
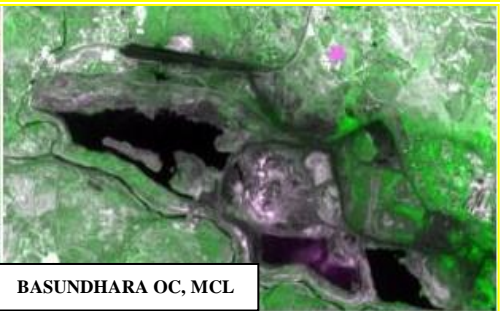
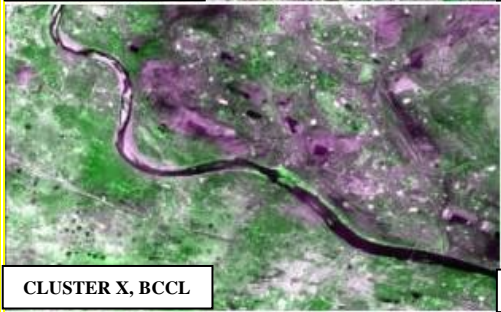
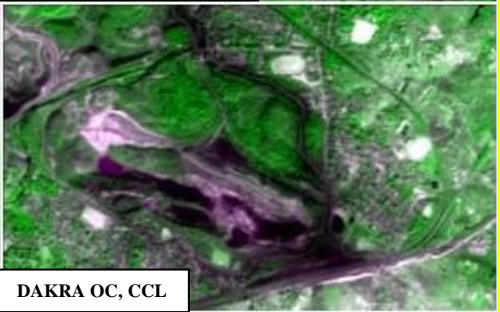




# Land Restoration / Reclamation Monitoring of 20 Opencast Coal Mines and 09 Clusters of coal mines of CIL producing less than 5 mcm (Coal+OB) annually based on Satellite Data for the Year 2021

Y E A R			2 0 2 1
	DAMUA OC, WCL	BASUNDHARA OC, MCL	
			
	CLUSTER X, BCCL	DAKRA OC, CCL	
			
	CLUSTER VII, ECL	KURASIA OC, SECL	

Submitted to  
**Coal India Limited**

**Land Restoration / Reclamation Monitoring of 20 Opencast Coal  
Mines and 09 Clusters of coal Mines of CIL producing less than 5  
mcm (Coal+OB) annually based on Satellite Data for the Year 2021**

***MARCH - 2022***



**Remote Sensing Cell  
Geomatics Division  
CMPDI, Ranchi**

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## Executive Summary

- 1.0 Project** Land restoration / reclamation monitoring of 20 opencast coal mines and 09 clusters of coal mines of different subsidiaries of Coal India Ltd. (CIL) producing less than 5 million cu.m. (Coal+OB) per year based on satellite data regularly at an interval of three years.
- 2.0 Objective** Objective of the land restoration / reclamation monitoring is to assess the area of backfilled, plantation, social forestry, active mining area, water bodies, distribution of wasteland, agricultural land and forest in the leasehold area of the project. This will help in assessing the progressive status of mined land reclamation and to take up remedial measures, if any, required for environmental protection.
- 3.0 Salient Findings**
- Out of the total mine leasehold area of 38079.01 Hectares of the 20 opencast projects & 09 clusters together of different subsidiaries of CIL producing less than 5 mcm (Coal +OB) annually considered for monitoring during 2021-22; total excavated area is 3609.63 hectares, out of which 550.83 hectares (15.26%) is under plantation (*Biologically Reclaimed*), 1792.63 hectares area (49.66%) is under backfilling (*Technical Reclamation*) and rest 1266.17 hectares (35.08%) area is under active mining. It is evident from the analysis that 2343.46 hectares (64.92%) area of the 20 OCPs & 09 clusters taken for monitoring for the year 2021-22 is under reclamation and balance 1266.17 hectares (35.08%) area is under active mining. Company wise details of land reclamation of the above OCPs & Clusters is given in Table-1 & Fig-1.
- The projects selected for land reclamation monitoring in the year 2021-22 are subdivided into two groups viz (A) 20 opencast projects belonging to WCL, SECL, MCL & CCL and (B) 09 clusters of mines of ECL and BCCL.
- For Group A, out of the total mine leasehold area of 10328.47 Hectares of the 20 OC projects of WCL, SECL, MCL and CCL producing less than 5 mcm (Coal+OB) annually considered for monitoring during 2021-22; total excavated area is 2339.45 hectares, out of which 488.91 hectares (20.90%) is under plantation (*Biologically Reclaimed*), 1055.73 hectares (45.13%) area is under backfilling (*Technical Reclamation*) and 794.81 hectares (33.97%) area is under active mining. It is evident from the analysis that 1544.64 hectares (66.03%) area of the 20 OC



projects taken for monitoring for the year 2021-22 is under reclamation and balance 794.81 hectares (33.97%) area is under active mining. Company wise details of land reclamation of the above 20 projects is given in Table-1(A) & Fig-1.

- Out of 30 opencast projects of different subsidiaries of CIL producing less than 5 mcm (Coal+ OB) annually which were taken up for monitoring during the year 2018-19, total 10 opencast projects of different subsidiaries have now been diverted under category of those opencast mine which are producing more than 5 mcm (Coal+ OB) annually and balance 20 opencast projects producing less than 5 mcm (Coal+ OB) annually has been considered for land reclamation monitoring during year 2021-22. This has resulted in significant decrease in Technical reclamation (Area under backfilling) from 1329.06 Hectare area (43.56%) (Yr. 2018) to 1055.73 Hectare area (45.13%) (Yr. 2021) and total area under plantation (Green cover) has also decreased from 1864.05 Ha (9.22%) (Yr. 2018) to 1488.59 Ha (14.41%) (Yr. 2021) whereas total area under reclamation in 20 opencast projects of WCL, SECL, MCL and CCL has also decreased from 1766.51 Ha (57.90%) in the year 2018-19 to 1544.64 Ha (66.03%) in the year 2021-22.
- Study indicates that there is an increase in percentage of area under total plantation as such percentage of total plantation has been calculated with respect to total leasehold area. While percentage of technical reclamation and biological reclamation have been calculated with respect to total excavated area due to which there is an increase in technical reclamation and biological reclamation from 47.17% (Yr. 2018) to 49.66% (Yr. 2021) and from 12.28% (Yr. 2018) to 15.26% (Yr. 2021) respectively.
- *For Opencast Projects under Group (A) in table-1:* On comparing the status of land reclamation for 20 nos. of opencast projects in WCL, SECL, MCL and CCL carried out in year 2021-22 with respect to previous cycle study done in the year 2018-19 in these opencast projects of CIL's subsidiary, it is evident from the analysis that area of plantation on backfill (Biological Reclamation) has increased from 437.45 Hectare (14.34%) area in the year 2018 to 488.91 Hectare (20.90%) in the year 2021.
- *For Clusters under Group (B) in table-1:* total 9 cluster of mines, 5 in BCCL and 4 in ECL have been considered for monitoring during year 2021-22 as compared to total 08 cluster monitored

during year 2018-19. One additional cluster of mines in BCCL is taken up for monitoring this year on request of BCCL.

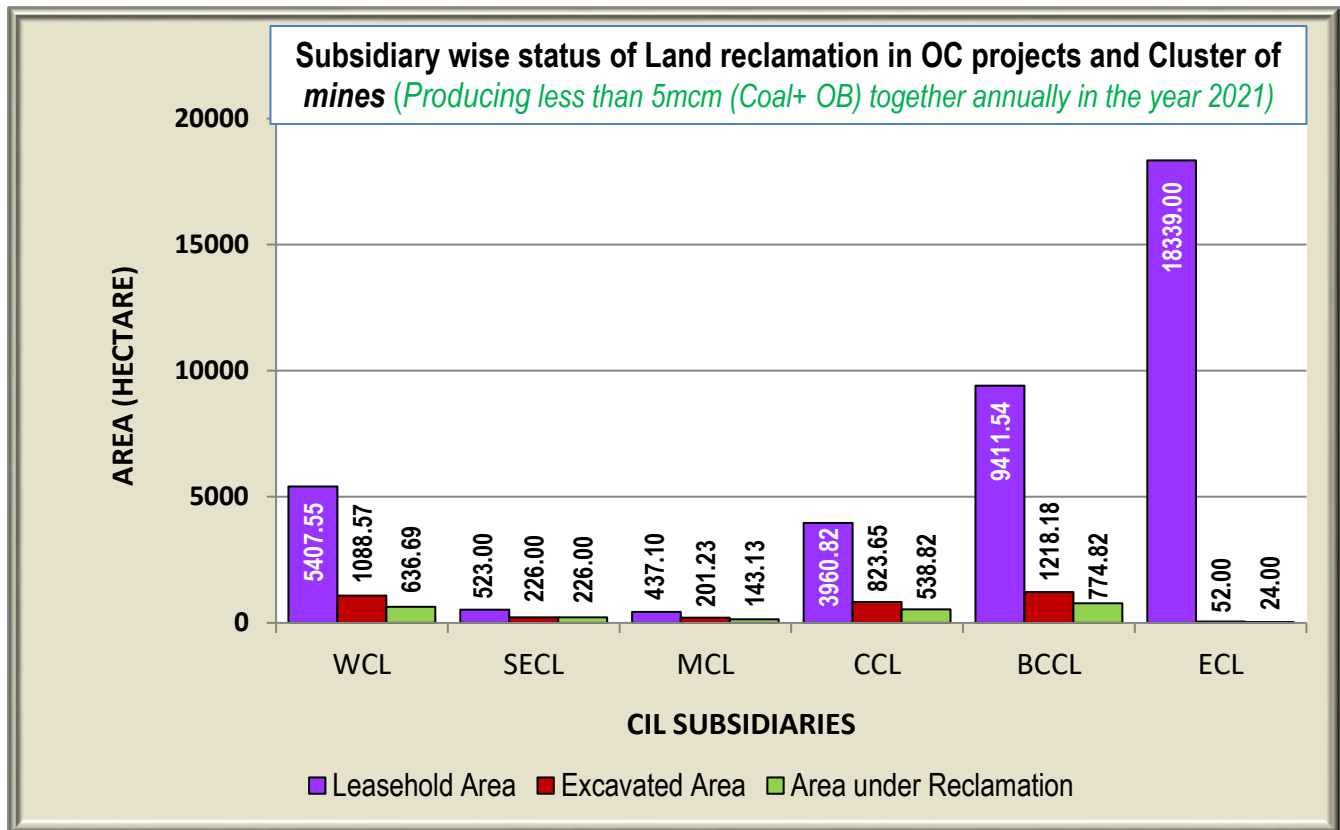
- Out of the total mine leasehold of 27750.54 Hectare for total no. of 09 cluster of mines; 05 in BCCL and 04 in ECL producing less than 5 mcm (Coal+OB) annually considered for monitoring during the Year 2021-22: total excavated area is 1270.18 Hectare out of which 61.92 hectare (4.87%) has been planted on backfill (*Biologically Reclaimed*), 736.90 hectare (58.02%) area is under backfilling (*Technical Reclamation*) and 471.36 hectare (37.11%) area is under active mining. It is also evident from Table -1(B) that 798.82 hectare (62.89%) area is under reclamation.
- From table-1(B) it is evident from analysis that 09 cluster of mines taken for monitoring, Technical reclamation (Area under backfilling) has increased from 634.58 Ha (57.09%) in the year 2018 to 736.90 Ha (58.02%) in the year 2021-22.
- It has also been observed from table-1(B) that biological reclamation for 09 cluster of mines in BCCL and ECL has decreased from 73.92 Ha (6.65%) (Yr.2018) to 61.92 Ha (4.87%) (Yr.2021).
- From Table (B), it is evident that total area under reclamation in BCCL and ECL consisting of together 9 clusters, have increased from 708.50 hectare (63.74%) in the year 2018 to 798.82 Ha (62.89%) in the year 2021 and total area under plantation (Green Cover) in the leasehold boundary of all cluster has also increased from 1779.20 Ha (7.35%) to 1956.94 Ha (7.05%) in the year 2021.
- On comparing the results obtained from Digital Image Processing of satellite data of the year 2018 & 2021, it is evident from table 1(B) that there is static or decreasing trend in the biological reclamation and increasing trend in technical reclamation in all 9 cluster of mines of BCCL and ECL.
- From Table 1(A) and 1(B) combined, it can be seen that total area under reclamation in the 20 OC mines of WCL, CCL, MCL, SECL and 09 clusters of BCCL and ECL considered for monitoring this year is 2343.46 Hectares, out of which 550.83 hectares (15.26%) has been planted on backfill (*Biologically Reclaimed*), 1792.63 Hectares area (49.66%) is under backfilling (*Technical Reclamation*) and balance 1266.17 hectares (35.08%) is under active mining.

**Table-1**  
**Company wise Land Reclamation Status in OC projects & Clusters of mines**  
**producing (Less than 5 million Cu.m. (Coal + OB) )based on Satellite Data of year 2021**

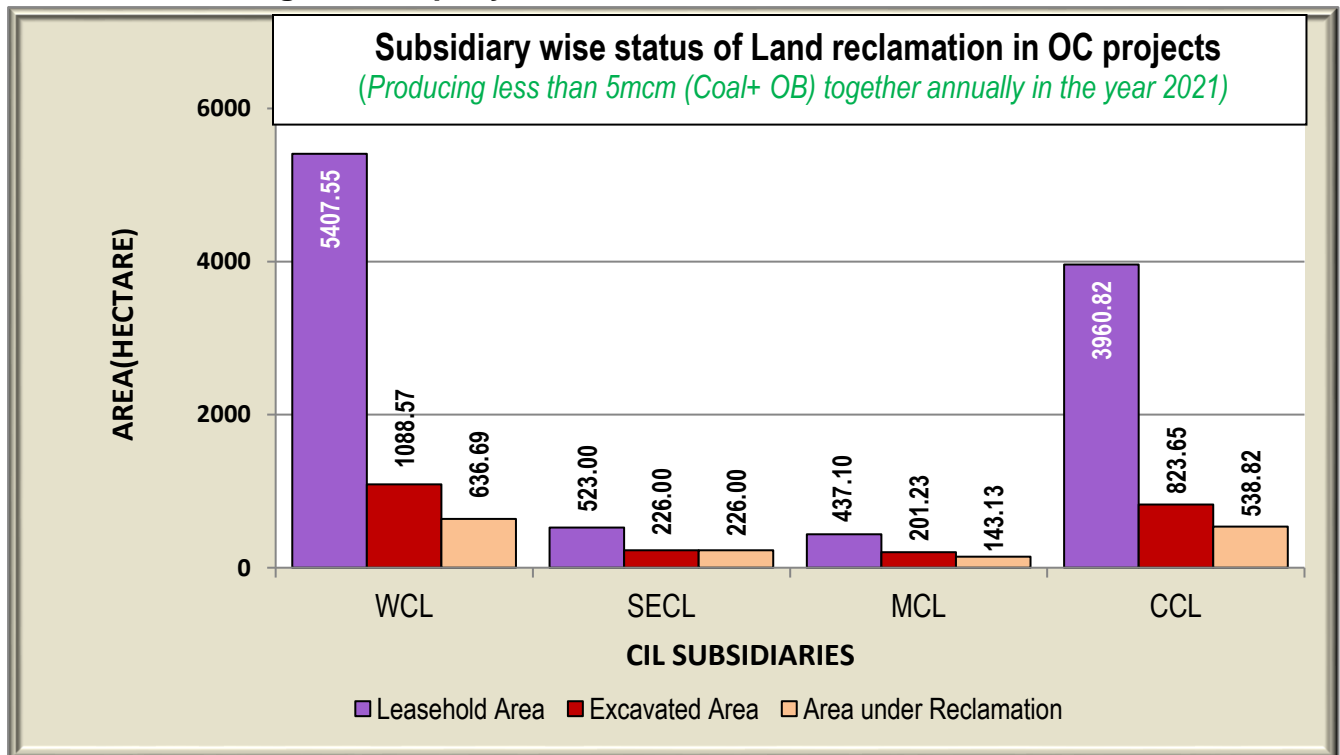
Sl. No.	Coal Company (No. of OC Projects , Cluster of mines )		Area in Hectare (% calculated in respect of total excavated area)																						
			Leasehold / All Right Boundary	Technical Reclamation		Plantation						Area under Active Mining	Total Excavated Area	Total Area under Plantation (% Green Cover generated in Leasehod)		Total Area under Reclamation									
						Biological Reclamation		Other Plantation																	
					Area under Backfilling		Area under Plantation on backfill		Plantation on External OB Dumps		Socail Forestry, Avenue 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	2018	2021					
(A)	PROJECTWISE(OC)																								
1	WCL(12)	WCL (11)	6035.43	5407.55	476.26 45.35%	522.15 47.97%	86.81 8.27%	114.54 10.52%	386.79	409.22	324.66	341.46	487.22 46.39%	451.88 41.51%	1050.29	1088.57	798.26 13.23%	865.22 16.00%	563.07 53.61%	636.69 58.49%					
2			SECL(03)	SECL(01)	3020.60	523.00	277.03 52.14%	86.00 38.05%	152.96 28.79%	140.00 61.95%	7.99	0.00	241.89	80.00	101.32 19.07%	0.00 0.00%	531.31	226.00	402.84 13.34%	220.00 42.07%	429.99 80.93%	226.00 100.00%			
4					MCL(03)	MCL (01)	2035.83	437.10	164.06 45.39%	143.13 71.13%	1.13 0.31%	0.00 0.00%	14.30	8.53	27.86	10.13	196.29 54.30%	58.10 28.87%	361.48	201.23	43.29 2.13%	18.66 4.27%	165.19 45.70%	143.13 71.13%	
5							CCL(12)	CCL (07)	9126.74	3960.82	411.71 37.16%	304.45 36.96%	196.55 17.74%	234.37 28.46%	250.72	97.37	172.39	52.97	499.77 45.10%	284.83 34.58%	1108.03	823.65	619.66 6.79%	384.71 9.71%	608.26 54.90%
TOTAL (A)(30)		TOTAL (A) (20)							20218.60	10328.47	1329.06 43.56%	1055.73 45.13%	437.45 14.34%	488.91 20.90%	659.80	515.12	766.80	484.56	1284.60 42.10%	794.81 33.97%	3051.11	2339.45	1864.05 9.22%	1488.59 14.41%	1766.51 57.90%
(B)	CLUSTERSWISE																								
1	BCCL(04)	BCCL(05)	5883.96	9411.54	625.15 58.11%	712.90 58.52%			73.92 6.87%	61.92 5.08%	156.71	149.84	570.04	757.18	376.70 35.02%	443.36 36.40%	1075.77	1218.18	800.67 13.61%	968.94 10.30%	699.07 64.98%	774.82 63.60%			
2			ECL(04)	ECL (04)	18339.00	18339.00	9.43 26.37%	24.00 46.15%	0.00 0.00%	0.00 0.00%	0.00	0.00	978.53	988.00	26.33 73.63%	28.00 53.85%	35.76	52.00	978.53 5.34%	988.00 5.39%	9.43 26.37%	24.00 46.15%			
TOTAL (B)(08)		TOTAL(B) (09)			24222.96	27750.54	634.58 57.09%	736.90 58.02%	73.92 6.65%	61.92 4.87%	156.71	149.84	1548.57	1745.18	403.03 36.26%	471.36 37.11%	1111.53	1270.18	1779.20 7.35%	1956.94 7.05%	708.50 63.74%	798.82 62.89%			
TOTAL CIL (A+B) (38) Less than 5 MCM		TOTAL CIL (A+B) (29)		44441.56	38079.01	1963.64 47.17%	1792.63 49.66%	511.37 12.28%	550.83 15.26%	816.51	664.96	2315.37	2229.74	1687.63 40.54%	1266.17 35.08%	4162.64	3609.63	3643.25 8.20%	3445.53 9.05%	2475.01 59.46%	2343.46 64.92%				

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

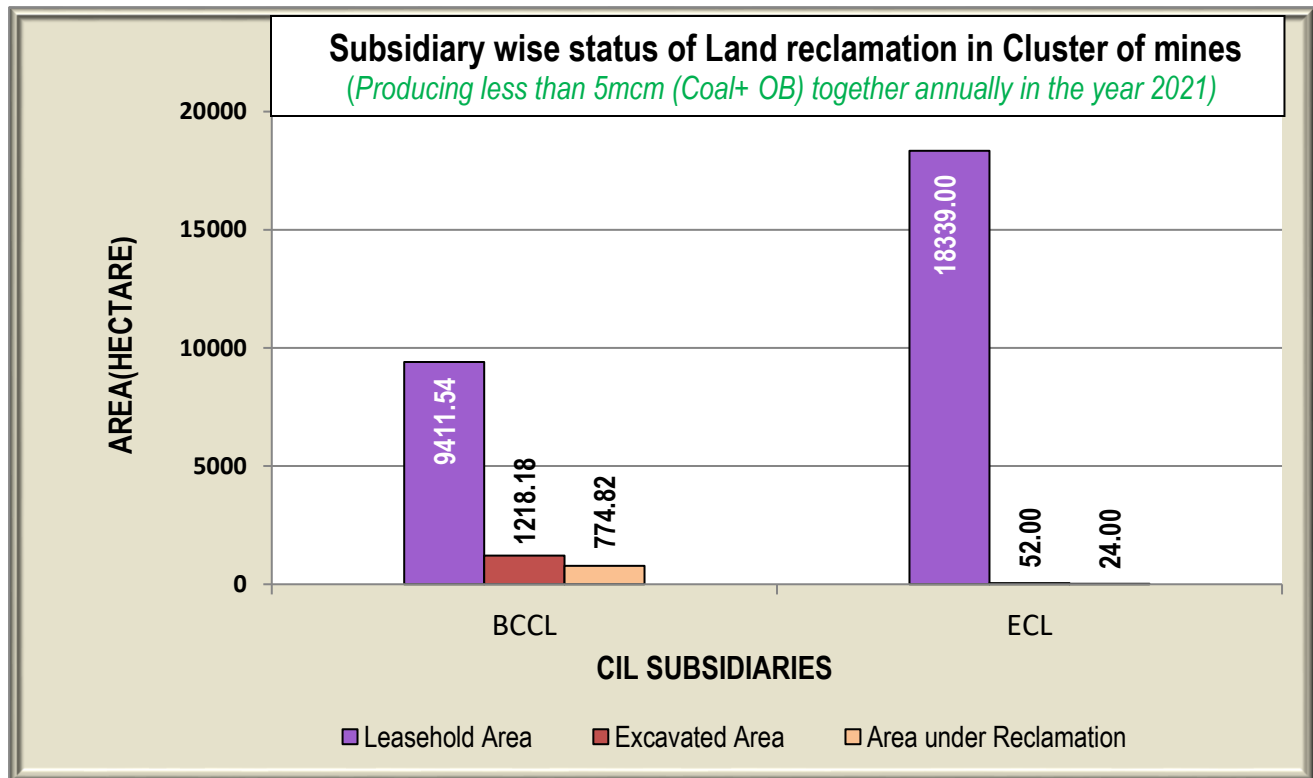
1. Area under **Biological Reclamation** includes Areas under Plantation done on Backfilled Area Only.
2. Area under **Technical Reclamation** includes Area under Barren Backfilling only
3. Area under Active Mining Includes Coal Quarry, Advance Quarry Site, Quarry filled with water etc., if any.
4. Social Forestry and Plantation on External OB Dumps are not included in Biological Reclamation and are put under separate categories as shown in the Table above.



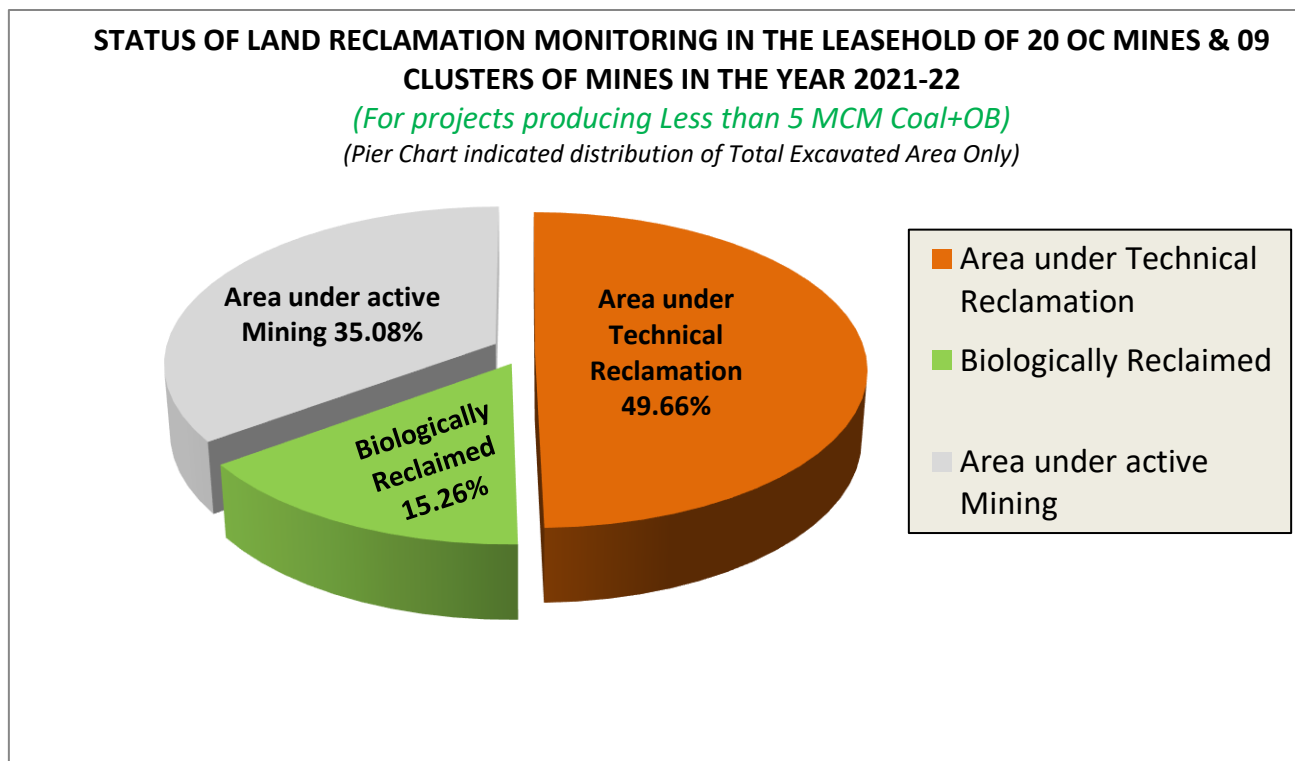
**Fig. 1 : Company wise Land Reclamation Status in the Year 2021**



**Fig. 2 : Company wise Land Reclamation Status in OC projects the Year 2021**



**Fig.3 : Company wise Land Reclamation Status in OC projects the Year 2021**



**Fig4: Pie Chart indicating Land Reclamation Status in 2021**

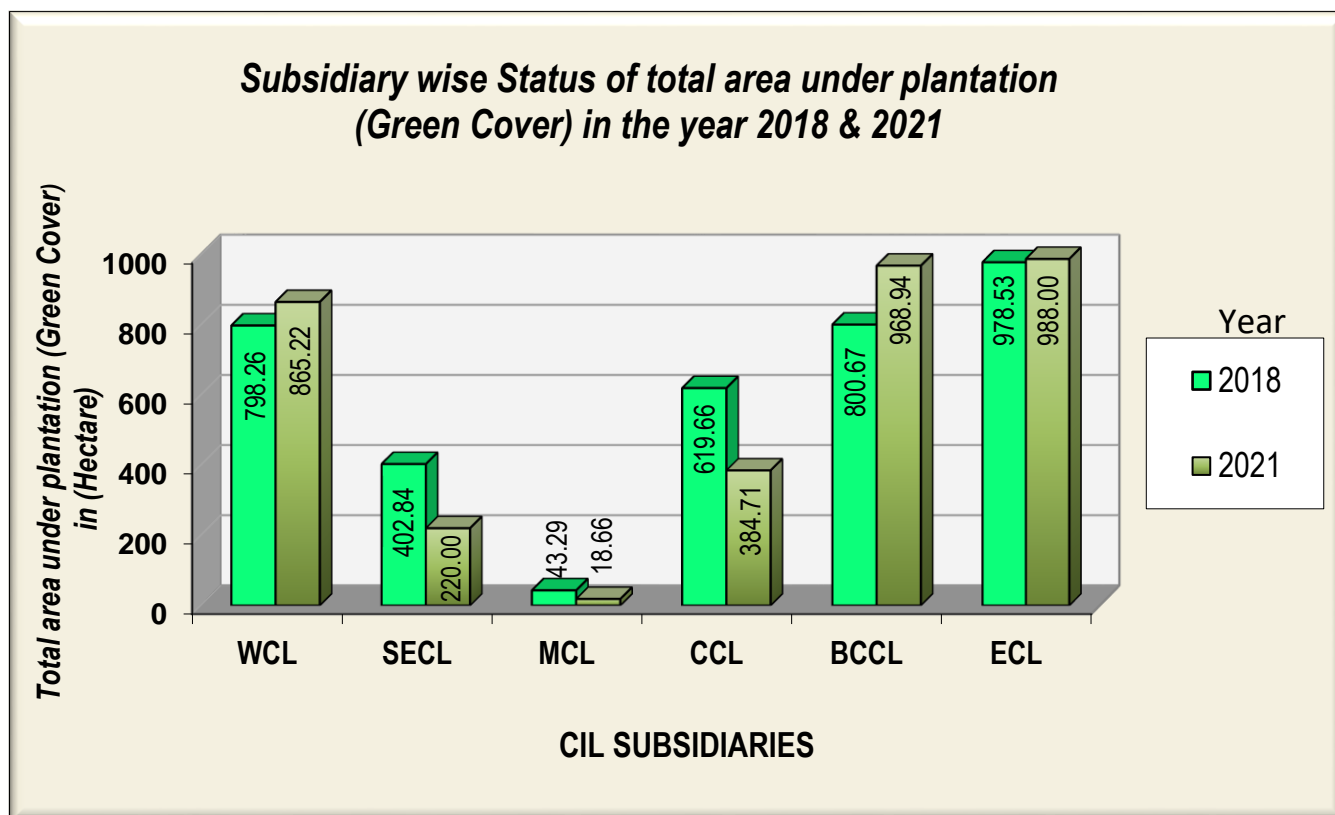


Fig 5: Bar Chart indicating status of total area under plantation (Green Cover) in the year 2018 & 2021

## 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 effect 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, a work order vide letter no. CIL/WBP/ENV./2011dated23/08/11 was issued by CIL for monitoring of less than 5 million m<sup>3</sup> per annum capacity (Coal +OB)

projects from the year 2011 at interval of three years. Further, a revised work order was issued vide letter no. CIL/WBP/Env/2011/4706 dated 12.10.2012 from Coal India Limited for the period 2012-13 to 2016-17 which was subsequently followed by another work order vide letter no. CIL/WBP/Env/2017/DP/8477 dated 21.09.2017 from Coal India Limited for the period 2017-18 to 2021-22 for land reclamation monitoring of opencast projects and vegetation cover monitoring of 19 major coalfields. According to this work order, all mines in CIL with output capacity of 5 million cu. m (coal +OB) shall be monitored every year and all mines below this capacity shall be monitored at an interval of 3 yrs. All coalfields in CIL shall also be monitored at an interval of 3 years as per a defined plan. The result of land reclamation status of all such mines to be put on the website of CIL, ([www.coalindia.in](http://www.coalindia.in)), CMPDI ([www.cmpdi.co.in](http://www.cmpdi.co.in)) and the concerned coal companies in public domain. Detail report to be submitted to Coal India Limited and respective subsidiaries.

- 1.3 Land reclamation monitoring of all opencast coal mining projects would also comply the statutory requirements of Ministry of Environment & Forest (MoEF). 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 CMPDI undertook the above study and the present report is embodying the findings in nutshell carrying out for the 20 opencast projects of different subsidiaries and 09 clusters of BCCL and ECL producing less than 5 million cubic m. Coal+OB annually in the year 2021-22 for baseline data generation and updation of database of these projects so that progressive changes in the status of land reclamation could be assessed in future.

## 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 project. 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 4. Following steps are involved in land reclamation /restoration monitoring:

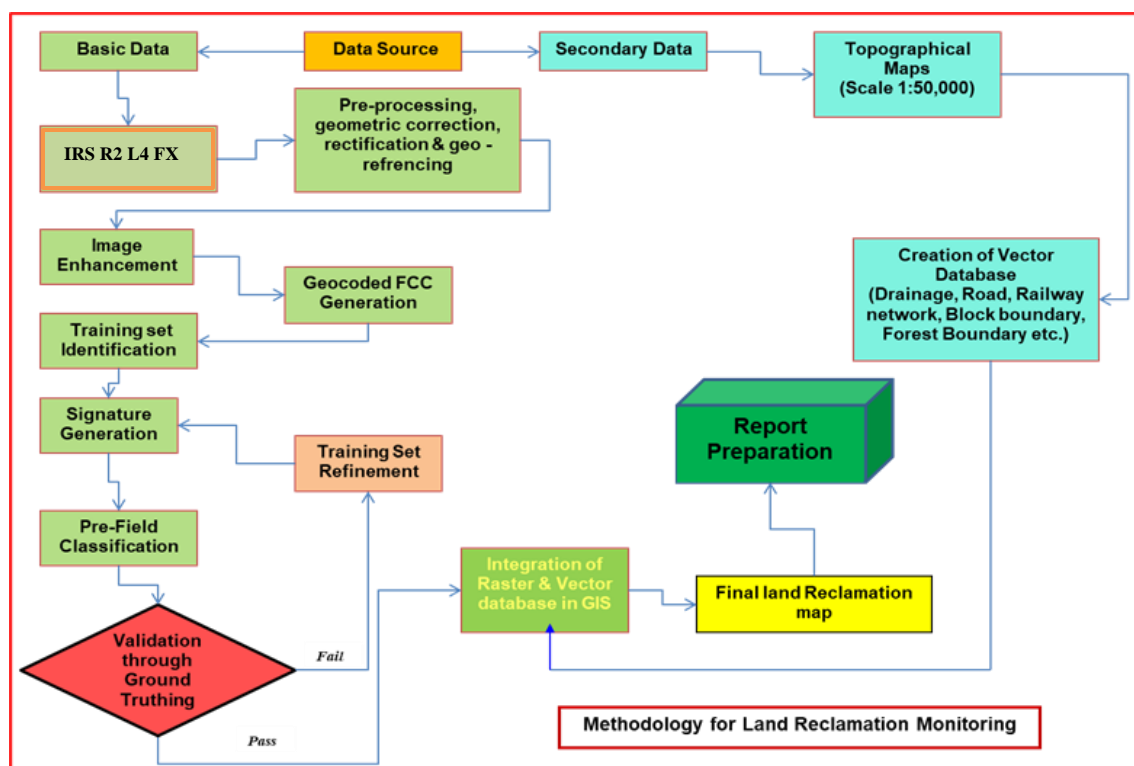


Fig : 6 Methodology for Land Reclamation Monitoring



**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, topo sheets are procured for creation of vector database.

**3.2 Satellite Data Processing:** Satellite data are processed using ERDAS IMAGINE v2014 s/w digital image processing s/w. Methodology involves the following major steps:

- **Rectification & Georeferencing:** 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 Sol 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 v 2014 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 v2014 s/w.

- **Overlay of Vector data base**

Vector data base 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-off dates.

**4.0 Work Plan**

- 4.1** Total 20 opencast projects of different CIL subsidiaries and 09 clusters of BCCL & ECL producing less than 5 million cubic m. (Coal + OB together) were taken up for the study during the year 2021-22. Based on the RESOURCESAT-2 satellite data, land reclamation /mine closure monitoring was carried out using ERDAS IMAGINE digital image processing s/w and Arc-Info GIS.

- 4.2** The list of the following 20 opencast projects of different CIL subsidiaries and 09 clusters of BCCL & ECL producing less than 5 mcm (Coal and OB) together annually taken up for land reclamation monitoring based on satellite data of year 2021 are given in table below:

<b>Subsidiary (No. of Projects)</b>	<b>Opencast Projects / Clusters (Less than 5 million Cu.m. Coal + OB per annum)</b>
<b>WCL (11)</b>	Inder UG to OC, Kamptee Deep OC, Navin Kunada, Shivpuri, Pauni Expn, HLOCM, Ghorawari, Dhorwasa, Damua, Barkuhi & Ambara.
<b>SECL (01)</b>	Kurasia.
<b>MCL (01)</b>	Basundhara.
<b>CCL (07)</b>	Tetariakhar, Dakra, Giddi – A, Pundi, Kedla, Jarangdih & Karma.
<b>BCCL(05)</b>	Cluster-I, Cluster-IV, Cluster-VII, Cluster-X & Cluster-XI.
<b>ECL (04)</b>	Cluster-V, Cluster-VI, Cluster-VII & Cluster-VIII.
<b>TOTAL(29)</b>	

- 4.3** Subsidiary wise land reclamation status of the above mentioned 20 opencast projects of different CIL subsidiaries and 09 clusters of BCCL & ECL derived from satellite data for the year 2021-22 are given in the following pages:

**WESTERN COALFIELDS LIMITED**

## 5.0 Land Reclamation Status in Western Coalfields Ltd.

5.1 Following 11 opencast projects of WCL producing less than 5 million cubic m. (Coal+OB) annually were taken up for land reclamation monitoring during the year 2021-22:

- Inder UG to OC
- Kamptee Deep OC
- Navin Kunada
- Shivpuri
- Pauni Expn
- HLOCM
- Ghorawari
- Dhorwasa
- Damua
- Barkuhi
- Ambara

5.2 Land reclamation status of the above mentioned 11 opencast projects were also prepared for the year 2018. Project wise Land Reclamation status in WCL is given in Table 5.1 and also shown graphically in Fig 5.1. Area statistics of different land use /cover class present in the mine leasehold of the above projects for the year 2021 are shown in the Table - 5.2. Land use maps derived from satellite data are shown in Plate 5.1 - 5.11. Different land use classes based on satellite data are depicted in Bar Charts in Fig. 5.2 - 5.12 for the years 2018 and 2021.

5.3 Study reveals that out of total mine leasehold area of 5407.55 Ha of 11 OC projects in WCL Viz Inder Ug to OC, Kamptee Deep , Navin Kunada ,Shivpuri Pauni Expn ,HLOCM Ghorawari ,Dhorwasa , Damua , Barkuhi and Ambara considered for monitoring during year 2021-22 ; total excavated area is 1088.57 Ha(20.13%) ,out of which 114.54 Ha (10.52%) area has been revegetated (Biologically reclaimed ) and 522.15 Ha (47.97%) area is under backfilling (Technically reclaimed) and balance 451.88 Hectare (41.51%)

area is under active mining. It is evident from analysis that 636.69 Hectare (58.49%) area of above OC projects are under total reclamation in WCL. Project wise details are given in Table-8.1

- 5.4** Study indicates that overall all the projects of WCL considered for this study indicate increase or static trend in biological reclamation (plantation on backfill) with respect to the year 2018.
- 5.5** It is evident from analysis that area under land reclamation has increased from 563.07 Ha(Yr.2018) to 636.69 Ha (Yr.2021) which includes both plantation on backfill (Biological Reclamation) and area under backfilling (Technical Reclamation) .This increase of 73.62 Ha area under total reclamation for eleven opencast mine of WCL in the period of three year is due to increase in area under Technical reclamation and Biological Reclamation to the tune of 45.89 Ha and 27.73 Ha respectively. Projectwise status of Land reclamation for eleven OC mines area are shown in bar chart (Figure-1)
- 5.6** There has been overall increase in area under Technical reclamation (area under backfilling) in all projects of WCL except in Navin Kunada OCP where area under technical reclamation has decreased from 87.46 Ha (Yr.2018) to 79.97 Ha (Yr.2021). This decrease of 7.49 Ha area under backfilling in the year 2021 as compared to the year 2018 is due to more area of backfilling has come under area of plantation on backfill in this mine as indicated in Table:1
- 5.7** After analyzing the satellite data of year 2018 vs. 2021, it is evident that total area under plantation (Green Cover) carried out on backfilled area, OB dumps as well as area under social forestry in all the mines of WCL has increased from 798.26 Ha area (Yr. 2018) to 865.22 Hectare area (Yr. 2021) in span of three year. This increase of 66.96 Hectare area of total plantation (Green Cover) during three years is due to more plantation has been carried out within leasehold area of these mines.

- 5.8** The production in Damua OC mine is temporarily discontinued since 2017, hence there is no change in area under technical reclamation and biological reclamation with respect to the year 2018 resulting which area under total reclamation with respect to Damua OC this year is also same as in the year 2018. It is also observed that there is no change in area of active mining and excavated area also with respect to the year 2018 as shown in Table-1.
- 5.9** In Kamptee Deep OC mine, the area under plantation on OB has decreased from 61.39 Ha (Yr.2018) to 39.91 Ha (Yr.2021) due to dumping of barren OB on planted area of overburden. This decrease of 21.48 Ha area in plantation on OB has resulted in decrease in area of green cover which has decreased from 107.38 Ha (Yr.2018) to 92.35 Ha (Yr.2021) and percentage green cover generated has also decreased from 22.78 % (Yr.2018) to 19.91% (Yr.2021).
- 5.10** The leasehold boundary of Ghorawari I&II OC has been updated as per EC this year which has resulted in significant change in shape but not in area of leasehold boundary i.e 1296.01 Ha which is same as in the year 2018. Area under plantation on backfill has increased from 8.92 Ha (13.93%) in the year 2018 to 16.24 Ha (16.73%) in the year 2021 and area under backfilling has increased from 32.06 Ha (50.05%) to 42.76 Ha (44.04%) resulting which there is an increase in area of total reclamation i.e from 40.98 Ha (63.98%) (Yr.2018) to 59.00 Ha (60.76%) (Yr.2021).
- 5.11** Out of 11 projects of WCL, maximum land reclamation has been carried out in Damua OC projects (76.04%) followed by Ambara (69.15%), Navin Kunada (66.55%), Dhorwasa OC (62.37%), Pauni OC Expn (62.26%), Shivpuri (61.07%), Ghorawari (60.76%), HLOCM (59.20%), Kamptee Deep (47.13%), Barkuhi OC (46.48%) and Inder UG to OC (43.17%) respectively.



