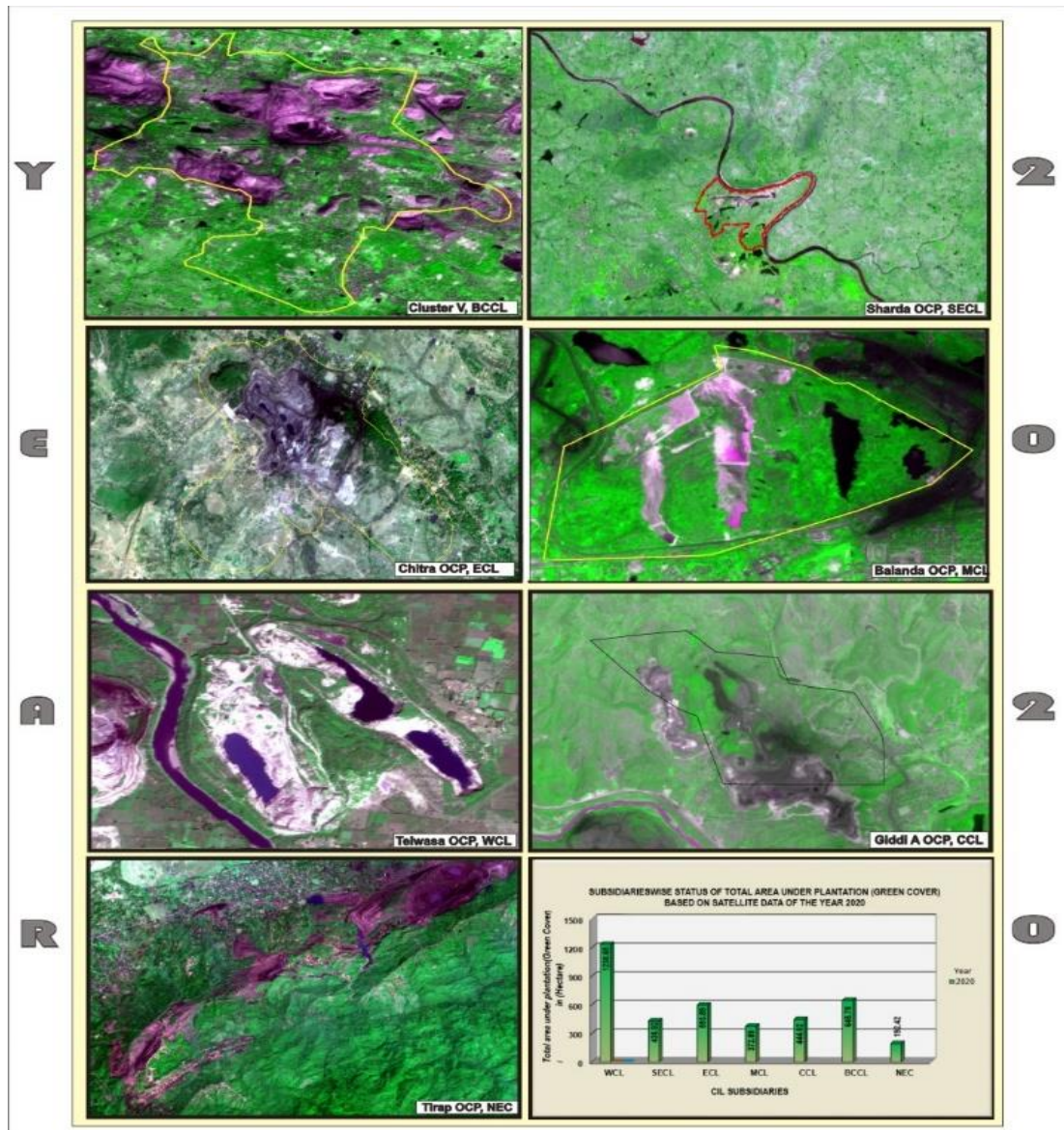


# Land Restoration / Reclamation Monitoring of 46 Opencast projects, 09 Cluster of mines and 05 Underground mines of CIL producing less than 5 m.c.m. (Coal+OB) based on Satellite Data for the Year 2020



Submitted to  
**Coal India Limited**

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Cluster of mines and 05 Underground mines of CIL producing less than  
5 m.c.m. (Coal+OB) based on Satellite Data for the Year 2020**

**March- 2021**



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## Executive Summary

- 1.0 Project** Land restoration/ reclamation monitoring of 60 projects consisting of 46 opencast coal mines, 9 clusters of (OC+UG) mines and 5 Underground mines of different subsidiaries of Coal India Ltd. (CIL) producing less than 5 million cubic meter (Coal+OB) annually, 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 these projects. 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 49743.76 Hectares of the 60 projects combine with 46 opencast coal mines, 9 cluster of (OC+UG) mines and 5 Underground mines producing less than 5 mcm (Coal +OB) considered for monitoring during 2020-21; total excavated area is only 7452.33 hectares out of which 938.83 hectares (12.60%) has been planted (*Biologically Reclaimed*), 3025.27hectares (40.59%) area is been under backfilling (*Technically Reclaimed*) and 3488.23 hectares (46.81%) area is under active mining. It is evident from the analysis that 3964.10 hectares (53.19%) area of the 60 projects taken for study for the year 2020-21 is under reclamation and balance 3488.23 hectares (46.81%) area is under active mining. Company wise details are given in Table-1 & Fig-1.
- The Projects selected for land reclamation monitoring in the year 2020-21 are subdivided into three groups viz (A) 46 opencast projects belonging to WCL, SECL, CCL, ECL, MCL & NEC, (B) 09 Cluster of mines of BCCL & ECL and (C) 05 Underground mines of SECL & MCL.
- For 46 nos. of Opencast mines which is indicated as Group (A), in Table – 1, out of total mine leasehold area 24604.03 hectare of 46 OC projects of WCL, SECL, ECL, MCL, CCL & NEC producing less than 5 mcm (Coal+OB) annually considered for

monitoring during 2020-21; total excavated area is 5298.66 hectares, out of which 801.30 hectares (15.12%) area has been planted (Biologically Reclaimed), 2010.71 hectares (37.95%) area is under backfilling (Technical Reclamation) and balance 2486.65 hectares (46.93%) area is under active mining. Company wise details of land reclamation of above 46 projects is given in table - 1 (A) & Fig-1.

- Comparing the status of land reclamation for 46 no. of opencast projects in WCL, ECL, SECL, CCL, MCL & NEC monitored in the year 2020-21 with respect to previous cycle study done for the same set of OC mines in the year 2017-18 in these opencast projects of CIL's subsidiary coal companies, it is evident from the analysis that area under land reclamation has increased from 1681.39 Hectares (43.07%) (Yr. 2017) to 2812.01 Hectares (53.07%) (Yr. 2020-21) which includes both plantation (Biological Reclamation) and areas under backfilling (Technical Reclamation). This increase of 1130.62 hectare area under land reclamation in a period of three years is due to addition of 03 OC projects of ECL and 02 OC projects of SECL and sincere efforts made by CIL's subsidiary companies towards land reclamation their mining area.
- It has been observed that in opencast projects in WCL, SECL, CCL, MCL, ECL & NEC, technical and biological reclamation has either increased or remained static in the leasehold area of opencast projects in the year 2020-21 as compared to the year 2017-18.
- The 46 nos. of opencast projects in WCL, SECL, CCL, MCL, ECL & NEC taken for study of land reclamation monitoring in the year 2020-21: the area under green cover has gone up from 1764.03 Ha (9.79%) area in the year 2017-18 to 2561.48 Ha (10.41%) area in the year 2020-21.
- For 9 nos. of Clustered mines which is indicated as Group (B) in Table -1, out of total mine leasehold of 17047.22 Hectare for total nos of 09 clusters 05 nos in BCCL and 04 nos in ECL producing less than 5 million cu.m. (Coal+OB) annually considered for monitoring during the year 2020-21; total

excavated area 1790.74 Ha, out of which 123.81 Ha (6.91%) area has been planted on backfill (Biologically Reclaimed), 844.49 Ha (47.16%) area is under backfilling (Technical Reclamation) and balance 822.44 Ha (45.93%) area is under active mining.

- In BCCL and ECL, cluster of mines consisting mostly opencast mine and few underground mines have been taken into consideration for land reclamation monitoring in the year 2020-21 on request of these subsidiaries.
- It is evident from Group (B) (refer table -1) that for 09 clusters taken for monitoring of land reclamation, plantation on backfill (Biologically Reclamation) has increased from 31.60 Ha (5.57%) in the year 2017 to 123.81 Ha (6.91%) in the year 2020 and Technical Reclamation has increased from 457.35 Ha (45.94%) in the year 2017 to 844.49 Ha (47.16%) in the year 2020.
- The area under green cover has gone up from 566.96 hectares (8.62%) in the year 2017 to 1179.75 hectares (6.92%) in the year 2020. The decrease of 1.70 % in percentage of green cover in the year 2020 as compared to the year 2017 is due to increase in area of leasehold boundary this year and percentage of green cover generated has been calculated with respect to area of leasehold boundary. Area of leasehold boundary has increased in the year 2020 due to addition of UG and OC mine in SECL and ECL as mentioned in Table-1.
- Total area under reclamation in 09 nos of cluster of BCCL and ECL has gone up from 488.95 hectares (49.11%) in 2017 to 968.30 hectares (54.07%) in 2020-21.
- For 5 nos. of underground mines which is indicated as Group (C), in Table – 1, out of total mine leasehold of 8092.51 Hectare for 02 underground mines of SECL and 03 nos. of Underground mines of MCL producing less than 5 million cu.m. (Coal+OB) annually considered for monitoring during the year 2020-21; total excavated area 362.93 Ha only, out of which 13.72 Ha (3.78%) area has been planted on backfill (Biologically Reclaimed) and 170.07 Ha (46.86%) area is under backfilling (Technical Reclamation) and balance 179.14 (49.36%) area is under active mining.

- Total area under reclamation in 02 nos of UG mine of SECL and 03 nos UG mine of MCL is 183.79 hectares (50.64%) in the year 2020.
- 02 nos each underground and OC mines of SECL and 03 nos of Underground mines of MCL producing less than 5 million cu.m. (Coal+OB) annually considered for the first time for land reclamation monitoring during the year 2020-21. Hence comparison has not been made this year however, data generated of these UG mine will be considered as base data for comparison of status of land reclamation for same set of mine during interval of three year.
- From Table 1; Group (A), (B) and (C) combined, it can be seen that total area of leasehold boundary in the 60nos of project consisting of 46 nos of OC, 09 nos of Cluster of mines and 05 nos of Underground mines of WCL, SECL, ECL, MCL, BCCL, CCL & NEC is 49743.76 Ha; total excavated area is 7452.33 only, out of which 938.83 Ha (12.60%) area has been planted on backfill (Biologically Reclaimed), 3025.27 Ha (40.59%) area is under backfilling (Technical Reclamation) and balance 3488.23 Ha (46.81%) area is under active mining.
- It has been observed that in all subsidiaries of CIL, biological reclamation as well as areas under technical reclamation has increased in the leasehold boundary from 486.48 (9.93%) (Yr.2017) to 938.83 Ha (12.60%) and 1683.86 Ha (34.37%) to 3025.27 (40.59%) respectively.
- Overall, the area under green cover has gone up from 2330.99 hectares (9.48%) in 2017-18 to 3910.54 hectares in 2020-21 as indicated in bar chart (fig-3).
- Total area under reclamation in all subsidiaries of CIL has gone up from 2170.34 hectares (44.30%) in 2017-18 to 3964.10 hectares (53.19%) in 2020-21.

**Table-1**  
**Company wise Land Reclamation Status in 46 OC , 09 Cluster of (UG+OC) mines and 05 underground mines producing**  
**( Less than 5 million cu.m. Coal + OB ) based on Satellite Data of year 2020**

Sl. No.	Coal Company (No. of OC Projects , Cluster of mines & Underground mines)		Area in Hectare (% calculated in respect of total excavated area)																	
			Leasehold / All Right Boundary		Technical Reclamation		Plantation				Area under Active Mining		Total Excavated Area		Total Area under Plantation (% Green Cover generated in Leasehold)		Total Area under Reclamation			
							Biological Reclamation		Other Plantation											
							Area under Backfilling	Area under Plantation on backfill	Plantation on External OB Dumps	Socail Forestry, Avenue Plantation etc.										
1	2	3	4	5	6	7	8	9 (=4+5+8)	10 (=5+6+7)	11 (=4+5)										
	2017	2020	2017	2020	2017	2020	2017	2020	2017	2020	2017	2020	2017	2020	2017	2020	2017	2020		
(A)	PROJECTWISE(OC)																			
1	WCL(14)	WCL (15)	7289.16	7759.95	337.31 26.45%	485.02 33.08%	60.35 4.73%	68.11 4.65%	526.46	760.04	406.54	402.50	877.63 68.82%	913.11 62.27 %	1275.29	1466.24	993.35 13.63%	1230.65 15.86%	397.66 31.18%	553.13 37.72%
2	SECL(05)	SECL (07)	2058.00	4732.67	527.00 52.75%	592.32 47.33%	181.00 18.12%	249.48 19.94%	11.00	63.77	9.00	55.95	291.00 29.13%	409.55 32.73%	999.00	1251.35	201.00 9.77%	369.20 7.80%	708.00 70.87%	841.80 67.27%
3	-	ECL (03)	-	1824.91	-	53.81 35.98%	-	0.00 0.00%	-	25.90	-	33.99	-	95.74 64.02%	-	149.55	-	59.89 3.28%	-	53.81 35.98%
4	MCL(03)	MCL (05)	700.22	2322.58	48.62 24.12%	126.56 24.77%	31.18 15.47%	226.16 44.26%	22.22	26.69	4.09	12.45	121.74 60.40%	158.22 30.97%	201.54	510.94	57.49 8.21%	265.30 11.42%	79.80 39.60%	352.72 69.03%
5	CCL(13)	CCL (13)	6376.05	6376.05	276.25 22.81%	702.86 41.42%	170.20 14.05%	239.74 14.13%	122.86	123.71	81.39	80.57	764.54 63.13%	754.40 44.45%	1210.99	1697.00	374.45 5.87%	444.02 6.96%	446.45 36.87%	942.60 55.55%
6	NEC(03)	NEC (03)	1587.87	1587.87	37.33 17.21%	50.14 22.43%	12.15 5.60%	17.81 7.97%	77.84	121.33	47.75	53.28	167.41 77.19%	155.63 69.61%	216.89	223.58	137.74 8.67%	192.42 12.12%	49.48 22.81%	67.95 30.39%
	TOTAL (A)(38)	TOTAL (A) (46)	18011.30	24604.03	1226.51 31.42%	2010.71 37.95%	454.88 11.65%	801.30 15.12%	760.38	1121.44	548.77	638.74	2222.32 56.93%	2486.65 46.93%	3903.71	5298.66	1764.03 9.79%	2561.48 10.41%	1681.39 43.07%	2812.01 53.07%
(B)	CLUSTERSWISE																			
1	BCCL(04)	BCCL(05)	6576.22	7988.22	457.35 45.94%	657.49 50.55%	31.60 3.17%	27.81 2.14%	108.72	113.72	426.64	504.23	506.65 50.89%	615.44 47.31%	995.60	1300.74	566.96 8.62%	645.75 8.08%	488.95 49.11%	685.30 52.69%
2	-	ECL (04)	-	9059.00	-	187.00 38.16%	-	96.00 19.59%	-	194.00	-	244.00	-	207.00 42.24%	-	490.00	-	534.00 5.89%	-	283.00 57.76%
	TOTAL(B) (04)	TOTAL(B) (09)	6576.22	17047.22	457.35 45.94%	844.49 47.16%	31.60 3.17%	123.81 6.91%	108.72	307.72	426.64	748.23	506.65 56.93%	822.44 45.93%	995.60	1790.74	566.96 8.62%	1179.75 6.92%	488.95 49.11%	968.30 54.07%
(C)	PROJECTWISE(UG)																			
1	-	SECL (02)	-	4256.71	-	0.00 0.00%	-	0.00 0.00%	-	0.00	-	61.72	-	0.00 0.00%	-	0.00	-	61.72 1.45%	-	0.00 0.00%
2	-	MCL (03)	-	3835.80	-	170.07 46.86%	-	13.72 3.78%	-	34.48	-	59.39	-	179.14 49.36%	-	362.93	-	107.59 2.80%	-	183.79 50.64%
	-	TOTAL(C) (05)	-	8092.51	-	170.07 46.86%	-	13.72 3.78%	-	34.48	-	121.11	-	179.14 49.36%	-	362.93	-	169.31 2.09%	-	183.79 50.64%
	TOTAL CIL (A+B+C) (42) (Less than 5 MCM)	TOTAL CIL (A+B+C) (60)	24587.52	49743.76	1683.86 34.37%	3025.27 40.59%	486.48 9.93%	938.83 12.60%	869.10	1463.64	975.41	1508.08	2728.97 55.70%	3488.23 46.81%	4899.31	7452.33	2330.99 9.48%	3910.54 7.86%	2170.34 44.30%	3964.10 53.19%

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.



