SIX MONTHLY REPORT
OF

EMP CLEARANCE
[J-11015/1005/2007-IA.II(M)]

for the period Oct'22 – March'23
(1st June 2023)

CHURI BENTI UNDERGROUND PROJECT
N K AREA

CENTRAL COALFIELDS LIMITED
(A Miniratna Company)

Status of compliance of the terms and conditions given in the Environmental clearance letter No.J-11015/1005/2007- IA. II(M) dt. 25.01.2012 issued by MOEF, Govt. of India New Delhi for Churi Benti Underground Coalmine Expansion Project (Expansion from 0.16 MTPA to 0.81 MTPA nominal with a peak capacity of 0.93 MTPA in a total ML area of 604.30 Ha.) for the period from Oct - 22 to March-23

S.No.	Condition	Status
(i)	No mining operations shall be undertaken in the 65.84 ha. of forestland consisting of 48.59 ha of forestland and 17.25 ha of GMK land in Benti Block for which forestry clearance has not been obtained.	This directive is being strictly followed. An application for forestry clearance of 281.17 ha forest land has been applied vide ref no FP/JH/MIN/23021/2016
(ii)	Mining shall be carried out as per statuette from River Damodar flowing between Churi and Benti Blocks within the lease and maintaining a safe distance of a minimum 60 m barrier from River Saphi flowing along the lease boundary.	Mining is being carried out as per the statuette and a safe distance of 60 m is being maintained from the River Saphi along the lease boundary
(iii)	No depillaring shall be undertaken below the two rivers and nalas. A depth of least 80-90 m of cover between River Damodar and drivage crossing shall be maintained with DGMS approval.	No depillaring is being undertaken below the two rivers and nalas. As per DGMS approvals, conditions are complied
(iv)	In other areas, at the time of depillaring, protective bunds and garland drains shall be provided so that no water from the surface enters the subsidence area and the shaft.	At the time of depillaring, protective bunds and garland drains have been provided.
(v)	While extracting panels in the Lower seam, all water bodies in the subsidence area shall be drained. Dewatering of the old goaves of the upper seam shall be contained as long as the lower seam is worked to prevent accumulation of large water bodies over working area.	Currently this condition is Not applicable, However in future if the conditions arise then this condition would be strictly followed.
(vi)	Sufficient coal pillars shall be left unextracted around the air shaft (within the subsidence influence area) to protect from any damage from subsidence, if any.	Not applicable
(vii)	No depillaring operation shall be carried out below the roads and village area found within the lease. Solid barriers shall be left below the roads falling within the blocks to avoid any damage to the roads.	No depillaring operation has been done or will be carried out below the roads and village area found within the lease.
(viii)	High capacity pumps shall be deployed for dewatering of mine.	Sufficient capacity pumps (500 GPM and 1000 GPM) are currently being deployed for dewatering of mine.
(ix)	Regular monitoring of subsidence movement	This directive is being continuously

	on the surface over and around the working area and impact on natural drainage pattern, water bodies, vegetation, structure, roads and surrounding should be continued till movement ceases completely. In case of observation of any high rate of subsidence movement, appropriate effective corrective measures should be taken to avoid loss of life and material. Cracks should be effectively plugged with ballast and clayey soil/suitable material.	followed.
(x)	Garland drains (size, gradient and length) around the safety areas such as mine shaft and low lying areas and dump capacity should be designed keeping 50 % safety margin over and above the peak sudden rainfall and maximum discharge in the area adjoining the mine sites. Sump capacity should also provide for adequate retention period to allow proper setting of silt material.	Garland drains have been constructed near the incline mouth of the mine keeping 50 % safety margin over and above the peak sudden rainfall and maximum discharge in the area adjoining the mine sites.
(xi)	Water sprinkling system should be provided to check fugitive emissions from crushing operations, storage area, conveyor system, haulage roads, transfer points, etc.	Water sprinkling system has been provided. 28kl mobile water tankers are deployed for dust mitigation on coal transportation roads etc. The continuous miner deployed in the mine is fitted with water sprinkling system to prevent emission of Dust during coal extraction.
(xii)	Drills should be wet operated only.	Pneumatic drills are used in the project and are wet operated
(xiii)	No additional water shall be consumed for the project. No ground water (bore well) shall be used for mining operations.	Ground water is not/ will be used for mining purpose
(xiv)	Regular monitoring of groundwater level and quality should be carried out by establishing a network of exiting wells and construction of new peizometers. The monitoring for quantity should be done four times a year in pre-monsoon (May), monsoon August), pot-monsoon (November) and winter (January) seasons and for quality in May. Data thus collected should be submitted to the Ministry of Environment & Forest and to the Central Pollution Control Board quarterly within one month of monitoring.	Regular monitoring of the underground water level is being carried out by a network of existing wells. New peizometers are being installed as required in and around the core and buffer zone.
(xv)	A total area of 538.32 ha would be afforested at the post of mining stage. These include afforestation developed along ML boundary,	This directive is being strictly followed. Plantation in 5.0 ha land has been completed with collaboration of Chatra

2

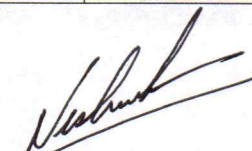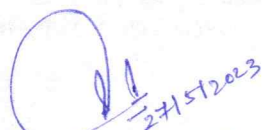|		
	infrastructure including CHP and along roads, vacant land, and green belt by planting native species in consultation with the local DFO/Agriculture Department/relevant institution. The density of the trees should be around 2500 plants par Ha.	South Forest Division in monsoon 2016 Gap plantation in 312 ha of forest land has been carried out in monsoon 2018
(xvi)	R&R for 6 PAFs is to be completed in 2011-12.	R&R for 6 PAFs is under process
(xvii)	Mine closure activities shall include sealing of incline mouth, dismantling of haulage system, clearing and afforestation of coal stock area, plantation on barren land and old abandoned mine, A total	A comprehensive final mine closure plan has been prepared for sealing of incline mouth, dismantling of haulage system, clearing and afforestation of coal stock area, plantation on barren land and old abandoned mine An amount of about Rs 907.35 lakh has been deposited in the escrow account till 31.03.2018
(xviii)	For monitoring land use pattern and for post mining land use, a time series of land use maps based on satellite imagery (on a scale of 1:5000) of the core zone and buffer zone from the start of the project until end of mine life shall be prepared once in 3 years (for any one particular season which is consistent on the time series) and the report submitted to MOEF and 'to Regional office at Bhubaneshwar.	The land use pattern map is prepared by CMPDIL, Ranchi for every three years and the same is timely submitted to MOEF. Report on Vegetation Cover Mapping of North and South Karanpura Coalfields based on Satellite Data of the Year 2018 is available at centralcoalfields.in/sutbs/pdf/nksk_report_2018.pdf

B.	**GENERAL CONDITIONS**	
(i)	No change in mining technology and scope of working shall be made without prior approval of the Ministry of Environment and Forest.	The mining in Churi UG is by " development & depillaring with caving with continuous miner "
(ii)	No change in the calendar plan including excavation, quantum of mineral coal and waste shall be made.	No change in calendar plan has been made. Coal Production for last five years is as follows <table><tr><td>Year</td><td>Coal (Te)</td></tr><tr><td>2015-16</td><td>34010</td></tr><tr><td>2016-17</td><td>42340</td></tr><tr><td>2017-18</td><td>11480</td></tr><tr><td>2018-19</td><td>1950</td></tr><tr><td>2019-2020</td><td>476164</td></tr><tr><td>2020-2021</td><td>211237</td></tr><tr><td>2021-22</td><td>580472</td></tr><tr><td>2022-2023</td><td>705995</td></tr></table>
(iii)	Four ambient air quality monitoring	The four air quality monitoring stations

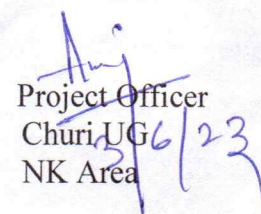| Year	Coal (Te)
2015-16	34010
2016-17	42340
2017-18	11480
2018-19	1950
2019-2020	476164
2020-2021	211237
2021-22	580472
2022-2023	705995

	stations shall be established in the core zone as well as in the buffer zone for monitoring PM10, PM 2.5, Sox, NOx. Location of the stations shall be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive targets in consultation with the State Pollution Control Board. In addition continuous monitoring of CO within the underground mining area shall be undertaken and data regularly furnished as part of monitoring report.	have been established at PO office, Churi Old colony, Subash nagar colony and pit top. The air quality is monitored quarterly by CMPDIL, Ranchi and the reports are submitted six monthly.
(iv)	Fugitive dust emissions (PM_{10} and $PM_{2.5}$ from all the sources shall be controlled regularly monitored and data recorded properly. Water spraying arrangement on haul roads, wagon loading, dump trucks (loading and unloading) points shall be provided and properly maintained.	Fugitive dust emissions are controlled by regular water sprinkling.
(v)	Data on ambient air quality (PM_{10}, $PM_{2.5}$, SO_x, NO_x) and on CO levels within the mine shall be regularly submitted to the Ministry including its Regional Office at Bhubaneshwar and to the State Pollution Control Board once in six months.	The air quality is monitored quarterly by CMPDIL, Ranchi and the reports are submitted six monthly
(vi)	Adequate measures shall be taken for control of noise levels below 85 dBA in the work environment. Workers engaged in blasting and drilling operations, operation of HEMM, etc. shall be provided with ear plugs/muffs.	Adequate measures has already been taken to control of noise below 85 dB(A).
(vii)	Industrial wastewater (workshop and wastewater from mine) shall be properly collected, treated so as to conform to the standards prescribed under GSR 422 (E) dated 19th may 1993 and 31stDecember 1993 or as amended from time to time before discharge. Oil and grease trap shall be installed before discharge of workshop effluents.	Mine water is passing through a settling tank and effluent water conforms the standards of MOEF.
(viii)	Vehicular emissions shall be kept under control and regularly monitored. Vehicles used for transporting the mineral shall be covered with tarpaulins and optimally loaded.	Vehicular emissions are kept under check. The trucks of road sale are covered with tarpaulins and optimally loaded
(ix)	Environmental laboratory shall be	Environment quality monitoring is done

	established with adequate number and type of pollution monitoring and analysis equipment in consultation with the State Pollution Control Board.	fortnightly by CMPDI, Ranchi.
(x)	Personnel working in dusty areas shall wear protective respiratory devices and they shall also be provided with adequate training and information on safety and health aspects. Occupational health surveillance programme of the workers shall be undertaken periodically to observe any contractions due to exposure to dust and to take corrective measures, if needed.	Personnel working in dusty area are being provided protective respiratory devices regularly and training is also imparting regularly. PME for all the work force at regular intervals are being done at central hospital Dakra. In the year 2022, PME of 743 employees of NK Area had been done in calendar year 2022.
(xi)	A separate environmental management cell with suitable qualified personnel shall be set up under the control of a Senior Executive, who will report directly to the Head of the company.	A separate environment cell headed by the Project Officer, Churi UGP has been established. Copy of order enclosed as annexure E
(xii)	The funds earmarked for environmental protection measures shall be kept in separate account and shall not be diverted for other purpose. Year-wise expenditure shall be reported to this Ministry and its Regional Office at Bhubaneshwar.	The fund (Both capital and recurring) earmarked for environmental control measures are not diverted for any other purpose.
(xiii)	The Regional Office of this Ministry located at Bhubaneshwar shall monitor compliance of the stipulated conditions. The Project authorities shall extend full cooperation to the office(s) of the Regional Office by furnishing the requisite data/information/monitoring reports.	Agreed.
(xiv)	A copy of the will be marked to concerned Panchayat/ local NGO, if any, from whom any suggestion/representation has been received while processing the proposal.	A copy of EC has been submitted to local panchayats.
(xv)	State Pollution Control Board shall display a copy of the clearance letter at the Regional Office, District Industry Centre and Collector's Office/Tehsildar's Office for 30 days.	Copy of clearance letter has been sent to Jharkhand State pollution control Board.
(xvi)	The Project authorities shall advertise at least in two local newspaper widely	Advertised in the following newspapers & Xerox copies of which are enclosed

	circulated around the project, one of which shall be in the vernacular language of the locality concerned within seven days of the clearance letter informing that the project has been accorded environmental clearance and a copy of the clearance letter is available with the State Pollution Control Board and may also be seen at the website of the ministry of Environment & Forest at http://envfor.nic.in. The compliance status shall also be uploaded by the project authorities in their website and regularly updated at least once in six months so as to bring the same in the public domain. The data shall also be displayed at the entrance of the project premises and mines office and in corporate office.	annexure F 1. Hindustan Times, Ranchi – dtd. 4th April – 2012. 2. Prabhat Khabar, Ranchi – dtd. 4th April– 2012.
3.	The Ministry or any other competent authority may stipulate any further condition for environmental protection.	No additional condition has been imposed.
4.	Failure to comply with any of the conditions mentioned above may result in withdrawal of this clearance and attract the provisions of the Environment (Protection) Act, 1986.	Agreed.
5.	The above conditions will be enforced inter-alia, under the provisions of the Water (prevention & Control of Pollution.) Act, 1974, the Air (Prevention & Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986 and the Public Liability Insurance Act, 1991 along with their amendments and Rules. The Proponent shall ensure to provide for the costs incurred for taking up remedial measures in case of soil contamination, contamination of groundwater and surface water, and occupational and other diseases due to the mining operations.	Agreed.

Dy. Manager (Envt)
NK Area

Environment Officer/ IC
Churi UG
NK Area

Project Officer
Churi UG
NK Area

6

CSR activities in NK Area

NK Area carries out CSR activities in 14 different panchayats of Khalari and Tandwa circle. Some of CSR activities are as follows:

Drinking Water

3 Deep borings, 9 wells, 6 handpumps, 3 water purifiers at Khalari & Mcluskieganj railway station and khalari block

Quarantine library

Graameen Football

खेल. धमरा स्टेडियम में ग्रामीण फुटबॉल प्रतियोगिता का उद्घाटन, लतीफ खेल

खिलाड़ियों को उपलब्ध करायेंगे बेहतर कोच

बालिका वर्ग में गणेश स्पोर्टिंग क्लब राय व बालक वर्ग में विश्रामपुर की टीम विजयी

Distribution of sports items

Swachhta Hi Sewa 2019

1000 cloth bag distribution, social message and branding with help of 3000 pamphlets depicting restriction on use of single use plastic at houses, shops and public places in NK Area

Tricycles for physically challenged

39 tricycles for physically challenged

Village/School health Camps

Total -175 Camps

Construction of toilets

Community hall constructed under CSR scheme of NK Area

Installation of Hand pipes
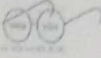
Construction of well at Mcluskiganj

P.C.C.Road TUMANG (C.D. Scheme)C.C.L.

Construction of road and bridge near Purnadih village

Office Order

As per directives of CCL, HQ, Ranchi a pit environment committee in respect of Churi Under Ground Mines is hereby constituted consisting of following members:-
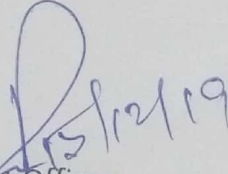
1. Project Officer, Churi Project Chairmen of the committee.
2. Manager, Churi-Member
3. P.E.(E&M), Churi-Member
4. P.E. (Civil), Churi-Member
5. Unit Nodal Officer (Environment), Churi –Member
6. Coal Dispatch Officer, Churi-Member.
7. Sr. Surveyor, Churi-Member.

Special Invitees:-
    1. SO (P&P), NK Area.
    2. Area Nodal Officer (Environment), NK Area.

The above committee will meet on every 3rd Thursday of the month at the office of the Project Officer at 4:30 PM to discuss the compliances of various statutory provisions related to environment such environment clearance , Forest, CTO, Hazardous wastes, other issues.

This issues with the consent of competent authority.

Project Officer
Churi Project, NK Area, CCL

Copy for kind information:-
    1. The GM , NK Area.
    2. The HOD, Environment & Forest, CCL , HQ, Ranchi,

Distribution:-
    1. All Committee Members,
    2. All Invitee Members.

राँची - प्रभात खबर,
दि. - 04/04/2012.

Hindustan Times, Ranchi, 4. 4. 201...

