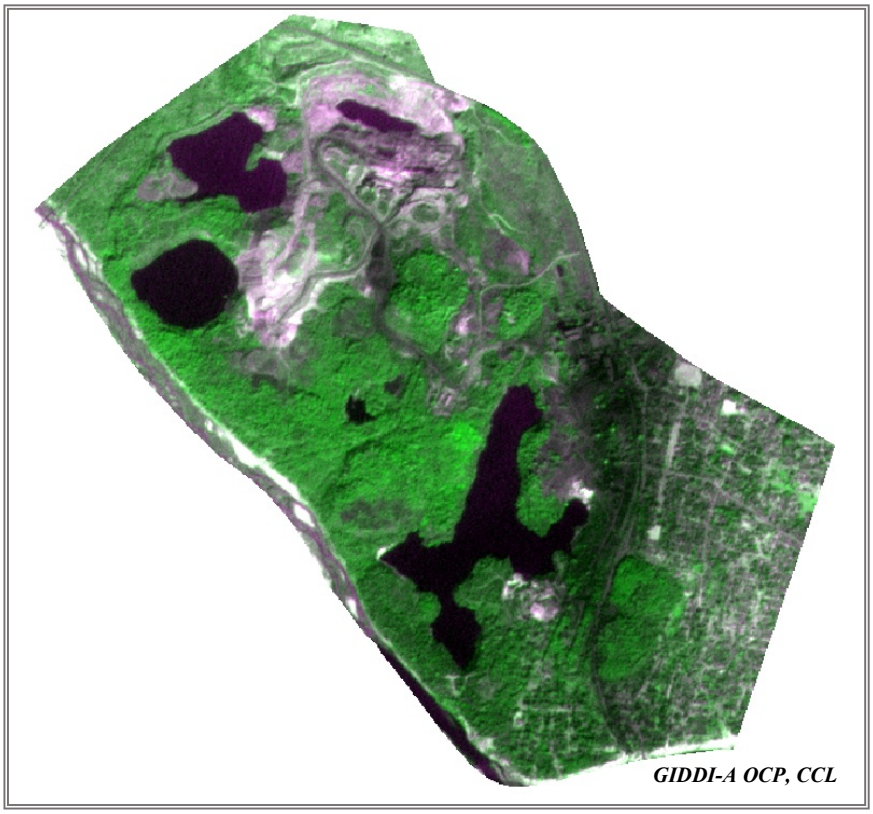
Land Restoration / Reclamation Monitoring of less than 5 m cu. m. (Coal + OB) Capacity Open Cast Coal Mines of Central Coalfields Limited Based on Satellite Data for the Year 2018



GIDDI-A OCP, CCL

Submitted to:

Central Coalfields Limited

cmpdi

A Mini Ratna Company

Land Restoration / Reclamation Monitoring of less than 5 m. cu. m (Coal + OB) capacity Open Cast Coal Mines of Central Coalfields Limited Based on Satellite Data for the Year 2018

March-2019

Remote Sensing Cell
Geomatics Division
CMPDI, Ranchi

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Executive Summary

1.0 Project

Land restoration / reclamation monitoring of 12 opencast coal mines of Central Coalfields Ltd. (CCL) producing less than 5 million cu. m. (Coal + OB) per year based on satellite data, on every three year basis.

2.0 Objective

Objective of the land restoration / reclamation monitoring is to assess the area of backfilled, plantation, social forestry, active mining area, water bodies, and distribution of wasteland, agricultural land and forest land in the leasehold area of the various projects. This will help in assessing the progressive status of mined out 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 9126.74 hectares of the 12 OC projects Viz. Tetriakhar, Dakra, Magadh, Amrapali, Giddi-A, Pundi, Kedla, Jarangdih, Kathara, Konar, Karo & Karma considered for monitoring during year 2018; total excavated area is only 1108.03 ha out of which 196.55 ha area (17.74%) has been biologically reclaimed, 411.71 ha area (37.16%) has been backfilled and 499.77 ha area (45.10%) is under active mining. It is evident from the analysis that 54.90% area of the OC projects have already been reclaimed and balance 45.10% area is under active mining. Project wise details are given in Table-1 & Fig -1.

- Of the total area reclaimed by CCL, 17.74% is under biological reclamation (plantation on excavated/backfilled area) and 37.16% is under technical reclamation (area under backfilling). Out of 12 projects of CCL, Giddi-A OCP ranks on top for land reclamation (76.18%) followed by Dakra OCP (75.17%) and Jarangdih OCP (67.32%).

- It is important to note that a new table format has been designed by Coal India Ltd. with new parameters of biological and technical reclamation. For comparative purposes the basic dataset for the year 2015-16 has been fed into the new format so that it can be compared with the results of 2018-19.

Table-1

Status of Land Reclamation in Central Coalfields Limited based on Satellite Data for the Year 2018

(Projects producing less than 5 mcm of Coal+OB annually)

(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											
						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)*	
		2015	*2018*	*2015*	*2018*	*2015*	*2018*	*2015*	*2018*	*2015*	*2018*	*2015*	*2018*	*2015*	*2018*	*2015*	*2018*	*2015*	*2018*
1	Tetariakhar	205.59	208.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.45	22.38	41.29	22.38	41.29	0.00	1.45	0.00	0.00
				0.00%	0.00%	0.00%	0.00%					100.00%	100.00%			0.00%	0.70%	0.00%	0.00%
2	Dakra	252.52	249.72	44.85	27.03	24.23	45.79	4.90	4.90	9.58	9.82	15.98	24.05	85.06	96.87	38.71	60.51	69.08	72.82
				52.73%	27.90%	28.49%	47.27%					18.79%	24.83%			15.33%	24.23%	81.21%	75.17%
3	Magadh	1704.00	1769.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.97	44.66	16.97	44.66	0.00	0.00	0.00	0.00
				0.00%	0.00%	0.00%	0.00%					100.00%	100.00%			0.00%	0.00%	0.00%	0.00%
4	Amrapali	1300.00	1300.00	0.00	72.84	0.00	0.00	0.00	1.36	0.00	0.00	98.48	53.90	98.48	126.74	0.00	1.36	0.00	72.84
				0.00%	57.47%	0.00%	0.00%					100.00%	42.53%			0.00%	0.10%	0.00%	57.47%
5	Giddi-A	494.20	510.00	105.72	109.10	67.64	80.14	41.57	43.90	13.22	14.00	74.61	59.16	247.97	248.40	122.43	138.04	173.36	189.24
				42.63%	43.92%	27.28%	32.26%					30.09%	23.82%			24.77%	27.07%	69.91%	76.18%
6	Pundi	1357.20	1357.20	31.06	35.87	13.86	13.88	23.03	22.36	1.35	1.35	31.19	30.75	76.11	80.50	38.24	37.59	44.92	49.75
				40.81%	44.56%	18.21%	17.24%					40.98%	38.20%			2.82%	2.77%	59.02%	61.80%
7	Kedla	1157.42	1157.42	49.73	49.76	0.00	0.00	27.05	26.75	1.46	1.46	34.30	45.92	84.03	95.68	28.51	28.21	49.73	49.76
				59.18%	52.01%	0.00%	0.00%					40.82%	47.99%			2.46%	2.44%	59.18%	52.01%
8	Jarangdih	179.05	179.05	28.51	29.53	7.19	7.20	3.50	3.50	16.50	18.93	21.57	17.83	57.27	54.56	27.19	29.63	35.70	36.73
				49.78%	54.12%	12.55%	13.20%					37.66%	32.68%			15.19%	16.55%	62.34%	67.32%
9	Kathara	792.52	792.52	59.39	61.04	31.83	31.83	122.03	103.67	75.02	89.17	78.67	76.98	169.89	169.85	228.88	224.67	91.22	92.87
				34.96%	35.94%	18.74%	18.74%					46.31%	45.32%			28.88%	28.35%	53.69%	54.68%
10	Konar	729.40	729.40	0.26	9.31	3.48	3.48	27.10	24.18	20.69	19.16	51.98	41.27	55.72	54.06	51.27	46.82	3.74	12.79
				0.47%	17.22%	6.25%	6.44%					93.29%	76.34%			7.03%	6.42%	6.71%	23.66%
11	Karo	575.00	575.00	14.11	17.23	11.88	14.23	10.83	12.07	15.90	15.78	40.93	34.19	66.92	65.65	38.61	42.08	25.99	31.46
				21.08%	26.25%	17.75%	21.68%					61.16%	52.08%			6.71%	7.32%	38.84%	47.92%
12	Karma	298.96	298.96	0.00	0.00	0.00	0.00	9.23	8.03	1.34	1.27	20.72	29.77	20.72	29.77	10.57	9.30	0.00	0.00
				0.00%	0.00%	0.00%	0.00%					100.00%	100.00%			3.54%	3.11%	0.00%	0.00%
	TOTAL	**9045.86**	**9126.74**	**333.63**	**411.71**	**160.11**	**196.55**	**269.24**	**250.72**	**155.06**	**172.39**	**507.78**	**499.77**	**1001.52**	**1108.03**	**584.41**	**619.66**	**493.74**	**608.26**
				33.31%	**37.16%**	**15.99%**	**17.74%**					**50.70%**	**45.10%**			**6.40%**	**6.79%**	**49.30%**	**54.9%**

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

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

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

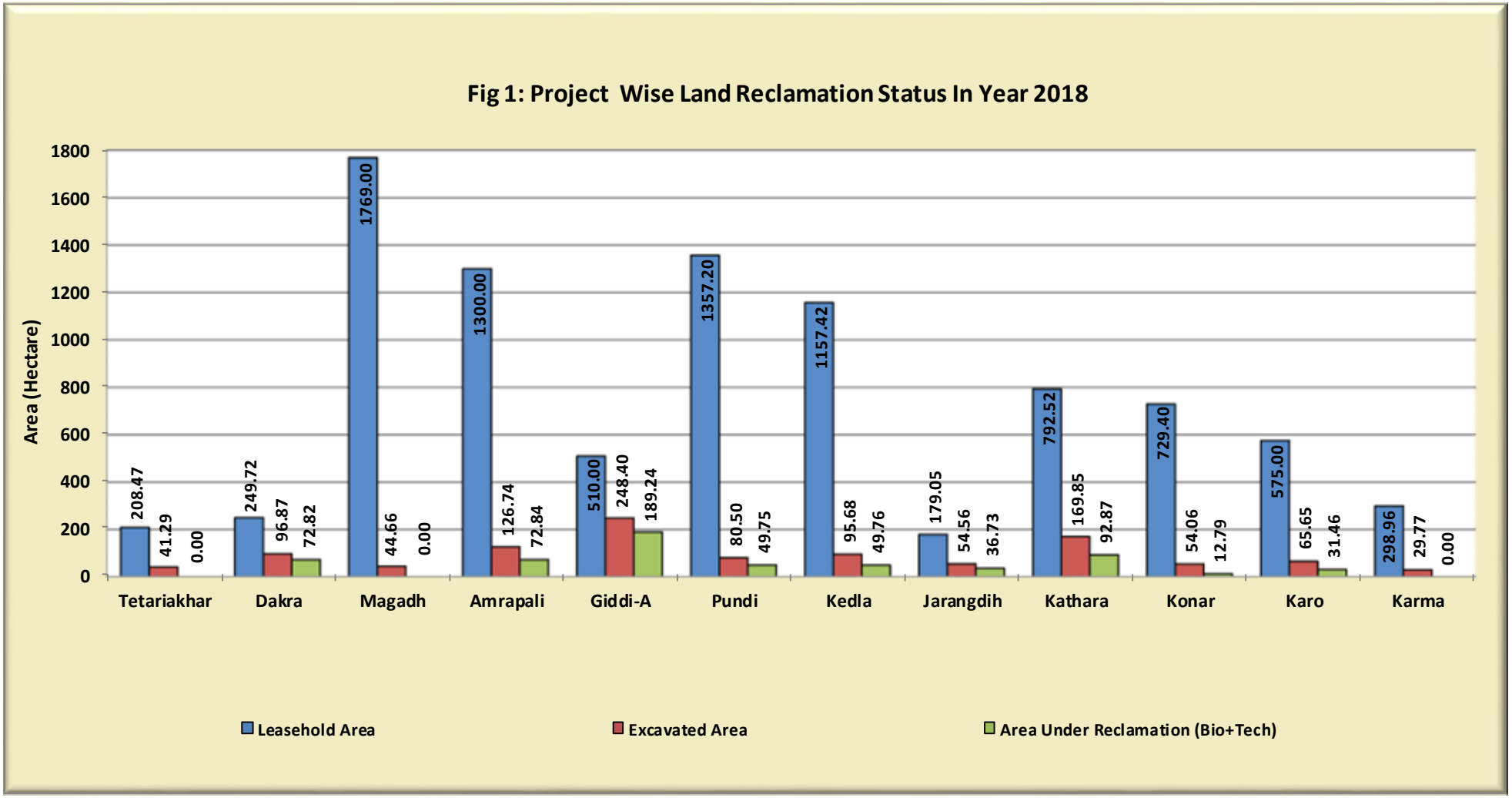


Fig 1: Project Wise Land Reclamation Status In Year 2018
Area (Hectare)
1800
1600
1400
1200
1000
800
600
400
200
0
208.47
41.29
0.00
249.72
96.87
72.82
1769.00
44.66
0.00
1300.00
126.74
72.84
510.00
248.40
189.24
1357.20
80.50
49.75
1157.42
95.68
49.76
179.05
54.56
36.73
792.52
169.85
92.87
729.40
54.06
12.79
575.00
65.65
31.46
298.96
29.77
0.00
Tetariakhar
Dakra
Magadh
Amrapali
Giddi-A
Pundi
Kedla
Jarangdih
Kathara
Konar
Karo
Karma
Leasehold Area
Excavated Area
Area Under Reclamation (Bio+Tech)

1.0 Background

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

1.2 Keeping above in view, M/s. Coal India Ltd. (CIL) issued a work order vide letter no. CIL/WBP/Env/2011/4706 dated 12.10.2012 for monitoring of opencast mines of less than 5 million m^3 per annum capacity (Coal +OB) from the year 2012 at intervals of three years. The result of land reclamation status of all such mines is to be published on the website of **CIL**, (www.coalindia.in), **CMPDI** (www.cmpdi.co.in) and the concerned coal companies in public domain. Detailed reports are to be submitted to Coal India and respective subsidiaries.

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

1.4 Present report is embodying the finding of the study based on satellite data of the year 2018 carried out for 12 OC projects of Central Coalfields Ltd. producing less than 5 mcm (Coal+OB) per annum.

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 given in fig 2. Following steps are involved in land reclamation /restoration monitoring:

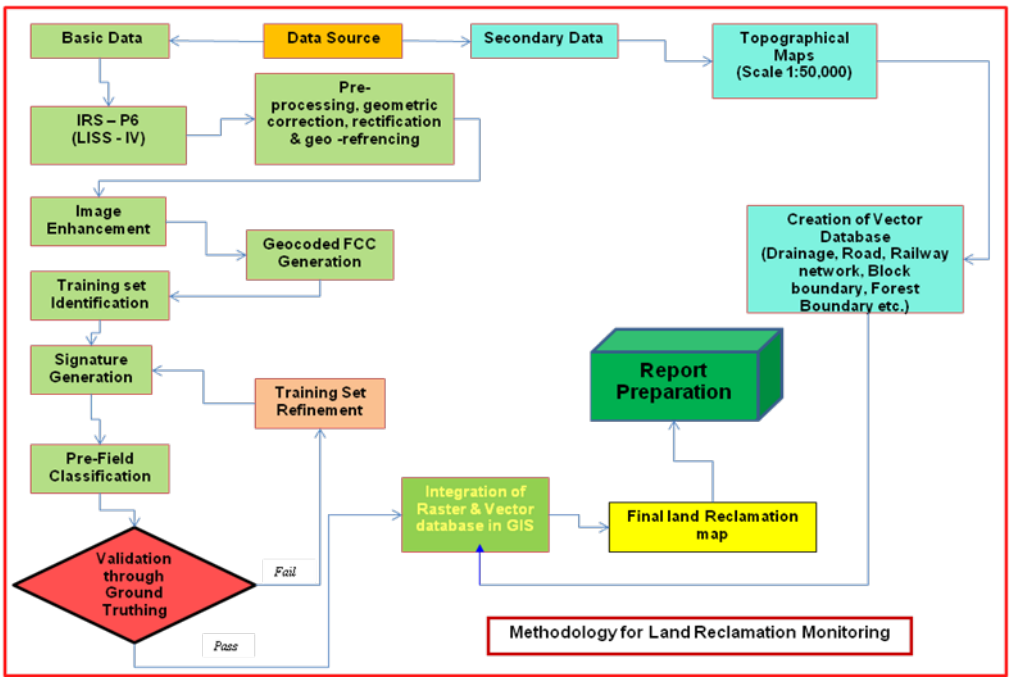


Figure: 2 Methodology for Land Reclamation Monitoring

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

- **Image enhancement:** To improve the interpretability of the raw data, image enhancement is necessary. Local operations modify the value of each pixel based on brightness value of neighbouring pixels using ERDAS IMAGINE 14 s/w. and enhance the image quality for interpretation.

