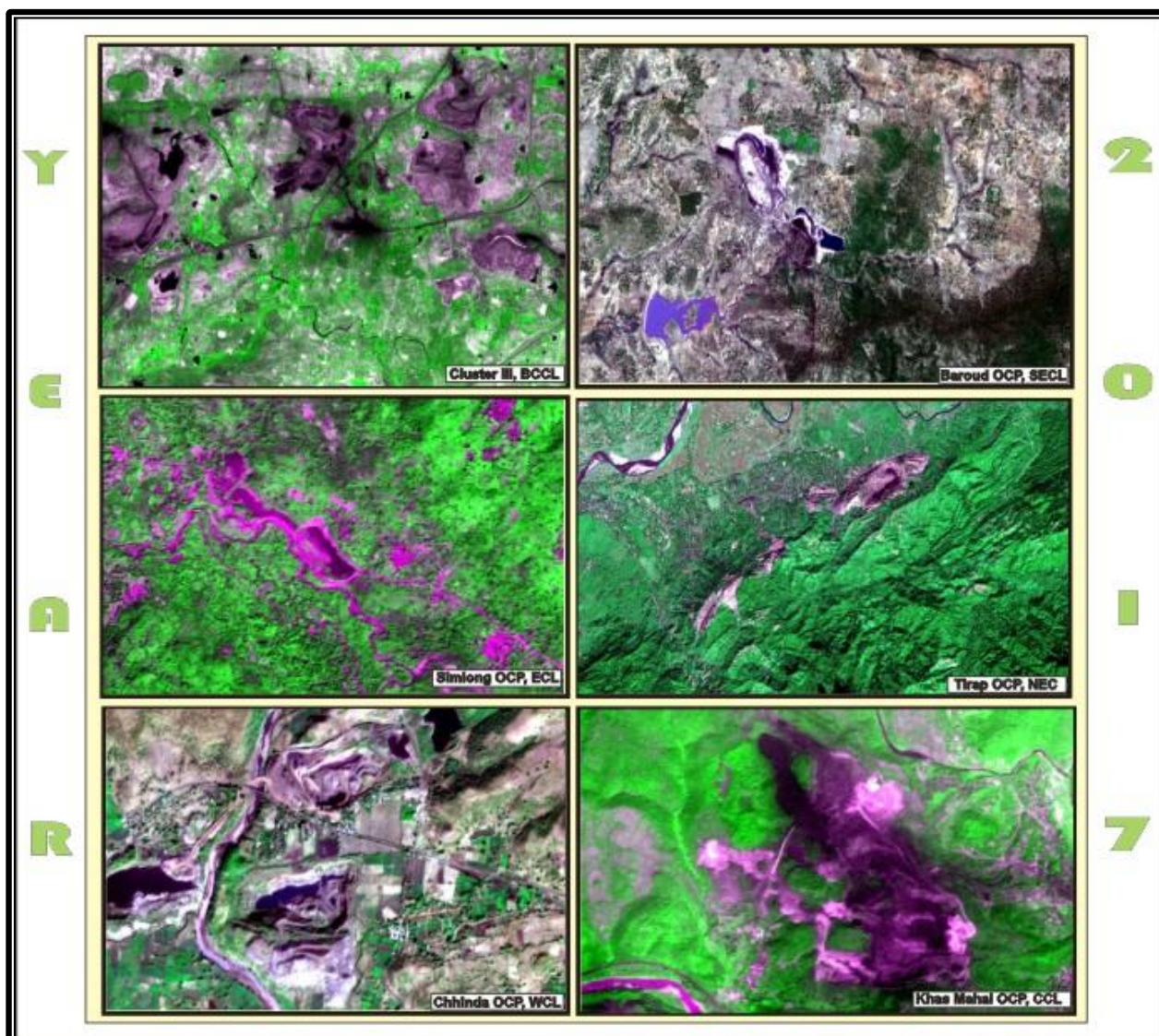


# Land Restoration / Reclamation Monitoring of 43 Opencast Coal Mines of CIL producing less than 5 mcm (Coal+OB) Based on Satellite Data for the Year 2017-18



Submitted to  
**Coal India Limited**



*cmpdi*  
A Mini-Ratna Company

**Land Restoration / Reclamation Monitoring of 43 Opencast  
Coal Mines of CIL producing less than 5 mcm (Coal+OB)  
based on Satellite Data for the Year 2017-18**

**March- 2018**



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

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## Executive Summary

- 1.0 Project** Land restoration / reclamation monitoring of 43 opencast 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, green cover, water bodies, and 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 24924.52 Hectares of the 43 OC projects producing less than 5 mcm (Coal +OB) considered for monitoring during 2017-18; total excavated area is only 4910.69 hectares out of which 486.48 hectares (9.91%) has been planted (*Biologically Reclaimed*), 1683.86 hectares area (34.29%) is been under backfilling (*Technically Reclaimed*) and 2740.35 hectares (55.80%) is under active mining. It is evident from the analysis that 2170.34 hectares (44.20%) area of the 43 OC projects taken for study for the year 2017-18 is under reclamation and balance 2740.35 hectares (55.80%) area is under active mining. Company wise details are given in Table-1 & Fig-1.
- On comparing the status of land reclamation carried out in year 2017-18 with respect to previous cycle study done for the same set of OC mines in the year 2014-15 in the CIL's subsidiary coal companies, it is evident from the analysis that area under land reclamation has increased from 1239.94 Hectares (Yr. 2014-15) to 2170.34 Hectares (Yr. 2017-18) which includes both plantation (Biological Reclamation) and areas under backfilling (Technical Reclamation). This increase of 930.40 hectares area of land reclamation in a period of three years is the result of the efforts made by CIL's subsidiary



companies towards land reclamation. Year wise comparison in land reclamation in different subsidiaries is given in Fig.2.

- It has been observed that in all subsidiaries of CIL, biological reclamation as well as areas under technical reclamation has increased in the leasehold areas except for MCL where there is decrease in area under technical reclamation as area under biologically reclamation has increased proportionately.
- Overall, the area under green cover has gone up from 1466.03 hectares in 2014-15 to 2331.95 hectares in 2017-18.
- Total area under reclamation in all subsidiaries of CIL has gone up from 1239.94 hectares (42.52%) in 2014-15 to 2170.34 hectares (44.20%) in 2017-18.
- It is important to note that a new Table format has been designed by Coal India Ltd. with new parameters for Biological & Technical Reclamation. For comparative purposes the basic dataset for the year 2014-15 has been fed into the new format so that it can be compared with the results of 2017-18 as per the new format.

Table-1

**Company wise Land Reclamation Status in OC Projects  
( Less than 5 million cu.m. Coal + OB ) based on Satellite Data of year 2017**

(Area in Hectares)

Sl. No.	Project (Nos.)	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)	
		2014	2017	2014	2017	2014	2017	2014	2017	2014	2017	2014	2017	2014	2017	2014	2017	2014	2017
1	WCL (14)	5323.57	7289.16	295.32	337.31	46.82	60.35	498.36	526.46	221.97	406.54	768.30	877.63	1110.44	1275.29	767.15	993.35	342.14	397.66
				26.59%	26.45%	4.22%	4.73%					69.19%	68.82%			14.41%	13.63%	30.81%	31.18%
2	SECL (05)	1627.00	2058.00	293.00	527.00	199.00	181.00	11.00	11.00	10.00	9.00	168.00	291.00	660.00	999.00	220.00	201.00	492.00	708.00
				44.39%	52.75%	30.15%	18.12%					25.45%	29.13%			13.52%	9.77%	74.55%	70.87%
3	CCL (13)	6376.05	6376.05	219.40	276.25	102.77	170.20	125.40	122.86	82.88	81.39	620.1	764.54	942.27	1210.99	311.05	374.45	322.17	446.45
				23.28%	22.81%	10.91%	14.05%					65.81%	63.13%			4.88%	5.87%	34.19%	36.87%
4	BCCL (04)	-	6576.22	-	457.35	-	31.6	-	108.72	-	426.64	-	506.65	-	995.60	-	566.96	-	488.95
					45.94%		3.17%						50.89%				8.62%		49.11%
5	ECL (01)	-	337.00	-	0.00	-	0.00	-	0.96	-	0.00	-	11.38	-	11.38	-	0.96	-	0.00
					0.00%		0.00%						100.00%				0.28%		0.00%
6	MCL (03)	700.22	700.22	50.10	48.62	25.13	31.18	20.10	22.22	4.09	4.09	79.51	121.74	154.74	201.54	49.32	57.49	75.23	79.80
				32.38%	24.12%	16.24%	15.47%					51.38%	60.40%			7.04%	8.21%	48.62%	39.60%
7	NEC (03)	1292.80	1587.87	0.00	37.33	8.40	12.15	52.86	77.84	57.25	47.75	40.60	167.41	49.00	216.89	118.51	137.74	8.40	49.48
				0.00%	17.21%	17.14%	5.60%					82.86%	77.19%			9.17%	8.67%	17.14%	22.81%
	TOTAL (43)	15319.64	24924.52	857.82	1683.86	382.12	486.48	707.72	870.06	376.19	975.41	1676.51	2740.35	2916.45	4910.69	1466.03	2331.95	1239.94	2170.34
				29.41%	34.29%	13.10%	9.91%					57.48%	55.80%			9.57%	9.36%	42.52%	44.20%

( % 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 barren backfilled only
3. Area under Active mining includes coal quarry site, quarry filled with water. Area of Coal Dump has been excluded from Area under Active Mining in this table.
4. Social Forestry and Plantation on external OB dump are not included in Biological Reclamation and are put under separate categories as shown in the table.
5. (%) calculated in the above table is in respect of total excavated area except for "Total area under plantation" where % is in terms of leasehold area.

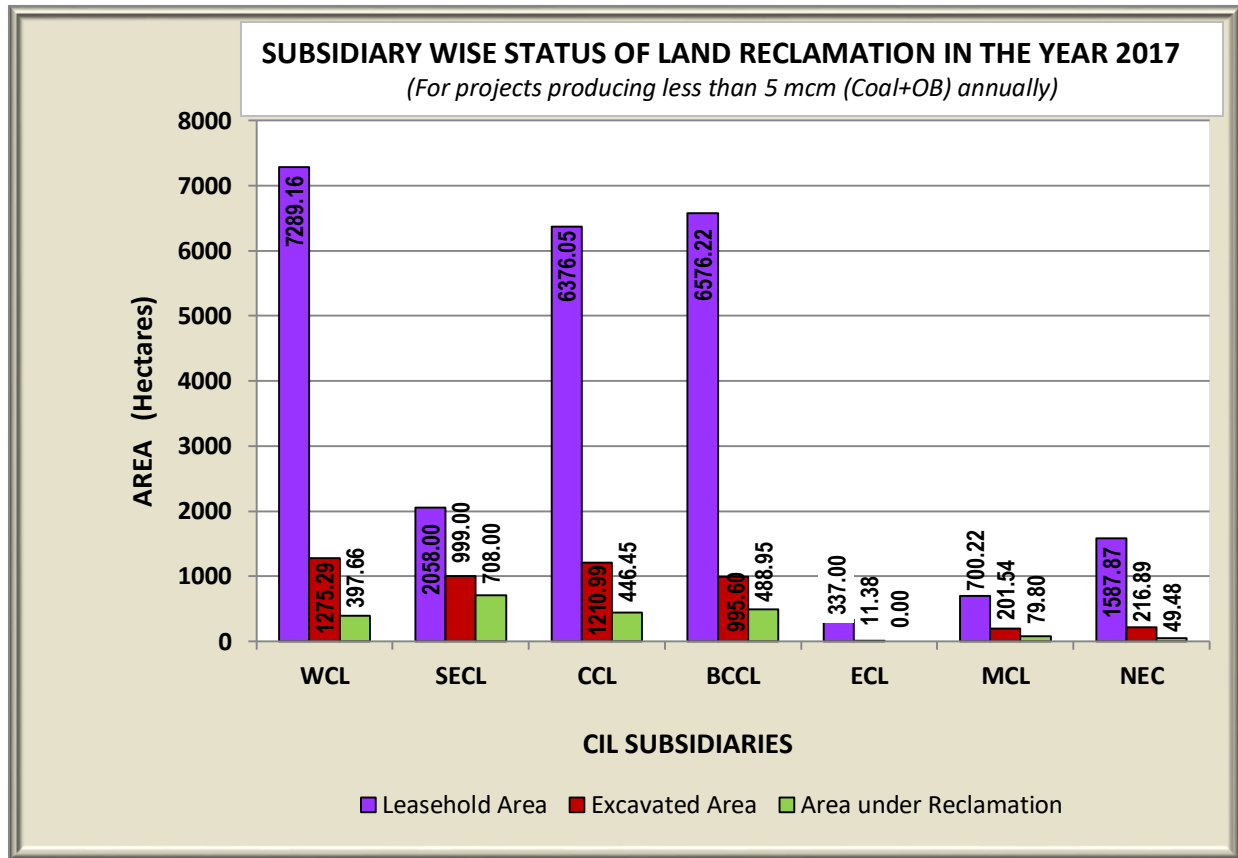


Fig. 1 : Company wise Land Reclamation Status in the Year 2017

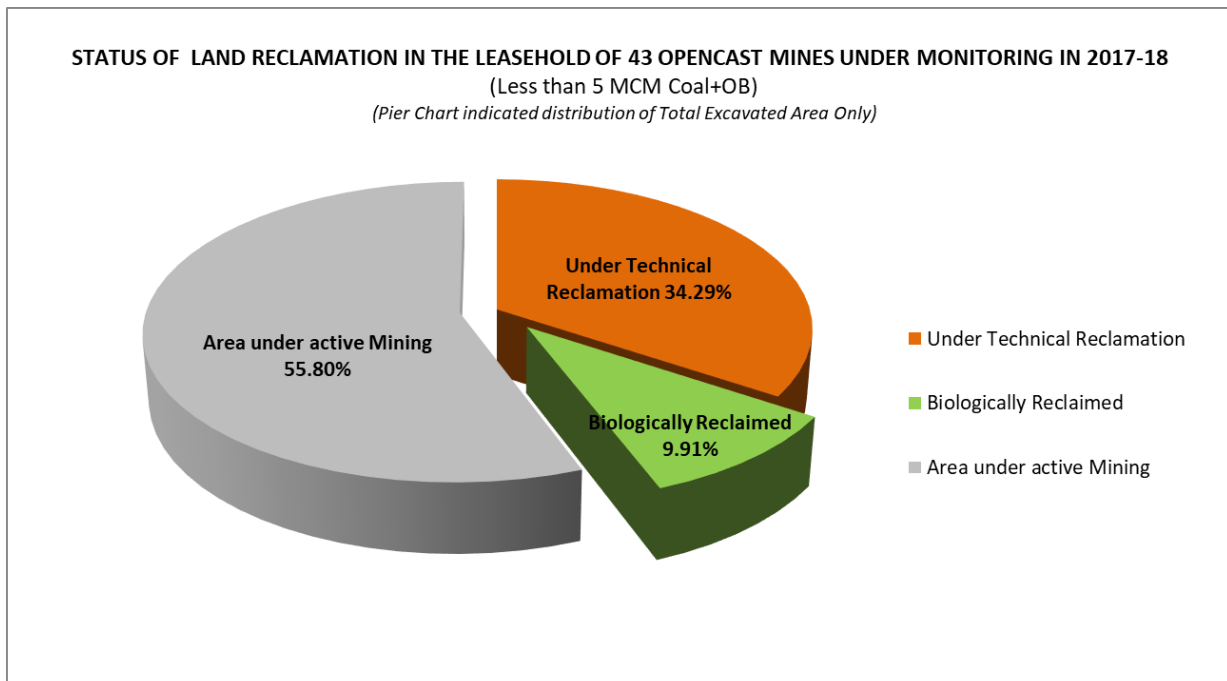


Fig. 2 : Pie Chart indicating Land Reclamation Status in 2017

## **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.

Keeping above in view, Coal India Ltd. (CIL) issued a work order vide letter no. CIL/WBP/Env/2009/2428 dated 29.12.2009 to Central Mine Planning & Design Institute (CMPDI), Ranchi, for monitoring land reclamation. status of all the opencast coal mines having production of more than 5 million m<sup>3</sup> per annum (coal + OB taken together per annum) based on remote sensing satellite data, regularly on annual basis for sustainable development of mining. 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 mines below this capacity shall be monitored at an interval of 3 years. 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. Detailed report to be submitted to Coal India and respective subsidiaries.

- 1.2** 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.
- 1.3** CMPDI undertook the above study and the present report is embodying the findings in nutshell carrying out for the 43 opencast projects of different subsidiaries producing less than 5 million cubic m. coal +OB in the year 2017-18 for baseline data generation / updation 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 3. Following steps are involved in land reclamation /restoration monitoring:

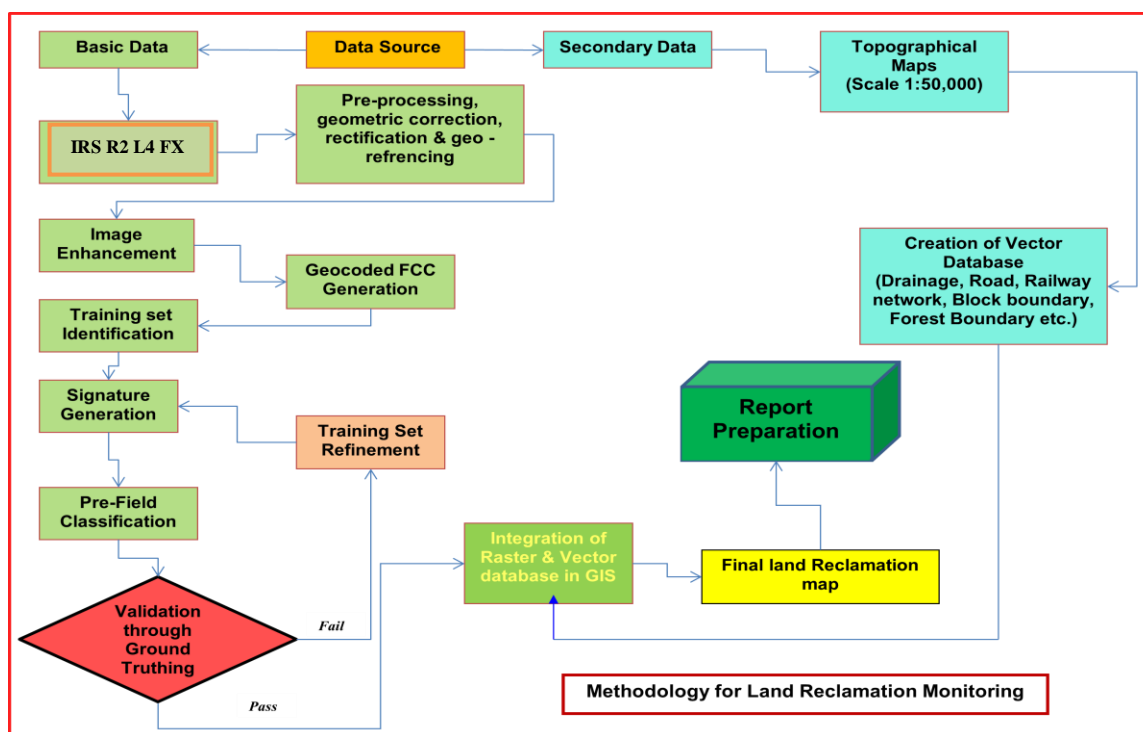


Fig.3 : Methodology for land reclamation monitoring

**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 / PCI Geomatica v10.1 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 / PCI Geomatica 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 / PCI Geomatica 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 43 opencast projects producing less than 5 million cubic m. (Coal + OB together) were taken up for the study during the year 2017-18. 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 subsidiary wise 43 opencast projects producing less than 5 mcm (coal and OB together) annually taken up based on satellite data of year 2017-18 is given in table below :

<b>Subsidiary</b> <i>(No. of Projects)</i>	<b>Opencast Projects</b> <i>( Less than 5 million Cu.m. Coal +OB per annum)</i>
<b>WCL (14)</b>	Kolegaon, Naigaon, Ghonsa, Ballarpur, Junad Extn, Urdhan, Telwasa, Gauri(I&II), Bhatadi Gondagaon, Kolarpimpri, Chhinda, Gauri Deep, Juna-Kunada
<b>SECL (05)</b>	Baroud, Chhal, Kanchan, Sharda, Mahan-II
<b>CCL (13)</b>	Rohini ,Purnadih, Tapin, Topa, Urimari, North Urimari, New Giddi "C", Govindpur, Khasmahal, Amlo, Selected Dhor, Tarmi
<b>BCCL (04)</b>	Cluster III ,Cluster V ,Cluster VIII, Cluster IX
<b>ECL (01)</b>	Simlong
<b>MCL (03)</b>	Chhendipada, Lilari, Kulda
<b>NEC (03)</b>	Ledo, Tikak, Tirap
<b>TOTAL (43)</b>	

Subsidiary wise land reclamation status of the above mentioned 43 OC projects derived from satellite data for the year 2017-18 are given in the following pages:

**WESTERN COALFIELDS LIMITED**

## 5.0 Land Reclamation Status in Western Coalfields Ltd.

5.1 Following 14 opencast projects of WCL producing less than 5 million cubic m. (Coal+OB) annually were taken up for land reclamation monitoring during the year 2017-18:

- Kolegaon
- Naigaon
- Ghonsa
- Ballarpur
- Junad Extension
- Urdhan
- Telwasa
- Gauri I&II (Amalgamated)
- Bhatadi
- Gondegaon
- Kolarpimpri
- Chhinda
- Gauri Deep
- Juna-Kunada

5.2 Area Statistics of different land use classes present in mine leasehold of the above projects for the year 2017 are shown in Table-2 .Land use maps derived from satellite data are shown in plate 1-14 and different land use classes based on satellite data are depicted in Bar chart in fig 5.2 to 5.15.

5.3 Study reveals that out of the total mine leasehold area of 7289.16 Hectare of the 14 projects Viz. Kolegaon, Naigaon, Ghonsa, Ballarpur, Junad Extn, Urdhan, Telwasa, Gauri I &II , Bhatadi , Gondegaon, Kolarpimpri, Chhinda ,Gauri deep and Juna kunada considered for monitoring during year-2017-18; total excavated area is 1275.29 Ha (17.50%), out of which 60.35 Ha (4.73%) area has been planted on backfill (*Biologically Reclaimed*) and 337.31 Ha (26.45%) area is under Backfilling (*Technically Reclaimed*).

and balance 877.63 Ha (68.82%) is under active mining It is evident from the analysis that 31.18% area of the above OC projects is under reclamation (biologically and technically). Project wise details are given in Table-5.1 & Fig-5.1

- 5.4** On comparing the status of land reclamation for the year 2017 with respect to the year 2014 in different projects taken for reclamation in the year 2017-18, it is evident from the analysis that area under land reclamation has increased from 342.14 Ha. (Yr. 2014) to 397.66 Ha (Yr. 2017). Overall percentage increase is 0.37%.
- 5.5** Out of 14 projects of WCL, maximum land reclamation has been carried out in Ballarpur OCP (72.86%) followed by Gauri I & II (Amalgamated) OCP (60.94%) Telwasa (41.44%), Junad Extn (39.53%) and Bhatadi Opencast Project (27.34%).
- 5.6** From analysis it is revealed that Area under biological reclamation (plantation on Backfill) has increased to 60.35 Ha (4.73%) in the year 2017 as compared to 46.82 Ha (4.22%) in the Year 2014 and area under technical reclamation ( backfilling) has also increased from 295.32 Ha (Yr 2014) to 337.31 Ha (Yr 2017). The increase of 13.53 Ha with respect to area of plantation on backfill (Biological Reclamation) is the result of sincere effort taken by Western coalfield Limited towards environmental protection. Project wise details are given in Table - 5.1 & Fig - 5.1.
- 5.7** Total leasehold area of 14 project has increased from 5323.57 Ha (Yr 2014) to 7289.16 Ha (Yr 2017) due to major change in leasehold area of Bhatadi, Kolarpimpri and Ballarpur OCPs. Calculation for Percentage of total area under plantation has been carried out with respect to total leasehold area hence minor decrease in percentage in green cover generated in the leasehold area i.e a decrease of 0.78% in the year 2017 is observed. However, cumulative excavated area for all OCPs selected for monitoring in year 2017 has increased from 1110.44 Ha (Yr 2014) to 1275.29 Ha (Yr 2017).



- 5.8 Ghonsa OCP and Kolegaon OCP is not in operation hence minor change in the active mining area as shown in Table-1.
- 5.9 This study will again be carried out at an interval of three year to assess the land reclamation status in the above projects.

**Table-5.1**  
**Projectwise Land Reclamation Status in opencast Projects of WCL**  
**(Less than 5 million Cu.M.of coal +OB) based on Satellite data of the year 2017**

(Area in Hectare.)

Sl. No.	Project	Total Leasehold Area(Hectare)		Technical Reclamation		Plantation						Area under Active Mining		Total Excavated/ Mined out 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)	
		2014	2017	2014	2017	2014	2017	2014	2017	2014	2017	2014	2017	2014	2017	2014	2017	2014	2017
1	Kolegaon	349.00	349.00	0.00	0.00	0.00	0.00	36.37	37.41	10.82	22.23	43.30	39.26	43.30	39.26	47.19	59.64	0.00	0.00
				0.00%	0.00%	0.00%	0.00%					100.00%	100.00%			13.52%	17.09%	0.00%	0.00%
2	Naigaon	398.66	398.66	43.83	8.81	6.01	9.81	21.76	21.87	0.49	28.94	66.66	122.24	116.50	140.86	28.26	60.62	49.84	18.62
				37.62%	6.25%	5.16%	6.96%					57.22%	86.78%			7.09%	15.21%	42.78%	13.22%
3	Ghonsa	293.64	278.68	16.11	0.00	0.00	0.00	2.47	2.10	0.54	4.65	48.42	46.87	64.53	46.87	3.01	6.75	16.11	0.00
				24.97%	0.00%	0.00%	0.00%					75.03%	100.00%			1.03%	2.42%	24.97%	0.00%
4	Ballarpur	242.64	549.64	41.90	67.87	11.21	12.99	46.17	67.73	6.53	14.03	28.12	30.12	81.23	110.98	63.91	94.75	53.11	80.86
				51.58%	61.16%	17.54%	13.71%					34.62%	27.14%			26.34%	17.24%	65.38%	72.86%
5	Junad Extn	163.64	420.97	3.50	34.51	0.35	2.45	18.41	36.14	5.20	26.86	30.71	56.54	34.56	93.50	23.96	65.45	3.85	36.96
				10.13%	36.91%	1.01%	2.62%					88.86%	60.47%			14.64%	15.55%	11.14%	39.53%
6	Urdhan	315.00	315.00	0.00	0.00	0.00	0.00	3.50	3.34	0.40	0.00	16.21	21.46	16.21	21.46	3.90	3.34	0.00	0.00
				0.00%	0.00%	0.00%	0.00%					100.00%	100.00%			1.24%	1.06%	0.00%	0.00%
7	Telwasa	271.91	271.91	45.58	44.61	2.84	4.68	30.73	34.20	5.12	23.62	73.93	69.64	122.35	118.93	38.69	62.50	48.42	49.29
				37.25%	37.51%	2.32%	3.94%					60.43%	58.56%			14.23%	22.99%	39.57%	41.44%
8	Gauril&I (Amalgamated)	676.53	676.53	78.90	106.57	26.41	28.56	148.43	118.61	62.07	96.11	85.80	86.60	191.11	221.73	236.91	243.28	105.31	135.13
				41.29%	48.06%	13.82%	12.88%					44.90%	39.06%			35.02%	35.96%	55.10%	60.94%
9	Bhatadi	398.66	838.14	16.27	21.27	0.00	0.00	11.86	13.28	38.78	45.63	57.04	56.52	73.31	77.79	50.64	58.91	16.27	21.27
				22.19%	27.34%	0.00%	0.00%					77.81%	72.66%			12.70%	7.03%	22.19%	27.34%
10	Gondegaon	917.00	917.00	27.46	32.88	0.00	0.00	40.46	52.00	82.01	84.03	104.84	101.71	132.30	134.59	122.47	136.03	27.46	32.88
				20.76%	24.43%	0.00%	0.00%					79.24%	75.57%			13.36%	14.83%	20.76%	24.43%
11	Kolarpimpri	508.23	1484.97	15.36	7.54	0.00	1.86	82.89	83.36	6.31	7.74	122.10	137.70	137.46	147.10	89.20	92.96	15.36	9.40
				11.17%	5.13%	0.00%	1.26%					88.83%	93.61%			17.55%	6.26%	11.17%	6.39%
12	Chhinda	106.68	106.68	0.00	0.00	0.00	0.00	20.01	20.44	2.80	2.80	20.07	22.78	20.07	22.78	22.81	23.24	0.00	0.00
				0.00%	0.00%	0.00%	0.00%					100.00%	100.00%			21.38%	21.78%	0.00%	0.00%
13	Gauri Deep	356.11	356.11	0.00	0.00	0.00	0.00	4.32	0.00	0.90	6.19	24.97	44.29	24.97	44.29	5.22	6.19	0.00	0.00
				0.00%	0.00%	0.00%	0.00%					100.00%	100.00%			1.47%	1.74%	0.00%	0.00%
14	Juna Kunada	325.87	325.87	6.41	13.25	0.00	0.00	30.98	35.98	0.00	43.71	46.13	41.90	52.54	55.15	30.98	79.69	6.41	13.25
				12.20%	24.03%	0.00%	0.00%					87.80%	75.97%			9.51%	24.45%	12.20%	24.03%
	TOTAL	5323.57	7289.16	295.32	337.31	46.82	60.35	498.36	526.46	221.97	406.54	768.30	877.63	1110.44	1275.29	767.15	993.35	342.14	397.66
				26.59%	26.45%	4.22%	4.73%					69.19%	68.82%	20.86%	17.50%	14.41%	13.63%	30.81%	31.18%

( % 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 barren backfilled only
3. Area under Active mining includes coal quarry site, quarry filled with water. Area of Coal Dump has been excluded from Area under Active Mining in this table.
4. Social Forestry and Plantation on external OB dump are not included in Biological Reclamation and are put under separate categories as shown in the table.
5. (%) calculated in the above table is in respect of total excavated area except for "Total area under plantation" where % is in terms of leasehold area.

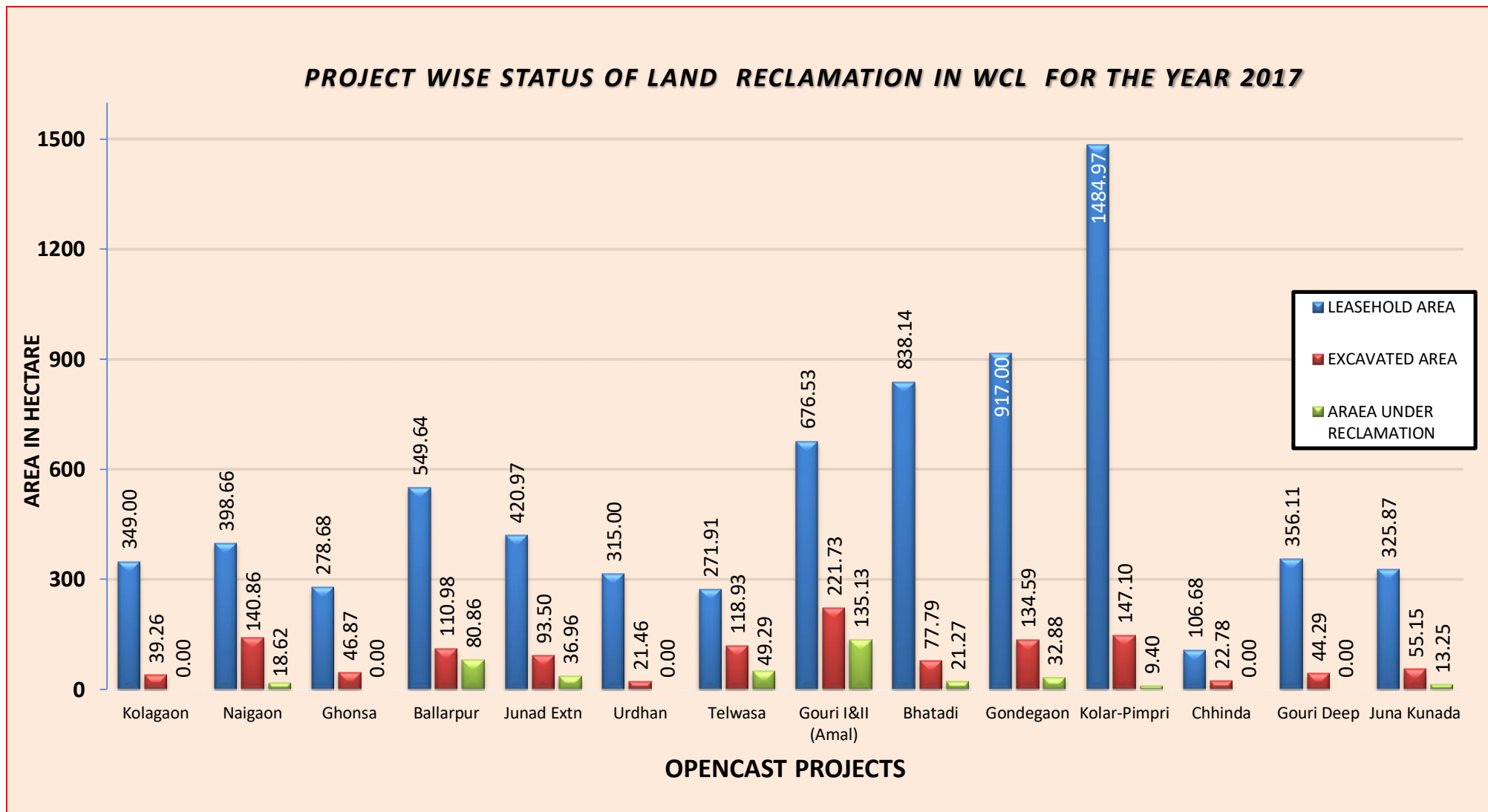




















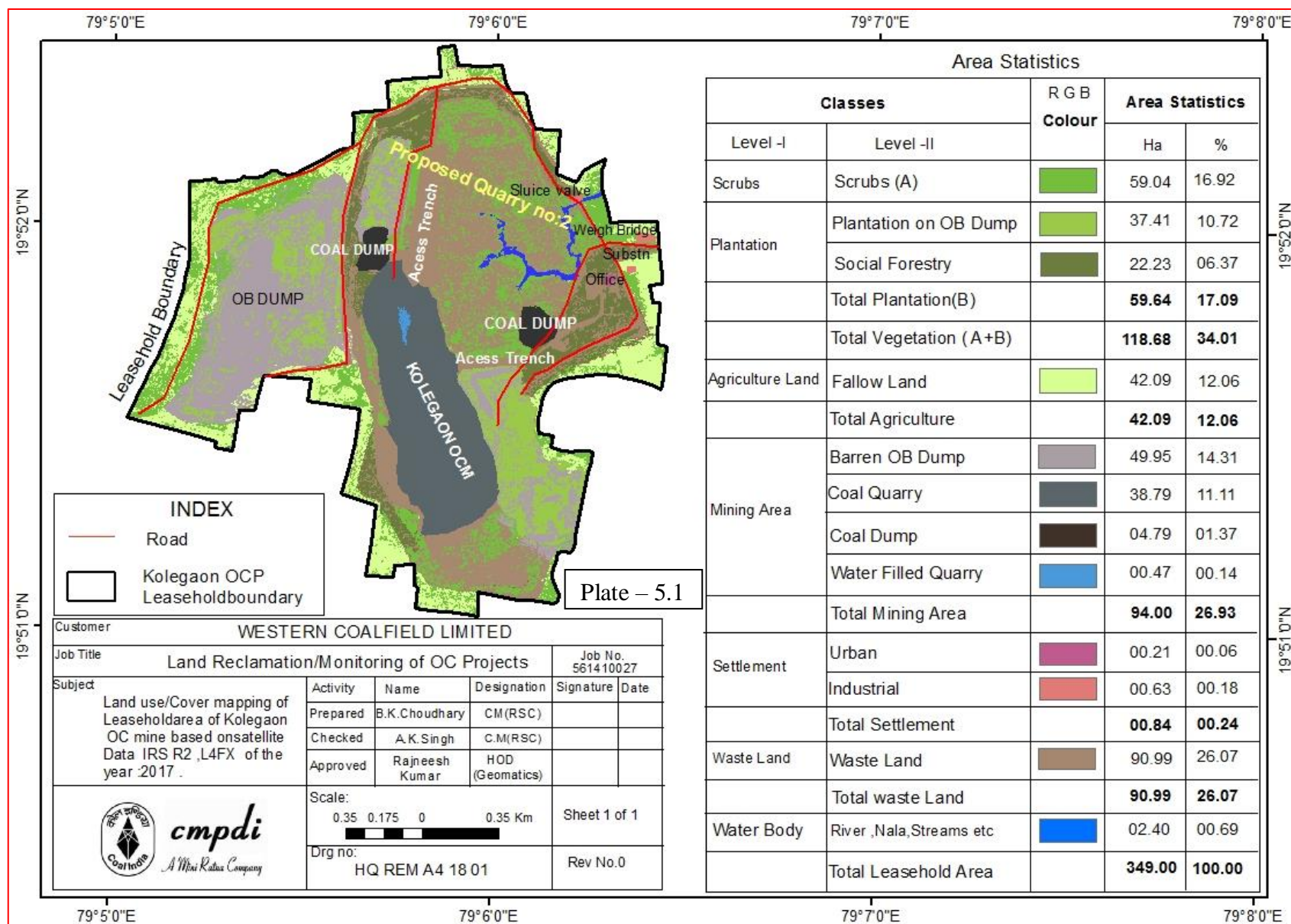


Fig 5.1: Land Reclamation Status in OC projects producing less than 5mcm (Coal + OB) of WCL in the Year 2017

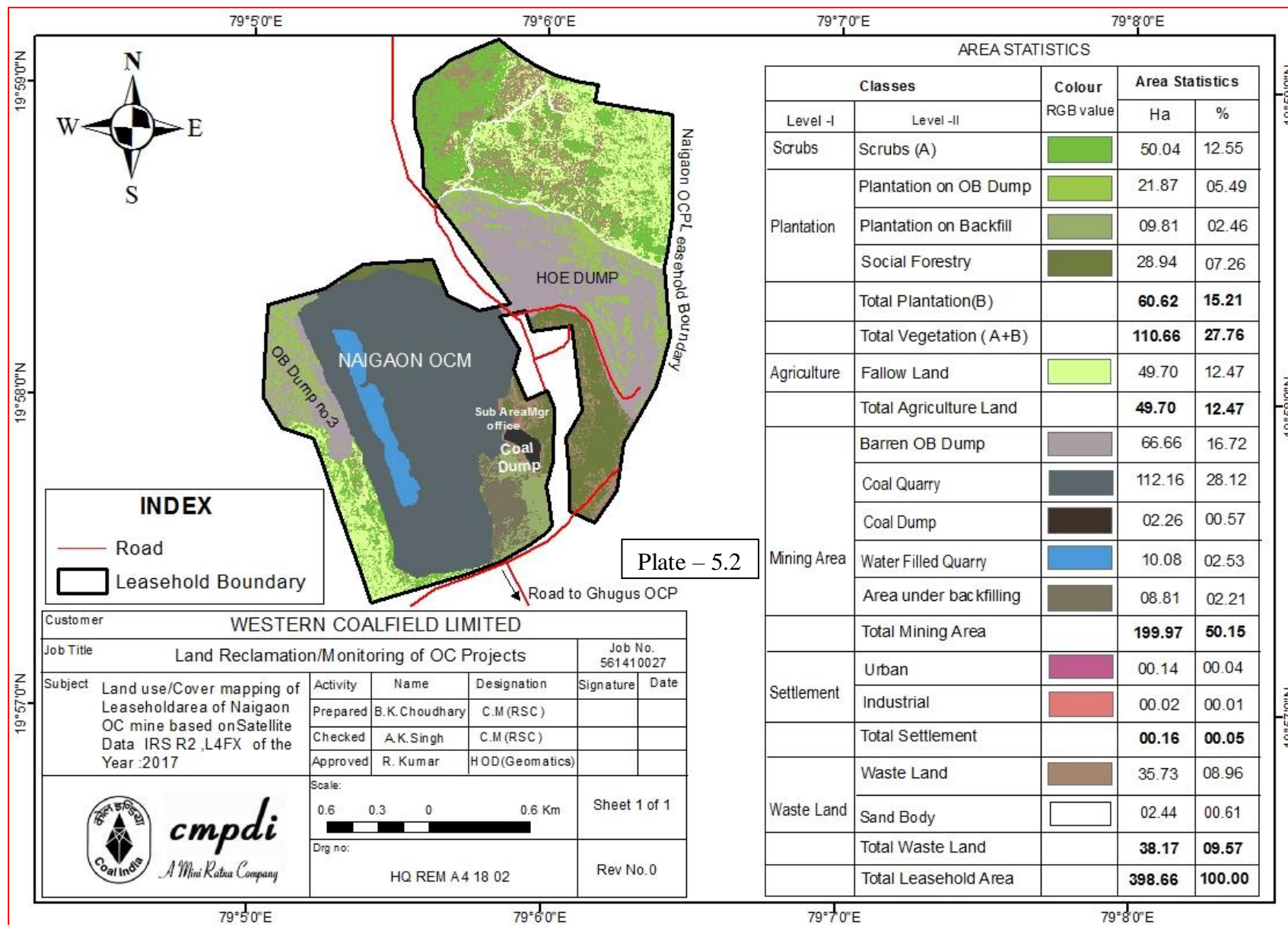
**Table 5.2**  
**STATUS OF LAND USE / RECLAMATION IN OC MINES (<5 MCU.M) OF WCL BASED ON SATELLITE DATA OF THE YEAR 2017**

Area in Hectare

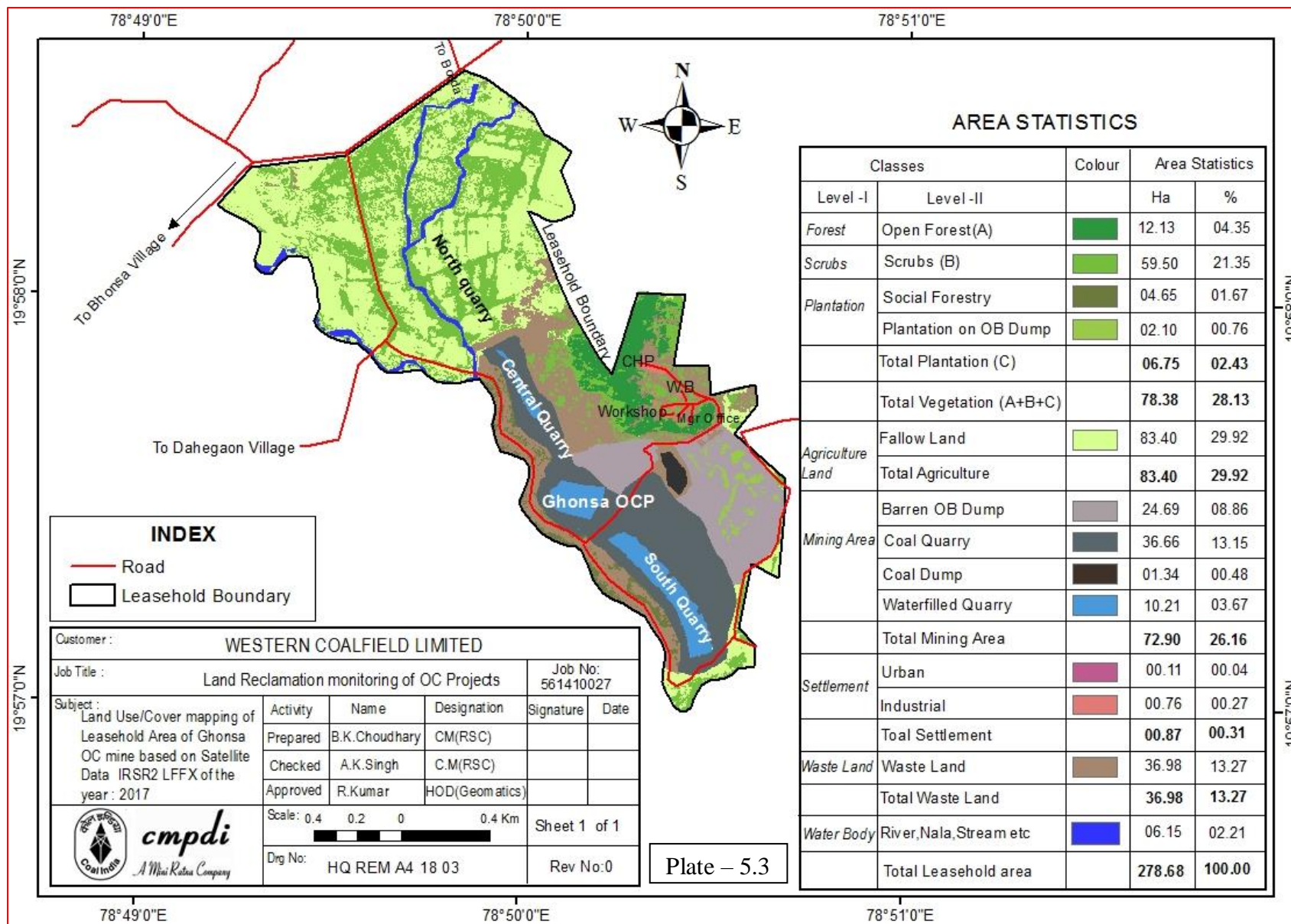
		Kolagaon		Naigaon		Ghonsa		Ballarpur		Junad Extn		Urdhan		Telwasa		Gouri -I&II		Bhatadi		Gondegaon		Kolar-Pimpri		Chhinda		Gouri Deep		Juna Kunada		Total			
FORESTS	Dense Forest		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
	Open Forest		0.00	0.00	0.00	0.00	12.13	4.35	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	12.13	0.17		
	Total Forest		0.00	0.00	0.00	0.00	12.13	4.35	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	12.13	0.17		
SCRUBS	Scrubs		59.04	16.92	50.04	12.55	59.50	21.35	47.42	8.63	36.94	8.77	21.51	6.83	6.95	2.55	23.04	3.41	97.09	11.58	79.29	8.65	186.63	12.57	2.88	2.70	38.84	10.91	29.64	9.10	738.81	10.14	
	Total Scrubs		59.04	16.92	50.04	12.55	59.50	21.35	47.42	8.63	36.94	8.77	21.51	6.83	6.95	2.55	23.04	3.41	97.09	11.58	79.29	8.65	186.63	12.57	2.88	2.70	38.84	10.91	29.64	9.10	738.81	10.14	
PLANTATION	Social Forestry		22.23	6.37	28.94	7.26	4.65	1.67	14.03	2.55	26.86	6.38	0.00	0.00	23.62	8.69	96.11	14.21	45.63	5.44	84.03	9.16	7.74	0.52	2.80	2.62	6.19	1.74	43.71	13.41	406.54	5.58	
	Total Social Forest		22.23	6.37	28.94	7.26	4.65	1.67	14.03	2.55	26.86	6.38	0.00	0.00	23.62	8.69	96.11	14.21	45.63	5.44	84.03	9.16	7.74	0.52	2.80	2.62	6.19	1.74	43.71	13.41	406.54	5.58	
	Plantation on OB Dump		37.41	10.72	21.87	5.49	2.10	0.76	67.73	12.32	36.14	8.58	3.34	1.06	34.20	12.58	118.61	17.53	13.28	1.58	52.00	5.67	83.36	5.61	20.44	19.16	0.00	0.00	35.98	11.04	526.46	7.22	
	Total Plantation on OB Dump		37.41	10.72	21.87	5.49	2.10	0.76	67.73	12.32	36.14	8.58	3.34	1.06	34.20	12.58	118.61	17.53	13.28	1.58	52.00	5.67	83.36	5.61	20.44	19.16	0.00	0.00	35.98	11.04	526.46	7.22	
	Plantation on Backfill		0.00	0.00	9.81	2.46	0.00	0.00	12.99	2.36	2.45	0.58	0.00	0.00	4.68	1.72	28.56	4.22	0.00	0.00	0.00	0.00	1.86	0.13	0.00	0.00	0.00	0.00	0.00	0.00	60.35	0.83	
	Total Plantation on backfill (Biological Reclamation)		0.00	0.00	9.81	2.46	0.00	0.00	12.99	2.36	2.45	0.58	0.00	0.00	4.68	1.72	28.56	4.22	0.00	0.00	0.00	0.00	1.86	0.13	0.00	0.00	0.00	0.00	0.00	0.00	60.35	0.83	
	Total Green Cover generated		59.64	17.09	60.62	15.21	6.75	2.43	94.75	17.23	65.45	15.55	3.34	1.06	62.50	22.99	243.28	35.96	58.91	7.02	136.03	14.83	92.96	6.26	23.24	21.78	6.19	1.74	79.69	24.45	993.35	12.80	
Total Vegetation		118.68	34.01	110.66	27.76	78.38	28.13	142.17	25.86	102.39	24.31	24.85	7.89	69.45	25.54	266.32	39.37	156.00	18.60	215.32	23.48	279.59	18.83	26.12	24.48	45.03	12.65	109.33	33.55	1744.29	23.94		
ACTIVE MINING	Coal Quarry		38.79	11.11	112.16	28.12	36.66	13.15	27.06	4.92	38.90	9.24	21.46	6.81	69.64	25.61	61.80	9.13	53.09	6.33	99.25	10.82	84.80	5.71	18.90	17.72	43.82	12.31	41.90	12.86	748.23	10.26	
	Advance Quarry Site		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.05	3.34	0.00	0.00	0.00	0.00	5.81	0.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.86	0.27	
	Quarry Filled With Water		0.47	0.14	10.08	2.53	10.21	3.67	3.06	0.56	3.59	0.85	0.00	0.00	0.00	0.00	18.99	2.81	3.43	0.41	2.46	0.27	52.90	3.56	3.88	3.64	0.47	0.13	0.00	0.00	109.54	1.50	
	Coal Dump		4.79	1.37	2.26	0.57	1.34	0.48	3.65	0.66	2.25	0.53	6.17	1.96	2.52	0.93	2.07	0.31	9.20	1.10	6.13	0.67	1.02	0.07	0.30	0.28	6.99	1.96	2.61	0.80	51.30	0.70	
	Total Area under Active Mining		44.05	12.62	124.50	31.22	48.21	17.30	33.77	6.14	58.79	13.96	27.63	8.77	72.16	26.54	88.67	13.11	65.72	7.84	107.84	11.76	138.72	9.34	23.08	21.64	51.28	14.40	44.51	13.66	928.93	12.73	
RECLAIMED	Barren OB Dump		49.95	14.31	66.66	16.72	24.69	8.86	32.68	5.94	87.58	20.80	77.45	24.59	41.55	15.28	131.38	19.42	107.26	12.80	120.23	13.11	288.70	19.44	22.84	21.40	81.07	22.77	57.62	17.68	1189.66	16.32	
	Barren Backfilled Area		0.00	0.00	8.81	2.21	0.00	0.00	67.87	12.35	34.51	8.20	0.00	0.00	44.61	16.41	106.57	15.75	21.27	2.54	32.88	3.59	7.54	0.50	0.00	0.00	0.00	0.00	0.00	13.25	4.07	337.31	4.63
	Total Area under backfill(Technical Reclamation)		0.00	0.00	8.81	2.21	0.00	0.00	67.87	12.35	34.51	8.20	0.00	0.00	44.61	16.41	106.57	15.75	21.27	2.54	32.88	3.59	7.54	0.50	0.00	0.00	0.00	0.00	0.00	13.25	4.07	337.31	4.63
	Total Area Under Mine Operation		94.00	26.93	199.97	50.15	72.90	26.16	134.32	24.43	180.88	42.96	105.08	33.36	158.32	58.23	326.62	48.28	194.25	23.18	260.95	28.46	434.96	29.28	45.92	43.04	132.35	37.17	115.38	35.41	2455.90	33.69	
WASTELANDS	Waste Lands		90.99	26.07	35.73	8.96	36.98	13.27	22.71	4.13	24.50	5.82	46.71	14.83	24.80	9.12	34.69	5.13	53.31	6.36	77.14	8.41	37.85	2.55	2.25	2.11	15.39	4.32	82.71	25.38	585.76	8.04	
	Fly Ash Pond / Sand Body		0.00	0.00	2.44	0.61	0.00	0.00	41.39	7.53	0.00	0.00	1.03	0.33	1.53	0.57	17.10	2.53	8.43	1.01	7.02	0.77	0.00	0.00	0.51	0.48	0.00	0.00	0.89	0.27	80.34	1.10	
	Total Wasteland		90.99	26.07	38.17	9.57	36.98	13.27	64.10	11.66	24.50	5.82	47.74	15.16	26.33	9.69	51.79	7.66	61.74	7.37	84.16	9.18	37.85	2.55	2.76	2.59	15.39	4.32	83.60	25.65	666.1	9.14	
WATERBODIES	Reservoir, nallah, ponds		2.40	0.69	0.00	0.00	6.15	2.21	88.11	16.04	0.00	0.00	0.59	0.18	10.91	4.01	5.41	0.80	10.66	1.27	0.00	0.00	11.88	0.81	1.37	1.28	1.91	0.54	14.63	4.49	154.02	2.11	
	Total Waterbodies		2.40	0.69	0.00	0.00	6.15	2.21	88.11	16.04	0.00	0.00	0.59	0.18	10.91	4.01	5.41	0.80	10.66	1.27	0.00	0.00	11.88	0.81	1.37	1.28	1.91	0.54	14.63	4.49	154.02	2.11	
AGRICULTURE	Crop Lands		0.00	0.00	0.00	0.00	0.00	0.00	8.88	1.62	15.25	3.62	24.86	7.89	0.00	0.00	0.33	0.05	9.38	1.12	126.54	13.80	151.50	10.20	3.92	3.67	154.60	43.41	0.00	0.00	495.26	6.79	
	Fallow Lands		42.09	12.06	49.70	12.47	83.40	29.92	110.20	20.05	96.04	22.81	109.93	34.90	5.25	1.93	23.12	3.41	399.52	47.67	222.94	24.31	554.31	37.33	25.41	23.82	6.27	1.76	0.00	0.00	1728.18	23.71	
	Total Agriculture		42.09	12.06	49.70	12.47	83.40	29.92	119.08	21.67	111.29	26.43	134.79	42.79	5.25	1.93	23.45	3.46	408.90	48.79	349.48	38.11	705.81	47.53	29.33	27.49	160.87	45.17	0.00	0.00	2223.44	30.50	
SETTLEMENTS	Urban Settlement		0.21	0.06	0.14	0.04	0.11	0.04	0.97	0.18	0.79	0.21	0.15	0.05	1.07	0.39	0.62	0.08	1.57	0.19	2.11	0.23	0.75	0.05	0.07	0.07	0.10	0.03	2.70	0.83	11.36	0.16	
	Rural Settlement		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.83	0.26	0.00	0.00	0.27	0.04	3.71	0.44	3.54	0.39	3.59	0.24	1.11	1.05	0.00	0.00	0.00	0.00	13.05	0.18	
	Industrial Settlement		0.63	0.18	0.02	0.01	0.76	0.27	0.89	0.16	1.12	0.27	0.97	0.31																			

