Final Draft Report

Wildlife Conservation and Management Plan

of

Bailadila Iron ore Deposit No.-4

M/s NMDC-CMDC Limited (NCL)

Dist. Dantewada Chhattisgarh

Prepared by

We the Foresters Welfare Society Chhattisgarh

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INDEX - WILDLIFE CONSERVATION AND MANAGEMENT PLAN BAILADILA IRON ORE DEPOSIT NO.-4

		2.6.1	REGIONAL GEOLOGICAL SETTING	
		2.6.2	LOCAL GEOLOGY (GEOLOGY OF DEPOSIT)	
		2.7	LAND USE PERTAINING TO PROJECT AREA FROM MINING PERSPECTIVE	
		2.8	**SOCIO- ECONOMIC ENVIRONMENT**	
		2.8.1	INTRODUCTION	
		2.8.2	REVIEW OF SECONDARY DATA	
		2.8.3	EXITING SOCIO-ECONOMIC SCENARIO	
		2.9	**POPULATION, HOUSEHOLD SIZE & SEX RATIO**	
		2.9.1	SEX RATIO	
		2.9.2	LITERACY	
		2.10	**ECONOMIC PATTERN AND LIVELIHOOD**	
		2.10.1	COMPARATIVE ANALYSIS OF THE WORKFORCE IN THE STUDY AREA	
		2.10.2	COMPARATIVE ANALYSIS OF ECONOMIC ACTIVITY IN THE STUDY AREA	
		2.10.3	BASIC AMENITIES OF DANTEWADA DISTRICT	
		2.10.4	AMENITIES AT STUDY AREA	
		2.10.5	MAJOR INDUSTRIES WITH NAME AND TYPE WITHIN STUDY AREA (10 KM RADIUS)	
		2.11	**LAND USE LAND COVER IN STUDY AREA**	
		2.11.1	GENERAL LAND USE/ LAND COVER	

	WILD LIFE CONSERVATION AND MANAGEMENT PLAN	7.2	OVERALL OBJECTIVES OF MANAGEMENT	
		7.3	IMPORTANT KNOWLEDGE ON MANAGEMENT AND CONSERVATION PLANS FOR FAUNA	
		7.4	BASIS AND REFERENCES FOR CONSERVATION PLAN	
		7.5	**WILDLIFE HABITAT STRUCTURES**	
		7.5.1	SPECIAL HABITAT FEATURES	
		7.6	**DEVELOPMENT OF WATER AND ITS RESOURCES TO ENSURE AVAILABILITY**	
		7.6.1	DEVELOPMENT OF NATURAL WATERHOLES	
		7.6.2	DEVELOPMENT OF ARTIFICIAL WATERHOLES	
		7.6.3	SOIL & WATER CONSERVATION	
		7.7	**IMPROVEMENT AND DEVELOPMENT OF NATURAL AND ARTIFICIAL SHELTER**	
		7.7.1	DEVELOPMENT OF NATURAL SHELTER	
		7.7.2	DEVELOPMENT OF ARTIFICIAL SHELTER	
		7.8	**PREVENTION OF FOREST FIRE**	
		7.8.1	MANAGEMENT PRESCRIPTIONS FOR FIRE PROTECTION	

		7.9	WEED MANAGEMENT	
		7.10	**ADDRESSING HUMAN-ANIMAL CONFLICTS**	
		7.10.1	CONDUCTING TRAINING AND AWARENESS PROGRAM AMONGST FOREST STAKE HOLDERS	
		7.11	**WORKING PLAN PRESCRIPTIONS FOR WILDLIFE MANAGEMENT**	
		7.11.1	NEED TO CONSERVE WILD LIFE	
		7.11.2	FACTORS AFFECTING WILDLIFE	
		7.11.3	CONSERVATION RULES / MEASURES	
		7.12	**OBJECTIVES OF MANAGEMENT TO MITIGATE THE THREATS SPECIFIC IN PROJECT AREA AND IMPACT ZONE**	
		7.12.1	PROJECT AREA	
		7.12.2	IMPACT ZONE	
		7.13	HABIT, HABITAT, THREATS AND CONSERVATION MEASURES FOR SCHEDULE 1 SPECIES	
		7.14	CONCLUSION OF OVERALL CONSERVATION MEASURES	
		7.15	SPECIAL CONSERVATION ACTIVITIES NEAR INDRAVATI TIGER RESERVE RECOMMENDED FOR	

LIST OF ANNEXURES		
S. NO.	**DISTRIBUTION**	**PAGE NO.**
1	T.O.R.	
2	FLORA OF DANTEWADA FOREST DIVISION	
3	FAUNA OF DANTEWADA FOREST DIVISION	
4	FOREST COMPARTMENT IN 10KMS RADIUS (Impact / Buffer Zone)	
5	LIST OF VILLAGES IN 10KMS RADIUS (Impact / Buffer Zone)	

CHAPTER I
PROJECT INTRODUCTION

NMDC-CMDC Ltd. (NCL) was incorporated on 1st July 2006 between NMDC and CMDC Ltd. as a Joint Venture Company. The objective of NCL is to develop, explore, raise and sell Iron Ore and any other minerals from the deposits allocated by GoI.

In view of the ambitious targets set by National Steel Policy, steel producers are ramping up their capacities and with the possibility of lifting of ban on the export of iron ore from Chhattisgarh, there will be sufficient demand of domestic iron ore produced.

The **"Make in India"** initiative is expected to witness significant investments inConstruction, Infrastructure, Automobile, Shipbuilding and Power sectors, which will stimulate steel demand. Hence, efforts will be made to pass on such benefit to the domestic steel producers. Use of cost efficient and competitive 'Indian Made steel' will pave the way for infrastructure development and construction activities in the country.

As per National Steel Policy – 2017, Government of India has an ambitious plan for increasing the domestic steel production from present capacity of around 115 MTPA to 300 MTPA in next 10 to 15 years.

Accordingly, NMDC-CMDC Ltd. (NCL) has targeted to achieve Iron Ore production of 84 MTPA by 2025 and 100 MTPA by 2030. To achieve this, NMDC-CMDC Ltd. (NCL) plans to opening up of green field projects and enhance capacity expansion of brown field projects. One of project identified under green field is Bailadila Iron Ore Deposit-4 of M/s NMDC-CMDC Limited (NCL) which is located North of Deposit-5 on the Western flank of the Bailadila range of hills, lying at a distance of about 135 kms towards South-West of Jagdalpur in the state Chhattisgarh.

1.1 THE TWO INTERLINKED PROJECTS:

Bailadila Iron Ore Deposit-4 Mine (M.L. Area = 646.596 Ha), it is proposed to produce ROM Iron ore of 7.0 MTPA and waste excavation of 6.41 MTPA (Total Excavation 13.41 MTPA) in ML Area 646.596 Ha **(Leaving Tree Fern area of 76.496 Ha.)** along with 2000 TPH Crushing plant inside lease area located in nearest Village; Bhansi, Tehsil Bacheli, District South Bastar Dantewada, State – Chhattisgarh along with Screening Cum Beneficiation Plant (750 TPH of 4 lines each) along with 2200 TPH Downhill Conveyor and Loading Facilities in 122.5428 Ha (Forest area of 100.077 Ha. and 22.4658 Ha. of revenue land) area located at outside the Mine Lease area of Bailadila Iron Ore Project, Deposit-4 at Village: Bhansi, Tehsil: Bacheli, District Dantewada, Chhattisgarh by M/s NMDC-CMDC Limited (NCL).

1.2 IDENTIFICATION OF PROJECT & PROJECT PROPONENT:

1.2.1 IDENTIFICATION OF PROJECT:

Ministry of Mines, GOI on 30.09.2019 has granted its prior approval for reservation of Bailadila Iron Ore Deposit-4 (Total Area 646.596 Ha), in favour of NMDC-CMDC Ltd. (NCL) for the purpose of Prospecting and Mining of Iron Ore.

The total lease area is earmarked for Bailadila Iron Ore Deposit-4 is 646.596 Ha **(Including area of Tree Fern i.e. 76.496 Ha. which shall be excluded from mining operations).** Total land is forest land.

To develop Screening Cum Beneficiation Plant along with 2200 TPH Downhill Conveyor and Loading facilities an area of 122. 5428 Ha. has been identified. Out of this 100.077 Ha is Forest Land and 22.4658 Ha is revenue Land. Application for diversion of the Forest Land is under process. Process of land acquisition of the revenue land will be initiated based on the project's progress.

1.2.2 PROJECT PROPONENT:

NMDC-CMDC Ltd. was incorporated based on the Memorandum of Understanding dated 1st July 2006 and the Shareholders & Joint Venture Agreement signed on 27th March 2007 by and between CMDC and NMDC Ltd.

1.3 BRIEF DESCRIPTION OF NATURE, SIZE, AND LOCATION OF THE PROJECT:

1.3.1 NATURE OF THE PROJECT:

Bailadila Iron Ore Deposit -4 is a big and homogeneous iron ore deposit.with average grade of Fe 64.80 %. Bailadila Iron Ore Deposit -4 will be worked as a fully mechanized mine. Deposit-4 has been designed for operation as fully mechanized opencast mines using shovel-dumper combination and various processes viz drilling, blasting, excavation, quality control, ore processing (crushing& screening), loading of finished products and waste disposal.

NMDC-CMDC Ltd. proposes to develop and operate the Bailadila Iron Ore Deposit -4 located in the state of Chhattisgarh by NCL through Departmental mining / Mine Developer cum Operator (MDO) . If MDO is going to be appointed by NCL then the MDO shall at its own cost and expenses procure, finance for, and undertake the design, engineering, procurement, construction and operation of the mine for excavation, processing and delivery of Iron Ore, and shall observe, fulfill, comply with and perform all its obligations set out in the Iron Ore Mining Service Agreement. In the first five years of mining plan period, mine developmental activities along with haul road preparation, approach to waste dump etc. are proposed.

The capacity of the mine shall be augmented in the continuously increasing manner from the sixth year of the operation of the mine and the mine shall attain its full rated capacity of 7.0 MTPA of capacity in the 9th year of operation.

During the first five years, all necessary infrastructure facilities, such as crushing and screening facilities, downhill long-distance conveyors, railway sidings, etc. will beestablished

1.3.2 SURROUNDING OF THE PROJECT:

Deposit No.4 is situated in the North of Deposit No.5 and South of Deposit No.3 in the western ridge. The ore body occurs as northern continuation of north block of Deposit No.5, separated from Deposit No.5 by a narrow parting of about 150 mts of poor grade lateritic ore.

On the northern side, Deposit No.4 is separated from Deposit No.3 by a parting of un- enriched banded hematite-quartzite.

The ore body is divided into north and south blocks which are separated by an enriched BHQ.

The deposit is bounded by a deep valley on western side and Galli nalla on eastern side.

The eastern flank of the deposit is mostly covered by poor grade laterites. Small cliffs composed of hard massive ore occur on the western side of the deposit. Western boundary is often marked by sharp contact against the BHQ.

1.3.3 LOCATION OF THE PROJECT:

Bailadila Iron Ore Deposit-4 Mine having lease area of 646.596 Ha is located in the Topo sheet no. E44J2 between longitude 810 12' 02" E to 810 13' 08" E and between latitude 180 41 ' 26" N to 180 43' 39"N.

Screening Cum Beneficiation Plant (750 TPH of 4 lines each) Bailadila Iron Ore Deposit-4 is located at Village-Bhansi, Tehsil/Taluka-Bacheli, District-Dantewada, State-Chhattisgarh.

1.4 SALIENT FEATURES OF THE PROJECT:

Salient Features of Bailadila Iron Ore Project Deposit-4		
Sl. No.	**Description**	**Particulars**
1	Mine Lease Area	646.596 Ha. (Including area of Tree Fern 76.496 Ha.)
2	Infrastructure Area Outside the Mining Lease of Bailadila Iron Ore Deposit -4	Forest area of 100.077 Ha. and Revenue Forest land 12.0952 Ha., Private land 6.9585 Ha. and Govt revenue land 1.0101 Ha., Railway land 2.4020
3	Type of mine	Open Cast Mine
4	Method of Mining	Fully Mechanized open cast method
5	Reserves	109.01 MT
6	Expected life of mine	21 Years
7	Ore to Waste ratio	1:0.61

8	Waste Excavation (Maximum)	6.41 MTPA (Estimated by mine scheduling software Mine Sched)
9	Rated Capacity	7.00 MTPA
10	Average no. of working days/ Number of Shifts / Working Hours for Mine	268 / 3 Shifts / 8 Hrs.
11	Bench height & width	12 m height &Minimum bench width during operation phase: 30 m
12	Top and Bottom Bench	1200 mRL and 996 mRL
13	Present Working Benches	Mining Operation Not yet Commenced
14	Waste (Till life of mine)	68.173 MT
15	Ultimate pit slope	Less than 45 degrees.
16	Downhill Conveyor System	2200 TPH of approx.length 8.7 KM
17	Screening Plant with Beneficiation Facilities	4 lines of 750TPH
18	Tertiary Crushing	2 lines of 800TPH
19	Loading and Stacking Facilities	3000 TPH Loading Facilities with Lump Stock pile of 3.2 LT and Fine Ore Stockpile 2.3LT
20	Average no. of working days / Number of Shifts / Working Hours for Plant	365 / 3 Shifts / 8 Hrs.
21	Power requirement & sources	Power requirement: 6 MVA,Sources: Chhattisgarh State Power Distribution Company Limited.
22	Water Requirement	Mining Lease Area – 4250 KLD Beneficiation Plant –1250 KLD (Dry Screening for 8 months) and 8,630KLD (Wet Screening for 4 months of monsoon period). Considering the future requirements including the proposed township, Water requirement is envisaged to be around 20,000Cu.m per day at the peak rated capacity which will be met from the source of existing Sankini Nallaand Nerli Nalla.
23	Total Project Cost (For entire Bailadila Iron Ore Deposit 4 including ancillary facilitieslocated outside the Mining Lease Area)	Rs. 4091 Crores (approx.)
(Source: Mine Planning-NMDC Limited)		

CHAPTER II
LOCATION, ACCESSIBILITY, TOPOGRAPHY, SOCIO ECONOMIC SCENARIO, LAND USE

2.1 LOCATION AND ACCESSIBILITY:

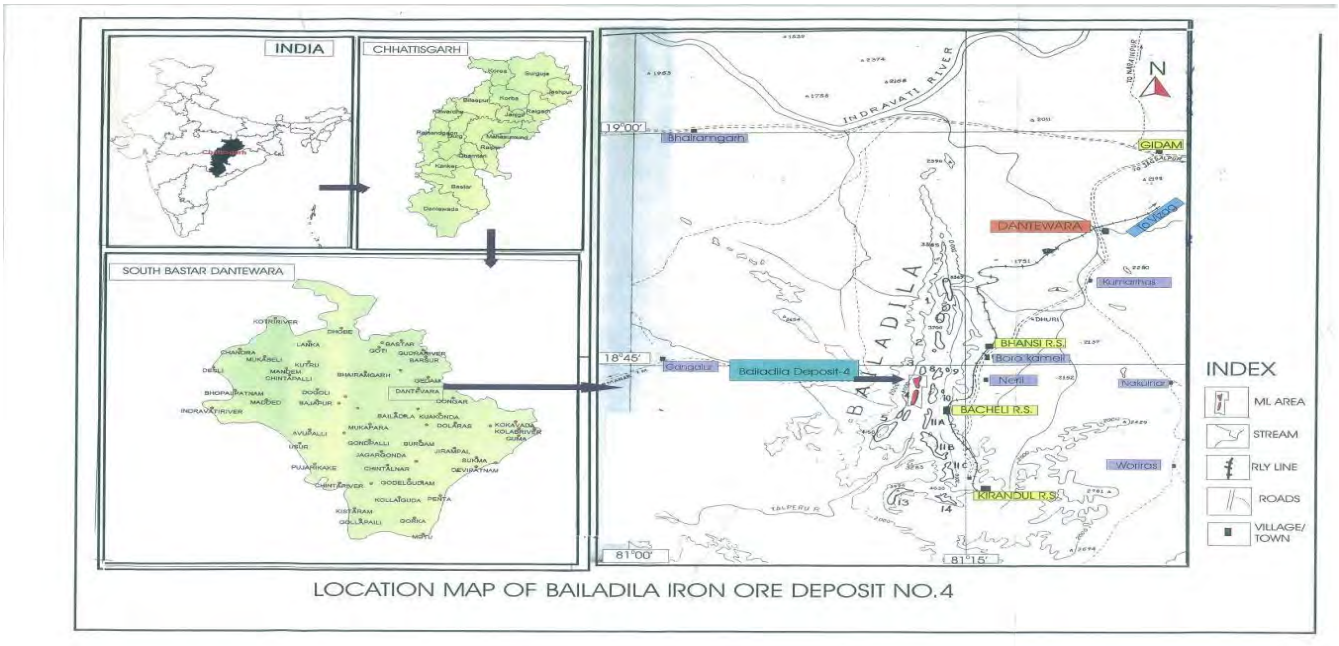
The Bailadila Deposit-4 Mining Lease area is located near village Bacheli, Tehsil Bacheli, District Dantewada, State Chhattisgarh. It is located at Bailadila range of hill trending N-S direction.

The Deposit-4 is approachable by kutcha road from Bhansi or from Deposit-5 of the NMDC Ltd. Bhansi is very well connected by SH road from Kirandul toGeedam. Bacheli is nearest town. Dantewada is district headquarters. The Location map of Bailadila Iron Ore Deposit-4 is given in SOI topo sheet.

Bailadila Iron Ore Deposit-4 having lease area of 646. 596 Ha is located in the Topo Sheet No.E44J2 between longitude 81^0 12' 02" E to 81^0 13' 08" E and between latitude 18^0 41 ' 26" N to 18^0 43' 39"N.Longitude& latitude of boundary pillars of mining lease areas below:

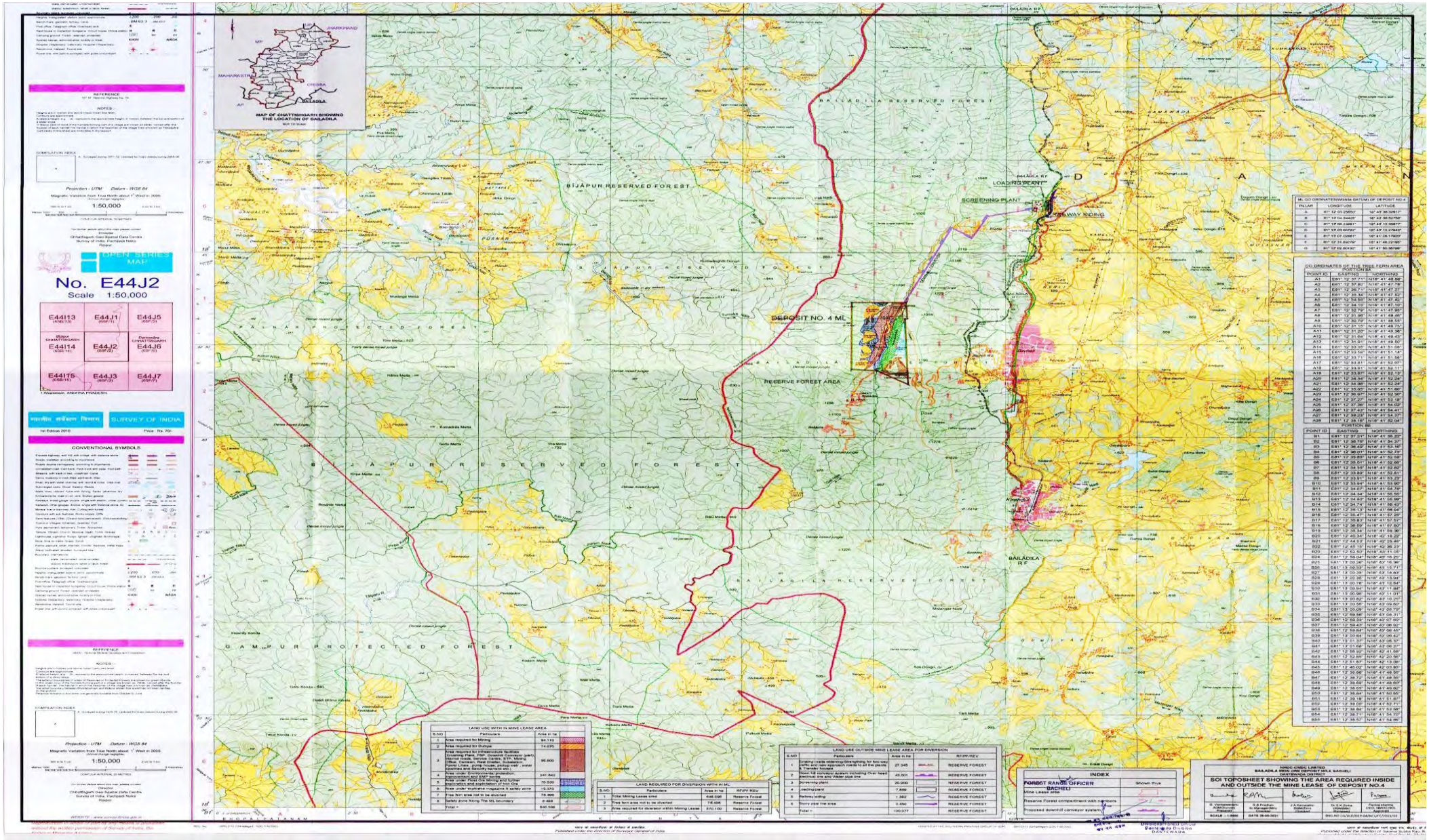
Pillar No.	Pillar Longitude	Pillar Latitude
A	81°12'03.25650"E	18°43'38.32617"N
B	81°13'04.84428"E	18°43'38.52758"N
C	81°13'06.24991"E	18°43'12.30677"N
D	81°13'03.60782"E	18°43'12.27943"N
E	81°13'07.02661"E	18°41'26.17920"N
F	81°12'31.89279"E	18°41'48.22195"N
G	81°12'02.90192"E	18°41'50.38796"N

Source Gazette Notification No.572 dated 30/09/2019



LOCATION MAP OF BAILADILA IRON ORE DEPOSIT NO.4

MAP 2.1 TOPO SHEET NO. E44J2



Vegetation falls in: -

Northern Tropical Moist Deciduous Forest - Type 3C

(i) Tropical Moist Penninsular High level Sal Forest 3C/C2ei

(ii) Tropical Moist Penninsular Sal Forest 3C/C2

(iii) Tropical Moist Penninsular Valley Sal Forest 3C/C2eiii

Southern Tropical Dry Deciduous Mixed Forest - Type 3B

(i) Southern Moist Mixed Deciduous Forest 3B/C2

2.2 STUDY AREA: THE STUDY AREA CONSISTS OF

a. Project area (Within Mining lease area)

b. Buffer Zone / Impact Zone (Area in 10 Km radius from project area)

Area details: Following table shows the forest area details of project andBuffer zone

2.2.1 DETAILS OF FOREST COMPARTMENTS:

(A) Compartment details inside Mining lease

Forest Division	Area	Compartment no.	Proposed area(In Ha)
Dantewada Reserve ForestRange, Bacheli	Inside MiningLease Area	1832	9.052
		1833	104.332
		1886	45.239
		1885	160.862
		1834	140.372
		1842	32.917
		1841	153.310
		1826	0.512
		Total	**646.596**

(B) Compartment details of Tree Fern area inside Mining Lease

Forest Division	Area	Compartment no.	Proposed area (In Ha)
Dantewada Reserve Forest Range, Bacheli	Tree Fern Area inside MiningLease area	1841	50.072
		1842	1.791
		1834	24.633
		Total	**76.496**

(C) Compartment details inside Mining lease excluding Tree Fern

Forest Division	Area	Compartment no.	Proposed area (In Ha)
Dantewada Reserve ForestRange, Bacheli	Inside Mining Lease Area excluding Tree Fern	1832	9.052
		1833	104.332
		1886	45.239
		1885	160.862
		1834	115.739
		1842	31.126
		1841	103.238
		1826	0.512
		Tota1	**570.100**

(D) Compartment details outside Mining lease

Forest Division	Area	Compartment no.	Proposed area (in Ha)
Dantewada Reserve Forest Range, Bacheli	Outside MiningLease Area	1834	0.957
		1826	21.650
		1827	0.512
		1822	6.712
		1825	18.282
		1824	51.741
		1811	0.223
		Total	**100.077**

(Chief Executive Officer)NMDC-CMDC Limited)

The list of total forest compartments falling in Impact zone and Project area are enclosed herewith as ……**Annexure no. 4**

(E) Details Of Proposed Land Outside ML Area(Forest, Revenue Forest Land ,Private And Govt. Revenue Land)

Sl. No.	Description	Area (Ha)				
		Forest	Revenue Forest Land (Bade Jhad ke Jungle)	Pvt. Revenue Land	Govt. Revenue Land	Railway Land
1	Major part of Downhill conveyor system including overhead electrical line & water pipeline	43.0000	-	-	-	
2	Screening Plant including all allied facilities	18.2810	-	-	-	
3	Loading Plant including all allied facilities	10.2390	6.4106	3.2936	0.1107	
4	Railway siding	1.0410	5.1193	3.6594	0.3055	2.4020
5	Existing roads widening / strengthening for two-way traffic and new approach roads to all the plants & transfer houses	27.5160				
6	Pump House	-	0.4000			
7	Pipe line	-	0.1653	0.0055	0.5939	
	Total	**100.0770**	**12.0952**	**6.9585**	**1.0101**	**2.4020**

2.3 TOPOGRAPHY:

Bailadila Iron Ore Deposit No. 4 is situated on the north of Deposit-5 and in the south of Deposit-3 in the western ridge of the Bailadila Iron ore range. The deposit is characterized by rugged and undulating topography.

The highest elevation is 1210m above MSL and the lowest elevation is about 1020 m above MSL.The ore body has a general NNE-SSW trend with steep easterly slope and forms a gentle slope towards west.

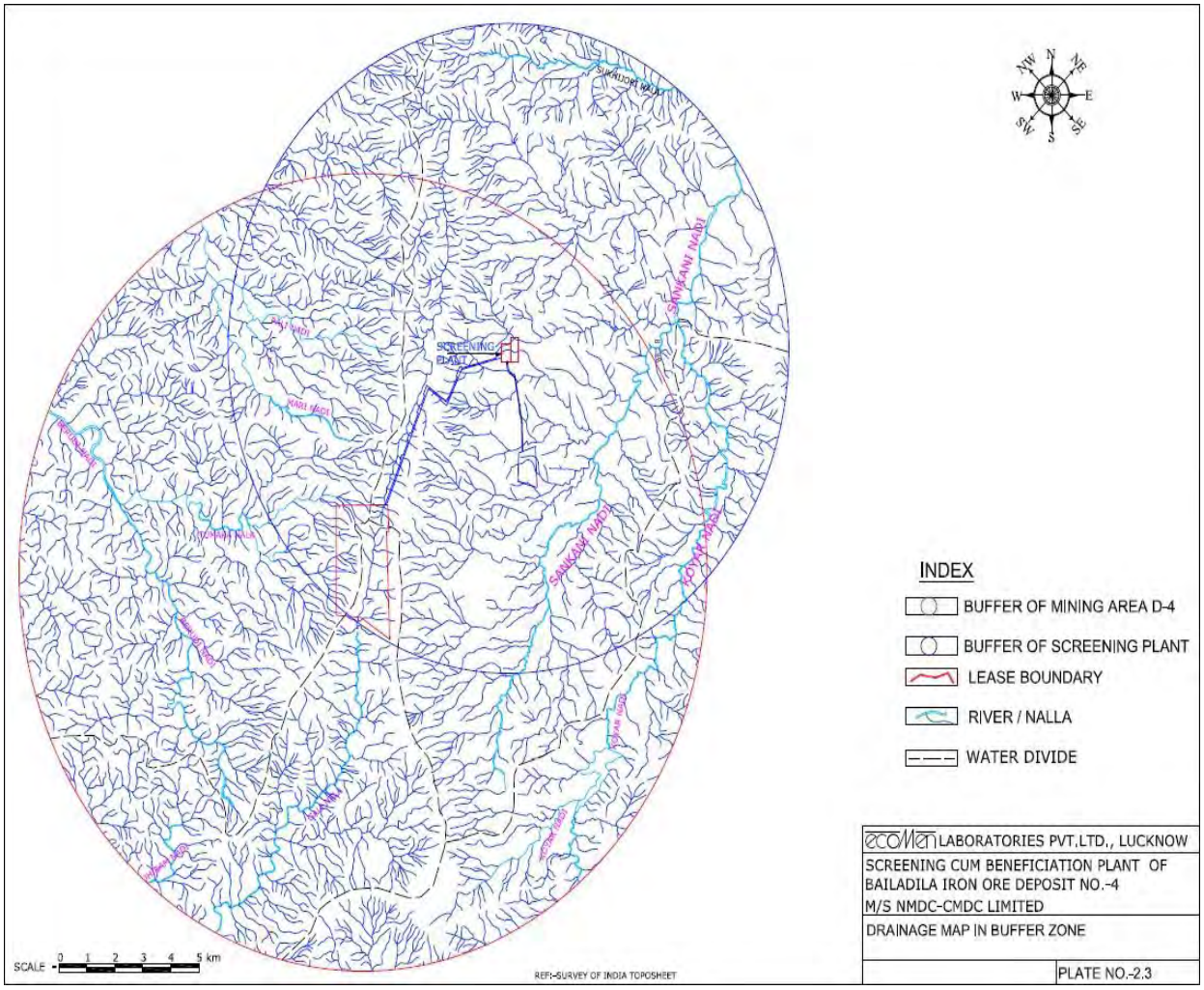
The mining lease of Deposit- 4 falls in the Bailadila reserve forest area. The Bailadila forest is fairly widespread and dense in nature. The hill tops however show a different picture ofbarren nature due to rocky out crops, duricrusts and lateralization having scanty soil cover to support dense vegetation. Scrubs, grasses and stunted trees wherever possible characterize thehilltops.