- **Training set selection**

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

- **Classification and Accuracy assessment**

  Image classification is carried out using the maximum likelihood algorithm. The classification proceeds through the following steps: (a) calculation of statistics [i.e. signature generation] for the identified training areas, and (b) the decision boundary of maximum probability based on the mean vector, variance, covariance and correlation

matrix of the pixels. After evaluating the statistical parameters of the training sets, reliability test of training sets is conducted by measuring the statistical separation between the classes that resulted from computing divergence matrix. The overall accuracy of the classification was finally assessed with reference to ground truth data.

- **Area calculation**

  The area of each land use class in the leasehold is determined using ERDAS IMAGINE v. 14 software and given in table 2.

- **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 Land Reclamation Status in Central Coalfields Ltd.

4.1 Following 12 OC projects producing less than 5 million m^3. (Coal + OB together) of Central Coalfields Ltd. have been taken up during the year 2018 for land reclamation monitoring:

- Tetariakhar
- Dakra
- Magadh
- Amrapali
- Giddi-A
- Pundi
- Kedla
- Jarangdih
- Kathara
- Konar
- Karo
- Karma

4.2 Area statistics of different land use classes present in OC projects in the year 2018 is given in Table 2. Land use maps derived from the satellite data is given in Plate no. 1 to 12. Land use statuses are shown in Fig. 3 – 14 and field photographs showing plantation and backfilled area in mining projects are shown in photos 1-4.

4.3 Study reveals that 54.90% of excavated area has already been reclaimed by CCL in the OC projects, out of which 17.74% area has been planted and 37.16% area are under backfilling.

4.4 On comparing the status of land reclamation for the year 2018 with respect to the year 2015 in different projects, it is evident that the area of land reclamation has increased from 493.74 Ha.(Yr. 2015) to 608.26 Ha (Yr .2018)

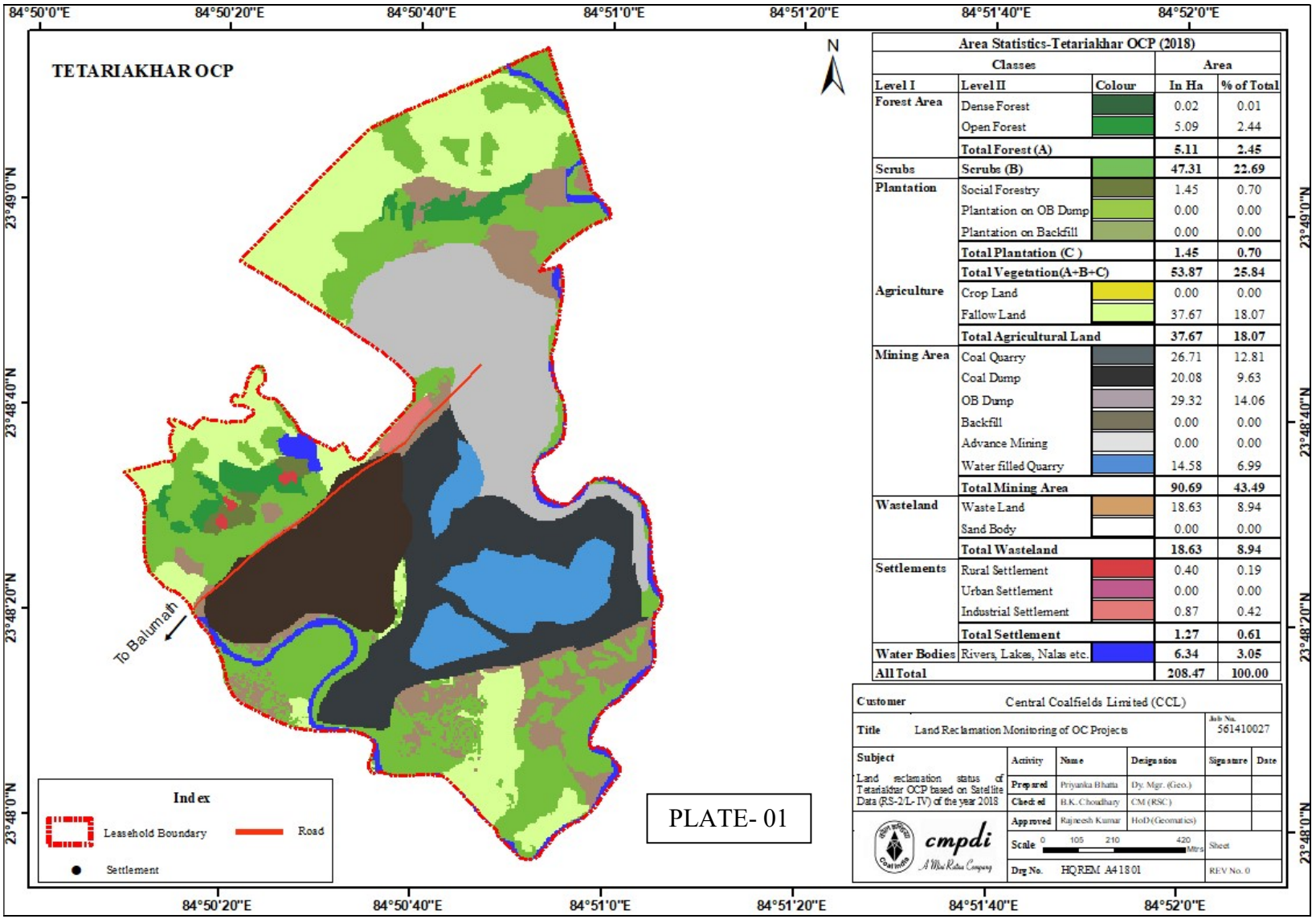
4.5 Out of 12 projects of CCL, Giddi-A OCP ranks on top for land reclamation (76.18%) followed by Dakra OCP (75.17%) and Jarangdih OCP (67.32%).

4.6 In Kathara OCP, plantation has decreased due to OB dumping over it.

Table 2 : STATUS OF LAND RECLAMATION IN CENTRAL COALFIELDS LIMITED BASED ON SATELLITE DATA OF THE YEAR 2018

(*Area in Hectare*)

		TETARIAKHAR		DAKRA		MAGADH		AMRAPALI		GIDDI-A		PUNDI		KEDLA		JARANGDIH		KATHARA		KONAR		KARO		KARMA		TOTAL	
		Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%
FORESTS	Dense Forest	0.02	0.01	0.00	0.00	53.17	3.01	20.70	1.59	0.00	0.00	181.58	13.38	0.04	0.00	0.00	0.00	0.00	0.00	76.78	10.53	66.61	11.58	0.00	0.00	398.90	4.37
	Open Forest	5.09	2.44	0.00	0.00	168.21	9.51	189.32	14.56	0.00	0.00	235.65	17.36	174.08	15.04	0.00	0.00	0.00	0.00	211.88	29.05	77.14	13.42	15.08	5.04	1076.45	11.79
	Total Forest (A)	5.11	2.45	0.00	0.00	221.38	12.52	210.02	16.15	0.00	0.00	417.23	30.74	174.12	15.04	0.00	0.00	0.00	0.00	288.66	39.58	143.75	25.00	15.08	5.04	1475.35	16.16
SCRUBS	**Scrubs (B)**	47.31	22.69	46.33	18.55	276.96	15.66	237.51	18.27	53.53	10.50	308.17	22.71	406.27	35.10	26.43	14.76	50.49	6.37	129.53	17.76	127.41	22.16	69.15	23.13	1779.09	19.49
PLANTATION	Social Forestry	1.45	0.70	9.82	3.93	0.00	0.00	0.00	0.00	14.00	2.75	1.35	0.10	1.46	0.13	18.93	10.57	89.17	11.25	19.16	2.63	15.78	2.74	1.27	0.42	172.39	1.89
	Plantation on External OB Dump	0.00	0.00	4.90	1.96	0.00	0.00	1.36	0.10	43.90	8.61	22.36	1.65	26.75	2.31	3.50	1.95	103.67	13.08	24.18	3.32	12.07	2.10	8.03	2.69	250.72	2.75
	Plantation on Backfill **(Biological Reclamation)**	0.00	0.00	45.79	18.34	0.00	0.00	0.00	0.00	80.14	15.71	13.88	1.02	0.00	0.00	7.20	4.02	31.83	4.02	3.48	0.48	14.23	2.47	0.00	0.00	196.55	2.15
	Total Plantation **(Green Cover) (C)**	**1.45**	**0.70**	**60.51**	**24.23**	**0.00**	**0.00**	**1.36**	**0.10**	**138.04**	**27.07**	**37.59**	**2.77**	**28.21**	**2.44**	**29.63**	**16.54**	**224.67**	**28.35**	**46.82**	**6.43**	**42.08**	**7.31**	**9.30**	**3.11**	**619.66**	**6.79**
	Total Vegetation (A+B+C)	**53.87**	**25.84**	**106.84**	**42.78**	**498.34**	**28.18**	**448.89**	**34.52**	**191.57**	**37.57**	**762.99**	**56.22**	**608.60**	**52.58**	**56.06**	**31.30**	**275.16**	**34.72**	**465.01**	**63.77**	**313.24**	**54.47**	**93.53**	**31.28**	**3874.11**	**42.44**
	Coal Dump	20.08	9.63	2.06	0.82	9.80	0.55	19.38	1.49	5.52	1.08	4.87	0.36	5.76	0.50	4.39	2.45	15.90	2.01	9.33	1.28	7.91	1.38	6.52	2.18	111.52	1.23
ACTIVE MINING	Coal Quarry	26.71	12.81	13.53	5.42	35.51	2.01	44.55	3.43	9.89	1.94	15.90	1.17	28.58	2.47	14.57	8.14	36.49	4.60	25.70	3.52	31.47	5.47	24.20	8.09	307.10	3.36
	Advance Quarry Site	0.00	0.00	0.00	0.00	0.00	0.00	5.20	0.40	0.00	0.00	0.65	0.05	0.34	0.03	1.47	0.82	0.00	0.00	12.99	1.78	0.00	0.00	1.42	0.47	22.07	0.24
	Quarry Filled with Water	14.58	6.99	10.52	4.21	9.15	0.52	4.15	0.32	49.27	9.66	14.20	1.05	17.00	1.47	1.79	1.00	40.49	5.11	2.58	0.35	2.72	0.47	4.15	1.39	170.60	1.87
	Total Area under *Active Mining*	**41.29**	**19.80**	**24.05**	**9.63**	**44.66**	**2.53**	**53.90**	**4.15**	**59.16**	**11.60**	**30.75**	**2.27**	**45.92**	**3.97**	**17.83**	**9.96**	**76.98**	**9.71**	**41.27**	**5.65**	**34.19**	**5.94**	**29.77**	**9.95**	**499.77**	**5.47**
	Barren OB dump	29.32	14.06	24.43	9.78	62.15	3.51	125.78	9.78	0.57	0.11	36.35	2.68	88.70	7.66	12.52	6.99	144.47	18.23	64.65	8.86	39.15	6.81	48.58	16.25	676.67	7.41
	Area Under Backfilling **(Technical Reclamation)**	0.00	0.00	27.03	10.82	0.00	0.00	72.84	5.60	109.10	21.39	35.87	2.64	49.76	4.30	29.53	16.49	61.04	7.70	9.31	1.28	17.23	3.00	0.00	0.00	411.71	4.51
	Total Area under Mine Operation	**90.69**	**43.49**	**77.57**	**31.05**	**116.61**	**6.59**	**271.90**	**20.92**	**174.35**	**34.18**	**107.84**	**7.95**	**190.14**	**16.43**	**64.27**	**35.89**	**298.39**	**37.65**	**124.56**	**17.07**	**98.48**	**17.13**	**84.87**	**28.38**	**1699.67**	**17.39**
WASTELANDS	Waste Lands	18.63	8.94	22.22	8.9	255.78	14.46	208.03	16.00	35.84	7.03	128.16	9.44	74.01	6.39	19.77	11.04	43.92	5.54	28.89	3.96	72.45	12.60	31.98	10.70	939.68	10.30
	Fly Ash Pond/Sand Body	0.00	0.00	0.00	0.00	5.80	0.33	12.17	0.94	5.98	1.17	3.02	0.22	0.66	0.06	0.97	0.54	9.87	1.25	0.00	0.00	0.00	0.00	9.75	3.26	48.22	0.53
	Total Wastelands	**18.63**	**8.94**	**22.22**	**8.90**	**261.58**	**14.79**	**220.20**	**16.94**	**41.82**	**8.20**	**131.18**	**9.66**	**74.67**	**6.45**	**20.74**	**11.58**	**53.79**	**6.79**	**28.89**	**3.96**	**72.45**	**12.60**	**41.73**	**13.96**	**987.90**	**10.83**
WATER	Reservoir, nallah, ponds etc.	6.34	3.05	2.85	1.16	17.46	0.98	20.91	1.61	17.95	3.52	8.68	0.64	16.53	1.43	2.28	1.29	5.45	0.68	0.44	0.06	1.01	0.18	11.94	4.01	111.84	1.23
	Total Waterbodies	**6.34**	**3.05**	**2.85**	**1.16**	**17.46**	**0.98**	**20.91**	**1.61**	**17.95**	**3.52**	**8.68**	**0.64**	**16.53**	**1.43**	**2.28**	**1.29**	**5.45**	**0.68**	**0.44**	**0.06**	**1.01**	**0.18**	**11.94**	**4.01**	**111.84**	**1.23**
AGRICULTURE	Crop Lands	0.00	0.00	0.00	0.00	289.09	16.34	97.32	7.49	0.00	0.00	127.37	9.38	1.48	0.13	0.62	0.35	20.12	2.54	6.88	0.94	0.09	0.02	0.00	0.00	542.97	5.95
	Fallow Lands	37.67	18.07	1.67	0.67	575.08	32.51	220.11	16.93	2.49	0.49	186.28	13.73	202.00	17.45	0.00	0.00	52.68	6.65	46.62	6.39	60.74	10.56	60.01	20.07	1445.35	15.84
	Total Agriculture	**37.67**	**18.07**	**1.67**	**0.67**	**864.17**	**48.85**	**317.43**	**24.42**	**2.49**	**0.49**	**313.65**	**23.11**	**203.48**	**17.58**	**0.62**	**0.35**	**72.80**	**9.19**	**53.50**	**7.33**	**60.83**	**10.58**	**60.01**	**20.07**	**1988.32**	**21.79**
SETTLEMENTS	Urban Settlement	0.00	0.00	12.87	5.15	0.00	0.00	0.00	0.00	61.14	11.99	6.93	0.51	26.71	2.31	31.96	17.85	40.82	5.15	50.80	6.96	19.87	3.46	0.00	0.00	251.10	2.75
	Rural Settlement	0.40	0.19	10.56	4.23	8.52	0.48	11.51	0.89	0.00	0.00	21.80	1.61	26.14	2.26	0.00	0.00	6.71	0.85	5.99	0.82	6.06	1.05	5.52	1.85	103.21	1.13
	Industrial Settlement	0.87	0.42	15.14	6.06	2.32	0.13	9.16	0.70	20.68	4.05	4.13	0.30	11.15	0.96	3.12	1.74	39.40	4.97	0.21	0.03	3.06	0.53	1.36	0.45	110.60	1.21
	Total Settlements	**1.27**	**0.61**	**38.57**	**15.44**	**10.84**	**0.61**	**20.67**	**1.59**	**81.82**	**16.04**	**32.86**	**2.42**	**64.00**	**5.53**	**35.08**	**19.59**	**86.93**	**10.97**	**57.00**	**7.81**	**28.99**	**5.04**	**6.88**	**2.30**	**464.91**	**5.09**
	GRAND TOTAL	**208.47**	**100.00**	**249.72**	**100.00**	**1769.00**	**100.00**	**1300.00**	**100.00**	**510.00**	**100.00**	**1357.20**	**100.00**	**1157.42**	**100.00**	**179.05**	**100.00**	**792.52**	**100.00**	**729.40**	**100.00**	**575.00**	**100.00**	**298.96**	**100.00**	**9126.75**	**100.00**



Area Statistics-Tetariakhar OCP (2018)				
Classes			Area	
Level I	Level II	Colour	In Ha	% of Total
Forest Area	Dense Forest		0.02	0.01
	Open Forest		5.09	2.44
	Total Forest (A)		**5.11**	**2.45**
Scrubs	**Scrubs (B)**		**47.31**	**22.69**
Plantation	Social Forestry		1.45	0.70
	Plantation on OB Dump		0.00	0.00
	Plantation on Backfill		0.00	0.00
	Total Plantation (C)		**1.45**	**0.70**
	Total Vegetation(A+B+C)		**53.87**	**25.84**
Agriculture	Crop Land		0.00	0.00
	Fallow Land		37.67	18.07
	Total Agricultural Land		**37.67**	**18.07**
Mining Area	Coal Quarry		26.71	12.81
	Coal Dump		20.08	9.63
	OB Dump		29.32	14.06
	Backfill		0.00	0.00
	Advance Mining		0.00	0.00
	Water filled Quarry		14.58	6.99
	Total Mining Area		**90.69**	**43.49**
Wasteland	Waste Land		18.63	8.94
	Sand Body		0.00	0.00
	Total Wasteland		**18.63**	**8.94**
Settlements	Rural Settlement		0.40	0.19
	Urban Settlement		0.00	0.00
	Industrial Settlement		0.87	0.42
	Total Settlement		**1.27**	**0.61**
Water Bodies	Rivers, Lakes, Nalas etc.		6.34	3.05
All Total			208.47	100.00