Project Officer
Churi Colliery (C.C.L)
O- Ray, Distt...
Project Officer
Churi Project, CCL

CENTRAL Hospital information (History, facilities, staff, etc)

Details of IME/PME of last 5 years from the Area

NK AREA DAKRA

S. No.	Year	Man Power	Target	PME		Total	IME		Total
				Below 45 Yrs	Above 45 Yrs		CCL	Contractual	
1	2018		462	170	302	472	25	242	267
2	2019		664	203	313	516	50	276	326
3	2020		450	260	340	600	60	108	168
4	2021		853	455	414	869	47	246	293
5	2022		806	321	422	743	32	130	162

9/5/023

Dy. Chief Medical Officer
C.H., Dakra
Ranchi (JH)

Disease report of last 5 years from the Area

<u>NK AREA DAKRA</u>

Area	Year	Total No of PME	Hypertension	Diabetics	Eye Problem	Hearing Impariment (Partial)	Back Problem	Spinal Injuri	CAD	Dyslipidemia	Respiratory Disease	Skin Disease Detected / Reacted	Cancer Detected / Reacted	Psychiatric	Obesity	Pneumoconiosis	Sleepinsomania	CVA / Paralysis
NK AREA	2018	490	27	59	03	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
''	2019	516	06	62	04	''	''	''	''	''	''	''	''	''	''	''	''	''
''	2020	600	30	53	08	''	''	''	''	''	''	''	''	''	''	''	''	''
''	2021	869	37	70	06	''	''	''	''	''	''	''	''	''	''	''	''	''
''	2022	743	37	62	17	''	''	''	''	N2L	Asthma 01	''	''	''	''	''	''	''

Dy. Chief Medical Officer,
C.H, Dakra
Ranchi (JH)
9/5/023

Vocational training Centre, NK Area

Sr. No.	Name of mine	Target						Contractual						Departmental					
		2017	2018	2019	2020	2021	2022	2017	2018	2019	2020	2021	2022	2017	2018	2019	2020	2021	2022
1	KDH	132	35	99	105	108	104	39	03	9	12			134	39	113	119	118	113
2	Dakra	64	60	65	78	73	67	17	11	10		7		81	69	82	83	90	77
3	Rohini	72	51	52	52	54	62	16	60	45	11	1		88	64	91	94	58	67
4	Purnadih	100	60	60	80	90	102	12	9	13		13		106	80	68	97	93	103
5	Churi	72	60	55	72	70	70	38	84	126	18	100	109	78	69	95	83	82	72
6	RR shop	20	20	20	15	15	12							21	20	21	21	16	14
7	GMO													01	08	22	14	18	14
		460	286	351	402	410	417	122	167	203	41	121	109	509	349	464	511	472	460

CENTRAL COALFIELDS LIMITED
(A subsidiary of Coal India Limited)
OFFICE OF THE V T MANAGER
GROUP VOCATIONAL TRAINING CENTER
NORTH KARNPURA AREA, DAKRA-829210, DIST-RANCHI (JHARKHAND)

Month: -DECEMBER 2022

To,
The Project Officer,
Dakra/ KDH/ Rohini /Purnadih/ Churi/ R. R. Shop/M & A/Rajhara
Sub: - Project wise training report at GVTC, N K Area, Dakra for the month of DECEMBER 2022
Dear Sir,
Please find here with the training report at Group Vocational Training Center, N K Area, Dakra.

PROJECT N K	ANNUAL TARGET (REF)	TRAINING DURING THE MONTH						PROGRESIVE					
		Departmental			Contractor			Departmental			Contractor		
		Basic	Refresher	Spl	Basic	Refresher	Spl	Basic	Refresher	Spl.	Basic	Refresher	Spl.
KDH	104	--	05	----	----	----	----	07	106	----	----	----	----
DAKRA	67	--	15	----	----	----	----	10	67	----	----	----	----
ROHINI	62	--	24	----	----	----	----	04	63	----	----	----	----
PURNADIH	102	--	--	----	----	----	----	01	102	----	----	----	----
CHURI	70	--	04	----	--	08	----	----	72	----	88	21	----
RR Shop	12	--	03	----	----	----	----	02	12	----	----	----	----
G M O	---	05	---	----	----	----	----	14	----	----	----	----	----
TOTAL	**417**	**05**	**51**	--	--	**08**	--	**38**	**422**	--	**88**	**21**	--
M & S	----	09	----	----	----	----	----	54	----	----	----	----	----
A & C	----	03	----	----	----	----	----	22	----	----	----	----	----
RAJHARA	---	---	---	----	----	----	----	47	29	----	----	----	----
GRAND TOTAL	**417**	**17**	**51**	--	--	**08**	--	**161**	**451**	--	**88**	**21**	--

APPRENTICES N K	MALE	FEMALE	MONTHLY ACHIVEMENT	MALE	FEMALE	PROGRESSIVE ACHIVEMENT
I T I	06	----	06	48	----	48
PDPT	06	---	06	97	----	97
Lamp Handling	----	------	-----	40	----	40
C S R	-----	-------	------	24	20	44

01.01.23
V T Manager
Group Vocational Training Center
N K Area Dakra

Distribution: -
1. SO (Safety), N K Area, Dakra.
2. Area Training Officer, N K Area, Dakra.

Copy for Kind Information please: -
1. GM (HRD), CCL, Ranchi.
2. General Manager, N.K. Area, Dakra.

Ref. No. 2946
Date 31/12/2021

CENTRAL COA... ..I
(A subsidiary ...
OFFICE OF T...
GROUP VOCATION...
NORTH KARNPURA AREA, DAKR...

To,
The Project Officer,
Dakra/ KDH/ Rohini /Purnadih/ Churi/ R. R. Shop

Sub:-Project wise training report at GVTC, NK Area, Dakra for the month of DECEMBER 2021.

Dear Sir,
Please find here with the training report at Group Vocational Training Center, N K Area, Dakra.

PROJECT N K	ANNUAL TARGET (REF)	TRAINING DURING THE MONTH						PROGRESIVE					
		Departmental			Contractor			Departmental			Contractor		
		Basic	Refresher	Spl	Basic	Refresher	Spl	Basic	Refresher	Spl	Basic	Refresher	Spl
KDH	108	—	06	---	---	---	---	08	110	---	---	---	---
DAKRA	73	05	—	---	---	---	---	17	73	---	07	---	---
ROHINI	54	—	04	---	---	---	---	04	54	---	-01	---	---
PURNADIH	90	---	—	---	---	---	---	01	92	---	---	13	---
CHURI	70	02	20	---	01	04	---	06	73	03	85	15	---
RR Shop	15	---	07	---	---	---	---	01	15	---	---	---	---
G M O	----	03	---	---	---	---	---	18	---	---	---	---	---
TOTAL	410	10	37	---	01	04	---	55	417	03	93	28	---
M &S	---	10	---	--	---	---	---	102	---	---	---	---	---
A & C	---	03	---	--	--	---		19	---	---	---	---	
RAJHARA	---	---	—	--	--	---	---	05	15	---	30	---	---
GRAND TOTAL	410	23	37	---	01	04	---	181	432	03	123	28	---

ITI APPRENTICES	MALE	FEMALE	MONTHLY ACHIVEMENT	MALE	FEMALE	PROGRESSIVE ACHIVEMENT
N K	—	---	—	82	---	82
CISF	—	---	—	343	---	343

31/12/2021

V T Manager
Group Vocational Training Center
NK Area Dakra

Distribution:-
1. SO (Safety & Training), N K Area, Dakra.

Copy for Kind Information please:-
1. DMS,SEZ, Ranchi Region, Ranchi
2. GM (HRD), CCL, Ranchi.
3. General Manager, N.K. Area, Dakra.

Month:-DECEMBER 2020

To,
The Project Officer,
Dakra/ KDH/ Rohini /Purnadih/ Churi/ R. R. Shop/M & A/Rajhara
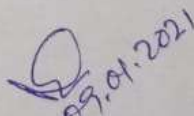
Sub:-Project wise training report at GVTC, NK Area, Dakra for the month of DECEMBER 2020.

Dear Sir,
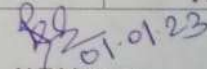Please find here with the training report at Group Vocational Training Center, N K Area, Dakra.

PROJECT N K	ANNUAL TARGET (REF)	TRAINING DURING THE MONTH						PROGRESIVE					
		Departmental			Contractor			Departmental			Contractor		
		Basic	Refresher	Spl	Basic	Refresher	Spl	Basic	Refresher	Spl.	Basic	Refresher	Spl.
KDH	105	---	10	---	01	---	---	09	106	04	12	---	---
DAKRA	78	01	---	---	---	---	---	02	79	02	---	---	---
ROHINI	52	03	---	---	---	--	---	17	64	13	08	03	---
PURNADIH	80	01	02	---	---	---	---	13	82	02	---	---	---
CHURI	72	---	01	---	---	---	---	02	75	06	11	07	---
RR Shop	15	03	02	---	---	---	---	05	15	01	---	---	---
G M O	----	03	---	---	---	---	---	14	---	---	---	---	---
TOTAL	**402**	**11**	**15**	---	**01**	---	---	**62**	**421**	**28**	**31**	**10**	---

M & A	---	05	---	---	----	----	--	19	---	---	---	---	---

RAJHARA	---	03	03	---	---	---	---	08	21	---	---	---	---

GRAND TOTAL	---	19	18	---	01	----	---	89	442	28	31	10	---

ITI Apprentice	Monthly Achievement	M	F	Progressive Achievement	M	F
	Total =02	02	NIL	Total =09	08	01

09.01.2021

V T Manager
Group Vocational Training Center
NK Area Dakra

Distribution:-
1. SO (Safety &Training), N K Area, Dakra.

Copy for Kind Information please:-

1. GM (HRD), CCL, Ranchi.
2. General Manager, N.K. Area, Dakra

OFFICE OF THE
GROUP VOCATIONAL
NORTH KARNPURA AREA, DAKRA-
A Miniratna C

To,
The Director of Mines Safety,
SEZ Ranchi, Ranchi Region,
RI-III, CMPDIL Complex, Kanke Road, Ranchi, Jharkhand, Pin-834008

DateMonth:-DECEMBER 2019

Sub:-Project wise training report at GVTC, NK Area Dakra for the month of December 2019.

Dear Sir,

Please find here with the training report at Group Vocational Training Center, N K Area, Dakra.

PROJECT N K	ANNUAL TARGET (REF)	TRAINING DURING THE MONTH						PROGRESIVE					
		Departmental			Contractor			Departmental			Contractor		
		Basic	Refresher	Spl	Basic	Refresher	Spl	Basic	Refresher	Spl.	Basic	Refresher	Spl.
KDH	99	---	---	---	---	---	---	07	103	03	07	02	---
DAKRA	65	---	---	--	---	---	---	09	66	07	06	04	---
ROHINI	52	02	02	-	05	05	---	04	52	06	33	12	---
PURNADIH	60	---	01	---	---	---	---	06	60	03	05	08	---
CHURI	55	----	---	---	08	--	---	28	66	01	98	28	---
RR Shop	20	----	04	---	---	---	---	01	20	---	----	----	---
G M O	---	----	---	---	---	---	---	22	---	---	----	----	---
TOTAL	351	02	07	---	13	05	---	77	367	20	149	54	---
M & A	---	01	---	---	----	----	--	35	----	---	----	----	---
RAJHARA	---	---	07	----	----	----	--	53	24	---	16	----	---
GRAND TOTAL	---	03	14	---	13	05	--	165	391	20	165	54	---

02.01.2020
V T Manager
Group Vocational Training Center
NK Area Dakra

Distribution:-
1. SO (Safety &Training), N K Area, Dakra.
2. The Project Officer-Dakra/ KDH/ Rohini /Purnadih/ Churi/ R. R. Shop/M&A/Rajhara

Copy for Kind Information please:-
1. GM (HRD), CCL, Ranchi.
2. General Manager. N.K. Area. Dakra

CENTRAL COAL FIELDS LIMITED
OFICE OF THE VT MANAGER
Group Vocational Training Center
N.K. Area Dakra , P.O.-Dakra,PIN-829210,Dist-Ranchi

To,
The Director of Mines Safety,
SEZ Ranchi, Ranchi Region,
RI –III ,CMPDIL Complex, Kanke Road ,Ranchi, Jharkhand ,PIN 834008.
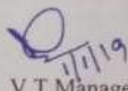
Sub:- Project wise training report at GVTC, NK Area, Dakra for the calender year 2018.

Dear Sir,

Please find with the training reports at Group Vocational Training Center NK Area Dakra

Project Name	Annual Target	Training during the month						Progressive					
		Departmental			Contractor			Departmental			Contractor		
		Basic	Refresher	Spl.	Basic	Refresher	spl	Basic	Refresher	Spl.	Basic	Refresher	Spl.
KDH	35	—	—	—	—	—	-	03	36	—	03	—	—
Dakra	60	—	—	—	06	—	-	08	61	—	07	04	—
Rohini	51	—	—	—	11	04	-	11	53	—	41	19	—
PND	60	—	07	—	—	02	-	18	62	—	02	07	—
Churi	60	—	—	02	04	—	-	02	62	05	63	21	—
RR Shop	20	—	07	—	—	—	-		20	—	—	—	—
Gmo	—	—	—	—	—	—	-	08		—	—	—	—
Total	286	—	14	02	21	06	-	50	294	05	116	51	—

M& A	—	—	—	—	—	—	—	50	—	—	—	—	—
Rajhara	—	—	10	—	—	—	—	—	10	—	—	—	—
Total	—	—	10	—	—	—	—	50	10	—	—	—	—

V T Manager
Group Vocational Training Center
NK Area Dakra

Distribution:-

1. SO(Safety&Training), NK,

Copy for Kind Information Please:-

1. General Manager, N.K. Area Dakra

भारतीय डाक India Post

...COALFIELDS LIMITED

...COALFIELDS LIMITED
...niratna Company)
...OF THE VT MANAGER
...IONAL TRAINING CENTER
...210, DIST-RANCHI (JHARKHAND)

Month-DECEMBER 2017

...R R Shop/Magadh –Amrapali/Rajhara.

...at GVTC, NK Area, Dakra.

Dear Sir,

Kindly find placed hereunder format in respect of training reports at Group Vocational Training Centre, NK Area for your kind perusal.