2.4 DRAINAGE AND WATER BODIES:

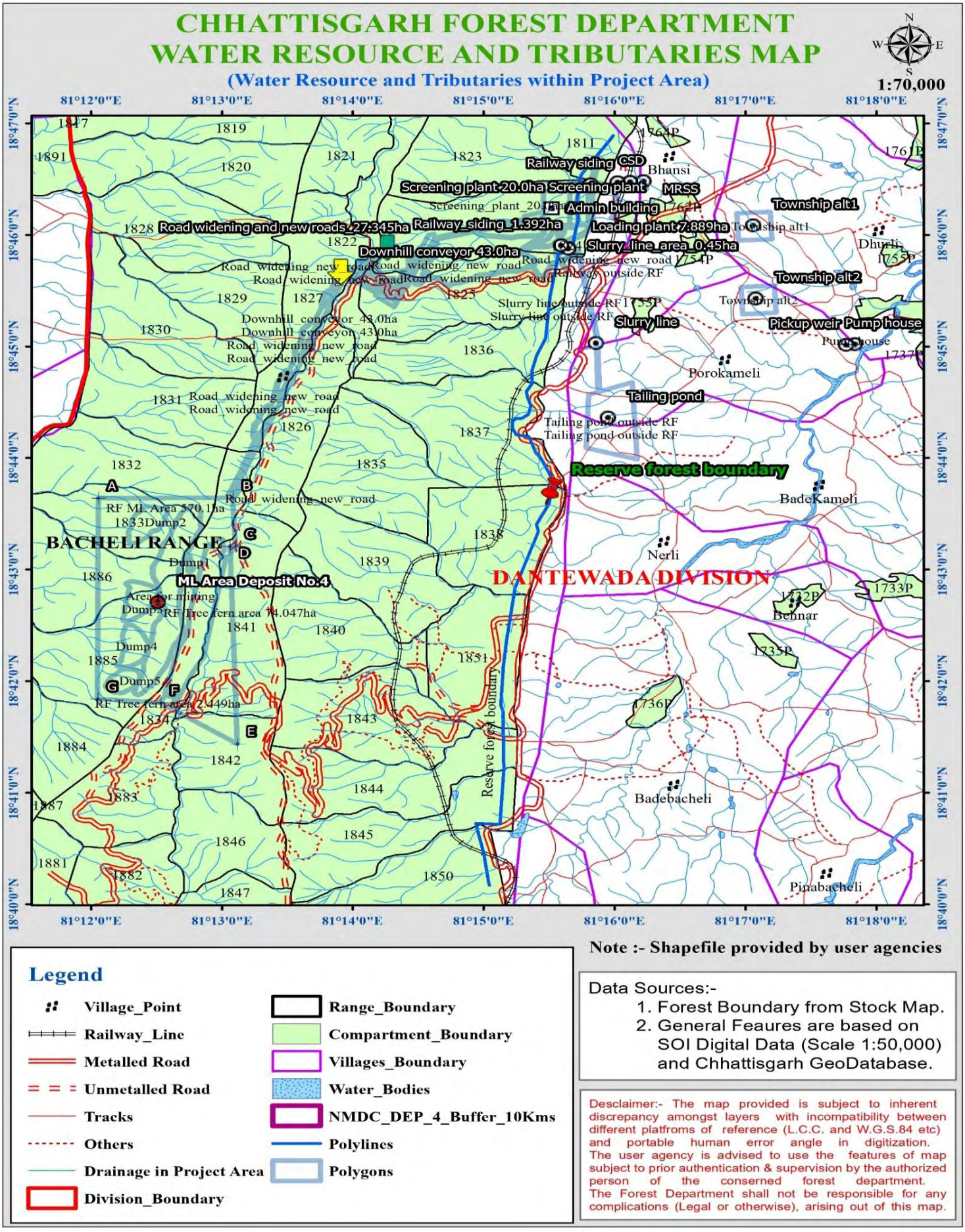
The eastern and western ridges of Bailadila become closer between the Deposit-4of western ridge and Depoist-8 of eastern ridge separated by shallow saddle. This happens to be the divide point for the drainage direction. The stream flowing towards south is called Galli Nallaand the one flowing towards north is Sankhani Nalla . Near to Deposit-4, these streams are in the form of "seeps". The regular flow starts much downstream on both sides. There is noperennial stream on the western slope of the deposit within the core zone. However, the slope ultimately drains to the streams which join and flow to the north and then west with the name of Mari Nadi. It is however, several kilo meters away from the core zone.

The important streams are Malinger Nadi flowing South West of Deposit-14, Kirandul or Koyar Nadi, south east of Deposit -14, stream from Deposit-11B, Bacheli Nalla, Galli Nalla and Sankani Nalla. The villagers use water from these nallas for their irrigation and drinking purposes. The course of the present natural drainage system in the Bailadila iron ore mines complex will not be affected due to the present and future mining, crushing, screening, beneficiation operations. The drainage pattern of buffer zone is shown in Map 2.2 .

MAP 2.2 SHOWING WATER TRIBUTARIES IN PROJECT AND IMPACT ZONE



MAP 2.3 WATER RESOURCE MAP



2.4.1 EXISTING WATER BODIES IN THE STUDY AREA WITH LOCATION:

Sr. No.	GPS coordinates	Description of water body
1	$18^0$41'47.94"N & $81^0$09'06.05"E: Elevation=431m	This irregular shaped water body located in western part of the core area. Distance of this area from core region is 6.10 km. The deep tone indicates deep water present in there. These waterbodies exist from Feb 27, 2014.The area is 2564.76 m^2
2	$18^0$42'25.97"N & $81^0$15'44.62"E ; Elevation=528m	This irregular shaped waterbody located in eastern part of the core area. Right side of this area, Bacheli settlement is observed. Distance of this area from core region is 5.64 km. This waterbody exist from Oct 22, 2011. The area is 815.71 m^2
3	$18^0$42'32.48"N & $81^0$15'50.09"E ; Elevation=517m	This irregular shaped waterbody located in eastern part of the core area. Right side of this area, Bacheli settlement is observed. A light tone indicates a large amount of suspended sediments present in there. Lighter tone indicate, it is a shallow waterbody. Distance of this area from core region is 5.85 km. This waterbody exist from Oct 22, 2011. The area is approximately 2497.28 m^2
4	$18^0$39'32.23"N & $81^0$17'15.11"E ; Elevation=569m	This irregular shaped waterbody located in South Eastern part of the core area. Right side of this area, Bacheli road is observed. Kadampal reservoir is found in the south portion of this area. The deep toneindicates presence of deep water. Distance of this area from core region is 9.19 km. This waterbody exist from oct 22, 2011. The area is 12030 m^2
5	$18^0$39'25.49"N & $81^0$17'09.18"E ; Elevation=570m	This irregular shaped waterbody located in South Eastern part of the core area. Right side of this area, Bacheli road is observed. Kadampal reservoir is found in the south portion of this area. The deep toneindicates presence of deep water. Distance of this area from core region is 9.17 km. This waterbody exist from Oct 22, 2011. The area is 6445.57 m^2
6	$18^0$39'10"N & $81^0$08'57.15"E ; Elevation=516m	This irregular shaped waterbody located in South Western part of the core area. Distance of this area from core region is 7.99 km. This waterbody exist from oct 22,2011. The area is 1633.62 m^2
7	$18^0$42'58.30"N & $81^0$10'11.84"E ; Elevation=451m	This irregular shaped water body located in western part of the core area. Distance of this area from core region is 4.68 km. The deep tone indicates presence of deep water. These waterbodies exist from Feb 27, 2014. The area is 721.81 m^2
8	$18^0$41'50.76"N & $81^0$09'09.28"E; Elevation=434m	This irregular shaped water body located in western part of the core area. Distance of this area from core region is 6 km. These waterbodiesexist from Oct 22,2011. The area is 1444.54 m^2

Source Draft EIA report

2.5 GENERAL CLIMATIC CONDITION (SECONDARY DATA):

The data collected during the monitoring period (1st March-2022 to 31st May-2022) is primary information for the baseline study and air quality prediction models. Meteorological parameter's historical data used as secondary information in identifying the general climatic nature of the region.

Bailadila region enjoys mild summer and winter is not severe. The maximum temperature in summer rises up to 40 degree Celsius between May and June whereas minimum temperature in winter drops to 10 degree Celsius. The area receives heavy rains during monsoon fromJune to October. Weather during rainy season is stormy accompanied by gales and thehilltops are covered with thick clouds and dense fog, which reduces visibility. (Source: IMD Jagdalpur)

The description of the meteorology of the study area is given below:

a) **Temperature: -** The South Bastar Dantewada district experiences a wide seasonal temperature variation and daily temperature variation. The maximum temperature goes up to 40^0C during summer in themonth of May and the minimum temperature goes down to 10^0C during winter in the monthof December and January (All recorded temperatures monthly average of daily maximum andminimum**)**

   Source: http://cgwb.gov.in/District_Profile/Chhatisgarh/Dantewada.pdf

b) **Rainfall: -** The average annual rainfall in Bailadila district is 1250 mm. The South-west monsoon lasts from July to September and the area gets about 85% of the annual rainfall during this period. October to December also experience the rains**.**

   Source: http://cgwb.gov.in/District_Profile/Chhatisgarh/Dantewada.pdf

c) **Wind: -** Data from the nearby IMD Station, Jagdalpur which is at a distance of 124 km has been obtained. The annual predominant wind directions are SW and NE (16.2). Average speed is 1.5m/s to 4.5m/s**.**

2.6 GEOLOGY:

2.6.1 REGIONAL GEOLOGICAL SETTING:

The Bailadila Iron Ore Deposits occur in two parallel ridges in the Bailadila range of hills stretching north-south. Altogether, fourteen deposits have been located in these two ridges. The Bailadila iron ore series is considered to be equivalent to iron ore series of Jharkhand and Orissa. The Bailadila Iron Ore Deposit 4 is a part of Bailadila Group of rocks of Archaean- Proterozoic age of Bastar Craton. It consists of mainly the banded iron formation (BIF), associated ferruginous shales and phyllite overlies unconformably the Bengpal group. Apart from these

major rock types, volcanic tuffs and quartzites are also present in and around the mine lease area. Metabasaltic traps with tuffs and cherts underlie the above suite of rocks (i.e. Bengpal Series). The basal metabasaltic lavas and dolerite intrusions are encountered along the eastern foothills of the range.

The Bailadila sequence forms a northerly plunging synclinorium (Crook shank, 1963; Ramakrishnan, 1990). According to Chatterjee (1970), the NNE plunging overturned folds in Bailadila sequence are a result of horizontal shear concomitant with flexural slip folding.

A three-tier classification of Bailadila Group is proposed by Khan and Bhattacharya (1993). Khan and Bhattacharya (1993) have incorporated the hitherto mentioned metabasalt – metapelite in the Bailadila Group, naming it as Bhansi Formation.

The lithostratigraphic sequence of Bailadila Group, South Bastar, Dantewada is detailed as follows:

STRATIGRAPHIC GROUP	SUBGROUP	FORMATION	MEMBER	LITHOLOGY
BAILADILAGROUP	Upper Subgroup	Kailash Nagar Iron Formation		Banded Hematite quartzite, banded magnetite quartzite, pockets of massive, laminated ores and blue dust.
		Loa Formation	Akash Nagar Shale	Thinly laminated, soft, ferruginous shales
			Galli-Nala Conglomerate	Polymictic, unsorted, matrix supported conglomerates, Matrix variable in composition from silty tuffaceous to sandy ferruginous.
	….....Local Unconformity….....			
	Middle Subgroup	East RidgeShale Formation		Interlaminated ferruginous tuffaceous shales and bedded cherts. Rarely carbonaceous shales/slates. Banded ferruginous cherts towards the top.
		Bacheli Meta-siliciclastic Formation		Thick to thin, gradedcross bedded wackes /arenites with interbedded shaly layers, becoming common upwards
	….....Local Unconformity….....			

	Lower Subgroup	Bhansi Formation		Chlorite, micaceous phyllites with or without andalusite porphyroblasts. Meta basalts occasionally containing amygdales.
	….....Angular Unconformity….....			
	Basement: Quartz- Chlorite Schists, Recrystallized Quartzites, Magnetite Quartzites of Bengpal (Sukma)			

2.6.2 LOCAL GEOLOGY (GEOLOGY OF DEPOSIT):

Deposit No.4 is situated in the North of Deposit No.5 and South of Deposit No.3 in the western ridge. The ore body occurs as northern continuation of north block of Deposit No.5, separated from Deposit No.5 by a narrow parting of about 150 mtrs of poor grade lateriticore. On the northern side, Deposit No.4 is separated from Deposit No.3 by a parting of un- enriched banded hematite-quartzite.

The ore body is divided into north and south blocks which are separated by unenriched BHQ. The deposit is bounded by a deep valley on western side and galli nalla on eastern side. The eastern flank of the deposit is mostly covered by poor grade laterites. Small cliffs composed of hard massive ore occur on the western side of the deposit. Western boundary is often marked by sharp contact against the BHQ.

The deposit has a general synclinal structure. The ore body is however, disturbed by several faults which are oblique and transverse in nature. The ore body is also characterized by cross folding, because of which the width of the ore body at places is wider and narrower.

2.7 LAND USE PERTAINING TO PROJECT AREA FROM MINING PERSPECTIVE:

(A) Land use plan inside Mining Lease

S.NO	Particulars	Area in Ha
1	Area required for Mining (ln situ)	94.11
	Area required for Mining (Float ore)	70.52
2	Area required for Dumps	74.07
3	Area required for infrastructure facilities (Crushing Plant, PSP, Downhill Conveyor (part), internal roads, Service Centre, ETP, Mining Office, Canteen, Rest Shelter, Substation, Power Lines, pump house, pickup weir, water pipelines and Security barrack etc.)	65.9

4	Area under Environmental protection, improvement and EMP Works	241.642
5	Area under explosive magazine & safety zone	15.37
7	**Tree fern area not to be diverted**	**76.496**
8	Safety zone Along the ML boundary	8.488
	Total	646.596
Land use Inside the Mining Lease area excluding the' tree fern area (not to be diverted) =646.596 Ha. -76.49b Ha. =570.1 Ha.		

(B) Summary of Forest Land outside mining lease Boundary is given below –

Land use details outside the Mining Lease of Deposit No.4 (Forest Land)				
Head	**Compartment No**	**Revenue Forest/Govt/Private**	**Reserve forest**	**Total forest area in Ha**
Existing roads widening/ Strengthing for two-way traffic and new approach roads to all the plants & Transfer houses	1822	Reserve Forest	0.913	27.238
	1824	Reserve Forest	9.332	
	1825	Reserve Forest	11.707	
	1826	Reserve Forest	5.286	
Downhill conveyor system including Overhead electrical line and Water pipe line	1822	Reserve Forest	5.714	43.000
	1824	Reserve Forest	12.006	
	1825	Reserve Forest	7.468	
	1826	Reserve Forest	17.165	
	1834	Reserve Forest	0.647	
Screening plant	1824	Reserve Forest	18.281	18.281
Loading plant	1824	Reserve Forest	10.083	10.239
	1811	Reserve Forest	0.156	
Railway Siding	1825	Reserve Forest	0.226	1.041
	1824	Reserve Forest	0.701	
	1811	Reserve Forest	0.114	
Slurry pipeline	1824	Reserve Forest	0.177	0.278
	1825	Reserve Forest	0.101	
TOTAL				**100.077**

TABLE 2.1 DETAILS OF PROPOSED LAND USE PATTERN OUTSIDE ML AREA (FOREST, REVENUE LAND and REVENUE FOREST LAND - Bade Jhad ke Jungle)

Sl. No.	Description	Area (Ha)			
		Forest	Revenue ForestLand (Bade Jhad ke Jungle)	Pvt. Revenue Land	Govt. Revenue Land
1	Major part of Downhill conveyor system including overhead electrical line & water pipeline	43.0000	-	-	-
2	Screening Plant including all allied facilities	18.2810	-	-	-
3	Loading Plant including all allied facilities	10.2390	7.9656	1.7387	0.1107
4	Railway siding	1.0410	9.6616	1.5190	0.3055
5	Existing roads widening / strengthening for two-way traffic and new approach roads to all the plants & transfer houses	27.5160	-	-	-
6	Pump House	-	0.4000	-	-
7	Pipe line	-	0.1653	0.0055	0.5939
	Total	**100.0770**	**18.1925**	**3.2632**	**1.0101**

2.8 SOCIO- ECONOMIC ENVIRONMENT:

2.8.1 INTRODUCTION:

M/s CMDC-NMDC Limited proposes to Expansion of Deposit-4. Study area is falling in Bacheli and Kuakonda Tehsils, South Bastar, Dantewada district of Chhattishgarh which have 25 villages and 2 municipalities.

The demographic and socio-economic details of 10 km radius of study area as per Census 2011 are given below. Socio-Economic status of the population is an indicator for the development of the region. Any developmental project of any magnitude will have a bearing on the living conditions and on the economic base of population in particular and the region as a whole.

Two more perennial rivers Shankhini and Dankini are major surface water source of the area. The main occupation of the tribes is farming, poultry farming and animal husbandry.

Socio-Economic Scenario (Urban & Rural) in the 10 km radius of the Deposite 4 mine has been assessed by Secondary data collection from statistical records (Census 2011)

2.8.2 REVIEW OF SECONDARY DATA:

Data from the secondary sources, viz. the latest available District Statistical Handbook, 2011 Census data and various census updates based on the 2011 census, were explored / reviewed for getting the demographic profile, viz., number of households, population, social composition, literacy and occupational structure, etc. of the population within the study area (10 km radius) of the project site.

The list of the existing villages (as on date) falling within 10 Kms of the project is enclosed …… as **annexure no.5**

2.8.3 EXITING SOCIO-ECONOMIC SCENARIO:

The information on socio-economic aspects of the study area as defined in this Chapter has been compiled from secondary sources, which include various public offices. Thesociological aspects of this study include human settlements, demography, social, such as Scheduled castes and Scheduled Tribes and literacy levels besides infrastructure facilityavailable in the study area. The economic aspects include occupational structure of workers. The salient features of the demographic and socio-economic details are presented in the following sections.

The house hold & population of the study area (10 Km) in three different distance range 0-3 km, 3km-7 km & 7-10 are given below in Table –

TABLE 2.2 VILLAGES IN THE STUDY AREA

Sr. No.	Village Name	House Holds	Population
0-3 km			
1	Bade Bacheli	5398	21435
2	Bhansi	347	1365
3	Porokameli	45	200
4	Dumirpalnar	44	180
5	Bhatpada	38	193
Sub Total		**5872**	**23373**
3-7 km			
6	Belnar	224	1085
7	Markapal	48	204
8	Porewada	10	34
9	Bainpal	150	709
10	Basanpur	53	226
11	Dhurli	404	2068
12	Gamawada	389	1574
13	Hiroli	21	115

14	Hiroli	178	802
15	Jhirka	68	305
16	Kirandul	4638	18887
17	Kodenar	460	1843
18	Nerli	193	871
19	Padhapur	99	406
Sub Total		**6935**	**29129**
7-10 km			
20	Manjhiguda	224	969
21	Kadampal	148	557
22	Kamaloor	247	1210
23	Kodripal	513	2048
24	Masenar	406	1619
25	Molasnar	78	321
26	Pinabacheli	13	54
27	Timmenar	118	404
Sub Total		**1747**	**7182**
Grant total		**14554**	**59684**

Source: - Census: 2011

2.9 POPULATION, HOUSEHOLD SIZE & SEX RATIO:

The total population of 25 villages is 59684 within 14554 Households in study area. Household size is 4.1. District base Population, Household Size& Sex Ratio of study area given in Table.

Population, Household Size & Sex Ratio

	Total (0 - 10 km)
Household	14554
Population	59684
Male Population	30314
Female Population	29370
Household Size	4.1
Sex Ratio	969

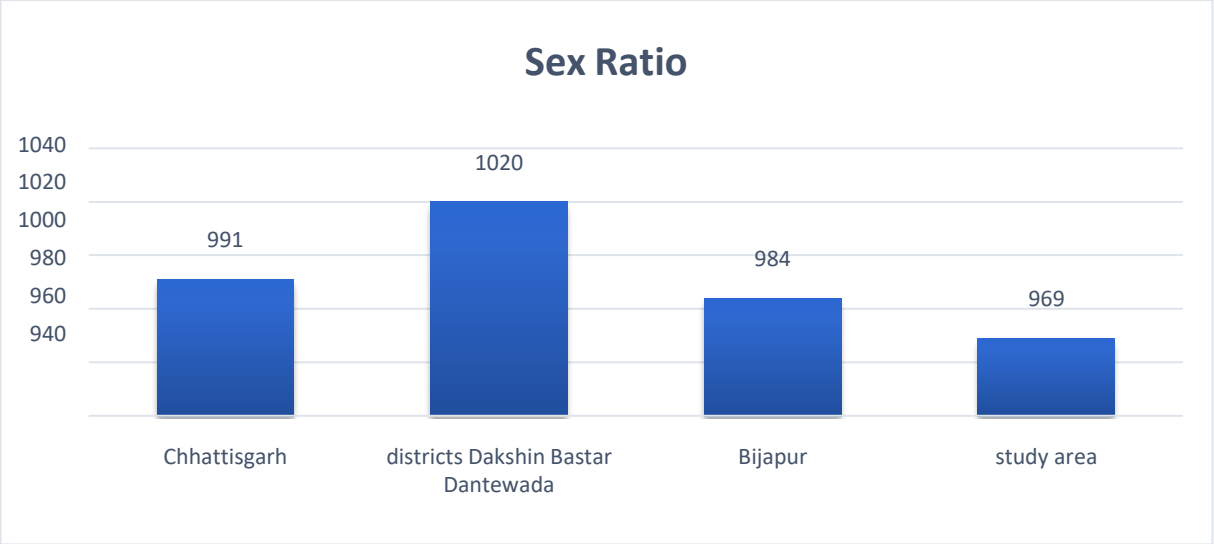
Source: - Census: 2011

2.9.1 SEX RATIO:

The study area has an overall density of 189.97 people per km^2. The sex ratio ie No. of females per thousand males for the state Chhattisgarh and districts Dakshin Bastar Dantewada& Bijapur

is 991 and 1020 & 984 respectively The sex ratio in the study area is 969 as per census 2011. In comparison to the Dakshin Baster Dantewada district sex ratio the study area is low. Comparative Sex Ratio is given in below Figure.

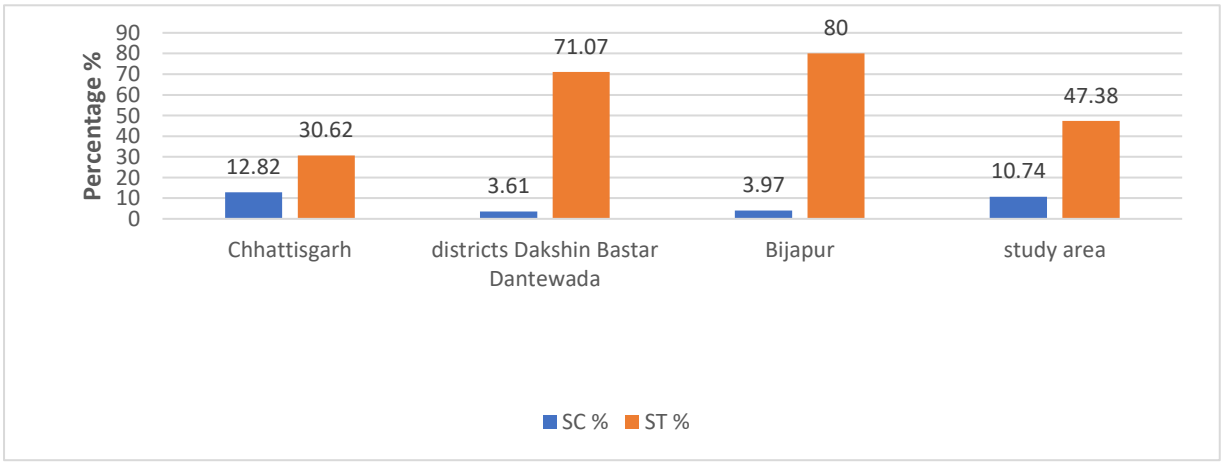
Sex Ratio Profile



Source: - Census: 2011

Scheduled Caste (SC) & Scheduled Tribe (ST) Population

In the study area, as per 2011 census, 10.74% of the population is from Scheduled Castes (SC) and 47.38% comes from Scheduled Tribes (ST) Overall the data on social stratification reveals that the SC and ST population is more than 58.12%. In comparison with study area proportion of SC population is less than the state average and ST population is more than state average (Chhattisgarh state average - SC 12.82% and ST 30.62%). Comparative analysisof SC & ST population is given below.The details of SC & ST population are given in Fig. Comparative Analysis of SC & ST Percentage

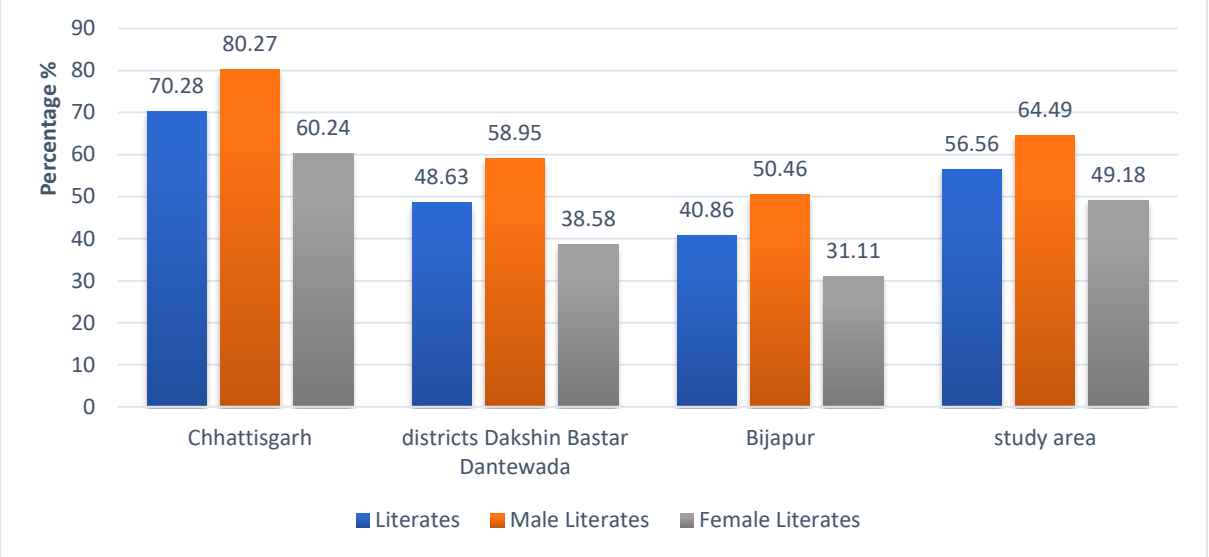


Source: - Census: 2011

2.9.2 LITERACY:

The data of study area reveals that literacy rate of 56.56% as per 2011 census, which is found to be more than Dakshin Baster Dantewada and Bijapur districts rate of literacy (Dakshin Baster Dantewada district 48.63% and Bijapur district 40.86%). The distribution of literate and literacy rate in the study area is given in the Literacy status of the study area is given in Comparative analysis of literacy level is given in below.

Figure: Comparative Analysis of Literacy Level in the Study Area



Source: - Census: 2011

2.10 ECONOMIC PATTERN AND LIVELIHOOD:

Total work participation in the study area is 43.45% and the non-workers constitute 56.55%. In work participation rate is less in study area compared to districts. (Dakshin Baster Dantewada district 51.12% and Bijapur district 52.7%). The main workers to the total workers are 81.37% and the marginal workers constitute to 18.63% to the total workers.

2.10.1 COMPARATIVE ANALYSIS OF THE WORKFORCE IN THE STUDY AREA:

The employment pattern in the villages indicate that only 27.59 % work as cultivators,10.68% as agricultural labourers, 61.01% as other workers and 0.68 % as household industry workers. Most of the villagers are agriculturists.

2.10.2 COMPARATIVE ANALYSIS OF ECONOMIC ACTIVITY IN THE STUDY AREA:

The male workers account to 67.34% and female workers to 32.66% of the total working population.

Work Participation: Male & Female

Category	Study Area			
	Male		Female	
	No.	%	No.	%
Total Workers	17464	67.34	8470	32.66
Main Workers	15692	60.51	5410	20.86
Marginal Workers	1772	6.83	3060	11.79
Cultivators	3918	15.11	3236	12.48
Agricultural Laborers	821	3.16	1950	7.52
Household Workers	134	0.52	42	0.16
Other Workers	12591	48.55	3232	12.46

Source: - Census: 2011

2.10.3 BASIC AMENITIES OF DANTEWADA DISTRICT:

i. Educational Facilities

Education is a very important determinant of socio-economic development of any area. Universal primary education is one of the essential development strategies of a developing country like India, which focus mainly over raising the Net Enrolment Ratio (NER) in primary education. As per Government of India norms, the education facilities available should be as follows:

Availability of primary school within one kilometer of habitation, Availability of middle school within 3 kilometers of habitation and Availability of high school and secondary education within 5 kilometers of habitation

The district has 6 PG/UG College and 1014 schools in 2022 (https://dantewada.nic.in/). As per the Government of India norms, the educationfacilities in the district in general and in particular in the blocks falling in study areaare less than adequate to fulfill the Government of India norms.

ii. Health Care System : The health care facilities available in the district are given in Table

Health Care System in Dantewada District

1	Community Health Centres	4
2	District Hospital	1
3	Primary Health Centres	13
4	Sub-Health Centres	76
5	Jeevan Deep Samitis	15
6	Mitanin	1372

https://dantewada.nic.in/en/departments/health

2.10.4 AMENITIES AT STUDY AREA

Schools /Colleges	Name of existing schools 1. KV School 2. DAV School 3. Prakash School 4. BIOP School 5. State Govt School 6. Anganwadi 7. Arvind College 8. Polytechnic College
Banks	SBI, UCO, Gramin Bank
Hospital	NMDC Project Hospital, State Govt Hospital
Post Office	5
Recreation /Sports Club	4
Parks	8
Bus Stop	2
Library	2
Railway Station	3

2.10.5 MAJOR INDUSTRIES WITH NAME AND TYPE WITHIN STUDY AREA (10KM REDIUS)

1. Bailadila Iron Ore Mine, Bacheli Complex (Iron Ore Mining Complex of NMDC Ltd.)
2. Bailadila Iron Ore Mine, Kirandul Complex (Iron Ore Mining Complex of NMDC Ltd.)
3. Beneficiation and Slurry Plant of AM/NS India at Kirandul

2.11 LAND USE LAND COVER IN STUDY AREA:

The land use/land cover information relates to the status, spatial distribution & area extent of different land cover/land use categories. Land cover and land use are terms that are often used interchangeably; however, they have different meanings. Land cover results from a complex mixture of natural and anthropogenic influences and is the composition and characteristics of land surface elements (Cihlar, 2000). In contrast, land use is characterized by economic uses of land and people's relationships with the environment (Avery and Berlin, 1992). With a view to facilitate utilization of modern technology in the management of the resources, a chain of

digital image processing steps has been carried for the land use/land cover mapping. The entire investigations have been carried out using ERADAS digital image processing software and Geographic Information System (ARC GIS).