Customer	Central Coalfields Limited (CCL)				
Title	Land Reclamation Monitoring of OC Projects			Job No. 561410027	
Subject	Activity	Name	Designation	Signature	Date
Land reclamation status of Tetariakhar OCP based on Satellite Data (RS-2/L-IV) of the year 2018	Prepared	Priyanka Bhatia	Dy. Mgr. (Geo.)		
	Checked	B.K. Choudhary	CM (RSC)		
	Approved	Rajneesh Kumar	HoD (Geomatics)		
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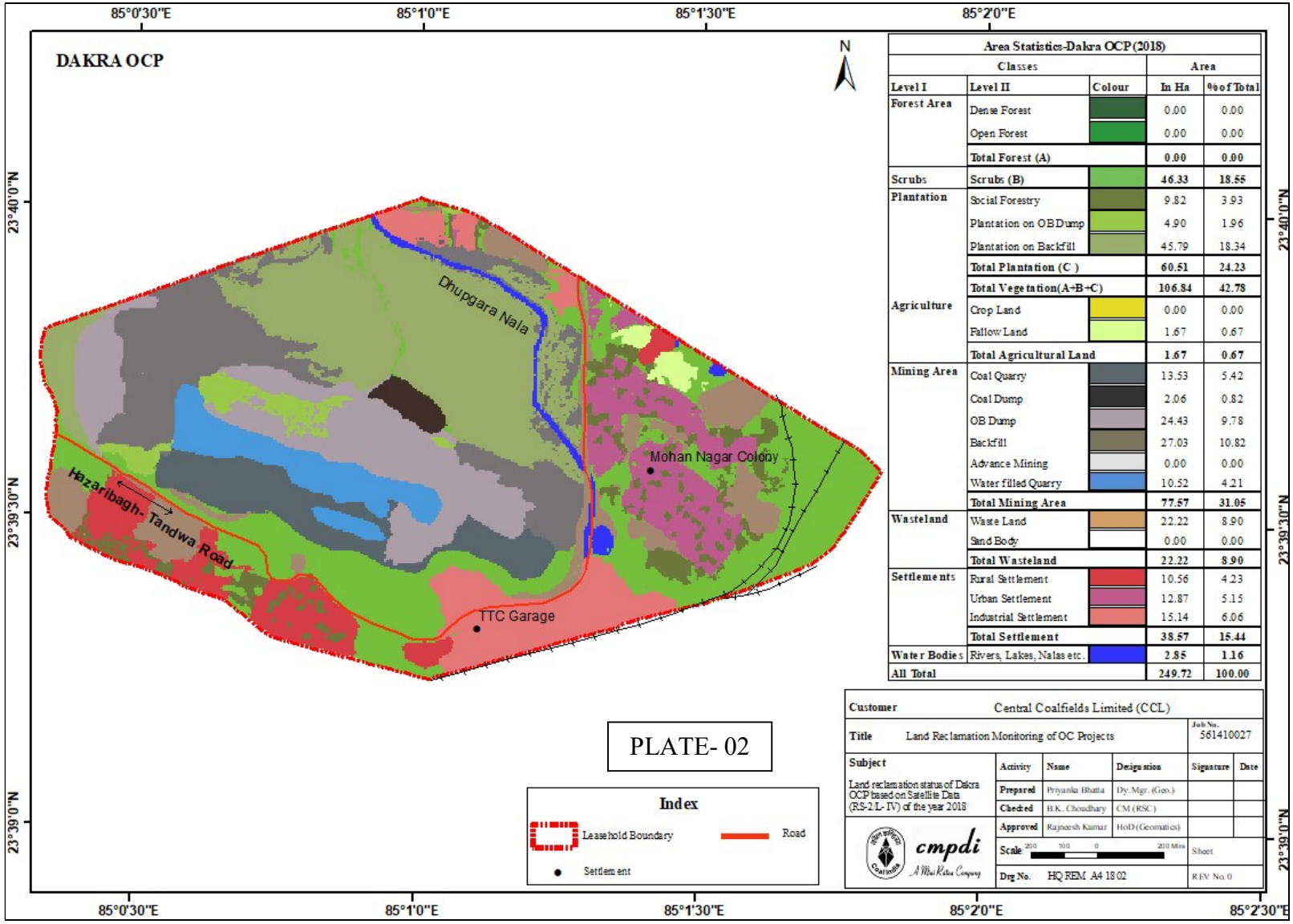
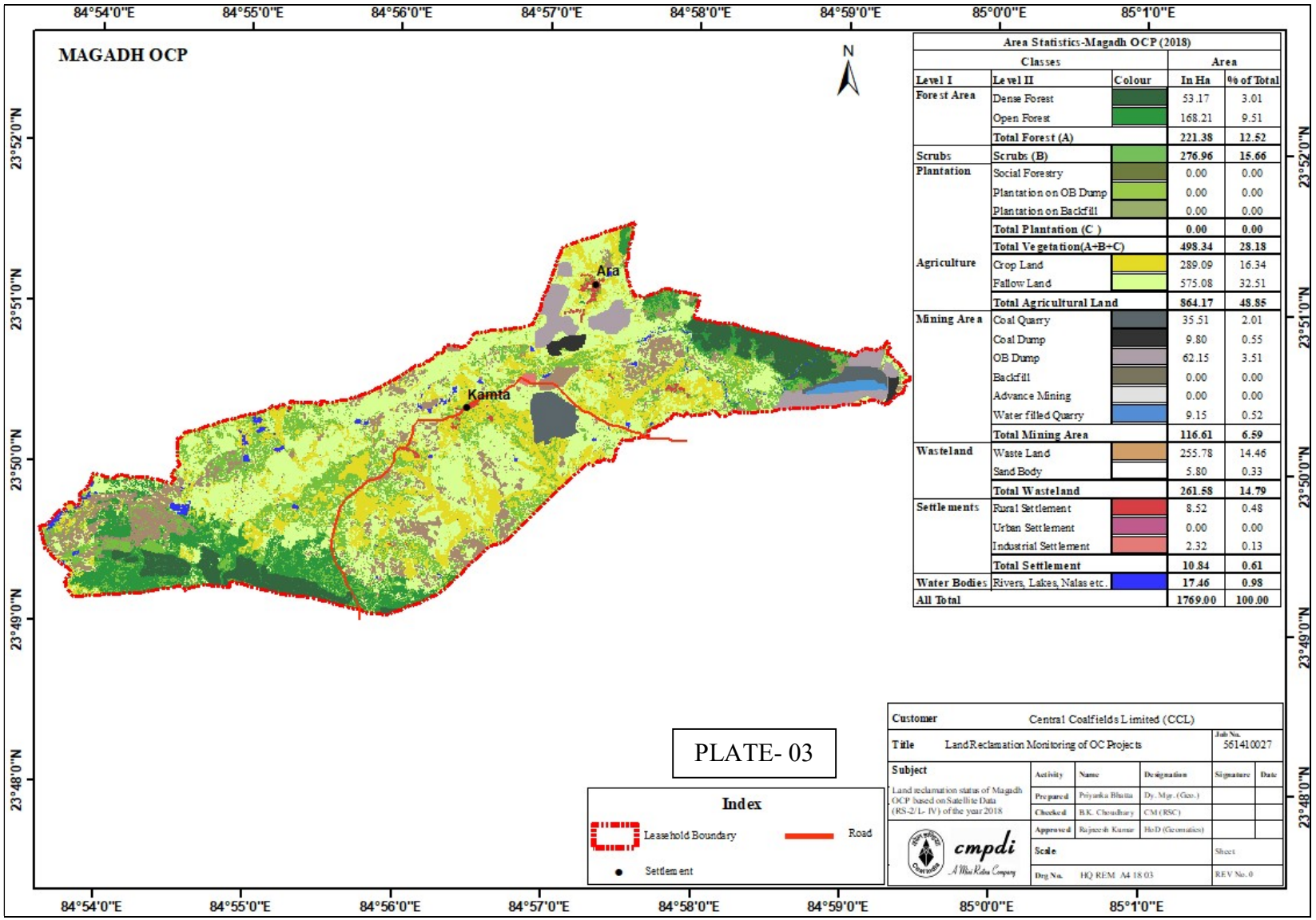
	Drg No. HQREM /A41801			REV No. 0	



Area Statistics-Dakra OCP (2018)

Classes			Area	
Level I	Level II	Colour	In Ha	%o f Total
Forest Area	Dense Forest		0.00	0.00
	Open Forest		0.00	0.00
	Total Forest (A)		**0.00**	**0.00**
Scrubs	**Scrubs (B)**		**46.33**	**18.55**
Plantation	Social Forestry		9.82	3.93
	Plantation on OB Dump		4.90	1.96
	Plantation on Backfill		45.79	18.34
	Total Plantation (C)		**60.51**	**24.23**
	Total Vegetation(A+B+C)		**106.84**	**42.78**
Agriculture	Crop Land		0.00	0.00
	Fallow Land		1.67	0.67
	Total Agricultural Land		**1.67**	**0.67**
Mining Area	Coal Quarry		13.53	5.42
	Coal Dump		2.06	0.82
	OB Dump		24.43	9.78
	Backfill		27.03	10.82
	Advance Mining		0.00	0.00
	Water filled Quarry		10.52	4.21
	Total Mining Area		**77.57**	**31.05**
Wasteland	Waste Land		22.22	8.90
	Sand Body		0.00	0.00
	Total Wasteland		**22.22**	**8.90**
Settlements	Rural Settlement		10.56	4.23
	Urban Settlement		12.87	5.15
	Industrial Settlement		15.14	6.06
	Total Settlement		**38.57**	**15.44**
Water Bodies	Rivers, Lakes, Nalas etc.		**2.85**	**1.16**
All Total			**249.72**	**100.00**

Customer	Central Coalfields Limited (CCL)				
Title	Land Reclamation Monitoring of OC Projects			Job No.	561410027
Subject	Activity	Name	Designation	Signature	Date
Land reclamation status of Dakra OCP based on Satellite Data (RS-2/L-IV) of the year 2018	Prepared	Priyanka Bhatta	Dy. Mgr. (Geo.)		
	Checked	B.K. Choudhary	CM (RSC)		
	Approved	Rajneesh Kumar	HoD (Geomatics)		
cmpdi A Mini Ratna Company	Scale: 200 100 0 200 Mtrs			Sheet	
	Drg No. HQ REM A4 1802			REV No. 0	


MAGADH OCP
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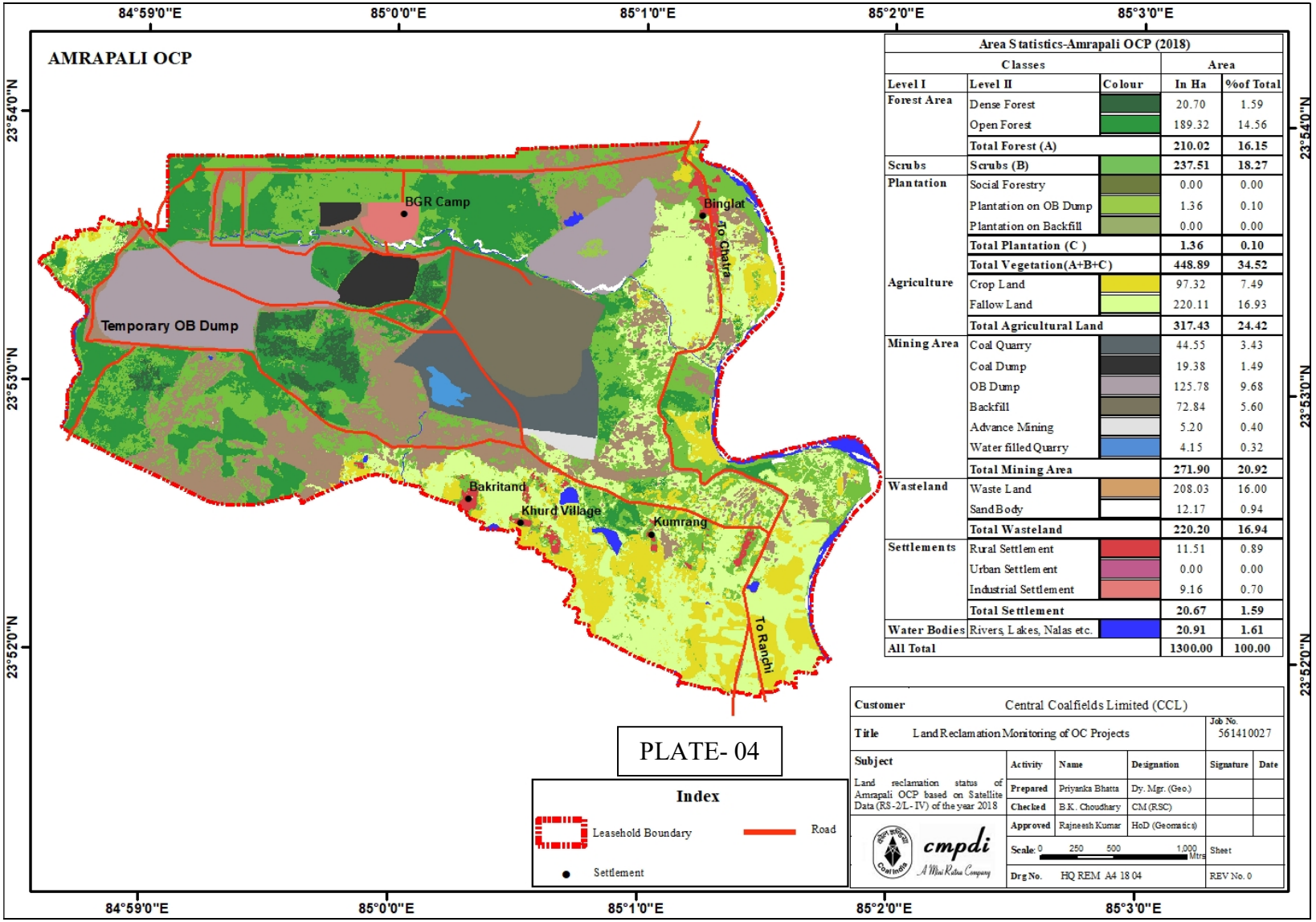
85°1'0"E
23°52'0"N
23°51'0"N
23°50'0"N
23°49'0"N
23°48'0"N
Ara
Kamta
Area Statistics-Magadh OCP (2018)
Classes
Area
Level I | Level II | Colour | In Ha | % of Total
Forest Area | Dense Forest | 53.17 | 3.01
Open Forest | 168.21 | 9.51
Total Forest (A) | 221.38 | 12.52
Scrubs | Scrubs (B) | 276.96 | 15.66
Plantation | Social Forestry | 0.00 | 0.00
Plantation on OB Dump | 0.00 | 0.00
Plantation on Backfill | 0.00 | 0.00
Total Plantation (C) | 0.00 | 0.00
Total Vegetation(A+B+C) | 498.34 | 28.18
Agriculture | Crop Land | 289.09 | 16.34
Fallow Land | 575.08 | 32.51
Total Agricultural Land | 864.17 | 48.85
Mining Area | Coal Quarry | 35.51 | 2.01
Coal Dump | 9.80 | 0.55
OB Dump | 62.15 | 3.51
Backfill | 0.00 | 0.00
Advance Mining | 0.00 | 0.00
Water filled Quarry | 9.15 | 0.52
Total Mining Area | 116.61 | 6.59
Wasteland | Waste Land | 255.78 | 14.46
Sand Body | 5.80 | 0.33
Total Wasteland | 261.58 | 14.79
Settlements | Rural Settlement | 8.52 | 0.48
Urban Settlement | 0.00 | 0.00
Industrial Settlement | 2.32 | 0.13
Total Settlement | 10.84 | 0.61
Water Bodies | Rivers, Lakes, Nalas etc. | 17.46 | 0.98
All Total | 1769.00 | 100.00
PLATE- 03
Index
Leasehold Boundary
Road
Settlement
Customer Central Coalfields Limited (CCL)
Title Land Reclamation Monitoring of OC Projects
Job No. 561410027
Subject
Land reclamation status of Magadh OCP based on Satellite Data (RS-2/L- IV) of the year 2018
Activity | Name | Designation | Signature | Date
Prepared | Priyanka Bhatia | Dy. Mgr. (Geo.)
Checked | B.K. Choudhary | CM (RSC)
Approved | Rajneesh Kumar | HoD (Geomatics)
cmpdi
A Mini Ratna Company
Scale
Sheet
Drg No. HQ REM/ A4/ 18/ 03
REV No. 0