Project Name	Annual Target Ref)	Training during the month						Progressive					
		Departmental			Contractor			Departmental			Contractor		
		Basic	Refresher	Special	Basic	Ref.	Specil	Basic	Refresher	Special	Basic	Ref.	Special
KDH	132	---	---	-----	-----	----	-----	01	133	-----	28	11	-----
Dakra	64	---	---	-----			-----	15	64	02	08	09	-----
Rohini	72	—	---	-----	-----	03	-----	16	72	-----	13	03	-----
Purnadih	100	—	24	-----	-----	02	-----	05	101	-----	07	05	-----
Churi U/G	72	01	01	-----	---	---	-----	02	76	-----	05	33	-----
M R S Churi	---	---	---	-----	-----	---	-----	-----	-----	-----	-----	-----	-----
R.R.S Dakra	20	---	02		-----	---	-----	01	20	-----	-----	-----	-----
GM Unit	---	---	---	-----	-----	-----	-----	01	-----	-----	-----	-----	-----
Total	460	01	27	-------	—	05	-----	41	466	02	61	61	-----

M & A	-----	02	-----	-----	-----	---	-----	21	-----	-----	-----	-----	-----
Rajhara	-----	-----	------	-----	-----	---	-----	-----	14	-----	-----	-----	-----

VT Manager,
Group Vocational Training Centre
N K, Area, Dakra

Copy to:-

1. SO (Safety)/Area Training Officer, N K Area, Dakra.

Copy for kind information:-

1 GM (HRD), CCL
2. General Manager, NK Area Dakra.

Report on Vegetation Cover Mapping of North and South Karanpura Coalfields based on Satellite Data of the Year 2018
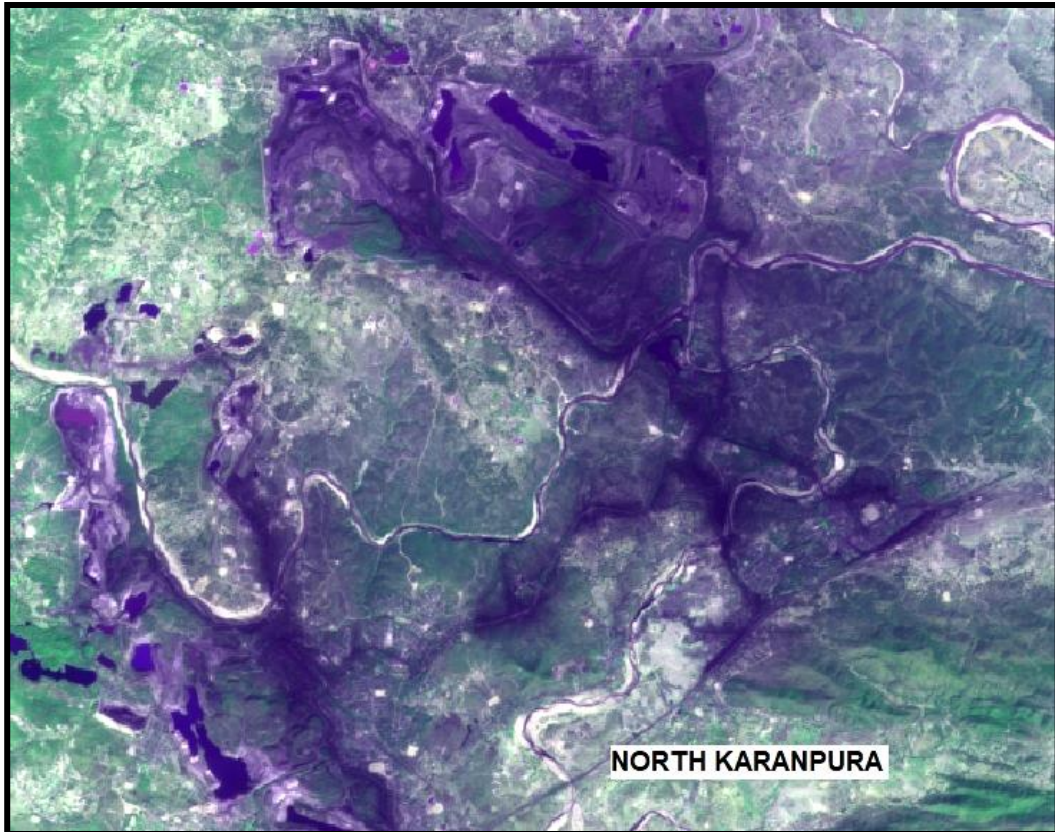
NORTH KARANPURA

Submitted to
**Central Coalfields Ltd
Ranchi**

cmpdi
A Mini-Ratna Company

Report on Vegetation Cover Mapping of North and South Karanpura Coalfields based on Satellite Data of the Year 2018

Submitted to
**Central Coalfields Ltd.
Ranchi**

March - 2019

**Remote Sensing Cell, Geomatics Division
CMPDI (HQ), Ranchi**

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(8)   Aim of the Report   To prepare Vegetation cover Map of North & South Karanpura Coalfields on 1:50000 scale based on IRS R-2 L4 MX Satellite data for assessing the impact of coal mining on vegetation cover.

(9)   Executing Unit   Remote Sensing Cell,

                                  Geomatics Division,

                                  Central Mine Planning & Design Institute Limited,

                                  Gondwana Place, Kanke Road, Ranchi 834031.

(10) User Agency   Central Coalfields Ltd.

(11) Authors   Hariharalal B, Sr. Manager (System)

                                  A. K. Singh, Chief Manager (E&M/ RSC)

                                  Rajneesh Kumar, HoD (Geomatics)

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(14) Distribution Statement   Official

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List of Maps/ Plates prepared on a scale of 1:50,000 are given below:

1. Plate No.1: HQ/REM/A0/18/001: IRS-R2 LISS-IV FCC of North & South Karanpura Coalfield.

2. Plate No.2: HQ/REM/A0/18/002: Vegetation Cover Map of North & South Karanpura Coalfield based on IRS – R2/ LISS-IV data.

Chapter 1

Introduction

1.1 Project Reference

In view of the urgent need of creating the geo-environmental database of coalfields for monitoring the impact of coal mining on vegetation cover, M/s Coal India Ltd directed CMPDIL to take up the study through the techniques of Remote Sensing. Accordingly, a road map was submitted to Coal India Ltd to implement the project of vegetation cover monitoring of major coalfields at regular interval of three years. A work order numbering CIL/WBP/Env/2009/2428 dated 29-12-2009 was issued by CIL to CMPDIL initially for a period of three years. After this, the work order was renewed periodically, and the latest work order is vide letter no. CIL/WBP/ENV/2017/DP/8477 dated 21-09-2017 for a period of 5 years up to 2021-22 for land reclamation monitoring of the opencast projects and vegetation cover mapping of 19 major coalfields as per a defined plan for monitoring the impact of coal mining on vegetation cover.

1.2 Objectives

The objectives of the present study are to prepare a regional vegetation cover map of Karanpura Coalfields (North and South) on 1:50,000 scale based on IRS R2 LISS-IV satellite data of the year 2018, using digital image processing technique for accessing the impact of coal mining and associated industrial activities on the vegetation cover in the coalfield area with respect to the earlier study carried out in the year 2015.

1.3   Location & Accessibility

Karanpura Coalfield (KCF), situated about 60 km north-west of Ranchi and 20 km south-west of Hazaribagh, forms part of Ranchi, Hazaribagh, Ramgarh, Latehar and Chatra districts of Jharkhand State. The study area is bounded between North Latitudes $23^0 37'16''$ to $23^0 58'05''$ and East longitudes $84^0 45'00''$ to $85^0 28'44''$ and is covered by Survey of India (SoI) toposheet Nos. $73^A/_{13}$, $73^A/_{14}$, $73^E/_1$, $73^E/_2$, $73^E/_5$ & $73^E/_6$. The new series (2009) numbers are F45(A13, A14, B1, B2, B5 & B6). The location map and the incidence of study area on toposheets are shown in Figure 2.1. The area extends for about 35 km in north-south direction and 75 km in east-west direction encompassing an area of about **1420** sq. km. The Ashwa Pahar hill ranges divide the area into North Karanpura Coalfield (NKCF) and South Karanpura Coalfield (SKCF).

NKCF is approachable from Ranchi on the southern side and Hazaribagh on the northern side. Khalari town is connected with Ranchi by all-weather metalled road, which in turn connects Tandwa, Barkagaon, Hazaribgh and Chatra towns. Though, the southern side of the Damodar river in the NKCF is approachable throughout the year, part of the northern portion remains cut off from Hazaribagh and Barkagaon during the monsoon season due to the absence of good road bridges on Garhi Nadi, Chundru Nala, Sadabahar Nala and other streams. The eastern and western parts of NKCF are connected with Tandwa by roads.

SKCF, both on the northern and southern sides of Damodar river, is approachable from Ramgarh town located on the Hazaribagh-Ranchi National Highway No.33 and also from Ranchi via Patratu by an all weathered metalled road.

KCF is also covered by Barkakana-Daltanganj branch of broad gauge railway line of the Eastern Railways connecting Gomoh and Dehri-on-Son. Mahauamilan, McCluskiganj, Khalari, Ray, Kole and Hendegir railway stations fall in NKCF, and Patraru, Bhurkunda, Barkakana and Argada railway stations fall in SKCF.

1.4 Drainage

The Karanpura Coalfields (NKCF and SKCF) forms a part of the Damodar river basin. The general flow direction of the Damodar river is from west to east and is locally characterized by open and closed meanders. Some of the tributaries and sub-tributaries originate within the Karanpura Coalfield and others originate in the crystalline rocks outside the study area. Garhi Nadi and Haharo Nadi are the two major tributaries of the Damodar river, flowing in the study area, which bring the discharge from various 2nd and 3rd order steams in the study area, and drain southwards through crystalline and sedimentary rocks of Gondwana Super Group. The smaller tributaries like Saphi Nadi, Chati Nala, Naikari Nadi etc. join the Damodar river from south and Nagarnadia Nala, Bandagarha Nala, Bolhariya Nala, Koti Nala, Patratu Nadi etc. join from the northern side. Apart from these, numerous streams/rivulets also join the Damodar river directly at different locations.

The central part of the Karanpura Coalfield is covered by Garhi Nadi and Haharo Nadi watersheds. The major tributaries of Garhi Nadi are Daini, Chundru, Kuhubad, Satkundariya, Sadabahar Nala, Barki, Medhiya & Garua. The major tributaries of Haharo Nadi are Kukkurduba, Patra, Hendraj, Harhori, Lathorwa, Ghaghra, Damuhani, Pakwa, Badamahi & Rajhar.

Mainly, the dendritic and parallel drainage patterns are prevalent in the area. The dendritic drainage is developed mainly in the moderate to deeply weathered pediplain over sedimentary and crystalline rocks indicating lack of structural control. The parallel type of drainage pattern is more common on the hill slopes of sedimentary and crystalline rocks. At places, joints/fractures also exhibit control on the stream pattern. Gullying is also common at places resulting in undulated land topography.
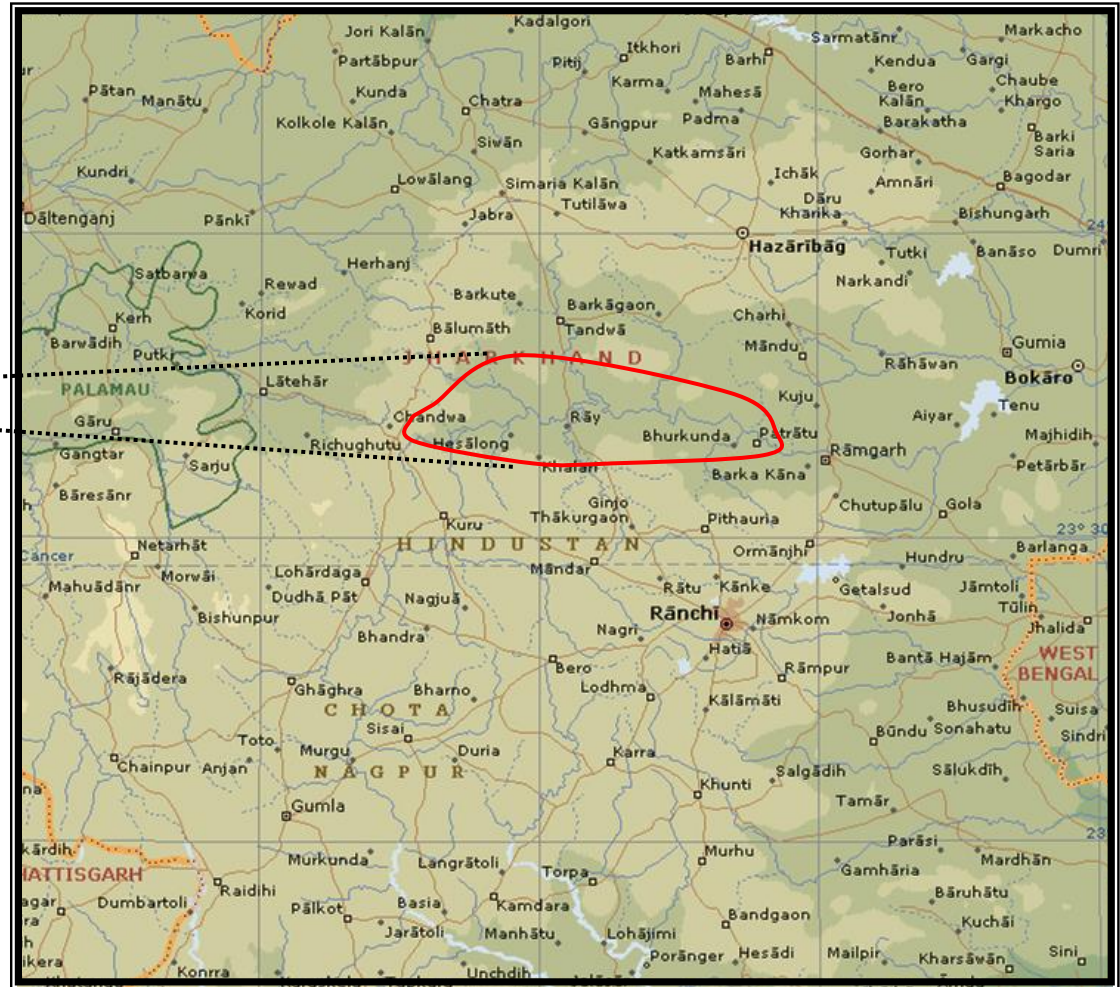
Fig. 1.1 : **Location Map of Karanpura Coalfield**

Chapter 2

Remote Sensing Concepts and Methodology

2.1 Remote Sensing

Remote sensing is the science and art of obtaining information about an object or area through the analysis of data acquired by a device that is not in physical contact with the object or area under investigation. The term *remote sensing* is commonly restricted to methods that employ electro-magnetic energy (such as light, heat and radio waves) as the means of detecting and measuring object characteristics.

Figure 2.1 Remote sensing radiation system
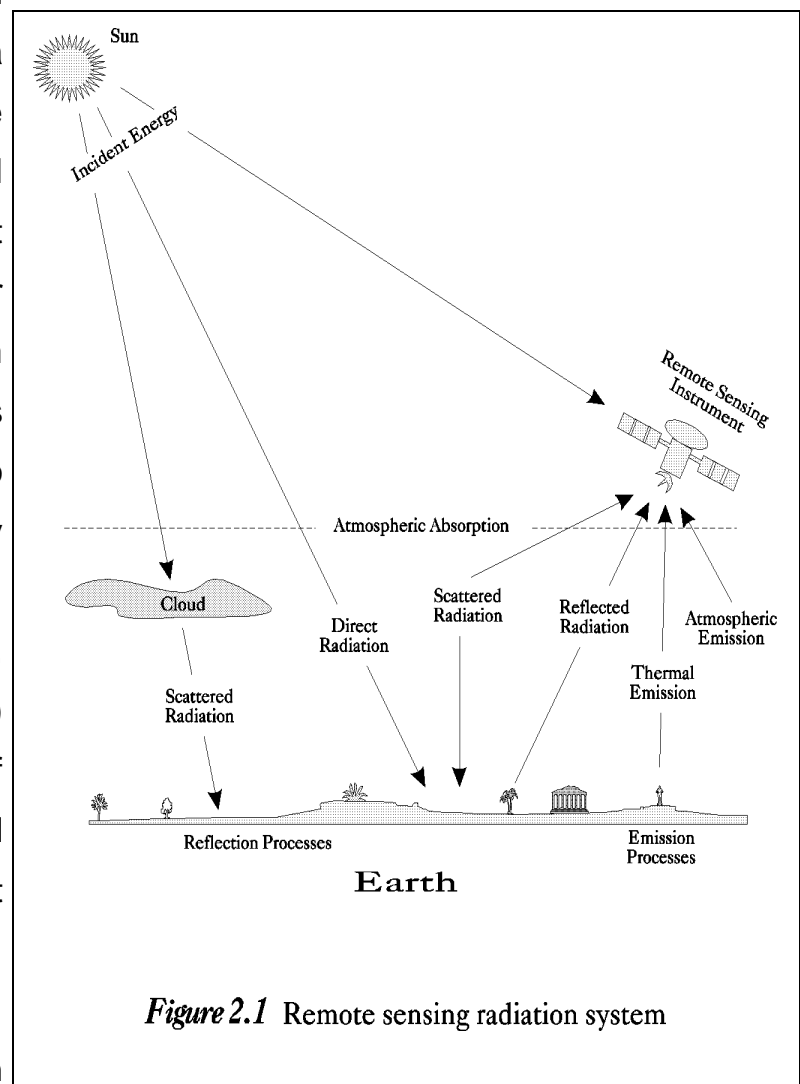
All physical objects on the earth surface continuously emit electromagnetic radiation because of the oscillations of their atomic particles. Remote sensing is largely concerned with the measurement of electro-magnetic energy from the

SUN, which is reflected, scattered or emitted by the objects on the surface of the earth. Figure 2.1 schematically illustrate the generalised processes involved in electromagnetic remote sensing of the earth resources.