- 5.12** Land reclamation monitoring of above set of opencast mines of WCL will be carried out again with the help of satellite data of the year 2024 and comparison for status of the same will be made also with respect to the satellite data of the year 2021.

**Table – 5.1**  
**Project wise Land Reclamation Status in Opencast Project of WCL**  
**producing (Less than 5 million Cu. M. of Coal+OB) based on Satellite Data of the year 2021**

(Area in Ha)

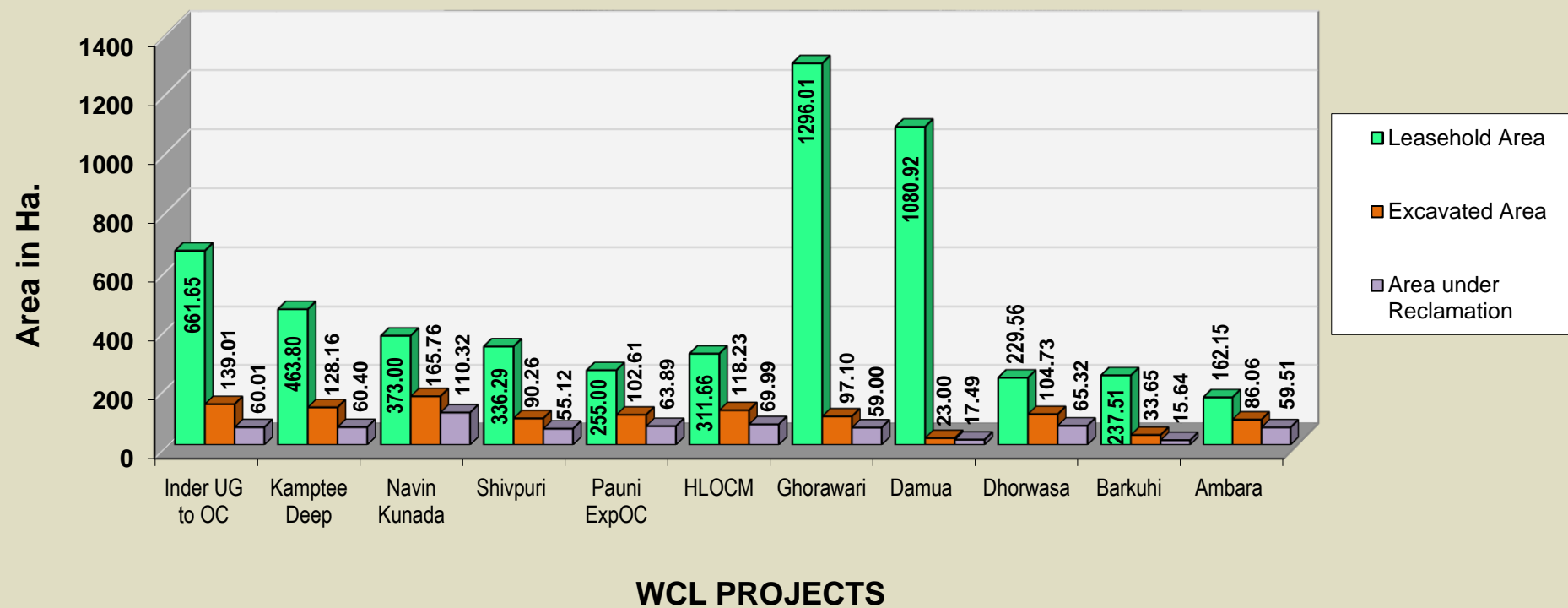
Sl.No	Project	Total Leasehold Area		Technical Reclamation		Plantation						Area under Active Mining		Total Excavated Area		Total Area under Plantation (% Green Cover Generated in Leasehold)		Total Area under Reclamation	
						Biological Reclamation		Other Plantations											
				Area under Backfilling		Plantation on Excavated / Backfilled Area		Plantation on External Over Burden Dumps		Social Forestry, Avaneue 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	Inder UG to OC	617.84	661.65	57.29	60.01	0.00	0.00	29.79	36.49	37.96	40.81	80.66	79.00	137.95	139.01	67.75	77.30	57.29	60.01
				41.53%	43.17%	0.00%	0.00%					58.47%	56.83%			10.97%	11.68%	41.53%	43.17%
2	kamptee deep	471.44	463.80	51.23	51.53	8.11	8.87	61.39	39.91	37.88	43.57	61.99	67.76	121.33	128.16	107.38	92.35	59.34	60.40
				42.22%	40.21%	6.68%	6.92%					51.09%	52.87%			22.78%	19.91%	48.91%	47.13%
3	Navin kunda OC Expn	373.00	373.00	87.46	79.97	19.71	30.35	88.44	93.26	5.05	4.19	58.17	55.44	165.34	165.76	113.20	127.80	107.17	110.32
				52.90%	48.24%	11.92%	18.31%					35.18%	33.45%			30.35%	34.26%	64.82%	66.55%
4	Shivpuri OC Expn	336.29	336.29	17.98	44.97	6.06	10.15	20.41	20.93	16.53	23.91	47.31	35.14	71.35	90.26	43.00	54.99	24.04	55.12
				25.20%	49.82%	8.49%	11.25%					66.31%	38.93%			12.79%	16.35%	33.69%	61.07%
5	Pauni Expn	255.00	255.00	47.37	57.30	3.83	6.59	36.64	50.66	9.94	10.16	43.76	38.72	94.96	102.61	50.41	67.41	51.20	63.89
				49.88%	55.84%	4.03%	6.42%					46.08%	37.74%			19.77%	26.44%	53.92%	62.26%
6	HLOCM	311.66	311.66	63.64	63.64	6.31	6.35	72.86	73.84	33.54	30.96	35.42	48.24	105.37	118.23	112.71	111.15	69.95	69.99
				60.40%	53.83%	5.99%	5.37%					33.61%	40.80%			36.16%	35.66%	66.39%	59.20%
7	Ghorawari I&II	1296.01	1296.01	32.06	42.76	8.92	16.24	27.60	27.68	14.43	14.84	23.07	38.10	64.05	97.10	50.95	58.76	40.98	59.00
				50.05%	44.04%	13.93%	16.73%					36.02%	39.24%			3.93%	4.53%	63.98%	60.76%
8	Damua	1080.92	1080.92	8.98	8.98	8.51	8.51	9.97	12.83	138.58	144.28	5.51	5.51	23.00	23.00	157.06	165.62	17.49	17.49
				39.04%	39.04%	37.00%	37.00%					23.96%	23.96%			14.53%	15.32%	76.04%	76.04%
9	Dhorwasa	232.91	229.56	51.07	51.68	11.85	13.64	39.69	53.62	11.47	9.02	36.12	39.41	99.04	104.73	63.01	76.28	62.92	65.32
				51.57%	49.35%	11.96%	13.02%					36.47%	37.63%			27.05%	33.23%	63.53%	62.37%
10	Barkuhi	237.51	237.51	13.84	15.64	0.00	0.00	0.00	0.00	8.73	8.81	18.69	18.01	32.53	33.65	8.73	8.81	13.84	15.64
				42.55%	46.48%	0.00%	0.00%					57.45%	53.52%			3.68%	3.71%	42.55%	46.48%
11	Ambara	162.15	162.15	45.34	45.67	13.51	13.84	0.00	0.00	10.55	10.91	21.50	26.55	80.35	86.06	24.06	24.75	58.85	59.51
				56.43%	53.07%	16.81%	16.08%					26.76%	30.85%			14.84%	15.26%	73.24%	69.15%
	TOTAL	5374.73	5407.55	476.26	522.15	86.81	114.54	386.79	409.22	324.66	341.46	432.20	451.88	995.27	1088.57	798.26	865.22	563.07	636.69
				47.85%	47.97%	8.72%	10.52%					43.43%	41.51%	18.52%	20.13%	14.85%	16.00%	56.57%	58.49%

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

**Note : In reference of the above Table-1, different parameters are classified as follows**

- 1.Area under Biological Reclamation includes area under plantation done on backfilled area only.
- 2.Area under Technical Reclamation includes areas under barren backfill only.
- 3.Area under Active Mining includes coal quarry, advance quarry & quarry filled with water etc.
- 4.Social forestry and plantation on external OB dump are not included in biological reclamation and are put under other plantation.
- 5.% claculated in respect to total excavated area except for "Total area under plantation" where % has been calculated in terms of leasehold area.
6. In the Year 21-22 , MKD-1 OC mine has been included in those category of mines of WCL which produce more than 5 mcm(Coal+OB).

### PROJECT WISE STATUS OF LAND RECLAMATION IN WCL FOR THE YEAR 2021



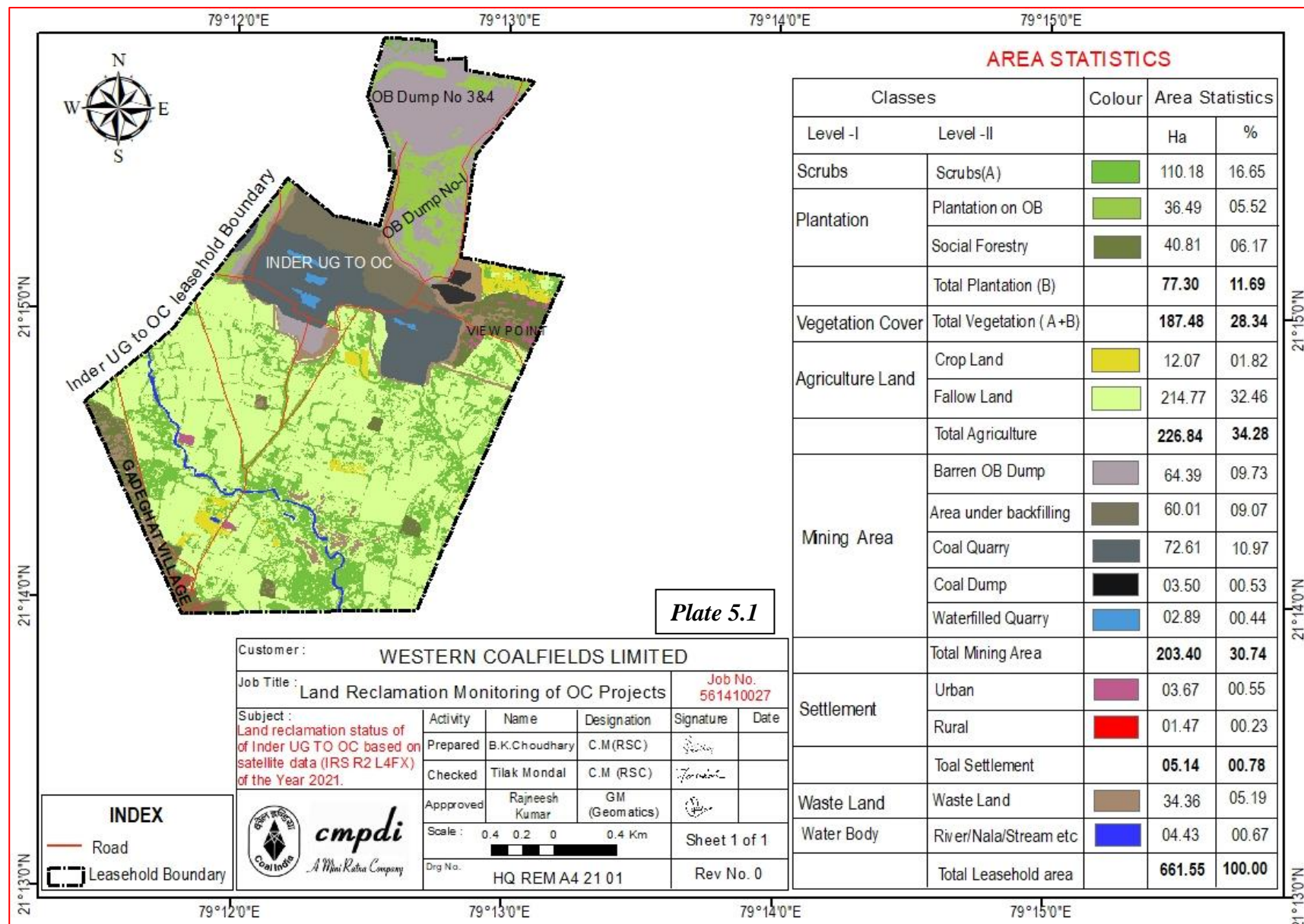
**Fig.5.1: Land Reclamation Status in OC projects producing less than 5 mcm (Coal+OB) annually of WCL in the year-2021**

Table 5.1

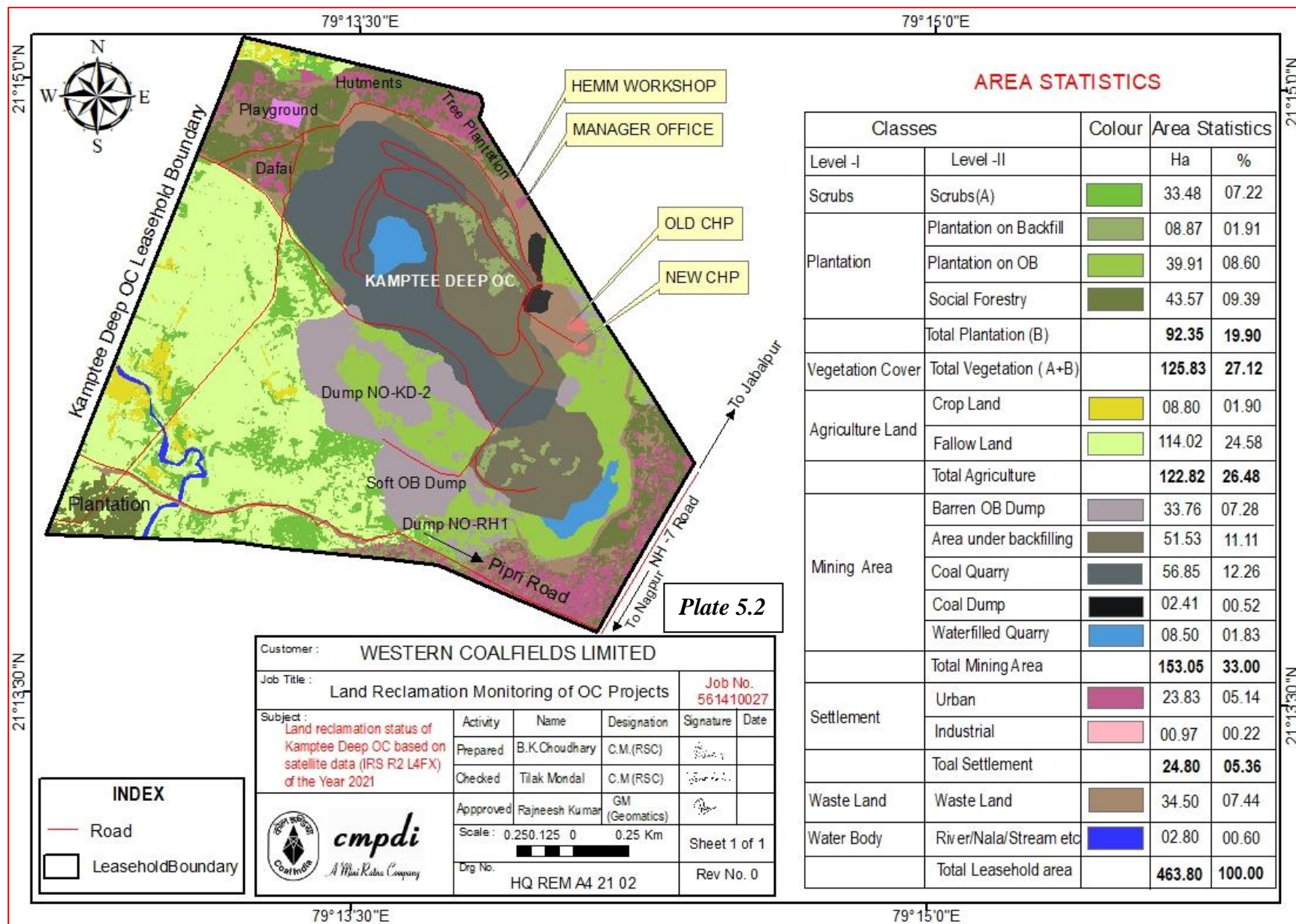
**Project wise area statistics of Land Use/Cover classes in Opencast Projects producing (<5 m.c.m( Coal+OB) )of WCL based on satellite data of the year 2021**

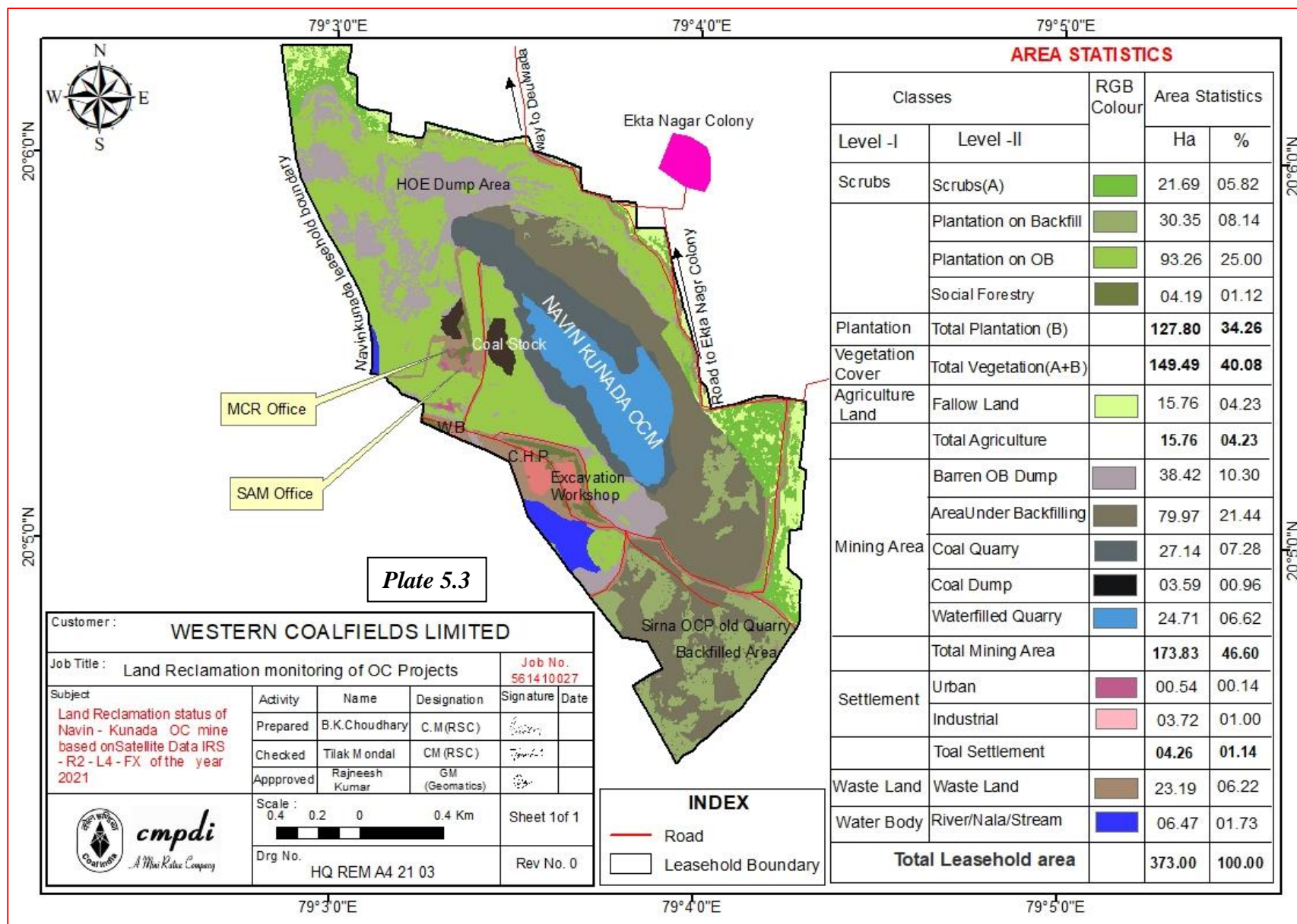
(Area in Hectare)

Area in Hectare)																											
CLASSES (RGB COLOUR)			Inder UG to OC		Kamptee Deep		Navin Kunada		Shivpuri		Pauni Expn OC		HLOCM		Ghorawari I&II		Damua		Dhorwasa		Barkuhi		Ambara		Total		
FOREST			Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	
			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.42	4.12	61.62	5.70	0.00	0.00	0.00	0.00	0.00	0.00	115.04	2.13
SCRUBS	Total Forest		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.42	4.12	61.62	5.70	0.00	0.00	0.00	0.00	0.00	0.00	115.04	2.13	
	Scrubs		110.18	16.65	33.48	7.22	21.69	5.82	23.15	6.88	21.63	8.48	5.25	1.69	315.59	24.35	283.26	26.21	16.22	7.07	26.73	11.25	18.98	11.71	876.16	16.20	
PLANTATION	Social Forestry		40.81	6.17	43.57	9.39	4.19	1.12	23.91	7.11	10.16	3.98	30.96	9.94	14.84	1.15	144.28	13.35	9.02	3.93	8.81	3.71	10.91	6.73	341.46	6.31	
	Plantation on OB Dump		36.49	5.52	39.91	8.60	93.26	25.00	20.93	6.22	50.66	19.87	73.84	23.69	27.68	2.14	12.83	1.19	53.62	23.36	0.00	0.00	0.00	0.00	409.22	7.57	
	Plantation on Backfill		0.00	0.00	8.87	1.91	30.35	8.14	10.15	3.02	6.59	2.58	6.35	2.04	16.24	1.25	8.51	0.79	13.64	5.94	0.00	0.00	13.84	8.54	114.54	2.12	
	Total Plantation on backfill		0.00	0.00	8.87	1.91	30.35	8.14	10.15	3.02	6.59	2.58	6.35	2.04	16.24	1.25	8.51	0.79	13.64	5.94	0.00	0.00	13.84	8.54	114.54	2.12	
Total Green Cover Generated			77.30	11.69	92.35	19.90	127.80	34.26	54.99	16.35	67.41	26.43	111.15	35.67	58.76	4.54	165.62	15.33	76.28	33.23	8.81	3.71	24.75	15.27	865.22	16.00	
Total Vegetation Cover			187.48	28.34	125.83	27.12	149.49	40.08	78.14	23.23	89.04	34.91	116.40	37.36	427.77	33.01	510.50	47.24	92.50	40.30	35.54	14.96	43.73	26.98	1856.42	34.33	
ACTIVE MINING	Coal Quarry		72.61	10.97	56.85	12.26	27.14	7.28	13.04	3.88	29.68	11.64	42.94	13.78	14.01	1.08	3.12	0.29	14.54	6.33	12.36	5.20	14.83	9.15	301.12	5.57	
	Coal Dump		3.50	0.53	2.41	0.52	3.59	0.96	2.56	0.76	4.03	1.58	1.96	0.63	1.36	0.10	0.00	0.00	2.59	1.13	1.88	0.79	0.86	0.53	24.74	0.46	
	Advance Quarry Site		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
	Quarry Filled With Water		2.89	0.44	8.50	1.83	24.71	6.62	19.54	5.81	5.01	1.96	3.34	1.07	22.73	1.75	2.39	0.22	22.28	9.71	3.77	1.59	10.86	6.70	126.02	2.33	
	Total Area under Active Mining		79.00	11.94	67.76	14.61	55.44	14.86	35.14	10.45	38.72	15.18	48.24	15.48	38.10	2.93	5.51	0.51	39.41	17.17	18.01	7.58	26.55	16.38	451.88	8.36	
RECLAIMED	Barren OB Dump		64.39	9.73	33.76	7.28	38.42	10.30	28.36	8.43	37.49	14.70	21.18	6.80	28.03	2.16	17.75	1.64	25.12	10.94	15.84	6.67	0.00	0.00	310.40	5.74	
	Barren Backfilled Area		60.01	9.07	51.53	11.11	79.97	21.44	44.97	13.37	57.30	22.47	63.64	20.42	42.76	3.30	8.98	0.83	51.68	22.51	15.64	6.58	45.67	28.17	522.15	9.66	
	Total Area under Technical Reclamation		60.01	9.07	51.53	11.11	79.97	21.44	44.97	13.37	57.30	22.47	63.64	20.42	42.76	3.30	8.98	0.83	51.68	22.51	15.64	6.58	45.67	28.17	522.15	9.66	
Total Area Under Mine Operation			203.40	30.74	153.05	33.00	173.83	46.60	108.47	32.25	133.51	52.35	133.06	42.70	108.89	8.39	32.24	2.98	116.21	50.62	49.49	20.83	72.22	44.55	1284.43	23.76	
WASTE LAND	Waste Lands		34.36	5.19	34.50	7.44	23.19	6.22	38.89	11.58	11.98	4.70	40.06	12.85	208.33	16.07	179.70	16.62	12.50	5.45	5.04	2.12	17.93	11.06	606.48	11.22	
	Fly Ash Pond / Sand Body		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.01	1.57	0.00	0.00	0.00	0.00	15.52	1.44	0.97	0.42	0.00	0.00	0.00	0.00	20.50	0.38	
WATERBODIES	Total Wasteland		34.36	5.19	34.50	7.44	23.19	6.22	38.89	11.58	15.99	6.27	40.06	12.85	208.33	16.07	195.22	18.06	13.47	5.87	5.04	2.12	17.93	11.06	626.98	11.60	
	Reservoir, nallah, ponds		4.43	0.67	2.80	0.60	6.47	1.73	1.18	0.35	0.00	0.00	6.51	2.09	2.34	0.20	10.98	1.01	0.00	0.00	6.24	2.63	0.00	0.00	40.95	0.75	
	Total Waterbodies		4.43	0.67	2.80	0.60	6.47	1.73	1.18	0.35	0.00	0.00	6.51	2.09	2.34	0.20	10.98	1.01	0.00	0.00	6.24	2.63	0.00	0.00	40.95	0.75	
AGRICULTURE	Crop Lands		12.07	1.82	8.80	1.90	0.00	0.00	18.20	5.41	0.00	0.00	0.00	0.00	87.28	6.73	10.85	1.00	0.00	0.00	79.09	33.30	15.69	9.68	231.98	4.29	
	Fallow Lands		214.77	32.46	114.02	24.58	15.76	4.23	72.51	21.56	15.75	6.20	4.07	1.31	453.65	35.00	273.95	25.34	6.70	2.91	57.92	24.39	11.40	7.03	1240.50	22.94	
	Total Agriculture		226.84	34.28	122.82	26.48	15.76	4.23	90.71	26.97	15.75	6.20	4.07	1.31	540.93	41.73	284.80	26.34	6.70	2.91	137.01	57.69	27.09	16.71	1472.48	27.23	
SETTLEMENTS	Urban Settlement		3.67	0.55	23.83	5.14	0.54	0.14	12.93	3.84	0.38	0.14	10.16	3.26	5.61	0.43	42.46	3.93	0.55	0.24	3.81	1.61	1.18	0.70	105.12	1.94	
	Rural Settlement		1.47	0.23	0.00	0.00	0	0	5.97	1.78	0.00	0.00	0.00	0.00	1.63	0.13	3.76	0.35	0.00	0.00	0.38	0.16	0.00	0.00	13.21	0.24	
	Industrial Settlement		0.00	0.00	0.97	0.22	3.72	1.00	0.00	0.00	0.33	0.13	1.40	0.43	0.51	0.04	0.96	0.09	0.13	0.06	0.00	0.00	0.00	0.00	8.02	0.15	
	Total Settlement		5.14	0.78	24.80	5.36	4.26	1.14	18.90	5.62	0.71	0.27	11.56	3.69	7.75	0.60	47.18	4.37	0.68	0.30	4.19	1.77	1.18	0.70	126.35	2.33	
Grand Total			661.65	100.00	463.80	100.00	373.00	100.00	336.29	100.00	255.00	100.00	311.66	100.00	1296.01	100.00	1080.92	100.00	229.56	100.00	237.51	100.00	162.15	100.00	5407.55	100.00	

