptiles and Amphibians</b> |                                  |                           |                       |                   |               |
|--------------------------------|----------------------------------|---------------------------|-----------------------|-------------------|---------------|
| 1.                             | Brachyura Latreille,             | <i>Crab</i>               | <i>Malacostraca</i>   | --                | --            |
| 2.                             | Bufo melanostictus               | <i>Common toad</i>        | <i>Bufo</i>           | Schedule-IV       | Leastconcern  |
| 3.                             | Bungarus caeruleus               | <i>Krait</i>              | <i>Elapidae</i>       | Schedule-IV       | NotEvaluated  |
| 4.                             | Calotes versicolor               | <i>Garden lizard</i>      | <i>Agamidae</i>       | Schedule-IV       | Not evaluated |
| 5.                             | Crotalus sp                      | <i>Pit viper</i>          | <i>Viperidae</i>      | Schedule-II       | Leastconcern  |
| 6.                             | Daboia russelii                  | <i>Russell's Viper</i>    | <i>Viperidae</i>      | ScheduleII        | NotEvaluated  |
| 7.                             | Enhydris enhydris                | <i>Smooth water snake</i> | <i>Homalopsidae</i>   | Schedule-IV       | Leastconcern  |
| 8.                             | <i>Euphlyctis hexadactyla</i>    | Commonfrog                | <i>Dicroglossidae</i> | Schedule-IV       | NotEvaluated  |
| 9.                             | <i>Eutropiscarinata</i>          | Common skink              | <i>Scincidae</i>      | Schedule-IV       | LeastConcern  |
| 10.                            | <i>Hemidactylus flaviviridis</i> | HouseGecko                | Gekkonidae            | --                | --            |
| 11.                            | <i>Ophiophagus hannah</i>        | Kingcobra                 | <i>Elapidae</i>       | ScheduleII        | Vulnerable    |
| 12.                            | <i>Ptyas mucosa Linnaeus</i>     | RatSnake                  | <i>Colubridae</i>     | Schedule-II       | NotEvaluated  |
| 13.                            | <b>Pythonmolurus</b>             | <b>Python</b>             | <b>Pythonidae</b>     | <b>Schedule-I</b> | Vulnerable    |
| 14.                            | <i>Ranatemporaria</i>            | Commonfrog                | <i>Ranidae</i>        | Schedule-IV       | NotEvaluated  |
| 15.                            | <b>Varanus bengalensis</b>       | <b>Monitorlizard</b>      | <b>Varanidae</b>      | <b>Schedule-I</b> | LeastConcern  |
| <b>Butterflies</b>             |                                  |                           |                       |                   |               |
| 1.                             | <i>Danauschrysius</i>            | PlainTiger                | Nymphalidae           |                   |               |
| 2.                             | <i>Danausgenutia</i>             | StrippedTiger             | Nymphalidae           |                   |               |
| 3.                             | <i>Euploeacore</i>               | Commoncrow                | Nymphalidae           |                   |               |
| 4.                             | <i>Tirumalalimniace</i>          | Bluetiger                 | Nymphalidae           |                   |               |
| 5.                             | <i>Euremabrigitta</i>            | Smallgrassyyellow         | Pieridae              |                   |               |
| 6.                             | <i>Danausplexippus</i>           | commontiger,              | Nymphalidae           |                   |               |
| <b>Avifauna</b>                |                                  |                           |                       |                   |               |
| 1.                             | <i>Gallusgallus</i>              | Junglehen                 | <i>Phasianidae</i>    | ScheduleIV        |               |

Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited

|     |                                 |                     |                           |                  |  |
|-----|---------------------------------|---------------------|---------------------------|------------------|--|
| 2.  | <i>Columbalivia</i>             | Pigeon              | <i>Columbidae</i>         | ScheduleIV       |  |
| 3.  | <i>Psittaculakrameri</i>        | RoseringedParakeet  | <i>Psittacidae</i>        | ScheduleIV       |  |
| 4.  | <i>Milvusmigrans</i>            | BlackKite           | <i>Accipitridae</i>       | ScheduleIV       |  |
| 5.  | <i>Acridotherestrictis</i>      | Myna                | <i>Sturnidae</i>          | ScheduleIV       |  |
| 6.  | <i>Francolinuspondicerianus</i> | Titar               | <i>Phasianidae</i>        | ScheduleIV       |  |
| 7.  | <i>Corvussplendens</i>          | Crow                | <i>Corvidae</i>           | ScheduleV        |  |
| 8.  | <b><i>Pavocristatus</i></b>     | <b>Peafowl</b>      | <b><i>Phasianidae</i></b> | <b>ScheduleI</b> |  |
| 9.  | <i>Amandavaamandava</i>         | Redmunia            | <i>Estrildidae</i>        | Schedule-IV      |  |
| 10. | <i>Egrettaalba</i>              | Largeregret         | <i>Ardeidae</i>           | Schedule-IV      |  |
| 11. | <i>Bubulcusibis</i>             | Cattleegret         | <i>Ardeidae</i>           | Schedule-IV      |  |
| 12. | <i>Ardeolagrayii</i>            | Indianpondheron     | <i>Ardeidae</i>           | Schedule-IV      |  |
| 13. | <i>Spilopelia senegalensis</i>  | Littlebrowndove     | <i>Columbidae</i>         | Schedule-IV      |  |
| 14. | <i>Alcedoatthis</i>             | Smallbluekingfisher | <i>Alcedinidae</i>        | Schedule-IV      |  |
| 15. | <i>Upupaepops</i>               | Commonhoopoe        | <i>Upupidae</i>           | Schedule-IV      |  |
| 16. | <i>Sturnuscontra</i>            | Asianpiedstarling   | <i>Sturnidae</i>          | Schedule-IV      |  |
| 17. | <i>Vanellusindicus</i>          | Red-wattledlapwing  | <i>Charadriidae</i>       | Schedule-IV      |  |
| 18. | <i>Pycnonotuscafer</i>          | Red-ventedbulbul    | <i>Pycnonotidae</i>       | Schedule-IV      |  |
| 19. | <i>Turdoidescaudate</i>         | Commonbabblar       | <i>Leiothrichidae</i>     | Schedule-IV      |  |
| 20. | <i>Centropussinensis</i>        | Crowpheasant        | <i>Cuculidae</i>          | Schedule-IV      |  |
| 21. | <i>Dicrurusadsimilis</i>        | Blackdrango         | <i>Dicruridae</i>         | Schedule-IV      |  |
| 22. | <i>Corvus macrorhynchos</i>     | Junglecrow          | <i>Corvidae</i>           | Schedule-IV      |  |
| 23. | <i>Passerdomesticus</i>         | Housesparrow        | <i>Passeridae</i>         | Schedule-IV      |  |
| 24. | <i>Saxicoloidesfulicatus</i>    | Indianrobin         | <i>Psittaculidae</i>      | Schedule-IV      |  |
| 25. | <i>Cinnyrisasiaticus</i>        | PurpleSunbird       | <i>Psittaculidae</i>      | Schedule-IV      |  |
| 26. | <i>Athenebrama</i>              | SpottedOwlet        | <i>Strigidae</i>          | Schedule-IV      |  |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|     |                    |                  |                     |             |  |
|-----|--------------------|------------------|---------------------|-------------|--|
| 27. | Sturniapagodarum   | BrahminyStarling | <i>Sturnidae</i>    | Schedule-IV |  |
| 28. | Dicrurusbracteatus | Drongo           | <i>Dicruridae</i>   | Schedule-IV |  |
| 29. | Motacillacinerea   | Greywagtail      | <i>Motacillidae</i> | Schedule-IV |  |
| 30. | Gallinulachloropus | JalMurgi         | <i>Rallidae</i>     | Schedule-IV |  |

### 3.8 Socio-Economic Study

Socio-economic study of core and buffer zone of Kathara OCP was carried out by Environmental Technical Services Private Limited during post monsoon season of 2020.

Core zone/ project area consists of only 1 village and the buffer zone for the concerned project comprises around 16 villages within 10 km radius around the concerned mine. These villages are listed below with the population as per Census of India 2011.

**Table 3.24 Village wise Demographic Profile at Core and Buffer Zone**

| Name               | HH           | Total Population | Total Male   | Total Female |
|--------------------|--------------|------------------|--------------|--------------|
| <b>Core Zone</b>   |              |                  |              |              |
| Kathara            | 67           | 460              | 253          | 207          |
| <b>Total</b>       | <b>67</b>    | <b>460</b>       | <b>253</b>   | <b>207</b>   |
| <b>Buffer Zone</b> |              |                  |              |              |
| Armo               | 327          | 1796             | 898          | 898          |
| Burgara            | 187          | 1001             | 501          | 500          |
| Garnke             | 195          | 892              | 434          | 458          |
| Kachho             | 351          | 2040             | 1047         | 993          |
| Kanjkiro           | 1061         | 5886             | 3026         | 2860         |
| Tenu Ghat          | 821          | 4533             | 2523         | 2010         |
| Gumia              | 9001         | 48141            | 25119        | 23022        |
| Jomuniya Tola      | 1077         | 5864             | 3011         | 2853         |
| Gharwatanr buludih | 762          | 4248             | 2132         | 2116         |
| Ulgara             | 525          | 2687             | 1388         | 1299         |
| Phutkadih          | 275          | 1430             | 714          | 716          |
| Rohar              | 263          | 1326             | 669          | 657          |
| Garri              | 169          | 740              | 373          | 367          |
| Mayapur            | 195          | 965              | 513          | 452          |
| Jhirki             | 171          | 821              | 427          | 394          |
| Jhujhko            | 392          | 1862             | 932          | 930          |
| <b>Total</b>       | <b>15772</b> | <b>84232</b>     | <b>43707</b> | <b>40525</b> |
| <b>Grand Total</b> | <b>15839</b> | <b>84692</b>     | <b>43960</b> | <b>40732</b> |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

### 3.8.1 Sampling

In order to understand the actual socio economic status of the villagers, household sampling has been carried out in villages falling in different zones in order to ensure effective representation. A total of 250 households were sampled covering core and buffer zone.

**Table 3.25 Details of Household sampling**

| S.No.              | Village              | Households   | Population    | Sample     |
|--------------------|----------------------|--------------|---------------|------------|
| <b>Core Zone</b>   |                      |              |               |            |
| 1                  | Nil                  | Nil          | Nil           | Nil        |
| <b>Buffer Zone</b> |                      |              |               |            |
| 1                  | Kanjkiro             | 1061         | 5886          | 90         |
| 2                  | Kachho               | 351          | 2040          | 41         |
| 3                  | Burgara              | 187          | 1001          | 27         |
| 4                  | Garnke               | 195          | 892           | 16         |
| 5                  | Armo                 | 327          | 1796          | 30         |
| 6                  | Gumia                | 9001         | 48141         | 20         |
| 7                  | Mayapur              | 195          | 965           | 11         |
| 8                  | Tenughat             | 821          | 4533          | 4          |
| 9                  | Champi Jamuniya Tola | 1077         | 5864          | 11         |
| <b>Total</b>       |                      | <b>13215</b> | <b>71,118</b> | <b>250</b> |

### 3.8.2 Socio-Economic Profile of the Study Area

#### *Demographic Profile*

**Table 3.26 Caste Structure at Surveyed Areas**

| BUFFER ZONE          |    |           |            |         |        |            |
|----------------------|----|-----------|------------|---------|--------|------------|
| Village Name         | SC | ST        | OBC        | General | Others | Total      |
| Kanjkiro             | -  | 18        | 72         | -       | -      | 90         |
| Kachho               | -  | 03        | 38         | -       | -      | 41         |
| Burgara              | -  | 14        | 13         | -       | -      | 27         |
| Garnke               | -  | 16        | -          | -       | -      | 16         |
| Armo                 | -  | 17        | 13         | -       | -      | 30         |
| Gumia                | -  | 07        | 13         | -       | -      | 20         |
| Mayapur              | -  | -         | 11         | -       | -      | 11         |
| Tenughat             | -  | -         | 04         | -       | -      | 04         |
| Champi Jamuniya Tola | -  | 10        | 01         | -       | -      | 11         |
| <b>Total</b>         | -  | <b>85</b> | <b>165</b> | -       | -      | <b>250</b> |

**Table 3.27 Type of Dwellings at Surveyed Area**

| BUFFER ZONE  |       |             |        |       |
|--------------|-------|-------------|--------|-------|
| Village Name | Pucca | Semi- Pucca | Kutcha | Total |
| Kanjkiro     | 15    | 25          | 50     | 90    |
| Kachho       | 18    | 03          | 20     | 41    |
| Burgara      | 01    | 02          | 24     | 27    |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|                      |    |    |     |     |
|----------------------|----|----|-----|-----|
| Garnke               | -  | -  | 16  | 16  |
| Armo                 | -  | 01 | 29  | 30  |
| Gumia                | 05 | 11 | 04  | 20  |
| Mayapur              | 02 | 07 | 02  | 11  |
| Tenughat             | -  | -  | 04  | 04  |
| Champi Jamuniya Tola | 01 | -  | 10  | 11  |
| Total                | 42 | 49 | 159 | 250 |

**Table 3.28 Religion Distribution**

| BUFFER ZONE          |       |        |      |           |       |
|----------------------|-------|--------|------|-----------|-------|
| Village Name         | Hindu | Muslim | Sikh | Christian | Total |
| Kanjkiro             | 90    | -      | -    | -         | 90    |
| Kachho               | -     | 41     | -    | -         | 41    |
| Burgara              | 27    | -      | -    | -         | 27    |
| Garnke               | 16    | -      | -    | -         | 16    |
| Armo                 | 30    | -      | -    | -         | 30    |
| Gumia                | 20    | -      | -    | -         | 20    |
| Mayapur              | 11    | -      | -    | -         | 11    |
| Tenughat             | 04    | -      | -    | -         | 04    |
| Champi Jamuniya Tola | 11    | -      | -    | -         | 11    |
| Total                | 209   | 41     | -    | -         | 250   |

### 3.8.3 Observation and Discussion

***Nature of Effect:***

1. This is an old project and hence no R&R is involved. Therefore, no loss would be majorly in terms of the land which will be taken away from the people of these villages.
2. Large amount of population are directly or indirectly engaged in primary sector which is Agriculture.
3. The farmers who have their own land would be affected severely as their livelihood directly depends on agriculture.
4. After agriculture, it's the labours that will be affected the most. It is second major occupation of the people in these villages.

***Expectations from the Project:***

For any large-scale project to be successful, it is also essential to ensure progress and advancement of affected families. Development along with social conscience is the essence to sustainable growth. The project affected families were interviewed for their thoughts about the project and they were unanimously in favour of the project. They were also questioned on specific pain points faced in their daily lives which gave a glimpse into the possibilities of specific interventions by CCL to enhance the lives. Multiple requests for various activities were received for assistance and thus the total number of responses is far more than 250 in the table.

| BUFFER ZONE  |                            |                  |                   |          |      |       |
|--------------|----------------------------|------------------|-------------------|----------|------|-------|
| Village Name | Water Facility enhancement | Access to School | Road Construction | Hospital | Jobs | Total |
| =====        |                            |                  |                   |          |      |       |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|                            |     |    |     |    |     |     |
|----------------------------|-----|----|-----|----|-----|-----|
| Kanjkiro                   | 51  | 32 | 70  | 24 | 10  | 187 |
| Kachho                     | 35  | 11 | 36  | 05 | 21  | 108 |
| Burgara                    | 27  | 09 | 27  | 10 | 18  | 91  |
| Garnke                     | 16  | 08 | 16  | 05 | 04  | 49  |
| Armo                       | 27  | 14 | 30  | 11 | 17  | 99  |
| Gumia                      | 14  | 05 | 19  | 06 | 11  | 55  |
| Mayapur                    | 11  | -  | 02  | -  | 10  | 23  |
| Tenughat                   | -   | -  | -   | -  | 04  | 04  |
| Champi<br>Jamuniya<br>Tola | 11  | -  | 08  | -  | 11  | 30  |
| Total                      | 192 | 79 | 208 | 61 | 106 | 646 |

### 3.8.4 Occupational Health Survey:

Under the Occupational Health and Safety Act, occupational illness is defined as a condition that results from exposure in a workplace to a physical, chemical or biological agent to the extent that the normal physiological mechanisms are affected and the health of the worker is impaired.

In core zone, it has been intimated by the project proponent that IME before employment and PME for 1/4<sup>th</sup> work-force is regularly done for keeping OHS surveillance.

In buffer zone, free health camps have been conducted to monitor the health status of nearby villagers. In buffer zone, it was found that there were no such major diseases prevailing in these villages. The problems shared by the people were not under the criteria of disease or illness, but simply regular problems faced by them.

- a) Malaria: During the survey, people complained of malaria as one of the major diseases. They said due to open water bodies and defecation lot of mosquito-borne diseases was prevalent in the area.
- b) Breathing/ Dust Problem: Breathing and dust problem were an overall concern by the people from all the villages. It was due to heavy vehicle movement. Majorly elderly people above 60-yearsold suffered from breathing problems.

## 3.9 Land Use Pattern

The land use pattern of core and buffer zone studied through satellite imagery data is as shown in the Plate IX. The observations of the study are as given below.

**Core Zone:** Around 308 Ha. (39.84 %) of the core zone is being used for mining and other purposes. Most of the remaining land is either plantation, or scrubs or settlements. There has been less agricultural land (around 67 Ha – 8.67 %) which has been observed as per the satellite imagery study.

**Buffer Zone:** Buffer zone largely consists of agricultural land (around 14,138 Ha – 37.80 %) and Scrubs (8011 Ha- 21.41%). Refer **Plate IX** for detailed land use plan.

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

| Area Statistics - Core & Buffer zone of Kathara OC (2020) |                               |        |                         |               |                         |               |
|---|-------------------------------|--------|-------------------------|---------------|-------------------------|---------------|
| Classes   |                               | Colour | Core Zone               |               | Buffer Zone             |               |
| Level-I   | Level-II                      |        | Area (Km <sup>2</sup> ) | % of Total    | Area (Km <sup>2</sup> ) | % of Total    |
| Forest  | Dense Forest                  |        | 0.00                    | 0.00          | 19.02                   | 4.11          |
|   | Open Forest                   |        | 0.00                    | 0.00          | 29.47                   | 6.36          |
|   | <b>Total Forest</b>           |        | <b>0.00</b>             | <b>0.00</b>   | <b>48.49</b>            | <b>10.47</b>  |
| Scrubs  | Scrubs                        |        | 0.53                    | 6.86          | 81.04                   | 17.50         |
| Plantation Area   | Social Forestry               |        | 0.83                    | 10.74         | 9.71                    | 2.10          |
|   | Plantation on OB              |        | 0.96                    | 12.42         | 1.47                    | 0.32          |
|   | Plantation on Backfill        |        | 0.33                    | 4.27          | 3.59                    | 0.78          |
|   | <b>Total Plantation Area</b>  |        | <b>2.12</b>             | <b>27.43</b>  | <b>14.77</b>            | <b>3.20</b>   |
| Agriculture Land  | Crop Land                     |        | 0.19                    | 2.46          | 42.66                   | 9.21          |
|   | Fallow Land                   |        | 0.48                    | 6.21          | 98.72                   | 21.31         |
|   | <b>Total Agriculture Land</b> |        | <b>0.67</b>             | <b>8.67</b>   | <b>141.38</b>           | <b>30.52</b>  |
| Waste Land  | Waste Land                    |        | 0.42                    | 5.43          | 27.98                   | 6.04          |
|   | Sand Body                     |        | 0.06                    | 0.78          | 5.36                    | 1.16          |
|   | Barren Rocky Land             |        | 0.00                    | 0.00          | 0.26                    | 0.06          |
|   | Fly Ash Pond                  |        | 0.11                    | 1.42          | 0.57                    | 0.12          |
|   | <b>Total Waste Land</b>       |        | <b>0.59</b>             | <b>7.63</b>   | <b>34.17</b>            | <b>7.38</b>   |
| Mining Area   | Coal Quarry                   |        | 0.36                    | 4.66          | 2.78                    | 0.60          |
|   | Adv. Quarry Site              |        | 0.00                    | 0.00          | 0.15                    | 0.03          |
|   | Barren OB Dump                |        | 1.70                    | 21.99         | 6.19                    | 1.33          |
|   | Back Fill                     |        | 0.65                    | 8.41          | 1.22                    | 0.26          |
|   | Coal Dump                     |        | 0.11                    | 1.42          | 0.55                    | 0.12          |
|   | Water Filled Quarry           |        | 0.26                    | 3.36          | 2.08                    | 0.45          |
|   | <b>Total Mining Area</b>      |        | <b>3.08</b>             | <b>39.84</b>  | <b>12.97</b>            | <b>2.79</b>   |
| Settlements   | Urban Settlements             |        | 0.41                    | 5.30          | 90.41                   | 19.52         |
|   | Rural Settlements             |        | 0.07                    | 0.91          | 5.81                    | 1.25          |
|   | Industrial Settlements        |        | 0.21                    | 2.72          | 1.73                    | 0.37          |
|   | <b>Total Settlement Area</b>  |        | <b>0.69</b>             | <b>8.93</b>   | <b>97.95</b>            | <b>21.14</b>  |
| Water Body  | River/ Ponds                  |        | 0.05                    | 0.65          | 32.41                   | 7.00          |
| <b>Total Area</b>   |                               |        | <b>7.73</b>             | <b>100.00</b> | <b>463.18</b>           | <b>100.00</b> |

\*\*\*\*\*

## Chapter 4

# Anticipated Environmental Impacts and Mitigation Measures

### 4.1 Introduction

The impacts (both beneficial and adverse) of mining and its allied activities have been assessed and presented in respect of air, water, noise, blasting vibration, socio-economic profile, flora & fauna, land resource, traffic movement and visual/aesthetic aspect in this chapter.

Control measures to mitigate various environmental impacts are also highlighted in this chapter for carrying out mining operation in an environmentally compatible manner.

### 4.2 Cumulative Impact Assessment & Pollution Control Measures for Air

The cumulative impact assessment has been carried out dealing with the following points:

- i. Inventory of air pollution emission sources in core and buffer zone.
- ii. Impact assessment (short-term and long-term besides direct/indirect and residual)
- iii. Detailing the mitigation Measures along with the cost estimates.

#### 4.2.1 Inventory of Air Pollution Sources

To assess the cumulative impact, contribution from the existing/proposed industrial sources as well as other polluting sources in the 10km radius of core zone has been calculated. Accordingly, the project life has been divided into following time frames:

- Operation phase (long term).
- Post-operational phase (short term).

The activities associated with these time frames and having impact on the ambient air quality along with the pollutants are enumerated in the following sections:

Operational phase: During this phase activities for mining of coal, its handling and transport are taken up. Such activities are detailed below:

|       |                                       |                        |
|-------|---------------------------------------|------------------------|
| (i)   | Drilling & Blasting                   | Dust                   |
| (ii)  | Handling, loading & unloading of coal | Dust and noxious gases |
| (iii) | Movement of vehicles                  | Dust and noxious fumes |
| (iv)  | Crushing of coal                      | Dust and noxious gases |
| (v)   | Wind erosion                          | Dust                   |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

***Post-operational phase:***

During this stage of the project, the activities related to the closure of mine are to be carried out as per the approved final mine closure plan. Major final mine closure activities that could have an impact on air environment are Physical and biological reclamation of degraded land, mine voids, OB dumps, Salvaging and shifting operation of redundant equipment, Clearing of coal and other materials, restoration of original land-use etc.

***Details of Air Pollution Sources***

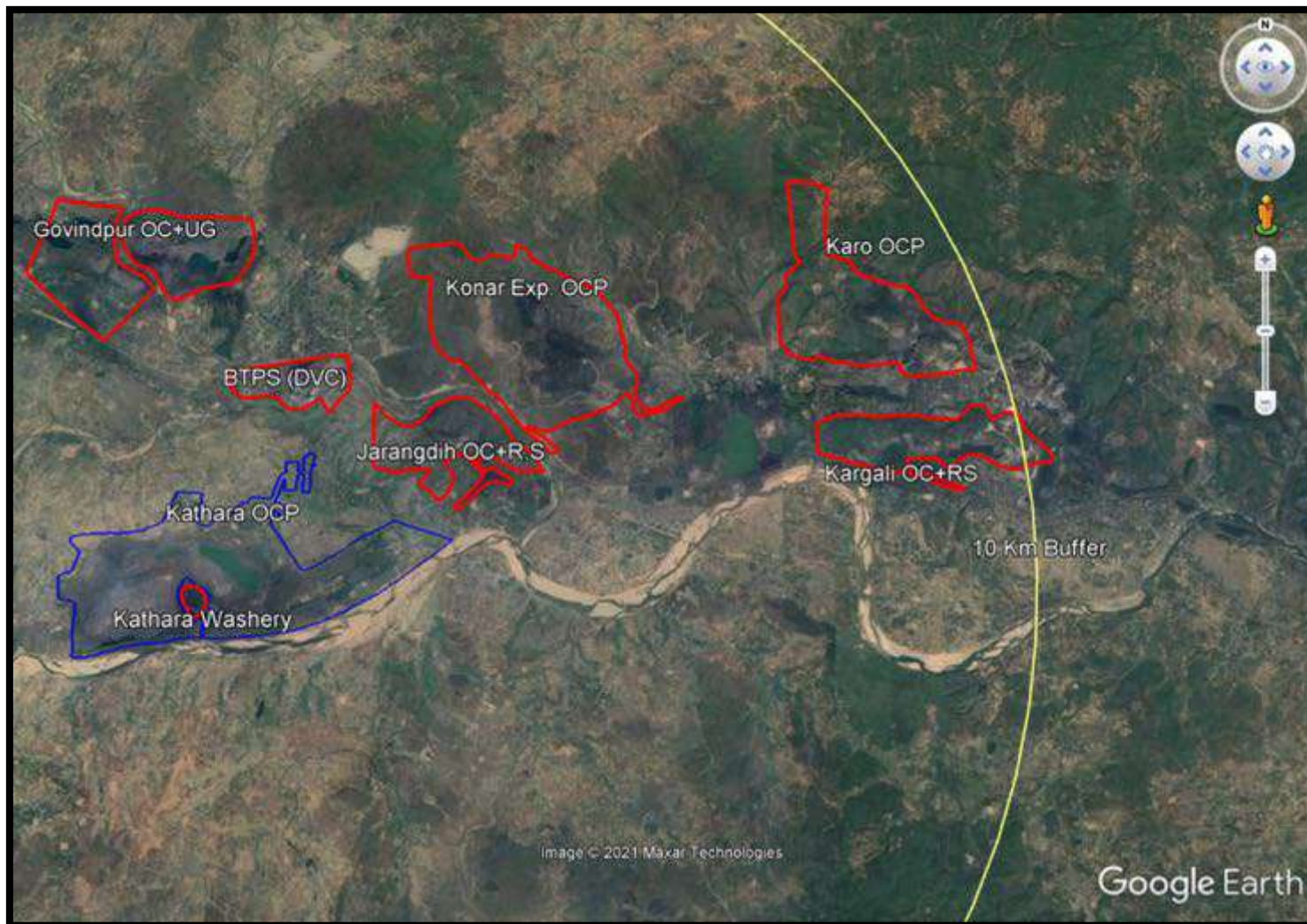
The details of industrial set up of buffer zone is as given below.

**Table 4.1 Details of air pollution sources in the buffer zone**

| S.N | Name of Project                             | Direction as per Wind flow from Kathara OC | Distance from Kathara OC (km) | EC Capacity (MTPA) | Production during Baseline Period (FY 20-21) (MTPA) | Proposed Future Expansion (MTPA) |
|-----|---|--|-------------------------------|--------------------|---|----------------------------------|
| 1   | Bokaro Thermal Power Station (BTPS, DVC)    | Crosswind (NNE)                            | 1.1                           | 710 MW             | 710 MW  | -                                |
| 2   | Tenughat Thermal Power Station (TTPS, TVNL) | Upwind (W)                                 | 8.9                           | 420 MW             | 420 MW  | -                                |
| 3   | Kathara Coking Coal Washery                 | Core                                       | ---                           | 3                  | 0.39  | -                                |
| 4   | Jarangdih OC+R.S.                           | Downwind (E)                               | 1.2                           | 0.88               | 0.77  | 1.5                              |
| 5   | Govindpur Ph. II OC                         | Crosswind (N)                              | 3.5                           | 2.5                | 1.87  | 3.0/4.0                          |
| 6   | Govindpur UG                                | Crosswind (N)                              | 4                             | 0.2                | 0.04  | -                                |
| 7   | Konar Expansion                             | Downwind (E)                               | 7                             | 11                 | 2.24  | -                                |
| 8   | Karo Exp. OCP                               | Downwind (ENE)                             | 8.5                           | 15                 | 2.22  | -                                |
| 9   | Kargali OCP+R.S                             | Downwind (E)                               | 8                             | -                  | -   | 1.0                              |

Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited

---



**Fig- Representation of air pollution sources within 10km buffer zone of Kathara OCP on Google Earth.**

---

Prepared by CMPDI, RI-III, Ranchi

#### 4.2.2 Air Quality Impact Prediction

Estimation for increase in pollutant levels at the 11 Ambient Air Quality Stations, chosen for the purpose of baseline AAQ data generation, has been done with the help of the AERMOD model. The cumulative incremental contribution of all the industrial activities in core and buffer zone have been assessed for the two scenarios of operation i.e. without control measures and with proposed control measures over and above the baseline concentrations found at the eleven AAQ stations.

##### ***Meteorological Input***

Micrometeorological and microclimatic parameters recorded for the post monsoon period have been detailed in the section 3.2 of this report. This data has been used as meteorological input for Air quality model (AERMOD) for impact prediction study.

##### ***Emission Factors***

A S&T study titled, "Development of emission factors for various mining machineries & operations in opencast coal mines (EE-27)" was carried out by CMPDI (HQ) during 2002 to 2008. During this study, emission factors for Suspended Particulate Matter (PM ≤ 100 μm) were developed for Drilling, Loading of coal and OB by Shovel, Unloading of OB, Transportation on haul roads and Coal sizing. The emission factors data for PM -10 and PM -2.5 have been estimated on the basis of particle size distribution study. SPM, RPM & PM-2.5 Emission Factors & control factors for Various Mining Operations have been given below:

**Table 4.2 Emission Factors for Air Pollution Sources**

| <b>Activity</b>              | <b>Unit</b> | <b>TSP</b>            | <b>PM -10</b> | <b>Control Factors</b>                          | <b>PM -2.5</b> | <b>Control Factors</b>                          |
|------------------------------|-------------|-----------------------|---------------|---|----------------|---|
| Top soil removal by scrapper | kg/t        | 0.029                 | 0.0052        | 50% When Soil is naturally or Artificially wet  | 0.00058        | 50%When Soil is naturally or Artificially wet   |
| Drilling in Coal Bench       | kg/hole     | 0.83                  | 0.22          | 70% for wet drilling and 90% for fabric filters | 0.04           | 50% for wet drilling and 70% for fabric filters |
| Drilling in OB Bench         | kg/hole     | 2.18                  | 0.56          | 70% for wet drilling and 90% for fabric filters | 0.11           | 50% for wet drilling and 70% for fabric filters |
| OB Loading by Shovel         | kg/t        | 7.7X10 <sup>-04</sup> | 0.00014       | 50% Wet Sprinkling                              | 0.000015       | 50% Wet Sprinkling                              |
| OB Unloading                 | kg/t        | 3.0X10 <sup>-03</sup> | 0.0005        | 50% Wet Sprinkling                              | 0.00006        | 50% Wet Sprinkling                              |
| Coal Loading                 | kg/t        | 7.1X10 <sup>-03</sup> | 0.0015        | 50% Wet Sprinkling                              | 0.00021        | 50% Wet Sprinkling                              |
| Coal Unloading               | kg/t        | 7.1X10 <sup>-03</sup> | 0.00123       | 50% Wet Sprinkling                              | 0.00014        | 50% Wet Sprinkling                              |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|   |           |                                     |                      |  |                      |  |
|---|-----------|-------------------------------------|----------------------|--|----------------------|--|
| Coal / OB transportation on unpaved haul road                 | kg/VKT    | 2.56                                | 0.53                 | 50% for Mobile Sprinkling<br>70% for Fixed Sprinkling or Mist Type Sprinkling<br>90% for Fixed sprinkling & Mist type sprinkling<br>95% for Fixed and Mist sprinkling system along with 3-tier Avenue Plantation | 0.076                | 30% for Mobile Sprinkling<br>50% for Fixed Sprinkling or Mist Type Sprinkling<br>70% for Fixed sprinkling & Mist type sprikling & 3-tier avenue plantation |
| Coal Sizing   |           |                                     |                      |  |                      |  |
| (a) Primary Crusher   | kg/t      | 0.28                                | 0.056                | 99% for Enclosure with dust extraction system  | 0.008                | 70% Enclosure with dust extraction system  |
| (b) Secondary Crusher   | kg/t      | 0.64                                | 0.13                 | 99% for Enclosure with dust extraction system  | 0.02                 | 70% Enclosure with dust extraction system  |
| Blasting OB / Coal  | kg/ blast | $344(A)^{0.8} / (M)^{1.9}(D)^{1.8}$ | 0.18 x E.F. for TSP* |  | 0.03 x E.F. for TSP* |  |
| Dozing OB**   | kg/hr     | $2.6 (S)^{1.2} / (M)^{1.3}$         | 0.29 x E.F. for TSP  |  | 0.11 x E.F. for TSP  |  |
| Dozing Coal#  | kg/hr     | $35.6 (S)^{1.2} / (M)^{1.4}$        | 0.29 x E.F. for TSP  |  | 0.11 x E.F. for TSP  |  |
| Wind erosion from OB dumps, coal mine pits and coal stockyard | kg/ha/hr  | 0.4                                 | 0.09                 | 50% for Mobile Sprinkling<br>70% for Fixed Sprinkling or Mist Type Sprinkling<br>90% for Fixed sprinkling & Mist type sprinkling<br>95% for Fixed Mist type Sprinkling System and wind curtains                  | 0.008                | 30% for Mobile Sprinkling<br>50% for Fixed Sprinkling or Mist Type Sprinkling<br>70% for Fixed sprinkling & Mist type sprikling & 3-tier avenue plantation |
| Pit retention   |           |                                     |                      | 10-50% Depends on Depth of Mine  |                      | 5-25% Depends on Depth of Mine   |
| Loading and   | kg/t      |                                     | 0.029                |  | 0.029                | USEPA 1998   |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|
| unloading<br>point of<br>Conveyor belt |  |  |  |  |  |  |
|--|--|--|--|--|--|--|

\*The average values for Silt(S) and Moisture (M) content in coal and OB were observed as S = 12 %, M = 7 % , For OB, S = 5 % & M = 4 % respectively during an coal S&T Study for "Development of emission factors for various mining machineries & operations in an opencast coal mines"(EE-27).

\*\*For Dozing OB, TSP = = 2.96 kg/hr for S = 5 %, M = 4 %,

#For Dozing Coal, TSP = = 46.06 kg/hr for S = 12 %, M = 7 %,

D – depth of drill hole, A – incremental area for blasting

Emission factor for Coal cutting & loading by Surface Miner (Kg/t) =  $0.153 \times 10^{-2}$

Emission Factor for NO<sub>x</sub> and SO<sub>2</sub> based on USEPA, 1998 and Study by ARAI, Pune:

| Equipment Type     | Emission Factor (kg/1000 litre of fuel) |                 |                        |
|--------------------|---|-----------------|------------------------|
|                    | NO <sub>x</sub>                         | SO <sub>2</sub> | Emission Factor Rating |
| Track type tractor | 34.16                                   | 1.70            | C                      |
| Wheeled tractor    | 52.35                                   | 1.70            | C                      |
| Wheeled dozer      | 34.29                                   | 1.70            | C                      |
| Scraper            | 30.99                                   | 1.70            | C                      |
| Grader             | 30.41                                   | 1.70            | C                      |
| Off-highway truck  | 34.29                                   | 1.70            | C                      |
| Wheeled loader     | 38.50                                   | 1.70            | C                      |
| Track type loader  | 30.73                                   | 1.70            | C                      |

(Source: USEPA, 1998)

| Equipment Type              | Emission Factor (g/VKT) |
|-----------------------------|-------------------------|
|                             | NO <sub>x</sub>         |
| HCV Diesel Truck, > 6000 cc | 9.30                    |

(Source: "Emission Factor development for Indian Vehicles" carried out by ARAI, Pune (an autonomous body affiliated to the Ministry of Heavy Industries, Government of India) and sponsored by MoEF&CC, New Delhi and CPCB)

### ***Air Quality Model***

AERMOD has been used to predict the impact on the ambient air quality of the core and buffer zone of the study area.

**Table 4.3 Details of calculated emission factors for air pollution sources in the buffer zone**

Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited

| Name of Project        | Pollution generating activity | Active Pollution Source area (Ha) | Calculated Incremental Emission (g/s) - With Existing Control Measures |                   |
|------------------------|-------------------------------|-----------------------------------|--|-------------------|
|                        |                               |                                   | PM10   | PM2.5             |
| Jarangdih OC +RS       | Open Pit                      | 30                                | 0.17598  | 0.1198            |
|                        | Haul Rd                       | 6                                 | 0.0002076  | 0.000042          |
|                        | Top Soil Removal              | 2                                 | 0.0119823  | 0.0031            |
|                        | OB Dump                       | 25                                | 0.12721  | 0.0156            |
|                        | Stockyard                     | 1                                 | 0.039115   | 0.0049            |
|                        | Rly Siding                    | 15                                | 0.01511  | 0.0017            |
|                        | CTR                           | 2.25                              | 0.000005625  | 0.0000007         |
|                        | <b>Total</b>                  | <b>81.3</b>                       | <b>0.369610525</b>   | <b>0.14512518</b> |
| Kathara Washery        | Open Pit                      | 0                                 | 0  | 0                 |
|                        | Haul Rd                       | 0                                 | 0  | 0                 |
|                        | Top Soil Removal              | 0                                 | 0  | 0                 |
|                        | OB Dump                       | 0                                 | 0  | 0                 |
|                        | Stockyard                     | 10                                | 1.66619  | 0.0197            |
|                        | Rly Siding                    | 5                                 | 0.072  | 0.0017            |
|                        | CTR                           | 0.00                              | 0  | 0                 |
|                        | <b>Total</b>                  | <b>15</b>                         | <b>1.73819</b>   | <b>0.0214</b>     |
| Govindpur Ph.II OC+ UG | Open Pit                      | 80                                | 0.65654  | 0.1143            |
|                        | Haul Rd                       | 5.5                               | 0.0006358  | 0.0001            |
|                        | Top Soil Removal              | 2                                 | 0.08041  | 0.0039            |
|                        | OB Dump                       | 30                                | 0.27964  | 0.0173            |
|                        | Stockyard                     | 1                                 | 0.106139   | 0.0134            |
|                        | UG+Rly Siding                 | 15                                | 0.01721  | 0.002             |
|                        | CTR                           | 4.05                              | 0.00002997   | 0.000002          |
|                        | <b>Total</b>                  | <b>138</b>                        | <b>1.14060477</b>  | <b>0.151046</b>   |
| Konar Exp. OC          | Open Pit                      | 250                               | 0.710014   | 0.2399            |
|                        | Haul Rd                       | 10.5                              | 0.002693439  | 0.0001            |
|                        | Top Soil Removal              | 2                                 | 0.091066   | 0.0102            |
|                        | OB Dump                       | 50                                | 0.38346  | 0.0395            |
|                        | Stockyard                     | 18                                | 0.49438  | 0.0604            |
|                        | Rly Siding                    | 0                                 | 0  | 0                 |
|                        | CTR                           | 0.00                              | 0  | 0                 |
|                        | <b>Total</b>                  | <b>331</b>                        | <b>1.681613439</b>   | <b>0.3502</b>     |
| Kargali OC+RS          | Open Pit                      | 25                                | 0.29194  | 0.22719           |
|                        | Haul Rd                       | 3                                 | 0.000229509  | 0.0001467         |
|                        | Top Soil Removal              | 2                                 | 0.02922  | 0.01124           |
|                        | OB Dump                       | 15                                | 0.11868  | 0.02882           |
|                        | Stockyard                     | 2                                 | 0.05621  | 0.01712           |
|                        | Rly Siding                    | 5                                 | 0.01884  | 0.00233           |
|                        | CTR                           | 0.00                              | 0  | 0                 |
|                        | <b>Total</b>                  | <b>52</b>                         | <b>0.515119509</b>   | <b>0.28686</b>    |
| Karo OC                | Open Pit                      | 200                               | 0.94793  | 0.30249           |
|                        | Haul Rd                       | 4.5                               | 0.0012258  | 0.000156248       |
|                        | Top Soil                      | 2                                 | 0.12027  | 0.01341           |

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|  |              |            |                  |                 |
|--|--------------|------------|------------------|-----------------|
|  | Removal      |            |                  |                 |
|  | OB Dump      | 50         | 0.439621         | 0.04627         |
|  | Stockyard    | 15         | 0.674337         | 0.840           |
|  | Rly Siding   | 0          | 0                | 0               |
|  | CTR          | 0.00       | 0                | 0               |
|  | <b>Total</b> | <b>272</b> | <b>2.1833838</b> | <b>0.446325</b> |

Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited

**Table 4.4 Cumulative Impact - Predicted Concentrations of PM<sub>10</sub>**

| 24 Hours average PM <sub>10</sub> Concentration (ug/m <sup>3</sup> ) |                     |                         |                    |   |  |   |  |                   |
|--|---------------------|-------------------------|--------------------|---|--|---|--|-------------------|
| Station Code   | Name of Station     | As per Wind Direction   | Baseline Conc. (1) | Incremental PM <sub>10</sub> without Control Measures (2) | Incremental PM <sub>10</sub> with Control Measures (3) | Total Predicted PM <sub>10</sub> Conc. without control measures (4)=(1)+(2) | Total Predicted PM <sub>10</sub> Conc. with control measures (5)=(1)+(3) | Permissible Limit |
| A1   | Workshop            | Core Zone               | 96.10              | 25.2  | 15.5   | 121.30  | <b>111.60</b>  | <b>300</b>        |
| A2   | CPP Complex         | Core Zone               | 87.60              | 15.7  | 11.32  | 103.30  | <b>98.92</b>   |                   |
| A3   | Kathara Sub-Station | Core Zone               | 86.70              | 18.21   | 6.9  | 104.91  | <b>93.60</b>   |                   |
| A4   | Saram Village       | Upwind (W)-1.8 km       | 77.10              | 4.92  | 1.1  | 82.02   | <b>78.20</b>   | <b>100</b>        |
| A5   | Bandh Basti         | Crosswind (N)-0.15 km   | 74.00              | 47.1  | 5.2  | 121.10  | <b>79.20</b>   |                   |
| A6   | Govindpur Colony    | Crosswind (NNE)-2.21 km | 69.00              | 2.8   | 0.9  | 71.80   | <b>69.90</b>   |                   |
| A7   | GM Office           | Downwind (ENE)-0.54 km  | 82.50              | 9.74  | 2.5  | 92.24   | <b>85.00</b>   |                   |
| A8   | Khetko Village      | Downwind (E)-1.22 km    | 79.60              | 4.5   | 2.7  | 84.10   | <b>82.30</b>   |                   |
| A9   | Jaridih Basti       | Downwind (E)-2.19 km    | 78.80              | 8.11  | 2.03   | 86.91   | <b>80.83</b>   |                   |
| A10  | Chalkari Basti      | Downwind (E)-5.10 km    | 73.60              | 3.3   | 1.2  | 76.90   | <b>74.80</b>   |                   |
| A11  | Phusro Village      | Downwind (E)-9.30 km    | 76.10              | 3.6   | 2.44   | 79.70   | <b>78.54</b>   |                   |

Prepared by CMPDI, RI-III, Ranchi

Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited

**Table 4.5 Cumulative Impact - Predicted Concentrations of PM<sub>2.5</sub>**

| 24 Hours average PM <sub>2.5</sub> Concentration (ug/m <sup>3</sup> ) |                     |                       |                    |  |   |  |   |                   |
|---|---------------------|-----------------------|--------------------|--|---|--|---|-------------------|
| Station Code  | Name of Station     | As per Wind Direction | Baseline Conc. (1) | Incremental PM <sub>2.5</sub> without Control Measures (2) | Incremental PM <sub>2.5</sub> with Control Measures (3) | Total Predicted PM <sub>2.5</sub> Conc. without control measures (4)=(1)+(2) | Total Predicted PM <sub>2.5</sub> Conc. with control measures (5)=(1)+(3) | Permissible Limit |
| A1  | Workshop            | Core Zone             | 53.8               | 3.98   | 1.27  | 57.78  | <b>55.07</b>  | -                 |
| A2  | CPP Complex         | Core Zone             | 46                 | 1.63   | 0.48  | 47.63  | <b>46.48</b>  |                   |
| A3  | Kathara Sub-Station | Core Zone             | 44.9               | 5.48   | 1.61  | 50.38  | <b>46.51</b>  |                   |
| A4  | Saram Village       | Upwind (W)            | 41.6               | 1.38   | 0.47  | 42.98  | <b>42.07</b>  | 60                |
| A5  | Bandh Basti         | Crosswind (N)         | 39.9               | 9.87   | 2.12  | 49.77  | <b>42.02</b>  |                   |
| A6  | Govindpur Colony    | Crosswind (NNE)       | 37.5               | 1.77   | 1.16  | 39.27  | <b>38.66</b>  |                   |
| A7  | GM Office           | Downwind (ENE)        | 40.8               | 3.42   | 0.7   | 44.22  | <b>41.5</b>   |                   |
| A8  | Khetko Village      | Downwind (E)          | 41.4               | 0.89   | 0.17  | 42.29  | <b>41.57</b>  |                   |
| A9  | Jaridih Basti       | Downwind (E)          | 38.6               | 2.46   | 0.36  | 41.06  | <b>38.96</b>  |                   |
| A10   | Chalkari Basti      | Downwind (E)          | 40.3               | 0.95   | 0.16  | 41.25  | <b>40.46</b>  |                   |
| A11   | Phusro Village      | Downwind (E)          | 41.4               | 0.73   | 0.25  | 42.13  | <b>41.65</b>  |                   |

Prepared by CMPDI, RI-III, Ranchi

Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited

**Table 4.6 Cumulative Impact - Predicted Concentrations of NO<sub>2</sub> and SO<sub>2</sub>**

| 24 Hours average NO <sub>2</sub> and SO <sub>2</sub> concentration (ug/m <sup>3</sup> ) |                     |                                |                               |                                   |                       |                   |                               |                                   |                       |                   |
|---|---------------------|--------------------------------|-------------------------------|-----------------------------------|-----------------------|-------------------|-------------------------------|-----------------------------------|-----------------------|-------------------|
| Station Code  | Name of Station     | Distance from the Project (Km) | NO <sub>2</sub>               |                                   |                       |                   | SO <sub>2</sub>               |                                   |                       |                   |
|   |                     |                                | Baseline NO <sub>2</sub> Conc | Incremental NO <sub>2</sub> Conc. | Total Predicted Conc. | Permissible Limit | Baseline SO <sub>2</sub> Conc | Incremental SO <sub>2</sub> Conc. | Total Predicted Conc. | Permissible Limit |
| A1  | Workshop            | 0                              | 32.3                          | 26.98                             | <b>59.28</b>          | 120               | 25.2                          | 2.34                              | <b>27.54</b>          | 120               |
| A2  | CPP Complex         | 0                              | 23.8                          | 45.28                             | <b>69.08</b>          |                   | 15.7                          | 2.76                              | <b>18.46</b>          |                   |
| A3  | Kathara Sub-station | 0                              | 20.2                          | 30.34                             | <b>50.54</b>          |                   | 15                            | 7.2                               | <b>22.2</b>           |                   |
| A4  | Saram Village       | 1.82                           | 23.3                          | 11.54                             | <b>34.84</b>          | 80                | 16                            | 5.21                              | <b>21.21</b>          | 80                |
| A5  | Bandh Basti         | 0.12                           | 13.3                          | 19.98                             | <b>33.28</b>          |                   | 11.1                          | 5.8                               | <b>13.93</b>          |                   |
| A6  | Govindpur Colony    | 2.21                           | 24.3                          | 5.6                               | <b>29.9</b>           |                   | 18.2                          | 2.25                              | <b>20.45</b>          |                   |
| A7  | GM Office           | 0.54                           | 23.9                          | 17.64                             | <b>41.54</b>          |                   | 18                            | 5.2                               | <b>23.2</b>           |                   |
| A8  | Khetko Village      | 1.22                           | 18.7                          | 21.68                             | <b>40.38</b>          |                   | 12                            | 1.73                              | <b>13.73</b>          |                   |
| A9  | Jaridih Basti       | 2.19                           | 22.5                          | 13.87                             | <b>36.37</b>          |                   | 16.5                          | 3.17                              | <b>19.67</b>          |                   |
| A10   | Chalkari Basti      | 5.1                            | 26.9                          | 10.12                             | <b>37.02</b>          |                   | 13.8                          | 4.57                              | <b>18.37</b>          |                   |
| A11   | Phusro Village      | 9.3                            | 23                            | 9.79                              | <b>32.79</b>          |                   | 14.5                          | 6.03                              | <b>20.53</b>          |                   |

Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited

**Table 4.7 Standalone Impact - Predicted Concentrations of PM<sub>10</sub>**

| 24 Hours average PM <sub>10</sub> Concentration (ug/m <sup>3</sup> ) |                     |                       |                    |   |  |   |  |                   |
|--|---------------------|-----------------------|--------------------|---|--|---|--|-------------------|
| Station Code   | Name of Station     | As per Wind Direction | Baseline Conc. (1) | Incremental PM <sub>10</sub> without Control Measures (2) | Incremental PM <sub>10</sub> with Control Measures (3) | Total Predicted PM <sub>10</sub> Conc. without control measures (4)=(1)+(2) | Total Predicted PM <sub>10</sub> Conc. with control measures (5)=(1)+(3) | Permissible Limit |
| A1   | Workshop            | Core Zone             | 96.10              | 13.82   | 1.54   | 109.92  | <b>97.64</b>   | <b>300</b>        |
| A2   | CPP Complex         | Core Zone             | 87.60              | 6.01  | 0.7  | 93.61   | <b>88.30</b>   |                   |
| A3   | Kathara Sub-Station | Core Zone             | 86.70              | 17.32   | 2.1  | 104.02  | <b>88.80</b>   |                   |
| A4   | Saram Village       | Upwind (W)            | 77.10              | 4.77  | 0.57   | 81.87   | <b>77.67</b>   | <b>100</b>        |
| A5   | Bandh Basti         | Crosswind (N)         | 74.00              | 46.97   | 5.16   | 120.97  | <b>79.16</b>   |                   |
| A6   | Govindpur Colony    | Crosswind (NNE)       | 69.00              | 2.501   | 0.3  | 71.50   | <b>69.30</b>   |                   |
| A7   | GM Office           | Downwind (ENE)        | 82.50              | 9.71  | 1.21   | 92.21   | <b>83.71</b>   |                   |
| A8   | Khetko Village      | Downwind (E)          | 79.60              | 2.57  | 0.3  | 82.17   | <b>79.90</b>   |                   |
| A9   | Jaridih Basti       | Downwind (E)          | 78.80              | 7.35  | 0.86   | 86.15   | <b>79.66</b>   |                   |
| A10  | Chalkari Basti      | Downwind (E)          | 73.60              | 2.48  | 0.3  | 76.08   | <b>73.90</b>   |                   |
| A11  | Phusro Village      | Downwind (E)          | 76.10              | 1.32  | 0.16   | 77.42   | <b>76.26</b>   |                   |

Prepared by CMPDI, RI-III, Ranchi

Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited

**Table 4.8 Standalone Impact - Predicted Concentrations of PM<sub>2.5</sub>**

| 24 Hours average PM <sub>2.5</sub> Concentration (ug/m <sup>3</sup> ) |                     |                       |                    |  |   |  |   |                   |
|---|---------------------|-----------------------|--------------------|--|---|--|---|-------------------|
| Station Code  | Name of Station     | As per Wind Direction | Baseline Conc. (1) | Incremental PM <sub>2.5</sub> without Control Measures (2) | Incremental PM <sub>2.5</sub> with Control Measures (3) | Total Predicted PM <sub>2.5</sub> Conc. without control measures (4)=(1)+(2) | Total Predicted PM <sub>2.5</sub> Conc. with control measures (5)=(1)+(3) | Permissible Limit |
| A1  | Workshop            | Core Zone             | 53.8               | 3.56   | 0.72  | 57.36  | <b>54.52</b>  | -                 |
| A2  | CPP Complex         | Core Zone             | 46                 | 1.5  | 0.3   | 47.5   | <b>46.3</b>   |                   |
| A3  | Kathara Sub-Station | Core Zone             | 44.9               | 5.4  | 1.12  | 50.3   | <b>46.02</b>  |                   |
| A4  | Saram Village       | Upwind (W)            | 41.6               | 1.28   | 0.27  | 42.88  | <b>41.87</b>  | 60                |
| A5  | Bandh Basti         | Crosswind (N)         | 39.9               | 9.76   | 1.97  | 49.66  | <b>41.87</b>  |                   |
| A6  | Govindpur Colony    | Crosswind (NNE)       | 37.5               | 0.45   | 0.1   | 37.95  | <b>37.6</b>   |                   |
| A7  | GM Office           | Downwind (ENE)        | 40.8               | 2.9  | 0.67  | 43.7   | <b>41.47</b>  |                   |
| A8  | Khetko Village      | Downwind (E)          | 41.4               | 0.7  | 0.26  | 42.1   | <b>41.66</b>  |                   |
| A9  | Jaridih Basti       | Downwind (E)          | 38.6               | 1.76   | 0.36  | 40.36  | <b>38.96</b>  |                   |
| A10   | Chalkari Basti      | Downwind (E)          | 40.3               | 0.65   | 0.14  | 40.95  | <b>40.44</b>  |                   |
| A11   | Phusro Village      | Downwind (E)          | 41.4               | 0.38   | 0.08  | 41.78  | <b>41.48</b>  |                   |

Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited

**Table 4.9 Standalone Impact - Predicted Concentrations of NO<sub>2</sub> and SO<sub>2</sub>**

| 24 Hours average NO <sub>2</sub> and SO <sub>2</sub> concentration (ug/m <sup>3</sup> ) |                     |                                |                               |                                   |                              |                   |                                |                                   |                              |                   |
|---|---------------------|--------------------------------|-------------------------------|-----------------------------------|------------------------------|-------------------|--------------------------------|-----------------------------------|------------------------------|-------------------|
| Station Code  | Name of Station     | Distance from the Project (Km) | NO <sub>2</sub>               |                                   |                              |                   | SO <sub>2</sub>                |                                   |                              |                   |
|   |                     |                                | Baseline NO <sub>2</sub> Conc | Incremental NO <sub>2</sub> Conc. | <b>Total Predicted Conc.</b> | Permissible Limit | Baseline SO <sub>2</sub> Conc. | Incremental SO <sub>2</sub> Conc. | <b>Total Predicted Conc.</b> | Permissible Limit |
| A1  | Workshop            | 0                              | 32.3                          | 7.32                              | <b>39.62</b>                 | 120               | 25.2                           | 2.07                              | <b>27.27</b>                 | 120               |
| A2  | CCP Colony          | 0                              | 23.8                          | 10.76                             | <b>34.56</b>                 |                   | 15.7                           | 2.75                              | <b>18.45</b>                 |                   |
| A3  | Kathara Sub-station | 0                              | 20.2                          | 21.6                              | <b>41.8</b>                  |                   | 15                             | 6.18                              | <b>21.18</b>                 |                   |
| A4  | Saram Village       | 1.82                           | 23.3                          | 7.97                              | <b>31.27</b>                 | 80                | 16                             | 2.81                              | <b>18.81</b>                 | 80                |
| A5  | Bandh Basti         | 0.12                           | 13.3                          | 17.39                             | <b>30.69</b>                 |                   | 11.1                           | 2.8                               | <b>13.9</b>                  |                   |
| A6  | Govindpur Colony    | 2.21                           | 24.3                          | 1.94                              | <b>26.24</b>                 |                   | 18.2                           | 0.75                              | <b>18.95</b>                 |                   |
| A7  | GM Office           | 0.54                           | 23.9                          | 15.86                             | <b>39.76</b>                 |                   | 18                             | 4.7                               | <b>22.7</b>                  |                   |
| A8  | Khetko Village      | 1.22                           | 18.7                          | 4.89                              | <b>23.59</b>                 |                   | 12                             | 1.51                              | <b>13.51</b>                 |                   |
| A9  | Jaridih Basti       | 2.19                           | 22.5                          | 7.39                              | <b>29.89</b>                 |                   | 16.5                           | 2.71                              | <b>19.21</b>                 |                   |
| A10   | Chalkari Basti      | 5.1                            | 26.9                          | 5.21                              | <b>32.11</b>                 |                   | 13.8                           | 1.59                              | <b>15.39</b>                 |                   |
| A11   | Phusro Village      | 9.3                            | 23                            | 4.07                              | <b>27.07</b>                 |                   | 14.5                           | 1.39                              | <b>15.89</b>                 |                   |

***Observation Conclusion***

The results of cumulative and standalone AQIP for the proposed mining activity are as given in the tables above. The Kathara OCP is an existing project, and comprises of existing air pollution control measures. Refer to the table given below for existing air pollution control measures installed at Kathara OCP.

The model has been run by considering the worst scenario (without control measures) and with proposed control measures and the results are as column (5) in the above table. Column (2) represents total predicted concentration without control measures. While Column (3) represents total predicted concentration with additional proposed control measures.

It can be observed from the above tables that Stations A2, A3, A5 and A7 will be having a significant impact as compared to other stations due to proximity from the pollution sources at Kathara OCP. Also, it can be observed from the comparison of cumulative and standalone impact assessment at distant stations like A9, A10 and A11 the major contribution in incremental PM<sub>10</sub> is because of the other neighbouring industrial air pollution sources in the region.

For Cumulative impact assessment the Isopleth of PM<sub>10</sub> and PM<sub>2.5</sub> without control measures (Business As Usual) and additional control measures are shown in enclosed Plates.

Plate XA - PM10 Isopleth without control

Plate XB - PM10 Isopleth with control

Plate XIA - PM2.5 Isopleth without control

Plate XIB - PM2.5 Isopleth with control

Plate XIIA – SO2 Isopleth

Plate XIIB – NO2 Isopleth

Similarly, the standalone impact of the project is represented by the Isopleths of PM<sub>10</sub>, PM<sub>2.5</sub>, NO<sub>2</sub>, and SO<sub>2</sub> without control measures (Business As Usual) and additional control measures are shown in enclosed plates:

Plate XIII A - PM10 Isopleth without control

Plate XIII B - PM10 Isopleth with control

Plate XIV A - PM2.5 Isopleth without control

Plate XIV B - PM2.5 Isopleth with control

Plate XV A – NO2 Isopleth

Plate XV B – SO2 Isopleth

The model was run for the worst-case scenario of peak coal production level. In view of this, the actual future AAQ is likely to be better than the predicted level.

**4.2.3 Air Pollution Control Measures**

The existing air pollution control measures at Kathara OCP are enumerated as below:

|                                 |
|---------------------------------|
| <b>Existing Control Measure</b> |
|---------------------------------|

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

- 03 nos. of mobile water sprinklers of 28 kL capacity and 02 nos. of 16 kL capacity are used for regular sprinling of water on haul roads and coal transport road respectively
- Till date 3,51,500 saplings are planted in an area of 140.60 Ha
- Control Blasting is being practised. All drills are equipped with wet drilling arrangement.
- Silo Loading arrangements for washed coal despatch at Kathara Washery.
- No road coal transport outside project.
- Personnel working in dusty areas have been provided with dust masks and provided adequate training and information on safety and health aspects.
- PM10 Analyzer has been installed at adjoining Kathara Washery.
- Adequate fire fighting arrangements including storage of sufficient water at all critical points.

In addition to the existing control measures, additional proposed measures (both preventive and suppressive) are as enumerated below:

**Table 4.10 Proposed Air Pollution Control Measures**

| <b>Proposed Control Measure</b>                                 |   |                       |  |
|---|---|-----------------------|--|
| <b>Activity</b>   | <b>Details</b>  | <b>Cost</b>           | <b>Tentative timeline of Completion</b>                  |
|   |   | <b>(in Rs. Lakhs)</b> |  |
| Wind Barriers along north and north-eastern boundary            | 2000 m along mine boundary along Jhirki, Bandh Basti Village and 500 m along residential Colony | 250                   | 1300m- Aug'2022<br>1200 m- Dec' 2022                     |
| Plantation on safety zone & green belt, avenue plantation.      | Total additional area proposed to be brought under green belt/ avenue plantation is 25 Ha.      | 750                   | Pre-Monsoon 2022- 12.5 Ha.<br>Pre-Monsoon 2023- 12.5 Ha. |
| Fixed mist sprinkling system of on Haul Road                    | 1600 m length along Haul Road side upto coal stock  | 150                   | Dec' 2022  |
| Permanent Haul Road   | 1600 m length of permanent Haul road upto Kathara Washery to be black topped                    | 250                   | Sept' 2022   |
| Fog Canons  | Total 02 nos for dust suppression at Coal Stockyard and Haul Road.                              | 100                   | Aug'2022   |
| Continuous Air Quality monitoring systems                       | CAAQMS at GM Office   | 100                   | Installed  |
| <b>Total Cost of proposed Air Pollution prevention measures</b> |   | <b>1600</b>           |  |

## 4.3 Cummulative Impact Assessment & Pollution Control Measures for Water Environment

### 4.3.1 Water Quality

The buffer region of Kathara OCP has multiple industrial units (other coal mining projects of CCL, thermal power plants etc.). Table 4.2 may be referred for information on different industrial units situated in the study area.

#### Surface Water Quality

River Damodar along with its tributary River Konar forms the major drainage of the study area. Refer Plate-III-A for the Drainage Map of the study area. To study the cumulative impact on the surface water bodies, water quality assessment has been carried out. Water Quaiuty Monitoring at key points in the study area has been done during Post-Monsoon 2020.

| Location | Surface Water Body | Falling under Impact Zone of    |
|----------|--------------------|---------------------------------|
| A        | Damodar River      | Kathara OCP                     |
| B        | Damodar River      | Kathara OCP and Kathara Washery |
| C        | Konar River        | BTPS                            |
| D        | Konar River        | Jarangdih OC , Konar OC         |
| E        | Damodar River      | Kargali OC                      |



**Fig. Schematic Diagram showing monitoring locations for surface water quality in the study area.**

**Table 4.11 Water Quality Assessment of Major Surface Bodies in the Buffer Zone.**

| Sl. No | Parameter       | Unit           | Locations     |               |               |               |               |
|--------|-----------------|----------------|---------------|---------------|---------------|---------------|---------------|
|        |                 |                | A             | B             | C             | D             | E             |
| 1.     | pH              | --             | 7.40          | 7.46          | 6.72          | 7.23          | 7.47          |
| 2.     | Temperature     | °C             | 26.2          | 26.2          | 26.3          | 25.2          | 26.2          |
| 3.     | B.O.D           | mg/L           | BQL<br>(QL=2) | 2.0           | BQL<br>(QL=2) | 2.1           | BQL<br>(QL=2) |
| 4      | C.O.D           | mg/L           | BQL<br>(QL=5) | 10            | BQL<br>(QL=5) | 10            | BQL<br>(QL=5) |
| 5      | D.O.            | mg/L           | 7.6           | 6.6           | 6.8           | 6.0           | 7.5           |
| 6      | T.S.S           | mg/L           | 11.0          | 19.0          | 16.8          | 17.3          | 20            |
| 7      | T.D.S           | mg/L           | 202.4         | 246.8         | 168.7         | 194.6         | 165.5         |
| 8      | Chloride        | mg/L           | 30.0          | 30.0          | 24.0          | 30.0          | 20.0          |
| 9      | Fluoride        | mg/L           | 0.88          | 0.98          | 0.73          | 0.78          | 0.86          |
| 10     | Sulphate        | mg/L           | 63.9          | 76.9          | 31.2          | 40.4          | 57.4          |
| 11     | Nitrate         | mg/L           | 4.3           | 5.3           | 4.1           | 6.1           | 7.0           |
| 12     | Oil & Grease    | mg/L           | BQL<br>(QL=1) | BQL<br>(QL=1) | BQL<br>(QL=1) | BQL<br>(QL=1) | BQL<br>(QL=1) |
| 13     | Total Coliform  | MPN/10<br>0 ml | 30            | 42            | 26            | 42            | 52            |
| 14     | Faecal Coliform | MPN/10<br>0 ml | Absent        | 16            | Absent        | 12            | Absent        |

### Ground Water Quality

Presence of multiple coal mining projects and thermal project in the region have surely impacted the groundwater regime of the buffer zone. The assessment of impact on the groundwater regime is broadly discussed in section 4.3.3.

An effort has been made to assess and map the groundwater quality in the region.

| ID | Location             | Falling under Impact Zone of |
|----|----------------------|------------------------------|
| A  | Bandh Basti          | Kathara OCP                  |
| B  | Kathara Bazar        | Kathara OCP, Jaragdih OC     |
| C  | Khetko Basti         | None                         |
| D  | Subhash Nagar Colony | Karo OCP, Kargali OCP        |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|   |                    |                             |
|---|--------------------|-----------------------------|
| E | Shiv mandir, Bermo | Kargali OC, kargali Washery |
|---|--------------------|-----------------------------|



**Fig. Schematic Diagram showing monitoring locations for ground water quality in the study area.**

**Table 4.12 Ground Water Quality Assessment in the Buffer Zone.**

| Sl. No. | Parameter                     | Unit | Locations |       |       |       |       | Permissible Limit |
|---------|-------------------------------|------|-----------|-------|-------|-------|-------|-------------------|
|         |                               |      | A         | B     | C     | D     | E     | IS:10500          |
| 1.      | pH                            | --   | 7.13      | 6.67  | 7.18  | 6.87  | 6.64  | No relaxation     |
| 2.      | Temperature                   | °C   | 24.3      | 26.3  | 26.0  | 24.5  | 25.3  | -                 |
| 3       | T.D.S                         | mg/L | 528.0     | 384.6 | 323.7 | 755.2 | 743.5 | 2000              |
| 4       | Chloride                      | mg/L | 44.0      | 54.0  | 24.0  | 158.0 | 92.0  | 1000              |
| 5       | Fluoride                      | mg/L | 0.85      | 0.69  | 0.49  | 0.60  | 0.74  | 1.5               |
| 6       | Sulphate                      | mg/L | 102.3     | 47.7  | 73.9  | 122.6 | 120.1 | 400               |
| 7       | Nitrate                       | mg/L | 1.7       | 14.5  | 11.2  | 20.4  | 23.1  | No relaxation     |
| 8       | Alkanity as CaCO <sub>3</sub> | mg/L | 300.0     | 144.0 | 144.0 | 288.0 | 420.0 | 600               |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|    |  |      |                   |                   |                   |                   |                   |               |
|----|--|------|-------------------|-------------------|-------------------|-------------------|-------------------|---------------|
| 9  | Total Hardness as CaCO <sub>3</sub>    | mg/L | 370.0             | 224.0             | 188.0             | 520.0             | 452.0             | 600           |
| 10 | Calcium as Ca                          | mg/L | 92.2              | 83.4              | 57.7              | 131.5             | 85.0              | 200           |
| 11 | Iron (as Fe)                           | mg/L | 0.97              | 0.23              | BQL<br>(QL=0.05)  | BQL<br>(QL=0.05)  | 0.78              | No relaxation |
| 12 | Zinc (as Zn)                           | mg/L | 0.20              | BQL<br>(QL=0.02)  | BQL<br>(QL=0.02)  | 0.02              | 0.08              | 15            |
| 14 | Manganese (as Mn)                      | mg/L | 1.44              | 0.42              | BQL<br>(QL=0.05)  | BQL<br>(QL=0.05)  | 0.18              | 0.3           |
| 15 | Arsenic (as As)                        | mg/L | BQL<br>(QL=0.005) | BQL<br>(QL=0.005) | BQL<br>(QL=0.005) | BQL<br>(QL=0.005) | BQL<br>(QL=0.005) | 0.05          |
| 16 | Hexavalent Chromium as Cr <sup>+</sup> | mg/L | BQL<br>(QL=0.01)  | BQL<br>(QL=0.01)  | BQL<br>(QL=0.01)  | BQL<br>(QL=0.01)  | BQL<br>(QL=0.01)  | -             |

#### 4.3.2 Water Demand

Mine requires water for domestic & industrial (i.e. Land reclamation, workshop, dust suppression, greenbelt development and fire fighting) uses. The peak industrial water demand for Kathara OCP was projected as 470 cum/day. The domestic water demand (colony + industrial buildings) was projected as 2400 cum/day. Thus, the total water requirement is 4900 cum/day. The details of peak water demand of the project are as given below.

**Table 4.13 Peak Industrial and Domestic Water Demand**

| Purpose  | Peak Demand<br>(m <sup>3</sup> /day) |
|--|--------------------------------------|
| <b>A. Mine site</b>  |                                      |
| HEMM Washing ( Excluding 60% recycle)  | 100                                  |
| Land reclamation & Plantation  | 90                                   |
| Dust suppression on Haul Road  | 130                                  |
| Coal Fire Mitigation   | 90                                   |
| Dust Suppression at Workshop   | 60                                   |
| <b>Total (A)</b>   | <b>470</b>                           |
| <b>B. Township</b>   |                                      |
| Housing  | 1720                                 |
| Process & Loss   | 80                                   |
| Other (Service Building like GM office, Guest house, Hospital, Club, School etc) | 600                                  |
| <b>Total (B)</b>   | <b>2400</b>                          |
| <b>Grand Total (A+B)</b>   | <b>2870</b>                          |

The estimated mine discharge due to the proposed mining activity is 1000 m<sup>3</sup>/day. The industrial water demand of Kathara OCP is proposed to be fulfilled by the mine discharge. Further, the accumulated water in the quarry 1 & 2 of Kathara OCP has been estimated as 7736 Mm<sup>3</sup> and 1033 Mm<sup>3</sup> respectively. It has been proposed to fulfill the industrial water needs

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

of Kathara Washery (1870 m<sup>3</sup>/day) through the accumulated water in Quarry 2&3. The domestic needs are being fulfilled by the nearby Konar River.

Refer **Plate XVIA** for Proposed water usage diagram of Kathara OCP.

#### 4.3.3 Impact on Ground Water Regime

##### **Ground Water Resource Computation**

The detailed Groundwater Resource Estimation of Buffer Zone (As per GEC '15) is as given below.

**Table 4.14 Summary of Groundwater Extraction/ Draft in Buffer Zone**

| <i>Groundwater Extraction/ Draft</i> |   | GEC-2015                     |                                  |                      |
|--------------------------------------|---|------------------------------|----------------------------------|----------------------|
|                                      |   | <i>Monsoon</i><br>(120 days) | <i>Non-monsoon</i><br>(245 days) | <i>Total (M cum)</i> |
| <b>A</b>                             | <b><i>Domestic Draft</i></b>                          | <b>7.12</b>                  | <b>14.53</b>                     | <b>21.66</b>         |
|                                      | Population-2,86,582 @ 135 LPCD (projected in 2025 AD) | 4.64                         | 9.48                             | 14.12                |
|                                      | Cattle harness @ 10%                                  | 0.46                         | 0.95                             | 1.41                 |
|                                      | Mine water  | 2.02                         | 4.10                             | 6.13                 |
| <b>1</b>                             | Dhori GOM   | 0.19                         | 0.38                             | 0.57                 |
| <b>2</b>                             | Amlu OCP  | 0.05                         | 0.10                             | 0.15                 |
| <b>3</b>                             | Bokaro OCP  | 0.11                         | 0.23                             | 0.35                 |
| <b>4</b>                             | Bermo OCP   | 0.09                         | 0.18                             | 0.26                 |
| <b>5</b>                             | Govindpur OCP   | 0.07                         | 0.13                             | 0.20                 |
| <b>6</b>                             | Jarangdih OCP   | 0.58                         | 1.19                             | 1.77                 |
| <b>7</b>                             | Swang GOM   | 0.52                         | 1.05                             | 1.57                 |
| <b>8</b>                             | Konar OCP and Washery                                 | 0.22                         | 0.45                             | 0.68                 |
| <b>9</b>                             | BTPS (Bokaro Thermal PS)                              | 0.07                         | 0.14                             | 0.21                 |
| <b>10</b>                            | Kathara OC  | 0.12                         | 0.25                             | 0.37                 |
| <b>B</b>                             | <b><i>Irrigation Draft</i></b>                        | <b>0.22</b>                  | <b>0.45</b>                      | <b>0.67</b>          |
|                                      | 7678 Ha area (Draft from Bermo Block)                 | 0.22                         | 0.45                             | 0.67                 |
| <b>C</b>                             | <b><i>Industrial Draft (Net Mine discharge)</i></b>   | <b>0.85</b>                  | <b>1.76</b>                      | <b>2.60</b>          |
| <b>1</b>                             | Dhori GOM   | 0.71                         | 1.44                             | 2.15                 |
| <b>2</b>                             | Amlu OCP  | 0.12                         | 0.25                             | 0.37                 |
| <b>3</b>                             | Bokaro OCP  | 0.14                         | 0.29                             | 0.44                 |
| <b>4</b>                             | Bermo OCP   | 0.09                         | 0.18                             | 0.26                 |
| <b>5</b>                             | Govindpur OCP   | 0.11                         | 0.23                             | 0.35                 |
| <b>6</b>                             | Jarangdih OCP   | 0.66                         | 1.35                             | 2.01                 |
| <b>7</b>                             | Swang GOM   | 0.74                         | 1.51                             | 2.24                 |
| <b>8</b>                             | Konar OCP and Washery                                 | 0.32                         | 0.66                             | 0.99                 |
| <b>9</b>                             | BTPS (Bokaro Thermal PS)                              | 0.07                         | 0.14                             | 0.21                 |
| <b>10</b>                            | Kathara OC  | 0.12                         | 0.25                             | 0.37                 |
|                                      | Total Mine Pumping in the Buffer Zone                 | 3.08                         | 6.30                             | 9.38                 |
|                                      | Mine Use (-)  | 2.02                         | 4.10                             | 6.13                 |
|                                      | Mine Pumping after Mine Use                           | 1.06                         | 2.20                             | 3.25                 |
|                                      | 20% return flow to Groundwater system (-)             | 0.21                         | 0.44                             | 0.65                 |
|                                      | Net Mine Pumping after Mine Use                       | 0.85                         | 1.76                             | 2.60                 |

Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited

|          |                    |             |              |              |
|----------|--------------------|-------------|--------------|--------------|
| <i>D</i> | <b>Total Draft</b> | <b>8.19</b> | <b>16.74</b> | <b>24.93</b> |
|----------|--------------------|-------------|--------------|--------------|

**Table 4.15 Summary of Recharge from other sources**

|          | <b>Recharge from Other Sources</b>                  | <b>GEC-2015</b> |                      |              |
|----------|---|-----------------|----------------------|--------------|
|          |   | <b>Monsoon</b>  | <b>Non-monsoon</b>   | <b>Total</b> |
| 1        | Irrigation Return flow                              | 0.06 @25%       | 0.11 @ 25%           | 0.17         |
| 2        | Return flow from Mine discharge                     | 0.17 @20%       | 0.35 @ 20%           | 0.52         |
| 3        | Recharge from water bodies (39.27 km <sup>2</sup> ) | 0.0             | 8.25 @ 150 day/annum | 8.25         |
| <b>4</b> | <b>Total</b>  | <b>0.23</b>     | <b>8.71</b>          | <b>8.94</b>  |

Recharge from Rainfall calculation using Rainfall Infiltration and Water Table Fluctuation Method as per GEC-2015 methodology has been given below:

**Rainfall Infiltration Method (RFIF)**

|          | <b>Description of items</b>        | <b>GEC-2015</b>                       |                    |                             |
|----------|------------------------------------|---------------------------------------|--------------------|-----------------------------|
|          |                                    | <b>Monsoon</b>                        | <b>Non-monsoon</b> | <b>Total</b>                |
| 1        | Normal Rainfall                    | 960 mm                                | 126 mm             | 1086 mm                     |
| 2        | Min. threshold value               | 108.60 mm                             | 108.60 mm          | -                           |
| 3        | Effective Rainfall                 | 851.40 mm                             | 17.40 mm           | -                           |
| 4        | Recharge (12%) in Sedimentary area | Area:137 km <sup>2</sup><br>13.99 MCM | 0.28 MCM           | 14.27 MCM                   |
| 5        | Recharge (7%) in Hard rock area    | Area:264 km <sup>2</sup><br>15.73 MCM | 0.32 MCM           | 16.05 MCM                   |
| <b>6</b> | <b>Total</b>                       | <b>29.72</b>                          | <b>0.60</b>        | <b>30.32 Mm<sup>3</sup></b> |

**Water Table Fluctuation Method (WTF) during Monsoon**

|   | <b>Description of items</b>                           | <b>GEC-2015</b>  |                      |                             |
|---|---|--|----------------------|-----------------------------|
|   |   | <b>Sedimentary</b>   | <b>Hard rock</b>     | <b>Total</b>                |
| 1 | Area  | 137 km <sup>2</sup>  | 264 Km <sup>2</sup>  | -                           |
| 2 | Specific Yield  | 03%  | 02%                  | -                           |
| 3 | Water Table Fluctuation                               | 1.60 m   | 1.78 m               | -                           |
| 4 | Change in Storage                                     | 6.57 Mm <sup>3</sup>   | 9.40 Mm <sup>3</sup> | 15.97 Mm <sup>3</sup>       |
| 5 | Gross GW Extraction of all uses during Monsoon season | Domestic- 7.07 Mm <sup>3</sup><br>Irrigation – 0.22 Mm <sup>3</sup><br>Industrial – 0.89 Mm <sup>3</sup> |                      | 8.19 Mm <sup>3</sup>        |
| 6 | Recharge from Other Sources during Monsoon season     | Irrigation return flow- 0.06 Mm <sup>3</sup><br>Mine water return flow-0.18 Mm <sup>3</sup>              |                      | 0.24 Mm <sup>3</sup>        |
| 7 | Gross Rainfall Recharge                               | <b>(4 + 5 - 6)</b>   |                      | 24.40 Mm <sup>3</sup>       |
| 8 | Normalized Monsoon season Rainfall Recharge           | Actual RF in Monsoon- 955<br>Normal RF in Monsoon-960  |                      | <b>24.27 Mm<sup>3</sup></b> |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

Rainfall Recharge in Buffer Zone after comparing results from Water Level Fluctuation Method and Rainfall Infiltration Factor Method during monsoon season (Percent Difference (PD) between RFIF & WTF Recharge).

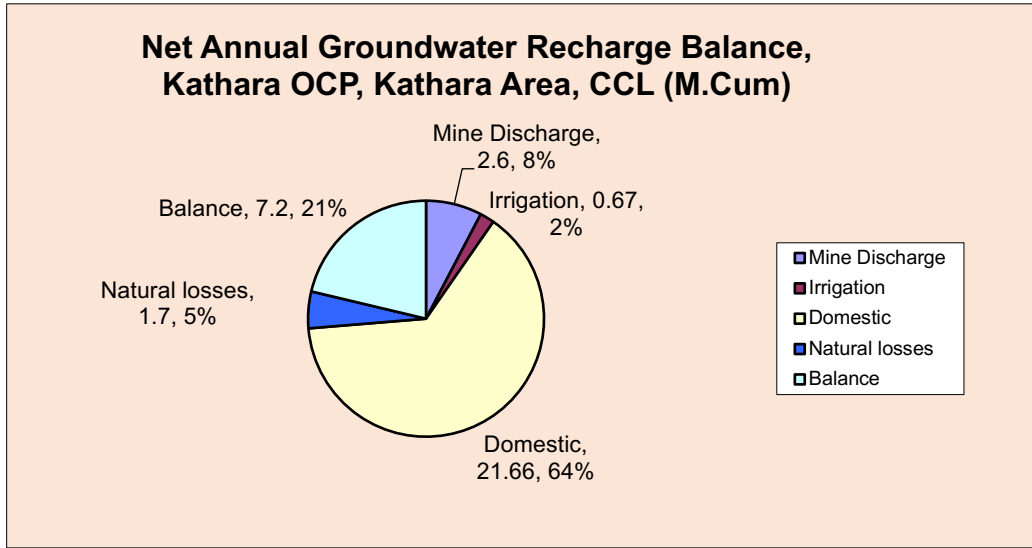
| Description of items  | <i>Quantity</i>              |
|---|------------------------------|
| 1. Rainfall Recharge during monsoon season in Buffer Zone   |                              |
| a. By Water Table Fluctuation Method (M cum) (Normalised)   | <i>24.27</i>                 |
| b. By Rainfall Infiltration Factor Method (M cum)   | <i>30.32</i>                 |
| 2. Difference between (1a) and (1b) expressed as a percentage of (1b), 'PD'   | -<br><i>19.95%</i>           |
| $\left[ \frac{\{(1a) - (1b)\}}{(1b)} * 100 \right]$   |                              |
| 3. Rainfall Recharge in the Buffer Zone during monsoon season (M cum)   | <i>24.27</i><br><i>M cum</i> |
| $[ = (1a) \text{ if 'PD' is between } -20 \text{ and } +20\%$ $= 0.8 * (1b) \text{ if 'PD' is less than } -20\%$ $= 1.20 * (1b) \text{ if 'PD' is greater than } +20\% ]$ |                              |

**Table 4.16 Net Annual Groundwater Availability in Buffer Zone**

| Description of items  | <i>(M cum)</i>  |
|---|-----------------|
| 1. Rainfall Recharge in Buffer Zone   |                 |
| a. During Monsoon season (Rainfall Infiltration Factor Method)  | <i>24.27</i>    |
| b. During Non-monsoon season (Rainfall Infiltration Method)<br>(from Table: 7.i.4.b)                                    | <i>0.60</i>     |
| c. Annual [ (1a) + (1b) ]   | <i>24.87</i>    |
| 2. Recharge from 'Other Sources'  |                 |
| a. During Monsoon season  | <i>0.23</i>     |
| b. During Non-monsoon season  | <i>8.71</i>     |
| c. Annual [ (2a) + (2b) ]   | <i>8.94</i>     |
| Environmental Flow assessed   | <i>NO</i>       |
| 3. Gross Annual Groundwater Recharge [ (1c) + (2c) ]  | <i>33.81</i>    |
| 4. Natural discharge and other Environmental losses @ 5%  | <i>1.70</i>     |
| 5. Net Annual Groundwater Availability in Buffer Zone [ (3) – (4) ]   | <i>32.12</i>    |
| 6. Annual Gross Groundwater Extraction/ Draft for all uses in Buffer Zone   | <i>24.93</i>    |
| 7. Balance Available Annual Groundwater Recharge (Net Annual Groundwater Availability – Gross Annual Groundwater Draft) | <i>7.20</i>     |
| 8. Stage of Ground Water Extraction   | <i>77.61 %</i>  |
| 9. Quality tag (if any)   | <i>Portable</i> |

\*Refer Plate XVIB for Ground water Balance diagram of Buffer Zone.

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**



**Fig: Net Annual Ground Water Recharge Balance of Kathara OCP**

From the water balance studies, it is estimated that there is very minimum availability of groundwater for replenishment.

CGWB, Mid-Eastern Region, Patna, has assessed and reported the total annual groundwater availability in the Bokaro district (where Kathara OC/Washery exists) as 208.76 M.cum (20876.58 Ham). The net groundwater draft for all uses were reported as 114.34 M.cum (11434.88 Ham) and Net available as 197.03 M.cum (19703.58 Ham) which indicate ample availability of groundwater source in the Bokaro district.

**Table 4.17 Groundwater Balance of Core Zone**

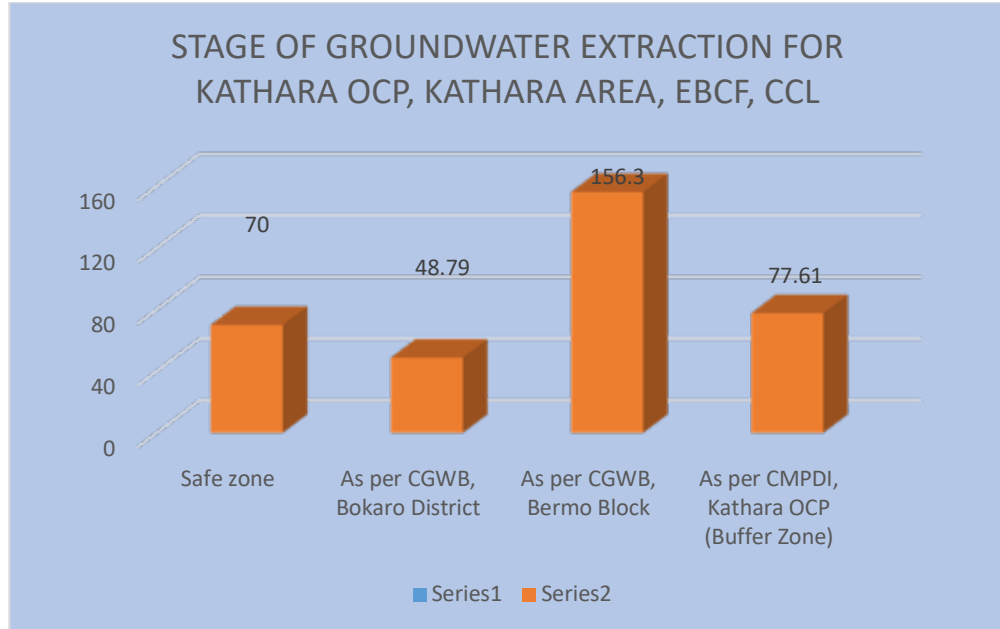
| <b>A.</b> | <b>Ground Water Recharge</b>  | <b>Mcum</b>  |
|-----------|---|--------------|
|           | Recharge through rainfall in geographical area (Rg)<br>(2.58 sq.km x 1.086 m rainfall x 12% infiltration)               | <b>0.33</b>  |
|           | Gross Recharge (Rg):  | <b>0.33</b>  |
|           | Natural discharges & other losses (5% of Rg): (-)   | 0.02         |
|           | <b>Net Annual Ground water Recharge:</b>  | <b>0.31</b>  |
| <b>B.</b> | <b>GROUNDWATER DRAFT</b>  |              |
|           | Mine Pumping (1,050 cum/day)  | <b>0.38</b>  |
|           | 12% return flow to Groundwater system (-)   | 0.05         |
|           | <b>Net mine discharge in the area</b>   | <b>0.33</b>  |
|           | Industrial water consumption, domestic water consumption of mine and nearby of villages are being met from mine pumping |              |
|           | <b>Net Annual Groundwater Draft</b>   | <b>0.33</b>  |
| <b>C.</b> | <b>Balance Available Annual Groundwater Recharge (A-B)</b>  | <b>-0.02</b> |

***Stage of Ground Water Extraction***

Coal mining is the major industrial activity in the area. CGWB, Mid-Eastern Region, Patna has reported the stage of ground water development in Gomia and Bermo block (where Kathara

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

OC/Washery exists), Bokaro district as 30% and 156% and identified the region with category "Safe" and "Over-exploited" respectively. The ground water development in Bokaro district was reported as 46% and identified under the category of "Safe". (Copy enclosed). Stage of groundwater development for buffer zone of the project area determined is about 77.61%, which is also under 'Critical' category as per GEC-2015 methodology.



**Radius of Influence**

Considering the dewatering of unconfined aquifer in the immediate mine area and permeability 1.0 m/d, by using the Sichardt formula [ $R = C \cdot (H - h_w) \cdot \sqrt{k}$ ], the radius of influence for Kathara Expansion OCP has been estimated.

| Sl.No | Project     | Final Mine Depth (m) | Probable drawdown (m) | Radius of Influence (m)            |
|-------|-------------|----------------------|-----------------------|------------------------------------|
|       |             |                      |                       | K= 1.0 (unconfined aquifer)        |
| 1     | Kathara OCP | 150                  | 25.0 to 50.0          | 250m to 485m(i.e 250 mt to 500 mt) |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**



**Fig: Radius of Influence- Kathara OCP**

The projected radius of influence due to Kathara OCP on groundwater has been estimated at about 250m to 485m from the mine periphery and the impact zone is restricted due to presence of Bokaro River in the North direction, by Damodar River in the Southern part and by Quarry in the eastern part of the area.

#### 4.3.4 Impact on Surface Water Regime

The project area lies in the catchment area of the Damodar River for the most part and Bokaro River in the north, which is the tributary of the master drainage Damodar River itself.

The easterly flowing Damodar River is a 5th order stream, adjacent to the southern boundary of the project. No seasonal or major streams/nallahs flows through the project.

Stabilised embankments are present at few places between the project boundary and river flow. Also, at few places, it has been found that old rejects of Kathara washery are placed in proximity to the H.F.L of River Damodar.

It is proposed to construct a continuous embankment along the southern boundary of the project. Also, the existing catch drains are to be strengthened and new catch drains are to be constructed along the eastern quarry boundary.

#### 4.3.5 Sources of water pollution

Likely sources of water pollution from this project along with the type of pollutants are as follows:

**Table 4.18 Sources of Water pollution**

|       |  |                                    |
|-------|--|------------------------------------|
| (i)   | Wastewater from mine   | Suspended solids of coal and clay. |
| (ii)  | Surface run-off passing through coal and washery reject stockpiles | Suspended solids.                  |
| (iii) | Storm water from leasehold area and built-up area                  | Suspended solids.                  |
| (iv)  | Domestic waste water   | BOD and TSS.                       |
| (v)   | Workshop Effluent  | Suspended solids and Oil & Grease. |

### 4.3.6 Treatment Technology

1. Workshop discharge → O&G Trap → Settling tank → Reuse (Existing)
2. Mine Discharge → Mine Sumps for TSS removal → Reuse (Existing)
3. Domestic effluent → Sewage Treatment Plant (involving primary, secondary and tertiary treatment) → Reuse (Proposed)

### 4.3.7 Water Pollution Control Measures

| <b>Existing</b>  |
|--|
| <ul style="list-style-type: none"> <li>• Mine Sumps have been provided for collection and treatment of Mine Seepage water.</li> <li>• Workshop effluent is being treated at ETP consisting of Oil and greese trap and Sequential Settling ponds.</li> <li>• 0.70 MGD filter plant has been installed to provide treated drinking water to different colonies in Kathara area.</li> <li>• Around 5.5 km of garland drain along with sequential settling ponds have been provided all around the mine periphery to treat surface run-off and prevent soil erosion.</li> <li>• Rain water harvesting system has been provided at P.O. Office of Kathara OCP and in about 100 residential quarters of Kathara Area.</li> <li>• 03 no. of ponds were constructed in nearby villages.</li> <li>• A Piezometer installation in Kathara OCP under process to check the level of ground water.</li> </ul> |

### Proposed

| <b>Activity</b>   | <b>Details</b>  | <b>Total Cost in Rs. Lakhs</b> | <b>Timeline of Completion</b> |
|---|---|--------------------------------|-------------------------------|
| Sewage Treatment Plant at the existing colony                             | Existing colonies at Kathara colliery with 794 quarters will be provided with an integrated sewage treatment plant.         | 500                            | Mar' 2023                     |
| Embankment with a catch drain along Damodar River                         | Embankment along with catch drain of 4000 m along Damodar River.  | 400                            | Dec' 2022                     |
| Additional Rain Water Harvesting System                                   | Roof top rain water harvesting system at Pit Office, MRS and Kathara Rest House   | 25                             | Dec' 2022                     |
| Toe wall and garland drain/ catch drain                                   | Toe wall, garland drain and catch drains around the active and stabilized OB Dumps, quarry and other industrial settlements | 200                            | Oct' 2022                     |
| Sedimentation Tank  | 02 Nos. of Sedimentation tank to arrest run-off before discharge of water into Damodar                                      | 30                             | Pre-monsoon 2022              |
| Piezometers   | Additional 2 no.of Poezometers in upstream and Downstream of the project.   | 50                             | Oct' 2022                     |
| <b>Total Cost of proposed Water Pollution &amp; Conservation Measures</b> |   | <b>1205</b>                    |                               |

## 4.4 Impact Assessment & Control Measures for Noise & Blasting

The sources of noise will be:

- Blasting in opencast workings.
- Coal and OB transportation, loading and unloading.

The noise associated with mining activities may be classified into three types

- Continuous
- Intermittent
- Impulsive

The workmen associated with the operation of different equipments, etc. experience high noise level in the range of 75-85 dB (A) for more than 4-4.5 hours per shift. So, suitable mitigation measures will be taken to prevent adverse impacts of high noise level on the workmen. This includes provision of ear muffs, sound proof operator cabins, sufficient warnings before blasting, and improved blasting techniques, plantation around industrial area and avenue plantation. It is worthwhile to mention that intermittent and impulsive noises are considered to be less dangerous than continuous noise due to the short exposure duration except under the situation when the level exceeds 115 dB (A).

Measures for Controlled Blasting

- Use of Nonnel for sequential blasting.
- Continuous monitoring by vibrometer for Peak Particle Velocity (PPV)

## 4.5 Impact on Land Resource and Its Management

### 4.5.1 Present Land Use

Kathara OCP is an existing project with project area of 773.23 Ha. The present land use as per remote sensing study is as given below.

| Classes     | Colour       | Area (Core Zone) |               |
|-------------|--------------|------------------|---------------|
|             |              | Area (sq.km)     | % of Total    |
| Level-I     |              |                  |               |
| Forest Area |              | 0.00             | 0.00          |
| Scrubs      |              | 0.53             | 6.86          |
| Plantation  |              | 2.12             | 27.43         |
| Agriculture |              | 0.67             | 8.67          |
| Waste Land  |              | 0.59             | 7.63          |
| Mining Area |              | 3.08             | 39.84         |
| Settlements |              | 0.69             | 8.93          |
| Water Body  |              | 0.05             | 0.65          |
|             | <b>Total</b> | <b>7.73</b>      | <b>100.00</b> |

#### 4.5.2 Landuse During Mining

Landuse details during mining is as given below.

**Table 4.19 Proposed Land Use Plan**

| Description                                       | Forest Area in Ha. | Non-Forest Area in Ha. | Total Area in Ha. |
|---|--------------------|------------------------|-------------------|
| Quarry  | 0                  | 258.46                 | 258.46            |
| External OB Dump                                  | 0                  | 109.53                 | 109.53            |
| Reclaimed OB Dump and Embankment                  | 0                  | 74.09                  | 74.09             |
| Industrial Area (W/S, S/S, Haul Road, Office etc) | 0                  | 64.54                  | 64.54             |
| Colony & Settlement                               | 0                  | 122.87                 | 122.87            |
| Safety Zone / Green belt                          | 0                  | 45                     | 45                |
| Vacant Land                                       | 0                  | 98.74                  | 98.74             |
| <b>Total</b>                                      | <b>0</b>           | <b>773.23</b>          | <b>773.23</b>     |

#### 4.5.3 Dump Management Plan

Total overburden quantity estimated for present proposal of Kathara Opencast Project is 76.4 Mcum, all of which has been proposed to be dumped into an integrated external and internal dump. Height of proposed external dump will be +340 m (Around 90 m AGL) and the top R.L of internal dump will be +310 m (Around 30 m AGL).

At present, the mine is divided into three patches namely Quarry I (right quarry), Quarry II (centre Quarry) and Quarry III (left quarry). Among them, Quarry I and Quarry II are submerged with water and part of Quarry III is operational only. In this proposal, the mine is proposed to be worked as a single quarry (combining I, II & III) to minimize any coal loss and maximum HEMM utilization.

The plan showing location and capacity of the OB dump has been given in Final Stage Dump Plan at **Plate-XVII**.

| SN | Dump          | Details   | Quantity   |
|----|---------------|---|--|
| 1  | Internal Dump | Area of Dump: 160.90 Ha<br>Top RL +310 m. (30m above G.L) | Total Vol.of OB to be dumped in present proposal:<br><b>76.4 M.Cum</b> |
| 2. | External Dump | Area of Dump: 109.53 Ha<br>Top RL +340 m. (90m above G.L) |  |

**4.5.4 Land Reclamation**

Land reclamation and enrichment through plantation will be done to bring back the land-use as similar as possible to the pre-mining land use. For this purpose, efforts will be made to bring approximately 455.12 Ha area to bring under plantation.

