EASTERN COALFIELDS LIMITED
(A Subsidiary of Coal India Limited)
Office of the Agent,Sodepur Area

UNDERTAKING

Information provided in Half yearly EC compliance report for the period Apr-2023 to Sep-2023 in respect of the following mines of Cluster no.-6 is true to the best of my knowledge:

Sl.No.	Name of the Mines	Name of the Manager	Signature of the Manager	Name of the Agent	Signature of the Agent
1.	Narsamuda UG	Md. Oshama	01/11/23	R.N Tewari	01/11/23
2.	Dhemomain UG	Shantanu Chakorborty	1/11/23		
3.	Chinakuri I UG	Pramod Kumar	01/11/23	P.K.Singh	01/11/23
4.	Chinakuri III UG	Dayakar Bolujju	01/11/2023		
5	Chinakuri III OC Patch				
6.	Sodepur® UG	MD Eklaque Khan	01/11/23		
7.	Sodepur OC Patch				
8.	Sheetapur UG				
9.	Bejdih UG	Manoj Kumar	01/11/2023	J.P.Singh	24/11/23
10.	Mithani UG	Prashanta Sarkar	01/11/23		
11.	Mithani OC Patch				
12.	Patmohna UG	Manoj Kumar	01/11/23		
13.	Patmohna OC Patch				

EASTERN COALFIELDS LIMITED
HALF YEARLY EC COMPLIANCE REPORT
H/Y ENDING SEP-23
CLUSTER NO. 6, SODEPUR AREA
EC No. J-11015/385/2010-IA-II. (M) Dt. 16-01-2015
Compliance of environment clearance conditions
Period: Half Yearly Report from 01.04.2023 to 30.09.2023

<table>
<tr><th>Sl no.</th><th>Specific Conditions</th><th>Compliance status</th></tr>
<tr><td>i.</td><td>The maximum production from the mine at any given time shall not exceed the limit as prescribed in the EC.</td><td>
<table>
<tr><th>Name of the mines</th><th>Annual Peak Capacity (in Tonne))</th><th>Production (Te) From 1st Apr-2023 to 30th Sep-2023 (in Tonne)</th></tr>
<tr><td>Bejdih</td><td>100000</td><td>19026</td></tr>
<tr><td>Methani</td><td>200000</td><td>27661</td></tr>
<tr><td>Patmohna</td><td>120000</td><td>22387</td></tr>
<tr><td>Dhemomain</td><td>210000</td><td>22239</td></tr>
<tr><td>Narsamuda</td><td>190000</td><td>27089</td></tr>
<tr><td>Sodepur R</td><td>150000</td><td>Suspended</td></tr>
<tr><td>Sheetalpur</td><td>500000</td><td>Abandoned</td></tr>
<tr><td>Chinakuri I</td><td>80000</td><td>0</td></tr>
<tr><td>Chinakuri III</td><td>200000</td><td>34433</td></tr>
</table>
Regular monitoring of production data is done to comply with the condition. Monthly production from Ape-2023 to Sep-2023 is tabulated below:
</td></tr>
<tr><td>ii.</td><td>The validity of the EC is for the life of the Mine or as specified in the EIA Notification, 2006, whichever is earlier.</td><td>Noted and Agreed.</td></tr>
<tr><td>iii.</td><td>All safety measures shall be taken as per CMR, 1957 & related circulars.</td><td>Complied (CMR, 2017)</td></tr>
<tr><td>iv.</td><td>The production shall be within the same Mining Lease area.</td><td>Complied.</td></tr>
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v.	Coal shall be transported by rail only. Coal transportation from mine to siding should be by conveyor belt. The loading to siding by pay loaders into railway wagons.	Coal from all the mines under cluster-6 is transported through centralized railway siding present at Chinakuri III Rly. Siding. Coal transportation from mine to siding is done by tarpaulin covered trucks.  Tarpaulin Covered Trucks or Coal Transportation
vi.	Independent network of railway sidings inside cluster be developed. Railway sidings should be constructed at the earliest and till then proponent may use mechanically covered trucks for transportation of coal.	Chinakuri III Railway Siding is being used for transportation of coal in this cluster.
vii.	Three tier green belts shall be raised around the railway sidings and along the road sides to prevent dust and noise pollution.	Plants and vegetation exist around the boundary of railway siding. More plantation will be done in the future as well. 

		  Beautification work at Chinakuri Siding
viii.	Stowing and depillaring shall be as per the recommendations of the DGMS.	It is being done as per DGMS guideline.
ix.	The proponent must comply with the Raniganj Action Plan. The unstable areas within the cluster will be brought under plantation after the population residing over these areas is rehabilitated under the Master plan for Raniganj Coalfield to be implemented by ADDA.	Not applicable.
x.	Trees with deep rooted system should be planted so as to prevent soil erosion.	Species selection and plantation is being done in consultation with forest department. Some of the species planted are Mohaneem, Karanj, Chatim, Sisso etc.
xi.	Proponent should plant additional 10 Ha/year over the next 10 years at various locations in this Cluster.	Agreed. Plantation is being done in phase manner in this cluster and according to availability of Land.

		a) 2 Hac. Plantation had been done in FY 20-21 in Patmohana Colliery. Around 5000 saplings has been planted with survival rate of 90%. Some species are (Shishu, Karanch, Mohaneem, Jarul and Chatim). Species planted will be maintained for 4 years to grow as a full tree till 2024-25. b) 2 Hac. Was done in Mithani Colliery in 2014-15. Species have grown into full grown trees. Some of the species are Mango, Guava and other fruits bearing trees. c) 2 Hac. Plantation has been done in 22-23 at Sodepur R Coal depot. Around 5000 saplings has been planted with survival rate of 90%. Some species are (Shishu, Karanch, Mohaneem, Jarul and Chatim). Species planted will be maintained for 4 years to grow as a full tree till 2026-27. d) 2 Hac. Plantation has been done in 22-23 at Mithani leasehold. Around 5000 saplings has been planted with survival rate of 90%. Some species are (Shishu, Karanch, Mohaneem, Jarul and Chatim). Species planted will be maintained for 4 years to grow as a full tree till 2026-27. e) 2 Hac. Plantation has been done in 2023-24 at Dhemomain Colliery leasehold. 840 nos. of fruit bearing species have been planted with survival rate of 90%. Some species are Mango, Guava etc. Species planted will be maintained for 4 years to grow as a full tree till 2027-28. 

		 Orchard Plantation done in FY: 2014-15 at Mithani Colliery Leasehold.    2 Hac. Plantation done in FY: 2020-21 at Patmohana Colliery Leasehold.

2 Hac. Plantation done in FY: 2022-23 at Sodepur R Coal Depot.

		 2 Hac. Plantation done in FY: 2022-23 in Mithani Leasehold.   2 Hac. Plantation done in FY: 2023-24 in Dhemomain Leasehold.
xii.	River/nallahs shall be desilted and restored back to functional state.	Agreed. Nallah is desilted as when required.

xiii.	Wild life conservation plan be prepared and submitted to MoEF&CC with the approval of The State Govt.	Modified Work Order has been issued Vide No. ECL/ENV/23/100 Dated-: 23.03.2023 to the President of Durgapur Wildlife Information and Nature Guide Society as per suggestion by Chief of Wildlife Warden, Government of West Bengal to submit the report. Draft Report has been prepared.
xiv.	Proponent shall use high resolution image of all clusters for evaluating land use, plantation etc.	Changes in the land use pattern is being tracked by carrying out satellite imagery at every three years' interval. This is being done by CMPDI, Ranchi. Mines in this Cluster are Under Ground. Last it was done in the year 2021. (Report Enclosed)
xv.	Separate drainage pattern be provided.	Garland drain is constructed wherever necessary. Garland Drain at Narsamuda has average depth of 2.3m and average Width of 5.5 m.  Garland Drain at Narsamuda Colliery
xvi.	Sand stowing must be used as recommended by CMPDIL.	Sand stowing is being done as per recommendation of CMPDIL.
xvii.	Action Plan for prevention and mitigation of subsidence be prepared and implemented.	Development District is running Mithani, Narsamuda, Dhemomain and Depillaring with Stowing in Bejdih, Patmohana and Chinakuri III.
xviii.	The OC patches to be operated will be completely filled up after exhaustion of reserves and reclaimed with plantation.	Not Applicable as the mines are underground.
xix.	The OB shall be completely re-handled at the end of mining.	Not Applicable as the mines are underground.
xx.	There shall be no residual OB dump after the mining.	Not Applicable as the mines are underground.
xxi.	After completion of mining activities, the subsided areas shall be graded and planted upon.	Agreed. It will be done as per Mine closure Plan. All the Operational Mines in this Cluster are UG Mines.
xxii.	Coal extraction shall also be	Complied.

	optimized in areas where agricultural production is continuing. Some pillars shall be left below the agricultural land. No depillaring and coal extraction should be carried out below habitation, H.T.Lines &beneath row, water bodies.	
xxiii.	The rehabilitation of the household falling within this cluster to be carried out in two phases within 10 years.	Noted and Agreed.
xxiv.	The land excavated after mining must be brought back to original condition for agricultural/plantation purpose.	No Applicable as the mines are underground.
xxv.	The water discharged from the mines should be as good as surface drinking water.	Mine discharge water is analyzed on regular basis by CMPDIL and found to be within the specified norms of CPCB. (Report enclosed).
xxvi.	Regular monitoring of subsidence movement on the surface over and around the working area and impact on natural drainage pattern, water bodies, vegetation, structure, roads and surroundings shall be continued till movement ceases completely. In case of observation of any high rate of subsidence movement, appropriate, effective corrective measures shall be taken to avoid the loss of life and material. Cracks shall be effectively plugged with ballast and clay soil/suitable material.	No subsidence has been observed till date. Subsidence is being monitored by Surveyor of the Mines. Project is always ready for any such encounter.
xxvii.	If subsidence is found exceeding the permitted limits, then the land owners shall be adequately compensated with mutual agreement with the land owners.	Subsidence is being monitored by Surveyor of the Mines. Project is always ready for any such encounter.

xxviii.	Water sprinkling system shall be provided to check fugitive emissions from loading operations, conveyor system, haulage roads, transfer points, etc. Major approach roads shall be black topped and properly maintained.	Fixed water sprinkler at Chinakuri Railway Siding has been installed. Mobile water tankers are used to suppress the dust in roads from Radhanagar More to Chinakuri Weighbridge. All approach roads are black topped. Sprinkling is done at Coal Depots.  Water Sprinkling at Radhanagar Road by Mobile Water Tanker.  Fixed Water Sprinkling System at Chinakuri Railway Siding.  Fixed Water Sprinkling System at Mithani Coal Depot.

		 Water Sprinkling at Bejdih Colliery by Mobile Water Tanker.  Water Sprinkling at Patmohana Colliery by Mobile Water Tanker.

		 Water Sprinkling at Dhemomain Colliery by Mobile Water Tanker. One Fixed Water Sprinkling System is under installation process at Bejdih Coal Depot
xxix.	The CSR cost should be Rs. 5 per Tones of Coal produced which should be adjusted as per the annual inflation.	As per the revised CSR policy of CIL 2% of the average profit of preceding 3 years is the norms for CSR expenditure in the entire ECL command areas or Rs. 2 per Tonn of coal produced last year whichever is higher. The total CSR expenditure of Sodepur Area, ECL during FY: 2022-23 is nearly Rs. 75000 and the work includes Distribution of Tiranga during Independence Day 2022.
xxx.	Mining in the existing mines should be phased out after expiry of the current mining lease and after reclamation of mined over areas. The operating mines may be analyzed and monitored for compliance of conditions, bearing with movement of wildlife and until such time they are closed/phased out.	Noted and Agreed. It shall be complied as per Mine Closure Plan (MCP).
xxxi.	Everybody in the core area should be provided with mask for protection against fugitive dust emissions.	Dust mask for protection against fugitive dust emissions is provided to the personnel working near dust producing sources. 300 Nos. of dust mask were issued from Area Store to mines of Cluster 6 from Apr-2023 to Sep-2023. Mines Wise Data-: Dhemomain Incline-: 70, Dhemomain Pit-: 50, Bejdih-: 50, Chinakuri III-: 130,
xxxii.	Dust mask to be provided working in the mining area.	Provided.
xxxiii.	The supervisory staff should be held personally responsible for	Complied. Safety Officer of the Mines endures that all the workers wear Dust Mask.

	ensuring compulsory regarding wearing of dust mask in the core area.	
xxxiv.	People working in the core area should be periodically tested for the lung diseases and the burden of cost on account of working in the coal mining area.	Followed. Health checkup along with lung disease is carries out on yearly basis. 20% of the worker are tested every year and all the workers are tested once in every five year at least. Total 832 people have gone through PME in Calendar Year 2023 till Sep-2023 (PME Report Enclosed).
xxxv.	The mining area should be grounded by green belt having thick closed thick canopy of the tree cover.	Agreed. Plantation is being done in phase manner in this cluster and according to availability of Land. a) 2 Hac. Plantation had been done in FY 20-21 in Patmohana Colliery. Around 5000 saplings has been planted with survival rate of 90%. Some species are (Shishu, Karanch, Mohaneem, Jarul and Chatim). Species planted will be maintained for 4 years to grow as a full tree till 2024-25. b) 2 Hac. Was done in Mithani Colliery in 2014-15. Species have grown into full grown trees. Some of the species are Mango, Guava and other fruits bearing trees. c) 2 Hac. Plantation has been done in 22-23 at Sodepur R Coal depot. Around 5000 saplings has been planted with survival rate of 90%. Some species are (Shishu, Karanch, Mohaneem, Jarul and Chatim). Species planted will be maintained for 4 years to grow as a full tree till 2026-27. d) 2 Hac. Plantation has been done in 22-23 at Mithani Leasehold. Around 5000 saplings has been planted with survival rate of 90%. Some species are (Shishu, Karanch, Mohaneem, Jarul and Chatim). Species planted will be maintained for 4 years to grow as a full tree till 2026-27. e) 2 Hac. Plantation has been done in 2023-24 at Dhemomain Colliery leasehold. 840 nos. of fruit bearing species have been planted with survival rate of 90%. Some species are Mango, Guava etc. Species planted will be maintained for 4 years to grow as a full tree till 2027-28.

		  Orchard Plantation done in FY: 2014-15 at Mithani Colliery Leasehold.  

2 Hac. Plantation done in FY: 2020-21 at Patmohana Colliery Leasehold.

2 Hac. Plantation done in FY: 2022-23 at Sodepur R Coal Depot.

		 2 Hac. Plantation done in FY: 2022-23 in Mithani Colliery Leasehold.   2 Hac. Plantation done in FY: 2023-24 in Dhemomain Leasehold.
xxxvi.	Besides carrying out regular periodic health check-up of their workers, 10% of the workers identified from workforce engaged in active mining operations shall be subjected to health check-up from	Health checkup is carried out on frequently as per norms and reported to DGMS. List of 10% workers has been prepared and sent to ECL HQ for further necessary action along with their year of service and age group for health check-up from specialized agency which has started in ECL and will be done in Sodepur Area in 2023.

	occupational diseases and hearing impairment, if any, through an specialized agency /institution within the District/State and the results reported to this Ministry and to DGMS.	
xxxvii.	The embankment constructed along the river boundary shall be of suitable dimensions and critical patches shall be strengthened by stone pitching on the river front side and stabilized with plantation so as to withstand the peak water flow and prevent mine inundation.	Not applicable as the mines are underground
xxxviii.	There shall be no over flow of OB into the river and into the agricultural fields and massive plantation of native species shall be taken up in the area between the river and the project.	Not applicable as the mines are underground
xxxix.	Catch drains and siltation ponds of appropriate size shall be constructed to arrest silt and sediment flow from soil, OB and mineral dumps. The water so collected shall be regularly watering the mine area, roads, green belt development, etc. The drains shall be regularly desilted and maintained properly. Garland drains (size, gradient and length) and sump capacity shall be designed keeping 50% safety margin over and above the peak sudden rainfall and maximum discharge in the area adjoining the mine site. Sump capacity shall also provide adequate retention period to allow proper settling of silt material.	Not applicable as the mines are underground
xl.	Garland drains(size, gradient and length) around the safety areas as mine shaft and low lying areas and sump capacity shall be	Not Applicable as the mine is underground.

	designed keeping 50% safety margin over and above the peak sudden rainfall and maximum discharge in the area adjoining the mine site. Sump capacity shall also provide adequate retention period to allow proper settling of silt material.	
xli.	Dimensions of the retaining wall at the toe of the dumps and OB benches within the mine to check rum-off and siltation shall be based on the rainfall data.	Not Applicable as the mines are underground.
xlii.	Crushers at the CHP of adequate capacity for the expansion project shall be operated with high efficiency bag filters, water sprinkling system shall be provided to check fugitive emissions from crushing operations, conveyor system, haulage roads, transfer points, etc.	No Crusher is there in this Cluster. Water spraying is done from Radhanagar More to CKI-III Railway Siding. Spraying of water is done at Coal Depots.
xliii.	Mine Discharge water outside the ML shall be monitored, particularly for TDS and treated to conform to prescribed levels before discharge into the natural environment.	Mine water discharge is regularly monitored for TDS level and other parameters. Quality of mine water is within the permissible limits. Report Enclosed
xliv.	Drills shall be wet operated.	Water spraying is done before and after drilling.
xlv.	The project authorities shall undertake regular repairing and tarring of roads used for mineral transportation. A 3- tier green belt comprising of a mix of native species shall be developed all along the major approach roads.	Roads are repaired and tarred regularly. 400 mts. Cement Concrete Road has been constructed from Chinakuri Bazar to Chinakuri Railway Siding for Coal Transportation and Minimizing the dust emission due to Transportation.