Area Statistics-Amrapali OCP (2018)				
Classes			Area	
Level I	Level II	Colour	In Ha	%of Total
Forest Area	Dense Forest		20.70	1.59
	Open Forest		189.32	14.56
	Total Forest (A)		**210.02**	**16.15**
Scrubs	**Scrubs (B)**		**237.51**	**18.27**
Plantation	Social Forestry		0.00	0.00
	Plantation on OB Dump		1.36	0.10
	Plantation on Backfill		0.00	0.00
	Total Plantation (C)		**1.36**	**0.10**
	Total Vegetation(A+B+C)		**448.89**	**34.52**
Agriculture	Crop Land		97.32	7.49
	Fallow Land		220.11	16.93
	Total Agricultural Land		**317.43**	**24.42**
Mining Area	Coal Quarry		44.55	3.43
	Coal Dump		19.38	1.49
	OB Dump		125.78	9.68
	Backfill		72.84	5.60
	Advance Mining		5.20	0.40
	Water filled Quarry		4.15	0.32
	Total Mining Area		**271.90**	**20.92**
Wasteland	Waste Land		208.03	16.00
	Sand Body		12.17	0.94
	Total Wasteland		**220.20**	**16.94**
Settlements	Rural Settlement		11.51	0.89
	Urban Settlement		0.00	0.00
	Industrial Settlement		9.16	0.70
	Total Settlement		**20.67**	**1.59**
Water Bodies	Rivers, Lakes, Nalas etc.		**20.91**	**1.61**
All Total			**1300.00**	**100.00**

Customer	Central Coalfields Limited (CCL)					
Title	Land Reclamation Monitoring of OC Projects				Job No. 561410027	
Subject		**Activity**	**Name**	**Designation**	**Signature**	**Date**
Land reclamation status of Amrapali OCP based on Satellite Data (RS-2/L-IV) of the year 2018		**Prepared**	Priyanka Bhatta	Dy. Mgr. (Geo.)		
		Checked	B.K. Choudhary	CM (RSC)		
		Approved	Rajneesh Kumar	HoD (Geomatics)		
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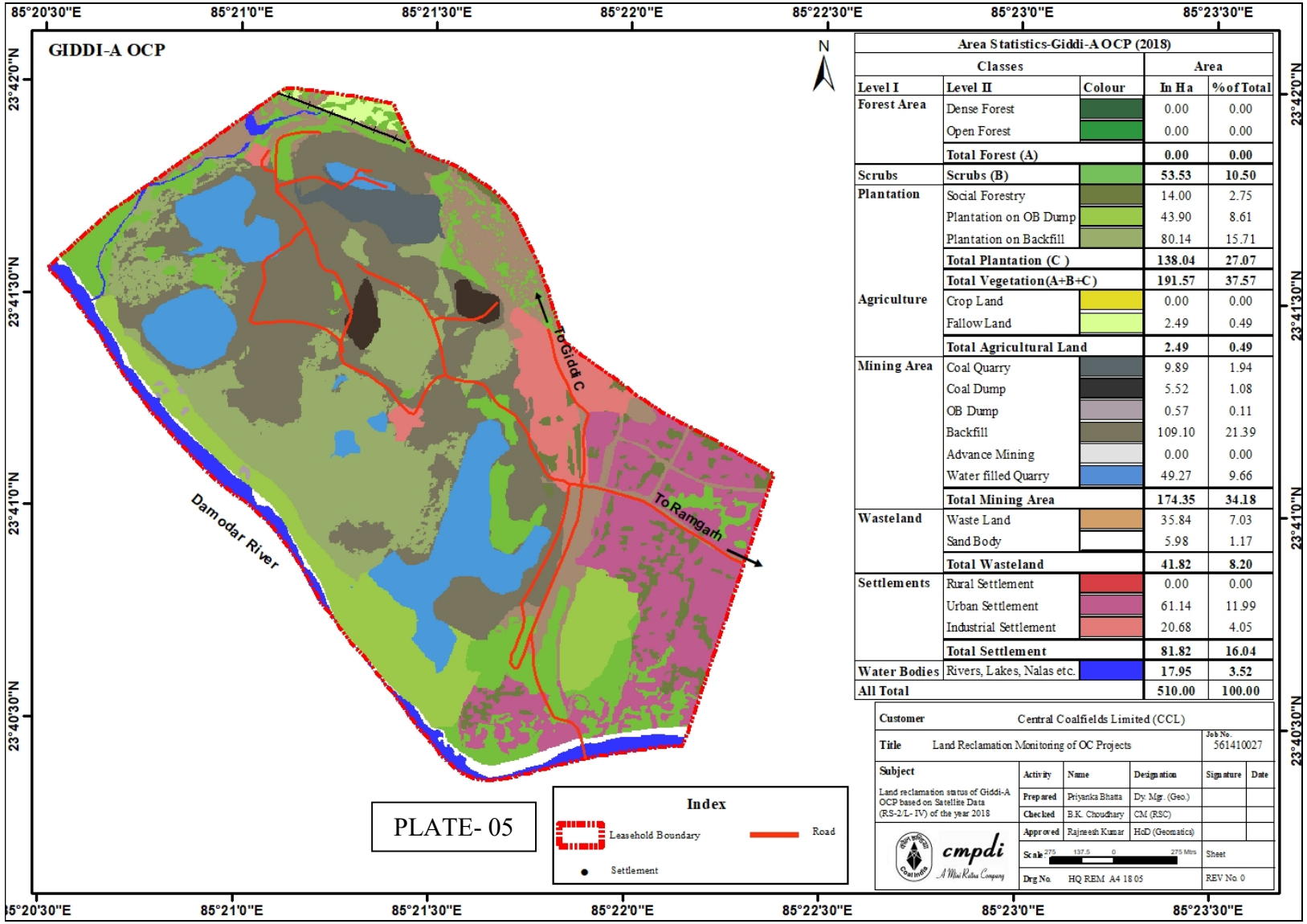

Area Statistics-Giddi-A OCP (2018)				
Classes			Area	
Level I	Level II	Colour	In Ha	% of Total
Forest Area	Dense Forest		0.00	0.00
	Open Forest		0.00	0.00
	Total Forest (A)		**0.00**	**0.00**
Scrubs	**Scrubs (B)**		**53.53**	**10.50**
Plantation	Social Forestry		14.00	2.75
	Plantation on OB Dump		43.90	8.61
	Plantation on Backfill		80.14	15.71
	Total Plantation (C)		**138.04**	**27.07**
	Total Vegetation(A+B+C)		**191.57**	**37.57**
Agriculture	Crop Land		0.00	0.00
	Fallow Land		2.49	0.49
	Total Agricultural Land		**2.49**	**0.49**
Mining Area	Coal Quarry		9.89	1.94
	Coal Dump		5.52	1.08
	OB Dump		0.57	0.11
	Backfill		109.10	21.39
	Advance Mining		0.00	0.00
	Water filled Quarry		49.27	9.66
	Total Mining Area		**174.35**	**34.18**
Wasteland	Waste Land		35.84	7.03
	Sand Body		5.98	1.17
	Total Wasteland		**41.82**	**8.20**
Settlements	Rural Settlement		0.00	0.00
	Urban Settlement		61.14	11.99
	Industrial Settlement		20.68	4.05
	Total Settlement		**81.82**	**16.04**
Water Bodies	Rivers, Lakes, Nalas etc.		**17.95**	**3.52**
All Total			**510.00**	**100.00**

Customer	Central Coalfields Limited (CCL)				
Title	Land Reclamation Monitoring of OC Projects			Job No. 561410027	
Subject	Activity	Name	Designation	Signature	Date
Land reclamation status of Giddi-A OCP based on Satellite Data (RS-2/L- IV) of the year 2018	Prepared	Priyanka Bhatta	Dy. Mgr. (Geo.)		
	Checked	B.K. Choudhary	CM (RSC)		
	Approved	Rajneesh Kumar	HoD (Geomatics)		
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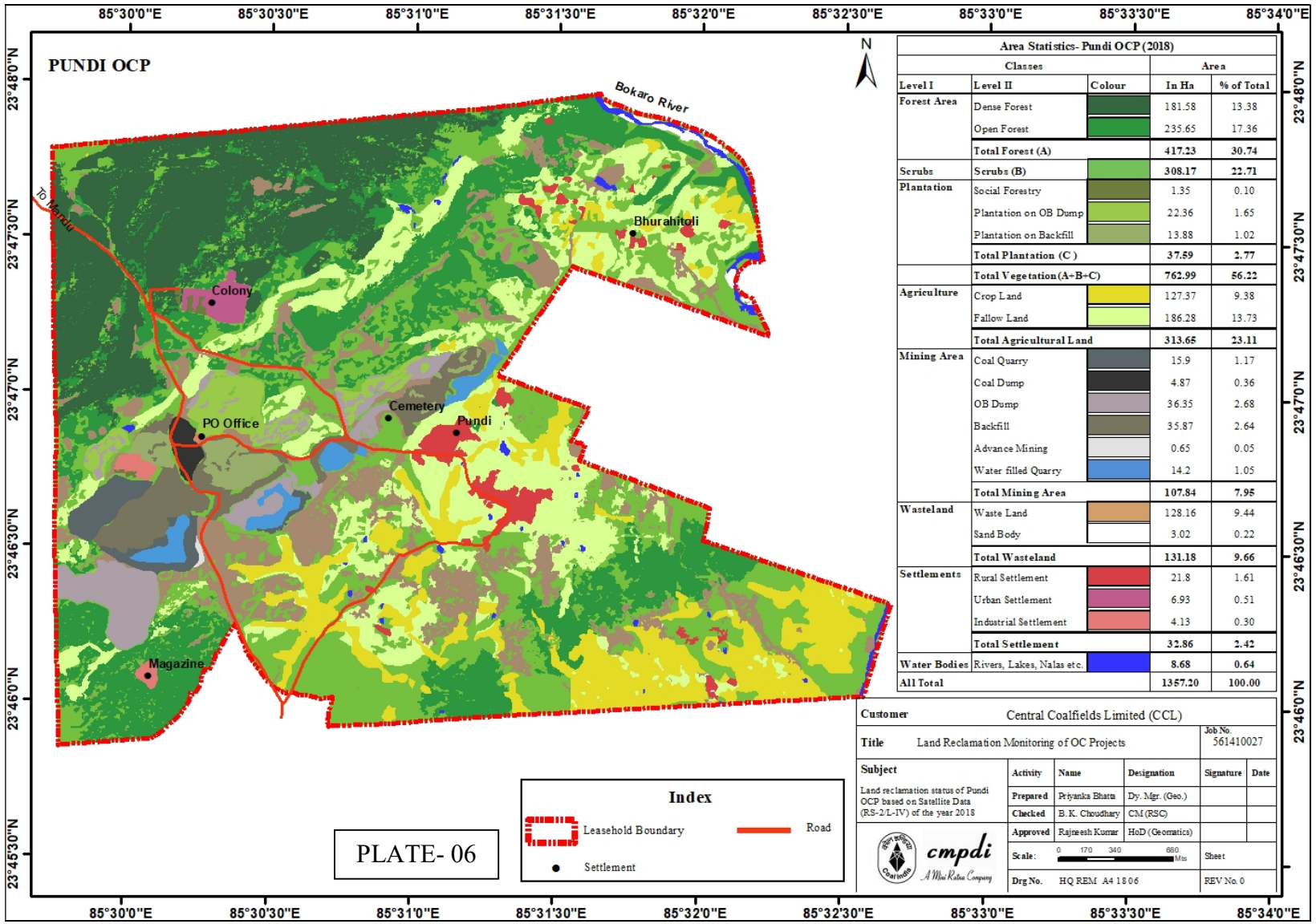

Area Statistics- Pundi OCP (2018)				
Classes			Area	
Level I	Level II	Colour	In Ha	% of Total
Forest Area	Dense Forest		181.58	13.38
	Open Forest		235.65	17.36
	Total Forest (A)		**417.23**	**30.74**
Scrubs	**Scrubs (B)**		**308.17**	**22.71**
Plantation	Social Forestry		1.35	0.10
	Plantation on OB Dump		22.36	1.65
	Plantation on Backfill		13.88	1.02
	Total Plantation (C)		**37.59**	**2.77**
	Total Vegetation (A+B+C)		**762.99**	**56.22**
Agriculture	Crop Land		127.37	9.38
	Fallow Land		186.28	13.73
	Total Agricultural Land		**313.65**	**23.11**
Mining Area	Coal Quarry		15.9	1.17
	Coal Dump		4.87	0.36
	OB Dump		36.35	2.68
	Backfill		35.87	2.64
	Advance Mining		0.65	0.05
	Water filled Quarry		14.2	1.05
	Total Mining Area		**107.84**	**7.95**
Wasteland	Waste Land		128.16	9.44
	Sand Body		3.02	0.22
	Total Wasteland		**131.18**	**9.66**
Settlements	Rural Settlement		21.8	1.61
	Urban Settlement		6.93	0.51
	Industrial Settlement		4.13	0.30
	Total Settlement		**32.86**	**2.42**
Water Bodies	Rivers, Lakes, Nalas etc.		**8.68**	**0.64**
All Total			**1357.20**	**100.00**

Customer	Central Coalfields Limited (CCL)				
Title	Land Reclamation Monitoring of OC Projects			Job No.	561410027
Subject	**Activity**	**Name**	**Designation**	**Signature**	**Date**
Land reclamation status of Pundi OCP based on Satellite Data (RS-2/L-IV) of the year 2018	**Prepared**	Priyanka Bhatia	Dy. Mgr. (Geo.)		
	Checked	B.K. Choudhary	CM (RSC)		
	Approved	Rajneesh Kumar	HoD (Geomatics)		
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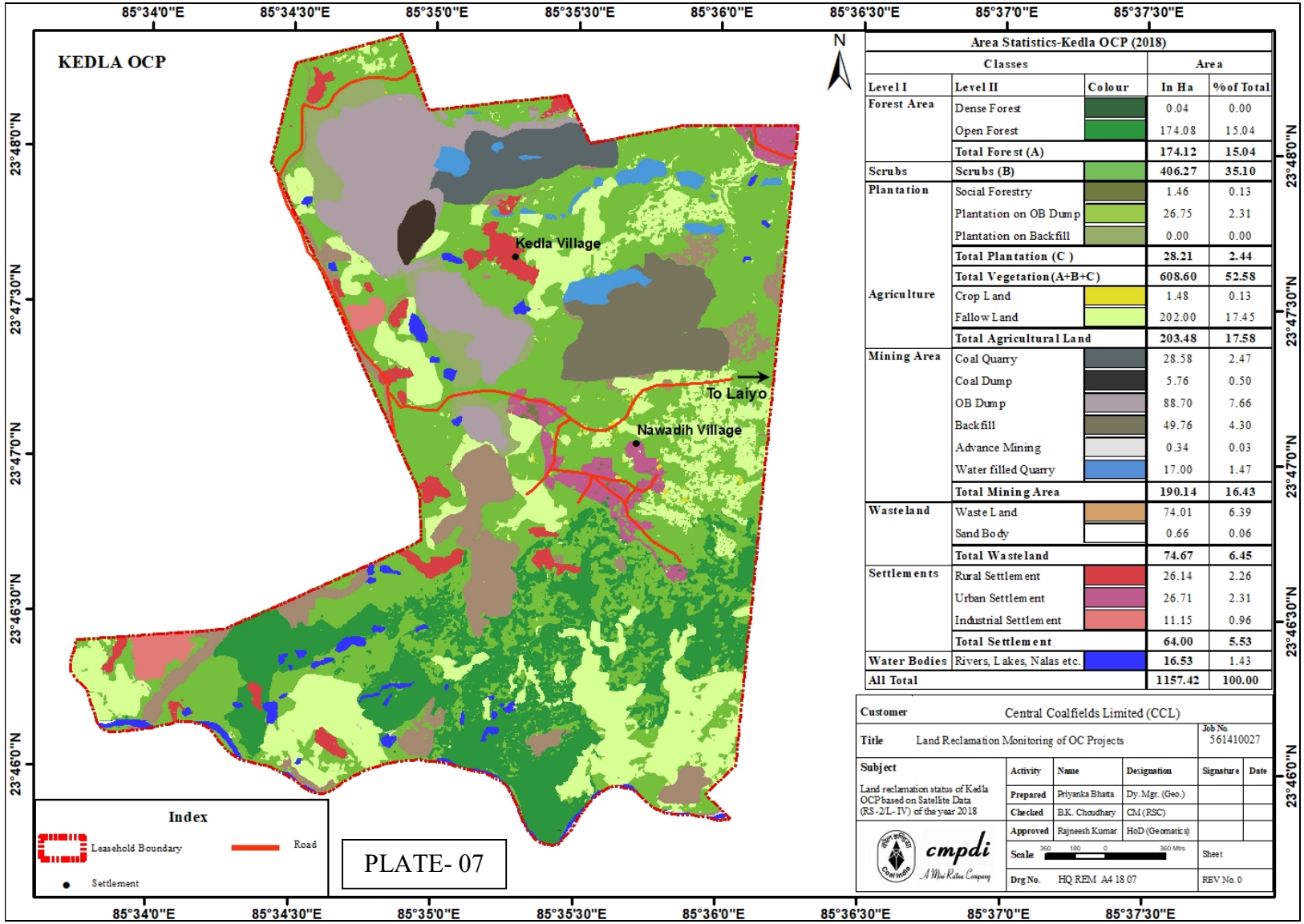