**Table 4.20 Post-Mining Land Use Plan**

| Landuse During Mining    |  |               | Post Mining Landuse Plan            |               |
|--------------------------|--|---------------|-------------------------------------|---------------|
| S.No                     | Landuse Details                              | Area in Ha.   | Landuse Details                     | Area in Ha.   |
| 1                        | Quarry                                       | 258.46        | Plantation on Backfilled Area       | 160.90        |
|                          |  |               | Mine Void Filled with Water         | 97.56         |
| 2                        | External OB Dump                             | 109.53        | Plantation on External Dump         | 109.53        |
| 3                        | Reclaimed OB Dump and Embankment             | 74.09         | Plantation                          | 74.09         |
| 4                        | Infrastructure (W/S, S/S, Office, Road etc.) | 64.54         | Infrastructure for Future Use       | 64.54         |
| 5                        | Colony & Settlement                          | 122.87        | Land for Public Use                 | 122.87        |
| 6                        | Safety Zone/Green belt                       | 45.00         | Plantation on Safety Zone/Greenbelt | 45.00         |
| 7                        | Vacant Land                                  | 98.74         | Undisturbed Land                    | 98.74         |
| <b>Total Area in Ha.</b> |  | <b>773.23</b> | <b>Total Area in Ha.</b>            | <b>773.23</b> |

\*Refer **Plate XVIII** for Post Mining landuse Plan.

Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited

**Year-wise Plantation Plan**

| Year                                    | Green Belt & Safety Zone |              | Backfilled Area |             | External Dump |              | Reclaimed OB dump and Embankment |               | Vacant/ Undisturbed Land* |               | Total        |               | Cost to be incurred in Rs. Lakhs |
|---|--------------------------|--------------|-----------------|-------------|---------------|--------------|----------------------------------|---------------|---------------------------|---------------|--------------|---------------|----------------------------------|
|   | Area (Ha)                | Trees 0      | Area (Ha)       | Trees (000) | Area (Ha)     | Trees (000)  | Area (Ha)                        | Trees (000)   | Area (Ha)                 | Trees (000)   | Area (Ha)    | Trees (000)   |                                  |
| <b>Plantation carried out till date</b> | <b>20</b>                | <b>50000</b> | <b>0</b>        | <b>0</b>    | <b>5</b>      | <b>12500</b> | <b>50</b>                        | <b>125000</b> | <b>65.6</b>               | <b>164000</b> | <b>140.6</b> | <b>351500</b> |                                  |
| Y1                                      | 12.5                     | 31250        | 0               | 0           | 0             | 0            | 0                                | 0             | 0                         | 0             | 12.5         | 31250         | 375                              |
| Y2                                      | 12.5                     | 31250        | 0               | 0           | 0             | 0            | 0                                | 0             | 0                         | 0             | 12.5         | 31250         | 375                              |
| Y3                                      | 0                        | 0            | 0               | 0           | 0             | 0            | 12                               | 30000         | 0                         | 0             | 12           | 30000         | 42                               |
| Y4                                      | 0                        | 0            | 0               | 0           | 0             | 0            | 12.09                            | 30225         | 0                         | 0             | 12.09        | 30225         | 42.315                           |
| Y5                                      | 0                        | 0            | 0               | 0           | 15            | 37500        | 0                                | 0             | 0                         | 0             | 15           | 37500         | 52.5                             |
| Y6                                      | 0                        | 0            | 0               | 0           | 15            | 37500        | 0                                | 0             | 0                         | 0             | 15           | 37500         | 52.5                             |
| Y7                                      | 0                        | 0            | 0               | 0           | 0             | 0            | 0                                | 0             | 0                         | 0             | 0            | 0             | 0                                |
| Y8                                      | 0                        | 0            | 0               | 0           | 0             | 0            | 0                                | 0             | 0                         | 0             | 0            | 0             | 0                                |
| Y9                                      | 0                        | 0            | 20              | 50000       | 0             | 0            | 0                                | 0             | 0                         | 0             | 20           | 50000         | 70                               |
| Y10                                     | 0                        | 0            | 20              | 50000       | 15            | 37500        | 0                                | 0             | 0                         | 0             | 35           | 87500         | 122.5                            |
| Y11                                     | 0                        | 0            | 20              | 50000       | 15            | 37500        | 0                                | 0             | 0                         | 0             | 35           | 87500         | 122.5                            |
| Y12                                     | 0                        | 0            | 25              | 62500       | 0             | 0            | 0                                | 0             | 0                         | 0             | 25           | 62500         | 87.5                             |
| Post Closure Y1                         | 0                        | 0            | 25              | 62500       | 0             | 0            | 0                                | 0             | 0                         | 0             | 25           | 62500         | 87.5                             |
| Post Closure                            | 0                        | 0            | 25              | 62500       | 20            | 50000        | 0                                | 0             | 0                         | 0             | 45           | 112500        | 157.5                            |

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|   |           |              |              |               |               |               |              |              |          |          |               |               |                |
|---|-----------|--------------|--------------|---------------|---------------|---------------|--------------|--------------|----------|----------|---------------|---------------|----------------|
| Y2  |           |              |              |               |               |               |              |              |          |          |               |               |                |
| Post Closure Y3                           | 0         | 0            | 25.9         | 64750         | 24.53         | 61325         | 0            | 0            | 0        | 0        | 50.43         | 126075        | 176.505        |
| <b>Total Plantation to be carried out</b> | <b>25</b> | <b>62500</b> | <b>160.9</b> | <b>402250</b> | <b>104.53</b> | <b>261325</b> | <b>24.09</b> | <b>60225</b> | <b>0</b> | <b>0</b> | <b>314.52</b> | <b>786300</b> | <b>1763.32</b> |
| Grand Total                               | 45        | 112500       | 160.9        | 402250        | 109.53        | 273825        | 74.09        | 185225       | 65.6     | 164000   | 455.12        | 1137800       | 1763.32        |

\*Plantation of approx. 65.6 Ha has been carried out on vacant/undisturbed land in the past.

#### 4.5.5 Topsoil Management

The salvaging, stockpiling and re-application of topsoil to be used as growth medium in the reclamation of Internal & External overburden dumps within the mining area is a major environment protection programme. Soil management in opencast mine is necessary to re-establish the stability & productivity of lands disturbed due to mining activity.

At present, the preserved top soil has been completely used for plantation activity. As the quarry will progress, the salvaged top soil will be stockpiled and preserved at designated place for its further use in biological reclamation.

#### 4.5.6 Biological Reclamation of Mined Out Area

For successful enrichment of lease area, preference is given to endemic species and mixed culture. The species will be selected carefully from the following groups for quick reclamation:

- ┌ Nitrogen fixing tree species for fuel wood, timber and fodder.
- ┌ Fruit bearing tree species.
- ┌ Tree species with dense foliage for shade.
- ┌ Flowering and ornamental tree species.
- ┌ Native species.

The list of the species recommended for afforestation on the overburden and other vacant areas is as given below:

| <b>Botanical Name</b>        | <b>Local /Trade Name</b> | <b>Mitigation value</b> |
|------------------------------|--------------------------|-------------------------|
| <i>Acacia ariculiformis</i>  | Babool                   | Dust pollution          |
| <i>Albizialebeck</i>         | Sirish                   | Dust pollution          |
| <i>Madhucalatifolia</i>      | Mahua Tree               | Dust pollution          |
| <i>Aeglemarmelos</i>         | Bael tree                | Dust pollution          |
| <i>Syzygiumcumini</i>        | Amrud                    | Dust pollution          |
| <i>Cassia fistula</i>        | Golden shower            | Dust pollution          |
| <i>Ailanthusexcelsa</i>      | Maharukha                | Dust pollution          |
| <i>Buteamonosperma</i>       | Flame of the Forest      | Dust pollution          |
| <i>Dalbergiasisoo</i>        | Indian Rose wood         | Dust pollution          |
| <i>Dendrocalamusstrictus</i> | Hard bamboo              | Wind barrier            |
| <i>Bambusaaurundinacea</i>   | Hallow bamboo            | Wind barrier            |
| <i>Ficusbenghalensis</i>     | Banayan Tree             | Soil erosion            |
| <i>Ficusreligiosa</i>        | Peepal Tree              | Soil erosion            |
| <i>Azadirachtaindica</i>     | Neem tree                | Soil erosion            |
| <i>Meliaazaderach</i>        | Bakneem                  | Soil erosion            |
| <i>Terminaliaarjuna</i>      | Arjun                    | Soil erosion            |
| <i>Terminaliatomentosa</i>   | Saj                      | Noise barrier           |
| <i>Ailanthus excelsa</i>     | Mahurkha                 | Noise barrier           |
| <i>Tectonagrandis</i>        | Teak wood                | Noise barrier           |

3-tier plantation will be done all along the periphery of the colony for dust and noise attenuation. This will protect colony from air & noise pollution.

## 4.6 Solid Waste Management

Based on the source, origin and type of waste a comprehensive classification likely to be generated from various facilities in Kathara OCP is given below:

- a) Municipal Solid Waste.
- b) Industrial Wastes
- c) Hazardous Wastes
- d) Sewage Wastes

### 4.6.1 Municipal Solid Waste Management

#### Quantum of Waste Generation:

Waste generation encompasses activities in which materials are identified as no longer being of value (in their present form) and are either thrown away or gathered together for disposal. Waste generation is, at present, an activity that is not very controllable.

The quantum of peak waste generated in the residential colony and office complexes of Kathara OCP is as given below.

**Table 4.21 Municipal Solid Waste Quantification**

| Location   | Total No. of Houses/ office Buildings | Estimated no. of People | Per capita MSW to be generated in kg/head/day | Total Waste to be generated in kg/day |
|--|---------------------------------------|-------------------------|---|---------------------------------------|
| Residential Colony   | 794                                   | 3176                    | 0.3 kg/capita/day                             | 952.8                                 |
| Office   | 3                                     | 750                     | 0.5 kg/day/employee                           | 375                                   |
| <b>Total MSW to be Generated in kg/day</b>                       |                                       |                         |   | <b>1327.8</b>                         |
| <i>Source: Municipal Solid Waste Management Manual By CPHEEO</i> |                                       |                         |   |                                       |

The general composition of Municipal Solid Waste is as given below.

| YEAR | COMPOSITION (%) |       |                 |       |       |      |       |        |
|------|-----------------|-------|-----------------|-------|-------|------|-------|--------|
|      | Biodegradables  | Paper | Plastic/ Rubber | Metal | Glass | Rags | Other | Inerts |
| 1996 | 42.21           | 3.63  | 0.60            | 0.49  | 0.60  | -    | -     | 45.13  |
| 2005 | 47.43           | 8.13  | 9.22            | 0.50  | 1.01  | 4.49 | 4.016 | 25.16  |

*Source: Municipal Solid Waste Management Manual By CPHEEO*

Segregation of waste will be done at the source itself. Recyclable waste will be handed over to the Govt. authorised recycling agency as per the MSW Rules, 2016.

Bio-degradable waste will be dumped at composting site for decomposition and the output manure will be used by the project for the plantation and reclamation activities.

Inert waste will be dumped at the landfill site. The landfill site will be properly maintained and at the closure stage of landfill site, the dump will be covered with soil and reclaimed with plantation as per MSW rules, 2016.

#### 4.6.2 Hazardous Waste Management

##### Source of Hazardous Waste:

As per Schedule-I of Hazardous Waste (Management, Handling & Transboundary) Rules, 2016, the list of processes generating hazardous wastes in the mine operation of the proposed project is identified as under:

| Sl. No. of Notification | Description                                |
|-------------------------|--|
| 5.1                     | Used / spent oil                           |
| 35.3                    | Chemical sludge from waste water treatment |
| 35.4                    | Oil and grease skimming residues           |

##### Quantum of Hazardous Waste

The specification of used oil suitable for reprocessing/recycling as per Schedule-V of Hazardous Waste (Management, Handling & Trans-boundary) Rules, 2016 is as under:

| Sl. No. | Parameter                        | Permissible Limits |
|---------|----------------------------------|--------------------|
| 1       | Polychlorinated biphenyls (PCBs) | < 2 ppm            |
| 2       | Lead                             | 100 ppm            |
| 3       | Arsenic                          | 5 ppm              |
| 4       | Cadmium + Chromium + Nickel      | 500 ppm            |
| 5       | Poly-aromatic hydrocarbons (PAH) | 6%                 |

The quality of the used oil generally confirms to the prescribed standards in the mining operations and arrangement may be made with the approved recycler for reprocessing/recycling.

Necessary authorization may be obtained from Jharkhand State Pollution Control Board for recycling of the hazardous waste as per Hazardous Waste (Management, Handling & Trans-boundary) Rules, 2016.

**Table 4.22 Quantification of Waste Load**

|   |                |
|---|----------------|
| No. of HEMM & other vehicles                                | 56             |
| Frequency of washing  | Once in 7 days |
| No. of washing per day                                      | 8              |
| Water required for washing of per vehicle (m <sup>3</sup> ) | 7.2            |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|  |                |
|--|----------------|
| Effluent generation from washing of vehicles per day (m3)        | 57.6           |
| Water requirement for workshop floor washing per day (Litres/m2) | 4              |
| Workshop floor area (m2)   | 10000          |
| Water requirement for workshop floor washing per day (m3)        | 40             |
| Total effluent generation from workshop per day (m3)             | 97.6           |
| <b>Effluent quality</b>  |                |
| Suspended solids (mg/litre)                                      | 2000           |
| Standard for Suspended solids (mg/litre)                         | 100            |
| Desired concentration of Suspended Solids (mg/litre)             | 60             |
| Effluent Sludge to be removed (mg/litre)                         | 1940           |
| Effluent Sludge to be removed (kg/m3)                            | 1.94           |
| <b>Total effluent sludge generation (kg)</b>                     | <b>189.344</b> |
| Oil & grease sludge generation due to skimming                   |                |
| Oil & grease concentration (mg/litre)                            | 50             |
| Standard for oil & grease (mg/litre)                             | 10             |
| Oil & grease to be removed (mg/litre)                            | 40             |
| Oil & grease to be removed (kg/m3)                               | 0.04           |
| <b>Total oil &amp; grease sludge generation per day (kg)</b>     | <b>13</b>      |

*Note: Assumptions are made as per CMPDI Norms.*

Necessary authorization may be obtained from Jharkhand State Pollution Control Board for recycling of the hazardous waste as per Hazardous Waste (Management, Handling & Trans-boundary) Rules, 2016.

## 4.7 Impact on Flora and Fauna

From the baseline Flora Fauna Study, it is observed that there are endangered and endemic species found in the core zone as well as in the buffer zone area as per Red Book of Botanical Survey and Zoological survey of India as per Wild Life (Protection) Act 1972 and its subsequent amendments.

As per the interaction with local stakeholders, visual sighting and reference of forest working plan, **Schedule-I** species viz. **Python**, **Monitor Lizard** and **Peafowl** have been observed in the core zone and buffer zone.

=====

Prepared by CMPDI, RI-III, Ranchi

**Presence of Schedule-I faunal and avifaunal species in the core zone indicates a healthy ongoing eco-restoration.**

Core area is mainly dominated by weed species mainly are Mesosphaerum suaveolens (Jungli tulusi), Lantana camara, Chromolaena odorata (Devill Weed). The most dominant tree species observed during study in core zone was Cassia siamea & Butea monosperma Bombax ceiba etc.

Mainly plant species planted in the core zone of Kathara Mine are Cassia siamea (Chirkundi), Dalbergia sisso (Shisham), Albizzia lebeck (Siras), Sagwan (Tectona grandis) & Shorea robusta (Sal), Bombax ceiba (Semal), Pongamia pinnata (Karanj), Ailanthus excels (Adusa).

The most dominant tree species in the study area are Shorea robusta, Cassia siame, Butea monosperma, Lagerstroemia parviflora, Diospyros melanoxylon etc. and in case of shrubs by Mesosphaerum suaveolens (Jungli tulusi), Lantana camara, Chromolaena odorata (Devill Weed). The other trees are Ficus benghalensis, Aegle marmelos, Bombax ceiba, Bauhinia racemosa and Artocarpus heterophyllus etc.

#### **4.7.1 Impact on Flora & Fauna**

The dust (Mainly PM<sub>2.5</sub> & PM<sub>10</sub>) is the only major pollutant which will be generated from different mining activities such as blasting including drilling holes, operation of machinery such as excavator and movement of dumpers/trucks can have impact in terms of disturbance due to noise; interference in movement etc. However, as the predicted incremental dust generation due to the proposed project is nominal, it is believed that the natural vegetation and agricultural field will not have any adverse effect.

The impact on the fauna of the buffer zone due to the mining activity will be marginal. For the core zone, as Kathara OCP is an existing project, there will not be any construction activity or further tree cutting. Thus nesting habitat of birds and avifaunal species will not be affected. Also, in present case, there will not be an increased level of human interferences. The operation of various equipment may be likely to generate significant noise. The noise may scare the fauna in the region.

#### **4.7.2 Conservation plan for flora & fauna**

The important animal species for conservation point of view in the study area which falls under schedule I, schedule II of "The wildlife (protection) Act, 1972 are Python, Monitor Lizard, Peafowl, jackal and Langur etc. sighted and as reported by villagers.

The conservation plan for the schedule I species has been obtained from the CCL and enclosed as **Annexure VI**. In addition, following general conservation measures along with the provisions of conservation plan for the observed endangered species.

##### ***a) Protection Measures***

With the help of local people and employees watch will be kept on hunting of these animals. Forest and Police Department will be informed if such incident happens to take action against the offenders. If necessary, with that help of forest department, the stranded species will be shifted to a safer place.

As a matter of practice now, CCL provides funds for fencing the forest land area in the Core Zone. This will further strengthen our attempts towards conservation of above indicated animals.

***b) Strengthening of Water Bodies***

Through community development work in villages in the Buffer Zone existing water sources particularly the village tanks will be strengthened to provide water to the local community so that biotic pressure on water resources presents in the forest areas and used by wild fauna is gradually reduced.

***c) Tree Planting***

The geo-climatic conditions of the area will favour growth of the following tree species.

- (i) Mahuwa (*Madhuca latifolia*) – For a shady tree.
- (ii) Jamun (*Syzigium cuminii*) – For Monkey a shady tree.
- (iii) Bad (*Ficus benghalensis*) – For other animals, a shady tree.
- (iv) Aam (*Mangifera indica*) – For Monkey etc. and a shady tree.
- (v) Sehtoot (*Morus alba*) – Different animals and the local people.
- (vi) Guava (*Psidium guajava*) – Different animals and the local people.
- (vii) Amla (*Embllica officinalis*) – For the people of the area, a shady tree.
- (viii) Peepal (*Ficus religioso*) – For other animals, a shady tree.
- (ix) Imli (*Tamarindus indica*) – Many animals, the people and shady tree.

***d) Control of forest fire, fire in coal seam and coal stock***

Fire can destroy the entire habitats (micro and macro) and its life supporting potential in a forest area. Fire does not spare fauna also. CCL will implement the existing DGMS stipulated fire protection norms on coal seams and coal stock. This will ensure that a congenial atmosphere is created and fire does not affect the fauna and flora as well. CCL will also encourage its employees and villagers to report forest fires (if any) to Forest/Police department. CCL will also extend its fire fighting capabilities whenever needed to forest department for fighting forest fires.

**4.7.3 Recommendations for Mitigation Measures**

During setting up and operation phase of mine following measures will be taken up to mitigate impact on surrounding biodiversity:-

- Tar road will be used for transportation to minimise fugitive emissions.
- Material will be covered during transportation.
- Plantation will be taken up in consultation with Forest department and species local to the area shall be planted as per findings during baseline environment which help maintain the

regional ecological balance, soil and hydrological conditions.

- Water sprinkling will be done on haul roads to control fugitive emissions.
- Hedge of sturdy woody shrubs along the lease area will be created.
- The removal or picking of any protected/unprotected plant will not be permitted.
- Fencing around the pit mouth to prevent fall of animal.
- If wildlife is noticed crossing the area, they will not be distributed at all.
- Animal rescue centre and Artificial Nesting of Birds will be proposed in project area.
- Worker will be made aware of the importance of the wildlife.
- Greenery development around mining area helps in creating habitats for local bird and create better environment for various fauna.
- Creating and developing awareness for nature and wildlife in the adjoining villages.
- Using topsoil during the restoration process can improve the productivity and rate of re-vegetation.

#### **4.7.4 Protection of drainage course in the lease area-**

The following mitigative measures are and will be implemented to prevent run-off of water & flow of sediments directly into the nearby water bodies/nallah, land and control water environment in the area.

- Dozing and levelling of inactive waste dumps.
- Spreading of topsoil on the top and slopes of the inactive dumps.
- Providing dump tops with inner slopes and through a system of drains and channels, allowing rainwater to descent into surrounding drains, so as to minimize the effects of erosion arising out of uncontrolled descent of water.
- Proper terracing of the OB dumps.
- Planting native tree species on the dump tops and slopes with grasses and shrubs to arrest and prevent erosion.
- Construction of garland drains of suitable size around mine area and dump with proper gradients to prevent rainwater descent into active mine area.
- Settling ponds are & will be made to prevent flow of fine particles from OB / Waste dumps, check dams, parapet/retaining walls & garlanded drains.
- The garland drains connected to settling tank to collect surface runoff, mine water and arrest siltation.
- Usage of stored water in the settling ponds for watering of haul roads, vehicle washing and green belt development etc.
- De-silting of the garland drains & settling ponds are being & will be carried out at regular intervals.

- Maintenance of all the runoff management structures.

As per base line status of Flora & Fauna potential impacts are discussed and accordingly mitigation measures are prepared. Which includes creation of green-belt with native species, breeding sites for wildlife in the proposed Wildlife habitat. Habitat restoration, Participatory monitoring and conservation of wildlife through, village level forest protection committees and village Panchayats under the overall supervision and guidance of wildlife wing in the forest department, etc.

## **4.8 Socio-Economic Impact**

### **4.8.1 Negative Impact**

The probable major impact of the project would be-

- Increased pollution due to enhanced mining activities

### **4.8.2 Positive Impact**

Positive aspects are as follows-

- Opportunities of indirect income generation
- Improved socioeconomic standard of local people
- Upgrading of infrastructure facilities in the villages of the PIA
- The villages in the PIA will be benefitted from the Corporate Social Responsibility (CSR) activities of the CCL.

### **4.8.3 Recommendations for mitigation measures**

To alleviate the negative impacts of the Project, it is vital to plan mitigation measures for the local residents in the villages under the PIA. The following recommendations are being made towards mitigating these undesirable adverse impacts:

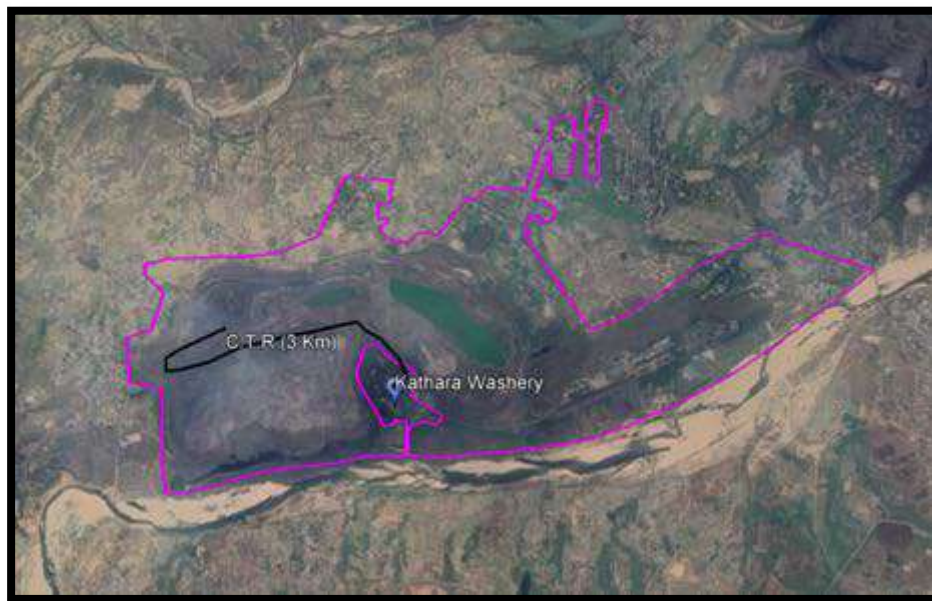
- Dialogue with the villagers in the PIA towards improving their participation in planning etc, otherwise they are totally against the Company
- Safe water supply to be provided through upgrading the existing systems
- Awareness generation for construction and use of latrines in the villages
- Proper solid waste management to be initiated
- Upgrading of road networks
- Health services to be restored towards providing proper and timely health care
- To minimise dust pollution water should be sprinkled at regular intervals daily
- Organise skill/vocational training for local residents to enhance their employability

Instead of CCL duplicating the available services in the locality, it would be better to coordinate with other Government departments in order to provide and upgrade the existing services in a convergent manner.

## 4.9 Effects on Traffic Movement

It is proposed to transport coal from Mine to adjoining Kathara Coking Coal Washery by tipping trucks. Total length of coal transportation road is around 2 kms. The figure given below depicts the Coal transportation route from mine to siding.

The coal transportation route is a dedicated mine road for coal transportation, free from any kind of public commutation. The existing coal transportation road was planned for peak production capacity of 1.9 MT (as per previous EC). As, the present proposal is also for the same production capacity. Thus, there is hardly any significant impact on the traffic movement due to incremental coal production.



**Fig: Coal Transportation Road on Google Earth**

### Details of Road

1. Length of Road: Around 2 km.
2. Width of Road: 15 m
3. Nature of Road: Dedicated road of Coal transportation
4. Type of Road: W.B.M

### 4.9.1 Traffic Desity Impact Study

As mentioned earlier, Coal is transported to adjoining Kathara Washery through a dedicated coal transportation road. No public commutation observed on the coal transportation road. Hence, coal transportation through tipping trucks is the only contributor for traffic density.

1. The transportation of coal from face of the mine to Kathara Washery 5758 tonnes/day (1.9 MTPA).

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

2. The carrying capacity of vehicles deployed for transportation of coal is around 100 tonnes/truck. Considering 80% efficiency of 80 Tonnes/truck.
3. The total number of trips made by trucks for movement of coal daily is around 72 trucks.
4. Considering 18 hours duration of truck movement, number of trucks movement will be around  $72/18 = 4$  trucks/hour or 15 PCUs/hr. (Considering 3.7 PCU for each MAV as per IRC:106-1990).
5. 15 PCUs/hr loaded and 15 PCU's/hr unloaded. Total 30 PCU/hr.

| V/C         | LoS      | Performance         |
|-------------|----------|---------------------|
| 0.0 – 0.2   | <b>A</b> | <b>Excellent</b>    |
| 0.2 – 0.4   | <b>B</b> | <b>Very Good</b>    |
| 0.4 – 0.6   | <b>C</b> | <b>Good</b>         |
| 0.6 – 0.8   | <b>D</b> | <b>Fair/Average</b> |
| 0.8 – 1.0   | <b>E</b> | <b>Poor</b>         |
| 1.0 & above | <b>F</b> | <b>Very Poor</b>    |

V= Volume in PCU's/hr. C= Capacity in PCU's/hr. LOS= Level of Service

| Predicted Traffic |      |     |
|-------------------|------|-----|
| No. of PCU's/hr   | V/C  | LoS |
| 30                | 0.06 | A   |

From the above study, it can be observed that the predicted traffic density falls under **Excellent LoS** category.

## 4.10 Visual/Aesthetic Effects

Suitable mitigation measures like levelling of uneven and degraded land, avenue and block plantation, removal of coal and solid waste heaps, removal of water logging and dismantling of redundant infrastructure are proposed to be done in this project to eliminate spots of eyesore.

## 4.11 Impact on local population and R&R Action Plan

As this is a very old project operating since pre-nationalization period, no R&R is involved in the present proposal. However, many local persons are expected to be engaged contractually from time to time for different activities like coal transportation, coal loading & unloading, plantation and its maintenance, civil construction and maintenance jobs, petty supply jobs, E&M maintenance jobs, water sprinkling at dust generating points etc. The existing contractors and suppliers are strongly encouraged to employ local people only as a matter of Company policy unless the awarded jobs require high technical competence not available locally.

Other traders and private ancillary enterprises have also grown in the area. This has given rise to additional indirect employment opportunities. Besides, the State and Central Government are also benefited by way of Central Sales Tax, Income Tax, Cess etc. As per the R&R Policy of CIL dated April, 2012, it is proposed to impart vocational training to land losers and weaker sections of the society.

\*\*\*\*\*

## Chapter 5

# Analysis of Alternative (TECHNOLOGY AND SITES)

### 5.1 Introduction

Mining project is a site-specific project. Mineral lies beneath the earth surface in a fixed area and extraction of that mineral needs excavation in the area. So, there is a very little choice left for the alternative sites. Final site selection depends on the quantity, quality and suitability of the particular mineral for particular industry.

### 5.2 Alternative for Technology

#### 5.2.1 Method of Mining

The method of mining to extract coal and OB in Kathara Opencast mine is with shovel-dumper combination, considering the geo-mining characteristics of this area.

A study was carried out to find out the possibility of opencast working upto seam Kargali Bottom/combined. Average grade of coal produced from this quarry is expected to be Washery Grade III. Quarriable reserves are there in the dip side of mine so it has been planned to expand the quarry in dip direction up to optimized surface boundary to evacuate the Washery grade coal. Feasibility of extracting coal upto 200 to 225 m depth by opencast method is studied and it is found technically feasible to continue the opencast mine upto seam Kargali Bottom/combined in dip direction.

The equipment selection process is the most critical part of the project planning. The following selection criteria have been considered for selecting the size and type of the equipment:

- The strike length of the mine
- Annual rate of advance/deepening
- Total volume of overburden and coal to be handled annually
- The individual thickness of coal seam and partings
- The geo-mining condition of the mine.
- The type of mining system to be used like Inclined Slicing or Horizontal Slicing.
- The intuitive economics of the mine
- Presence of geological disturbances like faults, intrusions etc.

### 5.2.2 Dumping Pattern

Total overburden quantity estimated for present proposal of Kathara Opencast Project is 76.4 Mcum all of which has been proposed to be dumped into an integrated external and internal dump. Height of proposed external dump will be +340 m (Around 90 m AGL) and the top R.L. of internal dump will be +310 m (Around 30 m AGL).

Refer **Plate XIII** for Final Stage Dump Plan.

### 5.2.3 Coal Transportation

Coal produced from the Kathara OCP is transported to Kathara Washery. Kathara Washery is at a distance of 3 Km from face of the mine.

## Chapter 6

# Environmental Monitoring Programme

### 6.1 Introduction

The Environmental Monitoring Programme covers the technical aspects associated with mitigation, namely sampling schedule, measurement methodologies, data analysis, reporting schedules, emergency procedures and budgetary allocations associated with the same.

Samples for study of air quality, water quality and noise level will be collected and tested fortnightly at strategic locations representing a wholesome picture of the project. Groundwater level shall be monitored regularly. The Implementing authority will be guided and advised by feedback data obtained from above monitoring data.

### 6.2 Monitoring of Environmental Control Measures

Environmental cell at the area and Corporate level will take all necessary care to implement and monitor pollution control measures and for overall environmental management, It will look after the following aspects of environmental management.

- Generation of environmental data bank
- Monitoring of project implementation along with environmental control measures.
- Co-ordination for timely implementation of compliance-conditions of Environmental clearance of the project.
- Liaison with MOEF&CC and Jharkhand State Pollution Control Board.

#### Corporate Level

Environmental Cell headed by H.O.D (Env & Forest), CCL HQ will provide necessary support required for environmental management of project.

#### Area Level

The GM of Kathara Area will co-ordinate the environmental control measures including environmental quality monitoring in consultation with CCL HQ, State Govt., State Forest Department and Area Staff Officer (Environment Management and Control). The Area Staff Officer (Environment Management and Control) gets the necessary staffs and other infra-structural facilities for effective implementation of various measures from the office of GM of Kathara Area.

## 6.3 Monitoring of Environmental parameters

### 6.3.1 Ambient Air, Noise & Water Monitoring

The existing routine monitoring stations of Kathara OCP for air, water, noise has been assessed and was found suitable for monitoring the environmental status of the proposed project. Additional stations has been proposed at strategic locations to ensure wholesome and scientific representation of the region.

Details of stations considered for monitoring of the environment for the proposed project is as follows:

**Table 6.1 Details of Environmental Monitoring Stations**

| Category                       | Type     | Location                        | Frequency          |
|--------------------------------|----------|---------------------------------|--------------------|
| Ambient Air                    | Existing | Railway Colony (Core Zone)      | Fortnightly        |
|                                | Existing | Guest House (Core Zone)         |                    |
|                                | Existing | Saram Village – (Up Wind)       |                    |
|                                | Existing | DAV School (Cross Wind))        |                    |
|                                | Existing | Mine Rescue Station (Down Wind) |                    |
|                                | Existing | Asnapani Tola (Down Wind)       |                    |
| Noise                          | Existing | Railway Colony (Core Zone)      | Fortnightly        |
|                                | Existing | Guest House (Core Zone)         |                    |
|                                | Existing | Saram Village – (Up Wind)       |                    |
|                                | Existing | Mine Rescue Station (Down Wind) |                    |
|                                | Existing | Asnapani Tola (Down Wind)       |                    |
| Surface Water                  | Existing | Damodar River (U/S)             | Quarterly          |
|                                | Existing | Damodar River (D/S)             |                    |
| Ground Water                   | Proposed | Borewell Water– Bandh Basti     | Quarterly          |
|                                | Proposed | Borewell Water- CPP Complex     |                    |
| Effluent Water (4 parameters)  | Existing | Mine Sump Effluent              | Fortnightly        |
|                                | Proposed | Workshop Effluent               |                    |
| Effluent Water (27 parameters) | Existing | Mine Sump Effluent              | Quarterly          |
|                                | Proposed | Workshop Effluent               |                    |
| Ground water level             | Existing | Kathara (Well No.: EB-26)       | Pre & Post Monsoon |

(Note: Selection of the routine ambient air stations has been made based on the annual wind direction pattern of the region as per IMD, which is predominantly flowing from W-SNW.)

### 6.3.2 Measurement Methodologies

**Air Quality:** Particulate Matter PM<sub>10</sub>, PM<sub>2.5</sub>, Sulphur dioxide (SO<sub>2</sub>) and Oxides of Nitrogen (NO<sub>x</sub>) concentration in downwind direction considering predominant wind direction, at a distance of 500 metres from the following dust generating sources shall be measured in the manner indicated below:

**Table 6.2 Measurement methodologies for Air Quality Monitoring**

| Sl. No. | Parameter          | Technique  | Technical Protocol        |
|---------|--------------------|--|---------------------------|
| 1       | PM <sub>10</sub>   | Respirable Dust Sampler<br>(Gravimetric Method)      | IS:5182<br>(Part-23)      |
| 2       | PM <sub>2.5</sub>  | Fine Dust Sampler<br>(Gravimetric Method)            | As per CPCB<br>guidelines |
| 3       | Sulphur Dioxide    | Modified West & Gaeke<br>(Ultra-violet Fluorescence) | IS:5182<br>(Part-2)       |
| 4       | Oxides of Nitrogen | Jacob & Hochheiser<br>(Chemiluminescence)            | IS:5182<br>(Part-6)       |

In addition to the general laboratory and analytical facilities, the following sampling and analytical equipment shall be used.

**Table 6.3 Sampling Analytical equipments used for environmental monitoring**

| Sl. No | Name of the Equipment      |
|--------|----------------------------|
| 1      | High Volume air samplers.  |
| 2      | Multi gas air samplers.    |
| 3      | Wind recorder              |
| 4      | Aneroid Barometer.         |
| 5      | Wet & Dry Bulb Thermometer |
| 6      | Hygrometer                 |
| 7      | Spectrophotometer.         |

**Water Quality:** Three litres of representative water samples will be collected in plastic container and transported to laboratory for physico-chemical analysis. For determination of BOD and bacteriological analysis, pre-sterilized bottles will be used and care will be taken to maintain cool temperature by keeping the bottles in ice boxes during transportation to the laboratory for analysis. Physico-chemical and bacteriological parameters for drinking water samples will be compared with IS:10500 standard and mine discharge water samples will be compared with MoEF&CC Schedule-VI standard.

**Noise Level:** Ambient Air Quality Standards in respect of Noise as per 'The Noise Pollution (Regulation and Control), Rules 2000 along with the guidelines prescribed by the Director General, Mines & safety (DGMS) shall be complied with.

The noise level meter capable of measuring equivalent sound pressure level shall be used for noise level measurement.

Ambient air quality, water quality (mine discharge and drinking water samples), ground water level, noise level and land use will be monitored. This is already being implemented through CMPDI in other running projects of CCL.

### 6.3.3 Plantation

Plant growth, its maintenance and survival rate will be monitored. This is already being implemented through Forest Department in other running projects of CCL.

### 6.3.4 Health

Health of the employees will be examined for identifying occupational diseases etc. to initiate remedial measures in time. This is already being implemented by way of periodic Medical Examination as per DGMS guidelines.

## 6.4 Emergency Procedures

The term 'major accident' means an unexpected and sudden occurrence of event from abnormal developments in course of one's industrial activity leading to a serious danger to public or environment, whether immediate or delayed, inside or outside the installation involving one or more hazardous substances.

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 of disaster management plan (DMP) is to be prepared for the project incorporating the following:

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

## 6.5 Environmental Budget

The routine environmental monitoring of the Kathara OCP, Kathara Area is being carried out by CMPDIL, Ranchi. The environmental monitoring cost budget has been proposed based on existing and proposed routine monitoring stations (refer Table 6.1) and the prevalent monitoring rates of CMPDI for different parameters.

**Table 6.4 Proposed Environmental Monitoring Cost**

| <b>Parameters</b>                        | <b>Rate<br/>(in Rs.)</b> | <b>Total No. of<br/>samples in a year</b> | <b>Annual Cost<br/>(in Rs.)</b> |
|--|--------------------------|---|---------------------------------|
| <b>PM10</b>                              | 14354                    | 144 (6*2*12)                              | 20,66,976                       |
| <b>PM2.5</b>                             | 12194                    | 144 (6*2*12)                              | 17,55,936                       |
| <b>Noise</b>                             | 6338                     | 120 (5*2*12)                              | 7,60,560                        |
| <b>Surface Water (19<br/>parameters)</b> | 8620                     | 48 (2*2*12)                               | 4,13,760                        |

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|                                       |       |             |                  |
|---------------------------------------|-------|-------------|------------------|
| <b>Ground Water (24 parameters)</b>   | 9313  | 8 (2*4)     | 74,504           |
| <b>Effluent Water (4 parameters)</b>  | 2329  | 48 (2*2*12) | 1,11,792         |
| <b>Effluent Water (27 parameters)</b> | 11959 | 8 (2*4)     | 95,672           |
| Total annual cost                     |       |             | <b>52,79,200</b> |

The above estimated cost against routine environmental monitoring is based on the current rate of CMPDI (as on May 2020). It cost may vary in future subject to any change in the rates.

\*\*\*\*\*

## Chapter 7

# Additional Studies

### 7.1 Public Consultation

This EIA/EMP has been prepared as per the Terms of Reference (ToR) recommended by EAC and submitted to Jharkhand State pollution Control Board (JSPCB), Ranchi, for conduct of public consultation as directed by MoEFCC.

The project area of Kathara OCP falls into Bokaro District of Jharkhand. Therefore, public consultation of Kathara OCP (1.90 MTPA/ 773.23 Ha.) was conducted as per the EIA Notification 2006 and Terms of Reference (ToR) granted by the MoEFCC. Refer Annexure IX for Minutes of PH

The details of Public Consultation are as given below:

| Particulars                                       | Details   |
|---|---|
| Date of Advertisement                             | 29.07.2021  |
| Newspapers in which the advertisement appeared    | Hindustan Times and Times of India  |
| Date of public hearing (DD/MM/YYYY)               | 31.08.2021  |
| Place of Public Hearing                           | At Officers Club, Kathara village, Bokaro Dist.   |
| Public Hearing Panel chaired by & members present | Chaired by Shri. Sadat Anwar, Additional Collector cum Deputy director (District Rural Development Agency)  |
|   | Shri. Arun Kumar Chaudary, Regional Officer, Dhanbad, JSPCB   |
|   | Shri. Mithilesh Jha, A.S.O, JSPCB Ranchi HQ   |
|   | General Manager, Project Officer and other Management/ Members of CCL.  |
| No. of people attended the public hearing meeting | About 103<br>(People of Bandh Basti, Jhirki, Asnapani, Chaudhari Tola, Kathara Basti, Jarandgih, Bermo, Swang Basti etc. participated in particular.) |

Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited

---



**Fig: Photographs Showing Public Hearing of Kathara OCP**

Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited

---

**7.1.1 Minutes of Public Hearing**

| SN | Name and address of the questioner                   | Questions asked by citizens / members  | Consolidated answers given by the company representative   |
|----|--|--|--|
| 1  | Sri Mathura Singh Yadav<br>Bandh Basti<br>Kamal Tola | <p>I welcome the project. Our relatives have given land for the project but have not compensated till date. We are not opposing the project but local people should be given fundamental facilities.</p> <p>Outsourcing agencies bring their labors from outside. Therefore we have to migrate for work. Displaced people should be given work on the basis of contract.</p> | <p>GM (Kathara) has informed that evaluation of land is being carried out and Khatiyani is being collected, as per the discussion with DC Bokaro, as the said land has been acquired 50 to 60 years back. There is a doubt in people's mind that receipt is being generated in their name but the process of establishing ownership of the land is underway &amp; any issues related to land is being cleared by the help of state govt.</p> <p>Under CSR Plan, approximately Rs. 6 Crore worth of expenditure has been done for works such as construction of bore well, wells, hand pump, ponds, roads, community hall, education, medical camp etc from year 2014 to 2019.</p> <p>In additional, basic facilities such as electricity, water, road, school, hospital etc is being provided. More such provisions shall be made if required.</p> <p>During Covid period, mask sanitizers, food has been distributed and Jarangdih hospital has been made Covid hospital, which has helped the villagers.</p> <p>Management has assured that displaced local peoples shall be given employment according to applicable rules and law.</p> |
| 2  | Sri Nizamuddin                                       | We want the expansion of the project but displaced locals shall  | The matter related to land acquisition should be   |

=====

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|   |                                |   |   |
|---|--------------------------------|---|---|
|   | Ansari Asnapani                | be given basic facilities. As the land has been acquired, we are not getting benefit of government plans. Plan for utilization of mine water for agriculture shall be made.   | solved by requesting state government. For treatment of mine water by establishment of effluent treatment plant, an MoU has been made with State Govt which will help the villagers.  |
| 3 | Sri Vijay Yadav Chaudhari Tola | We welcome the expansion of Kathara Colliery. The village is only 50 -100 meter away from Kathara Colliery. CCL provide various facilities in colony but attention is not paid to the village. Electricity & water is being provided to villagers but the facility is not good. The compensation of acquired land has not been paid properly. CCL has provided various facilities to people during Covid period.  | It was informed that evaluation of land is being carried out and Khatiyan is being collected as the said land has been acquired 50 to 60 years back. There is a doubt in people's mind that receipt is being generated in their name but the process of establishing ownership of the land is underway & any issues related to land should be cleared by the help of state govt.<br>The facilities provided by CCL are being maintained time to time, which will be improved further.   |
| 4 | Md. Sazzad Ansari Jhirki       | Kathara Colliery was started long time ago. We welcome the proposal of expansion of Kathara Colliery as proposed through this public hearing. Facility should be provided under CSR. The condition of road from Muslim Tola to Yadav Tola is very bad. Local people are being kept deprived of basic facilities. Even after, providing land for the project, village area is not being provided water from tankers while water is being provided by tankers in colony.<br>Local people should be given employment | It was informed that evaluation of land is being carried out and Khatiyan is being collected as the said land has been acquired 50 to 60 years back. There is a doubt in people's mind that receipt is being generated in their name but the process of establishing ownership of the land is underway & any issues related to land is being cleared by the help of state govt.<br><br>Various employee of CCL & displaced peoples stay around the area near Muslim Tola to Yadav Tola who helps in the works of company. We are committed to provide all facilities to people. |
| 5 | Srimati Devi Kathara Basti     | We want to inform project officer and manager that even after giving the land we are being deprived of basic facilities. There is no arrangement of water for the villagers. Colony & village should be treated equally   | All villages are our own and no discrimination between villages & colony is being done. There was water scarcity in the past due to which villagers and CCL employees have face the problem.  |

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|   |  |  |  |
|---|--|--|--|
|   |  |  |  |
| 6 | Sri Gopal Yadav<br>Panchayat<br>Samiti Sadasya<br>Bandh<br>Panchayat | <p>Kathara colliery was established in 1957 and land was acquired from Bandh, Kathara, Jhriki and Bodiya Basti. In 1979, 212 Acre land was acquired where 100 people were given employment. It was informed by the villagers we are near the colliery so where should we go. Due to blasting houses are getting damaged. We welcome the expansion of colliery. The village will be deserted if the colliery closes. Due to expansion of the mine, village has come near to the mine. A pond near villages is also filled. There is no justice in making villagers homeless or injured for making profit. In year 1992-93 land was acquired at a very less rate.</p>  | <p>It was informed that evaluation of land is being carried out and Khatiyan is being collected as the said land has been acquired 50 to 60 years back. There is a doubt in people's mind that receipt is being generated in their name but the process of establishing ownership of the land is underway &amp; any issues related to land is being cleared by the help of state govt.</p> <p>Controlled blasting is being carried out as per the DGMS guidelines.<br/>Under CSR, Rs 25 lakh was sanctioned for making a pond however pond couldn't be constructed due to lack of land. Villagers are requested to provide a suitable land for construction of pond.</p> |
| 7 | Sri Baleshwar<br>Gop<br>Jhirki                                       | <p>Today's program is for expansion of Kathara Colliery. Sri Dube Sahab, Project Officer Kathara Colliery has provided complete information. The work plan should be provided in detail. Since 1957, Kathara Colliery was given 2500-2600 acre land from the villagers. Kathara Colliery was also given a national award. Villagers have never created obstacles in project operation. Project management should tell what work has been done for development of villages. The management should take care of ensuring various facilities for land losers. Due to in-depth mining at Kathara OCP, water level has gone down in the nearby village. The management should provide the facility of water, electricity &amp; road. No employment is being provided. The villagers are being treated with discrimination. The status</p> | <p>It was informed that evaluation of land is being carried out and Khatiyan is being collected as the said land has been acquired 50 to 60 years back. There is a doubt in people's mind that receipt is being generated in their name but the process of establishing ownership of the land is underway &amp; any issues related to land is being cleared by the help of state govt.</p> <p>The facilities provided by CCL are being maintained time to time, which will be improved further.<br/>All villages are our own and no discrimination between villages &amp; colony is being done. There was</p>  |

=====

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|   |                         |   |   |
|---|-------------------------|---|---|
|   |                         | of villages is very poor. Management should be pay attention for improvement.   | water scarcity in the past due to which villagers and CCL employees have face the problem.<br>Rain water harvesting & dense afforestation is being carried out for conservation of water.   |
| 8 | Md. Belal Jarangdih     | Our lands have been taken which should be returned. Management should provide water for agriculture, electricity, and medical facilities. The retired personnel of CCL are living in land of CCL by construction of houses however CCL management, with the help of police, is evicting displaced persons who have constructed house in land of CCL. Various cases are also being filed for troubling villagers.  | It was informed that evaluation of land is being carried out and Khatiyan is being collected as the said land has been acquired 50 to 60 years back. There is a doubt in people's mind that receipt is being generated in their name but the process of establishing ownership of the land is underway & any issues related to land is being cleared by the help of state govt.<br><br>If any employee/villagers/retired employee carryout illegal construction, proper action shall be taken against such persons.   |
| 9 | Md. Murshid Alam Jhirki | We have given not only our lands but our entire wealth to CCL management, however we have only received unemployment in exchange. In Sawang washery, 42 labors & in Kathara Washery, 117 labors were contractually engaged in plant cleaning who are now un-employed. Our forefathers have given their land for the project. We have not been provided with the facility of electricity. The facilities provided to company quarters should also be extended to villages. Arrangement of water should be made. The school bus is operating only till Dahiya, it should be extended upto Jhriki. | It was informed that evaluation of land is being carried out and Khatiyan is being collected as the said land has been acquired 50 to 60 years back. There is a doubt in people's mind that receipt is being generated in their name but the process of establishing ownership of the land is underway & any issues related to land is being cleared by the help of state govt.<br>The work of plant planning is being done under the provision of company. If required, work is being undertaken by outsourcing labors as well. Company management shall take decision for operation of school bus |