		 400 mts. Cement Concrete road Constructed for coal transportation. Water Sprinkling is done regularly for dust suppression.  650 mts. approx.. Coal Transporting Road has been constructed from Bejdih Coal Depot

		 250 mts. approx.. Coal Transporting Road has been constructed from Patmohana Coal Depot  Coal Transporting Road constructed at Dhemomain Colliery

	Controlled blasting shall be practiced with use of delay detonators and only during daytime. The mitigative measures for control of ground vibrations and to arrest the fly rocks and boulders shall be implemented.	All the mines in this Cluster are Under Ground
xlvii.	A Progressive a forestation plan shall be implemented covering an area of 313.2 ha at the end of the mining which includes reclaimed external waste dump area (15Ha), excavation area (35.2 Ha), rail road area (20 Ha), Mine infrastructure area (97 Ha) and natural vegetation land (146 Ha) and in township located outside the lease by planting native species in consultation with the local DFO/Agricultural dept. The density of the trees shall be around 2500 plants/ Ha. Massive plantation shall be carried out in open spaces in and around the mine and a 3-tier avenue plantation along the main approach roads to the mine.	Not applicable as the Mines are Underground.
xlviii.	The proponent should prepare restoration and reclamation plan for the degraded area. The land be used in a productive and sustainable manner	It shall be implemented as per MCP. Till now all the mines in this Cluster are Underground.
xlix.	Compensatory Ecological & Restoration of waste land, other degraded lands and OB dumps in lieu of breaking open the land be carried out.	Not Applicable as the mines are underground.
l.	No groundwater shall be used for mining operations.	Noted and Agreed.
li.	An estimated total 7.70 Mm^3 of OB will be generated during the entire life of the mine. There shall be no residual external dump left at the mined site after exhaustion of the quarries. The	Not Applicable as the mines are underground.

	OB dump height is up to 60m. The maximum slope of the dump sites shall continue till the vegetation becomes self-sustaining and compliance status shall be submitted to MoEF&CC and its Regional Office on yearly basis.	
lii.	Of the total quarry area 35.2 ha. The backfilled quarry area of 35.2 ha shall be reclaimed with plantation by planting native plant species in consultation with the local DFO/Agriculture Department. The density of the trees shall be around 2500 plants per ha	Not applicable as the mines are underground.
liii.	Regular monitoring of groundwater level and quality shall be carried out by establishing a network of existing wells and construction of new peizometers. The monitoring for quantity shall be done four times a year in pre-monsoon (May), monsoon (August), post monsoon (November) and winter (January) seasons and for quality in May. Data thus collected shall be submitted to the Ministry of Environment, Forests & Climate Change and to the Central Pollution Control Board quarterly within one month of monitoring.	Monitoring of ground water table is being done by CMPDI to check the water table level quarterly. This is done in Jan, May, Aug, Nov Piezometer has been installed at Sodepur 9/10 Colliery and Ranishayer with the drilling depth of 100 mts and 145 mts.in Cluster 6 respectively.  Piezometric with Automatic Well Recorder At Sodepur Colliery Water level below ground level is 20.60 mts during monitoring in May-2023. 

		Piezometric at Ranishayer Bejdih Colliery Beside that monitoring of ground water level is done through Dug well also. Monitoring in May-2023 is mentioned below. Water level at Dug well at Chotta Dhemo village is 8.20 mts. below ground level. Water level at Dug well at Chinakuri village is 6.80 mts. below ground level. Water level at Dug well at Mazumdar industries near Sanmara village is 7.05 mts. below ground level.
liv.	The company shall put up artificial groundwater recharge measures for augmentation of groundwater resource in case monitoring indicates a decline in water table. The project authorities shall meet water requirement of nearby village(s) in case the village wells go dry due to dewatering of mine.	Roof Top Rain Water Harvesting has been installed at Area Vocational Center, Sodepur Area, GM Bungalow, Chinakuri Guest House, Chinakuri Agent Office, Chinakuri Manager Offfice, Dhemomain Agen Office, Narsamuda Manager Office and Dhemomain Manager Office.  Rain Water Harvesting at Chinakuri Guest House
lv.	Sewage treatment plant shall be installed in the existing colony. ETP shall also be provided for workshop and CHP wastewater.	Septic tank is installed in all the colonies. There is no workshop and CHP in this cluster. Treatability Study has been done for construction of Sewage Treatment Plant at Dhemomain.
lvi.	Land ousters shall be compensated as per the norms laid out R&R Policy of CIL or the National R&R Policy or R&R Policy of the State Government whichever is higher.	It is being complied as per R&R Policy of CIL/National R&R Policy.
lvii.	For monitoring land use pattern and for post mining land use, a time series of land use maps,	Changes in the land use pattern is being tracked by carrying out satellite imagery at every three years' interval.

	based on satellite imagery (on a scale of 1:5000) of the core zone and buffer zone, from the start of the project until end of mine life shall be prepared once in 3 years (for any one particular season which is consistent in the time series), and the report submitted to MoEF&CC and its concerned Regional office.	This is being done by CMPDI, Ranchi. Mines in this Cluster are Under Ground. Last it was done in the year 2021. (Report Enclosed).
lviii.	A detailed Final Mine Closure Plan along with details of Corpus Fund shall be submitted to the Ministry of Environment, Forest & Climate Change within 6 months of grant of Environment Clearance.	Complied. Progressive Mine Closure Audit from 2013-14 to 2017-18 has been completed for Bejdih, Mithani, Patmohana, Dhemomain, Narsamuda, Chinakuri III, Chinakuri I/II and Sodepur R.
lix.	The project authorities shall in consultation with the Panchayats of the local villages and administration identify socio-economic and welfare measures under CSR to be carried out over the balance life of the mine.	It is being complied as per CIL CSR Policy.
lx.	Corporate Environment Responsibility:	It is being complied with. a) Environment Policy of CIL: Coal India Limited (CIL) is committed to protect the environment through prevention, mitigation of pollution, proper disposal and recycling of wastes, conservation of biodiversity and bringing awareness among all its stakeholders for continual improvement in environmental performances following best practices.
	a) The Company shall have a well laid down Environment Policy approved by the Board of Directors. b) The Environmental Policy shall prescribe for standard operating process/procedures to bring into focus any infringements/deviation/violation of the environmental or forest norms/conditions. c) The hierarchical system or administrative Order of the company to deal	b) The environment policy ensures compliance of EC conditions and other statuary conditions issued by regulatory agencies. c) The Environment Department is headed by GM(Env) at HQ level and Environment Management Cell(EMC) has been established at each area of ECL which is responsible for looking after the compliances of the EC conditions of all the Clusters present in that area. The head of this EMC reports directly to the GM of the area.

	with environmental issues and for ensuring compliance with the environmental clearance conditions shall be furnished. d) To have proper checks and balances, the Company shall 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 stakeholders at large.	d) The Environment Audit Cell (EAC) has been established at area level for periodic audit of the Clusters for compliance of the EC conditions and other regulatory compliances. The non-compliances are being reported to the agents of the concerned cluster and also to the GM of the area. A copy of the audit report also being sent to the GM(Env), HQ. If the compliance is not done in the time bound manner then it is further reported to the higher authorities by GM(Env), HQ.
B.	**General conditions**	
i.	No change in mining technology and scope of working shall be made without prior approval of the Ministry of Environment, Forests & Climate Change.	No change in mining technology will be done without prior approval of the MoEF&CC.
ii.	No change in the calendar plan of production for quantum of mineral coal shall be made.	Production is being done according to the prior approved calendar plan and under the limit of EC as given in the Specific Condition no.(i).
iii.	Four ambient air quality monitoring stations shall be established in the core zone as well as in the buffer zone for PM_{10}, PM2.5, SO2 and NO_x monitoring. Location of the stations shall be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive targets in consultation with the State Pollution Control Board. Monitoring of heavy metals such as Hg, As, Ni, Cd, Cr, etc carried out at least once in six months.	Regular Environmental monitoring is being carried out quarterly basis by CMPDI, Asansol. Monitoring stations have been located in consultation with officials of SPCB in accordance with the direction of the wind. Location of station changes in summer and winter season according to the direction of wind and monitoring is done as per the condition meeting the norms at upstream and downwind direction.

iv.	Data on ambient air quality (PM_{10}, PM2.5, SO2 and NO_x) and heavy metals such as Hg, As, Ni, Cd, Cr and other monitoring data shall be regularly submitted to the Ministry including its concerned Regional Office and to the State Pollution Control Board and Central Pollution Control Board once in six months. Random verification of samples through analysis from independent laboratories recognised under the EPA rules, 1986 shall be furnished as part of compliance report.	Regular Environmental monitoring is being carried out on quarterly basis by CMPDI, Asansol. Same as per General Condition no.(iii)
v.	Adequate measures shall be taken for control of noise levels below 85 dB (A) in the work environment. Workers engaged in blasting and drilling operations, operation of HEMM, etc shall be provided with ear plugs/muffs.	Workers on pertinent activity are always being equipped with particular ear plugs.
vi	Industrial wastewater (workshop and wastewater from the mine) shall be properly collected, treated so as to conform to the standards prescribed under GSR 422 (E) dated 19th May 1993 and 31st December 1993 or as amended from time to time before discharge. Oil and grease trap shall be installed before discharge of workshop effluents.	Agreed. No workshop is present in this cluster.
vii.	Vehicular emissions shall be kept under control and regularly monitored. Vehicles used for transporting the mineral shall be covered with tarpaulins and optimally loaded.	Vehicles are checked for PUC certificates. Vehicles used for transporting coal are covered with tarpaulins and optimally loaded.
viii.	Monitoring of environmental quality parameters shall be carried out through establishment of adequate number and type of pollution monitoring analysis equipment	Environmental Laboratory with latest equipment has been established at CMPDI, RI – I, Asansol... Quarterly monitoring report of Air, Water, and Noise& Groundwater level is prepared at above laboratory and sent to West Bengal pollution control Board with Environmental Statement (Form-V) & by Six monthly

	in consultation with the State Pollution Control Board and data got analyzed through a laboratory recognised under EPA Rules, 1986.	compliance reports to the MoEF regional office.
ix.	Personnel working in dusty areas shall wear protective respiratory devices and they shall also be provided with adequate training information on safety and health aspects.	Protective wears are being supplied and used by workmen judiciously.
x.	Occupational health surveillance programme of the workers shall be undertaken periodically to observe any contractions due to exposure to dust and to take corrective measures, if needed and records maintained thereof. The quality of environment due to outsourcing and the health and safety issues of the outsourced manpower should be addressed by the company while outsourcing.	Followed. Health checkup along with lung disease is carries out on yearly basis. 20% of the worker are tested every year and all the workers are tested once in every five year at least. Total 832 people have gone through PME in Calendar Year 2023 till Sep-2023 (PME Report Enclosed).
xi.	A separate environmental management cell with suitable qualified personnel shall be set up under the control of a Senior Executive, who will report directly to the Head of the company.	A separate environmental management cell at Company HQ, headed by GM (Env), and nine executives has been set up. For management at mine level a cell is also functional headed by Nodal Officer (A senior level Executive) Environment, who reports to Area General Manger with unit nodal officer at mine level. GM (Env) and Area General Manager reports directly to Director (Technical) of the company.
xii.	The funds embarked for environmental protection measures shall be kept in separate account and shall not be diverted for other purpose. Year-wise expenditure shall be reported to this Ministry and its concerned Regional Office.	35 Lakhs has been spent under Revenue budget of FY: 2023-24 of Environment which includes Water spraying, Plantation Creation and Maintenance Celebration of World Environment day, World Earth day and Pollution Control Board Taxes. Rs. 102 lakhs had been allotted under Capital Head of Environment for the FY: 2023-24 Capital Budget Activities 1) Installation of one no. CAAQMS at Sodepur Area .. Rs. 90 lakhs 2) Installation of Fixed Water Sprinkler at Bejdih Colliery Coal Depot under Sodepur Area.. Rs. 3 lakhs 3) Construction of one no. Park at Area Colony of

		Sodepur Area is under process.
xiii.	The project authorities shall advertise at least in two local newspapers widely circulated around the project, one of which shall be in vernacular language of the locality concerned within seven days of the clearance letter informing that the project has been accorded environmental clearance and a copy of the clearance letter is available with the State Pollution Control Board and may also be seen at the website of the Ministry of Environment, Forests & Climate Change at http://envfor.nic.in	Complied.
xiv.	A copy of the environment clearance letter shall be marked to concern Panchayat/Zila Parishad, Municipal Corporation or Urban local body and local NGO, if any, from whom any suggestion/representation has been received while processing the proposal. A copy of the clearance letter shall also be displayed on company's website.	The copy of the clearance letter has been communicated to the Kulti Municipal Corporation and Asansol municipal Corporation of Burdwan Dist.(WB).The copy has also been displayed in Company' website.
xv.	A copy of the environment clearance letter shall also be displayed on the website of the concerned State Pollution Control Board. The EC letter shall also be displayed at the Regional Office, district Industry sector and Collector's Office/Tehsildar's office for 30 days	Copy of EC letter sent to concerned panchayats and receiving copy with seal and signature of the Panchayat is available with the Environment Management Cell (EMC). EC letter displayed on company's website: http://www.easterncoal.gov.in/notices/cancel04022015.pdf
xvi.	The clearance letter shall be uploaded on the company's website. The compliance status of the stipulated environmental clearance conditions shall also be uploaded by the project authorities on their website and updated at least once every six	Complied.

	months so as to bring the same in public domain. The monitoring data of environmental quality parameter (air, water, noise and soil) and critical pollutant such as PM_{10} ,$PM_{2.5}$,SO_2 and NO_x (ambient) and critical sectoral parameters shall also be displayed t the entrance of the project premises and mine office and in corporate office and on company's website	
xvii.	The project proponent shall submit six monthly compliance reports on status of compliance of the stipulated environmental clearance conditions (both in hard copy and in e-mail) to the respective Regional Office of the Ministry, respective Zonal Offices of CPCB and SPCB.	The six-monthly compliance reports will be communicated to MOEF, respective Zonal Office. The present report is the compliance report from Apr-2023 to Sep-2023.
xviii.	The Regional Office of this Ministry located in the Region shall monitor compliance of the stipulated conditions. The Project authorities shall extend full cooperation to the office(s) of the Regional Office by furnishing the requisite data/information/monitoring reports.	The project is always ready to co-operate with the Ministry whenever required.
xix.	The Environmental statement for each financial year ending 31 march in Form-V is mandated to be submitted by the project proponent for the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be uploaded on the company's website along with the status of compliance of EC conditions and shall be sent to the respective Regional Offices of the MoEF&CC by e-mail.	The environmental statement for financial year 2022-23 ending 31st March 2023 in Form-V has been already submitted to West Bengal Pollution Control Board and mailed to the respective Regional Offices of the MoEF&CC.

Piezometric Borewell with Automatic Well Recorder at Sodepur 9/10 Pit.

Piezometric Borewell at Ranishayer Bejdih Colliery

RO PLANT AT CHINAKURI MINE I

RO PLANT AT SODEPUR 9/10 PIT.

RAIN WATER HARVESTING AT CHINKAURI GUEST HOUSE

SOLAR PANEL AT SODEPUR ARE OFFICE

SOLAR PANEL AT SODEPUR AREA VOACTIONAL TRAINING CENTER

SOLAR LIGHTS AT SODEPUR AREA OFFICE

PRESSURE FILTER AT BEJDIH COLLIERY

PRESSURE FILTER AT MITHANI COLLIERY

ORCHARD PLANTATION AT MITHANI COLLIERY CREATED IN 2014-15

2 HAC. PLANTATION AT PATMOHANA COLLIERY CREATED IN 2020-21

2 HAC. PLANTATION AT SODEPUR R COLLIERY CREATED IN 2022-23

2 HAC. PLANTATION AT MITHANI COLLIERY CREATED IN 2022-23

2 HAC. ORCHARD PLANTATION AT DHEMOMAIN COLLIERY CREATED IN 2023-24

BEAUTIFICATION WORK IN MINE PREMISES

SAPLING PLANTATION AND DISTRIBUTION DURING WORLD EARTH DAY AND WORLD ENVIRONMENT DAY

WATER SPRINKLING AT RADHANAGAR ROAD BY MOBILE WATER TANKER

FIXED WATER SPRINKLING SYSTEM AT CHINAKURI RAILWAY SIDING

FIXED WATER SPRINKLING SYSTEM AT MITHANI COAL DEPOT

WATER SPRINKLING BY MOBILE WATER TANKER AT VARIOUS COLLIRIES

GARLAND DRAIN AT NARSAMUDA COLLIERY

ENVIRONMENT MONITORING REPORT OF CLUSTER NO. 6

(FOR THE MONTH OF JUNE, 2023)

(SODEPUR AREA)

Eastern Coalfields Limited

cmpdi
A Mini Ratna Company

Regional Institute-1
Asansol (WB)

CHAPTER - I
INTRODUCTION

1.0 The environmental monitoring has been carried out as per conditions laid down by MoEF&CC while granting environmental clearance to different projects. CMPDIL has trained manpower and well equipped laboratory to carry out monitoring, analysis and R&D work in the field of environment.