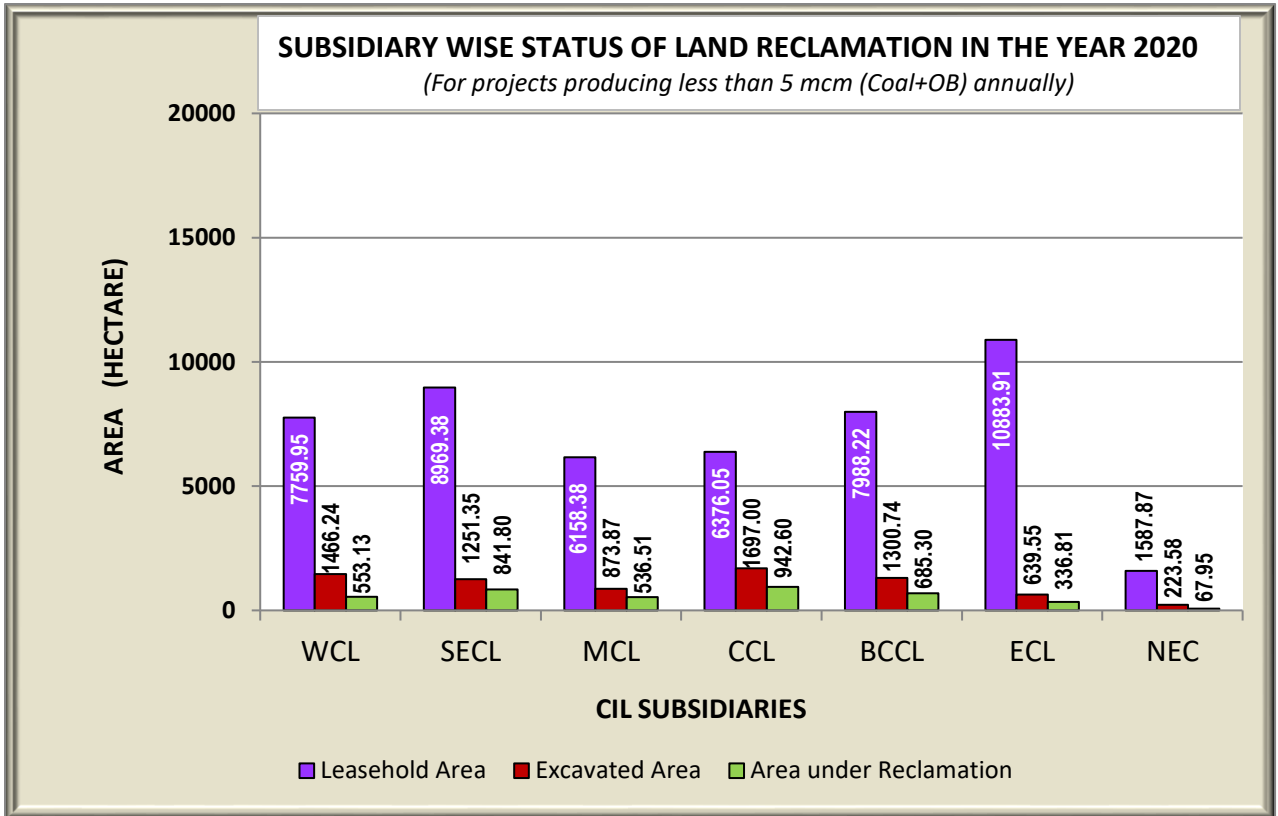


Fig. 1 : Company wise Land Reclamation Status in the Year 2020

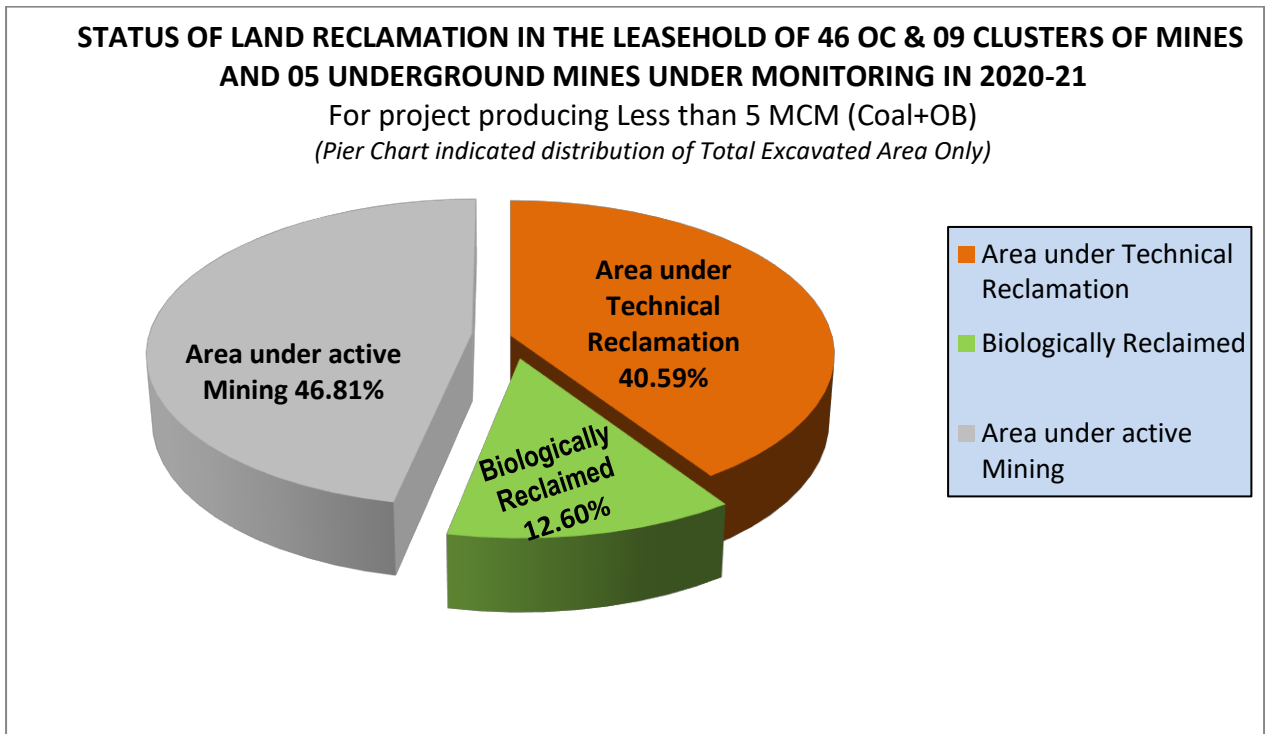


Fig. 2 : Pie Chart indicating Land Reclamation Status in 2020-21

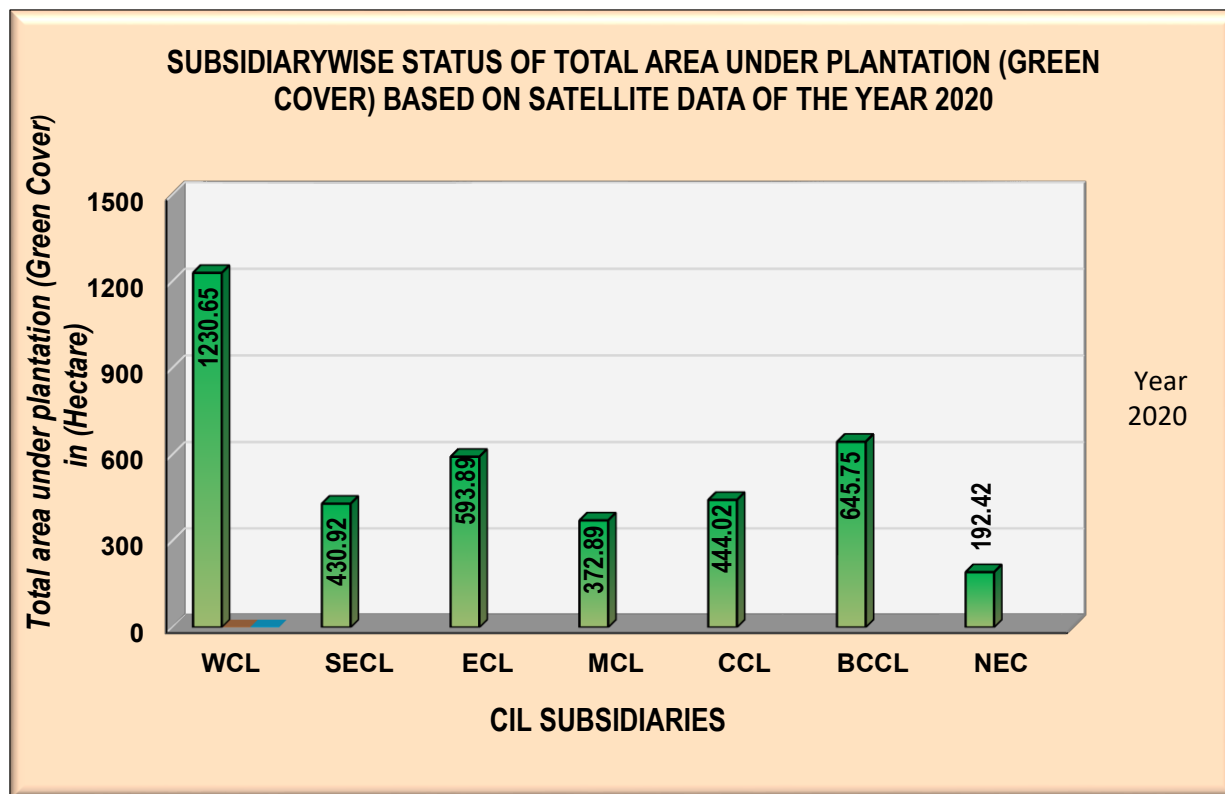


Figure- 3

## 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 & Climate Change (**MoEF & CC**). Such monitoring would not only facilitate in taking timely mitigation measures against environmental degradation, but would also enable coal companies to utilize the reclaimed land for larger socio-economic benefits in a planned way.
- 1.3 CMPDI undertook the above study and the present report is embodying the findings in nutshell carrying out for the 60 projects including 46 opencast mines, 09 cluster of (OC+UG) mines and 05 underground mines of different subsidiaries producing less than 5 million cubic m. coal +OB in the year 2020-21 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.

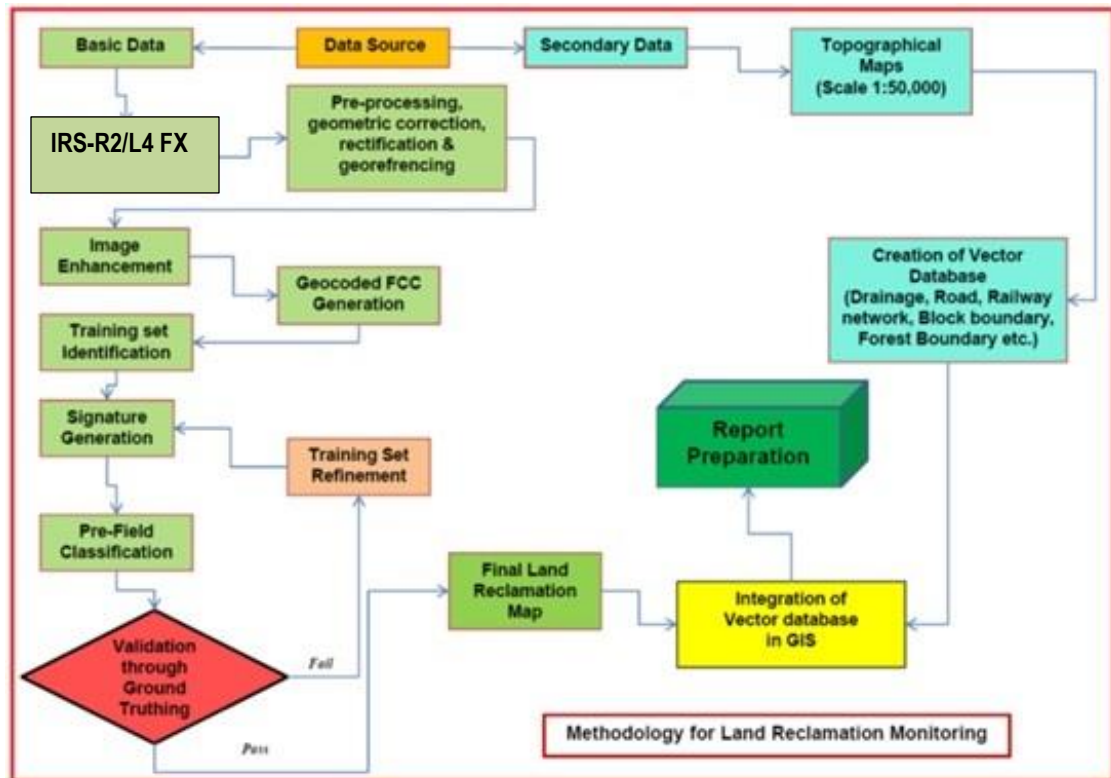


Fig.3: Methodology for Land Reclamation Monitoring

## 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:

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

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

- **Rectification & Georeferencing:** Inaccuracies in digital imagery may occur due to 'systematic errors' attributed to earth curvature and rotation as well as 'non-systematic errors' attributed to satellite receiving station itself. Raw digital images contain geometric distortions, which make them unusable as maps. Therefore, geo-referencing is required for correction of image data using ground control points (GCP) to make it compatible to Sol-topo-sheet.
- **Image enhancement:**  
To improve the interpretability of the raw data, image enhancement is necessary. Local operations modify the value of each pixel based on brightness value of neighbouring pixels using ERDAS IMAGINE v 2014 s/w and enhance the image quality for interpretation.
- **Training set selection**  
Training set requires to be selected, so that software can classify the image data accurately. The image data are analysed based on the interpretation keys. These keys are evolved from certain fundamental image-elements such as tone/colour, size,

shape, texture, pattern, location, association and shadow. Based on the image-elements and other geo-technical elements like land form, drainage pattern and physiography; training sets were selected/identified for each land use/cover class. Field survey was carried out by taking selective traverses in order to collect the ground information (or reference data) so that training sets are selected accurately in the image. This was intended to serve as an aid for classification.

- **Classification and Accuracy assessment**

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

- **Area calculation**

The area of each land use class in the leasehold is determined using ERDAS IMAGINE v 2014 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 60 projects including 46 opencast coal mines, 9 cluster of (OC+UG) mines and 5 Underground mines producing less than 5 million cubic m. (Coal + OB together) were taken up for the study during the year 2020-21 based on the R-2, L4FX satellite data, land reclamation /mine closure monitoring was carried out using ERDAS IMAGINE 14.0 version digital image processing s/w and Arc-Info GIS.

**4.2** The following are the total list of subsidiary wise 60 projects combine with 05 underground, 09 cluster of (UG+OC) mines and 46 opencast mines producing less than 5 mcm (coal and OB together) annually taken up for land reclamation monitoring based on satellite data of year 2020-21 is given in the Table below:

<b>Subsidiary (No. of Projects)</b>	<b>Opencast ,UG and Cluster of mines producing ( Less than 5 million Cu.m. Coal +OB per annum)</b>
<b>WCL (15)</b>	Kolegaon, Bellora-Naigaon, Ghonsa, Ballarpur, Junad Extn, Urdhan, Telwasa, Gauri Expn (A), Bhatadi, Gondegaon, Kolarpimpri, Chhinda, Gauri Deep, Juna-Kunada and Adasa UG to OC.
<b>SECL (09)</b>	Sharda, Baroud, Chhal, Kanchan, Mahan-II, Rajgamar UG, Behraband UG, Saraipalli OC and Bijari OC
<b>CCL (13)</b>	Rohini, Purnadih, Tapin, Jharkhand, Topa, Urimari, North Urimari, New Giddi- C, Govindpur, Khasmahal, Amlo, Selected Dhori and Tarmi
<b>BCCL (05)</b>	Cluster III, Cluster V, Cluster VIII, Cluster IX and Cluster XVII
<b>ECL (07)</b>	Cluster I, Cluster II, Cluster III, Cluster IV, Chitra East, Mohanpur and Hurra –C Opencast projects.
<b>MCL (08)</b>	Lilari OC, Kulda OC, Oreint I & II UG, Orient-III UG, Balanda OC, Nandira UG, Chhendipada OC and Subhadra OC .
<b>NEC (03)</b>	Ledo, Tikak and Tirap OC.
<b>TOTAL (60)</b>	

Subsidiary wise land reclamation status of the above mentioned 60 projects derived from satellite data for the year 2020 are given in the following pages:



**CENTRAL COALFIELDS LIMITED**

## 7.0 Land Reclamation Status in Central Coalfields Limited

7.1 Following 13 opencast projects of CCL producing less than 5 million cubic m. (Coal+OB) together, have been taken up for land reclamation monitoring during the year 2020-21 :

- 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 2020-21; total excavated area is 1697.00 Hectares, out of which 239.74 Ha. (14.13%) has been planted (*Biologically Reclaimed*), 702.86 Ha. (41.42%) area is under backfilling (*Technically Reclaimed*) and balance 754.40 hectares (44.45%) is under active mining.

- 7.4** Total area under Land Reclamation in all projects of CCL taken for this study during the year 2020 has increased from 446.45 Ha (36.87%) (Yr.2017) to 942.60 Ha (55.55%) (Yr. 2020). This increase of 496.15 Hectare in area under reclamation includes both 69.54 Ha increase in plantation on backfill (Biological Reclamation) and 426.61 Ha increase in area under backfilling (Technical reclamation).
- 7.5** After analyzing the satellite data of year 2020, 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 to 444.02 Ha (6.96%) till now as compared to 374.45 Ha (5.87%) in the Year 2017.
- 7.6** Study indicates that overall all the projects of CCL considered for this study indicate increase or static trend in area under backfilling (Technical Reclamation) with respect to the year 2017, except in Amlo OC where area under technical reclamation has decreased from 49.50 hectare in the year 2017 to 39.51 Hectare in the year 2020 resulting which area under reclamation has decreased from 56.93 Ha to 54.09 Ha. Whereas plantation on backfill in above project has increased from 7.43 Ha (Yr.2017) to 14.58 Ha (Yr.2020) as more area under backfilling has come under plantation on backfill.
- 7.7** After analyzing the satellite data of the year 2017 and 2020, it is evident that total area under plantation (Green cover) carried out on backfill area, OB dumps as well as under social forestry in all the mines of CCL has increased from 374.45 Ha to 444.02 Ha during span of three years. This increase of 69.57 Hectare area of plantation (Green cover) in three year is due to sincere effort of CCL towards mine land reclamation and environment protection.
- 7.8** Decrease of 2.99 Hectare area under biological reclamation in Rohini OC, 3.63 Hectare in New Giddi-C OC, 0.36 Hectare in Govindpur OC and 1.93 Hectare in Khasmahal OC in the span of three year is due to expansion of mining area. Plantation on backfill (Biological Reclamation) in Tapin OC has not been started as yet. However,

Biological Reclamation has increased from 170.20 in the year 2017 to 239.74 Hectare in the year 2020.

- 7.9** In case of Rohini OCP, there is minor decrease in biological reclamation from 45.38 Ha (Yr.2017) to 42.39 Ha (Yr.2020) as backfilling process are being carried out over the planted site.
- 7.10** Out of 13 projects of CCL taken for this study, Khasmahal OCP ranks top for land reclamation (77.60%) followed by Jharkhand OCP (72.57%) and Rohini (71.08%).
- 7.11** This study will again will be carried out after an interval of three years to assess the land reclamation status in the above projects.