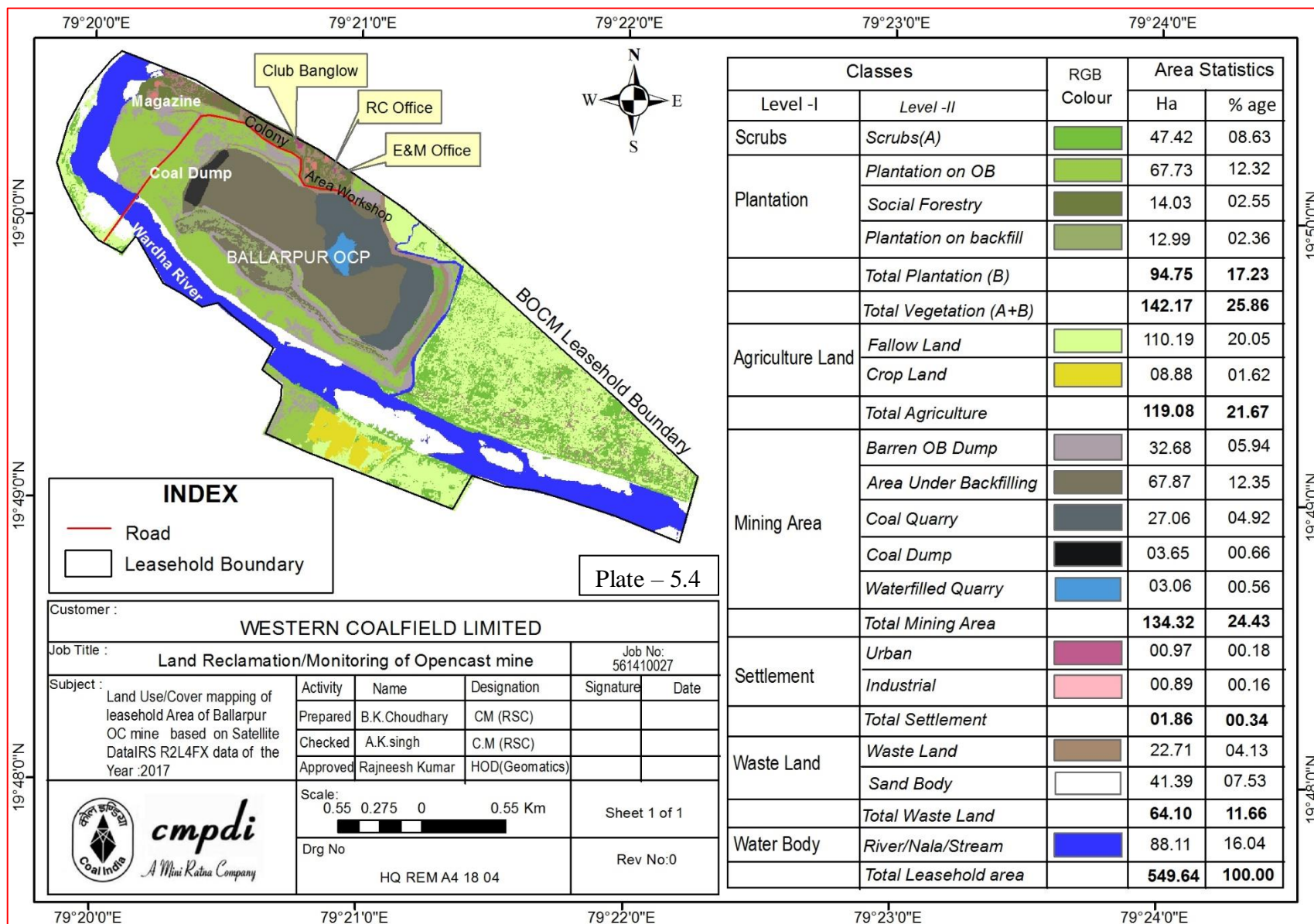


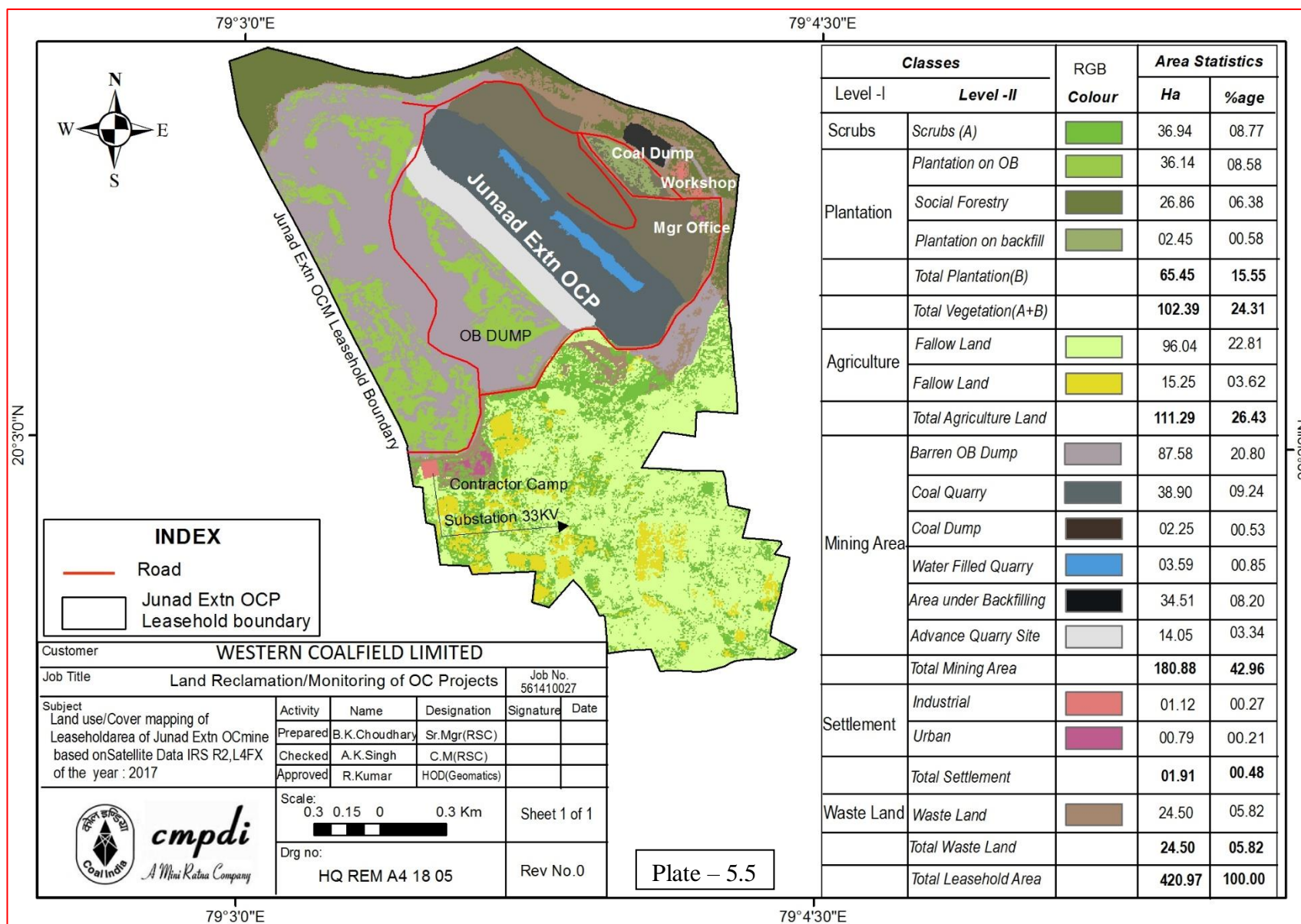




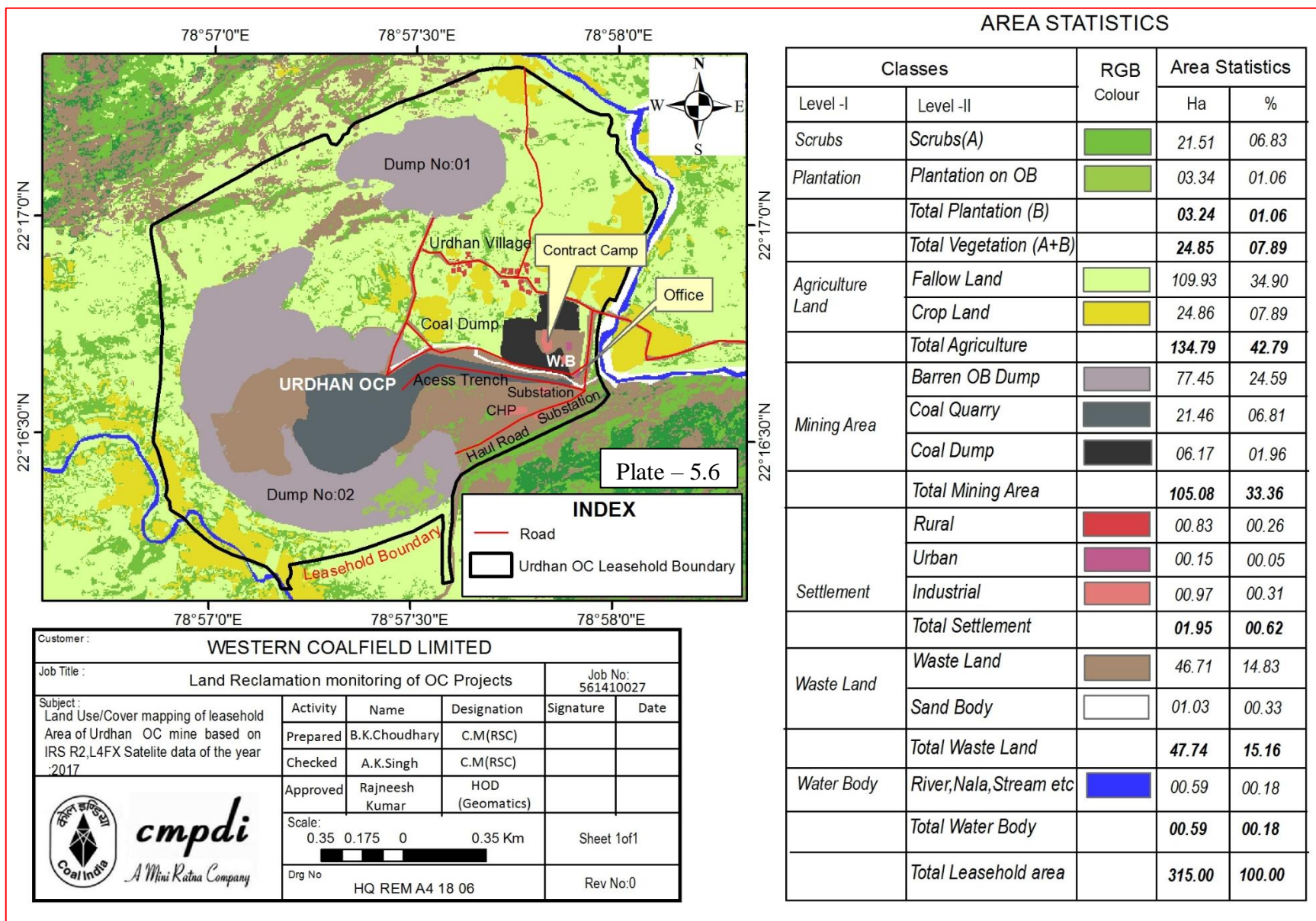




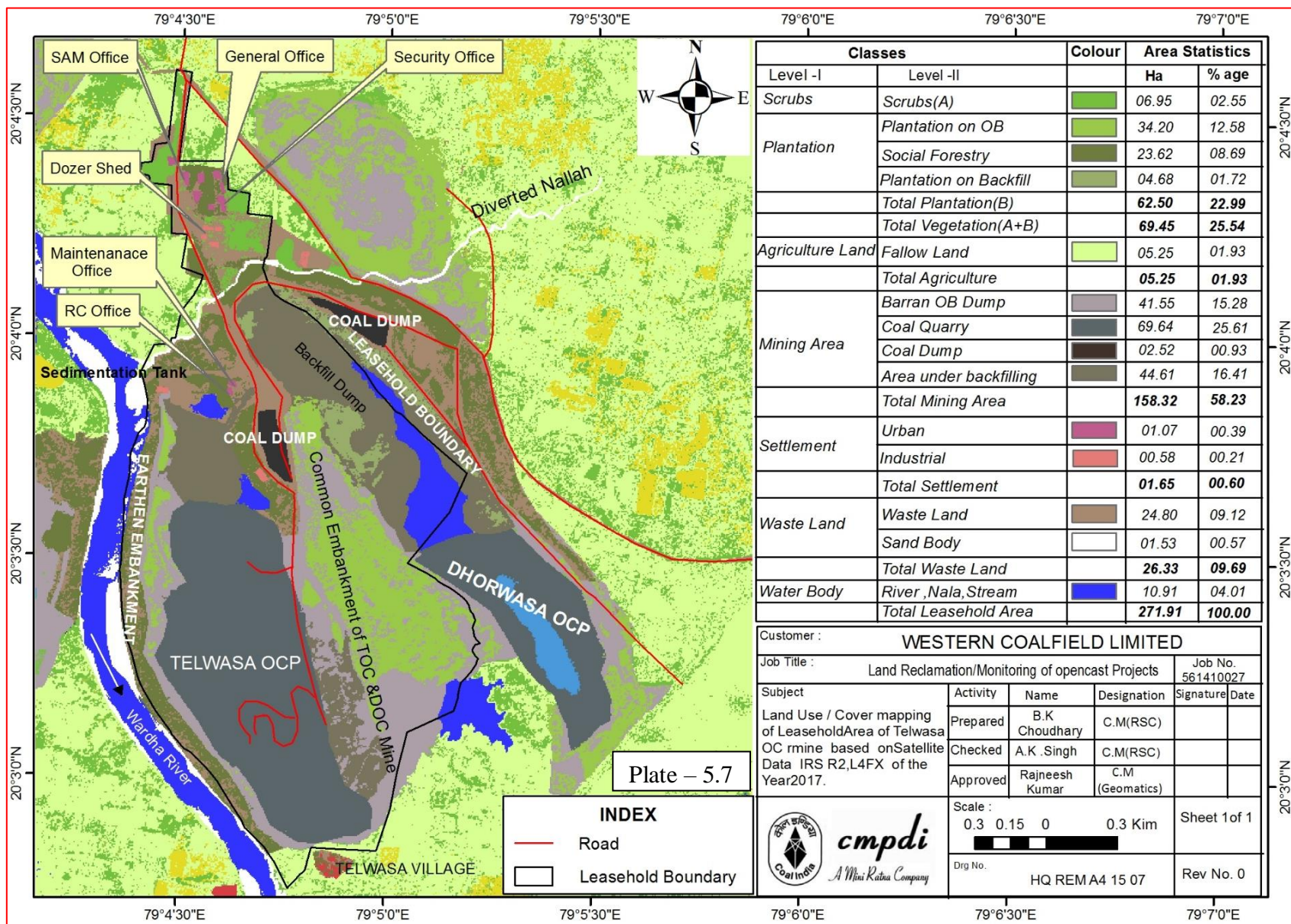


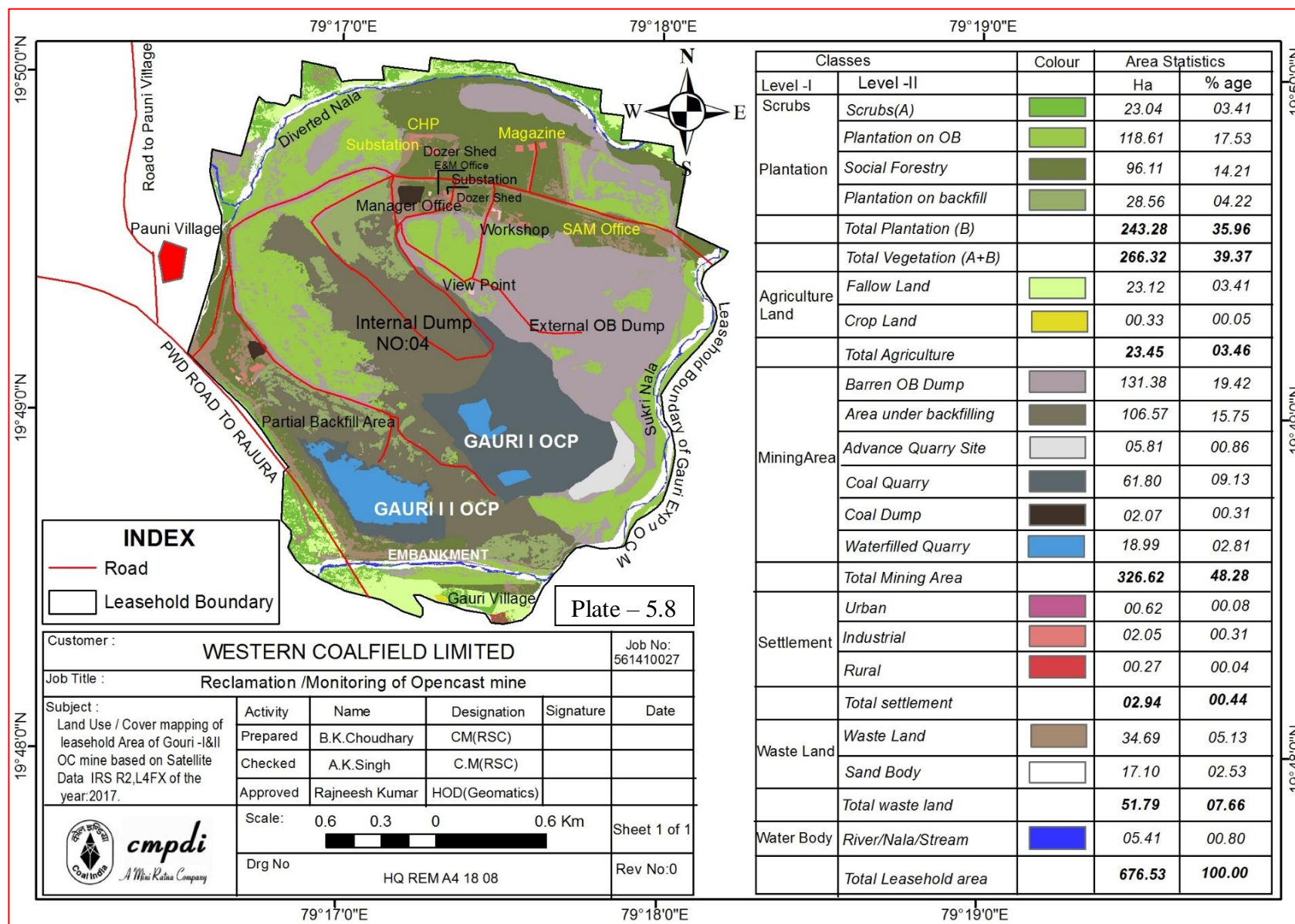




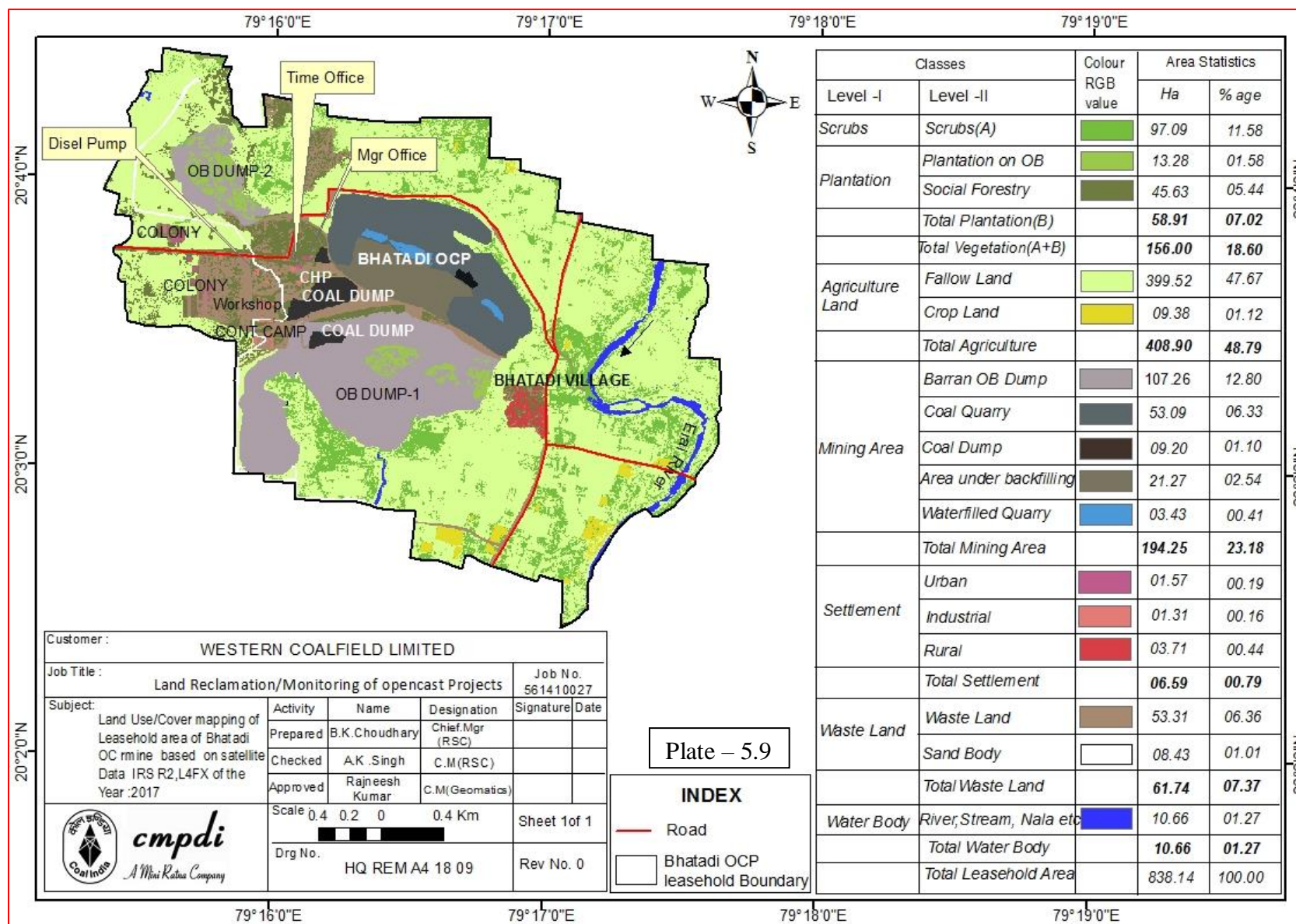


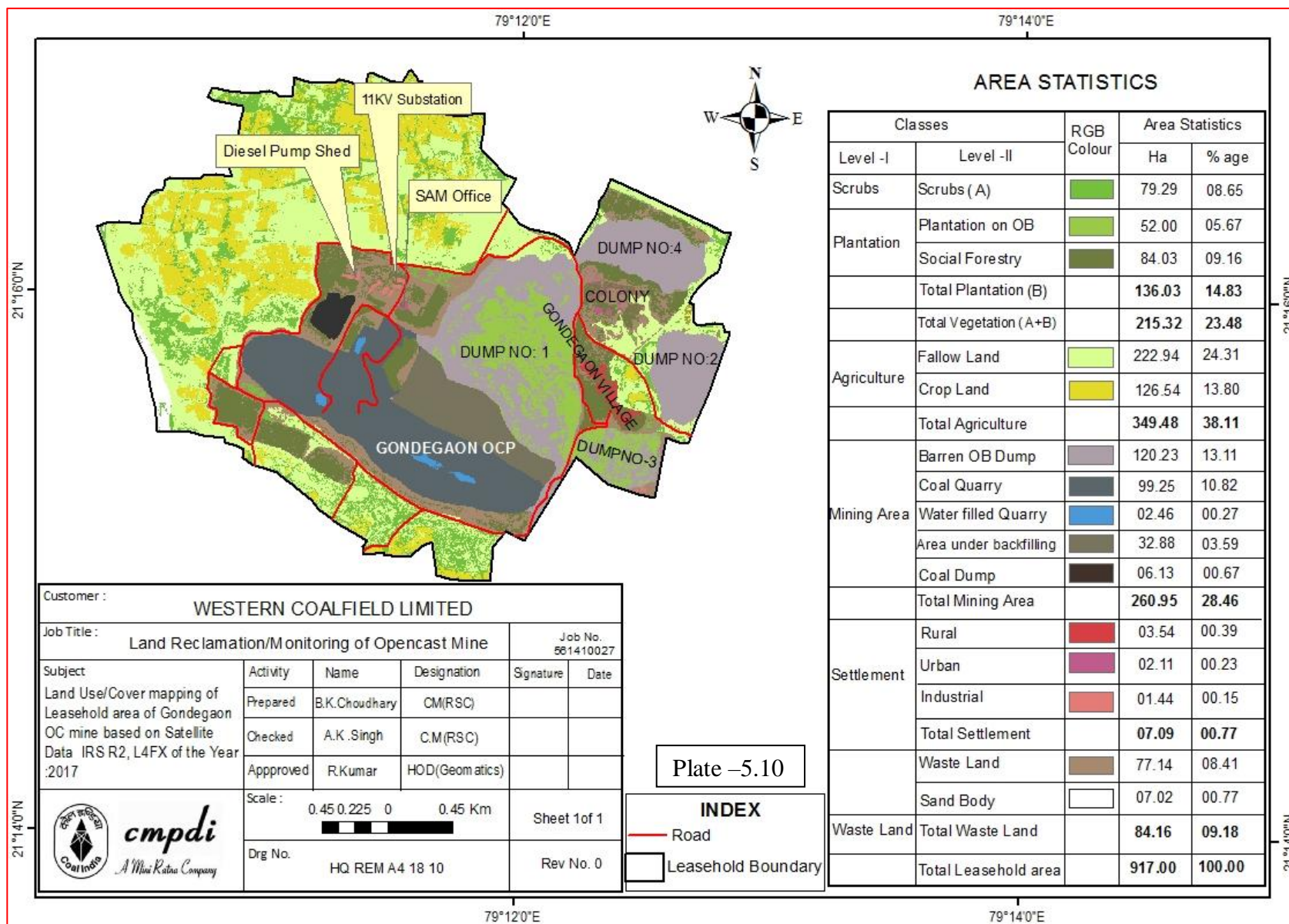














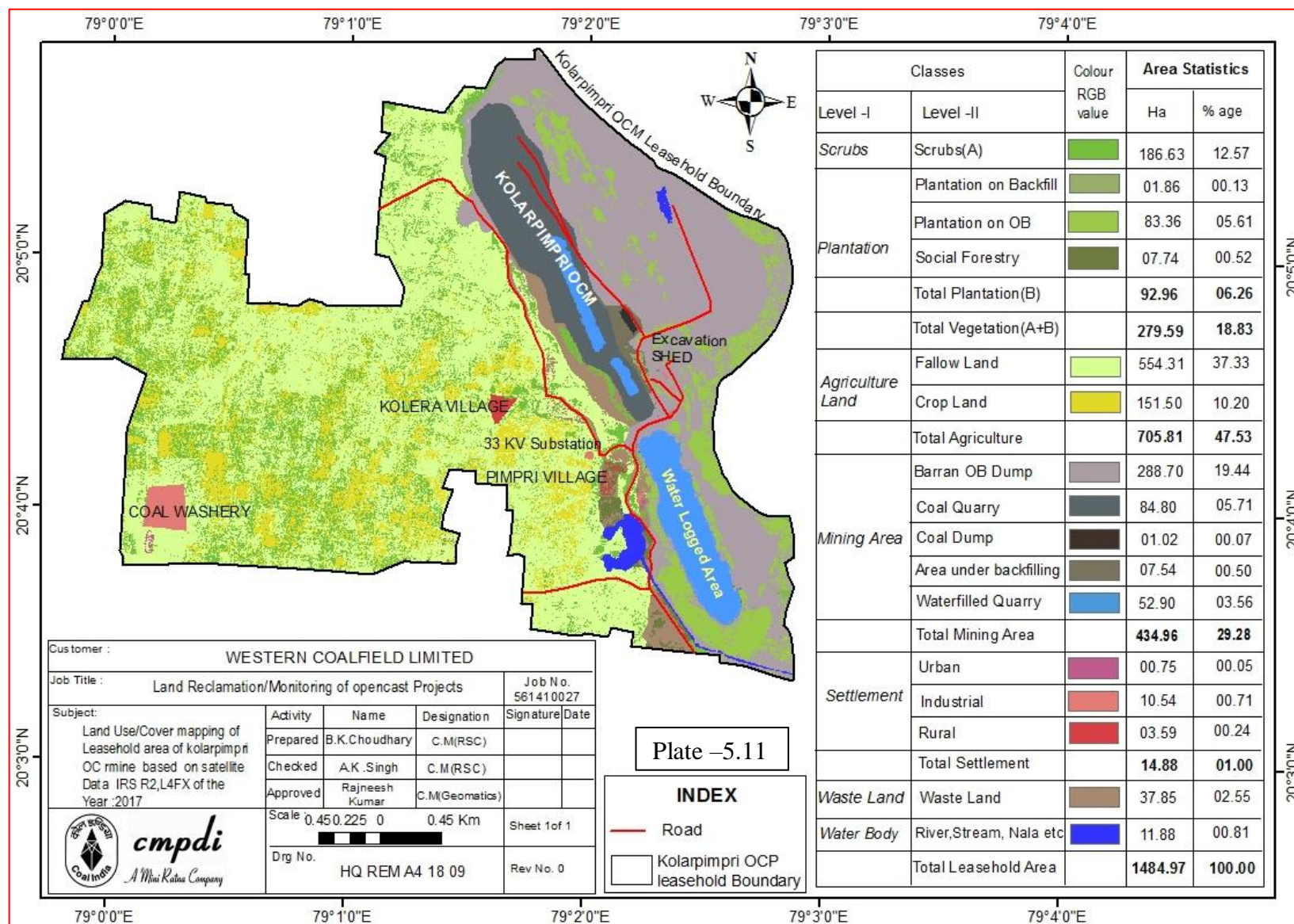


Plate -5.11

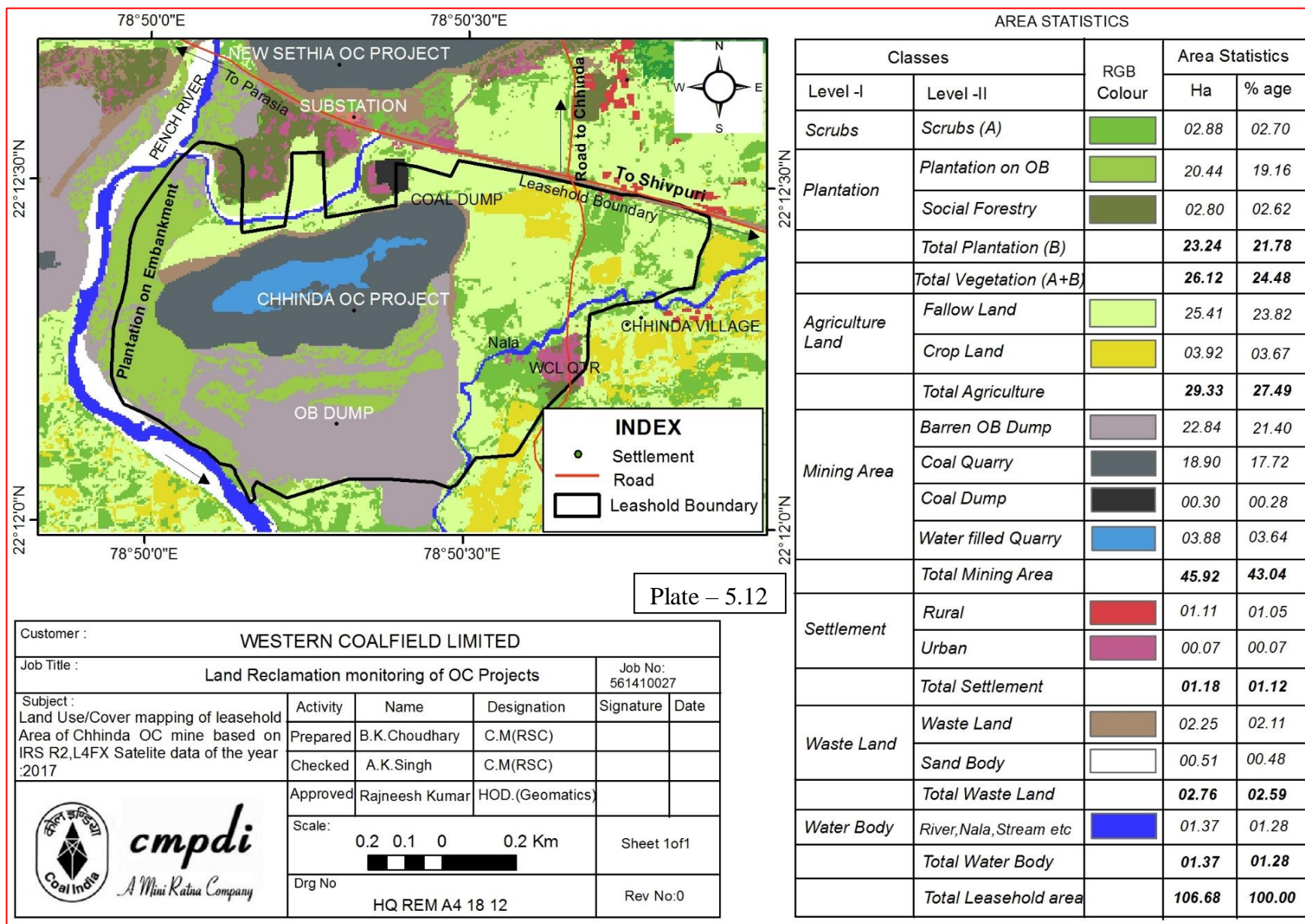
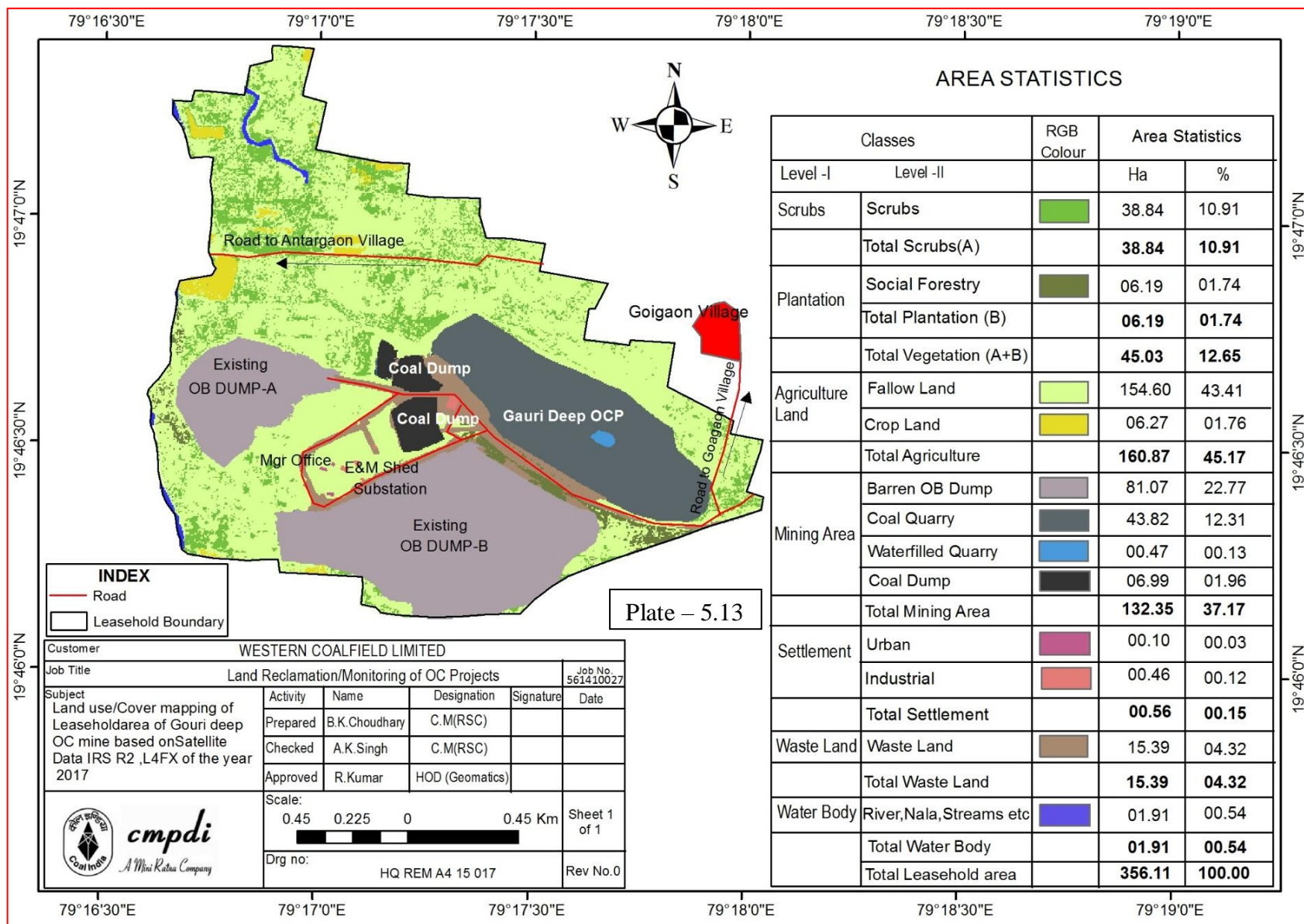
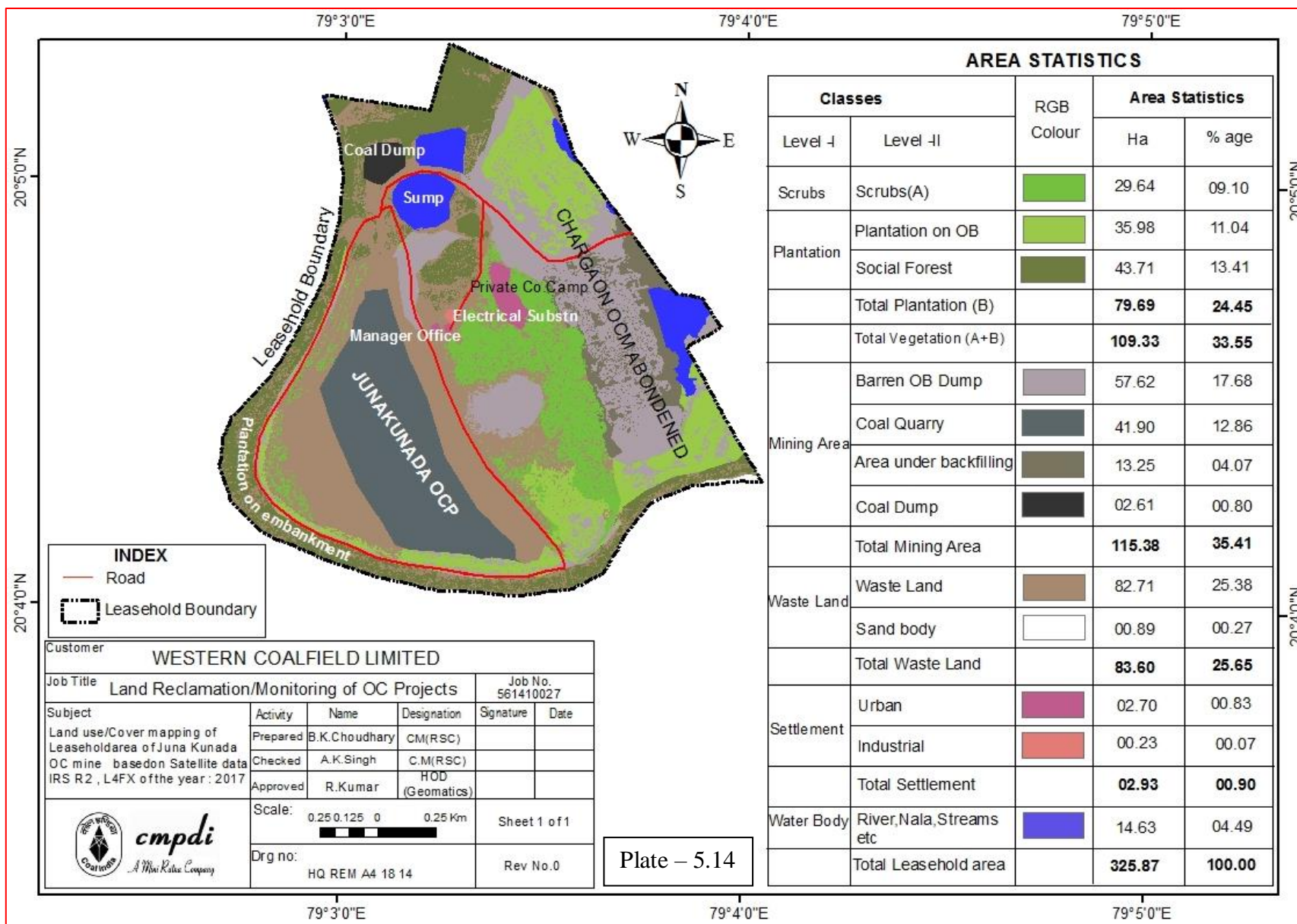