Digital classification procedure has been used for generation of maps on land use/land cover from satellite data. The technique is based on stratified approach.

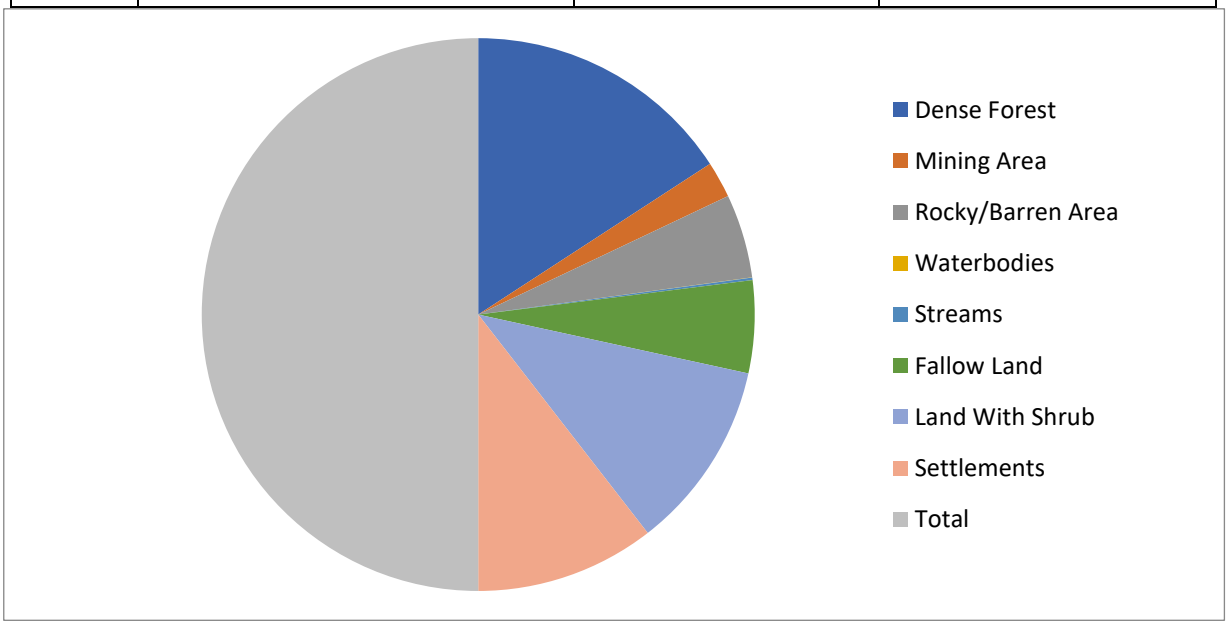
The land use classified through supervised classification of the area and the cultural features of roads, rail and village locations have been overlaid. The land use/ land cover map of the area has been extracted using 10 km radius mask and area statistics have been generated.

2.11.1 GENERAL LAND USE/ LAND COVER:

The land use/ land cover map has been generated on 1:50,000 scale using digital classification of LISS-IV. Based on the methodology developed for the present land use/ land cover, categories have been grouped under the following major land use/land cover categories.

TABLE 2.3 MAJOR LAND USE/LAND COVER CATEGORIES OF STUDY AREA

SL. No.	Category	Area in Ha	% Of the Study Area
1	Dense Forest	13691.6	31.64
2	Mining Area	1841.7	4.26
3	Rocky/Barren Area	4237.76	9.79
4	Waterbodies	13.33	0.03
5	Streams	125.54	0.29
6	Fallow Land	4681.25	10.82
7	Land With Shrub	9588.16	22.16
8	Settlements	9088.83	21.01
	Total	**43268.17**	**100**



Dense Forest: Forest with canopy cover more than 60% is considered as dense forest. Location of dense forest within study area is shown in Plate3.7. This represents the area under Dense Forest lands, about 13691.6 Ha or 31.64 % of the study area. The study area contains natural vegetation.

Mining Area: The total area falling within Proposed mining is 1841.7 Ha which 4.26 % of the study area.

Rocky/Barren Area: Based on satellite data, The Rocky and the Barren land are observed in the Western part of the study Area. These areas consist of hard formations and with less to none green cover. The total area falling within the water bodies are 4237.76 Ha which is about 9.79 % of the total study area**.**

Water Bodies: Based on satellite data, the water bodies and water-logged areas are giving the same tone and texture so it is very difficult to discriminate water logged areas with the water bodies.Presently old water logged is also being considered as water body in the study area. The total area falling within the water bodies are 13.33 Ha which is about 0.03 % of the total studyarea.

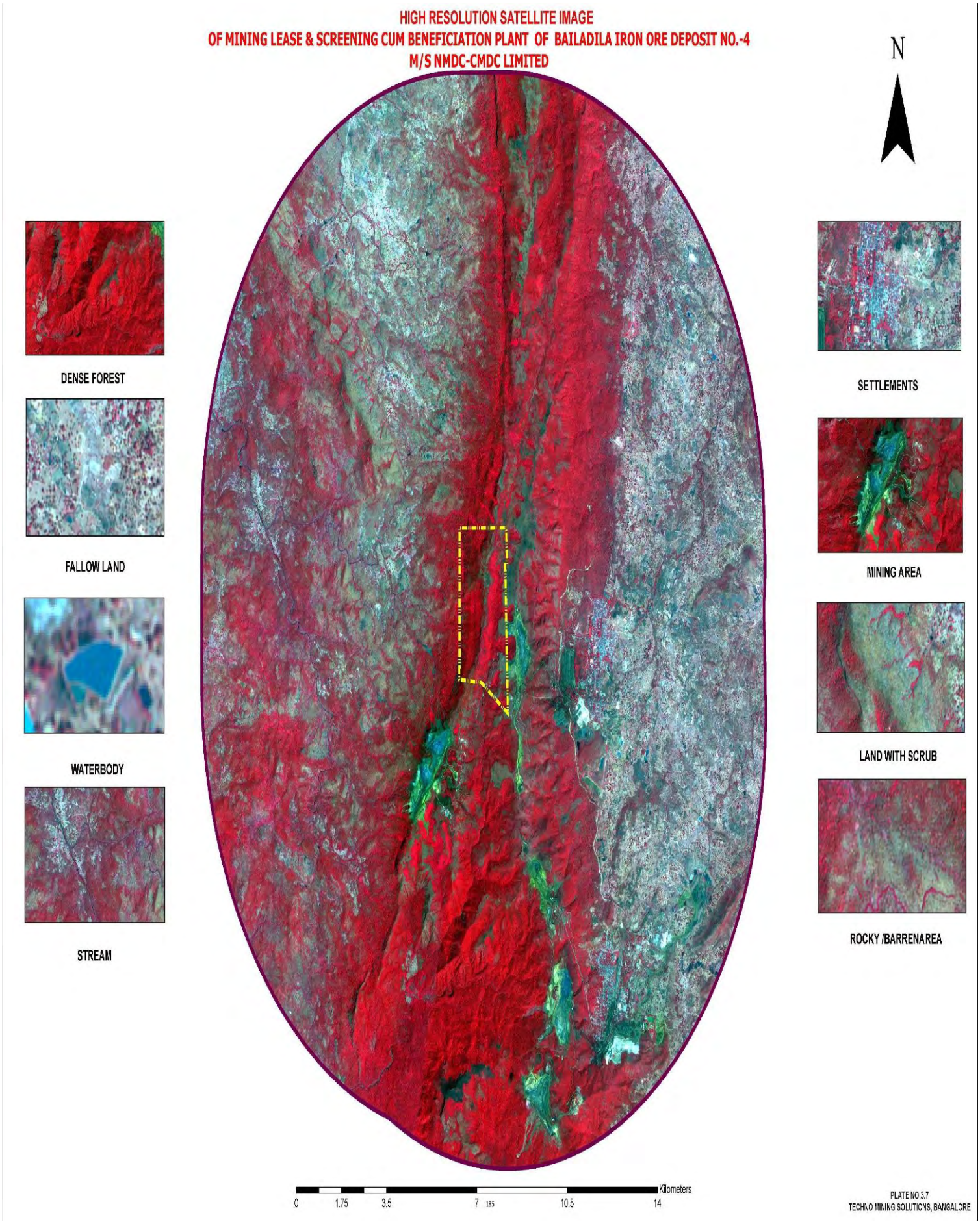
Streams: Based on satellite data, the Streams are giving the different tone and texture so it is typically little difficult to discriminate water bodies areas with the streams. The total area falling withinthe streams are 125.54 Ha which is about 0.29 % of the total study area.

Fallow land: Based on satellite data and ground truth, the total agricultural & fallow land, are classified by using image classification techniques. Existing agricultural area which are left unplanted weredepicted by utilizing multispectral satellite data. current fallow land is 4681.25 Ha area whichis about 10.82% of the total study area.

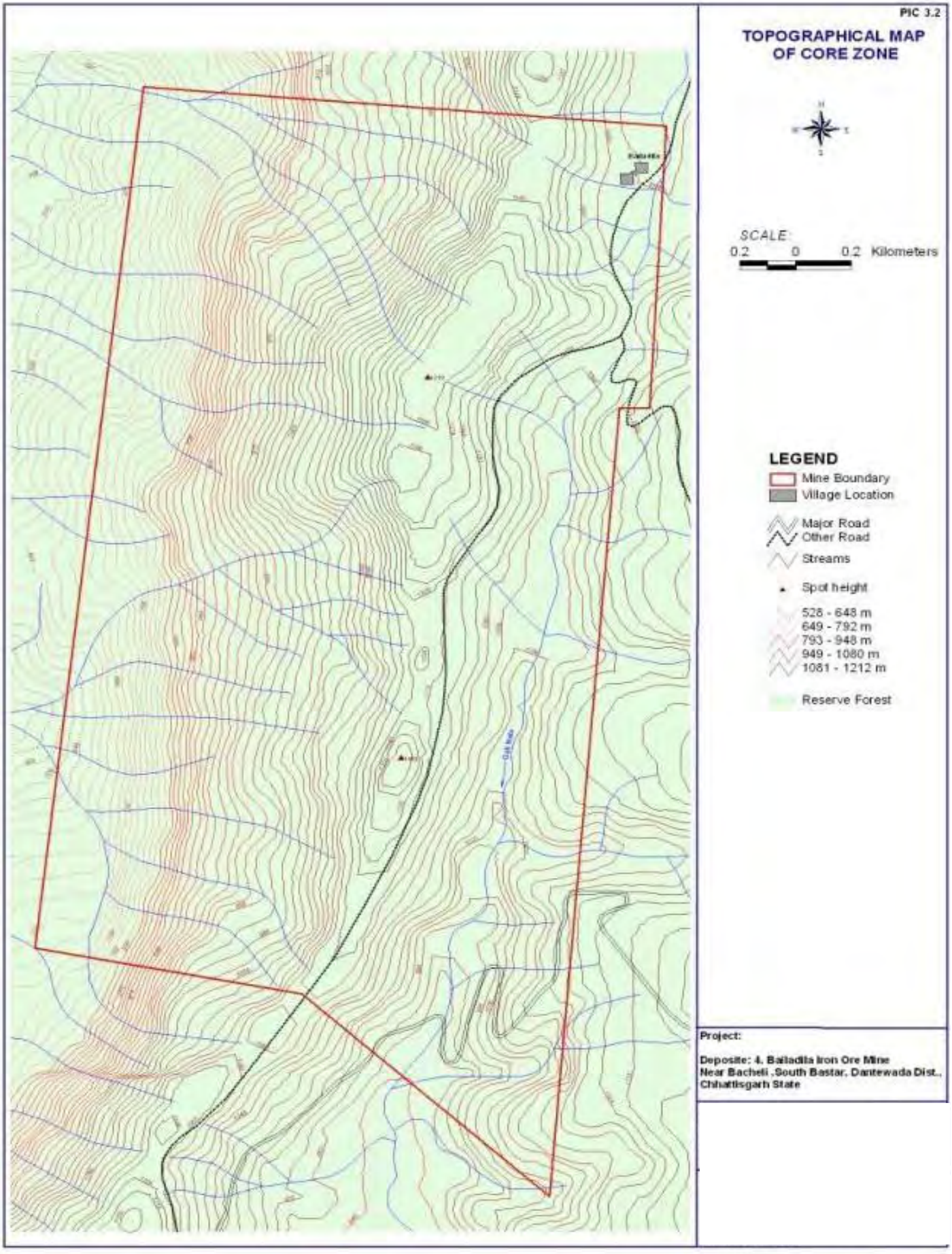
Land with Scrub: Scrub lands are quite similar with degraded forest in image characteristics. These lands are further examined on the ground and cross checked with the forest boundaries to classify into scrub lands. Scrub lands are 9588.16 Ha which is about 22.16 % of the study area**.**

Settlements: The village locations and built-up area extent have been extracted from the satellite data of high resolution and also from the existing topographical maps. The area occupied by Settlement class shown in the classified image is therefore based on the visual interpretation of high-resolution satellite data and also topographical maps. The major Settlement is about 9088.83 Ha which is 21.01 % of the total study area.

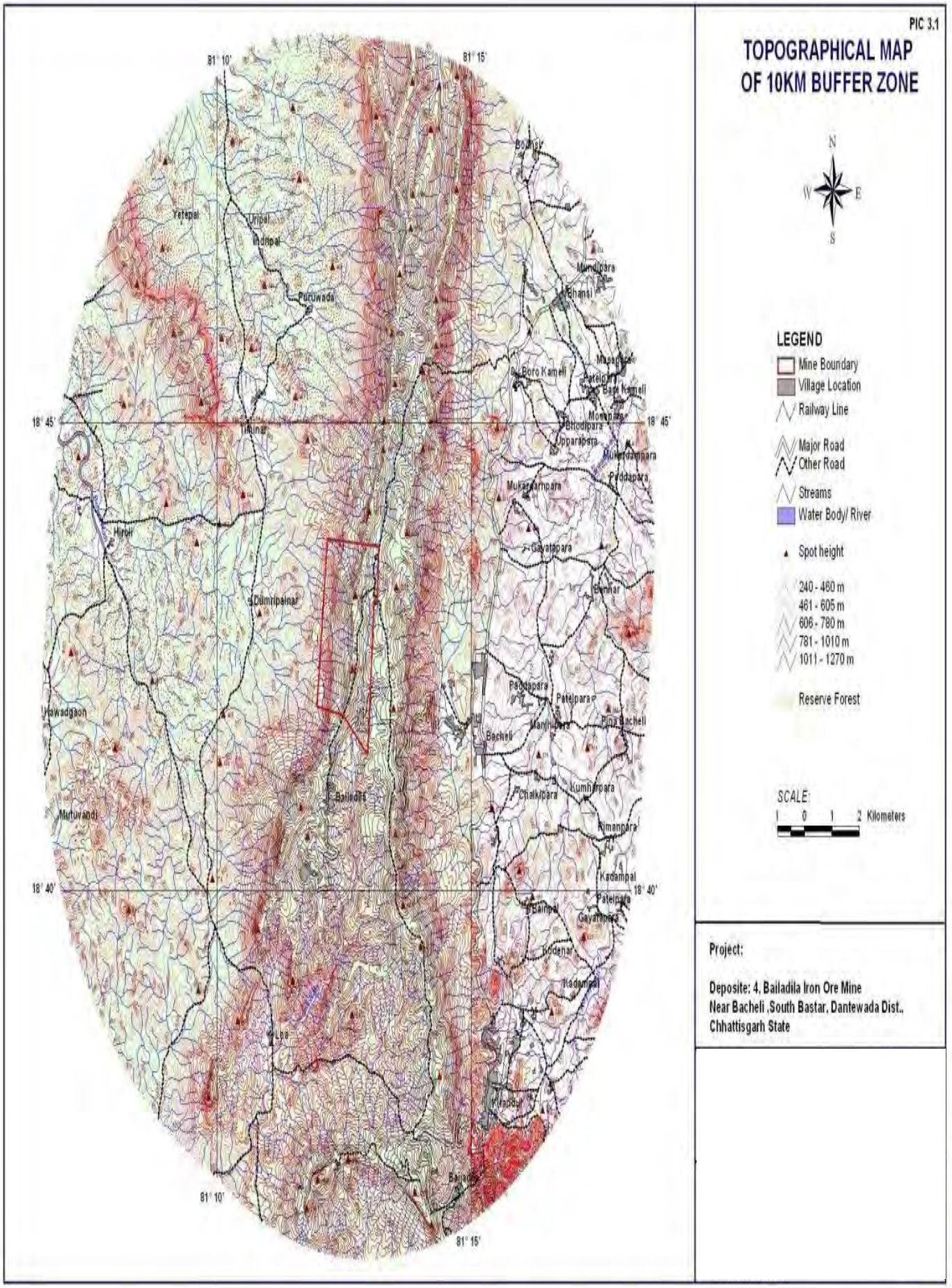
MAP 2.4 SATELLITE IMAGE OF CORE ZONE



MAP 2.5 TOPOGRAPHICAL MAP OF CORE ZONE AREA



MAP 2.6 TOPOGRAPHICAL MAP OF BUFFER ZONE AREA



CHAPTER III
METHODOLOGY FOLLOWED

3.1 ECOLOGY STUDY:

The study for the Flora and Fauna of the project and Impact zone give ample idea to formulate a Wild life Conservation and Management Plan required for Bailadila Iron Ore Deposit No.- 4 M/s NMDC-CMDC LIMITED

An eco-system can be studied from different perspective, this report has tried to explore various aspects of the study area to understand mostly of the forest eco–system and associated one. For this study sampling techniques was followed.

The study is a rapid one conducted in the month of October - November 2022.

3.2 METHODOLOGY FOLLOWED IN FAUNAL STUDY:

- For Faunal identification, primary data was prepared by interaction with field staff andlocal people, even from identification of field sign and call of the animals. Indirect evidences and information collected from forest dept. staff, villagers etc.
- Secondary data on Fauna was collected from working plan of concerned Forest divisions, Wildlife offence cases, conflict data.
- Different habitat was also indicative of presence of particular type of animal in those habitats.

An ecological survey of the study area (Project area) for understanding the Fauna of the study area was conducted, particularly with reference to listing of species and assessment of the existing base line ecological conditions in the study area in the following manner:

- **Dropping/ Scat:** Dropping and scat analysis are survey technique in which presence animals are recorded without capturing or even seeing them and are most useful technique for identifying species that are present in that area.
- **Interaction with Local villagers and Forest field staff:** Forest dwellers are well awareof the species found in the forest area as they frequently come across with these specieswhen they go to the forest for many reasons. The data recorded through interaction withlocal people of certain species in the study area. An oral rapid interactive discussion &inquire survey with villagers and departmental officers of the forest departments is alsobeen conducted during study.

- **Study of Secondary data:** An ecological survey of the study area for understanding the fauna of the study area was conducted, particularly with reference to listing of species and assessment of the existing wild life has been studied by the forest working plan 2010-2021 of Dantewada Division and compiled time to time departmental studies in wild life recent census. An oral rapid interactive discussion & inquire survey with villagers and departmental officers of the forest departments is also been conducted during study.

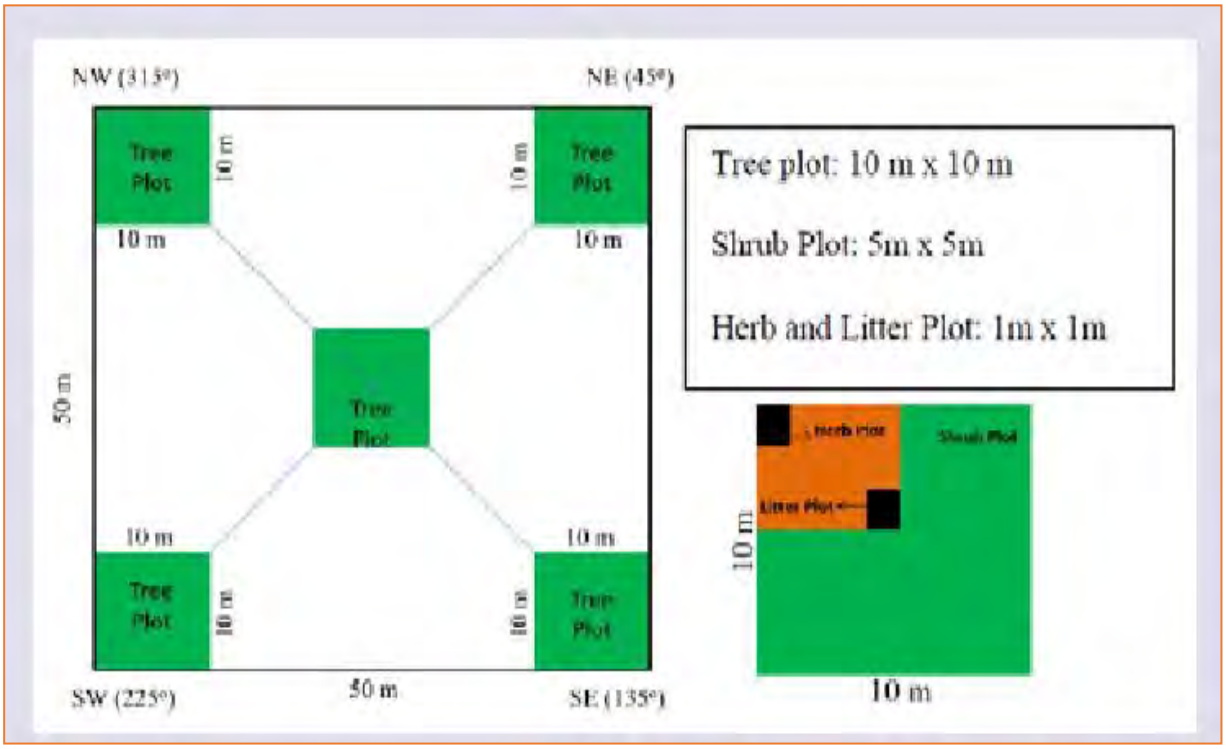
3.3 METHODOLOGY FOLLOWED IN FLORAL STATUS STUDY:

The details of the floral biodiversity assessment methodology are given below, Random samples were taken to assess the ecological structure of the study area and get some simple idea of the ecological functions. The study area deposit 04 is basically a hill running in East-West direction. The whole core area where mining activity is in progress is almost completely denuded and rarely has any species. In some places where species available was recorded as per the findings of transact walk. Random sampling was done with the help of Satellite Imagery and toposheet of the area. Samples were studied both within mining sites (ML area) and in the buffer area i.e., 10 km radius of the ML area of the three mines namely 14ML, 14NMZ and a part of 11ML i.e., 11B. Each site studied is marked with geographical coordinates recorded in GPS handset (GARMIN-e Trex-30).

Studies were done for understanding the phytosociology, inventorisation of faunal species as well as their habitat. non-forest areas. At the outset a species area curve was prepared in eastern side of the hill to find out the minimum size of the quadrat required for the study of three layers (considered as separate communities) such as tree, shrub, and herb (Cain, 1938).

It was inferred that for tree layer the minimum size of the quadrat required for study was 500m2 (50m X 10m) for trees, (5m X 5m) 25m2 for shrubs and (1m X 1m) 1m2 for herbs. In each of the sample sites a quadrat of 500m2 was laid to study the tree community (Philip, 1959), Diversity Index, and Canopy Cover. In each of the tree quadrat four shrub quadrats were laid on alternate sides and similarly five herb quadrats were for study of herb layer. Each quadrat was given a code.

Study of the forest type was done through visit both Project area and Impact zone involved in the project for primary information regarding the varying forest types of the region.



The secondary information was gathered from the concerned forest division.

- Status of floral species was assessed in representative vegetation types existing in the study area.
- Quantitative data was collected using Quadrant sampling method.
- Status of tree, shrubs and annuals (grass and herbs) was assessed using sample plots of different sizes.
- Plant species ascertained from the secondary sources was included in the report as Annexure along with the field data to give near complete floral list of the study area.
- Species of Economical, Ecological and Ethno botanical importance was identified.
- Types of Forest area and its conservation status were observed to the best possible extent.
- Information on the dependence of local people on minor forest products was also assessed.

3.4 MEASURING CANOPY COVER STATISTICS:

Canopy cover (CC) is an important indicator of the forest habitat conditions, the movement and behavioral pattern of large mammalian herbivores as well as birds and several groups of insects are dictated to a large extent, by the status of canopy cover. The overall forest cover may easily be estimated from the satellite imaginary. However, within the forest area shows, different patches of the forest understandably showed different characteristics, depending on the floral

composition, age structure of the stand and the history and degree of perturbation like fragmentation and felling etc. Instead of depending on the generalized satellite estimation, a more direct and authentic estimate of canopy cover was undertaken by the study team by physically measuring the canopy spread.

We have adopted a geometric measurement to estimate CC, by directly measuring the crown diameter at right angle in specific quadrant. Half of the average of these diameters gives the mean radius of the canopy, hence the mean canopy area of each tree can be calculated as $2\pi r$ (where r is the mean canopy radius for ith individual tree). The total canopy cover area (CC) in a sample quadrant equals the sum total of the canopy area of all trees within the quadrant, $\Sigma\pi r2$. Thus, the Canopy Cover Index (CCI) is the ratio of C to A where A = XY, (X and Y denoting axes of the quadrant being measured.) Open canopy inferred when CCI <0.4.

3.5 ETHNO-BOTANICAL STUDY:

This is the study related to use of the different plant species by the local people for food, medicine and other traditional uses.

- Information on plants associated with food, medicine, material culture and worship. The conservation aspects of the community, natural history, ethnology has been observed by interviewing and asking villagers by doing Rapid Ethno botanical Appraisal (REA as suggested by Martin (!995)). REA is a method by which quick assessment of ecological knowledge and resource use can be studied and assessed. This technique is adopted from various disciplines to form a collaborative approach.

- Study team was accompanied by some of the villagers and forest field staff to identify the species of importance to the local people.

- Ethno-botanical information has been collected for this study from the followingsources also, these are (a) Old literature (b) Oral history.

- The present study was done with many sources such as secondary data available in various forest division working plans, field observation and notes taken on Herbarium, and recorded natural history, ethnologist etc. In the present study all the tools mentioned above have been taken as source of information.

3.6 STUDY TECHNIQUES ADOPTED AND DETAILS OF VISIT:

- All the topographical details were collected from the Survey of India Topo Sheets
- The Village list and demographic composition has been collected from 2011 Census Report.
- Data were collected from prevailing Working Plans of the forest divisions.
- A questionnaire has been prepared with our own developed model for the survey of field data.
- Wild life movement and presence data collected from the concerned forest divisional records.
- Flora and fauna study have been done by field visit and in consultation with Forest Field Staff and villagers and confirmation by divisional working plan.

3.7 RECORDS REFERRED:

The following books/records were referred for preparation of site-specific conservation plan.

1. State of India's Forest Report-2019; Forest Survey of India. Dehradun
2. Champion H G. and Seth S K. (1968). A revised survey of forest types of India.
3. Working Plans of Dantewada Forest Division.
4. Book on Indian Birds by Salim Ali and Book on Birds of Chhattisgarh published by Biodiversity Board of Chhattisgarh.
5. Wildlife (Protection) Act 1972
6. WII (2016). Eco-friendly measures to mitigate impacts of linear infrastructure on wildlife. Wildlife Institute of India, Dehradun, India
7. Draft EIA report for Iron Ore Deposit No.- 4 M/s NMDC-CMDC LIMITED
8. Various research papers and reports on Tree Fern.

3.8 SURVEY AND DATA COLLECTION TEAM:

The team of "***We the Foresters Welfare Society***" visited the project area and its Impact Zone during March-April 2021 with an objective to gather first-hand information of Flora, Fauna and Ecological status of the study area.

Sr. No.	Member Name	Expertise
1.	Mr. Chandra Shekhar Tiwari IFS Retd. CCF (Wild Life)	Wild life and Forest management andConservation
2	Mr. Atul Shrivastava, SFS Retd. ACF	Forest management and Protection
3	Mr. Shirish Sinha SFS Retd. ACF	Wild life management, forest Protection
4	Mr. Dilip Kumar Verma, SFSEx. Forest Officer	Forest Management, Environmentalist, Statistical Data Analyst
5	Dr. Neeraj Tiwari	Ecology, Botany, Forestry
6	Ashutosh Mishra	Botany Plant Photography
7	Damini Bhuarya	Science Associate
8	Bindu Yadav	Field Associate for data collection
9	Pragati Trivedi	Botany and Ecologist

Accompanied by field staff of Bacheli Forest Range and staff of NMDC.