Area Statistics-Kedla OCP (2018)

Classes			Area	
Level I	Level II	Colour	In Ha	%of Total
Forest Area	Dense Forest		0.04	0.00
	Open Forest		174.08	15.04
	Total Forest (A)		**174.12**	**15.04**
Scrubs	**Scrubs (B)**		**406.27**	**35.10**
Plantation	Social Forestry		1.46	0.13
	Plantation on OB Dump		26.75	2.31
	Plantation on Backfill		0.00	0.00
	Total Plantation (C)		**28.21**	**2.44**
	Total Vegetation(A+B+C)		**608.60**	**52.58**
Agriculture	Crop Land		1.48	0.13
	Fallow Land		202.00	17.45
	Total Agricultural Land		**203.48**	**17.58**
Mining Area	Coal Quarry		28.58	2.47
	Coal Dump		5.76	0.50
	OB Dump		88.70	7.66
	Backfill		49.76	4.30
	Advance Mining		0.34	0.03
	Water filled Quarry		17.00	1.47
	Total Mining Area		**190.14**	**16.43**
Wasteland	Waste Land		74.01	6.39
	Sand Body		0.66	0.06
	Total Wasteland		**74.67**	**6.45**
Settlements	Rural Settlement		26.14	2.26
	Urban Settlement		26.71	2.31
	Industrial Settlement		11.15	0.96
	Total Settlement		**64.00**	**5.53**
Water Bodies	Rivers, Lakes, Nalas etc.		**16.53**	1.43
All Total			**1157.42**	**100.00**

Customer	Central Coalfields Limited (CCL)				
Title	Land Reclamation Monitoring of OC Projects			Job No.	561410027
Subject	**Activity**	**Name**	**Designation**	**Signature**	**Date**
Land reclamation status of Kedla OCP based on Satellite Data (RS-2/L-IV) of the year 2018	**Prepared**	Priyanka Bhatta	Dy. Mgr. (Geo.)		
	Checked	B.K. Choudhary	CM (RSC)		
	Approved	Rajneesh Kumar	HoD (Geomatics)		
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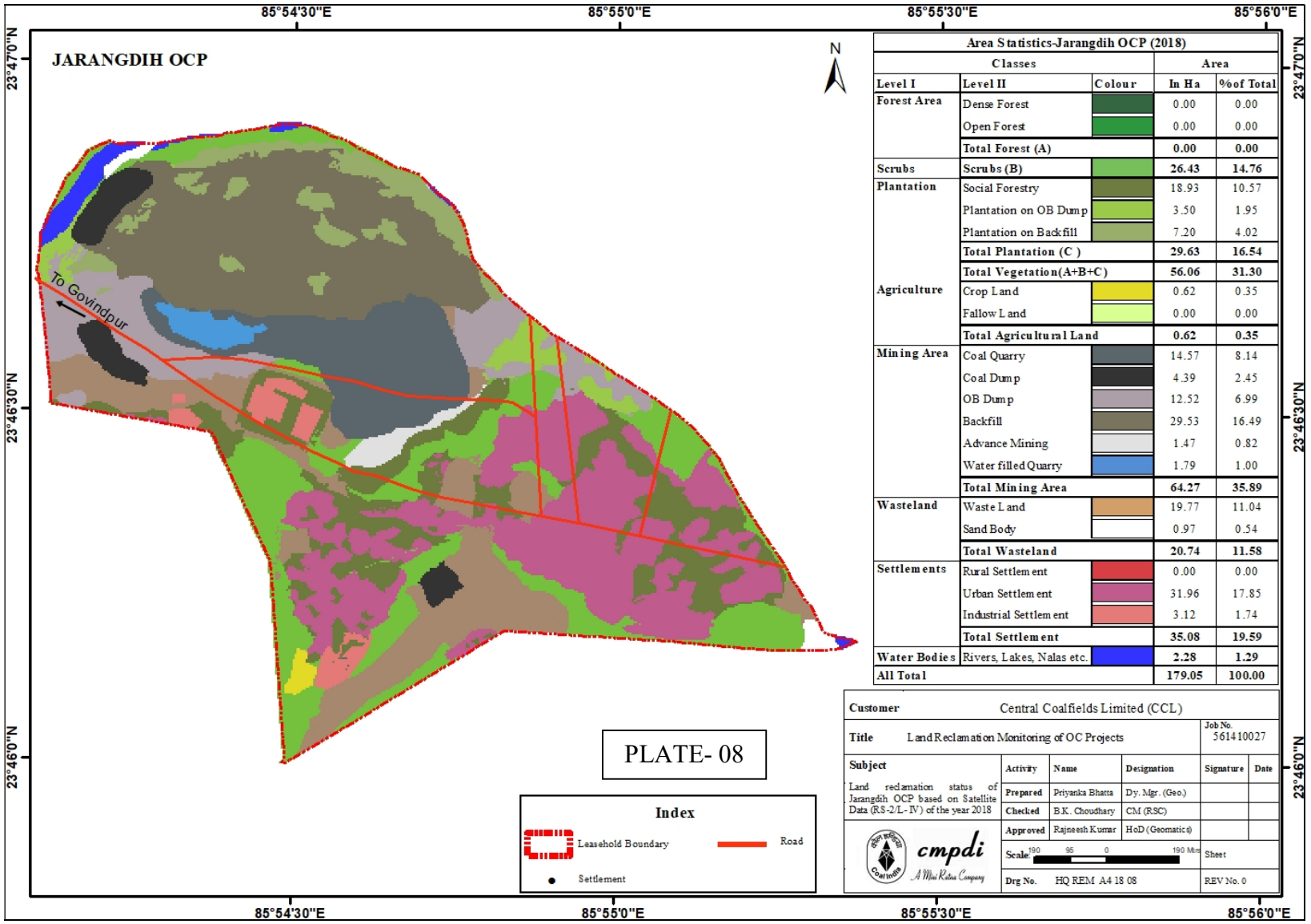

Area Statistics-Jarangdih OCP (2018)				
Classes			Area	
Level I	Level II	Colour	In Ha	%of Total
Forest Area	Dense Forest		0.00	0.00
	Open Forest		0.00	0.00
	Total Forest (A)		**0.00**	**0.00**
Scrubs	**Scrubs (B)**		**26.43**	**14.76**
Plantation	Social Forestry		18.93	10.57
	Plantation on OB Dump		3.50	1.95
	Plantation on Backfill		7.20	4.02
	Total Plantation (C)		**29.63**	**16.54**
	Total Vegetation(A+B+C)		**56.06**	**31.30**
Agriculture	Crop Land		0.62	0.35
	Fallow Land		0.00	0.00
	Total Agricultural Land		**0.62**	**0.35**
Mining Area	Coal Quarry		14.57	8.14
	Coal Dump		4.39	2.45
	OB Dump		12.52	6.99
	Backfill		29.53	16.49
	Advance Mining		1.47	0.82
	Water filled Quarry		1.79	1.00
	Total Mining Area		**64.27**	**35.89**
Wasteland	Waste Land		19.77	11.04
	Sand Body		0.97	0.54
	Total Wasteland		**20.74**	**11.58**
Settlements	Rural Settlement		0.00	0.00
	Urban Settlement		31.96	17.85
	Industrial Settlement		3.12	1.74
	Total Settlement		**35.08**	**19.59**
Water Bodies	Rivers, Lakes, Nalas etc.		**2.28**	**1.29**
All Total			**179.05**	**100.00**

Customer	Central Coalfields Limited (CCL)				
Title	Land Reclamation Monitoring of OC Projects			Job No.	561410027
Subject	**Activity**	**Name**	**Designation**	**Signature**	**Date**
Land reclamation status of Jarangdih OCP based on Satellite Data (RS-2/L-IV) of the year 2018	**Prepared**	Priyanka Bhatta	Dy. Mgr. (Geo.)		
	Checked	B.K. Choudhary	CM (RSC)		
	Approved	Rajneesh Kumar	HoD (Geomatics)		
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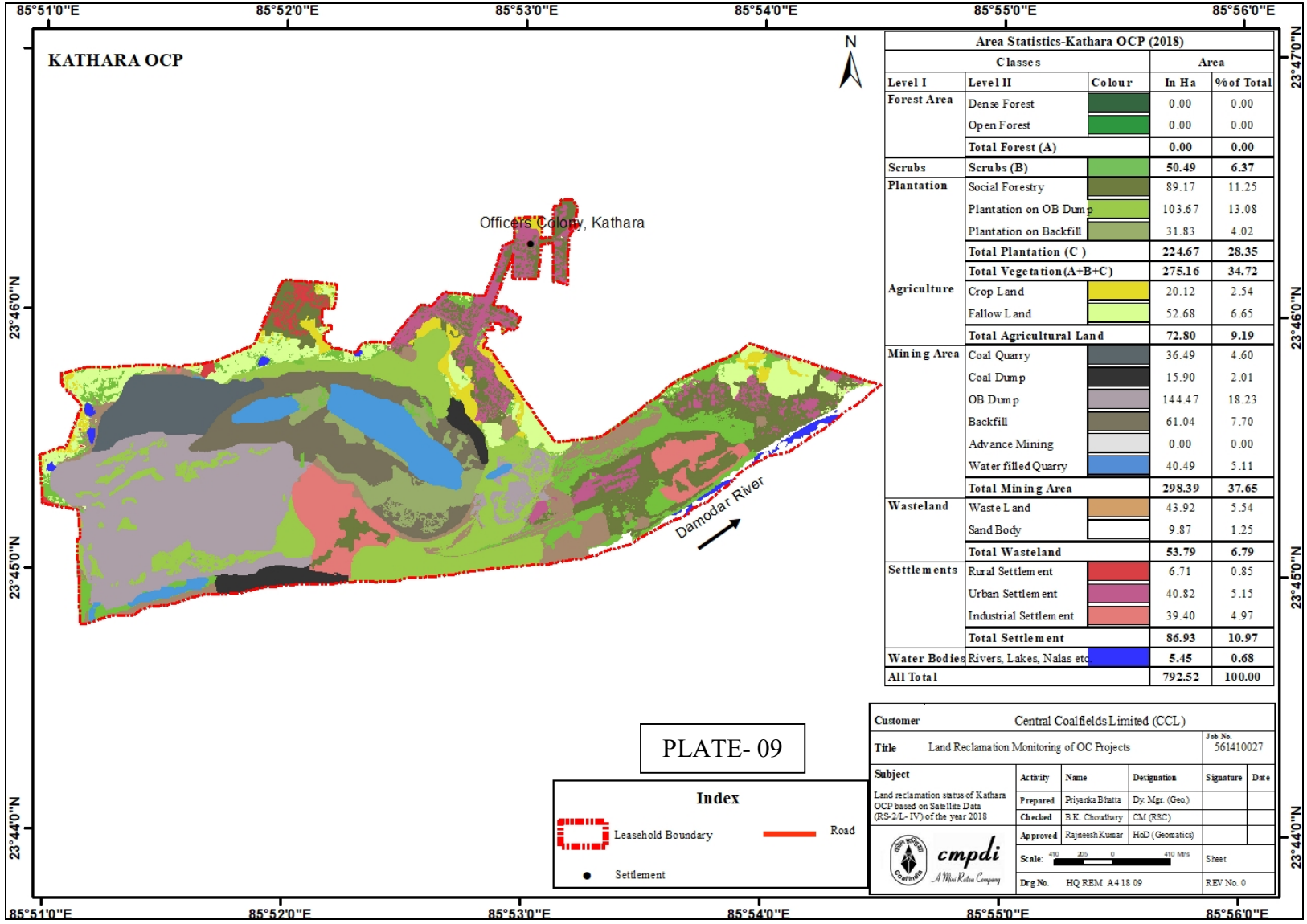
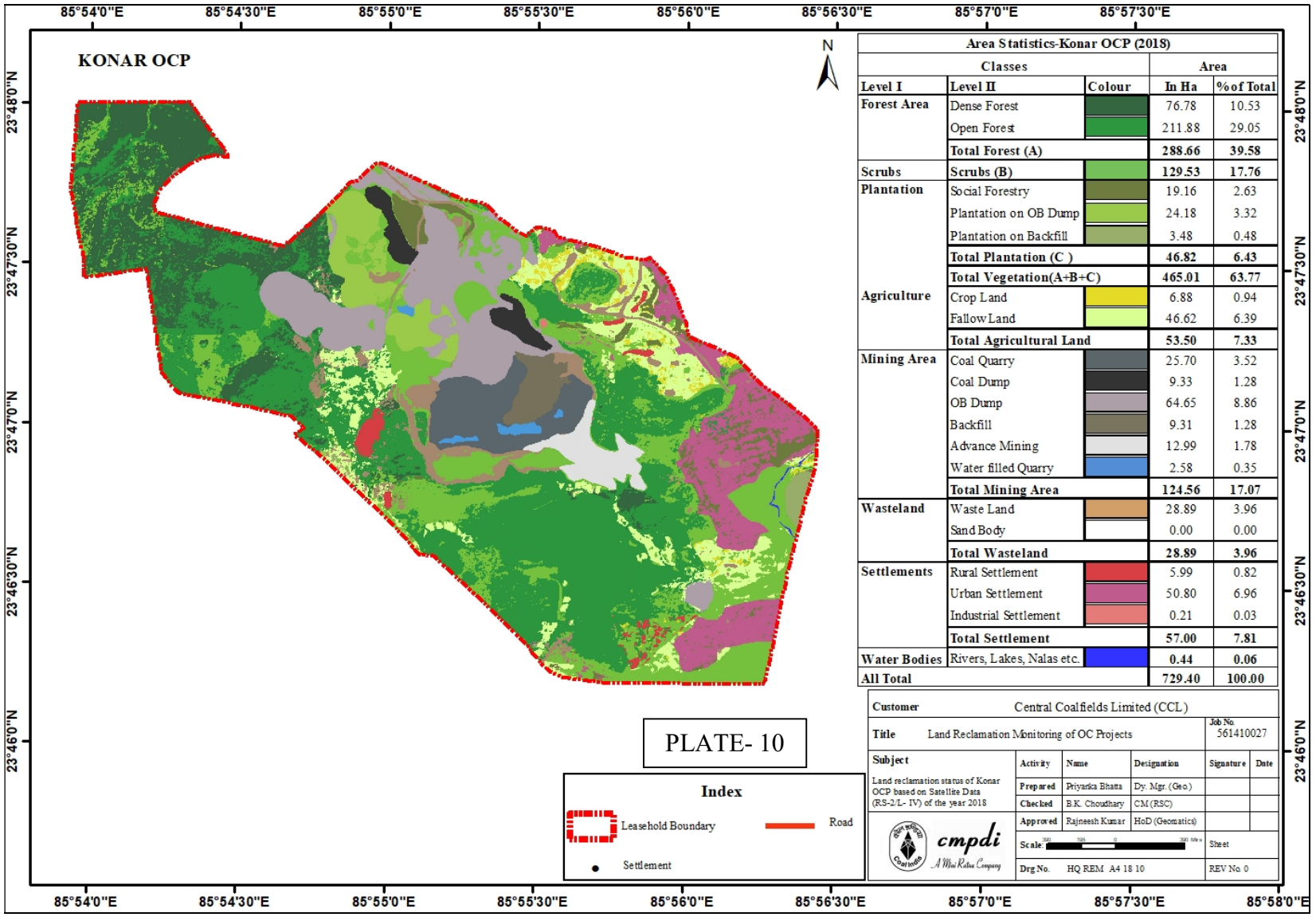


Area Statistics-Kathara OCP (2018)

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
	Total Forest (A)		**0.00**	**0.00**
Scrubs	**Scrubs (B)**		**50.49**	**6.37**
Plantation	Social Forestry		89.17	11.25
	Plantation on OB Dump		103.67	13.08
	Plantation on Backfill		31.83	4.02
	Total Plantation (C)		**224.67**	**28.35**
	Total Vegetation(A+B+C)		**275.16**	**34.72**
Agriculture	Crop Land		20.12	2.54
	Fallow Land		52.68	6.65
	Total Agricultural Land		**72.80**	**9.19**
Mining Area	Coal Quarry		36.49	4.60
	Coal Dump		15.90	2.01
	OB Dump		144.47	18.23
	Backfill		61.04	7.70
	Advance Mining		0.00	0.00
	Water filled Quarry		40.49	5.11
	Total Mining Area		**298.39**	**37.65**
Wasteland	Waste Land		43.92	5.54
	Sand Body		9.87	1.25
	Total Wasteland		**53.79**	**6.79**
Settlements	Rural Settlement		6.71	0.85
	Urban Settlement		40.82	5.15
	Industrial Settlement		39.40	4.97
	Total Settlement		**86.93**	**10.97**
Water Bodies	Rivers, Lakes, Nalas etc		**5.45**	**0.68**
All Total			**792.52**	**100.00**