Plate – 5.12







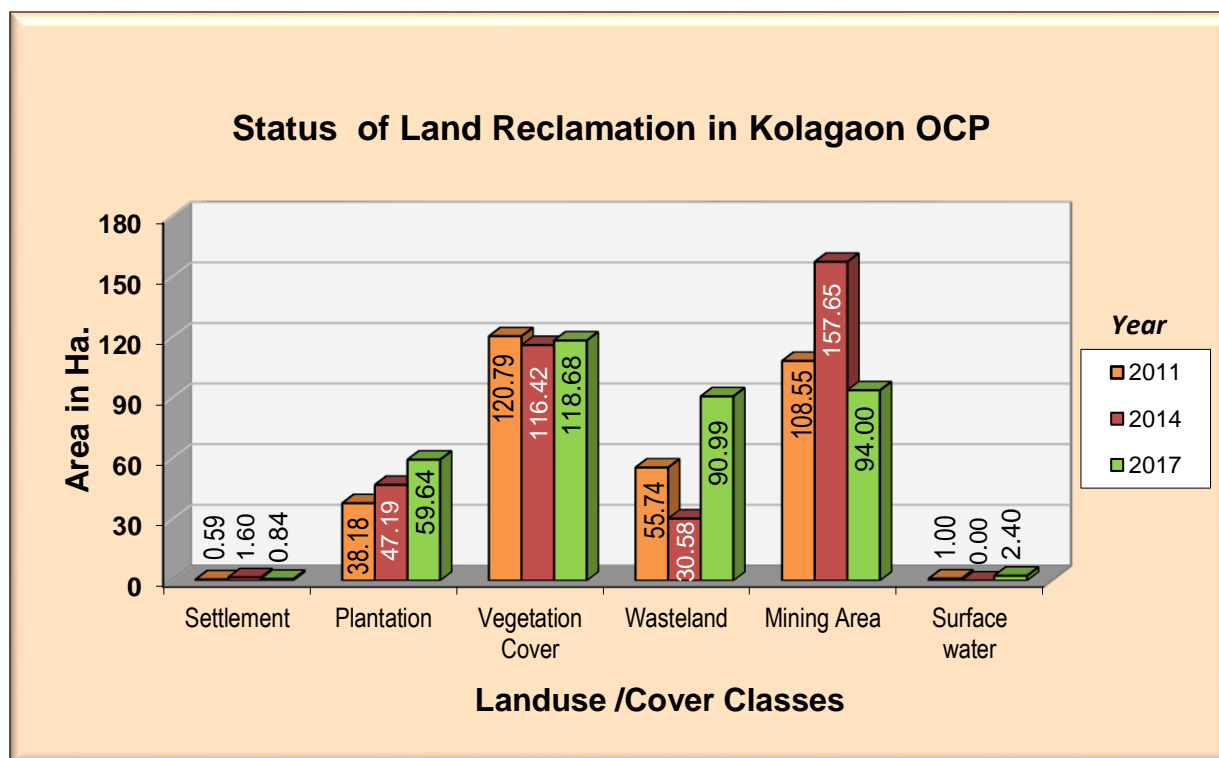


Figure-5.2

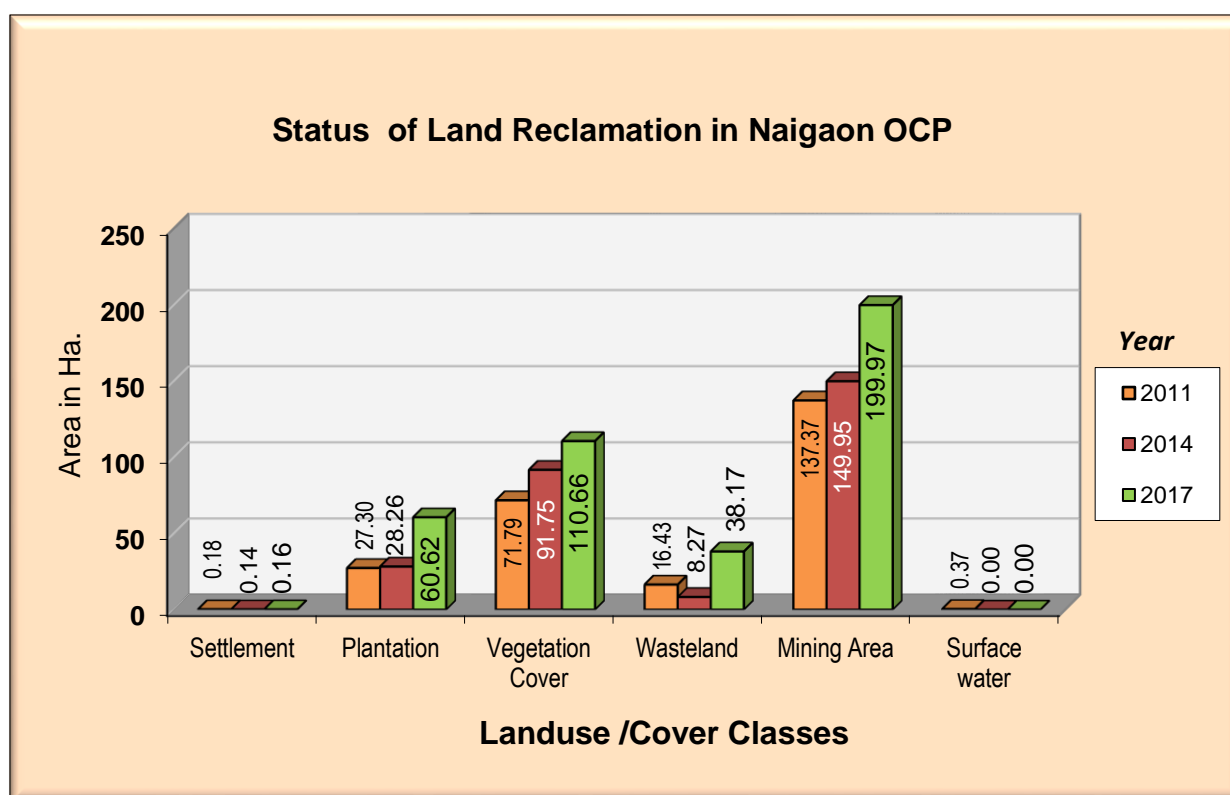


Figure-5.3

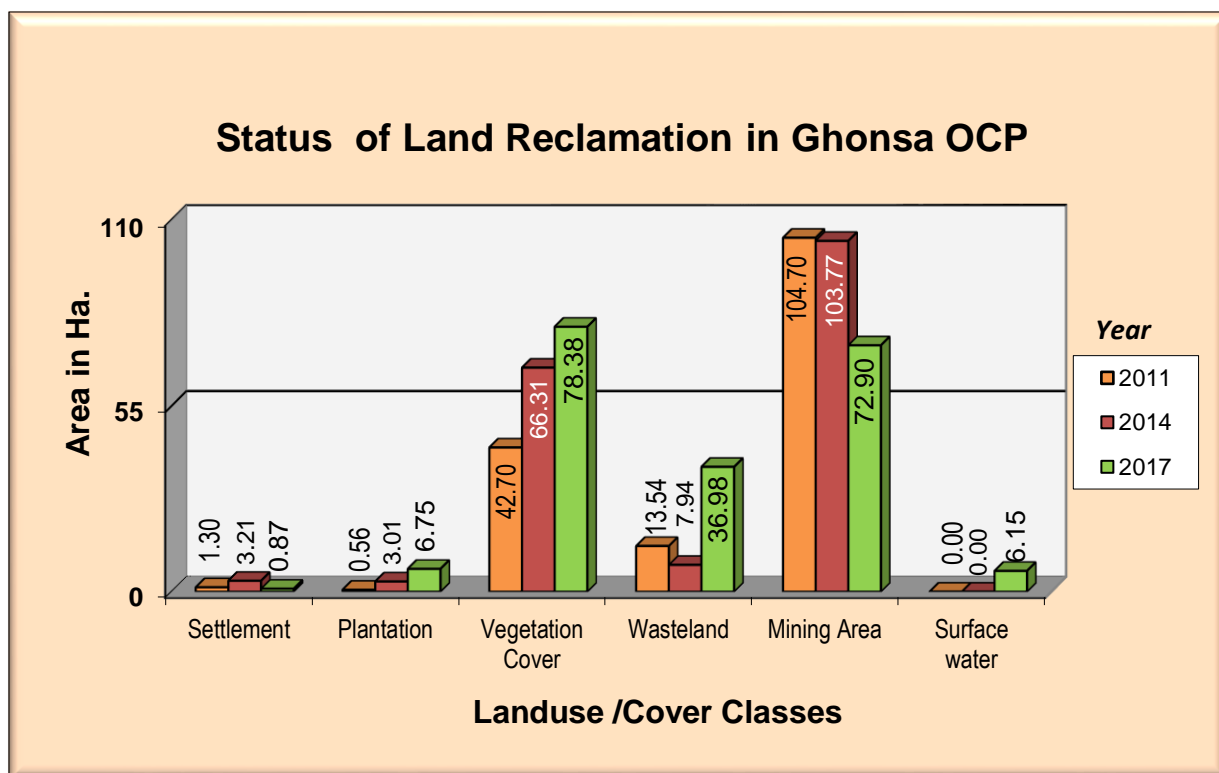


Figure - 5.4

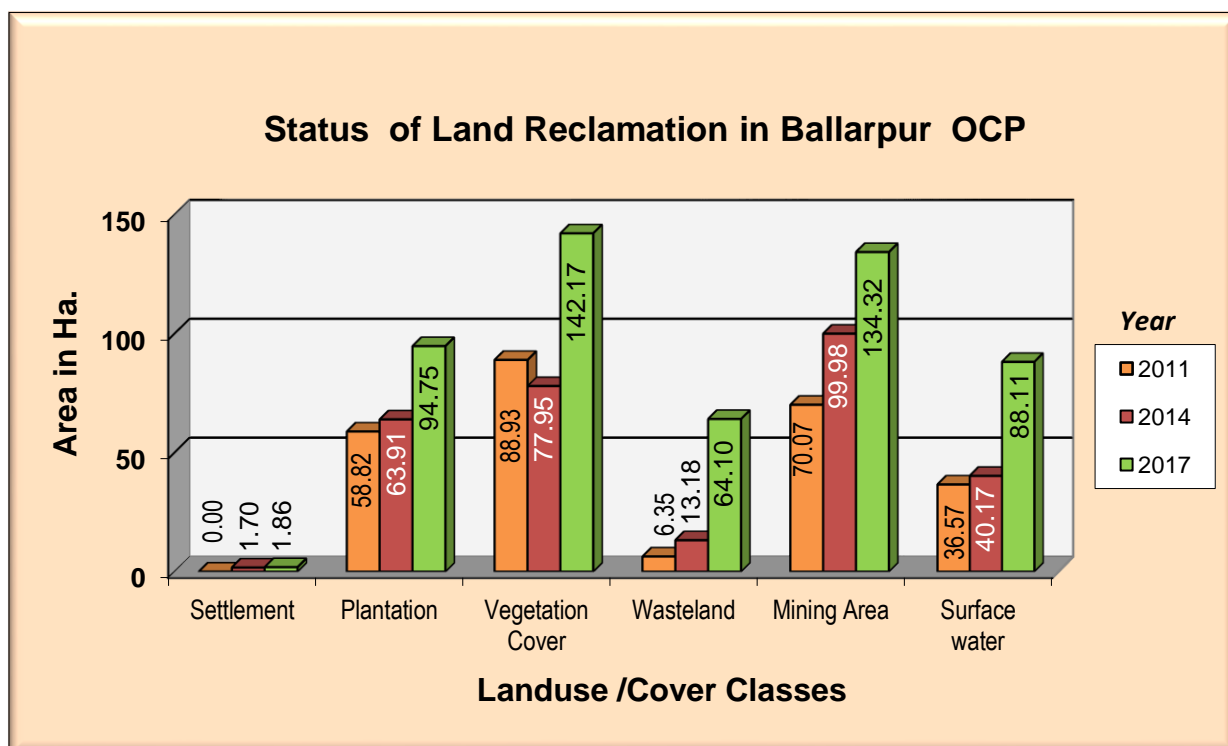


Figure - 5.5

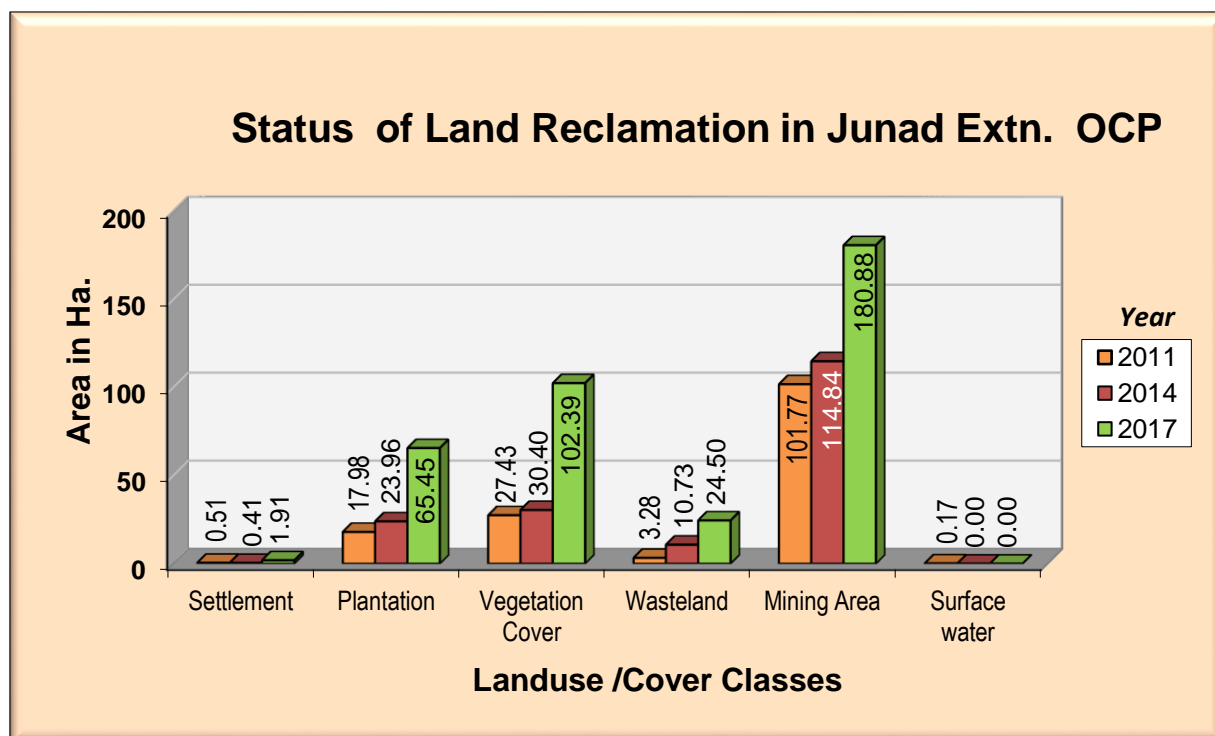


Figure - 5.6

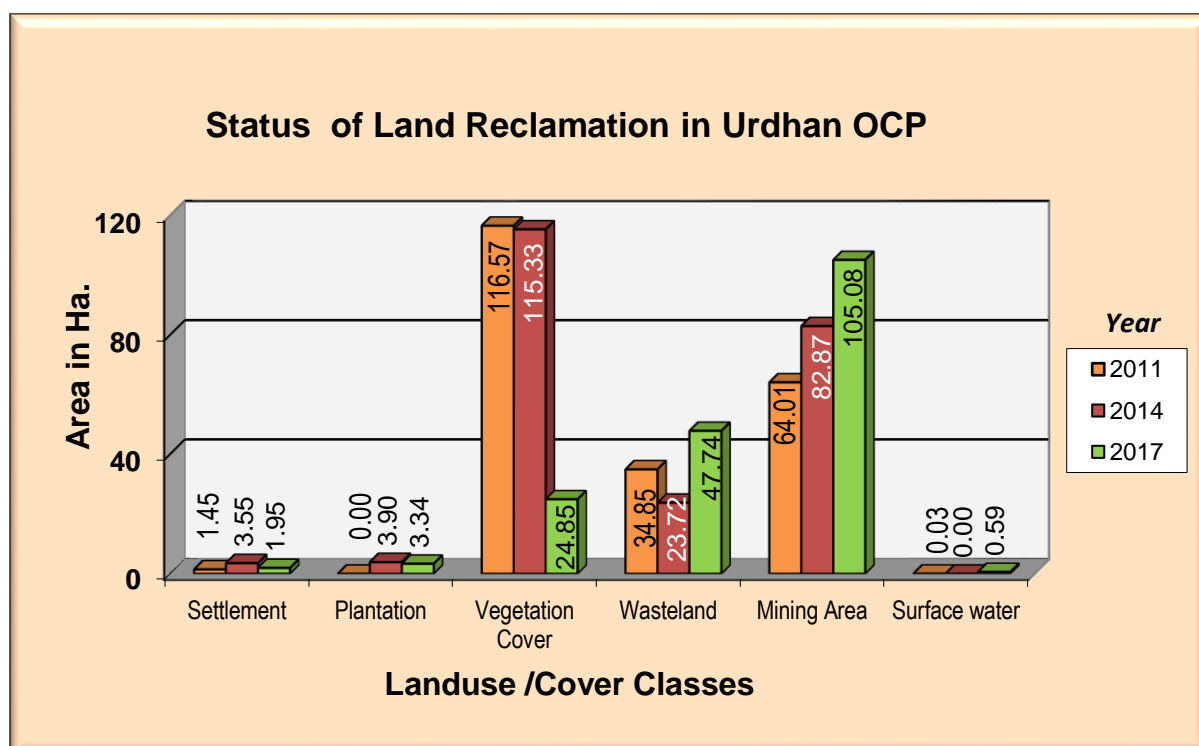


Figure - 5.7

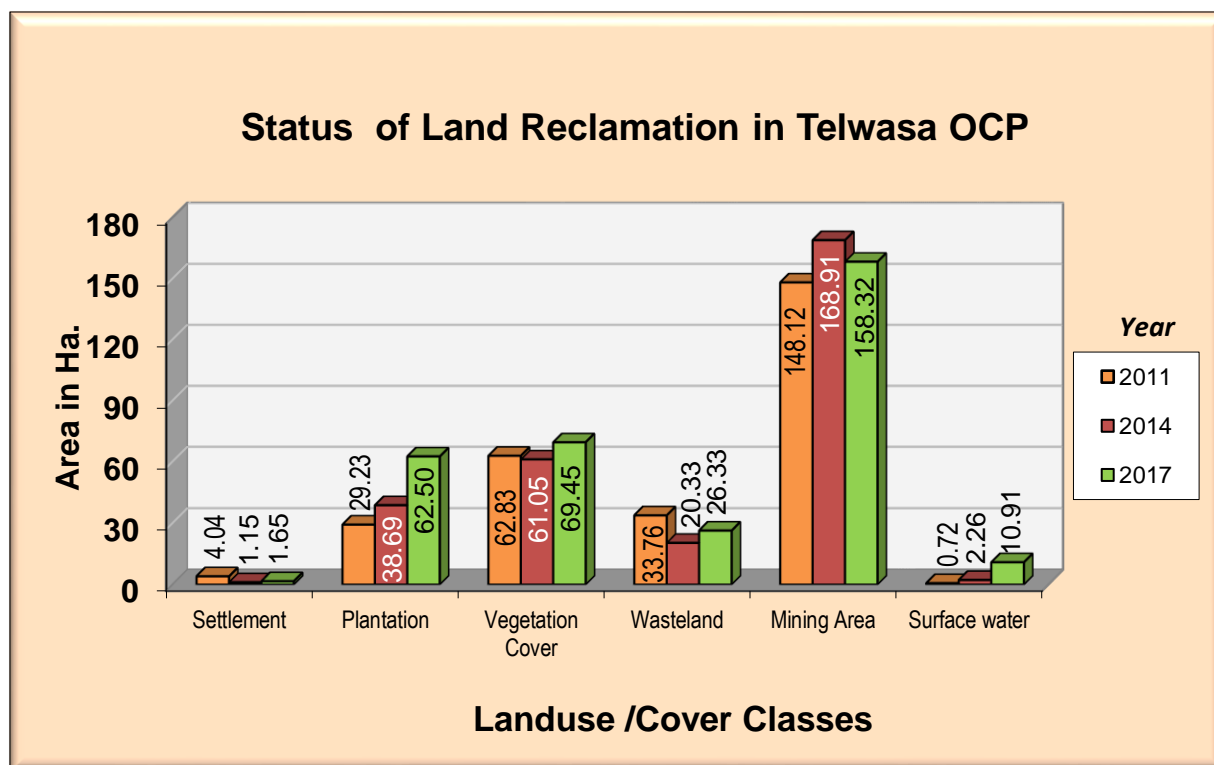


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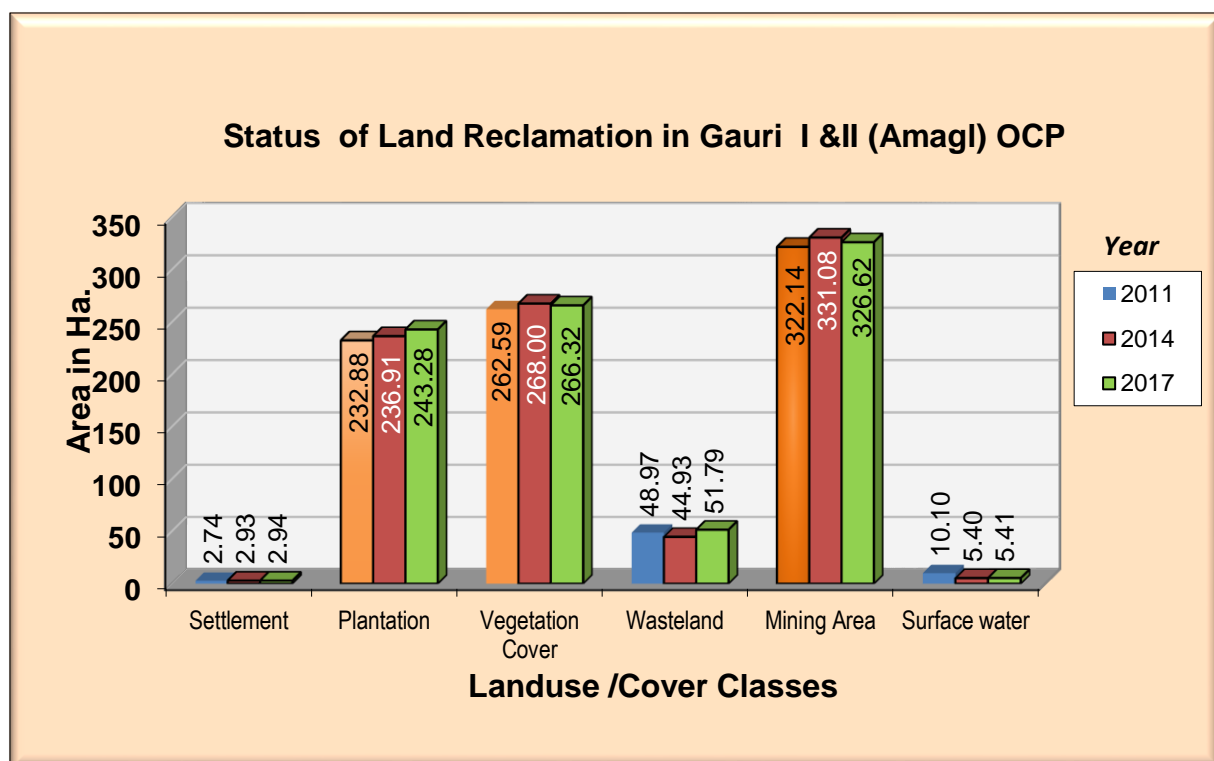


Figure-5.9



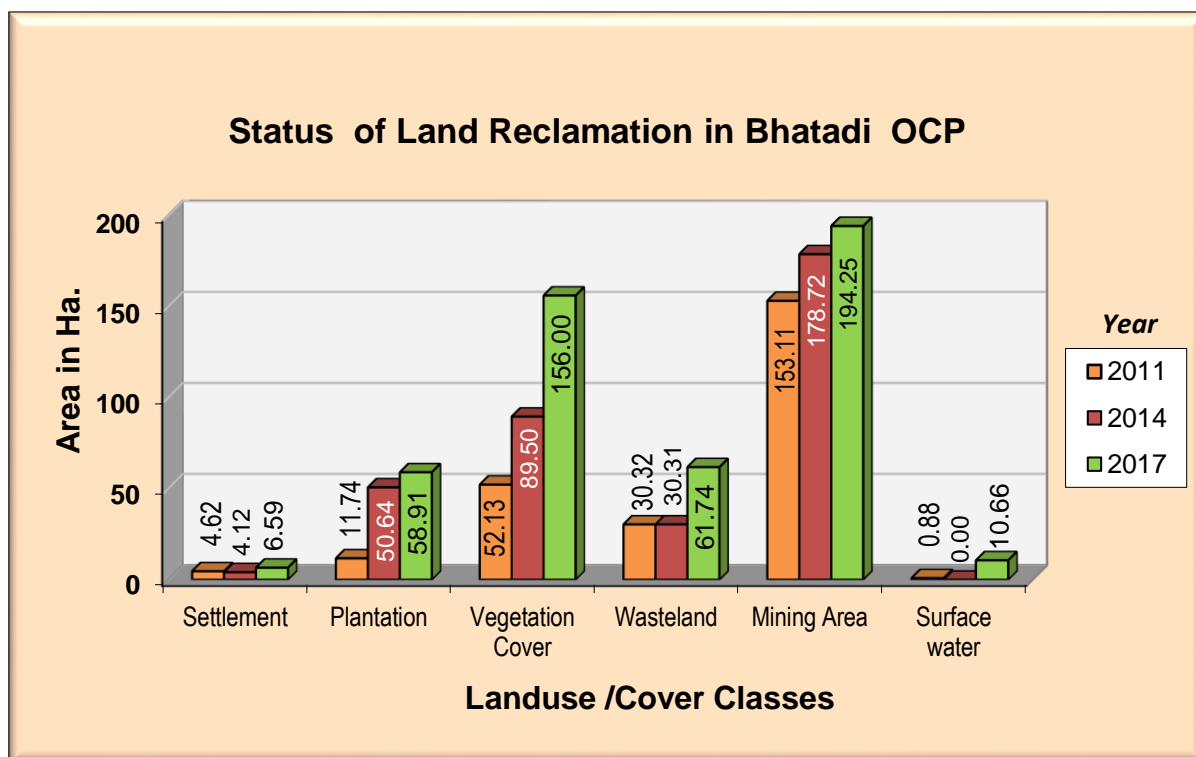


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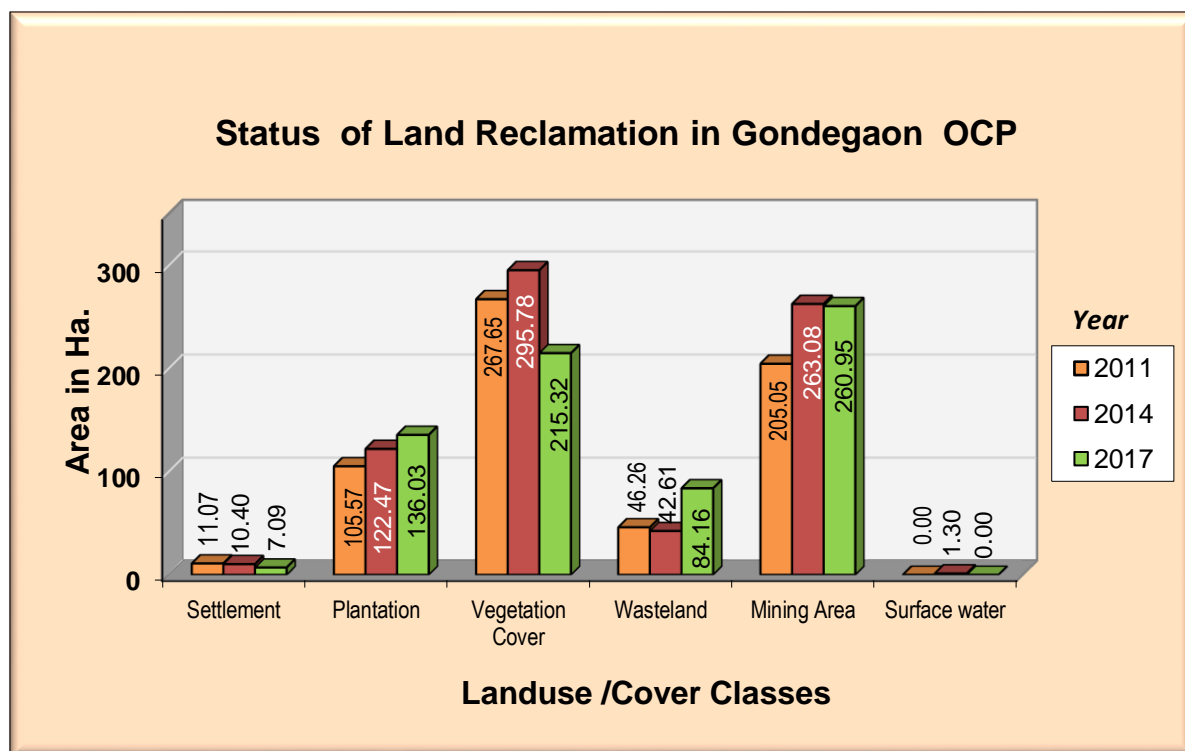


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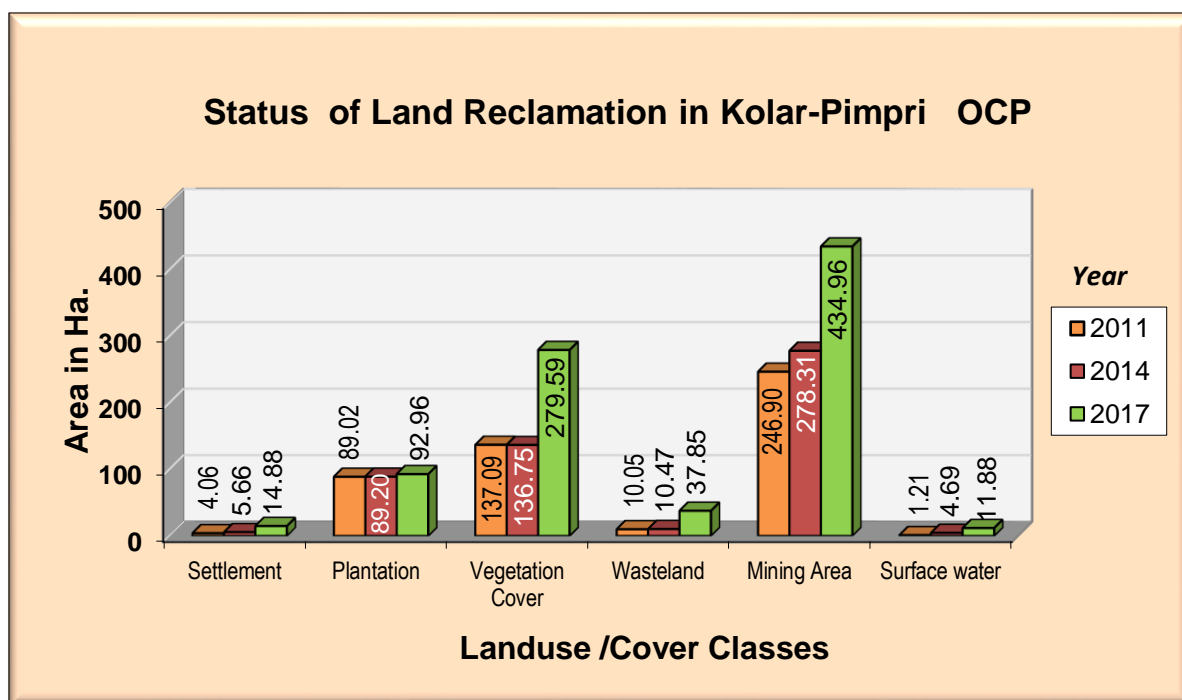


Figure-5.12

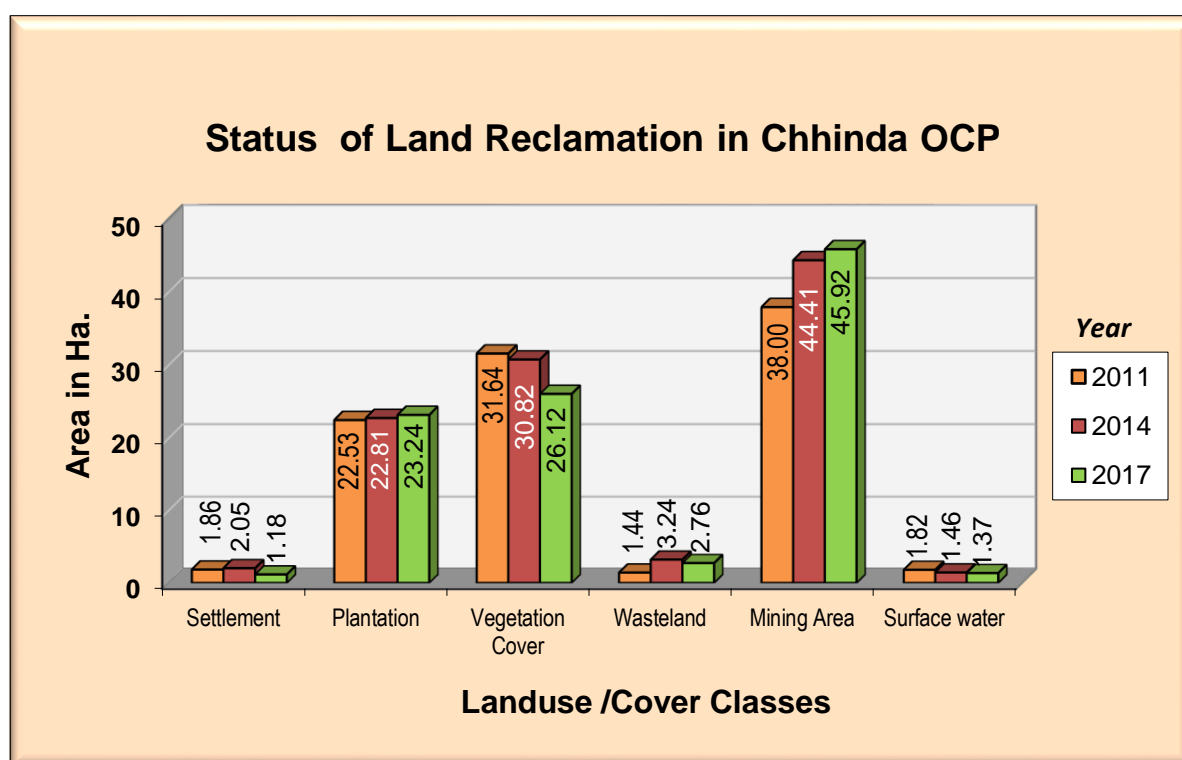


Figure-5.13

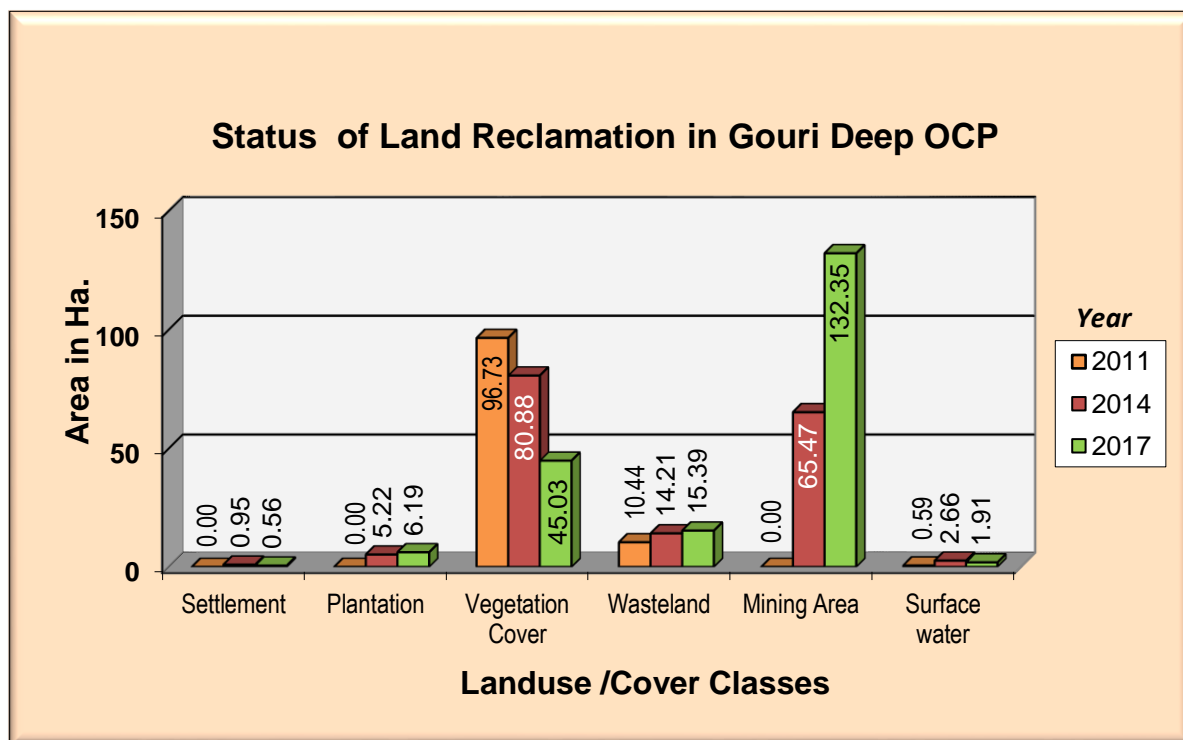


Figure-5.14

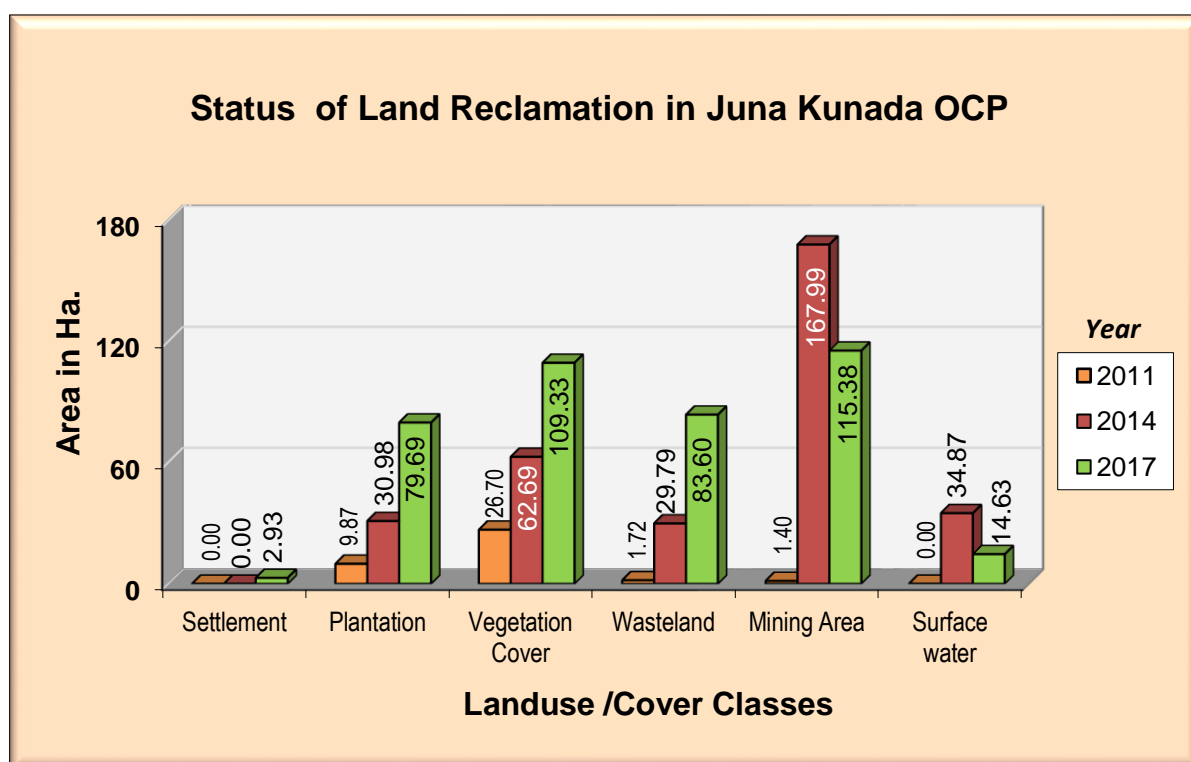
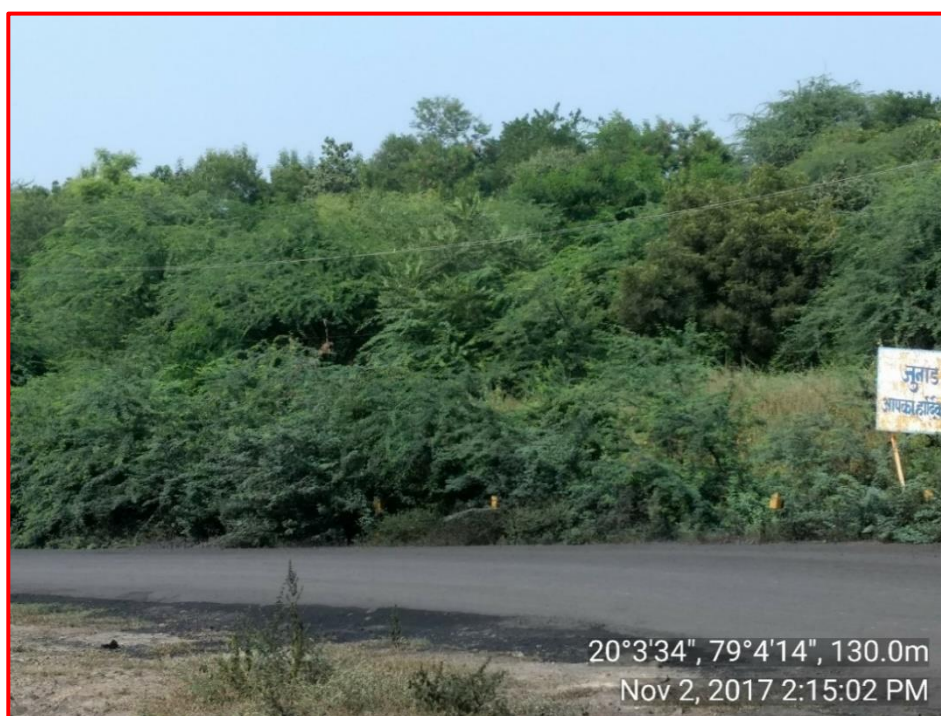


Figure-5.15



*Photo 5.1: Plantation under social forestry in Gondegaon OCP*



*Photo 5. 2: Plantation on Over Burden Dump in Junad Expansion OCP*





*Photo 5. 3: Plantation on Barren OB Dump in Kolarpimpri OCP*



*Photo 5.4: Plantation under social forestry in Kolegaon OCP*



*Photo 5.5: Plantation on Barren OB Dump in Naigaon CP*



*Photo 5. 6: Plantation on Barren OB Dump in Ballarpur OCP*





*Photo 5.7- Plantation on Barren OB Dump in Gauri I&II (Amal) OCP*



*Photo 5 8: Plantation under social forestry in Juna-Kunada OCP*

**SOUTH EASTERN COALFIELDS LIMITED**



## 6.0 Land Reclamation Status in South Eastern Coalfields Limited

- 6.1 Following five opencast projects of SECL producing less than 5 million cubic m. (Coal+OB) together, were taken up for land reclamation monitoring during the year 2017 :
- Baroud
  - Sharda
  - Kanchan
  - Mahan - II
  - Chhal
- 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 2017 are shown in the Table – 6.2. Land use maps derived from satellite data are shown in Plate 6.1 - 6.5. Different land use classes based on satellite data are depicted in Bar Charts in Fig. 6.2 - 6.6.
- 6.3 Study reveals that out of total mine leasehold area of 2058.00 Hectares of the 05 OC projects of SECL mentioned above taken for this study in 2017-18; total excavated area is 999.00 Ha. (48.54%), out of which 181.00 Ha. (18.12%) has been planted (*Biologically Reclaimed*), 527.00 Ha. (52.75%) is under backfilling (*under Technically Reclamation*) and balance 291.00 hectares (29.13%) is under active mining.
- 6.4 On comparing the status of land reclamation for the year 2017 with respect to the year 2014 in different projects, it is evident from the analysis that area of land reclamation has increased from 492.00 Ha. (74.55%) (Yr. 2014) to 708.00 Ha. (70.87%) (Yr. 2017)
- 6.5 Out of 5 projects of SECL, Baroud OCP ranks on top for land reclamation (88.59%) followed by Sharda OCP (81.94%), Mahan – II OCP (55.06%), Chhal (54.98%) and Kanchan OCP (52.38%).

Table – 6.1

**Projectwise Land Reclamation Status in Opencast Project of SECL  
( < 5 million Cu. M. of Coal+OB) based on Satellite Data of the year 2017**

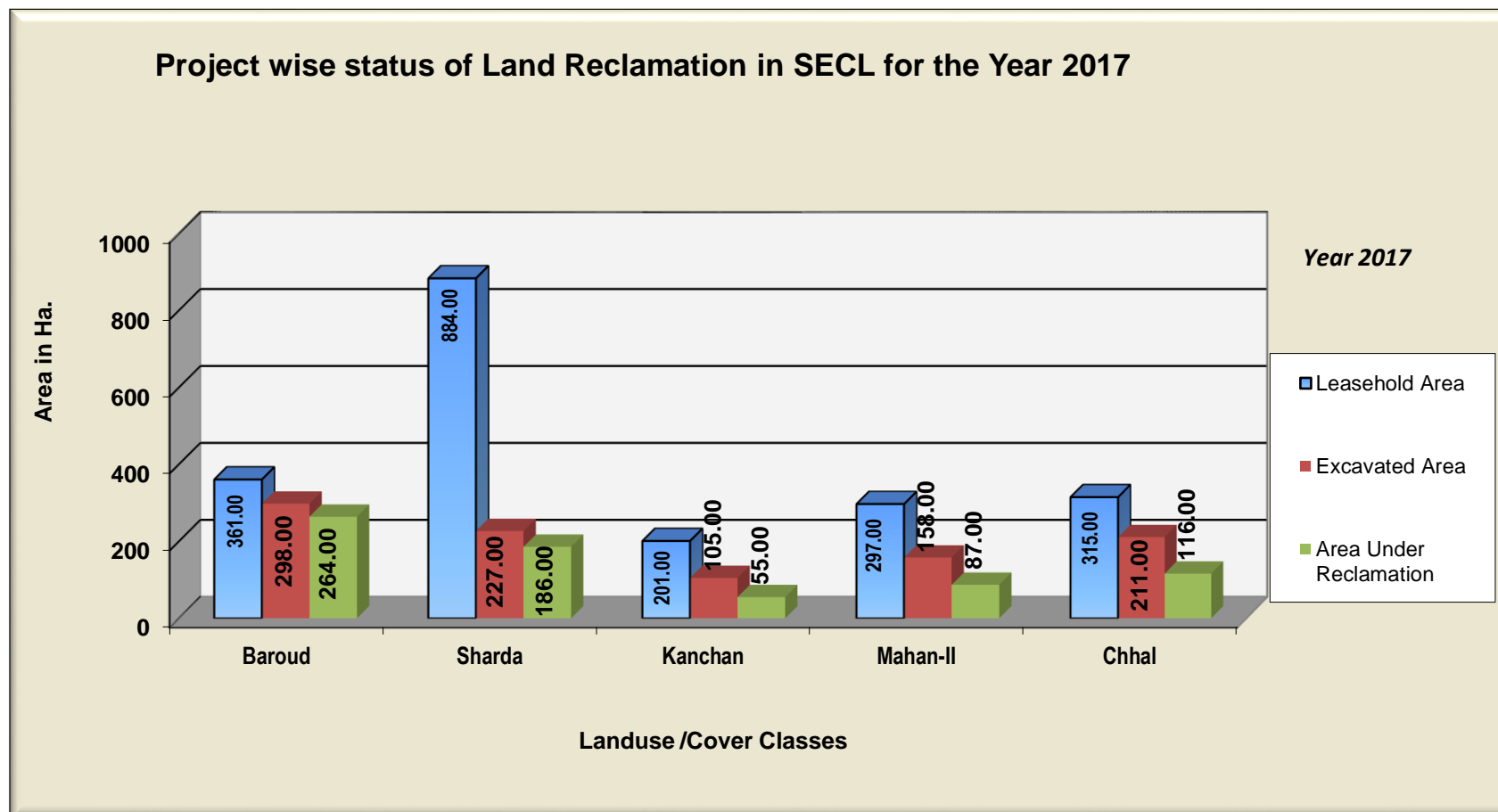
(Area in Hectare)

Sl. No.	Project	Total Leasehold Area		Technical Reclamation		Plantation						Area under Active Mining		Total Excavated Area		Total Area under Plantation (% Green Cover Generated in Leasehold)		Total Area under Reclamation	
						Biological Reclamation		Other Plantations											
				Area under Backfilling		Plantation on Excavated / Backfilled Area		Plantation on External Over Burden Dumps		Social Forestry, Avanue Plantation Etc.									
1	2	3		4		5		6		7		8		9 (=4+5+8)		10 (=5+6+7)		11(=4+5)	
		2014	2017	2014	2017	2014	2017	2014	2017	2014	2017	2014	2017	2014	2017	2014	2017	2014	2017
1	BAROUD	361.00	361.00	122.00	239.00	31.00	25.00	0.00	0.00	4.00	2.00	55.00	34.00	208.00	298.00	35.00	27.00	153.00	264.00
				58.65%	80.20%	14.90%	8.39%					26.44%	11.41%			9.70%	7.48%	73.56%	88.59%
2	SHARDA	825.00	884.00	96.00	84.00	121.00	102.00	11.00	11.00	1.00	1.00	9.00	41.00	226.00	227.00	133.00	114.00	217.00	186.00
				42.48%	37.00%	53.54%	44.93%					3.98%	18.06%			15.05%	12.90%	96.02%	81.94%
3	KANCHAN	144.00	201.00	34.00	33.00	25.00	22.00	0.00	0.00	0.00	0.00	50.00	50.00	109.00	105.00	25.00	22.00	59.00	55.00
				31.19%	31.43%	22.94%	20.95%					45.87%	47.62%			12.44%	10.95%	54.13%	52.38%
4	MAHAN -II	297.00	297.00	41.00	60.00	22.00	27.00	0.00	0.00	5.00	0.00	54.00	71.00	117.00	158.00	27.00	27.00	63.00	87.00
				35.04%	37.97%	18.80%	17.09%					46.15%	44.94%			9.09%	9.09%	53.85%	55.06%
5	CHHAL	-	315.00	0.00	111.00	0.00	5.00	0.00	0.00	0.00	6.00	0.00	95.00	0.00	211.00	0.00	11.00	0.00	116.00
				0.00%	52.61%	0.00%	2.37%					0.00%	45.02%			0.00%	3.49%	0.00%	54.98%
	TOTAL	1627.00	2058.00	293.00	527.00	199.00	181.00	11.00	11.00	10.00	9.00	168.00	291.00	660.00	999.00	220.00	201.00	492.00	708.00
				44.39%	52.75%	30.15%	18.12%					25.45%	29.13%			10.69%	9.77%	74.55%	70.87%

(% 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 barren backfilled only
3. Area under Active mining includes coal quarry site, quarry filled with water. Area of Coal Dump has been excluded from Area under Active Mining in this table.
4. Social Forestry and Plantation on external OB dump are not included in Biological Reclamation and are put under separate categories as shown in the table.
5. (%) calculated in the above table is in respect of total excavated area except for "Total area under plantation" where % is in terms of leasehold area.