**Table - 7.1**

**Project wise Land Reclamation Status in Opencast Projects of Central Coalfields Ltd. based on the Satellite data of the year 2020**

(Area in Hectare)

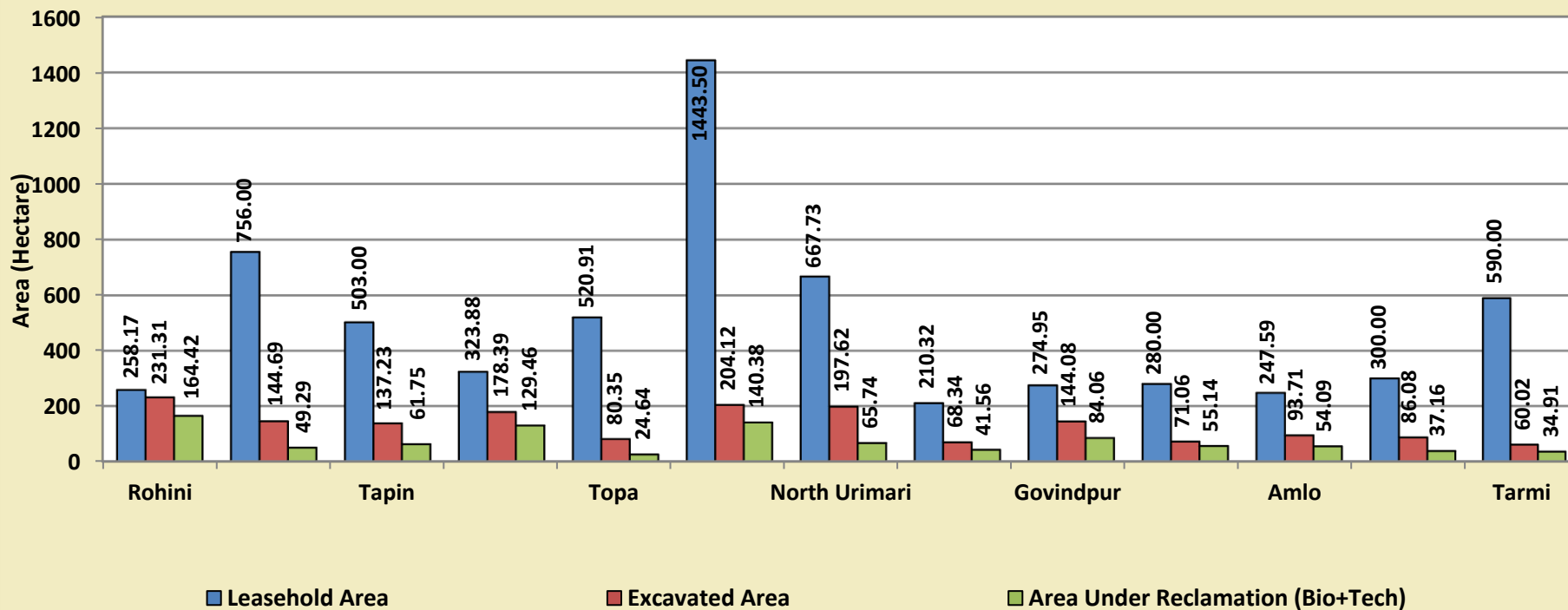
Sl. No.	Project	Total Leasehold Area		Plantation								Area under Active Mining		Total Excavated Area		Total Area under Plantation (% Green Cover Generated in Leasehold)		Total Area under Reclamation	
				Technical Reclamation		Biological Reclamation		Other Plantations											
				Area under Backfilling		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)	
		2017	2020	2017	2020	2017	2020	2017	2020	2017	2020	2017	2020	2017	2020	2017	2020	2017	2020
1	Rohini	258.17	258.17	65.76	122.03	45.38	42.39	1.55	0.11	5.44	0.00	53.02	66.89	164.16	231.31	52.37	42.50	111.14	164.42
				40.06%	52.76%	27.64%	18.33%					32.30%	28.92%			20.29%	16.46%	67.70%	71.08%
2	Purnadih	756.00	756.00	0.00	40.71	0.00	8.58	0.06	3.01	0.15	0.15	109.40	95.40	109.40	144.69	0.21	11.74	0.00	49.29
				0.00%	28.14%	0.00%	5.93%					100.00%	65.93%			0.03%	1.55%	0.00%	34.07%
3	Tapin	503.00	503.00	0.00	61.75	0.00	0.00	18.88	16.97	4.71	4.69	73.29	75.48	73.29	137.23	23.59	21.66	0.00	61.75
				0.00%	45.00%	0.00%	0.00%					100.00%	55.00%			4.69%	4.31%	0.00%	45.00%
4	Jharkhand	323.88	323.88	24.73	91.21	28.85	38.25	11.34	0.33	2.48	2.48	57.13	48.93	110.71	178.39	42.67	41.06	53.58	129.46
				22.34%	51.13%	26.06%	21.44%					51.60%	27.43%			13.17%	12.68%	48.40%	72.57%
5	Topa	520.91	520.91	0.00	20.89	0.00	3.75	25.88	43.81	14.24	14.22	67.18	55.71	67.18	80.35	40.12	61.78	0.00	24.64
				0.00%	26.00%	0.00%	4.67%					100.00%	69.33%			7.70%	11.86%	0.00%	30.67%
6	Urimari	1443.50	1443.50	24.16	91.58	25.03	48.80	7.56	0.06	37.59	42.67	81.97	63.74	131.16	204.12	70.18	91.53	49.19	140.38
				18.42%	44.87%	19.08%	23.91%					62.50%	31.23%			4.86%	6.34%	37.50%	68.77%
7	North Urimari	667.73	667.73	0.00	49.89	0.00	15.85	10.15	1.14	0.00	0.00	70.83	131.88	70.83	197.62	10.15	16.99	0.00	65.74
				0.00%	25.25%	0.00%	8.02%					100.00%	66.73%			1.52%	2.54%	0.00%	33.27%
8	New Giddi-C	210.32	210.32	17.97	31.22	13.97	10.34	2.69	3.02	6.47	5.83	26.72	26.78	58.66	68.34	23.13	19.19	31.94	41.56
				30.63%	45.68%	23.82%	15.13%					45.55%	39.19%			11.00%	9.12%	54.45%	60.81%
9	Govindpur	274.95	274.95	23.36	66.56	17.86	17.50	5.16	2.03	0.00	0.22	69.50	60.02	110.72	144.08	23.02	19.75	41.22	84.06
				21.10%	46.20%	16.13%	12.15%					62.77%	41.66%			8.37%	7.18%	37.23%	58.34%
10	Khasmahal	280.00	280.00	26.23	33.23	23.84	21.91	6.78	8.81	7.14	7.14	15.48	15.92	65.55	71.06	37.76	37.86	50.07	55.14
				40.02%	46.76%	36.37%	30.83%					23.62%	22.40%			13.49%	13.52%	76.38%	77.60%
11	Amla	247.59	247.59	49.50	39.51	7.43	14.58	15.27	15.27	1.53	1.53	26.02	39.62	82.95	93.71	24.23	31.38	56.93	54.09
				59.67%	42.16%	8.96%	15.56%					31.37%	42.28%			9.79%	12.67%	68.63%	57.72%
12	Selected Dhori	300.00	300.00	22.01	31.22	0.00	5.94	4.92	16.53	0.11	0.11	92.38	48.92	114.39	86.08	5.03	22.58	22.01	37.16
				19.24%	36.27%	0.00%	6.90%					80.76%	56.83%			1.68%	7.53%	19.24%	43.17%
13	Tarmi	590.00	590.00	22.53	23.06	7.84	11.85	12.62	12.62	1.53	1.53	21.62	25.11	51.99	60.02	21.99	26.00	30.37	34.91
				43.34%	38.42%	15.08%	19.74%					41.58%	41.84%			3.73%	4.41%	58.42%	58.16%
	<b>TOTAL</b>	<b>6376.05</b>	<b>6376.05</b>	<b>276.25</b>	<b>702.86</b>	<b>170.20</b>	<b>239.74</b>	<b>122.86</b>	<b>123.71</b>	<b>81.39</b>	<b>80.57</b>	<b>764.54</b>	<b>754.40</b>	<b>1210.99</b>	<b>1697.00</b>	<b>374.45</b>	<b>444.02</b>	<b>446.45</b>	<b>942.60</b>
				22.81%	41.42%	14.05%	14.13%					63.13%	44.45%			5.87%	6.96%	36.87%	55.55%

(% 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.

**PROJECTWISE STATUS OF LAND RECLAMATION IN CCL FOR THE YEAR 2020**

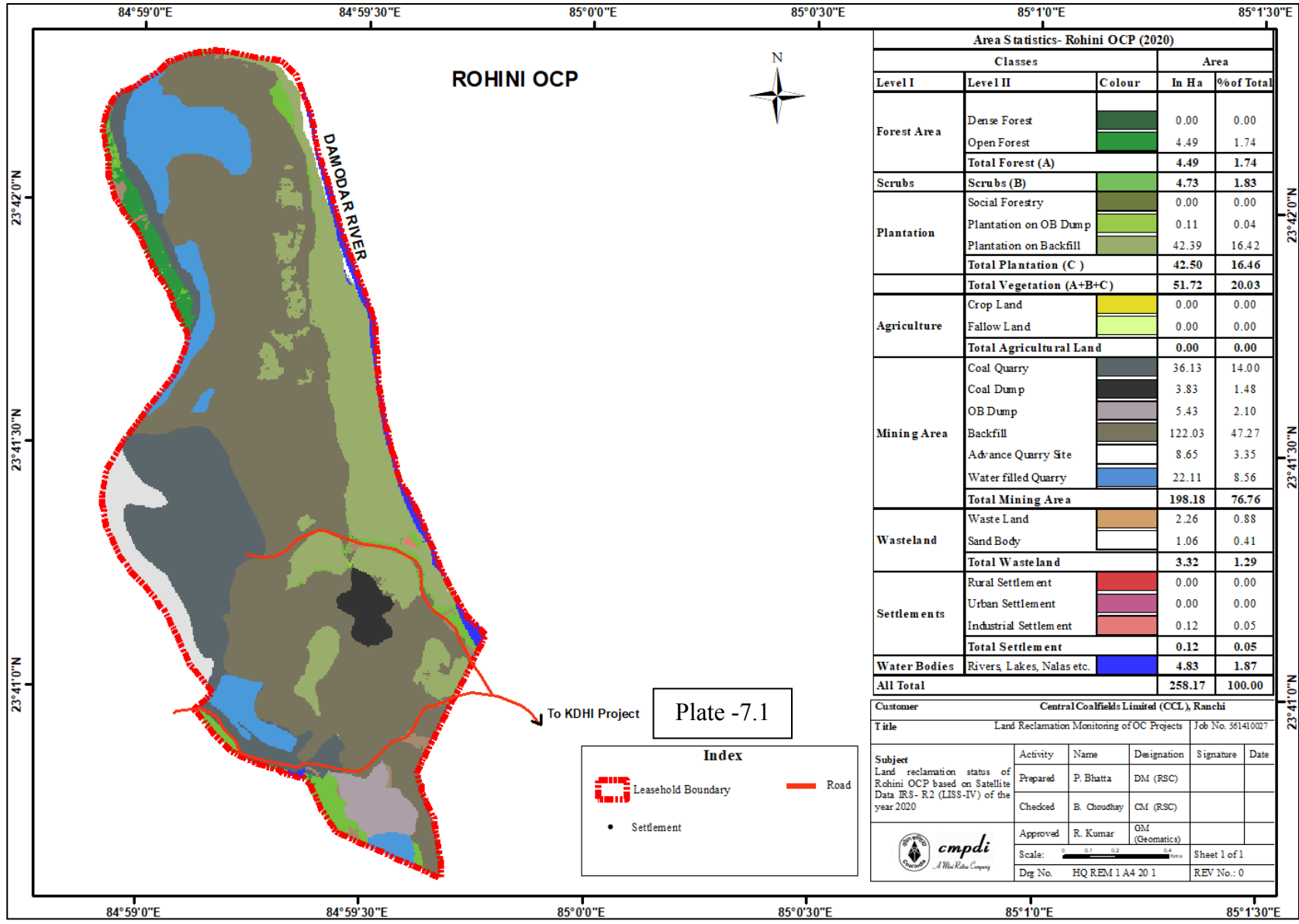


**Figure7.1: Land Reclamation status in OC Projects producing less than 5m.cm (Coal+OB) of CCL in the year 2020**

**TABLE 7.2: PROJECTWISE AREASTATISTICS OF LAND USE /COVER CLASSES AND LAND RECLAMATION IN OCP PRODUCING (<5 M.C.M (COAL +OB)) OF CCL BASED ON SATELLITE DATA OF THE YEAR 2020**

(Area in Ha)

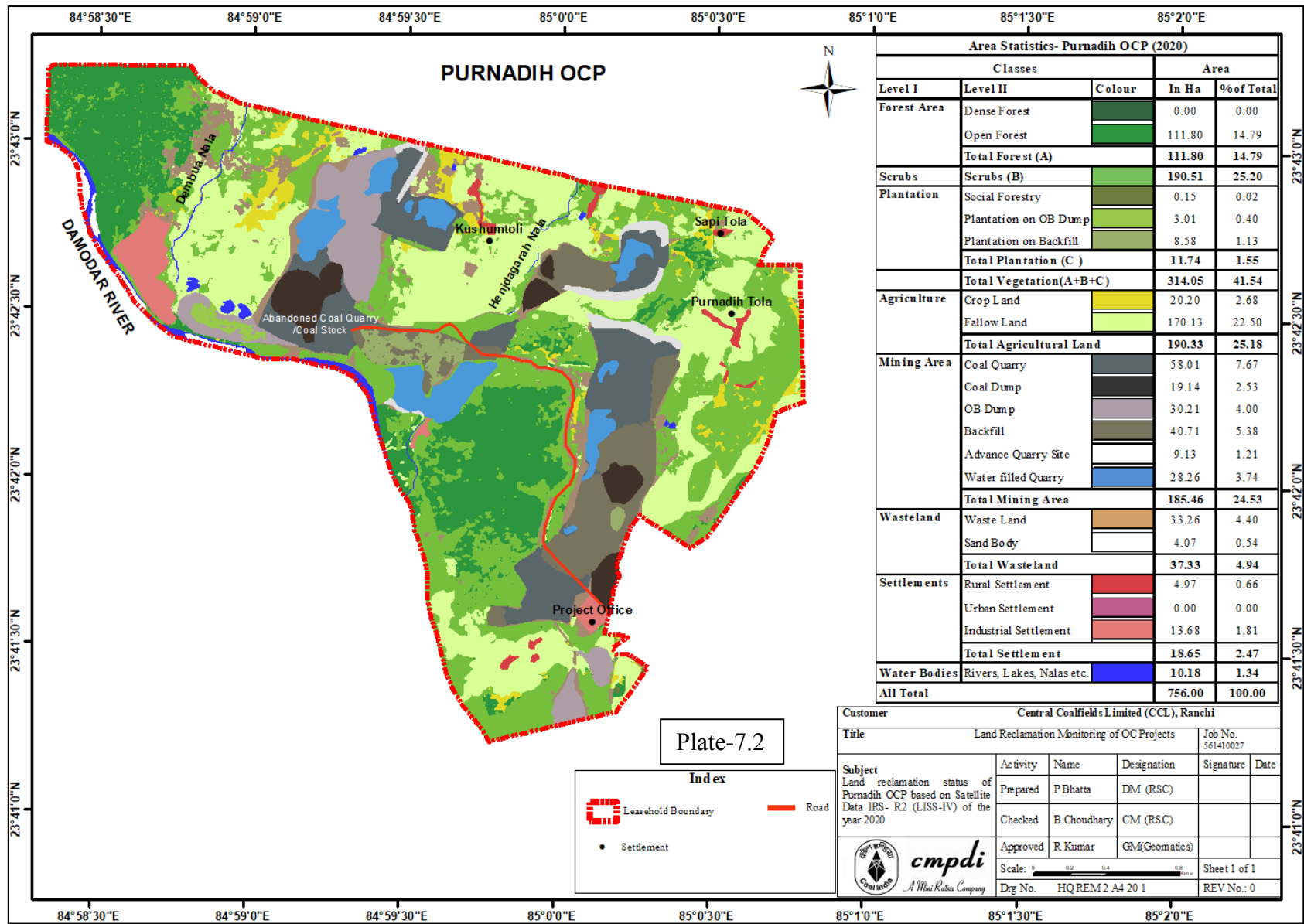
	ROHINI		PURNADIH		TAPIN		JHARKHAND		TOPA		URIMARI		NORTH URIMARI		NEW GIDDLIC		GOVINDPUR		KHAMSAHAL		AMLO		SELECTED DHORI		TARMI		TOTAL		
	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	
FORESTS	Dense Forest	0.00	0.00	0.00	0.00	0.20	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.61	0.25	0.02	0.00	0.03	0.01	0.86	0.01	
	Open Forest	4.49	1.74	111.80	14.79	68.24	13.57	5.97	1.84	0.00	0.00	182.21	12.62	20.94	3.14	0.00	0.00	0.00	0.00	52.41	18.72	19.49	7.87	3.80	1.27	57.76	9.79	527.11	8.27
	<b>Total Forest (A)</b>	4.49	1.74	111.80	14.79	68.44	13.61	5.97	1.84	0.00	0.00	182.21	12.62	20.94	3.14	0.00	0.00	0.00	0.00	52.41	18.72	20.10	8.12	3.82	1.27	57.79	9.80	527.97	8.28
SCRUBS	Scrub (B)	4.73	1.83	190.51	25.20	87.58	17.40	52.45	16.19	104.01	19.97	330.90	22.92	104.69	15.68	60.98	28.99	94.19	34.26	37.63	13.43	37.61	15.19	26.20	8.73	158.50	26.86	1289.98	20.23
	Social Forestry	0.00	0.00	0.15	0.02	4.69	0.94	2.48	0.77	14.22	2.73	42.67	2.96	0.00	0.00	5.83	2.77	0.22	0.08	7.14	2.55	1.53	0.62	0.11	0.04	1.53	0.26	80.57	1.26
	Plantation on OB Dump	0.11	0.04	3.01	0.40	16.97	3.37	0.33	0.10	43.81	8.41	0.06	0.00	1.14	0.17	3.02	1.44	2.03	0.74	8.81	3.15	15.27	6.17	16.53	5.51	12.62	2.14	123.71	1.94
	Plantation on Backfill	42.39	16.42	8.58	1.13	0.00	0.00	38.25	11.81	3.750	0.72	48.80	3.38	15.85	2.37	10.34	4.92	17.50	6.36	21.91	7.83	14.58	5.89	5.94	1.98	11.85	2.01	239.74	3.76
	<b>Total Plantation (Biological Reclamation C)</b>	42.50	16.46	11.74	1.55	21.66	4.31	41.06	12.68	61.78	11.86	91.53	6.34	16.99	2.54	19.19	9.13	19.75	7.18	37.86	13.53	31.38	12.68	22.58	7.53	26.00	4.41	444.02	6.96
<b>Total Vegetation (A+B+C)</b>	51.72	20.03	314.05	41.54	177.68	35.32	99.48	30.71	165.79	31.83	604.64	41.88	142.62	21.36	80.17	38.12	113.94	41.44	127.90	45.68	89.09	35.99	52.60	17.53	242.29	41.07	2261.97	35.48	
ACTIVE MINING	Coal Quarry	36.13	14.00	58.01	7.67	59.54	11.84	41.25	12.74	32.80	6.29	43.90	3.04	103.26	15.46	11.94	5.68	50.08	18.20	15.50	5.54	33.90	13.69	29.38	9.79	18.75	3.18	534.44	8.38
	Coal Dump	3.83	1.48	19.14	2.53	11.50	2.29	2.92	0.90	4.57	0.88	3.27	0.23	12.66	1.90	2.64	1.26	3.21	1.17	11.74	4.19	5.08	2.05	8.88	2.96	5.88	1.00	95.32	1.49
	Advance Quarry Site	8.65	3.35	9.13	1.21	6.36	1.26	2.76	0.85	5.16	0.99	2.40	0.17	26.37	3.95	3.63	1.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64.46	1.01
	Quarry Filled with Water	22.11	8.56	28.26	3.74	9.58	1.90	4.92	1.52	17.75	3.41	17.44	1.21	2.25	0.34	11.21	5.33	9.94	3.62	0.42	0.15	5.72	2.31	19.54	6.51	6.36	1.08	155.50	2.44
	<b>Total Area under Active Mining</b>	70.72	27.39	114.54	15.15	86.98	17.29	51.85	16.01	60.28	11.57	67.01	4.65	144.54	21.65	29.42	14.00	63.23	22.99	27.66	9.88	44.70	18.05	57.80	19.26	30.99	5.26	849.72	13.32
RECLAIMED	Barren OB dump	5.43	2.10	30.21	4.00	12.60	2.50	0.08	0.02	51.35	9.86	5.44	0.38	61.11	9.15	19.81	9.42	0.00	0.00	40.18	14.35	15.28	6.17	83.93	27.98	14.06	2.38	339.48	5.32
	Area Under Backfilling	122.03	47.27	40.71	5.38	61.75	12.28	91.21	28.16	20.89	4.01	91.58	6.34	49.89	7.47	31.22	14.84	66.56	24.21	33.23	11.87	39.51	15.96	31.22	10.41	23.06	3.91	702.86	11.02
	<b>Total Area under Technical Reclamation</b>	127.46	49.37	70.92	9.38	74.35	14.78	91.29	28.18	72.24	13.87	97.02	6.72	111.00	16.62	51.03	24.26	66.56	24.21	73.41	26.22	54.79	22.13	115.15	38.39	37.12	6.29	1042.34	16.34
<b>Total Area under Mine Operation</b>	198.18	76.76	185.46	24.53	161.33	32.07	143.14	44.19	132.52	25.44	164.03	11.37	255.54	38.27	80.45	38.26	129.79	47.20	101.07	36.10	99.49	40.18	172.95	57.65	68.11	11.55	1892.06	29.67	
WASTELANDS	Waste Lands	2.26	0.88	33.26	4.4	69.43	13.81	31.91	9.85	86.99	16.70	321.94	22.30	52.78	7.90	9.73	4.62	14.65	5.33	13.15	4.69	45.64	18.42	27.80	9.27	89.20	15.12	798.74	12.50
	Fly Ash Pond/Sand Body	1.06	0.41	4.07	0.54	1.01	0.20	1.10	0.34	0.01	0.00	32.12	2.23	0.00	0.00	0.00	0.00	0.08	0.03	0.00	0.00	0.00	0.00	9.31	3.10	16.17	2.74	64.93	1.02
	<b>Total Wastelands</b>	3.32	1.29	37.33	4.94	70.44	14.01	33.01	10.19	87.00	16.70	354.06	24.53	52.78	7.90	9.73	4.62	14.73	5.36	13.15	4.69	45.64	18.42	37.11	12.37	105.37	17.86	863.67	13.55
WATER	Reservoir, nallah, ponds etc.	4.83	1.87	10.18	1.35	6.36	1.26	5.70	1.77	2.74	0.52	52.59	3.64	5.29	0.80	0.01	0.00	0.26	0.09	0.97	0.34	0.94	0.38	5.85	1.95	10.37	1.75	106.09	1.66
	<b>Total Waterbodies</b>	4.83	1.87	10.18	1.34	6.36	1.26	5.70	1.77	2.74	0.52	52.59	3.64	5.29	0.80	0.01	0.00	0.26	0.09	0.97	0.34	0.94	0.38	5.85	1.95	10.37	1.75	106.09	1.66
AGRICULTURE	Crop Lands	0.00	0.00	20.20	2.68	10.88	2.16	15.03	4.64	0.03	0.01	0.00	0.00	35.80	5.36	22.61	10.75	5.35	1.95	2.48	0.89	0.00	0.00	0.24	0.08	6.69	1.13	119.31	1.87
	Fallow Lands	0.00	0.00	170.13	22.50	59.65	11.86	7.92	2.45	96.00	18.43	218.26	15.12	152.86	22.89	11.74	5.58	9.39	3.42	23.37	8.35	1.46	0.59	22.89	7.63	129.51	21.95	903.18	14.17
	<b>Total Agriculture</b>	0.00	0.00	190.33	25.18	70.53	14.02	22.95	7.09	96.03	18.44	218.26	15.12	188.66	28.25	34.35	16.33	14.74	5.37	25.85	9.24	1.46	0.59	23.13	7.71	136.20	23.08	1022.49	16.04
SETTLEMENTS	Urban Settlement	0.00	0.00	0.00	0.00	6.43	1.28	14.37	4.44	23.13	4.44	18.43	1.28	0.00	0.00	2.50	1.19	0.00	0.00	7.85	2.80	2.32	0.94	6.47	2.16	14.16	2.40	95.66	1.50
	Rural Settlement	0.00	0.00	4.97	0.66	9.06	1.80	0.00	0.00	11.38	2.18	23.56	1.63	20.79	3.11	3.11	1.48	0.77	0.28	1.39	0.50	4.03	1.63	0.48	0.16	8.45	1.43	87.99	1.38
	Industrial Settlement	0.12	0.05	13.68	1.81	1.17	0.24	5.23	1.61	2.32	0.45	7.93	0.55	2.05	0.31	0.00	0.00	0.72	0.26	1.82	0.65	4.62	1.87	1.41	0.47	5.05	0.86	46.12	0.72
	<b>Total Settlements</b>	0.12	0.05	18.65	2.47	16.66	3.32	19.60	6.05	36.83	7.07	49.92	3.46	22.84	3.42	5.61	2.67	1.49	0.54	11.06	3.95	10.97	4.44	8.36	2.79	27.66	4.69	229.77	3.60
<b>GRAND TOTAL</b>	258.17	100.00	756.00	100.00	503.00	100.00	323.88	100.00	520.91	100.00	1443.50	100.00	667.73	100.00	210.32	100.00	274.95	100.00	280.00	100.00	247.59	100.00	300.00	100.00	590.00	100.00	6376.05	100.00	