3.9 FIELD VISIT AND SURVEY PHOTOGRAPHS


ट्री फर्न संरक्षण एवं संवर्धन क्षेत्र
वैधानिक चेतावनी
सर्वसाधारण को सूचित किया जाता है कि यह सूक्ष्म जलवायु
क्षेत्र मे ट्री फर्न (साईथियसी स्यीसी) बत (केन) आर्किड्स इत्यादि
विलुप्त प्राय प्रजातियाँ पाई जाती है अतः विदेश व्यापार विकास
एवं नियंत्रण अधिनियम 1992 के अंतर्गत इनका वन क्षेत्र से प्राप्त
करना निषिद्ध है।
राष्ट्रीय औषधि पादप मण्डल
भारत सरकार, नई दिल्ली
सौनन्य-वन परिक्षेत्र बचेली, जिला-दन्तेवाड़ा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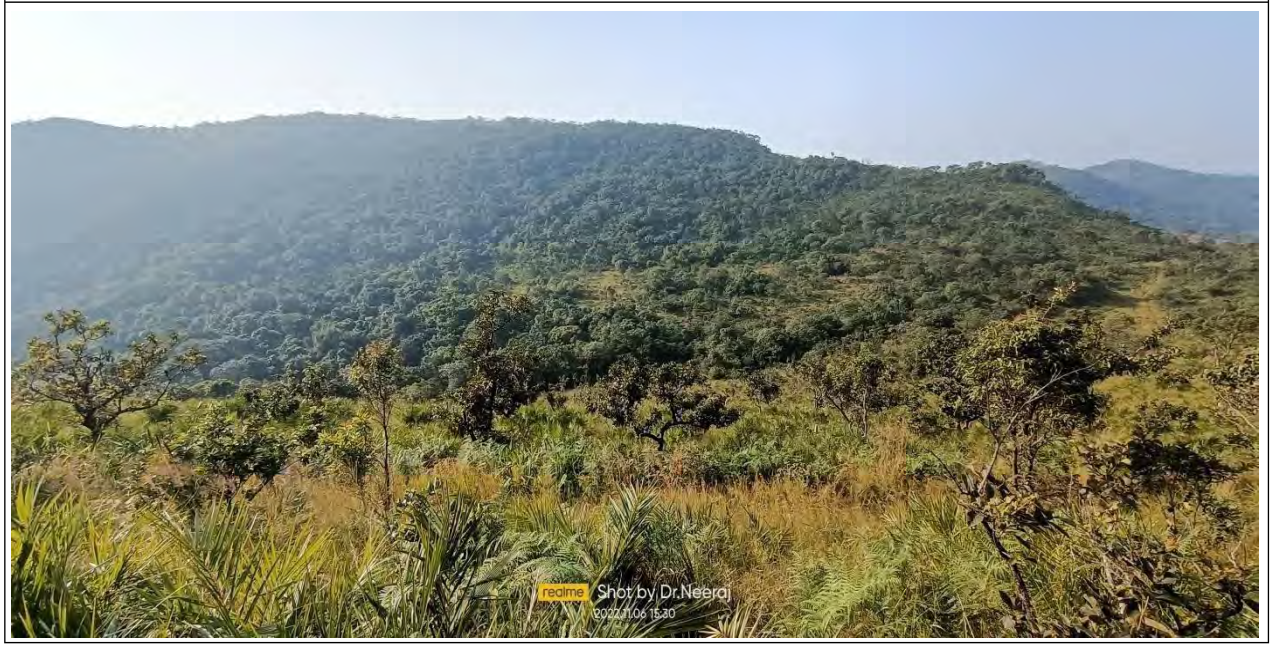
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CHAPTER IV
STATUS OF FLORAL DIVERSITY

4.1 DESCRIPTION OF FOREST:

The state of Chhattisgarh being placed in Deccan bio-geographical Area, which is an important part of rich and unique biological diversity. What is a more conspicuous is that the state is significantly rich in endemism with respect to many plants having medicinal importance. Apart from the species diversity, the state is also endowed with rich genetic diversity. The variation in the genetic composition of individuals within or among floristic species is large.

The recorded forest area in the state is 59,772 km2 which is 44.21 of its geographical area. Reserved, Protected and Unclassed Forests constitute 43.13%, 40.21% and 16.65% of the total forest area respectively.

The forests of the state fall under two major forest types, i.e., Tropical Moist Deciduous Forest and the Tropical Dry Deciduous Forest (Champion and Seth, 1968). The state of Chhattisgarh is endowed with about 22 varied forest sub-types existing in the state.

The study area falls under Deccan bio-geographical area that houses an important partof the rich and unique biological diversity.

As per Champion and Seth (1968), Sal is one of the dominant tree species in the tropical moist as well as dry deciduous forests in India and it has been considered as a deciduous species (Cooke, 1958; Kirtikar and Basu, 1975; Tiwari, 1995), semi-deciduous species (Bor, 1953), an evergreen species (Krishnaswamy and Mathauda, 1954; Singh and Singh, 1992; Borchert, 2000), and deciduous or brevi-deciduous (Joshi, 1980).

Major forest types in Chhattisgarh	
Forest types	**% of the total**
5A/C3 Southern Dry Mixed Deciduous Forest	27.37
3C/C2e (ii) Moist Peninsular Low-Level Sal Forest	16.64
3B/C2 Southern Moist Mixed Deciduous Forest	15.68
5B/C1c Dry Peninsular Sal Forest	15.27
5B/C2 Northern Dry Mixed Deciduous Forest	13.16
3B/C1c Slightly Moist Teak Forest	6.47

Relatively lesser forest types in Chhattisgarh	
5/E9 Dry Bamboo Brakes	1.49
3C/C2e (i) Moist Peninsular High-Level Sal Forest	1.48
Plantation/ TOF	1.01
5B/DS1 Dry Deciduous Scrub	0.98
5A/C1b Dry Teak Forest	0.43
3/E1 *Terminalia elliptica* Forest	0.02
(Source- FSI, 2019)	

4.2 CLASSIFICATION OF FOREST IN DANTEWADA DIVISION:

As per Champion and Seth the study area (Project area and Impact Zone) in Dantewada Forest Division can be termed as follows:

Northern Tropical Moist Deciduous Forest - Type 3C

(i) Tropical Moist Penninsular High level Sal Forest 3C/C2ei
(ii) Tropical Moist Penninsular Sal Forest 3C/C2
(iii) Tropical Moist Penninsular Valley Sal Forest 3C/C2eiii

Southern Tropical Dry Deciduous Mixed Forest - Type 3B

(i) Southern Moist Mixed Deciduous Forest 3B/C2

4.2.1 VEGETATION STRUCTURE:

The structure of vegetation in the study area of is represented by Sal and mixed forests. Sal forests are found tothe extent of 80% and mixed forests to the extent of 20%. The forests of the area are mainly tropophilous type (neither damp nor very dry) dominated by Sal as the climatic climax.

Due to prevalence of optimal climatic conditions for better germination, establishment and development. these forests are known as the home of Sal . Associates of the Sal are commonly found as Beeja, Saja, Tinsa, Kusum, Moda, Dhawda, Semal, Haldu, Lendia Dhoban, Harra, Mahua, Bhilawa, Karram Achar. Amla, Ghont etc.

The composition in study area is given as below

AS PER BIODIVERSITY STUDY CONDUCTED BY OUR EXPERT TEAM

4.3 FLORA WITH IN MINING LEASE AND IMPACT AREA:

A. PTRIDOPHYTES

SL. No.	PLANT NAME	FAMILY	ECOLOGY
1.	*Azolla pinnata*	*Azollaceae*	*Aquatic*
2.	*Adiantum philippense*	*Adiantacece*	*Swamp & aquatic*
3.	*Adiantum flabellulatum*	*Adiantacece*	*Terrestrial*
4.	*Dryopteris cochleate*	*Dryopteridaceae*	*Swamp & aquatic*
5.	*Equisetum palustre*	*Equisetaceae*	*Swamp & aquatic*
6.	*Ophioglossum nudicaule*	*Ophioglossaceae*	*Swamp & aquatic*
7.	*Ophioglossum costatum*	*Ophioglossaceae*	*Swamp & aquatic*
8.	*Pteris confuse*	*Pteridaceae*	*Terrestrial*
9.	*Pteris vittate*	*Pteridaceae*	*Terrestrial*
10.	*Lygodium*	*Lygodiaceae*	*Terrestrial*
11.	*Isoetes*	*Isoetaceae*	*Terrestrial*
12.	*Marsilea. Minutta*	*Marsileaceae*	*Terrestrial*
13.	*Selaginella miniatospora*	*Seleginaceae*	*Terrestrial*
14.	*Selaginella repanda*	*Seleginaceae*	*Terrestrial*
15.	*Cyathea spp.*	*Cyatheacea*	*Terrestrial*

B. ANGIOSPERMS TREE SPECIES

SL. No.	PLANT NAME	FAMILY	ECOLOGY
1.	*Acacia auriculiformis*	*Fabaceae*	*Xerophyte*
2	*Adina cordifolia*	*Rubiaceae*	*Mesophyte*
3	*Aegle marmelos*	*Rutaceae*	*Mesophyte*
4	*Albizzia procera*	*Fabaceae*	*Mesophyte*
5	*Bauhinia acuminate*	*Fabaceae*	*Mesophyte*
6	*Boswellia serreta*	*Burseraceae*	*Mesophyte*
7	*Buchanania lanzan*	*Anacardiaceae*	*Mesophyte*
8	*Butea monosperma*	*Fabaceae*	*Mesophyte*
9	*Cassia fistula*	*Fabaceae*	*Mesophyte*

10	*Cedrela toona*	*Meliaceae*	*Mesophyte*
11	*Cliestanthus collinus*	*Euphorbiaceae*	*Mesophyte*
12	*Dillenia pentagyna*	*Dilleniaceae*	*Mesophyte*
13	*Diospyros melanoxylon*	*Ebenaceae*	*Mesophyte*
14	*Emblica officinalis*	*Euphorbiaceae*	*Mesophyte*
15	*Ixora*	*Rubiaceae*	*Mesophyte*

C. ANGIOSPERMS SHRUB SPECIES

SL. No.	PLANT NAME	FAMILY	ECOLOGY
1	*Asparagus racemosus*	*Liliaceae*	*Mesophyte*
2	*Bauhinia vahlii*	*Fabaceae*	*Mesophyte*
3	*Caesalpinia bonducella*	*Caesalpiniaceae*	*Mesophyte*
4	*Calotropis procera*	*Asclepiadaceae*	*Mesophyte*
5	*Capparis spinosa*	*Capparidaceae*	*Mesophyte*
6	*Casiareavaracca*	*Samydaceae*	*Mesophyte*
7	*Coccinia grandis*	*Apocynaceae*	*Mesophyte*
8	*Cryptolepis buchanani*	*Apocynaceae*	*Mesophyte*
9	*Dioscorea bulbifera*	*Dioscoreaceae*	*Mesophyte*
10	*Flacourtia ramontchi*	*Flacourtiaceae*	*Mesophyte*
11	*Gardenia gummifera*	*Rubiaceae*	*Mesophyte*
12	*Gymnema sylvestre*	*Asclepiadaceae*	*Mesophyte*
13	*Hemidesmus indicus*	*Asclepiadaceae*	*Mesophyte*
14	*Icnocarpus frutescens*	*Apocynaceae*	*Mesophyte*
15	*Jatropha gossypifolia*	*Euphorbiaceae*	*Mesophyte*
16	*Phoenix acualis*	*Arecaceae*	*Mesophyte*
17	*Randia uliginosa*	*Rubiaceae*	*Mesophyte*
18	*Ricinus communis*	*Euphorbiaceae*	*Mesophyte*
19	*Rivea hypocrateriformis*	*Convolvulaceae*	*Mesophyte*
20	*Smilax macrophylla*	*Liliaceae*	*Mesophyte*
21	*Streblus asper*	*Moraceae*	*Mesophyte*
22	*Tephrosia purpurea*	*Papilionaceae*	*Mesophyte*
23	*Thespesia lampas*	*Malvaceae*	*Mesophyte*
24	*Trema orientales*	*Urticaceae*	*Mesophyte*
25	*Vangueria spinosa*	*Rubiaceae*	*Mesophyte*

26	*Vitex negundo*	*Verbenaceae*	*Mesophyte*
27	*Woodfordia floribunda*	*Lythraceae*	*Mesophyte*

D. HERBS SPECIES

SL. No.	PLANT NAME	FAMILY	ECOLOGY
1	*Aerva lanata*	*Amaranthaceae*	*Mesophyte*
2	*Ageratum conyzoides*	*Asteraceae*	*Mesophyte*
3	*Alternanthera sessilis*	*Amaranthaceae*	*Mesophyte*
4	*Alysicarpus monilifer*	*Fabaceae*	*Mesophyte*
5	*Amaranthus spinosus*	*Amaranthaceae*	*Mesophyte*
6	*Aristida adscenscionis*	*Poaceae*	*Mesophyte*
7	*Asparagus racemosus*	*Asperagaceae*	*Mesophyte*
8	*Atylosia scarabaeoides*	*Papilionaceae*	*Mesophyte*
9	*Bonnaya brachiate*	*Scrophulariaceae*	*Mesophyte*
10	*Botrychium daucifolium*	*Ophioglossaceae*	*Mesophyte*
11	*Cassia occidentalis*	*Caesalpiniaceae*	*Mesophyte*
12	*Cassia tora*	*Fabaceae*	*Mesophyte*
13	*Celosia argentea*	*Amaranthaceae*	*Mesophyte*
14	*Curculigo orchioides*	*Amaryllidaceae*	*Mesophyte*
15	*Cynodon dactylon*	*Poaceae*	*Mesophyte*
16	*Cyperus rotundus*	*Cyperaceae*	*Mesophyte*
17	*Dactyloctenium aegypticum*	*Poaceae*	*Mesophyte*
18	*Desmodium triflorum*	*Papilionaceae*	*Mesophyte*
19	*Digitaria sanguinalis*	*Poaceae*	*Mesophyte*
20	*Dioscorea alata*	*Dioscoreaceae*	*Mesophyte*
21	*Eichhornia crassipes*	*Pontederiaceae*	*Mesophyte*
22	*Elephantopus scaber*	*Asteraceae*	*Mesophyte*
23	*Eragrostis tenella*	*Poaceae*	*Mesophyte*
24	*Eragrostis unioloides*	*Poaceae*	*Mesophyte*
25	*Euphorbia hirta*	*Euphorbiaceae*	*Mesophyte*
26	*Euphorbia microphylla*	*Euphorbiaceae*	*Mesophyte*
27	*Evolvulusalsenoides*	*Convolvulaceae*	*Mesophyte*

28	*Evolvulus nummularius*	*Convolvulaceae*	*Mesophyte*
29	*Fimbristylis japonicum*	*Cyperaceae*	*Mesophyte*
30	*Flemingia chapper*	*Fabaceae*	*Mesophyte*
31	*Gymnema sylvestre*	*Asclepiadaceae*	*Mesophyte*
32	*Habenaria diphylla*	*Orchidaceae*	*Mesophyte*
33	*Hemidesmus indicus*	*Asclepiadaceae*	*Mesophyte*
34	*Indigofera pulchella*	*Fabaceae*	*Mesophyte*
35	*Ionidium suffruticosum*	*Violaceae*	*Mesophyte*
36	*Leea spp.*	*Leeaceae*	*Mesophyte*
37	*Panicum repens L.*	*Poaceae*	*Mesophyte*
38	*Parthenium hysterophorus*	*Asteraceae*	*Mesophyte*
39	*Paspalidium flavidum*	*Poaceae*	*Mesophyte*
40	*Perotis indica (P. latifolia)*	*Poaceae*	*Mesophyte*
41	*Phagmatiskarka*	*Poaceae*	*Mesophyte*
42	*Phyllanthus amarus*	*Euphorbiaceae*	*Mesophyte*
43	*Phyllanthus niruri*	*Euphorbiaceae*	*Mesophyte*
44	*Rivea hypocretariformis*	*Convolvulaceae*	*Mesophyte*
45	*Rungia parviflora*	*Acanthaceae*	*Mesophyte*
46	*Scoparia dulcis*	*Scrophulariaceae*	*Mesophyte*
47	*Setaria glauca*	*Poaceae*	*Mesophyte*
48	*Sida cordifolia*	*Malvaceae*	*Mesophyte*
49	*Solanum zylanicum*	*Solanaceae*	*Mesophyte*
50	*Spermacocehispida*	*Rubiaceae*	*Mesophyte*
51	*Stephania harnandifolia*	*Menispermaceae*	*Mesophyte*
52	*Thysanolaena*	*maxima Poaceae*	*Mesophyte*
53	*Trichosanthes spp.*	*Cucurbitaceae*	*Mesophyte*
54	*Tridax procumbens*	*Asteraceae*	*Mesophyte*
55	*Triumfetta rhomboidei*	*Tiliaceae*	*Mesophyte*
56	*Urena lobata*	*Malvaceae*	*Mesophyte*
57	*Vernonia cinerea*	*Asteraceae*	*Mesophyte*
58	*Vetiveria zizanioides*	*Poaceae*	*Mesophyte*

59	*Viscum articulatum*	*Loranthaceae*	*Mesophyte*
60	*Zornia diphylla*	*Papilionaceae*	*Mesophyte*

E. EPIPHYTES

SL. No.	PLANT NAME	FAMILY	ECOLOGY
1	*Cuscuta roxburghii*	*Convolvulaceae*	*Mesophyte*
2	*Viscum articulatum*	*Viscaceae*	*Mesophyte*
3	*Vanda roxburghii*	*Loranthaceae*	*Mesophyte*

4.4 LIST OF SOME SPECIES WHICH ARE COMMONLY FOUND IN BOTH THE STUDIES (EIA AND LATEST SURVEY):

After screening of the reports, we have found following are the species which are commonly placed in both the surveys.

SN	Local/Common Name	Scientific Name	Family	Habbit
Climber				
1	Satawar	*Asparagus racemosus*	Asparagaceae	Climber
2	Kachnarbel	*Bauhinia vahlii*	Fabaceae	Climber
3	Tindora	*Coccinia grandis*	Cucurbitaceae	Climber
4	Nag bel	*Cryptolepis buchananii*	Periplocaceae	Climber
5	Baichandi	*Dioscorea bulbifera*	Dioscoreaceae	Climber
6	Gudmar	*Gymnema sylvestre*	Apocynaceae	Climber Woody
7	Ban pui	*Rivea hypocrateriformis*	Convolvulaceae	Climber woody
Fern				
8	Hamsapadi	*Adiantum philippense*	Adiantaceae	Fern
9	Maidenhair creeper	*Lygodium flexuosum*	Lygodiaceae	Fern
10	Tree Fern	*Cyathea*	Cyatheaceae	
Grass				
11	Sixweeks threeawn	*Aristida adscensionis*	Poaceae	Grass
12	Doob	*Cynodon dactylon*	Poaceae	Grass

13	Makra	*Dactyloctenium aegyptium*	Poaceae	Grass
14	Jharniya	*Digitaria sanguinalis*	Poaceae	Grass
15	Bhurbhuci	*Eragrostis tenella*	Poaceae	Grass
16	Love grass	*Eragrostis unioloides*	Poaceae	Grass
17	Tarpido Ghas	*Panicum repens*	Poaceae	Grass
18	Yellow watercrown grass	*Paspalidium flavidum*	Poaceae	Grass
19	Indian Comet Grass	*Perotis indica*	Poaceae	Grass
20	Nal	*Phragmites karka*	Poaceae	Grass
Herb				
21	Gajar ghas	*Ageratum conyzoides*	Asteraceae	Herb
22	Gorakshaganja	*Aerva lanata*	Amaranthaceae	Herb
23	Honagonne	*Alternanthera sessilis*	Amaranthaceae	Herb
24	Chauli	*Alysicarpus monilifer*	Fabaceae	Herb
25	Katili Chaulai	*Amaranthus spinosus*	Amaranthaceae	Herb
26	Moon worts	*Botrychium daucifolium*	Ophioglossaceae	Herb
27	Bonnay	*Bonnay brachiata*	Linderniaceae	Herb
28	Bari Kasondi	*Cassia occidentalis*	Fabaceae	Herb
29	Chakod	*Cassia tora*	Caesalpiniaceae	Herb
30	Anne-soppu	*Celosia argentea*	Amaranthaceae	Herb
31	Nela-tengu	*Curculigo orchioides*	Hypoxidaceae	Herb
32	Motha	*Cyperus rotundus*	Cyperaceae	Herb
33	Kaadupullampuras	*Desmodium triflorum*	Fabaceae	Herb
34	Khamrua	*Dioscorea alata*	Dioscoreaceae	Herb
35	Adhomukha	*Elephantopus scaber*	Asteraceae	Herb

36	Badhi Dudhi	*Euphorbia hirta*	Euphorbiaceae	Herb
37	Choti Dudhi	*Euphorbia microphylla*	Euphorbiaceae	Herb
38	Sankhpushpi	*Evolvulus alsinoides*	Convolvulaceae	Herb
39	Duddhi	*Evolvulus nummularius*	Convolvulaceae	Herb
40	Fimbry	*Fimbristylis japonicum*	Cyperaceae	Herb
41	Jeevahi	*Habenaria diphylla*	Orchidaceae	Herb
42	Ghirol	*Indigofera pulchella*	Fabaceae	Herb
43	Ratan purush	*Ionidium suffruticosum*	Violaceae	Herb
44	Leea	*Leea sp.*	Vitaceae	Herb
45	Chatak Chandni	*Parthenium hysterophorus*	Asteraceae	Herb
46	Bhumi Amla	*Phyllanthus amarus*	Euphorbiaceae	Herb
47	Jangli Amla	*Phyllanthus niruri*	Phyllanthaceae	Herb
48	Comb rungia	*Rungia parviflora*	Acanthaceae	Herb
49	Mithi Patti	*Scoparia dulcis*	Plantaginaceae	Herb
50	Bariyar	*Sida cordifolia*	Malvaceae	Herb
51	Badi Kateri	*Solanum zeylanicum*	Solanaceae	Herb
52	Madhuri jadi	*Spermacoce hispida*	Rubiaceae	Herb
53	Stephania	*Stephania hernandiifolia*	Menispermaceae	Herb
54	Pointed Gourd	*Trichosanthes sp.*	Cucurbitaceae	Herb
55	Ghamra	*Tridax procumbens*	Compositae	Herb
56	Vanya Bala	*Urena lobata*	Malvaceae	Herb
57	Sahdevi	*Vernonia cinerea*	Compositae	Herb
58	Khas	*Vetiveria zizanioides*	Poaceae	Herb
59	Two leaf Zornia	*Zornia diphylla*	Fabaceae	Herb

60	Anant Mul	*Hemidesmus indicus*	Apocynaceae	Herb Creeper
Shrub				
61	Madar	*Calotropis procera*	Apocynaceae	Shrub
62	Hainsa	*Capparis spinosa*	Capparaceae	Shrub
63	Bangreda	*Jatropha gossypifolia*	Euphorbiaceae	Shrub
64	Chind	*Phoenix acaulis*	Arecaceae	Shrub
65	Arand	*Ricinus communis*	Euphorbiaceae	Shrub
66	Sharpunkha	*Tephrosia purpurea*	Fabaceae	Shrub
67	Bas Kapas	*Thespesia lampas*	Malvaceae	Shrub
68	Chiki	*Triumfetta rhomboidea*	Malvaceae	Shrub
69	Badanike	*Viscum articulatum*	Santalaceae	Shrub
70	Nirgundi	*Vitex negundo*	Lamiaceae	Shrub
71	Dhawai	*Woodfordia fruticosa*	Lythraceae	Shrub
Tree				
72	Bel	*Aegle marmelos*	Rutaceae	Tree
73	Siris Safed	*Albizia procera*	Fabaceae	Tree
74	Amata, Kachnar	*Bauhinia acuminata*	Fabaceae	Tree
75	Salai	*Boaswellia serrate*	Burseraceae	Tree
76	Achar (Char)	*Buchanania lanzen*	Anacardiaceae	Tree
77	Muttuga	*Butea monosperma*	Fabaceae	Tree
78	Amaltash	*Cassia fistula*	Fabaceae	Tree
79	Kalla (Karmata)	*Dillenia pentagyna*	Dilleniaceae	Tree
80	Tendu	*Diospyros melanoxylon*	Ebenaceae	Tree
81	Fetra	*Gardenia gummifera*	Rubiaceae	Tree
82	Gandhal	*Ixora pavetta*	Rubiaceae	Tree

83	Perar	*Randia uliginosa*	Rubiaceae	Tree
84	Jivanti	*Trema orientale*	Urticaceae	Tree

The list of flora found in Dantewada forest division is enclosed as…… **Annexure No. 2**

4.5 LOCATION OF SPECIAL TREE FERN AREA: It has been observed that there is tree fern area of 76.496 Ha within Mining Lease area which are not to be diverted for mining purpose and special conservation measures are to be taken.

The Location is given table below showing Latitude and Longitude of the special Tree fern area

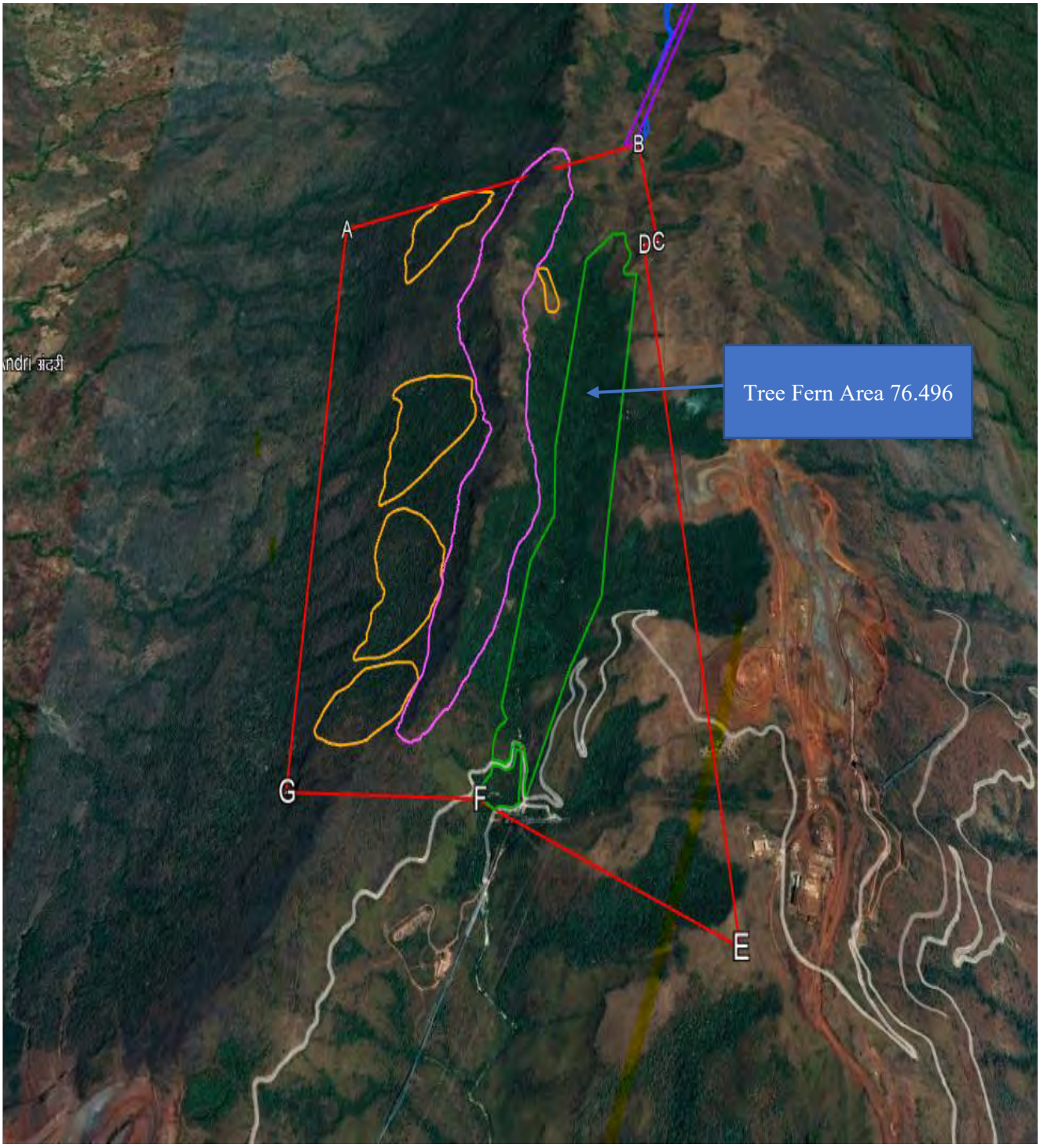
TREE FERN AREA:76.496 HA

Point id	Longitude	Latitude
Portion A		
A 1	81^0 12’ 37.71 “E	18^0 41’ 48.08“N
A 2	81^0 12’ 37.92“E	18^0 41’ 47.78“N
A 3	81^0 12’ 36.71“E	18^0 41’ 47.27“N
A 4	81^0 12’ 35.34“E	18^0 41’ 47.52“N
A 5	81^0 12’ 34.56“E	18^0 41’ 47.42“N
A 6	81^0 12’ 34.15“E	18^0 41’ 47.10“N
A 7	81^0 12’ 32.79“E	18^0 41’ 47.95“N
A 8	81^0 12’ 31.98“E	18^0 41’ 48.46“N
A 9	81^0 12’ 30.79“E	18^0 41’ 48.55“N
A 10	81^0 12’ 31.15“E	18^0 41’ 48.75“N
A 11	81^0 12’ 31.20“E	18^0 41’ 49.36“N
A 12	81^0 12’ 31.64“E	18^0 41’ 49.43“N
A 13	81^0 12’ 31.91“E	18^0 41’ 49.50“N
A 14	81^0 12’ 33.35“E	18^0 41’ 51.08“N
A 15	81^0 12’ 33.58“E	18^0 41’ 51.14“N
A 16	81^0 12’ 33.71“E	18^0 41’ 51.58“N
A 17	81^0 12’ 33.81“E	18^0 41’ 52.07“N
A 18	81^0 12’ 33.81“E	18^0 41’ 52.11“N
A 19	81^0 12’ 33.87“E	18^0 41’ 52.13“N
A 20	81^0 12’ 34.34“E	18^0 41’ 52.24“N
A 21	81^0 12’ 34.86“E	18^0 41’ 52.24“N
A 22	81^0 12’ 35.85“E	18^0 41’ 51.80“N
A 23	81^0 12’ 36.97“E	18^0 41’ 52.30“N
A 24	81^0 12’ 37.27“E	18^0 41’ 53.18“N
A 25	81^0 12’ 37.38“E	18^0 41’ 54.02“N
A 26	81^0 12’ 37.43“E	18^0 41’ 54.41“N
A 27	81^0 12’ 38.23“E	18^0 41’ 54.37“N
A 28	81^0 12’ 38.16“E	18^0 41’ 52.04“N
Portion B		
B 1	81^0 12’ 37.21“E	18^0 41’ 55.22“N
B 2	81^0 12’ 36.76“E	18^0 41’ 54.37“N