Reports have been prepared for submission to MoEF&CC, SPCB and other statutory authorities.

CHAPTER-II
AMBIENT AIR QUALITY MONITORING

2.0 Ambient air quality sampling stations: Ambient air quality monitoring stations have been classified in to residential and industrial based on their locations in different clusters of mines. The sampling stations are as described below:

i) **Chhotadhemo primary school (6A1):** The sampler was placed at primary school of Chhotadhemo village to assess the ambient air quality of residential area.

ii) **Sodepur area guest house (6A2):** The sampler was placed at guest house of Sodepur area. This station was selected to assess the ambient air quality of residential area in the buffer zone of Sodepur area.

iii) **Mithani colliery office (6A3):** The sampler was placed at agent office of Mithani colliery. This station was selected to assess the ambient air quality of Industrial Area in the core zone where mining activities are in progress.

iv) **Kali mandir, Narsumada Colliery (6A4):** The sampler was placed at Kali mandir of Narsumada colliery. This station was selected to assess the ambient air quality of Industrial Area in the core zone where mining activities are in progress.

v) **Environment department, Borachak house ECL (6A5) :** The sampler was placed at Borachak house, environment department, ECL to assess the present ambient air quality status.

vi) **Parbelia Colliery ECL (6A6):** The sampler was placed at Parbelia colliery to assess the present ambient air quality status.

vii) **Electric office, Mouthdih colliery (6A8):** The sampler was placed at Electric office, Mouthdih colliery. This site was selected to assess the present ambient air quality status in industrial area of core zone of the project.

viii) **DGMS office, Sitarampur (6A9)**: The sampler was placed at DGMS office, Sitarampur. This site was selected to assess the present ambient air quality status in residential area.

ix) **Marichkota Village (6A10)**: The sampler was placed at Marichkota village. This site was selected to assess the present ambient air quality status in buffer zone of Salanpur area.

x) **Managers' office, Chinakuri pit no. 1 & 2 (6A11):** The sampler was placed at manager office of Chinakuri 1&2 pit. This site was selected to assess the present ambient air quality status in industrial area of core zone of the project.

xi) **CDS building, Chinakuri pit no. - 3 (6A12):** The sampler was placed near CDS building of Chinakuri 3 near railway siding. The station was selected to assess the impact of coal transport activities on present ambient air quality.

2.1 Methodology of sampling and analysis: The air quality sampling stations have been chosen keeping in view predominant wind direction and have been classified as permanent, pre monsoon (April – September) & post monsoon (October – March) air sampling stations. Particulate Matter (PM_{10}), Fine Particulate Matter ($PM_{2.5}$), Sulphur Dioxide (SO_2) and Oxides of Nitrogen (NO_x) are monitored on fortnight basis. Heavy metals like Arsenic (As), Cadmium (Cd), Chromium (Cr), Mercury (Hg), Nickel (Ni) and Lead (Pb) are monitored half yearly.

The Respirable Suspended Particulate Matter (RSPM) Sampler & $PM_{2.5}$ Sampler machines are used for sampling of ambient air. The samples are collected and transported to Environmental Laboratory of CMPDI, RI-I, Asansol for analysis work.

2.2 Results & Interpretations: The observed value of Suspended Particulate Matter (SPM) varies from 104.6 to 322.3 µg/m^3 in industrial areas. The observed value of Particulate Matter (PM_{10}) varies from 59.3 to 264.7 µg/m^3 in industrial areas & from 87.2 to 209.9 µg/m^3 in residential areas. The observed value of Fine Particulate Matter ($PM_{2.5}$) varies from 18.7 to 46.4 µg/m^3 in industrial area & from 13.6 to 119.3 µg/m^3 in residential area· The observed value of Sulphur Dioxide (SO_2) has been found to be below 10 µg/m^3 in both industrial & residential areas· The observed value of Oxides of Nitrogen (NO_x) varies from 11.0 to 16.0 µg/m^3 in industrial areas & from 12.0 to 17.0 µg/m^3 in residential areas.

AMBIENT AIR QUALITY DATA

Name of the Customer: Eastern Coalfield Limited, Borachak House, P.O.-Sitarampur, Distt.-Paschim Bardhaman, West Bengal.

First fortnight:

Station Code	Station Name	Category of station	Date of Sampling	Parameter	Analytical Results (µg/m^3)	Name of method	Detection limit (µg/m^3)
6A1	Chhotadhemo primary school	Residential	02-Jun-23	PM_{10}	106.3	IS 5182 (Part 23): 2006	3.5
				$PM_{2.5}$	30.4	IS 5182 (Part 24): 2019	2.0
				SO_2	BDL	IS 5182 (Part 2): 2001	10
				NO_x	12.0	IS 5182 (Part 6): 2006	10
6A2	Sodepur area guest house	Residential	02-Jun-23	PM_{10}	110.5	IS 5182 (Part 23): 2006	3.5
				$PM_{2.5}$	38.6	IS 5182 (Part 24): 2019	2.0
				SO_2	BDL	IS 5182 (Part 2): 2001	10
				NO_x	15.0	IS 5182 (Part 6): 2006	10
6A3	Mithani colliery office	Industrial	15-Jun-23	SPM	192.6	IS 5182 (Part 4): 2019	5.0
				PM_{10}	157.3	IS 5182 (Part 23): 2006	3.5
				$PM_{2.5}$	18.7	IS 5182 (Part 24): 2019	2.0
				SO_2	BDL	IS 5182 (Part 2): 2001	10
				NO_x	14.0	IS 5182 (Part 6): 2006	10
6A4	Kali mandir, Narsumada Colliery	Industrial	15-Jun-23	SPM	306.8	IS 5182 (Part 4): 2019	5.0
				PM_{10}	243.2	IS 5182 (Part 23): 2006	3.5
				$PM_{2.5}$	46.4	IS 5182 (Part 24): 2019	2.0
				SO_2	BDL	IS 5182 (Part 2): 2001	10
				NO_x	16.0	IS 5182 (Part 6): 2006	10
6A5	Environment department, Borachak house ECL	Residential	13-Jun-23	PM_{10}	141.5	IS 5182 (Part 23): 2006	3.5
				$PM_{2.5}$	13.6	IS 5182 (Part 24): 2019	2.0
				SO_2	BDL	IS 5182 (Part 2): 2001	10
				NO_x	BDL	IS 5182 (Part 6): 2006	10
6A6	Parbelia Colliery	Industrial	02-Jun-23	SPM	271.4	IS 5182 (Part 4): 2019	5.0
				PM_{10}	213.7	IS 5182 (Part 23): 2006	3.5
				$PM_{2.5}$	40.2	IS 5182 (Part 24): 2019	2.0
				SO_2	BDL	IS 5182 (Part 2): 2001	10
				NO_x	BDL	IS 5182 (Part 6): 2006	10

Station Code	Station Name	Category of station	Date of Sampling	Parameter	Analytical Results ($\mu g/m^3$)	Name of method	Detection limit ($\mu g/m^3$)
6A8	Electric office, Mouthdih colliery	Industrial	02-Jun-23	SPM	203.6	IS 5182 (Part 4): 2019	5.0
				PM_{10}	145.9	IS 5182 (Part 23): 2006	3.5
				$PM_{2.5}$	36.8	IS 5182 (Part 24): 2019	2.0
				SO_2	BDL	IS 5182 (Part 2): 2001	10
				NO_x	12.0	IS 5182 (Part 6): 2006	10
6A9	DGMS office, Sitarampur	Residential	13-Jun-23	PM_{10}	209.9	IS 5182 (Part 23): 2006	3.5
				$PM_{2.5}$	119.3	IS 5182 (Part 24): 2019	2.0
				SO_2	BDL	IS 5182 (Part 2): 2001	10
				NO_x	17.0	IS 5182 (Part 6): 2006	10
6A10	Marichkota Village	Residential	13-Jun-23	PM_{10}	115.6	IS 5182 (Part 23): 2006	3.5
				$PM_{2.5}$	36.8	IS 5182 (Part 24): 2019	2.0
				SO_2	BDL	IS 5182 (Part 2): 2001	10
				NO_x	BDL	IS 5182 (Part 6): 2006	10
6A11	Managers' office, Chinakuri pit no. 1 & 2	Industrial	02-Jun-23	SPM	322.3	IS 5182 (Part 4): 2019	5.0
				PM_{10}	264.7	IS 5182 (Part 23): 2006	3.5
				$PM_{2.5}$	43.6	IS 5182 (Part 24): 2019	2.0
				SO_2	BDL	IS 5182 (Part 2): 2001	10
				NO_x	BDL	IS 5182 (Part 6): 2006	10
6A12	CDS building, Chinakuri pit no. - 3	Industrial	02-Jun-23	SPM	286.9	IS 5182 (Part 4): 2019	5.0
				PM_{10}	224.6	IS 5182 (Part 23): 2006	3.5
				$PM_{2.5}$	44.2	IS 5182 (Part 24): 2019	2.0
				SO_2	BDL	IS 5182 (Part 2): 2001	10
				NO_x	BDL	IS 5182 (Part 6): 2006	10

*BDL-Below Detection Limit

Second fortnight:

Station Code	Station Name	Category of station	Date of Sampling	Parameter	Analytical Results (µg/m³)	Name of method	Detection limit (µg/m³)
6A1	Chhotadhemo primary school	Residential	21-Jun-23	PM_{10}	102.8	IS 5182 (Part 23): 2006	3.5
				$PM_{2.5}$	29.4	IS 5182 (Part 24): 2019	2.0
				SO_2	BDL	IS 5182 (Part 2): 2001	10
				NO_x	14.0	IS 5182 (Part 6): 2006	10
6A2	Sodepur area guest house	Residential	21-Jun-23	PM_{10}	88.2	IS 5182 (Part 23): 2006	3.5
				$PM_{2.5}$	45.0	IS 5182 (Part 24): 2019	2.0
				SO_2	BDL	IS 5182 (Part 2): 2001	10
				NO_x	16.0	IS 5182 (Part 6): 2006	10
6A3	Mithani colliery office	Industrial	28-Jun-23	SPM	104.6	IS 5182 (Part 4): 2019	5.0
				PM_{10}	59.3	IS 5182 (Part 23): 2006	3.5
				$PM_{2.5}$	24.9	IS 5182 (Part 24): 2019	2.0
				SO_2	BDL	IS 5182 (Part 2): 2001	10
				NO_x	13.0	IS 5182 (Part 6): 2006	10
6A4	Kali mandir, Narsumada Colliery	Industrial	30-Jun-23	SPM	121.8	IS 5182 (Part 4): 2019	5.0
				PM_{10}	62.8	IS 5182 (Part 23): 2006	3.5
				$PM_{2.5}$	39.9	IS 5182 (Part 24): 2019	2.0
				SO_2	BDL	IS 5182 (Part 2): 2001	10
				NO_x	12.0	IS 5182 (Part 6): 2006	10
6A5	Environment department, Borachak house ECL	Residential	22-Jun-23	PM_{10}	87.2	IS 5182 (Part 23): 2006	3.5
				$PM_{2.5}$	34.7	IS 5182 (Part 24): 2019	2.0
				SO_2	BDL	IS 5182 (Part 2): 2001	10
				NO_x	BDL	IS 5182 (Part 6): 2006	10
6A6	Parbelia Colliery	Industrial	20-Jun-23	SPM	156.4	IS 5182 (Part 4): 2019	5.0
				PM_{10}	88.2	IS 5182 (Part 23): 2006	3.5
				$PM_{2.5}$	42.3	IS 5182 (Part 24): 2019	2.0
				SO_2	BDL	IS 5182 (Part 2): 2001	10
				NO_x	BDL	IS 5182 (Part 6): 2006	10
6A8	Electric office, Mouthdih colliery	Industrial	22-Jun-23	SPM	132.5	IS 5182 (Part 4): 2019	5.0
				PM_{10}	82.1	IS 5182 (Part 23): 2006	3.5
				$PM_{2.5}$	31.6	IS 5182 (Part 24): 2019	2.0

Station Code	Station Name	Category of station	Date of Sampling	Parameter	Analytical Results (µg/m^3)	Name of method	Detection limit (µg/m^3)
				SO_2	BDL	IS 5182 (Part 2): 2001	10
				NO_x	11.0	IS 5182 (Part 6): 2006	10
6A9	DGMS office, Sitarampur	Residential	30-Jun-23	PM_{10}	115.2	IS 5182 (Part 23): 2006	3.5
				$PM_{2.5}$	26.4	IS 5182 (Part 24): 2019	2.0
				SO_2	BDL	IS 5182 (Part 2): 2001	10
				NO_x	16.0	IS 5182 (Part 6): 2006	10
6A10	Marichkota Village	Residential	28-Jun-23	PM_{10}	87.5	IS 5182 (Part 23): 2006	3.5
				$PM_{2.5}$	28.2	IS 5182 (Part 24): 2019	2.0
				SO_2	BDL	IS 5182 (Part 2): 2001	10
				NO_x	BDL	IS 5182 (Part 6): 2006	10
6A11	Managers' office, Chinakuri pit no. 1 & 2	Industrial	21-Jun-23	SPM	184.3	IS 5182 (Part 4): 2019	5.0
				PM_{10}	138.5	IS 5182 (Part 23): 2006	3.5
				$PM_{2.5}$	26.9	IS 5182 (Part 24): 2019	2.0
				SO_2	BDL	IS 5182 (Part 2): 2001	10
				NO_x	BDL	IS 5182 (Part 6): 2006	10
6A12	CDS building, Chinakuri pit no. - 3	Industrial	22-Jun-23	SPM	216.2	IS 5182 (Part 4): 2019	5.0
				PM_{10}	167.0	IS 5182 (Part 23): 2006	3.5
				$PM_{2.5}$	33.2	IS 5182 (Part 24): 2019	2.0
				SO_2	BDL	IS 5182 (Part 2): 2001	10
				NO_x	BDL	IS 5182 (Part 6): 2006	10

*BDL-Below Detection Limit

Environmental Standards for Ambient Air Quality (AAQ):

Environmental standard for Raniganj Coalfield vide MOEF, Govt. of India, Gazette Notification No. GSR 742 (E) dated 25.09.2000 for 24 hourly samples at 500 meters from dust generating point					National Ambient Air Quality Standards (NAAQS), 2009 for industrial, residential and rural areas for 24 hours samples				
Pollutant Concentration (µg/m^3)					Pollutant Concentration (µg/m^3)				
SPM	PM_{10}	$PM_{2.5}$	SO_2	NO_x	SPM	PM_{10}	$PM_{2.5}$	SO_2	NO_x
600.0	300.0	Not Specified	120.0	120.0	Not Specified	100.0	60.0	80.0	80.0

CHAPTER – III
WATER QUALITY MONITORING

3.1 Mine water sampling stations:

i) **Dhemomain UG (6MW1):** This location has been selected to monitor the discharge quality of mine effluent after sedimentation tank.

ii) **Narsamuda UG (6MW3)**: This location has been selected to monitor the discharge quality of mine effluent to natural surface streams.

Iii) **Patmohana UG (6MW4)**: This location has been selected to monitor the discharge quality of mine effluent discharged to natural surface streams.

iv) **Chinakuri I & 2 UG (6MW5)**: This location has been selected to monitor the discharge quality of mine effluent to natural surface streams after sedimentation tank.

v) **Chinakuri III UG (6MW6)**:This location has been selected to monitor the discharge quality of mine effluent after sedimentation tank.

vi) **Mouthdih UG (6MW7)**: This location has been selected to monitor the discharge quality of mine effluent after sedimentation tank.

vii) **Bejdih UG (6MW8)**: This location has been selected to monitor the discharge quality of Mine effluent after sedimentation tank.

viii) **Mithani UG (6MW9)**:This location has been selected to monitor the discharge quality of mine effluent after sedimentation tank.

3.2 Methodology of sampling and analysis: The water samples are collected as per standard practice and transported to environment laboratory for analysis work.

The mine water samples are collected and analysed for five parameters on fortnightly basis except during the month of March and September when mine water samples are analysed for 29 parameters.

The ground water samples were collected and analysed for 26 parameters during the month of May. Drinking water samples are collected and analysed during the month of March and September.

3.3 Results & Interpretations: The results are given in tabular form along with the applicable standards. Results are compared with General Standards for Discharge of Effluent (Schedule VI) in case of effluent/mine water sample and compared with IS.10500: 2012 in case of drinking/ground water samples.