Area Statistics- Rohini OCP (2020)				
Classes			Area	
Level I	Level II	Colour	In Ha	% of Total
Forest Area	Dense Forest		0.00	0.00
	Open Forest		4.49	1.74
	<b>Total Forest (A)</b>		<b>4.49</b>	<b>1.74</b>
Scrubs	Scrubs (B)		4.73	1.83
Plantation	Social Forestry		0.00	0.00
	Plantation on OB Dump		0.11	0.04
	Plantation on Backfill		42.39	16.42
	<b>Total Plantation (C)</b>		<b>42.50</b>	<b>16.46</b>
<b>Total Vegetation (A+B+C)</b>			<b>51.72</b>	<b>20.03</b>
Agriculture	Crop Land		0.00	0.00
	Fallow Land		0.00	0.00
	<b>Total Agricultural Land</b>		<b>0.00</b>	<b>0.00</b>
Mining Area	Coal Quarry		36.13	14.00
	Coal Dump		3.83	1.48
	OB Dump		5.43	2.10
	Backfill		122.03	47.27
	Advance Quarry Site		8.65	3.35
	Water filled Quarry		22.11	8.56
<b>Total Mining Area</b>			<b>198.18</b>	<b>76.76</b>
Wasteland	Waste Land		2.26	0.88
	Sand Body		1.06	0.41
	<b>Total Waste land</b>		<b>3.32</b>	<b>1.29</b>
Settlements	Rural Settlement		0.00	0.00
	Urban Settlement		0.00	0.00
	Industrial Settlement		0.12	0.05
	<b>Total Settlement</b>		<b>0.12</b>	<b>0.05</b>
Water Bodies	Rivers, Lakes, Nalas etc.		4.83	1.87
<b>All Total</b>			<b>258.17</b>	<b>100.00</b>

Customer Central Coalfields Limited (CCL), Ranchi					
Title Land Reclamation Monitoring of OC Projects Job No. 561410027					
Subject Land reclamation status of Rohini OCP based on Satellite Data RS- R2 (LISS-IV) of the year 2020	Activity	Name	Designation	Signature	Date
	Prepared	P. Bhatta	DM (RSC)		
	Checked	B. Choudhary	CM (RSC)		
	Approved	R. Kumar	GM (Geomatics)		
Scale:		Sheet 1 of 1			
Dig No. HQ REM 1 A4 20 1		REV No.: 0			





Area Statistics- Purnadih OCP (2020)				
Classes			Area	
Level I	Level II	Colour	In Ha	%of Total
Forest Area	Dense Forest		0.00	0.00
	Open Forest		111.80	14.79
	<b>Total Forest (A)</b>		<b>111.80</b>	<b>14.79</b>
Scrubs	Scrubs (B)		190.51	25.20
Plantation	Social Forestry		0.15	0.02
	Plantation on OB Dump		3.01	0.40
	Plantation on Backfill		8.58	1.13
	<b>Total Plantation (C)</b>		<b>11.74</b>	<b>1.55</b>
	<b>Total Vegetation(A+B+C)</b>		<b>314.05</b>	<b>41.54</b>
Agriculture	Crop Land		20.20	2.68
	Fallow Land		170.13	22.50
	<b>Total Agricultural Land</b>		<b>190.33</b>	<b>25.18</b>
Mining Area	Coal Quarry		58.01	7.67
	Coal Dump		19.14	2.53
	OB Dump		30.21	4.00
	Backfill		40.71	5.38
	Advance Quarry Site		9.13	1.21
	Water filled Quarry		28.26	3.74
	<b>Total Mining Area</b>		<b>185.46</b>	<b>24.53</b>
Wasteland	Waste Land		33.26	4.40
	Sand Body		4.07	0.54
	<b>Total Waste land</b>		<b>37.33</b>	<b>4.94</b>
Settlements	Rural Settlement		4.97	0.66
	Urban Settlement		0.00	0.00
	Industrial Settlement		13.68	1.81
	<b>Total Settlement</b>		<b>18.65</b>	<b>2.47</b>
Water Bodies	Rivers, Lakes, Nalas etc.		10.18	1.34
<b>All Total</b>			<b>756.00</b>	<b>100.00</b>

Plate-7.2

**Index**

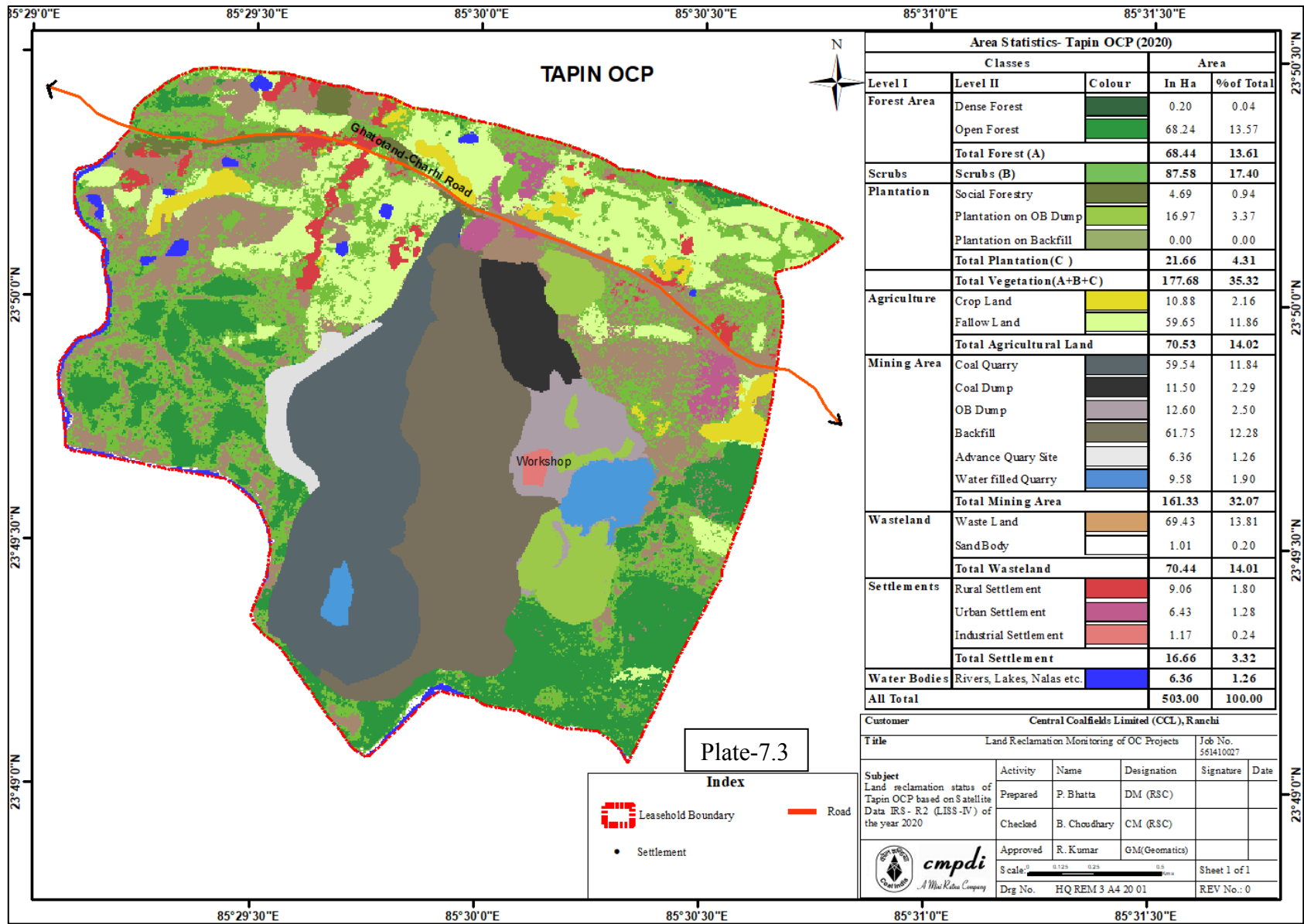
- Leasehold Boundary
- Road
- Settlement

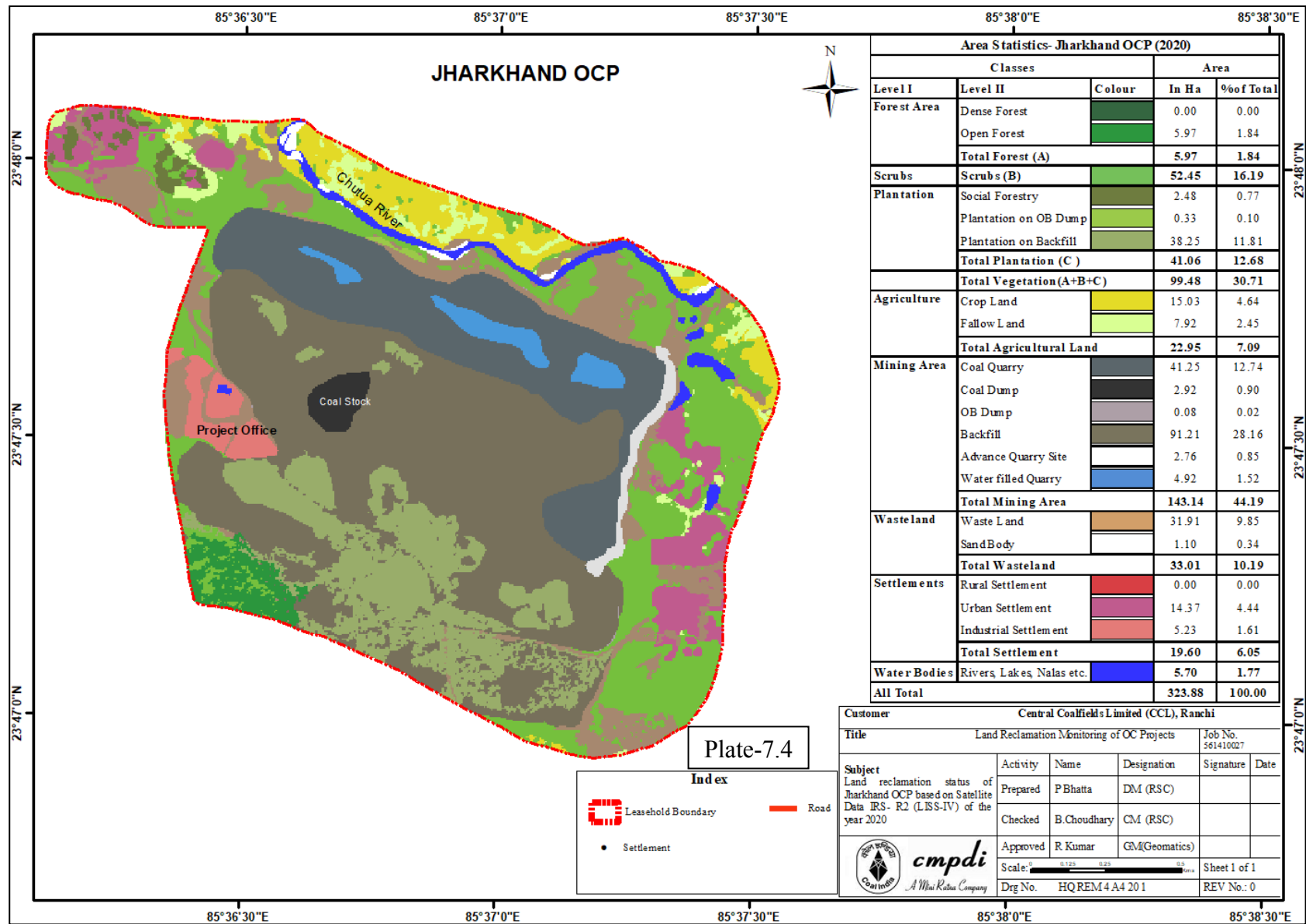
Customer: Central Coalfields Limited (CCL), Ranchi

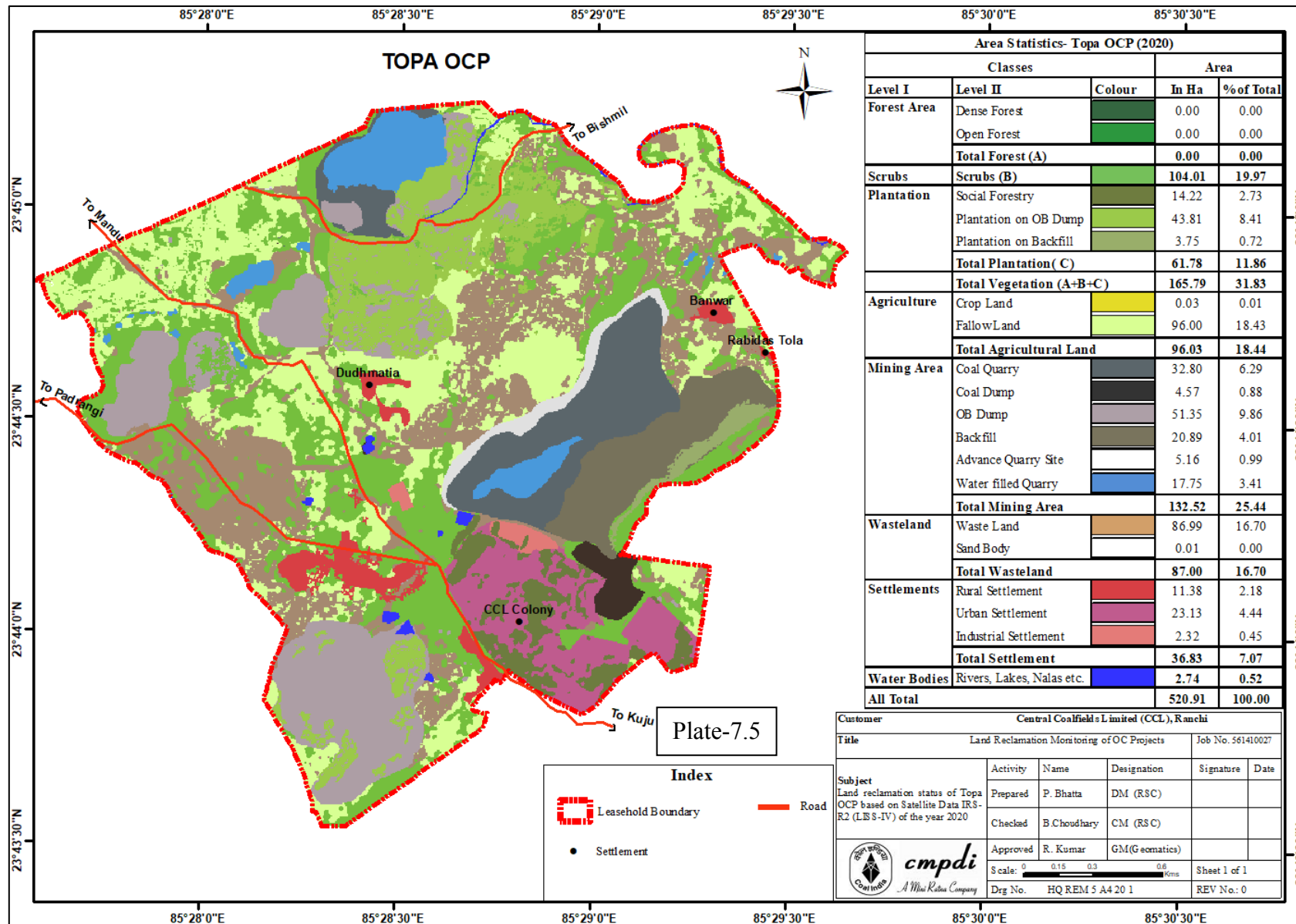
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Subject: Land reclamation status of Purnadih OCP based on Satellite Data IRS- R2 (LISS-IV) of the year 2020	Activity	Name
	Prepared	P.Bhatta
	Checked	B.Choudhary
	Approved	R.Kumar
Scale: 0 0.2 0.4 0.8	Designation	Signature
	DM (RSC)	
	CM (RSC)	
	GM(Geomatics)	
Dwg No. HQREM2 A4 20 1	Date	