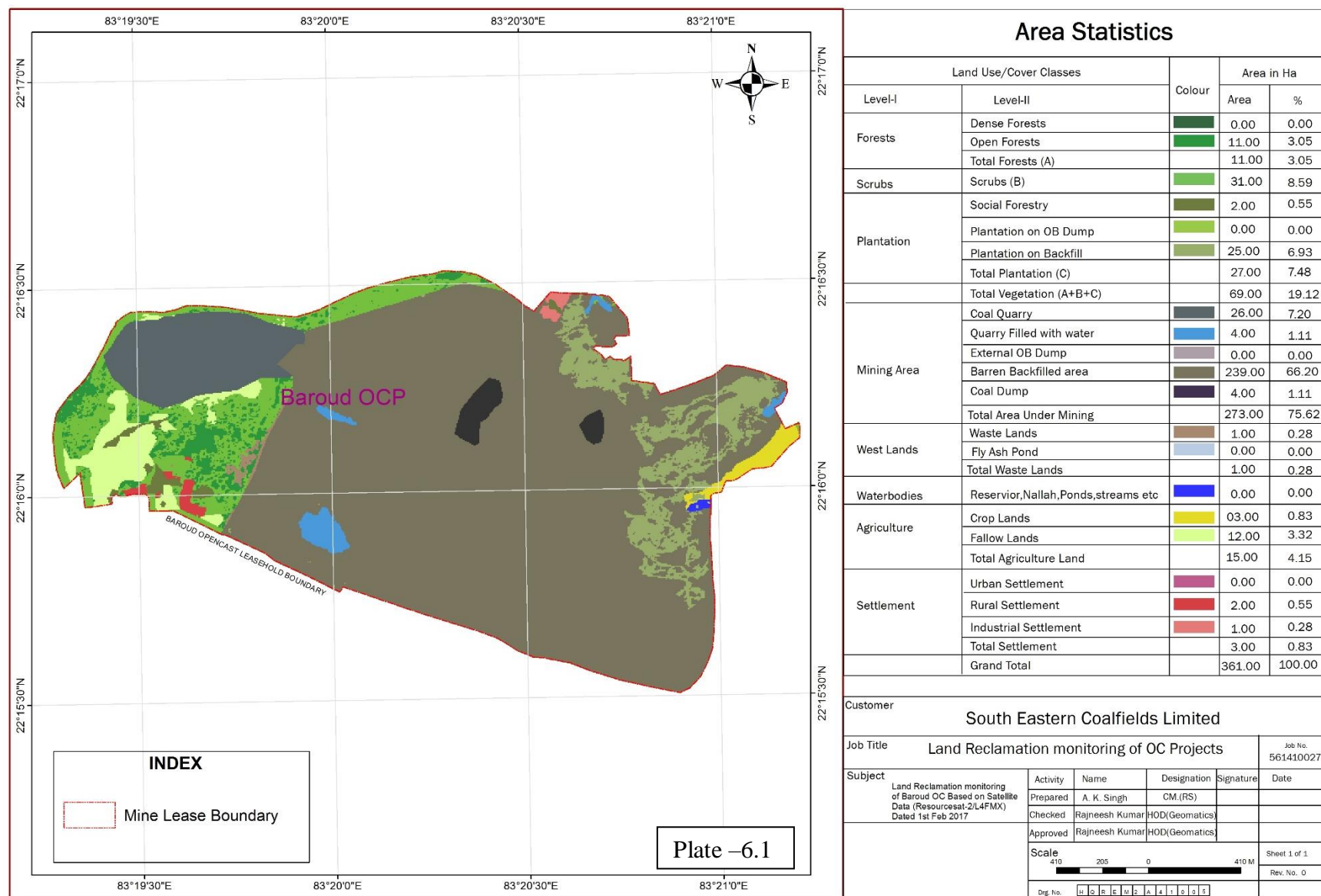
**Fig.6.1: Land reclamation status in OC projects of SECL in the year-2017**

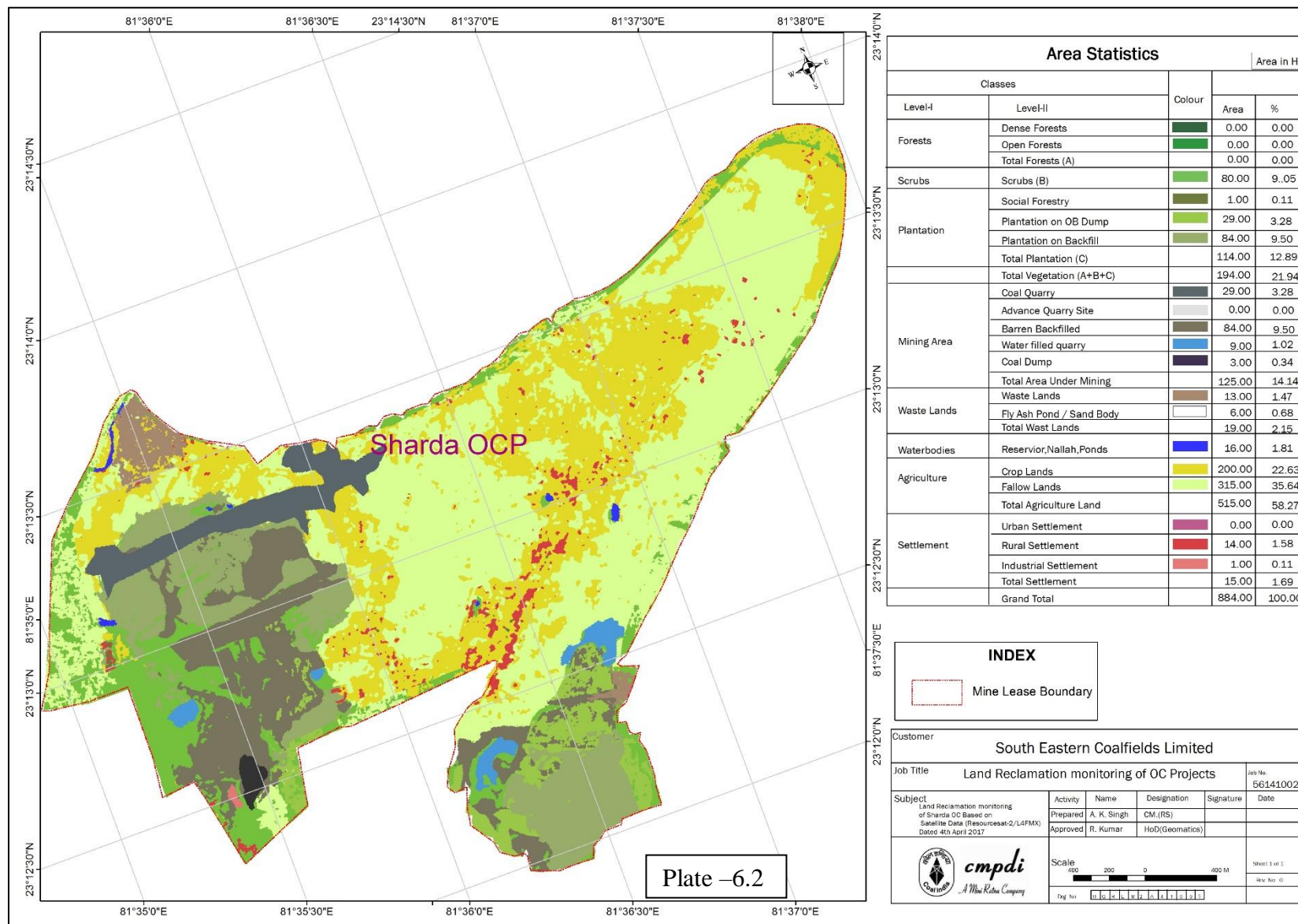
Table 6.2

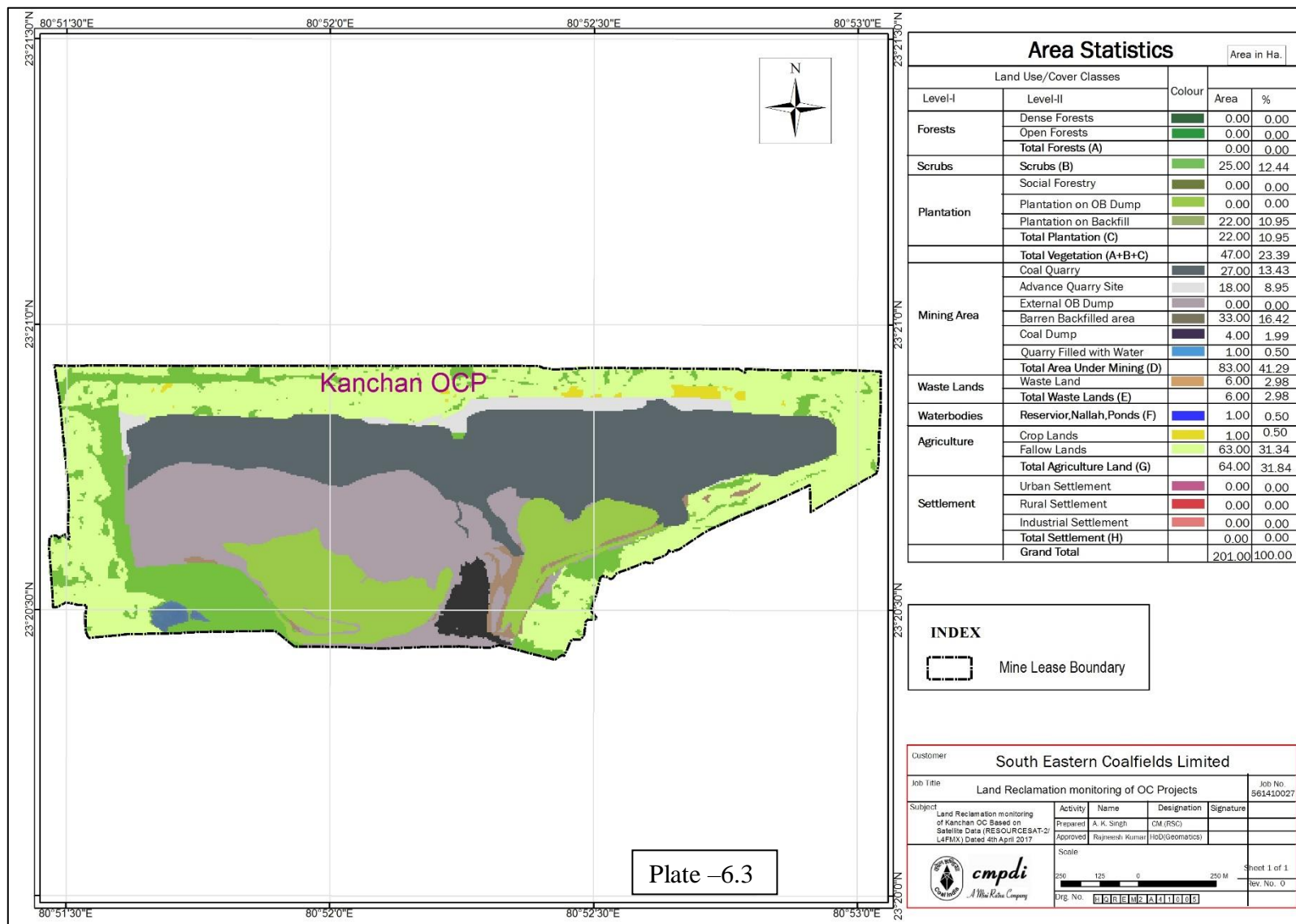
**Status of Land Use / Reclamation in OC Mines(Less than 5 mcu.m) of  
South Eastern Coalfields Ltd. based on Satellite data of the Year 2017**

(Area in Ha.)

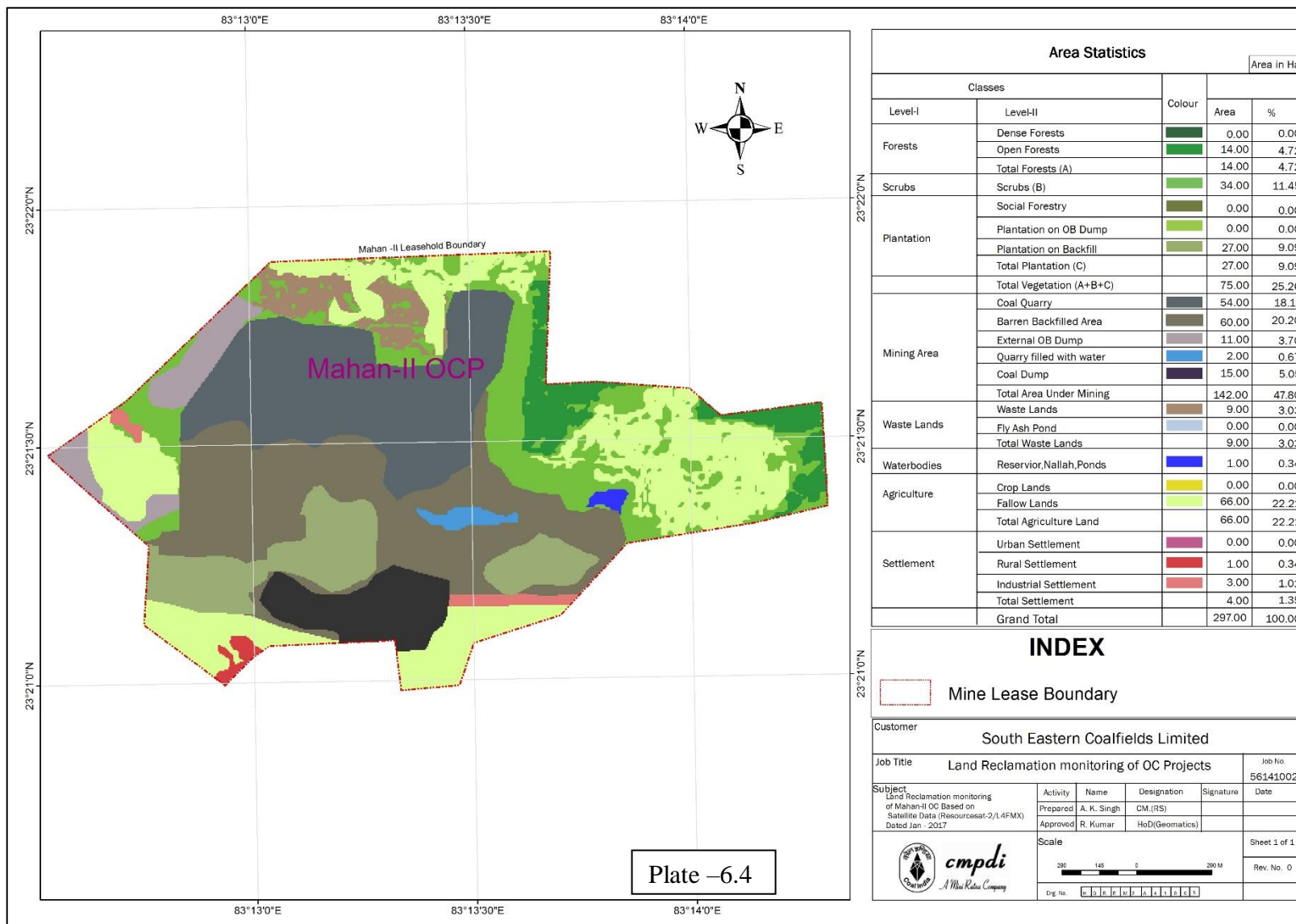
LAND USE/ OCVER CLASSES			BAROUD		SHARDA		KANCHAN		MAHAN-II		CHHAL		GRAND TOTAL	
			Area	%	Area	%	Area	%	Area	%	Area	%	Area	%
FORESTS	Dense Forest		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Open Forest		11.00	3.05	0.00	0.00	0.00	0.00	14.00	4.72	10.00	3.17	35.00	1.70
	<b>Total Forest (A)</b>		11.00	3.05	0.00	0.00	0.00	0.00	14.00	4.72	10.00	3.17	35.00	1.70
SCRUBS	<b>Scrubs (B)</b>		31.00	8.59	80.00	9.05	25.00	12.44	34.00	11.45	31.00	9.84	201.00	9.77
PLANTATION	Social Forestry		2.00	0.55	1.00	0.11	0.00	0.00	0.00	0.00	6.00	1.90	9.00	0.44
	Plantation on OB Dump		0.00	0.00	29.00	3.28	0.00	0.00	0.00	0.00	0.00	0.00	29.00	1.41
	Plantation on Backfill (Biological Reclamation)		25.00	6.93	84.00	9.50	22.00	10.95	27.00	9.09	5.00	1.59	163.00	7.92
	<b>Total Plantation (C)</b>		27.00	7.48	114.00	12.89	22.00	10.95	27.00	9.09	11.00	3.49	201.00	9.77
	<b>Total Vegetation (A+B+C)</b>		69.00	19.12	194.00	21.94	47.00	23.39	75.00	25.26	52.00	16.50	437.00	21.24
ACTIVE MINING	Coal Quarry		26.00	7.20	29.00	3.28	27.00	13.43	54.00	18.18	63.00	20.00	199.00	9.67
	Coal Dump		4.00	1.11	3.00	0.34	4.00	1.99	15.00	5.05	10.00	3.18	36.00	1.75
	Advance Quarry Site		0.00	0.00	0.00	0.00	18.00	8.95	0.00	0.00	0.00	0.00	18.00	0.87
	Quarry Filled With Water		4.00	1.11	9.00	1.02	1.00	0.50	2.00	0.67	22.00	6.99	38.00	1.85
	<b>Total Area under Active Mining</b>		34.00	9.42	41.00	4.64	50.00	24.87	71.00	23.90	95.00	30.17	291.00	14.14
RECLAIMED	Barren OB Dump		0.00	0.00	0.00	0.00	0.00	0.00	11.00	3.70	6.00	1.90	17.00	0.83
	Barren backfilled Area		239.00	66.20	84.00	9.50	33.00	16.42	60.00	20.20	111.00	35.24	527.00	25.61
	<b>Total Area under Technical Reclamation</b>		239.00	66.20	84.00	9.50	33.00	16.42	60.00	20.20	111.00	35.24	527.00	25.61
	<b>Total Mining Area</b>		273.00	75.62	125.00	14.14	83.00	41.29	142.00	47.80	212.00	67.31	835.00	40.58
WASTELAND	Waste Lands		1.00	0.28	13.00	1.47	6.00	2.98	9.00	3.03	43.00	13.65	72.00	3.50
	Fly Ash Pond / Sand Body		0.00	0.00	6.00	0.68	0.00	0.00	0.00	0.00	0.00	0.00	6.00	0.29
	<b>Total Wasteland</b>		1.00	0.28	19.00	2.15	6.00	2.98	9.00	3.03	43.00	13.65	78.00	3.79
WATERBODIES	Reservoir, nallah, ponds		0.00	0.00	16.00	1.81	1.00	0.50	1.00	0.34	7.00	2.22	25.00	1.21
	<b>Total Waterbodies</b>		0.00	0.00	16.00	1.81	1.00	0.50	1.00	0.34	7.00	2.22	25.00	1.21
AGRICULTURE	Crop Lands		3.00	0.83	200.00	22.63	1.00	0.50	0.00	0.00	0.00	0.00	204.00	9.91
	Fallow Lands		12.00	3.32	315.00	35.64	63.00	31.34	66.00	22.22	0.00	0.00	456.00	22.16
	<b>Total Agriculture</b>		15.00	4.15	515.00	58.27	64.00	31.84	66.00	22.22	0.00	0.00	660.00	32.07
SETTLEMENTS	Urban Settlement		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Rural Settlement		2.00	0.55	14.00	1.58	0.00	0.00	1.00	0.34	0.00	0.00	17.00	0.83
	Industrial Settlement		1.00	0.28	1.00	0.11	0.00	0.00	3.00	1.01	1.00	0.32	6.00	0.29
	<b>Total Settlement</b>		3.00	0.83	15.00	1.69	0.00	0.00	4.00	1.35	1.00	0.32	23.00	1.12
	<b>Grand Total</b>		361.00	100.00	884.00	100.00	201.00	100.00	297.00	100.00	315.00	100.00	2058.00	100.00















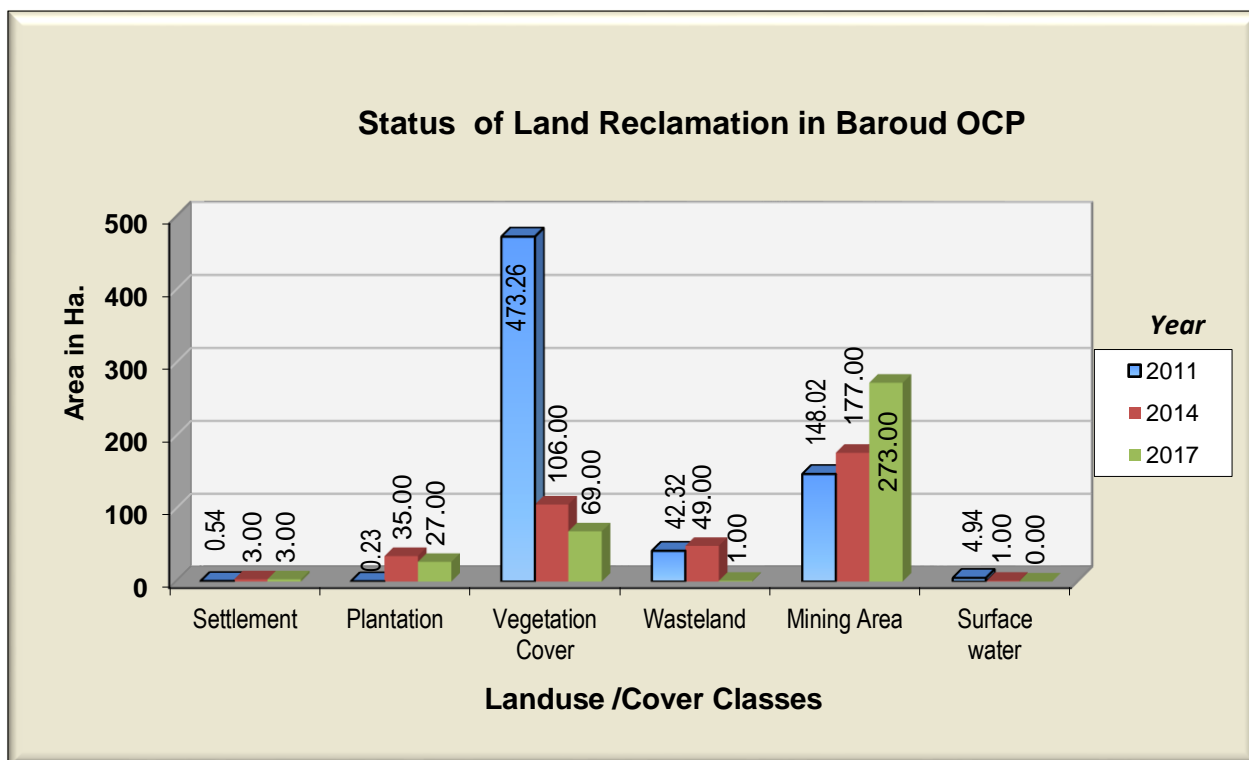


Fig: 6.2

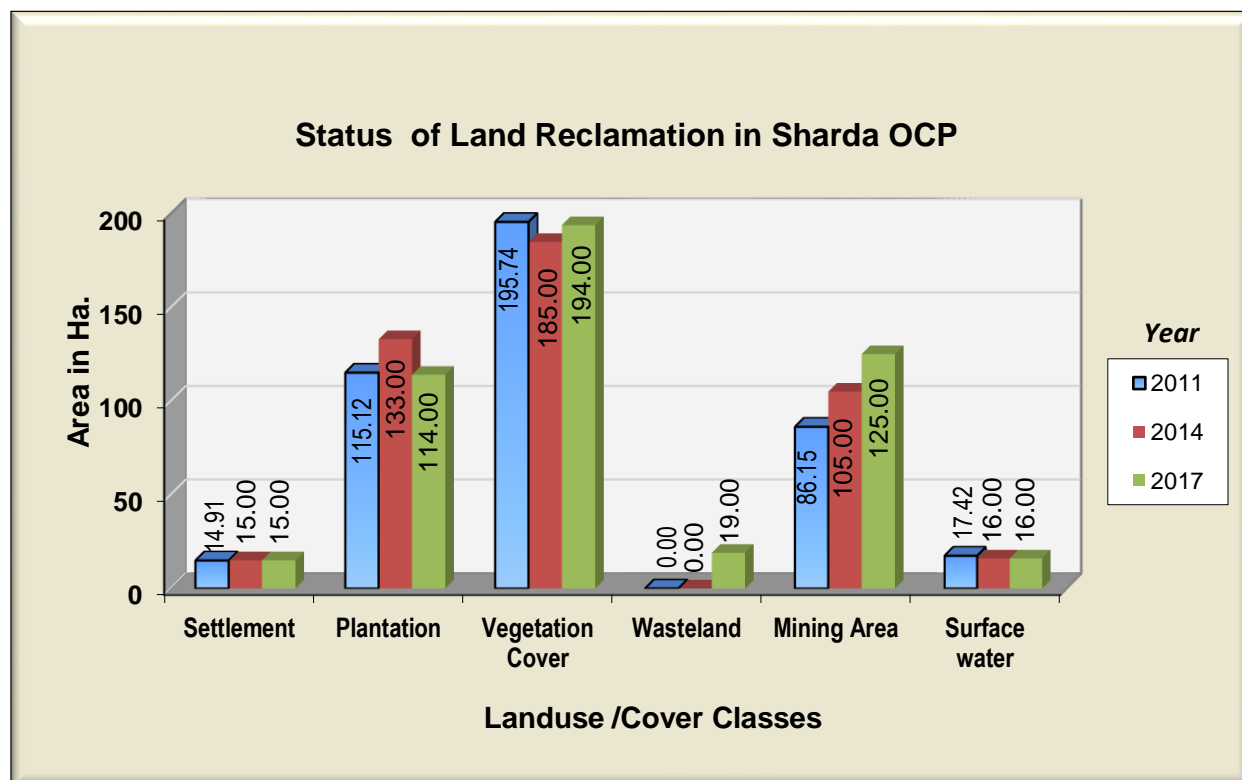


Fig: 6.3

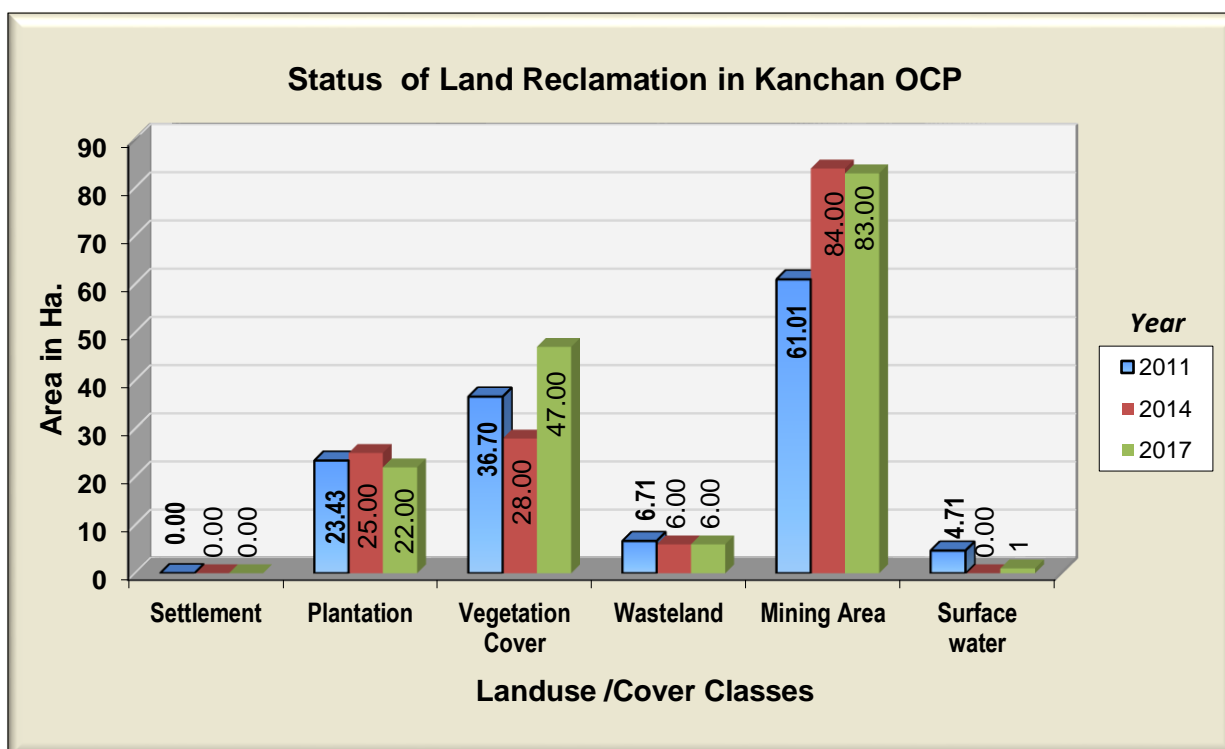


Fig: 6.4

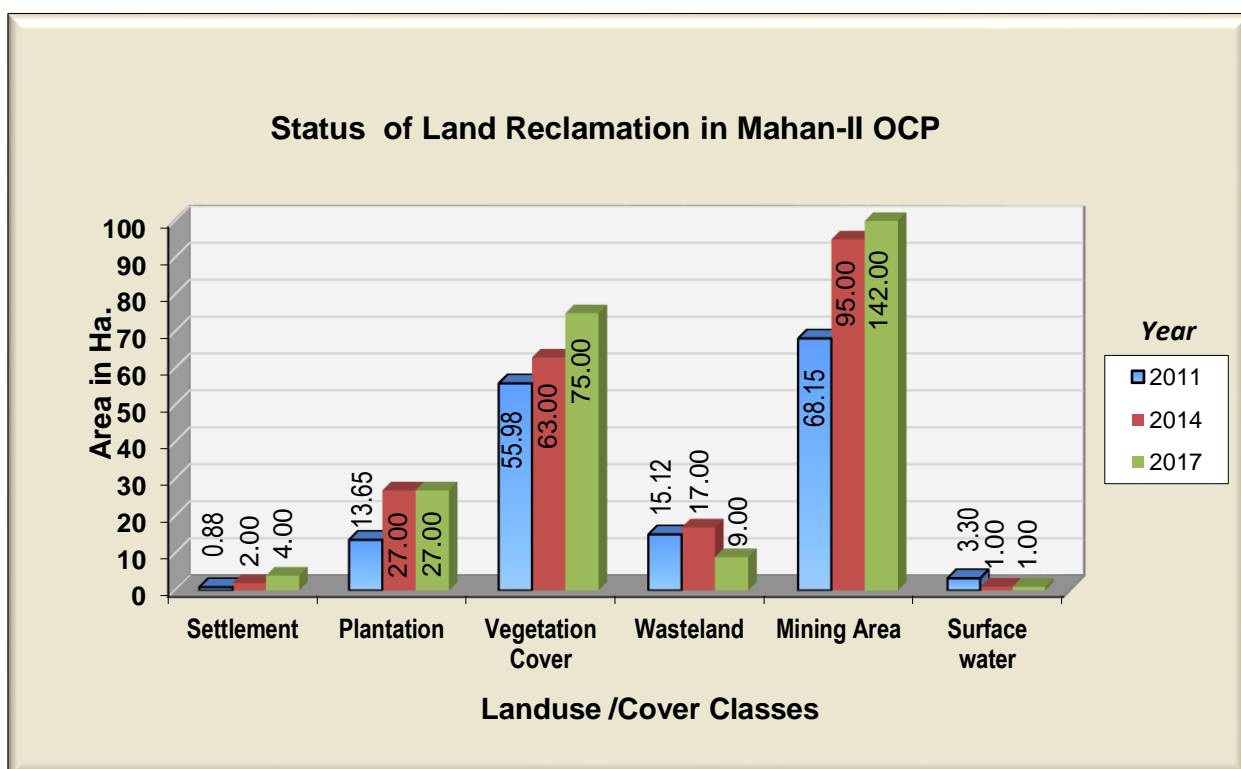
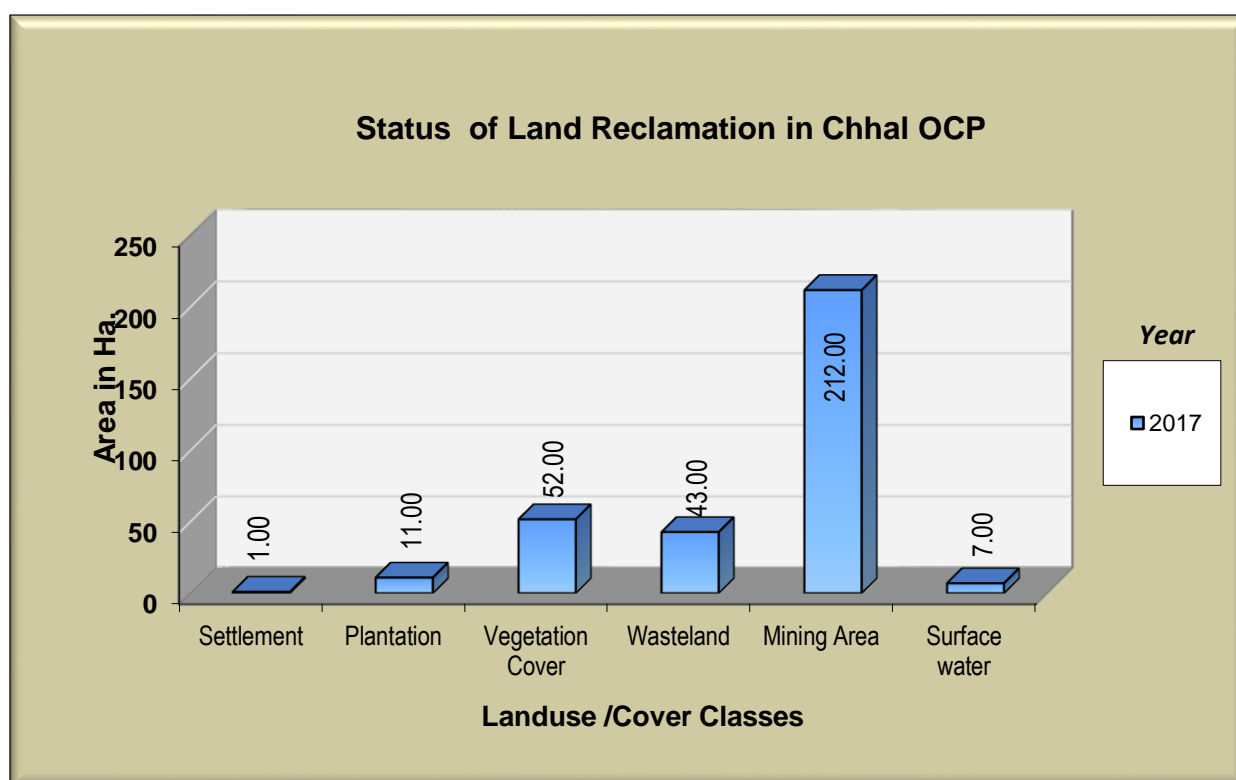
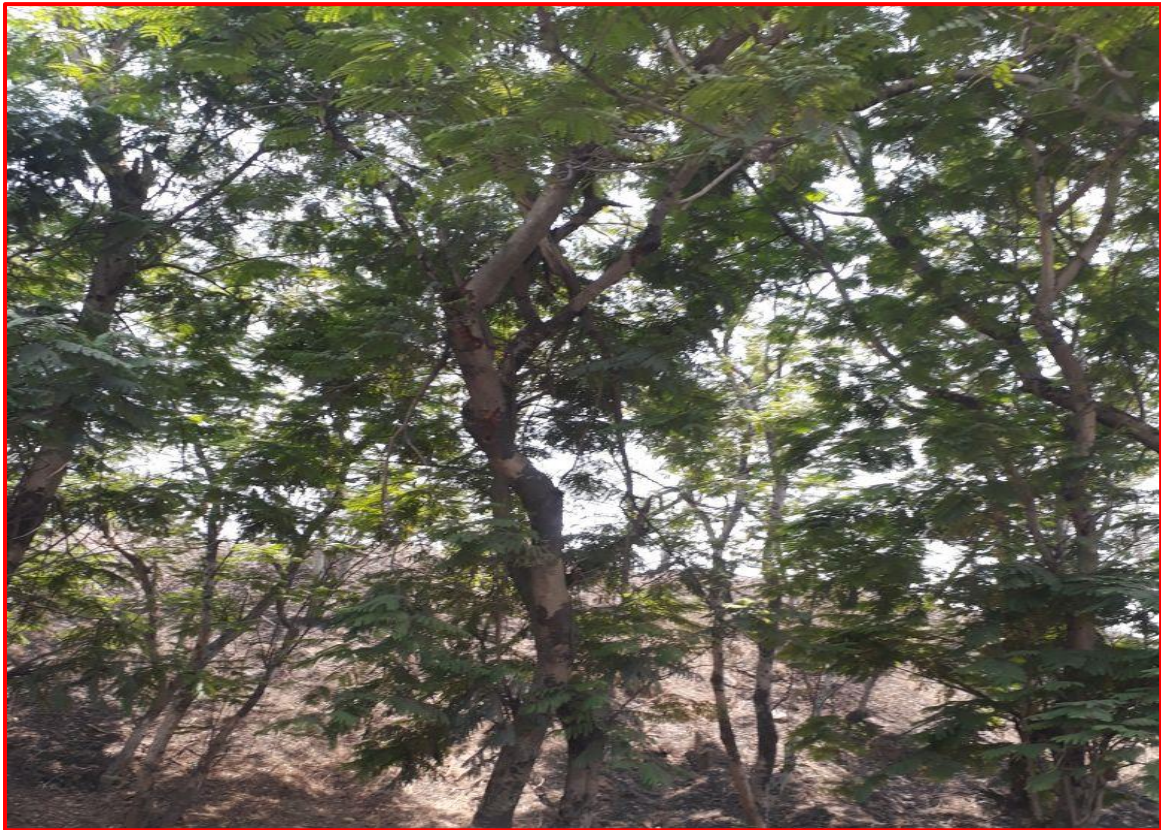


Fig: 6.5

**Fig: 6.6**





**Photograph - 6.1** Plantation on Backfill in Baroud OCP



**Photograph - 6.2** Plantation on Backfill in Chhal OCP





**Photograph -6.3** Plantation on Backfill in Kanchan OCP



**Photograph - 6.4** Plantation under social Forestry in Mahan-II OCP



**Photograph 6.5:** Plantation on Backfill in Sharda OCP

**CENTRAL COALFIELDS LIMITED**

## 7.0 Land Reclamation Status in Central Coalfields Limited

**7.1** Following 13 OC Projects producing less than 5 million m<sup>3</sup> (Coal +OB) of Central Coalfields Ltd. Have been taken up during the year 2017 -18 for land reclamation monitoring:

- Rohini
- Purnadih
- Tapin
- Jharkhand
- Topa
- Urimari
- North Urimari
- New Giddi -C
- Govindpur
- Khasmahal
- Amlo
- Selected Dhor
- Tarmi

**7.2** Project wise Land Reclamation status in CCL is given in Table 7.1 and also shown graphically in Fig 7.1. Area statistics of different land use class present in the mine leasehold of the above projects for the year 2017 are shown in the Table - 7.2. Land use maps derived from satellite data are shown in Plate 7.1 – 7.13. Different land use classes based on satellite data are depicted in Bar Charts in Fig. 7.2 - 7.14.

**7.3** Study reveals that out of total mine leasehold area of 6376.05 Hectares of the 13 OC projects of CCL mentioned above taken for this study in 2017-18; total excavated area is 1210.99 (18.99%) Hectares, out of which 170.20 Ha. (14.05%) has been planted (*Biologically Reclaimed*), 276.25 Ha. (22.81%) is under backfilling (*Technically Reclaimed*) and balance 764.54 hectares (63.13%) is under active mining.

- 7.4** After analyzing the satellite data of year 2017, it is evident that plantation (Green Cover) carried out on backfilled area, OB dumps as well as under social forestry in all the 13 mines of CCL taken up for study, has reached 374.45 Ha (5.87%) till now as compared to 311.05 Ha (4.88%) in the Year 2014. It can also be seen from the table.7.1 that the total area under reclamation has reached 36.87% till the year 2017-18.
- 7.5** Among thirteen projects in CCL taken up for this study, Khasmahal OCP ranks on the tops with 76.38% reclamation followed by Amlo OCP (68.63%) and Rohini OCP (67.70%).
- 7.7** 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 - 7.1

**Project wise Land Reclamation Status in Opencast Projects of  
Central Coalfields Ltd. based on the Satellite data of the year 2017**

(Area in Hectares)

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, Avenue Plantation Etc.										
1	2	3	4		5		6		7		8		9 (=4+5+8)		10 (=5+6+7)		11(=4+5)	
			2014	2017	2014	2017	2014	2017	2014	2017	2014	2017	2014	2017	2014	2017	2014	2017
1	Rohini OCP	258.17	77.65	65.76	27.83	45.38	1.02	1.55	5.48	5.44	26.58	53.02	132.06	164.16	34.33	52.37	105.48	111.14
			58.80%	40.06%	21.07%	27.64%					20.13%	32.30%			13.30%	20.29%	79.87%	67.70%
2	Purnadih OCP	756.00	0.00	0.00	0.00	0.00	0.78	0.06	1.06	0.15	68.93	109.4	68.93	109.40	1.84	0.21	0.00	0.00
			0.00%	0.00%	0.00%	0.00%					100.00%	100.00%			0.24%	0.03%	0.00%	0.00%
3	Tapin OCP	503.00	0.00	0.00	0.00	0.00	17.13	18.88	4.96	4.71	63.71	73.29	63.71	73.29	22.09	23.59	0.00	0.00
			0.00%	0.00%	0.00%	0.00%					100.00%	100.00%			4.39%	4.69%	0.00%	0.00%
4	Jharkhand OCP	323.88	23.26	24.73	18.64	28.85	11.99	11.34	2.48	2.48	43.04	57.13	84.94	110.71	33.11	42.67	41.90	53.58
			27.38%	22.34%	21.94%	26.06%					50.67%	51.60%			10.22%	13.17%	49.33%	48.40%
5	Topa OCP	520.91	0.00	0.00	0.00	0.00	25.73	25.88	14.31	14.24	59.03	67.18	59.03	67.18	40.04	40.12	0.00	0.00
			0.00%	0.00%	0.00%	0.00%					100.00%	100.00%			7.69%	7.70%	0.00%	0.00%
6	Urimari OCP	1443.50	20.33	24.16	25.03	25.03	7.57	7.56	37.58	37.59	76.48	81.97	121.84	131.16	70.18	70.18	45.36	49.19
			16.69%	18.42%	20.54%	19.08%					62.77%	62.50%			4.86%	4.86%	37.23%	37.50%
7	North Urimari OCP	667.73	0.00	0.00	0.00	0.00	10.26	10.15	0.00	0.00	48.94	70.83	48.94	70.83	10.26	10.15	0.00	0.00
			0.00%	0.00%	0.00%	0.00%					100.00%	100.00%			1.54%	1.52%	0.00%	0.00%
8	New Giddi C OCP	210.32	0.00	17.97	0.00	13.97	1.18	2.69	6.47	6.47	26.96	26.72	26.96	58.66	7.65	23.13	0.00	31.94
			0.00%	30.63%	0.00%	23.82%					100.00%	45.55%			3.64%	11.00%	0.00%	54.45%
9	Govindpur OCP	274.95	6.79	23.36	0.00	17.86	9.5	5.16	0.22	0.00	62.74	69.5	69.53	110.72	9.72	23.02	6.79	41.22
			9.77%	21.10%	0.00%	16.13%					90.23%	62.77%			3.54%	8.37%	9.77%	37.23%
10	Khasmahal OCP	280.00	24.08	26.23	23.84	23.84	6.78	6.78	7.14	7.14	13.95	15.48	61.87	65.55	37.76	37.76	47.92	50.07
			38.92%	40.02%	38.53%	36.37%					22.55%	23.62%			13.49%	13.49%	77.45%	76.38%
11	Amlo OCP	247.59	43.46	49.50	7.43	7.43	15.27	15.27	1.40	1.53	24.38	26.02	75.27	82.95	24.10	24.23	50.89	56.93
			57.74%	59.67%	9.87%	8.96%					32.39%	31.37%			9.73%	9.79%	67.61%	68.63%
12	Selected Dhori OCP	300.00	20.24	22.01	0.00	0.00	4.92	4.92	0.11	0.11	81.02	92.38	101.26	114.39	5.03	5.03	20.24	22.01
			19.99%	19.24%	0.00%	0.00%					80.01%	80.76%			1.68%	1.68%	19.99%	19.24%
13	Tami OCP	590.00	3.59	22.53	0.00	7.84	13.27	12.62	1.67	1.53	24.34	21.62	27.93	51.99	14.94	21.99	3.59	30.37
			12.85%	43.34%	0.00%	15.08%					87.15%	41.58%			2.53%	3.73%	12.85%	58.42%
	TOTAL	6376.05	219.40	276.25	102.77	170.20	125.40	122.86	82.88	81.39	620.10	764.54	942.27	1210.99	311.05	374.45	322.17	446.45
			23.28%	22.81%	10.91%	14.05%					65.81%	63.13%			4.88%	5.87%	34.19%	36.87%

( % 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 barren backfilled only
3. Area under Active mining includes coal quarry site, quarry filled with water etc.
4. Social Forestry and Plantation on external OB dump are not included in Biological Reclamation and are put under separate categories as shown in the table.
5. (%) calculated in the above table is in respect of total excavated area except for "Total area under plantation" where % is in terms of leasehold area.

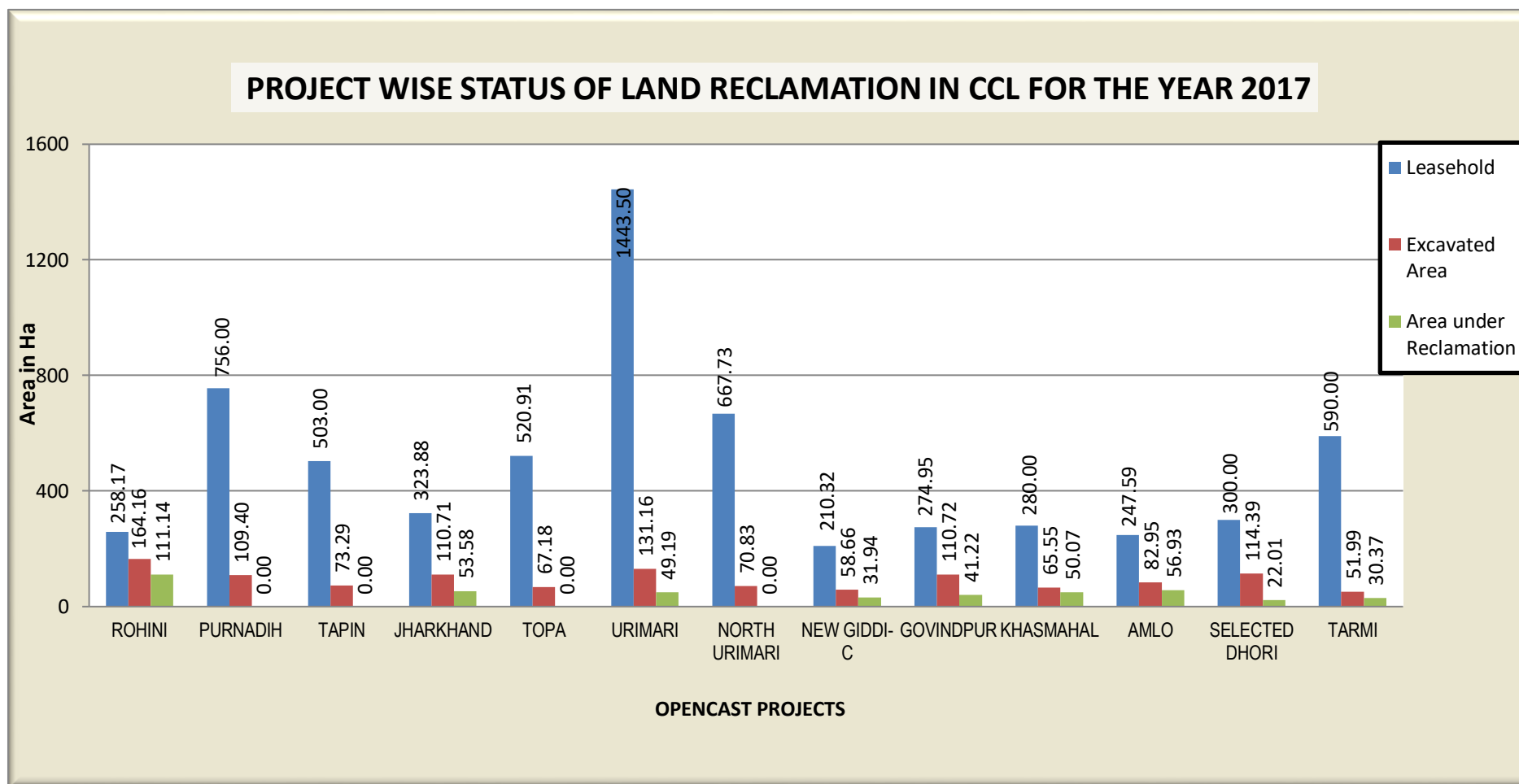
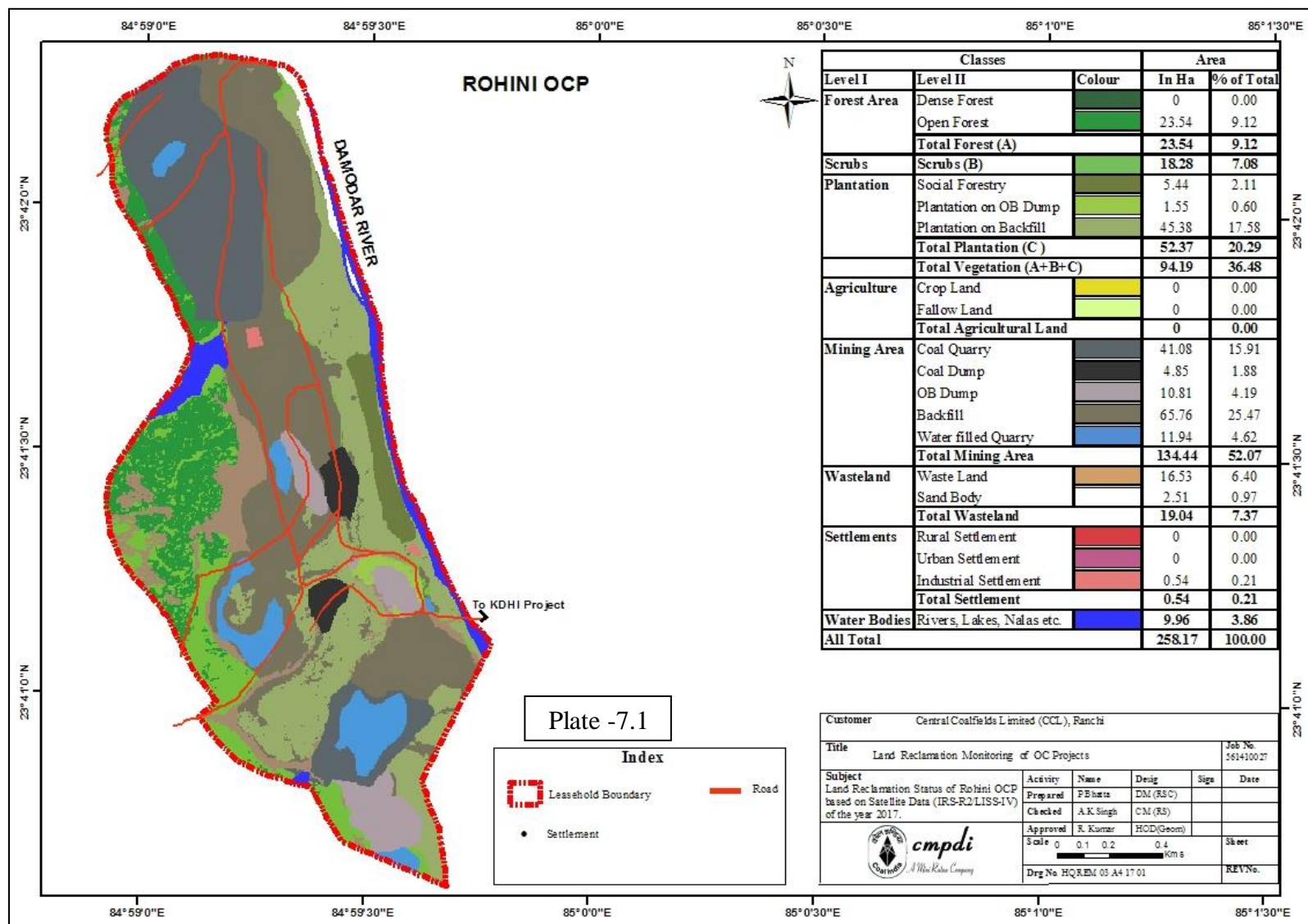


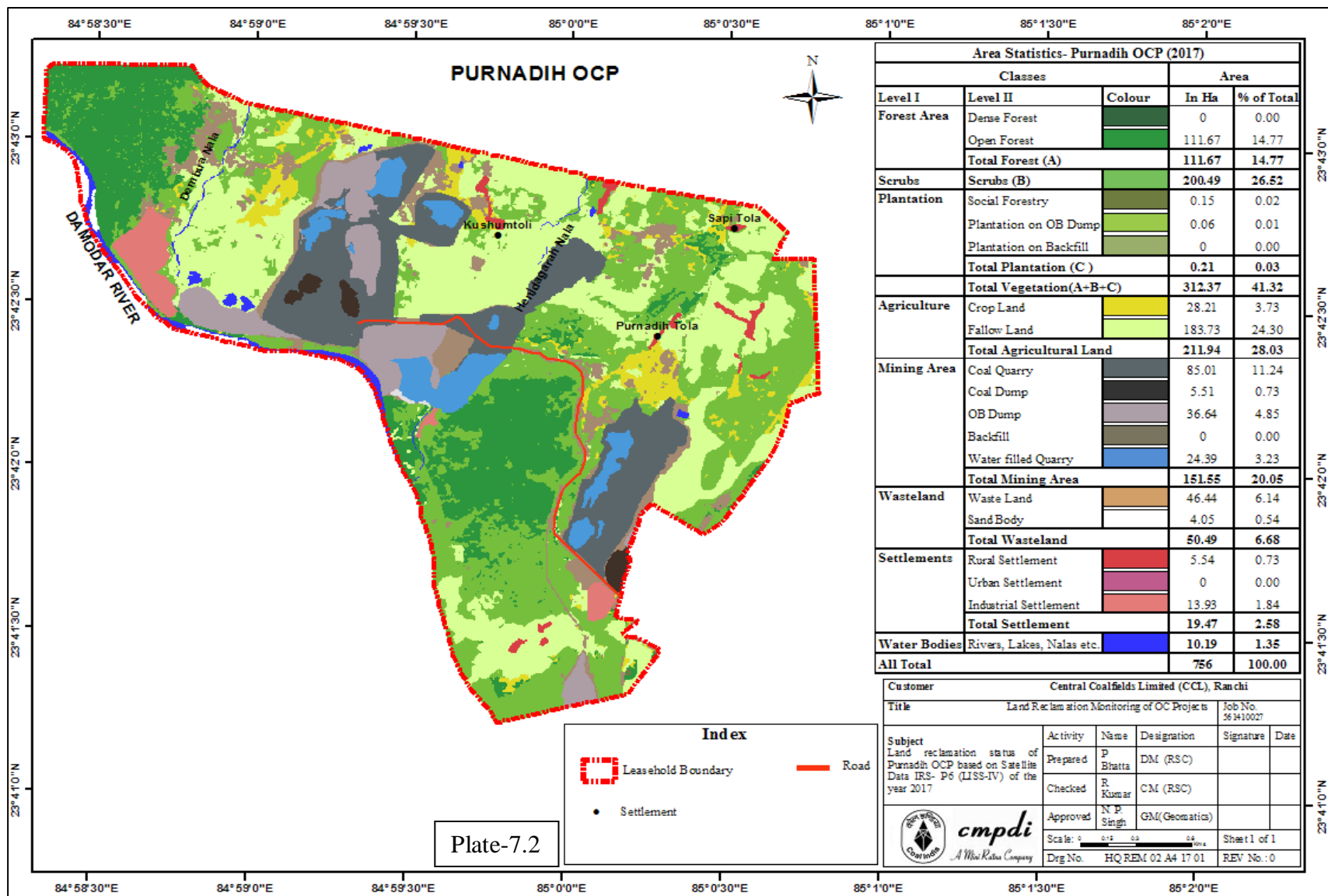
Fig. 7.1: Project wise Land Reclamation Status in CCL