=====

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|    |  |  |  |
|----|--|--|--|
|    |  |  |  |
| 10 | Sri Mahendra<br>Turi<br>Kathara Basti                        | Our village has become an island. Wastewater from colony enters our villages, which has caused mosquito problem. Management should take action for solving this problem.   | For removal of water, drains have been constructed. Proper inspection and action will be carried out to find out if there is water leakage, which is causing this issue. Mosquito fogging has been carried out last year and it will be done in future as well.  |
| 11 | Sri Rajesh<br>Kumar Pandey                                   | Public hearing has been carried out in past also but there is no action. Streetlights have not been installed in adequate numbers. Filter plant should be made maintained. Children who belong to the poor families and study in DAV school should be given fees exemption.  | It was not possible to install streetlight in the entire village therefore LED lights have been installed on intersections & crossroads. Other places shall be covered in future as required. The fee of DAV school is already very less in compare to the other nearby private schools. BPL families are exempted from paying fees. Any |
| 12 | Sri Ajay Kumar<br>Singh<br>Kathara 2 no<br>colony            | Public hearing is a medium for taking suggestion from people. Coal labors perform major role in the development of nation. The suggestion given in the public hearing should not be treated as complain rather as action plan for management. CCL management is carrying out social responsibility. The deficiencies should be removed. Local unemployed persons should be positively consulted and basic problems of the local people should be solved. Techniques for blasting should be incorporated so that it causes less harm. Environment clearance should be accorded so that there is villages support for project expansion. | This issue will be given attention and any deficiencies shall be removed as per the company policy.  |
| 13 | Sri Pramod<br>Kumar Singh<br>Representative<br>of MLA, Bermo | I have heard suggestion of various persons. This tells us that everyone wants to take it the positive direction. When the project was started, people were provided basic facilities but it is not the same today. For providing employment to local people, arrangements of local cell were made but that is not operational today. Small contracts were given to the local   | Almost all the questions raised by Sri Pramod Kumar Singh has been already been replied. Contracts upto the value of Rs 2 Lakhs are being issued in offline mode.  |

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|    |   |  |   |
|----|---|--|---|
|    |   | people but that is also stopped nowadays.  |   |
| 14 | Md. Gulsharif Ansari Jhirki                       | All these suggestions should not be treated as complaints. Contracts upto 5 lakhs should be reserved for local persons. Plantation should be done by spreading soil from Jhriki mine. Payment should be given for acquired land in cases where it has not been made yet. There is no lack of fund in CCL so all maintenance work shall be done if required. CCL management should form team to visit local villages to listen to basic problems of villagers and take action to remove the problem | Almost all the questions raised by Sri Gulsharif Ansari has been already been replied. Contracts upto the value of Rs 2 Lakhs are being issued in offline mode. CCL has a MOU with Forest Division Hazaribagh for carrying out massive afforestation under which plantation activities are being carried out. In addition, CCL management is also doing plantation & distributing saplings in large quantities. My office is also open from evening 5 PM for any complaints/suggestion of the villagers & other stakeholders. The action on complaints/suggestion received is also being taken timely. Periodic consultative meeting with hon'ble MLA & village heads are also being organized. |
| 15 | Sri Pradip Yadav Kathara Basti, Kathara Panchayat | Our land has been taken by CCL and the remaining land has been uses for dumping. There are approximately 6800 quarters in the area and total employees are approximately 4500. Many persons have taken un-authorized possession of the quarter. CCL should vacate such quarters. The pond of Bandh basti has been cut forcefully and alternate pond has not been constructed. It is requested that the facility of electricity, water & road should be maintained properly                         | Almost all the questions raised by Sri Pradeep Yadav has been already been replied. Management will take appropriate action to vacate any quarter, which are illegally occupied.  |
| 16 | Sri Manilal Singh Mahli Bandh, Kendua Tola        | Different problems have been discussed. If there are problem, there are solution as well. We do not oppose the expansion of the project however people should get employment and the region should develop. Kathara Hospital doesn't have proper treatment facility for local villagers, which should be corrected. We are being provided electricity but it is difficult to charge even one mobile.   | Almost all the questions raised by Sri Manilal Singh has been already been replied.   |

=====

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|    |  |  |   |
|----|--|--|---|
| 17 | Md Junaid<br>Jamali<br>Jhirki                                    | Local cell at Kathara OCP is closed since last 4 years due to the unavailability of mining challan. However rack loading is being done in the same period. There are three slurry ponds in Kathara, which is filled completely and spills into Damodar river. In case the slurry is not lifted it may cause serious problem in future. The problem needs attention and proper action is required.  | There is ongoing dispute between CCL and State Govt. regarding payment of 3 times royalty. State govt is demanding three times royalty. Govt. of India has also constituted a committee for this dispute. As per the decision taken by Govt. of India, this problem shall be resolved. As of now there is no danger of river pollution. |
| 18 | Sri Babloo<br>Kuamr Yadav<br>Bandh<br>Panchayat,<br>Bandh Basti  | Most of the points have already been discussed during the public hearing. 425 labors are now unemployed who were previously working in slurry and are facing very hard times. The issues have been raised at various forums but no solution has been reached till date. There is no reservation for the children of displaced persons in the DAV school admission. No medicine is being provided to the displaced persons in hospital. Special attention is required under corporate social responsibility. No roads till date have been constructed in our village. There are many plans to provide training to the children of displaced persons for employment but it is not being acted upon. One application was given on 15.06.2020 regarding damage caused by blasting but till no action has been taken. The inspection is being done only for pretense. If local villagers go to the PO office for any issues, cases are being lodged. Outsourcing agency should provide employment to local people. Compensation has not been given against the land acquired in past. Fire in coal stock every year is causing loss to the nation and it is also causing pollution. | Almost all the questions raised by Sri Babloo Kuamr Yadav has been already been replied. For preventing coal stock from getting fire, a fire fighting team has been constituted which maintains and extinguish any fire.  |
| 19 | Sri Lalan Kevat<br>Swang North<br>Panchayat<br>Samiti<br>Members | The iron bridge at Swang has been damaged due to which the local persons have to take a diversion of 2 KM via Gomia/Swang. Road should be constructed from Mahabir Stahn to Swang Kanta Ghar.  | The maintenance of iron bridge shall be done very soon. The work of construction of Mahabir Sthan to Kanta Ghar is under progress.  |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|    |                                    |   |  |
|----|------------------------------------|---|--|
| 20 | Sri Govind<br>Yadav<br>Bandh Basti | <p>All land required for 2 no quarry has been provided. Approximately 2300 Acre land has been acquired through CBA Act against which compensation and employment has not yet been provided. Additional 100 Acres of land has been taken. We have already gone bankrupt after providing 2300 acres of land and management has stopped sell/purchasing of the said land. Whenever management requires land, ten peoples are being called for discussion and decision is being taken and promises to provide basic facilities to the displaced persons. We do not oppose the expansion but management should provide fundamental facilities to us.</p> | <p>Almost all the questions raised by Sri Govind Yadav has been already been replied.</p>  |
| 21 | Md Arif<br>Jhirki                  | <p>Land has been given for Saram Mauza around 10 years back but till date mine has not been opened neither land was returned. Retired personal are given medical facility but they have to go CCL HQ Ranchi for reimbursement of expenditure made during treatment. The cost of going to CCL HQ Ranchi often exceeds the bill amount. Provision should be made to process the bill at Kathara itself. Ambulance facility should be provided for displaced persons/ villagers treatment.</p>   | <p>The matter of land of Saram mauza will be discussed at CCL Headquarter level and appropriate decision shall be taken accordingly.</p> <p>The matter of reimbursement of bills of retired persons will also be discussed at CCL Headquarter level and the matter will be resolved.</p> |

### 7.1.2 Action Plan for compliance of issues raised in the Public Hearing

#### A. Brief Overview of the Issues Raised

| S.No | Category of Issues Raised         | Frequen<br>cy | Concerned Village/ Person  |
|------|-----------------------------------|---------------|--|
| 1    | Land, Compensation and Employment | 9             | Jhirki, Bandh Basti, Choudhari Tola                                  |
| 2    | Water supply and sanitation       | 9             | Jhirki, Asnapani, Kathara Basti, Bandh Basti, Jarangdih, Sri. Rajesh |

=====

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|    |  |   |  |
|----|--|---|--|
|    |  |   | Kumar Pandey   |
| 3  | Improvement in Basic Facilities under CSR in nearby villages | 8 | Jhirki, Bandh Basti, Asnapani, Choudhari Tola, Kathara Basti |
| 4  | Education & Skill Development and related services           | 4 | Jhirki, Bandh Basti, Sri. Rajesh Kumar Pandey                |
| 5  | Repair and maintenance of roads and bridges                  | 3 | Jhirki, Swang North Panchayat, Bandh Basti                   |
| 6  | Medical and Health Facilities                                | 3 | Jarangdih, Kendua Tola, Jhirki                               |
| 7  | Damage due to blasting                                       | 2 | Bandh Basti  |
| 8  | Pollution and Mitigation Measures                            | 2 | Jhirki, Bandh Basti  |
| 9  | Plantation   | 1 | Jhirki   |
| 10 | Others   | 1 | Kathara Basti  |

**B. Brief Overview of the Issues Raised**

| SN | Category of Issues Raised                                    | Frequency | Concerned Village/ Person   |
|----|--|-----------|---|
| 1  | Land, Compensation and Employment                            | 9         | Jhirki, Bandh Basti, Choudhari Tola   |
| 2  | Water supply and sanitation                                  | 9         | Jhirki, Asnapani, Kathara Basti, Bandh Basti, Jarangdih, Sri. Rajesh Kumar Pandey |
| 3  | Improvement in Basic Facilities under CSR in nearby villages | 8         | Jhirki, Bandh Basti, Asnapani, Choudhari Tola, Kathara Basti                      |
| 4  | Education & Skill Development and related services           | 4         | Jhirki, Bandh Basti, Sri. Rajesh Kumar Pandey                                     |
| 5  | Repair and maintenance of roads and bridges                  | 3         | Jhirki, Swang North Panchayat, Bandh Basti  |
| 6  | Medical and Health Facilities                                | 3         | Jarangdih, Kendua Tola, Jhirki  |
| 7  | Damage due to blasting                                       | 2         | Bandh Basti   |
| 8  | Pollution and Mitigation Measures                            | 2         | Jhirki, Bandh Basti   |
| 9  | Plantation   | 1         | Jhirki  |
| 10 | Others   | 1         | Kathara Basti   |

=====

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

---

**C. Action Plan with Budgetary Provision :**

| S.No. | Category of Issues Raised         | Issues in Details   | Action Plan with Budgetary Provision   | Cost (in Rs. Lakh) |
|-------|-----------------------------------|---|--|--------------------|
| 1     | Land, Compensation and Employment | i. Compensation against Land<br><br>ii. Employment for locals | i. CCL provides employment to all land losers at one employment per 02 Acre of tenancy land.<br><br>ii. 100 employment already provided for land acquired under CBA in 1979. Employment to local villagers is being provided as per their skill in civil, electrical maintenance, workshops, washeries and other different contractual work like coal transportation , supply of spares, small capital and revenue nature of work.<br><br><b>Compensation and Employment to be provided to concerned as per the Company rules.</b> | --                 |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|          |                             |  |  |     |
|----------|-----------------------------|--|--|-----|
| <b>2</b> | Water supply and sanitation | i. Mine water and pond construction for agriculture and domestic use | i. State Govt has been contacted for preparation of scheme for utilization of mine water in Kathara Area as per MoU signed between CIL & State Govt, Jharkhand. 03 no. of ponds have been constructed in nearby villages. They are routinely cleaned.                            | --  |
|          |                             | ii. Water tanker facility (Jhirki)                                   | ii. Also, Deepening & cleaning of pond (at three locations near Bandh Basti & Kathara Basti) is under process for the purpose of agriculture & Other Usage use. (Photographs enclosed)<br><b>(Timeline: FY 22-23)</b>  | 5   |
|          |                             | iii. Water Supply  | iii. 2 pumps of 1000 GPM capacity are deployed for domestic water to Jhirki, Yadav tola, Asna pani and Bandh Basti located near project. The annual cost of operation, repair & maintenance of water supply system is approximately 56 Lakhs/annum.<br><b>(Ongoing Activity)</b> | 108 |
|          |                             | iv. Filter Plant maintenance   | iv. A water filter plant for the purpose of water supply to nearby villages is already under construction under DMFT scheme by State Govt.   | --  |
|          |                             | v. Wastewater from Colony and Mosquito issue                         | v. The site was inspected by CCL and the damaged part of drain repaired.<br><b>(Work Completed)</b>  | --  |
|          |                             |  | vi. Fogging to eliminate mosquito menace has been carried in past years and it will be done in future as well.   | --  |
|          |                             |  | vii. In addition to this, 3 numbers of fresh ponds has been constructed with Ghat in last two in command areas of Kathara area under CSR at a cost of Rs 20 Lakhs.   | --  |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

| <b>3</b>                                     | Improvement in Basic Facilities under CSR in nearby villages | <p>i. Better water supply/electricity/other basic facilities in villages as per CSR and Govt. schemes.</p> | <p>i. Different basic facilities are extended to the nearby villages under CSR scheme of CCL. This includes health, education, infrastructure, water supply road sanitation and environment.</p> <table border="1"> <thead> <tr> <th>Sector</th> <th>2018-19</th> <th>2019-20</th> <th>2020-21</th> <th>2021-22</th> <th>Grand Total (Rs. Lakh)</th> </tr> </thead> <tbody> <tr> <td><b>Drinking Water &amp; Water Management</b></td> <td>11.87</td> <td>28.59</td> <td>55.97</td> <td>138.5</td> <td><b>234.93</b></td> </tr> <tr> <td><b>Education</b></td> <td>3.31</td> <td>5.57</td> <td>1.88</td> <td></td> <td><b>10.76</b></td> </tr> <tr> <td><b>Health</b></td> <td></td> <td></td> <td>10.94</td> <td></td> <td><b>10.94</b></td> </tr> <tr> <td><b>Infrastructure</b></td> <td></td> <td>8.81</td> <td>6.83</td> <td>18.00</td> <td><b>33.64</b></td> </tr> <tr> <td><b>Sanitation</b></td> <td>7.19</td> <td></td> <td></td> <td>13.75</td> <td><b>20.94</b></td> </tr> <tr> <td><b>Skill Development</b></td> <td></td> <td></td> <td>6.50</td> <td>2.00</td> <td><b>8.5</b></td> </tr> <tr> <td><b>Sports</b></td> <td></td> <td>2.02</td> <td>1.92</td> <td>5.00</td> <td><b>8.94</b></td> </tr> <tr> <td><b>Grand Total</b></td> <td><b>22.37</b></td> <td><b>44.99</b></td> <td><b>84.04</b></td> <td><b>177.25</b></td> <td><b>328.65</b></td> </tr> </tbody> </table> <p><b>For FY 2022-23, a budget of Rs. 194.50 Lakhs has been provisioned to carry out various activities under CSR in Kathara Area.</b></p> | Sector        | 2018-19       | 2019-20 | 2020-21                | 2021-22 | Grand Total (Rs. Lakh) | <b>Drinking Water &amp; Water Management</b> | 11.87 | 28.59 | 55.97 | 138.5 | <b>234.93</b> | <b>Education</b> | 3.31 | 5.57 | 1.88 |  | <b>10.76</b> | <b>Health</b> |  |  | 10.94 |  | <b>10.94</b> | <b>Infrastructure</b> |  | 8.81 | 6.83 | 18.00 | <b>33.64</b> | <b>Sanitation</b> | 7.19 |  |  | 13.75 | <b>20.94</b> | <b>Skill Development</b> |  |  | 6.50 | 2.00 | <b>8.5</b> | <b>Sports</b> |  | 2.02 | 1.92 | 5.00 | <b>8.94</b> | <b>Grand Total</b> | <b>22.37</b> | <b>44.99</b> | <b>84.04</b> | <b>177.25</b> | <b>328.65</b> | -- |
|--|--|--|---|---------------|---------------|---------|------------------------|---------|------------------------|--|-------|-------|-------|-------|---------------|------------------|------|------|------|--|--------------|---------------|--|--|-------|--|--------------|-----------------------|--|------|------|-------|--------------|-------------------|------|--|--|-------|--------------|--------------------------|--|--|------|------|------------|---------------|--|------|------|------|-------------|--------------------|--------------|--------------|--------------|---------------|---------------|----|
|  |  | Sector   | 2018-19   | 2019-20       | 2020-21       | 2021-22 | Grand Total (Rs. Lakh) |         |                        |  |       |       |       |       |               |                  |      |      |      |  |              |               |  |  |       |  |              |                       |  |      |      |       |              |                   |      |  |  |       |              |                          |  |  |      |      |            |               |  |      |      |      |             |                    |              |              |              |               |               |    |
| <b>Drinking Water &amp; Water Management</b> | 11.87  | 28.59  | 55.97   | 138.5         | <b>234.93</b> |         |                        |         |                        |  |       |       |       |       |               |                  |      |      |      |  |              |               |  |  |       |  |              |                       |  |      |      |       |              |                   |      |  |  |       |              |                          |  |  |      |      |            |               |  |      |      |      |             |                    |              |              |              |               |               |    |
| <b>Education</b>                             | 3.31   | 5.57   | 1.88  |               | <b>10.76</b>  |         |                        |         |                        |  |       |       |       |       |               |                  |      |      |      |  |              |               |  |  |       |  |              |                       |  |      |      |       |              |                   |      |  |  |       |              |                          |  |  |      |      |            |               |  |      |      |      |             |                    |              |              |              |               |               |    |
| <b>Health</b>                                |  |  | 10.94   |               | <b>10.94</b>  |         |                        |         |                        |  |       |       |       |       |               |                  |      |      |      |  |              |               |  |  |       |  |              |                       |  |      |      |       |              |                   |      |  |  |       |              |                          |  |  |      |      |            |               |  |      |      |      |             |                    |              |              |              |               |               |    |
| <b>Infrastructure</b>                        |  | 8.81   | 6.83  | 18.00         | <b>33.64</b>  |         |                        |         |                        |  |       |       |       |       |               |                  |      |      |      |  |              |               |  |  |       |  |              |                       |  |      |      |       |              |                   |      |  |  |       |              |                          |  |  |      |      |            |               |  |      |      |      |             |                    |              |              |              |               |               |    |
| <b>Sanitation</b>                            | 7.19   |  |   | 13.75         | <b>20.94</b>  |         |                        |         |                        |  |       |       |       |       |               |                  |      |      |      |  |              |               |  |  |       |  |              |                       |  |      |      |       |              |                   |      |  |  |       |              |                          |  |  |      |      |            |               |  |      |      |      |             |                    |              |              |              |               |               |    |
| <b>Skill Development</b>                     |  |  | 6.50  | 2.00          | <b>8.5</b>    |         |                        |         |                        |  |       |       |       |       |               |                  |      |      |      |  |              |               |  |  |       |  |              |                       |  |      |      |       |              |                   |      |  |  |       |              |                          |  |  |      |      |            |               |  |      |      |      |             |                    |              |              |              |               |               |    |
| <b>Sports</b>                                |  | 2.02   | 1.92  | 5.00          | <b>8.94</b>   |         |                        |         |                        |  |       |       |       |       |               |                  |      |      |      |  |              |               |  |  |       |  |              |                       |  |      |      |       |              |                   |      |  |  |       |              |                          |  |  |      |      |            |               |  |      |      |      |             |                    |              |              |              |               |               |    |
| <b>Grand Total</b>                           | <b>22.37</b>   | <b>44.99</b>   | <b>84.04</b>  | <b>177.25</b> | <b>328.65</b> |         |                        |         |                        |  |       |       |       |       |               |                  |      |      |      |  |              |               |  |  |       |  |              |                       |  |      |      |       |              |                   |      |  |  |       |              |                          |  |  |      |      |            |               |  |      |      |      |             |                    |              |              |              |               |               |    |
|  |  | <p>ii. To ensure proper street lighting.</p>   | <p>ii. 30 numbers of 60-Watt LED lights along washery roads have been installed. In addition, around 250 numbers of 60-watt LED street light have also been installed at various junctions and community centers in nearby villages.</p> <p>iii. Construction of 1 number of community halls within the command area of Kathara<br/><b>(Timeline: FY 23-24)</b></p>   | 150           |               |         |                        |         |                        |  |       |       |       |       |               |                  |      |      |      |  |              |               |  |  |       |  |              |                       |  |      |      |       |              |                   |      |  |  |       |              |                          |  |  |      |      |            |               |  |      |      |      |             |                    |              |              |              |               |               |    |
| <b>4</b>                                     | Education & Skill Development and related services           | <p>i. Exemption/Lower school fee in DAVs for displaced and economically poor families</p>                  | <p>i. Fee waiver (ranging from 50 % - 100 %) has been provide to eligible students of weaker economic sections at DAV Kathara and DAV Swang. (Approximately 50 beneficiaries each year). The annual cost of fee waiver is approximately 4 Lakhs/annum.<br/><b>(Ongoing Activity)</b></p>  | 12            |               |         |                        |         |                        |  |       |       |       |       |               |                  |      |      |      |  |              |               |  |  |       |  |              |                       |  |      |      |       |              |                   |      |  |  |       |              |                          |  |  |      |      |            |               |  |      |      |      |             |                    |              |              |              |               |               |    |
|  |  | <p>ii. Extension of school</p>   | <p>ii. 4 number of school buses deployed for nearby colony and bastis including Jhirki, Yadav Tola,Bandh Basti, Yadav Tola, Kathara Basti, Asnapani, Railway Colony etc.</p>  | 144           |               |         |                        |         |                        |  |       |       |       |       |               |                  |      |      |      |  |              |               |  |  |       |  |              |                       |  |      |      |       |              |                   |      |  |  |       |              |                          |  |  |      |      |            |               |  |      |      |      |             |                    |              |              |              |               |               |    |

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|   |   |  |  |        |
|---|---|--|--|--------|
|   |   | bus service upto Jhirki  | In addition to this , 6 more numbers of bus are catering the welfare activities of nearby command area villages like Khetko, Piparadih , Karmatiya and Swang etc. The annual cost of operation, repair & maintenance of 4 numbers of school buses are approximately 48 Lakhs/annum.<br><b>(Ongoing Activity)</b> |        |
|   |   | iii. Skill Development   | iii. Training is provided to local persons through CIPET to about 100 dependents of villagers for gainful employment in CCL. Further, various courses like sewing, beautician, computer, food processing are arranged regularly under CSR.   |        |
| 5 | Repair and maintenance of roads and bridges | i. Repair of road from Muslim Tola to Yadav Tola                     | i. Road from Muslim Tola to Yadav Tola (1100 meter x 4 meter x .3 meter) has been repaired departmentally. <b>(Work Completed)</b>   | 23     |
|   |   | ii. Repair of Iron Bridge at Swang                                   | ii. The iron bridge over Montico Nala at Swang has repaired. <b>(Work Completed)</b>   | 1.50   |
|   |   | iii. Construction of road near Mahabir Sthan, Swang                  | iii. Strengthening & widening of main road from Kathara More to Kathara outpost (1450 meter) <b>(Work Completed)</b>   |        |
|   |   | iv. Construction of PCC road from Asnapani Mode to CPP Rly. Crossing | iv. Construction of PCC road from Asnapani Mode to CPP Rly. Crossing <b>(Timeline: FY 23-24)</b>   | 200.00 |
| 6 | Medical and Health Facilities               | i. Health Facility at Hospital, Ambulance Services                   | i. Already 3 dispensaries and 1 regional hospital with 5 ambulances cater to the needs of employees and villagers. Kathara Regional Hospital having facilities for outdoor and indoor treatment, radiology, ENT. Other patients are referred to Regional Hospital Dhori at about 10 km.                          | --     |

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|   |                                   |   | 2018-19  |             | 2019-20     |             | 2020-21     |             | 20221-22    |             |      |
|---|-----------------------------------|---|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|------|
|   |                                   |   | No.of Camps  | Beneficiary | No.of Camps | Beneficiary | No.of Camps | Beneficiary | No.of Camps | Beneficiary |      |
|   |                                   | ii. Medical Bill of retired personnel                                       | Village Health Camp  | 41          | 893         | 39          | 925         | 19          | 551         | 16          | 314  |
|   |                                   |   | HTN & Diabetic Detection Camp  | 1           | 26          | 1           | 160         | -           | -           | 1           | 144  |
|   |                                   |   | Anemia Camp  | 1           | 72          | 1           | 96          | 2           | 214         | 1           | 240  |
|   |                                   |   | CSR Dispensary   | Everyday    | 4300        | Everyday    | 4441        | Everyday    | 7182        | Everyday    | 7343 |
|   |                                   |   | School Health Camp   | 15          | 600         | 10          | 575         | -           | -           | -           | -    |
|   |                                   |   | ii. The medical bills of retired persons will be resolved as and when submitted for reimbursement.   |             |             |             |             |             |             |             |      |
| 7 | Damage due to blasting            | i. Damage of houses due to blasting   | i. Controlled Blasting using electronic detonator is carried out at specified timings to control ground vibration as per the DGMS guidelines. The vibration parameters during blasting has been found with safe limits. (Enclosed as Annexure)   |             |             |             |             |             |             |             |      |
| 8 | Pollution and Mitigation Measures | i. Coal stock fire causing pollution<br>ii. Slurry ponds of Kathara Washery | i. Coal stock fire whenever detected is controlled by firefighting team and extinguished.<br>ii. The washery is located at about 80 to 100 meters from Damodar River. In Kathara Washery 2 no. of thickeners and 5 no. of Slurry Ponds having a composite volume of 463000 cu.m are used to treat effluent and water from pond no. 5 is recycled into washing circuit. The old slurry at washery is being evacuated. 33000 tonne of slurry was sold vide e-auction on 16.11.2021. The local sale of slurry will resume shortly after due permission from State Govt. |             |             |             |             |             |             |             |      |
| 9 | Plantation                        | i. Requested to carryout additional plantation in nearby villages.          | i. Plantation is carried out by State Forest Department. Till now, 140.60 Ha. have been reclaimed and a total 3,51,500 trees have been planted.<br>ii. Additional Plantation has been proposed under EIA/EMP & NCRAP in project boundary & nearby villagers.   |             |             |             |             |             |             |             |      |

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|  |        |                                      |    |  |               |
|--|--------|--------------------------------------|----|--|---------------|
| <b>10</b>  | Others | i. Unauthorised occupation quarters. | of | A committee has been constituted to identify unauthorized occupants and they will be evicted with the help of District Administration. | --            |
| <b>Total Cost Proposed under CER for Compliance of PH Issues</b> |        |                                      |    |  | <b>643.50</b> |

## 7.2 Natural and Community Resource Augmentation Plan (NCRAP)

The project has come into violation due to production without a valid EC during the period 2017-18 to 2021-22. Subsequently the project was put up before violation EAC for the grant of ToR. The EAC in its Terms of Reference asked the PP to prepare a damage assessment report and a remediation plan and Natural and Community Resource Augmentation plan for the damage incurred to environment and Ecology. Therefore, study has been carried out in respect of Damage occurred and the remediation plan and NCRAP has been prepared and incorporated in Chapter XIII of this EIA EMP.

## 7.3 Safety & Risk assessment

Outside agency deploying HEMM or any equipment in the mine for excavation of coal shall plan their activities in conformation with the prevailing statutory provisions as per Mines Act 1952 and Coal Mines Regulations (CMR) 2017 applicable for safety in opencast mines. However, all statutory rules, regulations, applicable laws etc. and statutory requirement related to Govt. licenses, workers compensation, Insurance, etc., including minimum wage act for workers employed by the outside agency shall have to be adhered to. Rules if any imposed by local/State/Central authorities should also be complied by leaser of HEMM/equipment and then shall have to supply various protective equipments viz. helmet, shoes etc. to the workmen at their cost.

All the regulations & schedules of **CMR 2017** relating to opencast mining have to be adhered to and implemented in order to maintain day to day safety precautions as per stature.

### 7.3.1 Safety Aspects for Outsourcing/Hiring of HEMM/Equipment

Special precaution shall be taken while deploying workers in the mine. Before employing any labour to the mine proper vocation training shall be imparted and statutory provisions as per **Regulation 106 of CMR 2017**, and recommendations of VIII Safety Conference should be strictly followed. Terms and conditions shall be fixed by management for deployment of labourers by outside agency. Some of the major aspects are as follows:-

#### ***For persons :***

- No persons shall be deployed unless he is trained at VTC
- Records in Form-B, Form-D shall be maintained.
- Records of Vocational training Certificate and driving license of operators shall be kept by HEMM outsourcing agency and shall be made readily available for inspection by management.
- No person shall be employed unless person holds VTC certificate and Management is informed. A record of it shall be maintained.
- Adequate supervision shall be maintained by qualified competent persons.

- Outside agency shall follow safety guidelines and safety instructions from Project Authorities.

***For Machineries as recommended by DGMS Cir. (Tech.):***

- All the machineries to be deployed in mines should be checked before deployment by competent authority.
- Regular checking of m/c deployed by outside agency shall be done. No unfit machine shall be deployed before the defect is rectified.
- A proper record of repair and maintenance along with inspection done by management and defect pointed out shall be maintained and signed by authorized person.
- The trucks deployed by outside agency shall be provided with Audio-visual alarms, proper light for use at night and period when natural light is not sufficient. Also audio-visual alarms for reversing on trucks shall be provided.

***Other Precautions for machines***

- RTO certificate photo copies of all vehicles shall be submitted to management
- Daily welding, monitoring, inspection shall be done by the agency's mechanic as directed by management.
- Machine manufacturers should be asked to give risk analysis details in respect machines deployed by outside agencies.
- Suitable type of the fire extinguishers shall be provided in every machine.

***General :***

- No person/vehicle shall be deployed at any place other than authorized place.
- All workers should obey lawful instruction of mine management.
- Risk Management Plan of tipper/pay loader shall be made and implemented.
- All drivers shall obey systematic traffics rules prepared by management
- Before deploying workers they must be trained and briefed about safety aspects in opencast mine. However during course of execution of the work, if any accident occurs whether major or minor, the matter shall have to be immediately informed to mine management i.e. Colliery Manager/Agent/GM of Area so that Notices of accidents in accordance of **(Reg.8 of CMR 2017)** and Section 23 of Mines Act 1952 may be given and other necessary steps may be taken in accordance with the Mines Act 1952.
- Outside Agency shall operate transport system in such a way so as to minimize pollution in the mine.

### **7.3.2 Stability of Benches, Quarry High walls and Spoil Dumps**

During quarry operations, it is necessary to adopt required mining parameters for the stability of benches, high walls and spoil dumps. It is also mandatory to examine systematically the fencing of mine workings, land slides and cracks between benches. It is required to maintain well graded and wide roads on benches keeping the width of working areas sufficient for spreading of blasted rock and movement of the mining and transport equipment. Statutory provisions, applicable for opencast working, as mentioned in **Chapter X of CMR 2017** should be complied

During actual mining operation, systematic observations of the condition of benches, high wall slopes and spoil dumps should be carried out and the dimensions be modified if necessary to suit the local conditions.

### 7.3.3 Precautions against Danger of Inundation from Surface Water

- A careful assessment is to be made against the danger from surface water before the onset of rainy season. The necessary precautions, as per **Regulation 149 of CMR 2017** should be clearly laid down and implemented. Garland drains need to be provided to drain away the surface rain water from coming into the mine.
- Where any mine or part thereof is so situated that there is any danger of inrush of surface water into the mine or part, adequate protection against such inrush shall be provided and maintained
- Every entrance into a mine shall be so designed, constructed and maintained that its lowest point (which means the point at which a body of rising water on surface can enter the mine) shall be not less than 1.5 meters above the highest flood level at that point.
- During heavy rain inspection of vulnerable points is essential. In case of any danger persons are to be withdrawn to safer places.
- Nallah or water inlets may be diverted or isolated by embankments if so required.

### 7.3.4 Prevention of Flooding of Equipment Deployed at Bottom Horizons

During the heavy monsoon period, the mining operation in the lower-most bench may have to be stopped. Therefore, it is proposed to drown the lower-most bench, which would work as a sump. The water will be pumped out and discharged into the nearby Nalla.

For ensuring safety of the equipment while working out bottom horizons with no access to surface profile, the following measures should be taken:

Drivage of initial trenches and coal cutting on bottom benches should be done during the dry period of the year.

Ramps should be made for quick shifting of equipment from bottom horizons, liable to be flooded during monsoon period, to the top horizons.

### 7.3.5 Prevention of Electric Shocks:

During mining operations, all the statutory provisions of the Indian Electricity Rules 1956, and Indian Standards for installation and maintenance of electrical equipment etc. should be observed.

- For protection from electric shocks to persons, from electrical equipment with voltage up to 1000V Earth Leakage Relay should be provided which will automatically disconnect electrical circuits.

- Closed mobile substations and switchgears should be mechanically interlocked which exclude the possibility of opening the door when oil switch and air circuit breakers are in operation.
- All metal parts of electrical equipment should be properly earthed to avoid failure of insulation.
- All H.T lines and cables located within the blasting zones should be disconnected during blasting operations.

### **7.3.6 Dust Suppression & Dilution of Exhaust Fumes:**

The necessary precautions, as per **Regulation 143& 144 of CMR 2017** should be implemented to suppress dust generation during mining operations. In general, the following measures should be adopted for dust suppression at all quarry working places, dumps, haul roads, CHP and near other auxiliary mining operations.

- Spraying with water on all working faces & haul roads, by special spraying machines or water-sprinkler.
- While drilling holes, it is necessary to use dust extraction devices.
- Installation of local dust suppression and air conditioning devices in cabins of excavators and drilling rigs may be considered.
- Levelling of spoil dump surface.
- Separate dust suppression arrangement should be provided for CHP.

To prevent collection of harmful mixtures in the atmosphere, from the different sections of quarry workings, it is recommended: -

- 1) To spread out the sources of dust formation and omission of harmful gases throughout the working area of the quarry.
- 2) Drilling & blasting operations should be timed for periods of maximum wind activity during the day.
- 3) Dumpers may be provided with purifiers for exhaust gases.

### **7.3.7 Measures to be taken for Fire Fighting and Fire Prevention:**

In addition to statutory provisions, as mentioned in **Regulation 134& 135 of CMR 2017**, the measures for fire fighting and prevention of fires are as follows:

- 1) Organisation of special cell for systematic observations to examine and prevent fire
- 2) Removal of spillage of coal on benches and cleaning of coal horizons to prevent cases of coal heating.
- 3) Storage of lubricants and cotton waste in enclosed fireproof containers in working places.
- 4) Provision of fire extinguishers

### 7.3.8 Measures to be taken while Drilling & Blasting:

Following measures should be taken while drilling and blasting operations in the quarry:

- 1) Drilling and Blasting in quarry should be done in accordance with the provisions of Mines Safety Act, Rules and Regulations.
- 2) Statutory provisions, applicable for opencast working, as mentioned in **Chapter XIV of CMR 2017** should be complied.
- 3) Adequate safety measures have to be taken during blasting operation in the quarry so that men/machine is not affected.

## 7.4 Energy Conservation

Conservation of energy in any form is assuming greater importance in mechanized mines with rapid industrialization and increase in per capita consumption of energy resulting in insatiable demand of energy. The time is not far off when with the existing quantum of energy; the coal mining industry would be facing a bleak future. Hence it is of paramount importance that the existing quantum of energy is put to optimal and economical use with a high degree of conservation. Special emphasis is laid at the project formulation stage to take all steps for conservation of electrical energy including power consumption and power demand or fuel consumption. All efforts have been made to incorporate energy conservation system and equipment to achieve this in the planning and installation stage itself. At the stage of planning of the equipment of the underground mine, a careful study has been made with regard to location of power sub-station for the mine, selection of equipment, conductor size, operating power factor with special reference to the conservation of energy.

### 7.4.1 Managerial Control

To reduce occurrence of maximum power demand of certain group of equipment at a time and improve the effective load factor, demand meters have been proposed in each circuit breaker controlling the feeders. This would reduce power demand of the project at the same level of power consumption and also relieve the system of transmitting useless power.

### 7.4.2 Energy Audit

It is suggested that energy audit in the mine would be done regularly to even out maximum demand, as far as possible. Such an energy audit would not only pin point the defined areas but also would highlight the areas so that improvement can be implemented immediately.

### 7.4.3 Maintenance

A special emphasis would be laid on the preventive maintenance of all electrical, mechanical equipment. Energy conservation is very much related to preventive maintenance. Therefore the preventive maintenance would never be over looked. As part of management system, a feedback is necessary for better performance of equipment and statistical information of breakdowns would help in upgrading maintenance practices, after meaningful and purposeful analysis resulting in saving of diesel and power.

#### 7.4.4 Distribution Network

In the power distribution network, care has been taken to select suitable size of conductors and cables to minimise losses and voltage drop. It is suggested that the conductor sizes recommended in the P.R are drawn at the construction stage of the project itself to avoid duplication of work later on. The size should not be changed either with higher or lower size of the conductor.

#### 7.4.5 Lighting

For the purpose of illumination in mine and dump areas, sodium vapour lamps have been recommended to reduce the energy consumption and to achieve the desired lux level.

### 7.5 Flora & Fauna Conservation Plan

The important animal species for conservation point of view in the study area which falls under schedule I, schedule II of "The wildlife (protection) Act, 1972 are Python, Monitor Lizard, Peafowl, jackal and Langur etc. sighted and as reported by villagers.

The conservation plan for the schedule I species has been obtained from the CCL and enclosed as **Annexure VI**.

### 7.6 Social Impact Assessment

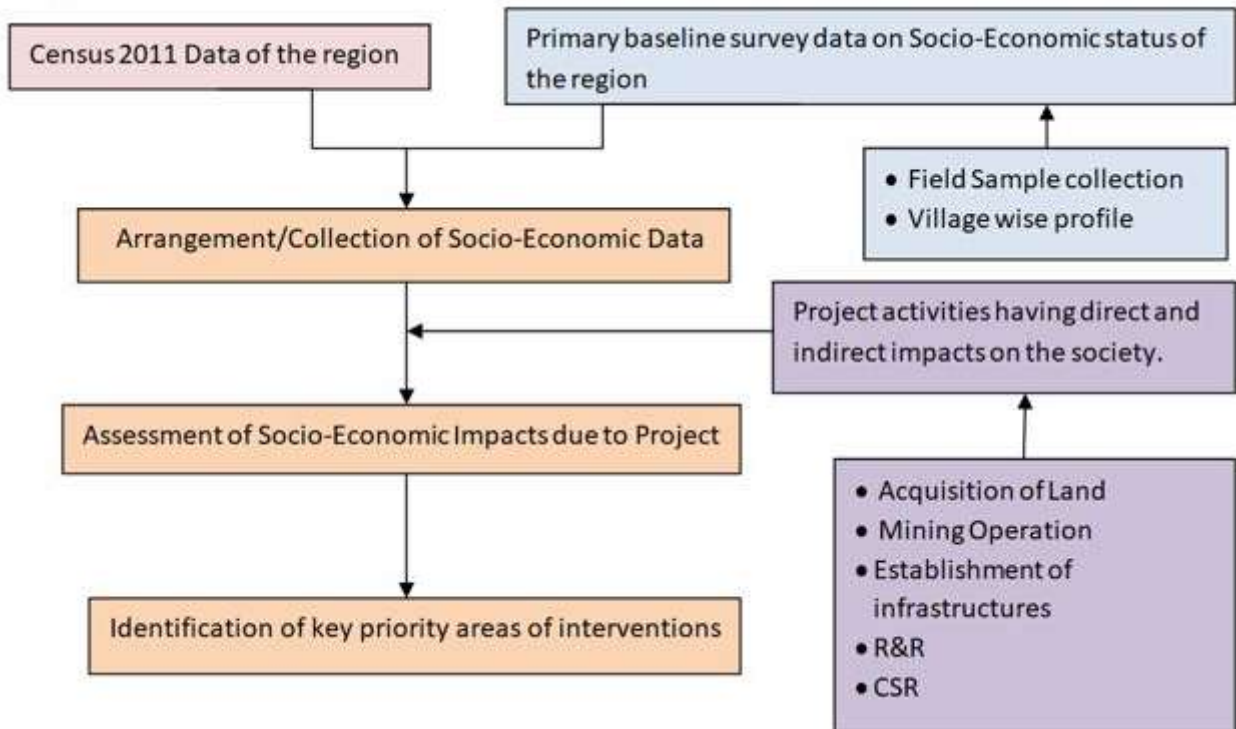
#### 7.6.1 Introduction

Katha coal mining project belong to Kathara Area of Central Coalfields Limited. The projects fall in the Bokaro district of Jharkhand. The location of the project is showed in the topographic map in Plate-II. The entire region is a coal mining area falls in the East Boakrocoalfileds. The mining activity in this region has been a regular practice since long time dating back to 1970s. Consequently, the local population has a direct relationship with the coal mining projects in this region.

#### 7.6.2 Methodology

The assessment of social impacts due to Kathara OCP has been carried out by taking into the consideration the socio-economic status of the affected population in core and buffer zones of the project. Observations from socio-economic baseline study report and secondary demographic data of the region from census 2011 has been utilised for carrying out the assessment.