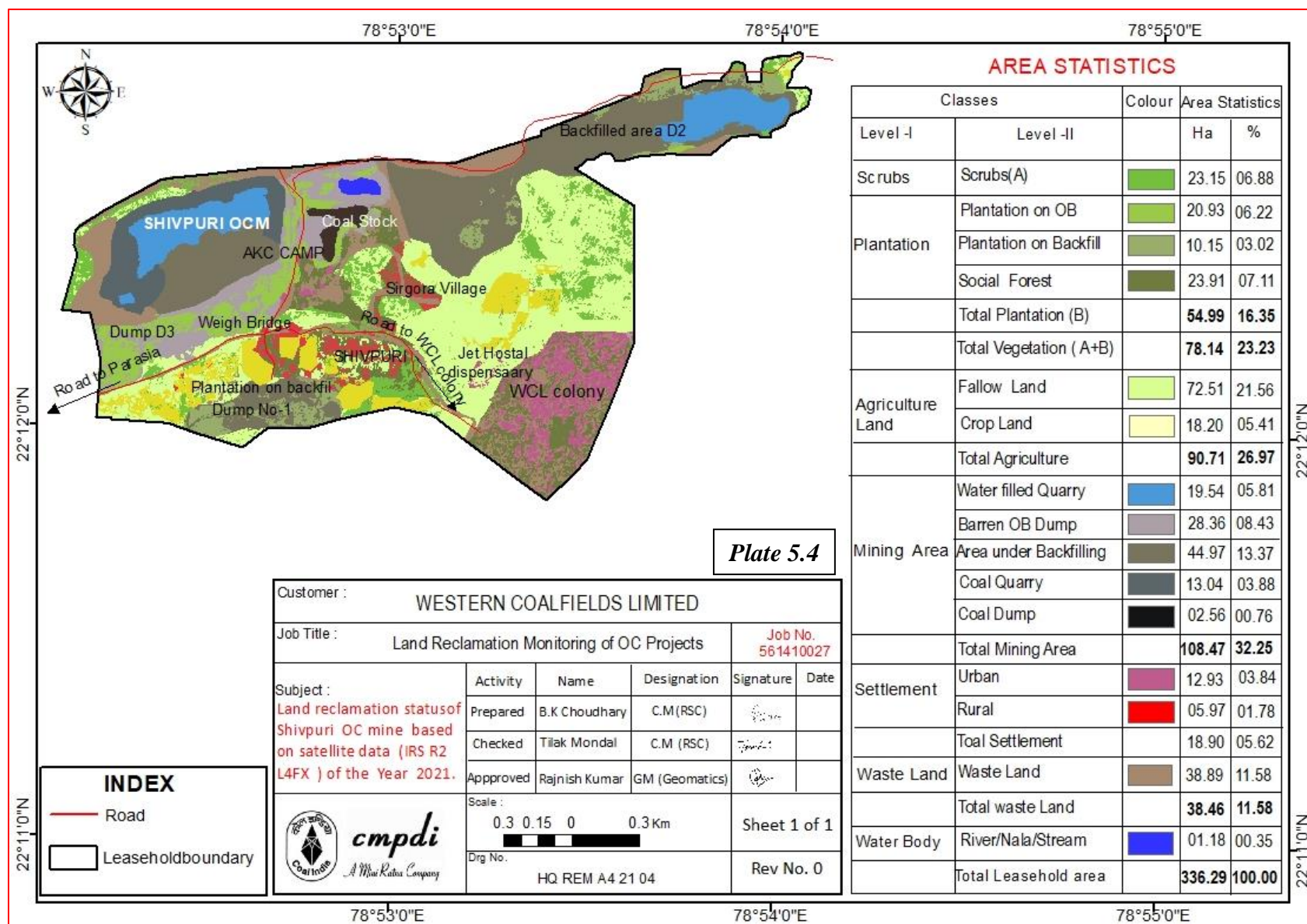




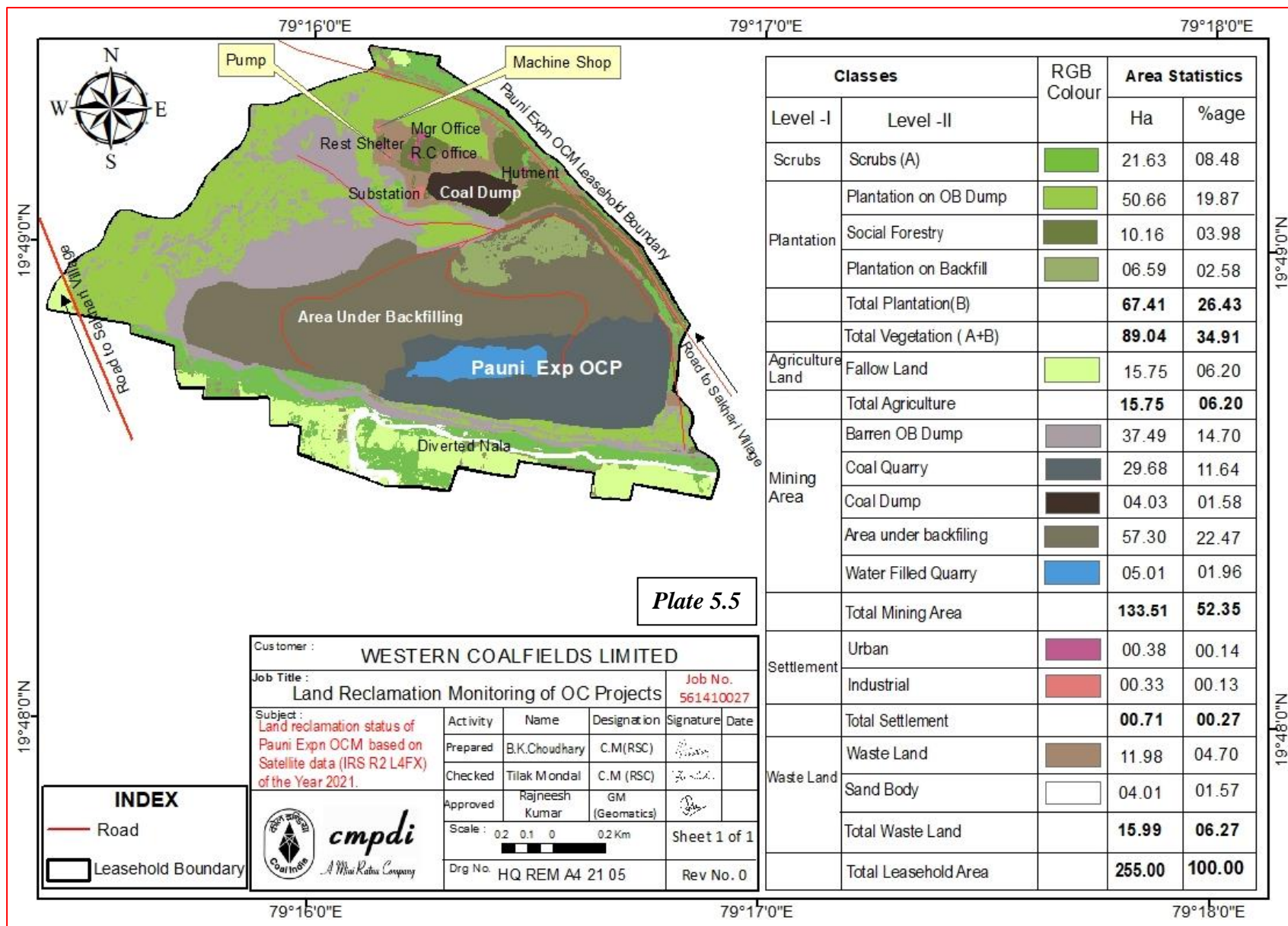


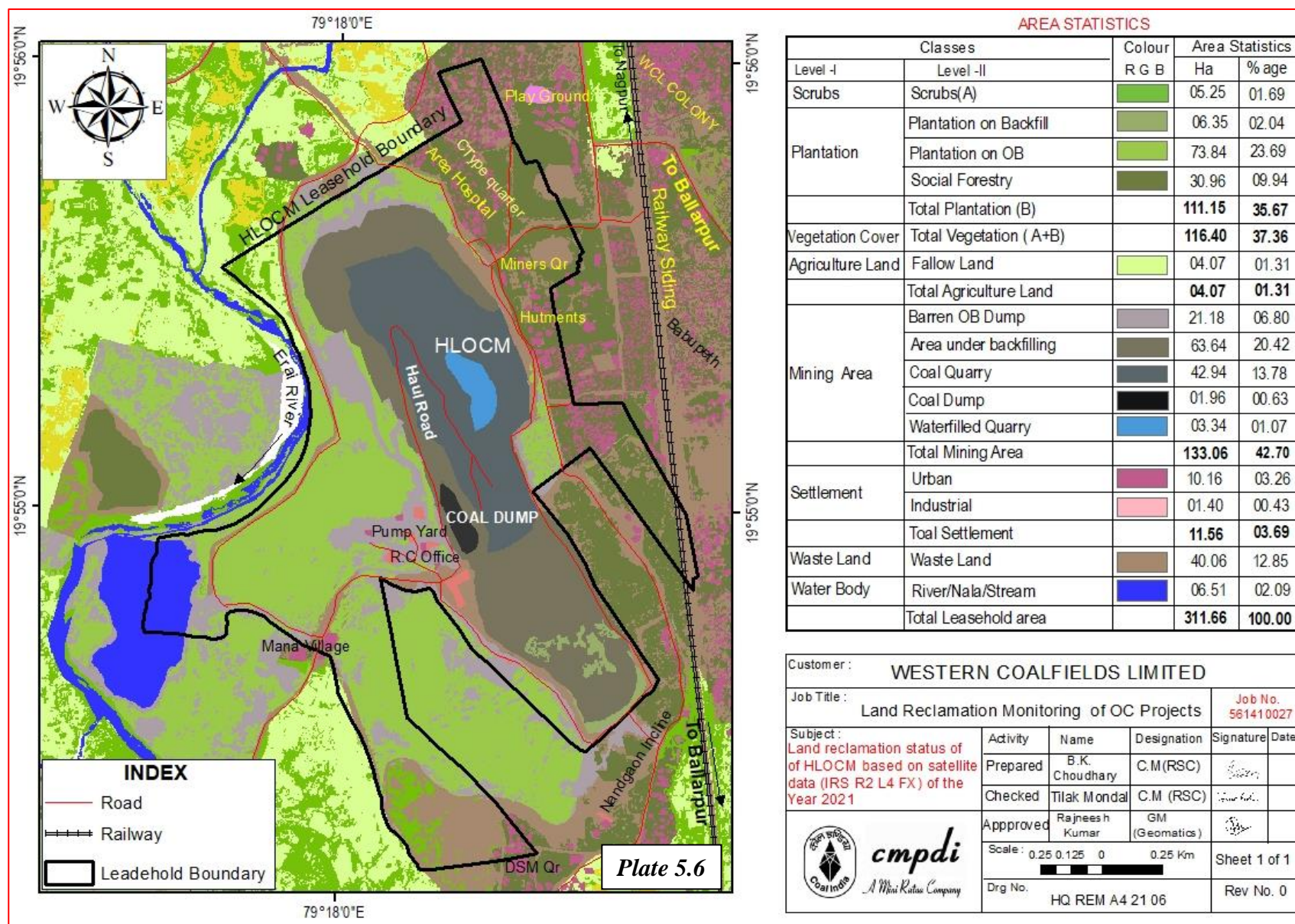




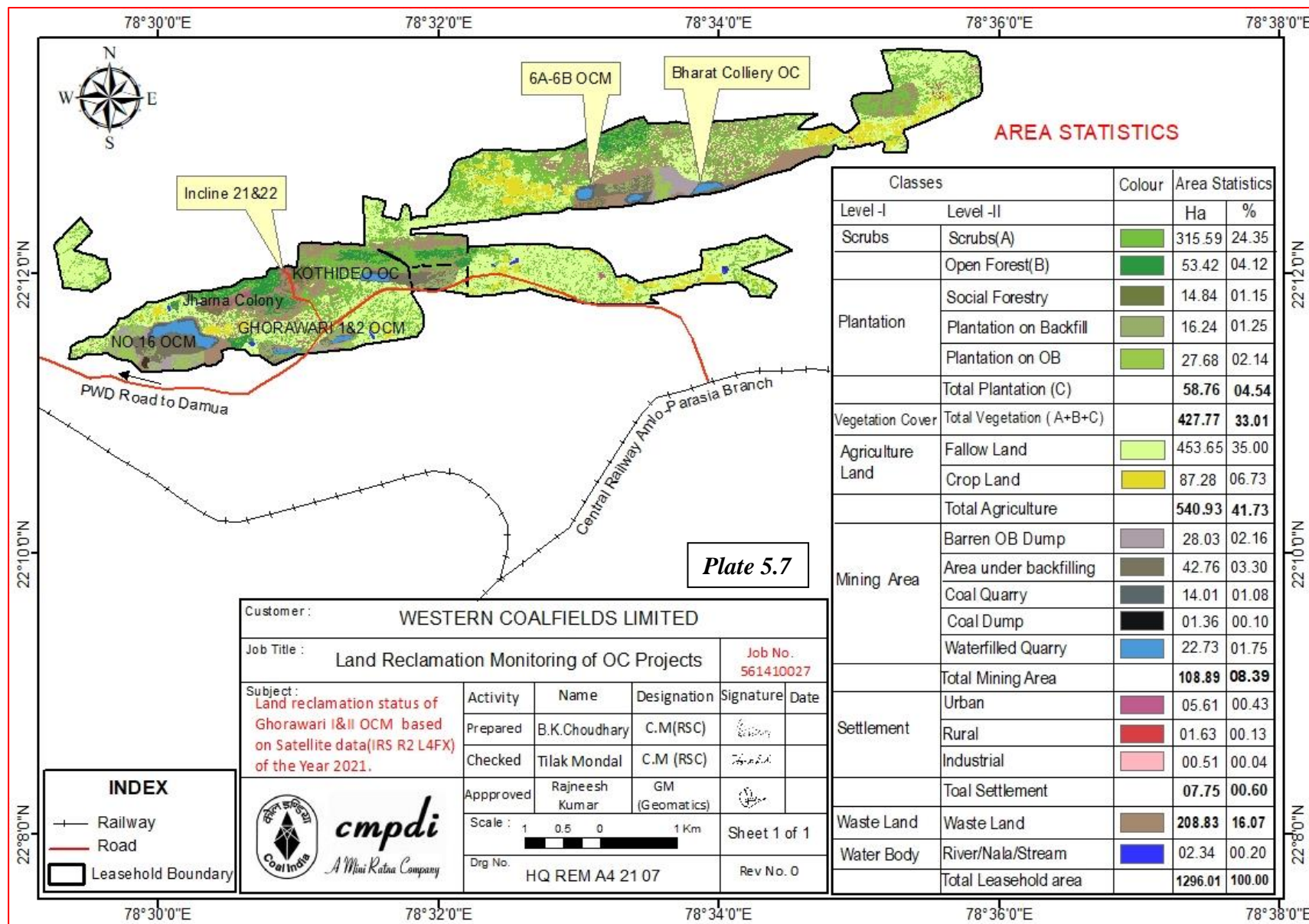


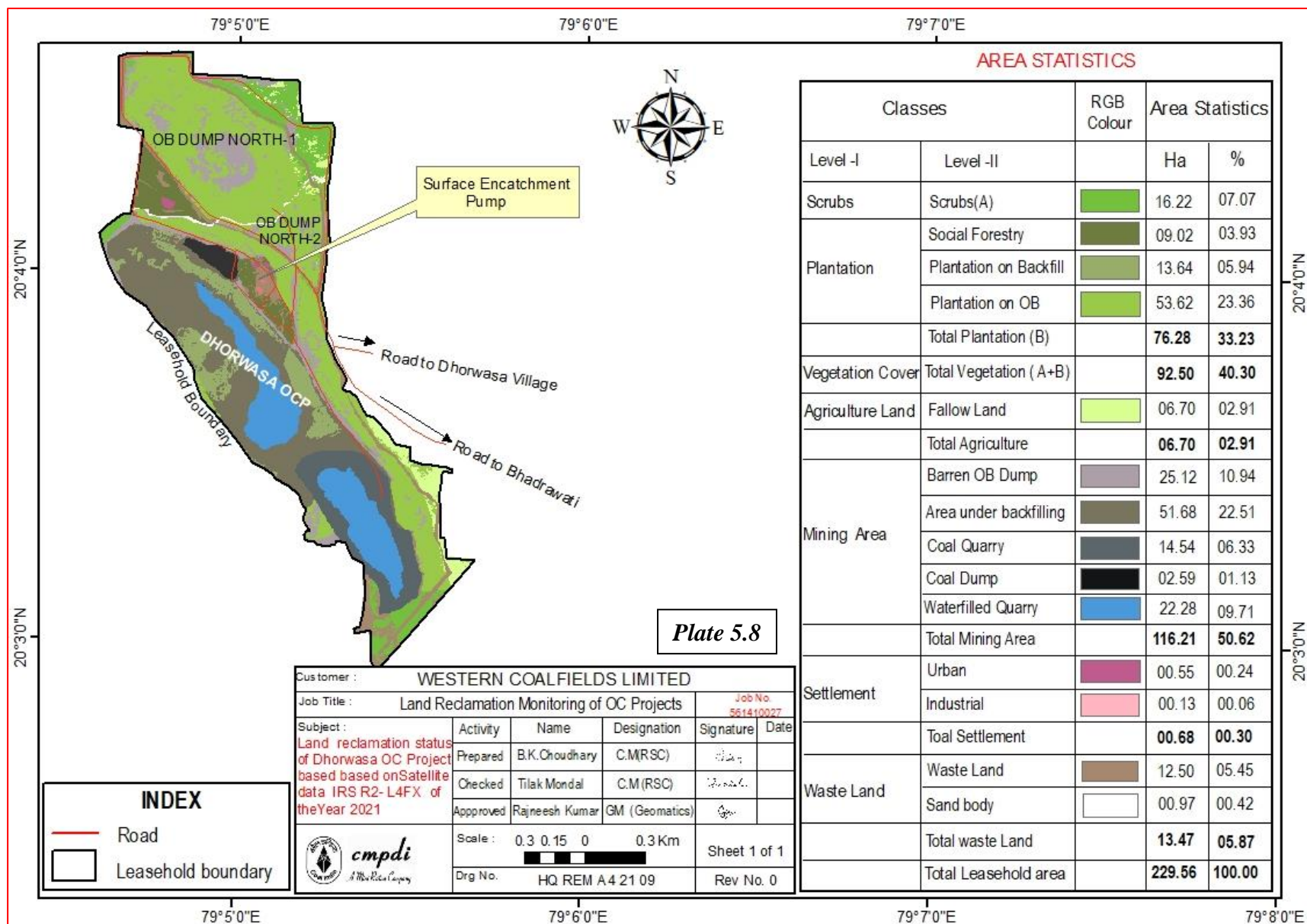




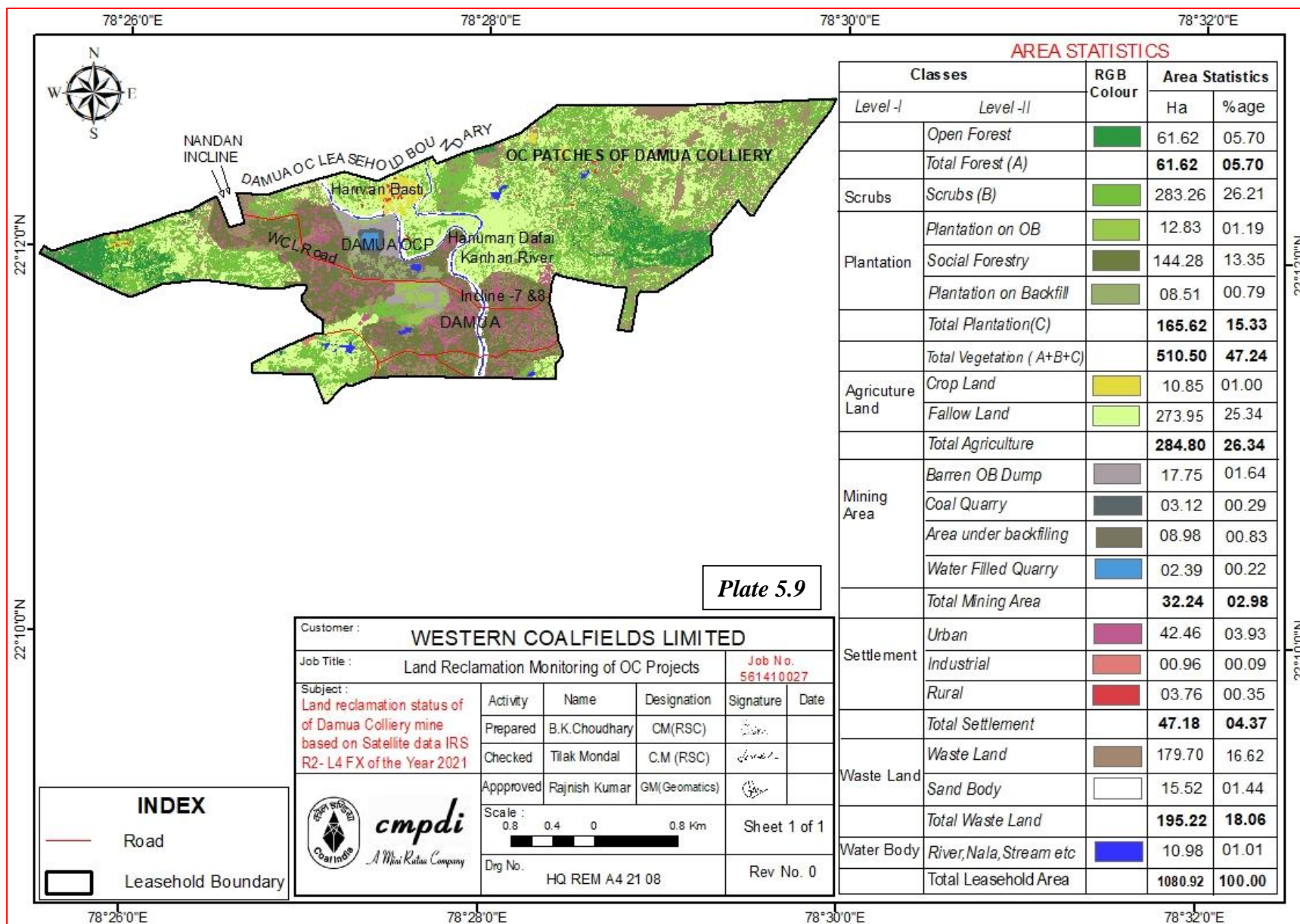


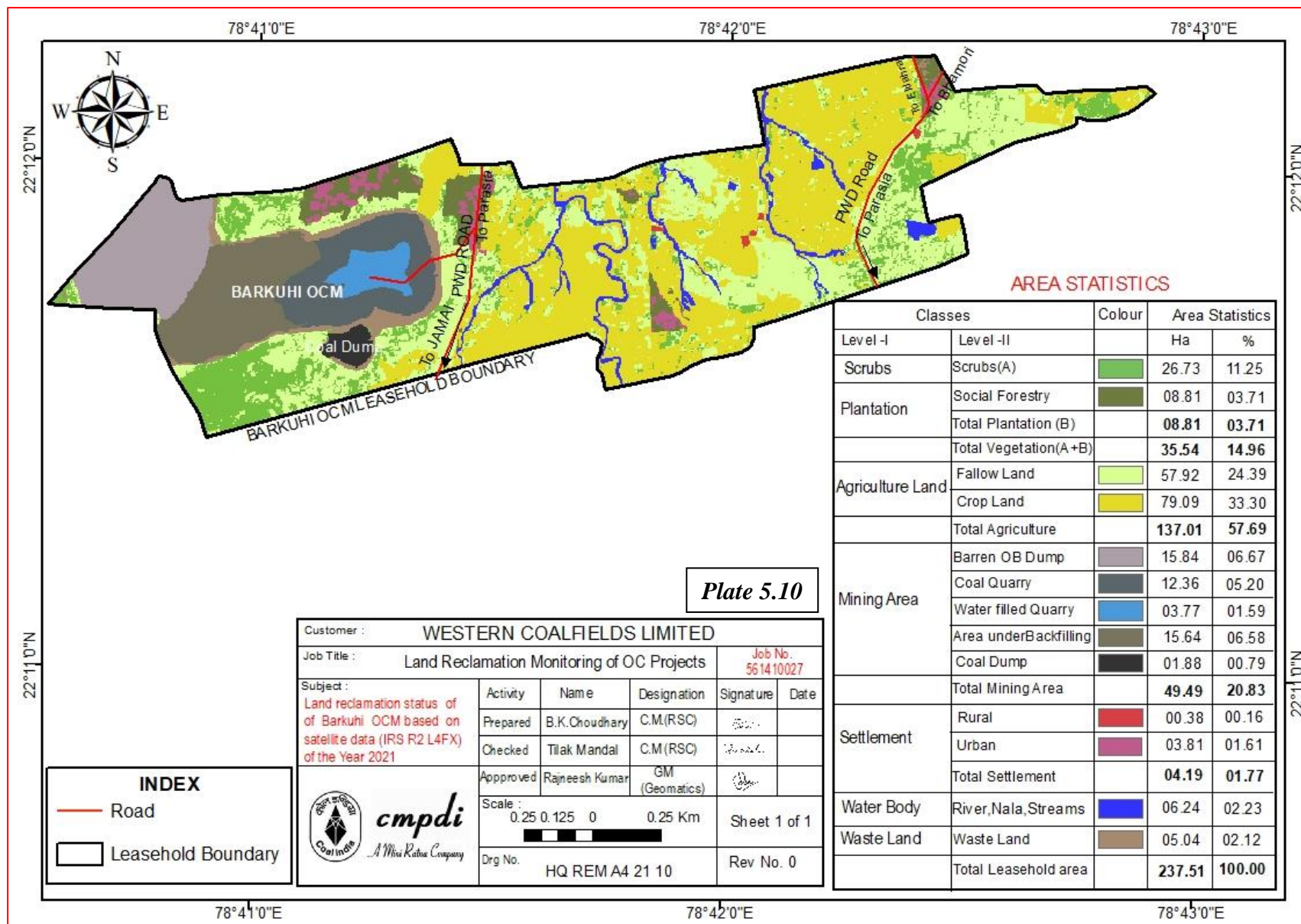




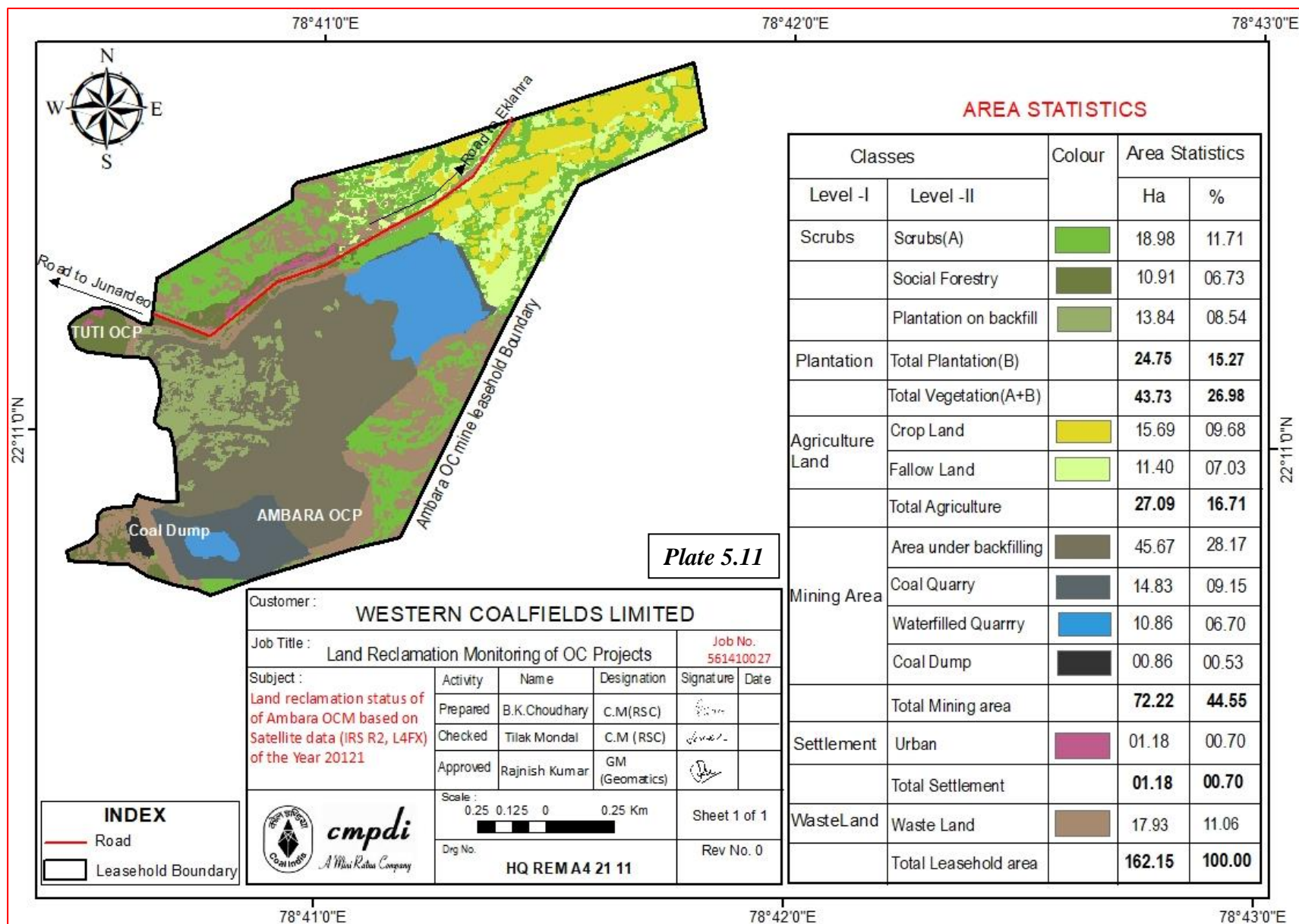












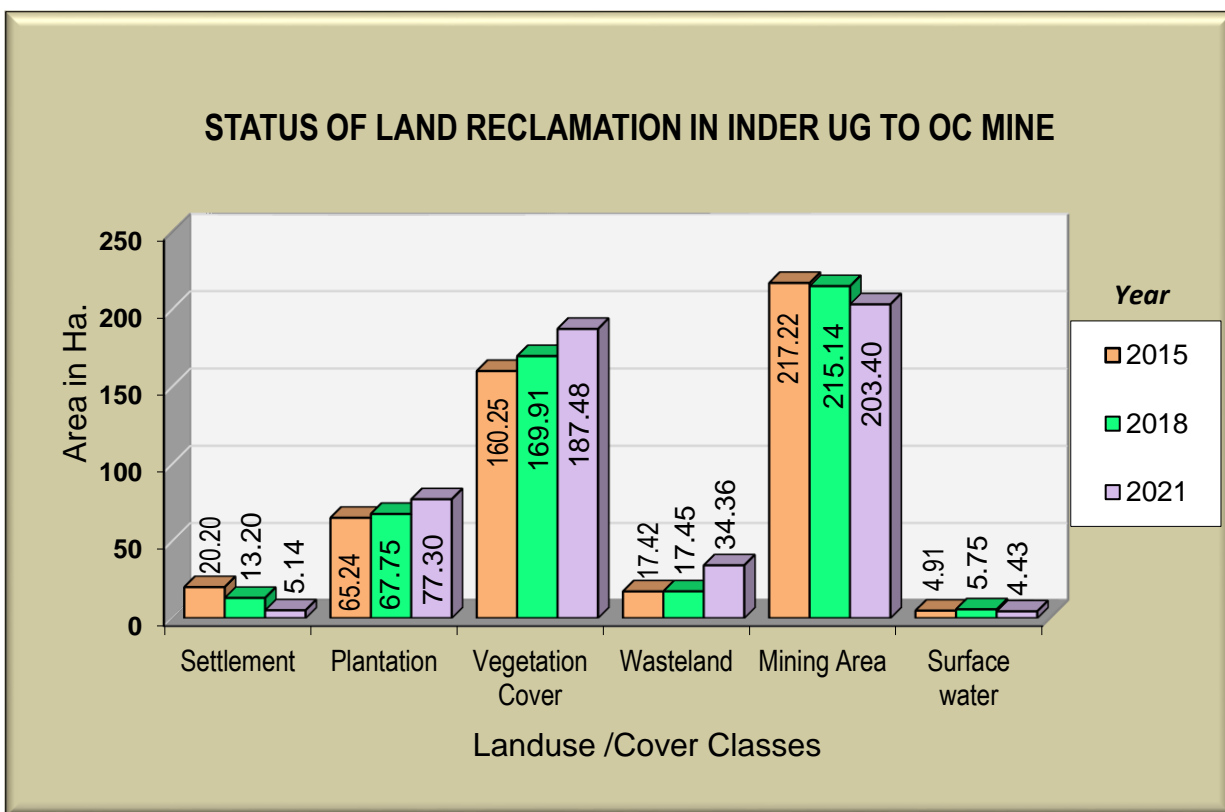


Figure - 5.2

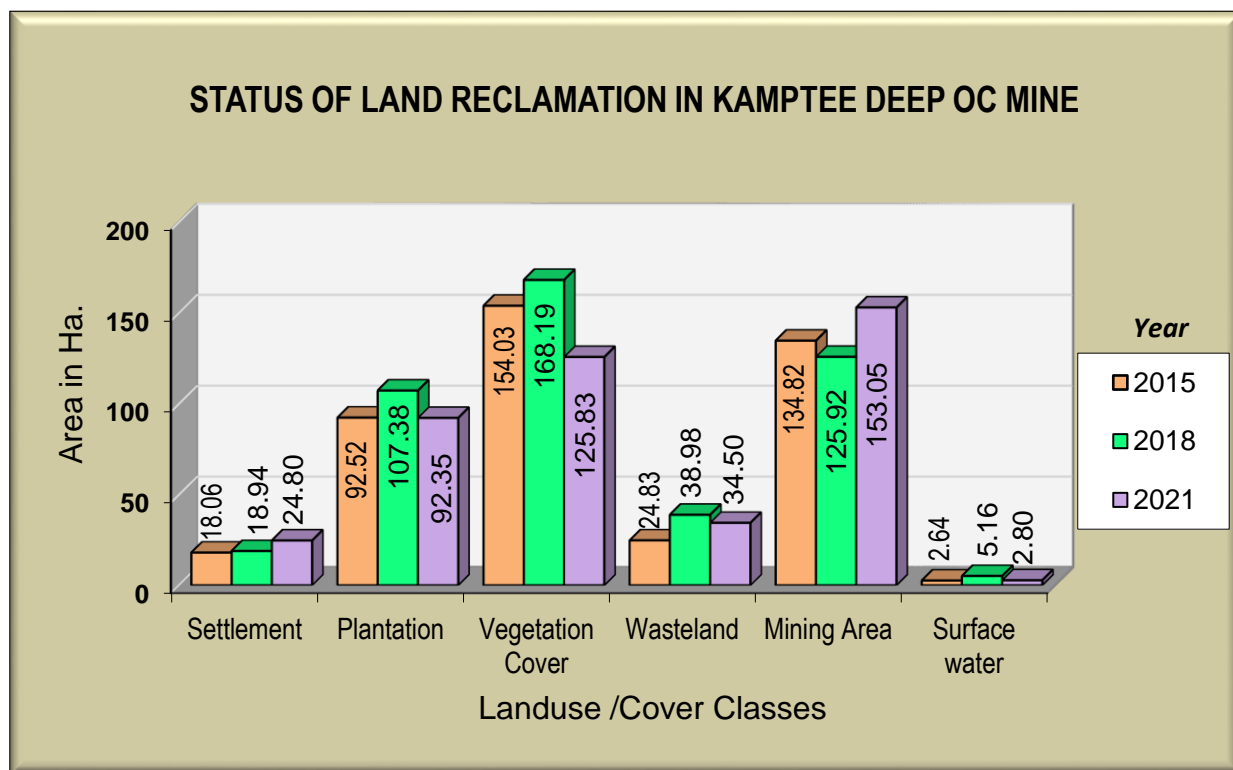


Figure - 5.3



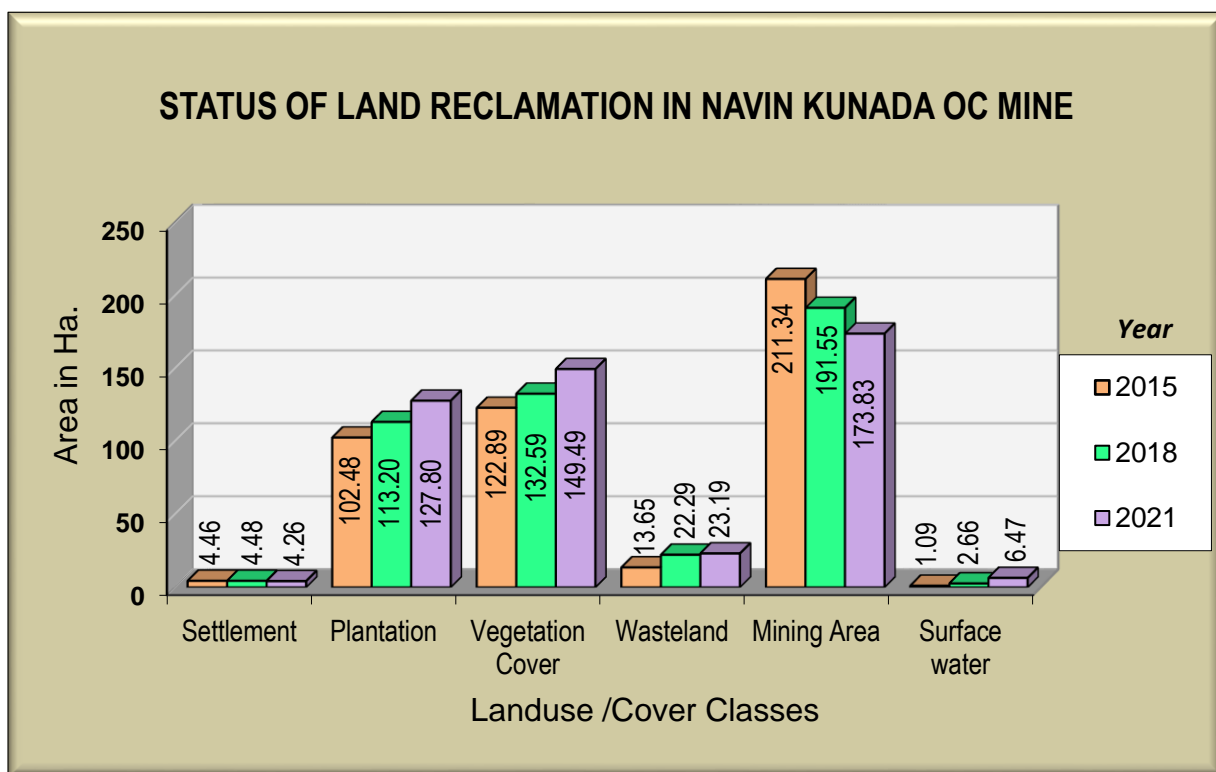


Figure - 5.4

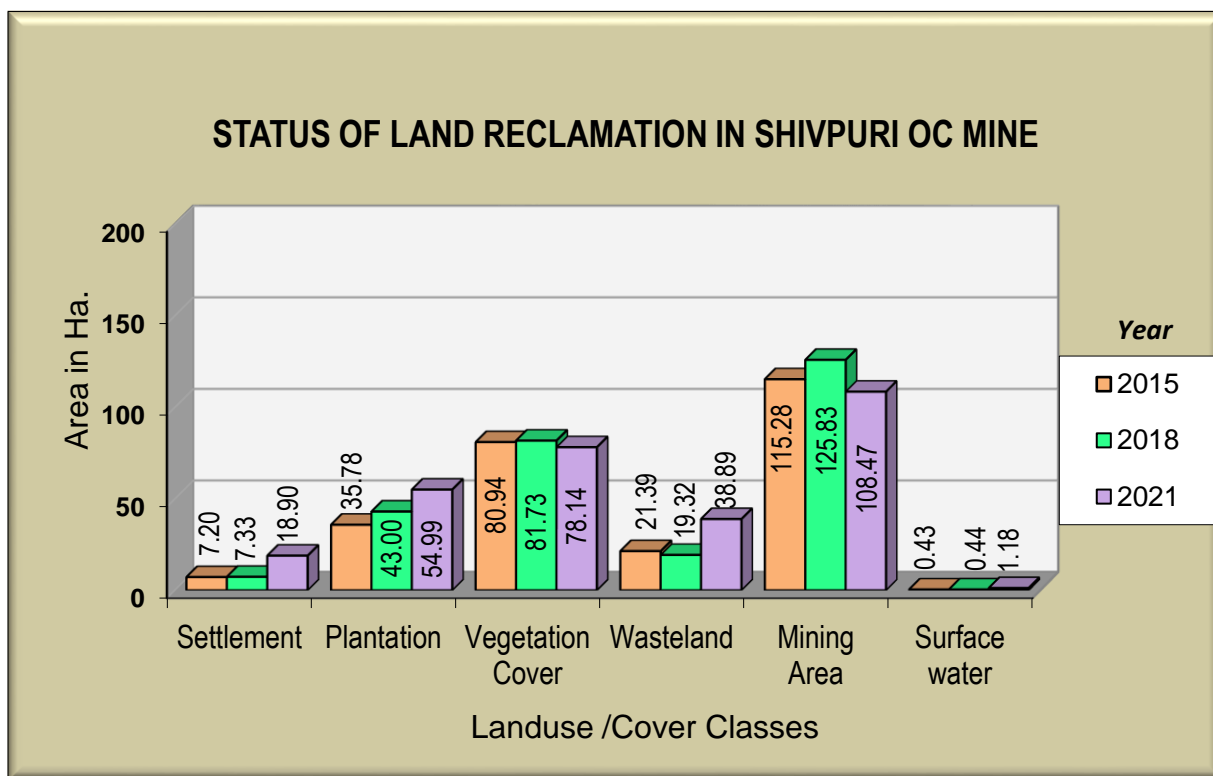


Figure - 5.5

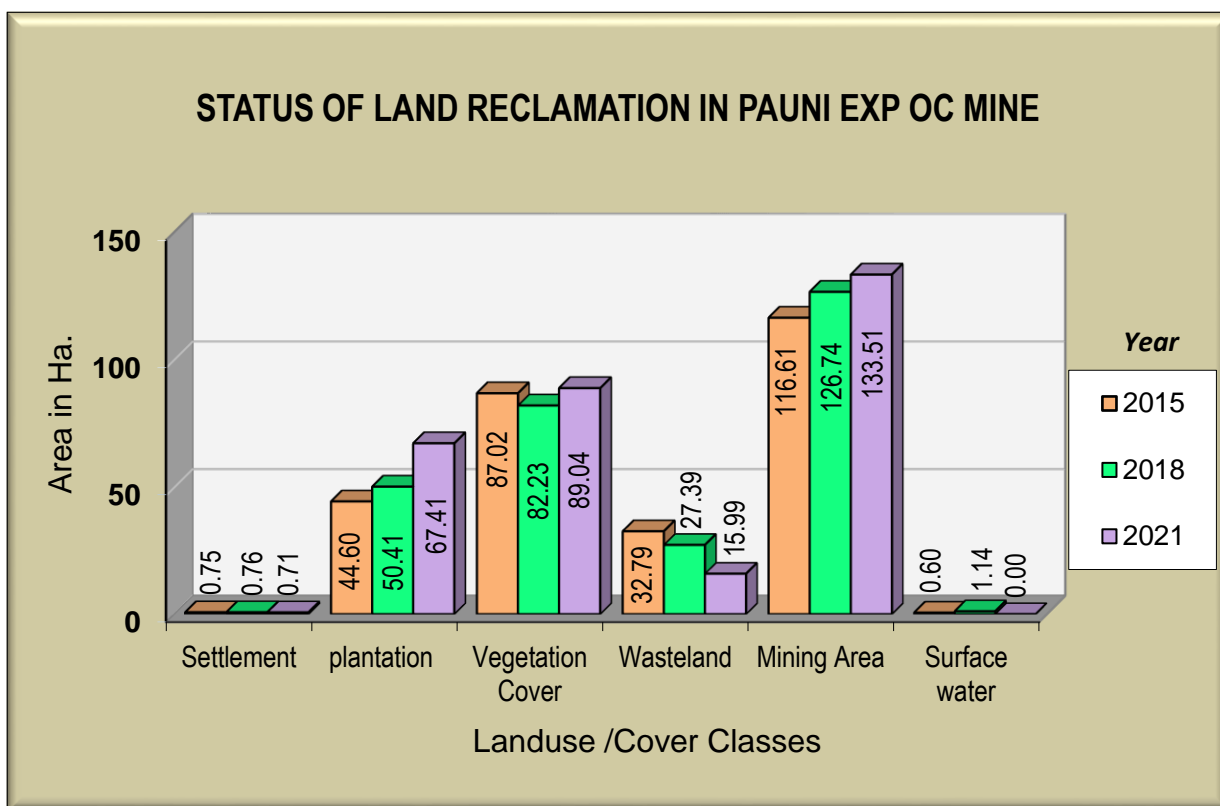


Figure - 5.6

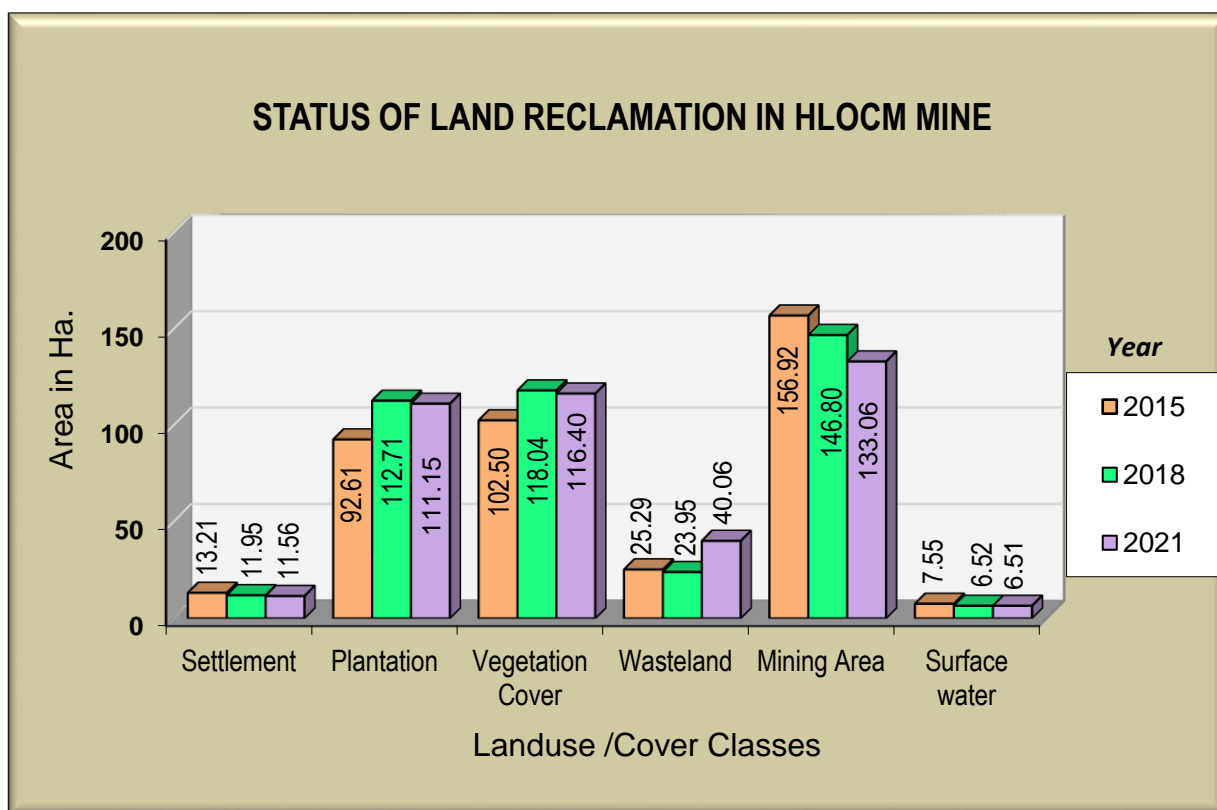


Figure - 5.7

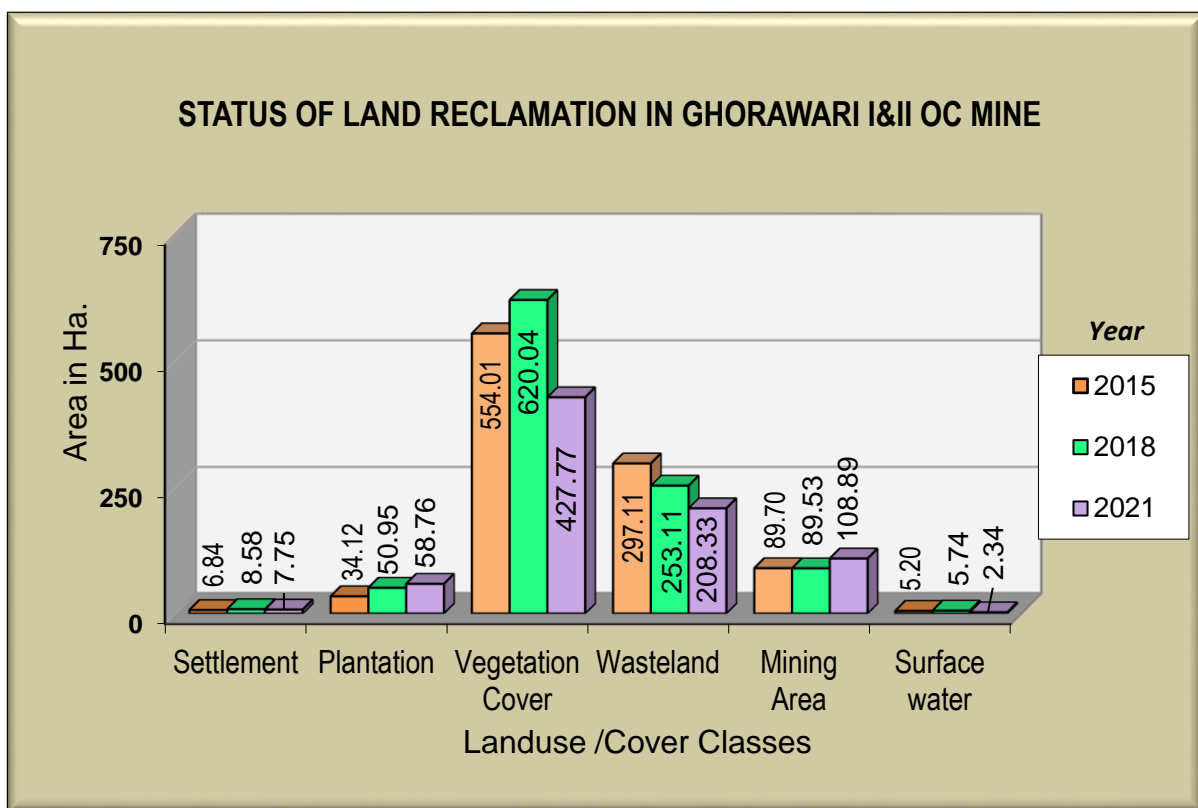


Figure - 5.8

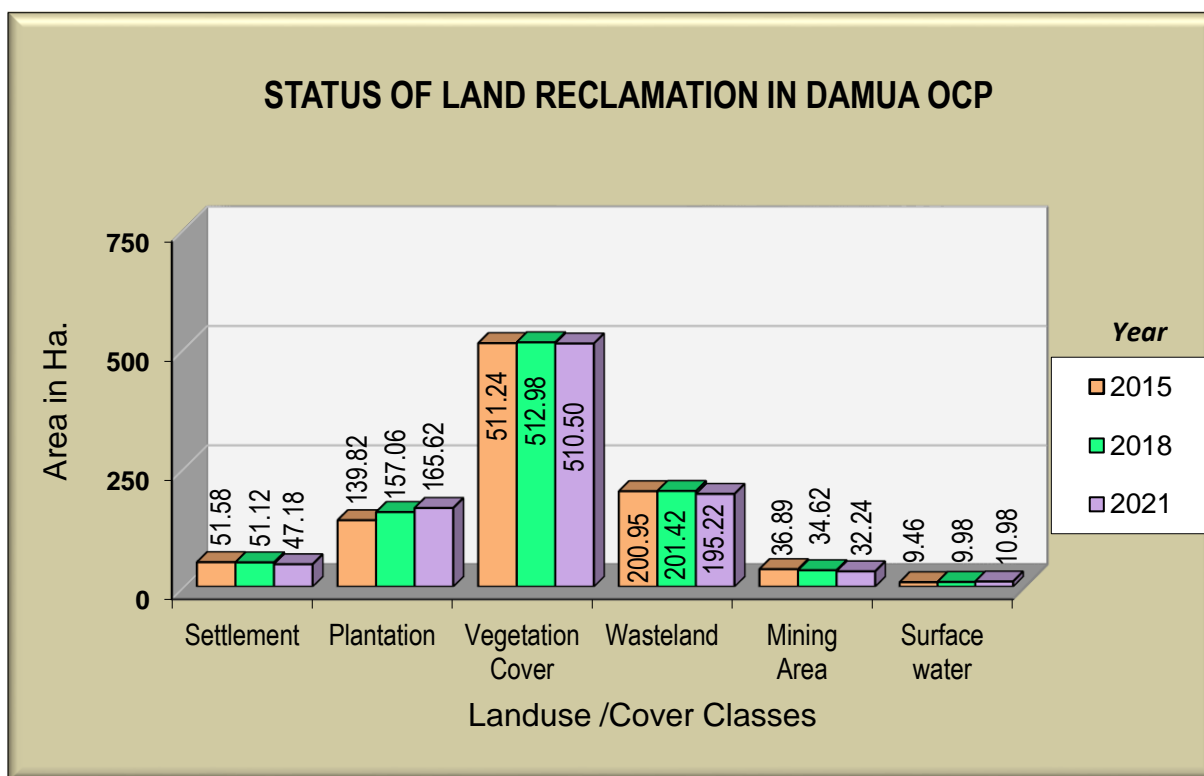


Figure - 5.9

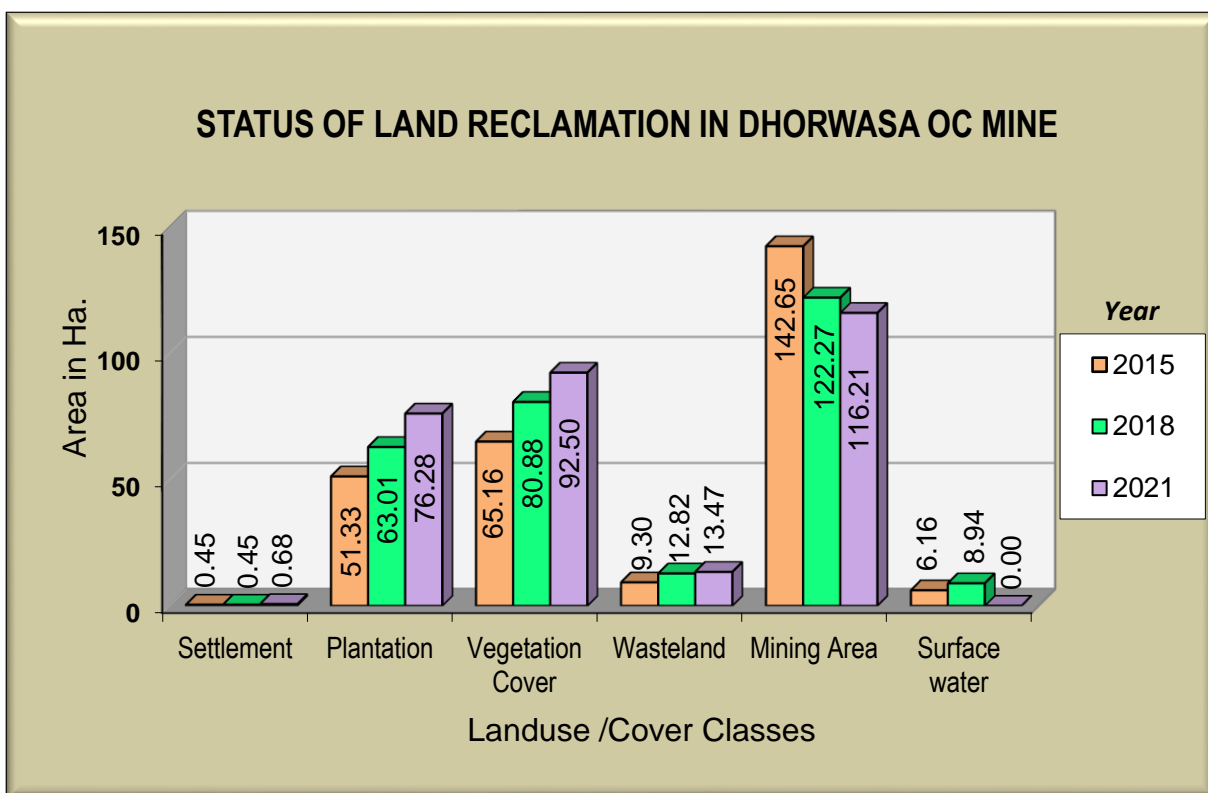


Figure - 5.10

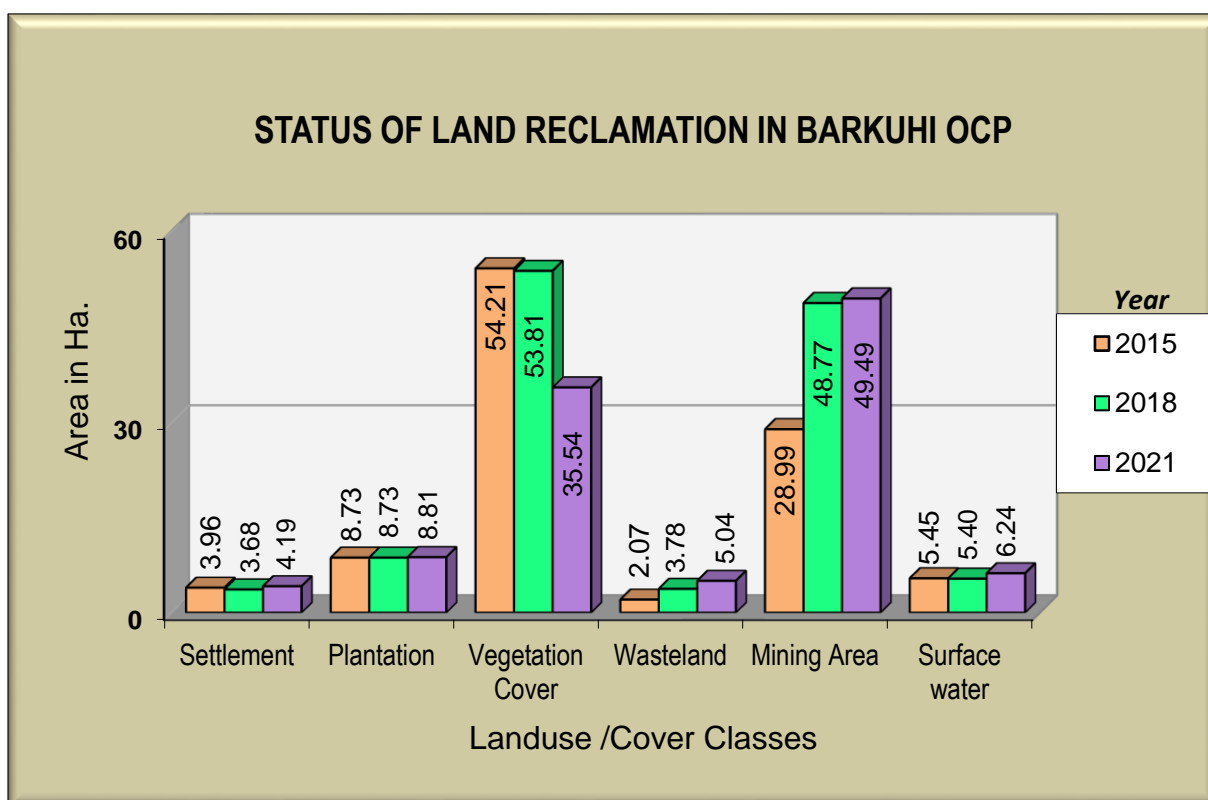
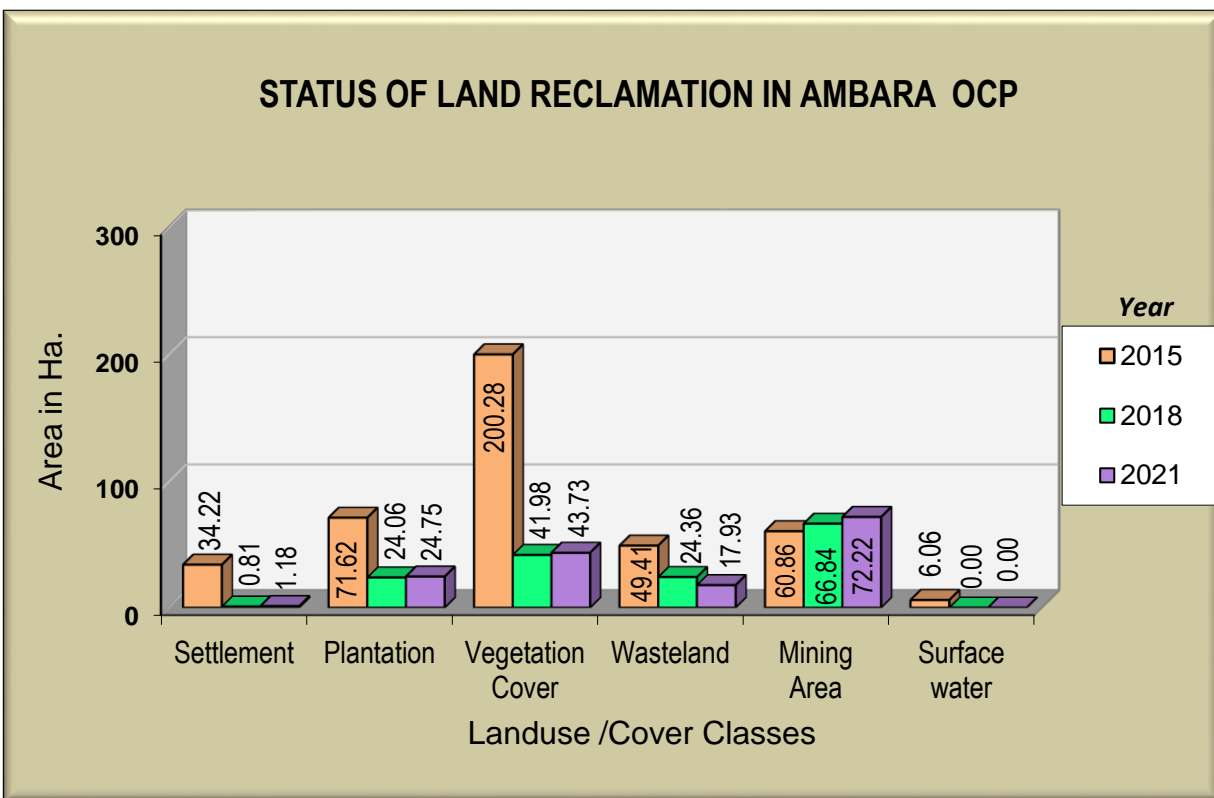


Figure - 5.11



**Figure - 5.12**





Photograph 5.1: Plantation under Social Forestry in Kamptee Deep OC mine.

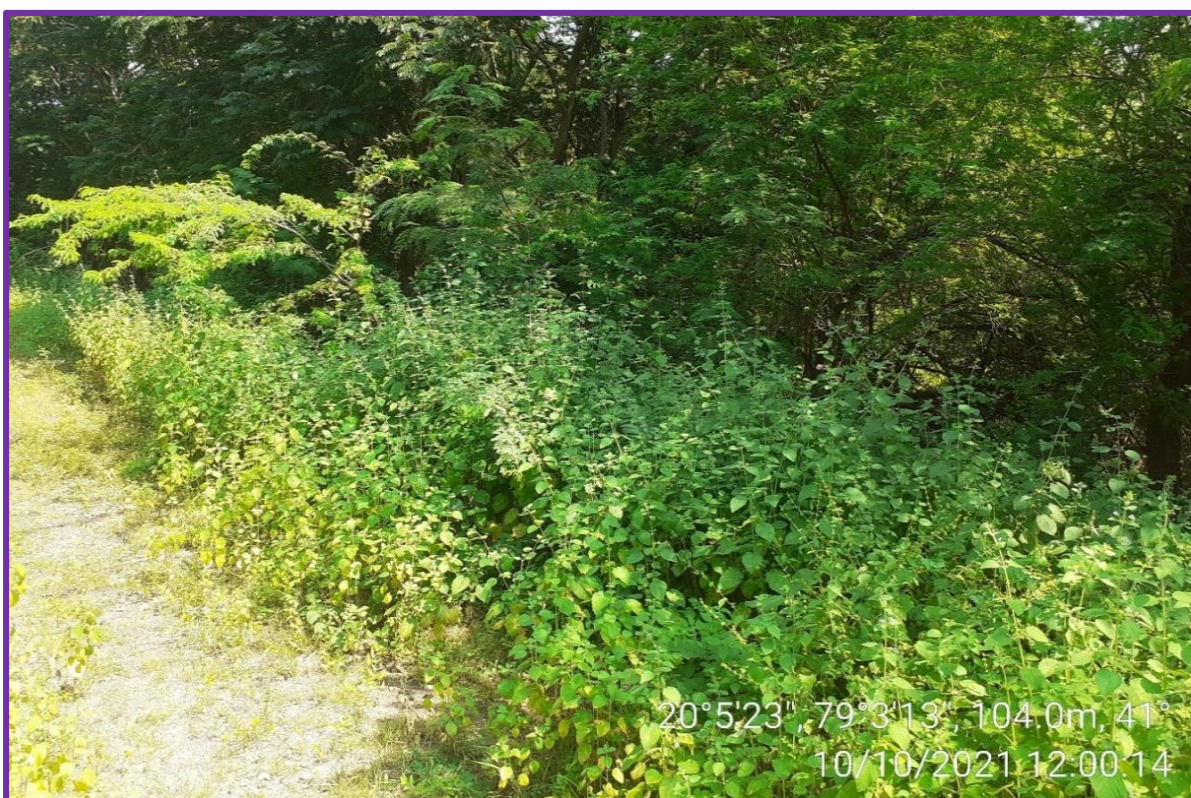


Photograph 5.2: Plantation on barren OB in Kamptee Deep OC mine.





Photograph 5.3: Plantation under social Forestry in Navin Kunda OC mine.



Photograph 5.4: Plantation on embankment in Navin Kunda OC mine.





Photograph 5.5: Plantation on barren OB in Navin Kunda OC mine.



Photograph 5.6: Plantation on backfill in Shivpuri OC mine.





Photograph 5.7: Plantation on Barren OB in Pauni OC mine.



Photograph 5.8: Plantation on Barren OB in Hindustan Lalpeth OC.



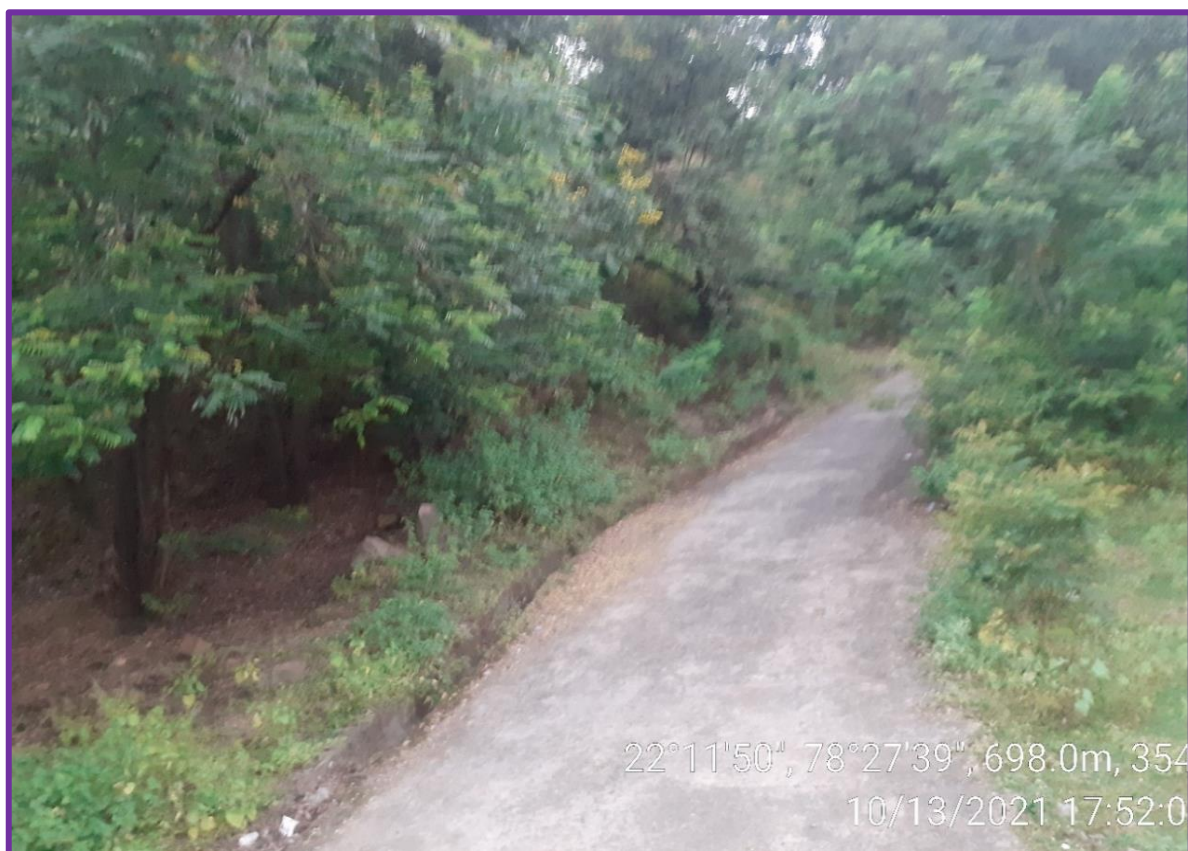


Photograph 5.9: Plantation under social Forestry in Hindustan Lalpeth OCM.



Photograph 5.10: Plantation on backfill in Ghorawari OC .





Photograph 5.11: Plantation on Barren OB in Damua OC mine.



Photograph 5.12: Plantation on embankment in Dhorwasa OC mine.





Photograph 5.13: Plantation on Barren OB Dump in Dhorwasa OC mine.



Photograph 5.14: Plantation on Backfill in Ambara OC mine.

**SOUTH EASTERN COALFIELDS LIMITED**

## **6.0 Land Reclamation Status in South Eastern Coalfields Limited**

**6.1** Following one opencast projects of SECL producing less than 5 million cubic m. (Coal+OB) together was taken up for land reclamation monitoring during the year 2021-22:

- Kurasia

**6.2** Project wise Land Reclamation status in SECL is given in Table 6.1 and also shown graphically in Fig 6.1. Area statistics of different land use class present in the mine leasehold of the above projects for the year 2021 are shown in the Table – 6.2. Land use map derived from satellite data is shown in Plate 6.1. Different land use classes based on satellite data are depicted in Bar Charts in Fig.6.2 .

**6.3** Study reveals that out of total mine leasehold area of 523.00 Hectares of the one OC project of SECL mentioned above, taken for this study in 2021-22, total excavated area is only 226.00 Ha., out of which 140.00 Ha (61.95%) has been planted (Biologically Reclaimed) and 86.00 Ha. (38.05%) area is under backfilling (Technically Reclaimed). At present there is no mining activity in Kurasia OCP.

**6.4** On comparing the status of land reclamation for the year 2021 with respect to the year 2018 in the above project, it is evident from the analysis that area under land reclamation has decreased from 234.73. (Yr. 2018) to 226.00. (Yr. 2021). This decrease of 8.73 Hectare area under total reclamation is due to updation of the leasehold boundary as per EC.

**6.5** On updation the leasehold boundary of above project in the year 2021, Study indicates that biological reclamation (plantation on backfill) has decreased from 147.21 Ha. (Yr. 2018) to 140.00 Ha. (Yr. 2021) and technical reclamation has reduced from 87.52 Ha. (Yr. 2018) to 86.00 Ha. (Yr. 2021) respectively.

**6.6** Leasehold boundary of of Kurasia OCP has been updated as per EC due to which significant change in the area of leasehold boundary is observed. The area of

leasehold boundary has decreased from 1043.25 Hectare (Yr. 2018) to 523.00 Ha (Yr. 2021) which has resulted in decrease of total area under plantation (Green Cover) carried out on backfilled area, OB dumps as well as under social forestry in the leasehold boundary of Kurasia OCP of SECL that has decreased from 283.07 Hectares (Yr. 2018) to 220.00 Hectare (Yr. 2021). At present production in Kurasia OCP is suspended.



**TABLE: 6.1**  
**PROJECT WISE LAND RECLAMATION STATUS IN OPENCAST PROJECT OF SECL PRODUCING (< 5 MILLION CU. M. OF (COAL+OB))**  
**BASED ON SATELLITE DATA OF THE YEAR 2021**

(Area in Ha)

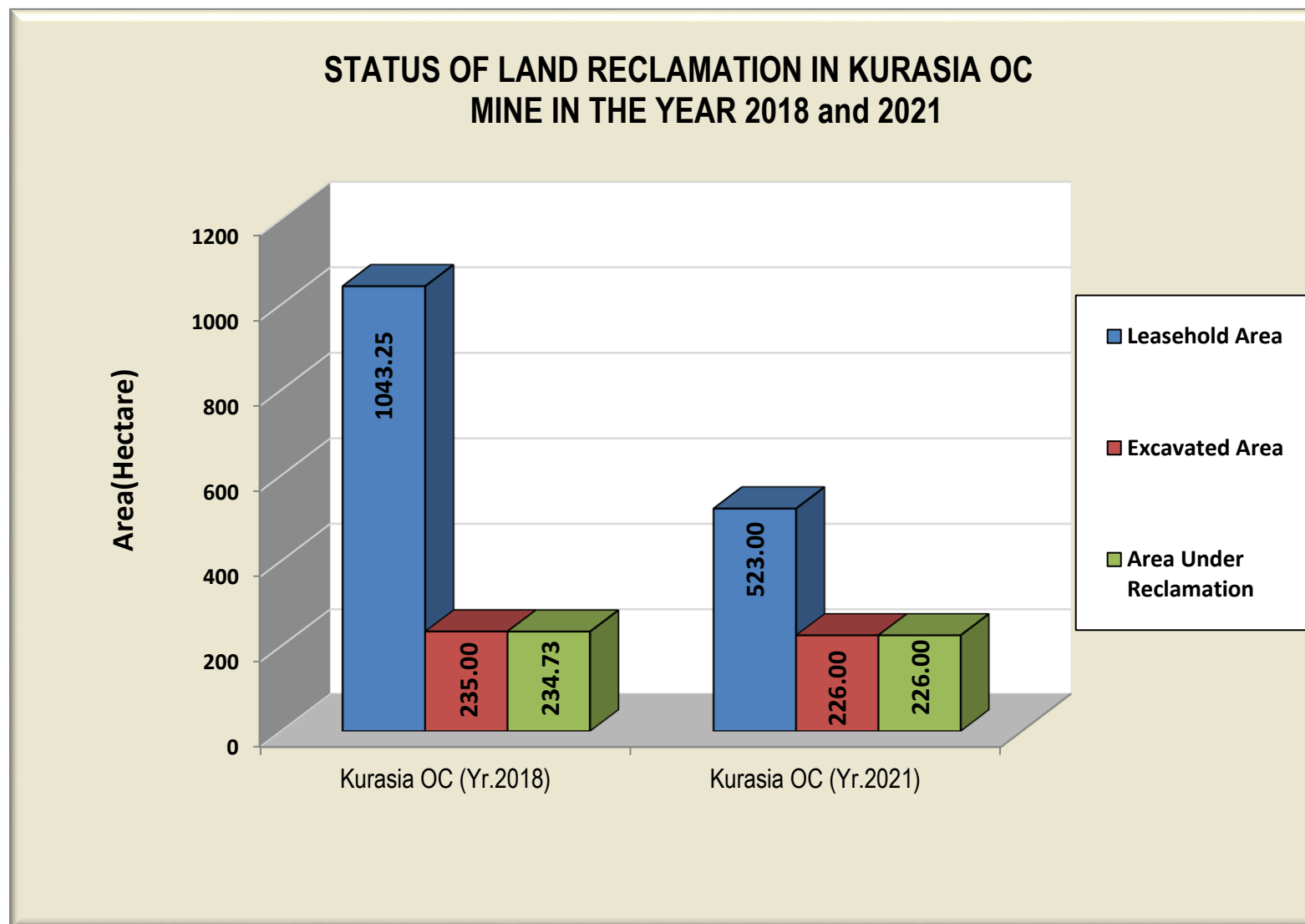
Sl. No.	Project	Total Leasehold Area 2018	Total Leasehold Area 2021	Technical Reclamation		Plantation						Area Under Active Mining		Total Excavated Area		Total Area Under Plantation (%Green Cover Generated in Leasehold)		Total Area Under Reclamation	
						Biological Reclamation		Other Plantation											
				Area under Backfilling		Plantation on Excavated/Backfilled Area		Plantation on External Over Burden Dump		Social Forestry, Avenue Plantation Etc.									
1	2	3	4	5		6		7		8		9		10(=5+6+9)		11(=6+7+8)		12(=5+6)	
				2018	2021	2018	2021	2018	2021	2018	2021	2018	2021	2018	2021	2018	2021	2018	2021
1	Kurasia OCP	1043.25	523.00	87.52	86.00	147.21	140.00	0.00	0.00	135.86	80.00	1.15	0.00	235.88	226.00	283.07	220.00	234.73	226.00
				37.10%	38.05%	62.41%	61.95%					0.49%	0.00%			27.13%	42.07%	99.51%	100.00%
Total(SECL)		1043.25	523.00	87.52	86.00	147.21	140.00	0.00	0.00	135.86	80.00	1.15	0.00	235.88	226.00	283.07	220.00	234.73	226.00
				37.10%	38.05%	62.41%	61.95%					0.49%	0.00%			27.13%	42.07%	99.51%	100.00%

( % is calculated with respect to excavated area as applicable)

**Note: In reference of the above Table-6.1, Different Parameter are classified as follows:**





















1. Area under Biological Reclamation includes area under plantation done on backfilled area only.
2. Area under Technical Reclamation includes area under barren backfill only.
3. Area under Active Mining includes coal Quarry, Advance quarry site, Quarry filled with water etc.
4. Social Forestry and Plantation on External OB Dump area not included in Biological reclamation and are put under other plantation.
5. % calculated in respect of total excavated area except for "Total area under plantation" where % has been calculated in terms of leasehold area.
6. Two Opencast mine in SECL named as Amera and Amadand have been included under category of mine producing more than 5m.c.m (Coal+OB) annually.
7. Leasehold boundary of Kurasia OCP has been updated as per EC.

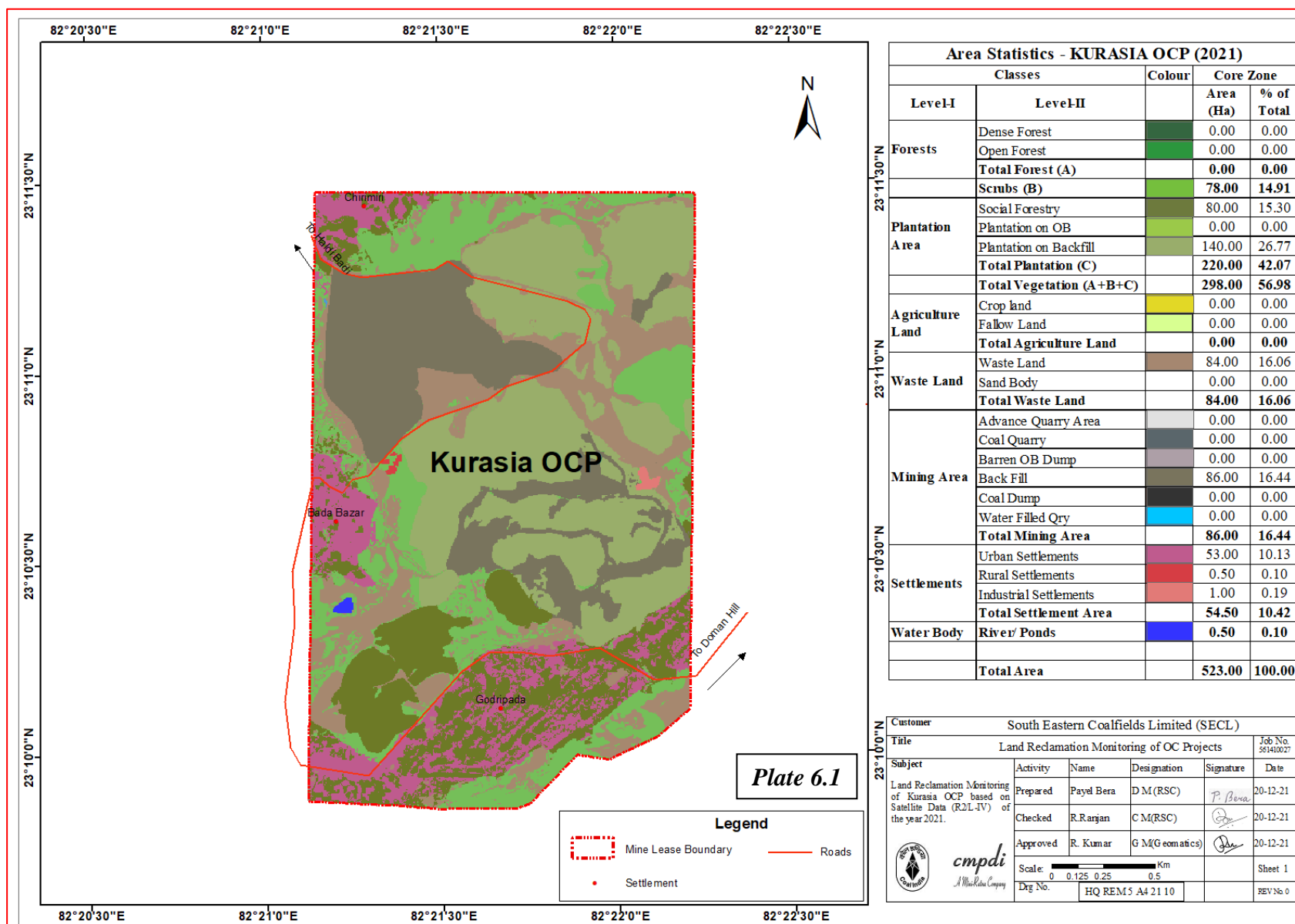