**Table 7.2 : .Area statistics of different land use class present in the mine leasehold of the Opencast projects of CCL for the year 2017**

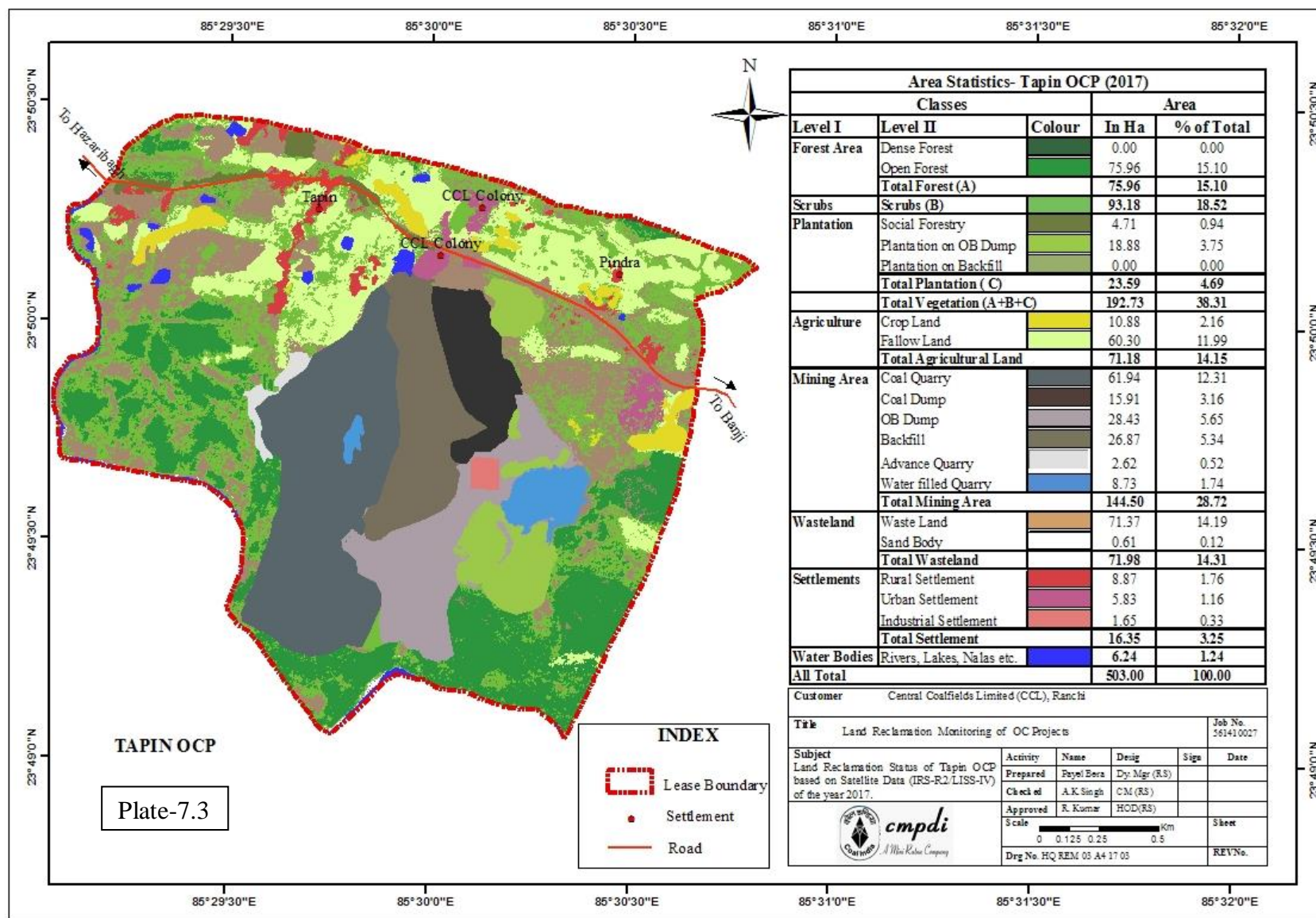
(Area in Hectares)

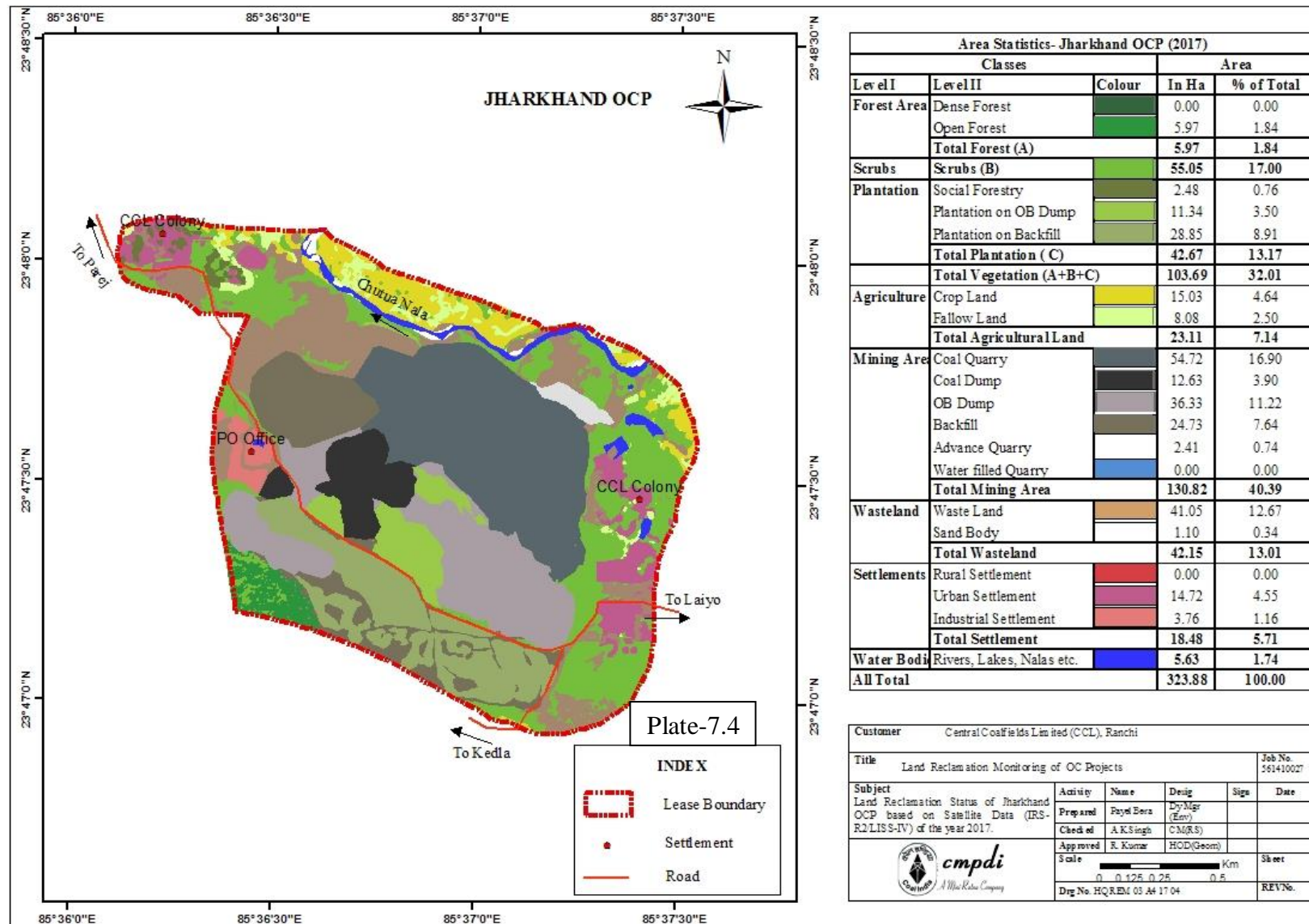
		ROHINI		PURNADIH		TAPIN		JHARKHAND		TOPA		URIMARI		NORTH URIMARI		NEW GIDDL-C		GOVINDPUR		KHAMMAHAL		AMLO		SELECTED DHORI		TARMI		TOTAL	
		Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%
FORESTS	Dense Forest	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.61	0.25	0.02	0.01	0.01	0.00	0.65	0.01
	Open Forest	23.54	9.12	111.67	14.77	75.96	15.10	5.97	1.84	0.00	0.00	180.16	12.48	30.75	4.60	0.00	0.00	23.15	8.42	62.89	22.46	19.58	7.91	3.80	1.26	57.76	9.79	595.23	9.34
	<b>Total Forest (A)</b>	<b>23.54</b>	<b>9.12</b>	<b>111.67</b>	<b>14.77</b>	<b>75.96</b>	<b>15.10</b>	<b>5.97</b>	<b>1.84</b>	<b>0.00</b>	<b>0.00</b>	<b>180.16</b>	<b>12.48</b>	<b>30.75</b>	<b>4.60</b>	<b>0.00</b>	<b>0.00</b>	<b>23.15</b>	<b>8.42</b>	<b>62.90</b>	<b>22.46</b>	<b>20.19</b>	<b>8.16</b>	<b>3.82</b>	<b>1.27</b>	<b>57.77</b>	<b>9.79</b>	<b>595.88</b>	<b>9.35</b>
PLANTATION	<b>Scrubs (B)</b>	<b>18.28</b>	<b>7.08</b>	<b>200.49</b>	<b>26.52</b>	<b>93.18</b>	<b>18.52</b>	<b>55.05</b>	<b>17.00</b>	<b>116.90</b>	<b>22.44</b>	<b>320.98</b>	<b>22.24</b>	<b>164.91</b>	<b>24.70</b>	<b>72.42</b>	<b>34.43</b>	<b>68.78</b>	<b>25.02</b>	<b>49.50</b>	<b>17.68</b>	<b>44.79</b>	<b>18.09</b>	<b>24.41</b>	<b>8.14</b>	<b>159.80</b>	<b>27.08</b>	<b>1389.49</b>	<b>21.79</b>
	Social Forestry	5.44	2.11	0.15	0.02	4.71	0.94	2.48	0.76	14.24	2.73	37.59	2.60	0.00	0.00	6.47	3.08	0.00	0.00	7.14	2.55	1.53	0.62	0.11	0.04	1.53	0.26	81.39	1.28
	Plantation on OB Dump	1.55	0.60	0.06	0.01	18.88	3.75	11.34	3.50	25.88	4.97	7.56	0.52	10.15	1.52	2.69	1.28	5.16	1.88	6.78	2.42	15.27	6.17	4.92	1.64	12.62	2.14	122.86	1.93
	Plantation on Backfill (Biological Reclamation)	45.38	17.58	0.00	0.00	0.00	0.00	28.85	8.91	0.00	0.00	25.03	1.73	0.00	0.00	13.97	6.64	17.86	6.49	23.84	8.51	7.43	3.00	0.00	0.00	7.84	1.33	170.20	2.67
	<b>Total Area under Plantation (C)</b>	<b>52.37</b>	<b>20.29</b>	<b>0.21</b>	<b>0.03</b>	<b>23.59</b>	<b>4.69</b>	<b>42.67</b>	<b>13.17</b>	<b>40.12</b>	<b>7.70</b>	<b>70.18</b>	<b>4.85</b>	<b>10.15</b>	<b>1.52</b>	<b>23.13</b>	<b>11.00</b>	<b>23.02</b>	<b>8.37</b>	<b>37.76</b>	<b>13.48</b>	<b>24.23</b>	<b>9.79</b>	<b>5.03</b>	<b>1.68</b>	<b>21.99</b>	<b>3.73</b>	<b>374.45</b>	<b>5.88</b>
<b>Total Vegetation (A+B+C)</b>		<b>94.19</b>	<b>36.49</b>	<b>312.37</b>	<b>41.32</b>	<b>192.73</b>	<b>38.31</b>	<b>103.69</b>	<b>32.01</b>	<b>157.02</b>	<b>30.14</b>	<b>571.32</b>	<b>39.57</b>	<b>205.81</b>	<b>30.82</b>	<b>95.55</b>	<b>45.43</b>	<b>114.95</b>	<b>41.80</b>	<b>150.16</b>	<b>53.63</b>	<b>89.21</b>	<b>36.04</b>	<b>33.26</b>	<b>11.09</b>	<b>239.56</b>	<b>40.60</b>	<b>2359.82</b>	<b>37.02</b>
ACTIVE MINING	Coal Dump	4.85	1.88	5.51	0.73	15.91	3.16	12.63	3.90	3.94	0.76	6.34	0.44	13.69	2.05	7.58	3.60	5.31	1.93	8.85	3.16	6.95	2.81	9.96	3.32	4.87	0.83	106.39	1.67
	Coal Quarry	41.08	15.91	85.01	11.24	61.94	12.31	54.72	16.90	50.90	9.77	67.50	4.68	58.36	8.74	18.20	8.65	54.02	19.65	13.98	4.99	15.30	6.18	82.66	27.55	14.94	2.53	618.61	9.70
	Coal Face	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
	Advance Quarry Site	0.00	0.00	0.00	0.00	2.62	0.52	2.41	0.74	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	5.03	0.08
	Quarry Filled with Water	11.94	4.62	24.39	3.23	8.73	1.74	0.00	0.00	16.28	3.13	14.47	1.00	12.47	1.87	8.52	4.05	15.48	5.63	1.50	0.54	10.72	4.33	9.72	3.24	6.68	1.13	140.90	2.21
	<b>Total Area under Active Mining</b>	<b>53.02</b>	<b>20.53</b>	<b>109.40</b>	<b>14.47</b>	<b>73.29</b>	<b>14.57</b>	<b>57.13</b>	<b>17.64</b>	<b>67.18</b>	<b>12.90</b>	<b>81.97</b>	<b>5.68</b>	<b>70.83</b>	<b>10.61</b>	<b>26.72</b>	<b>12.70</b>	<b>69.50</b>	<b>25.28</b>	<b>15.48</b>	<b>5.53</b>	<b>26.02</b>	<b>10.51</b>	<b>92.38</b>	<b>30.79</b>	<b>21.62</b>	<b>3.66</b>	<b>764.54</b>	<b>11.99</b>
	Barren OB dump	10.81	4.19	36.64	4.85	28.43	5.65	36.33	11.22	58.90	11.31	47.90	3.32	51.46	7.71	9.90	4.71	18.36	6.68	28.22	10.08	10.83	4.37	68.82	22.94	17.02	2.88	423.62	6.64
Reclaimed	Area Under Backfilling	65.76	25.47	0.00	0.00	26.87	5.34	24.73	7.64	0.00	0.00	24.16	1.67	0.00	0.00	17.97	8.54	23.36	8.50	26.23	9.37	49.50	19.99	22.01	7.34	22.53	3.82	303.12	4.75
	<b>Total Area under Technical Reclamation</b>	<b>65.76</b>	<b>25.47</b>	<b>0.00</b>	<b>0.00</b>	<b>26.87</b>	<b>5.34</b>	<b>24.73</b>	<b>7.64</b>	<b>0.00</b>	<b>0.00</b>	<b>24.16</b>	<b>1.67</b>	<b>0.00</b>	<b>0.00</b>	<b>17.97</b>	<b>8.54</b>	<b>23.36</b>	<b>8.50</b>	<b>26.23</b>	<b>9.37</b>	<b>49.50</b>	<b>19.99</b>	<b>22.01</b>	<b>7.34</b>	<b>22.53</b>	<b>3.82</b>	<b>303.12</b>	<b>4.75</b>
	<b>Total Area under Mine Operation</b>	<b>134.44</b>	<b>52.07</b>	<b>151.55</b>	<b>20.05</b>	<b>144.50</b>	<b>28.72</b>	<b>130.82</b>	<b>40.40</b>	<b>130.02</b>	<b>24.97</b>	<b>160.37</b>	<b>11.11</b>	<b>135.98</b>	<b>20.37</b>	<b>62.17</b>	<b>29.55</b>	<b>116.53</b>	<b>42.39</b>	<b>78.78</b>	<b>28.14</b>	<b>93.30</b>	<b>37.68</b>	<b>193.17</b>	<b>64.39</b>	<b>66.04</b>	<b>11.19</b>	<b>1597.67</b>	<b>25.05</b>
WASTELANDS	Waste Lands	16.53	6.4	46.44	6.14	71.37	14.19	41.05	12.67	92.33	17.72	351.32	24.34	65.15	9.76	12.02	5.72	19.18	6.98	13.21	4.72	52.26	21.11	26.91	8.97	94.00	15.93	901.77	14.10
	Fly Ash Pond/Sand Body	2.51	0.97	4.05	0.54	0.61	0.12	1.10	0.34	0.01	0.00	32.12	2.23	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.31	3.10	16.17	2.74	65.88	1.03
	<b>Total Wastelands</b>	<b>19.04</b>	<b>7.37</b>	<b>50.49</b>	<b>6.68</b>	<b>71.98</b>	<b>14.31</b>	<b>42.15</b>	<b>13.01</b>	<b>92.34</b>	<b>17.72</b>	<b>383.44</b>	<b>26.57</b>	<b>65.15</b>	<b>9.76</b>	<b>12.02</b>	<b>5.72</b>	<b>19.18</b>	<b>6.98</b>	<b>13.21</b>	<b>4.72</b>	<b>52.26</b>	<b>21.11</b>	<b>36.22</b>	<b>12.07</b>	<b>110.17</b>	<b>18.67</b>	<b>967.65</b>	<b>15.13</b>
WATER	Reservoir, nallah, ponds etc.	9.96	3.86	10.19	1.35	6.24	1.24	5.63	1.74	2.11	0.41	52.07	3.61	4.62	0.69	0.01	0	0.44	0.16	0.97	0.36	0.94	0.38	5.85	1.95	10.37	1.76	109.40	1.72
	<b>Total Waterbodies</b>	<b>9.96</b>	<b>3.86</b>	<b>10.19</b>	<b>1.35</b>	<b>6.24</b>	<b>1.24</b>	<b>5.63</b>	<b>1.74</b>	<b>2.11</b>	<b>0.41</b>	<b>52.07</b>	<b>3.61</b>	<b>4.62</b>	<b>0.69</b>	<b>0.01</b>	<b>0</b>	<b>0.44</b>	<b>0.16</b>	<b>0.97</b>	<b>0.36</b>	<b>0.94</b>	<b>0.38</b>	<b>5.85</b>	<b>1.95</b>	<b>10.37</b>	<b>1.76</b>	<b>109.40</b>	<b>1.72</b>
AGRICULTURE	Crop Lands	0.00	0.00	28.21	3.73	10.88	2.16	15.03	4.64	0.03	0.01	0.00	0.00	43.52	6.52	23.03	10.95	8.71	3.17	2.48	0.89	0.00	0.00	0.24	0.08	6.69	1.13	138.82	2.18
	Fallow Lands	0.00	0.00	183.73	24.30	60.30	11.99	8.08	2.50	101.80	19.54	226.37	15.68	189.31	28.35	11.88	5.65	13.66	4.97	23.04	8.23	1.50	0.61	22.89	7.63	129.51	21.95	972.07	15.25
	<b>Total Agriculture</b>	<b>0.00</b>	<b>0.00</b>	<b>211.94</b>	<b>28.03</b>	<b>71.18</b>	<b>14.15</b>	<b>23.11</b>	<b>7.14</b>	<b>101.83</b>	<b>19.55</b>	<b>226.37</b>	<b>15.68</b>	<b>232.83</b>	<b>34.87</b>	<b>34.91</b>	<b>16.60</b>	<b>22.37</b>	<b>8.14</b>	<b>25.52</b>	<b>9.12</b>	<b>1.50</b>	<b>0.61</b>	<b>23.13</b>	<b>7.71</b>	<b>136.20</b>	<b>23.08</b>	<b>1110.89</b>	<b>17.42</b>
SETTLEMENTS	Urban Settlement	0.00	0.00	0.00	0.00	5.83	1.16	14.72	4.55	25.55	4.90	18.43	1.28	0.00	0.00	2.50	1.19	0.00	0.00	7.85	2.80	1.57	0.63	6.47	2.16	14.16	2.40	97.08	1.52
	Rural Settlement	0.00	0.00	5.54	0.73	8.87	1.76	0.00	0.00	11.38	2.18	23.57	1.63	21.29	3.18	3.11	1.48	1.49	0.54	1.39	0.50	4.08	1.65	0.48	0.16	8.45	1.43	89.65	1.41
	Industrial Settlement	0.54	0.21	13.93	1.84	1.65	0.33	3.76	1.16	0.66	0.13	7.93	0.55	2.05	0.31	0.05	0.02	0.00	0.00	2.13	0.76	4.73	1.91	1.42	0.47	5.05	0.86	43.90	0.69
	<b>Total Settlements</b>	<b>0.54</b>	<b>0.21</b>	<b>19.47</b>	<b>2.57</b>	<b>16.35</b>	<b>3.25</b>	<b>18.48</b>	<b>5.71</b>	<b>37.59</b>	<b>7.21</b>	<b>49.93</b>	<b>3.46</b>	<b>23.34</b>	<b>3.49</b>	<b>5.66</b>	<b>2.69</b>	<b>1.49</b>	<b>0.54</b>	<b>11.37</b>	<b>4.06</b>	<b>10.38</b>	<b>4.19</b>	<b>8.37</b>	<b>2.79</b>	<b>27.66</b>	<b>4.69</b>	<b>230.63</b>	<b>3.62</b>
<b>GRAND TOTAL</b>		<b>258.17</b>	<b>100.00</b>	<b>756.00</b>	<b>100.00</b>	<b>503.00</b>	<b>100.00</b>	<b>323.88</b>	<b>100.00</b>	<b>520.91</b>	<b>100.00</b>	<b>1443.50</b>	<b>100.00</b>	<b>667.73</b>	<b>100.00</b>	<b>210.32</b>	<b>100.00</b>	<b>274.95</b>	<b>100.00</b>	<b>280.01</b>	<b>100.00</b>	<b>247.59</b>	<b>100.00</b>	<b>300.00</b>	<b>100.00</b>	<b>590.00</b>	<b>100.00</b>	<b>6376.05</b>	<b>100.00</b>













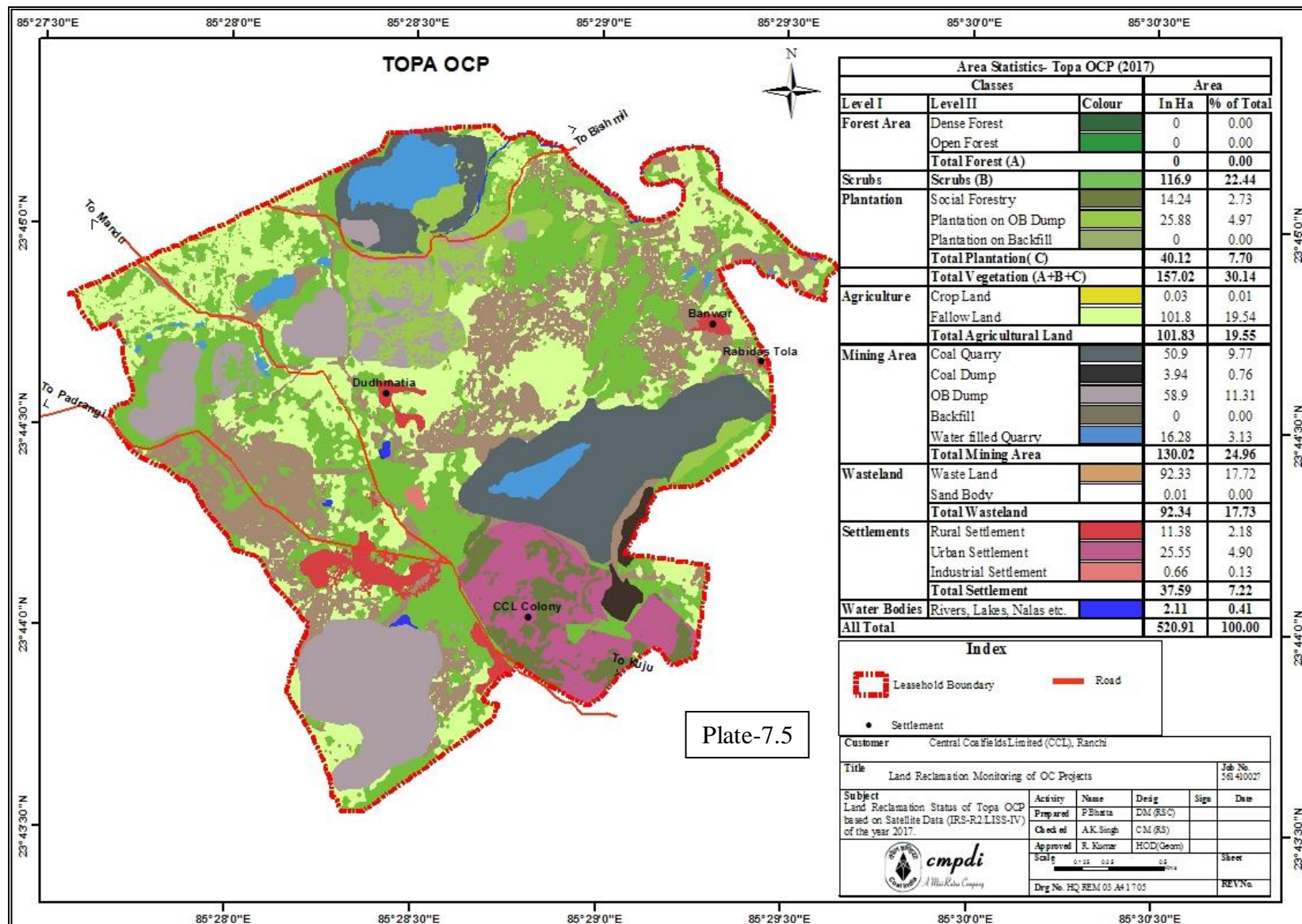
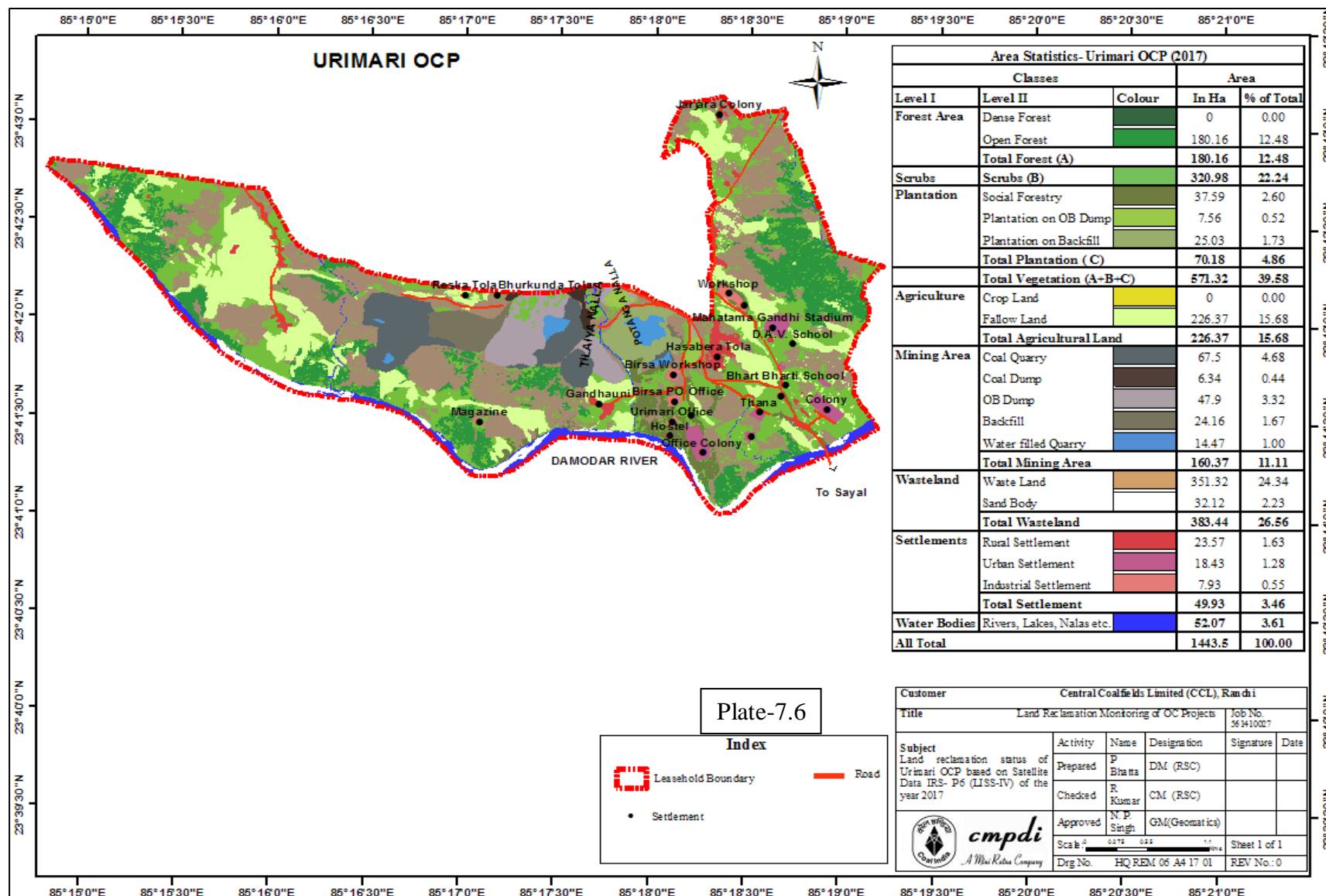
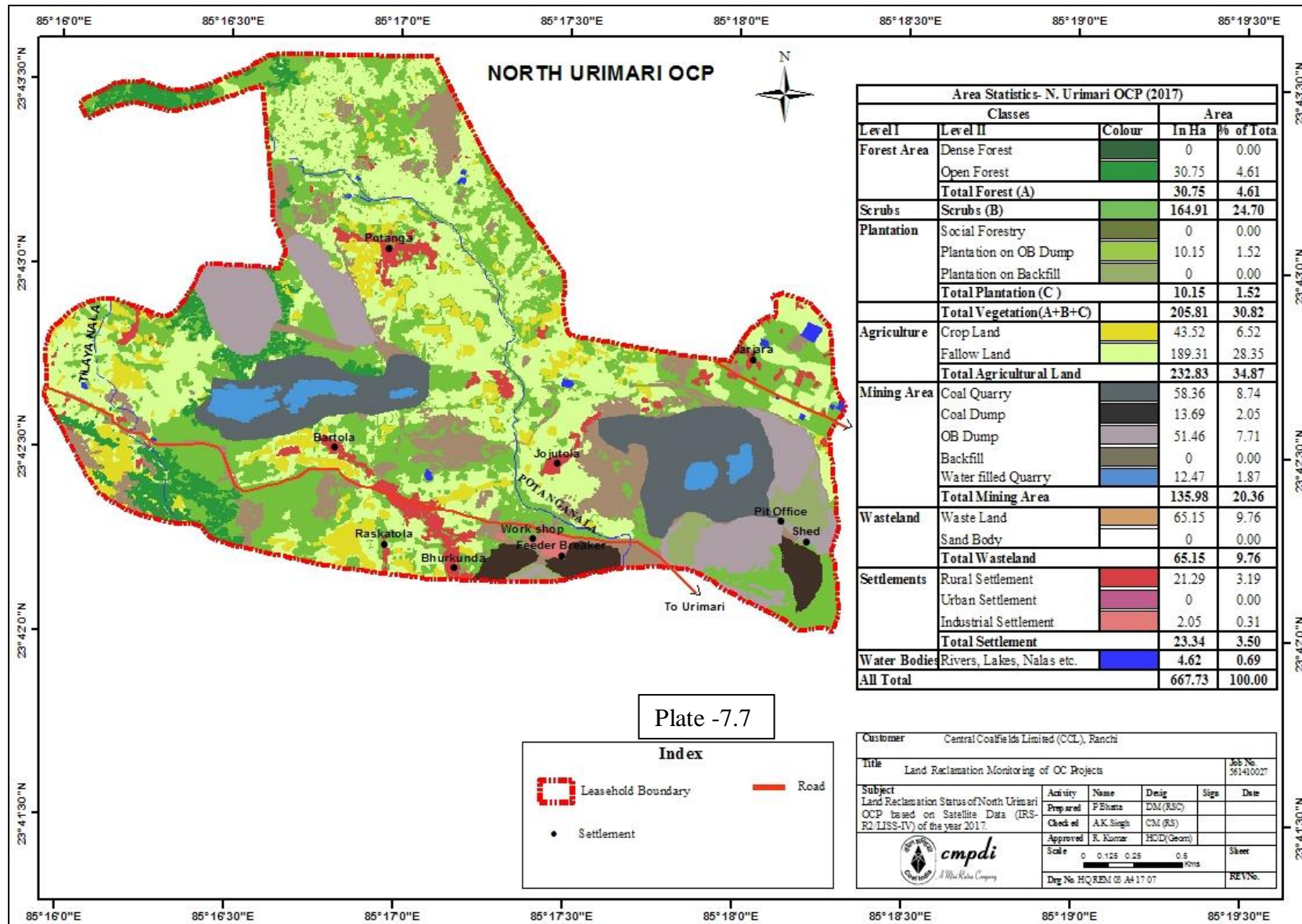
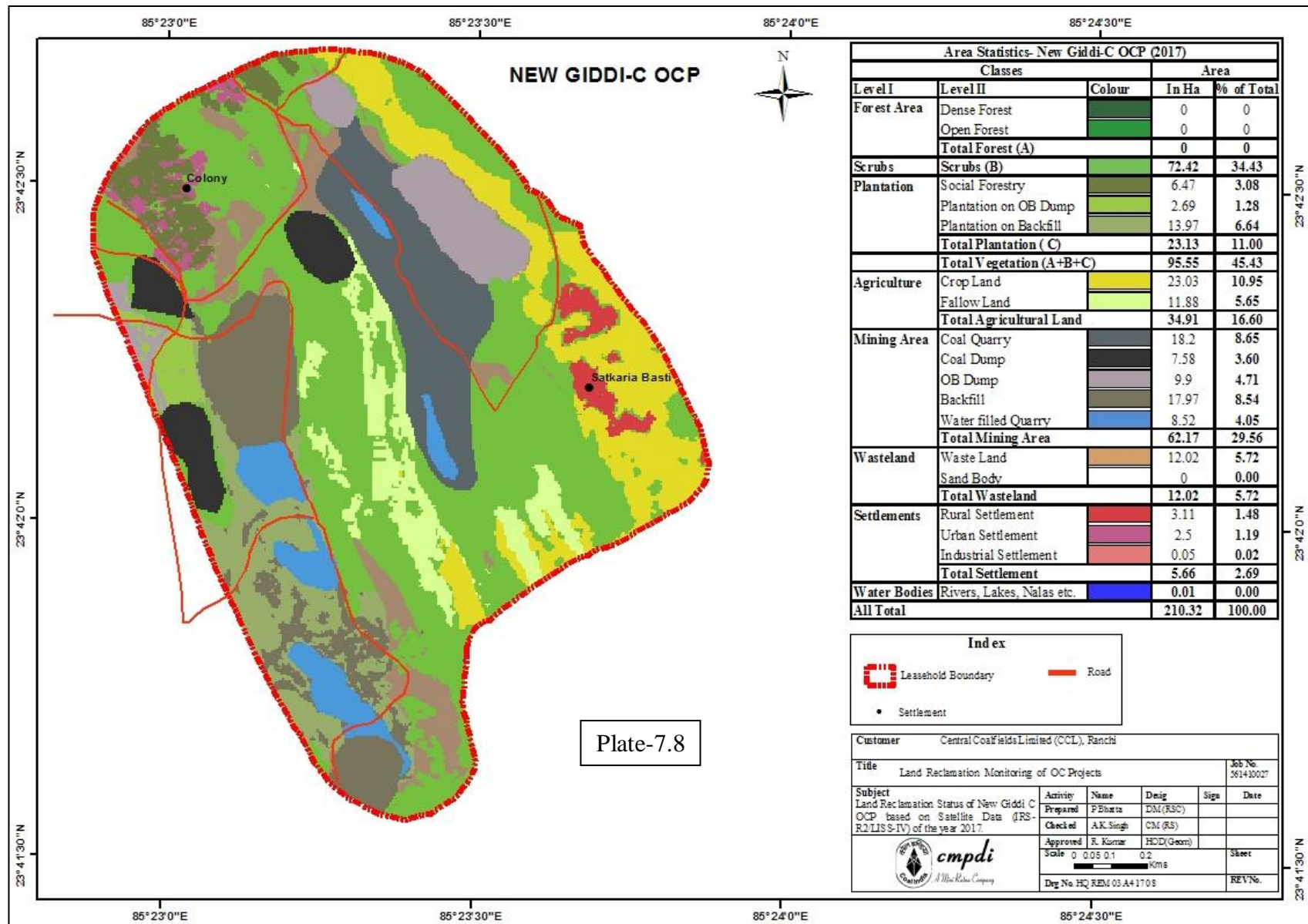