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**



### 7.6.3 Impact Assessment

| Village Name | Nearest Statutory Town (Name) | Total Geographical Area (in Hectares) | Total Households | Total Population of Village | Total Male Population of Village | Total Female Population of Village |
|--------------|-------------------------------|---------------------------------------|------------------|-----------------------------|----------------------------------|------------------------------------|
| Kanjkiro     | PHUSRO                        | 1537.82                               | 1061             | 5886                        | 3026                             | 2860                               |
| Burgara      | PHUSRO                        | 193                                   | 187              | 1001                        | 501                              | 500                                |
| Kachho       | PHUSRO                        | 326.04                                | 351              | 2040                        | 1047                             | 993                                |
| Garnke       | PHUSRO                        | 306                                   | 195              | 892                         | 434                              | 458                                |
| Armo         | PHUSRO                        | 689                                   | 327              | 1796                        | 898                              | 898                                |

| Village Name | Total Scheduled Castes Population of Village | Total Scheduled Castes Male Population of Village | Total Scheduled Castes Female Population of Village | Total Scheduled Tribes Population of Village | Total Scheduled Tribes Male Population of Village | Total Scheduled Tribes Female Population of Village |
|--------------|--|---|---|--|---|---|
| Kanjkiro     | 1118   | 560   | 558   | 308  | 167   | 141   |
| Burgara      | 253  | 122   | 131   | 399  | 207   | 192   |
| Kachho       | 179  | 96  | 83  | 330  | 164   | 166   |
| Garnke       | 0  | 0   | 0   | 885  | 430   | 455   |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|      |     |     |     |     |     |     |
|------|-----|-----|-----|-----|-----|-----|
| Armo | 521 | 247 | 274 | 787 | 386 | 401 |
|------|-----|-----|-----|-----|-----|-----|

| Village Name | Govt Pre-Primary School (Nursery/LKG/UKG) (Status A(1)/NA(2)) | Govt Pre-Primary School (Nursery/LKG/UKG) (Numbers) | Private Pre-Primary School (Nursery/LKG/UKG) (Status A(1)/NA(2)) | Private Pre-Primary School (Nursery/LKG/UKG) (Numbers) | Nearest Facility Status (Govt(1)/Private(2)) | Nearest Village/Town Name |
|--------------|---|---|--|--|--|---------------------------|
| Kanjkiro     | 2   | 0   | 2  | 0  | 2  | GOMIMATA                  |
| Burgara      | 2   | 0   | 2  | 0  | 2  | BOKAROTHERMAL             |
| Kachho       | 2   | 0   | 2  | 0  | 2  | GOMIMATA                  |
| Garnke       | 2   | 0   | 2  | 0  | 2  | BOKAROTHERMAL             |
| Armo         | 2   | 0   | 2  | 0  | 2  | BOKAROTHERMAL             |

| Village Name | Govt Senior Secondary School (Status A(1)/NA(2)) | Govt Senior Secondary School (Numbers) | Private Senior Secondary School (Status A(1)/NA(2)) | Private Senior Secondary School (Numbers) | Nearest Facility Status (Govt(1)/Private(2)) |
|--------------|--|--|---|---|--|
| Kanjkiro     | 2  | 0                                      | 2   | 0   | 1  |
| Burgara      | 2  | 0                                      | 2   | 0   | 1  |
| Kachho       | 2  | 0                                      | 2   | 0   | 1  |
| Garnke       | 2  | 0                                      | 2   | 0   | 1  |
| Armo         | 2  | 0                                      | 2   | 0   | 1  |

| Village Name | Dispensary (Numbers) | Dispensary Doctors Total Strength (Numbers) | Dispensary Doctors In Position (Numbers) | Dispensary Para Medical Staff Total Strength (Numbers) | Dispensary Para Medical Staff In Position (Numbers) |
|--------------|----------------------|---|--|--|---|
| Kanjkiro     | 0                    | 0   | 0  | 0  | 0   |
| Burgara      | 0                    | 0   | 0  | 0  | 0   |

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|        |   |   |   |   |   |
|--------|---|---|---|---|---|
| Kachho | 0 | 0 | 0 | 0 | 0 |
| Garnke | 0 | 0 | 0 | 0 | 0 |
| Armo   | 2 | 2 | 2 | 2 | 2 |

| Village Name | Tap Water-Treated (Status A(1)/NA(2)) | Covered Well (Status A(1)/NA(2)) | Hand Pump (Status A(1)/NA(2)) | Tube Wells/Borehole (Status A(1)/NA(2)) | Spring (Status A(1)/NA(2)) | River/Canal (Status A(1)/NA(2)) | Tank/Pond/Lake (Status A(1)/NA(2)) |
|--------------|---------------------------------------|----------------------------------|-------------------------------|---|----------------------------|---------------------------------|------------------------------------|
| Kanjkiro     | 2                                     | 2                                | 1                             | 1                                       | 1                          | 1                               | 1                                  |
| Burgara      | 2                                     | 2                                | 1                             | 2                                       | 1                          | 1                               | 1                                  |
| Kachho       | 2                                     | 2                                | 1                             | 1                                       | 2                          | 1                               | 1                                  |
| Garnke       | 2                                     | 2                                | 1                             | 2                                       | 2                          | 1                               | 1                                  |
| Armo         | 2                                     | 2                                | 1                             | 2                                       | 2                          | 2                               | 1                                  |

| Village Name | Sub Post Office (Status A(1)/NA(2)) | Post And Telegraph Office (Status A(1)/NA(2)) | Village Pin Code (Status A(1)/NA(2)) | PIN Code | Telephone (landlines) (Status A(1)/NA(2)) | Public Call Office /Mobile (PCO) (Status A(1)/NA(2)) | Mobile Phone Coverage (Status A(1)/NA(2)) |
|--------------|-------------------------------------|---|--------------------------------------|----------|---|--|---|
| Kanjkiro     | 1                                   | 2   | 1                                    | 829107   | 1   | 1  | 1   |
| Burgara      | 2                                   | 2   | 1                                    | 829107   | 2   | 2  | 2   |
| Kachho       | 2                                   | 2   | 1                                    | 829107   | 2   | 2  | 1   |
| Garnke       | 2                                   | 2   | 1                                    | 825312   | 2   | 2  | 2   |
| Armo         | 2                                   | 2   | 1                                    | 825312   | 2   | 2  | 2   |

| Village Name | Private Bus Service (Status A(1)/NA(2)) | Auto/Modified Autos (Status A(1)/NA(2)) | Tractors (Status A(1)/NA(2)) | State Highway (Status A(1)/NA(2)) | Major District Road (Status A(1)/NA(2)) | Other District Road (Status A(1)/NA(2)) | Black Topped (pucca) Road (Status A(1)/NA(2)) | All Weather Road (Status A(1)/NA(2)) |
|--------------|---|---|------------------------------|-----------------------------------|---|---|---|--------------------------------------|
|              |   |   |                              |                                   |   |   |   |                                      |

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|          |   |   |   |   |   |   |      |   |
|----------|---|---|---|---|---|---|------|---|
|          |   |   |   |   |   |   | (2)) |   |
| Kanjkiro | 1 | 2 | 2 | 1 | 1 | 1 | 1    | 1 |
| Burgara  | 1 | 2 | 2 | 2 | 2 | 2 | 1    | 1 |
| Kachho   | 2 | 2 | 2 | 2 | 2 | 1 | 1    | 1 |
| Garnke   | 2 | 2 | 1 | 2 | 2 | 2 | 1    | 1 |
| Armo     | 2 | 2 | 2 | 2 | 2 | 2 | 1    | 2 |

| Village Name | Commercial Bank<br>(Status A(1)/NA(2)) | Cooperative Bank<br>(Status A(1)/NA(2)) | Agricultural Credit Societies<br>(Status A(1)/NA(2)) | Self - Help Group (SHG)<br>(Status A(1)/NA(2)) | Public Distribution System (PDS) Shop<br>(Status A(1)/NA(2)) |
|--------------|--|---|--|--|--|
| Kanjkiro     | 1                                      | 1                                       | 2  | 2  | 1  |
| Burgara      | 2                                      | 2                                       | 2  | 2  | 1  |
| Kachho       | 2                                      | 2                                       | 2  | 2  | 2  |
| Garnke       | 2                                      | 2                                       | 2  | 1  | 2  |
| Armo         | 2                                      | 2                                       | 2  | 2  | 2  |

| Village Name | Mandis/Regular Market<br>(Status A(1)/NA(2)) | Weekly Haat<br>(Status A(1)/NA(2)) | Agricultural Marketing Society<br>(Status A(1)/NA(2)) | Nutritional Centres-ICDS<br>(Status A(1)/NA(2)) | Nutritional Centres-Anganwadi Centre<br>(Status A(1)/NA(2)) | Nutritional Centres-Others<br>(Status A(1)/NA(2)) | ASHA<br>(Status A(1)/NA(2)) |
|--------------|--|------------------------------------|---|---|---|---|-----------------------------|
| Kanjkiro     | 2  | 2                                  | 2   | 1   | 1   | 1   | 1                           |
| Burgara      | 2  | 2                                  | 2   | 1   | 1   | 2   | 1                           |
| Kachho       | 2  | 2                                  | 2   | 1   | 1   | 2   | 1                           |
| Garnke       | 2  | 2                                  | 2   | 1   | 1   | 2   | 1                           |

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|      |   |   |   |   |   |   |   |
|------|---|---|---|---|---|---|---|
| Armo | 2 | 1 | 2 | 1 | 1 | 2 | 1 |
|------|---|---|---|---|---|---|---|

| Village Name | Community Centre with/without TV (Status A(1)/NA(2)) | Sports Field (Status A(1)/NA(2)) | Sports Club/Recreation Centre (Status A(1)/NA(2)) | Cinema/Video Hall (Status A(1)/NA(2)) | Public Library (Status A(1)/NA(2)) | Public Reading Room (Status A(1)/NA(2)) | Daily Newspaper Supply (Status A(1)/NA(2)) | Assembly Polling Station (Status A(1)/NA(2)) | Birth and Death Registration Office (Status A(1)/NA(2)) |
|--------------|--|----------------------------------|---|---------------------------------------|------------------------------------|---|--|--|---|
| Kanjkiro     | 2  | 1                                | 2   | 2                                     | 2                                  | 2                                       | 1  | 1  | 2   |
| Burgara      | 2  | 2                                | 2   | 2                                     | 2                                  | 2                                       | 1  | 1  | 2   |
| Kachho       | 2  | 2                                | 2   | 2                                     | 2                                  | 2                                       | 2  | 1  | 2   |
| Garnke       | 1  | 2                                | 2   | 2                                     | 2                                  | 2                                       | 2  | 1  | 2   |
| Armo         | 2  | 2                                | 2   | 2                                     | 2                                  | 2                                       | 1  | 1  | 1   |

| Village Name | Forest Area (in Hectares) | Area under Non-Agricultural Uses (in Hectares) | Barren & Uncultivable Land Area (in Hectares) | Permanent Pastures and Other Grazing Land Area (in Hectares) | Land Under Miscellaneous Tree Crops etc. Area (in Hectares) | Culturable Waste Land Area (in Hectares) | Fallow Land other than Current Fallow Area (in Hectares) | Current Fallow Area (in Hectares) | Net Area Sown (in Hectares) |
|--------------|---------------------------|--|---|--|---|--|--|-----------------------------------|-----------------------------|
| Kanjkiro     | 191.39                    | 126.88   | 0   | 0  | 0   | 445.29                                   | 0  | 0                                 | 774.26                      |
| Burgara      | 30.94                     | 0  | 0   | 0  | 0   | 20.5                                     | 0  | 0                                 | 141.56                      |
| Kachho       | 42.5                      | 0.94   | 0   | 0  | 0   | 33.53                                    | 0  | 0                                 | 249.07                      |
| Garnke       | 58.4                      | 20.08  | 5   | 7.5  | 152.88  | 3.1                                      | 21.04  | 23.5                              | 14.5                        |

=====

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|      |       |      |     |      |        |     |      |      |       |
|------|-------|------|-----|------|--------|-----|------|------|-------|
| Armo | 243.9 | 18.4 | 7.5 | 12.5 | 290.22 | 6.1 | 40.4 | 35.5 | 34.48 |
|------|-------|------|-----|------|--------|-----|------|------|-------|

| Village Name | Total Unirrigated Land Area (in Hectares) | Area Irrigated by Source (in Hectares) | Canals Area (in Hectares) | Wells/Tube Wells Area (in Hectares) | Tanks/Lakes Area (in Hectares) |
|--------------|---|--|---------------------------|-------------------------------------|--------------------------------|
| Kanjkiro     | 754.18                                    | 20.08                                  | 16.3                      | 3.78                                | 0                              |
| Burgara      | 135.03                                    | 2.59                                   | 0                         | 2.59                                | 0                              |
| Kachho       | 243.3                                     | 5.77                                   | 3.58                      | 2.19                                | 0                              |
| Garnke       | 165                                       | 4.4                                    | 0                         | 0.2                                 | 4.2                            |
| Armo         | 278                                       | 8.45                                   | 0                         | 0.3                                 | 8.15                           |

Above mentioned table gives an overview of existing socio-economic condition of villages. This data has been extracted from Census 2011. Using this table, we can identify our priority area of intervention where project can directly intervene and bring about positive social change. Project can address such critical area of intervention through its CSR, R&R and mine closure activities. However, at baseline data generation stage we can predict that Education, Health and Livelihood are such areas where CCL can easily, through its core activities, provide substantial relief.

#### 7.6.4 Conclusion

The indicators through which areas of intervention can be and further prioritized as per availability of fund. Such issues can be discussed under different heads like:

**Health:** Project area including nearby buffer zone has very limited Government Hospital except few CHC. CCL has its dispensary. Along with that CCL has provided medical van for patients. However, almost all populations in locality depend on nearby Fusro, Bokaro and Petarwar for its health requirement. If we look at data of state Govt available in public domain, even existing CHC/PHC has very scant facility. Although CCL opens its dispensary at its mining site, which is of great relief to local population. Through CSR CCL can explore opportunity to provide health facility through Mobile medical vans or through tele medicine. Even under R and R such facility can be made available. Overall impact will be positive.

**Education:** As mentioned in table, even condition of education is not very good in project area. Near by locality has few good schools like DAV Swang etc. It can also provide financial support to existing schools to expand their infrastructure. Some villages don't even have pre-primary schools. Such areas can be given special focus. This table gives an overview of existing resources. Plan can be according made to increase the outreach of education.

**Water:** Drinking water is basic requirement. CCL can further identify specific tolas/mohalla to map and plan in order to provide drinking water. Presently CCL provides water through tanker in lean season under CSR. Strategy to ensure drinking water depends on local condition. Some may be provided handpump and in some areas tap water can also be provided. One major area of intervention could be utilization of mine discharge. In most of the villages there is no irrigation facility. Net sown area is very low. If mine discharge is effectively used then large area can be irrigated. Initially free or nominal fee can be charged but gradually village water user committee can be formed to manage and utilize water distribution system. If farmers increase their net sown area and their income enhances then they will pay as well. It can be made sustainable.

**Agriculture & Livelihood:** It is also related to water. As most of the population depend on agriculture, water utilization can provide more opportunity in terms of crop diversification. As evident from data that irrigated land is very less therefor mine water utilization is very important. However providing only water is not enough. Nearby KVK should be involved to develop better strategy for agriculture and animal husbandry. Some farmers can be provided training for horticulture crop. Tribal villages can be given more focus to start such intervention. Some villages are completely or predominantly tribal villages. Such villages can be taken up on priority basis. It will provide great opportunity to show a model of tribal development. Skill training of youth to get self-employed locally is also good strategy instead of migration oriented employment.

**Connectivity:** It is an important area of intervention as development of any community is closely associated with its connectivity to outside world. CCL can ensure this by constructing bus stop in strategic location based on feedback from villagers. It can also link connectivity to livelihood opportunity like providing soft loan/ subsidy to purchase auto rickshaw or other such transport facility to some villagers. Further it can provide infrastructure to bank to open its branch or banking kiosk.

**Community & Recreation:** Community services consist of hardware and software of community life like community centre to organise various events or haat, mela, jatra provide a place for communal gathering. Similarly, SHG/ Youth club etc provide community other area of opportunity for common growth. CCL can identify few such groups where through sports or other such community activity people can be encouraged to come together and find ways to develop together. CCL has provided community hall to some villages. CCL also organize inter village football tournament for village youths. It can further organize women and adolescent girls for health, nutrition and recreational activities.

Some areas where activity of coal mining may adversely impact is agriculture. As net sown area will drop due to mining activities. But since it is an ongoing project and most of the areas has already been acquired therefor degradation of agriculture doesn't arise. These are some of the measures to positively impact socio-economic parameters of the project area. Actual impact

cannot be measured at project construction stage however, it is mere prediction and this can be further made part of the plan. Following a planned intervention will not only improve condition of people but reduce wastage of resources in such type of interventions. It will help in long term CSR planning as well as Resettlement and Rehabilitation interventions. As on date almost 3 crore expenditure incurred under CSR in four years. Future CSR expenditure added to R and R expenditure and Mine closure fund becomes huge fund. This can easily fund most of the above mentioned activity in phased manner. Further, this is not exhaustive list of indicators but substantially addresses the core issues

## **7.7 Corporate Social Responsibility (C.S.R)**

### **7.7.1 Introduction**

CIL's CSR policy is framed after incorporating the features of the Companies Act 2013 and as per notification issued by Ministry of Corporate Affairs, Govt. of India on 27.02.2014 as well as DPEs guidelines.

The main objective of CSR policy is to lay down guidelines for the coal companies to make CSR a key business process for sustainable development for the Society. It aims at supplementing the role of the Govt. in enhancing welfare measures of the society based on the immediate and long term social and environmental consequences of their activities. CIL will act as a good Corporate Citizen, subscribing to the principles of Global Compact for implementation.

### **7.7.2 Scope of work under CSR**

As per Schedule VII of New Companies Act 2013 the following should be the Scope of Activities under Corporate Social Activities:

- Eradicating hunger, poverty and malnutrition, promoting preventive health care and sanitation and making available safe drinking water.
- Promoting education, including special education and employment enhancing vocation skills especially among children, women, elderly, and differently abled and livelihood enhancement projects;
- Promoting gender equality, empowering women, setting up homes and hostels for women and orphans, setting up old age homes, day care centres and such other facilities for senior citizens and measures for reducing inequalities faced by socially and economically backward groups;
- Ensuring environmental sustainability, ecological balance, protection of Flora and Fauna, animal welfare, agro-forestry, conservation of natural resources and maintaining quality of soil, air and water;
- Protection of national heritage, art and culture including restoration of buildings and sites of historical importance and works of art; setting up public libraries, promotion and development of traditional arts and handicrafts;
- Measures for the benefit of armed forces veterans, war widows and their dependents

- Training to promote rural sports, nationally recognized sports, Paralympics sports and Olympic sports;
- Contribution to the Prime Minister's National Relief Fund or any other fund set up by the Central Government for socio-economic development and relief and welfare of the Scheduled Castes, the Scheduled Tribes, other backward classes, minorities and women;
- Contributions or funds provided to technology incubators located within academic institutions which are approved by the Central Government; Rural development projects etc.

### **7.7.3 Allocation of fund for CSR**

The fund for the CSR should be allocated based on 2% of the average net profit of the Company for the three immediate preceding financial years or Rs. 2.00 per Tonne of Coal Production of previous year whichever is higher.

### **7.7.4 Implementation of CSR Activities**

The investment in CSR should be project based and for every project time framed periodic milestones should be finalized at the outset.

Project activities identified under CSR are to be implemented by Specialized Agencies. Specialized Agencies could be made to work singly or in tandem with other agencies. Specialized agencies would include:

1. Community based organization whether formal or informal.
2. Elected local bodies such as Panchayats
3. Voluntary Agencies (NGOs)
4. Institutes/Academic Organizations
5. Trusts, Mission etc.
6. Self-help groups
7. Government, Semi –Government and autonomous Organizations.
8. Standing Conference of Public Enterprises (SCOPE)
9. Mahila Mandals/Samitis and the like
10. Contracted agencies for civil works
11. Professional Consultancy Organization etc.

### **7.7.5 Sustainable Development**

Activities related to Sustainable Development will form a significant element of the total initiatives of CSR. Such activities should come under the 3 UN Global Compact Principles pertaining to the Environment Business are asked to

1. Support a precautionary approach to environmental challenges
2. Undertake initiatives to promote greater environmental responsibility and
3. Encourage the development and diffusion of environmentally friendly technologies.

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

**7.7.6 Action plan for CSR**

The fund for the CSR should be allocated based on 2% of the average net profit of the Company for the three immediate preceding financial years or Rs. 2.00 per Tonne of Coal Production of previous year whichever is higher. CSR expenditure has been estimated to the tune of Rs. 2.00 per tonne of proposed coal production for the life of mine i.e. 12 year

**Table 7.1 CSR expenditure in Kathara Area**

| Sector                            | Cost in Rs. Lakhs |              |              | Grand Total   |
|-----------------------------------|-------------------|--------------|--------------|---------------|
|                                   | 2018-19           | 2019-20      | 2020-21      |               |
| Drinking Water & Water Management | 11.87             | 28.59        | 55.97        | <b>96.43</b>  |
| Education                         | 3.31              | 5.57         | 1.88         | <b>10.76</b>  |
| Health                            |                   |              | 10.94        | <b>10.94</b>  |
| Infrastructure                    |                   | 8.81         | 6.83         | <b>15.64</b>  |
| Sanitation                        | 7.19              |              |              | <b>7.19</b>   |
| Skill Development                 |                   |              | 6.50         | <b>6.50</b>   |
| Sports                            |                   | 2.02         | 1.92         | <b>3.94</b>   |
| <b>Grand Total</b>                | <b>22.37</b>      | <b>44.99</b> | <b>84.04</b> | <b>151.40</b> |

**Table 7.2 Proposed CSR action plan**

| Year   | Proposed Coal Production (MT) | Estimated CSR expenditure in Lakh Rs. (Approx.) | Fields of Work   |
|--------|-------------------------------|---|--|
| Year 1 | 1.41                          | 28.20   | <ul style="list-style-type: none"> <li>• Education facilities including grant of schools, providing education kits, running of schools etc</li> <li>• Water Supply and rain water harvesting works, wells, ponds, hand pumps and tube wells</li> <li>• Health Care and vaccination, awareness camp, mobile medical camp, Immunisation, medicine etc.</li> <li>• Environment Protection i.e plantation etc.</li> <li>• Social Empowerment like Community centre, Literacy drive, shopping complex.</li> <li>• Infrastructure Development like road, bridge, repairing of school, drains,</li> </ul> |
| Year 2 | 1.90                          | 38.00   |  |
| Year 3 | 1.90                          | 38.00   |  |
| Year 4 | 1.90                          | 38.00   |  |
| Year 5 | 1.90                          | 38.00   |  |
| Year 6 | 1.90                          | 38.00   |  |
| Year 7 | 1.90                          | 38.00   |  |
| Year 8 | 1.90                          | 38.00   |  |

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|              |              |              |   |
|--------------|--------------|--------------|---|
| Year 9       | 1.90         | 38.00        | electric line etc.<br>• Sports Culture like village stadium village stadium, grant to village sports body, organizing sports meet<br>• Grant to NGO for community development<br>• Miscellaneous welfare for adopted villages |
| Year 10      | 1.90         | 38.00        |   |
| Year 11      | 1.90         | 38.00        |   |
| Year 12      | 1.75         | 35.00        |   |
| <b>Total</b> | <b>22.16</b> | <b>443.2</b> |   |

Note: Major stress shall be taken in such fields/sectors which will be identified for direct key intervention during Public Consultation.

\*\*\*\*\*

## Chapter 8

# Project Benefits

### 8.1 Introduction

The continuation up of Kathara OCP will positively contribute to the betterment in the living standards and quality of life of people in and around the mines by providing direct and indirect employment opportunities and through various welfare measures undertaken by Central Coalfields Limited (CCL). The project will continue to enhance the socio-economic activities in the adjoining areas. This will result in following benefits:

- Improvements in Physical Infrastructure
- Improvements in Social Infrastructure
- Increase in Employment Potential
- Contribution to the Exchequer
- Meet energy requirement
- Post-mining Enhancement of Green Cover

### 8.2 Improvements in Physical Infrastructure & Community Development

The existing Kathara OCP have improved and will continue to improve the physical infrastructure of the adjoining areas. This would include the following:

- Improved road communication.
- Strengthening of existing community facilities due to higher allocation through the Community Development Program of CCL.
- Greater availability of good quality coal will result in enhanced power generation to meet the energy demand of the society.
- Pumping of mine water may augment the water availability after due treatment
- Gainful post-mining land utilization of the mine lease area.
- Creation of community assets (infrastructure) like provision for drinking water, village roads / linked roads & culverts, community centres, market place etc.
- Skill development & capacity building like vocational training, income generation programs, and entrepreneurship development program.
- Literacy program, adult education, assist formation of Village Working Group (VWG), mahilamandal etc.

- Awareness program and community activities, like health camps, medical aides, family welfare camps, AIDS awareness program, immunization camp, sports & cultural activities, plantation etc.
- CCL may adopt one village in every Area to develop as a model village. This village should be provided minimum infrastructure such as a school building, a health centre, a pond and adequate tree plantation.

The above list is illustrative and not exhaustive. The activities will be village specific depending on the need assessed for the people. As far as possible, efforts will be made to co-ordinate with similar developmental program that are taken up by the central or state Govt. in the areas of Coal India. All activities under the CD program will be environment friendly and socially acceptable to the local people.

### 8.3 Improvements in Social Infrastructure & Quality of Life of People

There would be some obvious changes in various environmental parameters due to mining activity, increased economic activities, creation of new employment opportunities, infra-structural development, better educational and health facilities.

- **Socio-Economic** :Overall there will be positive impact in socio-economic area due to increased economic activities, creation of new employment opportunities, infra-structural development and better educational and health facilities. The impact in the Core Zone and Buffer Zone is due to the following-

#### *I. Population Dynamics*

Due to direct and indirect employment potential, there is scope of migration of people into project area and in the peripheral regions, from nearby areas Mining activities, acceleration of the economic activities and urbanisation along with creation of new employment opportunities and business may change the population dynamics of the area.

#### *II. Standard of Living*

The people will come in contact with migrated people. This may encourage higher aspirations among the people of the area. Accelerated economic activities and urbanization may increase quality of life and standard of living.

- **Water Supply** :

#### *I. Potable Drinking with Deep bore-well & water service reservoir*

Bore-well including submersible pump, GI connections up to Water Service Reservoir (RCC Overhead tanks for domestic as well as industrial purpose), Ground Water Service Reservoir, Clear Water Pumps, Pump house are provided in the project. These are improved benefits in the line of safe drinking water facility in the project.

#### *II. Planned water supply distribution system*

For water distribution system in the project, 80 -100 mm water supply pipe lines (External water supply system) are provided in the project for facilitating improved benefits of safe drinking water to the people of the project and its vicinity.

- **Health Care Facilities:** CCL will undertake awareness program and community activities, like health camps, medical aides, family welfare camps, AIDS awareness program, immunization camp etc. Immunization facilities are also available at every colliery hospital and dispensary. The family planning Camps are held regularly at the hospitals/dispensaries. Every worker is periodically checked up once in every five years and proper record of their health profile including X-ray and laboratory tests is kept.

## 8.4 Employment Potential

There is a possibility of creation of direct and indirect employment opportunities due to working of this mine. Overall, this will have positive impact on socio-economic profile of the area. CCL will undertake skill development & capacity building programs like vocational training, income generation and entrepreneurship development.

## 8.5 Other Tangible Benefits

Continuation of coal production from Kathara OCP (1.9MTPA) will help to bridge the gap of demand and supply of superior power grade coal in India. To meet the growing demand of coal, especially in power sector, sponge iron sector and brick and other small-scale sectors, the production of coal from the mines is of utmost importance. The project will also contribute to the exchequer of State and Central Government.

\*\*\*\*\*

## Chapter 9

# Environmental Cost Benefit Analysis

MOEF&CC while recommending standard TOR has indicated for carrying out "Cost Benefit analysis" hence, the same has been carried out.

**Table 9.1 Environmental Costs**

| <b>Assessment of Costs to Environment</b> |   |   |
|---|---|---|
| <b>Head</b>                               | <b>Details</b>  | <b>Monetary Equivalent of Cost (in Rs. Lakhs)</b> |
| Land and Ecological Services              | At present Kathara OCP is having around 308 Ha of Land being used for Mining and related activities causing land degradation. The present proposal involves no additional land utilization for mining and allied activities. Thus, causing no incremental land degradation.   | Nil   |
|   | Ecological Services like NWFP, Fuelwood Production, Fodder Production, Carbon Sequestration etc. are closely related with the land environment. As already mentioned that the present proposal involves no forest land as well as no additional land degradation, the cost of impact of project on ecological services is not applicable.   | Nil   |
| Air Environment                           | Kathara OCP is proposed to produce maximum coal production at rate of 1.9 MT/year. This incremental production will cause a corresponding increase in the pollutant emission. It has been assessed that the final GLC including incremental emissions lies well within the prescribed standard limits (refer Chapter 4). However, the monetary equivalent of the likely impact of incremental emission of pollutants has been assessed. Compensation rate has been taken as per CBCP prescribed rate. | 7770.19   |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|                                  |   |                 |
|----------------------------------|---|-----------------|
| Water Environment                | Mining Projects does involve extraction of ground water and significant impact on the aquifer system of the project area. The monetary equivalent of the likely impact of groundwater extraction has been assessed as per CGWA guidelines.  | 5403.77         |
|                                  | It has been proposed to utilize surface water from Konar river for the domestic needs of residential colony. It has been assessed that 2400 cum of surface water withdrawal will be required as peak demand. The monetary equivalent of the likely impact of groundwater extraction has been assessed as per CGWA guidelines. | 183.96          |
| Socio-Economic                   | The project is operational long before the nationalisation of coal mining projects. Present proposal does not involve any loss of habitation or livelihood.   | Nil             |
| <b>Total Cost (In Rs. Lakhs)</b> |   | <b>13357.92</b> |

**Table 9.2 Assessment of Benefits to Environment**

| <b>Assessment of Benefits to Environment</b> |         |  |  |
|--|---------|--|--|
| Head   | Details | Investment by Company towards Environment Conservation (Rs. Lakhs) | Monetary Equivalent of Services/ Benefits (in Rs. Lakhs) |
|  |         |  |  |

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|   |  |        |                     |
|---|--|--------|---------------------|
| Post-Mining Reclamation and Ecological Services | Bio-reclamation of the degraded land and eco-restoration of the area by bringing around 455.12 Ha under dense plantation. The nature of the degraded land is non-forest. Thus by undertaking dense plantation programmes (3-tier plantation @ 2500 tree/Ha), the Net Present Value of the land shall be rightfully increased by converting it to an equivalent of tropical dry deciduous forest. The computation of monetary equivalent (@Rs 8.87 Lakh/Ha for VDF) of the ecological service generated is based on the report "REVISION OF RATES OF NPV APPLICABLE FOR DIFFERENT CLASS/CATEGORY OF FORESTS-2014", CISM & IIFM Bhopal in collaboration of FSI, Dehradun activities. Thus causing no incremental land degradation. The monetary equivalent of the ecological services generated due to generation of dense plantation is inclusive in the NPV. | 1763.2 | 4036.9              |
|   | As per the interaction with local stakeholders, visual sighting and reference of forest working plan, Schedule I species viz. Python, Monitor Lizard and Peafowl have been observed in the core zone and buffer zone. Presence of Schedule-I faunal and avifaunal species in the core zone indicates a healthy ongoing eco-restoration.  | 85     | Intangible Benefits |
| Water Pollution Control and Control             | It has been proposed in the EMP to construct additional rain water harvesting structures and better water management practices. Also, it has been assessed that the mine voids act as a site for rain water harvesting and groundwater recharge. The assessed rainfall catchment area is approximately 1600 Ha with annual groundwater recharge potential of 0.31 Mcum. The annual average rainfall for Gumia Block of Bokaro is 1100 mm. The monetary equivalent of groundwater recharge has been estimated by adopting the CGWA rate.  |        | 2232                |
| Direct and Indirect Employment                  | The project renders direct employment to approx. 750 persons. Moreover, significant indirect employment generation due to mining in Kathara project and associated activities has always contributed in livelihood generation in the region.<br>(Source: Manpower related and EMS data from project)   |        | 11508.75            |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|   |  |                  |                                       |
|---|--|------------------|---------------------------------------|
| Socio-Economic Development of the society through CSR and Natural & Community Resource Augmentation | <p>Education facilities including grant of schools, providing education kits, running of schools etc</p> <ul style="list-style-type: none"> <li>• Water Supply and rain water harvesting works, wells, ponds, hand pumps and tube wells</li> <li>• Health Care and vaccination, awareness camp, mobile medical camp, Immunisation, medicine etc.</li> <li>• Environment Protection i.e plantation etc.</li> <li>• Social Empowerment like Community centre, Literacy drive, shopping complex.</li> <li>• Infrastructure Development like road, bridge, repairing of school, drains, electric line etc.</li> <li>• Sports Culture like village stadium, grant to village sports body, organizing sports meet</li> <li>• Grant to NGO for community development</li> <li>• Miscellaneous welfare for adopted villages</li> </ul> <p>(source:</p> | 998.52           | Intangible Benefits                   |
| Royalty to Government   | <p>Project also contributes to the revenue of government in form of royalties and cess. Various form of royalties/cess/surcharge being paid are as follows:</p> <ul style="list-style-type: none"> <li>• Royalty to DMO, Department of Mines and Geology (14% of sale value of per Te of Coal).</li> <li>• District Mineral Fund (30% of royalty value paid to DMO.)</li> <li>• National Mineral Exploration Trust (2% of royalty value paid to DMO.)</li> <li>• Management fee (Rs.1/Te)</li> <li>• Forest Dept. (Rs.57/Te)</li> </ul> <p>(source:data from project)</p>  | 125469           | Intangible Benefits                   |
| <b>Total Benefits (In Rs. Lakhs)</b>  |  | <b>128315.72</b> | <b>17777.65 + Intangible Benefits</b> |

## Chapter 10

# Environment Management Plan

### 10.1 Introduction

The success of environmental management in an organization not only depends on deep involvement of its personnel at all levels but also on the creation of an effective implementing organizational structure. The objectives are:

- To implement environmental control and protection measures.
- Subsequent environmental monitoring of the efficacy of various control measures.
- Plantation/green belt development.
- Land restoration.

Keeping this in view, organizational structure responsible for the implementation of environmental control and mitigation measures as well as monitoring of such implementation has been discussed in this chapter.

### 10.2 Implementing Organisation

Central Coalfields Limited, the owner of this project has already set-up an Environmental Cell headed by General Manager at its HQs. The cell provides necessary support that is required for Environmental Management of various projects and mines under the jurisdiction of the company. Further, to carry out land acquisition, Rehabilitation & Resettlement measures, a L&R Department under its General Manager has been set-up by CCL at its HQs.

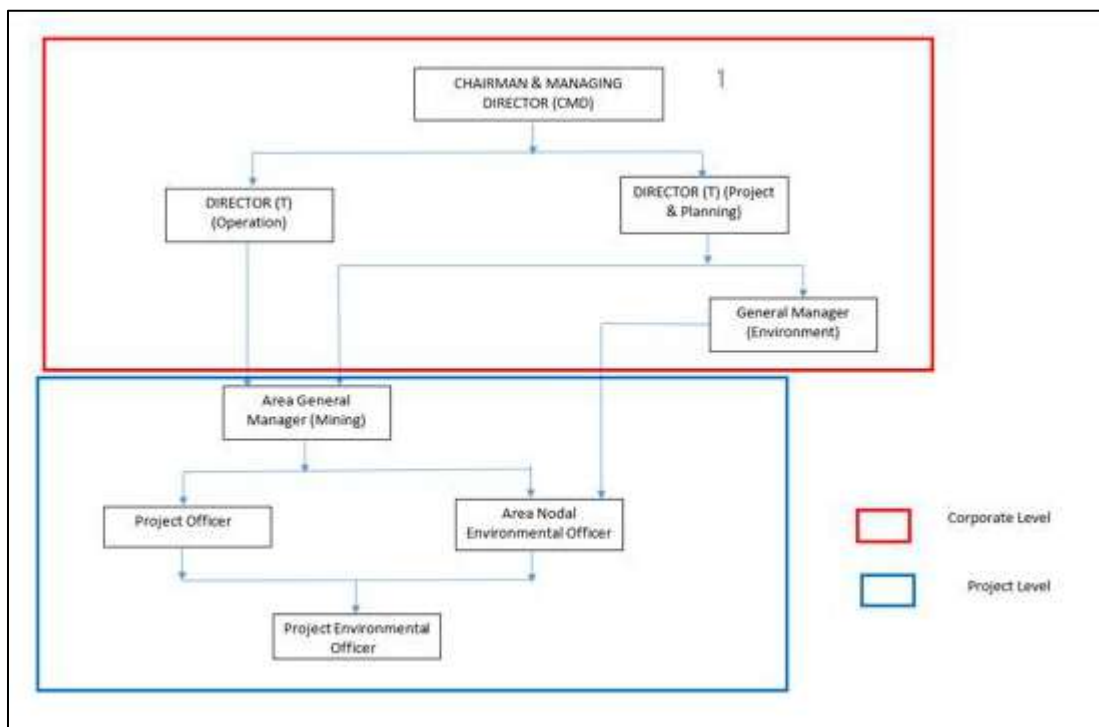
The responsibility for implementing Environmental Management Plan rests with the General Manager / Chief General Manager of the Project, who gets proper assistance by a team of qualified and trained personnel. The Environmental Cell at the Project and Corporate level looks after the following functions for implementation and monitoring of pollution control measures and for overall environmental management. The responsibility for implementing environmental management plan would rest with the project officer of the project, who would be properly assisted by team of qualified and trained personnel. Organisation for environmental management in Kathara Area will carry out the task and responsibility connected therewith.

- Generation of environmental data bank.
- Evolving micro environmental management plan for the project in collaboration with other agencies and consultants.
- Monitoring project implementation along with environmental control measures.
- Co-ordinate with other project activities to ensure timely implementation of the project.
- Co-ordination with Ministry of Environment & Forest, Central /State Pollution Control Board for prevention and control of pollution.

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

---

An organisation chart showing the hierarchial levels for administrative & environmental control is given in Figure below.



For effective implementation and mid term corrective measures (if required) monitoring and control of programme implementation is essential. For this purpose a time bound action programme for environmental management has been prepared.

The scope of environmental management includes plantation, surface drainage, industrial waste water treatment plant, air, water and noise pollution check etc. For the purpose of land reclamation and afforestation, the Project shall interact with different Government departments like Department of agriculture, Forest Department etc. Guidelines and advice from Ministry of Environment and Forest also result in systematic approach towards environmental management and control.

#### **Compensation to land losers**

- General Manager, Kathara Area
- Project Officer, Kathara OCP
- Land Survey and Revenue Deptt. CCL(HQ)
- Representative from State Govt.

#### **Pollution Control Measures**

- General Manager, Kathara Area
- Project Officer/Environmental Cell, Kathara OCP
- Environmental Cell, CCL (HQ)

#### **Plantation/Green Belt Development**

- General Manager, Kathara Area
- Project Officer/Environmental Cell, Kathara OCP

- Environmental Cell, CCL(HQ)

**Land Restoration**

- General Manager, Kathara Area
- Project Officer/Environmental Cell, Kathara OCP
- Environmental Cell, CCL(HQ)

## **10.3 Monitoring & Control**

For effective implementation and mid term corrective measures (if required) monitoring and control of programme implementation is essential. For this purpose a time bound action programme for environmental management has been prepared. The scope of environmental management includes plantation, surface drainage management, industrial water treatment plant, air, water and noise pollution checks etc.

For air, water and noise pollution control measures, samples will be collected and tested for all four seasons at strategic places representing all the categories of areas as indicated by MOEF/CPCB. The implementation authority should be guided and advised as per the feed back data from these tests. CMPDI may be consulted as and when necessary.

### **10.3.1 Monitoring Schedule**

The existing routine monitoring stations for air, water, noise has been found suitable for monitoring the environmental status of the project. Additional stations has been prosed, as required. The monitoring is carried out fortnightly. Following number of stations have been fixed for monitoring of environment for the proposed project.(Refer Chapter 6.3)

|                    |                                   |
|--------------------|-----------------------------------|
| Ambient Air        | : 6 Stations (Fortnightly)        |
| Noise              | : 5 Stations (Fortnightly)        |
| Ground Water       | :2 Stations (Quarterly)           |
| Surface Water      | : 2 Stations (Quarterly)          |
| Effluent Water     | : 2 Station (Fortnightly)         |
| Ground Water Level | : 1 Stations (Pre & Post Monsoon) |
| Overall Progress   | :Half-yearly compliance report    |

### **10.3.2 Plantation Monitoring**

The project authority at field level will continuously monitor the growth and survival/mortality rates of the plantations till the end of 3 years or so. Once trees attain desired growth, no further monitoring will be required.

### **10.3.3 Action Plan for Land Reclamation and Plantation**

The action plan delineates the quantum of overburden to be excavated, backfilled, the plantation schedules etc. Interaction with different Government Departments like Department of Agriculture, Jharkhand State forest department, Forest Research Institute would give additional technical guidelines. Guidelines from State and Central Ministry of Environment and Forest will be obtained for effective implementation of EMP.

#### 10.3.4 Health Monitoring

A regular schedule has been programmed for monitoring health of the workers and staff associated with the mining operations and other connected industrial activities for identifying occupational diseases etc. in time and initiating remedial measures. Mobile ambulance will also be used for such programmes to monitor the health of the population around the area.

### 10.4 Cost of Environmental Control Measures

#### 10.4.1 Capital Cost of Environmental Control Measures

The capital cost of environmental control measures has been estimated based on the proposed control measures and issues raised in the Public Consultation. The detailed environmental capital expenditure is as given below.

Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited

---

**Table 10.1 Estimated Capital Cost of Environmental Control Measures**

| Head                                  | Activity  | Details   | Proposed Control Measure |  |
|---------------------------------------|---|---|--------------------------|--|
|                                       |   |   | Cost<br>(in Rs. Lakhs)   | Tentative timeline of<br>Completion                            |
| <b>Air Pollution Control Measures</b> | Wind Barriers along north and north-eastern quarry boundary     | 2000 m along mine boundary along Jhirki, Bandh Basti Village and 500 m along residential Colony | 250                      | 1300m- Aug'2022<br>1200 m- Dec' 2022                           |
|                                       | Plantation on safety zone & green belt, avenue plantation.      | Total additional area proposed to be brought under green belt/ avenue plantation is 25 Ha.      | 750                      | Pre-Monsoon 2022-<br>12.5 Ha.<br>Pre-Monsoon 2023-<br>12.5 Ha. |
|                                       | Fixed mist sprinkling system of on Haul Road                    | 1600 m length along Haul Road side upto coal stock  | 150                      | Dec' 2022  |
|                                       | Permanent Haul Road   | 1600 m length of permanent Haul road upto Kathara Washery to be black topped                    | 250                      | Sept' 2022   |
|                                       | Fog Canons  | Total 02 nos for dust suppression at Coal Stockyard and Haul Road.                              | 100                      | Aug' 2022  |
|                                       | Continuous Air Quality monitoring systems                       | CAAQMS at GM Office   | 100                      | Installed  |
|                                       | <b>Total Cost of proposed Air Pollution prevention measures</b> |   |                          | <b>1600</b>  |

---

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|  |   |   |                |                  |
|--|---|---|----------------|------------------|
| <b>Water Control Measures</b>          | Sewage Treatment Plant at the existing colony                             | Existing colonies at Kathara colliery with 794 quarters will be provided with an integrated sewage treatment plant.         | 500            | Mar' 2023        |
|  | Embankment with a catch drain along Damodar River                         | Embankment along with catch drain of 4000 m along Damodar River.  | 400            | Dec' 2022        |
|  | Additional Rain Water Harvesting System                                   | Roof top rain water harvesting system at Workshop and Pit Office  | 25             | Dec' 2022        |
|  | Toe wall and garland drain/ catch drain                                   | Toe wall, garland drain and catch drains around the active and stabilized OB Dumps, quarry and other industrial settlements | 200            | Oct' 2022        |
|  | Sedimentation Tank  | 02 Nos. of Sedimentation tank to arrest run-off before discharge of water into Damodar                                      | 30             | Pre-monsoon 2022 |
|  | Piezometers   | Additional 2 no.of Piezometers in upstream and Downstream of the project.   | 50             | Oct' 2022        |
|  | <b>Total Cost of proposed Water Pollution &amp; Conservation Measures</b> |   | <b>1205</b>    |                  |
| <b>Reclamation and Eco Restoration</b> | Conservation of Flora and Fauna   | Conservation Measures for schedule-I species  | 15             |                  |
|  | Biological Reclamation  | Reclamation activities on degraded land   | 1013.32        |                  |
| <b>Grand Total</b>                     |   |   | <b>3833.32</b> |                  |

Prepared by CMPDI, RI-III, Ranchi

#### 10.4.2 Proposed Revenue Cost of Environmental Control Measures

Annual Revenue Cost to be incurred against environmental monitoring, plantation upkeep and other maintenances has been proposed as below.

**Table 10.2 Estimated Revenue Cost of Environmental Control Measures**

| S No.                     | Particulars   | Annual Revenue Cost (Rs Lakh) |
|---------------------------|---|-------------------------------|
| 1                         | Environmental Monitoring Cost   | 52.8                          |
| 2                         | Plantation Maintenance Cost   | 40                            |
| 3                         | Operation and Maintenance of Air Pollution control Measures                                     | 50                            |
| 4                         | Revenue cost on Flora-Fauna Conservation  | 19                            |
| 5                         | Maintenance cost for ETP and STP  | 15                            |
| 6                         | Maintenance of RWH, Catch drains, Storm water drains and other development measures in Township | 15                            |
| <b>Total Revenue Cost</b> |   | <b>191.8</b>                  |

#### 10.4.3 Mine Closure Details

As per approved Mine Closure Plan for Kathara OCP, the fund allocated against Progressive and Final Mine Closure of the project is **Rs. 7129.14 Lakhs**.

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

**10.4.4 Fund Allocation for Compliance of Issues Raised in PH/ CER**

As per the directions issued by the EAC (Coal) in its MoM, the fund allocation for PH compliance shall not be less than 2% of the total capital expenditure of the project. The capital cost of the project is 266.63 Crs. It has been proposed to spend around 2% of the capital cost of projects (i.e 2% of Rs. 266.63 Crores = 5.3 Crore) towards compliance of the issues raised during the public consultation of Kathara OCP. The details are as given below.

**Table 10.3 Proposed Activities for Compliance of Issues Raised in PH**

| S.No | Proposed Activity   | Tentative Cost in Rs. Lakhs | Timeline                                       |
|------|---|-----------------------------|--|
| 1    | Deepening & cleaning of pond (at three locations near Bandh Basti & Kathara Basti) is under process for the purpose of agriculture & Other Usage use.   | 5.00                        | FY 22-23                                       |
| 2    | 2 pumps of 1000 GPM capacity are deployed for domestic water to Jhirki, Yadav tola, Asna pani and Bandh Basti located near project.<br>The annual cost of operation, repair & maintenance of water supply system is approximately 36 Lakhs/annum.   | 108.00                      | On-going                                       |
| 3    | Construction of 1 number of community halls within the command area of Kathara  | 150.00                      | FY 23-24                                       |
| 4    | Fee waiver (ranging from 50 % - 100 %) has been provide to eligible students of weaker economic sections at DAV Kathara and DAV Swang. (Approximately 50 beneficiaries each year) @ 4 Lakhs/ Annum  | 12.00                       | On-going Activity                              |
| 5    | 4 number of school buses deployed for nearby colony and bastis including Jhirki, Yadav Tola,Bandh Basti, Yadav Tola, Kathara Basti, Asnapani, Railway Colony etc. In addition to this , 6 more numbers of bus are catering the nearby command area villages like Khetko, Piparadih , Karmatiya and Swang etc. The annual cost of operation, repair & maintenance of 4 numbers of school buses are approximately 48 Lakhs/annum. | 144.00                      | On-going Activity                              |
| 6    | Road from Muslim Tola to Yadav Tola (1100 meter x 4 meter x .3 meter) has been repaired departmentally  | 23.00                       | In-Progress<br>To be completed<br>by June 2022 |
| 7    | The iron bridge over Montico Nala at Swang  | 1.50                        | Work Completed                                 |

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

---

|   |  |               |          |
|---|--|---------------|----------|
| 8 | Construction of PCC road from Asnapani Mode to CPP Rly. Crossing | 200.00        | FY 23-24 |
|   |  | <b>643.50</b> |          |

---

Prepared by CMPDI, RI-III, Ranchi

## Chapter 11

# Summary and Conclusion

### 11.1 Introduction

Kathara OCP is an existing project and operating since pre-nationalization era, falling in the Bokaro District of Jharkhand, administratively under Kathara Area of CCL. This project has obtained Environmental clearance for 0.96/1.90 MTPA under EIA Notification, 2006 vide letter no: J-11015/482/2008-IA-II (M) dt. 08.01.2014.

The life of mine as per the calendar plan of previous EC was 03 years. Meanwhile, a revised cost estimate (RCE) of Kathara OCP was prepared with balance mineable reserve of 26.80 MT with mine life 15 years and rated capacity of 1.90 MTPA, and approved by CCL Board on 01.10.2012.

Based on RCE updated Form-I for amendment of EC was submitted online on 01.02.2019 with balance reserve of 22.16 MT and balance life of 12 years. EAC, MoEF&CC appraised the project on 25.06.2019 and 29.05.2020 directed to submit fresh application for Environmental Clearance as per EIA Notification, 2006 vide letter no. J-11015/482/2008-IA.II(M) dated 14.10.2020.

CCL has submitted fresh Form-I application in respect of Kathara OCP (1.90 MTPA/ 773.23 Ha) as per EIA Notification, 2006 on 17.10.2020.

Purpose of this EIA/EMP of Kathara OCP is to carry out impact assessment studies and propose suitable management plan based on the the ToR Prescribed by MoEFCC.