2.2   Electromagnetic Spectrum

The electromagnetic (EM) spectrum is the continuum of energy that ranges from meters to nanometres in wavelength and travels at the speed of light. Different objects on the earth surface reflect different amounts of energy in various wavelengths of the EM spectrum.
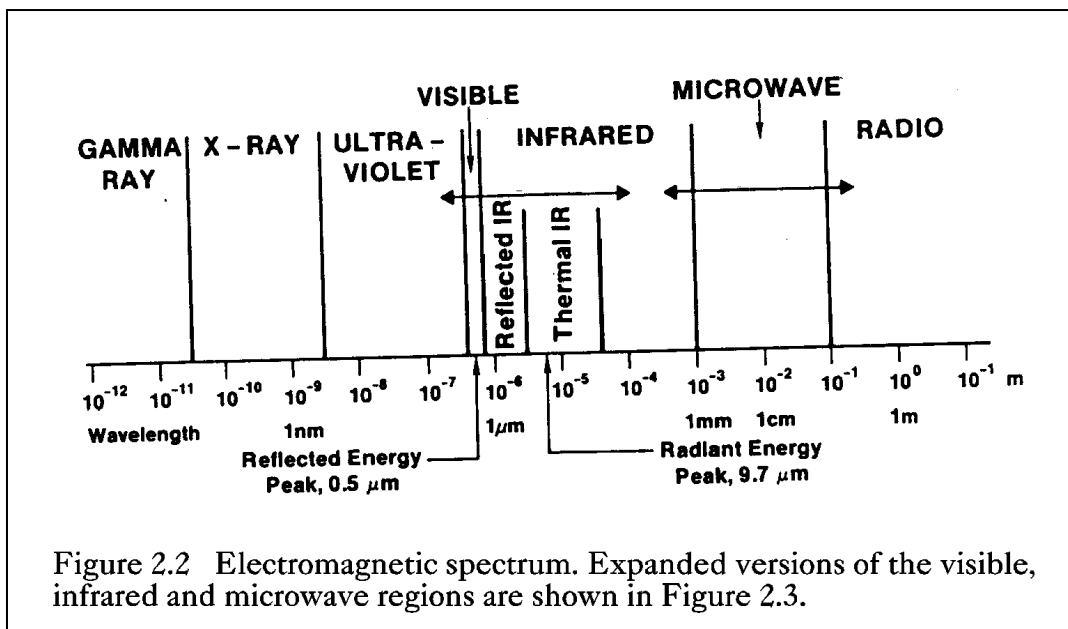
Figure 2.2   Electromagnetic spectrum. Expanded versions of the visible, infrared and microwave regions are shown in Figure 2.3.

Figure 2.2 shows the electromagnetic spectrum, which is divided on the basis of wavelength into different regions that are described in Table 2.1. The EM spectrum ranges from the very short wavelengths of the gamma-ray region to the long wavelengths of the radio region. The visible region (0.4-0.7μm wavelengths) occupies only a small portion of the entire EM spectrum.

Energy reflected from the objects on the surface of the earth is recorded as a function of wavelength. During daytime, the maximum amount of energy is reflected at 0.5μm wavelengths, which corresponds to the green band of the visible region, and is called the *reflected energy peak* (Figure 2.2). The earth

also radiates energy both day and night, with the maximum energy 9.7μm wavelength. This *radiant energy peak* occurs in the thermal band of the IR region (Figure 2.2).
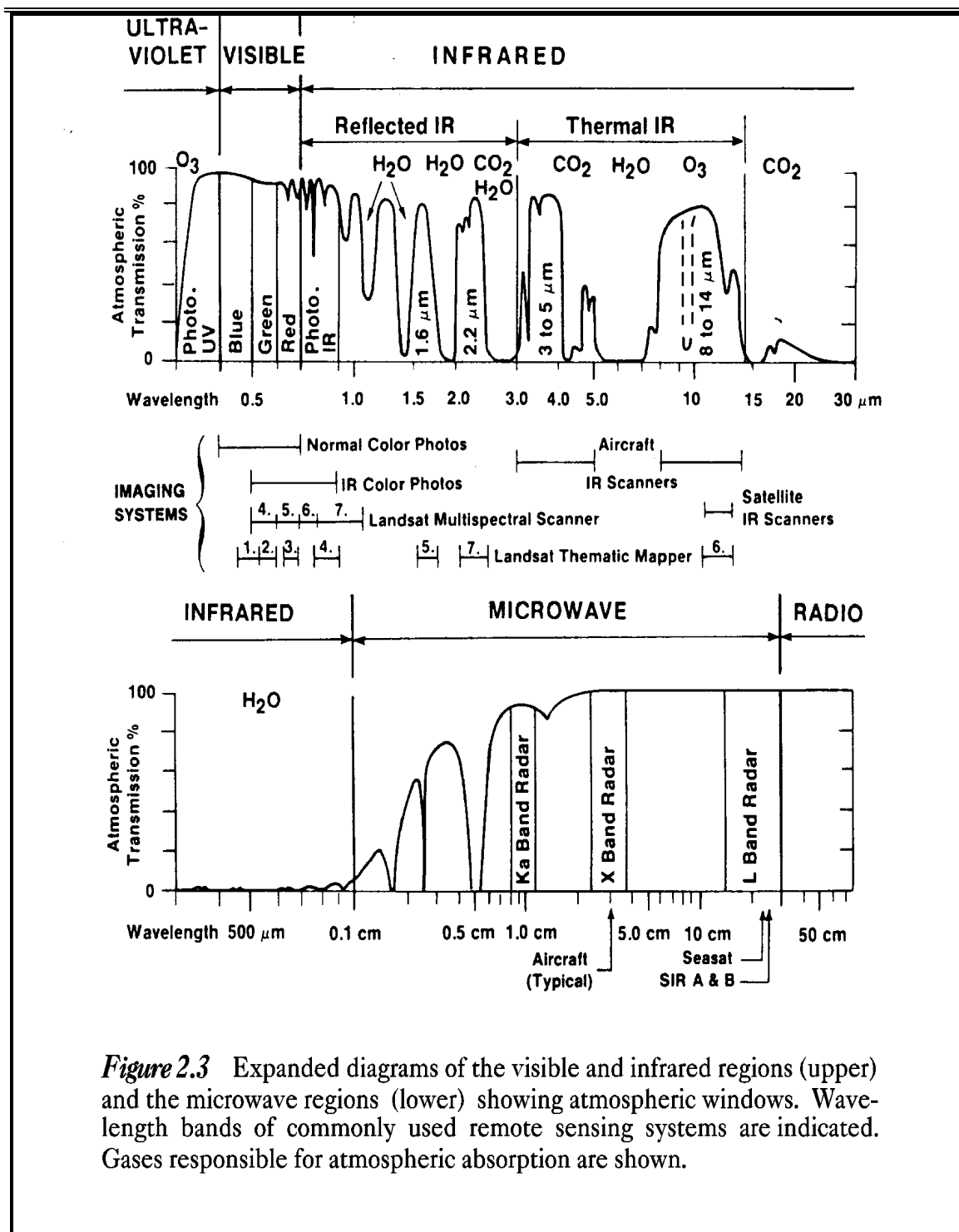
Figure 2.3 Expanded diagrams of the visible and infrared regions (upper) and the microwave regions (lower) showing atmospheric windows. Wavelength bands of commonly used remote sensing systems are indicated. Gases responsible for atmospheric absorption are shown.

Table 2.1 Electromagnetic spectral regions

Region	Wavelength				Remarks
Gamma ray		<	0.03	**nm**	Incoming radiation is completely absorbed by the upper atmosphere and is not available for remote sensing.
X-ray	0.03	to	3.00	**nm**	Completely absorbed by atmosphere. Not employed in remote sensing.
Ultraviolet	0.03	to	0.40	**µm**	Incoming wavelengths less than 0.3mm are completely absorbed by Ozone in the upper atmosphere.
Photographic UV band	0.30	to	0.40	**µm**	Transmitted through atmosphere. Detectable with film and photo detectors, but atmospheric scattering is severe.
Visible	0.40	to	0.70	**µm**	Imaged with film and photo detectors. Includes reflected energy peak of earth at 0.5mm.
Infrared	0.70	to	100.00	**µm**	Interaction with matter varies with wavelength. Absorption bands separate atmospheric transmission windows.
Reflected IR band	0.70	to	3.00	**µm**	Reflected solar radiation that contains no information about thermal properties of materials. The band from 0.7-0.9mm is detectable with film and is called the *photographic IR band*.
Thermal IR band	3.00 8.00	to to	5.00 14.00	**µm** **µm**	Principal atmospheric windows in the thermal region. Images at these wavelengths are acquired by optical-mechanical scanners and special vediocon systems but not by film.
Microwave	0.10	to	30.00	**cm**	Longer wavelengths can penetrate clouds, fog and rain. Images may be acquired in the active or passive mode.
Radar	0.10	to	30.00	**cm**	Active form of microwave remote sensing. Radar images are acquired at various wavelength bands.
Radio		>	30.00	**cm**	Longest wavelength portion of electromagnetic spectrum. Some classified radars with very long wavelength operate in this region.

The earth's atmosphere absorbs energy in the gamma-ray, X-ray and most of the ultraviolet (UV) region; therefore, these regions are not used for remote sensing. Details of these regions are shown in Figure 2.3. The horizontal axes show wavelength on a logarithmic scale; the vertical axes show percent atmospheric transmission of EM energy. Wavelength regions with high transmission are called *atmospheric windows* and are used to acquire remote sensing data. Detection and measurement of the recorded energy enables identification of surface objects (by their characteristic wavelength patterns or spectral signatures), both from air-borne and space-borne platforms.

2.3 Scanning System

The sensing device in a remotely placed platform (aircraft/satellite) records EM radiation using a *scanning system*. In scanning system, a *sensor*, with a narrow field of view is employed; this sweeps across the terrain to produce an image. The sensor receives electromagnetic energy radiated or reflected from the terrain and converts them into signal that is recorded as numerical data. In a remote sensing satellite, multiple arrays of linear sensors are used, with each array recording simultaneously a separate band of EM energy. The array of sensors employs a spectrometer to disperse the incoming energy into a spectrum. Sensors (or *detectors*) are positioned to record specific wavelength bands of energy. The information received by the sensor is suitably manipulated and transported back to the ground receiving station. The data are reconstructed on ground into digital images. The digital image data on *magnetic/optical media* consist of picture elements arranged in regular rows and columns. The position of any picture element, *pixel*, is determined on a x-y co-ordinate system. Each pixel has a numeric value, called digital number (DN) that records the intensity of electromagnetic energy measured for the ground resolution cell represented by that pixel. The range of digital numbers in an image data is controlled by the radiometric resolution of the satellite's sensor system. The digital image data are further processed to produce master images of the study area. By analysing the digital data/imagery, digitally/visually, it is possible to detect, identify and classify various objects and phenomenon on the earth surface.

Remote sensing technique (airborne/satellite) in conjunction with traditional techniques harbours in an efficient, speedy and cost-effective method for natural resource management due to its inherited capabilities of being multi-spectral, repetitive and synoptic areal coverage. Generation of environmental 'Data Base' on vegetation cover, soil, forest, surface and subsurface water,

topography and terrain   characteristics, settlement and transport network, etc., and their monitoring in near real - time is very useful for environmental management planning; this is possible only with remote sensing data.

2.4 Data Source

The following data are used in the present study:

- **Primary Data**

Remote Sensing Satellite data viz. IRS-R2 LISS-IV of January 2018 having 5 mtr. spatial resolution was used in the present study. The raw digital satellite data was obtained from NRSC, Hyderabad, on CD-ROM media.

- **Secondary Data**

Secondary (ancillary) and ground data constitute important baseline information in remote sensing, as they improve the interpretation accuracy and reliability of remotely sensed data by enabling verification of the interpreted details and by supplementing it with the information that cannot be obtained directly from the remotely sensed data. For **Karanpura Coalfield,** Survey of India topo sheet new series (2009) numbers F45(A13, A14, B1, B2, B5 & B6) as well as map showing location of coal blocks supplied by CCL were used in the study.

2.5 Characteristics of Satellite/Sensor

The basic properties of a satellite's sensor system can be summarised as:

1. Spectral coverage/resolution, i.e., band locations/width; (b) spectral dimensionality: number of bands; (c) radiometric resolution: quantisation; (d) spatial resolution/instantaneous field of view or IFOV; and (e) temporal resolution. Table 2.2 illustrates the basic properties of Resourcesat satellite/sensor that was used in the present study.

Table 2.2 Characteristics of the satellite/sensor used in the present project work

Platform	Sensor	Spectral Bands in µm				Radiometric Resolution	Spatial Resolution	Temporal Resolution	Country
Rsourc esat (R2)	LISS-IV	B2	0.28 - 0.31	Green		10-bit	5.8 m	5 days	India
		B3	0.25 - 0.38	Red			5.8 m		
		B4	0.27 - 0.30	NIR			5.8 m		

NIR: Near Infra-Red

2.6 Data Processing

The details of data processing carried out in the present study are shown in Figure 2.4. The processing methodology involves the following major steps:

(a)   Geometric correction, rectification and geo-referencing;

(b)   Image enhancement;

(c)   Training set selection;

(d)   Signature generation and classification;

(e)   Creation/overlay of vector database;

(f)   Validation of classified image;

(g)   Final thematic map preparation.

```
┌─────────────┐        ┌─────────────┐              ┌──────────────┐
│ Basic Data  │◄──────►│ Data Source │─────────────►│Secondary Data│
└─────────────┘        └─────────────┘              └──────────────┘
       │                                                    │
       ▼                                                    ▼
┌─────────────┐                                   ┌──────────────────┐
│IRS R2 LISS-IV│                                  │Topographical Maps │
└─────────────┘                                   │ (Scale 1:50,000) │
       │                                          └──────────────────┘
       ▼                                                    │
┌─────────────────────┐                                    ▼
│Pre-processing, geo- │                           ┌──────────────────────┐
│metric correction,   │                           │Creation of Vector    │
│rectification & geo- │                           │Database (Drainage,   │
│referencing          │                           │Road Network, Coal    │
└─────────────────────┘                           │block boundary)       │
       │                                           └──────────────────────┘
       ▼                                                    │
┌─────────────┐        ┌──────────────┐                    │
│   Image     │───────►│Geo-coded FCC │                    │
│ Enhancement │        │ Generation   │                    │
└─────────────┘        └──────────────┘                    │
       │                      │                             │
       ▼                      ▼                             │
┌─────────────┐◄─────────────┘                             │
│Training set │                                            │
│Identification│                                           │
└─────────────┘                                            │
       │                                                   │
       ▼                                                   │
┌─────────────┐◄──────────────────────┐                   │
│ Signature   │                        │                   │
│ Generation  │                        │                   │
└─────────────┘                        │                   │
       │                               │                   │
       ▼                        ┌──────────────┐           │
┌─────────────┐                 │Training Set  │           │
│ Pre-Field   │                 │ Refinement   │           │
│Classification│                └──────────────┘           │
└─────────────┘                        ▲                   │
       │                               │                   │
       ▼                               │                   │
┌──────────────────┐   Fail            │                   │
│Validation through│───────────────────┘                   │
│Ground Verification│                                       │
└──────────────────┘                                       │
       │                  ┌──────────────────┐             │
       │                  │Integration of    │             │
       │                  │Thematic          │             │
       │                  │Information on GIS │             │
       │                  └──────────────────┘             │
       ▼          Pass            │                         │
┌──────────────┐          ┌──────────────┐                 │
│Final Vegetation│───────►│   Report     │◄────────────────┘
│ Cover Map    │          │ Preparation  │
└──────────────┘          └──────────────┘
```

Fig-2.4 –Methodology of Vegetation Cover Analysis

2.6.1 Geometric correction, rectification and geo-referencing

Inaccuracies in digital imagery may occur due to 'systematic errors' attributed to earth curvature and rotation as well as 'non-systematic errors' attributed to intermittent sensor malfunctions, etc. Systematic errors are corrected at the satellite receiving station itself while non-systematic errors/ random errors are corrected in pre-processing stage.

In spite of 'System / Bulk correction' carried out at supplier end; some residual errors in respect of attitude attributes still remains even after correction. Therefore, fine tuning is required for correcting the image geometrically using ground control points (GCP).

Raw digital images contain geometric distortions, which make them unusable as maps. A map is defined as a flat representation of part of the earth's spheroidal surface that should conform to an internationally accepted type of cartographic projection, so that any measurements made on the map will be accurate with those made on the ground. Any map has two basic characteristics: (a) scale and (b) projection. While *scale* is the ratio between reduced depiction of geographical features on a map and the geographical features in the real world, *projection* is the method of transforming map information from a sphere (round Earth) to a flat (map) sheet. Therefore, it is essential to transform the digital image data from a generic co-ordinate system (i.e. from line and pixel co-ordinates) to a projected co-ordinate system. In the present study geo-referencing was done with the help of Satellite image data and Survey of India (SoI) topo-sheets so that information from various sources can be compared and integrated on a GIS platform.