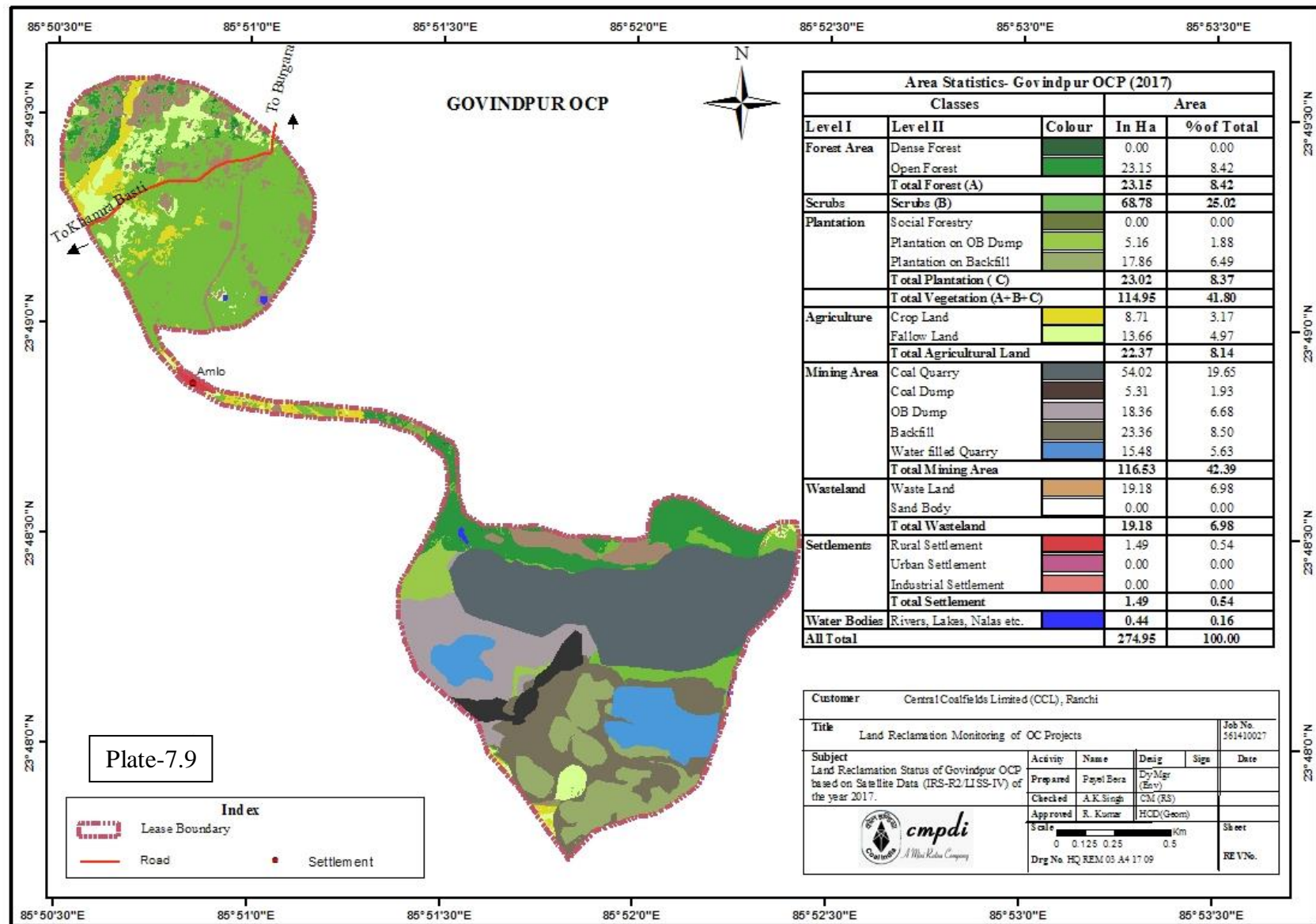
Plate-7.5

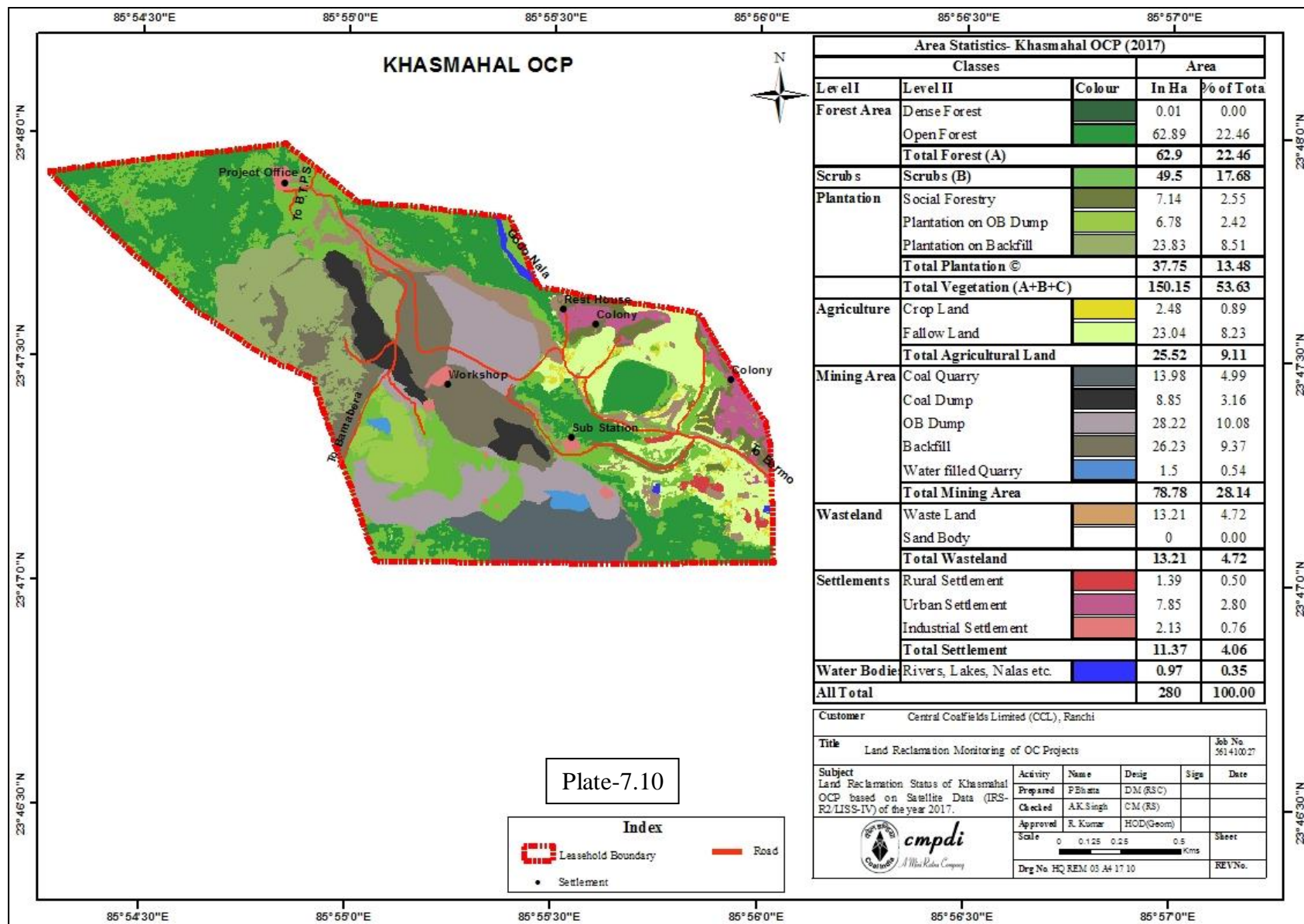




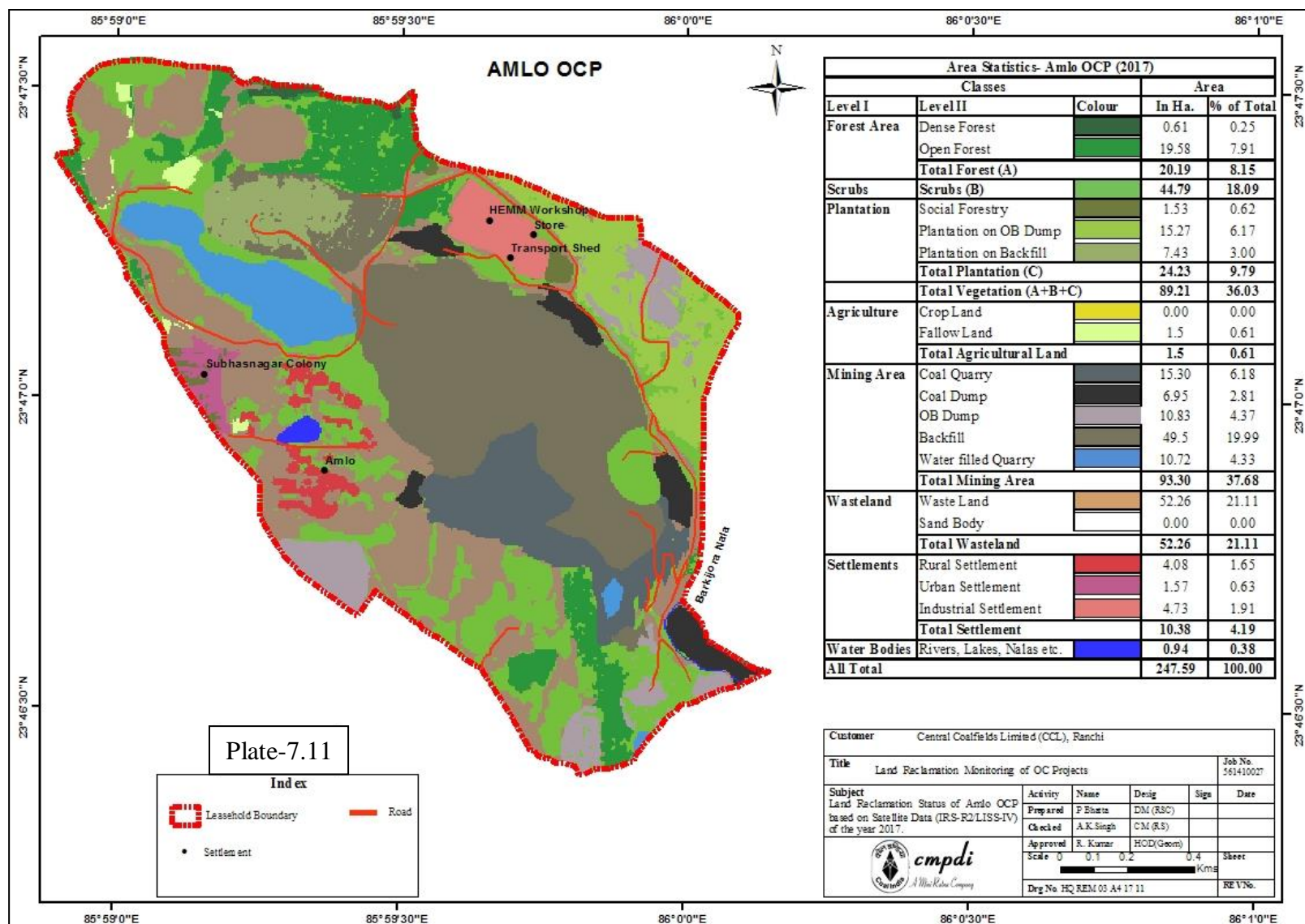


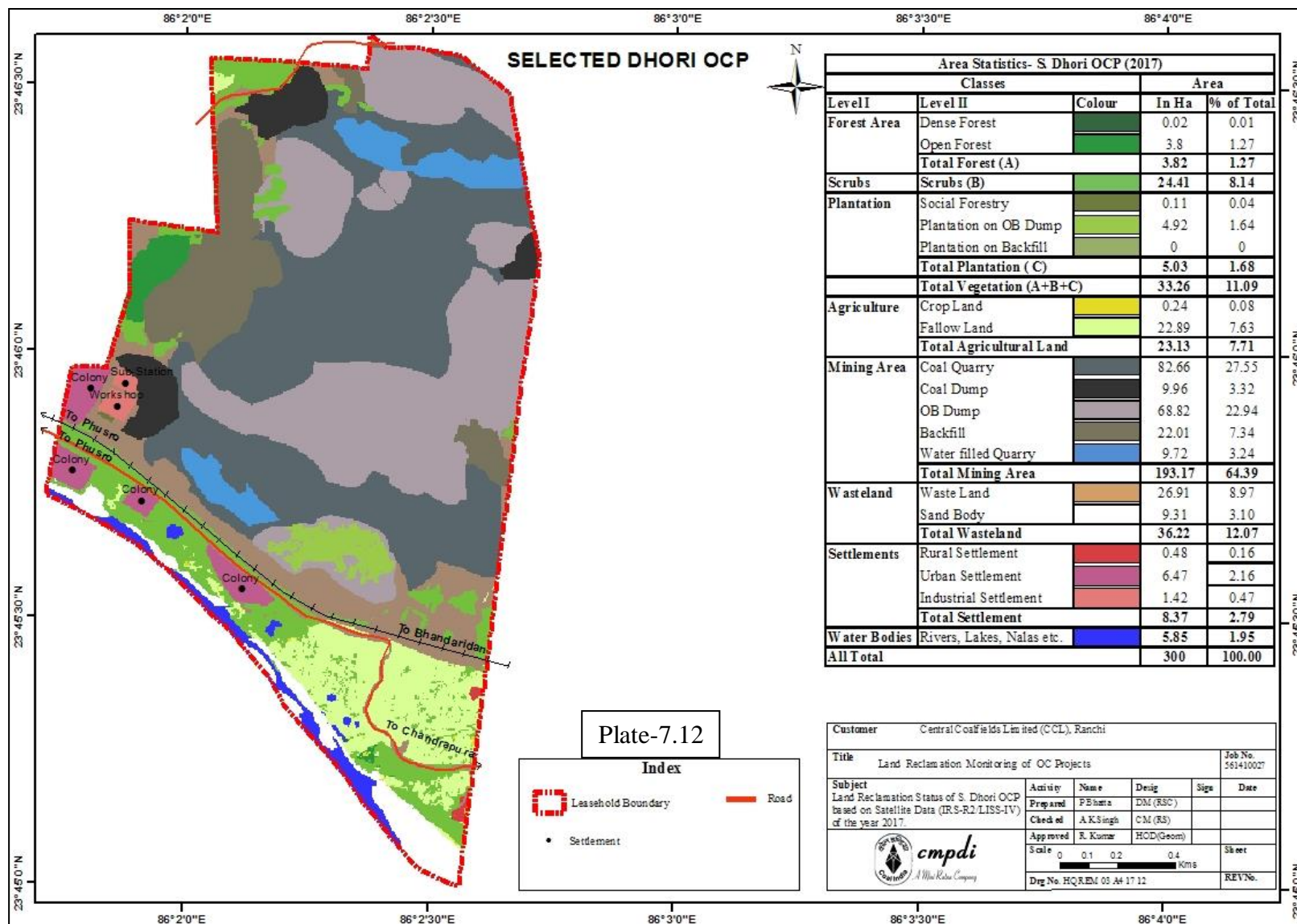




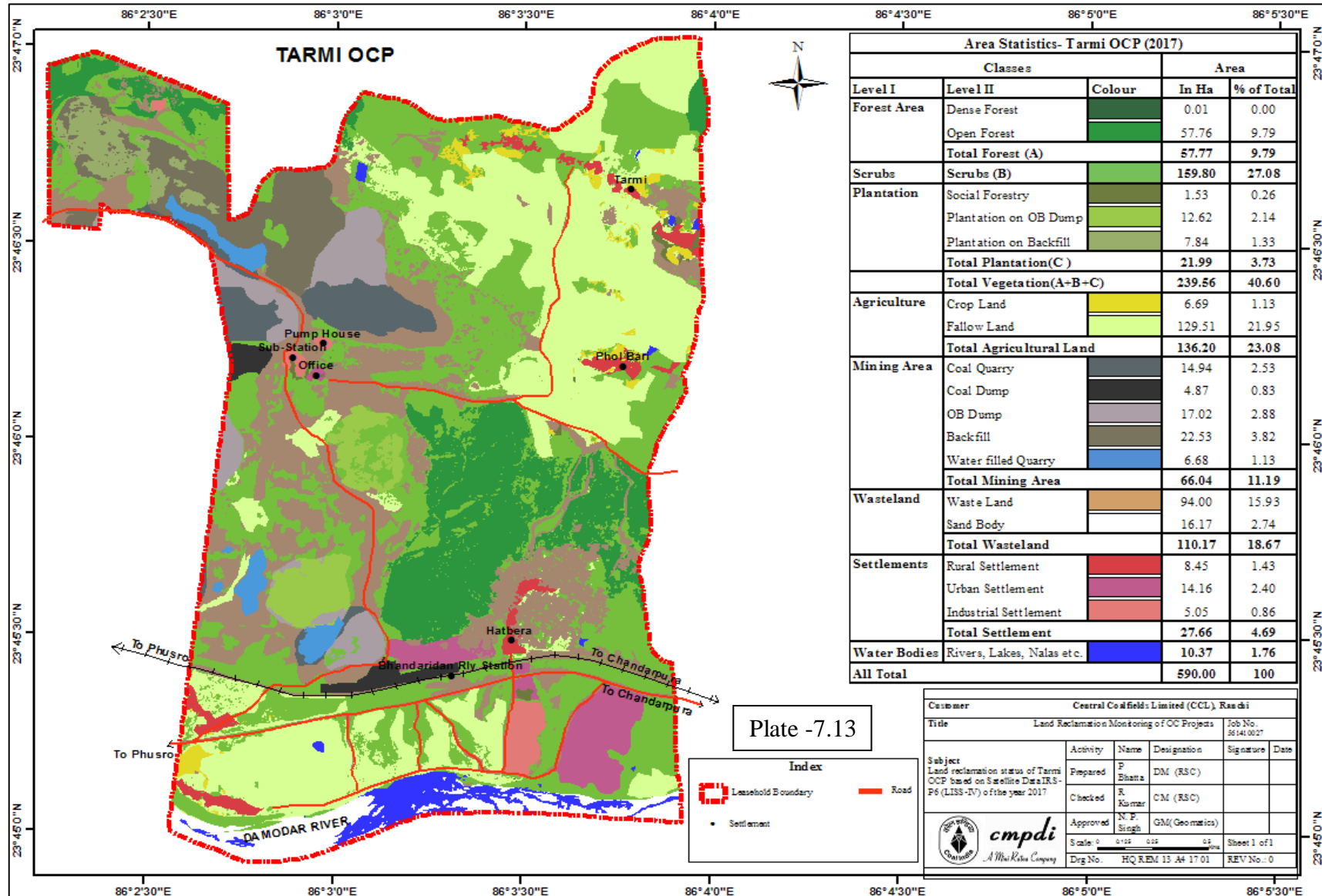












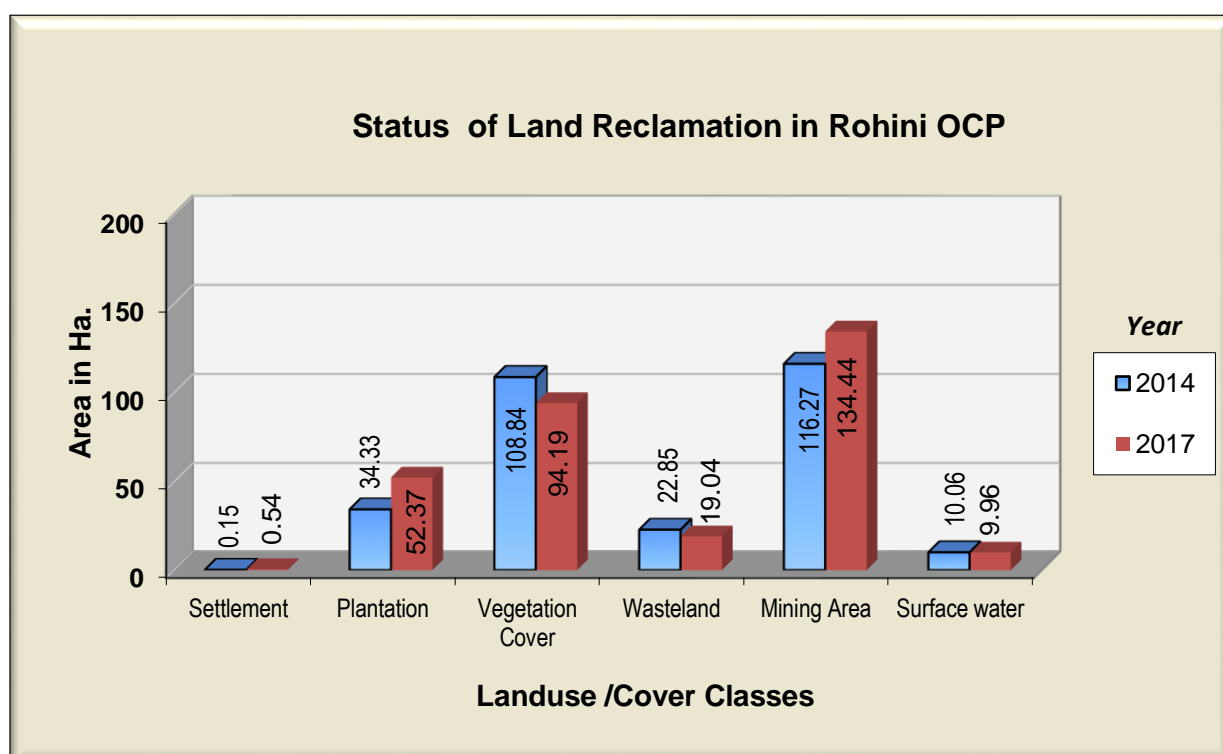


FIGURE – 7.2

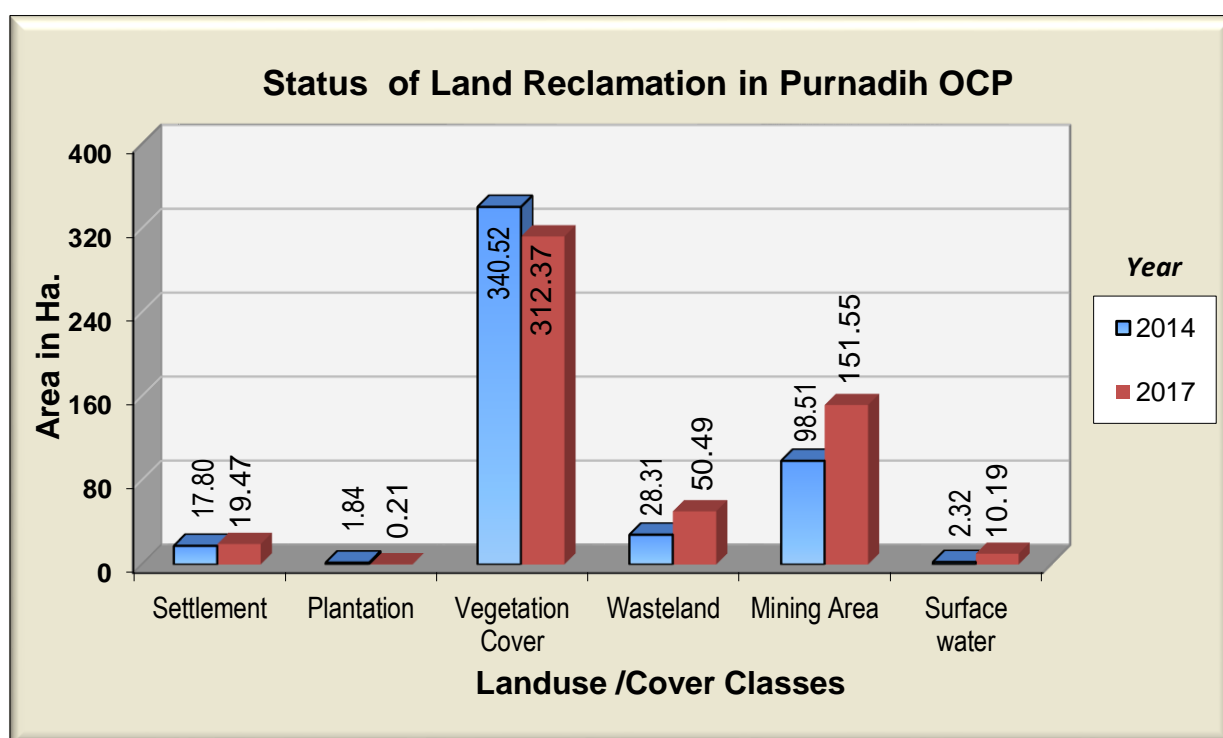


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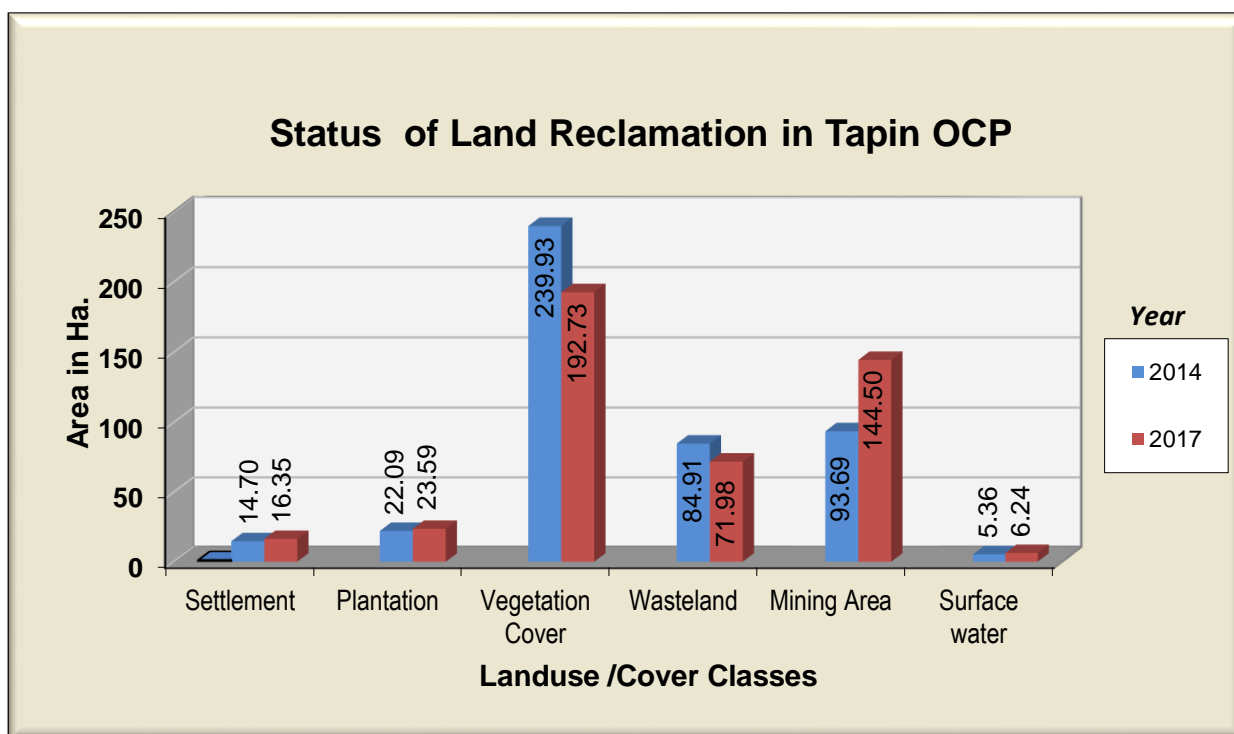


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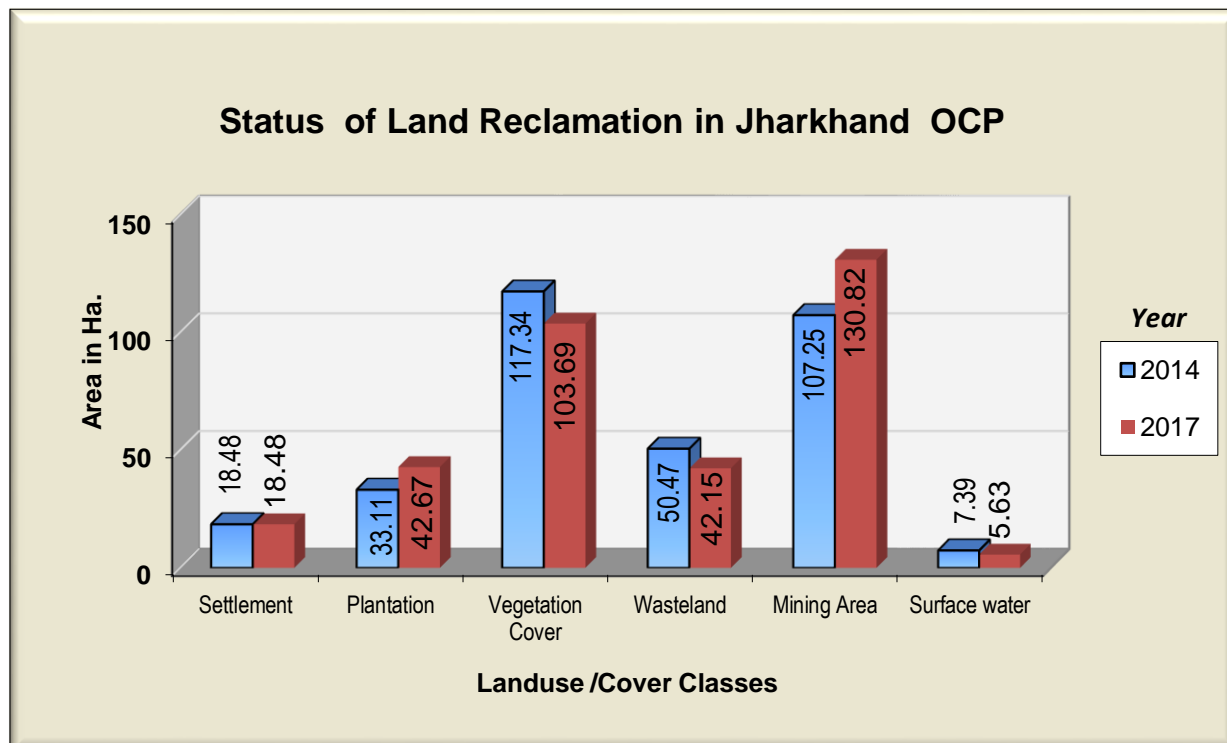


FIGURE – 7.5

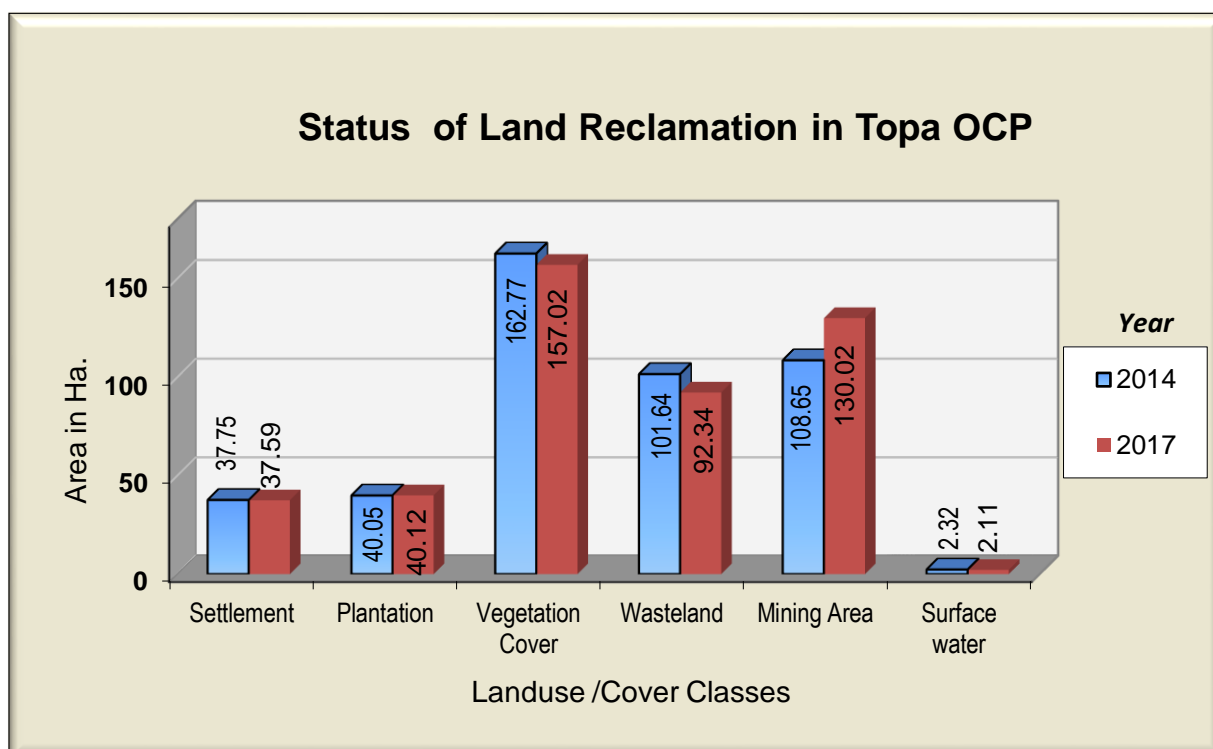


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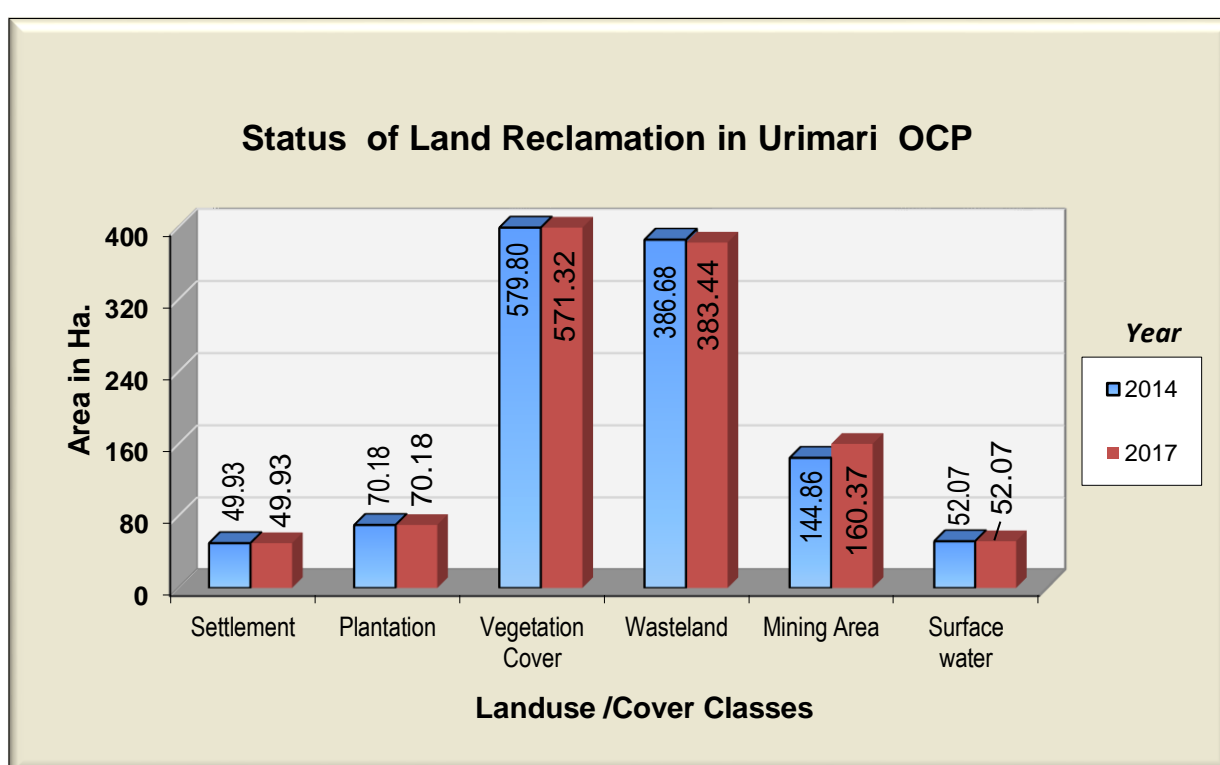


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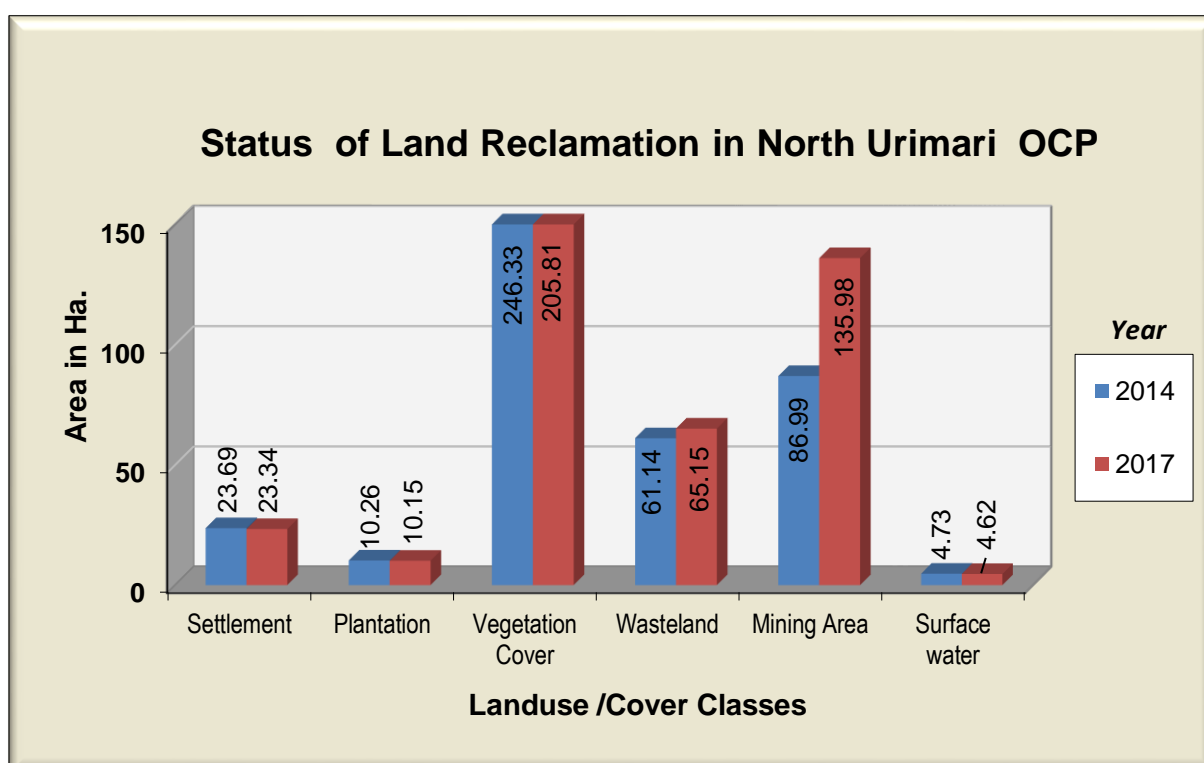


FIGURE – 7.8

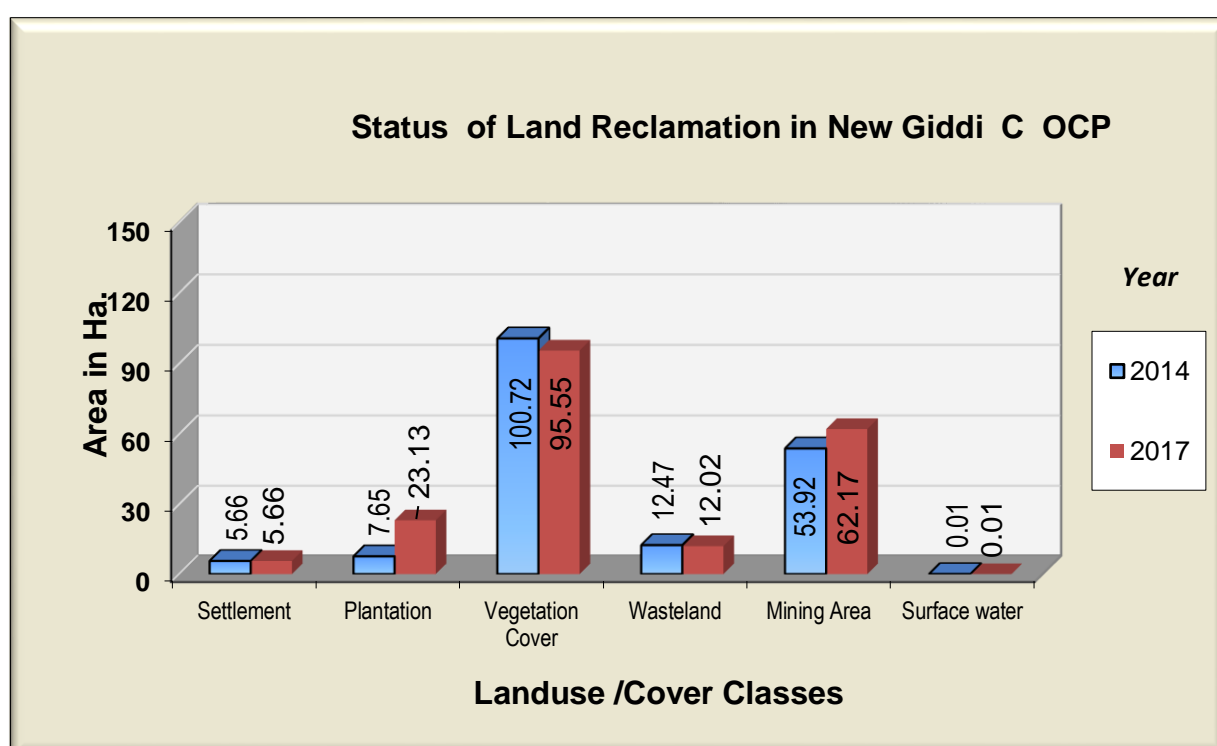


FIGURE – 7.9



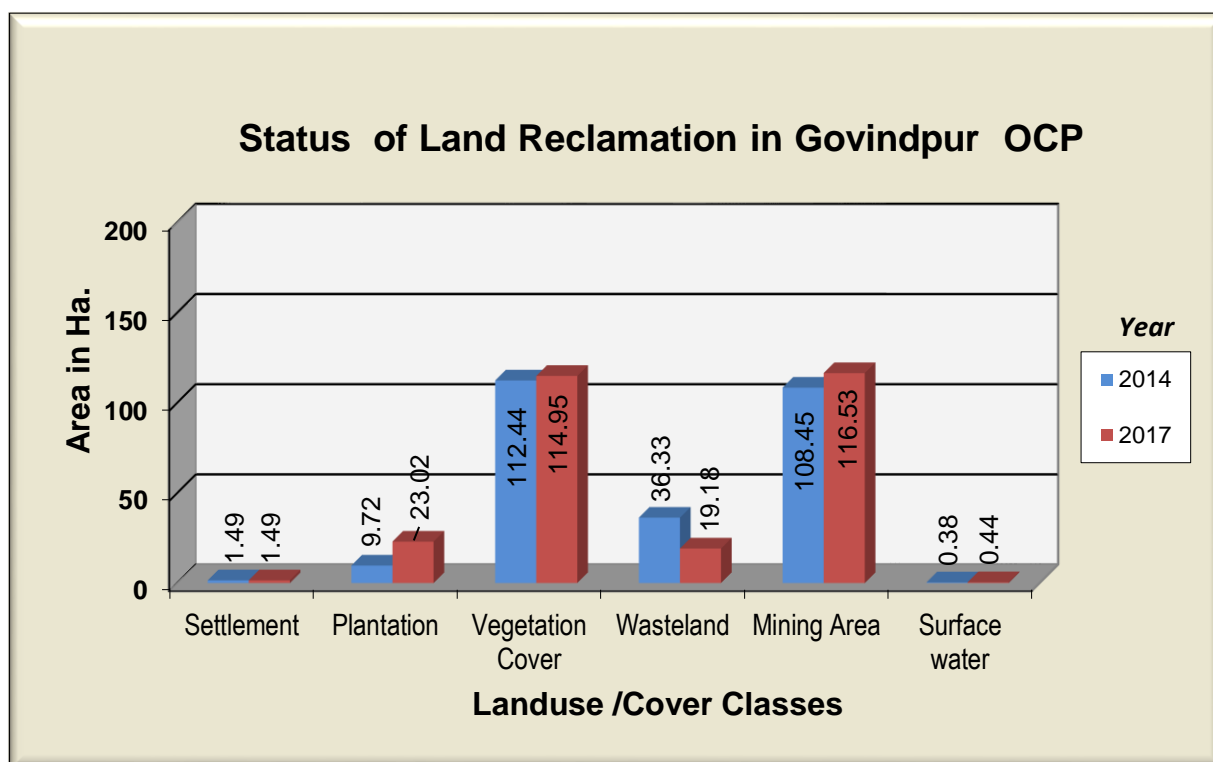


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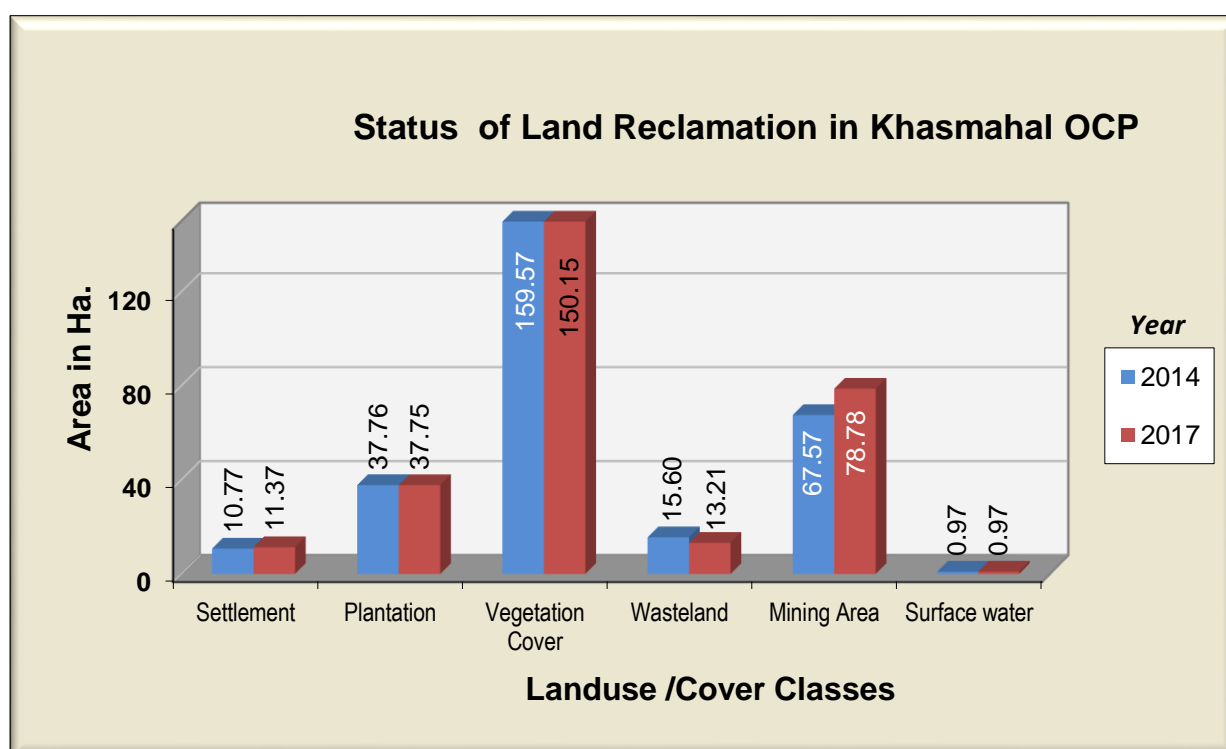


FIGURE – 7.11

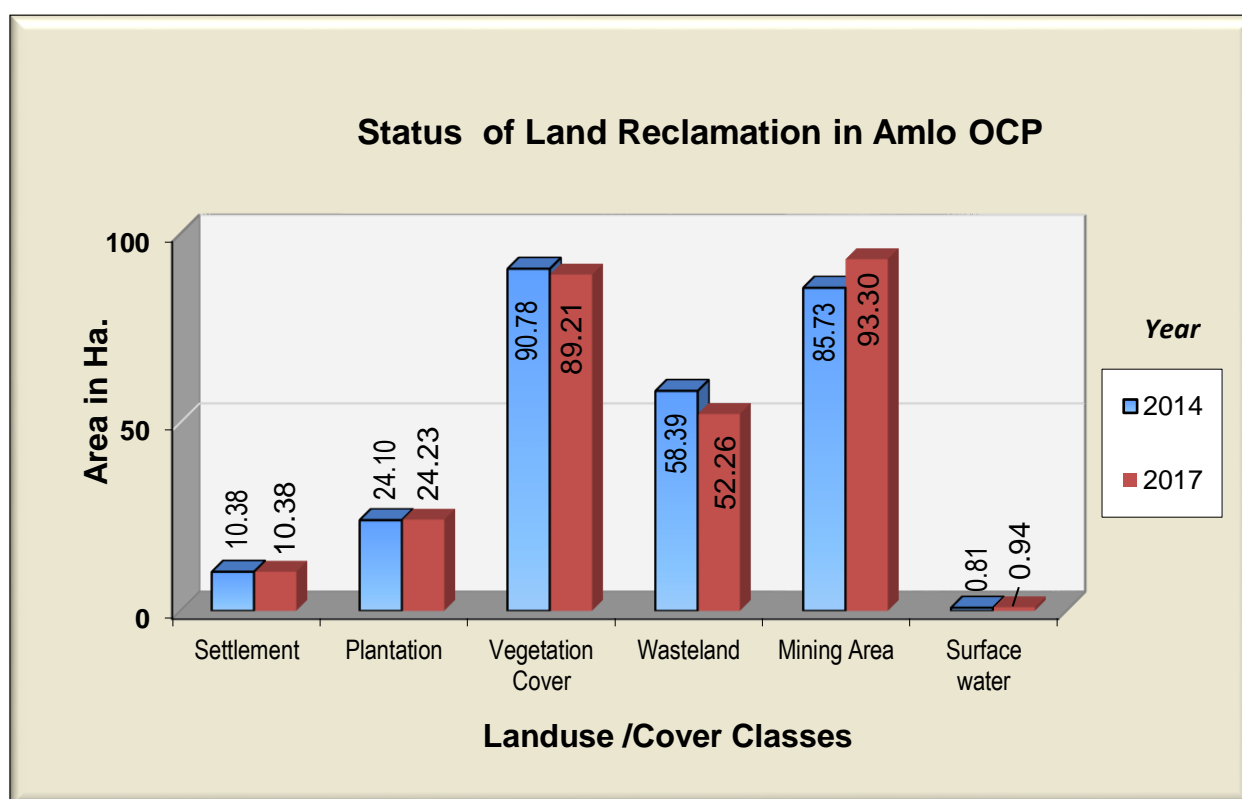


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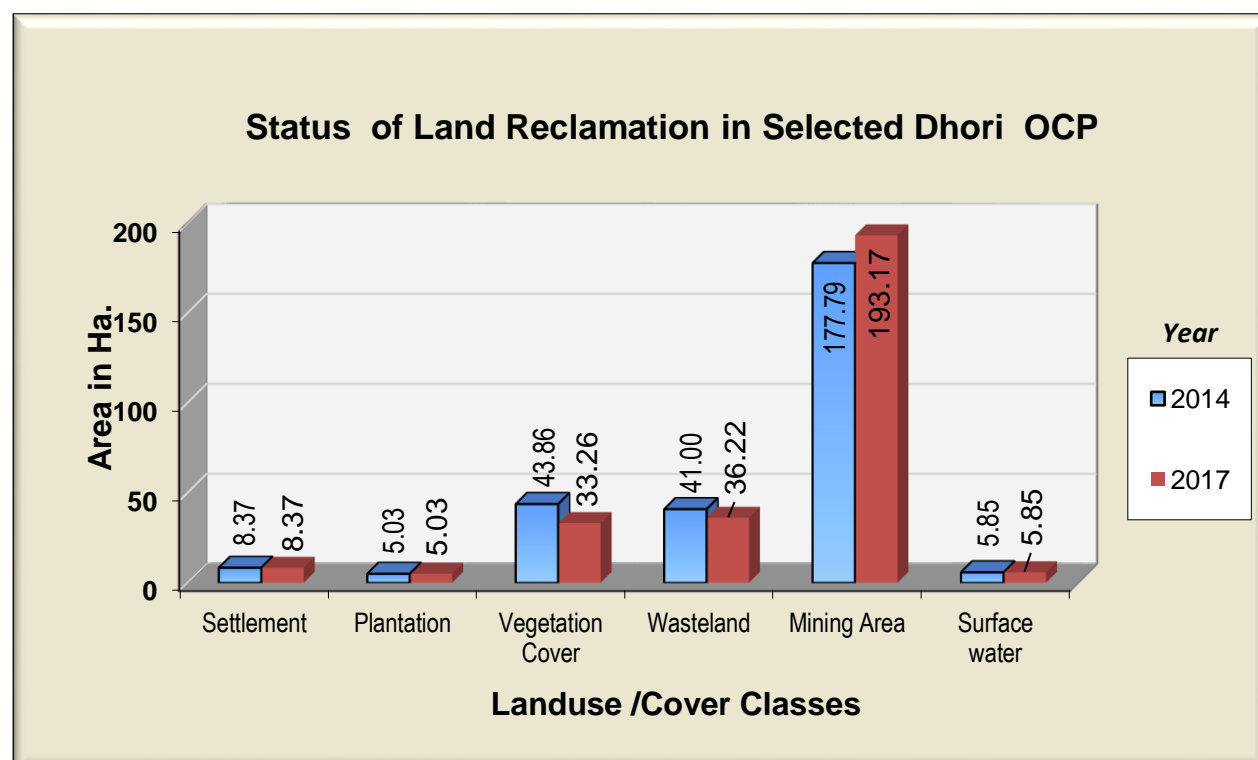


FIGURE – 7.13

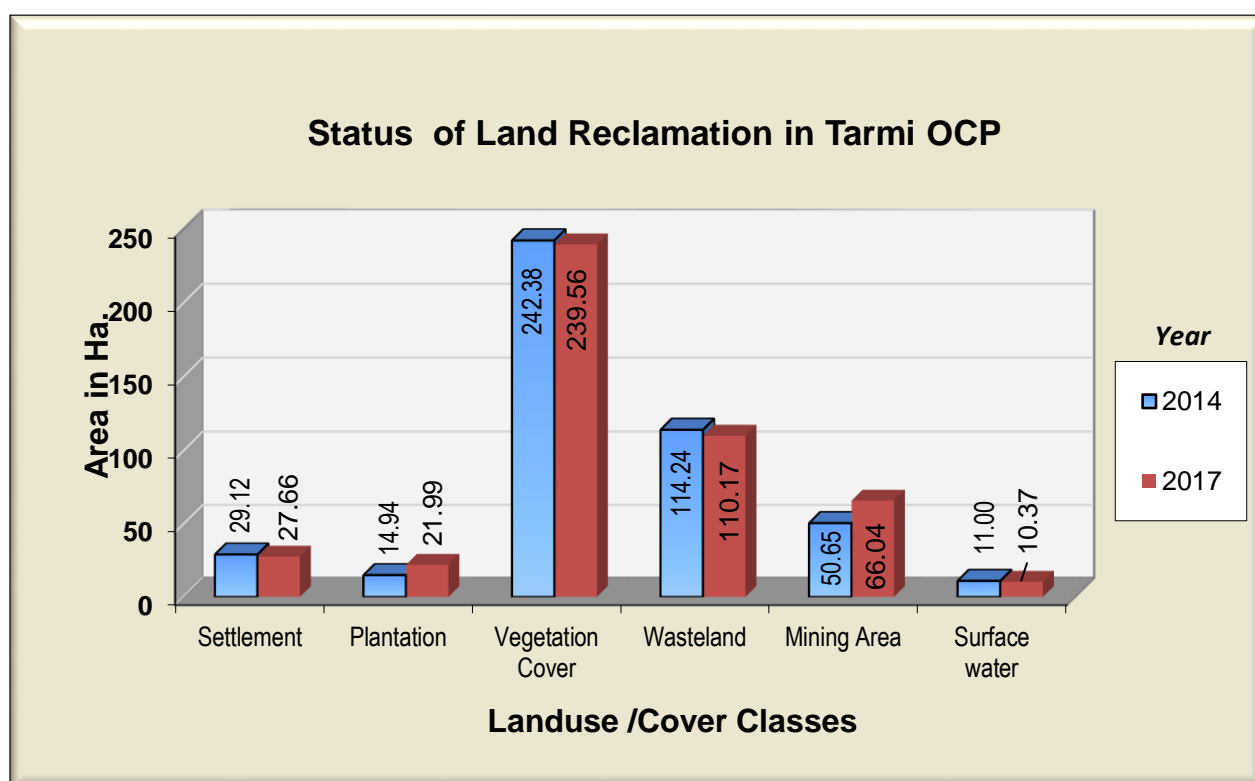


FIGURE – 7.14



**Photo 7.1:** Plantation on External OB Dump Tapin OCP



**Photo 7.2:** Plantation on Backfill Jharkhand OCP





**Photo 7.3:** Plantation on Backfill in Jharkhand OCP



**Photo 7.4:** Plantation on Backfill in Urimari OCP



**Photo 7.5:** Plantation on OB Dump in North Urimari OCP



**Photo 7.6:** Social Plantation along road side New Giddi- C OCP





**Photo 7.7:** Plantation on External OB Dump in Govindpur OCP



**Photo 7.8:** Plantation on External OB Dump in Khasmahal OCP



**Photo7. 9:** Plantation on External OB Dump (Amlo OCP)



**BHARAT COKING COAL LIMITED**

## 8.0 Land Reclamation Status in Bharat Coking Coal Limited

8.1 Following 4 Cluster of Opencast Project producing less than 5 million m<sup>3</sup>. (Coal + OB together) of Bharat Coking Coal Ltd. have been taken up during the year 2017-18 for land reclamation monitoring:

- Cluster -III
- Cluster -v
- Cluster -VIII
- Cluster-IX

8.2 Project wise Land Reclamation status of above mentioned projects in BCCL is given in Table 8.1 and also shown graphically in Fig 8.1. Area statistics of different land use class present in the mine leasehold of the above projects for the year 2016 are shown in the Table - 8.2. Land use maps derived from satellite data are shown in Plate 8.1 - 8.5. Different land use classes based on satellite data are depicted in Bar Charts in Fig. 8.2 - 8.6.

8.3 Study reveals that out of total mine leasehold area of 6576.22 Hectares of the 04 Cluster OC projects of BCCL mentioned above taken for this study in 2017-18; total excavated area is 995.60 hectares (15.14%) out of which 31.60 Ha. (3.17%) has been planted (*Biologically Reclaimed*), 457.35 Ha. (45.94%) is under backfilling (*Technically Reclaimed*) and balance 506.65 hectares (50.89%) is under active mining.

8.4 It is evident for the analysis of the satellite data of the year 2017 that plantation carried out on backfilled area, OB dumps as well as under social forestry in all the 4 mines of BCCL taken up for study, has reached 8.62% of the total leasehold area till now. It can

also be seen from Table.1 that the total area under reclamation has reached 49.11% till the year 2017 in the four cluster OCPs taken up for study.

**8.5** Out of Four clusters in BCCL, Cluster VIII tops with 61.25% reclamation followed by Cluster V (60.13%) , Cluster III (37.06%) and Cluster IX (31.68%) .

**8.6** 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 8.2

## Project wise Land Reclamation Status in Opencast Projects of BCCL based on the Satellite data of the year 2017

(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, Awanue Plantation Etc.				
1	2	3	4	5	6	7	8	9 (=4+5+8)	10 (=5+6+7)	11(=4+5)
			2017	2017	2017	2017	2017	2017	2017	2017
1	Cluster III	1552.53	55.87	3.89	21.11	128.07	101.5	161.26	153.07	59.76
			34.65%	2.41%			62.94%		9.86%	37.06%
2	Cluster V	1724.52	162.09	7.19	23.85	105.29	112.24	281.52	136.33	169.28
			57.58%	2.55%			39.87%		7.91%	60.13%
3	Cluster VIII	1331.95	161.86	13.72	21.97	24.70	111.06	286.64	60.39	175.58
			56.47%	4.79%			38.75%		4.53%	61.25%
4	Cluster IX	1967.22	77.53	6.80	41.79	168.58	181.85	266.18	217.17	84.33
			29.13%	2.55%			68.32%		11.04%	31.68%
	TOTAL	6576.22	457.35	31.60	108.72	426.64	506.65	995.60	566.96	488.95
			45.94%	3.17%			50.89%		8.62%	49.11%

(% 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 barren backfilled only
3. Area under Active mining includes coal quarry site, quarry filled with water etc.
4. Social Forestry and Plantation on external OB dump are not included in Biological Reclamation and are put under separate categories as shown in the table.
5. (%) calculated in the above table is in respect of total excavated area except for "Total area under plantation" where % is in terms of leasehold area.