First fortnight:

Sl. No.	Parameters	Analytical results (mg/l)				General Standards for Discharge of Effluent (Schedule VI)	Name of Method	Detection Limit (mg/l)
	Station Code	**6MW1**	**6MW3**	**6MW4**	**6MW5**			
	Date of sampling	15-Jun-23	01-Jun-23	01-Jun-23	01-Jun-23			
1	pH value	8.02	7.19	7.08	7.76	5.5 - 9.0	IS 3025 (Part 11): 2003	2.0
2	TSS	BDL	BDL	BDL	BDL	100	IS 3025 (Part 17): 1984	10.0
3	TDS	557	473	629	648	Not specified	IS 3025 (Part 16): 1984	25.0
4	Oil & Grease	BDL	BDL	BDL	BDL	10	IS 3025 (Part 39): 1991	2.0
5	COD	4	12	16	12	250	APHA 5220C Closed Reflux	4.0

Sl. No.	Parameters	Analytical results (mg/l)				General Standards for Discharge of Effluent (Schedule VI)	Name of Method	Detection Limit (mg/l)
	Station Code	**6MW6**	**6MW7**	**6MW8**	**6MW9**			
	Date of sampling	01-Jun-23	15-Jun-23	01-Jun-23	01-Jun-23			
1	pH value	8.14	8.12	7.23	7.49	5.5 - 9.0	IS 3025 (Part 11): 2003	2.0
2	TSS	BDL	10.91	BDL	BDL	100	IS 3025 (Part 17): 1984	10.0
3	TDS	552	528	648	402	Not specified	IS 3025 (Part 16): 1984	25.0
4	Oil & Grease	BDL	BDL	BDL	BDL	10	IS 3025 (Part 39): 1991	2.0
5	COD	8	8	20	4	250	APHA 5220C Closed Reflux	4.0

*BDL-Below Detection Limit

All values are expressed in mg/l except pH.

Second fortnight:

Sl. No.	Parameters	Analytical results (mg/l)				General Standards for Discharge of Effluent (Schedule VI)	Name of Method	Detection Limit (mg/l)
	Station Code	**6MW1**	**6MW3**	**6MW4**	**6MW5**			
	Date of sampling	29-Jun-23	20-Jun-23	29-Jun-23	20-Jun-23			
1	pH value	8.18	7.53	7.29	7.67	5.5 - 9.0	IS 3025 (Part 11): 2003	2.0
2	TSS	BDL	BDL	BDL	BDL	100	IS 3025 (Part 17): 1984	10.0
3	TDS	540	462	658	630	Not specified	IS 3025 (Part 16): 1984	25.0
4	Oil & Grease	BDL	BDL	BDL	BDL	10	IS 3025 (Part 39): 1991	2.0
5	COD	12	12	8	12	250	APHA 5220C Closed Reflux	4.0

Sl. No.	Parameters	Analytical results (mg/l)				General Standards for Discharge of Effluent (Schedule VI)	Name of Method	Detection Limit (mg/l)
	Station Code	**6MW6**	**6MW7**	**6MW8**	**6MW9**			
	Date of sampling	20-Jun-23	20-Jun-23	29-Jun-23	20-Jun-23			
1	pH value	8.41	8.32	7.29	7.32	5.5 - 9.0	IS 3025 (Part 11): 2003	2.0
2	TSS	BDL	10.58	BDL	BDL	100	IS 3025 (Part 17): 1984	10.0
3	TDS	537	550	621	427	Not specified	IS 3025 (Part 16): 1984	25.0
4	Oil & Grease	BDL	BDL	BDL	BDL	10	IS 3025 (Part 39): 1991	2.0
5	COD	4	8	4	8	250	APHA 5220C Closed Reflux	4.0

*BDL-Below Detection Limit

All values are expressed in mg/l except pH.

DRINKING WATER QUALITY

Name of the Customer: Eastern Coalfield Limited, Borachak House, P.O.-Sitarampur, Distt.-Paschim Bardhaman.

Name of station & code: **6FDW1 - RO Plant 5000 LPH at Chinakuri Agent office & 6FDW2 - RO Plant 5000 LPH at Sodepur 9/10 pit**

Sl. No.	Parameters	Analytical Results		Indian Standard Drinking Water (IS-10500 :2012)		Method of detection	Detection Limit
	Sample code	6FDW1	6FDW2				
	Sampling Date	14-Jun-23	14-Jun-23	Acceptable Limit	Permissible Limit		
1	Colour, Hazen	5	3	5.0	15.0	IS 3025 (Part 6): 2018	1.0
2	Odour	Unobjectionable	Unobjectionable	Unobjectionable		IS 3025 (Part 6): 2018	-
3	Taste	Agreeable	Agreeable	Agreeable		IS 3025 (Part 7): 1984	-
4	Turbidity, NTU	BDL	BDL	1	5	IS 3025 (Part 10): 1984	1.0
5	pH	7.77	7.81	6.5-8.5	No relaxation	IS 3025 (Part 11): 1983	2.0
6	Total Hardness	35.64	51.48	300	600	IS 3025 (Part 21): 2009	4.0
7	Iron	BDL	BDL	0.3	No relaxation	IS 3025 (Part 53): 2003	0.06
8	Chlorides	5.58	7.80	250	1000	IS 3025 (Part 32): 1988	2.0
9	Residual Free Chlorine	0.03	0.02	0.2	1	APHA 4500F DPD Ferrous Titrimetric	0.02
10	Dissolved Solids	108	196	500	2000	IS 3025 (Part 16): 1984	10.0
11	Calcium	9.52	11.11	75	200	IS 3025 (Part 40): 1991	1.60
12	Copper	BDL	BDL	0.05	1.5	APHA 3111B AAS Flame	0.03
13	Manganese	0.03	0.02	0.1	0.3	APHA 3111B AAS Flame	0.02
14	Sulphate	11.32	8.36	200	400	APHA 4500D Turbidimetric	2.0
15	Nitrate	1.82	2.82	45	No relaxation	IS 3025 (Part 34): 1988	0.5
16	Fluoride	0.30	0.33	1	1.5	APHA 4500 D SPANDS	0.02
17	Selenium	BDL	BDL	0.01	No relaxation	APHA 3111B AAS Flame	0.002
18	Arsenic	BDL	BDL	0.01	0.05	APHA 3112B AAS VGA	0.002
19	Lead	BDL	BDL	0.01	No relaxation	APHA 3113B AAS GTA	0.005
20	Zinc	BDL	BDL	5	15	APHA 3111B AAS Flame	0.01
21	Hex Chromium	BDL	BDL	0.05	0.05	APHA 3500B Colorimetric	0.01
22	Boron	BDL	BDL	0.5	1	IS 3025 (Part 57): 2005	0.20
23	Coliforms (MPN)	NIL	NIL	Not Specified		APHA Multiple Tube Fermentation	1.0
24	Phenolics	BDL	BDL	0.001	0.002	IS 3025 (Part 43): 1992	0.001
25	Alkalinity	23.76	30.70	200	600	IS 3025 (Part 23): 1986	4.0
26	Cadmium	BDL	BDL	0.003	No relaxation	APHA 3113B AAS GTA	0.0005

* BDL- Below Detection Limit.

All values are expressed in mg/l unless specified.

DRINKING WATER QUALITY

Name of the Customer: Eastern Coalfield Limited, Borachak House, P.O.-Sitarampur, Distt.-Paschim Bardhaman.

Name of station & code: **6FDW3 - Slow Sand Filter at Dhemomain Incline &**
6FDW4 - Slow Sand Filter at Narsumuda

Sl. No.	Parameters	Analytical Results		Indian Standard Drinking Water (IS-10500 :2012)		Method of detection	Detection Limit
	Sample code	6FDW3	6FDW4				
	Sampling Date	15-Jun-23	14-Jun-23	Acceptable Limit	Permissible Limit		
1	Colour, Hazen	2	2	5.0	15.0	IS 3025 (Part 6): 2018	1.0 Hazen
2	Odour	Unobjectionable	Unobjectionable	Unobjectionable		IS 3025 (Part 6): 2018	-
3	Taste	Agreeable	Agreeable	Agreeable		IS 3025 (Part 7): 1984	-
4	Turbidity, NTU	BDL	BDL	1	5	IS 3025 (Part 10): 1984	1.0 NTU
5	pH	7.99	7.91	6.5-8.5	No relaxation	IS 3025 (Part 11): 1983	2.0
6	Total Hardness	324.72	130.68	300	600	IS 3025 (Part 21): 2009	4.0
7	Iron	BDL	BDL	0.3	No relaxation	IS 3025 (Part 53): 2003	0.06
8	Chlorides	50.19	33.46	250	1000	IS 3025 (Part 32): 1988	2.0
9	Residual Free Chlorine	0.04	0.03	0.2	1	APHA 4500F DPD Ferrous Titrimetric	0.02
10	Dissolved Solids	585	443	500	2000	IS 3025 (Part 16): 1984	10.0
11	Calcium	46.02	17.46	75	200	IS 3025 (Part 40): 1991	1.60
12	Copper	BDL	BDL	0.05	1.5	APHA 3111B AAS Flame	0.03
13	Manganese	0.03	0.03	0.1	0.3	APHA 3111B AAS Flame	0.02
14	Sulphate	59.32	164.30	200	400	APHA 4500D Turbidimetric	2.0
15	Nitrate	2.10	1.62	45	No relaxation	IS 3025 (Part 34): 1988	0.5
16	Fluoride	0.24	0.36	1	1.5	APHA 4500 D SPANDS	0.02
17	Selenium	BDL	BDL	0.01	No relaxation	APHA 3111B AAS Flame	0.002
18	Arsenic	BDL	BDL	0.01	0.05	APHA 3112B AAS VGA	0.002
19	Lead	BDL	BDL	0.01	No relaxation	APHA 3113B AAS GTA	0.005
20	Zinc	BDL	BDL	5	15	APHA 3111B AAS Flame	0.01
21	Hex Chromium	BDL	BDL	0.05	0.05	APHA 3500B Colorimetric	0.01
22	Boron	BDL	BDL	0.5	1	IS 3025 (Part 57): 2005	0.20
23	Coliforms (MPN)	NIL	NIL	Not Specified		APHA Multiple Tube Fermentation	1.0
24	Phenolics	BDL	BDL	0.001	0.002	IS 3025 (Part 43): 1992	0.001
25	Alkalinity	257.40	237.60	200	600	IS 3025 (Part 23): 1986	4.0
26	Cadmium	BDL	BDL	0.003	No relaxation	APHA 3113B AAS GTA	0.0005

* BDL- Below Detection Limit. *All values are expressed in mg/l unless specified.*

DRINKING WATER QUALITY

Name of the Customer: Eastern Coalfield Limited, Borachak House, P.O.-Sitarampur, Distt.-Paschim Bardhaman.

Name of station & code: **6FDW5 - Pressure Filter at Mithani Colliery &**
6FDW6 - Pressure Filter at Parbelia Colliery

Sl. No.	Parameters	Analytical Results		Indian Standard Drinking Water (IS-10500 :2012)		Method of detection	Detection Limit
	Sample code	6FDW5	6FDW6				
	Sampling Date	14-Jun-23	14-Jun-23	Acceptable Limit	Permissible Limit		
1	Colour, Hazen	3	2	5.0	15.0	IS 3025 (Part 6): 2018	1.0
2	Odour	Unobjectionable	Unobjectionable	Unobjectionable		IS 3025 (Part 6): 2018	-
3	Taste	Agreeable	Agreeable	Agreeable		IS 3025 (Part 7): 1984	-
4	Turbidity, NTU	BDL	BDL	1	5	IS 3025 (Part 10): 1984	1.0
5	pH	7.24	8.00	6.5-8.5	No relaxation	IS 3025 (Part 11): 1983	2.0
6	Total Hardness	297.00	122.76	300	600	IS 3025 (Part 21): 2009	4.0
7	Iron	BDL	BDL	0.3	No relaxation	IS 3025 (Part 53): 2003	0.06
8	Chlorides	70.64	20.45	250	1000	IS 3025 (Part 32): 1988	2.0
9	Residual Free Chlorine	0.04	0.03	0.2	1	APHA 4500F DPD Ferrous Titrimetric	0.02
10	Dissolved Solids	708	306	500	2000	IS 3025 (Part 16): 1984	10.0
11	Calcium	30.15	28.57	75	200	IS 3025 (Part 40): 1991	1.60
12	Copper	BDL	BDL	0.05	1.5	APHA 3111B AAS Flame	0.03
13	Manganese	0.03	0.03	0.1	0.3	APHA 3111B AAS Flame	0.02
14	Sulphate	198.56	46.36	200	400	APHA 4500D Turbidimetric	2.0
15	Nitrate	5.82	2.20	45	No relaxation	IS 3025 (Part 34): 1988	0.5
16	Fluoride	0.46	0.46	1	1.5	APHA 4500 D SPANDS	0.02
17	Selenium	BDL	BDL	0.01	No relaxation	APHA 3111B AAS Flame	0.002
18	Arsenic	BDL	BDL	0.01	0.05	APHA 3112B AAS VGA	0.002
19	Lead	BDL	BDL	0.01	No relaxation	APHA 3113B AAS GTA	0.005
20	Zinc	BDL	BDL	5	15	APHA 3111B AAS Flame	0.01
21	Hex Chromium	BDL	BDL	0.05	0.05	APHA 3500B Colorimetric	0.01
22	Boron	BDL	BDL	0.5	1	IS 3025 (Part 57): 2005	0.20
23	Coliforms (MPN)	NIL	NIL	Not Specified		APHA Multiple Tube Fermentation	1.0
24	Phenolics	BDL	BDL	0.001	0.002	IS 3025 (Part 43): 1992	0.001
25	Alkalinity	237.60	126.72	200	600	IS 3025 (Part 23): 1986	4.0
26	Cadmium	BDL	BDL	0.003	No relaxation	APHA 3113B AAS GTA	0.0005

* BDL- Below Detection Limit. *All values are expressed in mg/l unless specified*.

DRINKING WATER QUALITY

Name of the Customer: Eastern Coalfield Limited, Borachak House, P.O.-Sitarampur, Distt.-Paschim Bardhaman.

Name of station & code: **6FDW7 - Slow Sand Filter at Patmohana Colliery**

Sl. No.	Parameters	Analytical Results	Indian Standard Drinking Water (IS-10500 :2012)		Method of detection	Detection Limit
	Sample code	6FDW7				
	Sampling Date	15-Jun-23	Acceptable Limit	Permissible Limit		
1	Colour, Hazen	4	5.0	15.0	IS 3025 (Part 6): 2018	1.0
2	Odour	Unobjectionable	Unobjectionable		IS 3025 (Part 6): 2018	-
3	Taste	Agreeable	Agreeable		IS 3025 (Part 7): 1984	-
4	Turbidity, NTU	BDL	1	5	IS 3025 (Part 10): 1984	1.0
5	pH	8.25	6.5-8.5	No relaxation	IS 3025 (Part 11): 1983	2.0
6	Total Hardness	39.60	300	600	IS 3025 (Part 21): 2009	4.0
7	Iron	BDL	0.3	No relaxation	IS 3025 (Part 53): 2003	0.06
8	Chlorides	48.33	250	1000	IS 3025 (Part 32): 1988	2.0
9	Residual Free Chlorine	0.03	0.2	1	APHA 4500F DPD Ferrous Titrimetric	0.02
10	Dissolved Solids	628	500	2000	IS 3025 (Part 16): 1984	10.0
11	Calcium	9.52	75	200	IS 3025 (Part 40): 1991	1.60
12	Copper	BDL	0.05	1.5	APHA 3111B AAS Flame	0.03
13	Manganese	0.03	0.1	0.3	APHA 3111B AAS Flame	0.02
14	Sulphate	102.34	200	400	APHA 4500D Turbidimetric	2.0
15	Nitrate	2.12	45	No relaxation	IS 3025 (Part 34): 1988	0.5
16	Fluoride	0.36	1	1.5	APHA 4500 D SPANDS	0.02
17	Selenium	BDL	0.01	No relaxation	APHA 3111B AAS Flame	0.002
18	Arsenic	BDL	0.01	0.05	APHA 3112B AAS VGA	0.002
19	Lead	BDL	0.01	No relaxation	APHA 3113B AAS GTA	0.005
20	Zinc	0.01	5	15	APHA 3111B AAS Flame	0.01
21	Hex Chromium	BDL	0.05	0.05	APHA 3500B Colorimetric	0.01
22	Boron	BDL	0.5	1	IS 3025 (Part 57): 2005	0.20
23	Coliforms (MPN)	NIL	Not Specified		APHA Multiple Tube Fermentation	1.0
24	Phenolics	BDL	0.001	0.002	IS 3025 (Part 43): 1992	0.001
25	Alkalinity	495.00	200	600	IS 3025 (Part 23): 1986	4.0
26	Cadmium	BDL	0.003	No relaxation	APHA 3113B AAS GTA	0.0005

* BDL- Below Detection Limit. *All values are expressed in mg/l unless specified*.

NOISE LEVEL MONITORING

4.1 Location of sampling sites and their rationale:

i) **Dhemomain UG (6N1)**: Noise level meter placed at Dhemomain pit – top to assess the noise level at workplace.

ii) **Sodepur UG (6N2)**: Noise level meter placed at Sodepur pit – top to assess the noise level at workplace.

iii) **Narsamuda UG (6N3)**: Noise level meter placed at Narsamuda pit – top to assess the noise level at workplace.

iv) **Patmohana UG (6N4)**: Noise level meter placed at Patmohana pit – top to assess the noise level at workplace.

v) **Sodepur Workshop (6N5)**: To assess the noise level at workplace, the noise levels were recorded in the mine area where all mining activities are in progress.

vi) **Chinakuri III UG (6N6)**: Noise level meter placed at Chinakuri III pit – top to assess the noise level at workplace.

vii) **Bejdih UG (6N7)**: Noise level meter placed at Bejdih pit – top to assess the noise level at workplace.

viii) **Mithani UG (6N8)**: Noise level meter placed at Methani pit – top to assess the noise level at workplace.