**Fig.6.1: Land Reclamation status in OC project producing less than 5mcm (Coal+OB) of SECL in the year 2021**

**Table 6.2**  
**PROJECT WISE AREA STATISTICS OF LAND USE/COVER CLASSES IN OPENCAST PROJECT**  
**PRODUCING ( <5 M.C.M OF (COAL+OB)) OF SECL BASED ON SATELLITE**  
**DATA OF THE YEAR 2021**

			(Area in Hectare)			
			Kurasia		TOTAL	
			Area	%	Area	%
FORESTS	Dense Forest		0.00	0.00	0.00	0.00
	Open Forest		0.00	0.00	0.00	0.00
	<b>Total Forest</b>		0.00	0.00	0.00	0.00
SCRUBS	Scrubs		78.00	14.91	78.00	14.91
PLANTATION	Social Forestry/Avenue Plantation		80.00	15.30	80.00	15.30
	Plantation on OB Dump		0.00	0.00	0.00	0.00
	Plantation on Backfill (Biological Reclamation)		140.00	26.77	140.00	26.77
	<b>Total Plantation(Green Cover)</b>		220.00	42.07	220.00	42.07
	<b>Total Vegetation</b>		<b>298.00</b>	<b>56.98</b>	<b>298.00</b>	<b>56.98</b>
ACTIVE MINING	Coal Dump		0.00	0.00	0.00	0.00
	Coal Quarry		0.00	0.00	0.00	0.00
	Advance Quarry Site		0.00	0.00	0.00	0.00
	Quarry Filled With Water		0.00	0.00	0.00	0.00
	<b>Total Area under Active Mining</b>		<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
	Barren OB Dump		0.00	0.00	0.00	0.00
RECLAIMED	Area Under Backfilling (Technical Reclamation)		86.00	16.44	86.00	16.44
	<b>Total Area under Technical Reclamation</b>		<b>86.00</b>	<b>16.44</b>	<b>86.00</b>	<b>16.44</b>
	<b>Total Area under Mine Operation</b>		<b>86.00</b>	<b>16.44</b>	<b>86.00</b>	<b>16.44</b>
WASTELAND	Waste Lands		84.00	16.06	84.00	16.06
	Fly Ash Pond / Sand Body		0.00	0.00	0.00	0.00
	<b>Total Wasteland</b>		<b>84.00</b>	<b>16.06</b>	<b>84.00</b>	<b>16.06</b>
WATERBODIES	Reservoir, nallah, ponds		0.50	0.10	0.50	0.10
	<b>Total Waterbodies</b>		<b>0.50</b>	<b>0.10</b>	<b>0.50</b>	<b>0.10</b>
AGRICULTURE	Crop Lands		0.00	0.00	0.00	0.00
	Fallow Lands		0.00	0.00	0.00	0.00
	<b>Total Agriculture</b>		<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
SETTLEMENTS	Urban Settlement		53.00	10.13	53.00	10.13
	Rural Settlement		0.50	0.10	0.50	0.10
	Industrial Settlement		1.00	0.19	1.00	0.19
	<b>Total Settlement</b>		<b>54.50</b>	<b>10.42</b>	<b>54.50</b>	<b>10.42</b>
	<b>Grand Total</b>		<b>523.00</b>	<b>100.00</b>	<b>523.00</b>	<b>100.00</b>



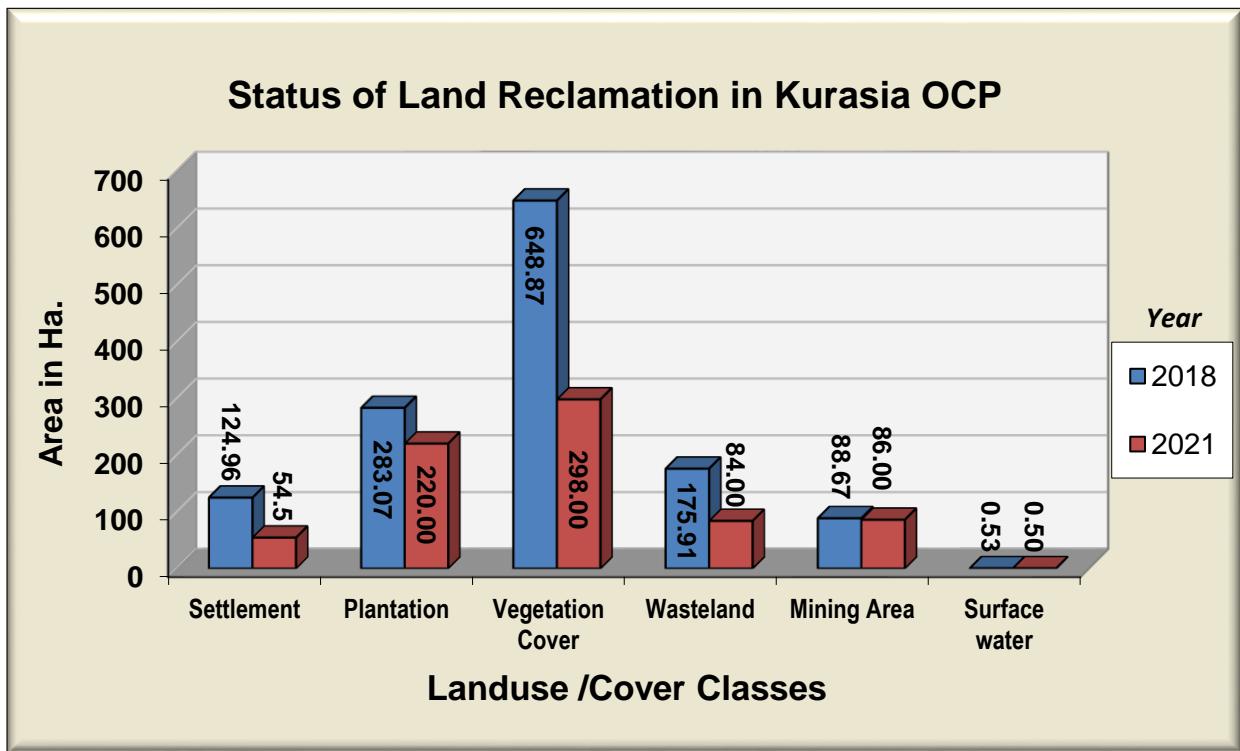


Fig -6.2





**Photo 6.1: Plantation on Backfill in Kurasia OCP**



**Photo 6.2: Plantation on Backfill in Kurasia OCP**

**MAHANADI COALFIELDS LIMITED**



## 7.0 Land Reclamation Status in Mahanadi Coalfields Ltd.

7.1 Following 1 OC project producing less than 5 million m<sup>3</sup>. (Coal + OB ) together of Mahanadi Coalfields Ltd. has been taken up for land reclamation monitoring during the year 2021-22:

- Basundhara

7.2 Area statistics of different land use classes present in the leasehold area of OC project in the year 2021 is given in Table 7.2. Land use map derived from the satellite data is given in Plate no.7.1. Land use/cover status of above OC mine are shown in the form of bar chart in the Fig. 7.2 and field photographs showing plantation on OB and plantation under social forestry in Basundhara project are shown in photo 7.1 - 7. 4. Land reclamation status of the above mentioned opencast project was also prepared for the year 2018.

7.3 Study reveals that out of the total mine leasehold area of 437.10 hectares of the Basundhara OCP of MCL taken for this study in 2021-22; total excavated area is 201.23 Ha, out of which 143.13 Hectare (71.13%) area is under backfilling (*Technically Reclaimed*) and balance 58.10 Ha area (28.87%) is under active mining.

7.4 Lease hold boundary of Basundhara OCP has been updated this year as per EC which has resulted in significant change in shape and decrease in area of leasehold boundary. Area of leasehold boundary of Basundhara OCP has decreased from 705.00 Ha in the year 2018 to 437.10 Ha in the year 2021. This decrease of 267.90 Hectare area in leasehold boundary of Basundhara OCP has resulted in decrease in technical reclamation and biological reclamation. Area under technical reclamation has decreased from 146.00 Ha in the year 2018 to 143.13 Ha in the year 2021. and revegetated area (Plantation on backfill ) has come down from 1.13 Ha (Yr.2018) to zero (Yr. 2021) resulting which area under total reclamation has decreased from 147.13 Ha in the year 2018 to 143.13 Ha in the year 2021 respectively as evident in Table-7.1.

**7.5** After analyzing the satellite data of the year 2018 and 2021, it is evident that total area of plantation (Green cover) which includes plantation on backfill, OB dump as well as under social forestry has decreased from 30.81 Ha. in the year 2018 to 18.66 Ha. in the year 2021. This decrease of 12.15 Ha. in the area of total plantation during three-year cycle is also due to change in the shape and decrease in area of the leasehold boundary of Basundhara OCP. However, there is minor change in the percentage of Green Cover generated in leasehold boundary of Basundhara OCP. As such percentage calculation of Green Cover is being carried out with respect to leasehold boundary of respective projects.



**TABLE: 7.1**  
**LAND RECLAMATION STATUS IN OPENCAST PROJECT OF MCL PRODUCING < 5 M. CU. M. OF (COAL+OB) BASED ON SATELLITE DATA OF THE YEAR 2021.**

OF THE YEAR 2024																			(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 OB Dumps		Social Forestry, Avaneue 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	Basundhara OC	705.00	437.10	146.00	143.13	1.13	0.00	14.30	8.53	15.38	10.13	92.45	58.10	239.58	201.23	30.81	18.66	147.13	143.13	
				60.94%	71.13%	0.47%	0.00%					38.59%	28.87%			4.37%	4.27%	61.41%	71.13%	
	TOTAL	705.00	437.10	146.00	143.13	1.13	0.00	14.30	8.53	15.38	10.13	92.45	58.10	239.58	201.23	30.81	18.66	147.13	143.13	
				60.94%	71.13%	0.47%	0.00%					38.59%	28.87%			4.37%	4.27%	61.41%	71.13%	

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

**Note: In reference of the above Table-7.1, different parameter are classified as follows:**

1. Area under Biological Reclamation includes area under plantation done on backfilled area only.
2. Area under Technical Reclamation includes area under barren backfill only.
3. Area under Active Mining includes Coal Quarry, Advance quarry site, Quarry filled with water etc.
4. Social Forestry and Plantation on External OB Dump area not included in Biological reclamation and are put under other plantation.
5. % calculated in respect of total excavated area except for "Total area under plantation" where % has been calculated in terms of leasehold area.
6. Two opencast mine of MCL names as Garjanbahal and Kaniha OC have been included under category of mines producing more than 5 m.c.m (Coal+OB) annually.
7. Leasehold boundary of Basundhara OC has been updated as per EC.