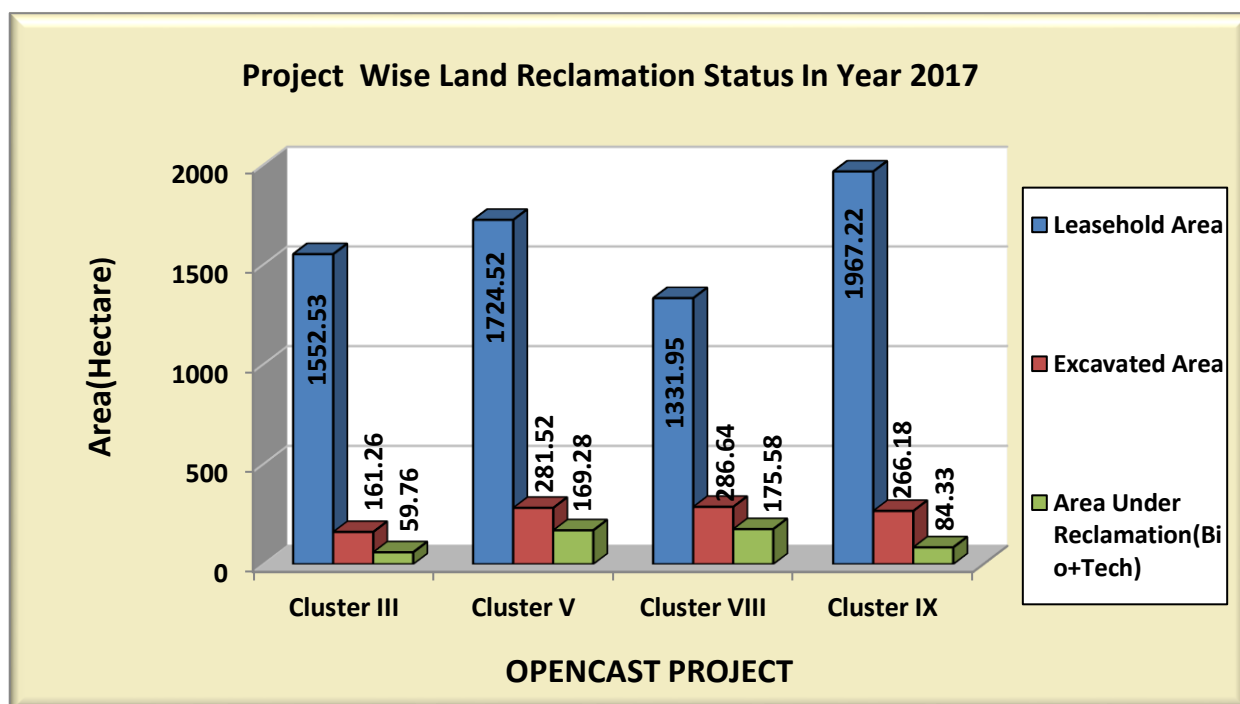
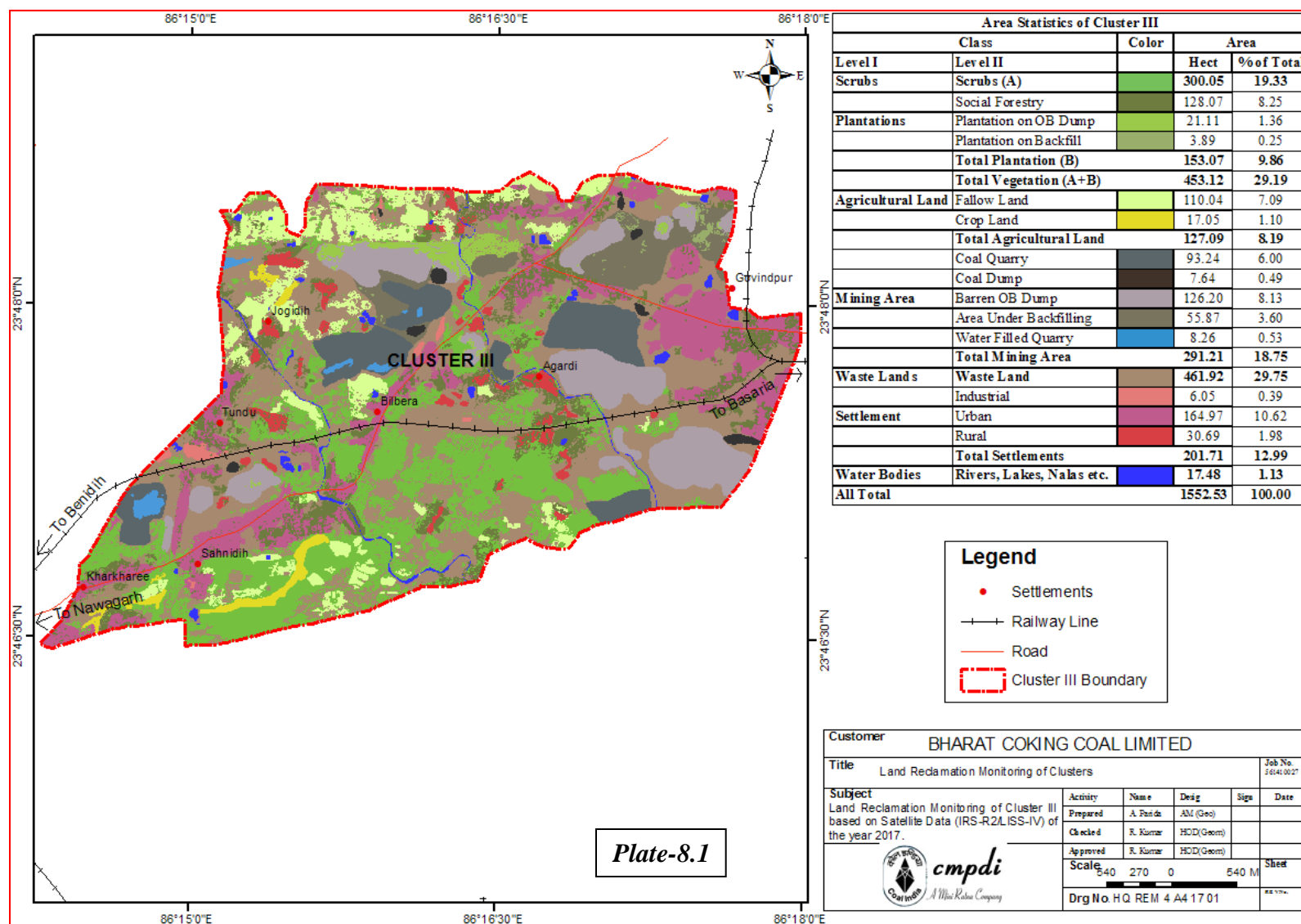
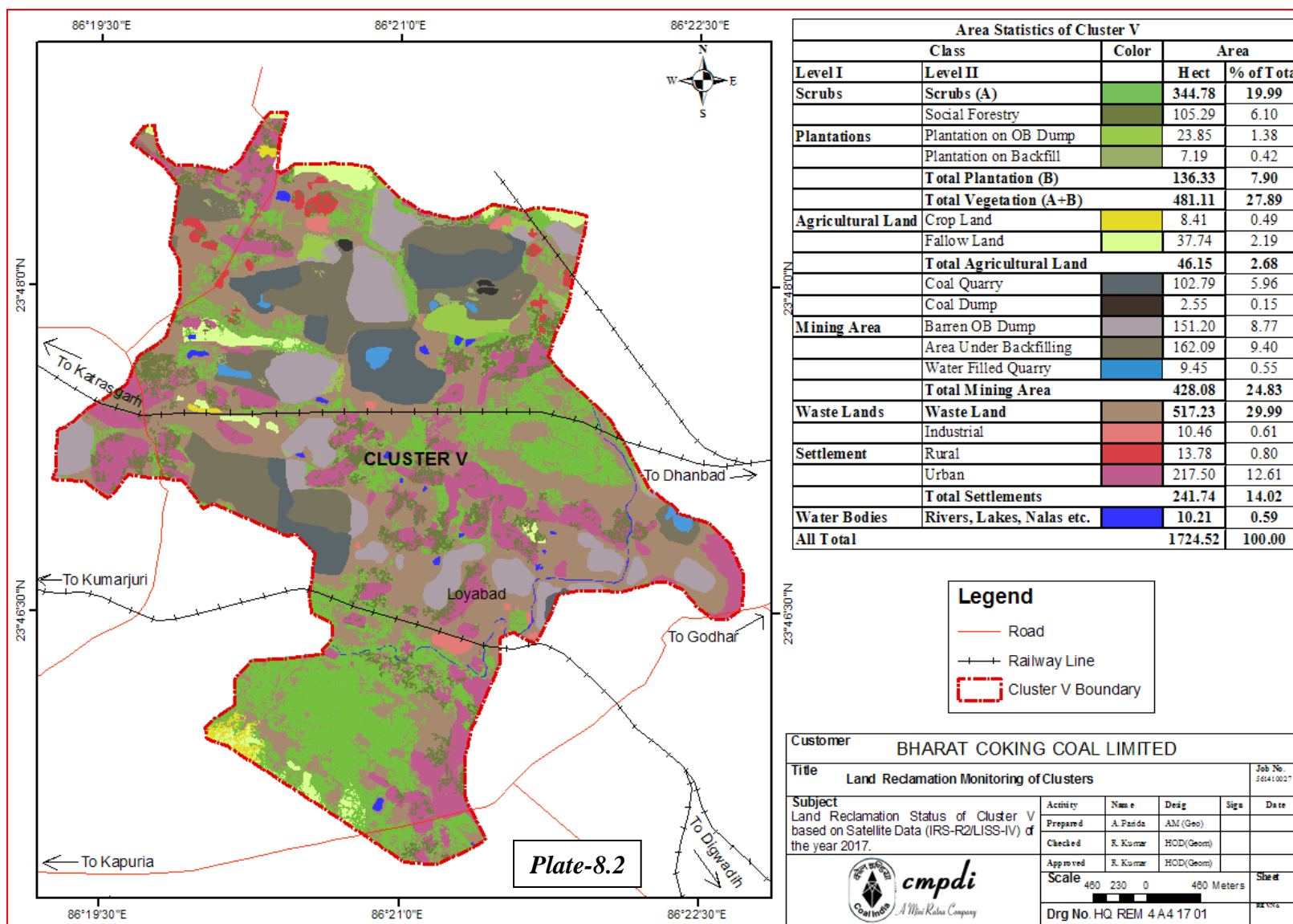


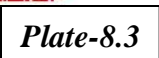
Figure -8.1

**STATUS OF LAND RECLAMATION / LAND USE/ COVER PATTERN OF  
OPEN CAST MINE IN BCCL BASED ON SATELLITE DATA OF THE YEAR 2017**

(Area in Hectare)											
		Cluster III		Cluster V		Cluster VIII		Cluster IX		TOTAL	
		Area	%	Area	%	Area	%	Area	%	Area	%
FORESTS	Dense Forest	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Open Forest	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	<b>Total Forest</b>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SCRUBS	Scrubs	300.05	19.33	344.78	19.99	143.21	10.75	339.86	17.28	1127.90	17.15
	Social Forestry	128.07	8.25	105.29	6.10	24.70	1.85	168.58	8.57	426.64	6.49
PLANTATION	Plantation on OB Dump	21.11	1.36	23.85	1.38	21.97	1.65	41.79	2.12	108.72	1.65
	Plantation on Backfill (Biological Reclamation)	3.89	0.25	7.19	0.42	13.72	1.03	6.80	0.35	31.60	0.48
	<b>Total Plantation</b>	153.07	9.86	136.33	7.90	60.39	4.53	217.17	11.04	566.96	8.62
	<b>Total Vegetation</b>	453.12	29.19	481.11	27.89	203.60	15.28	557.03	28.32	1694.86	25.77
	Coal Dump	7.64	0.49	2.55	0.15	7.71	0.58	9.67	0.49	27.57	0.42
ACTIVE MINING	Coal Quarry	93.24	6.00	102.79	5.96	108.02	8.11	178.55	9.08	482.60	7.34
	Advance Quarry Site	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Quarry Filled With Water	8.26	0.53	9.45	0.55	3.04	0.23	3.30	0.17	24.05	0.37
	<b>Total Area under Active Mining</b>	101.50	6.53	112.24	6.51	111.06	8.34	181.85	9.25	506.65	7.70
	Barren OB Dump	126.20	8.13	151.20	8.77	149.30	11.21	172.19	8.75	598.89	9.11
RECLAMED	Area Under Backfilling (Technical Reclamation)	55.87	3.60	162.09	9.40	161.86	12.15	77.53	3.94	457.35	6.95
	<b>Total Area under Technical Reclamation</b>	55.87	3.60	162.09	9.40	161.86	12.15	77.53	3.94	457.35	6.95
	<b>Total Area under Mine Operation</b>	291.21	18.75	428.08	24.83	429.93	32.28	441.24	22.43	1590.46	24.19
WATERBODIES	Waste Lands	461.92	29.75	517.23	29.99	443.58	33.30	614.64	31.24	2037.37	30.98
	Fly Ash Pond / Sand Body	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	<b>Total Wasteland</b>	461.92	29.75	517.23	29.99	443.58	33.30	614.64	31.24	2037.37	30.98
	Reservoir, nallah, ponds	17.48	1.13	10.21	0.59	13.15	0.99	20.59	1.05	61.43	0.93
	<b>Total Waterbodies</b>	17.48	1.13	10.21	0.59	13.15	0.99	20.59	1.05	61.43	0.93
AGRICULTURE	Crop Lands	17.05	1.10	8.41	0.49	18.05	1.35	0.00	0.00	43.51	0.66
	Fallow Lands	110.04	7.09	37.74	2.19	58.02	4.36	44.49	2.26	250.29	3.81
	<b>Total Agriculture</b>	127.09	8.19	46.15	2.68	76.07	5.71	44.49	2.26	293.80	4.47
SETTLEMENTS	Urban Settlement	164.97	10.62	217.50	12.61	97.19	7.30	232.31	11.81	711.97	10.83
	Rural Settlement	30.69	1.98	13.78	0.80	57.00	4.28	47.79	2.43	149.26	2.27
	Industrial Settlement	6.05	0.39	10.46	0.61	11.43	0.86	9.13	0.46	37.07	0.56
	<b>Total Settlement</b>	201.71	12.99	241.74	14.02	165.62	12.44	289.23	14.70	898.30	13.66
	<b>Grand Total</b>	1552.53	100.00	1724.52	100.00	1331.95	100.00	1967.22	100.00	6576.22	100.00











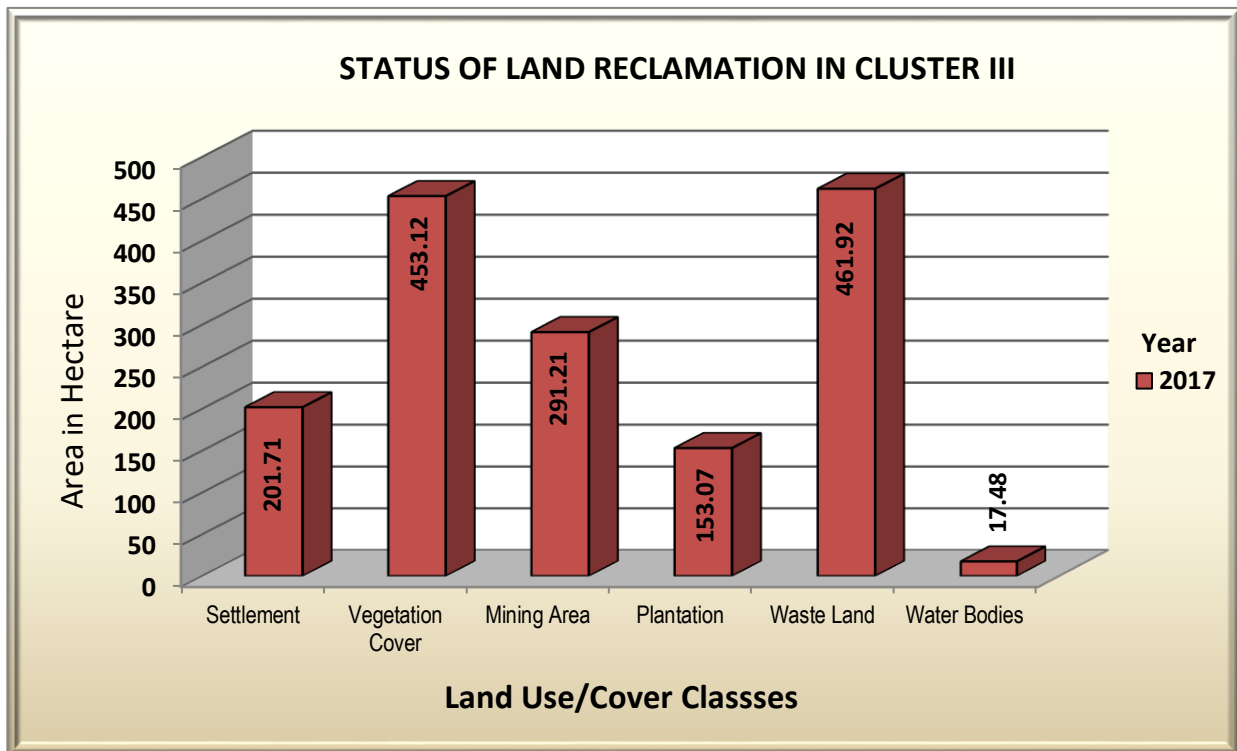


Figure 8.2

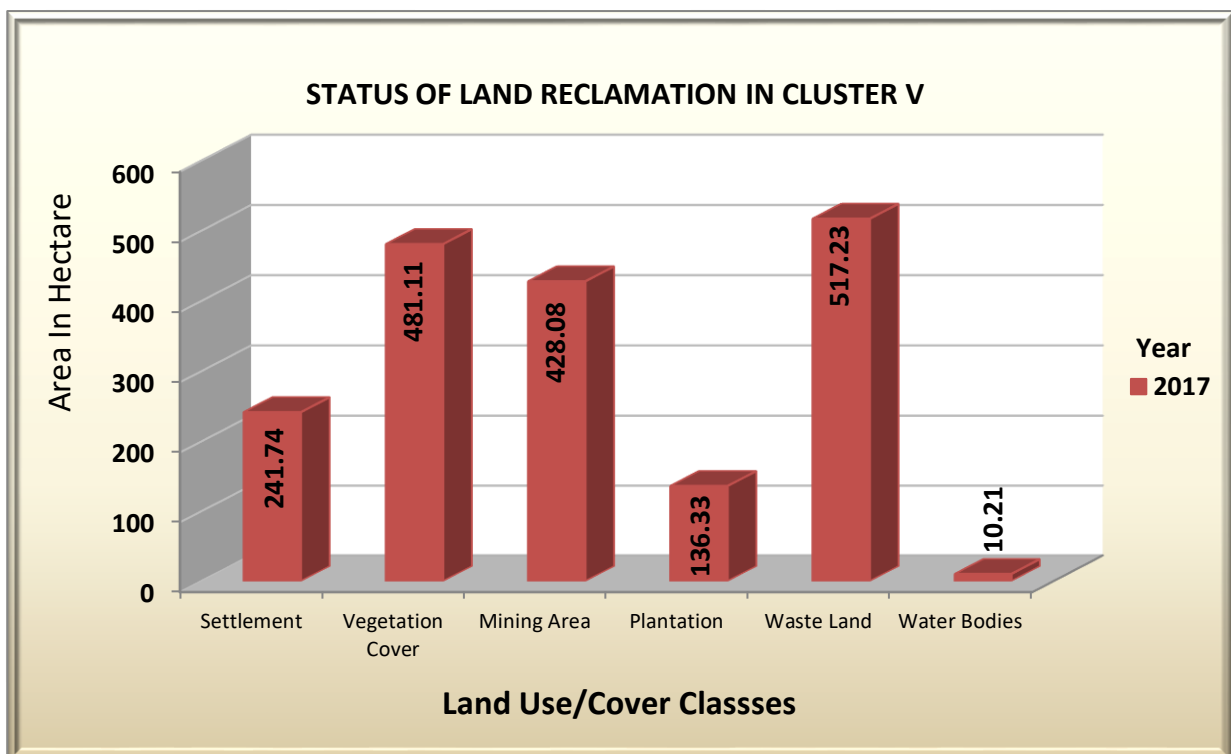


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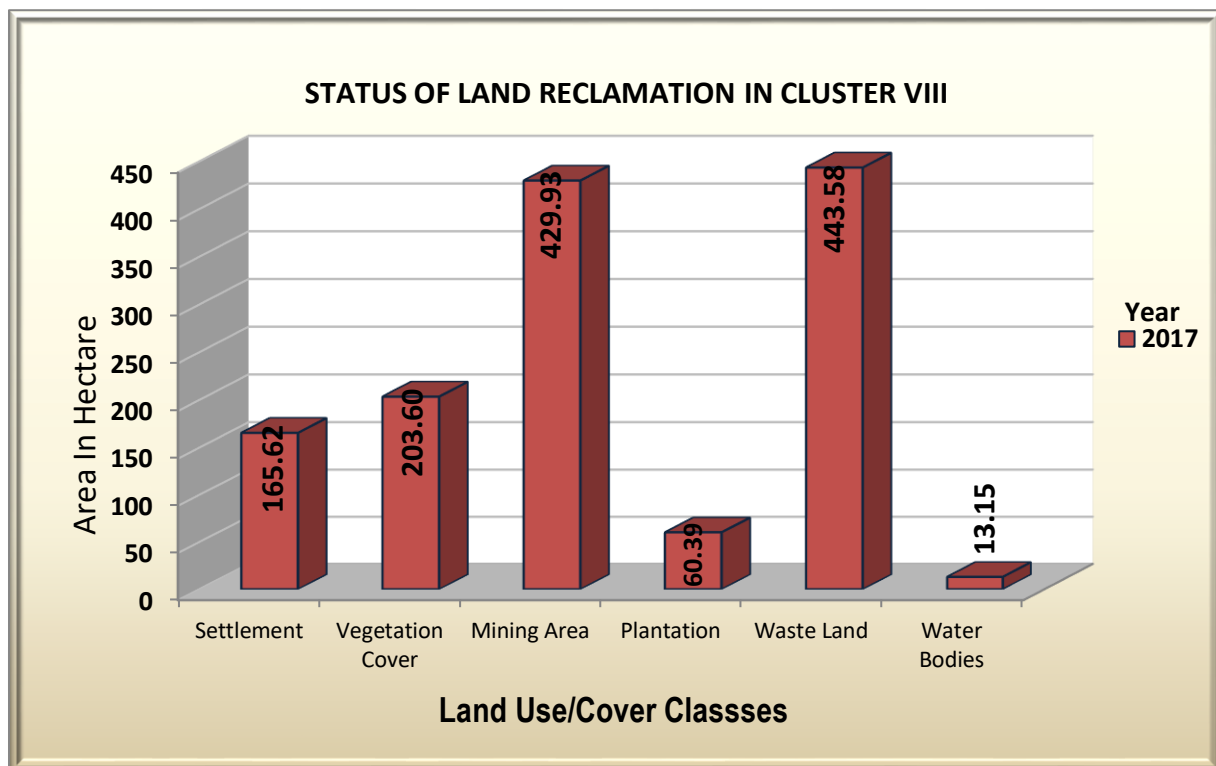


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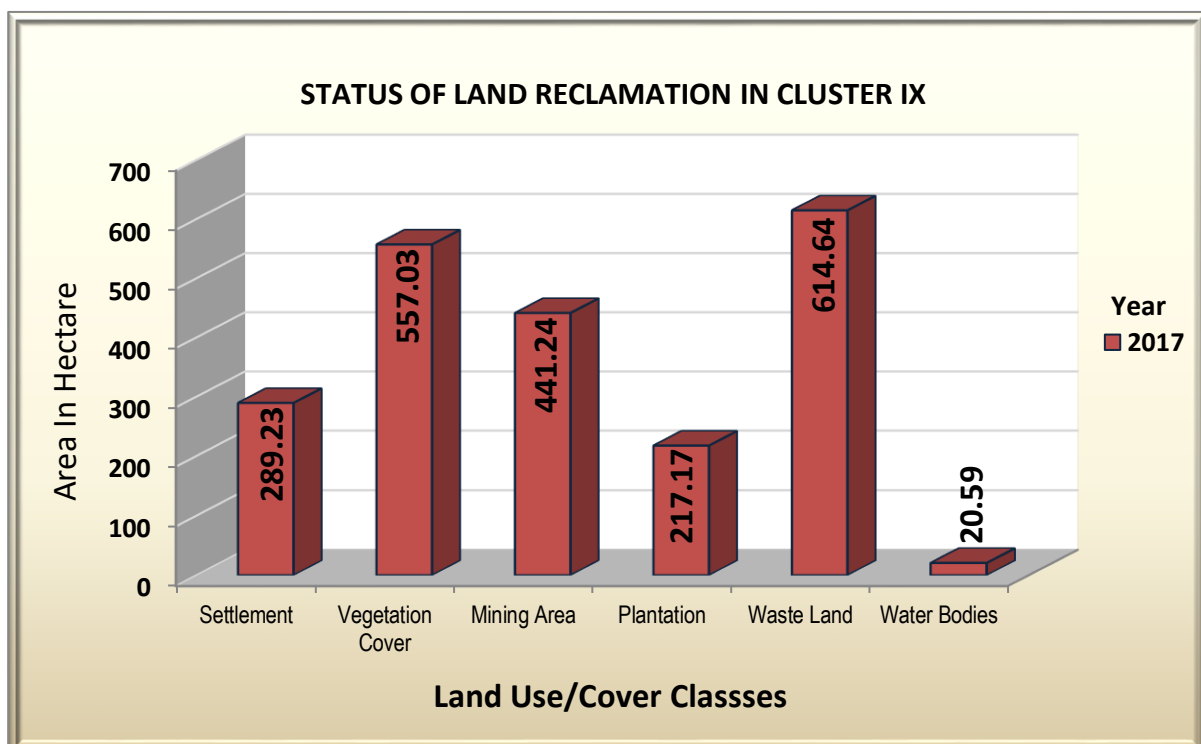


Figure 8.5



Photo 1: Ecological Restoration Site (Tetulmari Colliery)



Photo 2: Eco-Restoration Site (Rajapur OCP)





Photo 3: Social Forestry Plantation (Lodna)



**EASTERN COALFIELDS LIMITED**

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

**9.1** Following 1 OC projects producing less than 5 million m<sup>3</sup>. (Coal + OB together) of Eastern Coalfields Ltd. have been taken up during the year 2017-18 for land reclamation monitoring:

- Simlong OCP

**9.2** Project wise Land Reclamation status of above mentioned projects in ECL 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 projects for the year 2017 are shown in the Table - 9.2. Land use maps derived from satellite data are shown in Plate 9.1 Different land use classes based on satellite data are depicted in Bar Charts in Fig. 9.2.

**9.3** Study reveals that out of total mine leasehold area of 337.00 Hectares of the above mentioned 01 OC projects of ECL taken up for this study in 2017-18; total excavated area is 11.38 hectares (3.38%) . There is no Technical Reclamation and Biological Reclamation as such entire excavated area is under Quarry and water filled with Quarry. Only 0.29 % of leasehold area of Simlong OCP has been planted that too on embankment only.

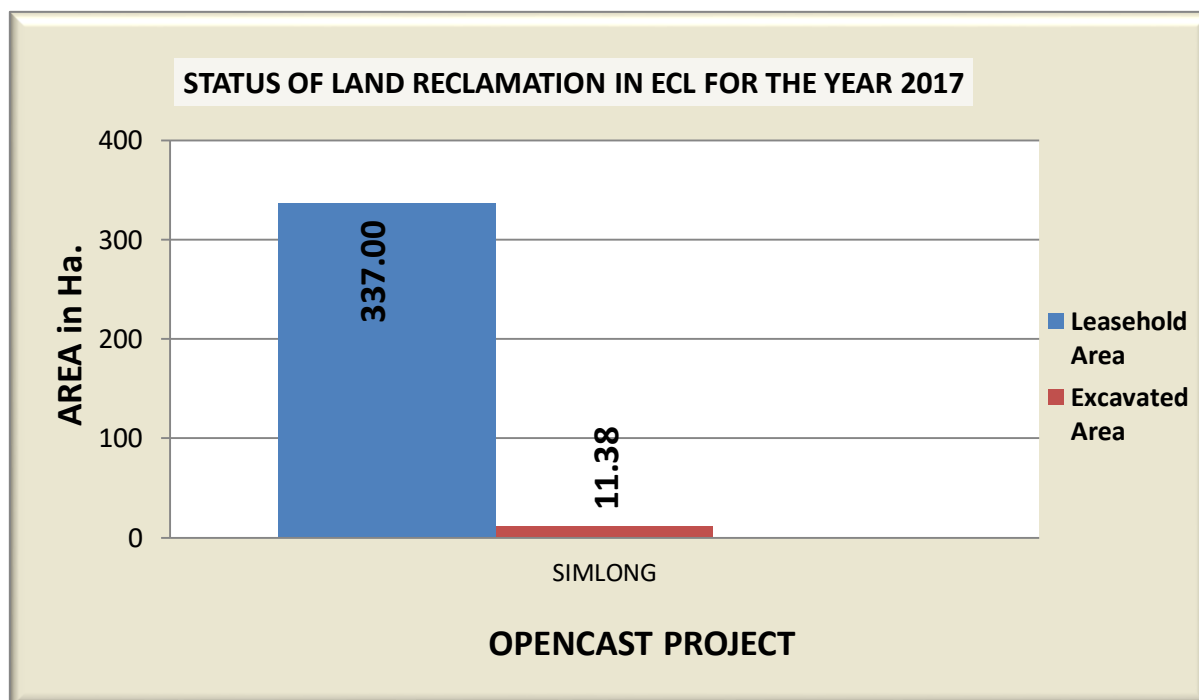
**Table 9.1**  
**Project wise Land Reclamation Status in Opencast Projects of ECL**  
**based on the Satellite data of the year 2017**

(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
			Area under Backfilling	Biological Reclamation	Other Plantations	Social Forestry, Avaneue Plantation Etc.				
				Plantation on Excavated / Backfilled Area	Plantation on External Over Burden Dumps					
1	2	3	4	5	6	7	8	9 (=4+5+8)	10 (=5+6+7)	11(=4+5)
			2017	2017	2017	2017	2017	2017	2017	2017
1	Simlong OCP	337.00	0.00	0.00	0.96	0.00	11.38	11.38	0.96	0.00
			0.00%	0.00%			100.00%	3.38%	0.28%	0.00%
	<b>TOTAL</b>	<b>337.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.96</b>	<b>0.00</b>	<b>11.38</b>	<b>11.38</b>	<b>0.96</b>	<b>0.00</b>
			0.00%	0.00%			100.00%	3.38%	0.28%	0.00%

(% 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 barren backfilled only
3. Area under Active mining includes coal quarry site, quarry filled with water etc.
4. Social Forestry and Plantation on external OB dump are not included in Biological Reclamation and are put under separate categories
5. (%) calculated in the above table is in respect of total excavated area except for "Total area under plantation" where % is in terms of leasehold area.

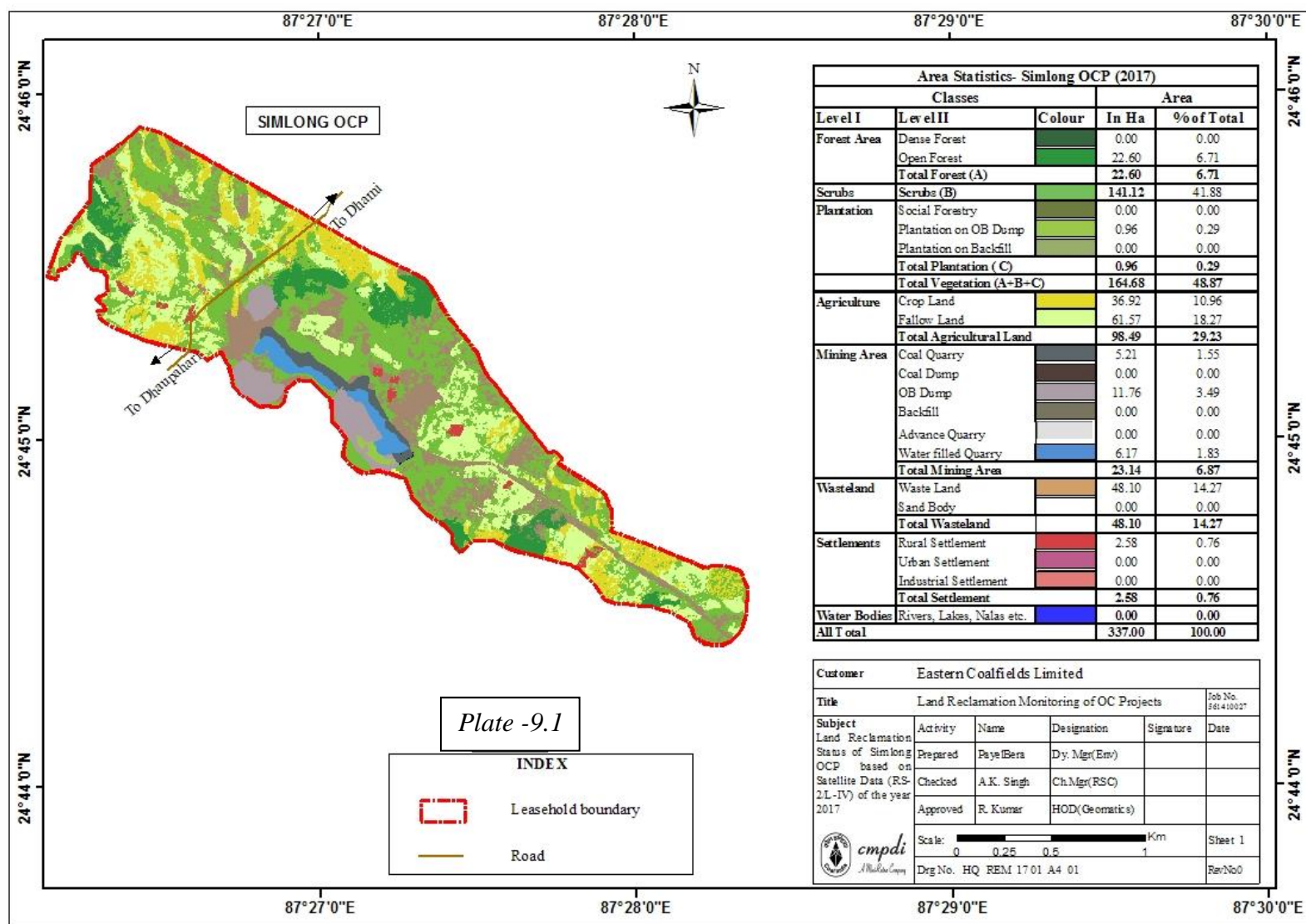


**Fig. 9.1: Project wise Land Reclamation Status-2017 in ECL**

Table 9.2

## STATUS OF LAND RECLAMATION IN ECL BASED ON SATELLITE DATA OF THE YEAR 2017

			SIMLONG	
			Area	%
FORESTS	Dense Forest		0.00	0.00
	Open Forest		22.60	6.71
	<b>Total Forest (A)</b>		22.60	6.71
SCRUBS	<b>Scrubs (B)</b>		141.12	41.88
PLANTATION	Social Forestry		0.00	0.00
	Plantation on OB Dump		0.96	0.29
	Plantation on Backfill (Biological Reclamation)		0.00	0.00
	<b>Total Plantation(C)</b>		<b>0.96</b>	<b>0.29</b>
	<b>Total Vegetation (A+B+C)</b>		<b>164.68</b>	<b>48.88</b>
ACTIVE MINING	Coal Quarry		5.21	1.55
	Coal Face		0.00	0.00
	Coal Dump		0.00	0.00
	Advance Quarry Site		0.00	0.00
	Quarry Filled with Water		6.17	1.83
	<b>Total Area under Active Mining</b>		<b>11.38</b>	<b>3.38</b>
Reclaimed	Barren OB dump		11.76	3.49
	Area Under Backfilling		0.00	0.00
	<b>Total Area under Technical Reclamation</b>		0.00	0.00
	<b>Total Area under Mine Operation</b>		<b>23.14</b>	<b>6.87</b>
WASTELANDS	Waste Lands		48.10	14.27
	Fly Ash Pond/Sand Body		0.00	0.00
	<b>Total Wastelands</b>		<b>48.10</b>	<b>14.27</b>
WATER	Reservoir, nallah, ponds etc.		0.00	0
	<b>Total Waterbodies</b>		<b>0.00</b>	<b>0</b>
AGRICULTURE	Crop Lands		36.92	10.96
	Fallow Lands		61.57	18.27
	<b>Total Agriculture</b>		<b>98.49</b>	<b>29.23</b>
SETTLEMENTS	Urban Settlement		0.00	0.00
	Rural Settlement		2.58	0.76
	Industrial Settlement		0.00	0.00
	<b>Total Settlements</b>		<b>2.58</b>	<b>0.76</b>
	<b>GRAND TOTAL</b>		<b>337.00</b>	<b>100.00</b>





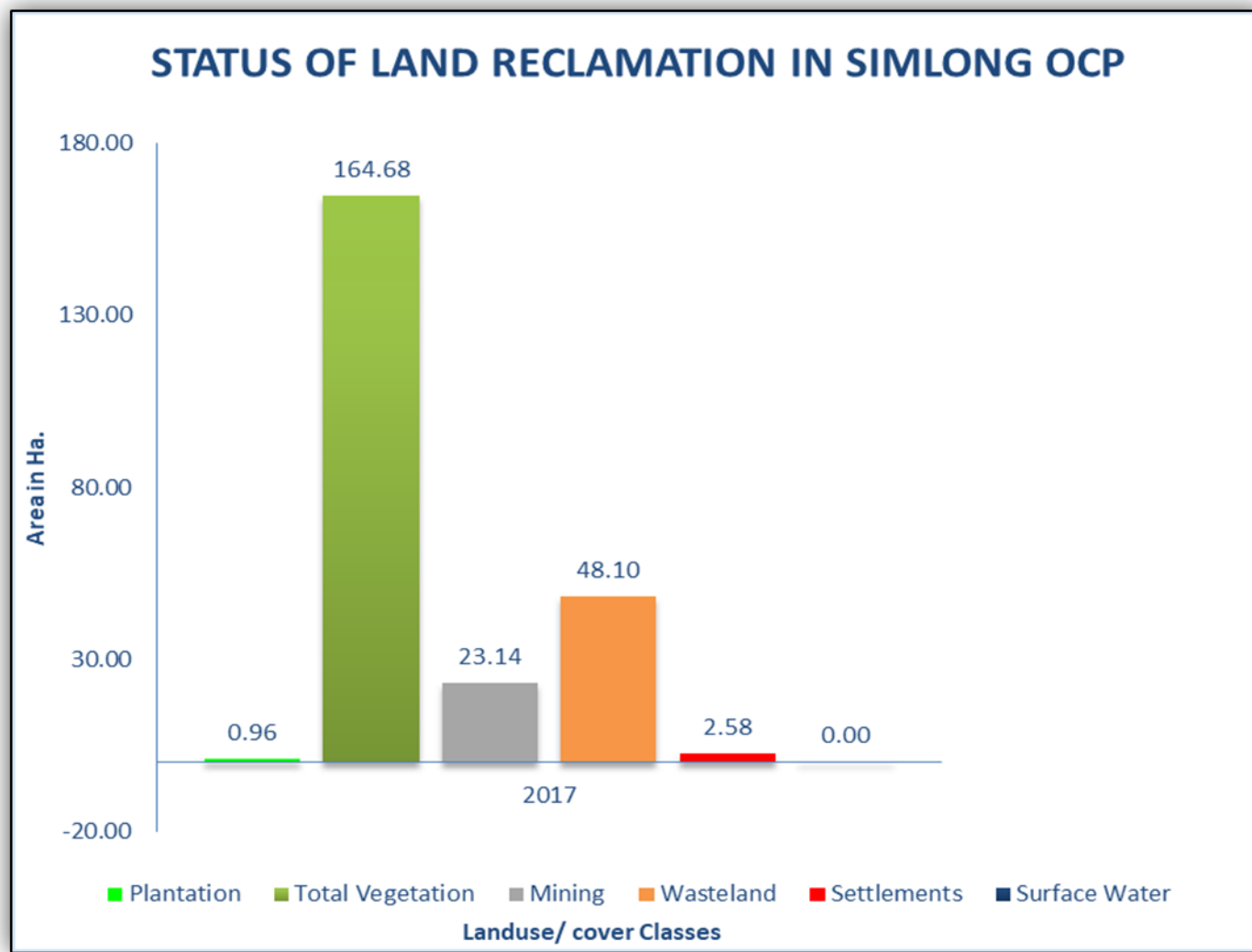


Fig – 9.2



**Photograph 9.1:** Plantation around Simlong OCP



**Photograph 9.2:** Social Forestry Simlong OCP

**MAHANADI COALFIELD LIMITED**

## 10.0 Land Reclamation Status in Mahanadi Coalfields Limited

**10.1** Following 3 OC projects producing less than 5 million m<sup>3</sup>. (Coal + OB together) of Mahanadi Coalfields Ltd. have been taken up during the year 2017-18 for land reclamation monitoring:

- Chhendipada OCP
- Lilari OCP
- Kulda OCP

**10.2** Project wise Land Reclamation status of above mentioned projects in MCL is given in Table 10.1 and also shown graphically in Fig 10.1. Area statistics of different land use class present in the mine leasehold of the above projects for the year 2017 are shown in the Table - 10.2. Land use maps derived from satellite data are shown in Plate 10.1 Different land use classes based on satellite data are depicted in Bar Charts in Fig. 10.2 – 10.4

**10.3** Study reveals that out of total mine leasehold area of 700.22 Hectares of the above mentioned 03 OC projects of MCL taken up for this study in 2017-18; total excavated area is 201.54 hectares (28.78%) out of which 31.18 hectares (15.47%) has been planted (*Biologically Reclaimed*), 48.62 Hectare (24.12%) is under Backfilling (*Technically Reclaimed*) and balance 121.74 Hectare (60.40%) is under active mining.

**10.4** Analysis of satellite data indicates that area of plantation (Green Cover) has increased from 49.32 Hectare (2014) to 57.49 Hectare (2017). This increase in plantation of 8.17 Hectares of plantation area in three years indicates that MCL is committed for reclamation of mine land for maintaining the ecological balance in the region projects.

**10.5** On comparing the status of land reclamation for the year 2017 with respect to the year 2014 in different projects .It is evident from analysis that area of land reclamation has increased from 75.23 Ha (Yr 2014) to 79.80 Ha (Yr 2017).

**10.6** Out of three project of MCL, Lilari OCP ranks on top for land reclamation (77.75%) followed by Chhendipada OCP (77.64%) and Kulda OCP (11.44%).

**Table10.1**

**Project wise Land Reclamation Status in OC projects of Mahanadi Coalfields**

**Ltd based on Satellite data of the year 2014 and 2017**

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)	
			2014	2017	2014	2017	2014	2017	2014	2017	2014	2017	2014	2017	2014	2017	2014	2017
1	Chhendipada	20.31	9.82	10.14	0.00	1.18	0.00	2.12	1.10	1.10	5.53	3.26	15.35	14.58	1.10	4.40	9.82	11.32
			63.97%	69.55%	0.00%	8.09%					36.03%	22.36%			5.42%	21.66%	63.97%	77.64%
2	Lilari	141.81	31.27	25.22	25.13	30.00	20.10	20.10	1.80	1.80	10.58	15.80	66.98	71.02	47.03	51.90	56.40	55.22
			46.69%	35.51%	37.52%	42.24%					15.80%	22.25%			33.16%	36.60%	84.20%	77.75%
3	Kulda	538.10	9.01	13.26	0.00	0.00	0.00	0.00	1.19	1.19	63.40	102.68	72.41	115.94	1.19	1.19	9.01	13.26
			12.44%	11.44%	0.00%	0.00%					87.56%	88.56%			0.22%	0.22%	12.44%	11.44%
	TOTAL	700.22	50.10	48.62	25.13	31.18	20.10	22.22	4.09	4.09	79.51	121.74	154.74	201.54	49.32	57.49	75.23	79.80
			32.38%	24.12%	16.24%	15.47%					51.38%	60.40%			7.04%	8.21%	48.62%	39.60%

(% 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 barren backfilled only
3. Area under Active mining includes coal quarry site, quarry filled with water etc.
4. Social Forestry and Plantation on external OB dump are not included in Biological Reclamation and are put under separate categories as shown in the table.
5. (%) calculated in the above table is in respect of total excavated area except for "Total area under plantation" where % is in terms of leasehold area.



Table 10.2

## STATUS OF LAND RECLAMATION IN MCL BASED ON SATELLITE DATA OF THE YEAR 2017

(Area in Hectare)

		CHHENDIPADA		LILARI		KULDA		TOTAL	
		Area	%	Area	%	Area	%	Area	%
FORESTS	Dense Forest	0.00	0.00	0.00	0.00	33.44	6.21	33.44	4.78
	Open Forest	0.00	0.00	4.45	3.14	50.55	9.39	55.00	7.85
	<b>Total Forest</b>	0.00	0.00	4.45	3.14	83.99	15.60	88.44	12.63
SCRUBS	Scrubs	0.00	0.00	28.40	20.03	180.12	33.47	208.52	29.78
PLANTATION	Social Forestry	1.10	5.42	1.80	1.27	1.19	0.22	4.09	0.58
	Plantation on OB Dump	2.12	10.44	20.10	14.17	0.00	0.00	22.22	3.17
	Plantation on Backfill (Biological Reclamation)	1.18	5.81	30.00	21.16	0.00	0.00	31.18	4.45
	<b>Total Plantation</b>	4.40	21.67	51.90	36.60	1.19	0.22	57.49	8.21
	<b>Total Vegetation</b>	<b>4.40</b>	<b>21.67</b>	<b>84.75</b>	<b>59.77</b>	<b>265.30</b>	<b>49.29</b>	<b>354.45</b>	<b>50.62</b>
	Coal Dump	0.00	0.00	2.53	1.78	16.01	2.98	18.54	2.65
ACTIVE MINING	Coal Quarry	0.00	0.00	15.80	11.14	94.47	17.56	110.27	15.75
	Advance Quarry Site	0.00	0.00	0.00	0.00	8.21	1.53	8.21	1.17
	Quarry Filled With Water	3.26	16.05	0.00	0.00	0.00	0.00	3.26	0.47
	<b>Total Area under Active Mining</b>	<b>3.26</b>	<b>16.05</b>	<b>15.80</b>	<b>11.14</b>	<b>102.68</b>	<b>19.09</b>	<b>121.74</b>	<b>17.39</b>
	Barren OB Dump	0.87	4.28	0.89	0.63	0.00	0.00	1.76	0.25
RECLAIM	Area Under Backfilling (Technical Reclamation)	10.14	49.93	25.22	17.78	13.26	2.46	48.62	6.94
	<b>Total Area under Technical Reclamation</b>	<b>10.14</b>	<b>49.93</b>	<b>25.22</b>	<b>17.78</b>	<b>13.26</b>	<b>2.46</b>	<b>48.62</b>	<b>6.94</b>
	<b>Total Area under Mine Operation</b>	<b>14.27</b>	<b>70.26</b>	<b>44.44</b>	<b>31.33</b>	<b>131.95</b>	<b>24.53</b>	<b>190.66</b>	<b>27.23</b>
WASTELAND	Waste Lands	1.64	8.07	6.88	4.85	74.50	13.85	83.02	11.86
	Fly Ash Pond / Sand Body	0.00	0.00	0.10	0.07	0.00	0.00	0.10	0.01
	<b>Total Wasteland</b>	<b>1.64</b>	<b>8.07</b>	<b>6.98</b>	<b>4.92</b>	<b>74.50</b>	<b>13.85</b>	<b>83.12</b>	<b>11.87</b>
WATERBODIES	Reservoir, nallah, ponds	0.00	0.00	3.07	2.17	2.75	0.51	5.82	0.83
	<b>Total Waterbodies</b>	<b>0.00</b>	<b>0.00</b>	<b>3.07</b>	<b>2.17</b>	<b>2.75</b>	<b>0.51</b>	<b>5.82</b>	<b>0.83</b>
AGRICULTURE	Crop Lands	0.00	0.00	0.00	0.00	2.17	0.40	2.17	0.31
	Fallow Lands	0.00	0.00	0.00	0.00	58.87	10.94	58.87	8.41
	<b>Total Agriculture</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>61.04</b>	<b>11.34</b>	<b>61.04</b>	<b>8.72</b>
SETTLEMENTS	Urban Settlement	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Rural Settlement	0.00	0.00	0.00	0.00	1.87	0.35	1.87	0.27
	Industrial Settlement	0.00	0.00	2.57	1.81	0.69	0.13	3.26	0.47
	<b>Total Settlement</b>	<b>0.00</b>	<b>0.00</b>	<b>2.57</b>	<b>1.81</b>	<b>2.56</b>	<b>0.48</b>	<b>5.13</b>	<b>0.73</b>
	<b>Grand Total</b>	<b>20.31</b>	<b>100.00</b>	<b>141.81</b>	<b>100.00</b>	<b>538.10</b>	<b>100.00</b>	<b>700.22</b>	<b>100.00</b>