An understanding of the basics of projection system is required before selecting any transformation model. While maps are flat surfaces, Earth however is an irregular sphere, slightly flattened at the poles and bulging at the Equator. Map projections are systemic methods for "*flattening the orange peel*" in measurable ways. When transferring the Earth and its irregularities onto the plane surface of a map, the following three factors are involved: (a) geoid (b) ellipsoid and (c) projection. Figure 2.5 illustrates the relationship between these three factors. The *geoid* is the rendition of the irregular spheroidal shape of the Earth; here the variations in gravity are taken into account. The observation made on the geoid is then transferred to a regular geometric reference surface, the *ellipsoid*. Finally, the geographical relationships of the ellipsoid (in 3-D form) are transformed into the 2-D plane of a map by a transformation process called map projection. As shown in Figure 2.5, the vast majority of projections are based upon *cones*, *cylinders* and *planes*.

cylindrical

conic

azimuthal

geoid
rendition of the
irregular spheroidal shape
of the Earth
(slightly flattened at the poles
and bulging at the Equator)

ellipsoid
geometric
reference
surface

projection
one of three types
(discussed later in this chapter)

map
shown here:
result of cylindrical projection

Fig 2.5 : Geoid – Ellipsoid – Projection Relationship
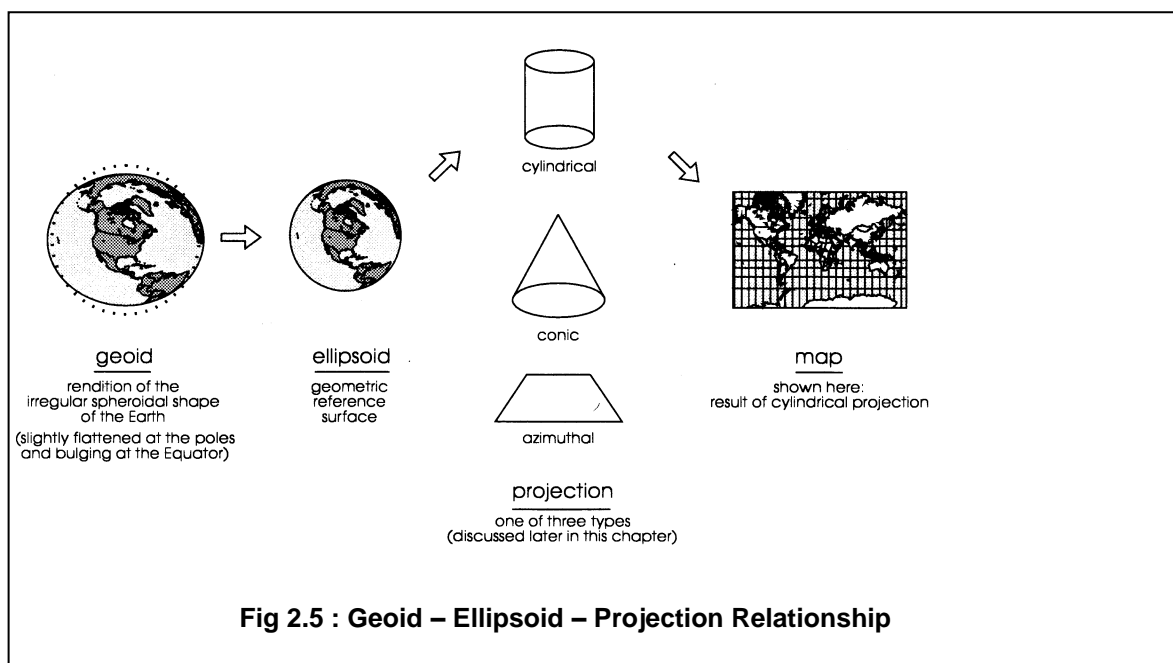
In the present study, ***UTM Projection*** with ***WGS-84 Spheroid model*** was used to prepare the map. Maps prepared using these projections are compatible with all the standard GIS platforms, and can be directly used over

Google Earth too. Distances, areas and shapes are true along central meridian. Distortion may happen slightly, away from central meridian.

2.6.2 Image enhancement

To improve the interpretability of the raw data, image enhancement is necessary. Most of the digital image enhancement techniques are categorised as either point or local operations. Point operations modify the value of each pixel in the image data independently. However, local operations modify the value of each pixel based on brightness value of neighbouring pixels. Contrast manipulations/ stretching technique based on local operation was applied on the image data using Erdas IMAGINE s/w. The enhanced and geocoded FCC image of Karanpura Coalfield is shown in Plate No. 1.

2.6.3 Training set selection

The image data were 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 vegetation 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. Based on the variability of vegetation cover condition and terrain characteristics and accessibility, around 150 points were selected to generate the training sets.

2.6.4 Signature generation and classification

Image classification was 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 was 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. The aerial extent of each vegetation cover class in the coalfield was determined using ERDAS IMAGINE s/w. The classified image for the year 2018 for Karanpura Coalfield is shown in Plate No. 2.

2.6.5 Creation/overlay of vector database

Plan showing coal block boundary are superimposed on the image as vector layer in the Arc GIS database. Road network, rail network and drainage network are also digitised on Arc GIS database and superimposed on the classified image.

2.6.6 Validation of classified image

Ground truth survey was carried out for validation of the interpreted results from the study area. Based on the validation, classification accuracy matrix was prepared. The classification accuracy matrix is shown in Table 2.3.

Classification accuracy in case of Plantation on OB Dump, Settlements and Barren OB Dump was 100%. Classification accuracy in case of Dense Forest and Water Bodies lie between 90% and 100%. In case of open forest and agriculture land, the classification accuracy varies from 85.0% to 90.0%. Classification accuracy for scrubs was 70% due to poor *signature separability index*. The overall classification accuracy in case of **Karanpura Coalfield** was 94%.

2.6.7 Final vegetation cover map preparation

Final vegetation cover map (Plate - 2) was printed using HP Designjet 4500ps Colour Plotter. The maps are prepared on 1:75,000 scale and enclosed as drawing No. HQ/REM/002 along with the report. A soft copy in .pdf format is also enclosed.   .

Table 2.3 : Classification Accuracy Matrix for Karanpura Coalfield in the Year 2018

Sl. No.	Classes in the Satellite Data	Class	Total Obsrv. Points	Vegetation cover classes as observed in the field									
				C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
1	Urban Settlement	C1	05	5									
2	Dense Forest	C2	10		8	1	1						
3	Open Forest	C3	10		1	8	1						
4	Scrubs	C4	10				7	1					
5	Social Forestry	C5	10				1	8	1				
6	Agriculture Land	C6	10					1	9				
7	Barren OB	C7	10							10			
8	Plantation Area	C8	10								10		
9	Quarry Area	C9	10									10	
10	Water Bodies	C10	10										10
Total no. of observation points			95	05	10	10	10	10	10	10	10	10	10
% of commission				00.0	10.0	10.0	30.0	20.0	10.0	0.0	0.0	0.0	0.0
% of omission				00.0	10.0	10.0	30.0	20.0	10.0	0.0	0.0	0.0	0.0
% of Classification Accuracy				100.0	90.0	90.0	70.0	80.0	90.0	100.0	100.0	100.0	100.0

Overall Accuracy (%)	94.00

Chapter 3

Vegetation Cover Mapping

3.1 Introduction

Land is one of the most important natural resource on which all human activities are based. Therefore, knowledge on different type of lands as well as its spatial distribution in the form of map and statistical data is vital for its geospatial planning and management for optimal use. In mining industry, the need for information on vegetation cover pattern has gained importance due to the all-round concern on environmental impact of mining. The information on vegetation cover inventory that includes type, spatial distribution, aerial extent, location, rate and pattern of change of each category is of paramount importance for assessing the impact of coal mining on vegetation cover.

Remote sensing data with its various spectral and spatial resolution offers comprehensive and accurate information for mapping and monitoring of vegetation cover pattern, dynamics of changing pattern and trends over a period of time. By analysing the data of different cut-off dates, impact of coal mining on vegetation cover can be determined.

3.2 Vegetation Cover Classification

The array of information available on vegetation cover requires to be arranged or grouped under a suitable framework in order to facilitate the creation of a vegetation cover database. Further, to accommodate the changing vegetation cover pattern, it becomes essential to develop a standardised classification system that is not only flexible in nomenclature

and definition, but also capable of incorporating information obtained from the satellite data and other different sources.

The present framework of vegetation cover classification has been primarily based on the '***Manual of Nationwide Land Use/ Land Cover Mapping Using Satellite Imagery***' developed by National Remote Sensing Centre, Hyderabad. Vegetation cover map was prepared on the basis of image interpretation carried out based on the satellite data for the year 2018 for North Karanpura & South Karanpura coalfields and following vegetation cover classes are identified (Table 3.1).

Table 3.1: *Vegetation cover classes identified in Karanpura Coalfield*		
	Level -I	*Level -II*
1	**Vegetation Cover**	1.1 Dense Forest 1.2 Open Forest 1.3 Scrubs 1.4 Social Forestry 1.5 Plantation on Backfill 1.6 Plantation on OB Dumps
2	**Agricultural Land**	2.1 Crop Land 2.2 Fallow Land
3	**Wasteland**	3.1 Barren Rocky Land 3.2 Waste upland with/without scrubs 3.3 Fly Ash Pond 3.4 Sand body
4	**Mining**	4.1 Coal Quarry 4.2 Area under Backfill 4.3 Barren OB Dump 4.4 Quarry filled with Water 4.5 Coal Stock 4.6 Advance Quarry Site
5	**Settlement/ Built-Up Land**	5.1 Urban 5.2 Rural 5.3 Industrial
6	**Water bodies**	6.1 River/ Streams/ Reservoir/ Ponds

Following maps are prepared on 1:75,000 scale:

Plate No. 1 : Map No. HQ/REM/A0/18/001: FCC (IRS R2 LISS-IV data of Karanpura 2018) with all the block boundaries of Karanpura coalfield region.

Plate No. 2 : Map No. HQ/REM/A0/18/002 - Vegetation Cover Map of Karanpura Coalfield based on IRS R2-L4 MX data.

3.3 Data Analysis & Change Detection

Satellite data of the year 2018 were processed using ERDAS IMAGINE 2014 image processing s/w in order to interpret the various vegetation cover classes present in the study area of North Karanpura and South Karanpura covering 1224.00 and 194.87 sq. kms respectively. The area of each vegetation cover class for Karanpura Coalfield were calculated using ERDAS IMAGINE s/w and tabulated in Table 3.2A and Table 3.2B. Distribution of various vegetation cover classes are shown in the Pie Diagrams (Fig. 3.1,Fig. 3.2).

3.3.1 Settlement/ Built-up land

All the man-made constructions covering the land surface are included under this category. Built-up land has been divided in to rural, urban and industrial classes based on availability of infrastructure facilities.

Total area of settlements in NKCF covers 24.86 km^2 (2.03%) which includes Urban (3.38 km^2; 0.28%), Rural (14.25 km^2 ; 1.16%) and Industrial (7.23 km^2 ; 0.59%) *(Refer Table 3.2A)*.

Total area of settlements in SKCF covers 9.02 km^2 (4.63%) which includes Urban (3.76 km^2; 1.93%), Rural (3.36 km^2 ; 1.72%) and Industrial (1.90 km^2 ; 0.98%) *(Refer Table 3.2B)*.

3.3.2 Vegetation Cover

Vegetation cover is an association of trees and other vegetation type capable of producing timber and other forest produce. It is also defined as the percentage of soil which is covered by green vegetation. Leaf area index (LAI) is an alternative expression of the term vegetation cover which gives the area of leaves in m^2 corresponding to an area of one m^2 of ground. Primarily vegetation cover is classified into the following three sub-classes based on crown density as per modified FAO-1963 (Food & Agricultural Organisation of United Nations) norms: (a) dense forest (crown density more than 40%), (b) open/degraded forest (crown density between 10% to 40%), and (c) scrubs (crown density less than 10%). The plantation that has been carried out on wasteland along the roadside and on the overburden dumps is also included under vegetation cover as social forestry and plantation on over-burden dumps respectively. The percentage of vegetation cover shown in the analysis here are in terms of total vegetation cover only.

Details of area statistics of the vegetation cover in North Karanpura and South Karanpura area is given in Table 3.2A & Table 3.2B respectively.

Analysis of data reveals that vegetation cover in NKCF occupies an area of 520.37 km^2 (42.51%). Out of which dense forest occupies 146.16 km^2 (11.94%), open forest cover occupies 249.30 km^2 (20.37%), scrub covers 112.26 km^2 (9.17%) of the area. Plantation under social forestry covers an area of 5.05 km^2 (0.41%) and plantation on OB dumps and backfill has 7.6 km^2 (0.62%) of area under its coverage.

Vegetation cover got increased by an area of 2.61 km^2 during 2015-18, mainly due to the increase in scrubs & change of agricultural land due to mining related activities in some of the big OCPs like Amrapali, Magadh etc.

Analysis of data reveals that vegetation cover in SKCF occupies an area of 95.95 km^2 (49.24%). The dense forest occupies 2.61 km^2 (1.34%), open

forest cover occupies 27.30 km^2 (14.01%), scrub covers 41.79 km^2 (21.45%) of the area. Plantation under social forestry covers an area of 15.70 km^2 (8.06%) and plantation on OB dumps & backfill has 8.55 km^2 (4.38%) of area under its coverage.

Vegetation cover got reduced by an area of 2.94 km^2 during 2015-18, mainly due to the advancement of mining and related activities, and some mix up with the agriculture areas on account of separability problems.

3.3.3 Agriculture

Land primarily used for farming and production of food, fibre and other commercial and horticultural crops falls under this category. It includes crop land and fallow land. Crop lands are those agricultural lands where standing crop occurs on the date of satellite imagery or land is used for agricultural purposes during any season of the year. Crops may be either kharif or rabi. Fallow lands are also agricultural land which is taken up for cultivation but temporarily allowed to rest, un-cropped for one or more season. In this study, both crop land and fallow land has been shown separately, and together shown as agricultural land.

Analysis of data reveals that agriculture that covers in NKCF occupies an area of 630.49 km^2 (51.51%). Out of which crop land is 263.61 km^2 (21.54%) and fallow land covers an area of 366.88 km^2 (29.97%).

Analysis of data reveals that agriculture land covers in SKCF occupies an area of 69.40 km^2 (35.61%). Out of which crop land is 25.60 km^2 (13.14%) and fallow land is 43.80 km^2 (22.48%).

3.3.4 Mining

The mining area includes the area of existing quarry, area under backfilling, barren OB dumps, old quarries filled with water, advance quarry sites and coal stock/dumps.

The mining activities covers an area of 20.16 km^2 (1.65%) in NKCF. Out of which 4.87 km^2 (0.40%) area is under coal quarry, 12.19 km^2 (1.00%) is under barren OB dump/ backfill and 0.42 km^2 (0.03%) comes under advance quarry site. The area increased by 7.23 km^2 on account of increased mining activities in various OCPs and opening of Amarapali and Magadh OCPs during this period.

The mining activities cover an area of 11.73 km^2 (6.02%) in the SKCF, Out of which 2.70 km^2 (1.39%) area is under coal quarry, and 6.41 km^2 (3.29%) area is under barren OB dump/ backfill.

The total mining area increased by 1.39 km^2 on account of the increased mining activities in various OCPs and OB/ backfilled areas during this period.

3.3.5 Wasteland

Wasteland is a degraded and under-utilised class of land that has deteriorated on account of natural causes or due to lack of appropriate water and soil management. Wasteland can result from inherent/imposed constraints such as location, environment, chemical and physical properties of the soil or financial or other management constraints (NWDB, 1987).

Analysis of data reveals that the area of only wasteland in NKCF is 11.02 km^2 (0.90%) and in SKCF is 4.14 km^2 (2.12%)

3.3.5 Surface Water bodies

Analysis of data reveals that surface water bodies in NKCF & SKCF covers an area of 17.10 km^2 (1.40%) and 4.63 Km^2 (2.38%) respectively. The surface water decreased only marginally due to the mining activities and more due to the climatic and natural drying up reasons.