### 11.2 Project Description

| Parameter  | Description   |
|--|---|
| <b>Type of Project</b>                                 | Kathara OCP is an existing opencast project with proposed capacity of 1.9 MTPA within a project area of 773.23 Ha.  |
| <b>Size<br/>Magnitude<br/>and<br/>of<br/>Operation</b> | Mineable reserves: 22.16 Mte<br>Total OBR: 76.4 Mm <sup>3</sup><br>Life of Mine: 12 Years<br>Peak Production rate: 1.90 MTPA<br>Capital Cost of Project – 266.63 Cr                                   |
| <b>Location of the project</b>                         | Kathara OCP falls in the Kathara Block East Bokaro Coalfields, Bermo CD Block located in Bokaro District of Jharkhand. This project is covered by the Survey of India Toposheet no: 73E/13 & 73 E/14, |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|   | enclosed by 23°44'47.26"N to 23°46'26.11"N and Longitude: 85°50'59.89"E to 85°54'25.91"E.  |             |                   |        |        |                  |        |                                  |       |   |       |                     |        |                          |       |             |        |              |               |
|---|--|-------------|-------------------|--------|--------|------------------|--------|----------------------------------|-------|---|-------|---------------------|--------|--------------------------|-------|-------------|--------|--------------|---------------|
| <b>Land Use</b>                                   | <p>The project area is 773.23 Ha. Land use details are as given below.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Description</th> <th>Total Area in Ha.</th> </tr> </thead> <tbody> <tr> <td>Quarry</td> <td>258.46</td> </tr> <tr> <td>External OB Dump</td> <td>109.53</td> </tr> <tr> <td>Reclaimed OB Dump and Embankment</td> <td>41.38</td> </tr> <tr> <td>Industrial Area (W/S, S/S, Haul Road, Office etc)</td> <td>64.54</td> </tr> <tr> <td>Colony &amp; Settlement</td> <td>122.87</td> </tr> <tr> <td>Safety Zone / Green belt</td> <td>45.00</td> </tr> <tr> <td>Vacant Land</td> <td>131.45</td> </tr> <tr> <td><b>Total</b></td> <td><b>773.23</b></td> </tr> </tbody> </table> <p>No forest land is involved.</p> | Description | Total Area in Ha. | Quarry | 258.46 | External OB Dump | 109.53 | Reclaimed OB Dump and Embankment | 41.38 | Industrial Area (W/S, S/S, Haul Road, Office etc) | 64.54 | Colony & Settlement | 122.87 | Safety Zone / Green belt | 45.00 | Vacant Land | 131.45 | <b>Total</b> | <b>773.23</b> |
| Description                                       | Total Area in Ha.  |             |                   |        |        |                  |        |                                  |       |   |       |                     |        |                          |       |             |        |              |               |
| Quarry  | 258.46   |             |                   |        |        |                  |        |                                  |       |   |       |                     |        |                          |       |             |        |              |               |
| External OB Dump                                  | 109.53   |             |                   |        |        |                  |        |                                  |       |   |       |                     |        |                          |       |             |        |              |               |
| Reclaimed OB Dump and Embankment                  | 41.38  |             |                   |        |        |                  |        |                                  |       |   |       |                     |        |                          |       |             |        |              |               |
| Industrial Area (W/S, S/S, Haul Road, Office etc) | 64.54  |             |                   |        |        |                  |        |                                  |       |   |       |                     |        |                          |       |             |        |              |               |
| Colony & Settlement                               | 122.87   |             |                   |        |        |                  |        |                                  |       |   |       |                     |        |                          |       |             |        |              |               |
| Safety Zone / Green belt                          | 45.00  |             |                   |        |        |                  |        |                                  |       |   |       |                     |        |                          |       |             |        |              |               |
| Vacant Land                                       | 131.45   |             |                   |        |        |                  |        |                                  |       |   |       |                     |        |                          |       |             |        |              |               |
| <b>Total</b>                                      | <b>773.23</b>  |             |                   |        |        |                  |        |                                  |       |   |       |                     |        |                          |       |             |        |              |               |
| <b>Seam Details</b>                               | A total no. of 5 coal seams are occurring within the proposed quarry area. Out of these, seam-Kargali Top, seam-Kargali Bottom Comb. are the thickest and most prominent seams. The coal horizons are dipping at a gradient of 12°-25°.  |             |                   |        |        |                  |        |                                  |       |   |       |                     |        |                          |       |             |        |              |               |
| <b>Mining System</b>                              | The method of mining to extract coal and OB in Kathara Opencast mine is with shovel-dumper combination, considering the geo-mining characteristics of this area.   |             |                   |        |        |                  |        |                                  |       |   |       |                     |        |                          |       |             |        |              |               |

### 11.3 Description of Environment

| <b>Air Environment</b>   | Baseline Air environment was studied by monitoring air quality at 11 stations (3 core and 8 buffer) within 10km of project area during post-monsoon 2020. All the monitored values are well within the prescribed limits.  |                                       |        |          |   |                      |                                      |                                       |   |                       |                              |                             |   |                        |                         |                        |
|--------------------------|--|---------------------------------------|--------|----------|---|----------------------|--------------------------------------|---------------------------------------|---|-----------------------|------------------------------|-----------------------------|---|------------------------|-------------------------|------------------------|
| <b>Water Environment</b> | <p>The monitoring of water quality has been conducted by collecting water samples from ground water, surface water and mine water discharge for the proposed project.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>S.No</th> <th>Source</th> <th>Location</th> </tr> </thead> <tbody> <tr> <td rowspan="2">1</td> <td rowspan="2"><b>Surface Water</b></td> <td>SW1 Damodar River U/S of Kathara OCP</td> </tr> <tr> <td>SW2- Damodar River D/S of Kathara OCP</td> </tr> <tr> <td rowspan="2">2</td> <td rowspan="2"><b>Drinking Water</b></td> <td>DW1- Borewell at Bandh Basti</td> </tr> <tr> <td>DW2- Well at Khetko Village</td> </tr> <tr> <td rowspan="2">3</td> <td rowspan="2"><b>Effluent Water:</b></td> <td>EW1. Mine Sump Effluent</td> </tr> <tr> <td>EW2. Workshop Effluent</td> </tr> </tbody> </table> | S.No                                  | Source | Location | 1 | <b>Surface Water</b> | SW1 Damodar River U/S of Kathara OCP | SW2- Damodar River D/S of Kathara OCP | 2 | <b>Drinking Water</b> | DW1- Borewell at Bandh Basti | DW2- Well at Khetko Village | 3 | <b>Effluent Water:</b> | EW1. Mine Sump Effluent | EW2. Workshop Effluent |
| S.No                     | Source   | Location                              |        |          |   |                      |                                      |                                       |   |                       |                              |                             |   |                        |                         |                        |
| 1                        | <b>Surface Water</b>   | SW1 Damodar River U/S of Kathara OCP  |        |          |   |                      |                                      |                                       |   |                       |                              |                             |   |                        |                         |                        |
|                          |  | SW2- Damodar River D/S of Kathara OCP |        |          |   |                      |                                      |                                       |   |                       |                              |                             |   |                        |                         |                        |
| 2                        | <b>Drinking Water</b>  | DW1- Borewell at Bandh Basti          |        |          |   |                      |                                      |                                       |   |                       |                              |                             |   |                        |                         |                        |
|                          |  | DW2- Well at Khetko Village           |        |          |   |                      |                                      |                                       |   |                       |                              |                             |   |                        |                         |                        |
| 3                        | <b>Effluent Water:</b>   | EW1. Mine Sump Effluent               |        |          |   |                      |                                      |                                       |   |                       |                              |                             |   |                        |                         |                        |
|                          |  | EW2. Workshop Effluent                |        |          |   |                      |                                      |                                       |   |                       |                              |                             |   |                        |                         |                        |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|                              |  |
|------------------------------|--|
| <b>Noise Environment</b>     | The ambient noise quality monitoring stations were set up at eleven locations, threelocations in core zone and eight locations in buffer zone area during the baseline study carried out during the post monsoon period.   |
| <b>Hydrogeology Study</b>    | Detailed watershed description and aquifer study along with the historical ground water data has been presented to understand the ground water regime of that area.  |
| <b>Flora and Fauna Study</b> | <p>As per the interaction with local stakeholders, visual sighting and reference of forest working plan, <b>Schedule I</b> speciesviz. <b>Python, Monitor Lizard</b> and <b>Peafowl</b>have been observed in the core zone and buffer zone.</p> <p><b>Presence of Schedule-I faunal and avifaunal species in the core zone indicates a healthy ongoing eco-restoration.</b></p> <p>Core area is mainly dominated by weed species mainly are Mesosphaerum suaveolens (Jungli tulsi), Lantana camara, Chromolaena odorata (Devill Weed). The most dominant tree species observed during study in core zone was Cassia siamea &amp; Butea monosperma Bombax ceiba etc.</p> <p>Mainly plant species planted in the core zone of Kathara Mine are Cassia siamea (Chirkundi), Dalbergia sisso (Shisham), Albizzia lebbeck (Siras), Sagwan (Tectona grandis) &amp; Shorea robusta (Sal), Bombax ceiba (Semal), Pongamia pinnata (Karanj), Ailanthus excels (Adusa).</p> |
| <b>Socio-Economic Study</b>  | <p>Socio-economic study of core and buffer zone of Kathara OCP was carried out by Environmental Technical Services Private Limited during post monsoon season of 2020.</p> <p>Core zone/ project area consists of only 1 village and the buffer zone for the concerned project comprises around 16 villages within 10 km radius around the concerned mine. These villages are listed below with the population as per Census of India 2011.</p> <p>Most of the villagers in adjacent villages in buffer zone are involved in mining related support activities. No R&amp;R is involved.</p>  |

## 11.4 Anticipated Environmental Impacts and Mitigation Measures

### Air Pollution Control Measures

| Activity  | Details   | Cost           |
|---|---|----------------|
|   |   | (in Rs. Lakhs) |
| Wind Barriers along north and north-eastern quarry boundary to protect nearby human | 2000 m along mine boundary along Jhirki, Bandh Basti Village and 500 m along residential Colony | 250            |

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|   |  |             |
|---|--|-------------|
| settlements.  |  |             |
| Plantation on safety zone & green belt, avenue plantation.      | Total additional area proposed to be brought under green belt/ avenue plantation is 25 Ha. | 750         |
| Fixed mist sprinkling system of on Haul Road                    | 1600 m length along Haul Road side upto coal stock   | 150         |
| Permanent Haul Road   | 1600 m length of permanent Haul road upto Kathara Washery to be black topped               | 250         |
| Fog Canons  | Total 02 nos for dust suppression at Coal Stockyard and Haul Road.                         | 100         |
| Continuous Air Quality monitoring systems                       | CAAQMS at GM Office  | 100         |
| <b>Total Cost of proposed Air Pollution prevention measures</b> |  | <b>1600</b> |

### Impact Assessment & Pollution Control Measures for Water

#### Sources of water pollution

|       |   |                                    |
|-------|---|------------------------------------|
| (i)   | Wastewater from mine                              | Suspended solids of coal and clay. |
| (ii)  | Surface run-off passing through coal stockpiles   | Suspended solids.                  |
| (iii) | Storm water from leasehold area and built-up area | Suspended solids.                  |
| (iv)  | Domestic waste water                              | Suspended solids and BOD.          |
| (v)   | Workshop Effluent                                 | Suspended solids and Oil & Grease. |

#### Treatment Technology

1. Workshop discharge → O&G Trap → Settling tank → Reuse
2. Mine Discharge → Mine Sumps for TSS removal → Reuse
3. Domestic effluent → Sewage Treatment Plant.

#### Water Pollution Control Measures

| Activity  | Details   | Total Cost in Rs. Lakhs | Timeline of Completion |
|---|---|-------------------------|------------------------|
| Sewage Treatment Plant at the existing colony     | Existing colonies at Kathara colliery with 794 quarters will be provided with an integrated sewage treatment plant. | 500                     | Dec' 2023              |
| Embankment with a catch drain along Damodar River | Embankment along with catch drain of 4000 m along Damodar River.  | 400                     | Pre-monsoon 2022       |

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|   |   |             |                  |
|---|---|-------------|------------------|
| Additional Rain Water Harvesting System                                   | Roof top rain water harvesting system (03 nos.) at Pit Office, MRS and Kathara Hostel                                       | 25          | Pre-monsoon 2022 |
| Toe wall and garland drain/ catch drain                                   | Toe wall, garland drain and catch drains around the active and stabilized OB Dumps, quarry and other industrial settlements | 200         | Pre-monsoon 2022 |
| Sedimentation Tank  | 02 Nos. of Sedimentation tank to arrest run-off before discharge of water into Damodar                                      | 30          | Pre-monsoon 2022 |
| Piezometers   | Additional 2 no.of Piezometers in upstream and Downstream of the project.   | 50          | Pre-monsoon 2022 |
| <b>Total Cost of proposed Water Pollution &amp; Conservation Measures</b> |   | <b>1205</b> |                  |

### Impact on land use pattern

| Landuse During Mining    |  |               | Post Mining Landuse Plan            |               |
|--------------------------|--|---------------|-------------------------------------|---------------|
| S.No                     | Landuse Details                              | Area in Ha.   | Landuse Details                     | Area in Ha.   |
| 1                        | Quarry                                       | 258.46        | Plantation on Backfilled Area       | 160.90        |
|                          |  |               | Mine Void Filled with Water         | 97.56         |
| 2                        | External OB Dump                             | 109.53        | Plantation on External Dump         | 109.53        |
| 3                        | Reclaimed OB Dump and Embankment             | 74.09         | Plantation                          | 74.09         |
| 4                        | Infrastructure (W/S, S/S, Office, Road etc.) | 64.54         | Infrastructure for Future Use       | 64.54         |
| 5                        | Colony & Settlement                          | 122.87        | Land for Public Use                 | 122.87        |
| 6                        | Safety Zone/Green belt                       | 45.00         | Plantation on Safety Zone/Greenbelt | 45.00         |
| 7                        | Vacant Land                                  | 98.74         | Undisturbed Land                    | 98.74         |
| <b>Total Area in Ha.</b> |  | <b>773.23</b> | <b>Total Area in Ha.</b>            | <b>773.23</b> |

### Impact on Flora and Fauna

From the baseline Flora Fauna Study, it is observed that there are endangered and endemic species found in the core zone as well as in the buffer zone area as per Red Book of Botanical Survey and Zoological survey of India as per Wild Life (Protection) Act 1972 and its subsequent amendments.

As per the interaction with local stakeholders, visual sighting and reference of forest working plan, **Schedule I** species viz. **Python, Monitor Lizard** and **Peafowl** have been observed in the core zone and buffer zone.

**Presence of Schedule-I faunal and avifaunal species in the core zone indicates a healthy ongoing eco-restoration.**

The conservation plan for the schedule I species has been obtained from the CCL and enclosed as **Annexure VI**. In addition, following general conservation measures along with the provisions of conservation plan will be adopted.

- Strengthening of water bodies
- Tree Planting
- Control of forest fires and fire in coal seams and stock yard
- Protection measures shall be designed and implemented in cor-ordination with forest officials and local villagers.

## **11.5 Project Benefits**

The continuation of Kathara OCP will improve the socio-economic activities in the adjoining areas. This will result in following benefits

- Improvements in Physical Infrastructure
- Improvements in Social Infrastructure
- Increase in Employment Potential
- Contribution to the Exchequer
- Meet energy requirement
- Post-mining Enhancement of Green Cover

## **11.6 Environment Management Plan**

The success of environmental management in an organization not only depends on deep involvement of its personnel at all levels but also on the creation of an effective implementing organizational structure. The objectives are:

- To implement environmental control and protection measures.
- Subsequent environmental monitoring of the efficacy of various control measures.
- Plantation/green belt development.
- Land restoration.

Keeping this in view, organizational structure responsible for the implementation of environmental control and mitigation measures as well as monitoring of such implementation has been discussed.

## Chapter 12

# Disclosure of Consultants Engaged

**Table 12.1 Consultants Engaged**

| S. No. | Nature of Study                    | Name of the Agency  |
|--------|------------------------------------|---|
| 1      | Geological Report                  | Central Mine Planing and Design Institute (CMPDI), a subsidiary of Coal India Ltd., is a premier consultancy organization engaged in mineral exploration, land resource management through remote sensing survey, coal petrography, mine planning, coal preparation & utilization, design of coal handling plants, environmental management of coal projects etc. |
| 2      | Project report                     |   |
| 3      | Land-use study                     |   |
| 4      | Hydro-geological Study             |   |
| 5      | Seasonal Ambient Air Quality Study | M/s Go Green Mechanisms Pvt Ltd., Ahmedabad.  |
| 6      | Ambient Noise Level Study          |   |
| 7      | Water Quality study                |   |
| 8      | Soil Quality study                 |   |
| 9      | Socio- Economic Study              | M/s Environmental Technical Services Pvt. Ltd.  |
| 10     | Flora & Fauna study                | M/s Wolkem India Pvt. Ltd., Rajasthan   |

### 12.1 About CMPDI

Central Mine Planning & Design Institute Limited, it is an ISO 9001:2008 certified company. Established in 1975 as a subsidiary of Coal India Ltd. as an in-house consultant. A Mini-Ratna Company providing consultancy services to various government & private organizations in exploration, mine planning and allied engineering services.

Its registered Corporate office is situated at Gondwana Place, Kanke Road, Ranchi-834 008, a capital city of Jharkhand state. It operates through seven strategically located Regional Institutes over six states territories of India.

### 12.1.1 Brief resume of the consultant

#### ***Establishment background***

The company was formerly known as Coal Mines Authority Limited. And, the Central Mine Planning & Design Institute Limited (herein after called as CMPDI) is a planning & design division of Coal India Limited (hereinafter called as CIL) as per Memorandum of Association of the company. The CIL is a holding company since November 01, 1975, and the CMPDI is one of its subsidiaries since then. It is under Ministry of Coal, Government of India.

#### ***Strength & Resources***

##### *Manpower*

CMPDI has more than 900 multidisciplinary technical executive professionals who combine innovation and initiative to deliver faster and effective solutions in planning, implementation and management of projects.

##### *Resources*

CMPDI is equipped with modern laboratory facilities for undertaking various analytical works to supplement its services. It has well equipped network of six environmental laboratories located in various coalfields to regularly monitor air, water and noise parameters. **The Environment Laboratory at Ranchi is accredited with NABL (National Accreditation Board for Testing and Calibration Laboratories).** The environment lab is having recognition of CPCB since 1997 and also working under ISO-9001:2015 Certification. Besides its own strength, CMPDI has access to the vast resources with its principal, CIL, India's largest coal producer and a **Maharatna Company**.

##### *Recognition*

CMPDI is recognized as preferred consultant by Indian and overseas clients, United Nation agencies and international financial institutions, and the company is registered with

- World Bank
- Asian Development Bank
- African Development Bank
- United Nations Development Programme

##### *Main Functional Area*

The main functional area of the CMPDI is to provide adequate and up-to-date planning, design and technological supports to the CIL and its coal producing subsidiaries to enable them to produce the planned quantity of coal efficiently and economically with due attention to safety, conservation, quality and environment. In addition to these, CMPDI also provides necessary consultancy for clients outside the CIL in India and abroad. The Quality management System of CMPDI, Ranchi is certified under international standard-ISO 9001:2015, Services covered under are as follows:

1. Consultancy in Mineral Exploration and Environmental Management.

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

---

2. Planning & Design in Mining, Civil & Architectural Engineering, Coal Preparation & Utilization, Electrical & Mechanical Engineering, Mining Electronics, Geomatics and Mine Construction.
3. Laboratory testing facilities for the above.
4. Technical & Management Training in Mineral & Mining Sector.

***Research & Development***

The Research & Development activities in coal and lignite is being administered through the Scientific Advisory Committee (SSRC) with Secretary (Coal) as its Chairman. The committee is entrusted with the task of planning, budgeting and overseeing the implementation of R & D programme in coal & lignite sector and also for application of research findings. And, CMPDI is the Nodal Agency to coordinate S & T / R &D activities in coal and lignite Sector and assist SSRC in areas mentioned herein after.

CMPDI applied research and development in the field of mining, beneficiation, utilization, environment, exploration, etc. serving as nodal agency for all S & T schemes funded by Ministry of Coal and R & D schemes funded by R & D Board of the CIL(constituted in August 1995). Field oriented research projects including transfer and absorption of new technology concerning main areas of coal research have been as follows:

- Production, productivity and safety.
- Coal beneficiation and utilization.
- Environment and Ecology.

## Chapter 13

# Remediation Plan and Natural & Community Resource Augmentation Plan

### 13.1 Brief Description

Kathara OCP is a brownfield project located in the East Bokaro Coalfields, Bermo CD block, Bokaro Dist. of Jharkhand. This project was started way back in 1944 by M/s Anderson Wright and Company on behalf of M/s Kathara Coal Company. This block was acquired by Govt. of India under the coal bearing area (acquisition and development) Act 1957 vide declaration SRO No.3810 dt. 23.11.57.

The project obtained Environment Clearance for capacity (0.960/1.90 MTPA) vide no. J-11015/482/2008-IA.IIM dated 08.01.2014 with project area of 792.81 Ha. The life of mine as per the EC obtained was 03 years.

The details of coal production from Kathara OCP since 1993-94 is given in the table below.

**Table 13.1 Year Wise Production Details**

| Financial Year | Coal Production (MTPA) | EC Capacity in MTPA |
|----------------|------------------------|---------------------|
| <b>1993-94</b> | <b>0.90</b>            | -                   |
| 1994-95        | 0.834                  | -                   |
| 1995-96        | 0.60                   | -                   |
| 1996-97        | 0.57                   | -                   |
| 1997-98        | 0.746                  | -                   |
| 1998-99        | 0.359                  | -                   |
| 1999-00        | 0.295                  | -                   |
| 2000-01        | 0.505                  | -                   |
| 2001-02        | 0.513                  | -                   |
| 2002-03        | 0.409                  | -                   |
| 2003-04        | 0.420                  | -                   |
| 2004-05        | 0.470                  | -                   |
| 2005-06        | 0.620                  | -                   |
| 2006-07        | 0.833                  | -                   |
| 2007-08        | 0.960                  | -                   |
| 2008-09        | 0.468                  | -                   |
| 2009-10        | 0.501                  | -                   |
| 2010-11        | 0.450                  | -                   |
| 2011-12        | 0.211                  | -                   |
| 2012-13        | 0.217                  | -                   |
| 2013-14        | 0.465                  | (0.960/1.90 MTPA)   |
| 2014-15        | 0.658                  | (0.960/1.90 MTPA)   |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|                |              |                   |
|----------------|--------------|-------------------|
| 2015-16        | 0.923        | (0.960/1.90 MTPA) |
| 2016-17        | 0.937        | (0.960/1.90 MTPA) |
| <b>2017-18</b> | <b>0.493</b> | -                 |
| <b>2018-19</b> | <b>0.733</b> | -                 |
| <b>2019-20</b> | <b>0.132</b> | -                 |
| <b>2020-21</b> | <b>0.200</b> | -                 |
| <b>2021-22</b> | <b>0.136</b> | -                 |

As detailed in the above table, the project has produced 0.90 MTPA in 1993-94 and operated with a valid EC during the period 2013-14 to 2016-17 (upto 8/01/2017). The project has gone into violation during the period 2016-17 (From 08/01/2017) to 2021-22 due to continuing the operation without a valid EC.

However, it is to be noted that, the project has never exceeded the 1993-94 production of 0.90 MTPA during the period of violation i.e., 2017-18 to 2020-21.

### 13.2 Economic Benefit Accrued During Period of Violation

Economic benefit calculations due to production of excess coal in the years of violations are as given below.

**Table 13.2 Economic benefits Accrued Due to Violation**

| S.No         | F.Y     | Total Months of Operation during violation | Actual Coal Prod. (Te) | EC Capacity | Excess Production in TPA | Profit in Rs.    | Loss             |
|--------------|---------|--|------------------------|-------------|--------------------------|------------------|------------------|
| 1            | 2016-17 | 3 months                                   | 386000                 | -           | 386000                   | 176400000        |                  |
| 2            | 2017-18 | 12 months                                  | 493000                 | -           | 493000                   | 82500000         | -                |
| 3            | 2018-19 | 12 months                                  | 733000                 | -           | 733000                   | 37100000         | -                |
| 4            | 2019-20 | 12 months                                  | 132000                 | -           | 132000                   | 136000000        | -                |
| 5            | 2020-21 | 12 months                                  | 200000                 | -           | 200000                   | -                | -141100000       |
| 6            | 2021-22 | 9 months                                   | 136000                 | -           | 136000                   | -                | -294700000       |
| <b>Total</b> |         |  | <b>2080000</b>         | -           | <b>2080000</b>           | <b>432000000</b> | <b>435800000</b> |

As summarized in the above table, as per the data provided by the project, the project has earned a total profit of Rs. 43.20 Cr. in the financial years 2016-17, 2017-18, 18-19 and 2019-20. Whereas, the project has run into loss of Rs. 43.58 cr. in the FY: 2020-21 and 21-22. Thus, there is a net loss of Rs. 0.38 Crs. during the period of violation i.e. 2016-17 to 2021-22. The signed copy of financial calculation of profit accrued during the period of violation has been enclosed as annexure XV.

### 13.3 Assessment of Ecological Damage Due to Violation

As per the condition no (xix) of ToR issued by the MoEF&CC, the assessment of damage caused due to the mining activity involving violation of regulatory frameworks is to be carried out.

The details of violation involved in Kathara OCP and the economic benefit accrued due to violation have already been discussed in the above sections.

The damage caused to different environmental attributes like air, water, land, flora and Fauna, socio economic and occupational health etc are quantified as given below.

### 13.3.1 Damage on Land and Ecology

As Kathara OCP has been in operation since pre nationalization era, majority of the project area is in utilization for mining and allied activities. It has been assessed that during the period of violation (2017 (Jan) to 2021-22), minor land use change has taken place. The land use change during this period has been studied using the Satellite based imagery (IRS LISS-IV).

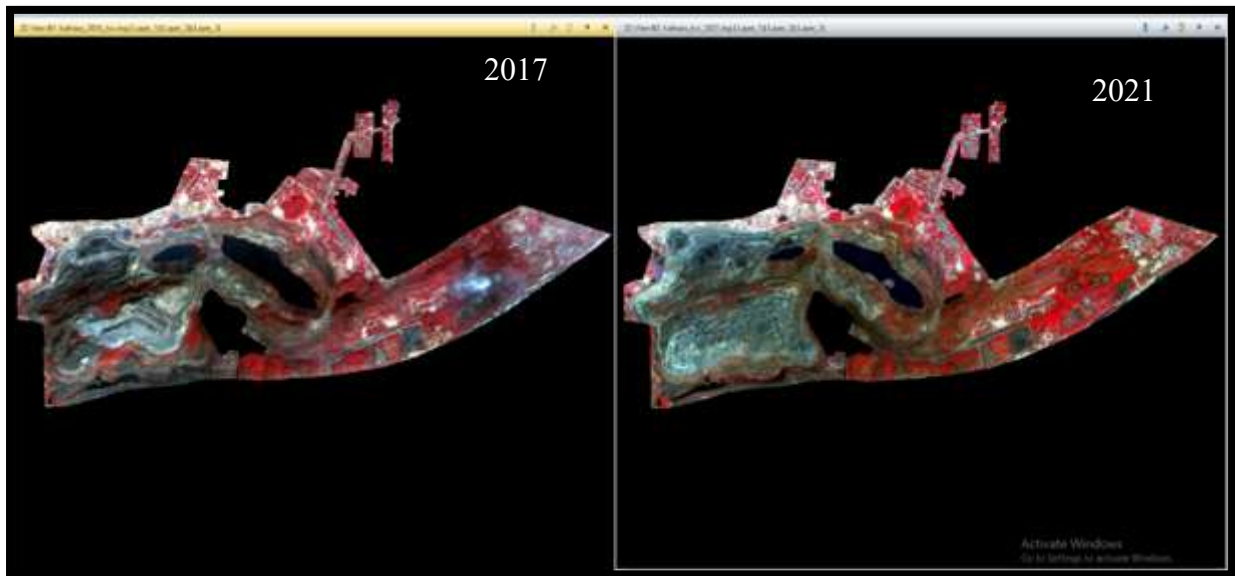


Fig. Satellite imagery (False Color Composite) showing Surface features of Kathara OCP during before and after violation (2017 and 2021)

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

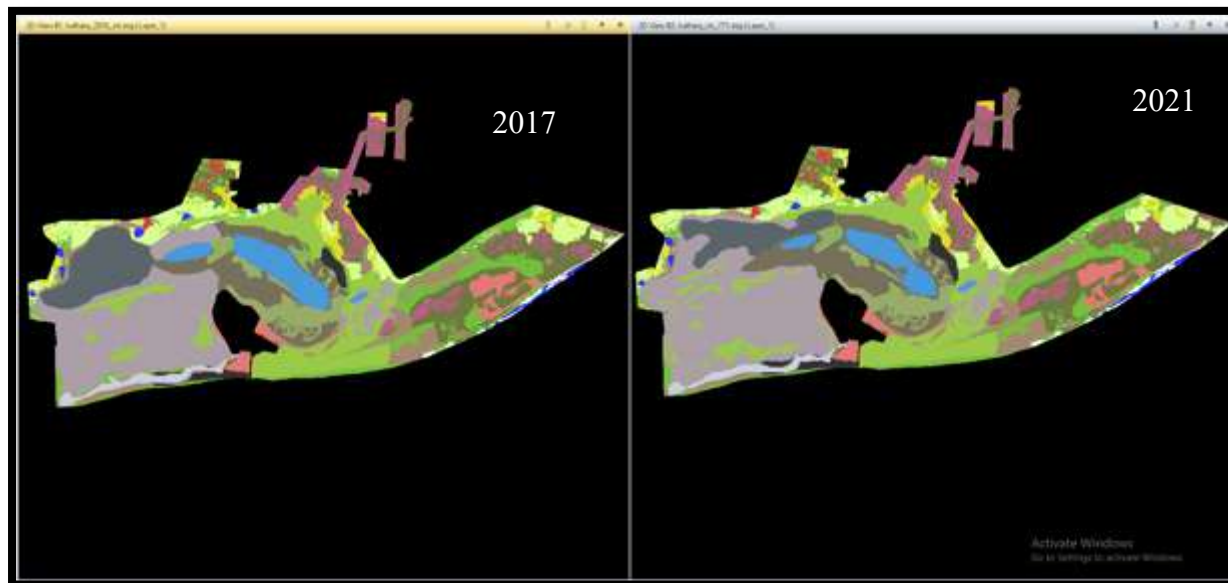


Fig. Land use map of Kathara OCP during before and after violation (2017 and 2021)

**Table 13.3 Land Use Change Analysis of Kathara OCP during period of Violation**

| Classes        | Colour       | Area (2021)   |               | Area (2017)   |               | Change %<br>Year<br>(2021-2017) | Change<br>(Area)<br>Year<br>(2021-2017) |
|----------------|--------------|---------------|---------------|---------------|---------------|---------------------------------|---|
|                |              | Area<br>(Hec) | % of<br>Total | Area<br>(Hec) | % of<br>Total |                                 |   |
| Level-I        |              |               |               |               |               |                                 |   |
| Forest Area    |              | 0.00          | 0.00          | 0.00          | 0.00          | 0.00                            | 0                                       |
| Scrubs         |              | 53.19         | 6.88          | 70.10         | 9.07          | -2.19                           | -16.91                                  |
| Plantation     |              | 212.50        | 27.48         | 206.54        | 26.71         | 0.77                            | 5.96                                    |
| Agriculture    |              | 67.19         | 8.69          | 64.74         | 8.37          | 0.32                            | 2.45                                    |
| Waste Land     |              | 59.02         | 7.63          | 57.41         | 7.42          | 0.21                            | 1.61                                    |
| Mining<br>Area |              | 308.04        | 39.84         | 303.55        | 39.26         | 0.58                            | 4.49                                    |
| Settlements    |              | 68.73         | 8.89          | 66.13         | 8.55          | 0.34                            | 2.60                                    |
| Water Body     |              | 4.56          | 0.59          | 4.76          | 0.62          | -0.03                           | -0.20                                   |
|                | <b>Total</b> | <b>773.23</b> | <b>100.00</b> | <b>773.23</b> | <b>100.00</b> |                                 |   |

It has assessed that, degradation of land of around 6.1 Ha. (increase of 4.9 Ha and 1.61 Ha in active mining area and waste land respectively) took place during period of violation, suggesting an impact of violation on land environment. It can also be observed that the land which got damaged due to mining were of scrub type.

The damage costs on land environment has been calculated as given below:

| Land Degradation Due to Mining | Quantity of Land Affected (Ha) | Type of Land | NPV Rate#(Rs.) | Environmental Price of land degradation (Rs.) |
|--------------------------------|--------------------------------|--------------|----------------|---|
|                                |                                | 6.1          | Scrub*         | 64,595/Ha.                                    |

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

---

\*As per the Remote Sensing based land use.

#NPV rate for has been considered for OF as per "Revision of Rates of NPV Applicable for Different Class/Category of Forests-2014", CESM & IIFM Bhopal, in collaboration of FSI, Dehradun.

Therefore, the total estimated damages due to violation on the land is around **Rs. 3,94,029.5**.

Further, around 140 Ha. of project area has already been reclaimed with dense plantation. It is evident from the baseline Flora Fauna Study that several species including a few **Schedule-I** species viz. Python, Monitor Lizard and Peafowl have been sighted in the reclaimed areas of core zone, indicating a healthy on going eco restoration. Therefore, no significant impact can be identified on the Biological regime of the Environment.

### **Mitigation Measures**

Following measures are proposed as a part of DRP & Natural and Community resource augmentation plan.

- Development of ecological park (creation and maintenance) in 19.10 ha at Kathara Area.
- Distribution of fruit bearing Saplings like Amla, Guava, Mango, Lichi etc. to nearby villagers.
- Providing colour coded bins (30 L) in 35 schools, 7 hospitals in buffer zone.
- Awareness programme for conservation of flora-fauna.

### **13.3.2 Air Environment**

During the period of violation i.e. from 2016-17 to 2020-21, the details of coal and OB production are as given below.

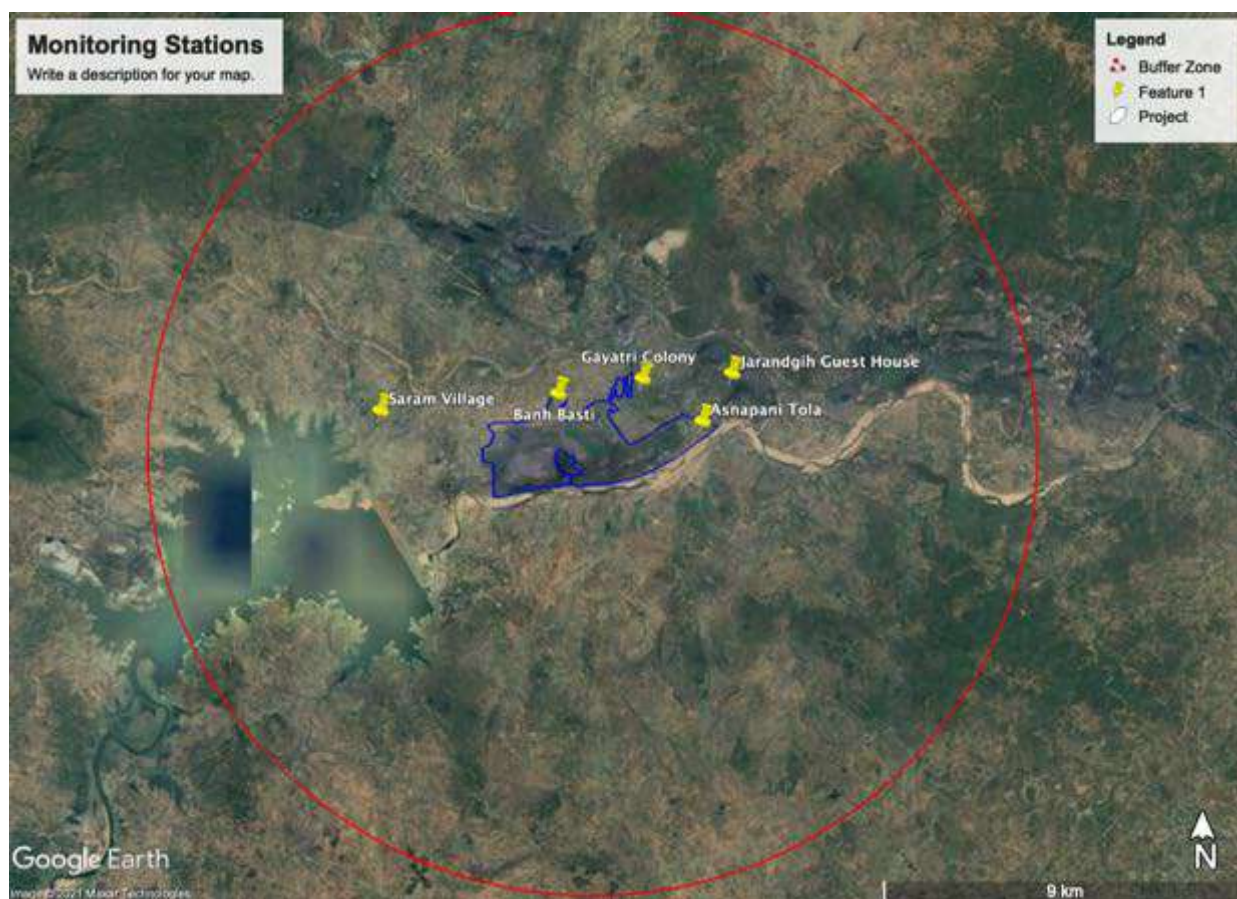
| <b>Year</b>               | <b>Coal (MT)</b> | <b>OB (M.Cum)</b> |
|---------------------------|------------------|-------------------|
| <b>1993-94</b>            | <b>0.904</b>     | <b>4.601</b>      |
| 2016-17<br>(Jan to March) | 0.386            | 1.304             |
| 2017-18                   | 0.493            | 4.862             |
| 2018-19                   | 0.733            | 4.898             |
| 2019-20                   | 0.132            | 3.519             |
| 2020-21                   | 0.2              | 0.956             |
| 2021-22                   | 0.136            | 0.805             |

The maximum production during the period of violation was 0.733 Mte in 2018-19, which is less than the rated capacity of previous EC i.e., 1.90 MTPA as well as 1993-94 production of 0.90 MTPA, suggesting that the impact of violation activities likely to have been below than that of 1993-94 production limits.

### **Damage Assessment**

The impact of mining and allied activities on the air environment during the period of violation has been studied using the routine monitoring data generated during the period of violation.

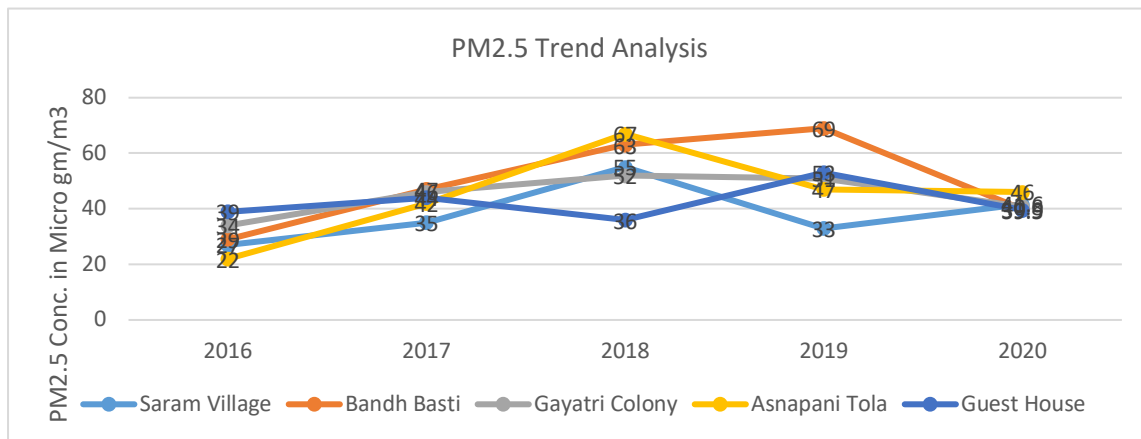
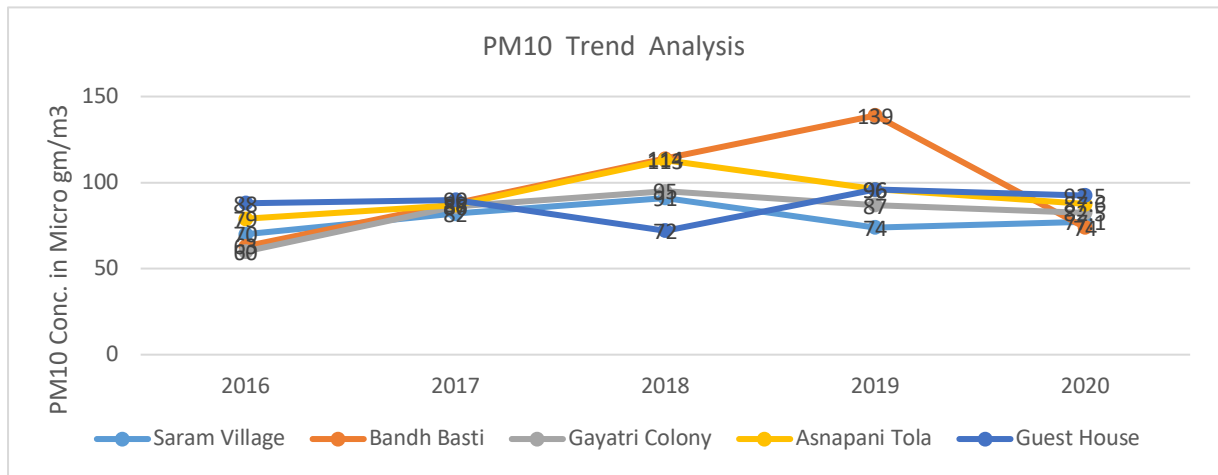
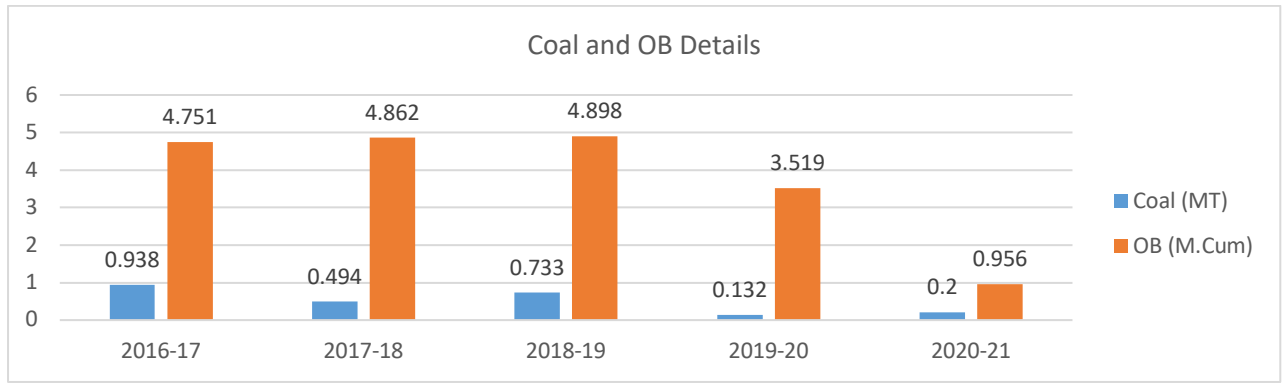
**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**



| Location       | Period of Non-Violation |       | Violation Period |       |      |       |      |       | No Production |       |
|----------------|-------------------------|-------|------------------|-------|------|-------|------|-------|---------------|-------|
|                | 2016                    |       | 2017             |       | 2018 |       | 2019 |       | 2020          |       |
|                | PM10                    | PM2.5 | PM10             | PM2.5 | PM10 | PM2.5 | PM10 | PM2.5 | PM10          | PM2.5 |
| Saram Village  | 70                      | 27    | 82               | 35    | 91   | 55    | 74   | 33    | 77.1          | 41.6  |
| Bandh Basti    | 63                      | 29    | 88               | 47    | 114  | 63    | 139  | 69    | 74            | 39.9  |
| Gayatri Colony | 60                      | 34    | 86               | 46    | 95   | 52    | 87   | 51    | 82.5          | 40.8  |
| Asnapani Tola  | 79                      | 22    | 87               | 42    | 113  | 67    | 96   | 47    | 87.6          | 46    |
| Guest House    | 88                      | 39    | 90               | 44    | 72   | 36    | 96   | 53    | 92.5          | 39.5  |

Source: Routine Environmental Monitoring Data of Kathara OCP in the Post-Monsoon Season

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**



PM<sub>10</sub> and PM<sub>2.5</sub> concentrations for the period 2016 to 2020 presented above depicts the comparison of 3 scenarios i.e. period of non-violation (2016), period of violation (2017-2020) and period of non-operation (Post-Monsoon 2020).

From the above data, it can be observed that particulate matter concentrations have exceeded the NAAQS limits at the location Bandh basti during 2018 and 2019, and at location Asnapani Tola in the year 2018. This is due to the fact both the locations fall within the core zone and, during the period of violation, mining has progressed towards north in close proximity to the village Bandh Basti.

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

**Damage Quantification**

In order to quantify the damages due to violation on air environment, operations carried out during the 2017 (January) to 2021-22 has been considered. The details are as follows.

**Table 13.4 Pollutant Emission Quantification during Violation**

|                                       | 2017<br>(Jan to March) | 2017-18       | 2018-19       | 2019-20       | 2020-21      | 2021-22      |
|---------------------------------------|------------------------|---------------|---------------|---------------|--------------|--------------|
| <b>Coal in Mte</b>                    | <b>0.386</b>           | <b>0.494</b>  | <b>0.733</b>  | <b>0.132</b>  | <b>0.2</b>   | <b>0.136</b> |
| <b>OB in Mm3</b>                      | <b>1.304</b>           | <b>4.862</b>  | <b>4.898</b>  | <b>3.519</b>  | <b>0.956</b> | <b>0.805</b> |
| <b>Sources</b>                        | <b>PM10</b>            |               |               |               |              |              |
| Total Pit Emissions                   | 72.10                  | 68.01         | 69.92         | 50.46         | 16.65        | 14.03        |
| Coal & OB Transportation on Haul Road | 113.17                 | 97.65         | 102.71        | 93.99         | 28.56        | 27.80        |
| Emissions from OB Dump                | 19.49                  | 19.64         | 19.71         | 17.20         | 12.54        | 12.27        |
| Stock Yard                            | 6.75                   | 2.94          | 3.93          | 1.45          | 1.73         | 1.46         |
| <b>Total Emissions in kg/day</b>      | <b>211.51</b>          | <b>188.25</b> | <b>196.27</b> | <b>163.10</b> | <b>59.48</b> | <b>55.56</b> |
| <b>Sources</b>                        | <b>PM2.5</b>           |               |               |               |              |              |
| Total Pit Emissions                   | 13.46                  | 12.76         | 13.10         | 9.38          | 3.09         | 2.59         |
| Coal & OB Transportation on Haul Road | 23.99                  | 20.69         | 21.77         | 19.92         | 7.11         | 5.86         |
| OB Dump                               | 2.81                   | 2.83          | 2.84          | 2.42          | 1.64         | 1.59         |
| Stock Yard                            | 1.16                   | 0.48          | 0.66          | 0.21          | 0.26         | 0.21         |
| <b>Total Emissions in kg/day</b>      | <b>41.42</b>           | <b>36.76</b>  | <b>38.37</b>  | <b>31.93</b>  | <b>12.10</b> | <b>10.25</b> |
| <b>Sources</b>                        | <b>SOX</b>             |               |               |               |              |              |
| Openpit                               | 28.350                 | 31.39         | 32.02         | 23.51         | 9.86         | 8.24         |
| OB Dumps                              | 0.816                  | 0.82          | 0.82          | 0.82          | 0.82         | 0.82         |
| Coal Stockyard                        | 0.816                  | 0.82          | 0.82          | 0.82          | 0.82         | 0.82         |
| Coal Transportation on Haul Road      | 0.139                  | 0.16          | 0.16          | 0.11          | 0.03         | 0.02         |

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|                                  |               |               |               |               |               |               |
|----------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|
| <b>Total Emissions in kg/day</b> | <b>30.12</b>  | <b>33.18</b>  | <b>33.81</b>  | <b>25.25</b>  | <b>11.53</b>  | <b>9.90</b>   |
| <b>Sources</b>                   | <b>NOX</b>    |               |               |               |               |               |
| Openpit                          | 137.55        | 145.46        | 147.79        | 120.89        | 120.89        | 74.47         |
| OB Dumps                         | 13.65         | 13.65         | 13.65         | 13.65         | 13.65         | 13.65         |
| Coal Stockyard                   | 13.65         | 13.65         | 13.65         | 13.65         | 13.65         | 13.65         |
| Coal Transportation on Haul Road | 7.53          | 4.77          | 5.13          | 4.39          | 5.24          | 1.14          |
| <b>Total Emissions in kg/day</b> | <b>172.39</b> | <b>177.52</b> | <b>180.22</b> | <b>152.58</b> | <b>153.43</b> | <b>102.91</b> |

*\*The Emission Factors used in the quantification are taken from the S&T study titled, "Development of emission factors for various mining machineries & operations in opencast coal mines (EE-27)" was carried out by CMPDI (HQ) during 2002 to 2008.*

Damages caused due to the mining and allied operations on air environment due to violation have been quantified as per the following methodology.

***Damage to Air Quality in Monetary Terms /Environmental Price Rs. /day:***

$$\text{Damage}_{AQ} (\text{Rs/day}) = (\text{Load}_{PM10} \times EP_{PM10}) + (\text{Load}_{PM2.5} \times EP_{PM2.5}) \quad \text{Eq (1)}$$

In the above formula,  $\text{Load}_{PM10}$  represents the PM10 load in kg/day and  $EP_{PM10}$  represents the environmental price for the particulate emissions  $PM_{10}$ .

The environmental prices considered have been obtained from EAC Violation committee guidelines. The environmental prices for different pollutants are as given below.

**Table 13.5 Environmental Prices of Air Pollutants**

| <b>Pollutant</b>  | <b>Environmental Price of avg. atmospheric emission in Rs./kg</b> |
|-------------------|---|
| PM <sub>10</sub>  | 340   |
| PM <sub>2.5</sub> | 524   |
| SO <sub>x</sub>   | 165   |
| NO <sub>x</sub>   | 96  |

Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited

**Table 13.6 Financial Evaluation of Damages to Air Environment**

| FY  | Coal in Mte | OB in Mm3 | Emissions in kg/day |                 |               |               | Environmental Cost in Rs./day |               |              |            | Total in Rs./day | Total Rs./year   | Total Rs.          |
|---|-------------|-----------|---------------------|-----------------|---------------|---------------|-------------------------------|---------------|--------------|------------|------------------|------------------|--------------------|
|   |             |           | PM10 in kg/day      | PM2.5 in kg/day | SOX in kg/day | NOx in kg/day | PM10 @ 340/kg                 | PM2.5 @524/kg | SOx@ 165 /kg | NOx@ 96/kg |                  |                  |                    |
| 2017<br>(Jan to March)  | 0.386       | 1.034     | 211.51              | 41.42           | 30.12         | 172.39        | 71913.4                       | 21704.08      | 4969.8       | 16549.44   | 115136.7         | <b>9556347.8</b> | <b>116074774.1</b> |
| 2017-18   | 0.494       | 4.862     | 188.25              | 36.76           | 33.18         | 177.52        | 64005                         | 19262.24      | 5474.7       | 3185.28    | 91927.22         | <b>30335983</b>  |                    |
| 2018-19   | 0.733       | 4.898     | 196.27              | 38.37           | 33.81         | 180.22        | 66731.8                       | 20105.88      | 5578.65      | 3245.76    | 95662.09         | <b>31568490</b>  |                    |
| 2019-20   | 0.132       | 3.519     | 163.1               | 31.93           | 25.25         | 152.58        | 55454                         | 16731.32      | 4166.25      | 2424       | 78775.57         | <b>25995938</b>  |                    |
| 2020-21   | 0.2         | 0.956     | 59.48               | 12.1            | 11.53         | 153.43        | 20223.2                       | 6340.4        | 1902.45      | 1106.88    | 29572.93         | <b>9759066.9</b> |                    |
| 2021-22   | 0.136       | 0.805     | 55.56               | 10.25           | 9.9           | 102.91        | 18890.4                       | 5371          | 1633.5       | 950.4      | 26845.3          | <b>8858949</b>   |                    |
| The compensation rate for the same has been taken as ₹ 340/kg/day for PM <sub>10</sub> , ₹ 524/kg/day for PM <sub>2.5</sub> , ₹ 165/kg/day for SOx and ₹ 96/kg/day for NOx as provided by EAC (Violation) |             |           |                     |                 |               |               |                               |               |              |            |                  |                  |                    |

Therefore, the total estimated damages due to violation on the air environment is around Rs. 11.61 Crores.