4.2 Methodology of sampling and analysis: Noise level monitoring is being carried out on quarterly basis at designated monitoring stations. The noise level is observed at the monitoring stations during day and night time. Noise level measurements are taken in form of 'Leq' using Integrated Data Logging Sound Level Meter. Noise levels are measured in decibels, 'A' weighted average, i.e. dB(A).

4.3 Results & Interpretations: The observed values of noise level measurements are compared with Noise Pollution (Regulation and Control) Rules, 2000. The observed values of noise level are as shown in table below:

NOISE LEVEL REPORT

Name of the Customer: Eastern Coalfield Limited, Borachak House, P.O.-Sitarampur, Distt.-Paschim Bardhaman, West Bengal.

Station Code	Station Name	Date of sampling	Sampling duration (hrs.)	Day – time Noise Level dB(A) Leq	Night – time Noise Level dB(A) Leq	Day – Night Noise Level dB(A) Leq
6N1	Dhemomain UG Pit Top	12-Apr-23	16.14 to 15.34	67.34	52.34	65.56
6N2	Sodepur UG Pit Top	12-Apr-23	15.33 to 12.38	51.13	41.71	49.34
6N3	Narsamuda UG Pit Top	26-May-23	16.52 to 16.14	66.53	59.82	65.21
6N4	Patmohana UG Pit Top	22-Jun-23	15.38 to 13.34	65.31	40.80	63.24
6N5	Sodepur Workshop	26-Apr-23	16.10 to 15.44	69.02	57.76	67.33
6N6	Chinakuri III UG Pit Top	25-Apr-23	16.11 to 15.46	78.67	59.49	76.84
6N7	Bejdih UG Pit Top	23-Jun-23	15.50 to 15.17	71.09	58.83	69.46
6N8	Methani UG Pit Top	13-Apr-23	16.25 to 15.11	63.50	59.93	62.56

Noise Pollution (Regulation and Control) Rules published in Gazette of India, vide S. O. 123 (E) dated 14.02.2000 under Environment Protection Act, 1986.

Station Category	Limits for noise (Leq dB (A))	
	Day Time: 6.00 AM to 10.00 PM	Night Time: 10.00 PM to 6.00 AM.
Industrial	75.0	70.0
Commercial	65.0	55.0
Residential	55.0	45.0
Silence Zone	50.0	40.0

ECL

Eastern Coalfields Limited
(A subsidiary of Coal India Limited)
ईस्टर्न कोलफील्ड्स लिमिटेड
(कोल इंडिया का एक अंग)

Office of the
Chief of Medical Services
Sanctoria, ECL (HQ)
Dishergarh, Burdwan 713333
Ph. No. 0341-2520813

Ref. No:- ECL/C-5 (E)/CMS(I/C)HQ/PME/23/ 101 **Date: 12-10-2023**

To

The GM (T&MS)/TS to CMD
ECL, Sanctoria

Sub: IME/PME report for the month of SEPTEMBER 2023

Dear Sir,

Please find the IME/PME Performance Report for the Month of SEPT 2023 as per the records received from respective area PME Centres and two Central Hospitals of ECL as mentioned below:

Sl. No.	Name of the PME Centre (Cov Area)	Periodical Medical Examination (PME) of Company Workers SEPT 2023					Initial Medical Examination (IME) before employement as Company Workers SEPT 2023		PME/IME of Contractual Worker SEPT 2023			
		PME Yearly Target for 2022 (1/5th of the total manpower)	PME Achieve-ment Above 45 yrs	PME Achieve-ment Below 45 yrs	Total Achieve-ment	Cumu-lative upto SEPT-23	IME Com-pany workers	Cumula-tive upto SEPT-23	PME Contractor worker	Cumula-tive upto SEPT-23	IME Contractor worker	Cumula-tive upto SEPT-23
1	CMD Office + HRD Office + Sanctoria Hospital+ ECL Sales Office + Pipe Line/Transit + Sodepur Central Store + Sodepur Central Workshop + Neamatpur Workshop + Mines Rescue Station Sitarampur	487	0	15	15	49	2	43	0	0	0	0
2	Central Hospital Kalla	99	7	3	10	59	0	0	0	0	0	0
3	Bankola Area + Ukhra Workshop	1787	96	39	135	1578	5	93	20	140	13	123
4	Jhanjra Area	774	33	6	39	683	3	44	25	93	56	255
5	Kajora Area + JK Ropeway	1610	58	14	72	1020	4	46	2	106	0	0
6	Kenda Area	1307	46	11	57	629	5	28	0	65	0	2
7	Kunustoria Area	1327	88	26	114	929	18	151	0	4	0	0
8	Mugma Area + Mugma Workshop + BEFW	1266	59	18	77	829	6	45	0	0	0	0
9	Pandaveswar Area	1257	103	52	155	928	1	41	32	301	0	12
10	Rajmahal Area	540	36	54	90	445	0	35	2	201	112	473
11	Salanpur Area	347	0	0	0	167	8	58	0	194	0	0
12	Satgram Area + Ratibati Workshop +Sripur Area + Ponihati Workshop	2015	84	34	118	1570	13	79	0	40	0	28
13	Sodpeur Area	1441	67	14	81	832	8	53	6	19	0	0
14	Sonepur Bazari Area	396	35	0	35	313	1	26	0	0	0	30
15	SP Mines Area	260	0	0	0	0	0	6	0	0	0	0
TOTAL		14912	712	286	998	10031	74	748	87	1163	181	923

This for your kind information and necessary action.

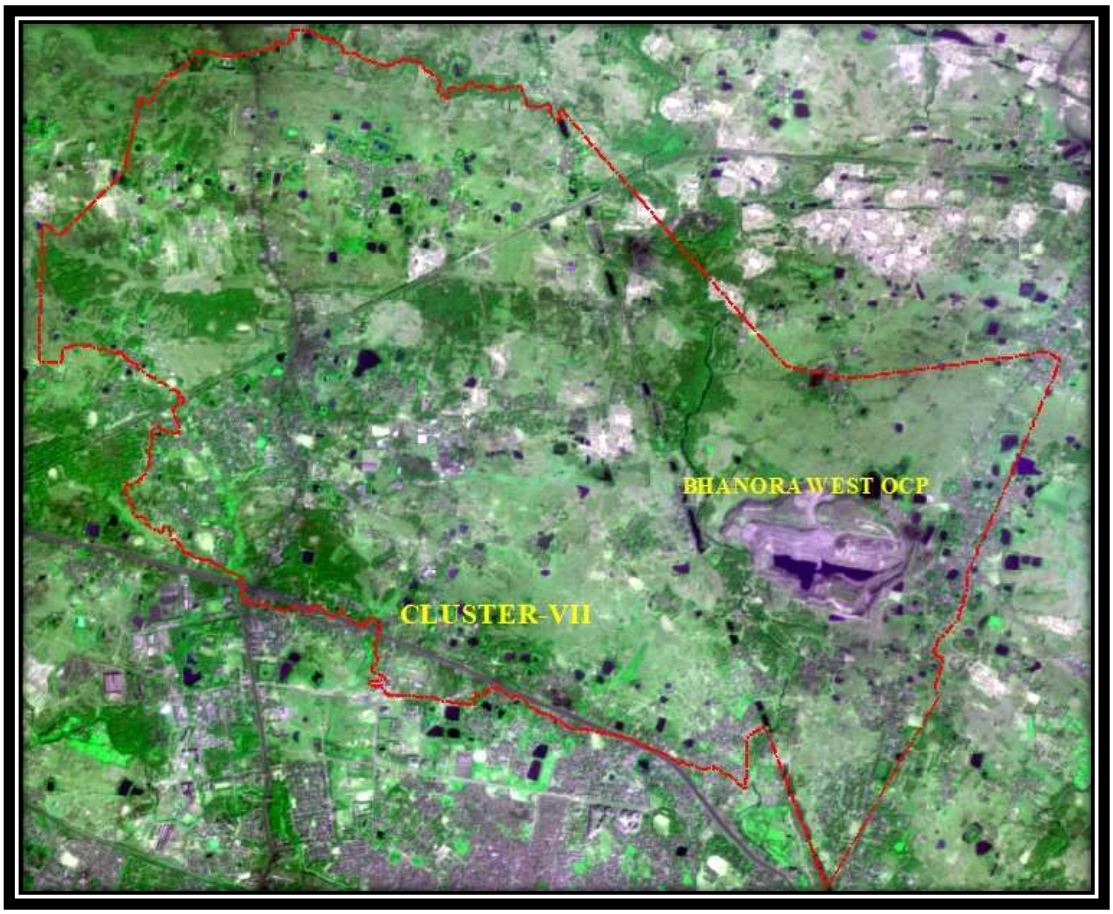
Yours faithfully,

12/10/23

CMO (I/C), ECL

Copy to through email:
TS to D(T) OP, TS to DT(P&P) TS to D(P), ECL
GM all Area, GM, Safety, ECL,HQ
CMO (I/C) SH, CMO (I/C) CHK
DyCMO (HQ) for related file

Land Reclamation/ Restoration Monitoring of Four Clusters of (Opencast + Underground) Coal Mines of Eastern Coalfields Limited based on Satellite Data of the Year 2021



Submitted to

Eastern Coalfields Limited

cmpdi

A Mini-Ratna Company

Land Reclamation / Restoration Monitoring of Four Clusters of (Opencast + Underground) Coal Mines of Eastern Coalfields Limited based on Satellite Data of the Year 2021

February - 2022

Remote Sensing Cell
Geomatics Division
CMPDI, Ranchi

CONTENTS

Executive Summary

1.0 Project

Land restoration / reclamation monitoring of four clusters of (Opencast + Underground) Coal Mines of Eastern Coalfields Ltd. (ECL) producing less than 5 million cu. m. (Coal + OB) per year, based on satellite data, on every three year basis.

2.0 Objective

Objective of the land restoration / reclamation monitoring is to assess the area under backfilling, plantation, social forestry, active mining area, water bodies, and distribution of wasteland, agricultural land and forest in the leasehold area of the clusters. This will help in assessing the progressive status of reclamation of mined land and to take up remedial measures, if any, required for environmental protection.

3.0 Salient Findings

- Four Clusters viz. Cluster - V, VI, VII and VIII were considered in 2021-22 for land reclamation/ restoration monitoring based on satellite data. These clusters consist of mainly underground mines and only few OC mines and patches.

- Since the clusters are having underground mines mainly, surface land has not been affected much due to mining in majority of the areas, except at the places and where opencast mines are present.

- Out of the total leasehold area of 18339.00 hectare, total excavated area is only 52.00 hectare, mostly belonging to the OC mines and patches. It is seen from the analysis that 46.15% of excavated area in OC mines has come under reclamation and 53.85% of the excavated area is under active mining. Cluster wise status of land reclamation is given in Table-1 & Fig-1.

- Total area under plantation covers an area of 988.00 ha. in 2021, which is 5.39% of total leasehold area. Plantation shows an overall increase of 9.47 ha. during the year 2018-21. This is due to the plantation activities taken up by the company (ECL) in plain areas, towards environmental protection.

- Bhanora West OCP in Cluster-VII is the only major opencast mine operating in the four clusters considered for land reclamation based on satellite data, in the year 2021-22.

Table - 1
Land Reclamation Status in Four Clusters of (UG + OC) Projects of ECL (< 5 M.C.M.) based on Satellite Data of the Year 2018 & 2021

(Area in Hectare)

Sl. No.	Project	Total Leasehold Area		Technical Reclamation		Plantation						Area under Active Mining		Total Excavated Area		Total Area under Plantation (% Green Cover Generated in Leasehold)		Total Area under Reclamation	
						Biological Reclamation		Other Plantations											
				Area under Backfilling		Plantation on Excavated / Backfilled Area		Plantation on External Over Burden Dumps		Social Forestry, Avanue Plantation Etc.									
1	*2*	*3*		*4*		*5*		*6*		*7*		*8*		*9 (=4+5+8)*		*10 (=5+6+7)*		*11(=4+5)*	
		2018	*2021*	*2018*	*2021*	*2018*	*2021*	*2018*	*2021*	*2018*	*2021*	*2018*	*2021*	*2018*	*2021*	*2018*	*2021*	*2018*	*2021*
1	**Cluster V**	**2970.00**	**2970.00**	0.00	0.00	0.00	0.00	0.00	0.00	119.94	123.00	0.00	0.00	0.00	0.00	119.94	123.00	0.00	0.00
																4.04%	4.14%		
2	**Cluster VI**	**4775.00**	**4775.00**	0.00	0.00	0.00	0.00	0.00	0.00	519.02	520.00	2.14	2.00	2.14	2.00	519.02	520.00	0.00	0.00
												100.00%	100.00%			10.87%	10.89%		
3	**Cluster VII**	**2313.00**	**2313.00**	9.43	24.00	0.00	0.00	0.00	0.00	143.21	140.00	24.19	26.00	33.62	50.00	143.21	140.00	9.43	24.00
				28.05%	48.00%							71.95%	52.00%			6.19%	6.05%	28.05%	48.00%
4	**Cluster VIII**	**8281.00**	**8281.00**	0.00	0.00	0.00	0.00	0.00	0.00	196.36	205.00	0.00	0.00	0.00	0.00	196.36	205.00	0.00	0.00
																2.37%	2.48%		
	TOTAL	**18339.00**	**18339.00**	**9.43**	**24.00**	**0.00**	**0.00**	**0.00**	**0.00**	**978.53**	**988.00**	**26.33**	**28.00**	**35.76**	**52.00**	**978.53**	**988.00**	**9.43**	**24.00**
				26.37%	**46.15%**	**0.00%**	**0.00%**					**73.63%**	**53.85%**			**5.34%**	**5.39%**	**26.37%**	**46.15%**

(% is calculated with respected to Excavated Area as applicable)

Note: In reference of the above Table, different parameters are classified as follows:

1. Area under Biological Reclamation includes Areas under Plantation done on Backfilled Area Only.
2. Area under Technical Reclamation includes Area under Backfilling only
3. Area under Active Mining Includes Coal Quarry, Advance Quarry Site and Quarry filled with water etc., if any.
4. Social Forestry and Plantation on External OB Dumps are not included in Biological Reclamation and are put under separate categories as shown in the above Table.
5. (**%**) calculated in the above Table is in respect to Total Excavated Area only, except for ""**Total Area under Plantation**"' where **%** is in terms of "**Leasehold Area**"'.

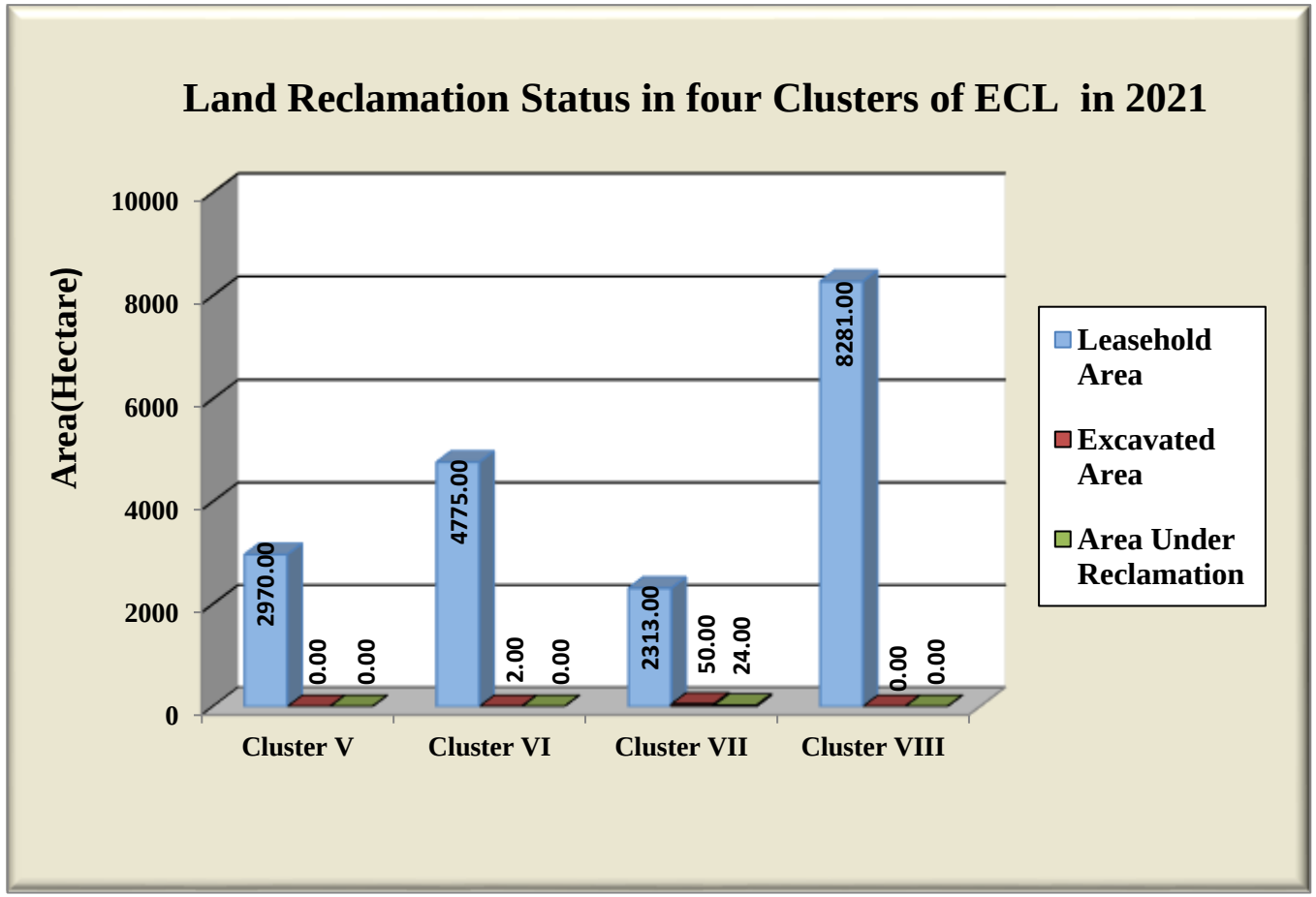


Figure 1: Cluster wise Land Reclamation Status in ECL - 2021

1.0 Background

1.1 Land is the most important natural resource which embodies soil, water, flora, fauna and total ecosystem. All human activities are based on the land which is the most scarce natural resource in our country. Mining is a site specific industry and it could not be shifted anywhere else from the location where mineral occurs. It is a fact that surface mining activities do affect the land environment due to ground breaking. Therefore, there is an urgent need to reclaim and restore the mined out land for its productive use for sustainable development of mining. This will not only mitigate environmental degradation, but would also help in creating a more congenial environment for land acquisition by coal companies in future.