B 3	81^0 12’ 36.49“E	18^0 41’ 53.16“N
B 4	81^0 12’ 36.01“E	18^0 41’ 52.73“N
B 5	81^0 12’ 35.65“E	18^0 41’ 52.58“N
B 6	81^0 12’ 35.01“E	18^0 41’ 52.85“N
B 7	81^0 12’ 34.35“E	18^0 41’ 52.82“N
B 8	81^0 12’ 33.89“E	18^0 41’ 52.81“N
B 9	81^0 12’ 33.91“E	18^0 41’ 53.23“N
B 10	81^0 12’ 33.94“E	18^0 41’ 53.90“N
B 11	81^0 12’ 34.07“E	18^0 41’ 54.78“N
B 12	81^0 12’ 34.34“E	18^0 41’ 55.55“N
B 13	81^0 12’ 34.50“E	18^0 41’ 55.99“N
B 14	81^0 12’ 34.74“E	18^0 41’ 56.43“N
B 15	81^0 12’ 35.13“E	18^0 41’ 56.94“N
B 16	81^0 12’ 35.47“E	18^0 41’ 57.25“N
B 17	81^0 12’ 35.83“E	18^0 41’ 57.57“N
B 18	81^0 12’ 36.09“E	18^0 41’ 57.80“N
B 19	81^0 12’ 35.34“E	18^0 41’ 59.36“N
B 20	81^0 12’ 40.34“E	18^0 41’ 18.22“N
B 21	81^0 12’ 44.53“E	18^0 41’ 25.48“N
B 22	81^0 12’ 45.15“E	18^0 41’ 36.23“N
B 23	81^0 12’ 52.50“E	18^0 41’ 11.05“N
B 24	81^0 12’ 58.94“E	18^0 41’ 16.25“N
B 25	81^0 12’ 00.26“E	18^0 41’ 16.36“N
B 26	81^0 12’ 00.33“E	18^0 41’ 15.71“N
B 27	81^0 12’ 00.35“E	18^0 41’ 14.83“N
B 28	81^0 12’ 00.36“E	18^0 41’ 13.94“N
B 29	81^0 12’ 00.76“E	18^0 41’ 12.54“N
B 30	81^0 12’ 0094“E	18^0 41’ 11.84“N
B 31	81^0 12’ 00.96“E	18^0 41’ 11.01“N
B 32	81^0 12’ 00.82“E	18^0 41’ 10.25“N
B 33	81^0 12’ 00.56“E	18^0 41’ 09.60“N
B 34	81^0 12’ 00.09“E	18^0 41’ 08.79“N
B 35	81^0 12’ 59.56“E	18^0 41’ 08.31“N
B 36	81^0 12’ 59.33“E	18^0 41’ 07.60“N
B 37	81^0 12’ 59.43“E	18^0 41’ 06.92“N
B 38	81^0 12’ 59.84“E	18^0 41’ 06.45“N
B 39	81^0 12’ 00.84“E	18^0 41’ 06.45“N
B 40	81^0 12’ 01.37“E	18^0 41’ 06.37“N
B 41	81^0 12’ 01.68“E	18^0 41’ 06.27“N
B 42	81^0 12’ 56.92“E	18^0 41’ 41.66“N
B 43	81^0 12’ 52.85“E	18^0 41’ 20.56“N
B 44	81^0 12’ 51.67“E	18^0 41’ 13.08“N
B 45	81^0 12’ 46.02“E	18^0 41’ 03.85“N
B 46	81^0 12’ 38.96“E	18^0 41’ 48.55“N
B 47	81^0 12’ 38.72“E	18^0 41’ 48.55“N
B 48	81^0 12’ 38.68“E	18^0 41’ 48.60“N
B 49	81^0 12’ 38.65“E	18^0 41’ 49.62“N

B 50	81^0 12’ 38.84“E	18^0 41’ 50.65“N
B 51	81^0 12’ 39.18“E	18^0 41’ 51.87“N
B 52	81^0 12’ 39.00“E	18^0 41’ 52.71“N
B 53	81^0 12’ 38.84“E	18^0 41’ 53.58“N
B 54	81^0 12’ 38.71“E	18^0 41’ 54.70“N
B 55	81^0 12’ 38.57“E	18^0 41’ 54.86“N

MAP 4.1 GOOGLE IMAGINARY OF TREE FERN AREA



Source KML File

4.6 PHOTOGRAPHS OF SOME SPECIES WHICH ARE COMMONLY FOUND IN BOTH THE STUDIES (EIA AND LATEST SURVEY)

Adiantum phillipense

. Aegle mermelos

Albizzia procera

Asparagus racemosus

Aerva lanata

Ageratum conyzoides

Aristida adscenscionis

Alysicarpus monilifer

Amaranthus spinosus

Alternanthera sessilis

Bauhinia acuminate

Botrychium daucifolium (fern)

Bauhinia vahlii

Buchanania lanzen

Butea monosperma

Bonnaya brachiata

Cyathea alata

Cassia fistula

Cliestanthus collinus

Calotropis procera

Capparis spinosa

Celosia argentia

Curculigo orchioides

Cynodon dactylon

Cassia occidentalis

Cassia tora

Cyperus rotundus

Coccinia grandis

Cryptolepis buchanani

Dillenia pentagyna

Diospyros melanoxylon

Dioscorea bulbifera

Dactyloctenium aegypticum

Desmodium triflorum

Digitaria sanguinalis

Dioscorea alata

Elephantopus scaber

Eragrostis tenella

Eragrostis uniloides

Euphorbia hirta

Euphorbia microphylla

Evolvulus alsenoides

Evolvulus nummularius

Fimbristylis japonicum

Gardenia gummifera

Gymnema sylvestre

Hemidesmus indicus

Habenaria diphylla

Ixora

Indigofera pulchella

Ionidium suffruticosum

Jatropha gossypifolia

Lygodium

Phoenix acualis

Panicum repens L.

Parthenium hysterophorus

Paspalidium flavidum

Perotis indica

Phagmatis karka

Phyllanthus amarus

Phyllanthus niruri

Randia uliginosa

Ricinus communis

Rivea hypocretaroformis

Rungia parviflora

Scoparia dulcis

Solanum zylanicum

Spermacoce hispida

Stephania harnandifolia

Sida cordifolia

Tridax procumbens

Triumfetta rhomboidea

Tephrosia purpurea

Thespesia lampus

Trema orientales

Urena lobata

Vernonia cinerea

Vetiveria zizanoides

Vitex negundo

Woodfordia floribunda

Zornia diphylla

Boswellia serreta

Lantana camara

Flemingia strobilifera

Acacia catechu

Artocarpus Heterophyllus

Albizzia lebbeck

Cassia fistula

Crotalaria sp.

Mimosa pudica

Morinda tinctoria

Mallotus phillippensis

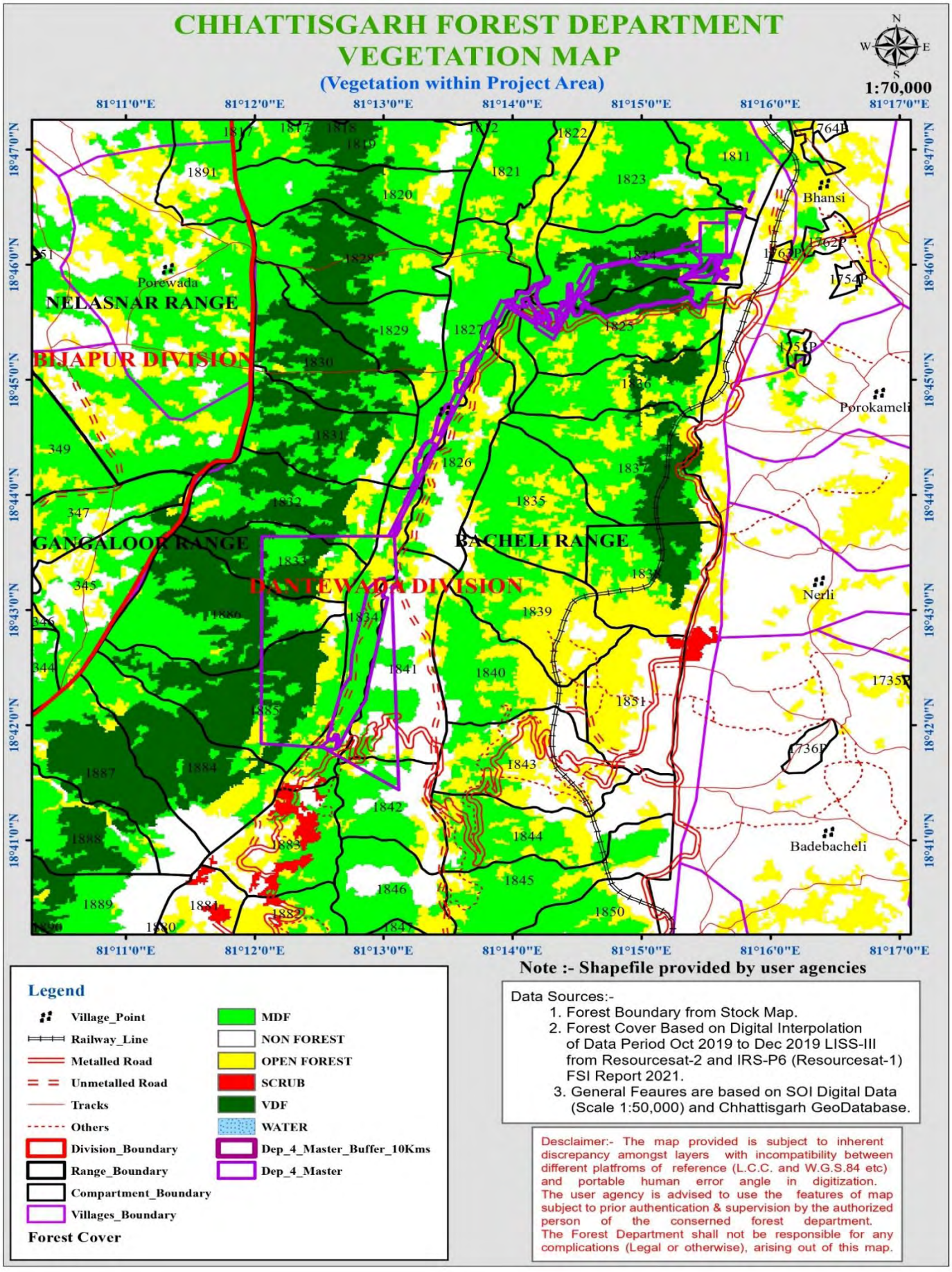
Madhuca longifolia

Tamarindus indica

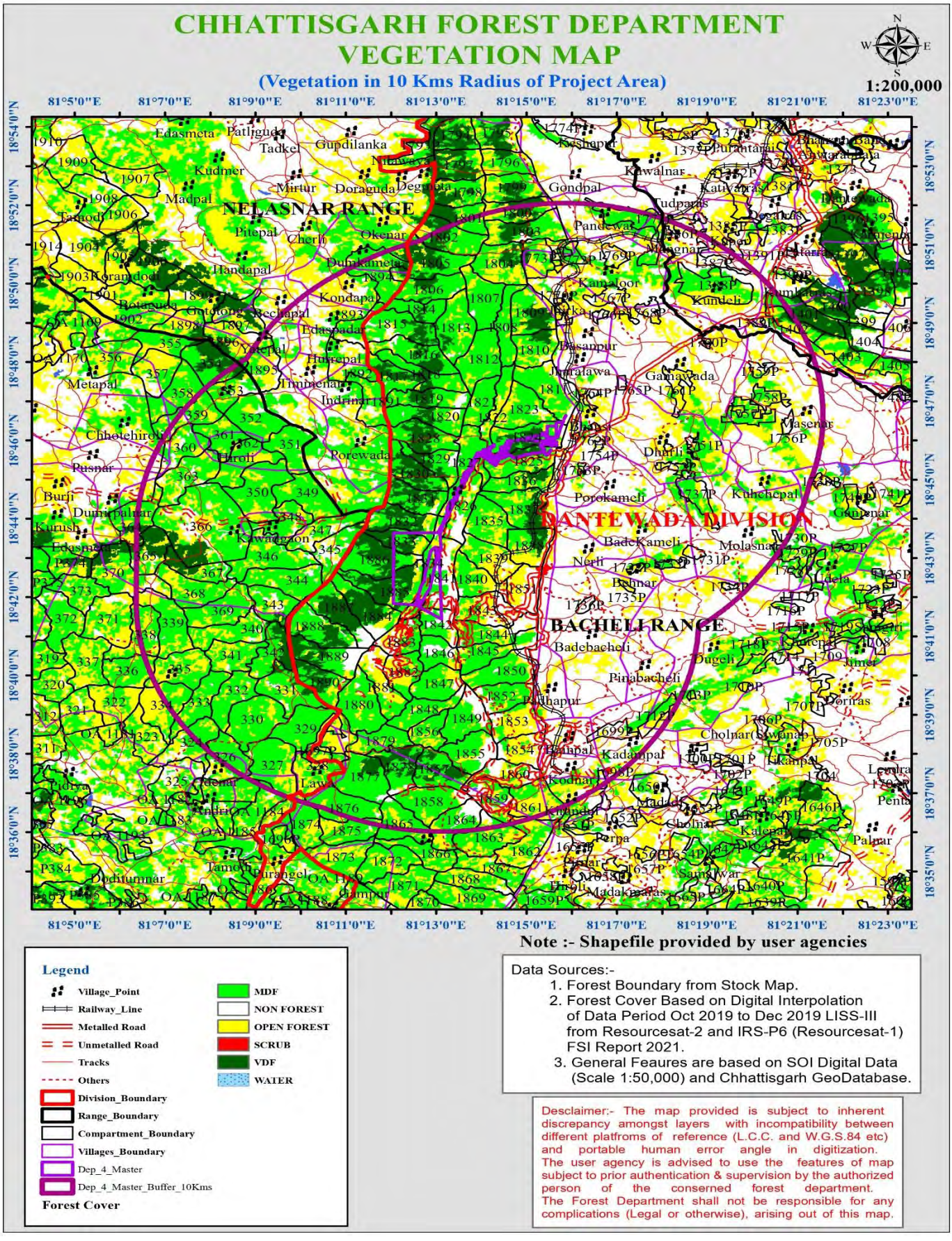
Spondias mangifera

Ficus hispida

MAP NO. 4.2 VEGETATION MAP SHOWING VEGETATION STATUS IN CORE AREA



MAP NO. 4.3 VEGETATION MAP SHOWING VEGETATION STATUS IN IMPACT ZONE



CHAPTER V
STATUS OF FAUNAL DIVERSITY

The State of Chhattisgarh falls under the Deccan Biogeographical Zone (Rodgers et al 2002) and its forests, 11% are under the Protected Area network.

An ecological survey of the study area for understanding the fauna of the study area was conducted, particularly with reference to listing of species and assessment of the existing baseline ecological conditions in the study area through Interaction with Local Villagers and field visits.

The study was conducted during winter season October in the year 2022. The study for fauna was conducted before sunrise to late night (11:00 am to 7:00pm).
The adults of Odonata, Lepidoptera and Hymenoptera were observed in the field with aspirator, manually and aerial sweeping nets.

Mollusca, Amphibians and Reptiles were observed with the help associates hand manually the random field observation was also made on different groups of the fauna of the study area. The Reptiles, Aves and Mammals were identified by using Binocular (10mm X25mm) and their presence was recorded by observation.

The presence of some Mammals species is also ascertained based on interview with wildlife and forest officials and their records, NMDC-CMDC staff and villagers residing in study area Birds of the region are currently subjected to many threats. The most important of which are deterioration and loss of habitat. Controlling poaching will improve bird habitat andkeystone species of the birds should be introduced for forage of the frugivores.

During the latest study around 81 species recorded from the Coreand Buffer Areas of proposed Iron Ore Mine study sites, 10 species of Reptiles; 56 species of Birds(16 reported in core zone) and 15 species of Mammals.

As a primary and secondary data regarding faunal diversity in the study area, two sources of the data have been considered. One is latest faunal study and second is the draft EIA report.

5.1 DETAILS OF FAUNA RECORDED AT Bailadila IRON ORE MINE Deposit -4 (CORE AND BUFFER AREA) DURING LATEST SURVEY

Mammals (COMPLETELY RECORDED BASED ON INTERWIEWS)				
SL. No.	**FAUNA SPECIES**	**COMMON NAME**	**CORE**	**BUFFER**
1	Bandicota bengalensis	Field Rat, Chooha	+	+
2	Boselaphus tragocamelus	Blue Bull, Neel gay	+	+
3	Canis aureus	Jackal, Siyar	–	+
4	Funambulus pennantii	Palm Squirrel, Gilhari	+	+
5	Harpestes edwardsii	Common Mongoose, Newla	–	+
6	Hystrix indica	Indian Porcupine, Sahi	–	+
7	Lepus nigricollis	Black-naped hare	+	+
8	Macaca mulatta	Rhesus Macaque, Bandar	–	+
9	Melursus ursinus	Sloth bear, Bhalu	–	+
10	Muntiacus muntjak	Barking deer, Bhedhaki	–	+
11	Pteropus giganteus	Indian flying fox	–	+
12	Ratufa indica	Giant Squirrel	–	+
13	Semnopithecus entellus	Sacred Langur	–	+
14	Sus scrofa	Indian wildboar, Jungli suar	–	+
15	Vulpes bengalensis	Indian fox, Lomdi	+	+
Reptiles (Lizards, Skinks and Snakes)				
1	Calotes versicolor	Chameleon, Girgit	–	+
2	Echis carinatus	Saw-scaled viper	–	+
3	Hemidactylus brooki	Spotted house gecko	–	+
4	Lycodon aulicu	Non-poisonous snake, Dhaman	–	+
5	Lygosoma punctata	Spotted Supple Skink	–	+
6	Mabuya macularia	Bronze grass skink	–	+
7	Naza naza	Cobra, Nag	–	+
8	Psammophilus dorsalis	Rock agama	–	+
9	Ptyas mucosa	Indian Rat Snake	+	+
10	Bungarus caeruleus	Indian Krait	+	+

Aves (Birds)				
S.No	**FAUNA SPECIES**	**COMMON NAME**	**CORE**	**BUFFER**
1	Accipiter badius	Little banded goshawk, Shikra	–	+
2	Actitis hypoleucos	Common Sandpiper	–	+
3	Ardeola grayii	Pond Heron, Bhura bagula	–	+
4	Acridotheres tristis	Common Myna, myna	+	+
5	Alcedo atthis	Common King fisher, Chhota kilkila	+	+
6	Bubulcus ibis	Cattle Egret, Gay bagula	+	+
7	Centropus sinensis	Crow-pheasant, Mahoka	–	+
8	Chloropsis cochinchinensis	Gold mantled chloropsis, Harit Kanchan	–	+
9	Columba livia	Blue Rock pigeon, Kabutar	+	+
10	Coracius benghalensis	Blue Jay, Neelkanth	–	+
11	Corvus splendens	House Crow, Kowa	+	+
12	Cypsiurus balasiensis	Asian Plam	–	+
13	Coturnix pectoralis	Stubble quail	+	+
14	Dendrocopos canicapillus	Grey- capped pygmy Woodpecker	–	+
15	Dendrocopos nanus	Indian pygmy Woodpecker	–	+
16	Dendrocitta vagabunda	Indian Tree Pie, Mahalat	–	+
17	Dinopium benghalense	Golden backed Wood pecker, Kathfodwa	–	+
18	Dicrurus adsimilis	King crow, Bhujang kotewal	+	+
19	Dryocopus Javensis	White-bellied Woodpecker	+	+
20	Egretta garzetta	Little Egret, Chhota bagula	–	+
21	Falco tinnunculus	European Kestrel, Koiyarut	–	+
22	Gallus gallus	Red Junglefowl	–	+
23	Halcyon smyrensis	White breasted Kingfisher, Kilkila	–	+
24	Hemicircus canente	Heart-spotted Woodpecker	–	+
25	Hierococcyx varius	Common Hawk-Cuckoo	–	+
26	Lanius cristatus	Brown Shrike	–	+
27	Lanius schach tricolor	Rufous backed Shrike, Kala latora	–	+

28	Megalaima asiatica	Berbet	–	+
29	Megalaima haemacephala	Crimson breasted Barbet, Chhota basant	–	+
30	Megalaima lineata	Lineated Barbet	–	+
31	Merops leschenaulti	Chestnut-headed Bee-eater	–	+
32	Merops orientalis	Green Bee-eater, Patringa	–	+
33	Mesophoyx intermedia	Smaller egret	–	+
34	Milvus migrans	Common Pariah Kite, Cheel	+	+
35	Nyctyornis athertoni	Blue-bearded bee-eater	–	+
36	Nettapus coromandelianus	Cotton teal	+	+
37	Oriolus tenuirostris	Slender-billed oriole	–	+
38	Oriolus xanthornus	Black headed oriole, Pitak	–	+
39	Pavo cristatus	Common Pea fowl, Mayur	–	+
40	Phaenico phaeus tristis	Large Green-billed Malkoha	–	+
41	Phalacrocorax niger	Little Cormorant	–	+
42	Pitta brachyura	Indian Pitta	–	+
43	Pseudibis papillosa	Black Ibis, Kala bagla	–	+
44	Psittacula cyanocephala	Blossom headed Parakeet	–	+
45	Passer domesticus	House sparrow	+	+
46	Perdicula asiatica	Jungle Bush Quail	+	+
47	Ploceus philippinus	Baya Weaver	+	+
48	Pycnonotus cafer	Red-vented Bulbul	+	+
49	Spilornis cheela	Crested Serpent Eagle	–	+
50	Spizaetus cirrhatus	Crested Hawk Eagle, Shahbaz	–	+
51	Streptopelia chinensis	Spotted Dove, Phakhta	–	+
52	Terpsiphone paradisi	Asian Paradise Flycatcher	+	+
53	Upupa epops	Common Hoopoe	+	+
54	Vanellus cinereus	Grey- headed lapwing	–	+
55	Vanellus indicus	Red wattled Lapwing, Titova	–	+
56	Vanellus malabaricus	Yellow Wattled Lapwing, ardee	–	+

Description: Where (+) indicates Presence and (-) indicates Absence of the species in thestudy area.

5.2 FAUNA DIVERSITY BASED ON EIA REPORT IN CORE ZONE OF MINING AREA (PRIMARY SOURCE)

Sl. No.	Common Name / Local Name	Scientific Name	WPA (1972) Schedule	IUCN Status (Global)
Mammals				
1	Field Rat	Bandicota bengalensis	V	Least Concern
2	Five striped squirrel	Funambulus pennantii	IV	Least Concern
3	Indian Hare	Lepus nigricollis	IV	Least Concern
4	Indian Fox	Vulpes bengalensis	II	Least Concern
5	Blue Bull (Nilgai)	Boselaphustragocamelus	III	Least Concern
Reptiles				
1	Indian Rat Snake (Dhaman)	Ptyas mucosa	II	Least Concern
2	Common Krait	Bungarus caeruleus	IV	Least Concern
Birds				
1.	Jungle Bush Quail	Perdicula asiatica	IV	Least Concern
2.	Grey Quail	Coturnix pectoralis	IV	Least Concern
3.	Baya weaver bird	Ploceusphilippinus	IV	Least Concern
4.	Fork-tailed Drengo	Dicrurusadsimilis	IV	Least Concern
5.	Red vented bulbul	Pycnonotuscafer	IV	Least Concern
6.	Common Pariah Kite	Milvus migrans	-	Least Concern
7.	Small blue kingfisher	Alcedoatthis	IV	Least Concern
8.	Indian Paradise flycatcher	Terpsiphone paradisi	-	Least Concern
9.	Cattle Egret	Bubulcus ibis	IV	Least Concern
10.	House sparrow	Passer domesticus	-	Least Concern
11.	Cotton Pigmy Goose	Nettapuscoromandelianus	IV	Least Concern
12.	Common Hoppoe	Upupa epops	-	Least Concern
13	White Bellied Wood Peeker	DryocopusJavensis	IV	Least Concern
14	Common Myna	Acridotheres tristis	IV	Least Concern

5.3 FAUNA DIVERSITY IN BUFFER ZONE (BASED ON PRIMARY & SECONDRY DATA SOURCE)

Sl. No.	Common Name / LocalName	Scientific Name	WPA (1972) Schedule	IUCN Status (Global)
Mammals				
1.	Rhesus Macaque (Red)	Macaca mulatta	II	LC
2.	Common Langur (GreyLangur)	Semnopithecus entellus	II	LC
3.	Sloth Bear	Melursus ursinus	I	VU
4.	Spotted Deer (Cheetal)	Axis axis	III	LC
5.	Grey Musk Shrew	Suncus murinus	-	LC
6.	Field Rat	Bandicota bengalensis	V	LV
7.	Five striped squirrel	Funambuluspennantii	IV	LC
8.	Indian Pangolin	Manis crassicaudata	I	EN
9.	Indian Giant FlyingSquirrel	Petauristaphilippensis	II	LC
10.	Jangle Cat	Felis chaus	II	LC
11.	Indian Hare	Lepus nigricollis	IV	LC
12.	Jackal	Canis aureus	II	LC
13.	Barking Deer	Muntiacusmuntjak	III	LC
14.	Indian Fox	Vulpes bengalensis	II	LC
15.	Common Mongoose	Urva edwardsii	II	LC
16.	Blue Bull (Nilgai)	Boselaphustragocamelus	III	LC
17.	Indian Porcupine	Hystrix indica	IV	LC
18.	Sambar Deer	Rusa unicolor	III	VU
19.	Indian Wild Boar	Sus scrofa	III	LC
20	Panther	Panthera pardus	I	VU
Reptiles				
1.	Cobra	Najanaja (Linnaeus)	II	LC
2.	Python	Python molurus	I	NT
3.	Indian Rat Snake(Dhaman)	Ptyasmucosus	II	LC
4.	Viper	Daboia russelii	II	LC
5.	Common Krait	Bungarus caeruleus	IV	LC
6.	Water Snake (Checkeredkeelback Snake)	Fowlea piscator	II	LC
7.	Bengal Monitor Lizard	Varanus bengalensis	I	NT

Birds				
1.	Jungle Bush Quail	Perdicula asiatica	IV	LC
2.	Grey Quail	Coturnix pectoralis	IV	LC
3.	Baya Weaver Bird	Ploceusphilippinus	IV	LC
4.	Fork-tailed Drengo	Dicrurusadsimilis	IV	LC
5.	Red Vented Bulbul	Pycnonotuscafer	IV	LC
6.	Common Pariah Kite	Milvus migrans	-	LC
7.	Small Blue-king Fisher	Alcedoatthis	IV	LC
8.	Indian ParadiseFlycatcher	Terpsiphone paradise	-	LC
9.	Cattle Egret	Bulbulcus ibis	IV	LC
10.	House sparrow	Passer domesticus (Linnaeus)		LC
11.	Eurasian Eagle Owl	Bubo bubo	IV	LC
12.	Cotton Pigmy Goose	Nettapuscoromandelianus	IV	LC
13.	Yellow Footed GreenPigeion	Treronphoenicopterus	IV	LC
14.	Common Hoppoe	Upupa epops		LC
15.	Large Billed Crow (formerly as Jungle Crow)	Corvus macrorhynchos	-	LC
16.	Red Jungle Fowl	Gallus gallus	IV	LC
17.	Blue ROCK PIGEON	Columba livia (Gmelin)		LC
18.	Bastar Hill Myna (Common Hill Myna)	Gracula religiosa	I	LC
19.	Rufous Woodpecker	Micropternusbrachyurus	IV	LC
20.	Common Flame BackWoodpecker	DinopiumJavanense	IV	LC
21.	White Bellied WoodPecker	Dryocopusjavensis	IV	LC
22.	House crow	Corvus splendens	V	LC
23.	Koel (Cuckoos)	Eudynamysscolopaceus	IV	LC
24.	Common Peafowl	Pavocristatus	I	LC
25.	Common Myna	Acridotheres tristis	IV	LC
26.	Comb Duck	Sarkidiornis melanotos	IV	LC
27.	Indian Roller (Blue Jays)	Coracias benghalensis	IV	LC
28.	Blue Throated Barbet	Psilopogon asiaticus		LC
29.	Lesser Whistling Teal(Duck)	Dendrocygnaja vanica	IV	LC
30.	Painted Partridge (orPainted Francolin)	Francolinus pictus	IV	LC

31.	Grey Francolin (formerlyGrey Partridge)	Ortygornispondicerianus	IV	-
32.	Large Indian Parakeet	Psittaculaeupatria	-	NT
33.	Common Barn Owl	Tyto alba	-	LC
34.	Brown fish Owl	Ketupazeylonensis	IV	LC

LC: Least Concern, **VU:** Vulnerable

5.4 LIST OF AQUATIC FAUNA (FISHES) FOUND IN WATER BODIES:

1.	Catla	Catlacatla
2.	Chanda	Chanda ranga
3.	Magur	Clariasbatrachus
4.	Singhi	Heteropneustesfossilis
5.	Rohu	Labeorohita
6.	Cat Fish	Wallago attu
7.	Kotri	Puntius sophore

5.5 SCHEDULE I SPECIES FOUND IN THE STUDY AREA:

After scrutiny of the presence of Schedule I species, the following table suggests the species

TABLE 5.1 SCHEDULE I SPECIES

Sl. No.	Common Name /Local Name	Scientific Name	WPA (1972) Schedule	IUCN Status (Global)
Mammals				
1	Sloth Bear	Melursus ursinus	I	VU
2	Indian Pangolin	Manis crassicaudata	I	EN
3	Panther	Panthera pardus	I	VU
Reptiles				
1	Python	Python molurus	I	NT
2	Bengal MonitorLizard	Varanus bengalensis	I	NT
Birds				
1	Bastar Hill Myna	Gracula religiosa peninsularis(Linnaeus)	I	LC
2	Common Peafowl	Pavocristatus (Linnaeus)	I	LC

Remarks: The conservation plan of these species are elaborated in chapter 7

The list of Fauna found in Dantewada forest division is enclosed as…… **Annexure No 3**

5.6 LOCATION OF NATIONAL PARKS, SANCTUARIES, BIOSPHERE RESERVES, WILDLIFE CORRIDORS, RAMSAR SITE TIGER / ELEPHANT RESERVES (EXISTING AS WELL AS PROPOSED), IFANY, WITHIN 10 KM OF THE MINE LEASE:

As per study conducted in the study area and as per information collected from Forest Range Office, Bacheli and Divisional Forest Officer, Dantewada, it is found that there are no National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/Elephant Reserves/(existing as well as proposed) within 10 km of the mine lease.