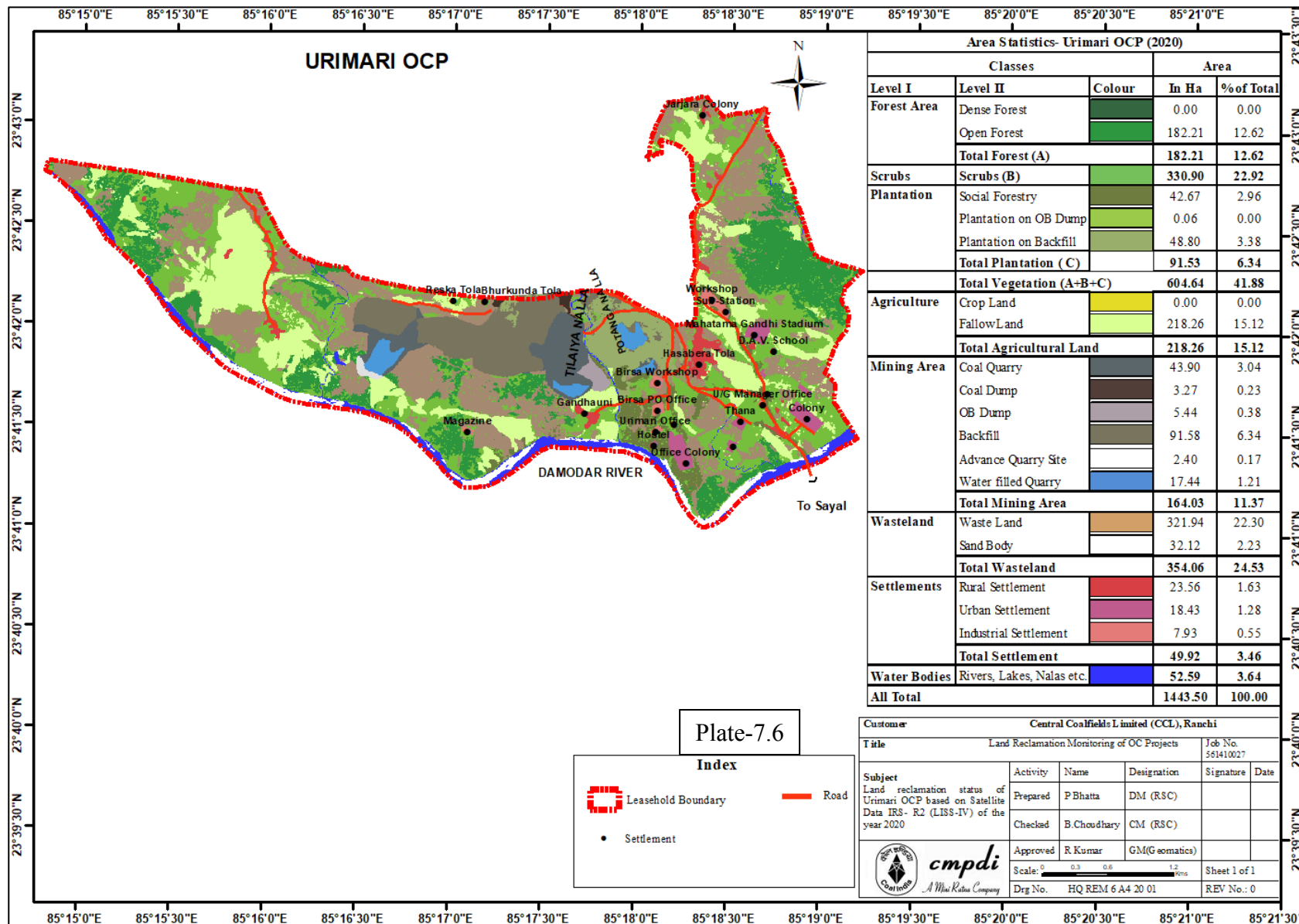
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REV No: 0

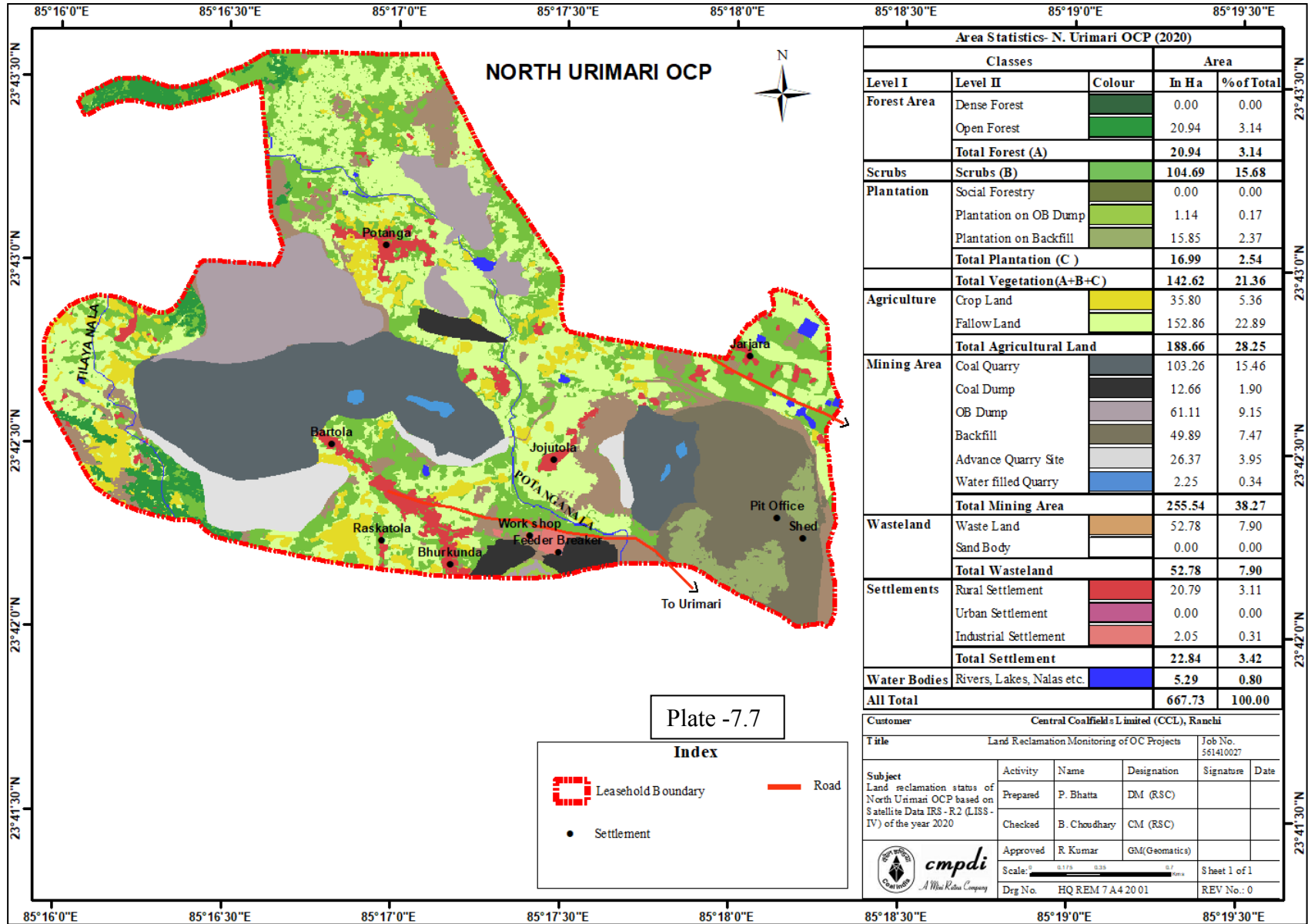




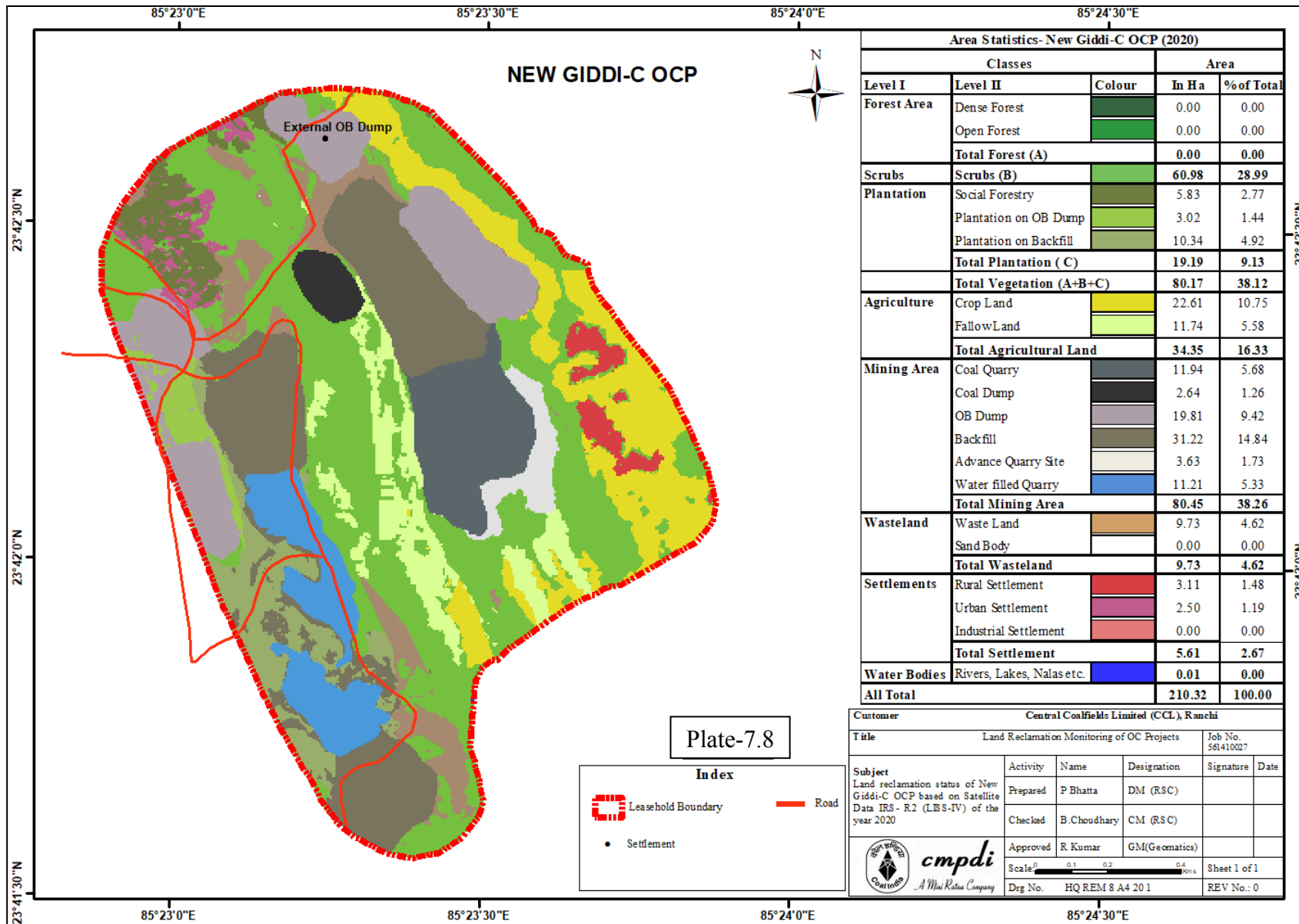










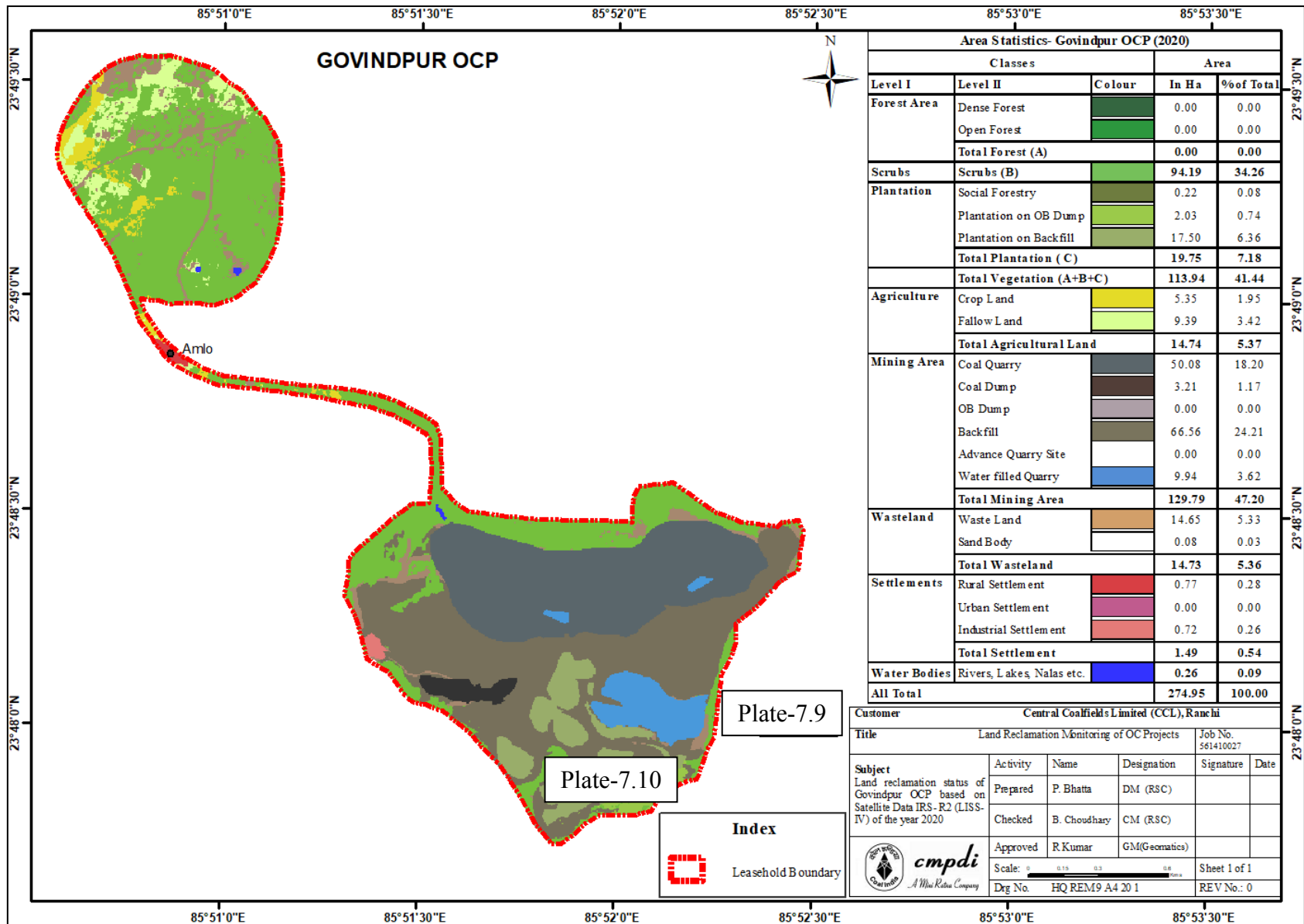


Area Statistics- New Giddi-C OCP (2020)				
Classes			Area	
Level I	Level II	Colour	In Ha	% of Total
Forest Area	Dense Forest		0.00	0.00
	Open Forest		0.00	0.00
	<b>Total Forest (A)</b>		<b>0.00</b>	<b>0.00</b>
Scrubs	Scrubs (B)		60.98	28.99
Plantation	Social Forestry		5.83	2.77
	Plantation on OB Dump		3.02	1.44
	Plantation on Backfill		10.34	4.92
	<b>Total Plantation (C)</b>		<b>19.19</b>	<b>9.13</b>
<b>Total Vegetation (A+B+C)</b>			<b>80.17</b>	<b>38.12</b>
Agriculture	Crop Land		22.61	10.75
	Fallow Land		11.74	5.58
	<b>Total Agricultural Land</b>		<b>34.35</b>	<b>16.33</b>
Mining Area	Coal Quarry		11.94	5.68
	Coal Dump		2.64	1.26
	OB Dump		19.81	9.42
	Backfill		31.22	14.84
	Advance Quarry Site		3.63	1.73
	Water filled Quarry		11.21	5.33
	<b>Total Mining Area</b>		<b>80.45</b>	<b>38.26</b>
Wasteland	Waste Land		9.73	4.62
	Sand Body		0.00	0.00
	<b>Total Wasteland</b>		<b>9.73</b>	<b>4.62</b>
Settlements	Rural Settlement		3.11	1.48
	Urban Settlement		2.50	1.19
	Industrial Settlement		0.00	0.00
	<b>Total Settlement</b>		<b>5.61</b>	<b>2.67</b>
Water Bodies	Rivers, Lakes, Nalas etc.		0.01	0.00
<b>All Total</b>			<b>210.32</b>	<b>100.00</b>

Plate-7.8

Index	
	Leasehold Boundary
	Road
	Settlement

Customer						Central Coalfields Limited (CCL), Ranchi	
Title				Land Reclamation Monitoring of OC Projects		Job No. 561410027	
Subject Land reclamation status of New Giddi-C OCP based on Satellite Data IRS - R2 (LBS-IV) of the year 2020	Activity	Name	Designation	Signature	Date		
	Prepared	P Bhatta	DM (RSC)				
	Checked	B.Choudhary	CM (RSC)				
	Approved	R. Kumar	GM(Geomatics)				
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Drg No.		HQ REM 8 A4 20 1		REV No.: 0			