**Mitigation Measures**

As a part of Damage remediation plan and Natural and Community Resource Augmentation Plan in respect of Air environment, following measures are proposed.

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

- Monthly Health Camps to monitor the respiratory and E&T health status in villages Jhirki Basti, Bandh Basti and Asnapani Tola
- Additional avenue Plantation (creation and maintenance) along with gabion protection on village roads connecting Jhirki and Bandh Basti, Asnapani and Kathara Basti (Total length 4.50 kms).
- Repair and periodic maintenance of public roads near Bandh Basti, Asnapani tola and Kathara Basti.

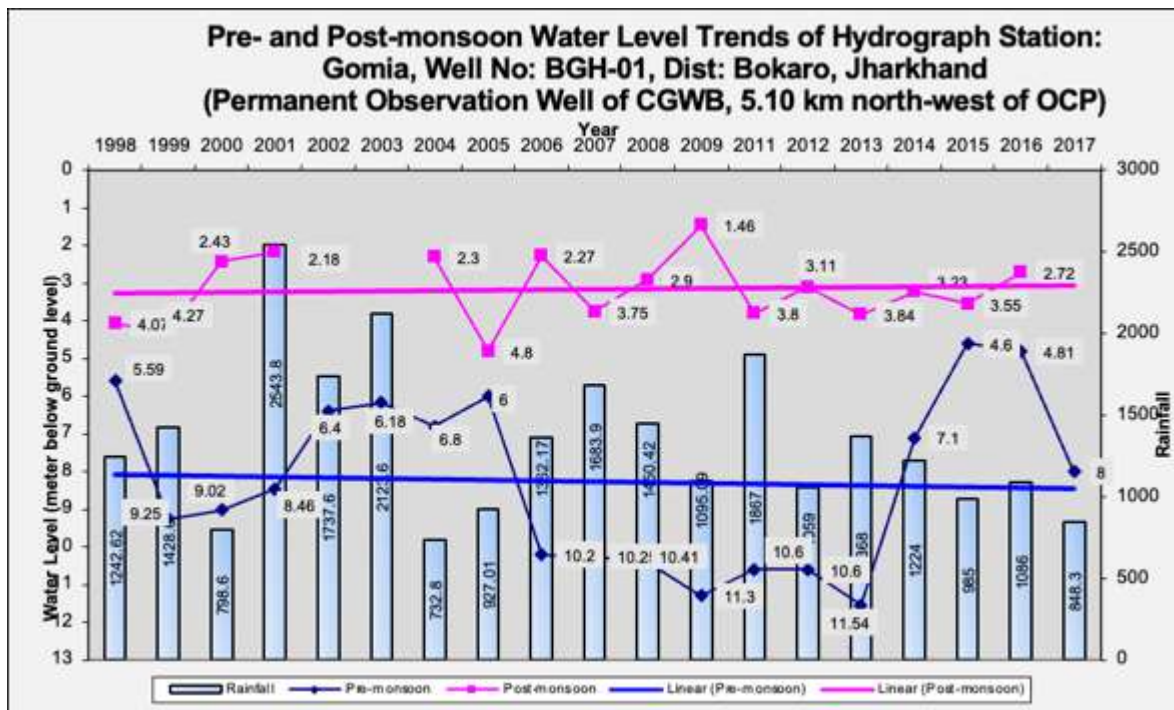
### 13.3.3 Water Environment

The impact of mining activities have been assessed for both surface and ground water regimes.

#### **Ground Water**

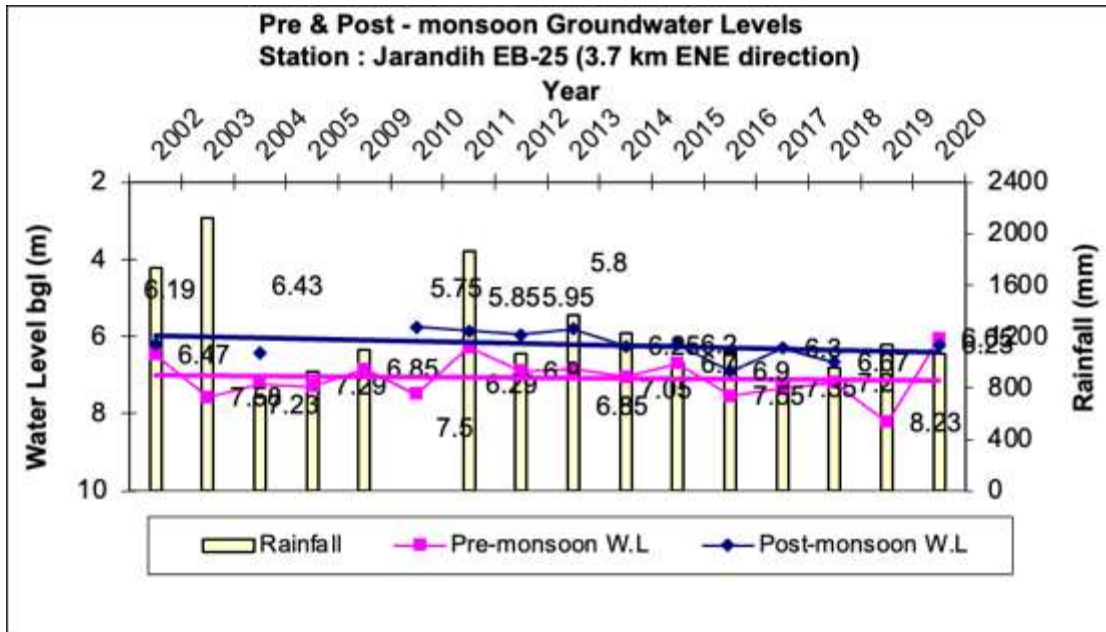
In order to understand the impact on ground water level due to the mining activity, long term ground water levels from nearby observation wells of CGWB has been referred.

Ground water level by Permanent Observation Well (PoW) of the area is continuously monitored by CMPDI and CGWB. There is a permanent observation well of CGWB in Gomia (Well No.: BGH-01). The pre-monsoon and post monsoon historical groundwater levels for the last few years (1998 to 2017) recorded by CGWB at the nearest permanent hydrograph stations at Gomia (Well No.: BGH-01). The pre-monsoon and post monsoon historical groundwater levels for the last few years recorded by CMPDI at the nearest permanent hydrograph stations like at Jarandih (Well No.: EB-25), Jhikri basti (EB-53) and Kathara (Well No.: EB-26) were collected and are given below.

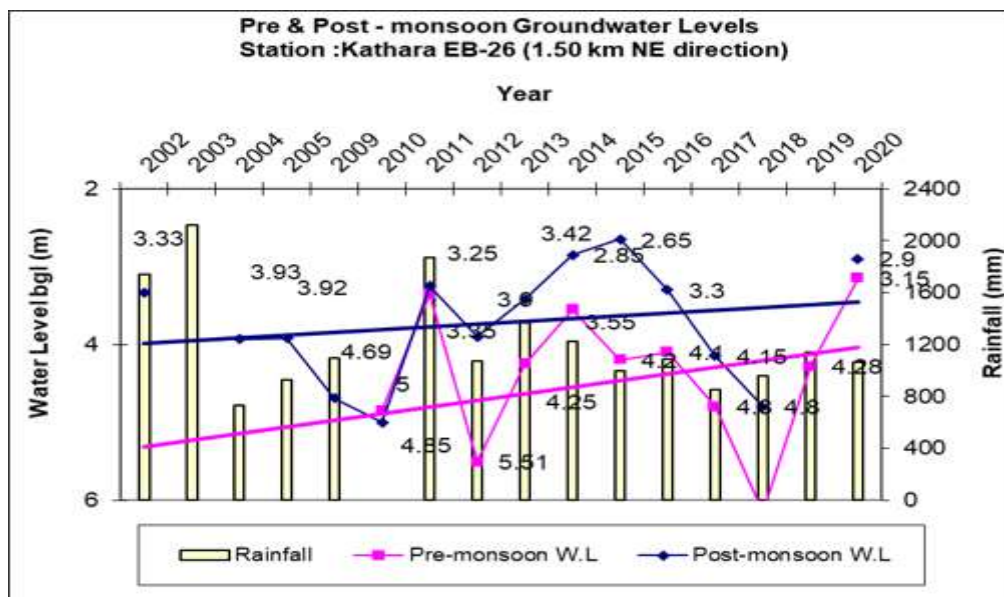


**Fig: Water level trend of CGWB Well, Gomia (BGH-01)**

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

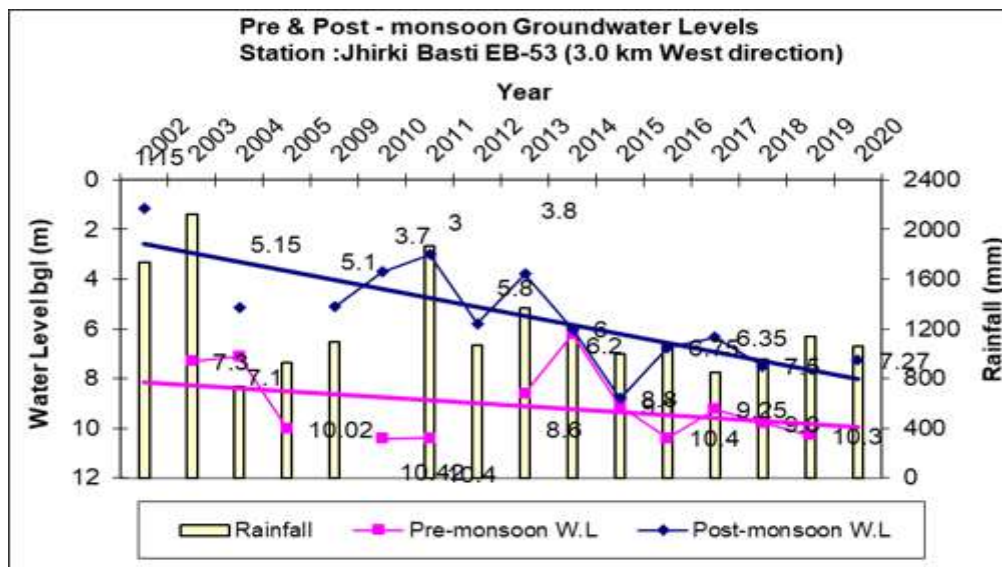


**Fig: Hydrograph station at Jarandih (Well No.: EB-25)**



**Fig: Hydrograph station at Kathara (Well No.: EB-26)**

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**



**Fig: Hydrograph station at Jhirki Basti (Well No.: EB-53)**

The average water level trends of the Hydrograph stations show declining trend at Jhirki Basti and Jarandgih both in Pre and Post-monsoon seasons, whereas in Kathara Basti has been showing the increasing trend.

Overall groundwater utilization with the increasing population and Industrial demand and less recharge by rainfall has in recent past years, may be affected the local groundwater regime.

**Damage Assessment**

During the period of violation i.e., from Jan’ 2017 to 2021-22, the project was in operation without obtaining NoC from CGWB. Hence, the cost of ground water extraction during the period of violation can be treated as the damage cost on ground water regime.

The assessment has been made for abstraction as well as compensation. For abstraction, rates have been obtained from CGWA notification of Sept. 2020, and for quantification of compensation due to violation, the methodology developed by CPCB for “Environmental Compensation in Case of Illegal Extraction of Ground Water” has been adopted.

**Environmental Compensation**

To quantify these damages, the methodology developed by CPCB for “Environmental Compensation in Case of Illegal Extraction of Ground Water” has been adopted.

As per this methodology, the formula proposed by CPCB for calculation of Environmental Compensation ( $EC_{GW}$ ) is as given below.

|           |   |   |
|-----------|---|---|
| $EC_{GW}$ | = | $\frac{\text{Water Consumption per Day} \times \text{No. of Days} \times \text{Environmental Compensation Rate for illegal extraction of ground water (ECR}_{GW})}{}$ |
|-----------|---|---|

The Environmental Compensation Rate for Illegal extraction of Ground Water ( $ECR_{GW}$ ) given by CPCB for mining, infrastructure and dewatering projects is as given below.

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

| Sl. No.                                      | Area Category  | Water Consumption (m <sup>3</sup> /day)                                   |              |               |              |
|--|----------------|---|--------------|---------------|--------------|
|  |                | <200  | 200 to <1000 | 1000 to <5000 | 5000 & above |
|  |                | Environmental Compensation Rate (EC <sub>GW</sub> ) in Rs./m <sup>3</sup> |              |               |              |
| 1  | Safe           | 15  | 21           | 30            | 40           |
| 2  | Semi critical  | 30  | 45           | 60            | 75           |
| 3  | Critical       | 45  | 60           | 85            | 115          |
| 4  | Over-exploited | 60  | 90           | 120           | 150          |
| <b>Minimum EC<sub>GW</sub>=Rs 1,00,000/-</b> |                |   |              |               |              |

The cost of ground water extracted by Kathara OCP during the period of violation is calculated as given below.

**Table 13.7 Cost of Compensation for Ground water Extraction**

| Year                           | Production in Mte | OB Removal in Mm3 | Discharge in m3/day | EC <sub>GW</sub> rate (Rs/-) | Environmental Price for ground water in rs./yr |
|--------------------------------|-------------------|-------------------|---------------------|------------------------------|--|
| 2016-17<br>Jan to mar'<br>2017 | 0.386             | 1.034             | 203                 | 90                           | <b>1498140</b>                                 |
| 2017-18                        | 0.494             | 4.862             | 259                 |                              | 7692300  |
| 2018-19                        | 0.733             | 4.898             | 385                 |                              | 11434500                                       |
| 2019-20                        | 0.132             | 3.519             | 69                  | 60                           | 1366200  |
| 2020-21                        | 0.2               | 0.956             | 105                 |                              | 2079000  |
| 2021-22                        | 0.136             | 0.805             | 71                  |                              | 1405800  |
| <b>Total</b>                   | <b>2.081</b>      | <b>16.074</b>     |                     |                              | <b>25475940</b>                                |

Thus, the compensation cost of ground water extracted during violation has been calculated as Rs. **2,54,75,940/-**.

***Cost of Abstraction***

Rates of ground water abstraction charges for mining, which are drawing ground water in safe, semi-critical, critical assessment and over exploited units as mentioned in the "Guidelines to regulate and control ground water extraction in India, published vide S.O. no. 3289 (E) Dt. 24.09.2020" are as given below.

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

| S.No. | Category of area<br>↓<br>Ground water use → | Quantum of ground water withdrawal |                                  |                                   |                                    |
|-------|---|------------------------------------|----------------------------------|-----------------------------------|------------------------------------|
|       |   | < 200 m <sup>3</sup> /day          | 200 to <1000 m <sup>3</sup> /day | 1000 to <5000 m <sup>3</sup> /day | 5000 m <sup>3</sup> /day and above |
| 1.    | Safe  | 1.00                               | 2.00                             | 2.50                              | 3.00                               |
| 2.    | Semi-critical                               | 2.00                               | 2.50                             | 3.00                              | 4.00                               |
| 3.    | Critical                                    | 3.00                               | 4.00                             | 5.00                              | 6.00                               |

| S.No. | Category of area<br>↓<br>Ground water use → | Quantum of ground water withdrawal |                                  |                                   |                                    |
|-------|---|------------------------------------|----------------------------------|-----------------------------------|------------------------------------|
|       |   | < 200 m <sup>3</sup> /day          | 200 to <1000 m <sup>3</sup> /day | 1000 to <5000 m <sup>3</sup> /day | 5000 m <sup>3</sup> /day and above |
| 1.    | Over-exploited                              | 4.00                               | 5.00                             | 6.00                              | 7.00                               |

The cost of ground water extraction during the period of violation is calculated as given below.

**Table 13.8 Cost for Ground water Abstraction**

| Year                           | Total coal production (MTe) | Mine Seepage in KLD | Extraction Rate in Rs. /m <sup>3</sup> /day | Total Cost in Rs. |
|--------------------------------|-----------------------------|---------------------|---|-------------------|
| 2016-17<br>( Jan to Mar' 2017) | 0.386                       | 203                 | 5   | 83230             |
| 2017-18                        | 0.494                       | 259                 | 5   | 427350            |
| 2018-19                        | 0.733                       | 385                 | 5   | 635250            |
| 2019-20                        | 0.132                       | 69                  | 4   | 91080             |
| 2020-21                        | 0.2                         | 105                 | 4   | 138600            |
| 2021-22                        | 0.136                       | 71                  | 4   | 93720             |
| <b>Total Cost in Rs.</b>       |                             |                     |   | <b>1469230</b>    |

Thus, the cost of ground water abstraction during violation has been calculated as Rs. **14,69,230/-**.

**Surface Water**

For economical evaluation of impact due to violation on surface water bodies, cost saved due to deficiency in provision of SW structures as per the previous EC has been considered. The details are as given below.

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

| S.No | Measures for protection and conservation of Surface water bodies   | Estimated Cost in Rs. |
|------|--|-----------------------|
| 1    | Stone revetment to provided upto HFL level in the portion where loose material was visible (50-100 m length) | 40                    |
| 2    | Toe walls with provision of weep holes along foot of external dump on the river side (1.5 km)                | 50                    |
|      | <b>Total Amount in Rs.</b>   | <b>90,00,000</b>      |

Thus, the cost due to loss in surface water run-off during violation has been calculated as Rs. **90,00,000/-**.

### ***Mitigation Measures***

As a part of Damage Remediation Plan and Natural and Community Resource Augmentation Plan, following mitigation measures are proposed.

1. Toe walls with provision of weep holes along foot of external dump on the river side (approx. 1.5 km)
2. Cleaning and restoration of wells, ponds and other water bodies in nearby villages.
3. Gabion type 3-tier gap plantation along the banks of River Damodar in consultation with Forest Department.

### **13.3.4 Socio-Economic Impact**

Kathara OCP is a very old mine operating since pre-nationalization era. Therefore, no R&R is involved in the project. Further, this project has been a source of direct employment to around 794 persons and indirect employment to the nearby villagers.

CSR activities are carried out continuously under Kathara OCP. More emphasis of CSR is in drinking water, infrastructure, sanitation, education, skill development, social empowerment, water management, environment, sports and health.

**Table 13.9 CSR Activities in Previous Years**

| Sector                                       | 2018-19      | 2019-20      | 2020-21      | 2021-22       | Grand Total<br>(Rs. Lakh) |
|--|--------------|--------------|--------------|---------------|---------------------------|
| <b>Drinking Water &amp; Water Management</b> | 11.87        | 28.59        | 55.97        | 138.5         | <b>234.93</b>             |
| <b>Education</b>                             | 3.31         | 5.57         | 1.88         |               | <b>10.76</b>              |
| <b>Health</b>                                |              |              | 10.94        |               | <b>10.94</b>              |
| <b>Infrastructure</b>                        |              | 8.81         | 6.83         | 18.00         | <b>33.64</b>              |
| <b>Sanitation</b>                            | 7.19         |              |              | 13.75         | <b>20.94</b>              |
| <b>Skill Development</b>                     |              |              | 6.50         | 2.00          | <b>8.5</b>                |
| <b>Sports</b>                                |              | 2.02         | 1.92         | 5.00          | <b>8.94</b>               |
| <b>Grand Total</b>                           | <b>22.37</b> | <b>44.99</b> | <b>84.04</b> | <b>177.25</b> | <b>328.65</b>             |

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

**Mitigation Measures**

Following measures are proposed as a part of Damage Assessment Plan & Natural and Community resource augmentation plan.

- Skill development training program including Motor Driving, Sewing, Nursing & skill development programmed by Central Institute of Plastics Engineering & Technology (CIPET).
- Scheme for providing of solar lights to nearby villages.

**13.3.5 Occupational Health and Safety**

To examine the health status of workmen who are exposed to extreme working conditions, periodic Medical Examination (PME) have been taken up. The details are as given below.

**Table 13.10 IME and PME Details**

| <b>Year</b>       | <b>PME</b> | <b>IME</b> |
|-------------------|------------|------------|
| 2016              | 198        | 22         |
| 2017              | 190        | 30         |
| 2018              | 172        | 39         |
| 2019              | 162        | 29         |
| 2020              | 192        | 00         |
| 2021              | 233        | 05         |
| 2022 (Till March) | 168        | 00         |

PME report suggests that, no adverse health impact on workmen due to dust. The details of health camps conducted during the previous years is as given below.

**Table. 13.11 Details of Health Camps**

| <b>Details</b>                | <b>2018-19</b>     |                    | <b>2019-20</b>     |                    | <b>2020-21</b>     |                    | <b>20221-22</b>    |                    |
|-------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
|                               | <b>No.of Camps</b> | <b>Beneficiary</b> | <b>No.of Camps</b> | <b>Beneficiary</b> | <b>No.of Camps</b> | <b>Beneficiary</b> | <b>No.of Camps</b> | <b>Beneficiary</b> |
| Village Health Camp           | 41                 | 893                | 39                 | 925                | 19                 | 551                | 16                 | 314                |
| HTN & Diabetic Detection Camp | 1                  | 26                 | 1                  | 160                | -                  | -                  | 1                  | 144                |
| Anemia Camp                   | 1                  | 72                 | 1                  | 96                 | 2                  | 214                | 1                  | 240                |
| CSR Dispensary                | Everyday           | 4300               | Everyday           | 4441               | Everyday           | 7182               | Everyday           | 7343               |
| School Health Camp            | 15                 | 600                | 10                 | 575                | -                  | -                  | -                  | -                  |

Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited

---

The major diseases reported were body aches, Anemia, Dermatitis, chest infection etc. and there was no instance of occupational diseases such as pneumoconiosis.

### 13.3.6 Summary

The estimated environmental damage costs due to violation on land, air, water, flora fauna and socio economics are as given below.

**Table 13.12: Summary of Assessment of Damages**

| <b>S.no</b>                     | <b>Particulars</b>          | <b>Estimated Damage Cost in Rs. Lakhs</b> |
|---------------------------------|-----------------------------|---|
| 1                               | Land and Ecosystem Services | 3.94                                      |
| 2                               | Air Environment             | 1160.74                                   |
| 3                               | <b>Water Environment</b>    |   |
|                                 | Ground Water                | 269.45                                    |
|                                 | Surface Water               | 90.00                                     |
| 4                               | Flora and Fauna             | Nil                                       |
| 5                               | Socio-Economis              | Nil                                       |
| <b>Grand Total in Rs. Lakhs</b> |                             | <b>1524.13</b>                            |

## 13.4 Proposed Remediation Plan and Natural & Community Resource Augmentation Plan (NCRAP)

The proposed fund allocation for remediation plan and Natural Resource Augmentation Plan are as given below.

**Table 13.13 Table Proposed budgetary provisions for Damage Remediation Plan**

| Remediation plan & budgetary provisions |                           |  |                    | Action Plan       |                    |                    |
|---|---------------------------|--|--------------------|-------------------|--------------------|--------------------|
| SI NO                                   |                           | Activity Proposed  | Total              | Year 01           | Year 02            | Year 03            |
| 1                                       | <b>Water Environment</b>  | <b>Protection &amp; Development of Damodar River bank:</b>   | 30000000.00        | 5000000           | 15000000           | 10000000           |
|   |                           | Development & Beautification of Damodar River Banks along with construction of picnic spots, approach road & pathways, chath ghat, shed, river side plantation etc.  |                    |                   |                    |                    |
| 2                                       |                           | Additional Water Sampling and analysis of Ground water and Surface water quarterly at 6 locations (4 Ground water at Bandh Basti, Jhirki Basti, Asnapani Tola and Kathara Basti and 2 surface water locations- u/s and d/s of Damodar River) | 500000             | 160000            | 170000             | 170000             |
| <b>Total Water Environment</b>          |                           |  | <b>30500000.00</b> | <b>5160000.00</b> | <b>15170000.00</b> | <b>10170000.00</b> |
| 1                                       | <b>Land &amp; Ecology</b> | Development of ecological park (creation and maintenance) in 19.10 ha at Kathara Area  | 92000000           | 10000000          | 41000000           | 41000000           |
| 2                                       |                           | Distribution of fruit bearing Saplings like Amla, Guava, Mango, Lichi etc. to nearby villagers.  | 150000             | 0                 | 150000             | 0                  |
| 3                                       |                           | Providing colour coded bins (30 L) in nearby schools & hospitals in buffer zone.   | 400000             | 0                 | 400000             | 0                  |
| 4                                       |                           | Setting up of Vermi composting plant for treating Bio-degradable waste generated from nearby habitation  | 4500000            | 0                 | 4500000            | 0                  |

---

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|  |                                    |  |                     |                    |                    |                    |
|--|------------------------------------|--|---------------------|--------------------|--------------------|--------------------|
| 5  |                                    | Awareness programme for conservation of flora-fauna & e-waste disposal   | 450000              | 150000             | 150000             | 150000             |
| <b>Total Ecological Environment</b>        |                                    |  | <b>97500000</b>     | <b>10150000</b>    | <b>46200000</b>    | <b>41150000</b>    |
| 1  | <b>Air &amp; Noise Environment</b> | Periodic Health Camps to monitor the respiratory and E&T health status in villages Jhirki Basti, Bandh Basti and Asnapani Tola   | 11000000            | 3000000            | 4000000            | 4000000            |
| 2  |                                    | Additional avenue Plantation (creation and maintenance) along with gabion protection on roads from filter plant to Asnapani More via khetko (Total length 1.50 kms)          | 2500000             | 500000             | 1000000            | 1000000            |
| 3  |                                    | Repair and periodic maintenance of public roads near Bandh Basti, Asnapani tola and Kathara Basti.   | 5000000             | -                  | 2500000            | 2500000            |
| <b>Total Air Environment</b>               |                                    |  | <b>18500000</b>     | <b>3500000</b>     | <b>7500000</b>     | <b>7500000</b>     |
| 1  | <b>Socio-Economic</b>              | Skill development training program including Motor Driving, Sewing, Nursing & skill development programmed by Central Institute of Plastics Engineering & Technology (CIPET) | 3000000             | 1000000            | 1000000            | 1000000            |
| 2  |                                    | Fogging machine in nearby villages of command area of CCL  | 900000              | 300000             | 300000             | 300000             |
| 3  |                                    | Organizing Training Sessions for sports and conducting Gramin Football League  | 3000000             | 1000000            | 1000000            | 1000000            |
| 4  |                                    | Additional awareness programs on Environmental protection  | 300000              | 100000             | 100000             | 100000             |
| <b>Total Socio-Economic Environment</b>    |                                    |  | <b>7200000</b>      | <b>2400000</b>     | <b>2400000</b>     | <b>2400000</b>     |
| <b>Total Fund for remediation measures</b> |                                    |  | <b>153700000.00</b> | <b>21210000.00</b> | <b>71270000.00</b> | <b>61220000.00</b> |

**Table 13.14 Details of EMP Cost saved during period of violation**

=====

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

| S.No   | EMP/EC Measures Supposed to be Implemented   | Capital Cost Saved in Rs. Lakhs (approx.) | Revenue Cost Saved in Rs. Lakhs (approx.) |
|--|--|---|---|
| 1  | PCC Topping of Permanent Hual road (1.6 km)  | 250                                       | -   |
| 2  | Strengthening of slopes by stone in wire mesh in certain portions of dumps (30-40 m length)                  | 30  | -   |
| 3  | Stone revetment to provided upto HFL level in the portion where loose material was visible (50-100 m length) | 40  | -   |
| 4  | Toe walls with provision of weep holes along foot of external dump on the river side (1.5 km)                | 50  | -   |
| 5  | Handling and Management of Municipal Solid Waste   | -   | 20  |
| <b>Total Cost Saved in Rs. Lakhs</b>   |  | <b>370</b>                                | <b>20</b>                                 |
| <b>Provision for CRAP= 3% of total EMP Cost saved during violation period in Rs. Lakhs</b> |  |   | <b>11.7</b>                               |

**Table 13.15 Proposed budgetary provisions for Natural and Community Resource Augmentation Plan**

| SN | Particular                           | Activity Proposed   | Total     | Action Plan |          |          |
|----|--------------------------------------|---|-----------|-------------|----------|----------|
|    |                                      |   |           | Year 01     | Year 02  | Year 03  |
| 1  | <b>Natural Resource Augmentation</b> | Total 05 nos. of Rainwater Harvesting cum Groundwater recharge structures to be installed on rooftop of public buildings in Bandh Basti, Jhirki Basti and Kathara Basti | 18,00,000 | 6,00,000    | 6,00,000 | 6,00,000 |

=====

Prepared by CMPDI, RI-III, Ranchi

**Final EIA & EMP of Kathara OCP  
(773.23 Ha./ 1.90 MTPA)  
Kathara Area, Central Coalfields Limited**

|   |  |  |                  |                  |                  |                  |
|---|--|--|------------------|------------------|------------------|------------------|
| 2   |  | Distribution of Solar Lantern in command areas of CCL (500 numbers)  | 10,00,000        | --               | 10,00,000        | -                |
| <b>Total Proposed Budget under NRAP (in Rs.Lakh)</b>                        |  |  | <b>28,00,000</b> | <b>6,00,000</b>  | <b>16,00,000</b> | <b>6,00,000</b>  |
| 1   | <b>Community Resource Augmentation</b> | Procurement, operation & maintaince of High Speed Fully Automatic Sanitary Pad Making Machine for nearby villages in command area of Kathara | 15,00,000        | -                | 10,00,000        | 5,00,000         |
| 2   |  | Battery Operated Handicapped Tricycle distribution to Divyangs of command area of Kathara (20 Numbers)                                       | 10,00,000        | -                | 10,00,000        | -                |
| 3   |  | Distribution of Bench, Desk, Table, Chair, Books and Almirah etc. to various schools of Kathara Area   | 15,00,000        | -                | 7,50,000         | 7,50,000         |
| 4   |  | Special vaccination drives for children vaccines, Covid vaccine etc. in nearby villages in collaboration with state govt.                    | 5,00,000         | 1,00,000         | 2,00,000         | 2,00,000         |
| 5   |  | Providing smart classes at DAV Schools (Swang & Kathara)   | 12,00,000        | 4,00,000         | 4,00,000         | 4,00,000         |
| <b>Total Proposed Budget under CRAP (in Rs.Lakh)</b>                        |  |  | <b>57,00,000</b> | <b>5,00,000</b>  | <b>33,50,000</b> | <b>18,50,000</b> |
| <b>Total cost of Natural &amp; Community Resource Augmentation Measures</b> |  |  | <b>85,00,000</b> | <b>11,00,000</b> | <b>49,50,000</b> | <b>24,50,000</b> |

=====

Prepared by CMPDI, RI-III, Ranchi

## Annexure-XV

**Form-2**

**APPLICATION FOR PRIOR ENVIRONMENTAL CLEARANCE**

| S.No                   | Item   | Details   |                         |                           |                        |                          |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|--|---|-------------------------|---------------------------|------------------------|--------------------------|--|--|--|--|--|--|--|--|--|--|--|
|                        | Whether it is a violation case and application is being submitted under Notification No. S.O. 804 (E) Dt. 14.03.2017   | Yes   |                         |                           |                        |                          |  |  |  |  |  |  |  |  |  |  |  |
|                        | <b>Details of Violation</b>  | <b>Kathara OCP is a pre 1993-94 mine.</b> This project has obtained Environmental clearance for 0.96/1.90 MTPA under EIA Notification, 2006 vide letter no: J-11015/482/2008-IA-II (M) dt. 08.01.2014 for a mine life of 3 years. The project has gone into violation from 2017 to 2021-22 due to continuing production without a valid EC. |                         |                           |                        |                          |  |  |  |  |  |  |  |  |  |  |  |
| <b>1</b>               | <b>Details of Project</b>  |   |                         |                           |                        |                          |  |  |  |  |  |  |  |  |  |  |  |
|                        | a. Name of the Project (s)   | : Kathara OCP   |                         |                           |                        |                          |  |  |  |  |  |  |  |  |  |  |  |
|                        | b. Name of the Company / Organization  | : Central Coalfields Limited  |                         |                           |                        |                          |  |  |  |  |  |  |  |  |  |  |  |
|                        | c. Registered Address  | :   |                         |                           |                        |                          |  |  |  |  |  |  |  |  |  |  |  |
|                        | d. Legal Status of the Company   | : CPSE  |                         |                           |                        |                          |  |  |  |  |  |  |  |  |  |  |  |
|                        | e. Joint Venture (Yes/No)  | : No  |                         |                           |                        |                          |  |  |  |  |  |  |  |  |  |  |  |
|                        | If Yes,  |   |                         |                           |                        |                          |  |  |  |  |  |  |  |  |  |  |  |
|                        | (i) No. of JV Partners ( <b>Multiple Entries Allowed</b> )   | :   |                         |                           |                        |                          |  |  |  |  |  |  |  |  |  |  |  |
|                        | <table border="1"> <thead> <tr> <th>Name of the JV Partner</th> <th>Share of the JV Partner</th> <th>Address of the JV Partner</th> <th>Email Id of JV Partner</th> <th>Mobile No. of JV Partner</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> | Name of the JV Partner  | Share of the JV Partner | Address of the JV Partner | Email Id of JV Partner | Mobile No. of JV Partner |  |  |  |  |  |  |  |  |  |  |  |
| Name of the JV Partner | Share of the JV Partner  | Address of the JV Partner   | Email Id of JV Partner  | Mobile No. of JV Partner  |                        |                          |  |  |  |  |  |  |  |  |  |  |  |
|                        |  |   |                         |                           |                        |                          |  |  |  |  |  |  |  |  |  |  |  |
|                        |  |   |                         |                           |                        |                          |  |  |  |  |  |  |  |  |  |  |  |
| <b>2</b>               | <b>Address for the correspondence</b>  |   |                         |                           |                        |                          |  |  |  |  |  |  |  |  |  |  |  |
|                        | a. Name of the applicant   | :   |                         |                           |                        |                          |  |  |  |  |  |  |  |  |  |  |  |
|                        | b. Designation (Owner / Partner / CEO)   | : Project Officer   |                         |                           |                        |                          |  |  |  |  |  |  |  |  |  |  |  |
|                        | c. Address   | : Project Officer,<br>Kathara OCP, Bermo<br>Tehsil, Bokaro Dist.,<br>Jharkhand. Pin: 829144   |                         |                           |                        |                          |  |  |  |  |  |  |  |  |  |  |  |
|                        | d. Pin code  | : 829144  |                         |                           |                        |                          |  |  |  |  |  |  |  |  |  |  |  |
|                        | e. e-mail  | : <a href="mailto:pokatharaocp@gmail.com">pokatharaocp@gmail.com</a>  |                         |                           |                        |                          |  |  |  |  |  |  |  |  |  |  |  |
|                        | f. Telephone No.   | : 0651 2360184  |                         |                           |                        |                          |  |  |  |  |  |  |  |  |  |  |  |
|                        | g. Fax No.   | :   |                         |                           |                        |                          |  |  |  |  |  |  |  |  |  |  |  |
| <b>3</b>               | <b>Category of the Project/Activity as per Schedule of EIA Notification, 2006</b>  |   |                         |                           |                        |                          |  |  |  |  |  |  |  |  |  |  |  |
|                        | a. Project / Activity<br>[1(a)(i) / 1(a)(ii) / 1(b) / 1(c) / 1(d) / 1 (e) / 2(a) / 2(b) / 3(a) / 3(b) / 4(a) / 4(b)(i)/ 4(b) (ii) / 4(c) / 4(d) / 4(e) / 4(f) / 5(a) / 5(b) / 5(c) / 5(d) / 5(e) / 5(f) / 5(g) / 5(h) / 5(i) / 5(j) / 6(a) /   | : 1(a)(i) Mining of minerals  |                         |                           |                        |                          |  |  |  |  |  |  |  |  |  |  |  |

|          |  |   |                                    |
|----------|--|---|------------------------------------|
|          | 6(b) / 7(a) / 7(b) / 7 (c) / 7 (d) / 7 (da) / 7 (e) / 7 (f) / 7 (g) / 7 (h) / 7 (i) / 8 (a) / 8 (b)  |   |                                    |
| b.       | Category (A/B <sub>1</sub> /B <sub>2</sub> )   | : | A                                  |
|          | If B <sub>1</sub> or B <sub>2</sub>  |   |                                    |
|          | Reason for application at Central Level / State level (in case of B <sub>2</sub> projects)   | : |                                    |
|          | If Others  |   |                                    |
| c.       | Proposal Number  | : | IA/JH/CMIN/179534/2020             |
| d.       | Master Proposal no   |   | SW/25570/2022                      |
| e.       | EAC concerned (for category A Projects only)<br>(Coal Mining / Non-coal Mining / Thermal / River Valley & Hydro / Industry-I / Industry-II / Infrastructure-I / Infrastructure-II / Nuclear & Defence / CRZ) | : | Coal Mining                        |
| f.       | New / Expansion / Modernization / One Time Capacity expansion (only for Coal Mining) / Expansion under Para 7(ii) / Modernization under Para 7(ii) / Change of Product Mix under Para 7(ii)                  | : | Fresh EC                           |
| <b>4</b> | <b>Location of the Project</b>   |   |                                    |
| a.       | Plot / Survey / Khasra No.   | : | Acquired under SO 2975, 2770, 1670 |
| b.       | Village  | : | Kathara                            |
| c.       | Tehsil   | : | Bermo                              |
| d.       | District   |   | Bokaro                             |
| e.       | State  |   | Jharkhand                          |
| f.       | Pin Code   |   | 829144                             |
| g.       | Bounded Latitudes (North)  |   |                                    |
|          | From   | : | 23°44'47.26"N                      |
|          | To   | : | 23°46'26.11"N                      |
| h.       | Bounded Longitudes (East)  |   |                                    |
|          | From   | : | 85°50'59.89"E                      |
|          | To   | : | 85°54'25.91"E                      |
| i.       | Survey of India Topo Sheet No.   | : | 73E/13 & 73 E/14                   |
| j.       | Upload Topo Sheet File ( <i>Upload pdf only</i> )  | : |                                    |
| k.       | Maximum Elevation Above Means Sea Level (AMSL)   | : | 330                                |
| l.       | Upload (kml) File ( <i>Upload kml only</i> )   | : | Yes                                |
| m.       | Distance of Nearest HFL from the project boundary within the study area  | : | 0.1                                |
| n.       | Seismic Zone (Zone: 1 / 2 / 3 / 4 / 5)   | : | 3                                  |
| <b>5</b> | <b>Whether project is executed in multiple States (Yes / No)?</b>  |   |                                    |
|          | <b>If Yes</b>  |   |                                    |
| a.       | Number of States in which Project will be Executed (e.g. 1,2,3,4,5,6)  |   |                                    |
| b.       | Main State of the Project  |   |                                    |
| c.       | Other State ( <i>Multiple Entries Allowed</i> )  |   |                                    |

|          |   |   |        |  |
|----------|---|---|--------|--|
|          |   | (If the project to be executed, does not belong to any state, then state category could be selected as 'Other') |        |  |
|          | State   | District  | Tehsil | Village  |
|          |   |   |        |  |
|          |   |   |        |  |
| <b>6</b> | <b>Details of Terms of Reference (ToR)</b>  |   |        |  |
| a.       | Date of issue of ToR / Standard ToR   |   |        | IA/JH/CMIN/11566/2008  |
| b.       | Date of Apply of ToR  |   |        | 17.Oct 2020  |
| c.       | Date of Issue of ToR  |   |        | 27 Apr 2021  |
| d.       | Upload ToR letter (PDF only)  |   |        | Yes  |
| <b>7</b> | <b>Details of Public Consultation</b>   |   |        |  |
| a.       | Whether the Project Exempted from Public Hearing (Yes/No)?  |   |        | No   |
|          | If yes,   |   |        |  |
|          | Reason  |   |        |  |
| b.       | Supporting Document ( <i>upload pdf only</i> )  |   |        |  |
| c.       | Whether details of Public Hearing available (Yes/No)?   |   | :      | <b>Yes</b>   |
|          | If No,  |   |        |  |
| d.       | Reason thereof  |   |        |  |
|          | Supporting Document ( <i>upload pdf only</i> )  |   |        |  |
|          | If Yes,   |   |        |  |
| e.       | Date of Advertisement of Public Hearing   |   |        | 29.07.2021   |
| f.       | Copy of advertisement in English (Upload PDF only)  |   | :      | uploaded   |
| g.       | Whether Public hearing was presided over by an officer of the rank of Additional District Magistrate or above (Yes/No)?     |   | :      | Yes  |
|          | If yes  |   |        |  |
| h.       | Designation of Presiding Officer (District Magistrate / District Collector / Deputy Commissioner / others - please specify) |   |        | Chaired by Shri. Sadat Anwar, Additional Collector cum Deputy director (District Rural Development Agency) |
| i.       | Copy of duly signed Proceedings of Public Hearing in English ( <i>Upload pdf only</i> )                                     |   | :      | uploaded   |
| j.       | Date of Public Hearing  |   | :      | 31.08.2021   |
| k.       | Venue of Public Hearing:  |   | :      | At Officers Club, Kathara village, Bokaro Dist.  |
|          | Village   |   |        | Kathara  |
|          | Tehsil  |   |        | Bermo  |
|          | District  |   |        | Bokaro   |
|          | State   |   |        | Jharkhand  |
| l.       | Distance of Public Hearing Venue from the Proposed Project (km)   |   | :      | 5  |
| m.       | No. of people attended  |   | :      | 103  |

|           |  |   |           |                 |  |
|-----------|--|---|-----------|-----------------|--|
|           | n.   | If the multiple public hearings conducted   |           | NA              |  |
|           |  | Pl give the details of each PH as per (e) to (o) above  |           |                 |  |
| <b>8</b>  | <b>Details of Project Configuration / Product (Multiple Entries Allowed)</b>   |   |           |                 |  |
|           | a.   | Whether the project is New (Yes/No?)  |           | <b>No</b>       |  |
|           |  | If yes,   |           |                 |  |
|           | b.   | Project Configuration   |           |                 |  |
|           |  | Project Area  | 773.23 Ha |                 |  |
|           |  | Balance Life  | 12 Years  |                 |  |
|           |  | Mineable Reserves   | 22.16 MT  |                 |  |
|           |  | Capacity  | 1.90 MTA  |                 |  |
|           | c.   | Product   | :         |                 |  |
|           |  | Product / Activity<br>(Capacity / Area)   | Quantity  | Unit            | Mode of Transport /<br>Transmission of Product |
|           |  | Coal  | 1.9       | MTPA            | Road, Rail                                     |
|           |  | <ul style="list-style-type: none"> <li>- Unit:- (Tons per Annum(TPA), Mega Watt(MW), Hectares(ha), Kilo Litre per Day(KLD), Tons Crushed per Day(TCD), Cubic Meter per Day, Kilometers(Km), Million Liters per Day(MLD), Others)</li> <li>- Mode of Transport/Transmission of Product (Road, Rail, Conveyor Belt, Pipe Conveyor, Arial Ropeway, combination of two or three modes, Others)</li> </ul> |           |                 |  |
| <b>9</b>  | If Expansion / Modernisation / One Time Capacity expansion (only for Coal Mining) / Expansion under Clause 7(ii) / Modernisation under Clause 7(ii) / Change of Product Mix under Clause 7(ii))<br><b>Details not Applicable</b> |   |           |                 |  |
|           | 9.1  | <b>Details of Consent to Operate</b>  |           |                 |  |
|           | (i)  | Whether Consent to operate obtained (Yes/No)?   |           | Not Applicable  |  |
|           |  | If yes,   |           | <b>Enclosed</b> |  |
|           | (ii)   | Upload Copies of all Consent to operate obtained since inception ( <i>Upload pdf only</i> )   |           | Uploaded        |  |
|           | (iii)  | Date of issue   |           |                 |  |
|           | (iv)   | Valid up to   |           |                 |  |
|           | (v)  | File No.  |           |                 |  |
|           | (vi)   | Application No.   |           |                 |  |
|           | (vii)  | Upload Copy of Consent to operate valid as on date ( <i>Upload pdf only</i> )   |           |                 |  |
| <b>10</b> | <b>Project Cost</b>  |   |           |                 |  |
|           | a.   | Total Cost of the Project at current price level  | :         | 266.63 Crs      |  |
|           | b.   | Funds Allocated for Environment Management (Capital) (in Lakhs)   | :         | 38.3332 Crs     |  |
|           | c.   | Funds Allocated Towards CER ( Corporate Environment Responsibility) in Crores   | :         | 6.43 Crs.       |  |
|           | d.   | Funds Allocated for Environment Management (Recurring) (in Lakhs)   | :         | 1.98 Crs        |  |

|           |  |   |                    |            |  |                   |   |  |    |
|-----------|--|---|--------------------|------------|--|-------------------|---|--|----|
| <b>11</b> | <b>Whether project attracts the General Condition specified in the Schedule of EIA Notification (Yes/No)? [provide name of WL/CPA/ESA/Inter-state boundary / International boundary and distance from the project]</b> |   |                    |            |  |                   |   | :  | No |
|           | If Yes   |   |                    |            |  |                   |   |  |    |
|           | a.   | Protected Area Notified Under the Wild Life(Protection) Act,1972  |                    |            |  |                   | :   |  |    |
|           | b.   | Critically Polluted Areas as identified by the Central Pollution Control Board from Time to Time  |                    |            |  |                   | :   |  |    |
|           | c.   | Notified Eco-Sensitive Areas  |                    |            |  |                   | :   |  |    |
|           | d.   | Inter-State Boundaries and International Boundaries   |                    |            |  |                   | :   |  |    |
| <b>12</b> | <b>Whether projects attract the Specific Condition specified in the Schedule of EIA Notification (Yes/No)?</b>   |   |                    |            |  |                   |   | :  |    |
|           | If Yes   |   |                    |            |  |                   |   |  | No |
|           | a.   | If any Industrial Estate / Complex / Export processing Zones / Special Economic Zones / Biotech Parks / Leather Complex with homogeneous type of industries such as Items 4(d), 4(f), 5(e), 5(f), or those Industrial estates with pre-defined set of activities (not necessarily homogeneous, obtains prior environmental clearance, individual industries including proposed industrial housing within such estates / complexes will not be required to take prior environmental clearance, so long as the Terms and Conditions for the industrial estate/complex are complied with (Such estates/complexes must have a clearly identified management with the legal responsibility of ensuring adherence to the Terms and Conditions of prior environmental clearance, who may be held responsible for violation of the same throughout the life of the complex/estate |                    |            |  |                   |   |  |    |
| <b>13</b> | <b>Raw Material / Fuel Requirement (Multiple Entries Allowed)</b>  |   |                    |            |  |                   |   |  |    |
|           | a.   | Details of Raw Material / Fuel Requirement  |                    |            |  |                   |   |  |    |
|           |  | Raw Material / Fuel   | Quantity per Annum | Unit       | Source (in case of Import, please specify country and Name of the port from which Raw Material / Fuel is received) | Mode of Transport | Distance of Source from Project Site (in Kilo meters) (In case of import, distance from the port from which the raw material / fuel is received | Type of Linkage (Linkage / Fuel Supply Agreement / e-auction / MoU / LOA / Captive / Open market / Others) |    |
|           |  | Explosives  | 2832               | Tons/Annum | IDL & IOCL   | Road              | 5   | MoU  |    |
|           |  | HSD   | 8.5                | KLD        | IOCL   | Road              | 5   | MoU  |    |

|           |  |   |                              |                                     |                                    |                             |                          |
|-----------|--|---|------------------------------|-------------------------------------|------------------------------------|-----------------------------|--------------------------|
|           |  |   |                              |                                     |                                    |                             |                          |
|           | <p>In case of expansion proposals, total requirement of raw material / fuel shall be given</p> <ul style="list-style-type: none"> <li>- Unit:- (Tons per Annum(TPA), Mega Watt(MW), Hectares(ha), Kilo Litre per Day(KLD), Tons Crushed per Day(TCD), Cubic Meter per Day, Kilometers(Km), Million Liters per Day(MLD), Others)</li> <li>- Mode of Transport/Transmission of Product (Road, Rail, Conveyor Belt, Pipe Conveyor, Arial Ropeway, combination of two or three modes, Others)</li> </ul> |   |                              |                                     |                                    |                             |                          |
|           | b.   | Upload copy of Linkage / Fuel Supply Agreement / e-auction / Memorandum of Understanding / Letter of Allocation / Captive source / others.  | :                            | Enclosed                            |                                    |                             |                          |
| <b>14</b> | <b>Baseline Data (Air / Water / Noise / Soil / Ground water table/ Others)</b>   |   |                              |                                     |                                    |                             |                          |
|           | a.   | Period of Base Line Data Collection   |                              |                                     |                                    |                             |                          |
|           |  | From (DD/MM/YYYY)   | :                            | 01.10.2020                          |                                    |                             |                          |
|           |  | To (DD/MM/YYYY)   | :                            | 24.12.2020                          |                                    |                             |                          |
|           | b.   | Season (Summer / Pre-monsoon / Post-monsoon / Winter)   | :                            | Post Monsoon                        |                                    |                             |                          |
|           | c.   | No. of Ambient Air Quality (AAQ) Monitoring Locations   | :                            | 11 Stations                         |                                    |                             |                          |
|           | d.   | Details of AAQ Monitoring ( <i>Multiple Entries Allowed</i> )   |                              |                                     |                                    |                             |                          |
|           |  |   |                              |                                     |                                    |                             |                          |
|           |  | Criteria Pollutants   | Unit                         | Maximum Value                       | Minimum Value                      | 98 % Value                  | Prescribed Standard      |
|           |  | PM10  | ( $\mu\text{g}/\text{m}^3$ ) | 96.8                                | 48.7                               | 96.1                        | 300                      |
|           |  | PM2.5   | ( $\mu\text{g}/\text{m}^3$ ) | 54                                  | 16.1                               | 46.90                       | 60                       |
|           |  | Sox   | ( $\mu\text{g}/\text{m}^3$ ) | 25.2                                | 5                                  | 18.9                        | 120                      |
|           |  | NOx   | ( $\mu\text{g}/\text{m}^3$ ) | 33.1                                | 5                                  | 26.4                        | 120                      |
|           |  | <ul style="list-style-type: none"> <li>- Criteria Pollutants: - (PM10, PM2.5, SO2, NOx, Others parameters specific to sector)</li> <li>- Unit: - (Micro Gram per Meter Cube, Nano Gram per Meter Cube, Mili Gram per Meter Cube, NA)</li> </ul> |                              |                                     |                                    |                             |                          |
|           | e.   | No. of Ground Water Monitoring Locations ( <i>Multiple Entries Allowed</i> )  | :                            | 2                                   |                                    |                             |                          |
|           | f.   | Details of Ground Water Monitoring :  |                              |                                     |                                    |                             |                          |
|           |  |   |                              |                                     |                                    |                             |                          |
|           |  | <b>Parameter</b>  | <b>Unit</b>                  | <b>Locations</b>                    |                                    | <b>As per IS 10500:2012</b> |                          |
|           |  |   |                              | <b>DW1- Borewell at Bandh Basti</b> | <b>DW2- Well at Khetko Village</b> | <b>Acceptable Limit</b>     | <b>Permissible Limit</b> |
|           |  | pH  | --                           | 7.13                                | 7.18                               | 6.8-8.5                     | No relaxation            |
|           |  | Temperature   | °C                           | 24.3                                | 26.0                               | -                           | -                        |
|           |  | Turbidity   | NTU                          | BQL(QL=0.1)                         | BQL(QL=0.1)                        | 1                           | 5                        |
|           |  | T.S.S   | mg/L                         | BQL(QL=5)                           | BQL(QL=5)                          | -                           | -                        |
|           |  | T.D.S   | mg/L                         | 528.0                               | 323.7                              | 500                         | 2000                     |
|           |  | Chloride  | mg/L                         | 44.0                                | 24.0                               | 250                         | 1000                     |

|                                     |            |               |               |        |               |
|-------------------------------------|------------|---------------|---------------|--------|---------------|
| Residual Chlorine                   | mg/L       | BQL(QL=0.05)  | BQL(QL=0.05)  | 0.2    | 1             |
| Fluoride                            | mg/L       | 0.85          | 0.49          | 1      | 1.5           |
| Sulphate                            | mg/L       | 102.3         | 73.9          | 200    | 400           |
| Nitrate                             | mg/L       | 1.7           | 11.2          | 45     | No relaxation |
| Alkanity as CaCO <sub>3</sub>       | mg/L       | 300.0         | 144.0         | 200    | 600           |
| Total Hardness as CaCO <sub>3</sub> | mg/L       | 370.0         | 188.0         | 200    | 600           |
| Calcium as Ca                       | mg/L       | 92.2          | 57.7          | 75     | 200           |
| Aluminium (as Al)                   | mg/L       | BQL(QL=0.002) | 0.029         | 0.03   | 0.2           |
| Iron (as Fe)                        | mg/L       | 0.97          | BQL(QL=0.05)  | 0.3    | No relaxation |
| Zinc (as Zn)                        | mg/L       | 0.20          | BQL(QL=0.02)  | 5      | 15            |
| Lead (as Pb)                        | mg/L       | BQL(QL=0.005) | BQL(QL=0.005) | 0.01   | No relaxation |
| Copper (as Cu)                      | mg/L       | BQL(QL=0.02)  | BQL(QL=0.02)  | 0.05   | 1.5           |
| Arsenic (as As)                     | mg/L       | BQL(QL=0.005) | BQL(QL=0.005) | 0.01   | 0.05          |
| Total Coliform                      | MPN/100 ml | Absent        | Absent        | Absent | Absent        |
| Faecal Coliform                     | MPN/100 ml | Absent        | Absent        | Absent | Absent        |