CHAPTER VI
IMPACT ASSESSMENT AND MITIGATION

There are certain Environment impacts exerted on surrounding of the mines area over a period of mining operations which shall impact the Flora & Fauna and other ecological components in the study area. Though the study conducted in this regard has been drawn from the reference of draft EIA prepared by Ecomen Laboratories Pvt. Ltd. Lucknow as secondary data.

This chapter illustrates the description of climate, atmospheric conditions, ambient air quality, ambient noise levels, water quality, soil quality, ecology, socio-economic profile, land use etc. Mining lease (ML) and screening cum beneficiation plant are located in forest area under Dantewada Forest Division.

The study area is core zone (Mining lease area of 646.596 Ha and Screening Cum Beneficiation Plant area of 122.5428 Ha) and buffer zone (a 10-km radius area around the ML and screening cum beneficiation plant). The various environmental attributes have been monitored in the core and buffer zone area.

6.1 STUDY COMPONENTS:

The attributes such as meteorology, ambient air quality, water quality, noise level etc. were studied and the details of monitoring such as location, frequency etc. are given below

TABLE 6.1 SHOWING ATTRIBUTES AND STUDY PARAMETERS

S. No.	Attribute	Parameters
1	Meteorology	Wind Speed andDirection, Temperature, Relative Humidity& Rainfall
2	Ambient air quality	PM_{10}, $PM_{2.5}$, SO_2, NO_2 and CO
3	Water quality	Physical, Chemical andBacteriological Parameters as per APHA and ISstandards
4	Noise levels	Noise levels indB(A) SPL, Leq(A), L_{day},L_{night}
5	Soil characteristics	Soil profile,characteristics, soil type and texture,NKP value etc.
6	Socio-economic Aspects	Socio-economiccharacteristics
7	Ecology	Existing terrestrialflora and fauna
8	Land use	Land use fordifferent categories.

6.2 AMBIENT AIR MONITORING:

Time averaged in-situ sampling was adopted by passing a known volume of air through a trap, and a collecting medium (filter paper and bubbler). Fine Dust Sampler and Respirable Dust Sampler were used for the purpose. The analytical methods followed for ambient air quality monitoring is described below:

a. **Particulate Matter less than 2.5 micron ($PM_{2.5}$)**

   The samples for $PM_{2.5}$ were collected on filter paper by Fine dust sampler operated at maximumrate of 16.67 lpm and concentrations were determined gravimetrically on 24 hours basis.

b. **Particulate Matter less than 10 micron (PM_{10})**

   The samples for PM_{10} were collected on filter paper by RDS/Fine dust sampler operated at maximum rate of 1.2 cu.m./min./16.67 lpm and concentrations were determined gravimetrically on 24 hours basis.

c. **Sulphur-dioxide (Improved, West & Gaeke Method)**

   Sulphur-dioxide measurement was done by aspirating a measured volume of air through sodium tetrachloromercurate solution. It forms a stable dichloro-sulphitomercurate. The amount of SO_2 is estimated by the reading from spectrophotometer at 560 nm.

d. **Nitrogen Oxides (Modified Jacob & Hochheimer Method)**

   Nitrogen oxides were estimated by bubbling air through 0.1 N sodium hydroxide (with sodiumarsenate) solution to form a stable solution of sodium nitrite. The nitrite ion produced during a sampling is determined using spectrophotometer at 540 nm by reacting the exposed absorbing reagent with phosphoric acid, sulphanilamide and NEDA.

e. **Carbon Monoxide [IS: 5182 (Part-X) 1976]**

   Grab sample of ambient air is taken in the sampling tube. The sample is injected into gas chromatograph (with methaniser) where it is carried from one end of the column to other. During the movement, the carbon monoxide is converted into methane and sample undergoesdistribution at different rates, ultimately separating from one another. The separated constituents are detected in form of distinct peaks in the plotter.

Other parameters like Ozone and Ammonia were monitored and analyzed by Chemical method and Indophenol Blue Method respectively. Benzene, BaP, trace metals etc. were monitored and analysed as per CPCB guidelines.

6.3 WATER QUALITY MONITORING:

As per the standard practice, one sample from each station was collected once, during the season. Grab water samples were collected in plastic container by standard sampling technique. Necessary precautions were taken for sample preservation. The physical parameters viz. pH, temperature & conductivity were measured at site by using portable water analysis kit. DO was fixed on spot as per Winkler's method, Parameters like hardness, colour, taste and odour, residual chlorine and free ammonia were analysed at the site, immediately after collection of water samples. The parameters as defined "General Standards for Discharge of Environmental Pollutions [GSR 422(E) and GSR 801 (E)] were analyzed as per the procedures defined in IS: 3025 and "standard methods for water and waste water analysis" (AWWA, APHA).

6.4 AMBIENT NOISE LEVEL:

Ambient noise level monitoring was done by an integrating sound level meter in dB (A). Outdoor noise measurements were made at a height of 1.5m, above the ground and away from sound reflecting sources like walls, buildings etc. the Ambient noise level monitoring was carried out day and night as given below:

TABLE 6.2 AMBIENT NOISE LEVEL MONITORING

Sl. No.	Time (hrs.)	Duration (minutes)
1	08:00-11:00	30
2	14:00-17:00	30
3	18:00-21:00	30
4	24:00-03:00	30

6.5 SOIL QUALITY:

Soil samples were collected and analysed by following standard procedures diagnosis and improvement of Saline and Alkali Soils, Agriculture hand book no.60 of US Department of Agriculture. Objective of study was to know quality of different soil profiles, its fertility potential and biological status (from 0 to 30 cm) in the area. Samples were collected up to the depth of 0-30 cm from the surface at 4 sampling spots. At each spot, surface litter was scrapped and samples were taken using depth sampler. These samples were kept for some time for air drying at room temperature. Samples were stored in polythene bags with label at the top. Soil samples were collected with the help of core sampling tube and rammer. The debris up to the surface was removed with the help of spade, then core of measured size was kept on the cleaned soil surface which was hit vertically with the help of rammer. Once the core gets in the soil the soil gets fitted, it was taken out by digging the surrounding earth with the help of shovel, (A manual agricultural implement with a curved blade fixed into a wooden handle).

Samples were analysed for the following parameters:

- pH
- Electrical Conductivity
- Nitrogen
- Phosphorous
- Potassium
- Calcium
- Magnesium
- Organic Carbon
- Iron
- Boron
- Natural Moisture content
- Bulk density
- Grain size distribution
- Cation exchange capacity

6.6 GENERAL IMPACT:

The aim is to ensure that potential environmental problems are foreseen and avoid data nearly stage in planning cycle so as to pre-empt problems. The EIA mechanism shall be applied to the project in the following order of priority:

- **Avoid** adverse environmental impact
- **Minimize** and control adverse environmental impact
- **Mitigate** adverse environmental impact

It has been observed that there are general impacts on the environment due to mining project. Developmental projects have both positive and negative impact on the society and the environment. However, to achieve the goal of sustainable development it is necessary to minimize/ mitigate the negative impact with modern technology and scientific study. This project is not left untouched in these aspects. Such negative impacts are discussed here to help in implementing mitigate measures.

Mining operation frequently involve a high degree of environmental impacts, which can extend well beyond the mineralized areas. An assessment of the environmental and health impact of the operation of mines has become essential and pre-requisite over the years.

Air pollution caused by the emission of particulate matter, Sulphur Dioxide (SO_2) and oxides of nitrogen (NO_X) due to the operation of mines results in the health hazards to the exposed population.

The environmental problem associated with Iron ore during mining, in storage, handling and transportation results in severe impacts. Keeping in mind environmental baseline data has been collected for the project site as well as for 10 km Impact zone.

The environmental base line has been assessed covering an area of 10 km radius, termed as Impact Area of the project. A reconnaissance survey of the study area was initially conducted to identify environmentally sensitive spots located within the study area.

Environmental base line data was collected through primary surveys, knowledge sharing and interaction with local people and front line field staff, as well as secondary data obtained from divisional records like Working plan of Dantewada forest Division and other relevant literatures.

6.7 POSSIBLE IMPACTS:

There will be specific impacts on flora and fauna which are dealt in detail under this plan, following impacts are anticipated in the project area and impact zone

6.7.1 SOCIAL IMPACT:

There are Bade Bacheli, Bhansi, Porokameli, Dumirpalnar, Bhatpada, Belnar, Markapal, Porewada, Bainpal, Basanpur, Dhurli, Gamawada, Hiroli, Jhirka, Kirandul, Kodenar, Nerli, Padhapur, Manjhiguda, Kadampal, Kamaloor, Kodripal, Masenar, Molasnar, Pinabacheli, Timmenar Villages in study area. However, special care is to be taken by the project authorities that the people of surrounding areas get maximum benefits and minimum negative impact.

The beneficial aspects of the projects on the socio-economic environment of the area are in areas of employment, service, trade, commerce, public utility, literacy, social awareness, health care facilities, recreation etc.

Communication facilities created by the project in the form of approach roads, market centres etc. will benefit the local population.

6.7.2 LAND DEGRADATION

The disturbed area will comprise excavated land, external dumps, area occupied by infrastructure, roads etc.

6.7.3 EFFECT ON HABITAT:

Human settlement

The mine lease area is spread over two villages namely Bhansi, Porokameli Block-Badebacheli Tehsil- Badebacheli District South Bastar. Villages in mine lease area shall be required to be shifted and rehabilitated to some other site as per rehabilitation policy of the state govt.

The mining and allied activities will provide job opportunities for eligible persons and many will find employment in service sector and marketing of day-to-day needs viz-vegetables, poultry and other agricultural products. The facilities and amenities like schools, hospitals and communication, to be set up for the project will improve the basic infrastructure and these amenities can also be used by the people of the nearby villagers. Communication facilities created by the project in the form of approach roads, telephones, market centres etc. will benefit the local population.

Increase in SPM levels over the agricultural lands and crop is another factor of concern. If control measures like dust suppression and prevention of the dispersal of airborne dust at sources, provision of green belt around the mine etc. are taken up, this adverse effect can be reduced to a great extent.

6.7.4 IMPACT ON AIR QUALITY

The opencast mining operations are prone to generation of higher levels of SPM and to a limited extent of SOz, NOx and CO due to blasting, fuel oil combustion e!c. However. there is no point source emissions.

The activities which cause Impact on air are as under: -

- Drilling, blasting, excavation and transportation of overburden;
- Drilling, blasting, excavation and transportation of Ore;
- Construction and demolition activities like construction of workshop, land cleaning, handling of debris and materials etc.;
- Loading, unloading of mineral and movement of vehicles and equipments;
- Movement of vehicles on haul roads at the time of transportation of mineral and overburden.

The dust generated in the mining process will create respiratory problems in wild animals as well as human beings. Large amount of dust will settle on the Grasses and other fodder plants making the fodder plants undesirable for consumption.

6.7.5 IMPACT ON WATER QUALITY:

The surface water quality is likely to be affected with higher load of suspended solids by the following:

- wash off from dumps
- soil erosion from mine and roads
- pumping out mine water to surface water channels

The outside dump may contribute to the pollution of surface water in terms of suspended solids. The overburden to be excavated includes mostly hard sandstone; hence wash off mine is expected to be free from colloidalsuspension or turbidity. In the same way water pumped out during dewatering may also carry higher levels of suspended solids. Other sources of pollution are by oil spillage at the pit head and at the facilities viz- workshop, resulting in oil and grease contamination of surface water if appropriate control measures are not adopted.

Meagre amount of sanitary waste, expected to be generated from various facilities will be treated properly and is not anticipated to cause any water pollution. Similarly domestic sanitary waste generated from colony is discharged into septic tanks.

Ground water pollution can take place only if dumps and stock piles contain harmful chemical substances, which may get leached by precipitation of water and percolate to the ground water tabIe, thus causing water pollution. However, this is not the case with this mine, as neither the ore nor the OB, contains any harmful ingredients which may leach down to the water table and pollute it. Therefore, no adverse imoact on ground water quality is anticipated considering this aspect.

6.7.6 IMPACT ON CLIMATE:

The climatic conditions such as temperature, rainfall, wind speed and relative humidity are not likely to be affected due to the project activities as such changes are affected by changes in atmospheric pressure from Bay of Bengal and are of regional nature.

6.7.7 IMPACT ON SOIL:

(a) Top soil:-

Topsoil occurs over the ore and waste rock surfaces which will be taken up for ore excavation. The thickness of top soil varies from location to location from nilon exposed outcrop and steeply sloping surfaces, about 0.5m in valley sand depression.

During initial development of mine and subsequently top soil and alluvium is to be separately taken out to be stored exclusively in a dump for future use before taking up plantations.

Major part of the forest land will come under the mining pit setting aside the safety zone.Therefore, soil erosion will take place which may cause formation of Gullies and Ravinesleading to further destruction of Forest as well as wild-life habitat. The possibility of landslide also cannot be ruled out.

(b) Overburden:-

The over burden will be removed by mechanized means. Hydraulic shovel type excavators will be used for removal of over burden. Transportation ofoverburden will be done by dumpers. As envisaged in the Mining Plan.

6.7.8 NOISE POLLUTION:

The proposed mining operation will be open cast mechanized method. In this open cast mechanized mining, various sources of noise in the area are attributable mainly due to drilling, blasting, operation of compressor, loading and haulage, operation of diesel pump and vehicular traffic. Operation of heavy machinery and blasting in the mining area will produce large amount of sound which may cause disturbance to wild animals. Movement of large number of heavy vehicles and operation of HEMM and other equipment in and around the lease area will create a lot of noise and disturb the wild animals and create panic within the impact area. The wild animals will try to avoid the area frequented by heavy vehicles and therefore these areas will not be available to them.

The various sources of noise mentioned above shall only be periodical and is limited to a fixed period of operation only. In addition to this, the transportation of ores might cause a little effect on the noise level.

Adverse effects of noise can either be audible, physiological, or behavioral. Auditory effects can be direct loss of hearing or threshold shift in decibel.

6.7.9 IMPACT ON FLORA AND FAUNA:

6.7.9.1 IMPACT ON FLORA:

Due to excavation for mining, the existing vegetation (Trees, Shrubs, Herbs/climbers, Grasses and medicinal plants) over the area will disappear, in phases as per progress of the mined-out area. Similarly, due to influx of labor force, there may be a sudden spurt in

demand of small timber and fire wood thereby shifting the additional biotic pressure on the surrounding forests causing further destruction of forests within the impact zone. Thiswill lead to depletion of quantity and quality of flora.

There is local demand for fuel wood, Cattle grazing, Collection of NTFP, collection of small timber and building materials. Some portions of these materials were being collected from the forest areas covered under the project. Now after implementation of the project, these biotic pressures will be shifted to the surrounding forests. The additional pressure due to diversion of forest land for mining purpose will cause further degradation of the surrounding Forests and within the impact area in particular.

6.7.9.2 IMPACT ON FAUNA:

Due to the mining operation, there will be some disturbance in the surrounding area, particularly within the protected/reserve Forests situated in the Impact Zone.

For the mining activity instead of digging large pits. top soil bearing iron ores will be dressed and cut particularly on sloppy terrain. Hence the original physiographic of the area will be changed thereby disturbing the present wildlife habitat. As per the baseline data of fauna, there is no endangered fauna within the project area. However, Schedule-I Mammals like Panther, Sloth bear and Schedule-II Mammals like Jackal, Barking deer, snakes and other reptiles, found within the Impact zone may be affected by project implementation. Further, Scheduled animals like Sloth bear, Panther, and reptiles like Python and found within the impact Zone may be affected by project implementation.

Forest fire poses a direct threat as a number of small and medium animals are trapped and killed in the forest fire, and sometimes the large animals are also trapped.

Indirect threat is due to shrinkage and degradation of habitat, Shortage of Food and water. The animals in search of food and water try to enter in to habitations. Most of the man animal conflict takes place due to indirect threat.

- Due to deposit of large amount of dust on grasses and fodder plants, there will be shortage of palatable fodder for the animals.
- The movement of the Heavy vehicles and machineries will generate a lot of noise creating panic among the wild animals.
- The vehicular lights will also scare the animals.
- The movement of the vehicles may also cause accidental death of the animals.

6.8 STRATEGIES TO MITIGATE THE IMPACTS:

During the course of mining, as minimum as possible the forest land shall be brought into use and rest shall be protected. Besides the above the following steps are further taken:

1. A 7.5m wide safety zone of forest will be maintained around the mine lease area for protection of wild life and local people from hazards of mining activity.
2. Vegetation of the surrounding area will not be damaged in any case.
3. Slopes of active dump areas would be put under greenery with suitable local species of herbs, shrubs, trees and grasses which may fulfill the requirement of medicine, fodder etc. needs of the inhabitants and fodder requirement of the locality to some extent as well as prevent the dust nuisance.
4. Creation of green belt will control spreading of dust and absorb noise.

6.9 SOLID WASTE (OVER BURDEN) MANAGEMENT:

Top soil generated during the mining period, shall be stored temporarily over the designated location. Arrangements for watering the top soil dump through internal perforated pipes shall be made to maintain moisture level in the soil.

6.9.1 ORE:

All the overburden dumps shall be reclaimed technically and biologically completely as soon as the dumps are declared dead. However, the dump slopes shall be periodically sprinkled with water and plantation shall be carried out over the slopes. Garland drains and toe walls shall be constructed all along the dumping area in order to check the surfacerun off. These garland drains shall be routed through settling tank where the suspended solid shall settle down and the decanted water shall be used in the beneficiation plant. During the operation period of mining activity, several first order streams which flow from the top of the hill gets disturbed due to the hill cutting. Re-establishment ofdirectional flow in the streams are important not only because the streams are surface recharge sources for adjoining nalas but also to regulate water flow in the disturbed area in a systematic manner. Long drainage channel shall be constructed along the quarry anddumping areas connected to settling ponds in order to arrest the suspended solid and thenfinally shall be discharged to the nearby water body. The drainage channels should be of adequate size to meet the load of monsoon runoff.

6.10 DUMP STABILIZATION:

The dump stabilization process will involve

- Segregation of materials
- Water sprinkling
- Regular compaction
- Terracing at dead end
- Construction retaining walls
- Provision of garland drains around the dumps leading to settling tank through a series of check dams.
- Coir-matting of dump slopes shall be undertaken in order to prevent rain-wash-offs wherever possible. The dump slopes will thereafter be vegetated.
- The entire mine pit after reclamation will be planted up.
- Green belt will be developed and maintained along the safety zone by planting. This belt will also act as a buffer zone between the mine and the Wild-life habitat.
- In other areas some steps will also be taken by plantation to improve the aesthetic view. The lessee proposes to take up plantation along the roads and around the mine office.
- Besides the above proposed steps the overburden will be filled back in the mine pits and plantations will be taken up as per Mine Closure Plan.

6.11 SOIL AND WATER CONSERVATION:

There will be substantial loss of moisture as well as heavy soil erosion due to mining activity. For enhancing seepage of water and to reduce soil erosion the rain water will be channelized through garland drains provided around the dumps to the settling tanks through a series of check dams. The rain water dewatering process from the mine pit if required will involve channelizing the water along with slurry to pass through similar garland drains and settling tanks. The treated water will be utilized for spraying the haul roads for suppression of dust.

In the safety zone the rain water will be diverted through easy gradient drains to minimise soil erosion. Check-dams will be provided on the natural channels in order to prevent soil erosion in the safety zone.

These activities have been proposed in the Mining Plan; hence no separate provision is made on this account.

6.11.1 LAND DEGRADATION CONTROL MEASURES:

Land degradation is one of the major adverse outcomes of opencast mining activities and any effort to control adverse impacts is considered incomplete when appropriate land reclamation strategy is not adopted. Since the land degradation in this mine is partly in the form of excavated void and partly in to form of external and internal dumps. It is suggested to carry out the reclamation programme simultaneously with excavation. The gap can be reduced between degradation and reclamation by this programme.

All the disturbed areas will be reclaimed before abandoning the mine excluding the garages, office, magazine etc. which will be left as such to be used later as social infrastructure. The colony, school, medical centre etc. will also remain as such to be used by the surrounding population.

6.11.2 AIR AND DUST POLLUTION CONTROL MEASURES:

Prevention of Air pollution:

To prevent air pollution in mines, in stockpiles, in all plants etc., suitable integrated dust suppression systems are to be adopted. Methods like water sprinkling along mine haul roads, on roads in plant and stockpile areas, wet drilling in mines etc., are to be adopted. Enclosing the conveyors & junction houses, providing water mist spray in at conveyor discharge points and development of green barriers around the Plants, Loading Yards, Waste dumps etc. Also, air pollution measuring shall be monitored regularly at all such sources in plants andstockpiles. Regular water sprinkling will be done on haulage roads by 28,000 Ltrs. capacity Water Sprinklers for dust suppression.

The proposed OCSL Plant will be provided with water sprinkling and adequate nos. of dry fog type dust suppression system stations, comprising of MS water tanks, pipe work, nozzles, solenoid valves, manual shut-off valves, pumps (one working and one stand-by), air compressors (one working and one stand-by), all necessary electrics with MCC and instrumentation required for operation of the system through PLC, in order to arrest the dust generation at all necessary material transfer points. Plain raw water dust suppression system is provided at dumper platform and at the iron ore fines storage yard.

Drilling Operations:

When the blast holes are drilled, the cuttings from the holes are flushed out of the holes by passing the compressed air through drill rods and these cuttings are allowed to fall outside the collar of the blast hole by means of blowers. The dust thus generated during drilling will be suppressed and allowed to settle in the form of a cone near the collar of the blast hole itself by use of water during drilling so that the air will not be polluted by the blast hole drilling.

Blasting:

The air pollution during blasting is in the form of chemical gases produced during the explosion and dust generated during the blast. Since the number of holes blasted during any blast event will not exceed a maximum of about 30/40 holes per blast and on an average about20 holes per blast, the gases generated during explosion are not likely to contribute much to air pollution as no such ill effects of the escaped gases will be observed on vegetation nor onthe residents of the nearby townships or residential houses near to the mines.

Crushing Operations:

Fugitive dust will be generated at dumper platform while unloading the ROM iron ore into primary crusher. In order to ensure effective dust suppression, water will be sprayed in the form of a mist at dumper platform during unloading of iron ore. Since crushing will be done by the equipment which will be housed in an enclosure, there will be no threat of air pollutionto the surrounding areas of the crushing plant as the huge GI sheet enclosure of the crushing plant acts as a good shield for prevention of any dust particles to escape out of the crushing plant premises. Crushed ore from the primary crusher will be transported to screening plant for further processing through a system of closed conveyor belts. This system will be developed in order to control the dust generation during transportation of ore from one placeto another. The conveyor system will be stretched from crushing plant to screening plant. Theeffective conveyor system will be provided to control dust generation while ore transportation.

Screening and Loading Operations:

During stacking of lump and fines some dust may generate and arrangements are made to ensure effective dust suppression by water spraying.

6.12 CONTROL OF DUST*:*

Dust pollution affects more to the human beings and the workers engaged in the mining activity, besides creating problems for the wild animals. Therefore, dust control is a major activity in the mining process. Dust hazards cannot be completely eliminated, but attempt is made to reduce the quantum of dust generation. The Haul Road in the mining area are regularly sprinkled with water so that, dust is minimized due to movement of vehicles.

The ore at the time of loading, transportation and unloading in and around the mining area will also be sprinkled with water to reduce dust. The important dust control measures which will be taken within the lease area will be:

- Wet drilling practice will be followed.
- Spreading of dust is minimized by use of suitable explosive.
- Regular sprinkling of water on other non-metalled haul roads.
- Regular water sprinkling to be done on Ore Stacks.
- Over loading at the time of transport to be avoided.
- OB dumps will be planted with grasses and other suitable soil binding species.
- Dust extraction system will be installed in the crusher plant.
- Green belts will prevent spreading of fugitive dust.

All these dust control measures have been proposed as a requirement in the approved Mining Plan and therefore special provision is not made for this activity in this Plan.

6.13 WATER POLLUTION CONTROL MEASURES:

Effluent from mine: To prevent surface and ground water contamination. Leak proof containers will be used. Oil/grease will be kept in empty safe open containers of higher volume than the containers to avoid overflow spillage on the ground. The floors of the areas wherever oil/grease is handled will be kept effectively impervious. Any wash off from the oil/grease handling area or workshop will be drained through impervious drains, collected in specialty constructed pit and treated appropriately before releasing it into the natural drains.

The sewage waste generated will be drained by underground impervious drains, lead to appropriately design septic tanks and soak pits to prevent any pollution of surface or ground water.

i. The surface and ground water in and around the mine, crushing/ loading plant and infrastructure will be regularly tested and appropriate control measures adopted in case of any pollutant is detected above the prescribed limit.

ii. All stacking and loading areas will be provided with proper garland drains equipped with baffles to prevent wash offs from reaching the downstream natural channels.

Affluent from colony: The domestic effluent generated from the colony is led to sewage treatment plant through properly designed septic tanks and soak pits.

Stream water: Control measures to be adopted are briefly discussed below.

Check dams will be provided to prevent solids from wash area and screen if any from the mine related activities.

- Peripheral bunds will be erected on the outer edge of the abandoned benches before reclamation so that the soil is not carried away by stream water.
- A water gradient of about 1 in 105 will be kept at every bench towards off thebench to prevent formation of gullies in the bench slopes causing serious erosion. Chutes will be constructed by using local stone or masonry to guide the water in areas with loose soil to prevent erosion and uncontrolled descent of water wherever necessary.
- Construction of garland drains around freshly excavated and dumped areas sothat flow of water with loose material is prevented. The mine water will be passed through specially constructed catch pits to arrest any loose material being carried away with water.
- Any area with loose debris within the lease hold will be planted.

Prevention of Water Pollution –

- **Waste dump management:**

  Suitable number of check dams, buttress walls and trench at toe of waste-dumps shall be constructed to prevent water pollution. Drainage in mine area shall be checked before the on- set of monsoons.

- **Discharges from Mine and allied Operations:**

  The drains will be constructed throughout the mine for the rain water and these are let to the natural streams. Since the water is turbid, check dams will be constructed across the nalla at downstream. The settled material will be removed every year before monsoon season by mechanical means. Check bunds with loose boulders wrapped with chain link mesh will be constructed on the nallas to control the velocity of flow during monsoon season.

- **Drainage System:**

  At stockpile and loading plant area a network of drains with concrete bottom will be constructed at a depth of 1.5 m below the lowest level on the side parallel to the stockpile areawith inter connected box culverts. The sloping of surface given inward to the stock pile so thatthe surface water will only infiltrate in to the drain. This entire system with special design helpsin preventing the turbid flow. Only the clear water will ultimately flow out to natural streams and joins the Nerli nalla.

6.14 MEASURES TO CONTROL NOISE POLLUTION:

The following control measures will be adopted to keep the ambient noise levels below permissible limits 75 dB(A).

i. Provision and maintenance of thick tree belts to screen noise.

ii. Avenue plantation within the projected area to dampen the noise.

iii. Proper maintenance of noise generating machinery including the transportvehicles will be ensured.

iv. Provision of the air silencers to modulate the noise generated by the machines will be made wherever required.

To protect the workers from exposures to higher noise levels the following measures will be adopted

1. Provision of protective deviles like ear muffs/ear plugs to these workers whocannot be isolated from the source of noise
2. Confining the noise by isolating the source of noise.
3. Reducing the exposure time of workers to the higher noise levels.

Additional measures

- **Prevention of noise pollution:**

  To arrest and minimize the noise produced beyond acceptable levels from running machinery in all plants, heavy earth machineries, drills etc., suitable acoustics shall be provided in their vicinities. Also, noise level measuring shall be monitored regularly at all such sources in plants.

  Noise generated from blasting will not be continuous but for shorter duration and instantaneous. As the blast holes will be initiated with different noiseless delay detonators for noise control, the impact on noise may be less than 5 seconds.

  As the nearest village is located at about 3.0 km from the mine boundary, impact due to noise levels from blasting is not envisaged. Noise generated from blasting is neither continuous nor for a shorter duration but instantaneous. It takes less than 5 seconds to occur. The noise levels during blasting operations are likely to be in the range of 120 to 130 dB(A) at the blast site. The noise levels tend to decrease with distance. The noise levels over this time would be instantaneous and short in duration. The nearest village settlement is away from the mine faces hence impact on noise levels from blasting are not envisaged.

The crusher in the mines will be housed in an enclosure. Hence, noise will be prevented.The noise level control measures at various stages of the mining is given below:

- Proper and timely maintenance of mining machinery;
- Deep hole blasting will be restricted to day time hours only;
- Operator cabins of dumpers and shovels will be air conditioned;
- Noise levels will be controlled by using optimum explosive charge per hole andmilli second delay detonators and proper stemming to prevent blow out of holes;
- The crushers in the mine will be completely enclosed in a covered building to minimize sound propagation;
- Use of rubber / panel coated screens in screening plant;
- Rubber lining at transfer points of conveyors;
- Developing greenbelt on the sides of conveyor, crushing plant screening plant and loading plant.
- Blasting shall be well designed and arranged in such a way that only one or twoholes are blasted at a time with the use of short delay detonators in combinationwith sequential blasting machine;
- No trunk line of detonating fuse shall be used on surface (even if detonating fuse is used as trunk line with cord relays, then it will be covered with clay properly);
- Primary blasts shall be designed such that boulder generation will be minimum;
- Secondary blasting shall be avoided;
- Explosives shall be blasted into confined stage or optimum stemming columnshall be maintained for holes during charging of hole;
- Blasting shall be done only during afternoon hours when temperature inversionsare not likely to be there and air density is less;
- Blast of optimum size shall be taken to keep noise level of blasting within 130dB(A);
- No blasting shall be done when the sky is cloudy because cloud cover can causereflection of pressure wave back to the ground at some distance from blast;
- Non-electric down-the-hole detonators shall be used thus reducing noise level during blasting operation; and
- Speed of moving dumpers and other vehicles running in the mine will be limitedto moderate speed (25 km/hr) to prevent undue noise as per DGMS circulars enforcing safety standards.