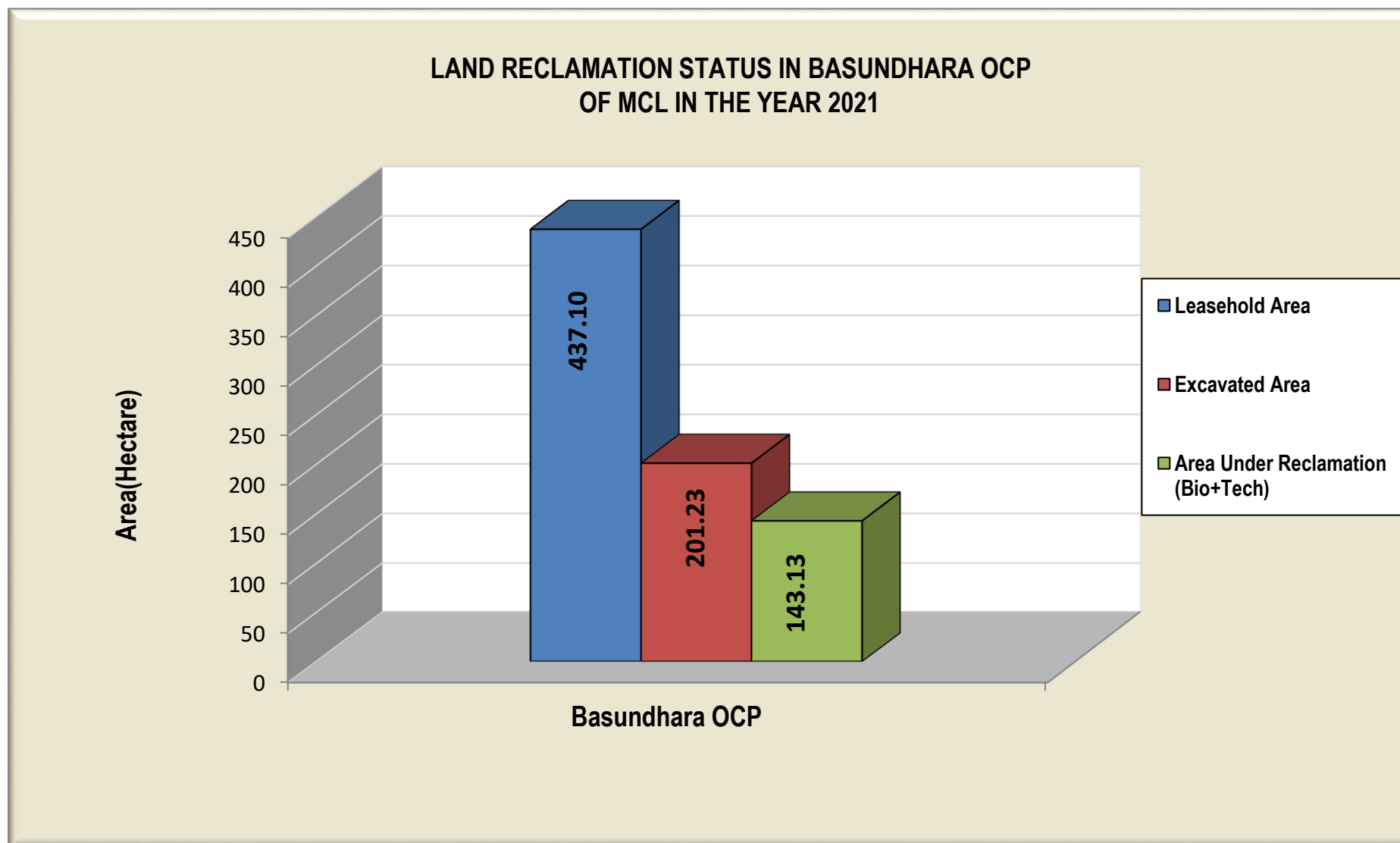
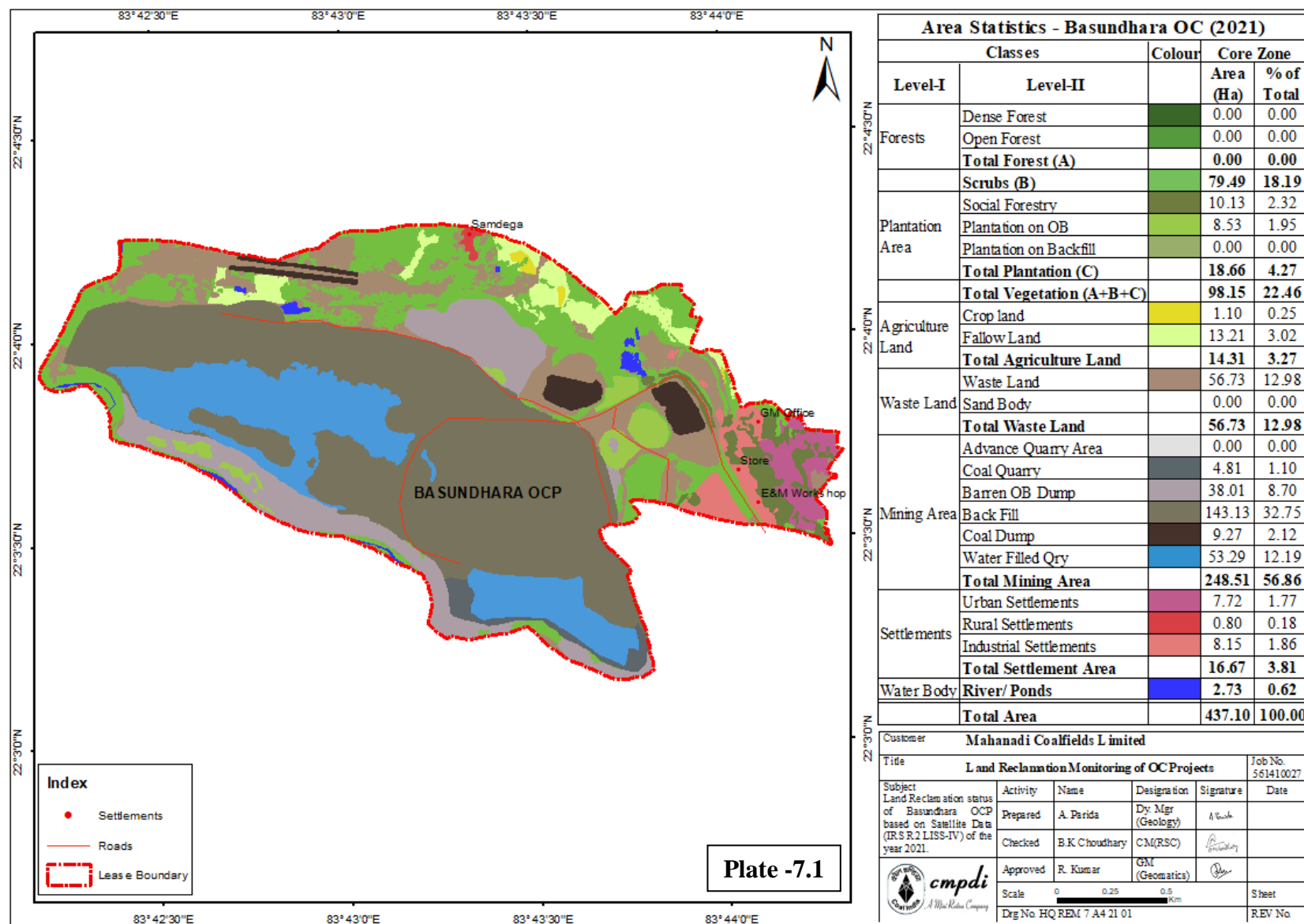


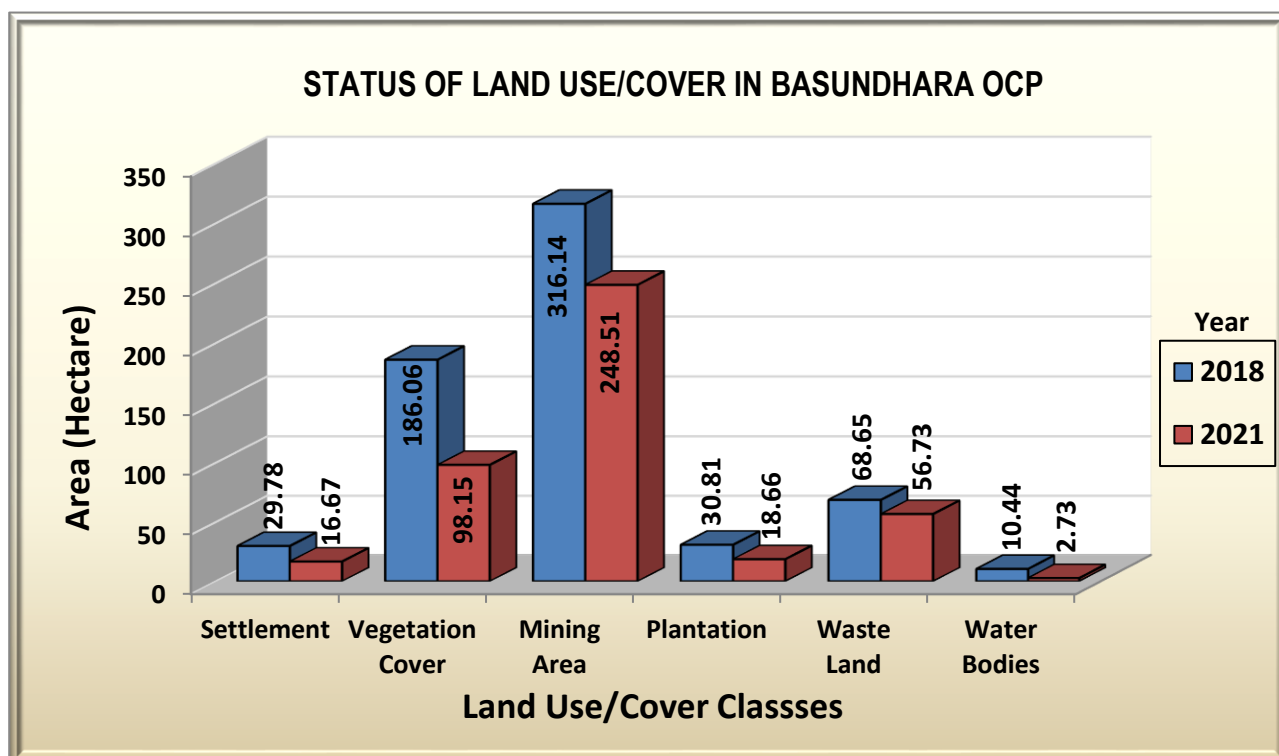
Fig. 7.1 : Land Reclamation Status in Basundhara OCP producing (< 5 mcm (Coal+OB) annually based on satellite data of the year 2021.

**Table 7.2**  
**AREA STATISTICS OF LAND USE/COVER CLASSES IN BASUNDHARA OPENCAST PROJECT**  
**PRODUCING( <5 M.C.M (COAL+OB)) OF MCL BASED ON SATELLITE DATA OF THE YEAR 2021**

(Area in Hectare)

		Basundhara OC		TOTAL	
		Area	%	Area	%
FOREST	Dense Forest	0.00	0.00	0.00	0.00
	Open Forest	0.00	0.00	0.00	0.00
	<b>Total Forest</b>	0.00	0.00	0.00	0.00
SCRUBS	Scrubs	79.49	18.19	79.49	18.19
PLANTATION	Social Forestry/Avenue Plantation	10.13	2.32	10.13	2.32
	Plantation on OB Dump	8.53	1.95	8.53	1.95
	Plantation on Backfill (Biological Reclamation)	0.00	0.00	0.00	0.00
	<b>Total Plantation</b>	18.66	4.27	18.66	4.27
	<b>Total Vegetation</b>	<b>98.15</b>	<b>22.46</b>	<b>98.15</b>	<b>22.46</b>
	Coal Dump	9.27	2.12	9.27	2.12
ACTIVE MINING	Coal Quarry	4.81	1.10	4.81	1.10
	Advance Quarry Site	0.00	0.00	0.00	0.00
	Quarry Filled With Water	53.29	12.19	53.29	12.19
	<b>Total Area under Active Mining</b>	<b>58.10</b>	<b>13.29</b>	<b>58.10</b>	<b>13.29</b>
	Barren OB Dump	38.01	8.70	38.01	8.70
RECLAIMED	Area Under Backfilling (Technical Reclamation)	143.13	32.75	143.13	32.75
	<b>Total Area under Technical Reclamation</b>	<b>143.13</b>	<b>32.75</b>	<b>143.13</b>	<b>32.75</b>
	<b>Total Area under Mine Operation</b>	<b>248.51</b>	<b>56.86</b>	<b>248.51</b>	<b>56.86</b>
WASTELAND	Waste Land	56.73	12.98	56.73	12.98
	Fly Ash Pond / Sand Body	0.00	0.00	0.00	0.00
	<b>Total Wasteland</b>	<b>56.73</b>	<b>12.98</b>	<b>56.73</b>	<b>12.98</b>
WATERBODIES	Reservoir, Nallah, Ponds	2.73	0.62	2.73	0.62
	<b>Total Waterbodies</b>	<b>2.73</b>	<b>0.62</b>	<b>2.73</b>	<b>0.62</b>
AGRICULTURE	Crop Land	1.10	0.25	1.10	0.25
	Fallow Land	13.21	3.02	13.21	3.02
	<b>Total Agriculture</b>	<b>14.31</b>	<b>3.27</b>	<b>14.31</b>	<b>3.27</b>
SETTLEMENTS	Urban Settlement	7.72	1.77	7.72	1.77
	Rural Settlement	0.80	0.18	0.80	0.18
	Industrial Settlement	8.15	1.86	8.15	1.86
	<b>Total Settlements</b>	<b>16.67</b>	<b>3.81</b>	<b>16.67</b>	<b>3.81</b>
	<b>Grand Total</b>	<b>437.10</b>	<b>100.00</b>	<b>437.10</b>	<b>100.00</b>





**Figure – 7.2**





**Photo 7. 1: Plantation on External OB Dump (Basundhara OCP)**



**Photo 7. 2: Plantation on External OB Dump (Basundhara OCP)**





**Photo 7. 3: Plantation under Social Forestry in Basundhara OCP**



**Photo 7. 4: Plantation under Social Forestry in Basundhara OCP**

**CENTRAL COALFIELDS LIMITED**

## 8.0 Land Reclamation Status in Central Coalfields Limited

8.1 Following 07 opencast projects of CCL producing less than 5 million cubic m. (Coal+OB) together annually were taken up for land reclamation monitoring during the year 2021-22 :

- Tetariakhar
- Dakra
- Giddi-A
- Pundi
- Kedla
- Jarangdih
- Karma

8.2 Project wise Land Reclamation status in CCL is given in Table 8.1 and also shown graphically in Fig 8.1. Area statistics of different land use classes present in the mine leasehold of the above projects for the year 2021 are shown in the Table - 8.2. Land use maps derived from satellite data are shown in Plate 8.1 - 8.7. Different land use classes based on satellite data are depicted in Bar Charts in Fig.8.2 - 8.8 for the year 2018 and 2021.

8.3 Study reveals that out of total mine leasehold area of 3960.82 Ha of 7 OC projects in CCL Viz Teteriakhar ,Dakra ,Giddia-A ,Pundi ,Kedla ,Jarangdih and Karma OC considered for monitoring during year 2021-22 ; total excavated area is 823.65 Ha ,out of which 234.37 Ha (28.46%) area has been revegetated (Biologically reclaimed ) and 304.45 Ha (36.96%) area is under backfilling (Technically reclaimed) and balance 284.83 Hectare (34.58%) area is under active mining. It is evident from analysis that 538.82 Hectare (65.42%) area of above OC projects is under total reclamation in CCL. Projectwise details area given in Table-8.1

8.4 On comparing the status of land reclamation for the year 2021 with respect to the year 2018 in different opencast mine of CCL taken for reclamation monitoring in the year 2021-22 ,it is evident from table-8.1 that area under total reclamation has increased from 398.30 Ha(61.55%) in the year 2018 to 538.82 Ha (65.42%) in the year 2021.



This increase of 140.52 Hectare area under total reclamation in CCL is due to increase of 87.36 Ha area under plantation on backfill (Biological reclamation) and 53.16 Ha area under backfilling (Technical reclamation) respectively.

- 8.5** There has been increase in area under technical reclamation in all projects of CCL in the year 2021, except in Giddi - A OCP where area under technical reclamation has decreased significantly as compared to the year 2018. Area under backfilling (Technical reclamation) in this OC mine has decreased from 109.10 Hectare(43.92%) (Yr..2018) to 90.81Hectare (37.30%) (Yr.2021).whereas plantation on backfill (Biological reclamation) has gone up from 80.14 Hectare (32.26%) in 2018 to 84.88 Hectare (34.87%) in the year 2022.
- 8.6** After analyzing the satellite data of year 2018 vs. 2021 it is evident that total area under plantation (Green Cover) carried out on backfilled area, OB dumps as well as under social forestry in all the mines of CCL has increased from 304.73 Hectare (7.69%) to 384.71 Hectare (9.71%) in the span of three years. This increase of 79.98 Hectare area of total plantation (Green Cover) in three year time is due to the sincere efforts made by CCL towards land reclamation of above mentioned OC mine and environment protection.
- 8.7** In Dakra OCP, area under plantation on OB has decreased from 4.90 Hectare (Yr. 2018) to 1.11 Hectare (Yr. 2021) and plantation on backfill has also decreased from 45.79 Ha (Yr.2018) to 37.86 Ha (Yr. 2021). This decrease of 3.79 Hectare area in plantation on OB and 7.93 Hectare area in plantation on backfill (Biological reclamation) are mainly due to dumping of barren OB and barren backfill over planted area. However, overall increase in revegetated area (Biological reclamation) in the year 2021 is 87.36 Hectare with respect to the year 2018.
- 8.8** Out of 7 projects of CCL, Dakra OCP ranks on top for land reclamation (79.32%) followed by Kedla OCP (79.19%) and Giddi - A OCP (72.17%) respectively.
- 8.9** This study will again will be carried out after an interval of three years to assess the land reclamation status in the above projects.

**Table: 8.1**  
**Project wise Land Reclamation Status in Opencast Project producing (<5 mcm (Coal+OB)) of Central Coalfields Ltd based on the Satellite data of the Year 2021**

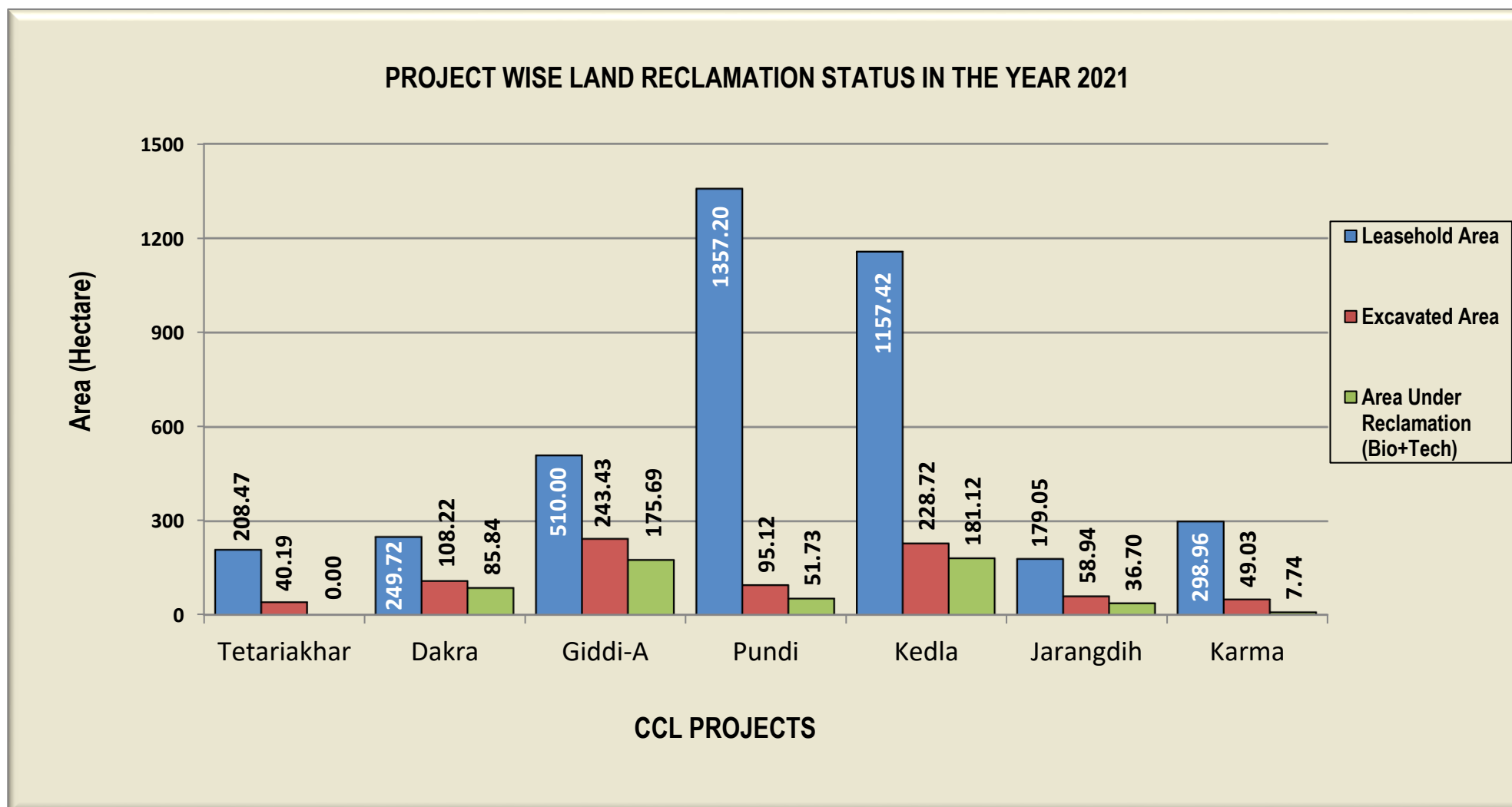
(Area in Hectare)

Sl.N o.	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	Tetariakhar	208.47	208.47	0.00	0.00	0.00	0.00	0.00	0.00	1.45	1.45	41.29	40.19	41.29	40.19	1.45	1.45	0.00	0.00
				0.00%	0.00%	0.00%	0.00%					100.00%	100.00%			0.70%	0.70%	0.00%	0.00%
2	Dakra	249.72	249.72	27.03	47.98	45.79	37.86	4.90	1.11	9.82	15.77	24.05	22.38	96.87	108.22	60.51	54.74	72.82	85.84
				27.90%	44.34%	47.27%	34.98%					24.83%	20.68%			24.23%	21.92%	75.17%	79.32%
3	Giddi-A	510.00	510.00	109.10	90.81	80.14	84.88	43.90	40.61	14.00	13.84	59.16	67.74	248.40	243.43	138.04	139.33	189.24	175.69
				43.92%	37.30%	32.26%	34.87%					23.82%	27.83%			27.07%	27.32%	76.18%	72.17%
4	Pundi	1357.20	1357.20	35.87	37.85	13.88	13.88	22.36	22.35	1.35	1.35	30.75	43.39	80.50	95.12	37.59	37.58	49.75	51.73
				44.56%	39.79%	17.24%	14.59%					38.20%	45.62%			2.77%	2.77%	61.80%	54.38%
5	Kedla	1157.42	1157.42	49.76	90.56	0.00	90.56	26.75	20.24	1.46	1.46	45.92	47.60	95.68	228.72	28.21	112.26	49.76	181.12
				52.01%	39.59%	0.00%	39.59%					47.99%	20.81%			2.44%	9.70%	52.01%	79.19%
6	Jarangdih	179.05	179.05	29.53	29.51	7.20	7.19	3.50	3.44	18.93	17.83	17.83	22.24	54.56	58.94	29.63	28.46	36.73	36.70
				54.12%	50.07%	13.20%	12.20%					32.68%	37.73%			16.55%	15.90%	67.32%	62.27%
7	Karma	298.96	298.96	0.00	7.74	0.00	0.00	8.03	9.62	1.27	1.27	29.77	41.29	29.77	49.03	9.30	10.89	0.00	7.74
				0.00%	15.79%	0.00%	0.00%					100.00%	84.21%			3.11%	3.64%	0.00%	15.79%
	TOTAL	3960.82	3960.82	251.29	304.45	147.01	234.37	109.44	97.37	48.28	52.97	248.77	284.83	647.07	823.65	304.73	384.71	398.30	538.82
				38.84%	36.96%	22.72%	28.46%					38.45%	34.58%			7.69%	9.71%	61.55%	65.42%

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

**Note:** In reference of the above Table-6.1, Different Parameter are classified as follows:

1. Area under Biological Reclamation includes area under plantation done on backfilled area only.
2. Area under Technical Reclamation includes area under barren backfill only.
3. Area under Active Mining includes Coal Quarry, Advance quarry site, Quarry filled with water etc.
4. Social Forestry and Plantation on External OB Dump area not included in Biological reclamation and are put under other plantation.
5. % calculated in respect of total excavated area except for "Total area under plantation" where % has been calculated in terms of leasehold area.
6. Total six opencast mine of CCL named as Rohini, Purnadih, Kathara, North Urimari, Karo, Konar Expn, Selected Dhori & Tapin North OC have been included under category of those oc mines which have capacity of producing more than 5 million cubic meter (Coal +OB) annually.



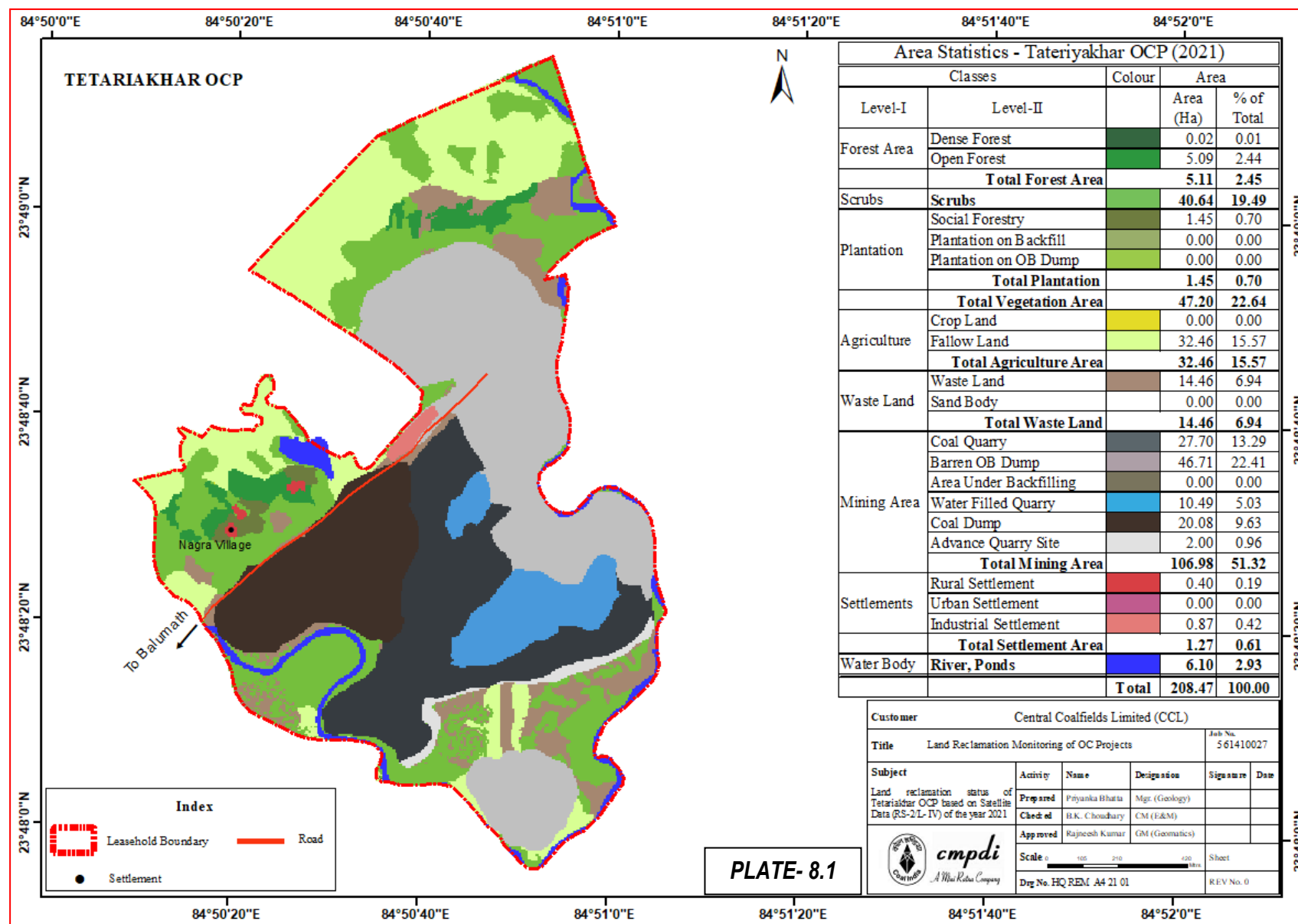
**Figure. 8.1: Land Reclamation Status in OC Projects producing Less than 5mcm (Coal+OB) of CCL in the Year 2021**

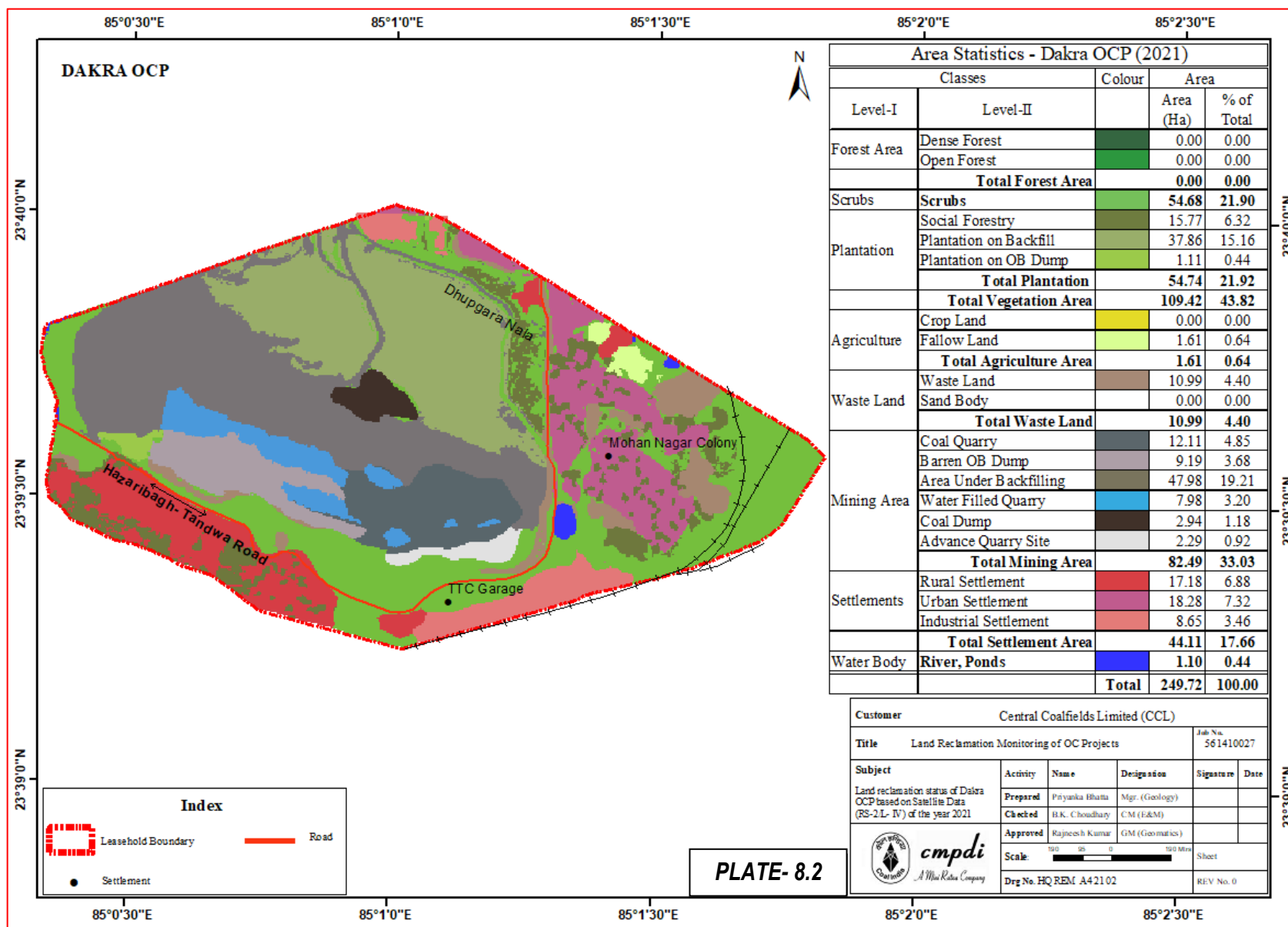
**TABLE-8.2**  
**AREA STATISTICS OF LAND USE/ COVER CLASSES IN OPENCAST PROJECTS PRODUCING**  
**(<5 MCM COAL+OB) OF CCL BASED ON SATELLITE DATA OF THE YEAR 2021**

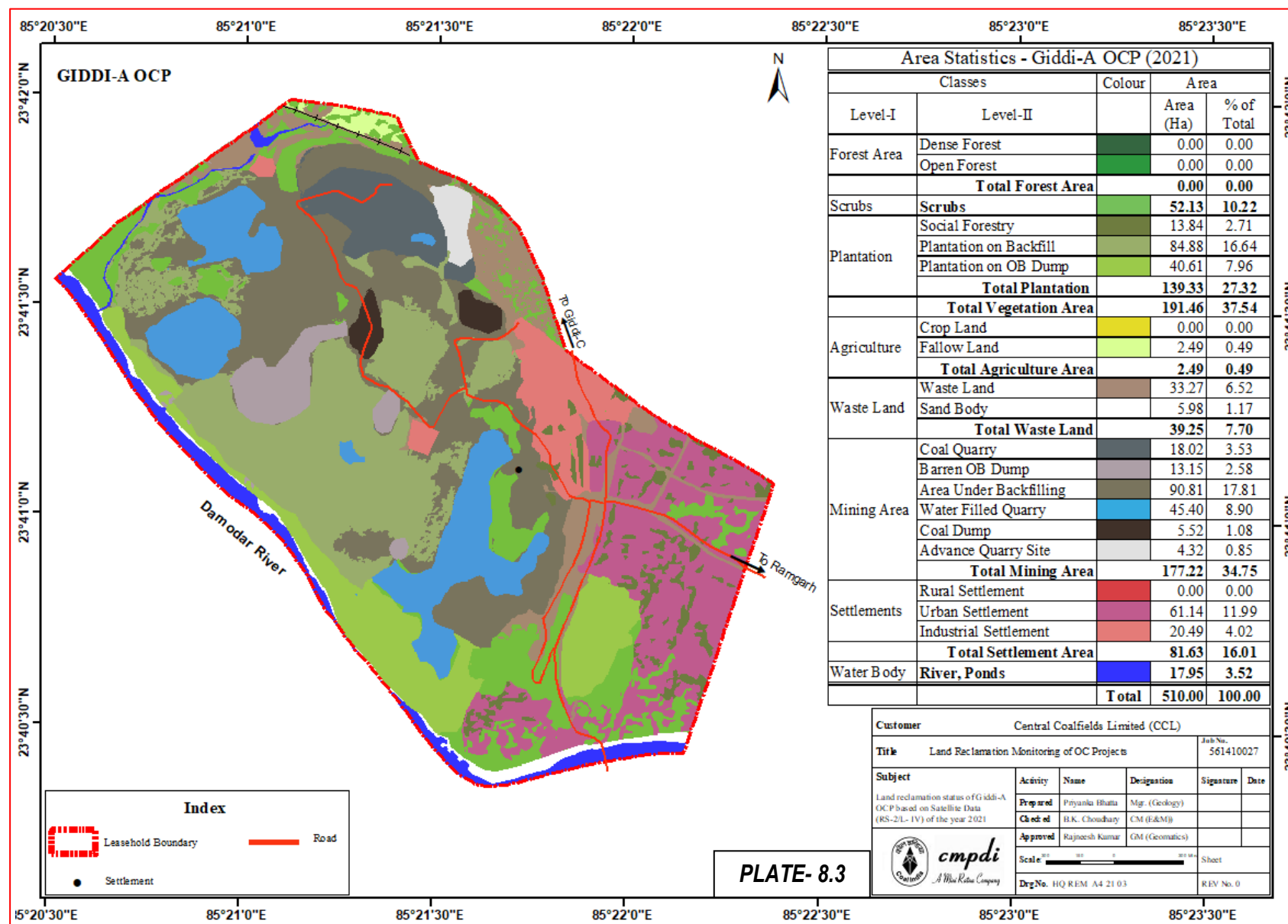
(Area in Hectare)

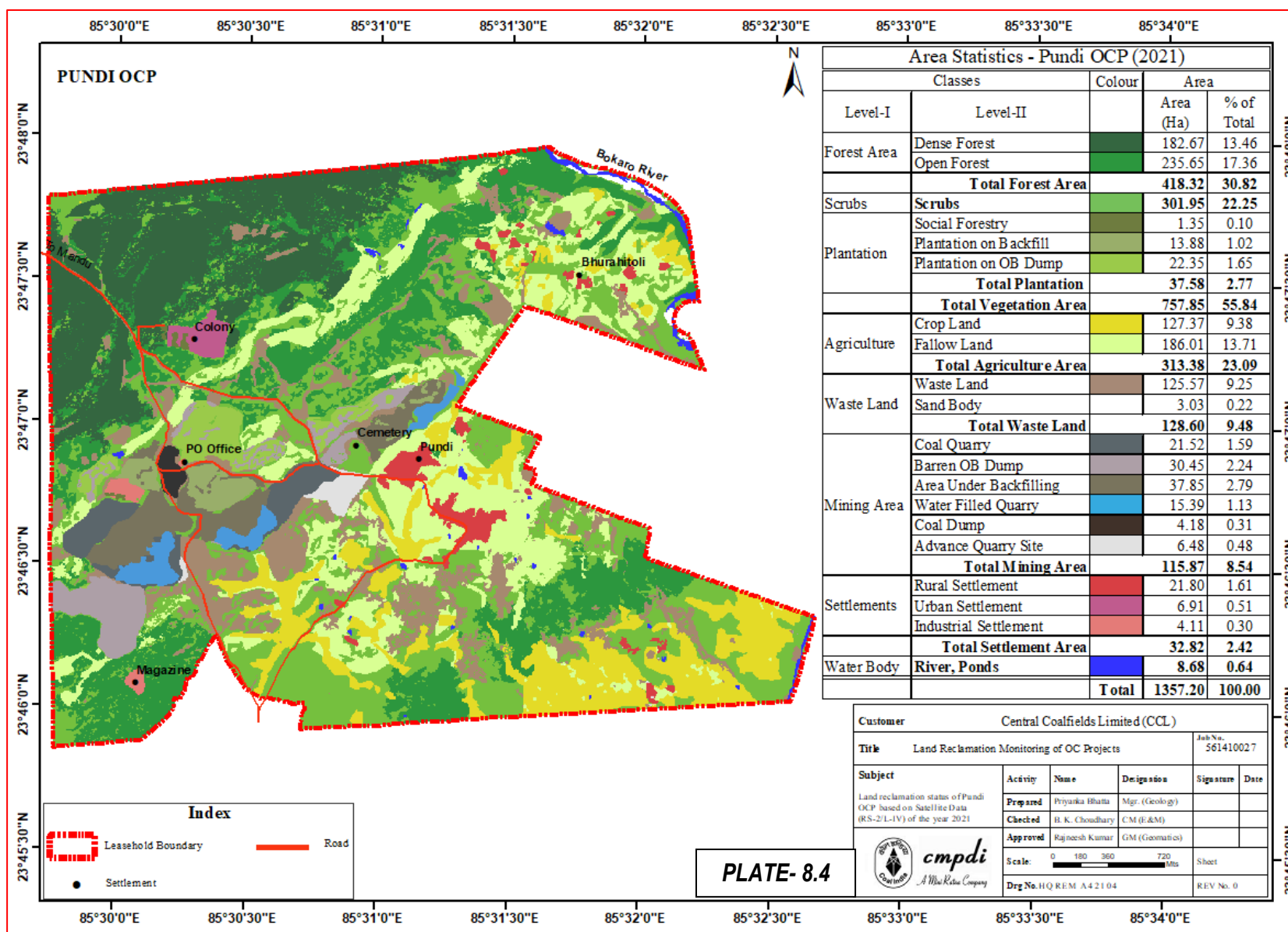
		TETARIAKHAR		DAKRA		GIDDI-A		PUNDI		KEDLA		JARANGDIH		KARMA		TOTAL	
		Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%
FORESTS	Dense Forest	0.02	0.01	0.00	0.00	0.00	0.00	182.67	13.46	0.00	0.00	0.00	0.00	0.00	0.00	182.69	4.61
	Open Forest	5.09	2.44	0.00	0.00	0.00	0.00	235.65	17.36	174.07	15.04	0.00	0.00	15.08	5.04	429.89	10.85
	<b>Total Forest (A)</b>	<b>5.11</b>	<b>2.45</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>418.32</b>	<b>30.82</b>	<b>174.07</b>	<b>15.04</b>	<b>0.00</b>	<b>0.00</b>	<b>15.08</b>	<b>5.04</b>	<b>612.58</b>	<b>15.47</b>
	<b>Scrubs(B)</b>	<b>40.64</b>	<b>19.49</b>	<b>54.68</b>	<b>21.90</b>	<b>52.13</b>	<b>10.22</b>	<b>301.95</b>	<b>22.25</b>	<b>397.87</b>	<b>34.38</b>	<b>26.02</b>	<b>14.53</b>	<b>60.60</b>	<b>20.27</b>	<b>933.89</b>	<b>23.58</b>
PLANTATION	Social Forestry	1.45	0.70	15.77	6.32	13.84	2.71	1.35	0.10	1.46	0.13	17.83	9.96	1.27	0.42	52.97	1.34
	Plantation on OB Dump	0.00	0.00	1.11	0.44	40.61	7.96	22.35	1.65	32.61	2.82	3.44	1.92	9.62	3.22	109.74	2.77
	Plantation on Backfill (Biological Reclamation)	0.00	0.00	37.86	15.16	84.88	16.64	13.88	1.02	20.24	1.75	7.19	4.02	0.00	0.00	164.05	4.14
	<b>Total Plantation(C)</b>	<b>1.45</b>	<b>0.70</b>	<b>54.74</b>	<b>21.92</b>	<b>139.33</b>	<b>27.32</b>	<b>37.58</b>	<b>2.77</b>	<b>54.31</b>	<b>4.69</b>	<b>28.46</b>	<b>15.90</b>	<b>10.89</b>	<b>3.64</b>	<b>326.76</b>	<b>8.25</b>
	<b>Total Vegetation(A+B+C)</b>	<b>47.20</b>	<b>22.64</b>	<b>109.42</b>	<b>43.82</b>	<b>191.46</b>	<b>37.54</b>	<b>757.85</b>	<b>55.84</b>	<b>626.25</b>	<b>54.11</b>	<b>54.48</b>	<b>30.43</b>	<b>86.57</b>	<b>28.96</b>	<b>1873.23</b>	<b>47.29</b>
ACTIVE MINING	Coal Quarry	27.70	13.29	12.11	4.85	18.02	3.53	21.52	1.59	28.38	2.45	20.22	11.29	37.25	12.46	165.20	4.17
	Advance Quarry Site	2.00	0.96	2.29	0.92	4.32	0.85	6.48	0.48	1.11	0.10	1.28	0.71	0.00	0.00	17.48	0.44
	Quarry Filled With Water	10.49	5.03	7.98	3.20	45.40	8.90	15.39	1.13	18.11	1.56	0.74	0.41	4.04	1.35	102.15	2.58
	<b>Total Area under Active Mining(D)</b>	<b>40.19</b>	<b>19.28</b>	<b>22.38</b>	<b>8.97</b>	<b>67.74</b>	<b>13.28</b>	<b>43.39</b>	<b>3.20</b>	<b>47.60</b>	<b>4.11</b>	<b>22.24</b>	<b>12.41</b>	<b>41.29</b>	<b>13.81</b>	<b>284.83</b>	<b>7.19</b>
WASTELANDS MINING AREA	Coal Dump	20.08	9.63	2.94	1.18	5.52	1.08	4.18	0.31	5.49	0.47	4.39	2.45	6.51	2.18	49.11	1.24
	Barren OB Dump	46.71	22.41	9.19	3.68	13.15	2.58	30.45	2.24	29.23	2.53	12.52	6.99	46.82	15.66	188.07	4.75
	Area Under Backfilling (Technical Reclamation)	0.00	0.00	47.98	19.21	90.81	17.81	37.85	2.79	90.56	7.82	29.51	16.48	7.74	2.59	304.45	7.69
	<b>Total Area under Mine Operation(D+E)</b>	<b>106.98</b>	<b>51.32</b>	<b>82.49</b>	<b>33.04</b>	<b>177.22</b>	<b>34.75</b>	<b>115.87</b>	<b>8.54</b>	<b>172.88</b>	<b>14.93</b>	<b>68.66</b>	<b>38.33</b>	<b>102.36</b>	<b>34.24</b>	<b>826.46</b>	<b>20.87</b>
WASTELANDS	Waste Lands	14.46	6.94	10.99	4.40	33.27	6.52	125.57	9.25	74.01	6.39	18.01	10.06	21.21	7.09	297.52	7.51
	Fly Ash Pond / Sand Body	0.00	0.00	0.00	0.00	5.98	1.17	3.03	0.22	0.66	0.06	0.97	0.54	9.83	3.29	20.47	0.52
	<b>Total Wasteland</b>	<b>14.46</b>	<b>6.94</b>	<b>10.99</b>	<b>4.40</b>	<b>39.25</b>	<b>7.70</b>	<b>128.60</b>	<b>9.48</b>	<b>74.67</b>	<b>6.45</b>	<b>18.98</b>	<b>10.60</b>	<b>31.04</b>	<b>10.38</b>	<b>317.99</b>	<b>8.03</b>
WATERBODY	Reservoir, Nallah, Ponds	6.10	2.93	1.10	0.44	17.95	3.52	8.68	0.64	16.58	5.53	2.28	1.27	12.04	4.03	64.73	1.63
	<b>Total Waterbodies</b>	<b>6.10</b>	<b>2.93</b>	<b>1.10</b>	<b>0.44</b>	<b>17.95</b>	<b>3.52</b>	<b>8.68</b>	<b>0.64</b>	<b>16.58</b>	<b>5.53</b>	<b>2.28</b>	<b>1.27</b>	<b>12.04</b>	<b>4.03</b>	<b>64.73</b>	<b>1.63</b>
AGRICULTURE	Crop Lands	0.00	0.00	0.00	0.00	0.00	0.00	127.37	9.38	1.48	0.13	0.62	0.35	0.00	0.00	129.47	3.27
	Fallow Lands	32.46	15.57	1.61	0.64	2.49	0.49	186.01	13.71	201.56	17.41	0.00	0.00	60.01	20.07	484.14	12.22
	<b>Total Agriculture</b>	<b>32.46</b>	<b>15.57</b>	<b>1.61</b>	<b>0.64</b>	<b>2.49</b>	<b>0.49</b>	<b>313.38</b>	<b>23.09</b>	<b>203.04</b>	<b>17.54</b>	<b>0.62</b>	<b>0.35</b>	<b>60.01</b>	<b>20.07</b>	<b>613.61</b>	<b>15.49</b>
SETTLEMENTS	Urban Settlement	0.00	0.00	18.28	7.32	61.14	11.99	6.91	0.51	26.71	2.31	31.96	17.85	0.00	0.00	145.00	3.66
	Rural Settlement	0.40	0.19	17.18	6.88	0.00	0.00	21.80	1.61	26.14	2.26	0.00	0.00	5.57	1.86	71.09	1.79
	Industrial Settlement	0.87	0.42	8.65	3.46	20.49	4.02	4.11	0.30	11.15	0.96	2.07	1.16	1.37	0.46	48.71	1.23
	<b>Total Settlements</b>	<b>1.27</b>	<b>2.93</b>	<b>44.11</b>	<b>17.66</b>	<b>81.63</b>	<b>16.01</b>	<b>32.82</b>	<b>2.42</b>	<b>64.00</b>	<b>5.53</b>	<b>34.03</b>	<b>19.01</b>	<b>6.94</b>	<b>2.32</b>	<b>264.80</b>	<b>6.69</b>
	<b>Grand Total</b>	<b>208.47</b>	<b>100.00</b>	<b>249.72</b>	<b>100.00</b>	<b>510.00</b>	<b>100.00</b>	<b>1357.20</b>	<b>100.00</b>	<b>1157.42</b>	<b>100.00</b>	<b>179.05</b>	<b>100.00</b>	<b>298.96</b>	<b>100.00</b>	<b>3960.82</b>	<b>100.00</b>