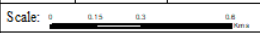
Area Statistics- Govindpur OCP (2020)				
Classes			Area	
Level I	Level II	Colour	In Ha	%of Total
Forest Area	Dense Forest		0.00	0.00
	Open Forest		0.00	0.00
	<b>Total Forest (A)</b>		<b>0.00</b>	<b>0.00</b>
Scrubs	Scrubs (B)		94.19	34.26
Plantation	Social Forestry		0.22	0.08
	Plantation on OB Dump		2.03	0.74
	Plantation on Backfill		17.50	6.36
	<b>Total Plantation (C)</b>		<b>19.75</b>	<b>7.18</b>
<b>Total Vegetation (A+B+C)</b>			<b>113.94</b>	<b>41.44</b>
Agriculture	Crop Land		5.35	1.95
	Fallow Land		9.39	3.42
	<b>Total Agricultural Land</b>		<b>14.74</b>	<b>5.37</b>
Mining Area	Coal Quarry		50.08	18.20
	Coal Dump		3.21	1.17
	OB Dump		0.00	0.00
	Backfill		66.56	24.21
	Advance Quarry Site		0.00	0.00
	Water filled Quarry		9.94	3.62
	<b>Total Mining Area</b>		<b>129.79</b>	<b>47.20</b>
Wasteland	Waste Land		14.65	5.33
	Sand Body		0.08	0.03
	<b>Total Wasteland</b>		<b>14.73</b>	<b>5.36</b>
Settlements	Rural Settlement		0.77	0.28
	Urban Settlement		0.00	0.00
	Industrial Settlement		0.72	0.26
	<b>Total Settlement</b>		<b>1.49</b>	<b>0.54</b>
Water Bodies	Rivers, Lakes, Nalas etc.		0.26	0.09
<b>All Total</b>			<b>274.95</b>	<b>100.00</b>

Plate-7.9

Plate-7.10

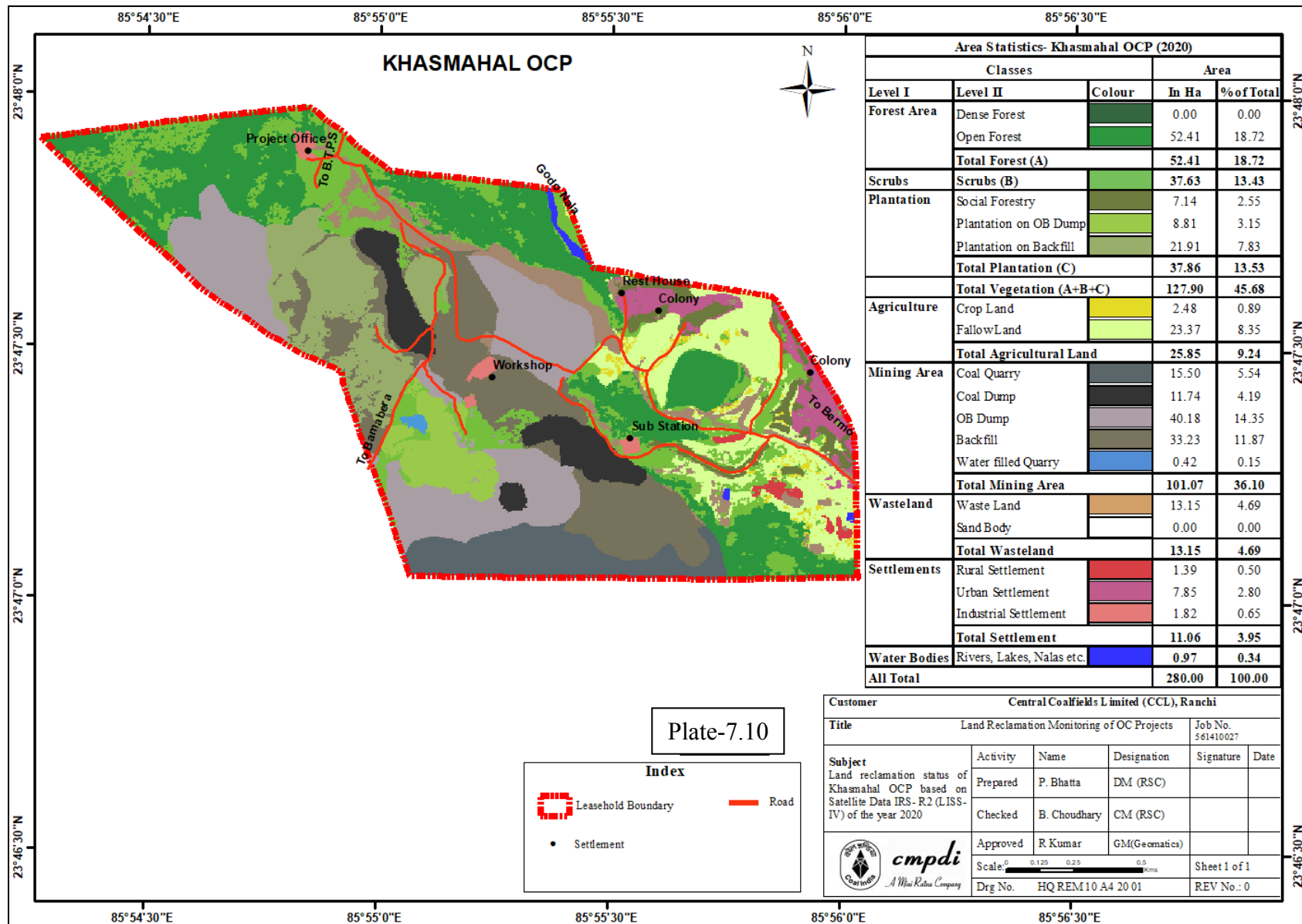
**Index**

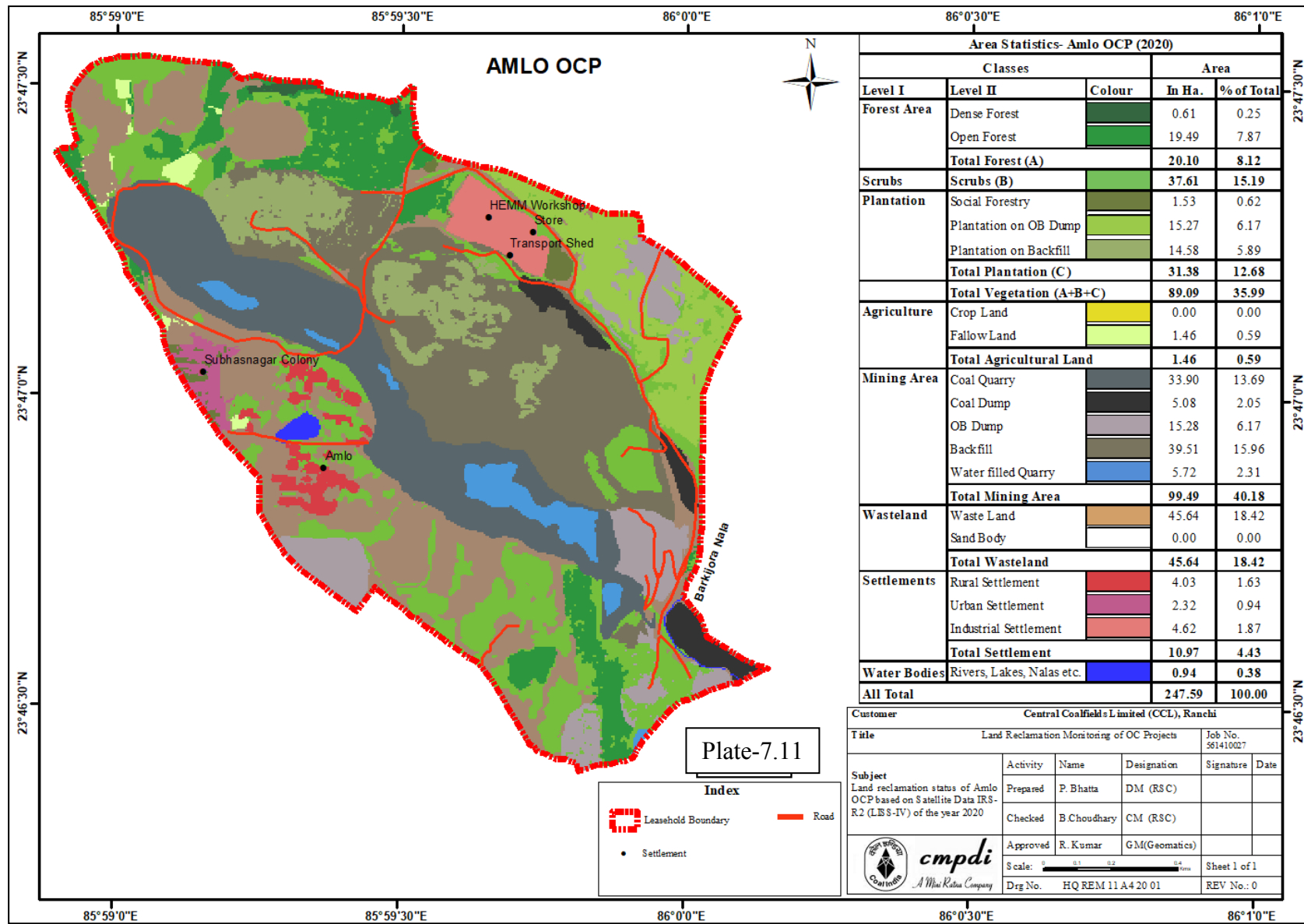
 Leasehold Boundary

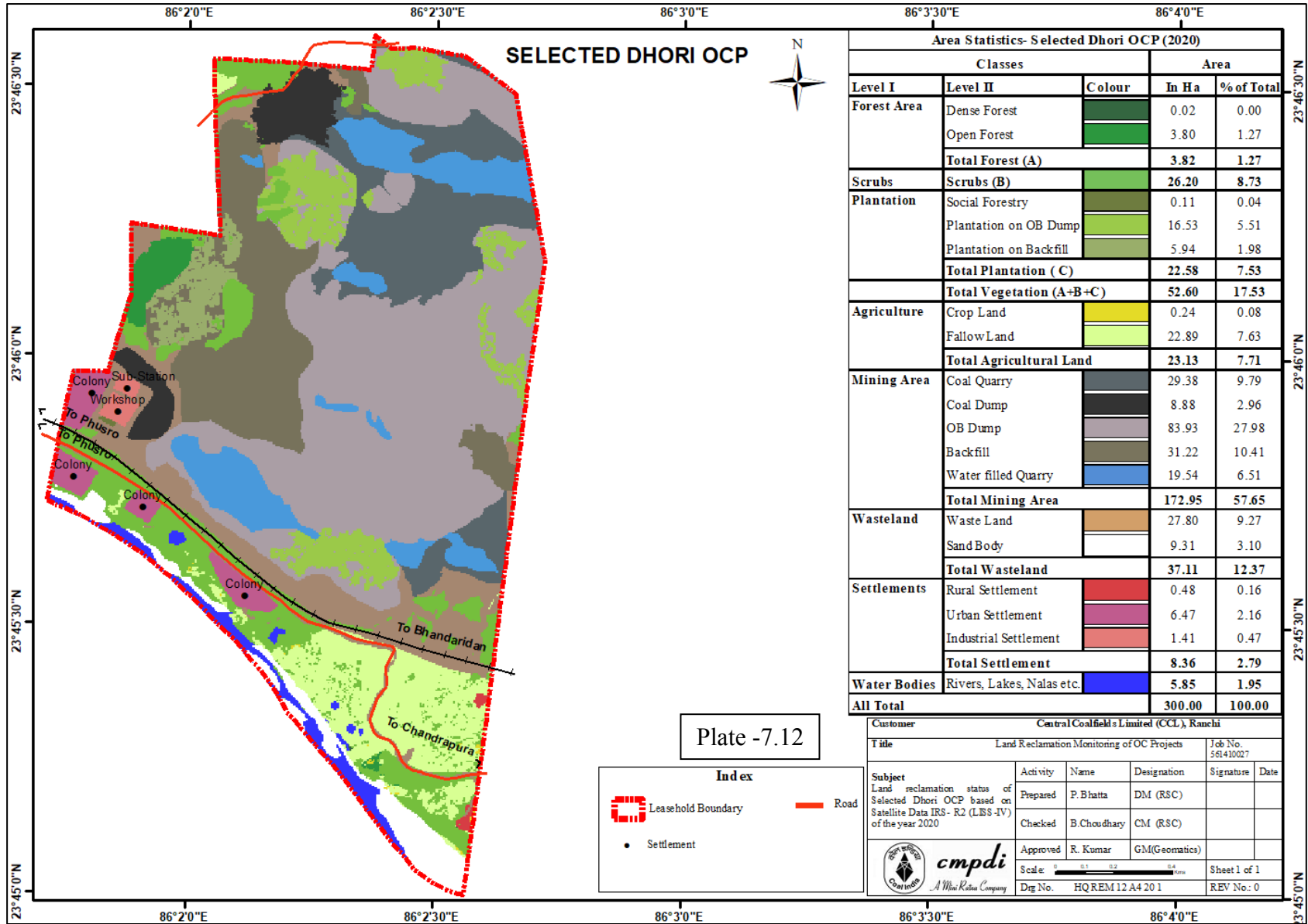
Customer Central Coalfields Limited (CCL), Ranchi					
Title Land Reclamation Monitoring of OC Projects				Job No. 561410027	
Subject Land reclamation status of Govindpur OCP based on Satellite Data IRS-R2 (LIS-IV) of the year 2020	Activity	Name	Designation	Signature	Date
	Prepared	P. Bhatta	DM (RSC)		
	Checked	B. Choudhary	CM (RSC)		
	Approved	R. Kumar	GM(Geomatics)		
Scale: 				Sheet 1 of 1	
Drg No. HQ REM9 A4 20 1				REV No. : 0	