Table 3.2 A

Change in Vegetation cover in North Karanpura
Coalfield during the year 2015 - 2018

(Based on IRS – R2 / L4 MX Data)

Sl. No.	Vegetation Cover Classes		January 2015		January 2018		Change in area	Possible Reasons for Change
			IRS – R2 / L4 MX		IRS – R2 / L4 MX			
	Level - I	Level - II	Km²	%	Km²	%	Km²	
1	**Forest Area**	Dense Forest	146.36	11.96	146.16	11.94	-0.20	Natural degradation and mine opening in Amarapli & Magadh OC.
		Open Forest	249.70	20.40	249.30	20.37	-0.40	
		Sub – Total	**396.06**	**32.36**	**395.46**	**32.31**	-0.60	
2	**Scrubs**	Scrubs	**107.22**	**8.76**	**112.26**	**9.17**	5.04	
3	**Plantation Area**	Social Forestry	4.88	0.40	5.05	0.41	0.17	Trees cut in dip sides of Piparwar for mining & other infrastructural set-ups
		Plantation on OB Dump/ Backfill	9.60	0.78	7.60	0.62	-2.00	
		Sub – Total	**14.48**	**1.18**	**12.65**	**1.03**	**-1.83**	
		Total Vegetation area (1+2+3)	**517.76**	**42.30**	**520.37**	**42.51**	**2.61**	
4	**Agricultural Land**	Crop Land	271.91	22.21	263.61	21.54	-8.30	Due to advancement of mining in Ashok, Pip-arwar, Amarapali etc.
		Fallow Land	367.05	29.99	366.88	29.97	-0.17	
		Sub – Total	**638.96**	**52.20**	**630.49**	**51.51**	**-8.47**	
5	**Wasteland**	Waste up land with / without Scrubs	4.83	0.39	7.29	0.60	2.46	Land used for mining and other activities, development of roads, rail etc.
		Rocky Land	0.53	0.04	0.83	0.07	0.30	
		Sand Body	2.80	0.23	2.90	0.24	0.10	
		Sub – Total	**8.16**	**0.67**	**11.02**	**0.90**	**2.86**	
6	**Mining Area**	Coal Quarry	4.57	0.37	4.87	0.40	0.30	Advancement of mining activities in big OC mines of NK area and resultant OB/backfill area.
		Backfilling	3.83	0.31	9.05	0.74	5.22	
		Barren OB Dump	2.24	0.18	3.14	0.26	0.90	
		Water filled Quarry	1.22	0.10	1.98	0.16	0.76	
		Coal Dump	0.67	0.05	0.70	0.06	0.03	
		Advance Quarry Site	0.40	0.03	0.42	0.03	0.02	
		Sub – Total	**12.93**	**1.06**	**20.16**	**1.65**	**7.23**	
7	**Settlements**	Urban	4.48	0.37	3.38	0.28	-1.10	Data correction & Shifting of settlements for mining and allied activities.
		Rural	16.25	1.33	14.25	1.16	-2.00	
		Industrial	8.23	0.67	7.23	0.59	-1.00	
		Sub – Total	**28.96**	**2.37**	**24.86**	**2.03**	**-4.10**	
8	**Water Body**	River, Ponds	**17.23**	**1.41**	**17.10**	**1.40**	**-0.13**	Natural reasons, drying up
		TOTAL	**1224.00**	**100.00**	**1224.00**	**100.00**		

Table 3.2 B

Change in Vegetation cover in South Karanpura
Coalfield during the year 2015 - 2018

(Based on IRS – R2 / L4 MX Data)

Sl. No.	Vegetation Cover Classes		January 2015		January 2018		Change in area	Possible Reasons for Change
			IRS – R2 / L4 MX		IRS – R2 / L4 MX			
	Level - I	Level - II	Km²	%	Km²	%	Km²	
1	**Forest Area**	Dense Forest	2.68	1.38	2.61	1.34	-0.07	Natural degradation and becoming scrubs.
		Open Forest	27.84	14.29	27.30	14.01	-0.54	
		Sub – Total	**30.52**	**15.66**	**29.91**	**15.35**	-0.61	
2	**Scrubs**	Scrubs	**40.60**	**20.83**	**41.79**	**21.45**	1.19	
3	**Plantation Area**	Social Forestry	16.86	8.65	15.70	8.06	-1.16	Mining & other infrastructural setups, some agri. area mix-up
		Plantation on OB Dump/ Backfill	10.91	5.59	8.55	4.38	-2.36	
		Sub – Total	**27.77**	**14.25**	**24.25**	**12.44**	-3.52	
		Total Vegetation area (1+2+3)	**98.89**	**50.75**	**95.95**	**49.24**	**-2.94**	
4	**Agricultural Land**	Crop Land	26.16	13.42	25.60	13.14	-0.56	Due to human interference and other activities etc.
		Fallow Land	42.81	21.97	43.80	22.48	0.99	
		Sub – Total	**68.97**	**35.39**	**69.40**	**35.61**	**0.43**	
5	**Wasteland**	Waste up land with / without Scrubs	1.74	0.89	2.54	1.30	0.80	Land used for mining and other activities, development of roads, rail etc.
		Rocky Land	0.00	0.00	0.00	0.00	0	
		Sand Body	1.04	0.53	1.60	0.82	0.54	
		Sub – Total	**2.78**	**1.43**	**4.14**	**2.12**	**1.34**	
6	**Mining Area**	Coal Quarry	2.48	1.27	2.70	1.39	0.22	Advancement of mining activities in OC mines of SK area and resultant OB/backfill area.
		Backfilling	1.69	0.87	2.05	1.05	0.36	
		Barren OB Dump	3.82	1.96	4.36	2.24	0.54	
		Water filled Quarry	2.03	1.04	2.20	1.13	0.17	
		Coal Dump	0.20	0.10	0.32	0.16	01.2	
		Advance Quarry Site	0.12	0.06	0.10	0.05	-0.02	
		Sub – Total	**10.34**	**5.31**	**11.73**	**6.02**	**1.39**	
7	**Settlements**	Urban	2.36	1.21	3.76	1.93	1.40	Shifting of settlements for mining and allied activities
		Rural	3.78	1.94	3.36	1.72	-0.42	
		Industrial	3.06	1.57	1.90	0.98	-1.16	
		Sub – Total	**9.20**	**4.72**	**9.02**	**4.63**	**-0.18**	
8	**Water Body**	River, Ponds	**4.69**	**2.41**	**4.63**	**2.38**	**-0.06**	Natural reasons, drying up
		TOTAL	**194.87**	**100.00**	**194.87**	**100.00**		
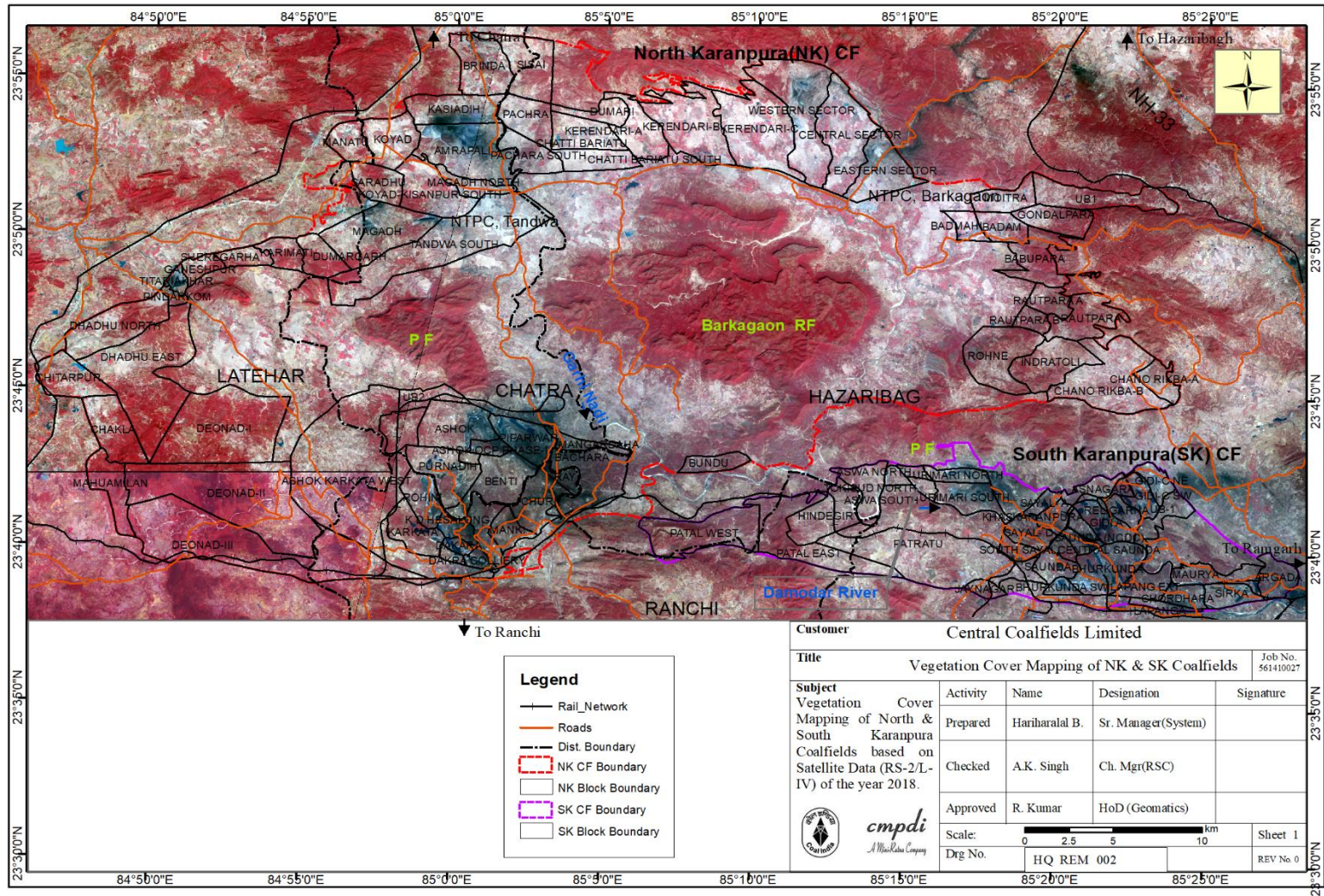
Plate 1 : Geocoded FCC (Band 3, 2, 1) of Karanpura CF based on IRS R2- L4FMX Satellite Data of Year – 2018

Legend

- ┼ Rail_Network
- ── Roads
- ─·─ Dist. Boundary
- ▭ NK CF Boundary
- ▭ NK Block Boundary
- ▭ SK CF Boundary
- ▭ SK Block Boundary

Customer	Central Coalfields Limited			
Title	Vegetation Cover Mapping of NK & SK Coalfields			Job No. 561410027
Subject Vegetation Cover Mapping of North & South Karanpura Coalfields based on Satellite Data (RS-2/L-IV) of the year 2018.	Activity	Name	Designation	Signature
	Prepared	Hariharalal B.	Sr. Manager(System)	
	Checked	A.K. Singh	Ch. Mgr(RSC)	
	Approved	R. Kumar	HoD (Geomatics)	
	Scale:	0 2.5 5 km 10		Sheet 1
	Drg No.	HQ REM 002		REV No. 0

Plate 2 : Vegetation Cover Map of Karanpura CF based on IRS R2 –L4FMX Satellite Data of Year – 2018
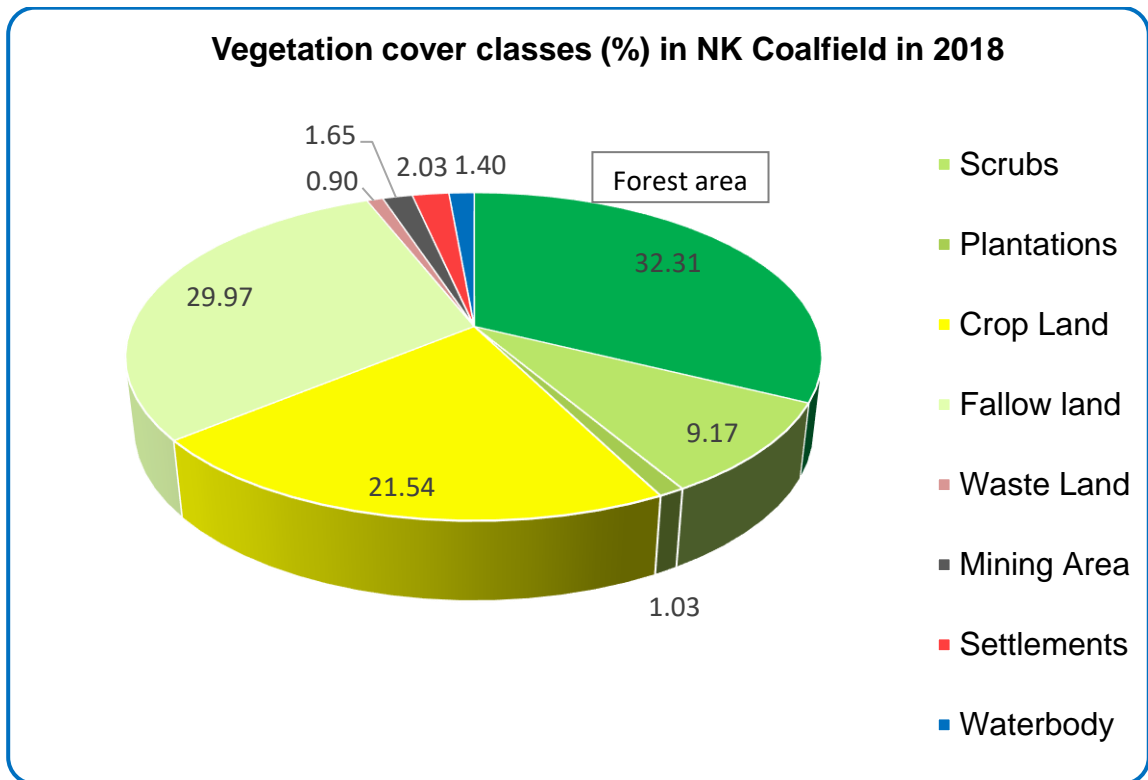
Fig. 3.1A
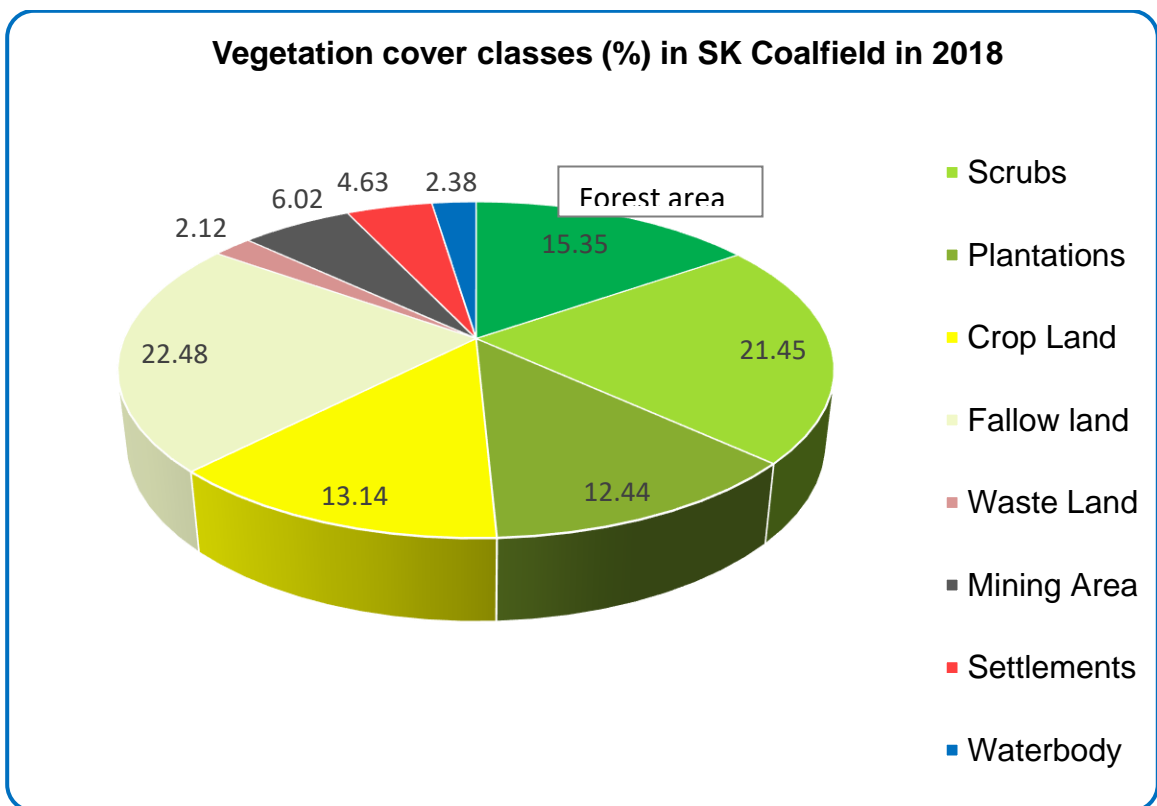
Fig. 3.1B

Chapter 4

Conclusion & Recommendations

4.1 Conclusion

In the present study, vegetation cover mapping has been carried out based on IRS-R2 L-IV, Multi spectral Satellite data of January, 2018 in order to generate the database on vegetation cover in Karanpura Coalfield for monitoring the impact of coal mining on land environment. The vegetation cover data will help in assessing the land restoration status as well as for formulating the mitigation measures required, if any.