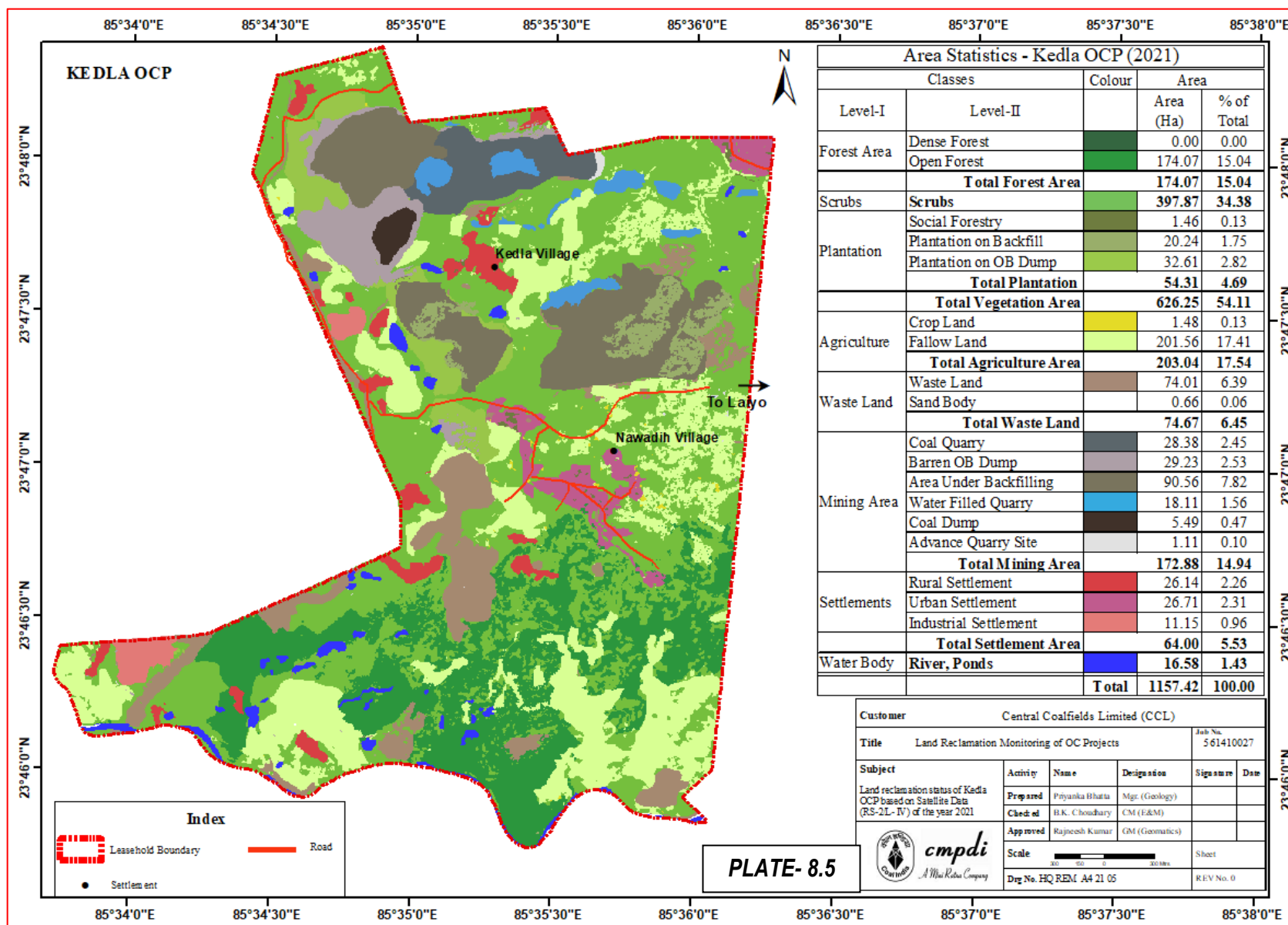


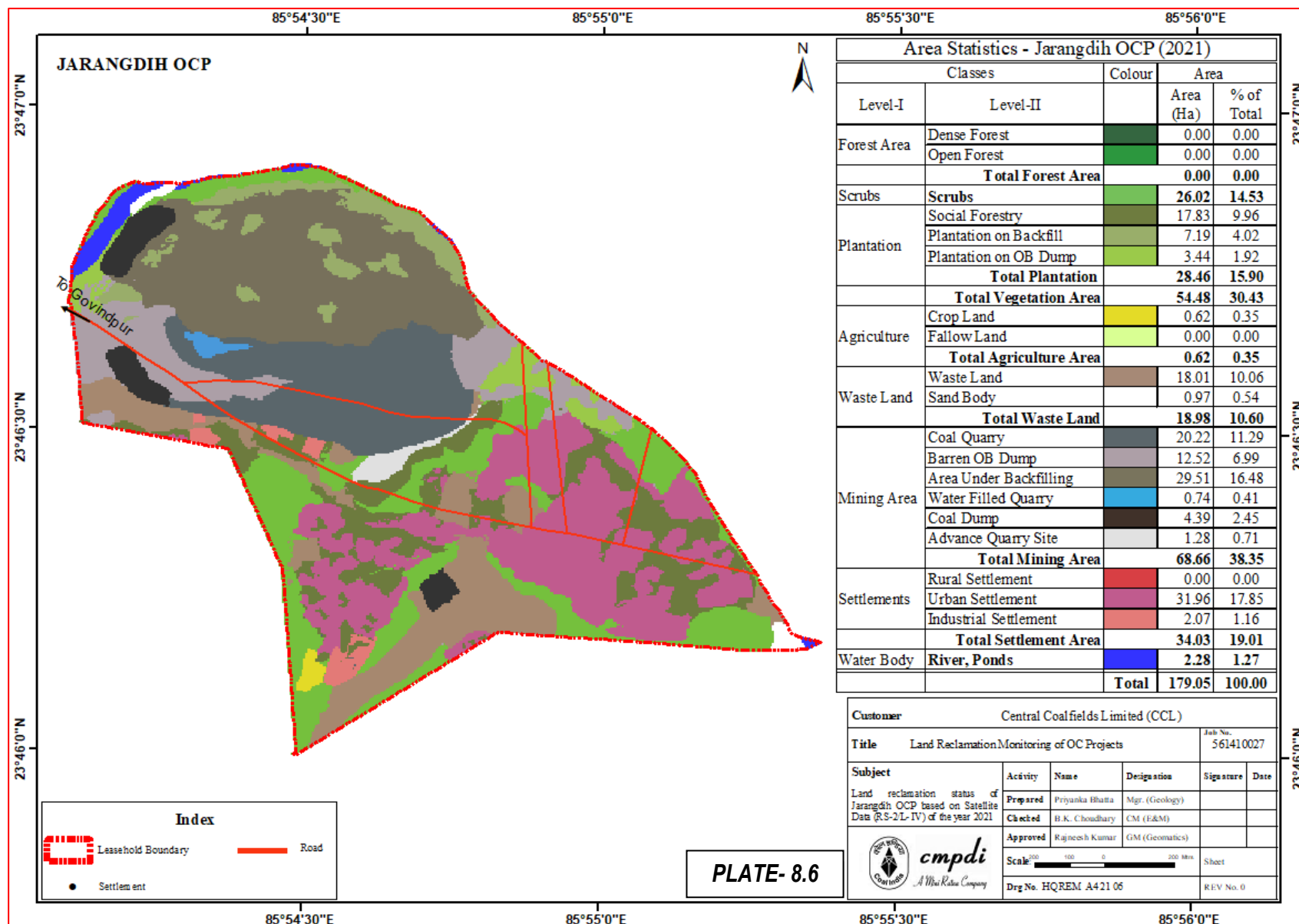


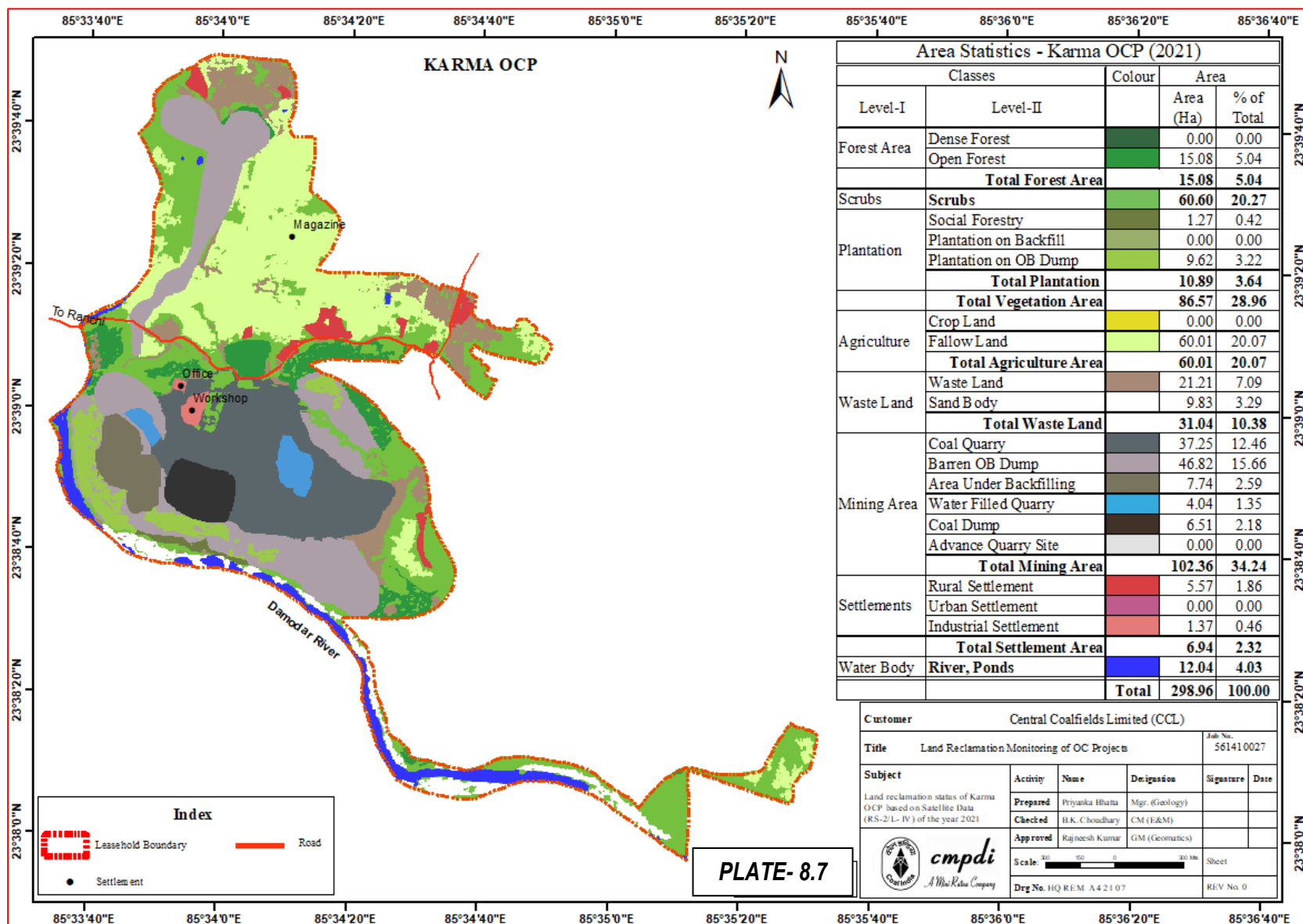












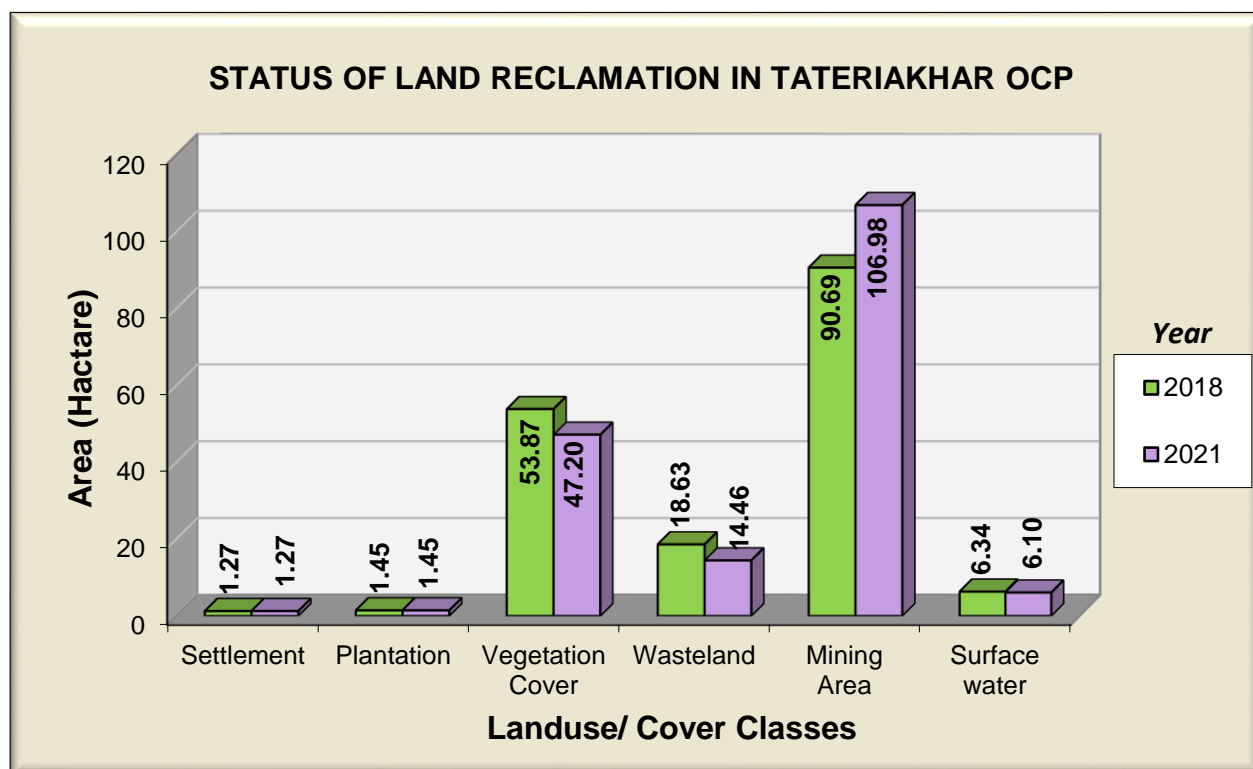


FIGURE – 8.2

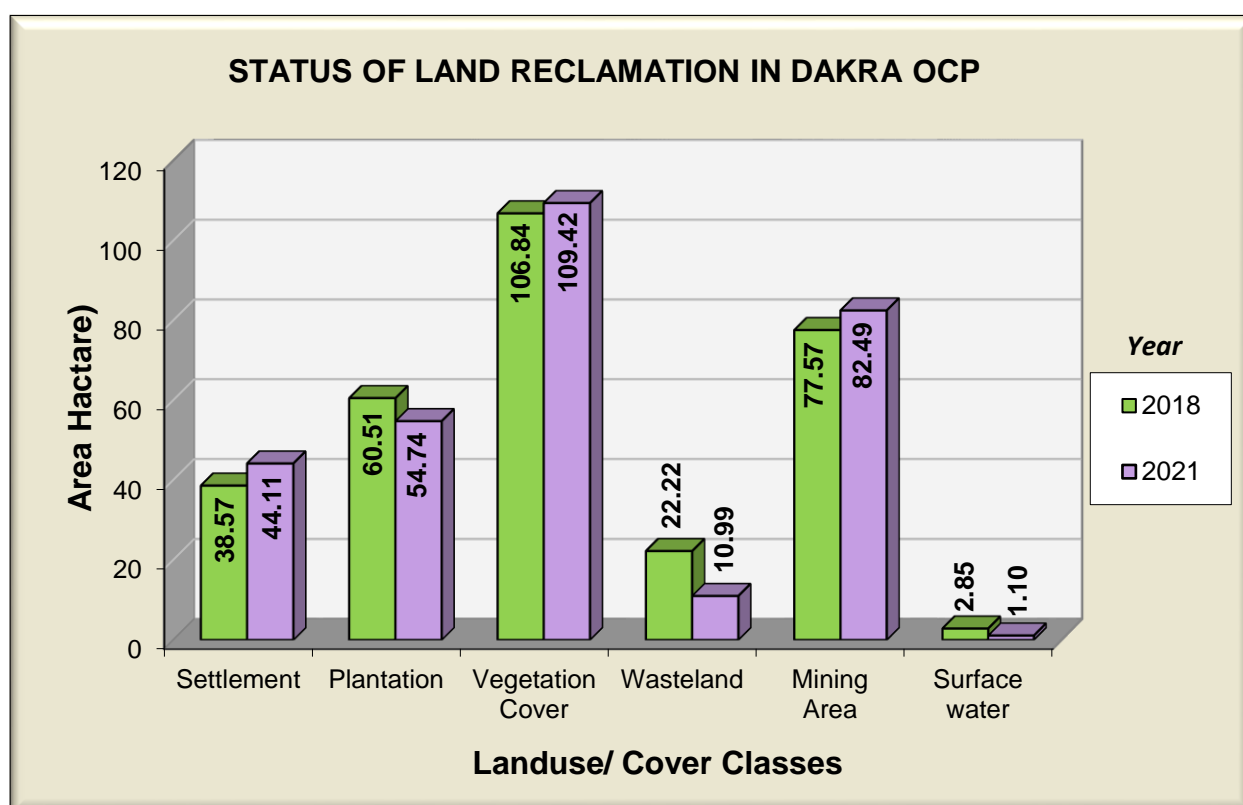


FIGURE – 8.3



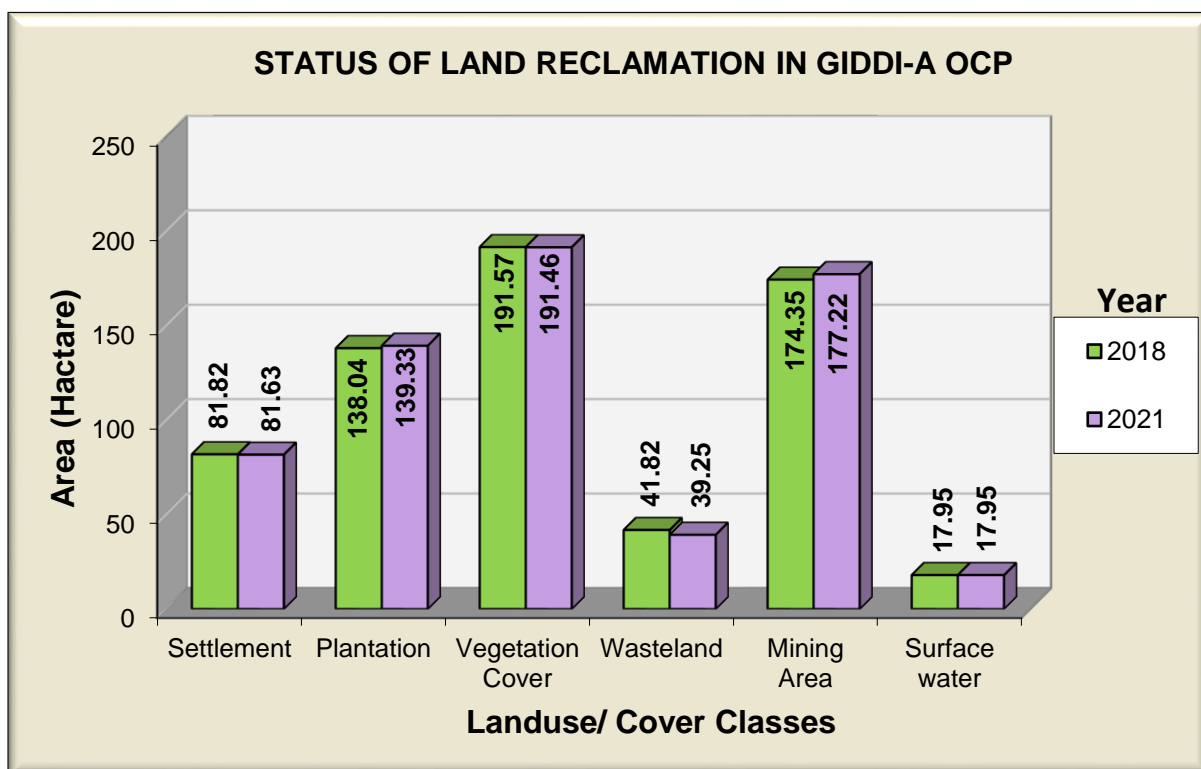


FIGURE – 8.4

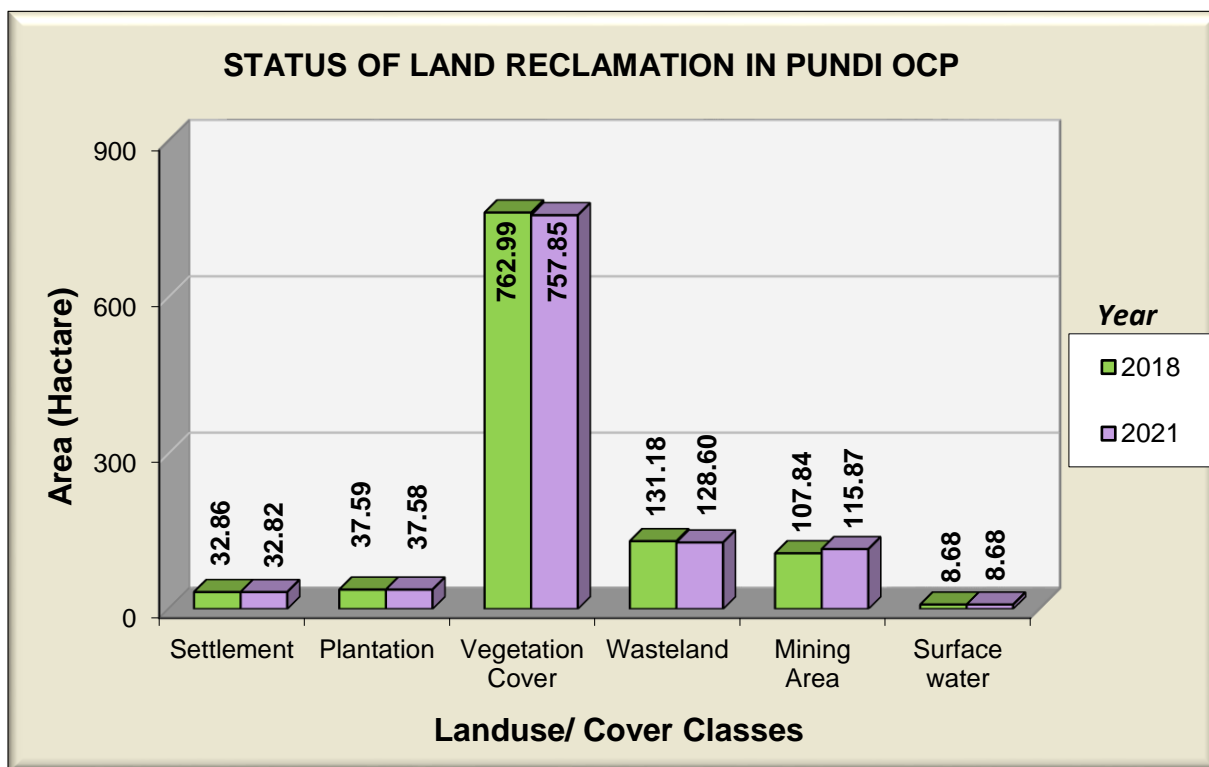


FIGURE – 8.5

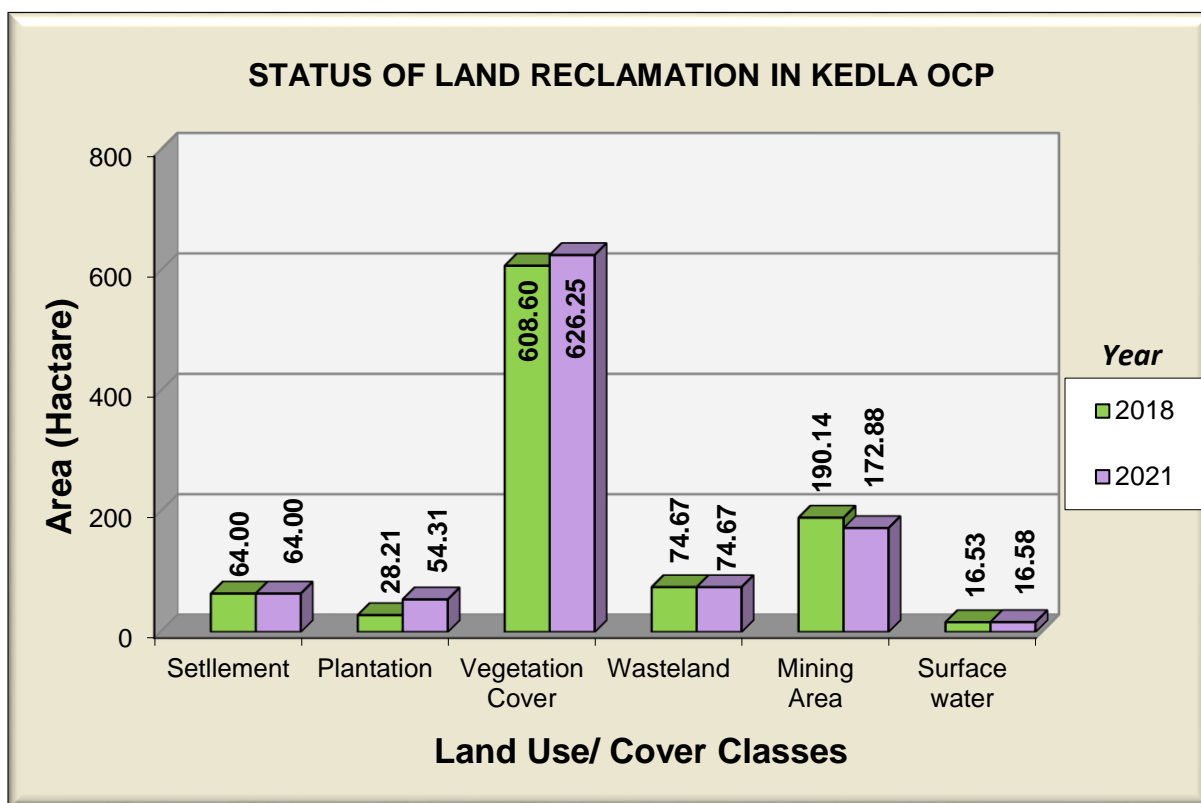


FIGURE – 8.6

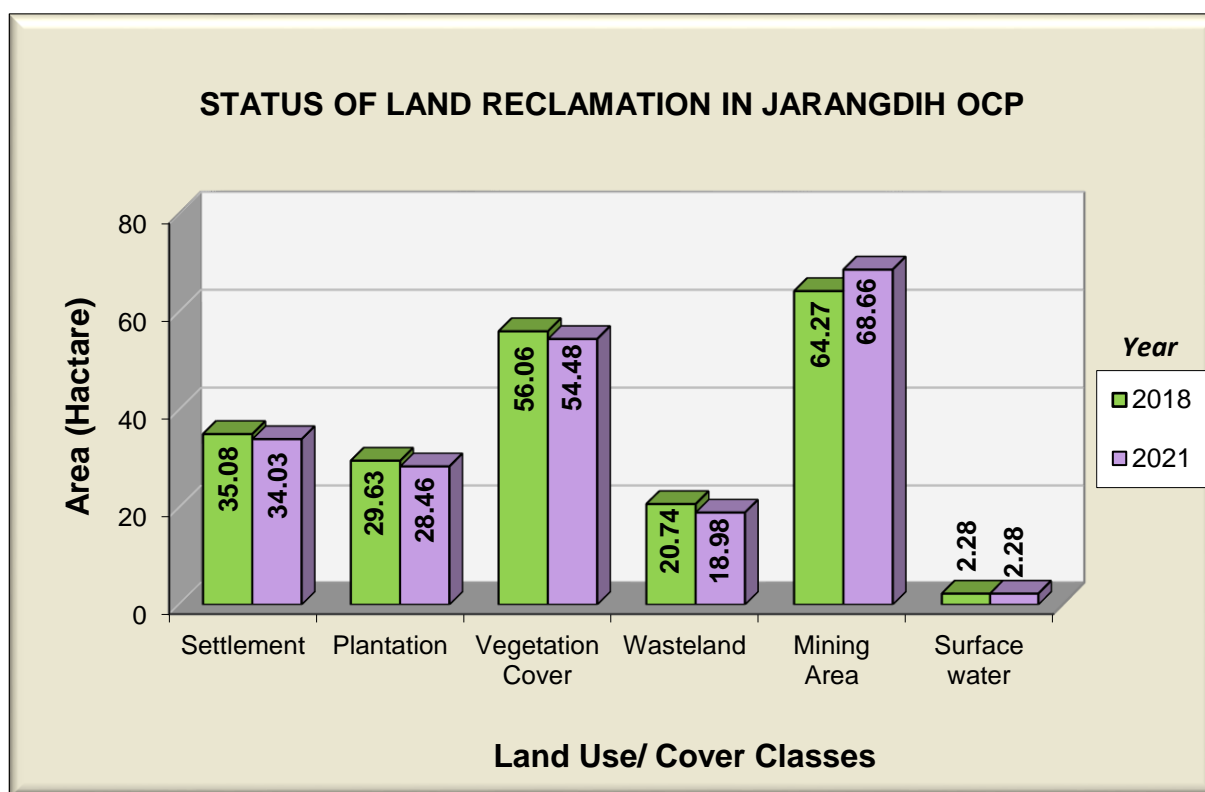


FIGURE – 8.7

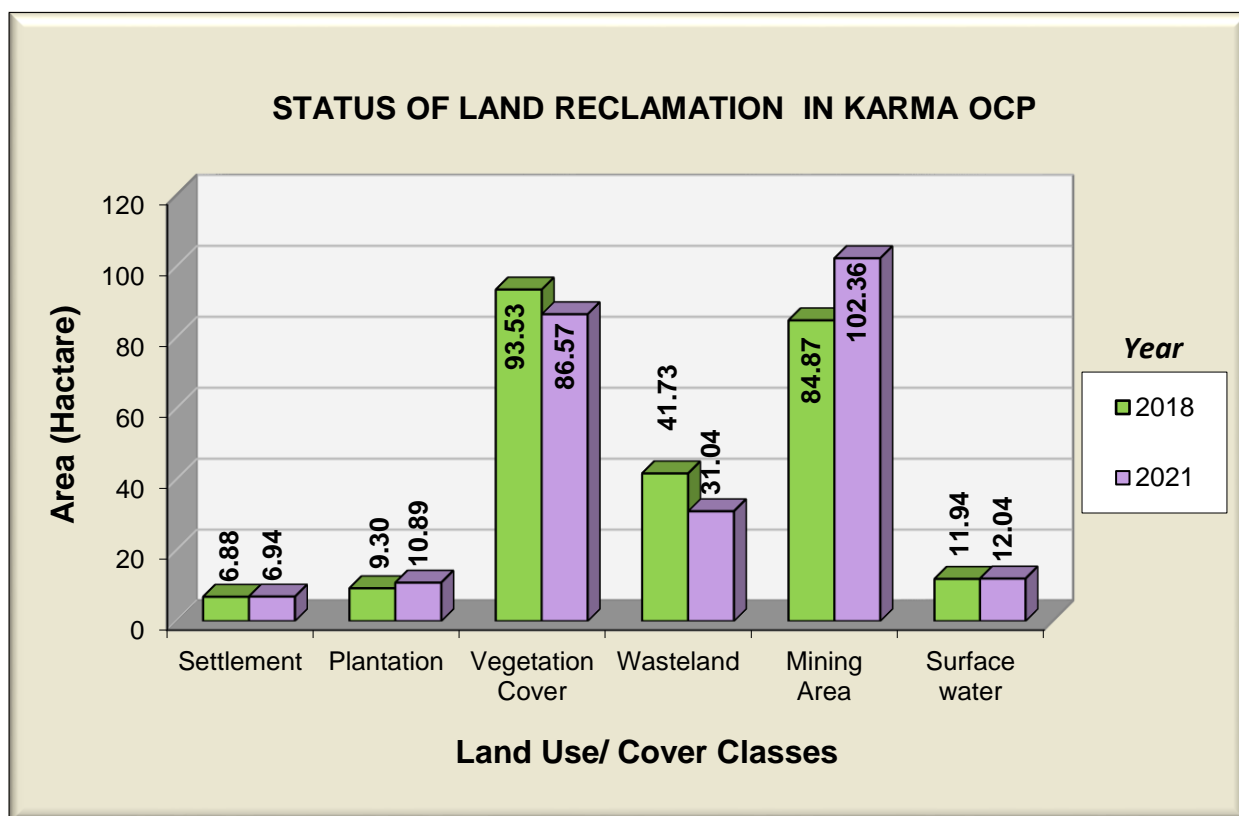


FIGURE – 8.8





**Photo 8.1: Plantation using seed ball technique on OB Dump in Tetariakhar OCP**



**Photo 8.2: Plantation on OB Dump in Tetariakhar OCP**





**Photo 8.3: Plantation on Internal OB Dump/Backfill in Giddi-A OCP**



**Photo8. 4: Plantation on Embankment in Karma OCP**





**Photo8.5: Plantation over Internal OB Dump in Pundi OCP**



**Photo 8.6: Plantation on Internal OB Dump in Jarangdih OCP**





**Photo 8.7: Plantation on backfill in Dakra OCP**



**Photo 8.8: Plantation over Internal OB Dump (Kedla OCP)**

**BHARAT COKING COAL LIMITED**



## 9.0 Land Reclamation Status in Bharat Coking Coal Limited

9.1 Following 5 clusters of mines comprising both underground and opencast projects of Bharat Coking Coal Ltd. have been taken up for land reclamation monitoring during the year 2021-22:

- **Cluster I** (Damoda OCP)
- **Cluster IV** (Salanpur Colliery, Amalgamated Keshalpur West Mudidih Colliery, Amalgamated Gaslitand Katras Choitudih Colliery)
- **Cluster VII** (Kusunda OCP, Kustore OCP, Alkusa OCP, Dhansar OCP, Industry, Ena OCP, Rajapur OCP, Amalgamated East Bhuggatdih Simlabahal Colliery)
- **Cluster X** (Bhowra North Colliery, Bhowra South Colliery, Patherdih Colliery, Sudamdih Shaft, Sudamdih INC, Amlabad Colliery)
- **Cluster XI** (Gopalichuck, Pootkee, Kendwadih)

9.2 Cluster wise Land Reclamation status of above mentioned clusters in BCCL is given in Table 9.1 and also shown graphically in Fig 9.1. Area statistics of different land use class present in the mine leasehold of the above clusters for the year 2021 are shown in the Table - 9.2. Land use maps derived from satellite data are shown in Plate 9.1 - 9.5. Different land use classes present in leasehold of above clusters based on satellite data are depicted in Bar Charts in Fig.9.2 - 9.6.

9.3 Study reveals that out of total mine leasehold area of 9411.54 Hectares of the above mentioned 05 clusters of mines (UG +OC) of BCCL taken up for the land reclamation monitoring during the year 2021-22; total excavated area is 1218.18 Hectare, out of which 61.92 Hectare (5.08%) has been planted on backfill (*Biologically Reclaimed*), 712.90 Ha. (58.52%) is under backfilling (*Technical Reclamation*) and balance 443.36 hectares (36.40%) is under active mining.

- 9.4** Land reclamation monitoring for cluster XI of BCCL is taken up for the first time in the year 2021-22. Hence comparison of this cluster in year 2021 has not been made with respect to year 2018. The data thus generated in the year 2021 will be considered as base data for comparison of land reclamation of this cluster of mines at the interval of every three year.
- 9.5** Study indicates that overall all the projects of BCCL considered for this study in the year 2021-22 indicate increasing trend in Technical reclamation (area under backfill) with respect to the year 2018.
- 9.6** After analyzing the satellite data of the year 2018 vs 2021, it reveals that area under total plantation (Green cover) carried out on backfilled area, OB dumps as well as under social forestry in all the cluster of BCCL has increased from 800.67 Ha (13.61%) to 968.94 Hectare (10.30%) in the span of three year. This significant increase of 168.27 Hectare area under total plantation (Green Cover) with respect to the year 2018 in the leasehold boundary of all the above clusters is due to addition of cluster –XI.
- 9.7** On comparing the status of land reclamation for the year 2021 with respect to the year 2018 in all Cluster of mines of BCCL considered for land reclamation monitoring in the year 2021-22, it is evident from the analysis that area under total land reclamation has increased from 699.07 Ha.( 64.98%) (Yr 2018) in the year 2018 to 774.82 Ha (63.60%) in the year 2021. This increase of 75.75 Ha.area under total land reclamation in the period of three years is the result of sincere effort made by BCCL towards land reclamation and environmental protection.
- 9.8** In Cluster VII, it is observed that area under plantation on backfill (Biological Reclamation) has decreased from 37.47 Ha. in the year 2018 to 25.47 Ha. in the year 2021. This decrease of 12.00 Ha. area in biological reclamation is due to rehandling

of backfill and effect of fire in UG mine present in the leasehold boundary of this cluster. Hence total area under plantation has decreased from 291.66 Ha. (Yr 2018) to 275.57 Ha. (Yr 2021).

- 9.9** Out of the 5 Clusters in BCCL considered for satellite data based land reclamation monitoring in 2021, Cluster X tops with 79.08% reclamation followed by Cluster VII with 67.28%, Cluster IV with 53.62%, Cluster XI with 47.01% and Cluster I with 39.98%.
- 9.10** The area under total plantation (Green Cover) is maximum in Cluster IV (17.10%) followed by Cluster I with 13.57%, Cluster VII with (12.95%), Cluster X with (11.47%) and Cluster XI with (5.31%).
- 9.11** This study will again will be carried out after an interval of three years to assess the land reclamation status in the above projects.