Customer	Central Coalfields Limited (CCL)				
Title	Land Reclamation Monitoring of OC Projects			Job No. 561410027	
Subject	Activity	Name	Designation	Signature	Date
Land reclamation status of Kathara OCP based on Satellite Data (RS-2/L- IV) of the year 2018	Prepared	Priyanka Bhatta	Dy. Mgr. (Geo.)		
	Checked	B.K. Choudhary	CM (RSC)		
	Approved	Rajneesh Kumar	HoD (Geomatics)		
cmpdi A Mini Ratna Company	Scale: 410 205 0 410 Mtrs			Sheet	
	Drg No. HQ REM A4 18 09			REV No. 0	



Area Statistics-Konar OCP (2018)

Classes			Area	
Level I	**Level II**	**Colour**	**In Ha**	**% of Total**
Forest Area	Dense Forest		76.78	10.53
	Open Forest		211.88	29.05
	Total Forest (A)		**288.66**	**39.58**
Scrubs	**Scrubs (B)**		**129.53**	**17.76**
Plantation	Social Forestry		19.16	2.63
	Plantation on OB Dump		24.18	3.32
	Plantation on Backfill		3.48	0.48
	Total Plantation (C)		**46.82**	**6.43**
	Total Vegetation(A+B+C)		**465.01**	**63.77**
Agriculture	Crop Land		6.88	0.94
	Fallow Land		46.62	6.39
	Total Agricultural Land		**53.50**	**7.33**
Mining Area	Coal Quarry		25.70	3.52
	Coal Dump		9.33	1.28
	OB Dump		64.65	8.86
	Backfill		9.31	1.28
	Advance Mining		12.99	1.78
	Water filled Quarry		2.58	0.35
	Total Mining Area		**124.56**	**17.07**
Wasteland	Waste Land		28.89	3.96
	Sand Body		0.00	0.00
	Total Wasteland		**28.89**	**3.96**
Settlements	Rural Settlement		5.99	0.82
	Urban Settlement		50.80	6.96
	Industrial Settlement		0.21	0.03
	Total Settlement		**57.00**	**7.81**
Water Bodies	Rivers, Lakes, Nalas etc.		**0.44**	**0.06**
All Total			**729.40**	**100.00**

Customer	Central Coalfields Limited (CCL)				
Title	Land Reclamation Monitoring of OC Projects			**Job No.**	561410027
Subject	**Activity**	**Name**	**Designation**	**Signature**	**Date**
Land reclamation status of Konar OCP based on Satellite Data (RS-2/L- IV) of the year 2018	**Prepared**	Priyanka Bhatta	Dy. Mgr. (Geo.)		
	Checked	B.K. Choudhary	CM.(RSC)		
	Approved	Rajneesh Kumar	HoD (Geomatics)		
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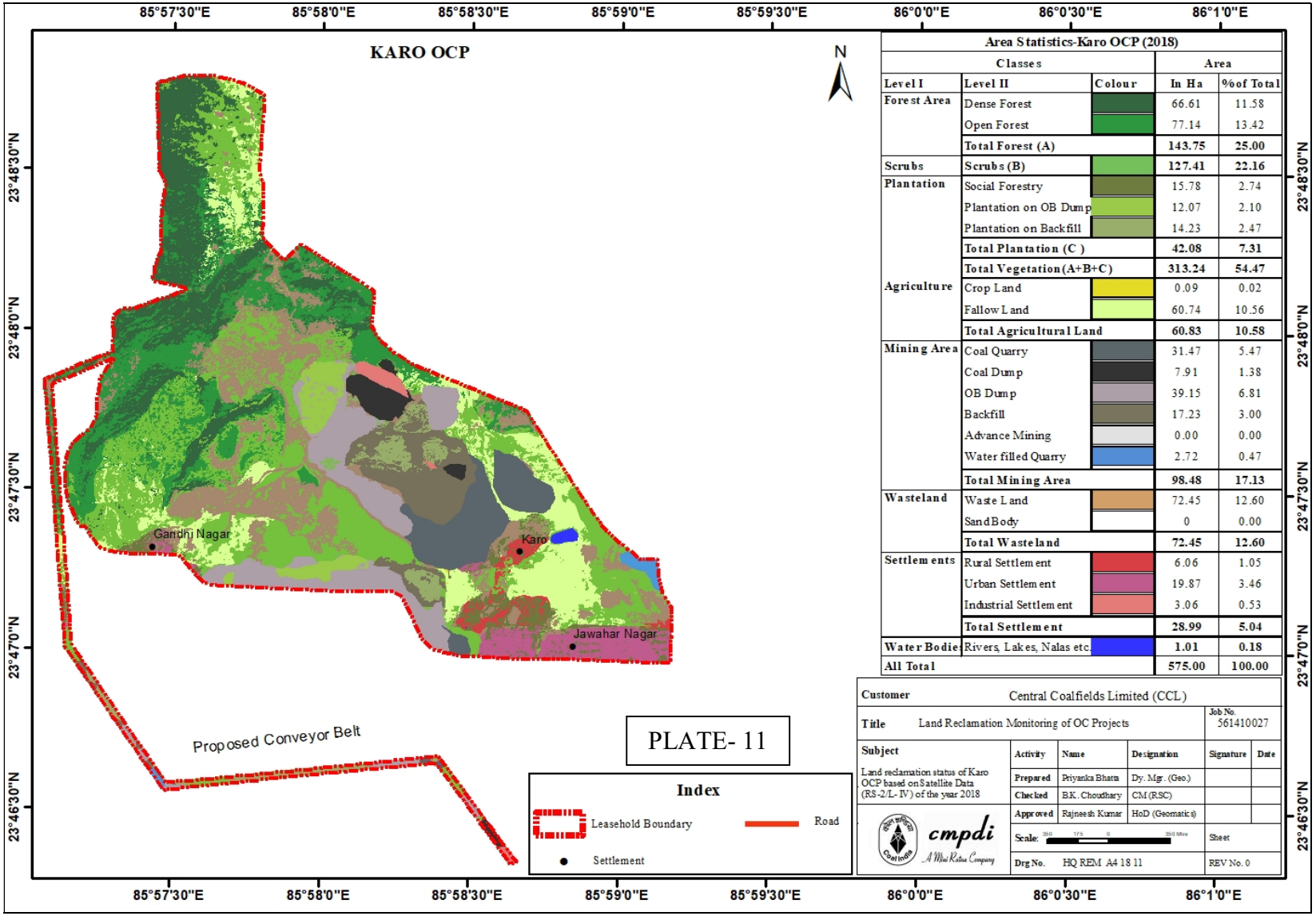

Area Statistics-Karo OCP (2018)				
Classes			Area	
Level I	Level II	Colour	In Ha	%of Total
Forest Area	Dense Forest		66.61	11.58
	Open Forest		77.14	13.42
	Total Forest (A)		**143.75**	**25.00**
Scrubs	**Scrubs (B)**		**127.41**	**22.16**
Plantation	Social Forestry		15.78	2.74
	Plantation on OB Dump		12.07	2.10
	Plantation on Backfill		14.23	2.47
	Total Plantation (C)		**42.08**	**7.31**
	Total Vegetation(A+B+C)		**313.24**	**54.47**
Agriculture	Crop Land		0.09	0.02
	Fallow Land		60.74	10.56
	Total Agricultural Land		**60.83**	**10.58**
Mining Area	Coal Quarry		31.47	5.47
	Coal Dump		7.91	1.38
	OB Dump		39.15	6.81
	Backfill		17.23	3.00
	Advance Mining		0.00	0.00
	Water filled Quarry		2.72	0.47
	Total Mining Area		**98.48**	**17.13**
Wasteland	Waste Land		72.45	12.60
	Sand Body		0	0.00
	Total Wasteland		**72.45**	**12.60**
Settlements	Rural Settlement		6.06	1.05
	Urban Settlement		19.87	3.46
	Industrial Settlement		3.06	0.53
	Total Settlement		**28.99**	**5.04**
Water Bodies	Rivers, Lakes, Nalas etc.		**1.01**	**0.18**
All Total			**575.00**	**100.00**

Customer	Central Coalfields Limited (CCL)			Job No. 561410027	
Title	Land Reclamation Monitoring of OC Projects				
Subject	**Activity**	**Name**	**Designation**	**Signature**	**Date**
Land reclamation status of Karo OCP based on Satellite Data (RS-2/L-IV) of the year 2018	Prepared	Priyanka Bhatta	Dy. Mgr. (Geo.)		
	Checked	B.K. Choudhary	CM (RSC)		
cmpdi A Mini Ratna Company	Approved	Rajneesh Kumar	HoD (Geomatics)		
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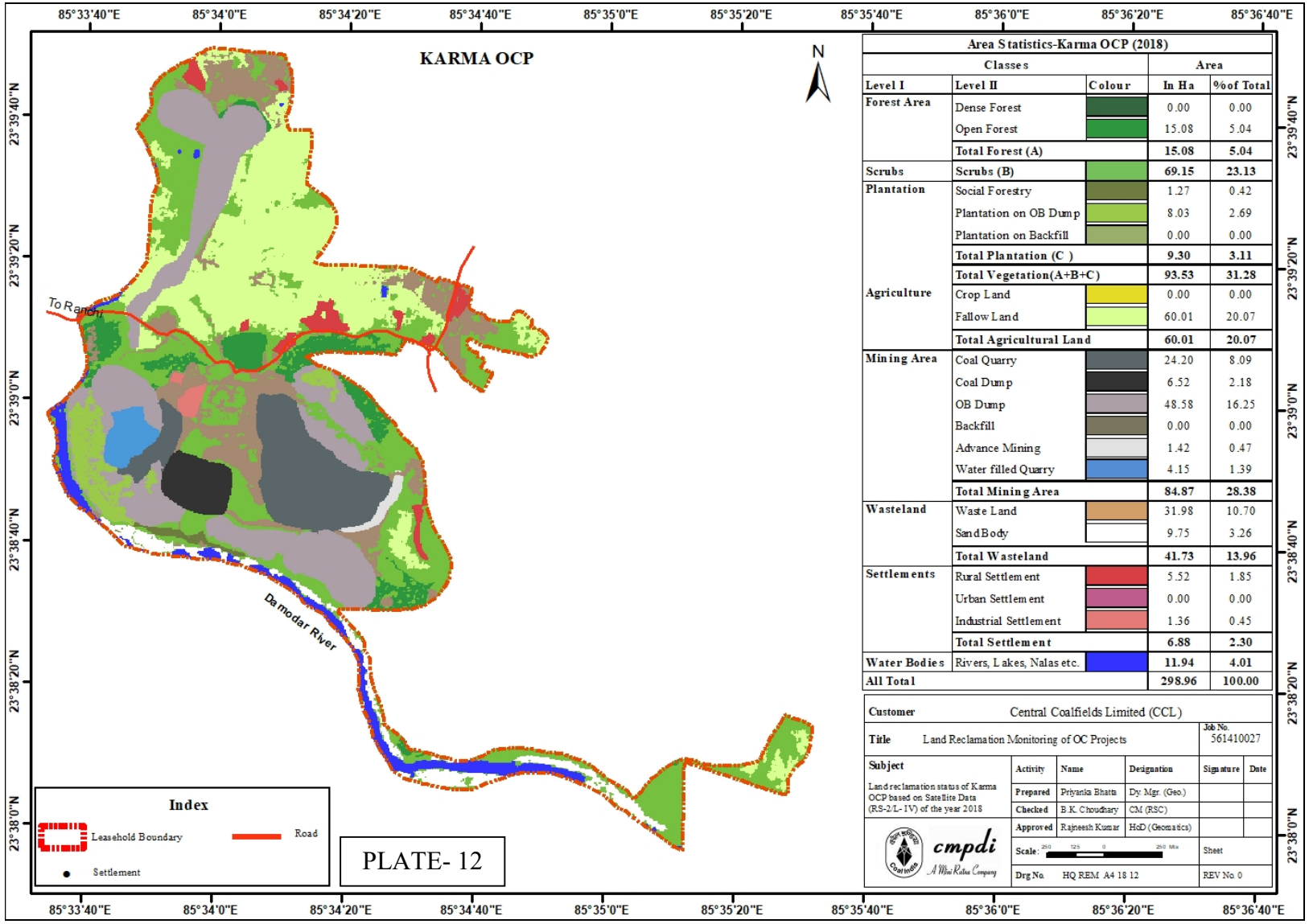

Area Statistics-Karma OCP (2018)

Classes			Area	
Level I	Level II	Colour	In Ha	%of Total
Forest Area	Dense Forest		0.00	0.00
	Open Forest		15.08	5.04
	Total Forest (A)		**15.08**	**5.04**
Scrubs	**Scrubs (B)**		**69.15**	**23.13**
Plantation	Social Forestry		1.27	0.42
	Plantation on OB Dump		8.03	2.69
	Plantation on Backfill		0.00	0.00
	Total Plantation (C)		**9.30**	**3.11**
	Total Vegetation(A+B+C)		**93.53**	**31.28**
Agriculture	Crop Land		0.00	0.00
	Fallow Land		60.01	20.07
	Total Agricultural Land		**60.01**	**20.07**
Mining Area	Coal Quarry		24.20	8.09
	Coal Dump		6.52	2.18
	OB Dump		48.58	16.25
	Backfill		0.00	0.00
	Advance Mining		1.42	0.47
	Water filled Quarry		4.15	1.39
	Total Mining Area		**84.87**	**28.38**
Wasteland	Waste Land		31.98	10.70
	Sand Body		9.75	3.26
	Total Wasteland		**41.73**	**13.96**
Settlements	Rural Settlement		5.52	1.85
	Urban Settlement		0.00	0.00
	Industrial Settlement		1.36	0.45
	Total Settlement		**6.88**	**2.30**
Water Bodies	Rivers, Lakes, Nalas etc.		**11.94**	**4.01**
All Total			**298.96**	**100.00**