Study reveals that the total area of settlements which includes urban, rural and industrial settlements in the NKCF cover an area of 24.86 km^2 (2.03%). Vegetation cover, which includes dense forests, open forests, scrubs, avenue plantation, plantation on overburden dumps and backfilled areas has an area of 520.37 km^2 (42.51%). The analysis further indicates that total agricultural land which includes both crop and fallow land covers an area of 630.49 km^2 (51.51%). The mining area which includes coal quarry, advance quarry site, barren OB dump, backfill and coal dump covers 20.16 km^2 (1.65%). Surface water bodies covered an area of 17.10 km^2 (1.40%).

Two major OCPs (Magadh & Amarpali) have become operational in the NK Coalfield region during this study period, which required further attention in the land classification process of this region. Also, NTPC is setting up a thermal power plant in Tandwa near the Magadh project, which may further affect the land pattern in the coming years.

As the mining activities are progressing at a faster rate, the process of restoration and monitoring of the mined out areas and affected regions need to be enhanced for geo-environmental and ecological protection and socio-economic benefits.

Study reveals that the total area of settlements in the SKCF covers 9.02 km^2 (4.63%). Vegetation cover which includes dense forests open forests, scrubs, avenue plantation, plantation on overburden dumps and backfill covers 95.95 km^2 (49.24%). The analysis further indicates that total agricultural land which includes both crop and fallow land covers 69.40 km^2 (35.61%). The mining area which includes coal quarry, advance quarry site, barren OB dump, backfill and coal dump covers 11.73 km^2 (6.02%). Surface water bodies covered 4.63 km^2 (2.38%) area.

4.2 Recommendations

Keeping in view the sustainable development together with coal mining in the area, it is recommended that similar study should be carried out regularly at an interval of three years to assess the impact of coal mining on vegetation cover in the coalfield to formulate the remedial measures, if any, required for mitigating the adverse impact of coal mining on land environment. Such regional study will also be helpful in assessing the environmental degradation caused by different industrial establishments operating in the coalfield area.

TEST REPORT

12/22 Test Report No. 2006	Job No. 094322160	Year	FY2022-23
Type of Sample	Ambient Air	Quarter Ending	Dec-22
Customer	CCL		
Mode of Receipt of Sample:	Joint sampling with customer		
Testing/ Sampling Protocol:	IS 5182 (part 14): 2000 ,R -2010, Methods for Measurement of Air Pollution, LQR 32		
Remarks & Observation:	All samplers placed 1.5 m above ground level		

TEST RESULT

The sample has been tested with the following results: -

Area : North Karanpura   **Project:** Churi Benti UGP   **Stations:** P.O. Office

Month	Date of Sampling	Date of receipt of sample	Date of analysis	Total Particulate Matter (PM_{10}+ >PM_{10})TPM	Particulate Matter (PM_{10})	Particulate Matter ($PM_{2.5}$)	Sulphur Dioxide (SO_2)	Nitrogen Oxides (as NO_x)	Wind Direction (from) & Weather
				Parameters (in $\mu g/m^3$)					
Oct-22 1st FN	03/10/22-04/10/22	17-10-2022	17/10/22-26/10/22	214	98	63	< 25	< 6	East Sunny
Oct-22 2nd FN	17/10/22-18/10/22	01-11-2022	01/11/22-07/11/22	148	74	35	< 25	< 6	East Sunny
Nov-22 3rd FN	01/11/22-02/11/22	16-11-2022	16/11/22-23/11/22	247	110	48	< 25	< 6	East Sunny
Nov-22 4th FN	16/11/22-17/11/22	01-12-2022	01/12/22-09/12/22	238	106	63	< 25	< 6	East Sunny
Dec-22 5th FN	01/12/22-02/12/22	16-12-2022	16/12/22-21/12/22	182	79	37	< 25	< 6	East Sunny
Dec-22 6th FN	16/12/22-17/12/22	02-01-2023	02/01/23-10/01/23	202	110	54	< 25	< 6	East Sunny

Note:
1. Gazette Notification No. G.S.R 742(E) dt.25th Sept.'2000 is applicable in core zone.
2. Gazette Notification No. G.S.R 826 (E) dt.Nov.'2009 is applicable in buffer zone.

Analysed By   Authorized Signatory

TEST REPORT

12/22 Test Report No. 2207	Job No. 094322160	Year	FY2022-23
Type of Sample	Ambient Air	Quarter Ending	Dec-22
Customer	CCL		
Mode of Receipt of Sample:	Joint sampling with customer		
Testing/ Sampling Protocol:	IS 5182 (part 14): 2000 ,R -2010, Methods for Measurement of Air Pollution, LQR 32		
Remarks & Observation:	All samplers placed 1.5 m above ground level		

TEST RESULT

The sample has been tested with the following results: -

Area :   **North Karanpura**   **Project:**   **Churi Benti UGP**   **Stations:**   Churi Old Colony

Month	Date of Sampling	Date of receipt of sample	Date of analysis	Total Particulate Matter (PM$_{10}$+ >PM$_{10}$)TPM	Particulate Matter (PM$_{10}$)	Particulate Matter (PM$_{2.5}$)	Sulphur Dioxide (SO$_2$)	Nitrogen Oxides (as NO$_x$)	Wind Direction (from) & Weather
				Parameters (in µg/m^3)					
Oct-22 1st FN	04/10/22-05/10/22	17-10-2022	17/10/22-26/10/22	148	65	30	< 25	< 6	East Sunny
Oct-22 2nd FN	18/10/22-19/10/22	01-11-2022	01/11/22-07/11/22	245	94	52	< 25	< 6	East Sunny
Nov-22 3rd FN	02/11/22-03/11/22	16-11-2022	16/11/22-23/11/22	201	89	50	< 25	< 6	East Sunny
Nov-22 4th FN	17/11/22-18/11/22	01-12-2022	01/12/22-09/12/22	203	113	58	< 25	< 6	East Sunny
Dec-22 5th FN	02/12/22-03/12/22	16-12-2022	16/12/22-21/12/22	216	96	47	< 25	< 6	East Sunny
Dec-22 6th FN	17/12/22-18/12/22	02-01-2023	02/01/23-10/01/23	245	118	50	< 25	< 6	East Sunny

Note:

1. Gazette Notification No. G.S.R 742(E) dt.25th Sept.'2000 is applicable in core zone.
2. Gazette Notification No. G.S.R 826 (E) dt.Nov.'2009 is applicable in buffer zone.

Analysed By   Authorized Signatory

ENVIRONMENT LABORATORY, CMPDI(HQ), RANCHI

TEST REPORT

12/22 Test Report No. 2208	Job No. 094322160	Year	FY2022-23
Type of Sample	Ambient Air	Quarter Ending	Dec-22
Customer	CCL		
Mode of Receipt of Sample:	Joint sampling with customer		
Testing/ Sampling Protocol:	IS 5182 (part 14): 2000 ,R -2010, Methods for Measurement of Air Pollution, LQR 32		
Remarks & Observation:	All samplers placed 1.5 m above ground level		

TEST RESULT

The sample has been tested with the following results: -

Area : **North Karanpura**   **Project:** **Churi Benti UGP**   **Stations:** Subhas Nagar Colony

Month	Date of Sampling	Date of receipt of sample	Date of analysis	Parameters (in µg/m^3)					Wind Direction (from) & Weather
				Total Particulate Matter (PM$_{10}$+ >PM$_{10}$)TPM	Particulate Matter (PM$_{10}$)	Particulate Matter (PM$_{2.5}$)	Sulphur Dioxide (SO$_2$)	Nitrogen Oxides (as NO$_x$)	
Oct-22 1st FN	04/10/22-05/10/22	17-10-2022	17/10/22-26/10/22	158	78	41	< 25	< 6	East Sunny
Oct-22 2nd FN	18/10/22-19/10/22	01-11-2022	01/11/22-07/11/22	180	80	41	< 25	< 6	East Sunny
Nov-22 3rd FN	02/11/22-03/11/22	16-11-2022	16/11/22-23/11/22	134	61	26	< 25	< 6	East Sunny
Nov-22 4th FN	17/11/22-18/11/22	01-12-2022	01/12/22-09/12/22	134	64	30	< 25	< 6	East Sunny
Dec-22 5th FN	02/12/22-03/12/22	16-12-2022	16/12/22-21/12/22	225	75	36	< 25	< 6	East Sunny
Dec-22 6th FN	17/12/22-18/12/22	02-01-2023	02/01/23-10/01/23	216	96	56	< 25	< 6	East Sunny

Note:
1. Gazette Notification No. G.S.R 742(E) dt.25th Sept.'2000 is applicable in core zone.
2. Gazette Notification No. G.S.R 826 (E) dt.Nov.'2009 is applicable in buffer zone.

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ENVIRONMENT LABORATORY, CMPDI(HQ), RANCHI

TEST REPORT

12/22 Test Report No. 2209	Job No. 094322160	Year	FY2022-23
Type of Sample	Ambient Air	Quarter Ending	Dec-22
Customer	CCL		
Mode of Receipt of Sample:	Joint sampling with customer		
Testing/ Sampling Protocol:	IS 5182 (part 14): 2000 ,R -2010, Methods for Measurement of Air Pollution, LQR 32		
Remarks & Observation:	All samplers placed 1.5 m above ground level		

TEST RESULT

The sample has been tested with the following results: -

Area :   **North Karanpura**   **Project:**   **Churi Benti UGP**   **Stations:**   Pit Top

Month	Date of Sampling	Date of receipt of sample	Date of analysis	Total Particulate Matter (PM$_{10}$+ >PM$_{10}$)TPM	Particulate Matter (PM$_{10}$)	Particulate Matter (PM$_{2.5}$)	Sulphur Dioxide (SO$_2$)	Nitrogen Oxides (as NO$_x$)	Wind Direction (from) & Weather
				Parameters (in µg/m³)					
Oct-22 1st FN	04/10/22-05/10/22	17-10-2022	17/10/22-26/10/22	160	74	40	< 25	< 6	East Sunny
Oct-22 2nd FN	18/10/22-19/10/22	01-11-2022	01/11/22-07/11/22	212	101	55	< 25	< 6	East Sunny
Nov-22 3rd FN	02/11/22-03/11/22	16-11-2022	16/11/22-23/11/22	162	87	51	< 25	< 6	East Sunny
Nov-22 4th FN	17/11/22-18/11/22	01-12-2022	01/12/22-09/12/22	198	91	57	< 25	< 6	East Sunny
Dec-22 5th FN	02/12/22-03/12/22	16-12-2022	16/12/22-21/12/22	251	96	61	< 25	< 6	East Sunny
Dec-22 6th FN	17/12/22-18/12/22	02-01-2023	02/01/23-10/01/23	210	91	40	< 25	6	East Sunny

Note:
1. Gazette Notification No. G.S.R 742(E) dt.25th Sept.'2000 is applicable in core zone.
2. Gazette Notification No. G.S.R 826 (E) dt.Nov.'2009 is applicable in buffer zone.

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ENVIRONMENT LABORATORY, CMPDI(HQ), RANCHI

TEST REPORT

12/22 Test Report No. 2210	Job No. 094322160	Year	FY2022-23
Type of Sample:	Noise	Quarter Ending	Dec-22
Customer	CCL		
Testing/ Sampling Protocol:	'The noise pollution (Regulation and Control), Rules,2000, LQR 34		
Remarks:			

TEST RESULT

The sample has been tested with the following results: -

Area :   **North Karanpura**   **Project:**   **Churi Benti UGP**

Station Name	Noise Level dB(A) Leq					
	Oct-22 1st FN	Oct-22 2nd FN	Nov-22 3rd FN	Nov-22 4th FN	Dec-22 5th FN	Dec-22 6th FN
	Day/Night	Day/Night	Day/Night	Day/Night	Day/Night	Day/Night
Date of recording	03-10-2022	17-10-2022	01-11-2022	16-11-2022	01-12-2022	16-12-2022
1. P.O.Office	71.6/65.4	71.7/65.4	71.7/65.8	71.2/65.6	70.5/64.4	71.5/65.3
Date of recording	04-10-2022	18-10-2022	02-11-2022	17-11-2022	02-12-2022	17-12-2022
2. Churi Old Colony	70.8/64.7	69.6/63.1	69.5/63.4	70.3/64.1	68.3/62.2	68.9/62.7

Ambient Air Quality Standards in respect of Noise as per 'The noise pollution (Regulation and Control), Rules,2000		
Time Frame	Limits in dB(A) Leq	
	Day Time 6.00 AM to 10.00 PM	Night Time 10.00 PM to 6.00 AM
Industrial Area	75	70
Commercial Area	65	55
Residential area	55	45
Silence Zone	50	40

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ENVIRONMENT LABORATORY, CMPDI(HQ), RANCHI

TEST REPORT

12/22 Test Report No. 2211	Job No. 094322160	Year		FY2022-23
Type of Sample:	**Effluent Water**	Quarter Ending		Dec-22
Customer	CCL			
Mode of Receipt of Sample:	Joint sampling with customer			
Testing/ Sampling Protocol:	**MOEF -SCH-VI STANDARDS, Class 'A', LQR 33**			
Remarks & Observation:	Samples received in 5 ltrs plastic Jerri cane, Colour as observed is transparent			

TEST RESULT

The sample has been tested with the following results: -

Area: **North Karanpura**   **Project:** **Churi Benti UGP**   **Stations:**   Mine Water

Analysis Results of FN Effluent Water				COD	O & G	pH value	TSS
Parameters →				**COD**	**O & G**	**pH value**	**TSS**
Detection Limit				**4**	**2**	**0.2**	**10**
MOEF -SCH-VI, STANDARDS, Class 'A'				**250**	**10**	**5.5 to 9.0**	**100**
Month	Date of Sampling	Date of Receipt of Sample	Date of Analysis	**Value in mg/l, except pH**			
Oct-22 1st FN	08/10/22	17/10/22	17/10/22-31/10/22	16	<2.00	7.76	29
Oct-22 2nd FN	22/10/22	01/11/22	01/11/22-15/11/22	16	<2.00	7.81	30
Nov-22 3rd FN	05/11/22	16/11/22	16/11/22-30/11/22	12	<2.00	7.7	26
Dec-22 5th FN	06/12/22	16/12/22	16/12/22-30/12/22	16	<2.00	7.9	41
Dec-22 6th FN	21/12/22	02/01/23	02/01/23-13/01/23	12	<2.00	7.6	28
BIS Standard & Method				APHA, 23rd Edition, Closed Reflux, Titrimetric Method, 2017	IS 3025/39:1991, R : 2003, Partition Gravimetric	IS-3025/11:1983, R-1996, Electrometric	IS 3025/17:1984, R :1996, Gravimetric Method

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ENVIRONMENT LABORATORY, CMPDI(HQ), RANCHI

TEST REPORT

12/22 Test Report No. 2212	Job No. 094322160	Year	2022-23
Type of Sample:	**Effluent Water**	Quarter Ending	**Dec.'22**
Customer / W. O. no. & Date:	CCL	Date of Receipt of Sample:	01/12/22
Mode of Receipt of Sample:	Joint sampling with customer	Date of Analysis:	01/12/22-06/01/23
Testing /Sampling Protocol	**MOEF -SCH-VI STANDARDS, Class 'A',** LQR 33		
Remarks & Observation:	Samples received in 5 ltrs plastic Jerri cane, Colour as observed is transparent		