**Table 9.1**  
**Cluster wise Land Reclamation Status in Cluster of mines (UG+OC) of BCCL based on the Satellite data of the Year 2021**  
*(Clusters producing less than 5 m.c.m of (Coal+OB) annually)*

*(Area in Hectare)*

Sl. No.	Cluster No.	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 OB Dumps		Social Forestry, Avaneue 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 I	575.00	575.00	10.11	11.10	7.29	7.29	47.99	45.21	25.53	25.53	28.39	27.61	45.79	46.00	80.81	78.03	17.40	18.39
				22.08%	24.13%	15.92%	15.85%					62.00%	60.02%			14.05%	13.57%	38.00%	39.98%
2	Cluster IV	1123.79	1123.79	147.22	176.03	0.00	0.00	27.11	27.11	165.09	165.09	166.67	152.29	313.89	328.32	192.20	192.20	147.22	176.03
				46.90%	53.62%	0.00%	0.00%					53.10%	46.38%			17.10%	17.10%	46.90%	53.62%
3	Cluster VII	2127.70	2127.70	351.54	351.68	37.47	25.47	15.52	11.43	238.67	238.67	122.23	183.42	511.24	560.57	291.66	275.57	389.01	377.15
				68.76%	62.74%	7.33%	4.54%					23.91%	32.72%			13.71%	12.95%	76.09%	67.28%
4	Cluster X	2057.47	2057.47	116.28	143.64	29.16	29.16	66.09	66.09	140.75	140.75	59.41	45.71	204.85	218.51	236.00	236.00	145.44	172.80
				56.76%	65.74%	14.23%	13.34%					29.00%	20.92%			11.47%	11.47%	71.00%	79.08%
5	Cluster XI	-	3527.58	-	30.45	-	0.00	-	0.00	-	187.14	-	34.33	-	64.78	-	187.14	-	30.45
					47.01%		0.00%						52.99%				5.31%		47.01%
	TOTAL	5883.96	9411.54	625.15	712.90	73.92	61.92	156.71	149.84	570.04	757.18	376.70	443.36	1075.77	1218.18	800.67	968.94	699.07	774.82
				58.11%	58.52%	6.87%	5.08%					35.02%	36.40%			13.61%	10.30%	64.98%	63.60%

*(% is calculated with respect 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-9.1
5. (%) calculated in the above Table is in respect to Total Excavated Area except for "Total Area under Plantation" where % is in terms of "Leasehold Area".
6. Cluster XI has been included for land reclamation monitoring first time in the year 2021.



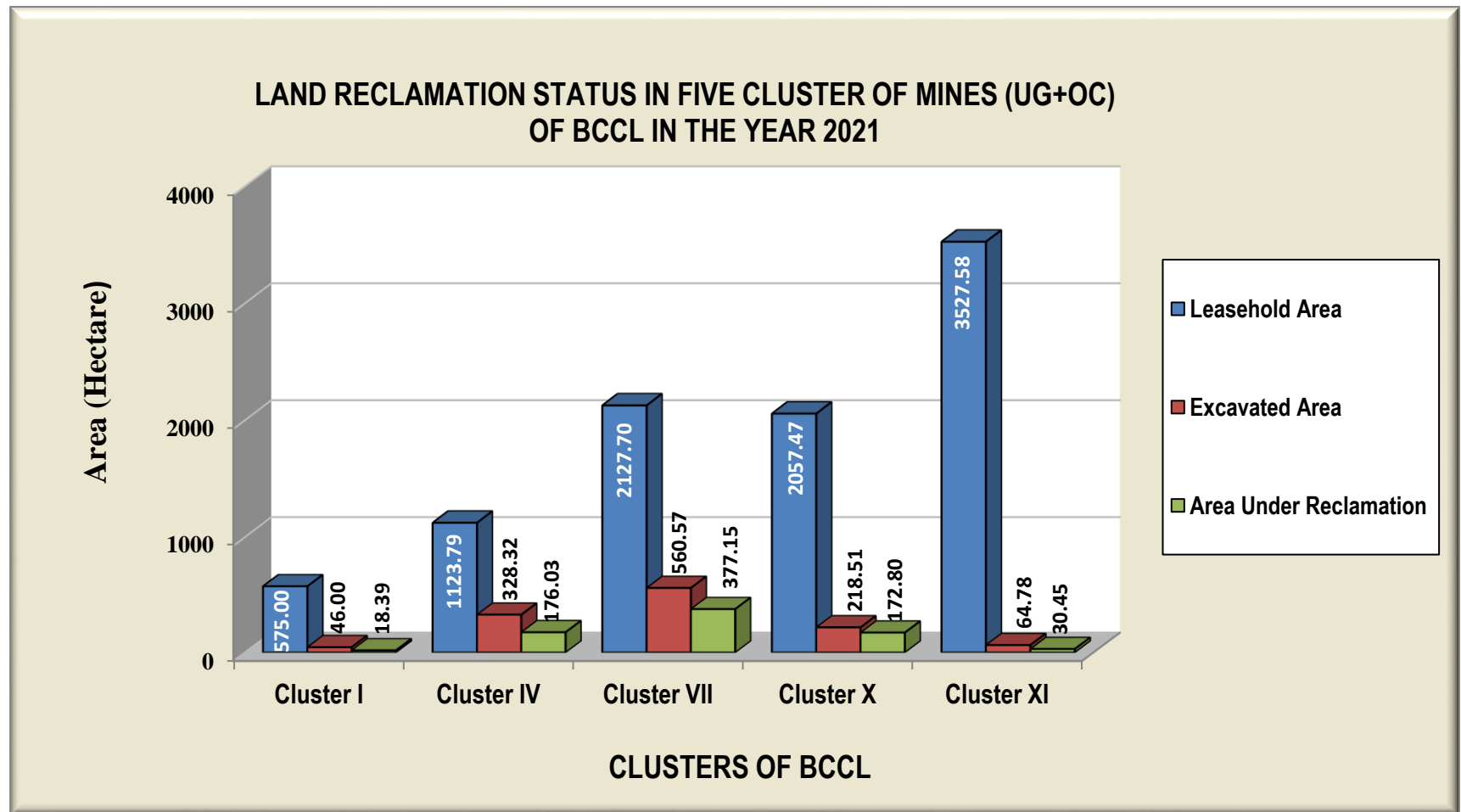
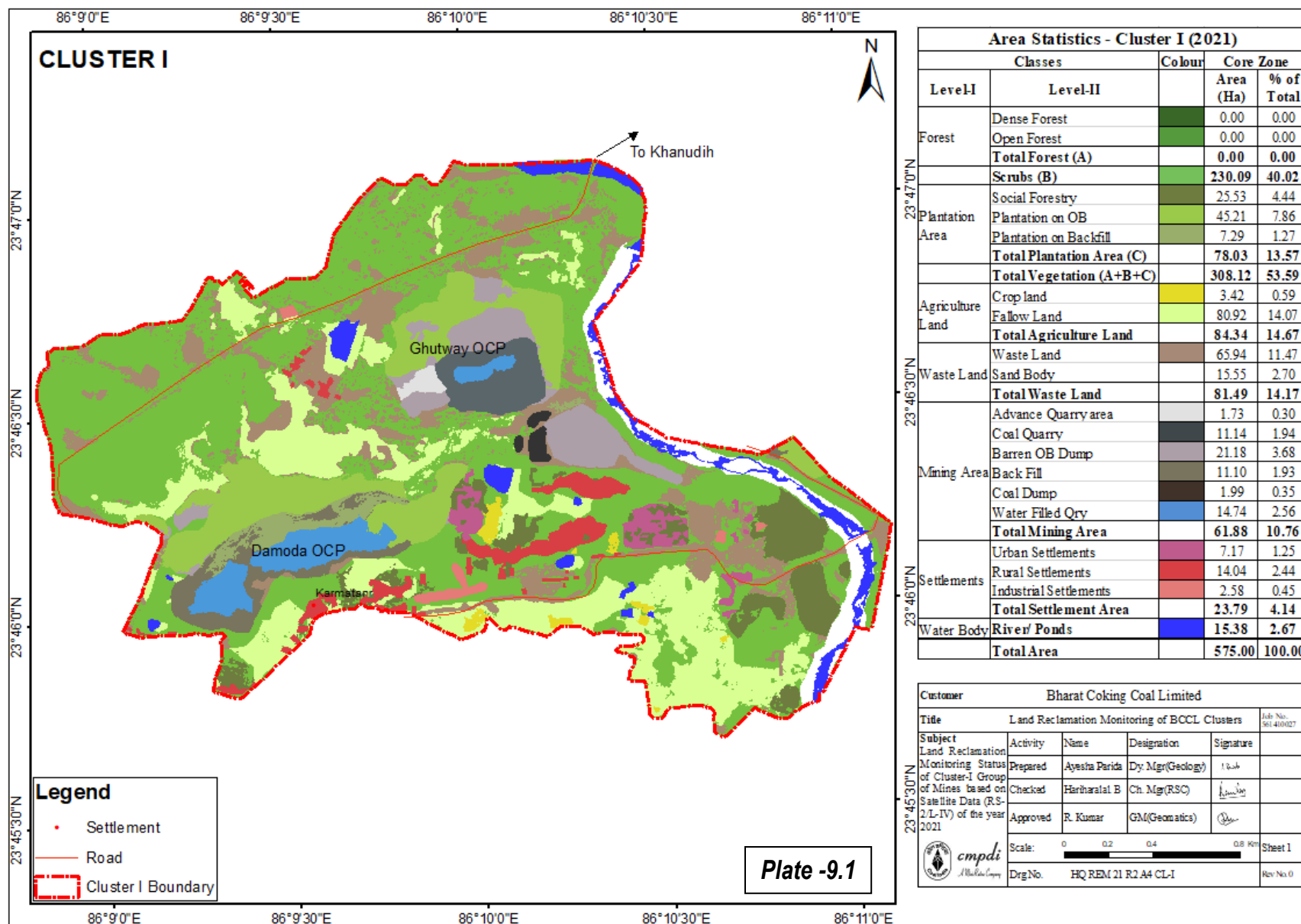


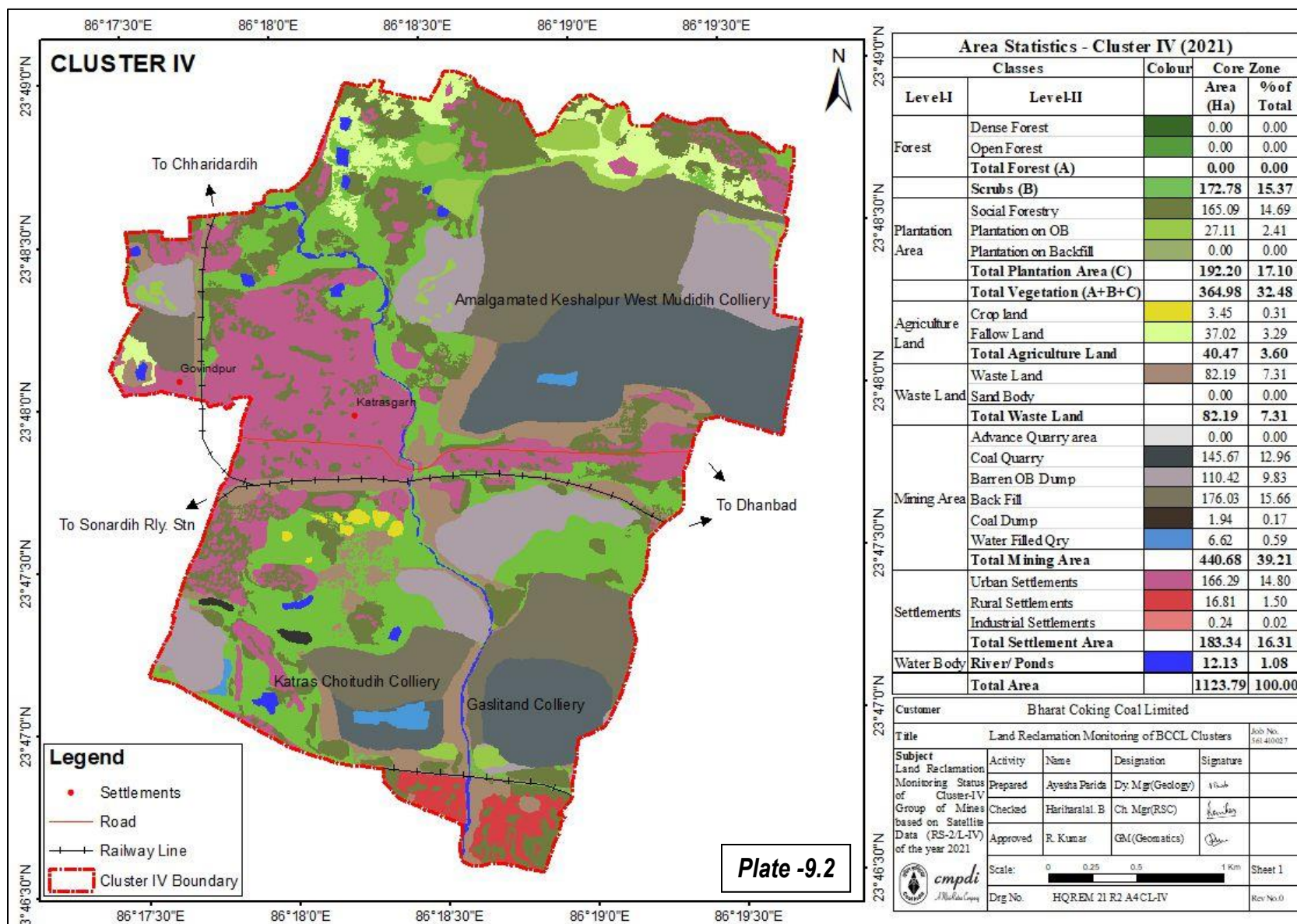
Figure-9.1 : Land Reclamation Status in Clusters of BCCL based on satellite data of the year 2021.

**TABLE-9.2**  
**CLUSTER WISE AREA STATISTICS OF LAND USE/COVER CLASSES IN CLUSTER OF MINES PRODUCING**  
**(<5 M.C.M OF (COAL +OB)) OF BCCL BASED ON SATELLITE DATA OF THE YEAR 2021**

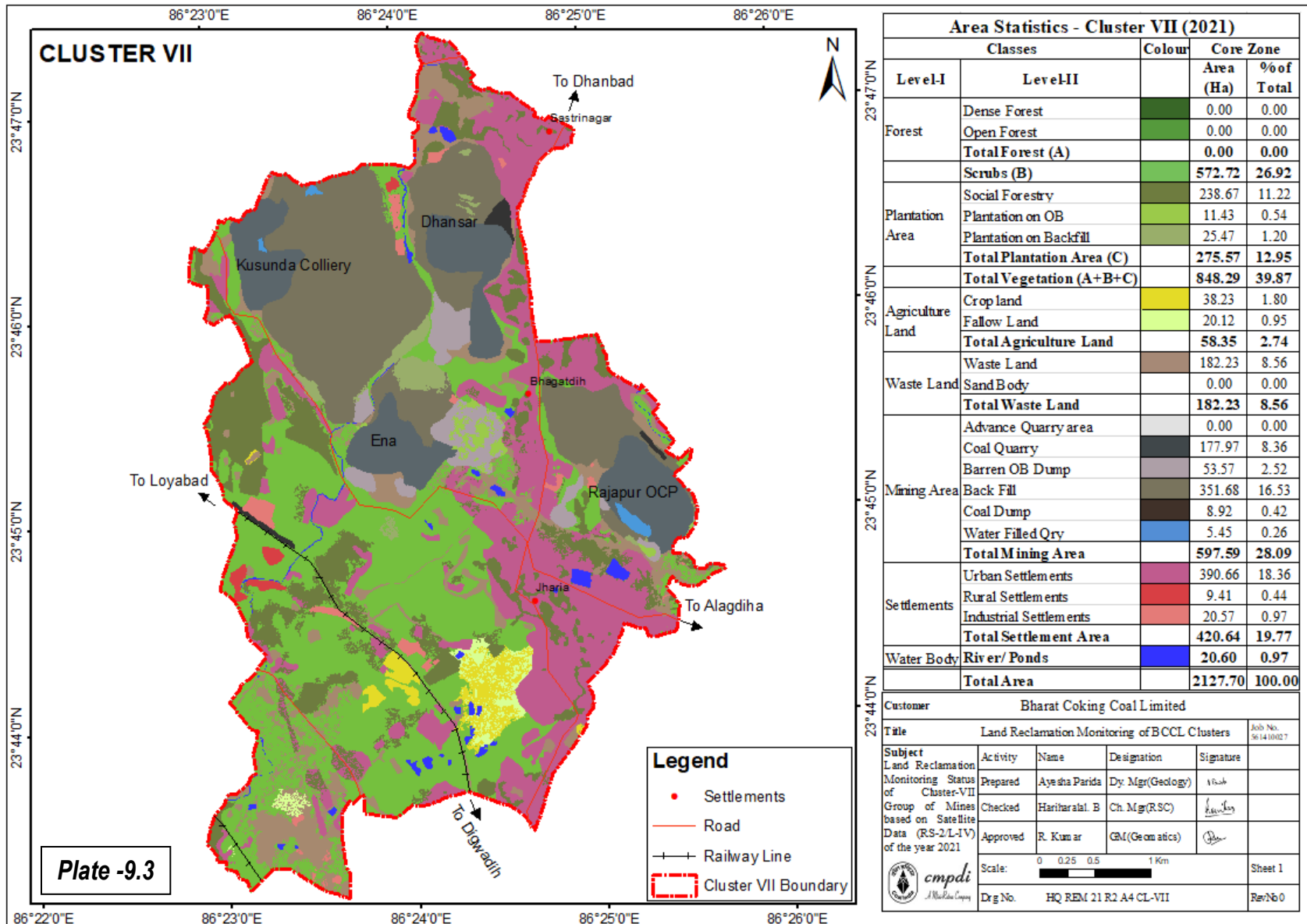
(Area in Hectare)

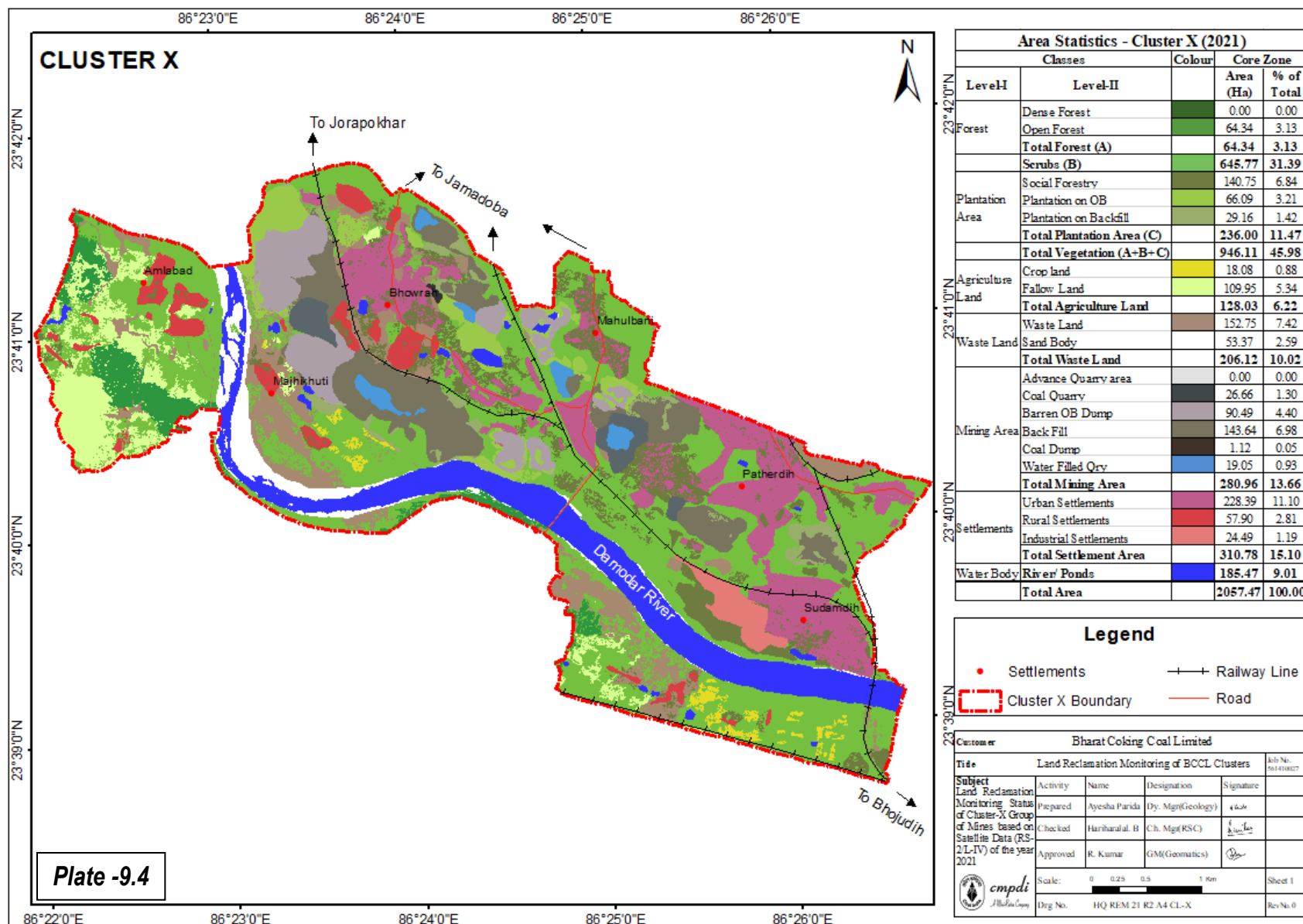
		CLUSTER I		CLUSTER IV		CLUSTER VII		CLUSTER X		CLUSTER XI		TOTAL	
		Area	%	Area	%	Area	%	Area	%	Area	%	Area	%
FORESTS	Dense Forest	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Open Forest	0.00	0.00	0.00	0.00	0.00	0.00	64.34	3.13	0.00	0.00	64.34	0.68
	<b>Total Forest (A)</b>	0.00	0.00	0.00	0.00	0.00	0.00	64.34	3.13	0.00	0.00	64.34	0.68
SCRUBS	<b>Scrubs (B)</b>	230.09	40.02	172.78	15.37	572.72	26.92	645.77	31.39	1177.06	33.37	2798.42	29.73
PLANTATION	Social Forestry/Avenue Plantation	25.53	4.44	165.09	14.69	238.67	11.22	140.75	6.84	187.14	5.31	757.18	8.05
	Plantation on OB Dump	45.21	7.86	27.11	2.41	11.43	0.54	66.09	3.21	0.00	0.00	149.84	1.59
	Plantation on Backfill (Biological Reclamation)	7.29	1.27	0.00	0.00	25.47	1.20	29.16	1.42	0.00	0.00	61.92	0.66
	<b>Total Plantation (C)</b>	78.03	13.57	192.20	17.10	275.57	12.95	236.00	11.47	187.14	5.31	968.94	10.30
	<b>Total Vegetation (A+B+C)</b>	308.12	53.59	364.98	32.48	848.29	39.87	946.11	45.98	1364.20	38.67	3831.70	40.71
ACTIVE MINING	Coal Dump	1.99	0.35	1.94	0.17	8.92	0.42	1.12	0.05	0.73	0.02	14.70	0.16
	Coal Quarry	11.14	1.94	145.67	12.96	177.97	8.36	26.66	1.30	31.66	0.90	393.10	4.18
	Advance Quarry Site	1.73	0.30	0.00	0.00	0.00	0.00	0.00	0.00	2.67	0.08	4.40	0.05
	Quarry Filled With Water	14.74	2.56	6.62	0.59	5.45	0.26	19.05	0.93	0.00	0.00	45.86	0.49
	<b>Total Area under Active Mining</b>	27.61	4.80	152.29	13.55	183.42	8.62	45.71	2.22	34.33	0.97	443.36	4.71
	Barren OB Dump	21.18	3.68	110.42	9.83	53.57	2.52	90.49	4.40	22.66	0.64	298.32	3.17
RECLAIMED	Area Under Backfilling (Technical Reclamation)	11.10	1.93	176.03	15.66	351.68	16.53	143.64	6.98	30.45	0.86	712.90	7.57
	<b>Total Area under Mine Operation</b>	61.88	10.76	440.68	39.21	597.59	28.09	280.96	13.66	88.17	2.50	1469.28	15.61
WASTELAND	Waste Lands	65.94	11.47	82.19	7.31	182.23	8.56	152.75	7.42	708.59	20.09	1191.70	12.66
	Fly Ash Pond / Sand Body	15.55	2.70	0.00	0.00	0.00	0.00	53.37	2.59	15.83	0.45	84.75	0.90
	<b>Total Wasteland</b>	81.49	14.17	82.19	7.31	182.23	8.56	206.12	10.02	724.42	20.54	1276.45	13.56
WATERBODIES	Reservoir, Nallah, Ponds	15.38	2.67	12.13	1.08	20.60	0.97	185.47	9.01	63.67	1.80	297.25	3.16
	<b>Total Waterbodies</b>	15.38	2.67	12.13	1.08	20.60	0.97	185.47	9.01	63.67	1.80	297.25	3.16
AGRICULTURE	Crop Lands	3.42	0.59	3.45	0.31	38.23	1.80	18.08	0.88	81.78	2.32	144.96	1.54
	Fallow Lands	80.92	14.07	37.02	3.29	20.12	0.95	109.95	5.34	822.67	23.32	1070.68	11.38
	<b>Total Agriculture</b>	84.34	14.67	40.47	3.60	58.35	2.74	128.03	6.22	904.45	25.64	1215.64	12.92
SETTLEMENTS	Urban Settlement	7.17	1.25	166.29	14.80	390.66	18.36	228.39	11.10	336.58	9.54	1129.09	12.00
	Rural Settlement	14.04	2.44	16.81	1.50	9.41	0.44	57.90	2.81	14.68	0.42	112.84	1.20
	Industrial Settlement	2.58	0.45	0.24	0.02	20.57	0.97	24.49	1.19	31.41	0.89	79.29	0.84
	<b>Total Settlements</b>	23.79	4.14	183.34	16.31	420.64	19.77	310.78	15.10	382.67	10.85	1321.22	14.04
	<b>Grand Total</b>	575.00	100.00	1123.79	100.00	2127.70	100.00	2057.47	100.00	3527.58	100.00	9411.54	100.00