6.15 MEASURES TO REDUCE GROUND VIBRATIONS DUE TOBLASTING:

General recommendations:

1. To control fly rocks, stemming column will not be less than burden of the hole and the blasting area will be muffled.
2. Each blast will be carefully planned, checked, executed and observed. Blasting data will be recorded. During blasting a responsible officer will be supervising the whole operation.
3. Blasting will be carried out at mid-day and never at night.
4. Blasting will not be carried out when strong winds are towards the inhabited areas.

6.16 GARBAGE MANAGEMENT:

Garbage not only creates problems for the wildlife but also creates problems for mining activity particularly non-degradable materials like polythene bags etc. pose a lot of problem for the humans as well as Wild animals. Hence proper Garbage Management is also an important activity in Mining process.

The additional steps which are to be taken for Garbage management are as follows:

i. Entry of non-biodegradable materials which are likely to produce Garbage such as Polythene bags, Aluminium foils, Tin foils etc. are restricted in to the Mining area.

ii. The Garbage generated in the Mining area is regularly collected and segregated in- to Bio-degradable and non-degradable materials.

iii. The non-degradable materials if any are sent for recycling.

iv. The Bio-degradable waste material should be kept separately for conversion in-to manure. The Manure obtained from these pits will be utilized for plantation purpose.

6.17 SOCIO-ECONOMIC ASPECTS INCLUDING RESETTLEMENT AND BENEFITS:

The mine lease area includes Five villages Bade Bacheli, Bhansi, Porokameli, Dumirpalnar, Bhatpada District South Bastar Dantewada. However, the development in the area which is predominantly backward, will largely benefit the local population. Preference will be given to the local people for gainful employment in the unskilled and semi-skilled categories as and when the need arises.

6.18 OTHER CONTROL MEASURES AT MINING AREA:

The other control measures adopted for controlling air pollution and dust emissions fromthe proposed mining activity are summarized below:

- Proper maintenance of the heavy earth moving machinery and vehicles;
- The haul roads and service roads will be graded to remove the accumulated loosematerial;
- Mostly wet drilling will be practiced. The dry drilling equipment will be provided withdust collection system;
- Drilling machines will be equipped with sharp drill bits for drilling holes;
- Blasting will be carried out with optimum charge;
- Blasting will be avoided during high winds, night time and temperature inversionperiods;
- The waste dumps will be given proper slopes so that during rainy season water wouldnot flow down from the dump slopes;
- During high winds, excavation and transportation operations will be suspended;
- The dumpers will not be overloaded so as to prevent spillage of the ore on the haul roadsduring transportation;
- Good housekeeping will be practiced at all the development and production benches andat utility service places;
- Good canopy greenbelt will be developed around the mining area and along mine haulroads, which acts as barrier between mining operation and outside mining area; and
- Usage of 100 T dumpers for higher capacity and reducing number of trips of dumpersfrom mine face to crushing plant.

CHAPTER VII

WILD LIFE CONSERVATION AND MANAGEMENT PLAN

7.1 WILDLIFE CONSERVATION, MANAGEMENT AND ITS RELEVANCE IN MINES PROJECT:

Wildlife conservation allows stakeholders to include rare, threatened and endemic biodiversity along with strategically planning for ecological balance for natural wealth and human being through sustainable approach of development.

Wildlife conservation started nearly 50 years ago across the world where "protected areas" were established and were treated as natural islands that remained largely untouched or unexploited by the human or system influences.

The forest cover in India is 21.34% of the total geographical area of the country out of which 4.89% treated as "protected areas" where no. of National parks, sanctuaries, conservation reserves and community reserves are notified. (www.wl.gov.in/national_wildlife_database).

The forest cover in the Chhattisgarh State is 55674 Sq. Km which is 41.18% of the state's geographical area.

In Indian context, the Project area in PAs are relatively very small so the PA management gradually extended to landscape conservation where support to wildlife in Project areas are duly complimented by its management in wildlife protection point view. Hence the approaches of wildlife management legalized to manage core, Impact zones and areas that provide connecting corridors.

The increasing trends in extent of linear developments in most landscape outside PA face major challenge for wild life conservation and management. There is need of an hour to guide developments which often ruin or disturb habitats and ultimately adversely affect the wildlife conservation and ecosystems.

7.2 OVERALL OBJECTIVES OF MANAGEMENT:

The major adverse effect and threats due to the project implementations would be

- displacement of wildlife and their loss of habitat,
- destruction of forest including biodiversity loss,
- increase in human and wild life conflicts,
- forest areas shall be susceptible to fire hazard,

- loss of natural harmony of villages in Project area,
- increase in pollutions,
- reduction in water bodies,
- Forest encroachments etc.

Mitigation measures refer to avoid, reduce or remedy harm and address the conservation concerns likely to be associated with the development proposals.
Hence, the main objective of this plan is to reduce/minimize/ mitigate various stress occur due to implementation of this project in this particular locality having wildlife importance by using the best available resources.

Wildlife management is a probable solution to maintain the balance between needs of wildlife and people living together in the area with the help of scientific strategies, which consist of applying and executing proper recommendations of the plan to reduce the impacts of decimating factors and neutralizing harmful effects of limiting factors that keep the animal population lower than the carrying capacity of the area.

It also aims at management of human dimensions relating to

- regulation of habitat use,
- sufferance from animal damages,
- livelihood issues and taking people as partners in conservation management.

This Conservation Plan will suggest measures to mitigate such stress and if possible how to avoid certain activities which could reduce the negative impact and the most important to ensure safe habitat of wildlife.

The management of the project area aims for maintenance of habitat for smaller animals that used to live and share habitat. At the same time, it ensures the safe habitat of wildlife in their habitat. The management of Impact Zone will target optimization and maintenance of wildlife habitat and biodiversity, involving local people as far as practicable and aim to avoid /minimize or mitigate the adverse impact of the project.
The project area and Buffer zone have Reserve &Protected Forests and Orange area with composition of rich flora and fauna.
The main features are considered as scientific management of wildlife as

- The displaced animals should be taken care with the highest degree of development measures. Their rehabilitation would be the major objective of the plan.
- To fulfill all these requirements, the plan focused on improving forage and browse volume by increasing food plant diversity with vertical and horizontal cover.

- These measures will arrest habitat destruction and fragmentations also prevent soil erosion and loss of bio-diversity. Keeping natural water resource free from negative impact during mining phase will also be targeted.
- The proposed plan has the same pitch of mitigation measures for sustainable development of habitats and wildlife.
- Keeping in view the Wild Life (Protection) Act 1972 and the rules made there under, Forest conservation Act (1980) and the rules made there under, Biological Diversity Act 2002 & its rule, the National Forest Policy 1988 and the National Wildlife Action Plan (2002-2016) have also been kept in mind while formulating this Wildlife Conservation Plan (WLCP).

7.3 IMPORTANT KNOWLEDGE ON MANAGEMENT AND CONSERVATION PLANS FOR FAUNA:

- Home range of the animal.
- Territorial requirement of the animal depends on species in the area.
- Deciding the number of animals to be conserved and accordingly evaluating the carrying capacity of the habitat.
- Conservation is aimed at single species or multiple species.

7.4 BASIS AND REFERENCES FOR CONSERVATION PLAN:

The following books and records were referred for preparation of wildlife and avifauna specific conservation plan.

- Working plan of Dantewada Forest Division
- Wildlife (Protection) Act 1972
- WII (2016). Eco-friendly measures to mitigate impacts of linear infrastructure on wildlife. Wildlife Institute of India, Dehradun, India
- Menon-Vivek 2009, Mammals of India, A field guide, wild life trust of India.
- Book on Indian Birds by Salim Ali
- State of India's Forest Report-2019; Forest Survey of India. Dehradun
- Champion H G. and Seth S K. (1968). A revised survey of forest types of India.
- **Status of Faunal and Floral diversity in the area.**

7.5 WILDLIFE HABITAT STRUCTURES:

This has been increasingly concerned in recent years about potential negative effects on wildlife caused by infrastructural development and other modifications of wildlife habitat.

Conversion of naturally regenerated mature and old-growth forests to intensively managed plantations for wild life habitat is associated with forest structures. As a result of the concerns, regulatory pressures on forest management to provide habitat has resulted in creating a system of development for wildlife habitat with the hope of providing an increased amount of habitat for species associated.

The concept of wildlife habitat varies according to the needs of each species, and for management purpose the concept may include a description of those areas that are best suited for a species to successfully nest, roost, forage, and reproduce. Given the wide diversity of wildlife, however, all terrestrial species require food, cover, water, and space (Yarrow and Yarrow 1999).

It is generally accepted that increases in the diversity of vegetation across a landscape will lead to increases in the value of the landscape as habitat for a variety of species (Whitaker and McCuen 1976).

Focus have been shifted from a narrow view that is guided by the habitat value of one or a few individual species to a broader view that recognizes the multiple values that wildlife habitat can provide for a wider mix of species (Johnson and O'Neil 2001).

The most critical aspect of wildlife conservation is habitat management. Habitat loss presents the greatest threat to wildlife.

The most important features of wildlife habitat is its canopy cover, availability of fodder, prey, water etc. In general, good habitat conditions for wildlife can be created while managing canopy cover through plantation of indigenous species or other management practices. The proposed plan here will help in planning for integrated land management program that optimizes timber growth, plantation of fodder species for herbivores and thus planting to create wildlife habitats and corridors.

Wildlife has four basic needs: food, cover, water and space. The quality and quantity of these components determine the carrying capacity of the land – the maximum number of animals that can be supported in good conditions throughout the year. Carrying capacity changes by season and by year as a direct result of changes in forest habitat. Most animals can be found where

food and cover meet, particularly near a water source. This is called edge effect. Edge effects can be in the form of topographical or vegetation edges, suchas the saddle of a mountain range. River bottoms are ideal, offering many animals all their habitat needs along one corridor.

With proper planning, forest management can be conducted in such a fashion as to improve habitat conditions for certain species of wildlife. As forest are altered to grow timber products, wild life habitat are also changed. Some of the habitat characteristics that influence wildlife are edge, habitat diversity, Interspersion and plant succession.

The arrangement of habitat patches also influences the presence of certain types of wildlife. Some species require large tracts of similar habitats (low interspersion), whereas others use a variety of habitats at different stages in their life cycle and require multiple habitat types in close proximity to one another (high interspersion)

A Forest stand arrangement also has an effect on the quality of wildlife habitat. Stand arrangement refers to how the forest stands are located in relation to each other. For quality wildlife habitat, forest stands providing habitat components must be available within the home ranges of the wildlife species being managed.

Arrangement refers to the placement of food, water, cover, and space in a habitat. The ideal arrangement allows animals to meet all of their needs in a small area so that they minimize the energy they use traveling from food to cover to water.

Proper arrangement of food, water and cover can often determine the use and value of these habitat components to wildlife. Poor arrangement of habitat components fails to make the best use of a particular site for wildlife. Mixture of development measures such as pasture land, forest plantations, development of water bodies etc. creates more diversity.

7.5.1 SPECIAL HABITAT FEATURES:

In addition to general wildlife-habitat relationships, some species also require special habitat features and will be absent if these features are not present. These features include snags, cavities, dead and downed wood, rock outcrops, caves, evergreens, temporary pools, and spring seeps.

Snags and Cavity Trees: -

Snags are dead or partially dead standing trees. They provide a number of important benefits to wildlife. As a tree dies, its bark begins to loosen and form bark cavities, which are used as roost sites by forest-dwelling bats and as nest sites by brown creepers. Insects, a valuable high-protein food source for certain species, are abundant in snags. A wide variety of birds, including raptors, kingfishers, flycatchers, and many songbirds, also use snags as hunting and singing perches.

Cavities are holes excavated in snags by woodpeckers. They are used for shelter and nesting cover by many species. Over 65 species of birds and 18 species of mammals in study area require cavities for nesting, and reptiles and amphibians also use cavities for shelter.

Dead and Downed Wood:

Dead wood, including fallen branches and trees lying on the ground, is also important for wildlife habitat. As wood decays, it slowly returns nutrients to the ground and supports colonies of insects on which many animals feed. Amphibians rely on downed trees for cover, especially during droughts, when the undersides of fallen logs become a critical source of moisture. Small mammals also use logs on the ground as runways, and reptiles that prey on small mammals and insects use them as hunting areas. In addition, grouse use large logs for drumming sites.

To provide dead, downed wood for wildlife, resist the urge to clean up your property. Strike a compromise by tidying up some of the dead branches into a brush pile, but leave the rest where they land. You can also add dead wood to your habitats during tree cutting by leaving some felled trees on the forest floor and building brush piles with others.

Rocky Outcrops and Caves:

Rocky outcrops and caves are generally less common than some other habitat features. Certain species, however, such as the Indian Monitor lizard (Varanus begalensis), Sloth Bear (**Melursus ursinus**) require the unique habitat provided by rocky outcrops and many species of snakes use outcrops as escape cover and sunning sites also use caves and rock outcrops for nest sites, food storage and traveling, many of the nocturnal animals use caves and outcrops for den sites and cover. Caves are especially important in the winter for hibernating bats, and some bats inhabit caves throughout the year. To protect these uncommon species, minimize disturbances around caves and rocky outcrops.

Temporary Pools:

Temporary, or vernal, pools are unique wetland habitats that fill with water during a rainy season and then dry up later in the year. Although temporary, they provide a critical breeding ground for amphibians. Because temporary pools do not support fish populations, amphibian eggs can develop there without high losses to fish predation.

In addition to providing breeding and hibernating habitat for amphibians, temporary pools also support a complex web of interactions among a variety of organisms, including aquatic insects, salamanders, frogs, turtles, snakes, small and large mammals, waterfowl, and songbirds.

Spring Seeps

Spring seeps are small streams or ponds fed by fresh water from beneath the surface of the ground. Spring seeps are different from temporary pools because the water source persists year-round. This constant water supply provides important benefits to wildlife.

Spring seeps are particularly important during the winter when they may be an animal's only source of fresh water and food. Wildlife use spring seeps heavily during severe winters, when other sources of water are frozen for extended periods of time. Spring seeps can be critical during periods of deep snow, when the area around a seep remains unfrozen and provides a snow-free travel lane. In early spring, vegetation grows first around seeps, providing a food source at a time of year when most others have been depleted.

To assess condition of the habitats, it is essential to manage areas as per the needs of the wildlife.

Fire protection, Grazing control, ANR works and introduction of fodder species, wherever needed, are essential taking into consideration the suitability of the wild animals.

Improvement in Habitat structure:

The objectives should be brought about following principles to improve habitat structures such as:

(a) Removal of Alien grass and reduction of other competitive plants to allow moisture and soil nutrients for the planted seeds/slips.
(b) Elimination or control of grazing.
(c) Terrain and soil should be suitable to support the desired forage species.
(d) Plantation of suitable species for the habitat.
(e) Plantation of mixture (mixed species)/ fruit trees because it supports different species.

7.6 DEVELOPMENT OF WATER AND ITS RESOURCES TO ENSURE AVAILABILITY:

Water is an integral part for survival of wildlife. Availability of water is life saving for many birds, infants and small sized wildlife. The requirement of water is one of the basic needs of wild animals, though its consumption varies in accordance with the species concerned. Hence water affects density of the animal's population and therefore, the management and maintenance of waterholes is an important tool in habitat-improvement in wildlife management.

Sometimes in quest of water animals have to run a long distance even near village where they may become victim to poachers. Hence development of water resources and its management are utmost important aspect in theWildlife conservation. Important and necessary measures would be undertaken in order to ensure the availability of water for a longer duration especially in the pinch period.

Even ample of food and shelter cannot alone do survival for the wild life and the mortality of animals increase in absence of water holes specially in pinch period.

Proper distribution and numbers of water holes are in the habitat matter a lot. If sufficient numbers are not developed or made available, there will be crowd of the animals around water holes beyond its carrying-capacity.

There shall all the chances one can experience misbalance of natural ecology. As the resultant, the animals will come under psychological pressure due to over-crowding hampering their productivity.

There should be at least one waterhole in each home-range for the animals which require water daily regularly, for others, it may be at distinct places serving their requirement.

For the purpose, maintenance of natural waterholes and development of artificial waterholes are must. Following are the methods of improving waterholes for wildlife:

7.6.1 DEVELOPMENT OF NATURAL WATERHOLES:

Natural waterholes can be maintained and improved as follows:

(i) Natural waterholes are often found in nalas and rocky areas where run-off water is accumulated in depressions. At times, such holes can be improved by deepening the catchments or by trenching run-off water directly to the basin.

(ii) For natural waterholes, arrangement of restructuring or development of water holes should be done under strict supervision of experienced and expert persons to make if available to the wildlife.

(iii) Seeping of water is geographical condition, where water oozes out drop by drop through rock or soil. Such water cannot be consumed directly by the wildlife. Such water can be collected in a artificially made ditch/tank by applying devices like through hollow bamboo or pipe catching those Seeping water.

7.6.2 DEVELOPMENT OF ARTIFICIAL WATERHOLES:

Artificial waterholes are developed as follows:

(i) Reservoirs and Ponds: Man- made reservoir and ponds shall help animals to availwhich can be constructed at places of requirement.

(ii) Water Catchments: These are the natural channels through which water flows . Thesechannels can be identified and developed.

(iii) Other Water Developments like small ponds or water collection points can be developed.

7.6.3 SOIL & WATER CONSERVATION:

Good vegetation and cover in any area can restore and retain water and soil carrying capacity of area. From habitat improvement point of view, it is important to take care simultaneously for soil and water conservation.

Soil is the prime natural base for the development of vegetation. Soil is one of the factors determining the kinds and growth of the plant of a place. Soil and water can be conserved by proper selection of suitable plant species during plantation. This will also solve water and food problem of wildlife. In addition, formation of check-dams and other suitable devices are also necessary to prevent soil-erosion and run-off sof water.

7.7 IMPROVEMENT AND DEVELOPMENT OF NATURAL AND ARTIFICIAL SHELTER:

In addition to Water and Soil, shelter is also considered as the main factor for wildlife. Therefore, the management technique should be accessed and applied as per the need of the target species. The various artificial measures for shelter/cover improvement are as follows:

7.7.1 DEVELOPMENT OF NATURAL SHELTER:

Plant succession is phenomenon of continuous and contiguous nature in its own way unless and until it is manipulated by the human being.

If the plant succession is in favorable direction for the target species, then it should be enhanced in the habitat by applying measures such as fire-protection, control-grazing, plantation of suitable species, if required and so on.

If a particular stage of succession itself is beneficial for target species, then measures for manipulation should be applied to retain that particular stage of the succession such as felling, grazing, control burning, changes in the silvicultural operations etc.

Management of shelter or improvement is to support wildlife so that they can stay long and propagate with desired speed.

7.7.2 DEVELOPMENT OF ARTIFICIAL SHELTER:

(i) Plantation of Trees (Afforestation/Reforestation) : Preference would be given fruit treeplantation, pasture development and palatable grass plantation

(ii) Caves and Rock-cliff Shelters: Suitable development for area specific species.

(iii) Development of Brush-piles: Suitable development for area specific species.

(iv) Artificial Nesting: Its dependent on the local conditions, if required then artificial nestdevelopment can be done for particular species in consideration.

(v) Suggestive Silvicultural Operations:

a) Felling of shade and fruit trees should be stopped as far as possible.

b) In There should be always mixed-species plantation to meet the various foods-chainsof various wild animals.

c) The felling of coups should be in such a way that they may given maximum core-effects to the wild animals resulting highest interspersion and juxtaposition for them.

d) After felling and trading operations, the left-out parts of the trees should be arrangedin the form or brush-piles to provide shelter for certain small wild animals and birds.

e) There should not be interruption near the riparian zone as well as shelters like cavesand rock-cliffs.

f) At least, five snag trees per hectare should be left for protection and propagationpurposes of wild animals.

7.8 PREVENTION OF FOREST FIRE:

Forest fires are the most damaging factor for habitat-management. It causes damage to the habitat of the wild animals destroying its food and shelter, forest crop, regeneration, productivity of forest and soil. Hence, wildlife is caused excessive loss by the fire by burning their eggs, young ones and the habitat. .Anthropogenic causes will be minimized through forming a fire line around the forest area. Toadd to the prevention of fire local persons will be employed as fire watchers, during the fire prone season.

7.8.1 MANAGEMENT PRESCRIPTIONS FOR FIRE PROTECTION:

Forest Fire management is crucial for entire forest area falling under core or Impact Zone .The forest fires along with unregulated grazing have been acknowledged as the main causes of degradations of forest eco-systems and wildlife habitat.Fire also exposes the soil to erosion and, hence, causes habitat degradation in the process.

Due to deciduous nature of the forests, the grasses, weeds and falling leaves and twigs forms a thick layer of undergrowth which is highly inflammable in nature.

The Fire lines are classified into the following, categories in order of priority.

A Class Fire lines: These Fire lines comprise of the external boundary These are the prominent Fire lines, which should be prescribed for clearing, burning and maintenance every year on priority basis.

B Class Fire lines: These Fire lines include internal boundaries and roads. These Fire lines should also be prescribed for clearing, burning and maintenance, every year.

C Class Fire lines: It includes the remaining Fire lines including the internal boundaries of compartments and coupe lines.

7.9 WEED MANAGEMENT:

"A weed is a plant growing at place where it is not desired" - Jethro Tail (1731) was the first person to use the word. Alien species are non-native or exotic organisms that occur outside their natural adapted ranges and dispersal potential. Many alien species support our forestry systems in a big way. However, some of the alien species become invasive when they are introduced deliberately or unintentionally outside their natural habitats into new areas where they express the capability to establish, invade and out complete native species.

7.10 ADDRESSING HUMAN-ANIMAL CONFLICTS:

Threat to the mankind by wildlife often happens when they cross the edges and move towards villages and damage the houses and crops, Man-animal conflict is a difficult problem to be eliminated. The conflict is both deliberate as well as in advertent.

There is a considerable loss of agricultural crops by the wild animals such as Elephant, Nilgai, Wild boar, Chital and other species.

In most cases, wild animals move out of forests in search of water and food. Therefore, forests should have enough water and food resources well distributed within the forest boundary.

7.10.1 CONDUCTING TRAINING AND AWARENESS PROGRAM AMONGST FOREST STAKE HOLDERS:

Besides various measures applied in forest management, community and people awareness shall be important tool for the conservation.

Education and knowledge imparting about environment and wild life will be created amongst the adjoining villages through slide and film shows people will be made convinced about the sustenance of natural ecosystems.

People and community shall be educated about the balance of natural eco-system boards, also conducting audio visual classes and distributing literature in respective villages in the Impact Zone.

Wildlife exposure visits can be organized for the people. Awareness programs will be run with the help of Forest Officers and more importantly some national experts will be invited to deliver talks on awareness related to wildlife conservation.

7.11 WORKING PLAN PRESCRIPTIONS FOR WILDLIFE MANAGEMENT:

The study area falls in the Dantewada Forest Divisions. Working plans, prepared now-a-days, have more ecologically systemic approach as compared to earlier reports which had more emphasis on exploitation of the forest products for economic gains.

Mainly Sal and mixed forest exist in Study area, which provide good stay, food, water and protection to wildlife.

7.11.1 NEED TO CONSERVE WILD LIFE:

Many wild lives are at the verge of extinct and many are threatened to live due to many reasons. In a citation, honorable Supreme Court cases 665 para 10, which is quoted in honorable High Court of Delhi F. L.T. 192(209) of 1994 regarding necessity of conservation of wild life

"According to ecologists, nature is perfect mixture and balance of flora and fauna and human is only independent part of the system who should not be allowed to intervene in the balance and system and destroy the harmony. The main cause behind the diminishing of wild life is illegal and excessive hunting and exploitation of the animals for commercial gain. Human entered in their natural habitat of animals and killed them. So in lieu of the directives issued by honorable Supreme Court & honorable High Court of Delhi, conservation of wild life should be top priority"

7.11.2 FACTORS AFFECTING WILDLIFE:

- Forest fire
- Excessive grazing
- Water resources
- Encroachment and illicit felling
- Food habit of tribes
- Poverty and illiteracy
- Lack of awareness among forest staff towards wild life.

Working plans have several circles but one related to wildlife conservation is the Wildlife and Bio-diversity Conservation Working Circle.

Main objectives of the circle are:

- Conservation and Propagation of Biodiversity
- Increase density of forest crop
- Soil & water conservation
- Improve habitat for wildlife
- Conservation and propagation of endangered species
- Provide special protection to plants of medicinal value
- Involve fringe villagers for active co-operation in Eco development.

However, it is worth mentioning that none of the presently proposed impact areas fall under areas marked by the circle for special biodiversity treatment.

For wildlife conservation, the areas have been divided in to three zones as follows:

- P-1 High presence of wildlife
- P-II Medium level presence of wildlife
- P-III Minimum level presence of wildlife

7.11.3 CONSERVATION RULES / MEASURES: for above mentioned category of zones

For P-1 High presence of wildlife:

Conservation and protection of Natural habitat should beon top priority along with the following treatments

(i) Complete ban on grazing and control over fire hazard.

(ii) Community participation in development of ecology.

(iii) Construction of artificial holes &ponds, stop dam, anicut etc. Properly maintain naturalwater resources.

(iv) Saltlick strips shall be provided near water sources.

(v) Vaccination to be done in domestic animals in nearby villages.

For P-II Medium level presence of wildlife:

Here the main objective is to develop habitatalong with the following treatments

(i) No silvicultural operations shall be carried out within 200 mts on either side ofperennial river and within20 mts on either side of the nalas.

(ii) Coupe felling should be completed as early as possible.

(iii) Labour camp shall not be allowed within 300 mts of water sources just to avoiddisturbances to wild life.

(iv) Caves, special habitat, rocky outcrops and animal shelter shall be protected.

(v) Trees having nesting places shall not be felled.

(vi) Fruit bearing trees shall not be felled.

(vii) Bunch of shed bearing trees near Pilgrim places, water sources, pond etc shall not befelled but protected.

(viii) Control over excessive grazing and fire hazard.

(vi) Saltlick strips shall be provided near water sources.

(ix) Non palatable grass land shall be converted into pasture land.

(x) Community participation in development of ecology.

For P-III Minimum level presence of wildlife:

Such areas shall be developed in such a way that both carnivores and herbivores have habitats for them. Following treatments shall be carried out

(i) Public awareness program shall be taken up.

(ii) Immediate distribution of compensation in case of any kind of damage by wild life.

(iii) Small check dams shall be constructed in forest area to discourage movement of wild animals towards village area.

(iv) Plantation of fruit bearing trees shall be taken up and protection and development works shall be done for the naturally grown fruit trees.

7.12 OBJECTIVES OF MANAGEMENT TO MITIGATE THE THREATS SPECIFIC IN PROJECT AREA AND IMPACT ZONE:

The objectives of management to mitigate the threats to wildlife are covering the following aspects-

7.12.1 PROJECT AREA:

- Ensure appropriate measures to avoid / minimize or mitigate the adverse impacts like accidents and causalities of wildlife in and around the mines.
- Create appropriate facilities like **underpass and /or overpass** on approach roads for safe movement of large animals like Leopard, Wild boar, Sloth bear, Deer etc. and small animals like hare, civets, mongoose etc., Reptiles, Amphibians, Fishes etc on approach roads within mine area

- Create noise buffer using a diversity of tree species with a range of foliage shapes and sizes: a combination of shrubs and trees necessary to achieve this effect.
- Mount Hoarding at strategic locations near villages or places to generate awareness among people also by displaying signages like caution signs, dynamic message signs.
- Infrastructure development like torch, and fixing light in various locations to prevent human wildlife interface.

7.12.2 IMPACT ZONE:

- Improvement of water availability by digging of ponds and water bodies to create water hole.
- Soil moisture conservation works like contour trench, contour bund, gulley plugging, check dams etc.
- Removal of invasive Alien Species, like Lentana camara, Argemone mexicana, Bacopa procumbens, Chromolaena odorata, Phoenix acaulis, Cardiospermum halicacabum, Iseile malexum *etc*. hindering the growth and regeneration of valuable fodder species.
- Mopping up the same area to remove the remnants.
- Pasture development by removing Alien Species in natural grass land and also in potential grass land where the density of canopy is < 0.4.
- Planting / Sowing of palatable grass seeds / slips of local species like Dicanthium annulatum (ChhotiKandi), Dicanthium caricosum (BadiKandi), Iseli malaxum (Machhori grass), Chloris barbata (Finger grass), Themeda quadrivalvis (Gunher), Apludamutica (Fulera), Heteropogon contortus (Sukla grass), Brachiaria ramosa and wild leguminous plants like Jungalim oong, jungali urad, jungali tuar etc and their maintenance.
- Improvement of stock by dressing of existing stumps of browsable species and cut back.
- Gap Planting of fruit bearing trees like **Aonla, Jamun, Anjan, Bel, Ber, Gular, Bargad, Peepal etc.** by pitting and planting. **Plantation technique** Leaf fodder species should be planted in such a manner that leaf fodder tree species minimum 1-1.2 M height should be planted in spacing of 10MX10M and Grass fodder species should be sown by preparing raised bed (10MX1M) method as inter- species plantation in between the tree fodder species.
- Fire protection by cleaning and maintaining the fire line and engaging the firefighting squad.
- Monitoring and Evaluation of works

- **Habitat improvement activities -** food resource enhancement for SlothBear and FHA i.e. 30 plots @ 4 Ha each (120 Ha.), 5 year maintenance of food resource enhancement area for Sloth Bear and FHA i.e.30 plots @ 4 Ha each (120 Ha.)