Customer	Central Coalfields Limited (CCL)					
Title	Land Reclamation Monitoring of OC Projects				**Job No.**	561410027
Subject		**Activity**	**Name**	**Designation**	**Signature**	**Date**
Land reclamation status of Karma OCP based on Satellite Data (RS-2/L- IV) of the year 2018		**Prepared**	Priyanka Bhatti	Dy. Mgr. (Geo.)		
		Checked	B.K. Choudhary	CM (RSC)		
		Approved	Rajneesh Kumar	HoD (Geomatics)		
cmpdi A Mini Ratna Company		**Scale:**			Sheet	
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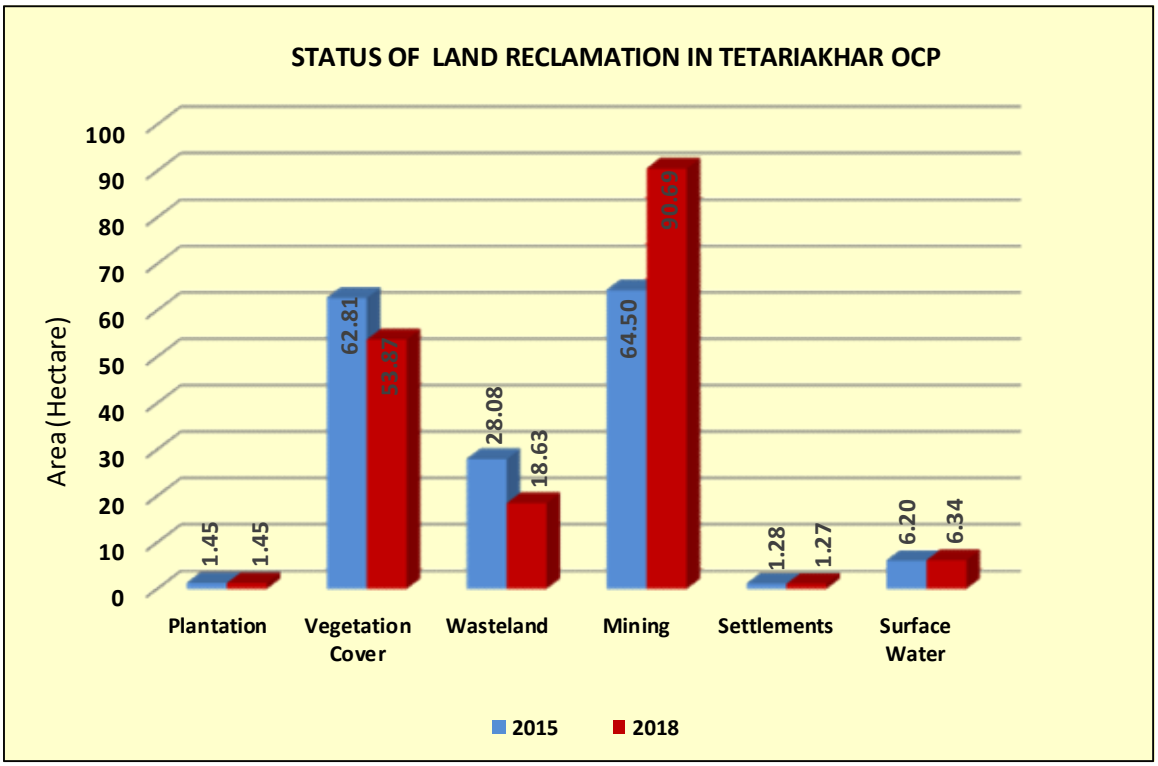
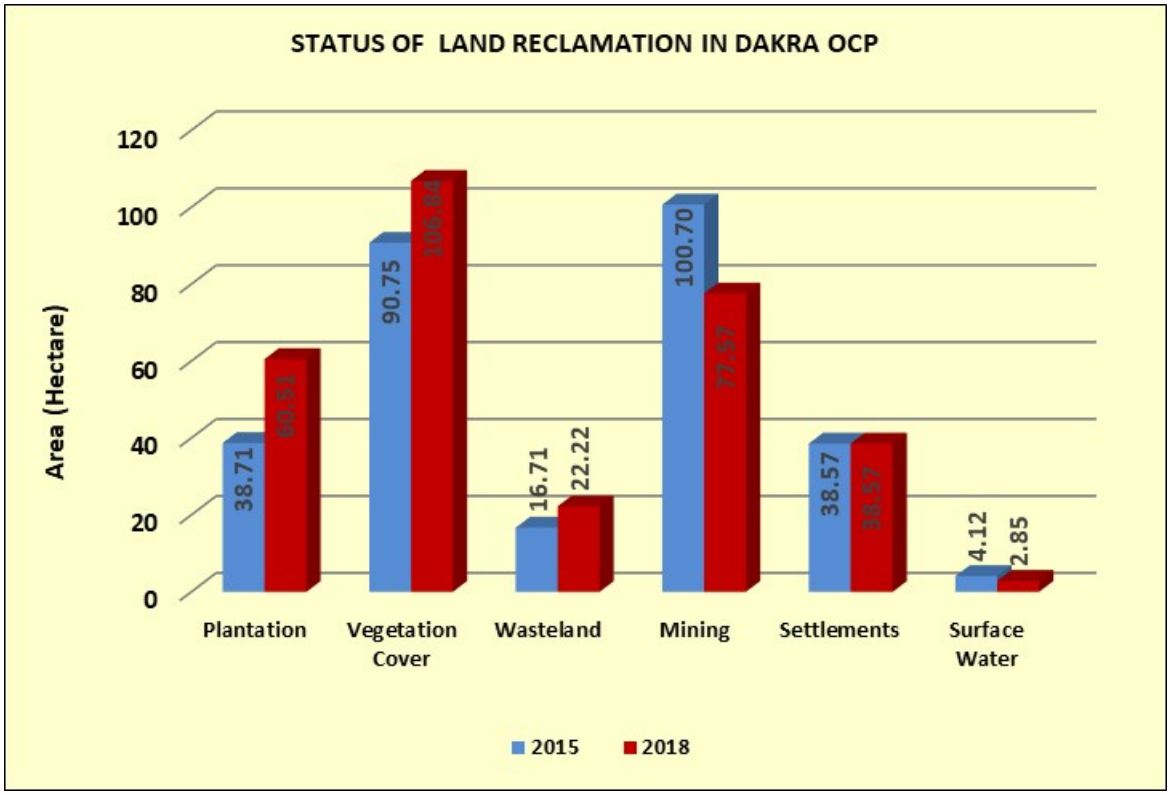


Figure - 3



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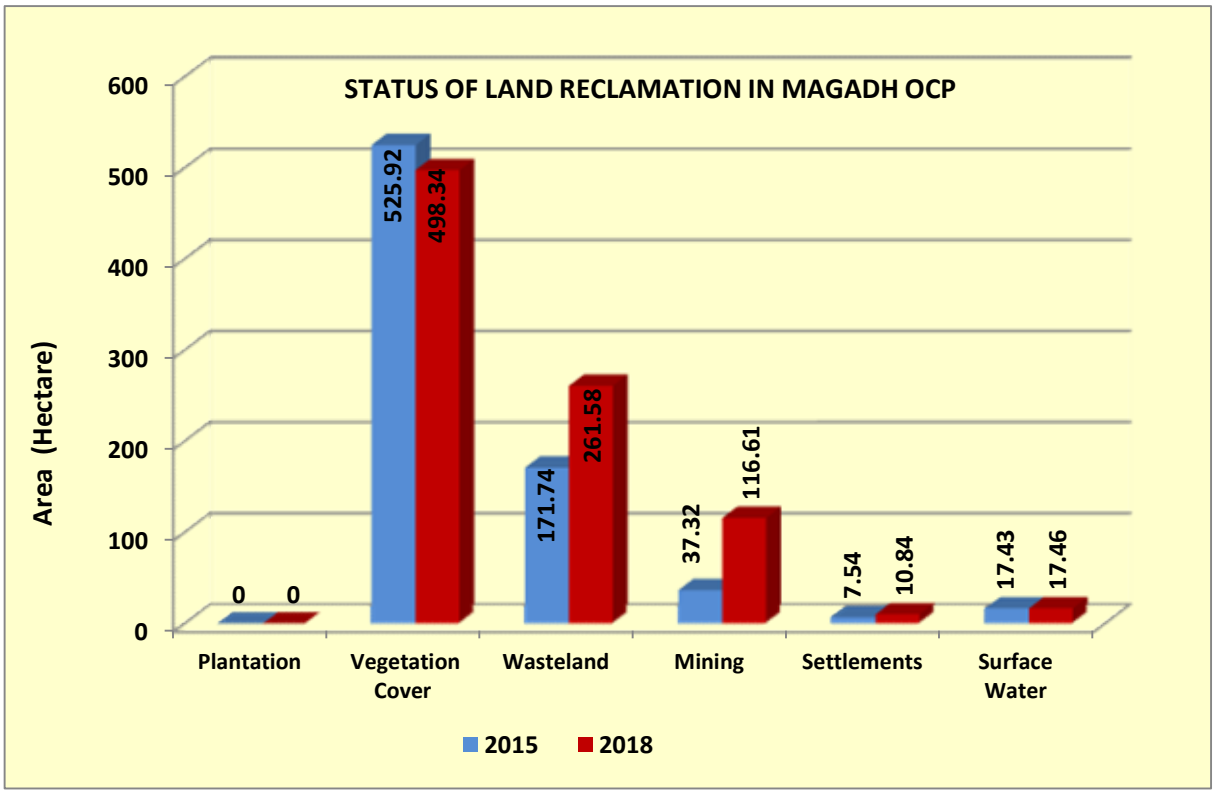

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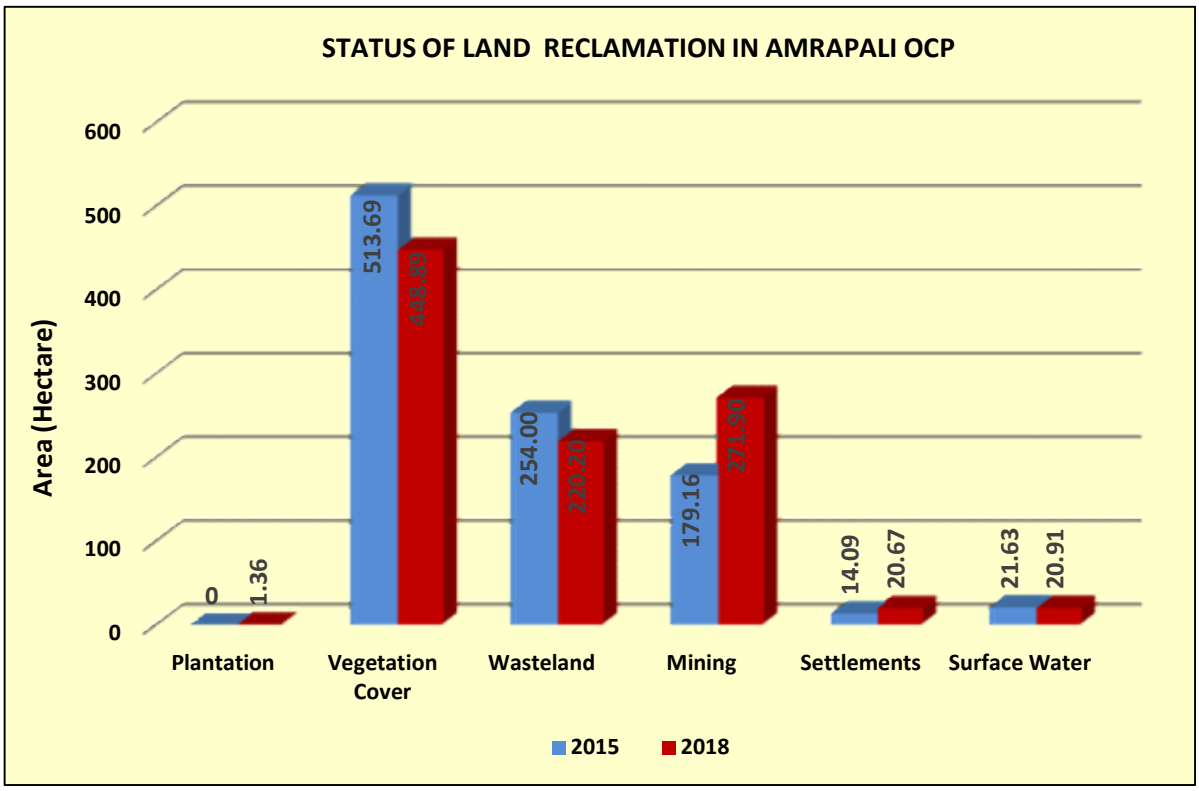

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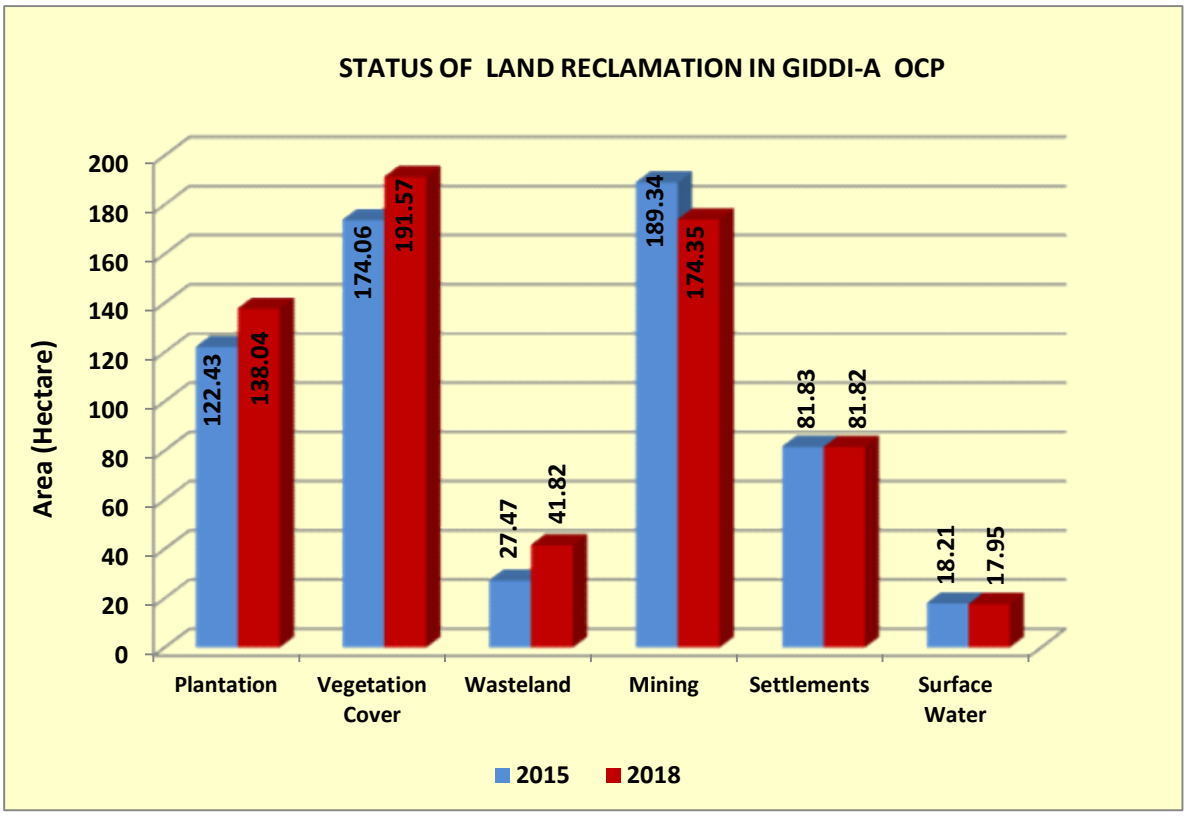

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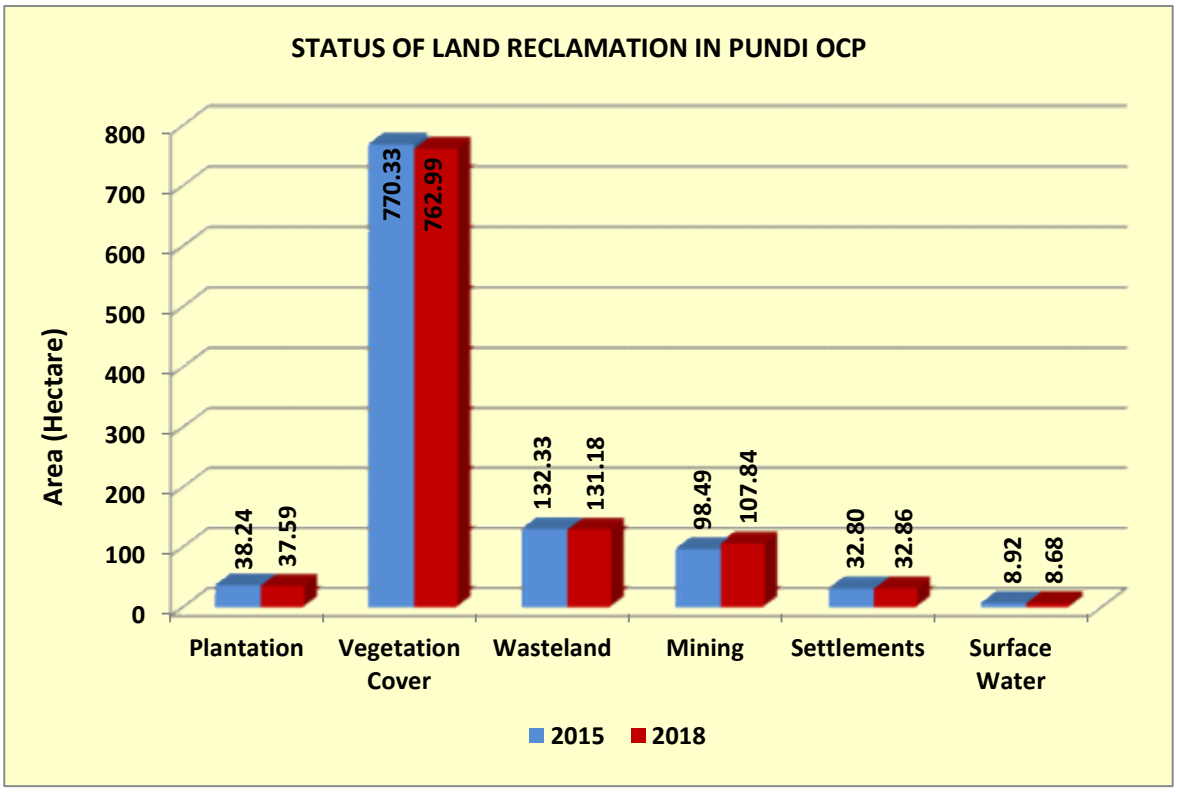