1.2 Keeping above in view, Coal India Ltd. (**CIL**) issued a work order vide letter no. CIL/WBP/ENV/2017/DP/8477 dated 21.09.2017 to Central Mine Planning & Design Institute (**CMPDI**), Ranchi, for monitoring of clusters with coal mines (both underground and open cast projects) having less than 5 million m^3 per annum capacity (Coal +OB) at an interval of three years based on remote sensing satellite data for sustainable development of mining. Earlier, CMPDI used to carry out land reclamation monitoring for individual projects of less than 5 million capacity, but from 2018, the same is being be carried out cluster wise for mines of ECL & BCCL. For operational reasons and convenience, underground and opencast mines (often with multiple overlapping seams), have now been clustered together. The result of land reclamation status of all such mines are hosted on the website of CIL, (www.coalindia.in), CMPDI (www.cmpdi.co.in) and the concerned coal companies in public domain. Detailed report is submitted to Coal India and respective subsidiaries.

1.3 Land reclamation monitoring of all clusters of coal mining projects would also comply the statutory requirements of Ministry of Environment, Forest & Climate Change (**MoEF & CC**). Such monitoring would not only facilitate in taking timely mitigation measures against environmental degradation, but would also enable coal companies to utilize the reclaimed land for larger socio-economic benefits in a planned way.

1.4 Present report is embodying the finding of the study based on Satellite data of the year 2021 carried out for four clusters of mines comprising both underground and OC projects producing less than 5 mcm (Coal + OB) for Eastern Coalfields Ltd.

2.0 Objective

Objective of the land reclamation/restoration monitoring is to assess the area of backfilled, plantation, OB dumps, social forestry, active mining area, settlements and water bodies, distribution of wasteland, agricultural land and forest land in the leasehold area of the clusters. This is an important step taken up for assessing the progressive status of mined land reclamation and for taking up remedial measures, if any, required for environmental protection.

3.0 Methodology

There are number of steps involved between raw satellite data procurement and preparation of final map. National Remote Sensing Centre (**NRSC**) Hyderabad, being the nodal agency for satellite data supply in India, provides only raw digital satellite data, which needs further digital image processing for extracting the information and map preparation before uploading the same in the website. Methodology for land reclamation monitoring is given in fig 2. Following steps are involved in land reclamation /restoration monitoring:

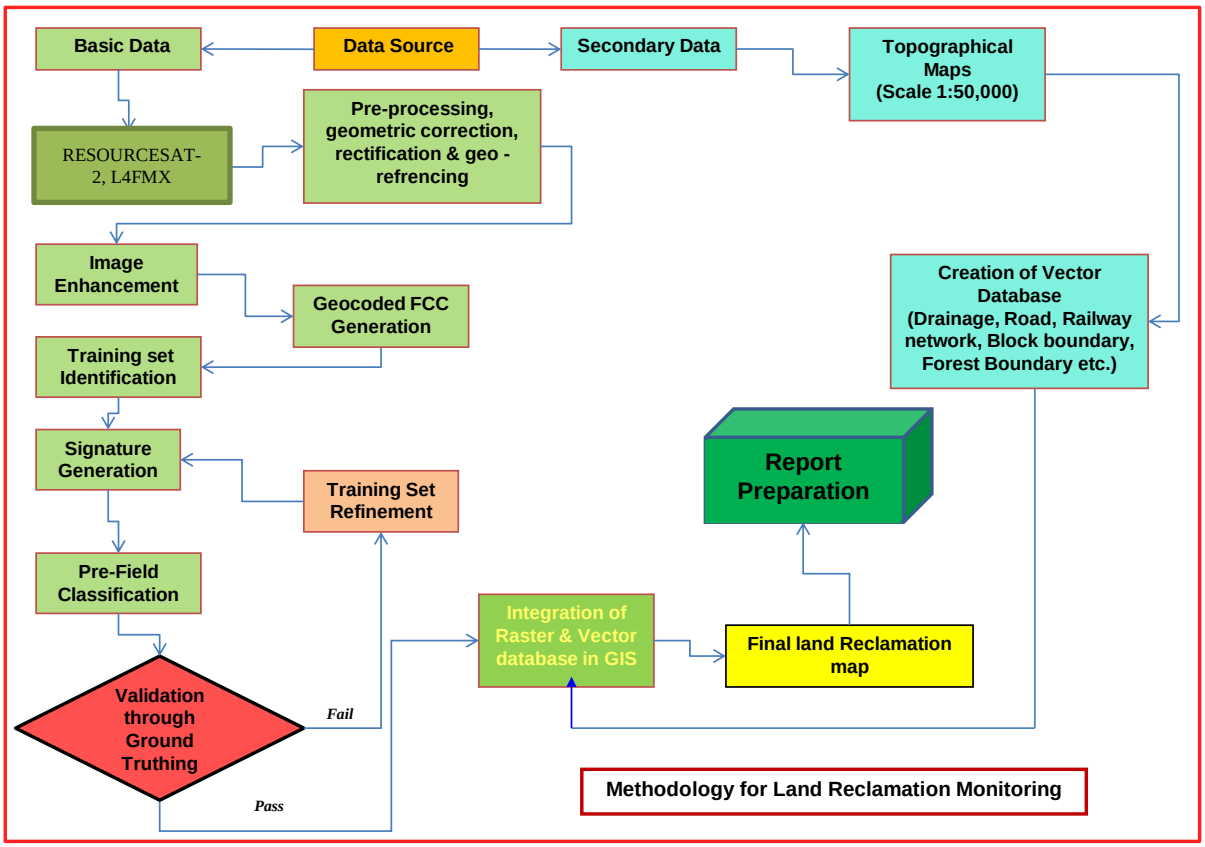


Figure 2: Methodology of Land Reclamation Monitoring

3.1 Data Procurement: After browsing the data quality and date of pass on internet, supply order for data is placed to NRSC. Secondary data like leasehold boundary, toposheet are procured for creation of vector database.

3.2 Satellite Data Processing: Satellite data are processed using ERDAS IMAGINE digital image processing s/w. Methodology involves the following major steps:

- **Rectification & Geo-referencing:** Inaccuracies in digital imagery may occur due to 'systematic errors' attributed to earth curvature and rotation as well as 'non-systematic errors' attributed to satellite receiving station itself. Raw digital images contain geometric distortions, which make them unusable as maps. Therefore, geo-

referencing is required for correction of image data using ground control points (GCP) to make it compatible to SoI toposheet.

- **Image enhancement:**

  To improve the interpretability of the raw data, image enhancement is necessary. Local operations modify the value of each pixel based on brightness value of neighbouring pixels using ERDAS IMAGINE 14.0 s/w. and enhance the image quality for interpretation.

- **Training set selection**

  Training set requires to be selected, so that software can classify the image data accurately. The image data are analysed based on the interpretation keys. These keys are evolved from certain fundamental image-elements such as tone/colour, size, shape, texture, pattern, location, association and shadow. Based on the image-elements and other geo-technical elements like land form, drainage pattern and physiography; training sets were selected/identified for each land use/cover class. Field survey was carried out by taking selective traverses in order to collect the ground information (or reference data) so that training sets are selected accurately in the image. This was intended to serve as an aid for classification.

- **Classification and Accuracy assessment**

  Image classification is carried out using the maximum likelihood algorithm. The classification proceeds through the following steps: (a) calculation of statistics [i.e. signature generation] for the identified training areas, and (b) the decision boundary of maximum probability based on the mean vector, variance, covariance and correlation matrix of the pixels. After evaluating the statistical parameters of the training sets, reliability test of training sets is conducted by measuring the statistical separation between the classes that resulted from computing divergence matrix.

The overall accuracy of the classification was finally assessed with reference to ground truth data.

- **Area calculation**

  The area of each land use class in the leasehold is determined using ERDAS IMAGINE v. 14.0 s/w.

- **Overlay of Vector data base**

  Vector data base is created based on secondary data. Vector layer like drainage, railway line, leasehold boundary, forest boundary etc. are superimposed on the image as vector layer in the Arc GIS database.

- **Pre-field map preparation**

  Pre-field map is prepared for validation of the classification result

3.3 Ground Truthing:

Selective ground verification of the land use classes are carried out in the field and necessary corrections if required, are incorporated before map finalization.

3.4 Land reclamation database on GIS:

Land reclamation database is created on GIS platform to identify the temporal changes identified from satellite data of different cut - of dates.

4.0 Land Reclamation Status in Eastern Coalfields Ltd.

4.1 In ECL, there are a total of twelve clusters of mines. Following four clusters of mines comprising both underground and OC projects producing less than 5 million cubic m. (Coal+OB together) of Eastern Coalfields Ltd. were taken up for land reclamation monitoring based on satellite data in the year 2021-22, on once in three year basis.

- Cluster **V** (Parbelia UG & OC, Dubeshwari UG& OC)
- Cluster **VI** (Dhemomain UG, Sodepur UG & OC, Narsamuda UG, Patmohana UG & OC Patch, Chinakuri I UG and Chinakuri III UG & OC Patch, Bejidih UG, Methani UG &OC Patch, Sheetalpur UG)
- Cluster **VII** (Barmondia UG, Chakballavpur UG, Manoharbahal UG, Bhanora West UG & OCP)
- Cluster **VIII** (Bhanora UG, Girmint /KDI UG, Sirpur UG, Sirpur Seam Incline UG, Ningah UG, Mithapur West UG & Mithapur West OC, Satgram UG)

4.2 All the four above clusters were mapped during the year 2018 and 2021, for assessing the changes in land use classes and monitoring the progress of land reclamation.

4.3 Area statistics of different land use classes present in the four clusters for the year 2021 is given in Table 2. Land use/ cover maps derived from the satellite data are given in Plate nos.1, 2, 3 & 4. The status of land use in clusters are shown in Fig. 3, 4, 5 & 6.

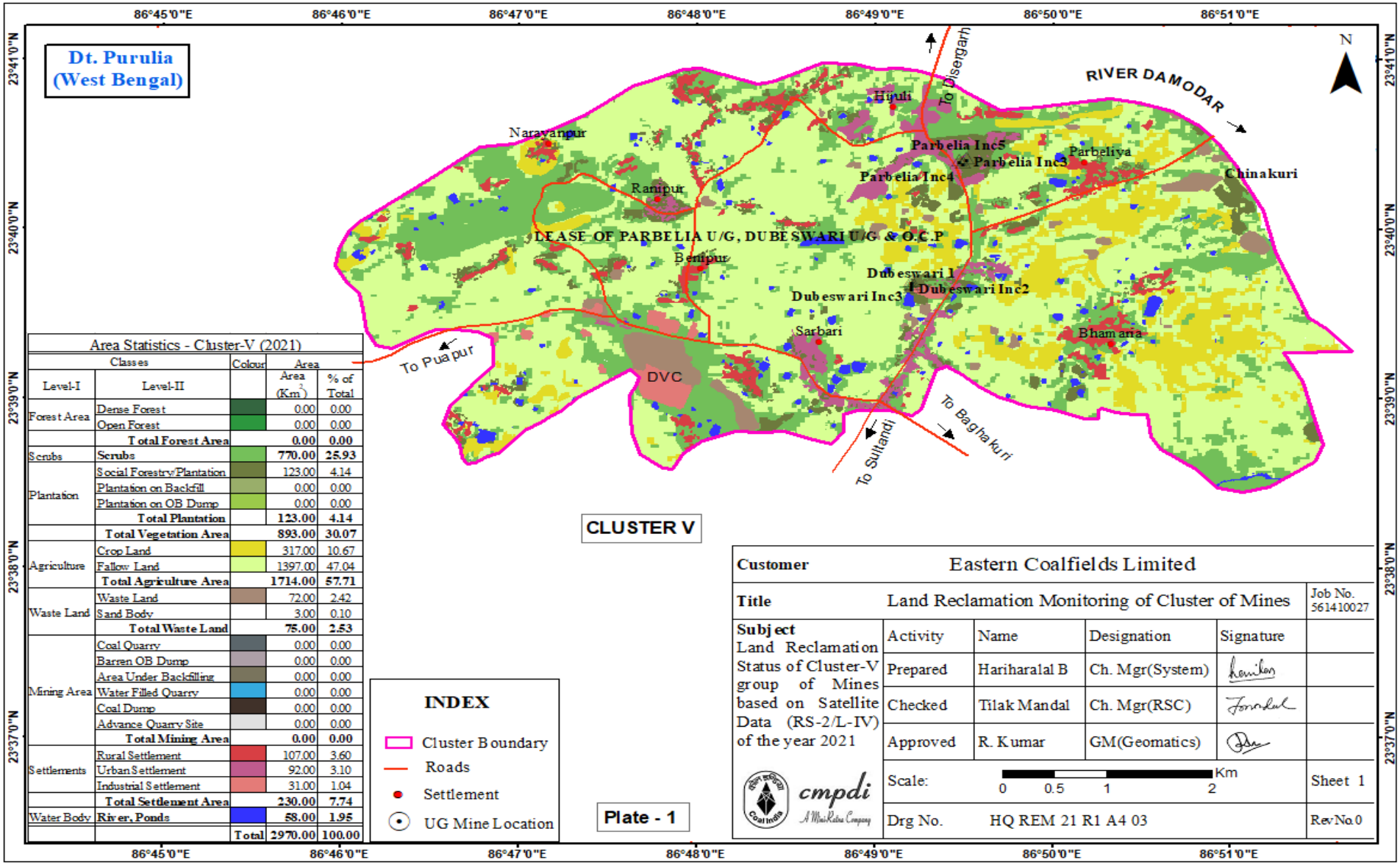
4.4 Study reveals that majority of the mines under the four clusters considered for monitoring are underground mines with one opencast mine, Bhanora west in Cluster-VII. It is seen that till monitoring time in 2021, 53.85% of total excavated area is under active mining and remaining 46.15% is under technical reclamation. Social forestry/ plantation cover an area of 5.39% of the total leasehold area of the four clusters.

4.5 Total area under plantation in four clusters increased by **9.47** ha., from 978.53 ha. in 2018 to 988 ha. in 2021. Noticeably, Sodepur area has developed and maintained two plantations, one in Dubeswari UG and one **Orchard** plantation in Aldi village.