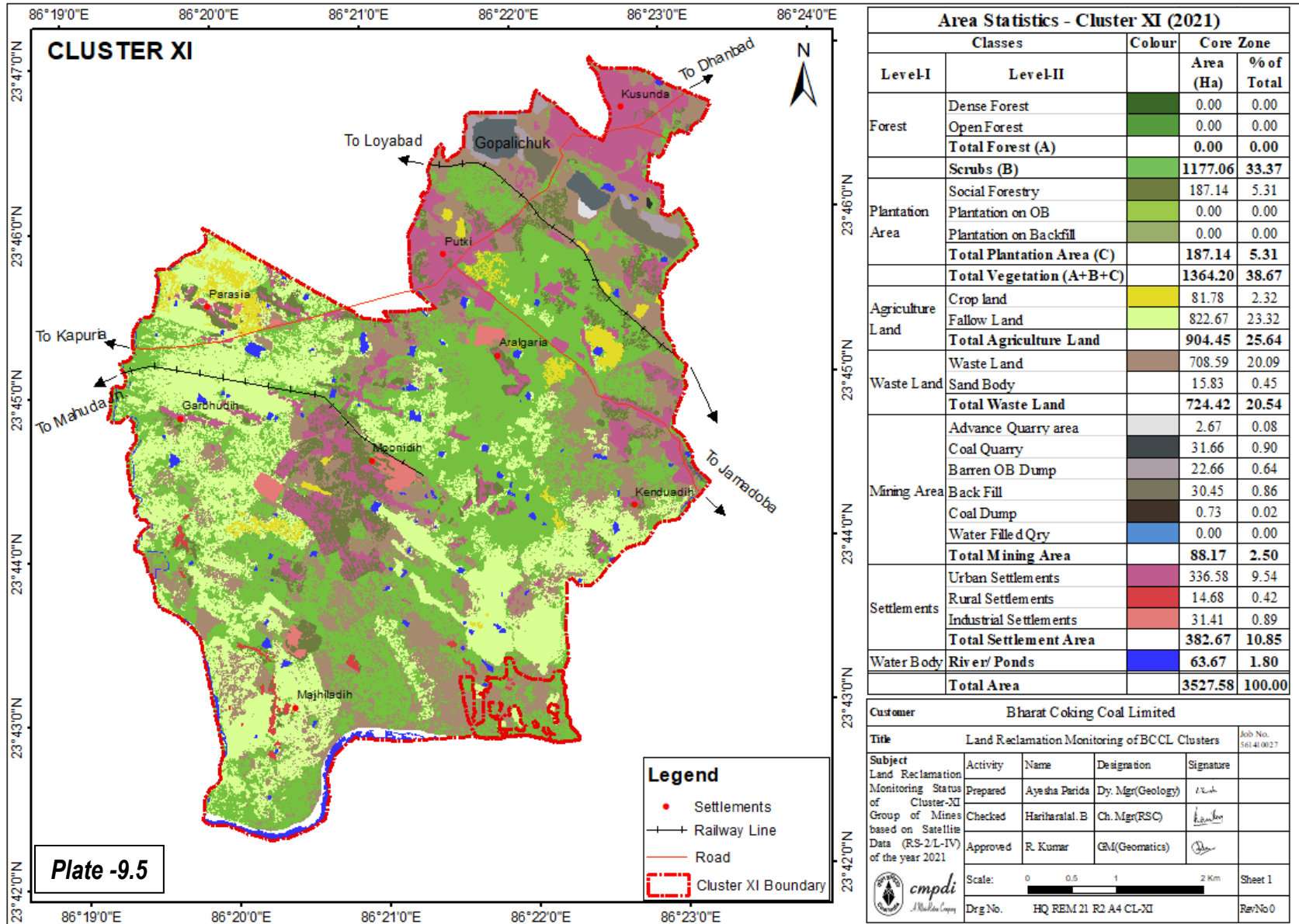












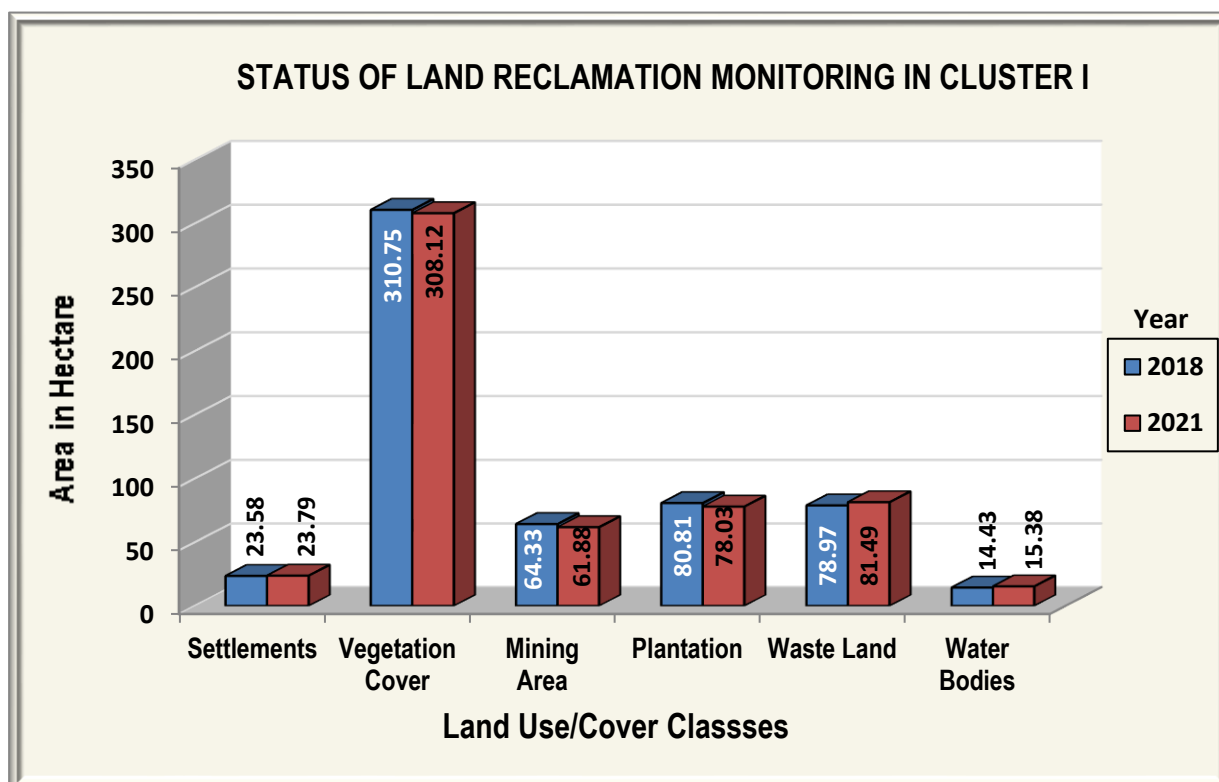


Figure-9.2

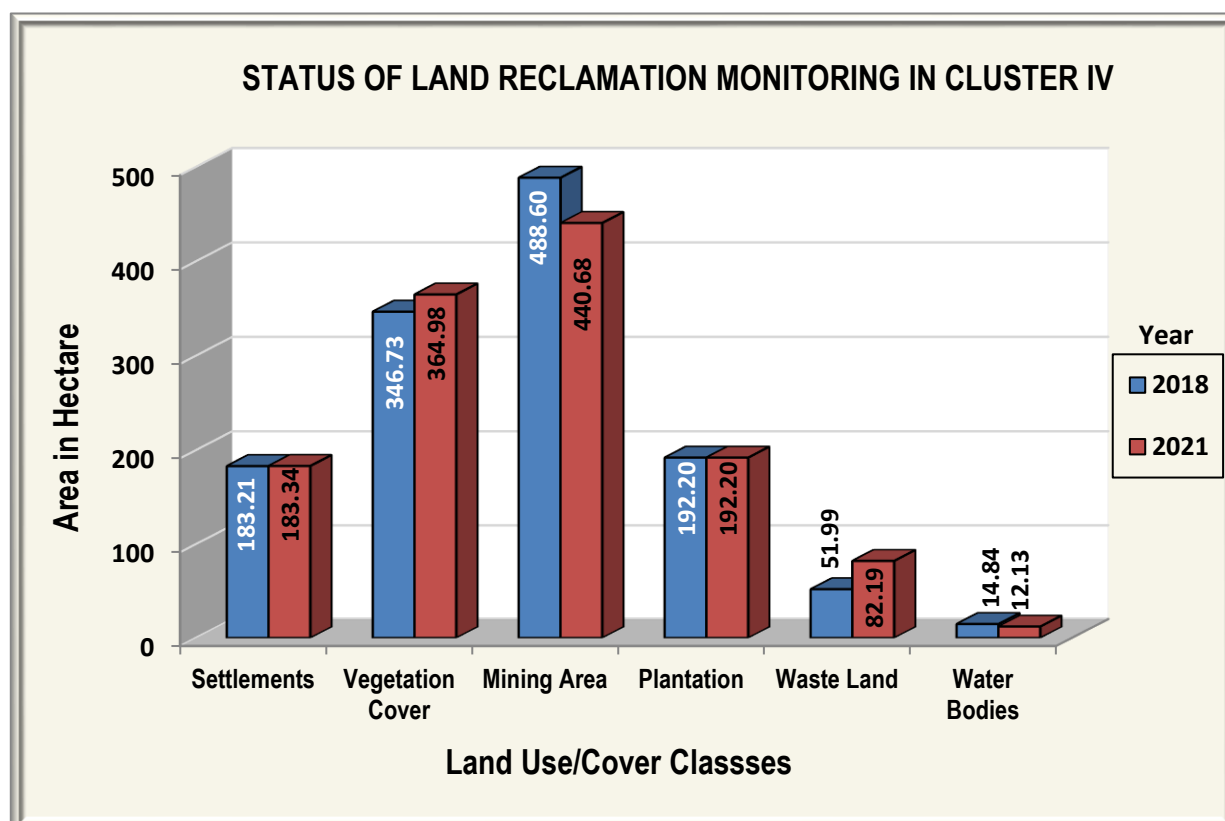


Figure-9.3



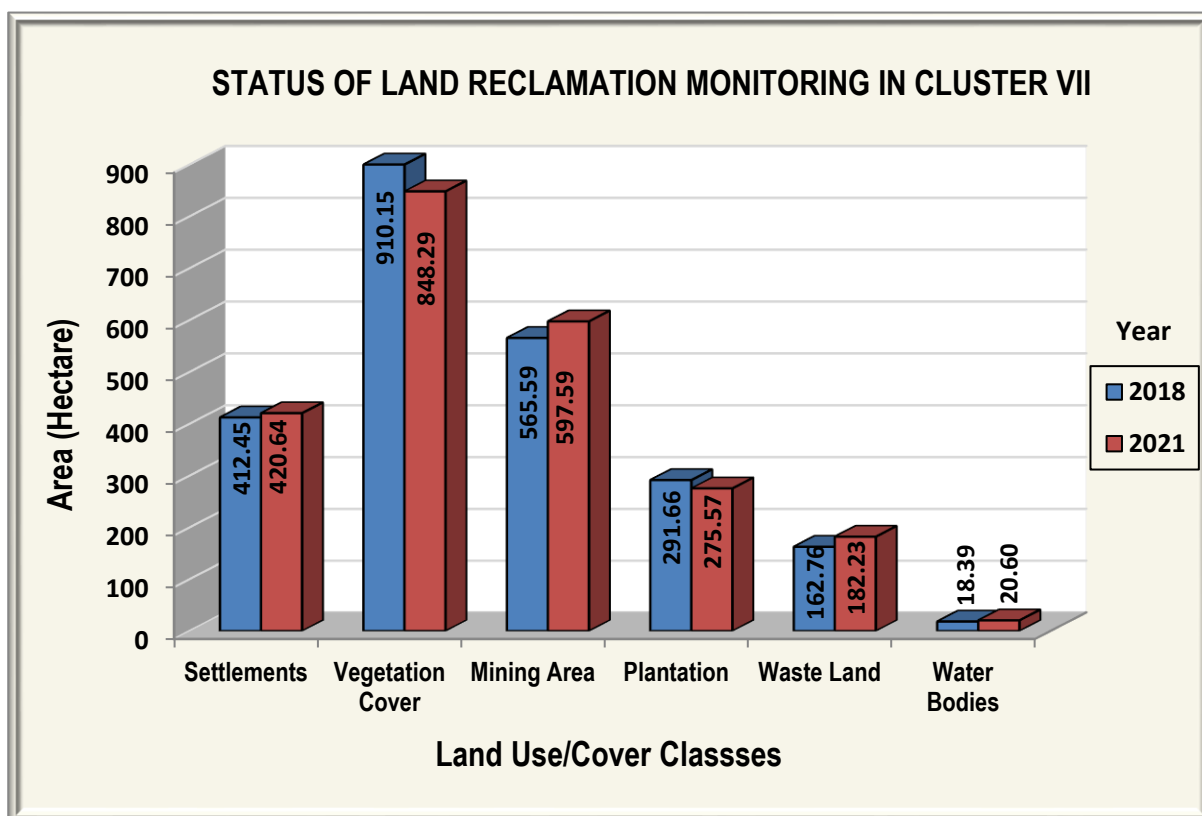


Figure-9.4

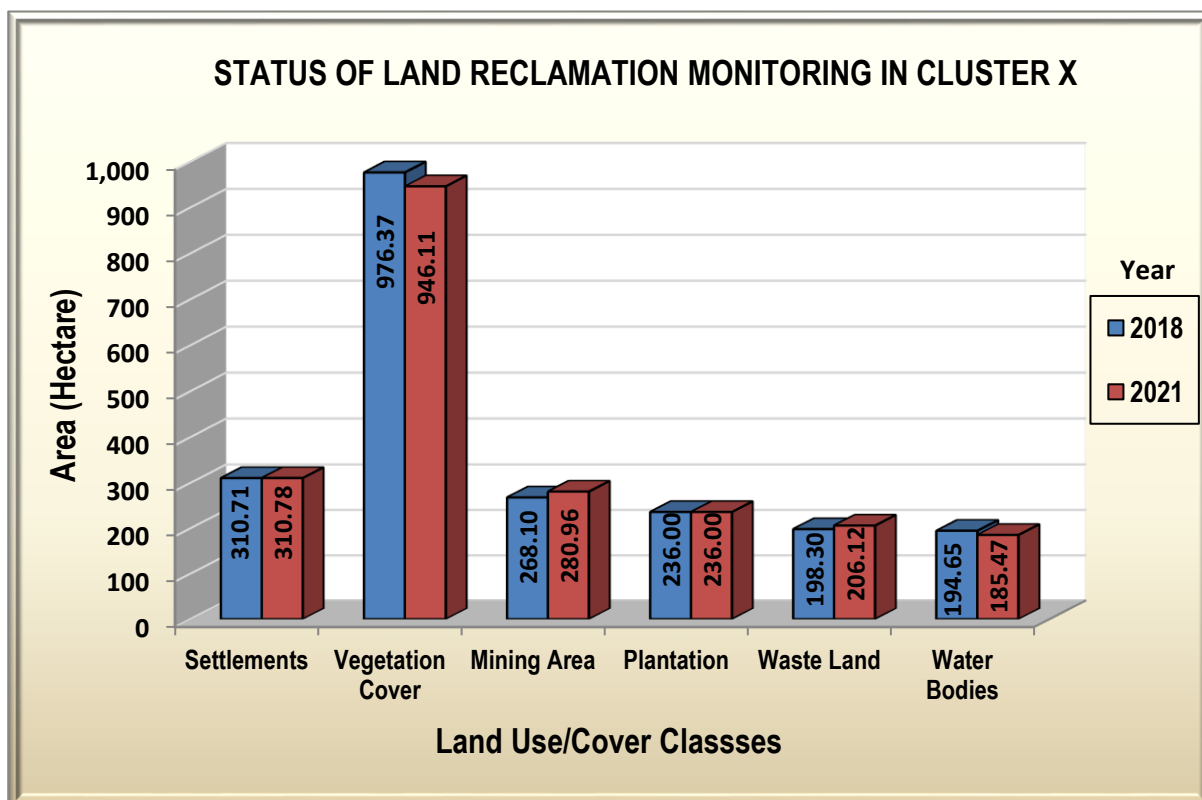


Figure-9.5

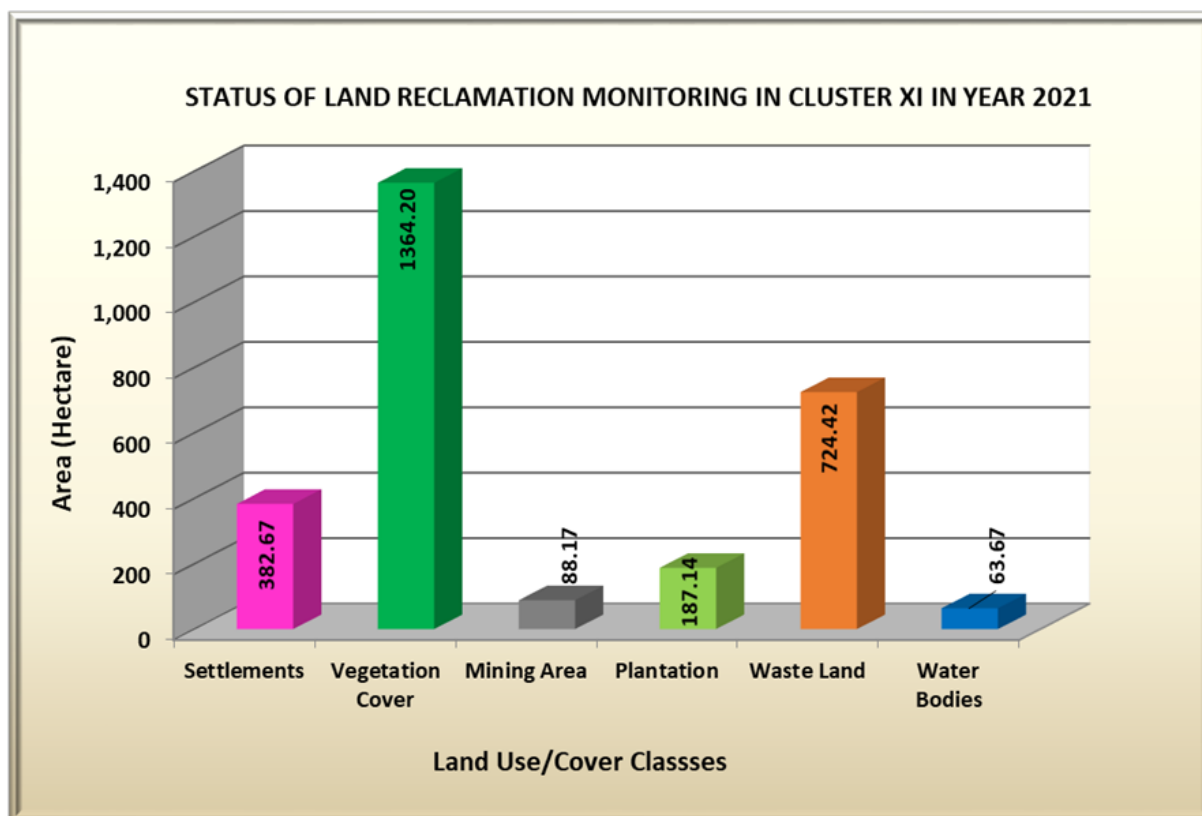


Figure-9.6



Photo 9.1: Ecological Restoration Site in Cluster I





**Photo 9.2: Plantation on OB Dump in Cluster I**



**Photo 9.3: Plantation on OB Dump in Cluster IV**





**Photo 9.4: Parasnath Udyaan in Cluster IV**

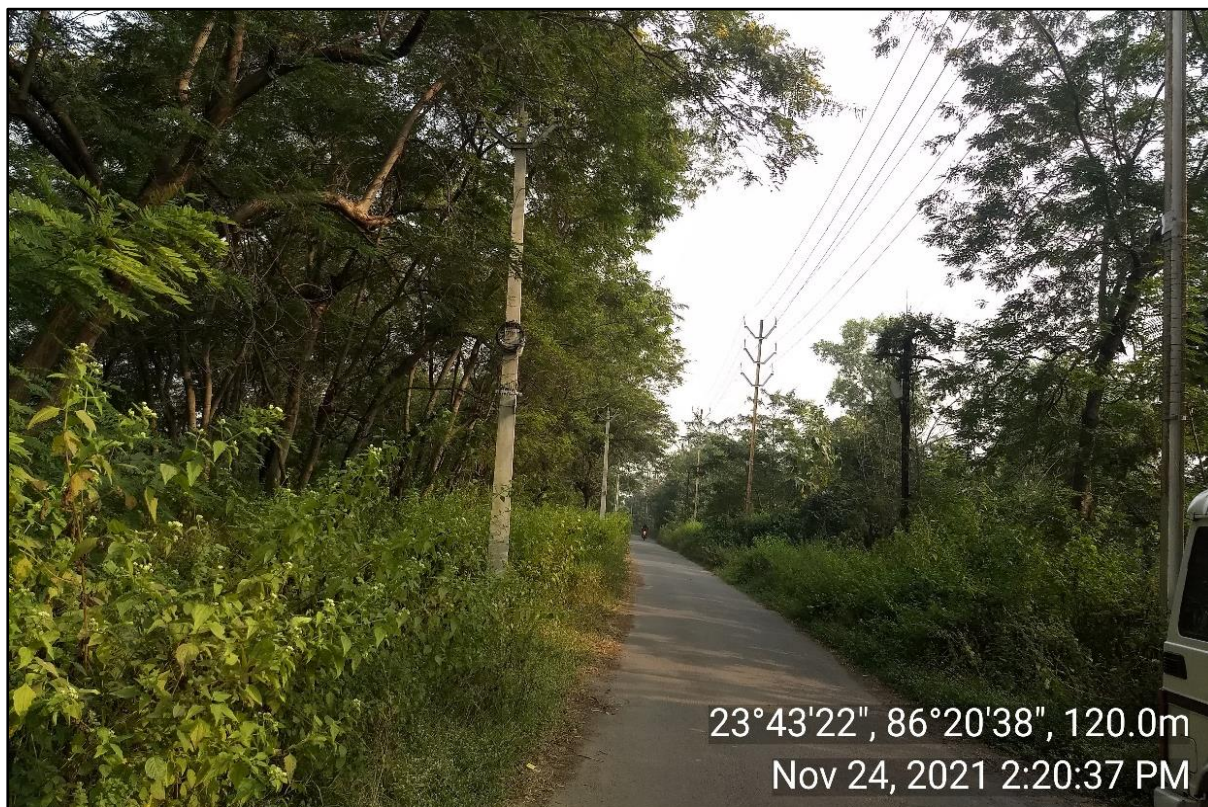


**Photo 9.5: Plantation under Social Forestry along Road side in Cluster VII**





**Photo 9.6: Plantation on OB Dump in Cluster X**



**Photo 9.7: Plantation under Social Forestry in Cluster XI**

**EASTERN COALFIELDS LIMITED**

## **10.0 Land Reclamation Status in Eastern Coalfields Limited**

**10.1** Following 04 Cluster comprising Opencast and Underground mines producing less than 5 million m<sup>3</sup>. (Coal + OB together) of Eastern Coalfields Ltd. have been taken up for land reclamation monitoring during the year 2021-22:

**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 & OC

**Cluster VIII** Bhanora UG, Girmint /KDI UG, Sirpur UG, Sirpur Seam Incline UG, Ningah UG, Mithapur West UG & Mithapur West OC Patch, Satgram UG.

**10.2** Cluster wise Land Reclamation status of above mentioned projects in ECL is given in Table 10.1 and also shown graphically in Fig 10.1. Area statistics of different land use class present in the leasehold of the above clusters for the year 2021 are shown in the Table - 10.2. Land use maps derived from satellite data are shown in Plate 10.1 - 10.4. Different land use classes based on satellite data are depicted in Bar Charts in Fig. 10.2 - 10.5.

**10.3** Study reveals that majority of the mines under four clusters considered for monitoring are underground mines except Cluster – VII which consists of one opencast mine also i.e Bhanora OCP. Out of total mine leasehold area of 18339.00 Hectares of the above mentioned 04 clusters of mines in ECL taken up for this study in 2021-22; total excavated area is 52.00 hectare, out of which 24.00

Ha. (46.15%) is under backfilling (*Technical Reclamation*) and balance 28.00 hectare (53.85%) area is under active mining.

- 10.4** After analyzing the satellite data of year 2018 vs. 2021 it is evident that total area under plantation (Green Cover) carried out on backfilled area, OB dumps as well as under social forestry in all the four Cluster of mines in ECL has increased from 978.53 Hectare in the year 2018 to 988.00 Hectare in the year 2021 in a span of last three years. This increase of 9.47 Hectare area of total plantation (Green Cover) in three year time is due to the sincere efforts made by Sodepur area in ECL which has carried out plantation in two places one at Dubeswari UG and other at Aldi Village where orchard plantation has been carried out.
- 10.5** This study will again will be carried out after an interval of three years to assess the land reclamation status in the above projects.



Table: 10.1

**CLUSTER WISE LAND RECLAMATION STATUS IN CLUSTER (UG+OC) MINES OF ECL BASED ON SATELLITE DATA OF THE YEAR 2021**  
*(For projects/Clusters producing Less than 5 mcm Coal+OB)*

(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, Avaneue 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 except for "Total Area under Plantation" where % is in terms of "Leasehold Area".

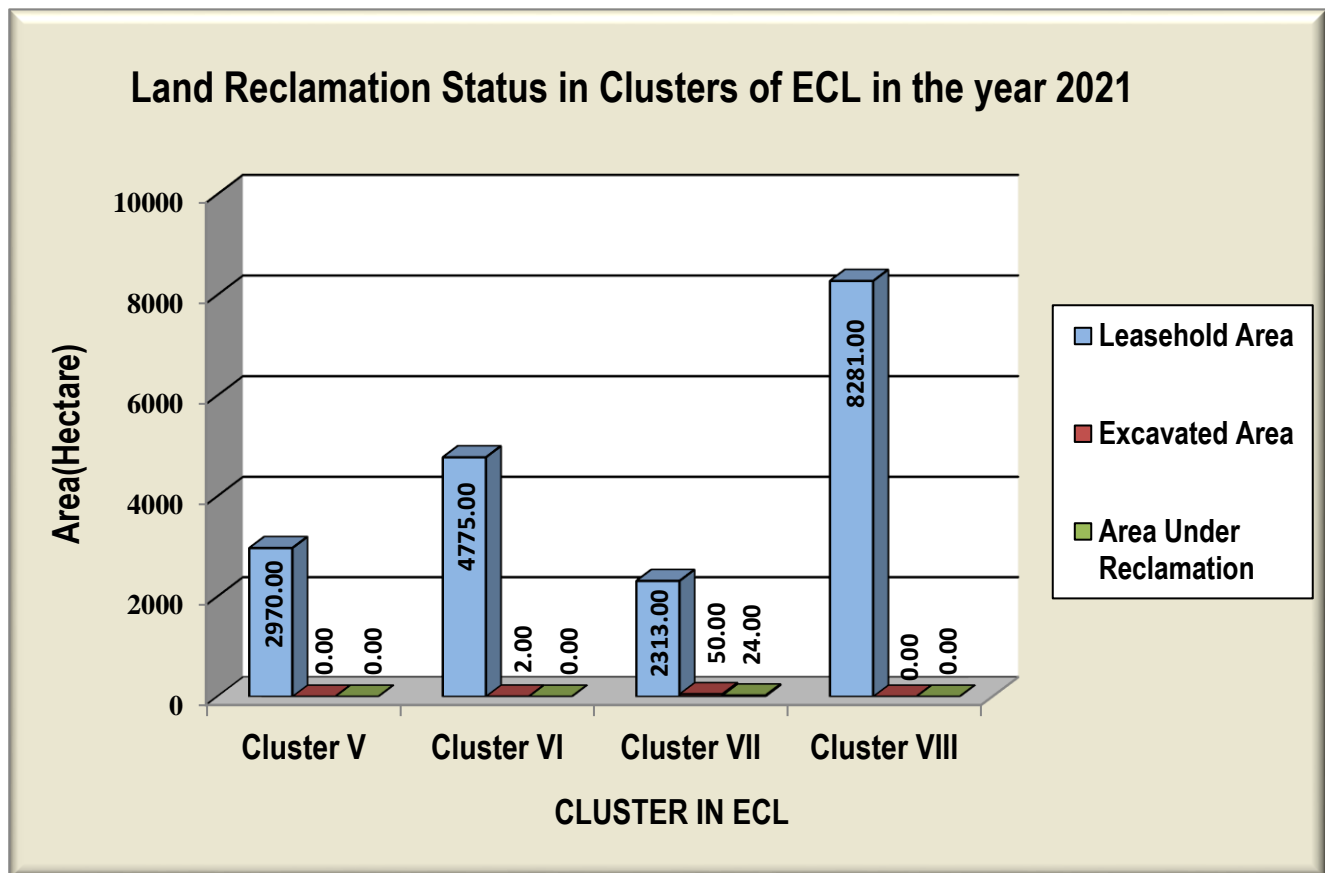


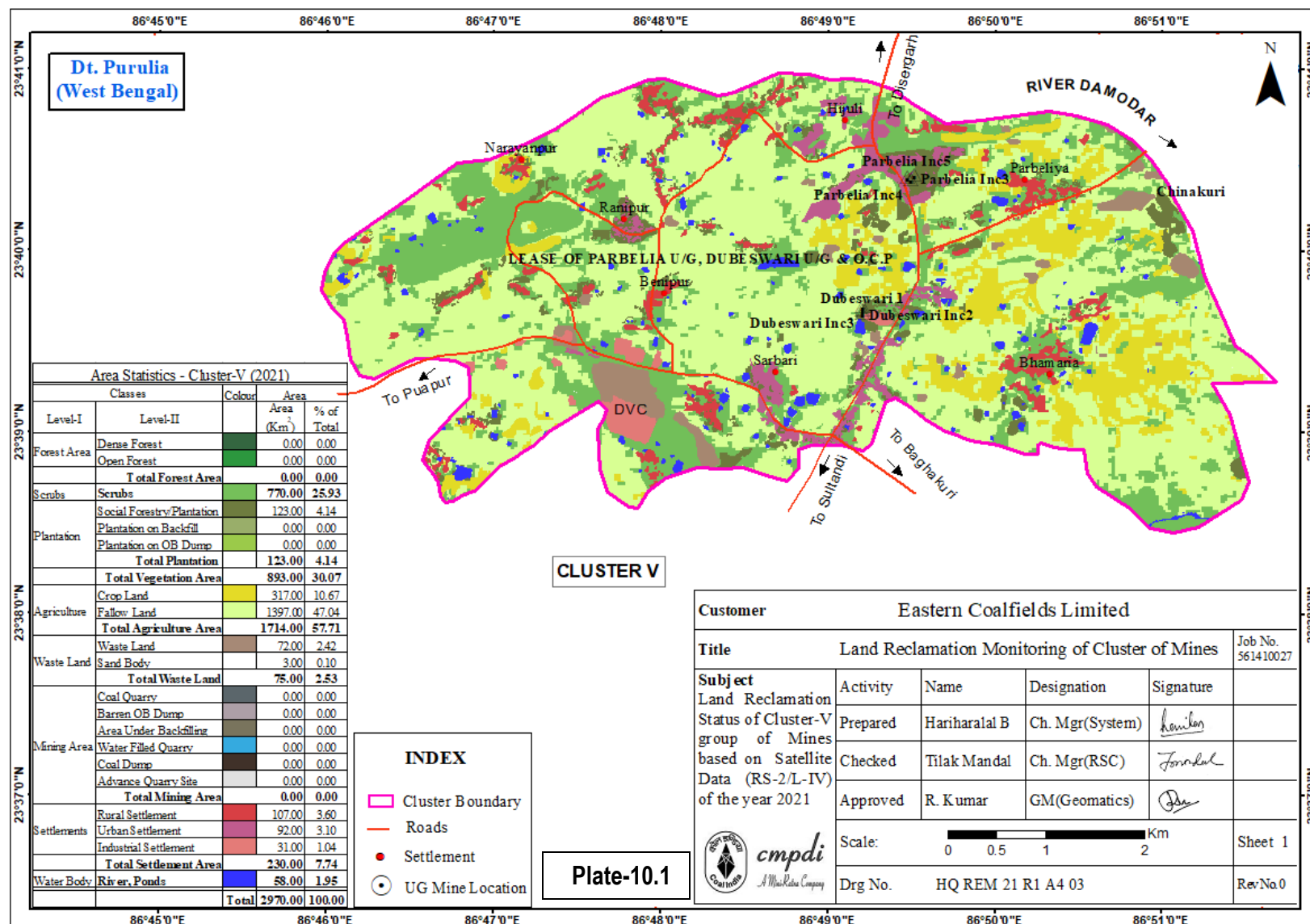


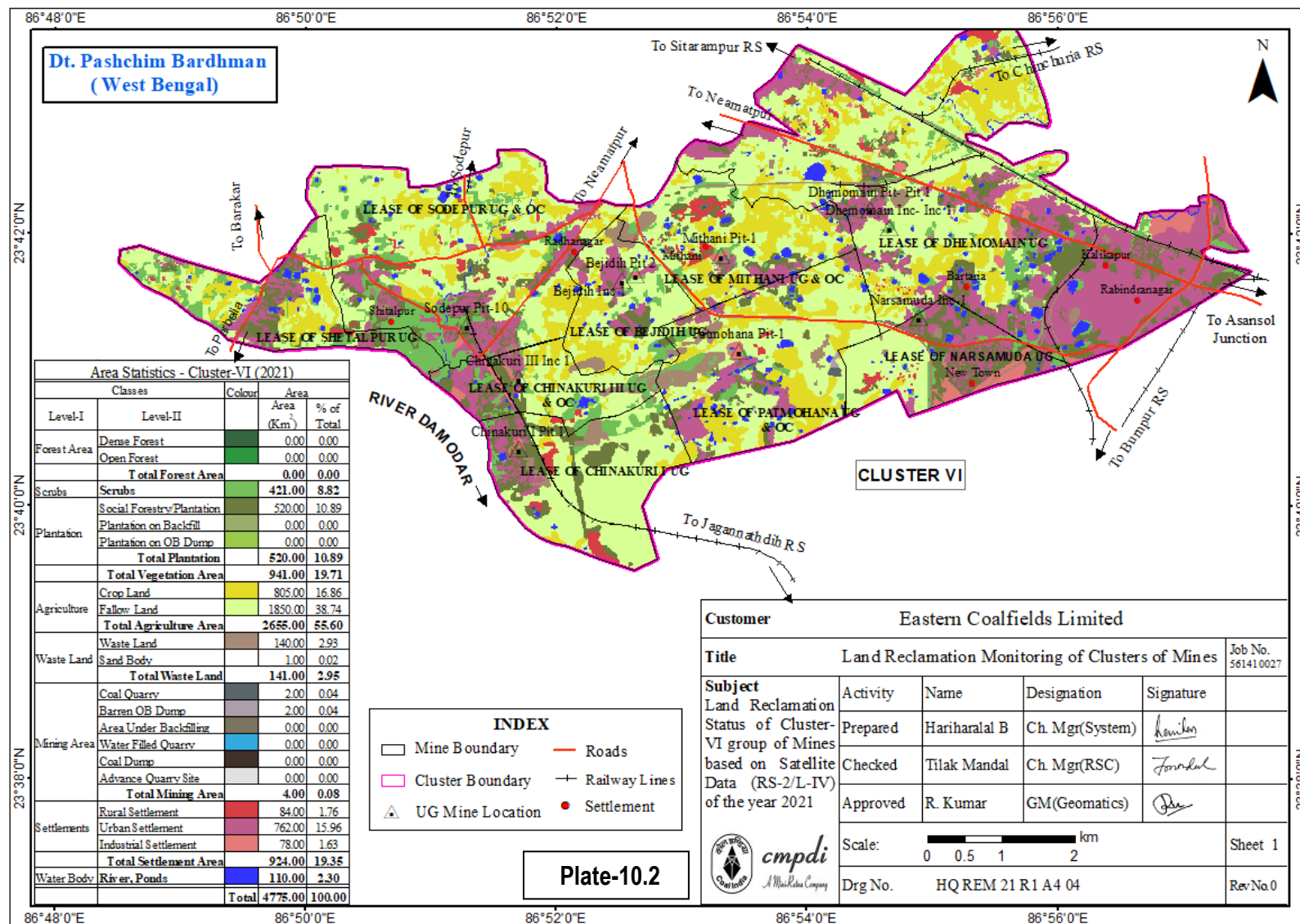
Figure-10.1 : Land Reclamation Status in Cluster of ECL based on satellite data of the year 2021.

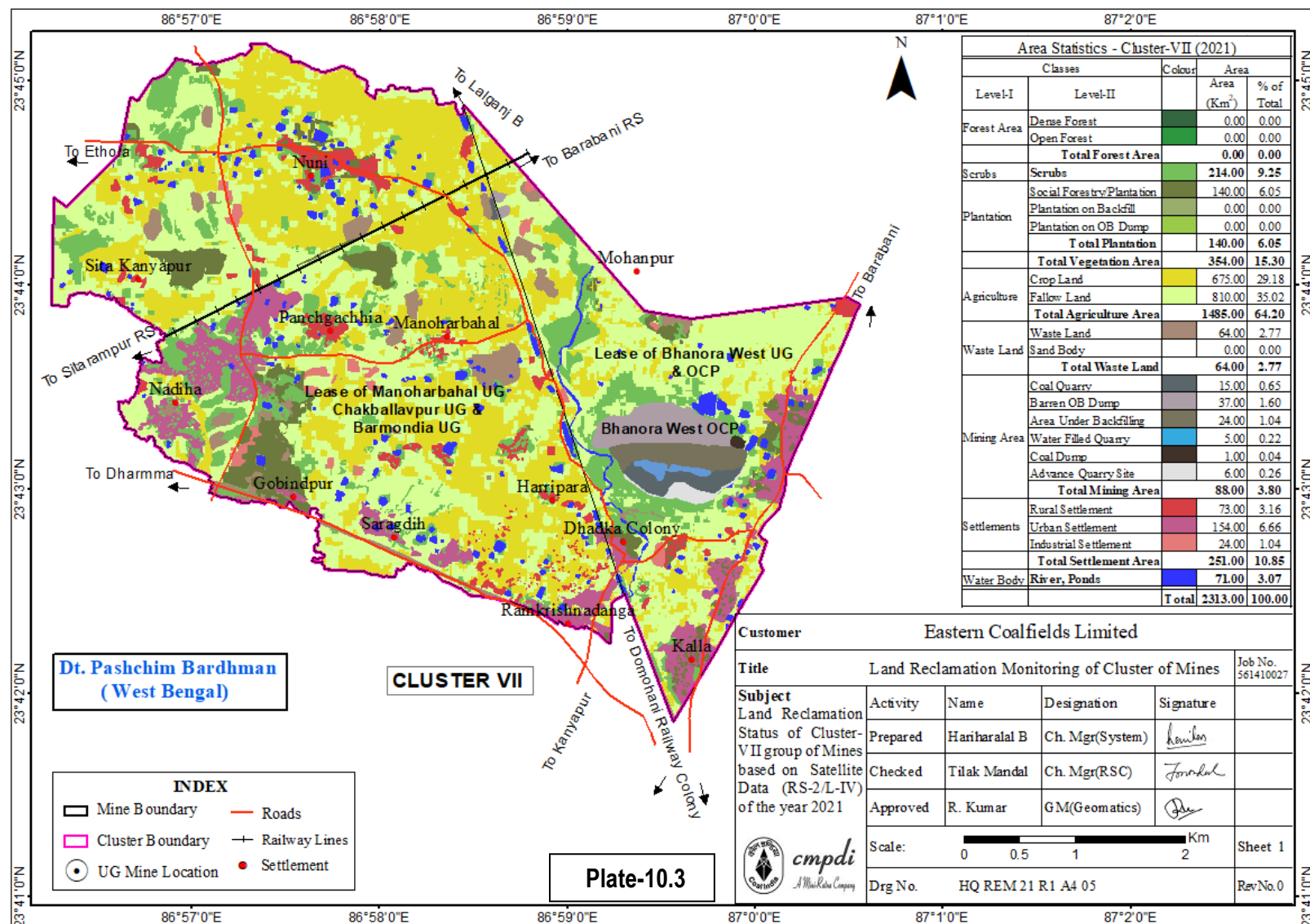
**Table: 10.2**  
**Cluster wise area statistics of Land use/Cover classes in Cluster of mines producing**  
**< 5 m.c.m of (Coal +OB) of ECL based on Satellite data of the year 2021**

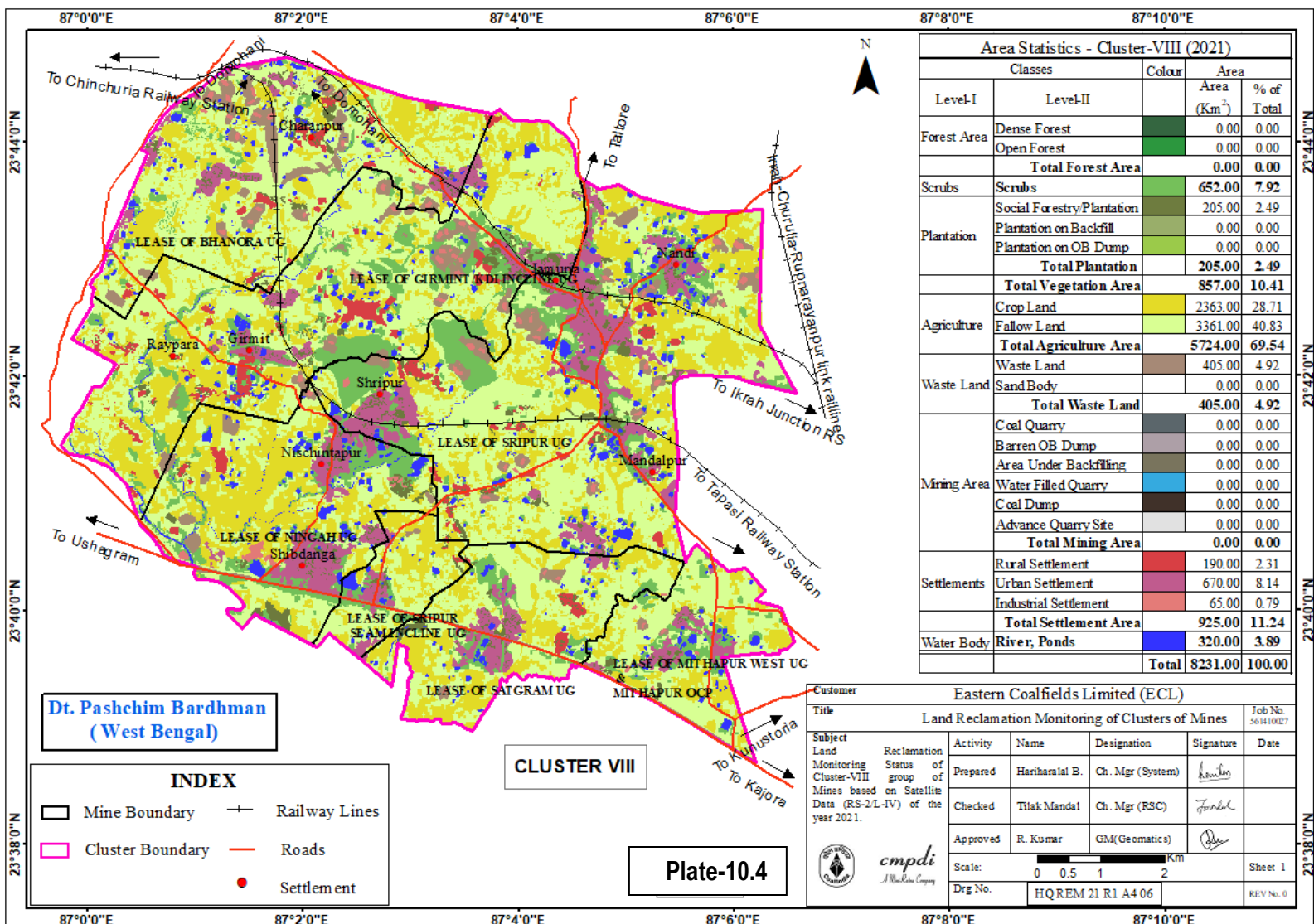
(Area in Hectare)												
			CLUSTER V		CLUSTER VI		CLUSTER VII		CLUSTER VIII		TOTAL	
FORESTS			Area	%	Area	%	Area	%	Area	%	Area	%
	Dense Forest		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Open Forest		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total Forest		0.00	0.00	0.00	0.00	0.00	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
ACTIVE MINING												
	Coal Dump		0.00	0.00	0.00	0.00	1.00	0.04	0.00	0.00	1.00	0.01
	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
RECLAMATION												
	Barren OB Dump		0.00	0.00	2.00	0.04	37.00	1.60	0.00	0.00	39.00	0.21
	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
WATERBODIES												
	Total Wasteland		75.00	2.53	141.00	2.95	64.00	2.77	405.00	4.89	685.00	3.74
	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











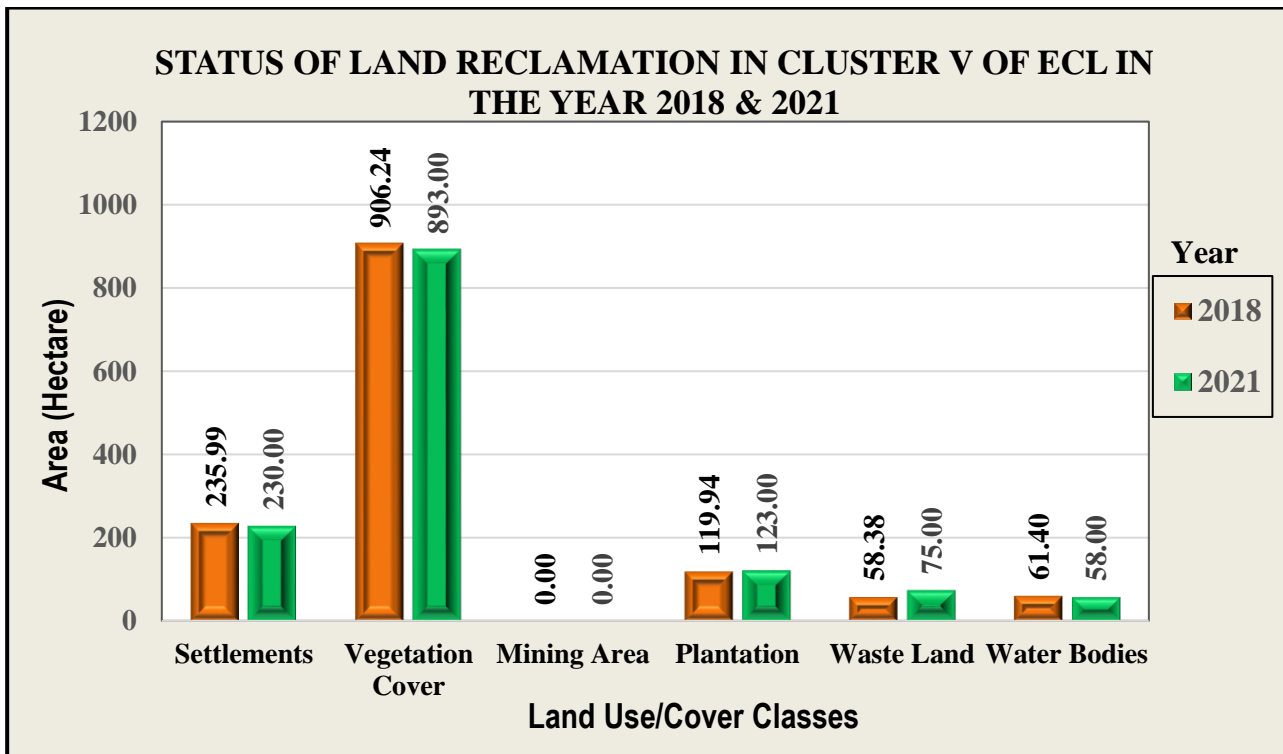


Figure-10.2

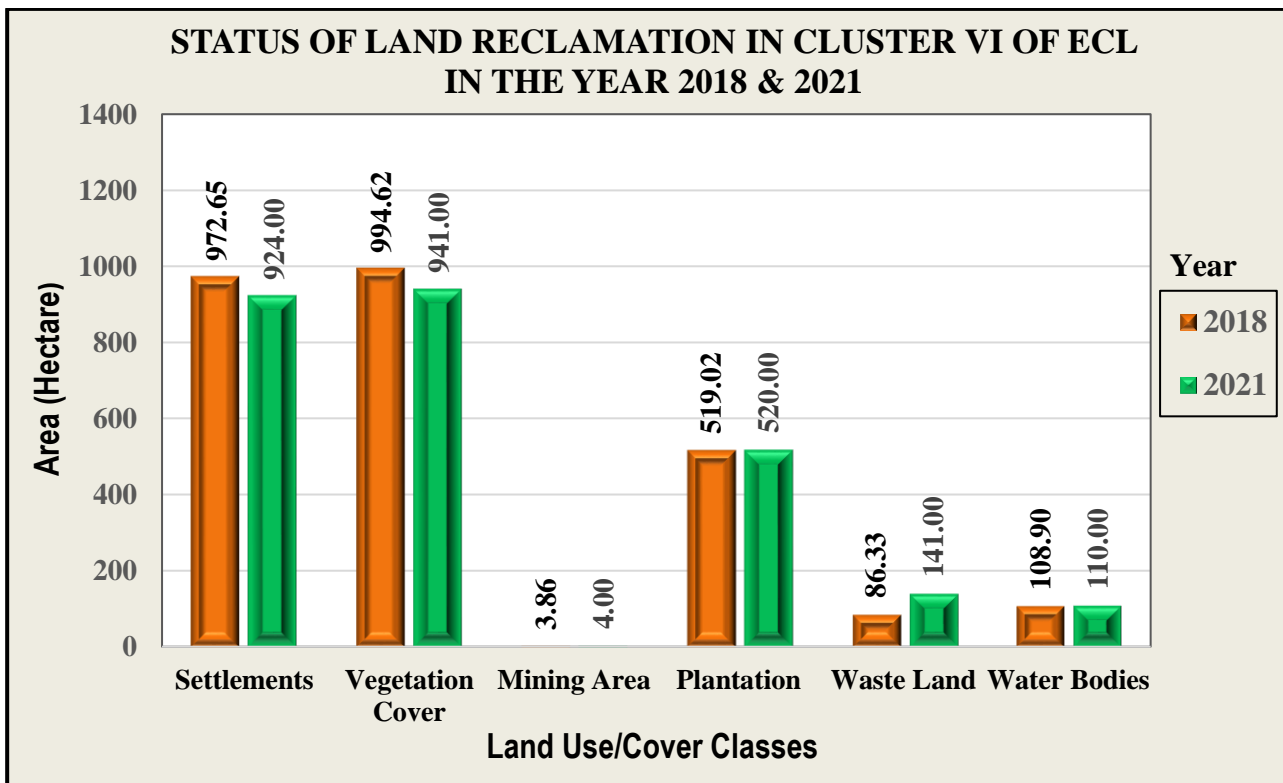


Figure-10.3



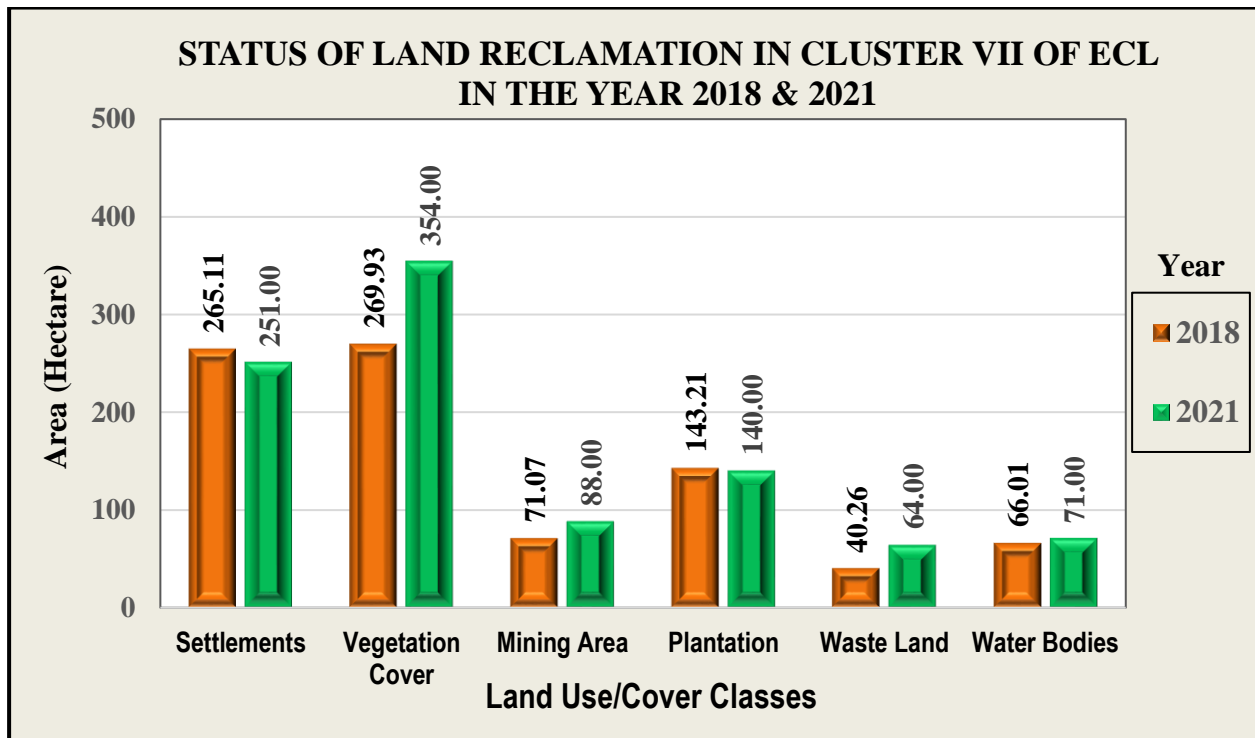


Figure-10.4

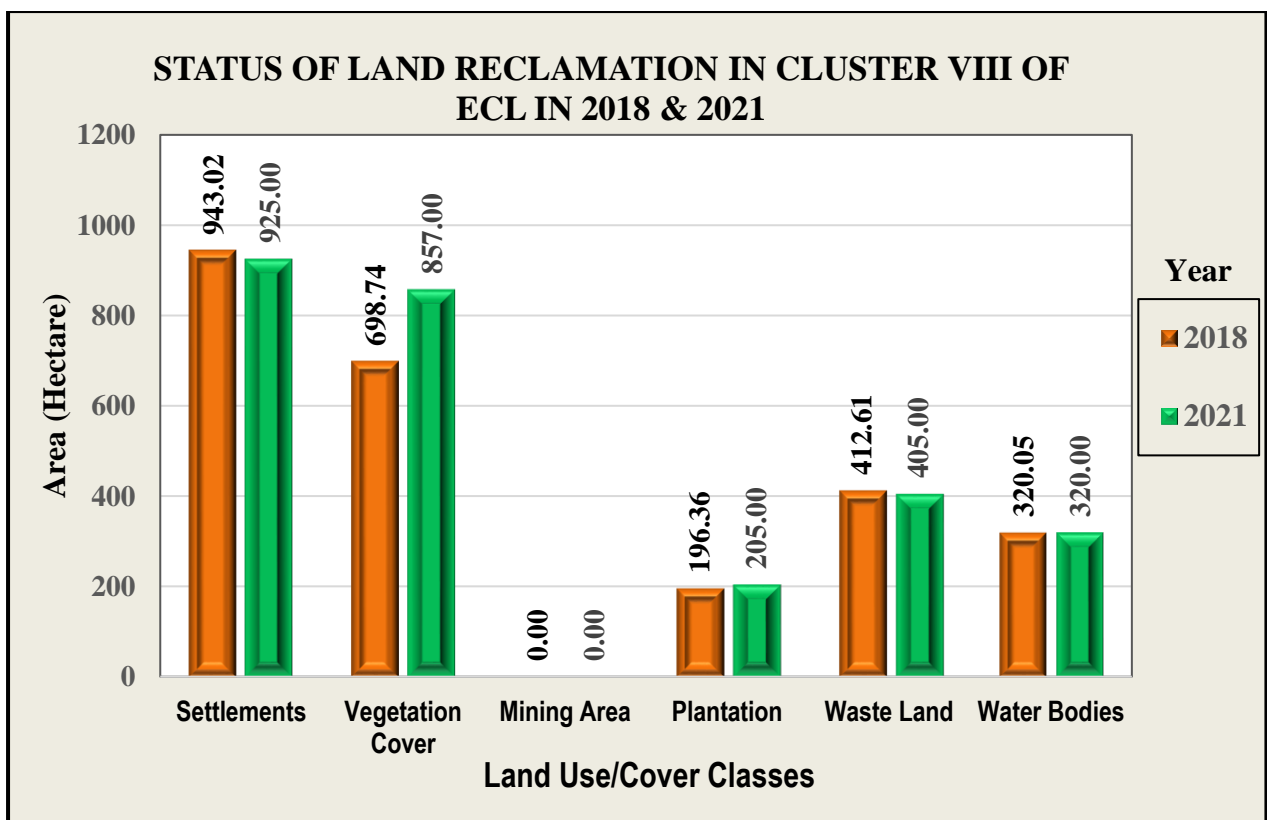


Figure-10.5



**Photo -10.1: Plantation done in Dubeswari UG, Sodepur Area, Cluster V**



**Photo -10.2: Orchid Plantation done in Aldi Village, Sodepur, Cluster VI**





**Photo -10.3: Eco Park developed in Sripur Area of Cluster VII**



**Photo -10.4: Avenue Plantation in Satgram Area of Cluster VIII**



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*A Mini Ratna Company*

## Central Mine Planning & Design Institute Ltd.

(A Subsidiary of Coal India Ltd.)

Gondwana Place, Kanke Road, Ranchi 834031, Jharkhand

Phone : (+91) 651 2230001, 2230002, 2230483, FAX (+91) 651 2231447, 2231851

Website : [www.cmpdi.co.in](http://www.cmpdi.co.in), Email : [cmpdihq@cmpdi.co.in](mailto:cmpdihq@cmpdi.co.in)