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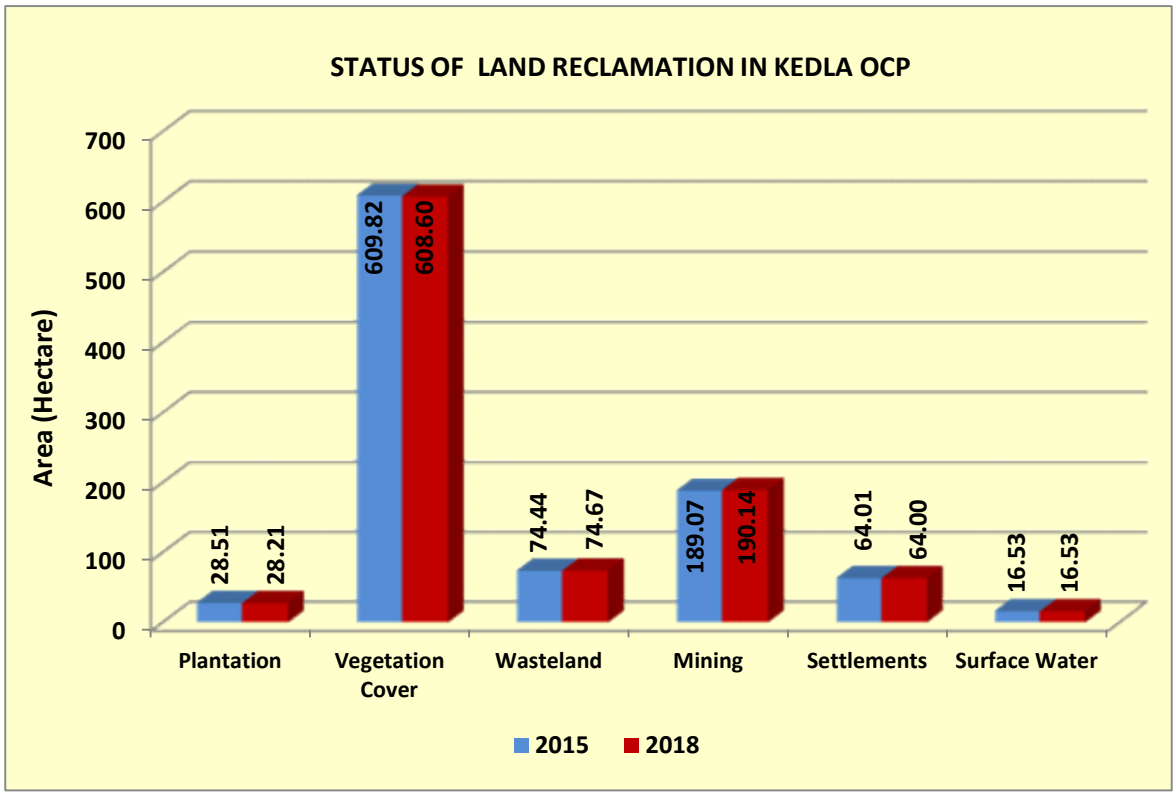

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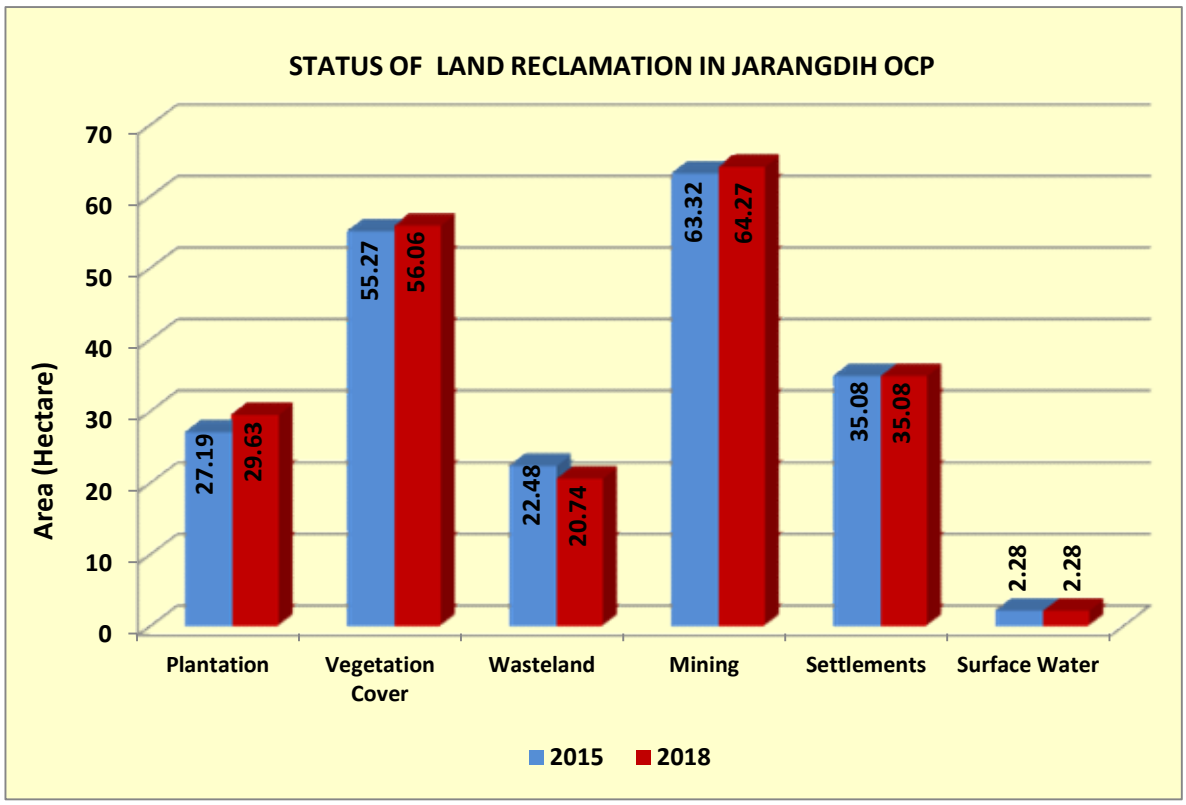

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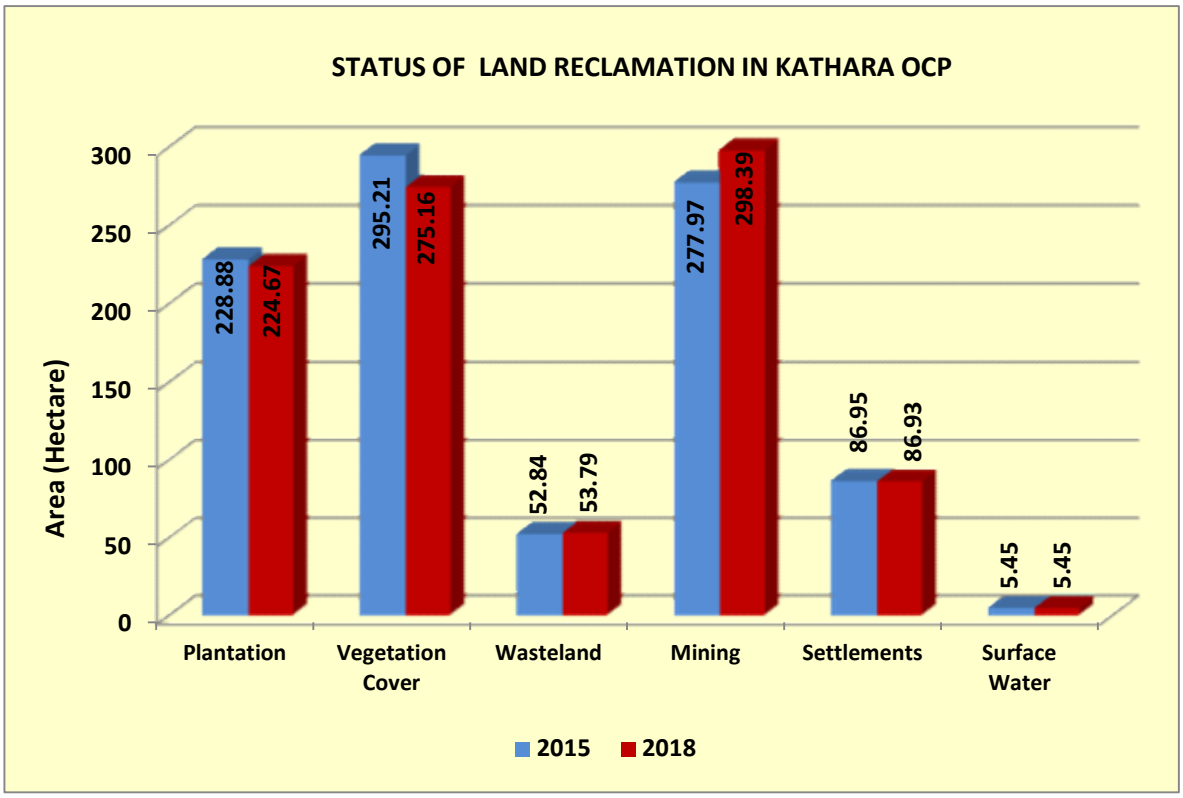

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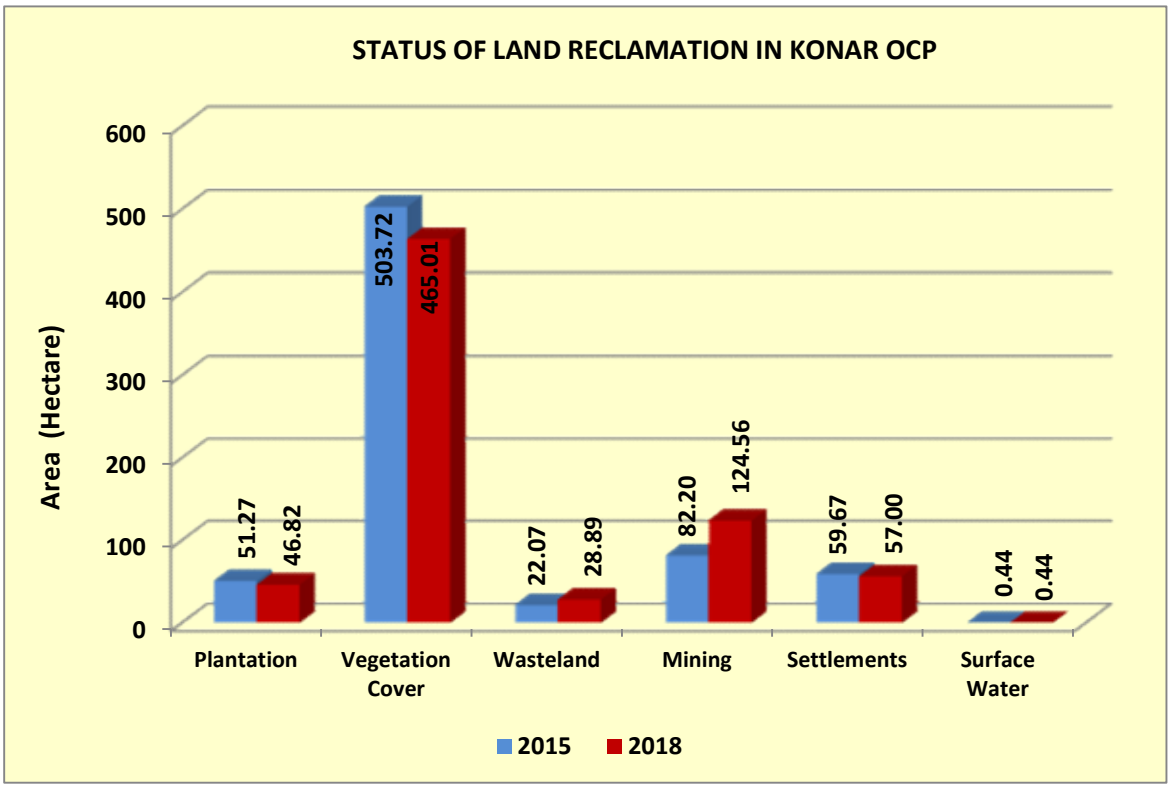

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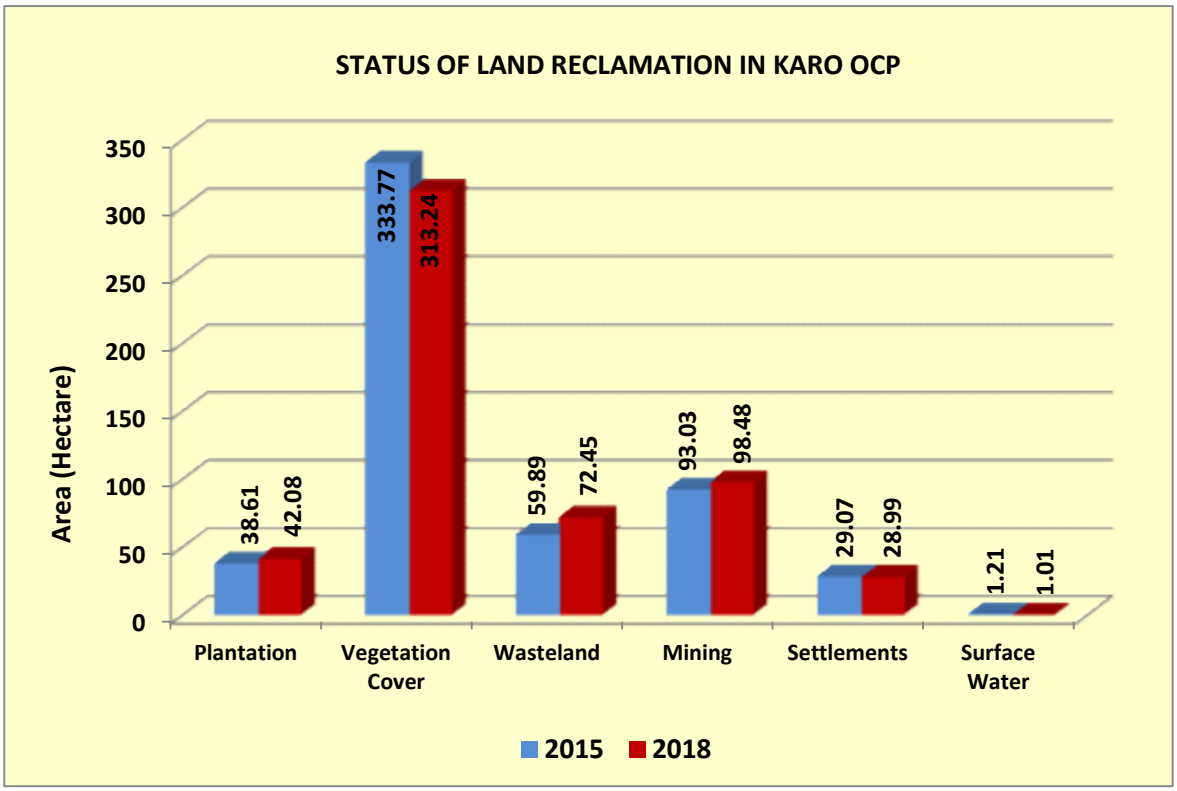

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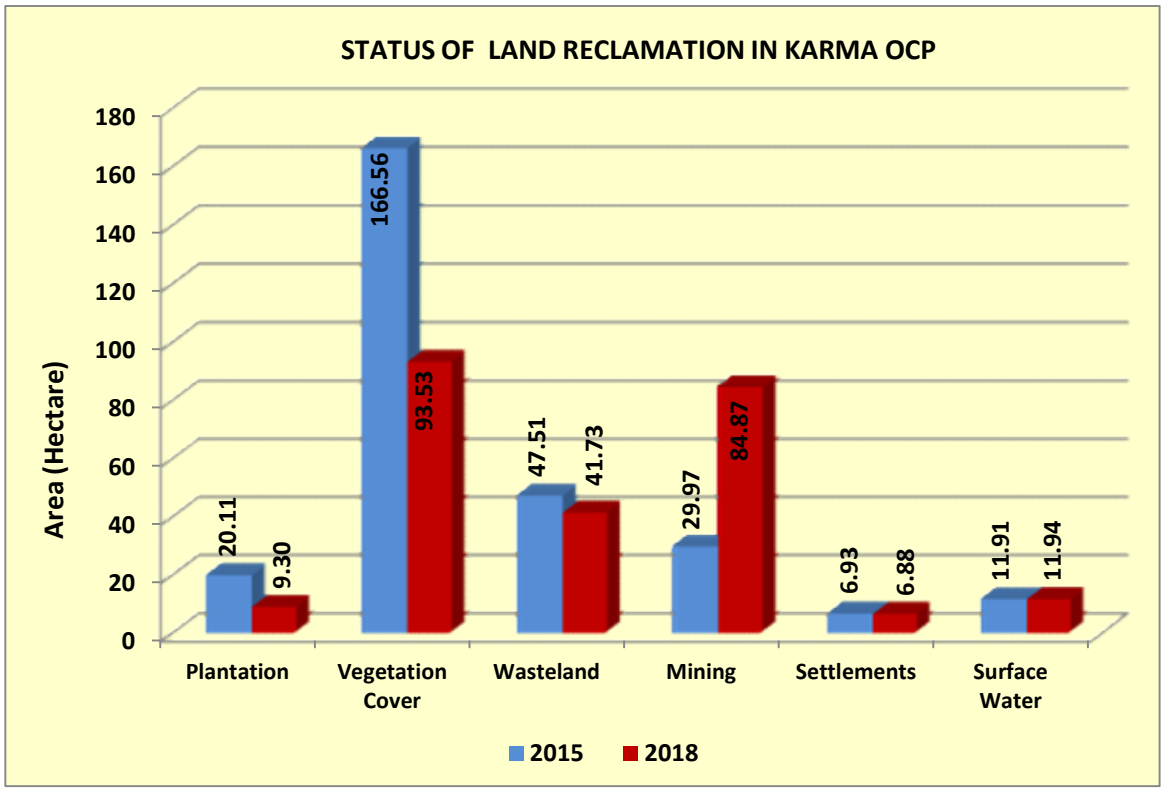

Figure - 14

Photo 1: Plantation on External OB Dump (Amrapali OCP)

Photo 2: Plantation on Internal OB Dump/Backfill (Giddi-A OCP)

Photo 3: Plantation on External OB Dump (Dakra OCP)

Photo 4: Internal OB Dump (Teteriakhar OCP)

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