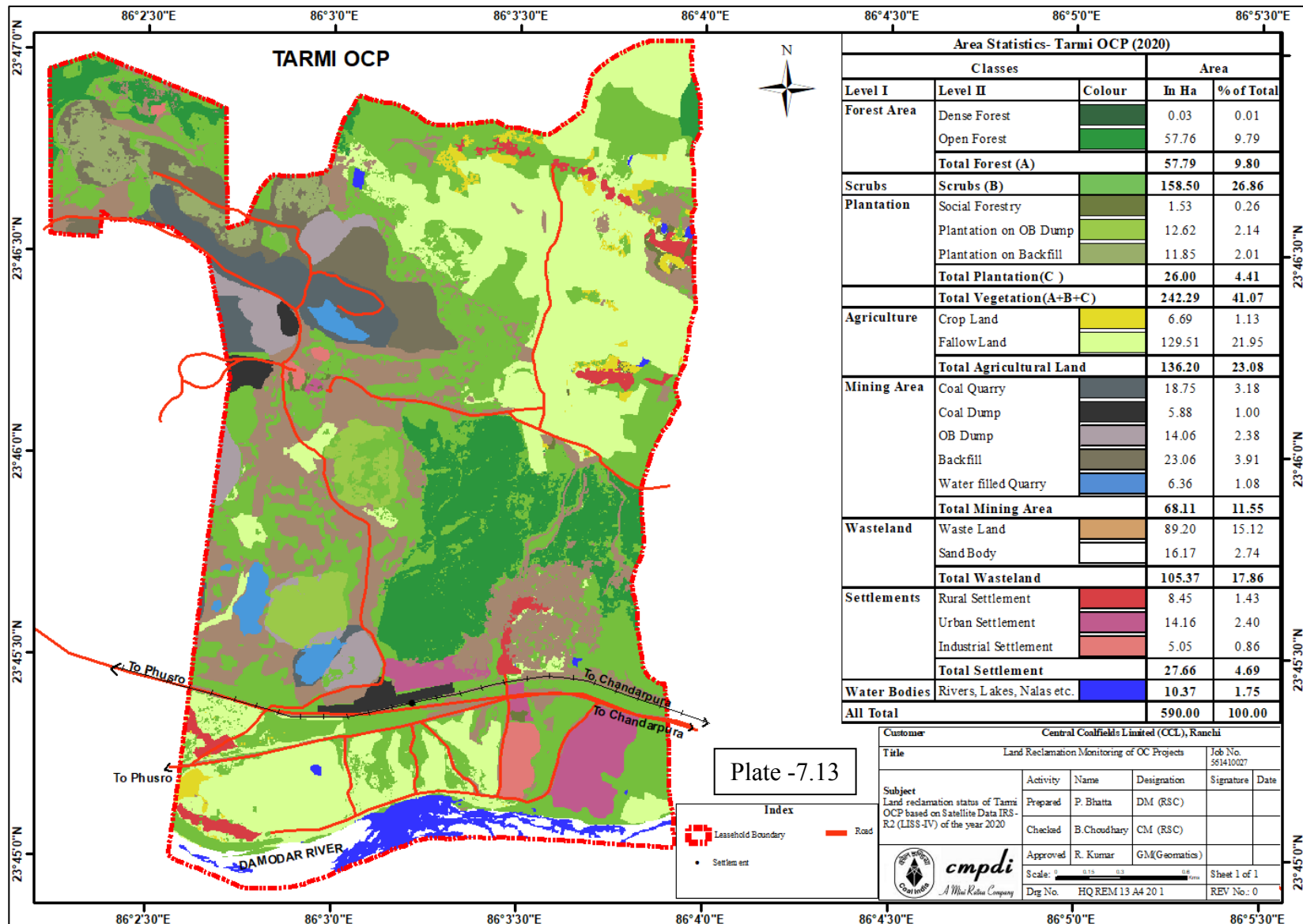












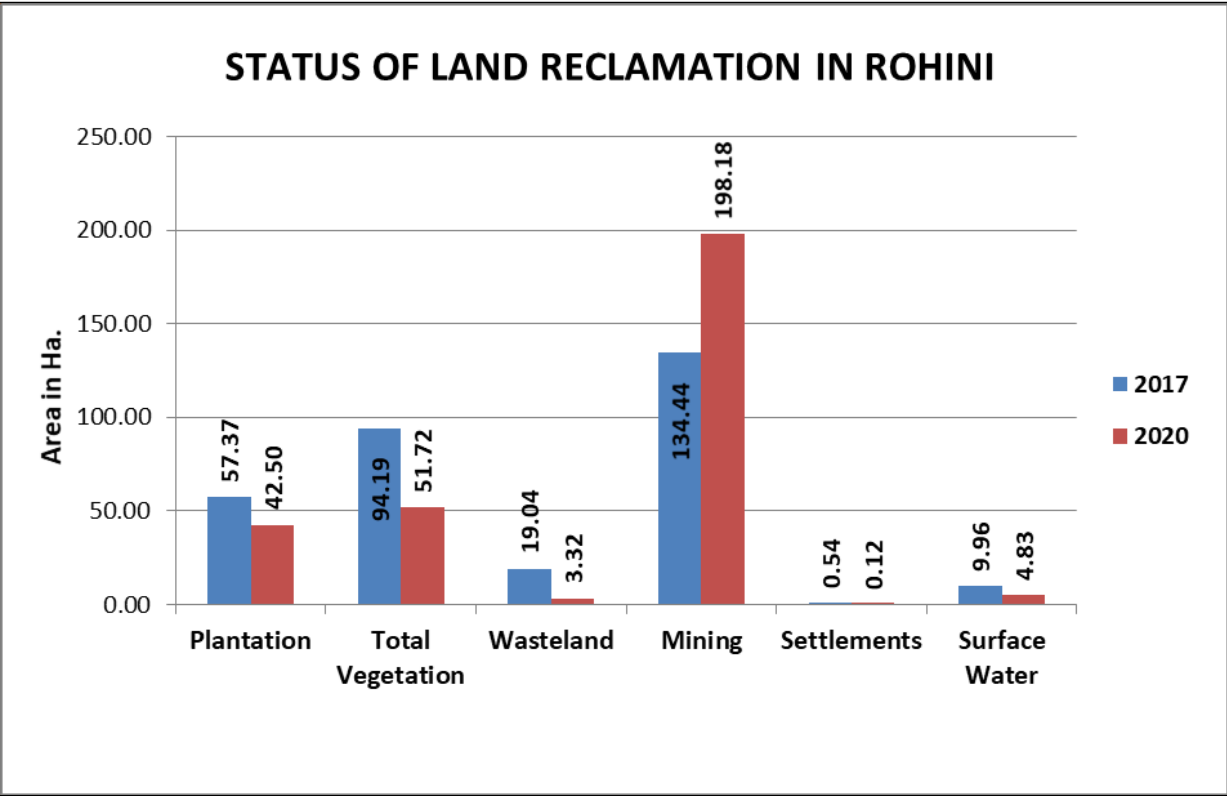


FIGURE – 7.2

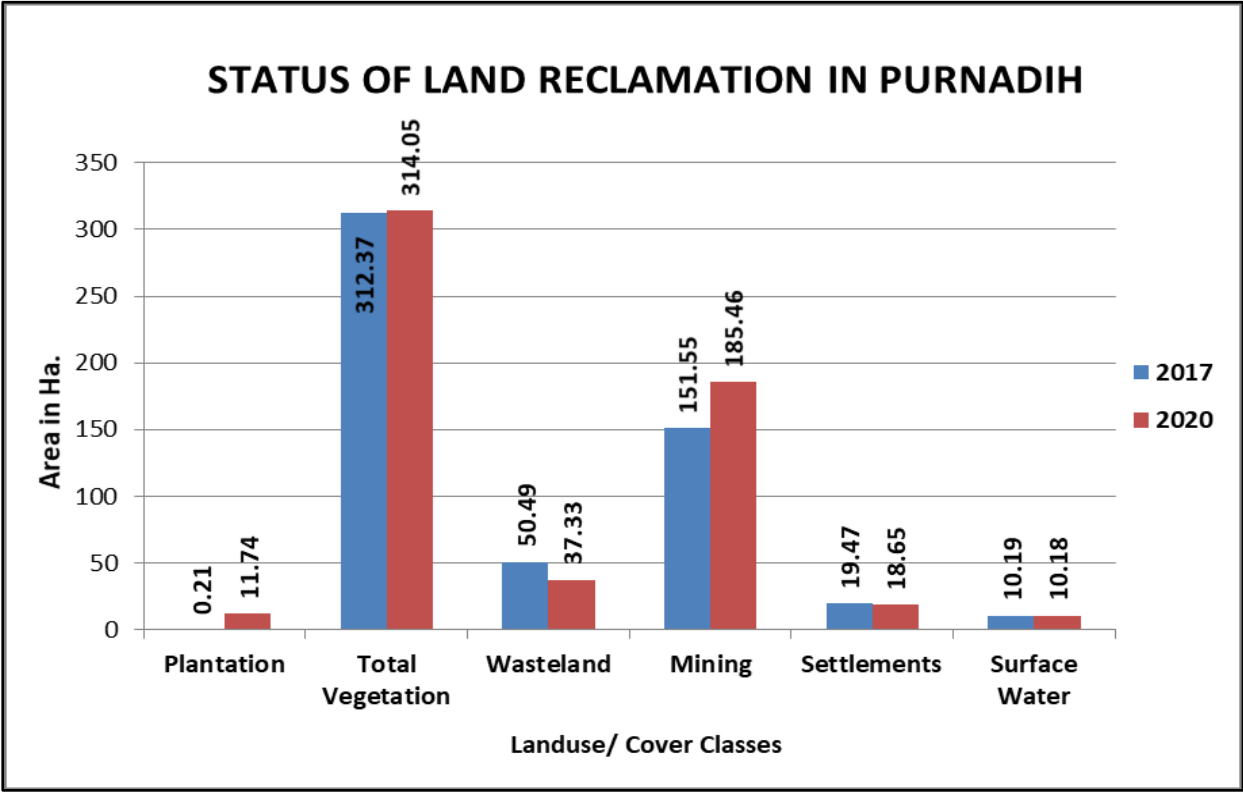


FIGURE – 7.3

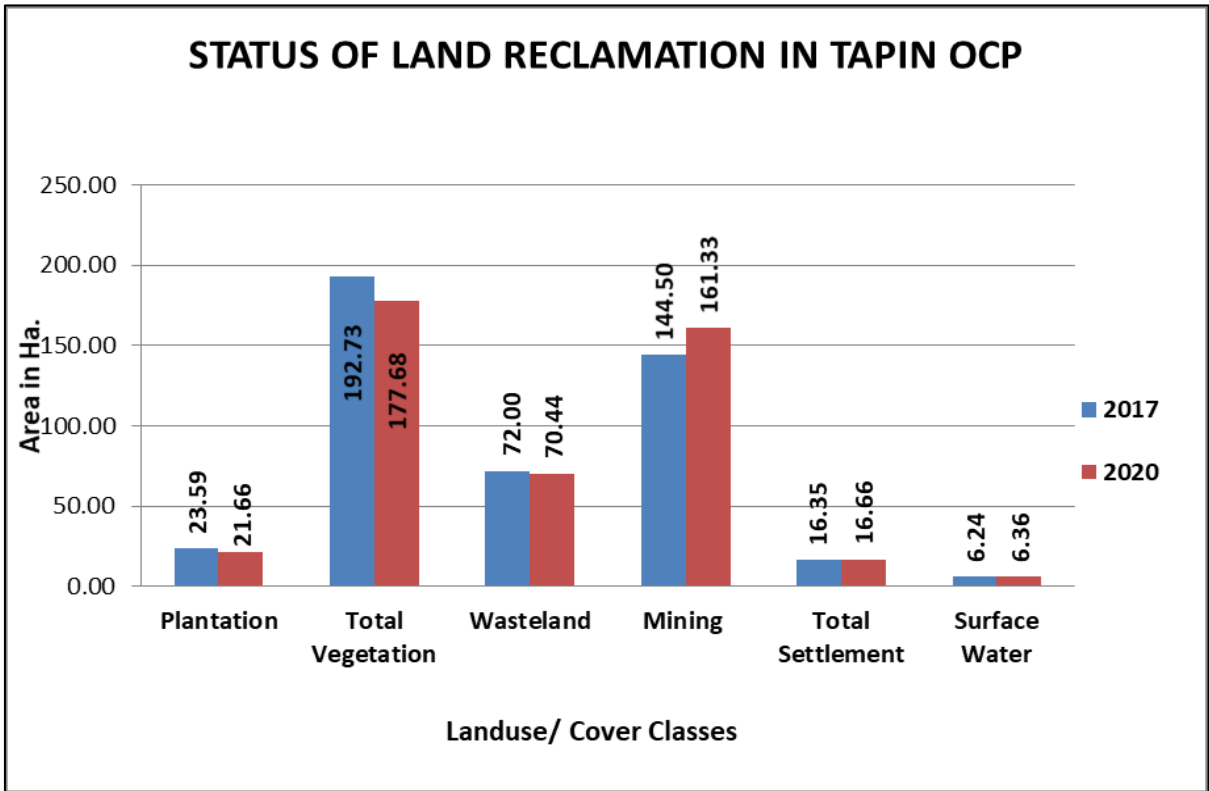


FIGURE – 7.4

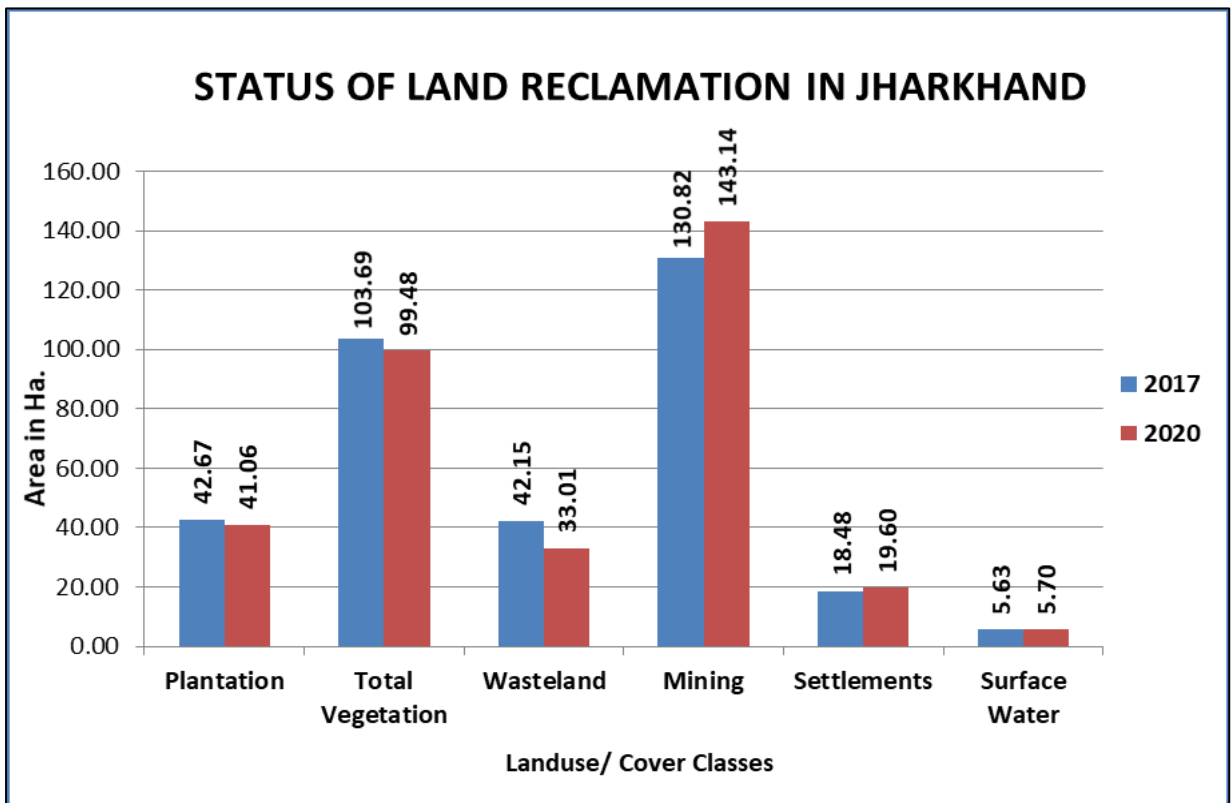


FIGURE – 7.5

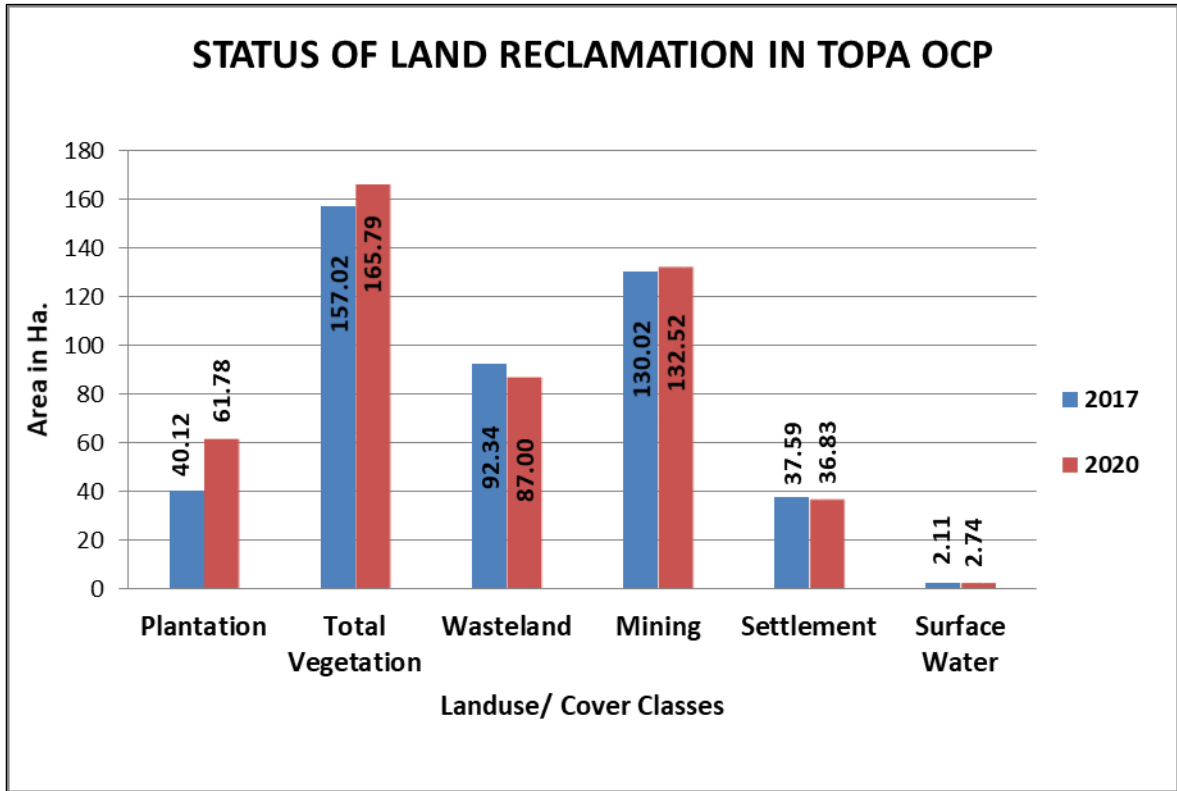


FIGURE – 7.6

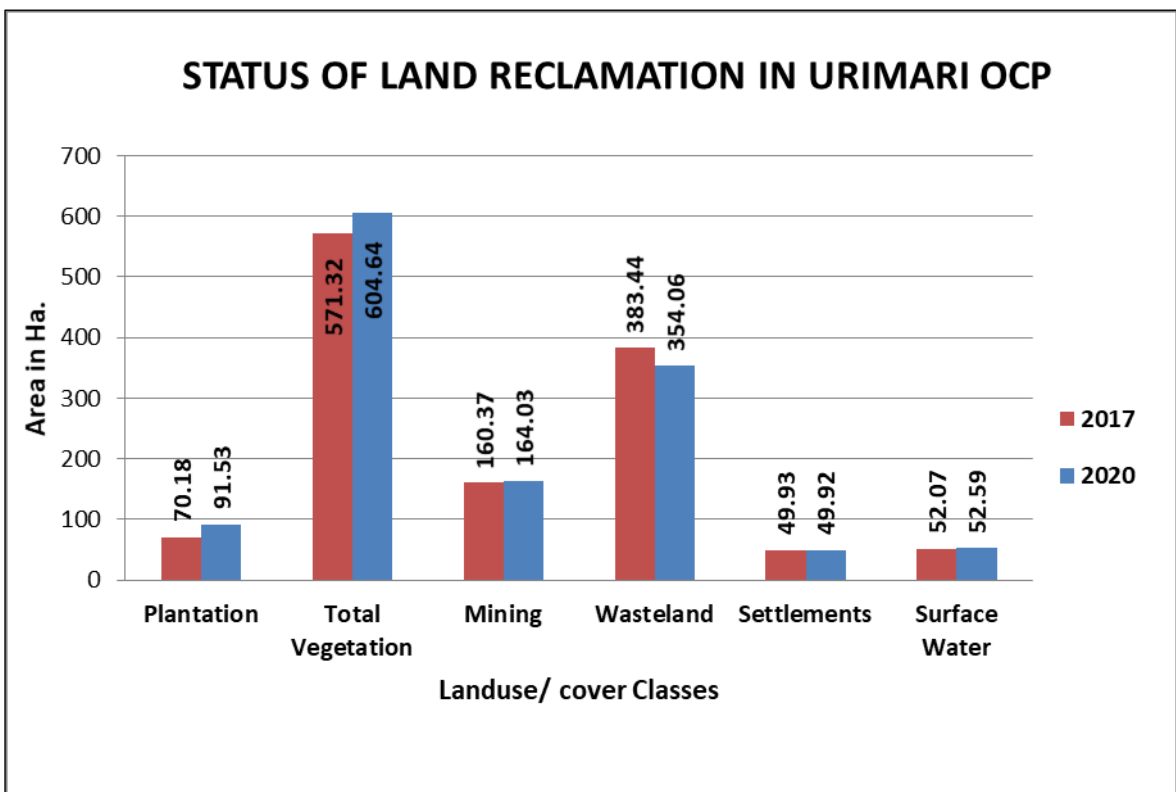


FIGURE – 7.7

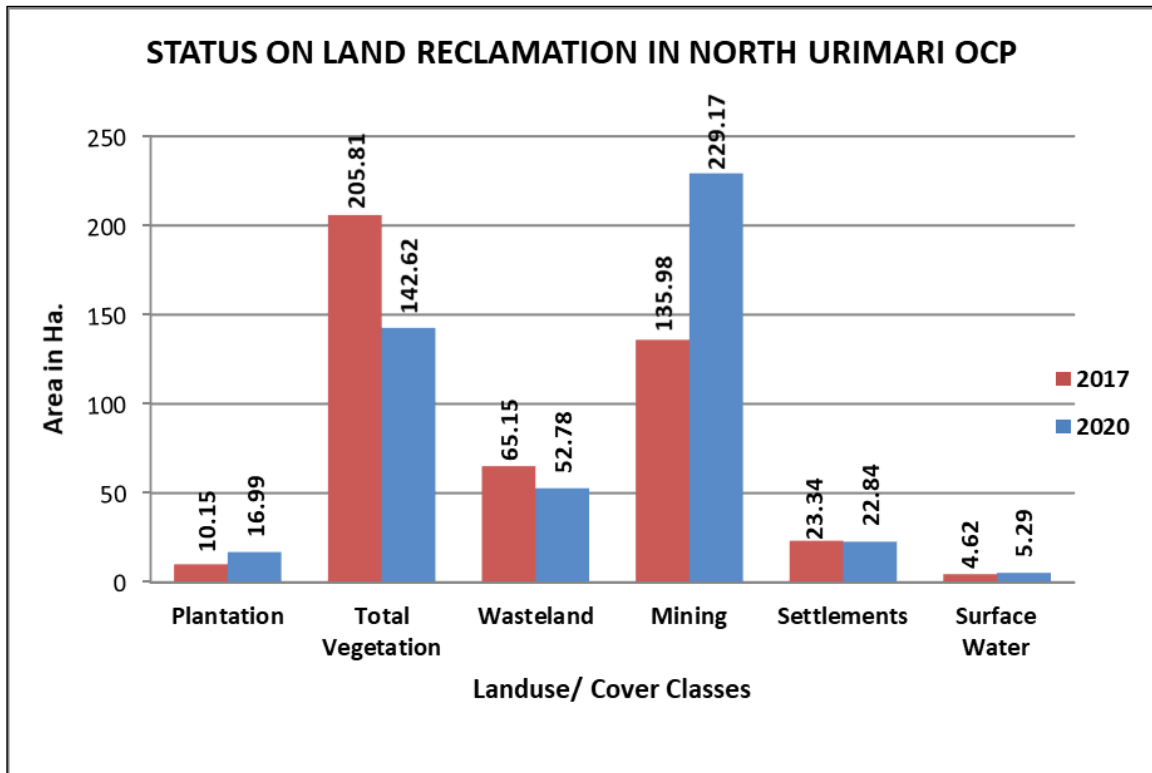


FIGURE – 7.8

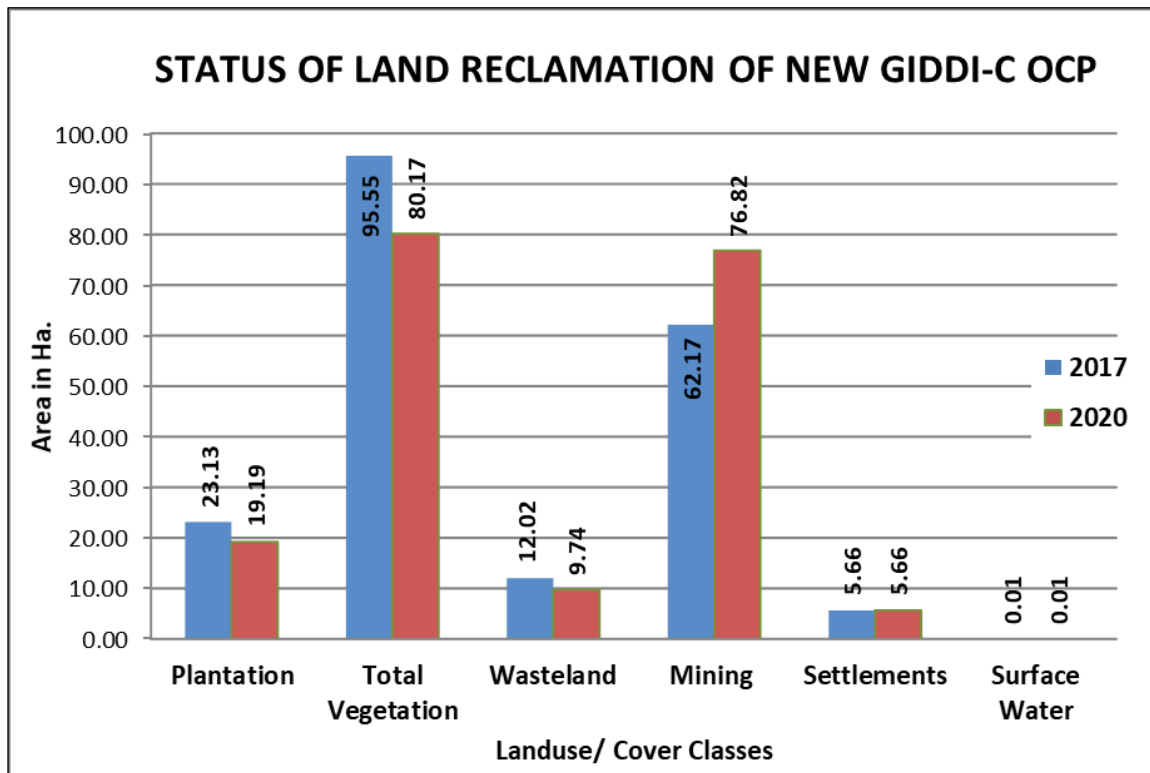


FIGURE – 7.9



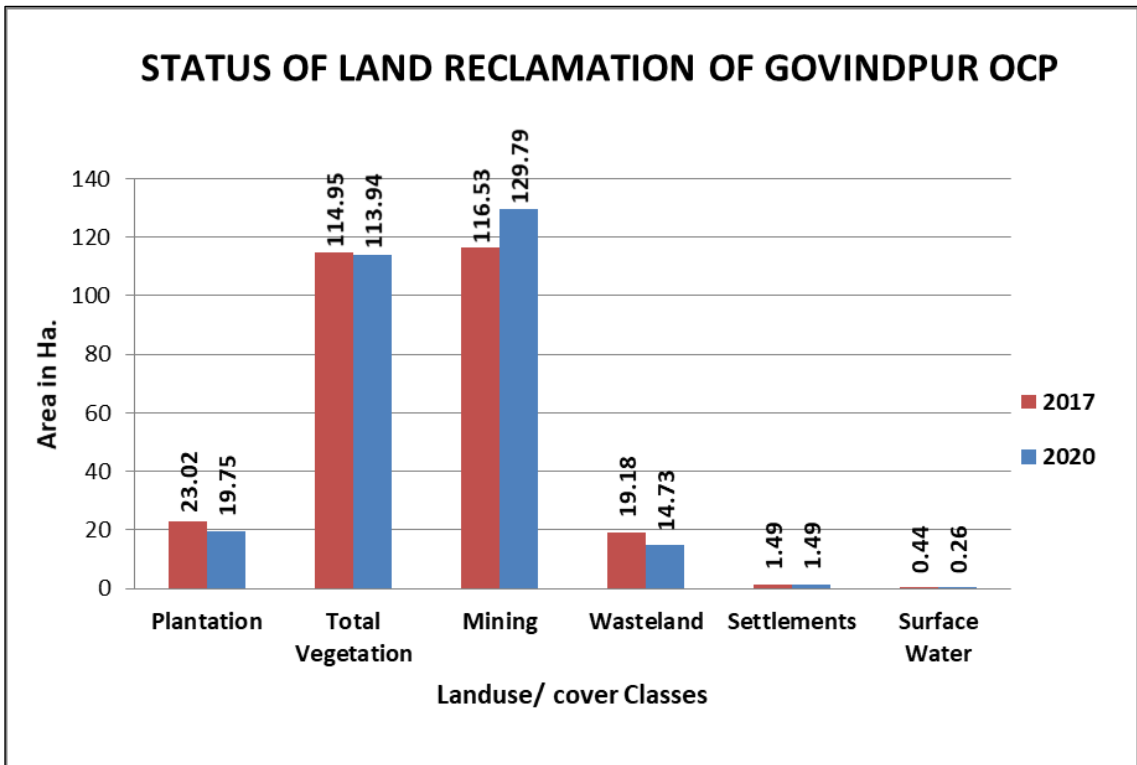


FIGURE – 7.10

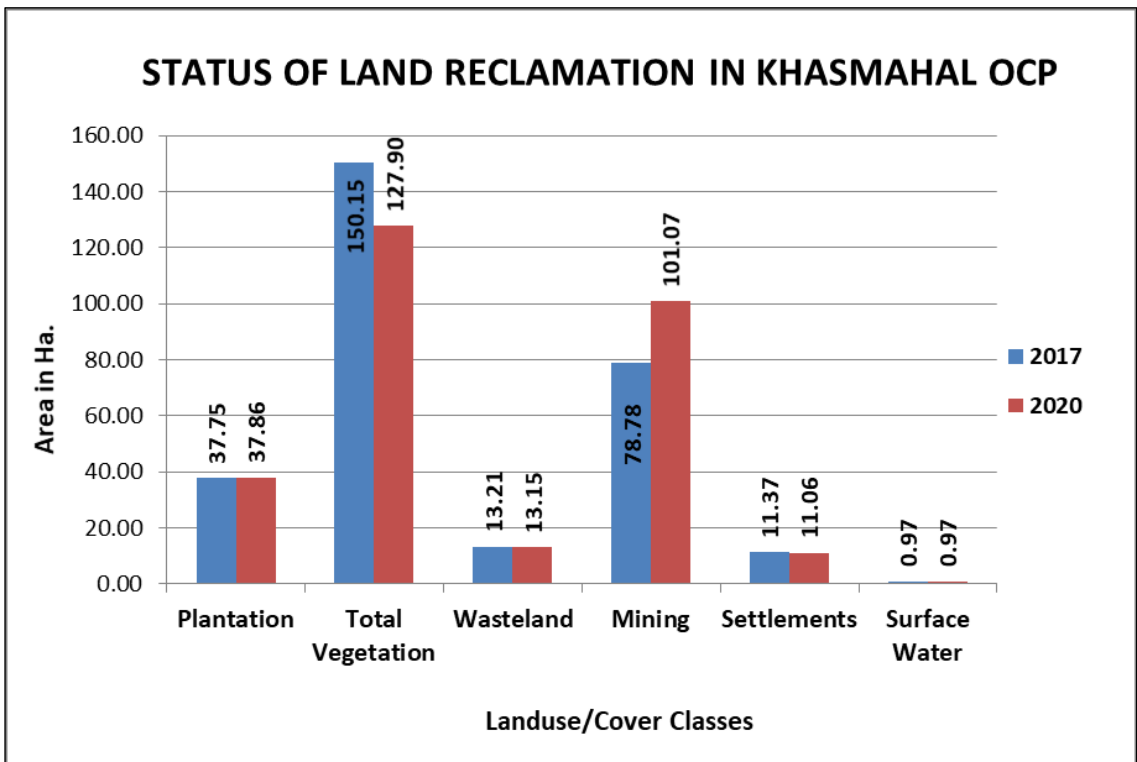


FIGURE – 7.11

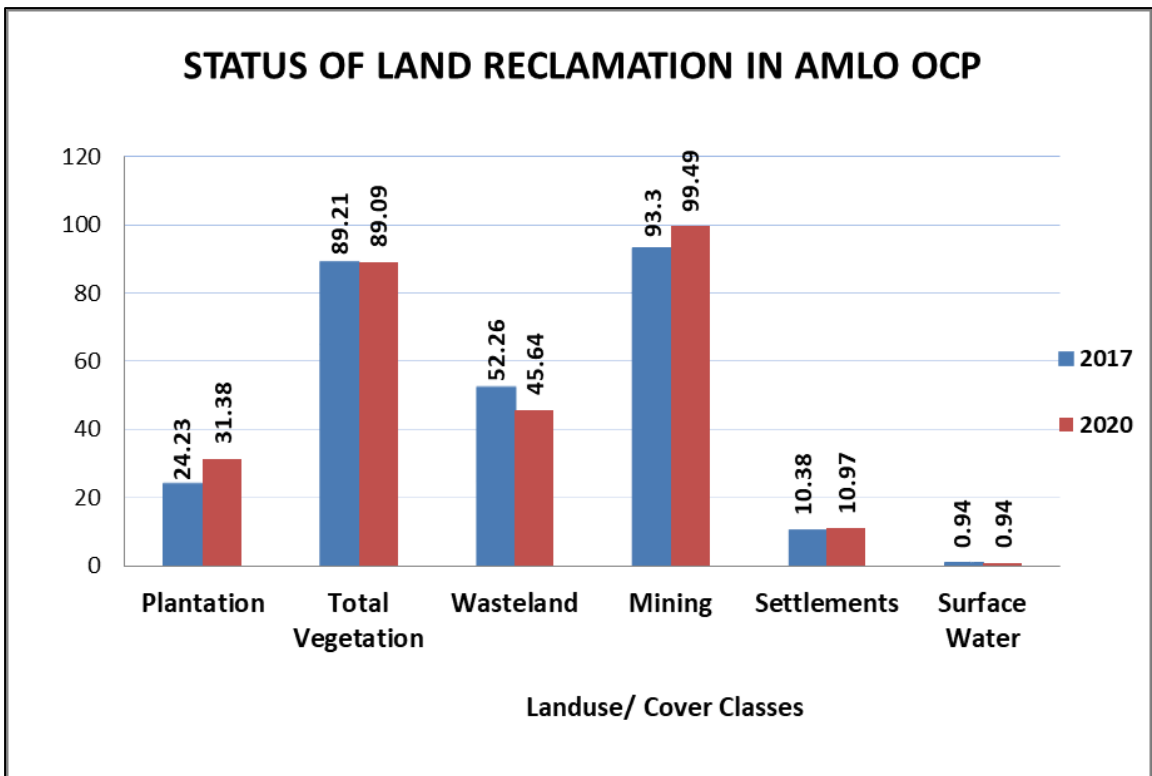


FIGURE – 7.12

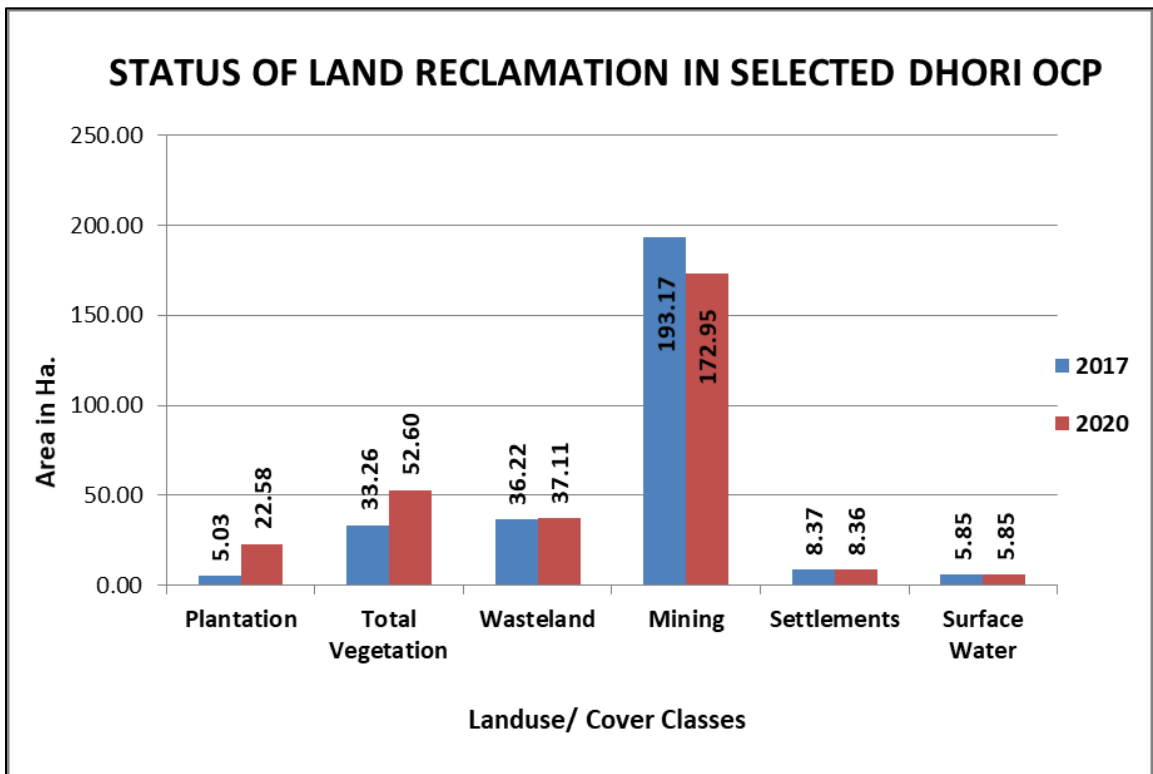


FIGURE – 7.13