TEST RESULT

The sample has been tested with the following results: -

Area : North Karanpura **Project:** Churi Benti UGP

Stations: **Date of Sampling:**

1. Mine Water (Nov 2nd FN) 21/11/2022

Sl.No.	Parameter	Sampling Stations			Detection Limit	MOEF -SCH-VI STANDARDS Class 'A'	BIS Standard & Method
		1	2	3			
1	Ammonical Nitrogen, mg/l, Max	0.72			0.02	50.0	IS 3025/34:1988, R : 2009, Nessler's Method
2	Arsenic (as As), mg/l, *Max*	<0.002			0.002	0.2	IS 3025/37:1988 R : 2003, AAS-VGA
3	B.O.D (3 days 27°C), mg/l, Max	<2.00			2.00	30.0	IS 3025 /44:1993, R:2003 3 day incubation at 27°C
4	Cadmium(as Cd), mg/l, Max	<0.0004			0.0004	2.0	APHA, 23rd Edition 3120 B ICP Method, 2017
5	COD, mg/l, Max	16			4.00	250.0	APHA, 23rd Edition, Closed Reflux, Titrimetric Method: 2017
6	Copper (as Cu), mg/l, *Max*	<0.02			0.02	3.0	IS 3025/42: 1992, R : 2009, AAS (Air-Ac-Flame)
7	Dissolved Phosphate, mg/l, Max	<0.30			0.30	5.0	APHA, 23rd Edition Molybdovanadate Method, 2017
8	Fluoride (as F) mg/l, *Max*	0.92			0.02	2.0	APHA, 23rd Edition, SPADNS Method, 2017
9	Free Ammonia, mg/l, Max	<0.02			0.02	5.0	IS:3025/34:1988, Nesseler's
10	Hexavalent Chromium, mg/l, Max	<0.01			0.01	0.1	APHA, 23rd Edition, Diphenylcarbohydrazide
11	Iron (as Fe), mg/l, *Max*	<0.04			0.04	3.0	IS 3025 /53: 2003, R : 2009 , AAS-(Air-Ac-Flame)
12	Lead (as Pb), mg/l, *Max*	<0.001			0.001	0.1	APHA, 23rd Edition 3120 B ICP Method, 2017
13	Manganese(as Mn), mg/l, Max	<0.01			0.01	2.0	IS-3025/59:2006, AAS (Air-Ac-Flame)
14	Nickel (as Ni), mg/l, *Max*	<0.003			0.003	3.0	APHA, 23rd Edition 3120 B ICP Method, 2017
15	Nitrate Nitrogen, mg/l, *Max*	1.37			0.50	10.0	APHA, 23rd Edition, UV-Spectrphotometric Method, 2017
16	Oil & Grease, mg/l, Max	<2.00			2.00	10.0	IS 3025/39:1991, R : 2003, Partition Gravimetric Method
17	pH value	7.6			1.0	5.5 to 9.0	IS-3025/11:1983, R-1996, Electrometric Method
18	Phenolic compounds (as C_6H_5OH),mg/l, *Max*	<0.001			0.001	1.0	APHA, 23rd Edition, 4- Amino Antipyrine Method, 2017
19	Selenium (as Se), mg/l, *Max*	<0.0005			0.0005	0.05	APHA, 23rd Edition 3120 B ICP Method, 2017
20	Sulphide (as S^{-2}), mg/l, Max	<0.005			0.005	2.0	APHA, 23rd Edition Methylene Blue Method, 2017
21	Temperature (°C)	20.2			Shall not exceed 5^0 C above the receiving temp.		IS-3025/09:1984, R;2002, Thermometeric
22	Total Chromium (as Cr), mg/l, *Max*	<0.002			<0.002	2.0	APHA, 23rd Edition 3120 B ICP Method, 2017
23	Total Kjeldahl Nitrogen, mg/l, Max	2.8			1.00	100.0	APHA, 23rd Edition, Kjeldahl Method: 2017
24	Total Residual Chlorine, mg/l, Max	<0.02			0.02	1.0	APHA, 23rd Edition, DPD Method, 2017
25	Total Suspended Solids, mg/l, Max	26			10.00	100.0	IS 3025/17:1984, R :1996, Gravimetric Method
26	Zinc (as Zn), mg/l, *Max*	<0.005			0.005	5.0	IS 3025 /49: 1994, R: 2009, AAS (Air-Ac-Flame)

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TEST REPORT

03/23 Test Report No. 2006	Job No. 094322160	Year	FY2022-23
Type of Sample	Ambient Air	Quarter Ending	Mar-23
Customer	CCL		
Mode of Receipt of Sample:	Joint sampling with customer		
Testing/ Sampling Protocol:	IS 5182 (part 14): 2000 ,R -2010, Methods for Measurement of Air Pollution, LQR 32		
Remarks & Observation:	All samplers placed 1.5 m above ground level		

TEST RESULT

The sample has been tested with the following results: -

Area : **North Karanpura**   **Project:** **Churi Benti UGP**   **Stations:** **P.O. Office**

Month	Date of Sampling	Date of receipt of sample	Date of analysis	Parameters (in µg/m³)					Wind Direction (from) & Weather
				Total Particulate Matter (PM_{10}+ >PM_{10})TPM	Particulate Matter (PM_{10})	Particulate Matter ($PM_{2.5}$)	Sulphur Dioxide (SO_2)	Nitrogen Oxides (as NO_x)	
Jan-23 1st FN	02/01/23-03/01/23	16-01-2023	16/01/23-19/01/23	349	171	59	< 25	< 6	East Sunny
Jan-23 2nd FN	16/01/23-17/01/23	01-02-2023	01/02/23-08/02/23	272	131	64	< 25	< 6	East Sunny
Feb-23 3rd FN	01/02/23-02/02/23	16-02-2023	16/02/23-17/02/23	151	88	42	< 25	< 6	East Sunny
Feb-23 4th FN	16/02/23-17/02/23	01-03-2023	01/03/23-14/03/23	202	94	47	< 25	< 6	East Sunny
Mar-23 5th FN	01/03/23-02/03/23	16-03-2023	16/03/23-22/03/23	240	115	54	< 25	< 6	East Sunny
Mar-23 6th FN	16/03/23-17/03/23	01-04-2023	01/04/23-17/04/23	132	82	57	< 25	< 6	East Sunny

Note:
1. Gazette Notification No. G.S.R 742(E) dt.25th Sept.'2000 is applicable in core zone.
2. Gazette Notification No. G.S.R 826 (E) dt.Nov.'2009 is applicable in buffer zone.

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TEST REPORT

03/23 Test Report No. 2207	Job No. 094322160	Year	FY2022-23
Type of Sample	Ambient Air	Quarter Ending	Mar-23
Customer	CCL		
Mode of Receipt of Sample:	Joint sampling with customer		
Testing/ Sampling Protocol:	IS 5182 (part 14): 2000 ,R -2010, Methods for Measurement of Air Pollution, LQR 32		
Remarks & Observation:	All samplers placed 1.5 m above ground level		

TEST RESULT

The sample has been tested with the following results: -

Area :   **North Karanpura**   **Project:**   **Churi Benti UGP**   **Stations:**   Churi Old Colony

Month	Date of Sampling	Date of receipt of sample	Date of analysis	Total Particulate Matter (PM$_{10}$+ >PM$_{10}$)TPM	Particulate Matter (PM$_{10}$)	Particulate Matter (PM$_{2.5}$)	Sulphur Dioxide (SO$_2$)	Nitrogen Oxides (as NO$_x$)	Wind Direction (from) & Weather
				Parameters (in µg/m³)				
Jan-23 1st FN	03/01/23-04/01/23	16-01-2023	16/01/23-19/01/23	165	70	32	< 25	< 6	East Sunny
Jan-23 2nd FN	17/01/23-18/01/23	01-02-2023	01/02/23-08/02/23	174	69	43	< 25	< 6	East Sunny
Feb-23 3rd FN	02/02/23-03/02/23	16-02-2023	16/02/23-17/02/23	218	82	53	< 25	< 6	East Sunny
Feb-23 4th FN	17/02/23-18/02/23	01-03-2023	01/03/23-14/03/23	119	67	36	< 25	< 6	East Sunny
Mar-23 5th FN	02/03/23-03/03/23	16-03-2023	16/03/23-22/03/23	146	69	29	< 25	< 6	East Sunny
Mar-23 6th FN	17/03/23-18/03/23	01-04-2023	01/04/23-17/04/23	141	69	27	< 25	< 6	East Sunny

Note:
1. Gazette Notification No. G.S.R 742(E) dt.25th Sept.'2000 is applicable in core zone.
2. Gazette Notification No. G.S.R 826 (E) dt.Nov.'2009 is applicable in buffer zone.

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TEST REPORT

03/23 Test Report No. 2208	Job No. 094322160	Year	FY2022-23
Type of Sample	Ambient Air	Quarter Ending	Mar-23
Customer	CCL		
Mode of Receipt of Sample:	Joint sampling with customer		
Testing/ Sampling Protocol:	IS 5182 (part 14): 2000 ,R -2010, Methods for Measurement of Air Pollution, LQR 32		
Remarks & Observation:	All samplers placed 1.5 m above ground level		

TEST RESULT

The sample has been tested with the following results: -

Area : **North Karanpura** **Project:** **Churi Benti UGP** **Stations:** Subhas Nagar Colony

Month	Date of Sampling	Date of receipt of sample	Date of analysis	Parameters (in $\mu g/m^3$)					Wind Direction (from) & Weather
				Total Particulate Matter (PM_{10}+ >PM_{10})TPM	Particulate Matter (PM_{10})	Particulate Matter ($PM_{2.5}$)	Sulphur Dioxide (SO_2)	Nitrogen Oxides (as NO_x)	
Jan-23 1st FN	03/01/23-04/01/23	16-01-2023	16/01/23-19/01/23	304	108	67	< 25	< 6	East Sunny
Jan-23 2nd FN	17/01/23-18/01/23	01-02-2023	01/02/23-08/02/23	155	76	32	< 25	< 6	East Sunny
Feb-23 3rd FN	02/02/23-03/02/23	16-02-2023	16/02/23-17/02/23	138	71	31	< 25	< 6	East Sunny
Feb-23 4th FN	17/02/23-18/02/23	01-03-2023	01/03/23-14/03/23	110	55	24	< 25	< 6	East Sunny
Mar-23 5th FN	02/03/23-03/03/23	16-03-2023	16/03/23-22/03/23	218	91	51	< 25	< 6	East Sunny
Mar-23 6th FN	17/03/23-18/03/23	01-04-2023	01/04/23-17/04/23	182	78	38	< 25	< 6	East Sunny

Note:
1. Gazette Notification No. G.S.R 742(E) dt.25th Sept.'2000 is applicable in core zone.
2. Gazette Notification No. G.S.R 826 (E) dt.Nov.'2009 is applicable in buffer zone.

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TEST REPORT

03/23 Test Report No. 2209	Job No. 094322160	Year	FY2022-23
Type of Sample	Ambient Air	Quarter Ending	Mar-23
Customer	CCL		
Mode of Receipt of Sample:	Joint sampling with customer		
Testing/ Sampling Protocol:	IS 5182 (part 14): 2000 ,R -2010, Methods for Measurement of Air Pollution, LQR 32		
Remarks & Observation:	All samplers placed 1.5 m above ground level		

TEST RESULT

The sample has been tested with the following results: -

Area : **North Karanpura**   **Project:** **Churi Benti UGP**   **Stations:** Pit Top

Month	Date of Sampling	Date of receipt of sample	Date of analysis	Parameters (in $\mu g/m^3$)					Wind Direction (from) & Weather
				Total Particulate Matter (PM_{10}+ >PM_{10})TPM	Particulate Matter (PM_{10})	Particulate Matter ($PM_{2.5}$)	Sulphur Dioxide (SO_2)	Nitrogen Oxides (as NO_x)	
Jan-23 1st FN	03/01/23-04/01/23	16-01-2023	16/01/23-19/01/23	399	194	64	< 25	< 6	East Sunny
Jan-23 2nd FN	17/01/23-18/01/23	01-02-2023	01/02/23-08/02/23	169	83	40	< 25	< 6	East Sunny
Feb-23 3rd FN	02/02/23-03/02/23	16-02-2023	16/02/23-17/02/23	263	139	75	< 25	< 6	East Sunny
Feb-23 4th FN	17/02/23-18/02/23	01-03-2023	01/03/23-14/03/23	219	129	68	< 25	< 6	East Sunny
Mar-23 5th FN	02/03/23-03/03/23	16-03-2023	16/03/23-22/03/23	166	84	44	< 25	< 6	East Sunny
Mar-23 6th FN	17/03/23-18/03/23	01-04-2023	01/04/23-17/04/23	155	101	64	< 25	< 6	East Sunny

Note:
1. Gazette Notification No. G.S.R 742(E) dt.25th Sept.'2000 is applicable in core zone.
2. Gazette Notification No. G.S.R 826 (E) dt.Nov.'2009 is applicable in buffer zone.

Analysed By   Authorized Signatory

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TEST REPORT

03/23 Test Report No. 2210	Job No. 094322160	Year	FY2022-23
Type of Sample:	Noise	Quarter Ending	Mar-23
Customer	CCL		
Testing/ Sampling Protocol:	'The noise pollution (Regulation and Control), Rules,2000, LQR 34		
Remarks:			

TEST RESULT

The sample has been tested with the following results: -

Area :   **North Karanpura**   Project: **Churi Benti UGP**

Station Name	Noise Level dB(A) Leq					
	Jan-23 1st FN	Jan-23 2nd FN	Feb-23 3rd FN	Feb-23 4th FN	Mar-23 5th FN	Mar-23 6th FN
	Day/Night	Day/Night	Day/Night	Day/Night	Day/Night	Day/Night
Date of recording	02-01-2023	16-01-2023	01-02-2023	16-02-2023	01-03-2023	16-03-2023
1. P.O.Office	70.2/64.3	70.4/64.3	71.3/65.6	71.7/65.6	70.4/64.3	71.3/65.4
Date of recording	03-01-2023	17-01-2023	02-02-2023	17-02-2023	02-03-2023	17-03-2023
2. Churi Old Colony	68.8/62.6	68.6/62.2	69.4/63.6	69.5/63.7	68.8/62.4	68.2/62.5

Ambient Air Quality Standards in respect of Noise as per 'The noise pollution (Regulation and Control), Rules,2000		
Time Frame	Limits in dB(A) Leq	
	Day Time 6.00 AM to 10.00 PM	Night Time 10.00 PM to 6.00 AM
Industrial Area	75	70
Commercial Area	65	55
Residential area	55	45
Silence Zone	50	40

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TEST REPORT

03/23 Test Report No. 2211	Job No. 094322160	Year	FY2022-23
Type of Sample:	**Effluent Water**	Quarter Ending	Mar-23
Customer	CCL		
Mode of Receipt of Sample:	Joint sampling with customer		
Testing/ Sampling Protocol:	**MOEF -SCH-VI STANDARDS, Class 'A',** LQR 33		
Remarks & Observation:	Samples received in 5 ltrs plastic Jerri cane, Colour as observed is transparent		

TEST RESULT

The sample has been tested with the following results: -

Area: **North Karanpura**   **Project:** **Churi Benti UGP**   **Stations:** Mine Water

Analysis Results of FN Effluent Water				COD	O & G	pH value	TSS
Parameters →				**COD**	**O & G**	**pH value**	**TSS**
Detection Limit				**4**	**2**	**0.2**	**10**
MOEF -SCH-VI, STANDARDS, Class 'A'				**250**	**10**	**5.5 to 9.0**	**100**
Month	Date of Sampling	Date of Receipt of Sample	Date of Analysis	Value in mg/l, except pH			
Jan-23 1st FN	07/01/23	16/01/23	16/01/23-31/01/23	20	<2.00	8.2	41
Jan-23 2nd FN	21/01/23	01/02/23	01/02/23-15/02/23	16	<2.00	7.7	39.8
Feb-23 3rd FN	06/02/23	16/02/23	16/02/23-28/02/23	20	<2.00	8.1	41
Feb-23 4th FN	21/02/23	01/03/23	01/03/23-15/03/23	20	<2.00	8.2	49
Mar-23 5th FN	06/03/23	16/03/23	16/03/23-31/03/23	16	<2.00	7.7	33
Mar-23 6th FN	21/03/23	03/04/23	03/04/23-13/04/23	20	<2.00	8.3	47
BIS Standard & Method				APHA, 23rd Edition, Closed Reflux, Titrimetric Method, 2017	IS 3025/39:1991, R : 2003, Partition Gravimetric	IS-3025/11:1983, R-1996, Electrometric	IS 3025/17:1984, R :1996, Gravimetric Method

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