Table - 2
Status of Land Reclamation in four Clusters of (OC + UG) Mines of Eastern Coalfields Limited based on Satellite Data of the Year 2021

(Area in Hectare)

		COL	CLUSTER V		CLUSTER VI		CLUSTER VII		CLUSTER VIII		TOTAL	
			Area	%	Area	%	Area	%	Area	%	Area	%
FORESTS	Dense Forest		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Open Forest		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total Forest		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SCRUBS	Scrubs		770.00	25.93	421.00	8.82	214.00	9.25	652.00	7.87	2057.00	11.22
PLANTATION	Social Forestry/Avenue Plantation		123.00	4.14	520.00	10.89	140.00	6.05	205.00	2.48	988.00	5.39
	Plantation on OB Dump		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Plantation on Backfill (Biological Reclamation)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total Plantation		123.00	4.14	520.00	10.89	140.00	6.05	205.00	2.48	988.00	5.39
	Total Vegetation		**893.00**	**30.07**	**941.00**	**19.71**	**354.00**	**15.30**	**857.00**	**10.35**	**3045.00**	**16.60**
	Coal Dump		0.00	0.00	0.00	0.00	1.00	0.04	0.00	0.00	1.00	0.01
ACTIVE MINING	Coal Quarry		0.00	0.00	2.00	0.04	15.00	0.65	0.00	0.00	17.00	0.09
	Advance Quarry Site		0.00	0.00	0.00	0.00	6.00	0.26	0.00	0.00	6.00	0.03
	Quarry Filled With Water		0.00	0.00	0.00	0.00	5.00	0.22	0.00	0.00	5.00	0.03
	Total Area under *Active Mining*		**0.00**	**0.00**	**2.00**	**0.04**	**26.00**	**1.13**	**0.00**	**0.00**	**28.00**	**0.15**
	Barren OB Dump		0.00	0.00	2.00	0.04	37.00	1.60	0.00	0.00	39.00	0.21
RECLAIM	Area Under Backfilling (Technical Reclamation)		0.00	0.00	0.00	0.00	24.00	1.04	0.00	0.00	24.00	0.13
	Total Area under *Technical Reclamation*		**0.00**	**0.00**	**0.00**	**0.00**	**24.00**	**1.04**	**0.00**	**0.00**	**24.00**	**0.13**
	Total Area under Mine Operation		**0.00**	**0.00**	**4.00**	**0.08**	**88.00**	**3.81**	**0.00**	**0.00**	**92.00**	**0.50**
WASTELAND	Waste Lands		72.00	2.42	140.00	2.93	64.00	2.77	405.00	4.89	681.00	3.71
	Fly Ash Pond / Sand Body		3.00	0.11	1.00	0.02	0.00	0.00	0.00	0.00	4.00	0.02
	Total Wasteland		**75.00**	**2.53**	**141.00**	**2.95**	**64.00**	**2.77**	**405.00**	**4.89**	**685.00**	**3.74**
WATERBODIES	Reservoir, Nallah, Ponds		58.00	1.95	110.00	2.30	71.00	3.07	320.00	3.86	559.00	3.05
	Total Waterbodies		**58.00**	**1.95**	**110.00**	**2.30**	**71.00**	**3.07**	**320.00**	**3.86**	**559.00**	**3.05**
AGRICULTURE	Crop Lands		317.00	10.67	805.00	16.86	675.00	29.18	2363.00	28.54	4160.00	22.68
	Fallow Lands		1397.00	47.04	1850.00	38.74	810.00	35.02	3411.00	41.19	7468.00	40.72
	Total Agriculture		**1714.00**	**57.71**	**2655.00**	**55.60**	**1485.00**	**64.20**	**5774.00**	**69.73**	**11628.00**	**63.41**
SETTLEMENTS	Rural Settlement		107.00	3.60	84.00	1.76	73.00	3.16	190.00	2.29	454.00	2.48
	Urban Settlement		92.00	3.10	762.00	15.96	154.00	6.66	670.00	8.09	1678.00	9.15
	Industrial Settlement		31.00	1.04	78.00	1.63	24.00	1.04	65.00	0.78	198.00	1.08
	Total Settlements		**230.00**	**7.74**	**924.00**	**19.35**	**251.00**	**10.86**	**925.00**	**11.16**	**2330.00**	**12.71**
	Grand Total		**2970.00**	**100.00**	**4775.00**	**100.00**	**2313.00**	**100.00**	**8281.00**	**100.00**	**18339.00**	**100.00**



Area Statistics - Cluster-V (2021)

Classes		Colour	Area	
Level-I	Level-II		Area (Km²)	% of Total
Forest Area	Dense Forest		0.00	0.00
	Open Forest		0.00	0.00
	Total Forest Area		**0.00**	**0.00**
Scrubs	**Scrubs**		**770.00**	**25.93**
Plantation	Social Forestry/Plantation		123.00	4.14
	Plantation on Backfill		0.00	0.00
	Plantation on OB Dump		0.00	0.00
	Total Plantation		**123.00**	**4.14**
	Total Vegetation Area		**893.00**	**30.07**
Agriculture	Crop Land		317.00	10.67
	Fallow Land		1397.00	47.04
	Total Agriculture Area		**1714.00**	**57.71**
Waste Land	Waste Land		72.00	2.42
	Sand Body		3.00	0.10
	Total Waste Land		**75.00**	**2.53**
Mining Area	Coal Quarry		0.00	0.00
	Barren OB Dump		0.00	0.00
	Area Under Backfilling		0.00	0.00
	Water Filled Quarry		0.00	0.00
	Coal Dump		0.00	0.00
	Advance Quarry Site		0.00	0.00
	Total Mining Area		**0.00**	**0.00**
Settlements	Rural Settlement		107.00	3.60
	Urban Settlement		92.00	3.10
	Industrial Settlement		31.00	1.04
	Total Settlement Area		**230.00**	**7.74**
Water Body	**River, Ponds**		**58.00**	**1.95**
		Total	**2970.00**	**100.00**

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- Cluster Boundary
- Roads
- Settlement
- UG Mine Location

Plate - 1

Customer	Eastern Coalfields Limited				
Title	Land Reclamation Monitoring of Cluster of Mines				Job No. 561410027
Subject Land Reclamation Status of Cluster-V group of Mines based on Satellite Data (RS-2/L-IV) of the year 2021	Activity	Name	Designation	Signature	
	Prepared	Hariharalal B	Ch. Mgr(System)		
	Checked	Tilak Mandal	Ch. Mgr(RSC)		
	Approved	R. Kumar	GM(Geomatics)		
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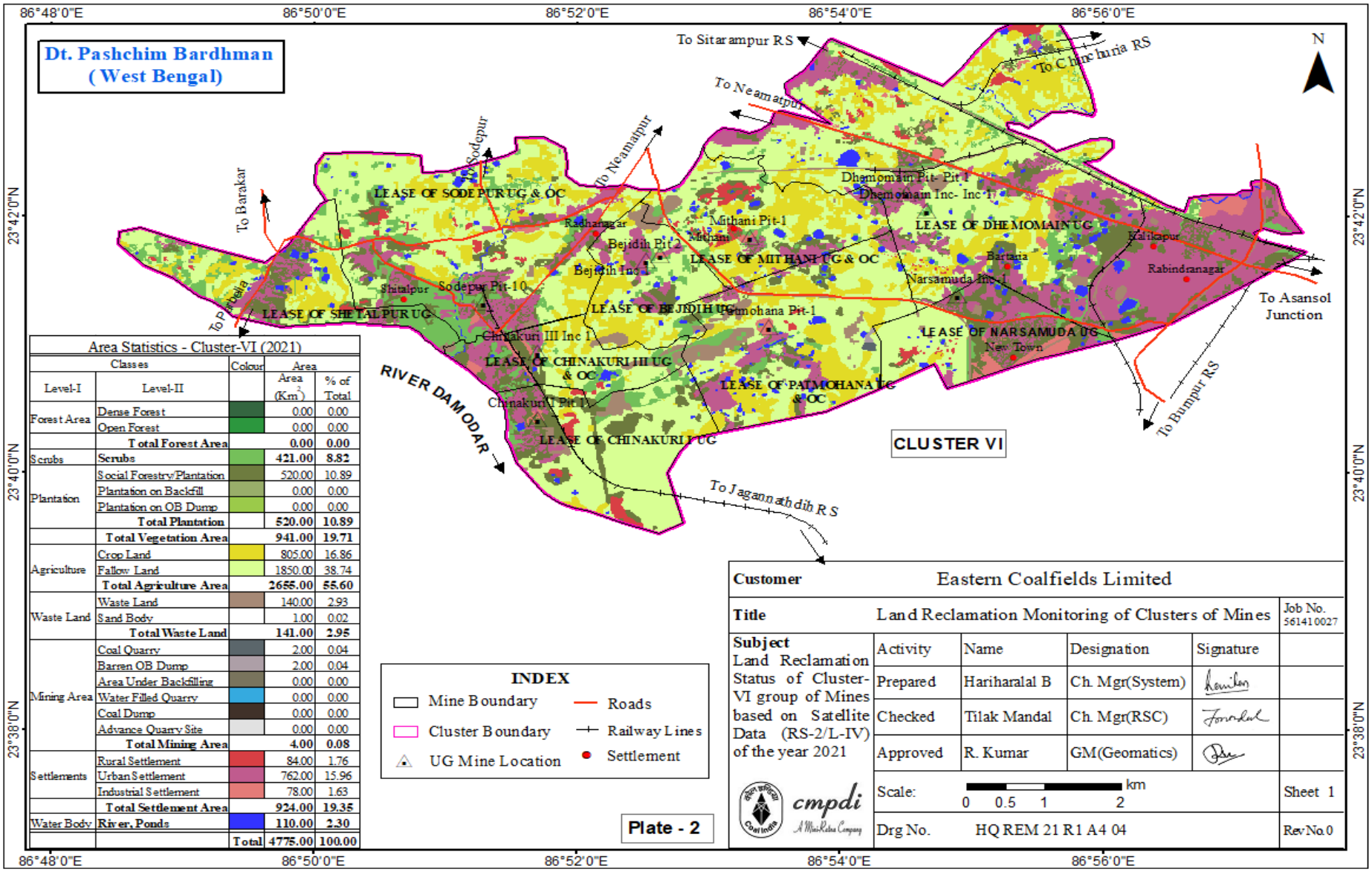
	Drg No.	HQ REM 21 R1 A4 03			Rev No.0



Area Statistics - Cluster-VI (2021)

Classes		Colour	Area	
Level-I	Level-II		Area (Km²)	% of Total
Forest Area	Dense Forest		0.00	0.00
	Open Forest		0.00	0.00
	Total Forest Area		**0.00**	**0.00**
Scrubs	**Scrubs**		**421.00**	**8.82**
Plantation	Social Forestry/Plantation		520.00	10.89
	Plantation on Backfill		0.00	0.00
	Plantation on OB Dump		0.00	0.00
	Total Plantation		**520.00**	**10.89**
	Total Vegetation Area		**941.00**	**19.71**
Agriculture	Crop Land		805.00	16.86
	Fallow Land		1850.00	38.74
	Total Agriculture Area		**2655.00**	**55.60**
Waste Land	Waste Land		140.00	2.93
	Sand Body		1.00	0.02
	Total Waste Land		**141.00**	**2.95**
Mining Area	Coal Quarry		2.00	0.04
	Barren OB Dump		2.00	0.04
	Area Under Backfilling		0.00	0.00
	Water Filled Quarry		0.00	0.00
	Coal Dump		0.00	0.00
	Advance Quarry Site		0.00	0.00
	Total Mining Area		**4.00**	**0.08**
Settlements	Rural Settlement		84.00	1.76
	Urban Settlement		762.00	15.96
	Industrial Settlement		78.00	1.63
	Total Settlement Area		**924.00**	**19.35**
Water Body	**River, Ponds**		**110.00**	**2.30**
		Total	**4775.00**	**100.00**

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- Mine Boundary
- Cluster Boundary
- UG Mine Location
- Roads
- Railway Lines
- Settlement

Plate - 2

Customer	Eastern Coalfields Limited				
Title	Land Reclamation Monitoring of Clusters of Mines				Job No. 561410027
Subject Land Reclamation Status of Cluster-VI group of Mines based on Satellite Data (RS-2/L-IV) of the year 2021	Activity	Name	Designation	Signature	
	Prepared	Hariharalal B	Ch. Mgr(System)		
	Checked	Tilak Mandal	Ch. Mgr(RSC)		
	Approved	R. Kumar	GM(Geomatics)		
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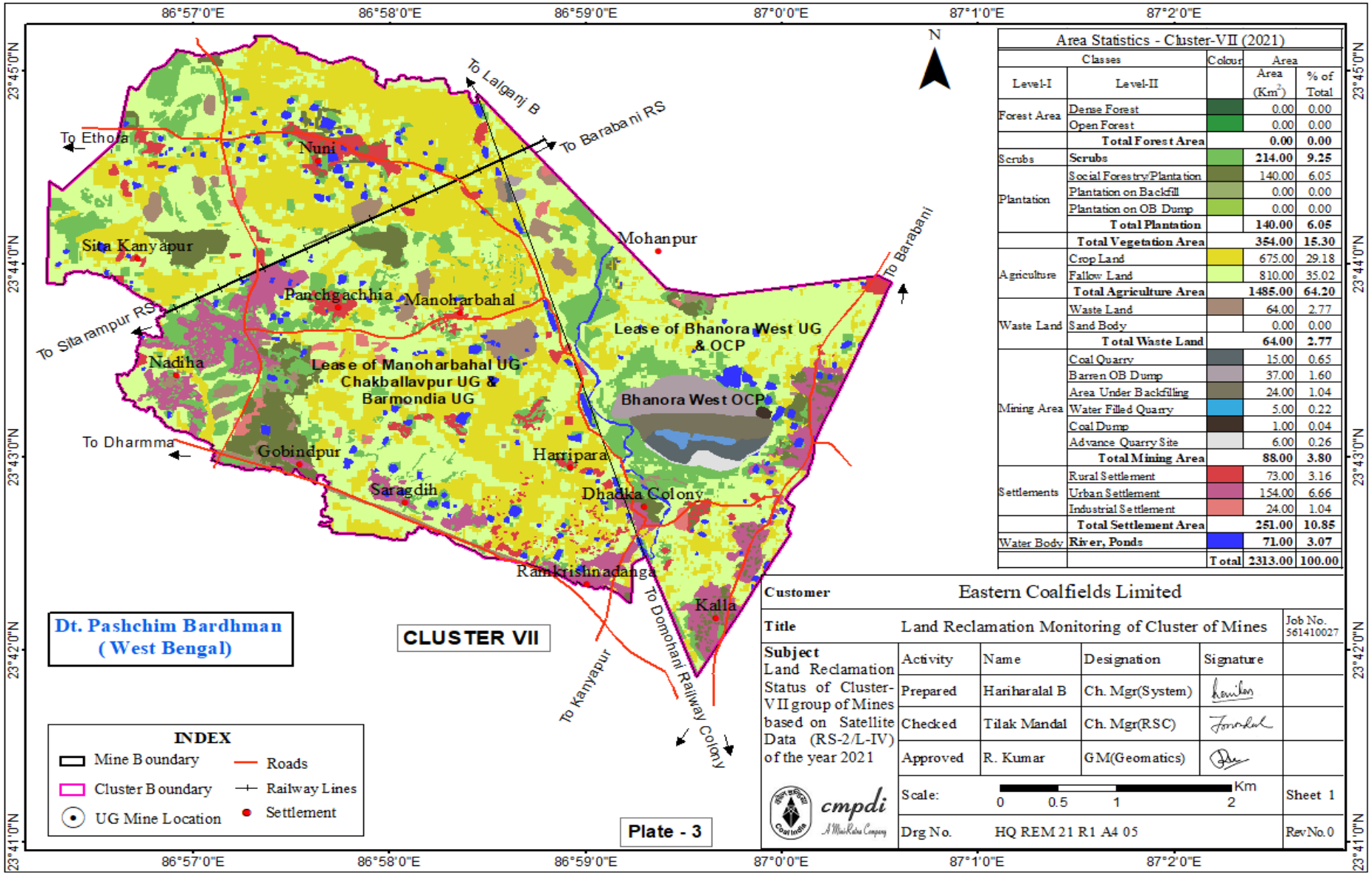
	Drg No. HQ REM 21 R1 A4 04				Rev No. 0



Area Statistics - Cluster-VII (2021)

Classes		Colour	Area	
Level-I	Level-II		Area (Km^2)	% of Total
Forest Area	Dense Forest		0.00	0.00
	Open Forest		0.00	0.00
	Total Forest Area		**0.00**	**0.00**
Scrubs	**Scrubs**		**214.00**	**9.25**
Plantation	Social Forestry/Plantation		140.00	6.05
	Plantation on Backfill		0.00	0.00
	Plantation on OB Dump		0.00	0.00
	Total Plantation		**140.00**	**6.05**
	Total Vegetation Area		**354.00**	**15.30**
Agriculture	Crop Land		675.00	29.18
	Fallow Land		810.00	35.02
	Total Agriculture Area		**1485.00**	**64.20**
Waste Land	Waste Land		64.00	2.77
	Sand Body		0.00	0.00
	Total Waste Land		**64.00**	**2.77**
Mining Area	Coal Quarry		15.00	0.65
	Barren OB Dump		37.00	1.60
	Area Under Backfilling		24.00	1.04
	Water Filled Quarry		5.00	0.22
	Coal Dump		1.00	0.04
	Advance Quarry Site		6.00	0.26
	Total Mining Area		**88.00**	**3.80**
Settlements	Rural Settlement		73.00	3.16
	Urban Settlement		154.00	6.66
	Industrial Settlement		24.00	1.04
	Total Settlement Area		**251.00**	**10.85**
Water Body	**River, Ponds**		**71.00**	**3.07**
		Total	**2313.00**	**100.00**

Customer Eastern Coalfields Limited

Title Land Reclamation Monitoring of Cluster of Mines — Job No. 561410027

Subject Land Reclamation Status of Cluster-VII group of Mines based on Satellite Data (RS-2/L-IV) of the year 2021

Activity	Name	Designation	Signature
Prepared	Hariharalal B	Ch. Mgr(System)	
Checked	Tilak Mandal	Ch. Mgr(RSC)	
Approved	R. Kumar	GM(Geomatics)	