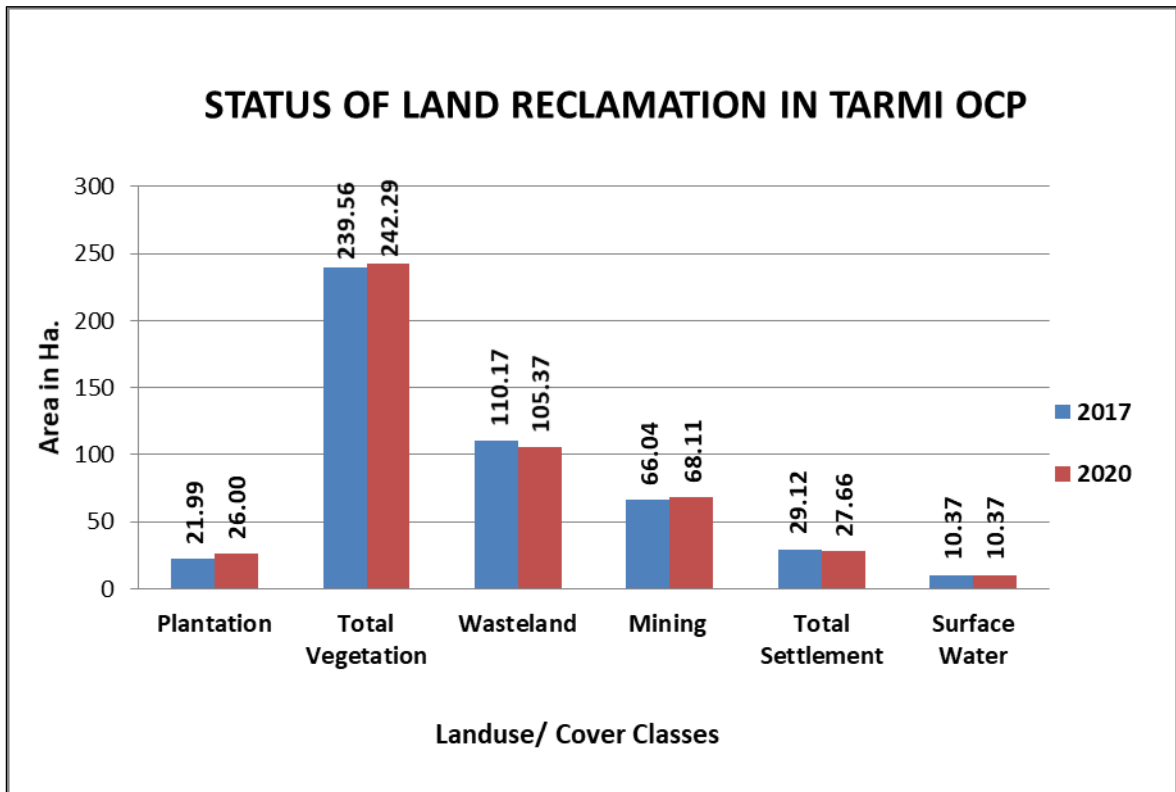


FIGURE – 7.14



Photo 7.1: Plantation on Backfill Dump in Rohini OCP





**Photo7.2: Plantation on Backfill Dump in Purnadih OCP**



**Photo7.3: Plantation on Backfill Dump in Jharkhand OCP**





**Photo7.4: Plantation on OB Dump in Topa OCP**



**Photo7.5: Growing Plantation using Seed Ball Technique on Backfill in Urimari OCP**





**Photo7. 6: Plantation on Backfill Dump in Urimari OCP**



**Photo7.7: Plantation on External OB Dump in North Urimari OCP**





**Photo7.8: Plantation on Backfill Dump in North Urimari OCP**



**Photo7.9: Plantation under social forestry in Govindpur OCP**





**Photo7.10: Plantation on Backfill Dump in Khasmahal OCP**





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