Criteria Pollutants: - (pH, TSS, TDS, Total Hardness, Chlorides, Fluoride, Heavy Metals, other parameters specific to the sector)

-

|    |   |   |                   |
|----|---|---|-------------------|
| g. | No. of Surface Water Monitoring Locations                               | : | <b>2 Stations</b> |
| h. | Details of Surface Water Monitoring ( <i>Multiple Entries Allowed</i> ) |   |                   |

| Parameter   | Unit | Locations               |                         |
|-------------|------|-------------------------|-------------------------|
|             |      | SW1 - Damodar River U/S | SW2 - Damodar River D/S |
| pH          | --   | 7.40                    | 7.46                    |
| Temperature | °C   | 26.2                    | 26.2                    |
| B.O.D       | mg/L | BQL(QL=2)               | 2.0                     |
| C.O.D       | mg/L | BQL(QL=5)               | 10                      |
| D.O.        | mg/L | 7.6                     | 6.6                     |
| T.S.S       | mg/L | 11.0                    | 19.0                    |
| T.D.S       | mg/L | 202.4                   | 246.8                   |

|                                     |            |               |               |
|-------------------------------------|------------|---------------|---------------|
| Chloride                            | mg/L       | 30.0          | 30.0          |
| Fluoride                            | mg/L       | 0.88          | 0.98          |
| Sulphate                            | mg/L       | 63.9          | 76.9          |
| Nitrate                             | mg/L       | 4.3           | 5.3           |
| Total Hardness as CaCO <sub>3</sub> | mg/L       | 112.0         | 140.0         |
| Calcium as Ca                       | mg/L       | 28.9          | 27.3          |
| Iron (as Fe)                        | mg/L       | BQL(QL=0.05)  | BQL(QL=0.05)  |
| Zinc (as Zn)                        | mg/L       | BQL(QL=0.02)  | BQL(QL=0.02)  |
| Lead (as Pb)                        | mg/L       | BQL(QL=0.005) | BQL(QL=0.005) |
| Oil & Grease                        | mg/L       | BQL(QL=1)     | BQL(QL=1)     |
| Phenolic Compounds                  | mg/L       | BQL(QL=0.001) | BQL(QL=0.001) |
| Total Coliform                      | MPN/100 ml | 30            | 42            |
| Faecal Coliform                     | MPN/100 ml | Absent        | 16            |

- Parameter :- (pH, DO, BOD, COD, Others parameters specific to the sector)
- Unit :- (mg/l, NA)

|    |   |   |           |
|----|---|---|-----------|
| i. | No. of Ambient Noise Monitoring Locations | : | <b>11</b> |
|----|---|---|-----------|

|    |   |  |  |
|----|---|--|--|
| j. | Details of Noise Monitoring ( <i>Multiple Entries Allowed</i> ) |  |  |
|----|---|--|--|

| Sl.No.           | Parameter   | Location  | Noise Level Day Time (Leq) |      |                   | Noise Level Night Time (Leq) |      |                   |
|------------------|-------------|-----------|----------------------------|------|-------------------|------------------------------|------|-------------------|
|                  |             |           | Max                        | Min  | Permissible Limit | Max                          | Min  | Permissible Limit |
| <b>Core Zone</b> |             |           |                            |      |                   |                              |      |                   |
| N1               | Workshop    | Core Zone | 74.3                       | 65.8 | 75                | 62.7                         | 50.4 | 70                |
| N2               | CPP Complex | Core Zone | 54.2                       | 45.7 | 55                | 42.2                         | 35.9 | 45                |

|             |                     |           |      |      |    |      |      |    |
|-------------|---------------------|-----------|------|------|----|------|------|----|
| N3          | Kathara Sub-Station | Core Zone | 73.5 | 66.9 | 75 | 60.0 | 50.2 | 70 |
| Buffer Zone |                     |           |      |      |    |      |      |    |
| N4          | Saram Village       | Upwind    | 53.3 | 43.0 | 55 | 43.4 | 33.9 | 45 |
| N5          | Bandh Basti         | Crosswind | 52.9 | 45.3 | 55 | 42.2 | 36.2 | 45 |
| N6          | Govindpur Colony    | Crosswind | 53.7 | 45.5 | 55 | 44.4 | 37.8 | 45 |
| N7          | GM Office           | Downwind  | 54.7 | 43.5 | 65 | 44.8 | 32.3 | 55 |
| N8          | Khetko Village      | Downwind  | 53.7 | 42.5 | 55 | 43.0 | 40.1 | 45 |
| N9          | Jaridih Basti       | Downwind  | 54.0 | 45.5 | 55 | 43.5 | 36.8 | 45 |
| N10         | Chalkari Basti      | Downwind  | 53.6 | 50.4 | 55 | 43.0 | 38.4 | 45 |
| N11         | Phusro Village      | Downwind  | 54.6 | 50.8 | 55 | 42.3 | 37.7 | 45 |

- Parameter:- (Leq(Day), Leq(Night))
- Unit :- (A-weighted decibels(dB(A)))

|    |   |   |            |
|----|---|---|------------|
| k. | No. of Soil Monitoring Locations (Multiple Entries Allowed) | : | 3 Stations |
|----|---|---|------------|

| Parameter             | Unit            | Maximum Value | Minimum Value |
|-----------------------|-----------------|---------------|---------------|
| pH                    |                 | 7.25          | 6.20          |
| Nitrogen              | kg/ha           | 520.8         | 145.60        |
| Phosphorus            | kg/ha           | 14.6          | 7.20          |
| Potassium             | kg/ha           | 263.80        | 171.50        |
| Electric Conductivity | Millisiemens/cm | 0.51          | 0.35          |
|                       |                 |               |               |

|           |  |  |                           |                                     |   |   |                        |                                    |  |
|-----------|--|--|---------------------------|-------------------------------------|---|---|------------------------|------------------------------------|--|
|           | Parameter :- (pH, N(Nitrogen), P(Phosphorus), K(Potassium), Electric Conductivity)<br>- Unit :- (Millisiemens per Centimeter, Milligram per Litre, Percent, Centimeter per Second, Milliequivalents per 100 Gram, Milligram per Kilogram, Parts per Million, Kilogram per hectare, Others) |  |                           |                                     |   |   |                        |                                    |  |
|           | <b>1 Ground Water Table</b>  |  |                           |                                     |   |   |                        |                                    |  |
|           | i Range of Water Table Pre-Monsoon Season (Meters Below Ground Level (m bgl)):   |  |                           |                                     |   |   |                        |                                    |  |
|           | From   |  | :                         | 2.40                                |   |   |                        |                                    |  |
|           | To   |  | :                         | 12.60                               |   |   |                        |                                    |  |
|           | ii Range of Water Table Post-Monsoon Season (Meters Below Ground Level (m bgl)):   |  |                           |                                     |   |   |                        |                                    |  |
|           | From   |  | :                         | 1.28                                |   |   |                        |                                    |  |
|           | To   |  | :                         | 10.05                               |   |   |                        |                                    |  |
|           | iii Whether Ground Water Intersection will be there (Yes / No)?  |  |                           |                                     |   |   |                        |                                    |  |
|           | If Yes,  |  |                           |                                     |   |   |                        |                                    |  |
|           | (i) Upload Copy of Central Ground Water Authority Letter<br>(Upload pdf only)  |  | :                         | Application Made                    |   |   |                        |                                    |  |
|           | (ii) Letter No.  |  | :                         | 21-4/837/JH/MIN/2022 Dt. 27.03.2022 |   |   |                        |                                    |  |
|           | (iii) Date of issue  |  | :                         |                                     |   |   |                        |                                    |  |
| <b>15</b> | <b>Details of Water Requirement (During Operation) (Multiple Entries Allowed)</b>  |  |                           |                                     |   |   |                        |                                    |  |
|           | S.No   | Source                                   | Reqd. Qty in m3/day       | Distance from Source in km          | Copy of Permission from Competent Authority | Mode of Transport                           | Method of Withdrawl    | Letter no                          |  |
|           | 1  | Mine Discharge                           | 470                       | 0                                   |   | Pipeline                                    | Mine Pump              | 21-4/837/JH/MIN/2022 Dt. 27.3.2022 |  |
|           | 2  | Konar River                              | 2400                      | 0.5                                 |   | Pipeline                                    | Intake well            | DVC                                |  |
|           | a.   | Details                                  |                           |                                     |   |   |                        |                                    |  |
|           | <ul style="list-style-type: none"> <li>- Source: Surface / Ground Water / Sea / Others</li> <li>- Mode of Transportation: Pipeline / Canal / Others</li> <li>- Method of water withdrawal: Barrage / Weir / Intake well / Jackwell / Tube well / Open well / Others</li> </ul>             |  |                           |                                     |   |   |                        |                                    |  |
| <b>16</b> | <b>Waste Water Management (During Operation)</b>   |  |                           |                                     |   |   |                        |                                    |  |
|           | Type / Source  | Quantity of Waste Water Generated (m3/d) | Treatment Capacity (m3/d) | Treatment Method                    | Mode of Disposal                            | Quantity of Treated Water Used in Recycling | Quantity of Discharged |                                    |  |

|           |  |                              |                    |   |                   |                                  |           |          |
|-----------|--|------------------------------|--------------------|---|-------------------|----------------------------------|-----------|----------|
|           |  |                              |                    |   |                   | / Reuse<br>(m3/d)                |           |          |
|           | Industrial   | 200                          | 250                | Oil & Grease and sequential settling ponds                          | -                 | 150<br>(Considering 20% losses)  | Nil       |          |
|           | Domestic   | 1856                         | 2400<br>(Proposed) | STP with Sedimentation, Biological treatment( ASP) and disinfection | -                 | 1485<br>(Considering 20% losses) | Nil       |          |
|           | a.   | Total Waste Water Generation |                    |   | :                 | 2056 KLD                         |           |          |
|           | b.   | Total Discharged Water       |                    |   | :                 | 0 KLD                            |           |          |
|           | c.   | Total Reused Water           |                    |   | :                 | 1635 KLD                         |           |          |
| <b>17</b> | <b>Solid Waste Generation Management (Multiple Entries Allowed)</b>  |                              |                    |   |                   |                                  |           |          |
|           | Item   | Quantity per Annum           | Unit               | Distance from Site  | Mode of Transport | Mode of Disposal                 |           |          |
|           | OB   | 6550000                      | Tons               | 0   | Road              | Internal Dumping                 |           |          |
|           | MSW  | 485                          | Tons               | 0   | Roads             | Landfills                        |           |          |
|           | Oil & Grease   | 4.75                         | Tons               | 0   | Roads             | Authorized Recyclers             |           |          |
|           | <ul style="list-style-type: none"> <li>- Item:- (Industrial waste, Municipal Solid waste, Fly ash, Bottom Ash, Hazardous Waste (as per Hazardous and Other Waste Management Rules 2016), E Waste, Bio-Medical waste, Construction &amp; Demolition waste, Plastic Waste, Others)</li> <li>- Unit:- (Tons, Kiloliter)</li> <li>- Mode of Disposal:- (Treatment, Storage and Disposal Facility(TSDF), Authorized Re-cyclers, Landfills, Sanitary Landfills, Others)</li> </ul> |                              |                    |   |                   |                                  |           |          |
| <b>18</b> | <b>Air Quality Impact Prediction (Multiple Entries Allowed)</b>  |                              |                    |   |                   |                                  |           |          |
|           | S.No   | Criteria Pollutant           | Unit               | Baseline Conc.  | Distance GLC      | Incremental Conc.                | Total GLC | Standard |
|           | 1  | PM <sub>10</sub>             | (µg/ m3)           | 96.10   | 0                 | 15.50                            | 111.60    | 300      |
|           | 2  | PM <sub>2.5</sub>            | (µg/ m3)           | 41.60   | 1.82              | 0.47                             | 42.07     | 60       |
|           | 3  | Sox                          | (µg/ m3)           | 32.30   | 0                 | 26.98                            | 59.28     | 120      |
|           | 4  | NOx                          | (µg/ m3)           | 25.20   | 0                 | 2.34                             | 27.54     | 120      |
|           | <ul style="list-style-type: none"> <li>- Parameter:- (PM<sub>10</sub>, PM, SO<sub>2</sub>, NO<sub>x</sub>, Others parameters specific to the sector)</li> <li>- Unit :- (Microgram per Meter Cube, NA)</li> </ul>  |                              |                    |   |                   |                                  |           |          |
| <b>19</b> | <b>Power Requirement</b>   |                              |                    |   |                   |                                  |           |          |

|   | a.  | Quantity (MwH)                                      | :           | 134257.14         |        |        |                  |        |                                  |       |   |       |                     |        |  |  |
|---|---|---|-------------|-------------------|--------|--------|------------------|--------|----------------------------------|-------|---|-------|---------------------|--------|--|--|
|   | b.  | Source  | :           | DVC               |        |        |                  |        |                                  |       |   |       |                     |        |  |  |
|   | c.  | Upload Copy of Agreement ( <i>Upload pdf only</i> ) | :           |                   |        |        |                  |        |                                  |       |   |       |                     |        |  |  |
|   | d.  | Standby Arrangement (Details of DG Sets)            | :           | nil               |        |        |                  |        |                                  |       |   |       |                     |        |  |  |
|   | e.  | Stack Height (in m)                                 | :           | nil               |        |        |                  |        |                                  |       |   |       |                     |        |  |  |
| <b>20</b>   | <b>Land Ownership Pattern (Prior to the project proposal) in Ha</b>   |   |             |                   |        |        |                  |        |                                  |       |   |       |                     |        |  |  |
|   | a.  | Forest land   | :           | 0                 |        |        |                  |        |                                  |       |   |       |                     |        |  |  |
|   | b.  | Private Land  | :           | 320.33 Ha.        |        |        |                  |        |                                  |       |   |       |                     |        |  |  |
|   | c.  | Government Land                                     | :           | 452.90 Ha.        |        |        |                  |        |                                  |       |   |       |                     |        |  |  |
|   | d.  | Revenue Land  | :           | 0                 |        |        |                  |        |                                  |       |   |       |                     |        |  |  |
|   | e.  | Other Land  | :           |                   |        |        |                  |        |                                  |       |   |       |                     |        |  |  |
|   |   | Total land  |             | 773.23 Ha.        |        |        |                  |        |                                  |       |   |       |                     |        |  |  |
| <b>21</b>   | <b>Present Land Use breakup in Ha ( As per Remote Sensing Study)</b>  |   |             |                   |        |        |                  |        |                                  |       |   |       |                     |        |  |  |
|   | a.  | Agriculture Area                                    | :           | 67.00 Ha          |        |        |                  |        |                                  |       |   |       |                     |        |  |  |
|   | b.  | Waste/Barren Area                                   | :           | 59.00 Ha          |        |        |                  |        |                                  |       |   |       |                     |        |  |  |
|   | c.  | Grazing / Community Area                            | :           | 0                 |        |        |                  |        |                                  |       |   |       |                     |        |  |  |
|   | d.  | Surface Water bodies                                | :           | 5.00              |        |        |                  |        |                                  |       |   |       |                     |        |  |  |
|   | e.  | Homestead land                                      |             | 69.00             |        |        |                  |        |                                  |       |   |       |                     |        |  |  |
|   | f.  | Industrial (including service building/mine infra.) |             | 308.23            |        |        |                  |        |                                  |       |   |       |                     |        |  |  |
|   | g.  | Forest  | :           | 0                 |        |        |                  |        |                                  |       |   |       |                     |        |  |  |
|   | h.  | Scrubs  | :           | 53 Ha.            |        |        |                  |        |                                  |       |   |       |                     |        |  |  |
|   | i.  | Marine area   |             |                   |        |        |                  |        |                                  |       |   |       |                     |        |  |  |
|   | j.  | Others (Specify) Plantation Area                    | :           | 212 Ha            |        |        |                  |        |                                  |       |   |       |                     |        |  |  |
|   |   | Total   | :           | <b>773.23 Ha</b>  |        |        |                  |        |                                  |       |   |       |                     |        |  |  |
| <b>22</b>   | <b>Land requirement for various activities (Multiple entries allowed) in Ha</b>   |   |             |                   |        |        |                  |        |                                  |       |   |       |                     |        |  |  |
|   | <table border="1"> <thead> <tr> <th>Description</th> <th>Total Area in Ha.</th> </tr> </thead> <tbody> <tr> <td>Quarry</td> <td>258.46</td> </tr> <tr> <td>External OB Dump</td> <td>109.53</td> </tr> <tr> <td>Reclaimed OB Dump and Embankment</td> <td>74.09</td> </tr> <tr> <td>Industrial Area (W/S, S/S, Haul Road, Office etc)</td> <td>64.54</td> </tr> <tr> <td>Colony &amp; Settlement</td> <td>122.87</td> </tr> </tbody> </table> |   | Description | Total Area in Ha. | Quarry | 258.46 | External OB Dump | 109.53 | Reclaimed OB Dump and Embankment | 74.09 | Industrial Area (W/S, S/S, Haul Road, Office etc) | 64.54 | Colony & Settlement | 122.87 |  |  |
| Description                                       | Total Area in Ha.   |   |             |                   |        |        |                  |        |                                  |       |   |       |                     |        |  |  |
| Quarry  | 258.46  |   |             |                   |        |        |                  |        |                                  |       |   |       |                     |        |  |  |
| External OB Dump                                  | 109.53  |   |             |                   |        |        |                  |        |                                  |       |   |       |                     |        |  |  |
| Reclaimed OB Dump and Embankment                  | 74.09   |   |             |                   |        |        |                  |        |                                  |       |   |       |                     |        |  |  |
| Industrial Area (W/S, S/S, Haul Road, Office etc) | 64.54   |   |             |                   |        |        |                  |        |                                  |       |   |       |                     |        |  |  |
| Colony & Settlement                               | 122.87  |   |             |                   |        |        |                  |        |                                  |       |   |       |                     |        |  |  |

|  |                          |               |
|--|--------------------------|---------------|
|  | Safety Zone / Green belt | 45            |
|  | Vacant Land              | 98.74         |
|  | <b>Total</b>             | <b>773.23</b> |

- Activity / Facility / Plant / Others include: Main Plant, Township, Greenbelt, Ash pond, Quarry area, OB dump Area, Safety zone, Tailing pond, Landfill, Water reservoir, De-salination plant, Area for solid waste management, Built-up area, others

|           |   |             |                                |  |
|-----------|---|-------------|--------------------------------|--|
| <b>23</b> | <b>Ecological and Environmental Sensitivity (Within 10 Km):- <u>WLS-Wild Life Species; NPA-Notified Protected Area; ESAs-Eco Sensitive Areas; ESZs- Eco Sensitive Zones</u></b> |             |                                |  |
| a.        | Details of Ecological Sensitivity   |             |                                |  |
|           | Details of Ecological Sensitivity   | Name        | Distance from the Project (Km) | Remarks  |
|           | Wildlife corridors  | NA          | 0                              | No Such Area is located within 10km of the project         |
|           | WLS   | NA          | 0                              | No Such Area is located within 10km of the project         |
|           | Critically Polluted Area  | NA          | 0                              | No Such Area is located within 10km of the project         |
|           | NPA   | NA          | 0                              | No Such Area is located within 10km of the project         |
|           | ESZs  | NA          | 0                              | No Such Area is located within 10km of the project         |
|           | ESAs  | NA          | 0                              | No Such Area is located within 10km of the project         |
|           | Corridors   | NA          | 0                              | No Such Area is located within 10km of the project         |
| c.        | Details of Environmental Sensitivity  |             |                                |  |
|           | Details of Environmental Sensitivity  | Name        | Distance from the Project (Km) | Remarks  |
|           | Forest  | Barugora PF | 20                             | No forest in core zone of the project                      |
|           | Archeological Sites   | NA          |                                | NO Such area is located within 10km buffer of project area |
|           | Defence Installation  | NA          |                                |  |

|  |  |   |   |   |
|--|--|---|---|---|
|  | Others   | Tenughat Dam  | 5 | Tenughat dam is located in approx.. 5 km areal distance from the project  |
| - Details of Environmental Sensitivity:- (Forest, Archaeological Sites, Defence Installations, Others) |  |   |   |   |
|  | d.   | Whether NoC / Permission from the competent authority is required (Yes/No)?   |   | No  |
|  |  | If yes  |   |   |
|  |  | Upload NoC / Permission from the competent authority in PDF                   |   | NO  |
| <b>24</b>  | <b>Forest Land</b>   |   |   |   |
|  | 1  | Whether any Forest Land involved (Yes/No)?                                    |   | NO  |
| <b>25</b>  | <b>Tree Cutting, if any</b>                                      |   |   |   |
|  | a.   | No. of Trees Cut for the Project (if Forestland not involved)                 | : | 0   |
|  | b.   | Details of Tree Cutting and Planting of Trees ( <i>Upload pdf Only</i> )      | : | NA  |
| <b>26</b>  | <b>Land Acquisition Status</b>                                   |   |   |   |
|  | a.   | Acquired Land   |   | 773.23 Ha   |
|  | b.   | Land yet to be acquired   |   | 0   |
|  | c.   | Status of Land acquisition if not acquired                                    |   | Completed   |
| <b>27</b>  | <b>Rehabilitation and Resettlement (R&amp;R)</b>                 |   |   |   |
|  | a.   | No. of Villages   |   | NA  |
|  | b.   | No. of Households   |   |   |
|  | c.   | No. of PDFs (Project Displaced Families)                                      |   |   |
|  | d.   | No. of PAFs (Project Affected Families)                                       |   |   |
|  | e.   | Funds Allocated for R&R   |   |   |
|  | f.   | Status of R&R (Completed / In-progress / Yet to start)                        |   |   |
| <b>28</b>  | <b>Whether there is Presence of Schedule-I Species (Yes/No)?</b> |   |   |   |
|  |  | If yes,   |   | Yes   |
|  | a.   | Details of Schedule-I Species   | : | According to Flora and Fauna Study Carried out, Python, monitor Lizard and Peafowl have been observed in core and buffer zone |
|  | b.   | Whether conservation plan for Schedule-I Species has been prepared (Yes/ No)? | : | Yes   |
|  |  | If Yes,   |   |   |
|  |  | (i) Upload conservation plan (Upload only PDF)                                |   | Uploaded  |

|           |  |   |   |
|-----------|--|---|---|
|           | (ii) Fund Provision made   |   | Capital Cost: 15 Lakhs;<br>Revenue Cost: 19 Lakh/year   |
|           | (iii) Period of Implementation   |   | 12 Years (Balance year)   |
| c.        | Whether conservation plan for Schedule-I Species has been approved by competent authority (Yes/ No)?                       |   | No  |
|           | (i) Upload copy of approval (Upload PDF Only)  | : |   |
|           | (ii) Letter No.  | : |   |
|           | (iii) Date of issue  | : |   |
|           | (iv) Recommendations if any  | : |   |
| <b>29</b> | <b>Whether there is Presence of Water Bodies in Core Area (Yes/No)?</b>  | : |   |
|           | If yes,  |   | No  |
| a.        | Details of Water Bodies in Core Area   | : | No  |
| b.        | Whether there is Diversion required (Yes/No)?  |   | No  |
|           | If yes,  |   |   |
| c.        | Details of diversion required  |   |   |
| d.        | Details of study conducted   |   |   |
| e.        | Whether permission has been obtained from competent authority (Yes/No)?  |   | No  |
| <b>30</b> | <b>Whether there is Presence of Water Bodies in Buffer Area (Yes/No)?</b>  | : |   |
|           | If Yes   |   | Yes   |
| a.        | Details of Water Bodies in Buffer Area   | : | The general surface slopes towards the Damodar River, the master drainage in the area. The drainage of the area is controlled by Damodar River, Bokaro River and Konar River. Bokaro river and Konar river which flows from north-west to south-east and joins in Damodar River. Damodar River located south of the project flowing towards east. |
| b.        | Direction of Water Bodies in Buffer Area (North / South / East / West / North East / North West / South East / South West) | : | South   |
| c.        | Distance of Water Bodies in Buffer Area (kilo meters)  |   | 100 m   |
| <b>31</b> | <b>Manpower Requirement</b>  |   |   |
| a.        | Permanent employment during construction   | : |   |

|           |   |  |   |                          |
|-----------|---|--|---|--------------------------|
|           | b.  | Permanent employment during operation  | :   | 750                      |
|           | c.  | Temporary employment during construction   | :   |                          |
|           | d.  | Temporary employment during operation  | :   |                          |
|           | e.  | No. of working days  | :   | 330                      |
|           | f.  | Total manpower   | :   | 750                      |
| <b>32</b> | <b>Green Belt in Ha</b>   |  |   |                          |
|           | i.  | Total Area of Green Belt   |   | 45                       |
|           | ii.   | Percentage of Total Project Area   | :   | 5.82                     |
|           | iii.  | No. of Plants to be Planted  | :   | 112500                   |
|           | iv.   | Funds Allocated for Plantation   | :   | 75000000                 |
|           | v   | Upload Green Belt Plan (Upload PDF Only)   |   |                          |
|           | ii.   | Upload Green Belt Plan (Upload PDF Only)   |   | Enclosed                 |
| <b>33</b> | <b>Project Benefit (Multiple entry allowed)</b>                                       |  |   |                          |
|           | Type of Project Benefits  |  | Details of Project Benefit  |                          |
|           | Social  |  | Socioeconomic benefits of the Project will accrue through direct and indirect employment to local population.                           |                          |
|           | Environmental   |  | Reclamation activities will be carried out throughout the life of mine and post closure as per progressive and final mine closure plan. |                          |
|           | Financial   |  | Contribution to exchequer   |                          |
|           | (Project benefits shall include environmental, social and others)                     |  |   |                          |
| <b>34</b> | <b>Whether the Project / Activity attracts the provisions of CRZ (Yes/No)?</b>        |  |   | <b>No</b>                |
| <b>35</b> | <b>Sector Specific Details</b>  |  |   |                          |
| <b>I</b>  | <b>Whether the proposal is mining of minerals (coal / non-coal) project (Yes/No)?</b> |  |   | <b>Yes (Coal)</b>        |
|           |   | If yes,  |   |                          |
|           | 1   | No. of Mineral to be Mined (Multiple Entries Allowed)  | :   | 1                        |
|           | 2   | Mine Capacity in ROM (Run of Mine)   |   | <b>1.90 MTPA</b>         |
|           | 3   | Upload 500 meters Cluster Certificate from State Mines and Geology in case of minor minerals (Upload pdf Only) |   | NA                       |
|           | 4   | <b>Mining Plan</b>   |   |                          |
|           | a.  | Approval Letter No.  |   | CS/BM/485/2020/014       |
|           | b.  | Date of Approval   |   | 05.05.2020               |
|           | c.  | Upload Approved Letter ( <i>Upload pdf only</i> )  |   | Enclosed                 |
|           | d.  | Approved by State Mines & Geology Department / Indian Bureau of Mines / Ministry of Coal /                     |   | Board of Directors, CCL. |

|   |   |   |                   |  |
|---|---|---|-------------------|--|
|   |   | Ministry of Mines / State Government / Atomic Mineral Directorate / Others)                                 |                   |  |
|   | f.  | Approved Mining Lease Area  |                   | <b>773.23 Ha</b>   |
|   | g.  | Approved Capacity   |                   | 1.90 MTPA  |
| 5 | <b>Technical Details</b>  |   |                   |  |
|   | a.  | Total Geological Reserves (Million Ton)   |                   | 185 Mte  |
|   | b.  | Mineable Reserves (Million Ton)   |                   | 22.16  |
|   | c.  | Extractable Reserves (Million Ton)  |                   | 22.16  |
|   | d.  | Percent of Extraction (%)   |                   | 100 %  |
|   | e.  | Grade of Coal /Ore /Mineral   |                   | Washery Grade-III  |
|   | f.  | Stripping Ratio   |                   | 3.45   |
|   | g.  | Category of Gaseousness (Only for Coal Mining, Others may write Not applicable)                             |                   | NA   |
|   | h.  | Average Gradient(Degree)  |                   | 12 to 25   |
|   | i.  | Mining Method (Opencast / Underground / Mixed (Opencast + Underground) / Adit                               |                   | Opencast   |
|   | j.  | Life of Mine (Years)  |                   | 12 Years   |
| 6 | <b>Details of beneficiation (including crushing / screening/others)</b> |   |                   |  |
|   | a.  | Whether it is proposed to install crusher within the mining lease area (Yes/No)?                            |                   | No   |
|   |   | If yes,   |                   |  |
|   | b.  | No. of crushers   |                   |  |
|   | c.  | Details of crusher (Multiple entries allowed)   |                   |  |
|   |   | Crusher ID  | Capacity (in TPH) | Remarks  |
|   |   |   |                   |  |
|   |   |   |                   |  |
|   |   |   |                   |  |
|   | d.  | Whether it is proposed to install beneficiation plant / Coal washery within the mining lease area (Yes/No)? |                   |  |
|   |   | If yes,   |                   |  |
|   | e.  | Beneficiation / washing Technology  |                   |  |
|   | f.  | Capacity  |                   |  |
| 7 | <b>Details of Seams if applicable</b>                                   |   |                   |  |
|   | a.  | No. of seams  |                   | 5 (Kathara, Uchidih, Uchidih A, Kargali Top, Kargali Bottom/ Comb) |
|   | b.  | Thickness of seams to be worked on  |                   | 1 to 34 m.   |
|   | c.  | Maximum Thickness of Seams(meters) (if not Applicable, may Write NA)  |                   | 34 m   |

|    |  |   |                            |
|----|--|---|----------------------------|
| 8  | <b>Details of Mining Lease</b>                                       |   |                            |
|    | a.   | Details of Mining Lease   | Land acquired under CB Act |
|    | b.   | Upload Letter of Intent (Upload pdf only)   | No                         |
|    | c.   | Date of Execution of Mining Lease with Reference Number   |                            |
|    | d.   | Validity of Mining Lease  |                            |
|    | e.   | Upload Copy of Executed Lease deed valid as on Date (Upload pdf only)   |                            |
|    | f.   | Earlier Renewals (Multiple Entries Allowed)   |                            |
|    |  | Uploaded Copy of Earlier Lease  | Date of Renewal            |
|    |  |   |                            |
|    |  |   |                            |
| 9  | <b>OB (Over Burden) Management (Only if Mining Method: Opencast)</b> |   |                            |
|    | a.   | <b>Details of External Dumps</b>  |                            |
|    |  | i) No. of OB Dumps  | 01                         |
|    |  | ii) Total Area (in Hectare)   | 109.53 Ha                  |
|    |  | iii) Height (in meter)  | 90 m above G.L             |
|    |  | iv) Quantity (in Million Cubic meter)   | 12                         |
|    |  | v) No. of year back fill up   | NA                         |
|    | b.   | <b>Details of Internal Dump</b>   |                            |
|    |  | i) No. of Internal Dumps  | 1                          |
|    |  | ii) Total Area (in Hectare)   | 160.90                     |
|    |  | iii) Height (in meter)  | 30 m                       |
|    |  | iv) Quantity (in Million Cubic meter)   | 64.40                      |
| 10 | <b>Details of Topsoil Management</b>                                 |   |                            |
|    | a.   | Quantity of Topsoil excavated during the entire life of the mine (in Million Cubic meter)                                     | 1.10 Mm <sup>3</sup>       |
|    | b.   | Quantity of Topsoil proposed for utilization for reclamation during the entire life of the mine (in Million Cubic meter)      | 1.10 Mm <sup>3</sup>       |
|    | c.   | Quantity of Topsoil proposed for utilization for other activities during the entire life of the mine (in Million Cubic meter) |                            |
| 11 | <b>Detail of Final Mine Void (Only if Mining Method: Opencast)</b>   |   |                            |
|    | a.   | Area (in Hectare)   | 97.56 Ha                   |
|    | b.   | Depth (in meter)  | 120 m B.G.L                |
|    | c.   | Volume (in Million Cubic meter)   | 117.08                     |

|    |  |  |                        |                        |  |                         |              |
|----|--|--|------------------------|------------------------|--|-------------------------|--------------|
| 12 | <b>Details of Quarry (Only if Mining Method: Opencast)</b>                           |  |                        |                        |  |                         |              |
|    | a.   | Final Void of (hectare)  |                        |                        | 97.56 Ha   |                         |              |
|    | b.   | At a Depth of (meter which is proposed to be converted into a Water Body.) |                        |                        | 120 m B.G.L  |                         |              |
|    | c.   | Total Quarry Area (ha)   |                        |                        | 258.46 Ha.   |                         |              |
| 13 | <b>Details of Transportation</b>   |  |                        |                        |  |                         |              |
|    | a.   | In Pit/Underground to Surface  |                        |                        | Road   |                         |              |
|    | b.   | Surface to Siding/Loading  |                        |                        | By Road to Kathara Washery                         |                         |              |
|    | c.   | Transportation / Conveyor Details  |                        |                        | Silo Loading arrangements for washed coal despatch |                         |              |
| 14 | <b>Details of Land Usage in Ha (Pre-Mining) (As per Satellite Imagery Data 2020)</b> |  |                        |                        |  |                         |              |
|    |  |  | <b>Type of Land</b>    | <b>Area in Ha</b>      |  |                         |              |
|    |  |  | Forest Land            | 0                      |  |                         |              |
|    |  |  | Scrubs                 | 53                     |  |                         |              |
|    |  |  | Plantation Area        | 212                    |  |                         |              |
|    |  |  | Agricultural land      | 67                     |  |                         |              |
|    |  |  | Mining Area            | 308.23                 |  |                         |              |
|    |  |  | Settlement             | 69.00                  |  |                         |              |
|    |  |  | Water Body             | 5.00                   |  |                         |              |
|    |  |  | Waste Land             | 59.00                  |  |                         |              |
|    |  |  | <b>Total</b>           | <b>773.23</b>          |  |                         |              |
| 15 | <b>Details of Land Usage (Post-Mining)</b>   |  |                        |                        |  |                         |              |
|    |  |  |                        |                        |  |                         |              |
|    | <b>S.No</b>  | <b>LAND USE</b>  | <b>PLANTATION (HA)</b> | <b>WATER BODY (HA)</b> | <b>Public Use (Ha)</b>                             | <b>Undisturbed (Ha)</b> | <b>Total</b> |
|    | 1  | Internal OB Dumps & Embankment   | 74.09                  | 0                      | 0  | 0                       | 74.09        |
|    | 2  | Greenbelt  | 45                     | 0                      | 0  | 0                       | 45           |

|  |    |  |  |                                  |  |  |                           |  |    |
|--|----|--|--|----------------------------------|--|--|---------------------------|--|----|
|  |    | 3  | Built-Up area (Infrastructure & Township)  | 0                                | 0                                      | 187.41   | 0                         | 187.41   |    |
|  |    | 4  | Virgin Area  | 65.6                             | 0                                      | 33.14  | 0                         | 98.74  |    |
|  |    | 5  | Top Soil Storage   | 0                                | 0                                      | 0  | 0                         | 0  |    |
|  |    | 6  | Roads  | 0                                | 0                                      | 0  | 0                         | 0  |    |
|  |    | 7  | Excavation/Quarry  | 160.9                            | 97.56                                  | 0  | 0                         | 258.46   |    |
|  |    | 8  | External OB Dumps  | 109.53                           | 0                                      | 0  | 0                         | 109.53   |    |
|  |    | <b>Total</b>   |  | <b>455.12</b>                    | <b>97.56</b>                           | <b>220.55</b>  | <b>0</b>                  | <b>773.23</b>                                      |    |
|  | 16 | <b>Details of Reclamation (Only if Mining Method: Opencast) Total Afforestation Plan shall be Implemented Covering of Mining. This will include:</b> |  |                                  |  |  |                           |  |    |
|  |    | a.   | External OB Dump (in hectare)  |                                  |  |  |                           | 109.53   |    |
|  |    | b.   | Internal Dump (in hectare)   |                                  |  |  |                           | 74.09  |    |
|  |    | c.   | Quarry (in hectare)  |                                  |  |  |                           | 160.90   |    |
|  |    | d.   | Safety Zone (in hectare)   |                                  |  | :  |                           | 45   |    |
|  |    | e.   | Final Void of (hectare)  |                                  |  | :  |                           | 97.56  |    |
|  |    | f.   | At a Depth of ( <i>meter which is proposed to be converted into a Water Body.</i> )  |                                  |  | :  |                           | 120 m B.G.L  |    |
|  |    | g.   | Density of Tree Plantation per ha (in no.)   |                                  |  | :  |                           | 2500   |    |
|  |    | h.   | Others in ha (such as Excavation Area along ML Boundary, along Roads and Infrastructure, Embankment Area and in Township Located outside the Lease etc.) |                                  |  |  |                           | 65.60  |    |
|  |    | i.   | Total afforestation plant (in hectare)   |                                  |  |  |                           | 455.12   |    |
|  | 17 | <b>Status of Progressive Mining Closure Plan (For Expansion Projects only)</b>   |  |                                  |  |  |                           |  | NA |
|  | 20 | <b>Actual Coal/Ore Production vis-a-vis sanctioned capacity Since inception (<i>Multiple Entries Allowed</i>)</b>                                    |  |                                  |  |  |                           |  |    |
|  |    | <b>S.No</b>  | <b>FY</b>  | <b>Sanction ed Capacity MTPA</b> | <b>Sanction ed Capacity as per CTO</b> | <b>Sanctioned Capacity as per Approved Mining Plan</b> | <b>Actual Producti on</b> | <b>Excess production Beyond EC/CTO/Mining Plan</b> |    |

|           |   |   |     |     |     |  |       |  |
|-----------|---|---|-----|-----|-----|--|-------|--|
|           | 1   | 2014  | 1.9 | 0   | 1.9 |  | 0.658 |  |
|           | 2   | 2015  | 1.9 | 0   | 1.9 |  | 0.923 |  |
|           | 3   | 2016  | 1.9 | 0   | 1.9 |  | 0.937 |  |
|           | 4   | 2017  | 0   | 0   | 1.9 |  | 0.493 |  |
|           | 5   | 2018  | 0   | 0   | 1.9 |  | 0.733 |  |
|           | 6   | 2019  | 0   | 0   | 1.9 |  | 0.132 |  |
|           | 7   | 2020  | 0   | 0.9 | 1.9 |  | 0.2   |  |
|           | 8   | 2021  | 0   | 0.9 | 1.9 |  | 0.136 |  |
| <b>36</b> | <b>Details of Court Cases if any</b>  |   |     |     |     |  |       | No   |
| <b>37</b> | <b>Details of direction issued under Environment (Protection) Act / Air (Prevention &amp; Control of Pollution) Act / Water (Prevention &amp; Control of Pollution) Act</b> |   |     |     |     |  |       |  |
|           | a.  | Whether any direction issued under Environment (Protection) Act / Air (Prevention & Control of Pollution) Act / Water (Prevention & Control of Pollution) Act (Yes/No)? |     |     |     |  |       | No   |
| <b>38</b> | <b>Details of EIA Consultant</b>  |   |     |     |     |  |       |  |
|           | a.  | Have you hired Consultant for preparing document (Yes/No)?  |     |     |     |  | :     | Yes  |
|           |   | (i) Accreditation No.   |     |     |     |  | :     | Certificate No:<br>NABET/EIA/1720/SA0108<br>Valid till 10.05.2022.,<br>communicated vide letter<br>no:<br>QCI/NABET/EIA/ACO/22/2<br>245 Dt. 11.02.2022 |
|           |   | (ii) Name of the EIA Consultant   |     |     |     |  | :     | Central Mine Planning and<br>Design Institute, Ranchi  |
|           |   | (iii) Address   |     |     |     |  |       | Gondwana Place, Kanke<br>Road, Ranchi, Jharkhand   |
|           |   | (iv) Mobile No.   |     |     |     |  | :     | 8987789101   |
|           |   | (v) Landline No.  |     |     |     |  | :     | 0651279222   |
|           |   | (vi) E-mail Id  |     |     |     |  | :     | gmenv.cmpdi@yahoo.co.i<br>n  |
|           |   | (vii) Category of Accreditation (Eligible for Category A / Eligible for Category B)   |     |     |     |  | :     | A  |

|           |  |   |  |
|-----------|--|---|--|
|           | (viii) Sector of Accreditation   | : | 1 (Mining of minerals including Open cast/ Underground mining).<br>2. Off shore and On shore oil and gas exploration, development & Production.<br>4 ( Thermal Power Plants) and<br>6 (Coal Washeries) |
|           | (ix) Validity of Accreditation   | : | 10.05.2022   |
|           | (x) Upload Certificate of Accreditation certified by QCI/NABET ( <i>Upload pdf Only</i> )  | : | Enclosed   |
| <b>39</b> | <b>Documents to be attached</b>  |   |  |
| <b>I</b>  | <b><i>If Project Type is New / Expansion / Modernization / one-time capacity expansion for coal mining:</i></b>  |   |  |
| a.        | Upload Copy of EIA/EMP Report  |   | Enclosed   |
| b.        | Upload Copy of Risk Assessment Report  |   | Enclosed   |
| c.        | Upload Copy of Feasibility Report/ Detailed Project Report(DPR) /Detailed Engineering Report /Detailed Conceptual Plan / Approved Mining Plan (in case of Mining proposals) ( <i>Upload pdf only</i> )   |   | Enclosed   |
| d.        | Upload Copy of Final Layout Plan ( <i>Upload pdf only</i> )  |   | Enclosed   |
| e.        | Upload Cover Letter ( <i>Upload pdf only and attach it as Annexure-document of Cover letter</i> )  |   | Enclosed   |
| f.        | Upload a copy of documents in support of the competence/authority of the person making this application to make application on behalf of the User Agency ( <i>Upload pdf only and attach it as Annexure-authorization</i> )  |   | Enclosed   |
| g.        | Upload Additional File, if any ( <i>Upload pdf only</i> )  |   |  |
| <b>40</b> | <b>Undertaking</b>   |   |  |
| a.        | I hereby give undertaking that the data and information given in the application and enclosures are true to be best of my knowledge and belief and I am aware that if any part of the data and information found to be false or misleading at any stage, the project will be rejected and clearance given, if any to the project will be revoked at our risk and cost. In addition to above, I hereby give undertaking that no activity / construction / expansion has since been taken up |   |  |
| b.        | Name   | : | Nawal Kumar Dubey  |
| c.        | Designation  | : | PO   |
| d.        | Company  | : | CCL  |
| e.        | Address  | : | Darbhanga House, Ranchi.   |

\*\*\*\*\*