Scale: 0 0.5 1 2 Km — Sheet 1

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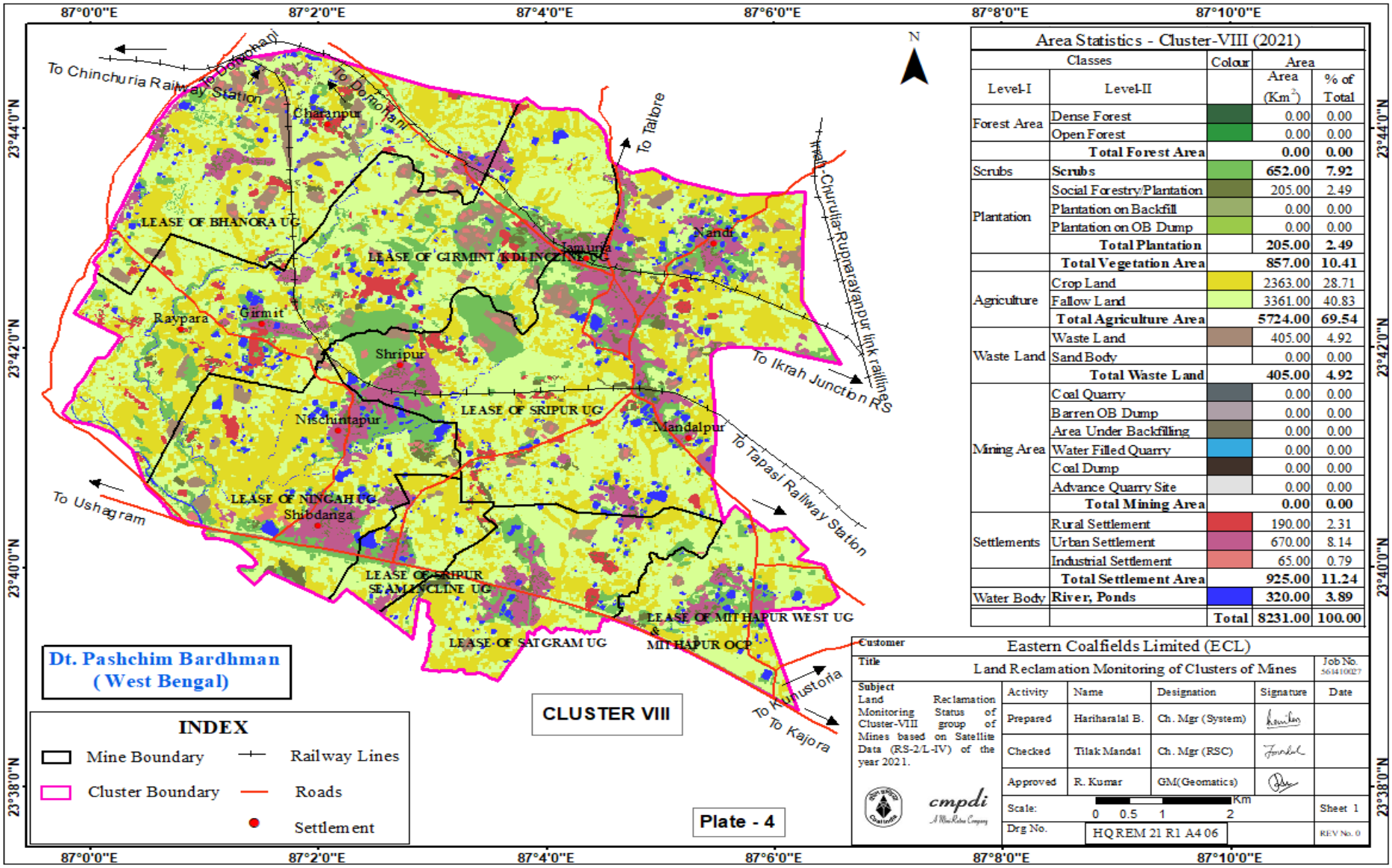

Area Statistics - Cluster-VIII (2021)

Classes		Colour	Area	
Level-I	Level-II		Area (Km^2)	% of Total
Forest Area	Dense Forest		0.00	0.00
	Open Forest		0.00	0.00
	Total Forest Area		**0.00**	**0.00**
Scrubs	**Scrubs**		**652.00**	**7.92**
Plantation	Social Forestry/Plantation		205.00	2.49
	Plantation on Backfill		0.00	0.00
	Plantation on OB Dump		0.00	0.00
	Total Plantation		**205.00**	**2.49**
	Total Vegetation Area		**857.00**	**10.41**
Agriculture	Crop Land		2363.00	28.71
	Fallow Land		3361.00	40.83
	Total Agriculture Area		**5724.00**	**69.54**
Waste Land	Waste Land		405.00	4.92
	Sand Body		0.00	0.00
	Total Waste Land		**405.00**	**4.92**
Mining Area	Coal Quarry		0.00	0.00
	Barren OB Dump		0.00	0.00
	Area Under Backfilling		0.00	0.00
	Water Filled Quarry		0.00	0.00
	Coal Dump		0.00	0.00
	Advance Quarry Site		0.00	0.00
	Total Mining Area		**0.00**	**0.00**
Settlements	Rural Settlement		190.00	2.31
	Urban Settlement		670.00	8.14
	Industrial Settlement		65.00	0.79
	Total Settlement Area		**925.00**	**11.24**
Water Body	**River, Ponds**		**320.00**	**3.89**
		Total	**8231.00**	**100.00**

Customer	Eastern Coalfields Limited (ECL)				
Title	Land Reclamation Monitoring of Clusters of Mines				Job No. 561410027
Subject: Land Reclamation Monitoring Status of Cluster-VIII group of Mines based on Satellite Data (RS-2/L-IV) of the year 2021.	Activity	Name	Designation	Signature	Date
	Prepared	Hariharalal B.	Ch. Mgr (System)		
	Checked	Tilak Mandal	Ch. Mgr (RSC)		
	Approved	R. Kumar	GM(Geomatics)		
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	Drg No. HQ REM 21 R1 A4 06				REV No. 0

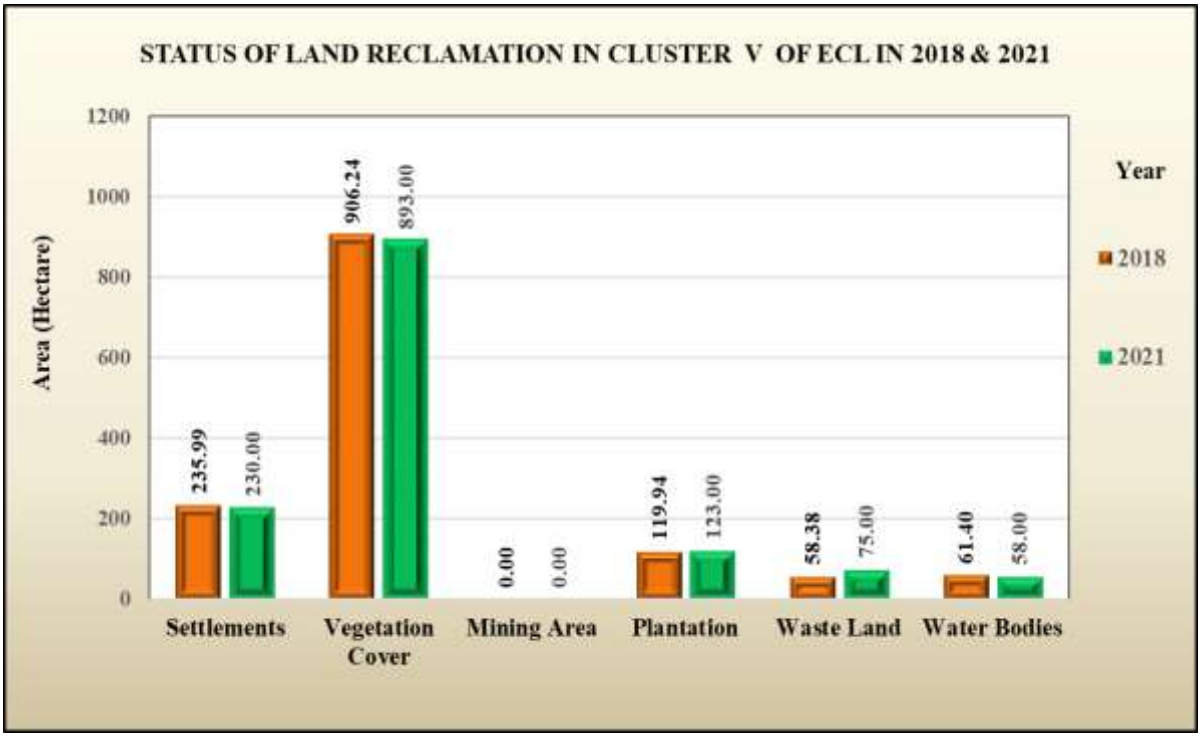

Figure 3: Land Reclamation Status of Cluster V

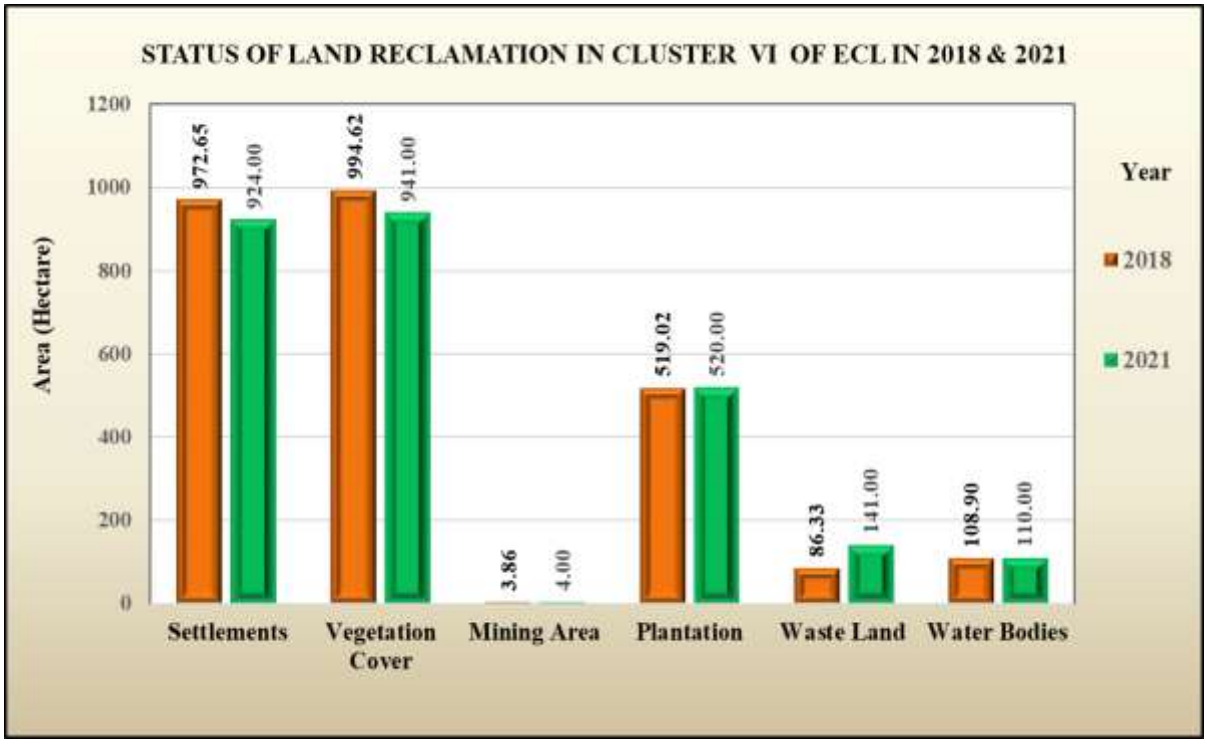

Figure 4: Land Reclamation Status of Cluster VI

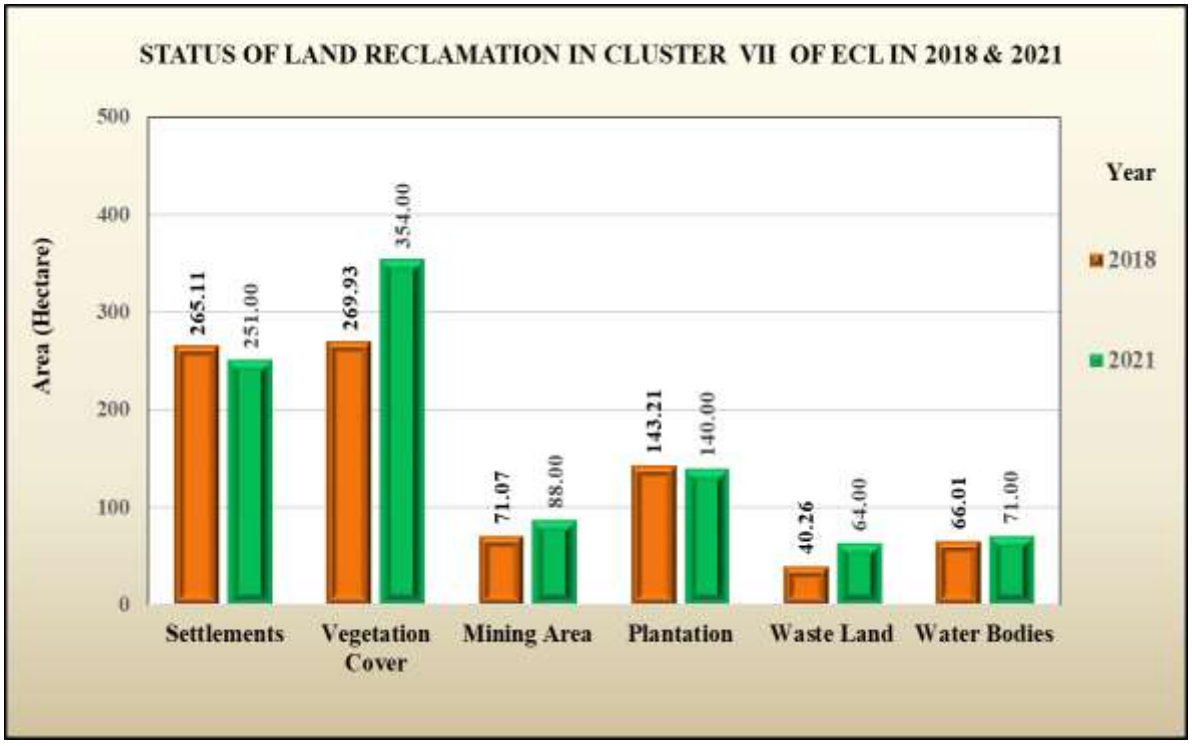

Figure 5: Land Reclamation Status of Cluster VII

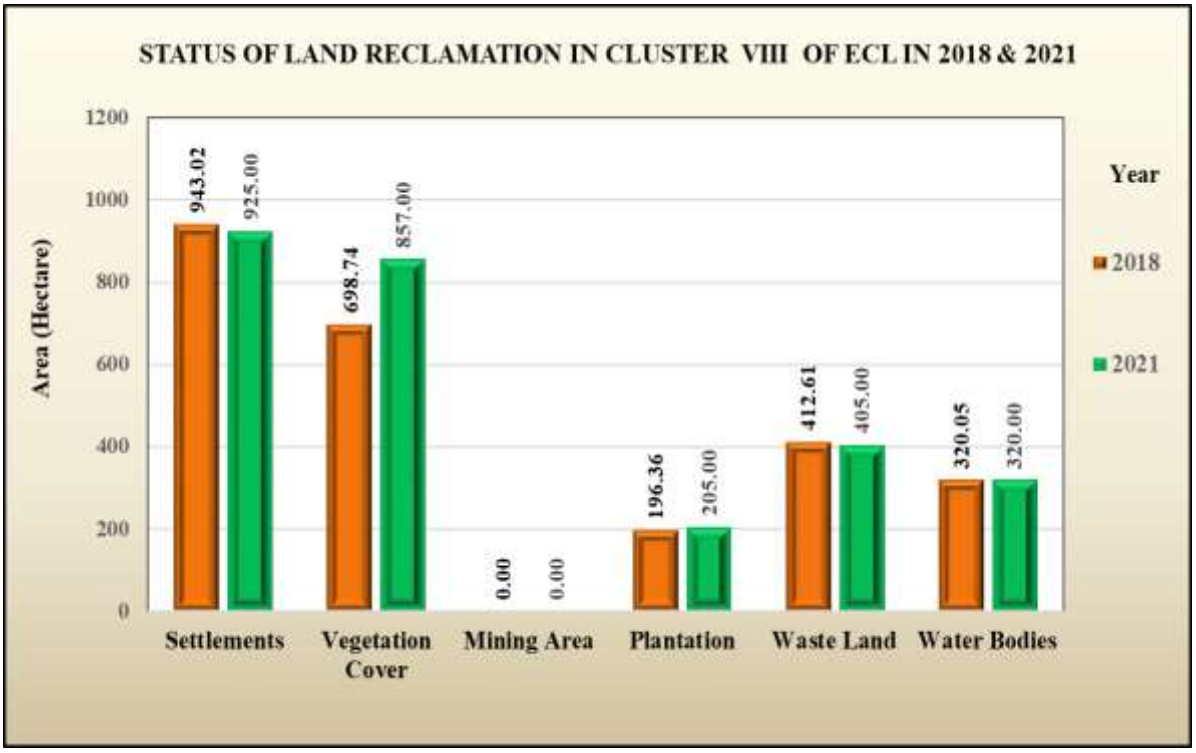

Figure 6: Land Reclamation Status of Cluster VIII

Photo -1: Plantation done in Dubeswari UG, Sodepur Area, Cluster V

Photo -2: Orchid Plantation done in Aldi Village, Sodepur, Cluster VI

Photo -3: Echo Park in developed in Sripur Area of Cluster VII

Photo -4: Avenue Plantation in Satgram Area of Cluster VIII

Central Mine Planning & Design Institute Ltd.
(A Subsidiary of Coal India Ltd.)
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