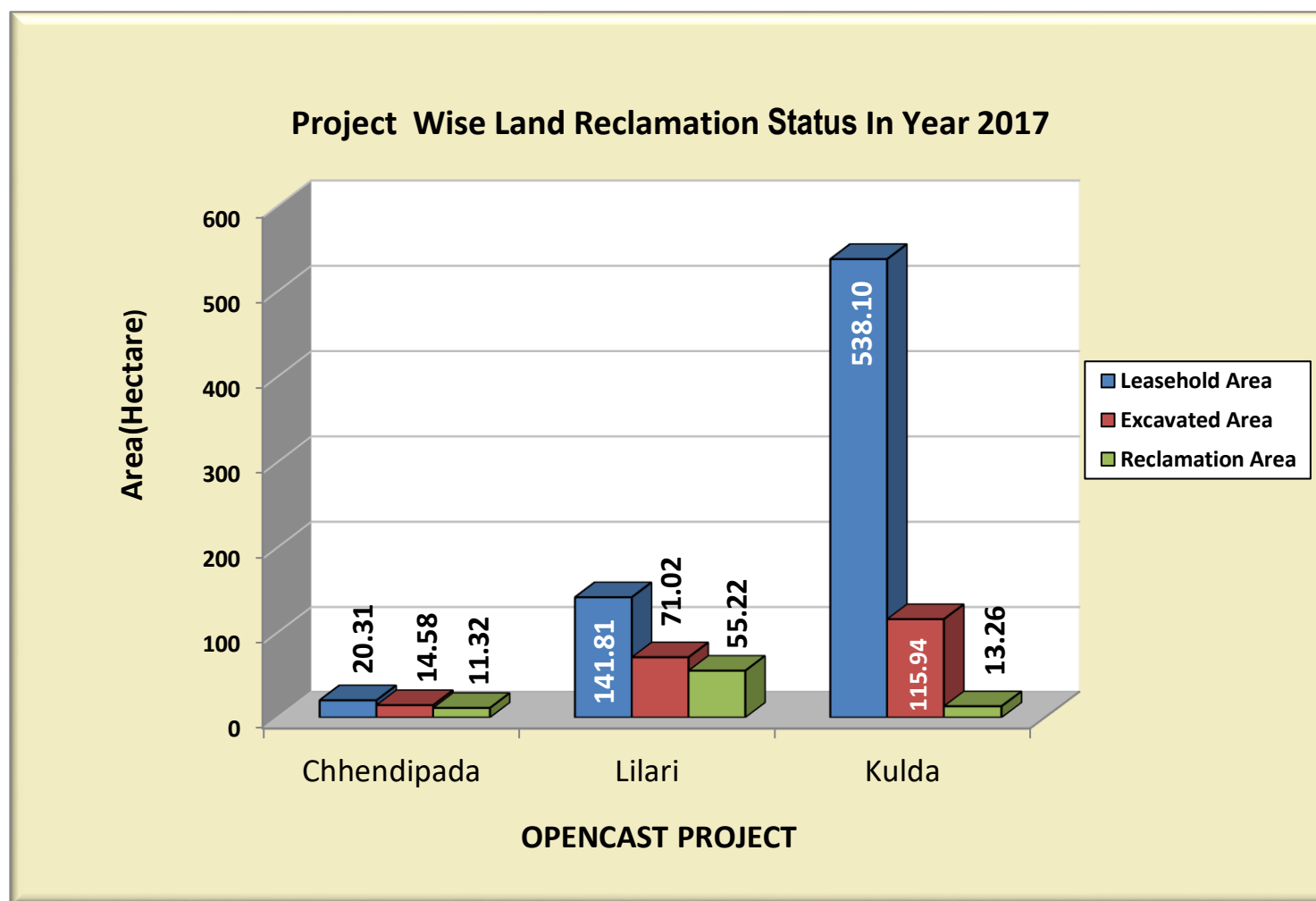
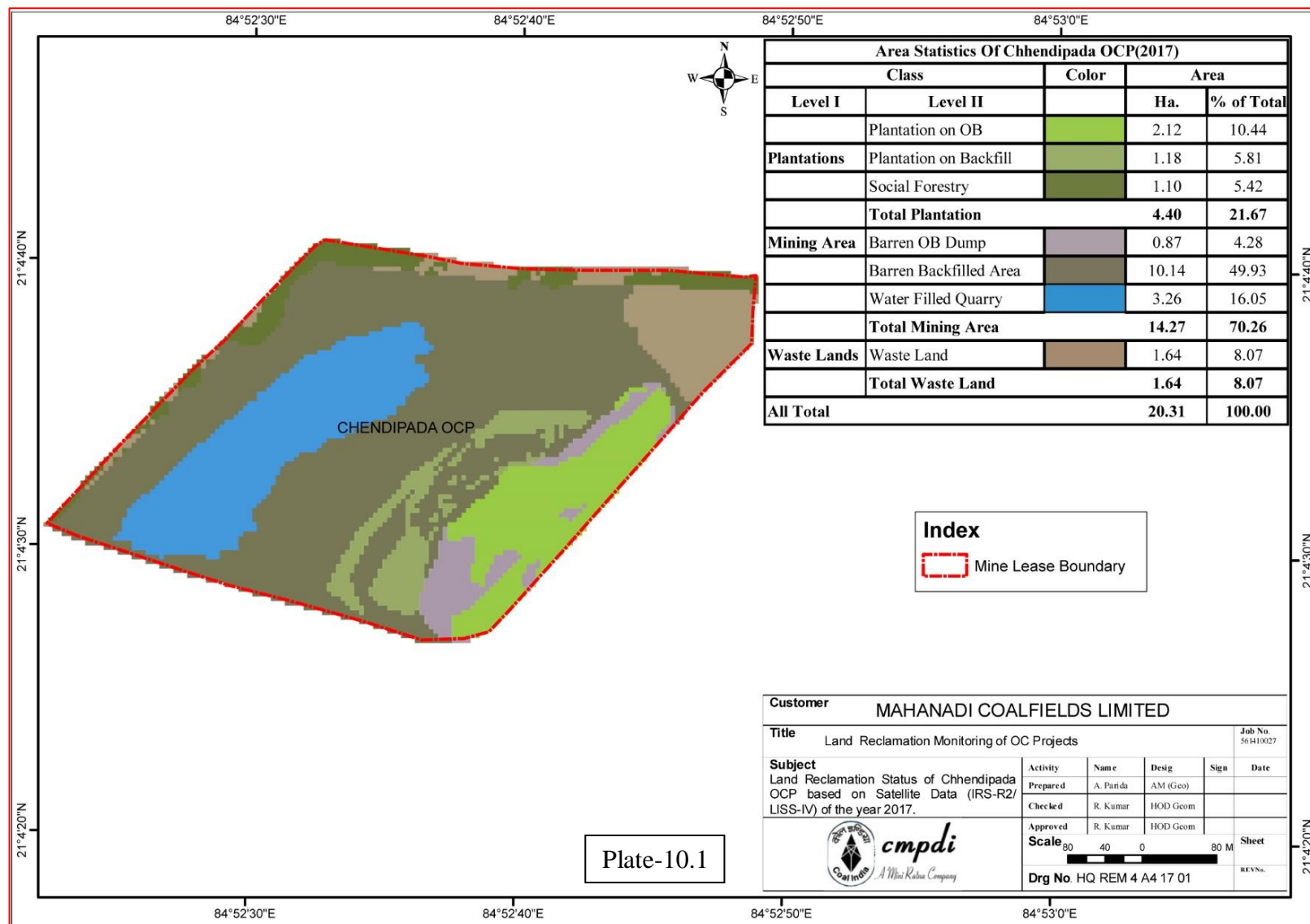
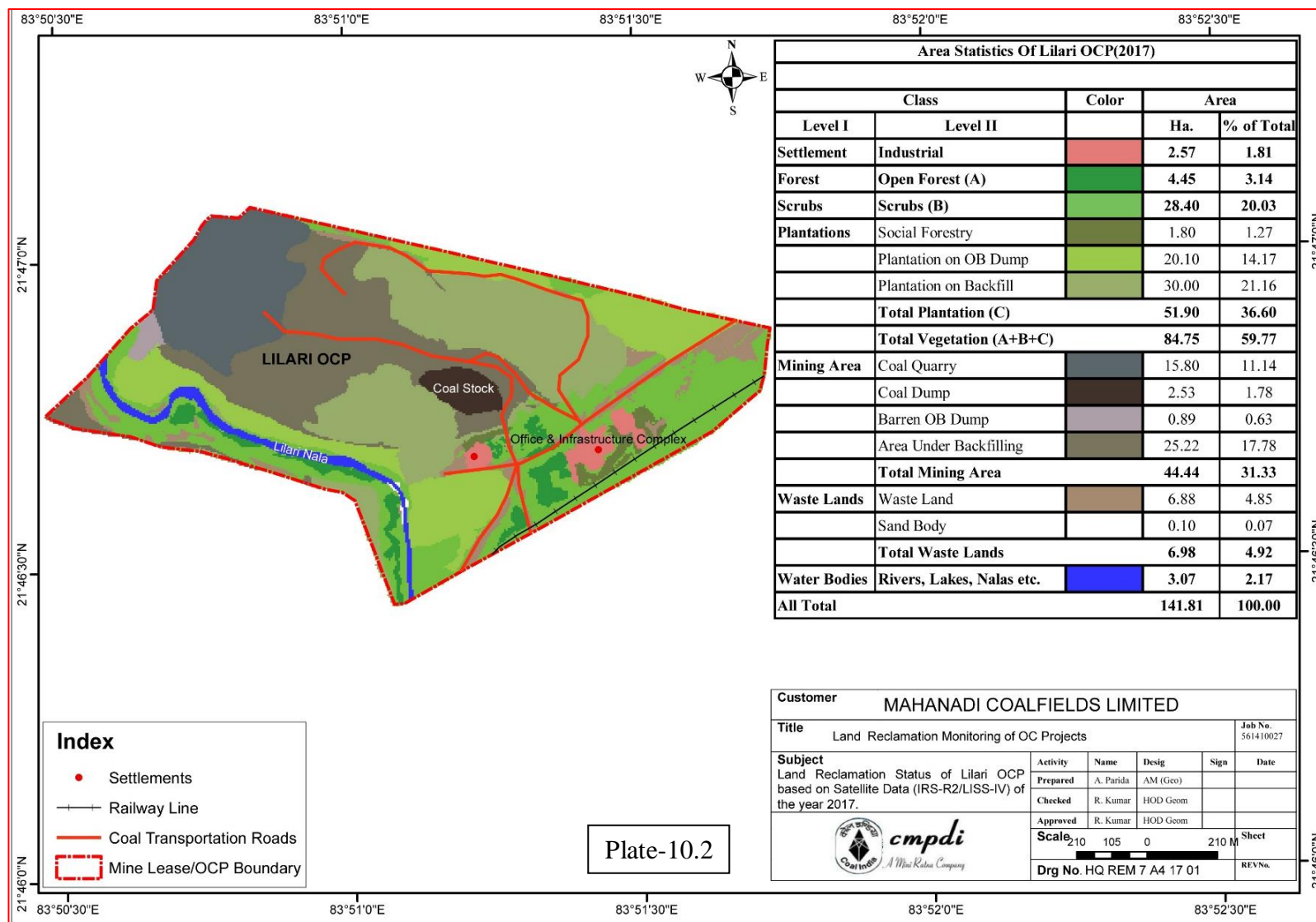
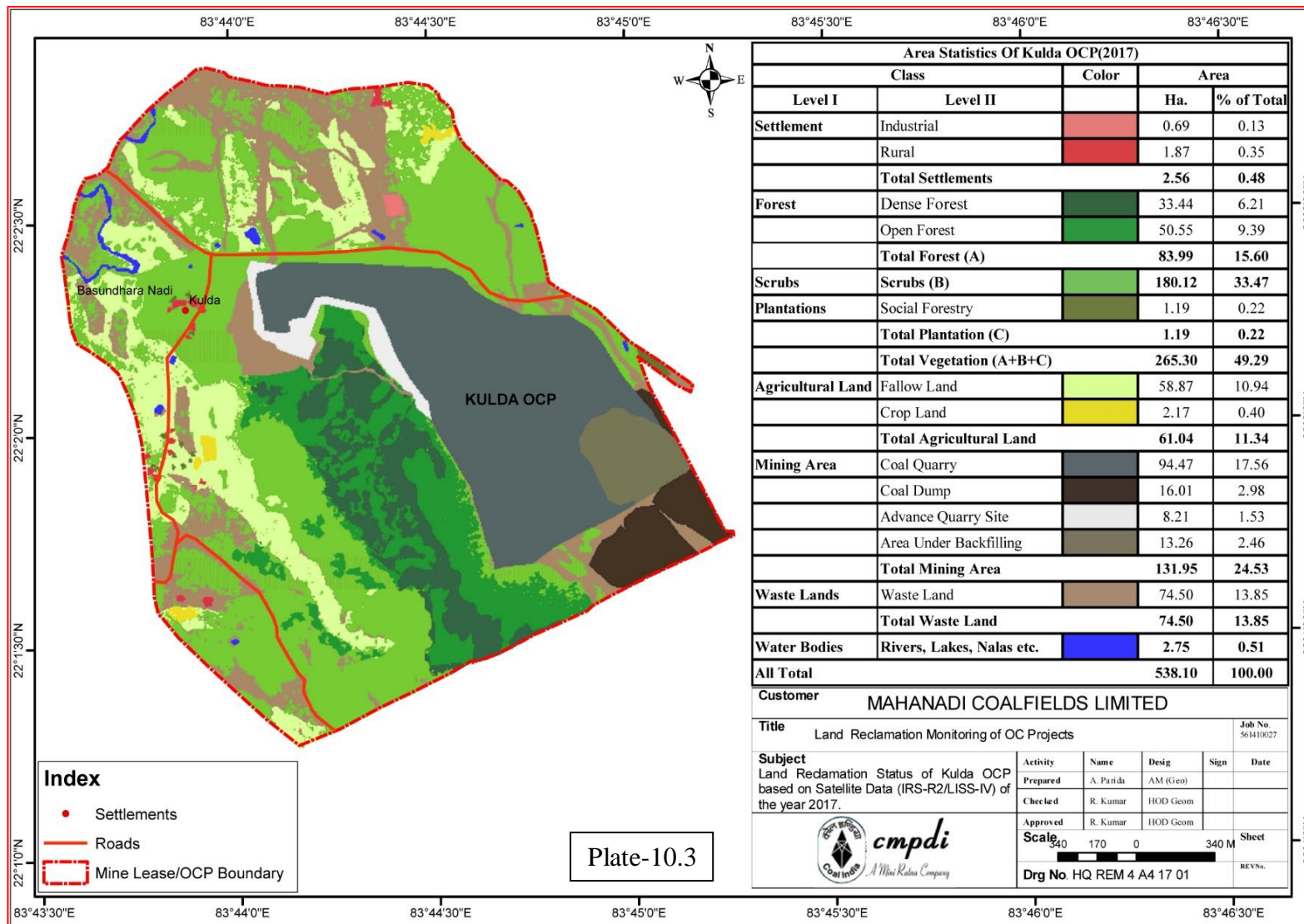


Fig 10.1









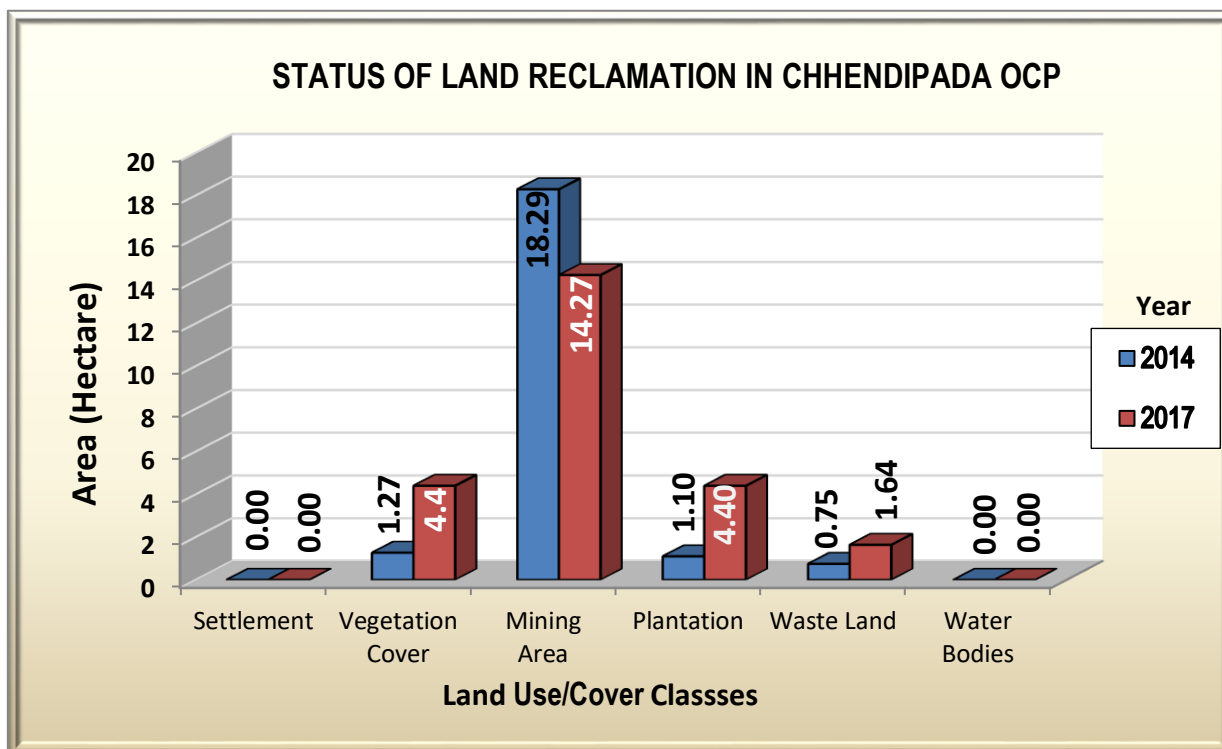


Figure – 10.2

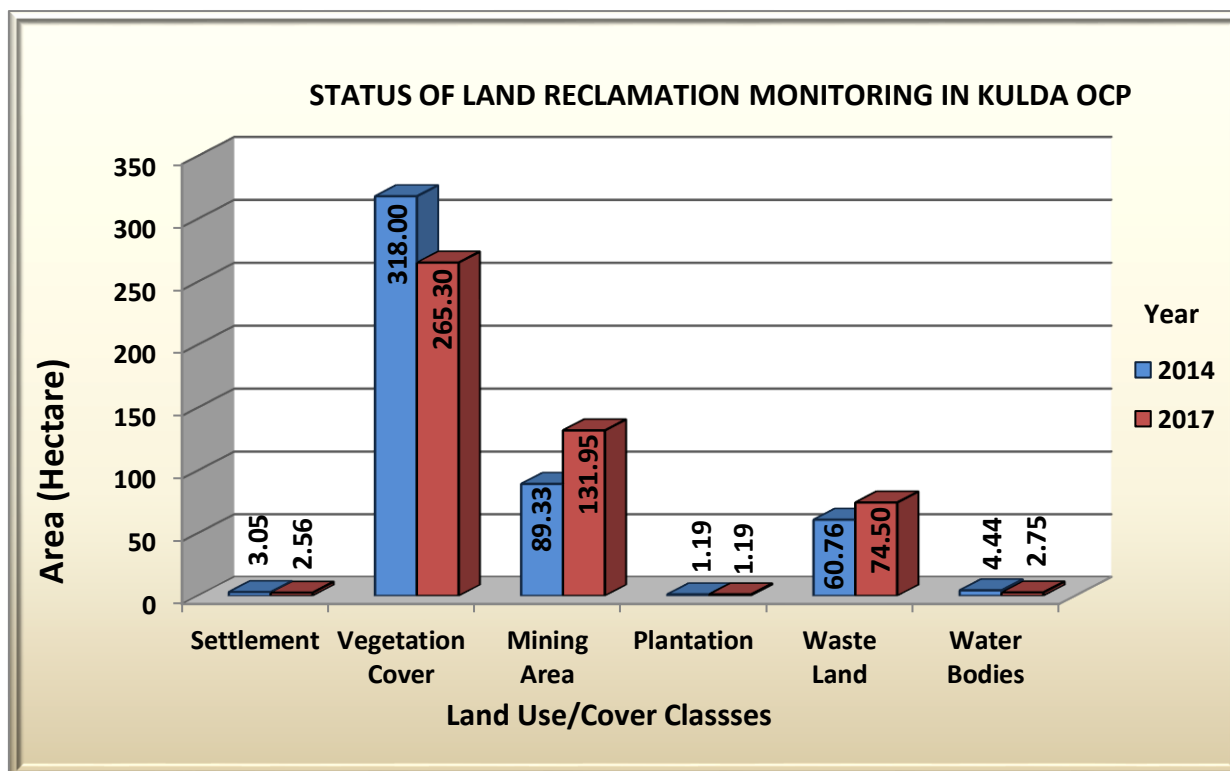


Figure -10.3

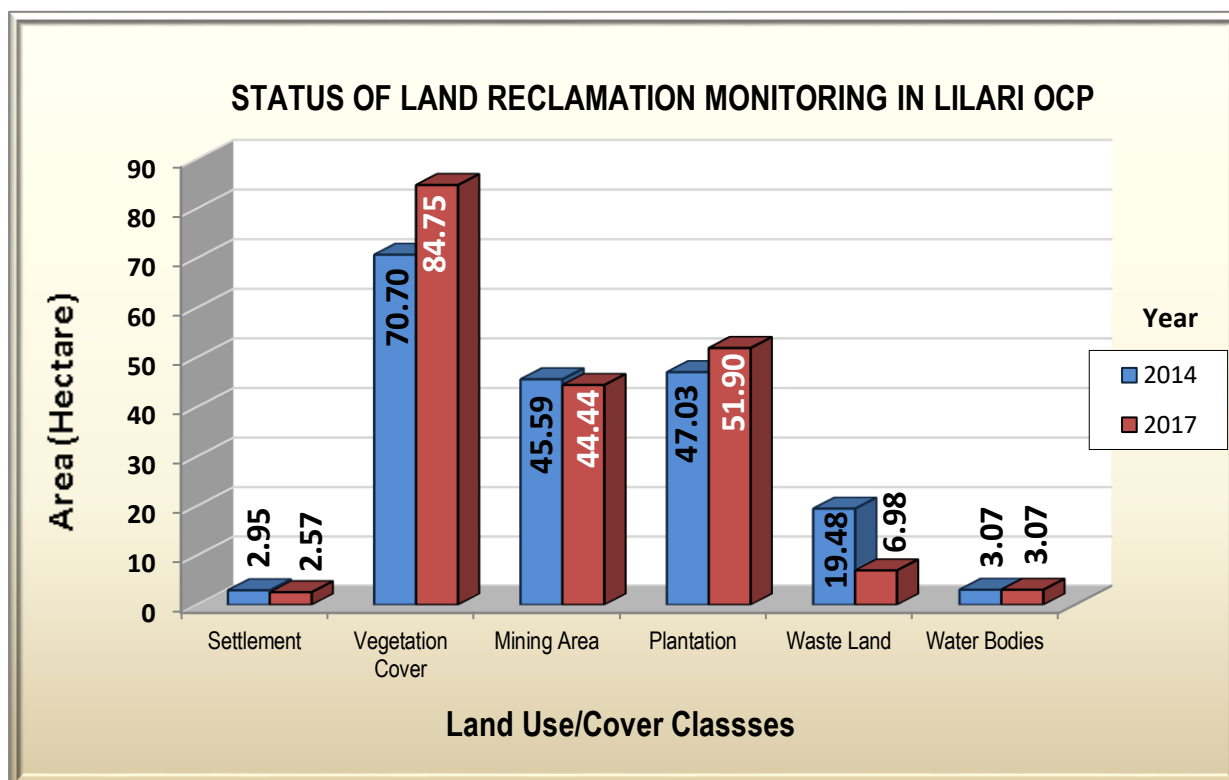


Figure -10.4



Photograph10.1: Block plantation (new) (Chhendipada OCP)



Photograph10.2: Plantation on Barren OB Dump( Lilari OCP)

# **NORTH EASTERN COALFIELDS**

## 11.0 Land Reclamation Status in North Eastern Coalfields

- 11.1** Following three OC projects producing less than 5 million m<sup>3</sup> (Coal + OB together) of North Eastern Coalfields Ltd. have been taken up during the year 2017-18 for land reclamation monitoring based on satellite data:
- Lido OCP
  - Tikak OCP
  - Tirap OCP
- 11.2** Project wise Land Reclamation status of above mentioned projects in NEC is given in Table 11.1 and also shown graphically in Fig 11.1. Area statistics of different land use class present in the mine leasehold of the above projects for the year 2017 are shown in the Table - 11.2. Land use maps derived from satellite data are shown in Plate 11.1 -11.3 Different land use classes based on satellite data are depicted in Bar Charts in Fig. 11.2 to 11.4.
- 11.3** Study reveals that out of total mine leasehold area of 1587.87 Hectares of the above mentioned 03 OC projects of NEC taken up for this study in 2017-18; total excavated area is 216.89 hectares (13.66%), out of which 12.15 Hectare (5.60%) has been planted (Biologically Reclaimed), 37.33 Hectare (17.21%) is under backfilling (Technically Reclamation) and balance 167.41 Hectare (77.19%) is under active mining.
- 11.4** Out of three projects in NEC, Tirap OCP tops with 43.66 Hectare (34.23%) reclamation followed by Ledo OCP (21.30%) while there is no reclamation in Tikak OCP as evident from Table -11.1
- 11.5** This study will be carried out again after an interval of three years to assess the land reclamation status in the above projects.



Table-11.1

## Projects wise Land Reclamation Status in opencast projects of NEC based on the satellite data of the year 2017

(Area in Hectare)

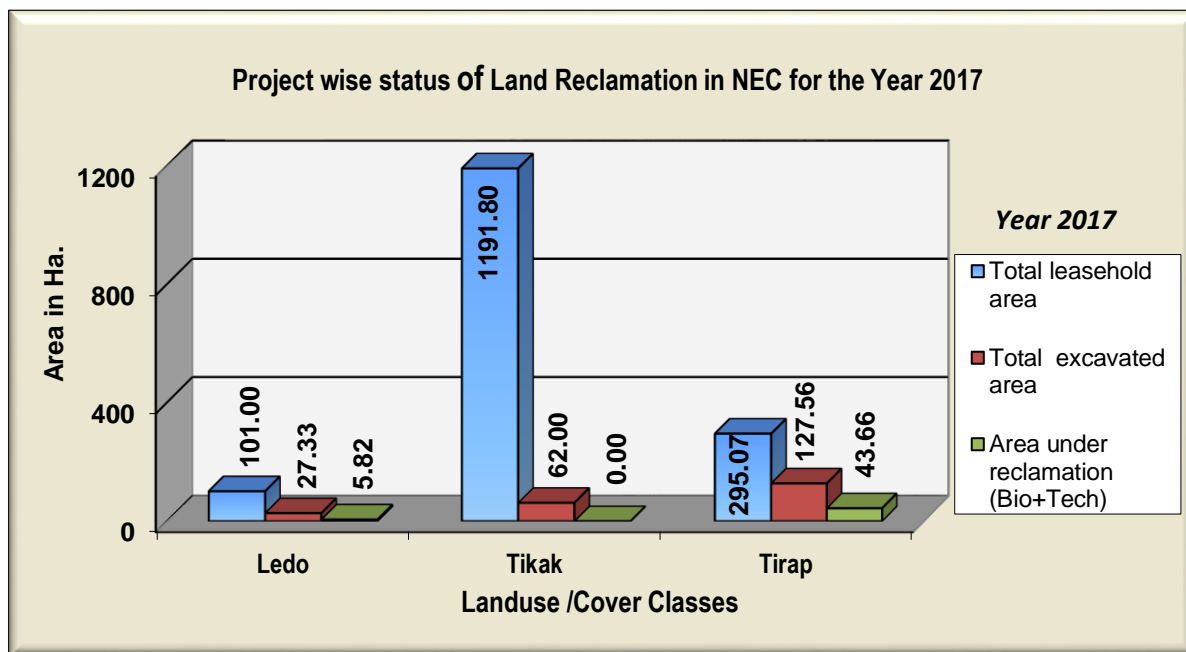
Area in hectare)

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, Avamue Plantation Etc.									
1	2	3		4		5		6		7		8		9 (=4+5+8)		10 (=5+6+7)		11(=4+5)	
		2014	2017	2014	2017	2014	2017	2014	2017	2014	2017	2014	2017	2014	2017	2014	2017	2014	2017
1	Ledo	101.00	101.00	0.00	0.00	8.40	5.82	0.00	1.31	32.10	29.21	14.55	21.51	22.95	27.33	40.50	36.34	8.40	5.82
				0.00%	0.00%	36.60%	21.30%					63.40%	78.70%			40.10%	35.98%	36.60%	21.30%
2	Tikak	1191.80	1191.80	0.00	0.00	0.00	0.00	52.86	71.26	25.15	18.54	26.05	62.00	26.05	62.00	78.01	89.80	0.00	0.00
				0.00%	0.00%	0.00%	0.00%					100.00%	100.00%			6.55%	7.53%	0.00%	0.00%
3	Tirap	-	295.07	0.00	37.33	0.00	6.33	0.00	5.27	0.00	0.00	0.00	83.90	0.00	127.56	0.00	11.60	0.00	43.66
				0.00%	29.26%	0.00%	4.96%					0.00%	65.77%			0.00%	3.93%	0.00%	34.23%
	TOTAL	1292.80	1587.87	0.00	37.33	8.40	12.15	52.86	77.84	57.25	47.75	40.60	167.41	49.00	216.89	118.51	137.74	8.40	49.48
				0.00%	17.21%	17.14%	5.60%					82.86%	77.19%			9.17%	8.67%	17.14%	22.81%

(% 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 barren backfilled only
3. Area under Active mining includes coal quarry site, quarry filled with water etc.
4. Social Forestry and Plantation on external OB dump are not included in Biological Reclamation and are put under separate categories as shown in the table.
5. (%) calculated in the above table is in respect of total excavated area except for "Total area under plantation" where % is in terms of leasehold area.



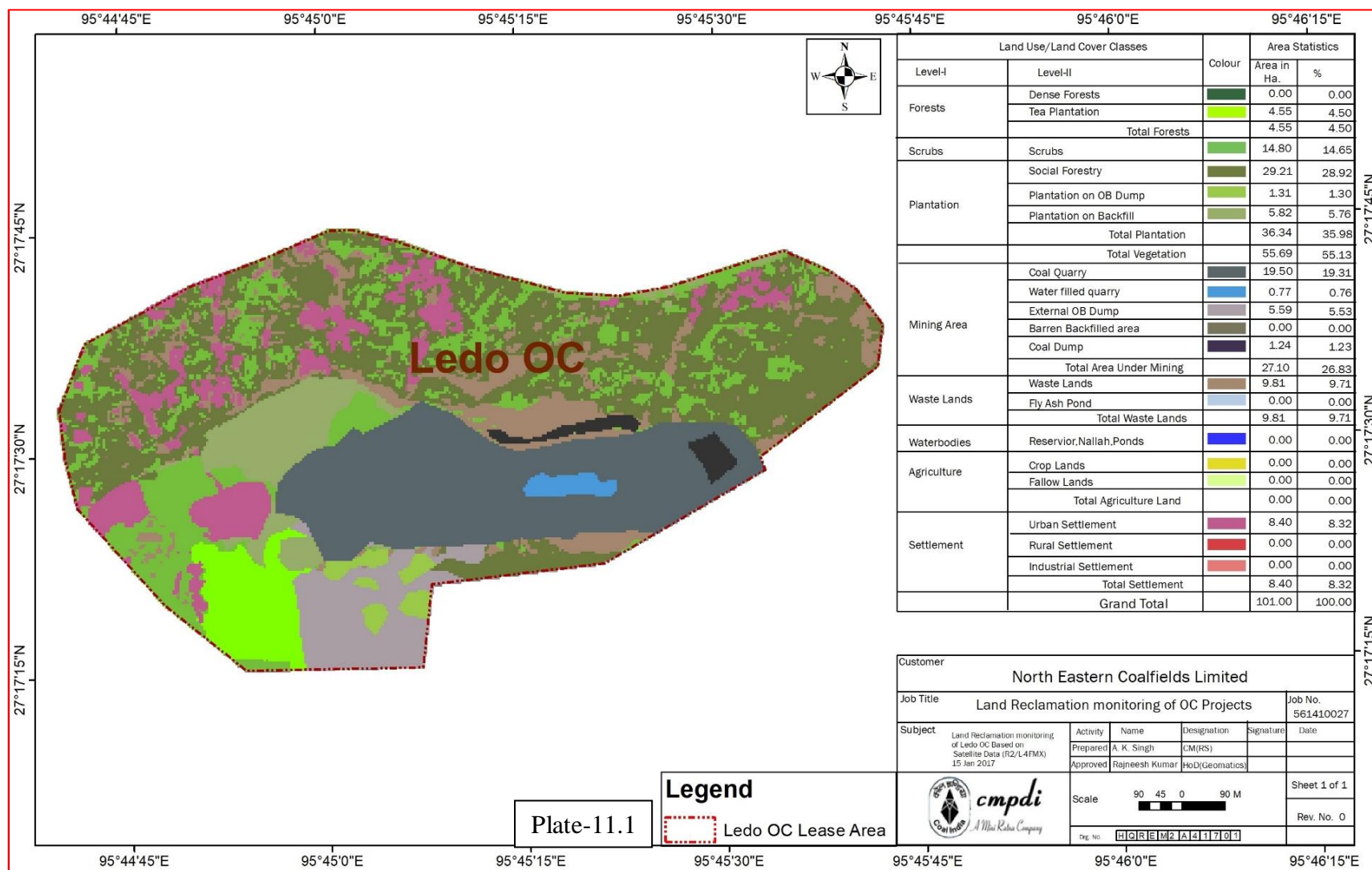
**Figure 11.1: Projects wise Land Reclamation Status -2017(NEC)**

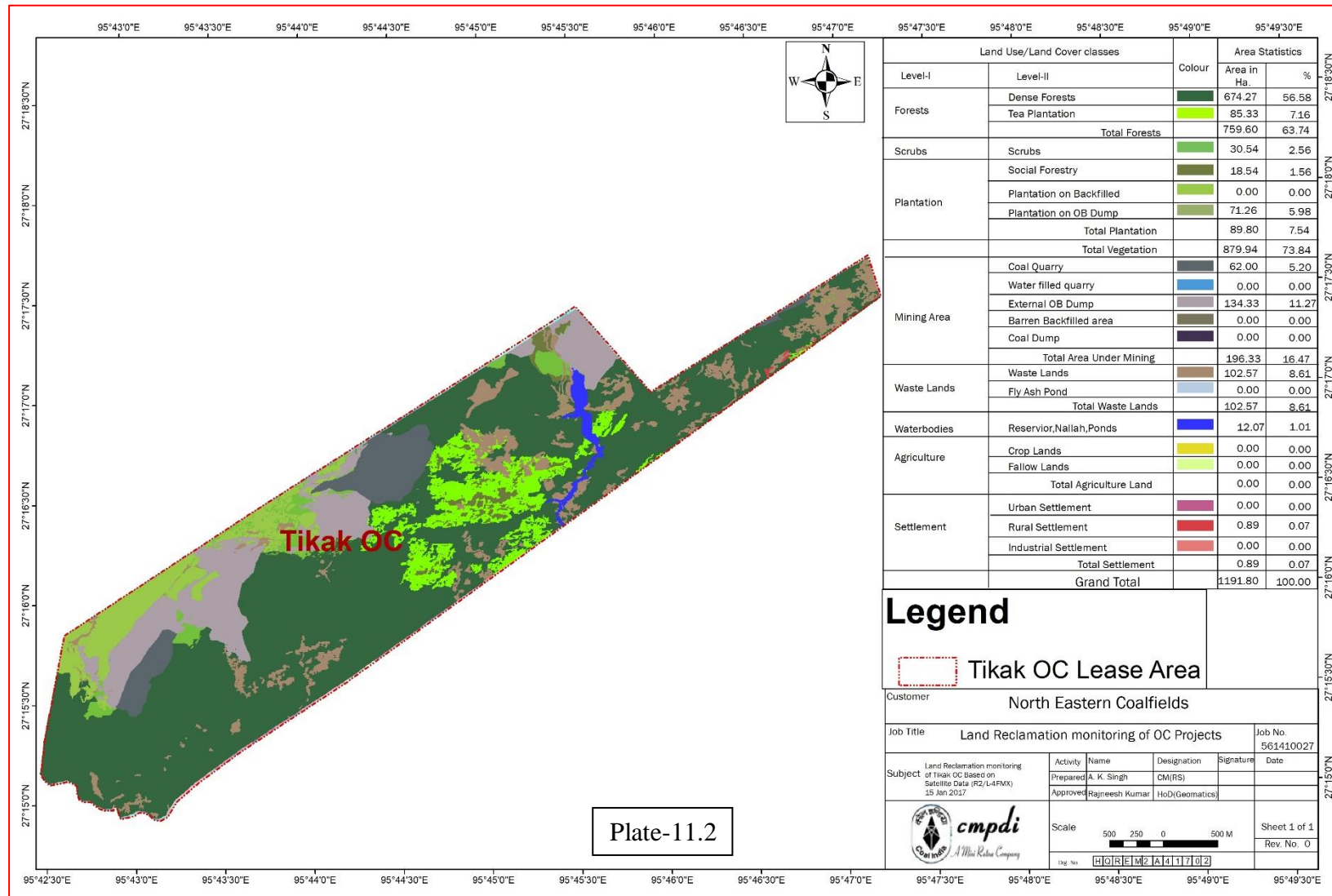
TABLE-11.2

## STATUS OF LAND RECLAMATION IN NEC BASED ON SATELLITE DATA OF THE YEAR 2017

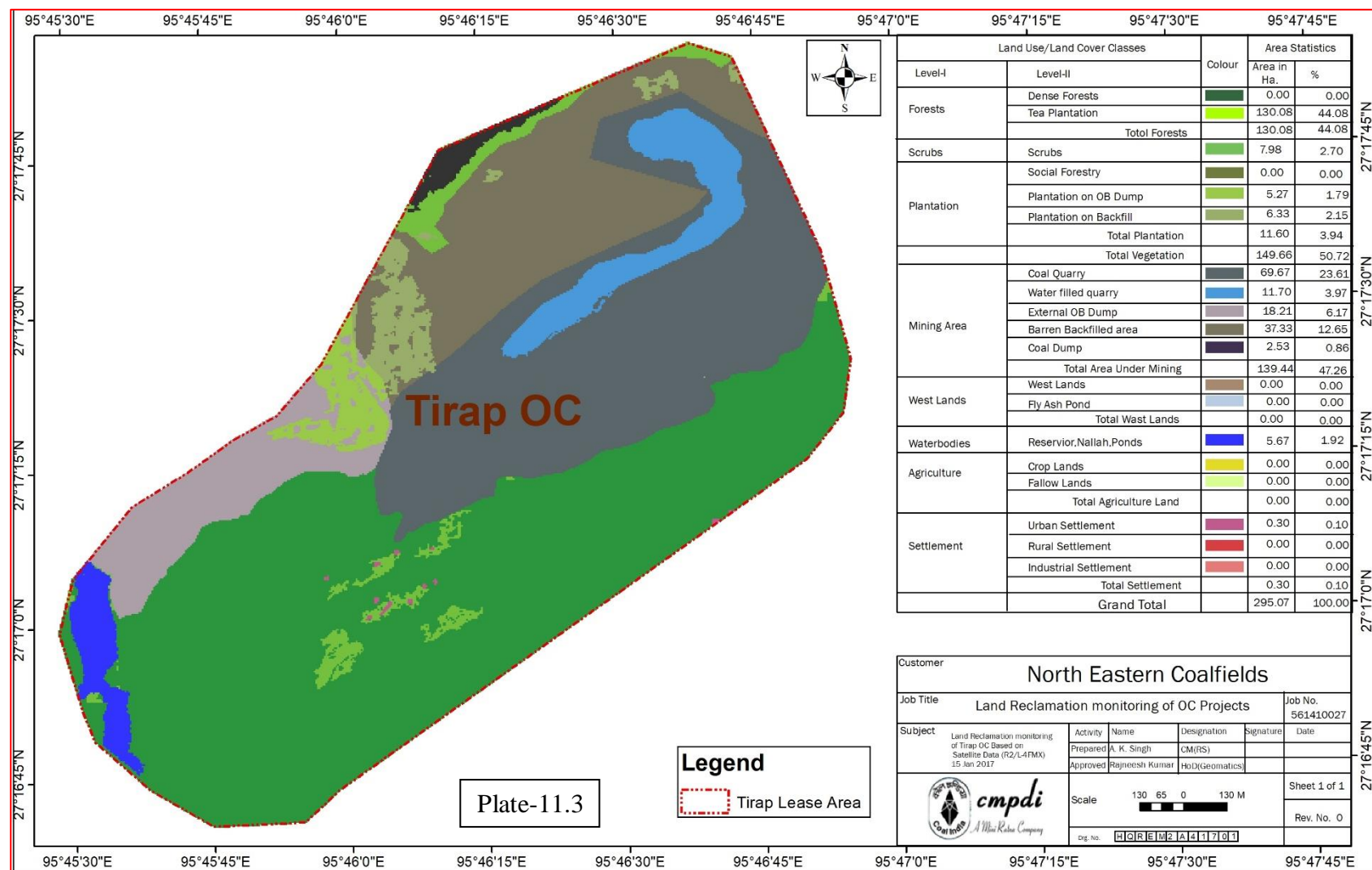
(Area in Hq.)

		Ledo		Tikak(4 miles leased area including Namdang)		Tirap		TOTAL	
		Area	%	Area	%	Area	%	Area	%
FORESTS	Dense Forest	0.00	0.00	674.27	56.58	0.00	0.00	674.27	42.46
	Tea Plantation	4.55	4.50	85.33	7.16	130.08	44.08	219.96	13.85
	<b>Total Forest/Tea Plantation</b>	4.55	4.50	759.60	63.74	130.08	44.08	894.23	56.32
SCRUBS	Scrubs	14.80	14.65	30.54	2.56	7.98	2.70	53.32	3.36
PLANTATION	Social Forestry	29.21	28.92	18.54	1.56	0.00	0.00	47.75	3.01
	Plantation on OB Dump	1.31	1.30	71.26	5.98	5.27	1.79	77.84	4.90
	Plantation on Backfill (Biological Reclamation)	5.82	5.76	0.00	0.00	6.33	2.15	12.15	0.77
	<b>Total Plantation</b>	36.34	35.98	89.80	7.54	11.60	3.94	137.74	8.67
<b>Total Vegetation</b>		<b>55.69</b>	<b>55.13</b>	<b>879.94</b>	<b>73.84</b>	<b>149.66</b>	<b>50.72</b>	<b>1085.29</b>	<b>68.35</b>
ACTIVE MINING	Coal Quarry	19.50	19.31	62.00	5.20	69.67	23.61	151.17	9.52
	Coal Dump	1.24	1.23	0.00	0.00	2.53	0.86	3.77	0.24
	Advance Quarry Site	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Quarry Filled With Water(Sump)	0.77	0.76	0.00	0.00	11.70	3.97	12.47	0.79
<b>Total Area under Active Mining</b>		<b>21.51</b>	<b>21.30</b>	<b>62.00</b>	<b>5.20</b>	<b>83.90</b>	<b>28.44</b>	<b>167.41</b>	<b>10.54</b>
RECLAIMED	Barren OB Dump	5.59	5.53	134.33	11.27	18.21	6.17	158.13	9.96
	Barren Backfilled Area (Technical Reclamation)	0.00	0.00	0.00	0.00	37.33	12.65	37.33	2.35
	<b>Total Area under Technical Reclamation</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>37.33</b>	<b>12.65</b>	<b>37.33</b>	<b>2.35</b>
<b>Total Area under Mine Operation</b>		<b>27.10</b>	<b>26.83</b>	<b>196.33</b>	<b>16.47</b>	<b>139.44</b>	<b>47.26</b>	<b>362.87</b>	<b>22.85</b>
WASTELANDS	Waste Lands	9.81	9.71	102.57	8.61	0.00	0.00	112.38	7.08
	Fly Ash Pond / Sand Body	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	<b>Total Wasteland</b>	<b>9.81</b>	<b>9.71</b>	<b>102.57</b>	<b>8.61</b>	<b>0.00</b>	<b>0.00</b>	<b>112.38</b>	<b>7.08</b>
WATERBODIES	Reservoir, nallah, ponds	0.00	0.00	12.07	1.01	5.67	1.92	17.74	1.12
	<b>Total Waterbodies</b>	<b>0.00</b>	<b>0.00</b>	<b>12.07</b>	<b>1.01</b>	<b>5.67</b>	<b>1.92</b>	<b>17.74</b>	<b>1.12</b>
AGRICULTURE	Crop Lands	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Fallow Lands	0.00	0.00	0.00	0.00	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>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
SETTLEMENTS	Urban Settlement	8.40	8.32	0.00	0.00	0.30	0.10	8.70	0.55
	Rural Settlement	0.00	0.00	0.89	0.07	0.00	0.00	0.89	0.06
	Industrial Settlement	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	<b>Total Settlement</b>	<b>8.40</b>	<b>8.32</b>	<b>0.89</b>	<b>0.07</b>	<b>0.30</b>	<b>0.10</b>	<b>9.59</b>	<b>0.60</b>
<b>Grand Total</b>		<b>101.00</b>	<b>100.00</b>	<b>1191.80</b>	<b>100.00</b>	<b>295.07</b>	<b>100.00</b>	<b>1587.87</b>	<b>100.00</b>









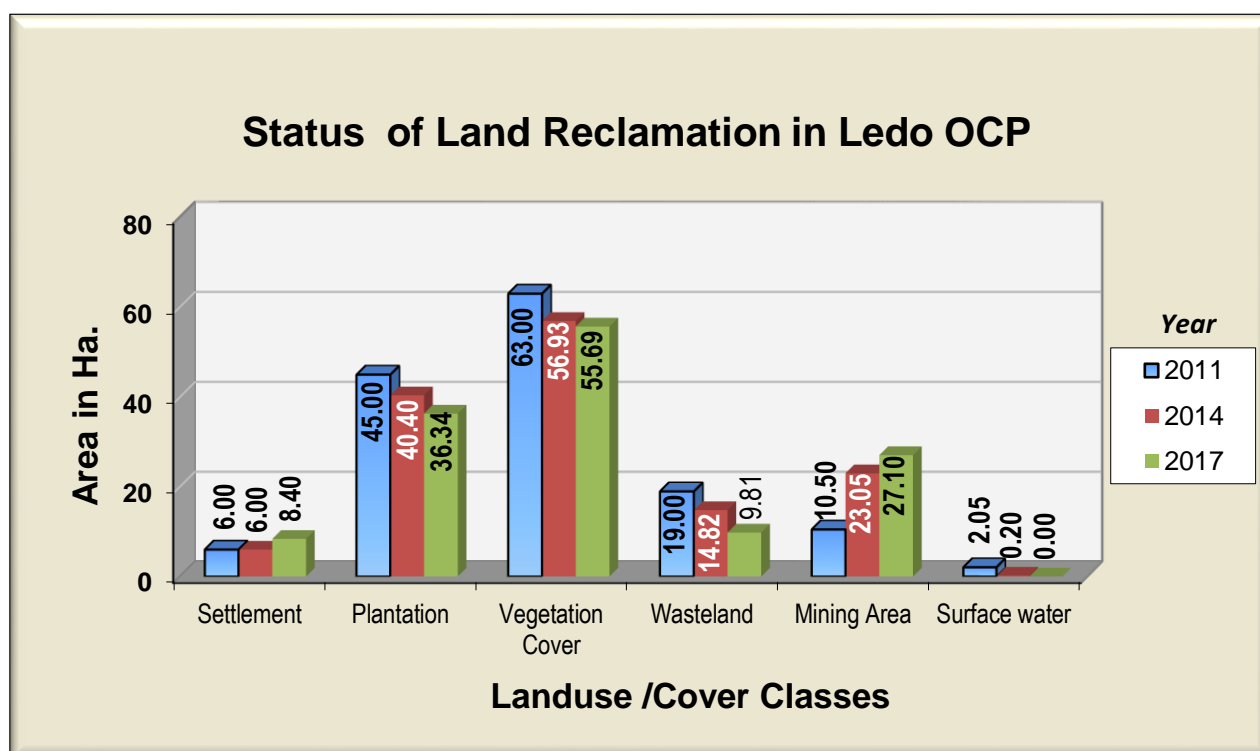


Figure -11.2

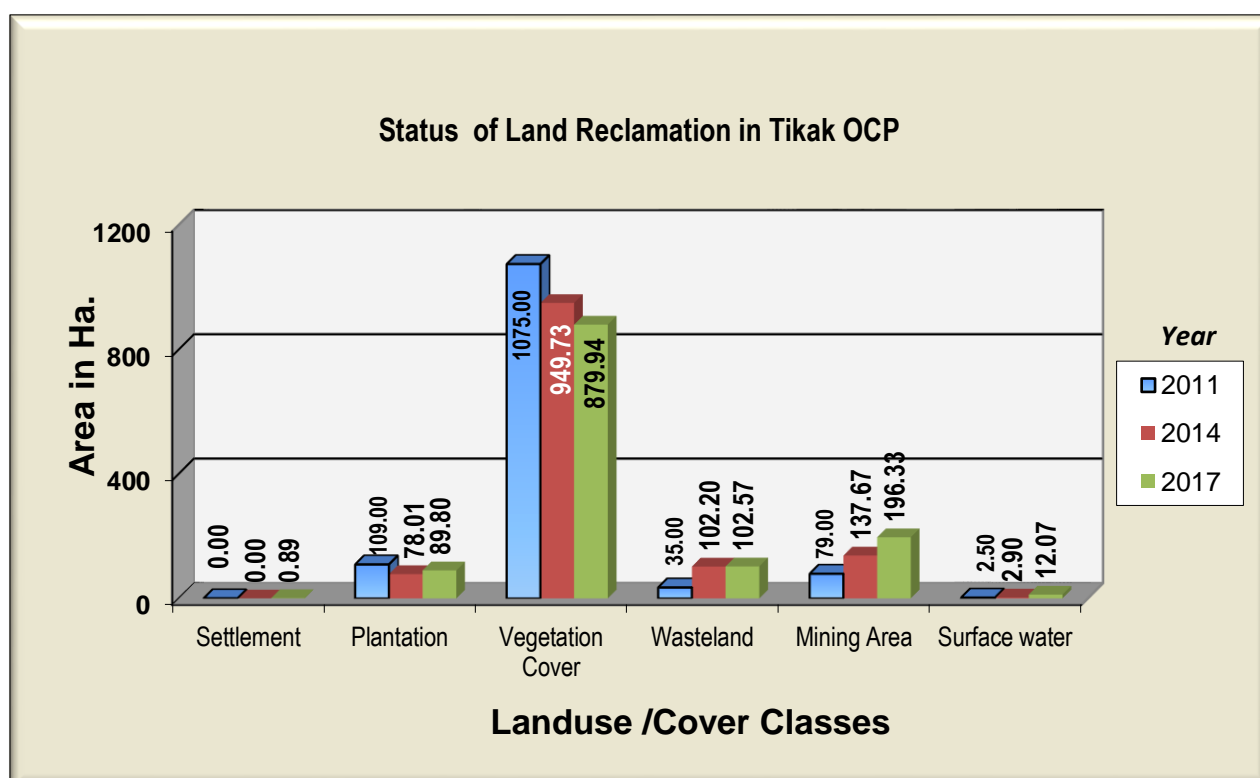


Figure -11.3

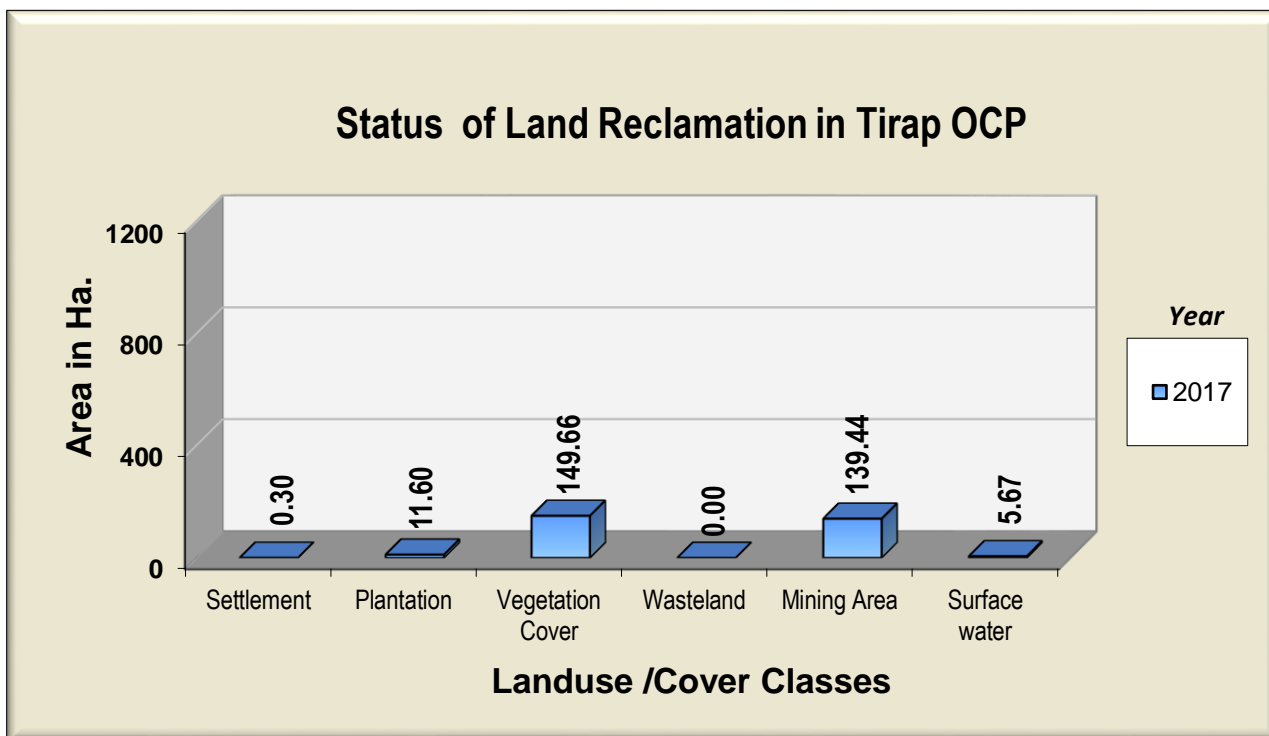


Figure-11.4

**Photo-1:** Plantation under Social Forestry in Ledo OCP





**Photo-2:** Plantation on OB in Tikak OCP



**Photo-3:** Plantation in Tikak OCP



**Photo-4:** Plantation in Tirap OCP





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