- **Development of Denning niche (Rock boulder and Earthen) for small mammals** 7 locations 20 niches and maintenance from 8th year upto 12th year, Budgetary provision for Development of Denning niche for small mammals 'Rock boulder den 7 locations 10 niches and maintenance from 8th year upto 12th year, Budgetary provision for Development of Denning niche for small mammals 'earthen den' 7 locations 10 niches and maintenance from 8th year upto 12th year, Budgetary provision for Monitoringof dens, Budgetary provision for Development of earthen and rock dens after monitoring,

- **Development of Reptile habitat niche** Status Survey of Snake Species Initiate baseline surveys of snake in the nearest seven protected forests sharing the buffer zone, Monitoring and assessment of the surveyin 2nd year onwards, Based on the availability of the species, the survey can be extended to the rests of next five in 3rd year, Monitoring and assessment of the status survey in 4th , 6th , 8th and 10th year.

Action plan is as follows:

1. Seven locations in the restored external dump with dense tree cover can be developed as reptile habitat niche leaving at least 100-m distance from each other
2. The seven nearest protected forests (PF) in the vicinitycan be selected to develop reptilehabitat niches per protected forest (i.e., 20 niches).
3. Develop rock /boulder heaps of 1m height and spreading 3m radius using the boulder/rocks of size 0.5m^3 dimension is preferable. This size boulders, can provide compactness with required gaps for reptiles to occupy. Artificial burrows with varyingsizes should be constructed under the rock heaps.
4. Multiple 10 sq m black tar surfaces may be created within each reptile niches which canprovide hot surfaces for thermoregulation especially for nocturnal snakes.
5. Any natural logs, snag, termite mounds, leaf itter or large rocks should be kept aspotential reptile habitat.
6. A portion of waste wood and dead logs generated during any land clearing should bestrategically placed within this area.
7. Availability of rocky boulders and earthen materials in the mining site is common and using those waste materials to develop this kind of experimental reptile habitat is easy and economically viable.

Each reptile niches should be fenced with barbed wire with signages not to trespass the area. This habitat development plan is expected to provide habitat for the reptiles in the study area including threatened species viz. Indian rock python, Bengal Monitor Lizard + other important species and other snake species.

- **Human – Wildlife conflict management** Arrangement of utility vehicle for the field to transport of man, materials used in Human- Wildlife conflicts. With POL and maintenance for 10 years
- **People's awareness** Empowering and sensitizing people for protection of wildlife and Eco-development works etc.
- Conservation of Threatened mammals:

Mitigation and Action plan

Habitat restoration – Food Resource enhancement for (Sloth bear, FHA and Elephant) Identify 4 Ha. of open forest as well as partly dense (degraded) patches within PFs/RFs and develop 2Ha. for planting food plants for sloth bear and 2 Ha. species of Four-Horn Antelope food plants.

- The forest patches should be selected from gentle to moderate slope in nature and preferably far from the human habitation and grazing pressure.
- Restore those species-specific patches with the food specific plant species suggested with the help of restoration and forestry expert. (DFO and CCF) (Additional budget should be proposed)

TABLE 7.1 PLANT SPECIES RECOMMENDED FOR HABITAT IMPROVEMENT AND FOOD RESOURCE ENHANCEMENT FOR SLOTH BEAR

S.No.	Scientific name	Life Form	S.no	Scientific name	Life Form
1	Aegle marmelos	Tree	9	Ficus infectoria	Tree
2	Cassia fistula	Tree	10	Ficus racemose	Tree
3	Cordia Macleodii	Tree	11	Ficus religiosa	Tree
4	Cordia myxa	Tree	12	Flacourtia indica	Tree
5	Diospyros melanoxylon	Tree	13	Madhuca indica	Tree
6	Emblica Officinalis	Tree	14	Mangifera indica	Tree
7	Ficus benghalensis	Tree	15	Syzygium cumini	Tree
8	Ficus glomerata	Tree	16	Zizyphus Mauritiana	Tree

TABLE 7.2 FOOD PLANT SPECIES RECOMMENDED FOR RESTORATION AND DEVELOPMENT OF HABITAT FOR FOUR-HORN ANTELOPE HABITAT

S.no	Scientific Name	Habit	S.no	Scientific Name	Habit
1	Acacia catechu	Tree	9	Hymenodictyon Orixense	Tree
2	Asparagus racemosus	Shrub	10	Mallotus philippensis	Tree
3	Bauhinia malabarica	Tree	11	Mitragyna parvifolia	Tree
4	Bauhinia retusa	Tree	12	Nyctanthes arbor-tristis	Tree
5	Bauhinia vahlii -	Creeper AdSp	13	Phyllanthus emblica	Tree
6	Bridelia retusa	Tree	14	Schleichera oleosa	Tree
7	Buchanania lanzan	Tree	15	Shorea robusta	Tree
8	Dendrocalamus strictus	Bamboo/Adsp	16	Ziziphus mauritiana	Tree
Source Kunwar et al. 2006					

Selection of native tree species from above tables should be considered and given priority while taking upplantation activities.

7.13 HABIT, HABITAT, THREATS AND CONSERVATION MEASURES FOR SCHEDULE 1 SPECIES:

Here are illustrations regarding some of the schedule 1 species (Fauna) notified under wild lifeconservation act (1972) found in study area,

1. Sloth Bear (Melursus Ursinus):

Distributed throughout the Central and south India, except a few areas of the coastal districts and is a threatenedspecies.

Habit:

Bears are nocturnal in habit; their sense of smell is well developed than their sight and hearing.During accidental encounter with human being they cause severe damage to the human or evendeath. When they have cubs, they move with them, otherwise they are solitary or are in pair with opposite sex. They have a specific breeding season. Mating takes place in June to July andthey give birth to cubs in caves during December and January. Litter varies between 1 and 3 cubs. Parental care lies with mother only. Their average life span is around 40 years.

Habitat:

They are in good number in drier and secondary forests and are also found in dense forests. They are omnivorous in nature. They feed on tubers, roots, grubs, various fruits, various insects, honey, termites, flowers (Mahua, Simul, etc.). It also damage sugar cane crop, maize etc. Their home range is limited and restricted. In quest of food they may travel several kilometers. It is believed that their gall bladder and bile have medicinal properties and hence they are exposed to poaching, particularly due to demand of these parts in China and other South East Asian countries.

Threats: Prominent threats are

- Loss of habitat, destruction of termite and ant nests due to development activities and biotic interference and illegal poaching.
- Cubs are snatched and use them as show piece by Madaris in rural and urban exhibitions.
- During conflict with human, bear are killed in self-defense.

Conservation measures:

- People residing or having Agri field around the habitats should be educated and trained to protect sloth bear.
- Periodical training campaign in nearby villages shall help in save the life of bear.
- Effective network and bonding should be developed among all the stakeholders in order to reduce human bear conflicts.
- Proper water availability should be ensured in habitat.

2. Indian Rock Python (Python molurus):

Habit: This is a non- venomous snake and can grow up to 4m and weigh 45 kg. The colour is darkbrown to yellowish white in a blotched pattern. They are very good swimmers and take to water when disturbed but on land, they hiss and remain motionless. The species in oviparous and lay up to 100 eggs in a clutch protected and incubated by the female. Being exothermic, python basks in open but canalso raise body temperature by muscular contraction.

Habitat: Python occurs in wide range of habitats viz. rocky foot hills, grass lands, marshes, swamps, wood lands, open jungle. At times, they take refuge in mammal burrows, howllowtrees

etc. It has also been reported close to habitation and crop fields. The snake feeds on small mammals, birds and reptiles but prefers the first. Chital deer, fawns, hares, mous deer, jungle fowl are natural food. It can swallow prey bigger than its size as the jaw bones are not hinged. The prey is constricted to death by muscular movement and swallows head first. Once held in jaw, prey cannot escape because of inward bent teeth.

Pythons are held endangered according to law. Many specimens are killed due to ignorance or out of fear when they enter habitation and capture goats or poultry. Specimens are also silently poached for their ornamental skin.

Threats:

- Any changes in the locality and habitat of Python affect its survival.
- Habitat destruction by biotic interference, conversion of forest land into agriculture land , grazing etc.
- Pollution due to Industrial and agricultural activities has a direct impact on survival of species. Environ pollution due to use of hazardous chemicals can cause serious damageto the survival of the species.
- Python are often killed by people when it enters in house or courtyard thinking it's a poisonous snake.

Conservation measures:

- Identify the habitat and train the people living in close vicinity not to disturb its natural belongings.
- Development of den, burrows and plantations for habitat improvement.
- Systematic monitoring of Python habitat for its nesting and basking is essential.
- All forest areas should be well watched for illegal activities just to protect nesting and basking spots.
- Conservation awareness program that involves local people in conservation of pythonis vital to ensure long term success of management plan. Plans will be included educational materials, organizing plays, poster display and induce pride amongst the local as caretakers of the last population python in their habitation.
- Public awareness is an important priority within the scope of overall management plans.
- Fencing will be constructed around nesting and burrows area to avoid any interference.
- Build effective communication system in area in case of poaching or killing of Python.
- Habitat management of Python shall be crafted in such a manner that it should ensure availability of prey for python.
- Training program should be conducted by the experts with local villagers.

3. Peafowl (Pavocristatus):

Habit: Pea fowl is the national bird of India and is colorful for its brilliant tail feathers with 'eyes'. The so called 'tail' of the peacock, also termed the 'train' is not tail quill feathers but highly elongated upper tail feather coverts. During moulting season, the males shed their stunning tail feathers. Peacocks train is fanned during courtship display, The male has a shininggeneral blue-green plumage with blue neck. The peahen has a mixture of dull green, brown andgrey in her plumage. She lacks the tail coverts but has a crest as in males. Many of the brilliantcolours of peacock are due to optical interference based on periodic nano structure fund in the barbules of feathers giving to iridescent hues. The plumage display by males in a courtship display to attract females. During mating season, high pitched calls are also emitted. Pea hens nest on the ground in a shallow scrape in a dense thicket, lined with leaves and sticks in which3-5 eggs are laid. Nesting occurs in spring and post monsoon season. It is a polygamous speciesand covey of one peacock and 3- 6 peahens are seen. In non-breeding season, unisex groups ofpeahens and rarely of peacocks are seen. With slight alarm, it takes to cover.

Habitat: Pea fowl inhabits both scrub and dense deciduous forests in valleys and slopes not far from water source. It roosts on trees during night. Food consists of grain, berries vegetable shoots, insects, lizards and even snakes. In mosaic habitats of forest and cultivation, pea f owls make regular forays to cultivated land and get killed due to poisoning from insecticide spray in crop lands. The birds are persecuted in the egg stage, hatched with the help of a domestic rooster hen, chicks reared and then pushed to pet trade. Indiscriminate f ire wood collection and forest fires are a scourge to their habitat lowering its quality and cover values.

Why Conservation:

- This is scheduled 1 under WPA 1972.
- Its important link in our eco system.
- This is listed as Least concern species in the Red list of IUCN as it is widespread distribution.
- Feather bare being traded during festive seasons for various reasons.

4. Indian Pangolin (Manis crass Caudata):

Indian Pangolin is listed on the IUCN Red list (1996) as Lower Risk/Near Threatened.

Physical appearance: Indian Pangolin is 45-75 cm long. They have small triangular shaped head. Their tongue is 23- 25.5 cm long and its tail is 33 – 45 cm long. They do not have teeth. They have bad listening power and have bad eyesight. Each limb has powerful five claws. They are covered with the horny scales which protect their body. Males are heavier than the females. Lifespan of Indian Pangolin is more than 13 years. They are foundin almost all the parts of India.

Diet: Indian Pangolin is insectivore. It feeds on insects and termites and termite eggs.

Reproduction: The gestation period lasts for 65-70 days. Females give birth to single offspring. Young ones weigh between 200 -500 gm. New born is carried on mother's tail for several weeks. They are weaned at three months of age.

Habitat: Indian Pangolin prefers tropical rain forests, lower slopes of mountains, sub-tropical thorn forests and plains to live.

Threats: The species is in danger due to hunting by local villagers for food (Meat)

Conservation: People should be trained and made aware of conservation importance of the species. Rewards may be given to informers as they sight poaching of the species.

5. Bengal Monitor Lizard (Goh)

Identification:

This are large sized varanids. In their life cycle starting from juvenile to adult they show ranges of color variations. Adult monitors are grey to greenish- grey in color. Young monitor lizards are more colorful than adults with series of dark crossbars on theneck, throat and back. The belly is white, banded with dark crossbars and are spotted with greyor yellow. the dorsal surface of young monitors, there are a series of yellow spots with dark transverse bars connecting them. As they mature, the ground color becomes light brown or grey,and dark spots give them a speckled appearance.

Habitat & Reproduction: Bengal monitors are usually ground dwellers and solitary, although the young are often seen on trees. They are widely distributed across their geographical range and prefer variety of habitats ranging from deserts and rainforests to habitats with seasonal snowy winters. They are also found in farmlands, near human habitations and small vegetation patches. Monitors are good tree climbers and took shelter in tree holes, burrows, crevices in rocks and buildings etc. Females may able to retain sperm, and held in confinement are able to lay fertile eggs. The main breeding season is June to September. Males' however, begin to show combat behavior in April. Females dig a nest hole in ground level or a vertical bank and lays their eggs inside, filling it up and using their snouts to compact the soil. The females often dig false nests nearby and shovel soil around the area. Termite mound are found some time to be used as nest by monitor lizards. A single clutch of about 20 eggs are laid. The eggs hatch in 168 to nearly as long as 254 days.

Their normal prey consists of beetles, grubs, orthopterans, scorpions, ants, snails and other invertebrates. Vertebrate prey is comparatively rare, and includes frogs, fish, lizards, snakes and rodents. They are sometimes found to scavenge on corpses.

Distribution: Widely distributed throughout India and is commonly seen in monsoon across Chhattisgarh.

The Bengal monitor lizard (Varanus bengalensis) or bis-cobra is known by various names in the local dialects, viz., Godha in Sanskrit ,Goh in Hindi and Punjabi, guishaap or goshaap in Bengal, goyra in Rajasthan, ghorpad in Maharashtra, belonging to Varanidae family, is sliding fast towards extinction, due to consistent persecution for its precious skin, yummy meat, and various body parts for folk remedies, besides freak accidents on road, while the farmers in some parts of India are engaged in the conservation of this species, due to agro-friendly characterises, like feeding on insects and common pests, inimical to crops.

This large lizard is mainly terrestrial and grows to about 175 cm from the tip of the snout to the end of the tail. Young monitors may be more arboreal but adults mainly hunt on the ground preying mainly on arthropods but also taking small terrestrial vertebrates, ground birds, eggs and fish. It is basically omnivorous and often engaged in scavenging, hence playing a key role in cleaning the environment.

Reason for Conservation: The Varanus bengalensis (Indian Monitor Lizard) is least concern species in the IUCN Red list of the species within the country, the species is Protected under Schedule-I Of the Wildlife Protection Act (1972) of Indian.

Ecology and behaviour: Monitor lizards are usually solitary and usually found on the ground, although the young are often seen on trees. V.b. nebulosus has a greater propensity for trees climbing. Bengal monitors shelter in burrows, they dig or crevices in rocks and building, whilst clouded monitors prefer tree hollows. Both races will make use of abandoned termite mounds. Bengal monitors, like other varanids, show true sleep are night and are diurnal, becoming active around 6am and bask in the morning sun. during winter, in the colder parts of their distribution range, they may take shelter and go through a period of reduced metabolic activity. They are not territorial, and may change their range seasonally in response to food availability.

They are usually shy and avoid humans. They have keen eyesight and can detect human movement nearly 250 m away. When caught, a few individuals may bite, but rarely do so. Captive have been known to live for nearly 22 years. Predators of adults include pythons, mammalian predators and birds.

Food & feeding habit: This is a carnivorous animal. It eats any animals it can overcome. Young monitors may be more arboreal, but mainly hunt on the ground, preying mainly on arthropods, but also taking small terrestrial vertebrates, ground birds, eggs and fish, small turtle and snakes also. it probably seeks its prey both by smell & sight.

Breeding Pattern: The main breeding season is June to September. Eggs are laid from mid-April to October. Females may be able to retain sperm, and held in confinement have been able to lay fertile eggs. Males, however, begin to show combat behaviour in April. Females dig a nest hole in level ground or a vertical bank and lay the eggs inside, filling if up and using their snouts to compact the soil. The females often dig false nests nearby and shovel soil around the area. They sometimes make use of a termite mound to nest. A single clutch of about 20 eggs are laid. The eggs hatch in 168 to nearly as long as 254 days. About 40 to80% of the eggs may hatch. The larger females, as among other reptiles, lay more eggs. Incubation period is 8 to9 months. They newly hatched young's are common at the beginning of the monsoon

Threats: Monitors lizards are hunted for skin and their body fat. Its eggs are considered a delicacy and the entire animal is also eaten.

- Unani, the Greco-Arabian system of medicine, recommends the use of various body partsof monitors to cure numerous ailments.
- The population of the Common Indian Monitors, Varanus bengalensis has alarmingly dwindled throughout the Indian sub-continent mainly due to excessive exploitation of theadults for their commercially valuable skins, as food and it traditional medicines.

- Habitat loss due to large-scale deforestation, urbanization, industrial activities and other biotic factors are also responsible for the population decline of the species.
- The population of the species of monitor lizards has drastically declined throughout their range due to illegal and exploitations and adults for their commercially valuable skin, foodpurposes by local fisherman community and traditional medicinal values

Conservation and management plan for Indian lizard

- A conservation awareness program that involves local people in the conservation of this species is vital to ensure long-term success of any management plan. Plans should include educational materials, sings, and instil pride amongst the locals as caretakers of the last population of this species in their habitation. These is an equally compelling need for a concreted human/monitor lizard conflict mitigation program.
- Public awareness is an important priority within the scope of overall management plans the species. Public awareness often yields new locality information and could reduce the frequency with which this species are killed.
- Poaching should be restricted and poaching should be punished.

Poaching and hunting of this reptile would continuous monitor and take action against it according to wildlife protection Act-1972. Aware local people and built effective information system against hunting and poaching activities.

6. Panther (Panthera pardus):

The Indian leopard has strong legs and a long well-formed tail, broad muzzle, short ears and small, yellowish grey eyes, light grey ocular bulbs. Its coat is spotted and rosetted on a pale yellow to yellowish-brown or golden background, except for the melanistic forms; the spots fade toward the white underbelly and the insides and lower parts of the legs. Rosettes are most prominent on the back, flanks and hindquarters. The pattern of the rosettes is unique to each individual.

Habitat: Indian leopard has high capability to adopt any type of habitat where it can get sufficient food and covers. Leopards avoid overlapping their territory or the home rangewith the tigers. Therefore they try to occupy the fringe areas of the forests, as well as dare more to enter the human inhabited areas.

Behaviour: leopards are highly territorial. Leopards are not only the widest ranging of all Big Cats but are actually one of the most adaptable and are found in a variety of different habitats. The Leopard can be found inhabiting numerous different areas providing that there is a good source of cover and an ample supply of food including tropical rainforests, tree-lined savannah, barren deserts and mountain highlands. One ofthe reasons why they are thought to bestill surviving successfully throughout much of their natural range is that Leopards have adaptedto the growing presence of people andare known to both live and hunt in areas close to urban activity. However, in some parts of their natural range populations are threatened by loss of their natural habitats to both deforestation and growing settlements.

Food Habits: The diet of these big cats is surprisingly varied which includes: wildebeest, impalas, reed-bucks, Thomson's gazelles, jackals, monkeys, fish and storks. However, at times they seem to show a preference for canines, even attempting to snatch dogs right from the feet of their masters.

Status: The species has been assigned almost all the categories of IUCN Red List Categories including: Near threatened, Threatened, Endangered, Critically endangeredto Vulnerable, by different workers and agencies. However these categories have been assigned mostly on regional basis. On global basis the species has been assigned Lower Risk Status. The species has been included in Schedule I. of WLPA.

Conservation Status: CITES APPENDIX: I; Indian wildlife (Protection) Act (1972) (As amended up to 2002); Schedule-1; Part-1; Indian Red Data Book (IUCN, 1994); Vulnerable; (IUCN 1998) (Proposed); Vulnerable (National) and Data Deficient (Global)

Threats: The Indian leopard (Panthera pardus fusca) is facing the crisis of adaptation.

The species could soon qualify for Vulnerable under criterion A4 (30% decline over a period of 30 years = three generations, including both past and future).

Despite being the most widespread cat, the Indian leopard faces several types of threat. The animal shares its habitat with other animals, which include tigers, bears, wolves, Asian elephants, hyenas, and wild dogs. These animals may kill leopard cubs if given a chance.

Apart from its natural enemies, the leopard's main threat is people. For years, it has been threatened, due to loss of habitat and poaching. An estimated 50% of the population lives outside Protected Areas and so it is vulnerableto habitat destruction.

Conservation: Capture and translocation to protected areas has been practiced more as a means of conservation. However, investigations have shown that the animal is highly territorial. Shifting causes inter and intra specific fighting to establish a territory in the translocated area.

However, Leopard are somewhat tolerant of habitat conversion, and may persist close to large human populations provided they have suitable cover and prey.

The MoEF & CC has issued guidelines. The guidelines suggest a three-pronged strategy to deal with man-leopard conflict as a means to their conservation:

- Awareness generation among local communities, media and officials of various departments.
- Establish trained teams at two levels; the primary response team and theemergency response team

7. Bastar Hill Myna, Pahadi / Kali Mayna (Gracula religiosa)

M/F: Alike
Resident: Arboreal
Habitat: Moist Deciduous Forest
Nest: Grass, leaves in natural tree hole

Food: Fruits, berries, figs
Id: Yellow wattles, large orange to yellowbill, rest glossy black
Zone Distr: Bastar
Voice: Loud, sharp creaky shrieks

Conservation Plans:

Natural habitat cannot be replaced by the alternative habitat but proper landscape development plan considering Habitat Suitability Index (HSI) in general. This exercise shall give an idea regarding feeding pattern, nesting parameters, canopy and density of plant species which can support the planning of alternate habitat.

Adaptability of the habitat by birds greatly differs in natural and managed habitat. A good quality bird habitat is a composite in nature and suitable for insects, small mammals, snakes, lizards, amphibians, butterflies and fishes.

The habitat loss and its consequences due to rail project have to be replaced with an alternate site nearby.

The development, management and conservation plan shall consider

- **Development of alternate habitat**
- **Community participation**
- **Awareness program**
- **Monitoring and Evaluation**

Development Of Alternate Habitat: This shall include following major works

1. **Development of water holes and small ponds:** One of the basic requirements and needs is water for avifauna. Water availability should be ensured for all time. In lack of water sources in habitat result into depletion of the population sometimes death of birds may be common phenomenon in that area. Water affects the population hence water management in habitat becomes important tool for the conservation and management of avifauna. Food and shelter cannot alone guarantee the population growth until availability of water sources is ensured. Number and size of the waterholes should be ascertained according to need in order to manage properly.
2. **Planting and seeding of local grasses: More** importantly grasses like Kush, Dudhi, Khas, Doobetc are to be sown in areas having density less than 0.4 and removal of invasive grasses.
3. **Gap planting:** There should be combination of different varieties of trees in gap planting like fruit bearing trees Goolar, Pipal, Bargad, Semal, Arjuna, Mangoetc. and flower bearing trees like Spathodia, Bauhinia species, Mulbary, Amaltas, Gulmohar, jakranda, Champa etc. should be planted in gaps. Small bushes species like Kaner, Tecoma, Cassia glauca, Jetropha etc. should be planted below the flowering trees after silviculture operations (Cut Back Operations- CBO) and removal of invasive species.

Community Participation:

Local community can play a vital important role in conservation. They can prevent the hunting, nest disturbance etc. The community can be involved in development of alternate nesting sites. Knowledge of community in regard to habitat structures of birds or avian can be taken into consideration while developing alternate habitat.

Awareness Program:

This is the most important aspect of conservation plan. Massive awareness campaign can be conducted through schools, panchayats, local bazaar etc. People can be educated on importance of conservation, birds habits and habitats, eco system, cultural and pilgrimage values of

avifauna. Meeting with local resident doctors can also lead to create impact on conservation of species as they may influence people on subject. Organizing bird watching tours, quiz at schools etc. Expert and forest officers can organize seminars and training sessions at intervals in affected locality.

Monitoring And Evaluation:

All plans need strict monitoring and evaluation from time to time. A committee under the concerned forest divisions shall be formed and M&E can be executed as per laid norms. The components in monitoring can be destruction of habitat, status of new habitat, nesting status in new habitat, change in perception and support of community. A research document can be prepared on birds of locality in lieu of infrastructure development in that locality.

7.14 CONCLUSION OF OVERALL CONSERVATION MEASURES:

Science and technology of natural resource management can never be unidirectional and also can never follow a regular path. It is more based on people's experience rather than text book formulae. In the following lines the team has tried to follow the bookish knowledge in the one hand and knowledge and experience of the people of the area in the other to chalk out conservation and management measures. The area falls within one of the rich bio-diversity zone of Central India. However, contiguous forest is expected to provide opportunity for the faunal elements to migrate to the adjacent areas. The conservation and management plan has been dealt from different aspects.

A detailed floral account only provides supportive evidence to ensure the survival of the herbivorous and the carnivores, once the adjacent habitat can offer ecological niche for maintaining a prey predator base. The undulating mountain forest is expected to have the distribution of the recorded species over a wider area. However a more detailed survey covering four seasons could provide a better picture with regard to the opportunities for conservation especially for the fully protected species. Conservation measures to be adopted are treated separately and will center around the following principles.

1. Developing the habitat to make sure the availability of cover, food, water and space for corridor for wildlife.
2. Developing participatory conservation approach taking the villagers of the buffer as well as fringe area in to confidence.
3. To train up local people for reducing man-wildlife conflict in the buffer as well as fringe area.

4. Taking necessary measures in the buffer area of the project so as to reduce soil erosion and assuring water conservation.
5. Sensitizing people in protection of forest against fire, illicit felling and encroachment.
6. Conducting periodical monitoring of the ecosystem in the soil, vegetation and faunal level.

7.15 SPECIAL CONSERVATION ACTIVITIES NEAR INDRAVATI TIGER RESERVE RECOMMENDED FOR WILDLIFE:

Though Indravati Tiger Reserve does not fall within project or Buffer zone of this mining project but as a special conservation measure here are some recommendations for Bastar Hill Myna, Tiger and Wild Buffalo and other important species

1. Identify the suitable land for habitat development for Bastar hill Myna under Ex situ conservation.
2. Habitat development for Wild Buffalo.
3. Awareness among people for Tiger conservation.
4. Water sources development activities for wildlife.

These are the works which shall be carried out by the Forest Department through the Divisional Forest officer Dantewada. Budgetary provision is being made for the same and included in proposed expenditure table in chapter no. 8.

CHAPTER VIII
SUMMARY AND FINANCIAL OUTLAY OF WILDLIFE CONSERVATION AND MANAGEMENT PLAN

Keeping in view of various impacts, a wildlife conservation & management plan and Avifauna study and its conservation plan have been proposed for Bailadila Iron ore Deposit No.-4 of M/s NMDC-CMDC Limited (NCL) , District Dantewada in the state of Chhattisgarh.

The salient feature of this management plan is summarized as below: -

I. Maintenance of ecological balance through preservation and restoration of wherever it hasbeen disturbed due to project developmental activities,
II. Conservation, preservation and betterment of natural habitats in Impact zone
III. Rehabilitation of critical species (endemic and threatened species of this region), if any with provisions for in-situ or ex-situ conservation of critical/ important plant/ animal species,
IV. Mitigation and control of project induced biotic and/or abiotic pressures/influences that may affect the natural habitats,
V. Habitat enhancement in project Impact zone by taking up forestation and soil conservationmeasures,
VI. Creating all round awareness regarding conservation and ensuring people's participation in the conservation efforts and minimizing human - animal conflict.

All the remedial measures for wildlife and avifauna safety in the Project area and ImpactZone have been discussed in chapter-7

The proposed activities, which are to be executed by **State Forest Department**, are as follows

1. **Soil and Water conservation** Improvement of water availability by digging of ponds and water holes, Improvement and maintenance of existing water sources, Soil water conservation works (LBCD, BCD,Gulley plucking, Dams)
2. **Assisting regeneration** Removal of invasive Alien species hindering the growth and regeneration of valuable species for wild life. (800 Ha), Mopping up the samearea to remove the reminants
3. **Pasture and Grass land Development** Pasture development by removing alien species in natural grass lands and also in potential grass lands where the density ofcanopy <0.4 (500 Ha), Pasture development by Planting / sowing of palatable grassseeds/ slips (500 Ha), Maintenance works for first Three years (500 Ha)

4. **Gap Panting with Fruit bearing species for wildlife habitat improvement** Improvement of stock by dressing of existing stumps of browsable species and cutback (The DFO should inspect the area and after proper marking and hammering ,the dressing of live stumps can be permitted) and Gap plantation of fruit bearing trees like Aonla, Jamun, Bel, Ghular, Bargad, and Peepal by planting in 1st year itself) (500 Ha), Maintenance of fruit trees plantation for 5 years
5. Monitoring and Evaluation of works
6. **Fire Protection works in Project and Impact / Buffer area**
7. **Habitat improvement activities -** food resource enhancement for Sloth Bear and FHA i.e. 30 plots @ 4 Ha each (120 Ha.), 5 year maintenance of food resource enhancement area for Sloth Bear and FHA i.e. 30 plots @ 4 Ha each (120 Ha.)
8. **Development of Denning niche(Rock boulder and Earthen) for small mammals**7 locations 20 niches and maintenance from 8th year upto 12th year, Budgetary provision for Development of Denning niche for small mammals'Rock boulder den7 locations 10 niches and maintenance from 8th year upto 12th year, Budgetary provision for Development of Denning niche for small mammals 'earthen den' 7 locations 10 niches and maintenance from 8th year upto 12th year, Budgetary provision for Monitoringof dens, Budgetary provision for Development of earthenand rock dens after monitoring,
9. **Development of Reptile habitat niche** Status Survey of Snake Species Initiate baseline surveys of snake in the nearest five protected forests sharing the buffer zone, Monitoring and assessment of the surveyin 2nd year onwards, Based on the availabilityof the species, the survey can be extended to the rests of next five in 3rdyear, Monitoring and assessment of the statussurvey in 4th , 6th , 8th and 10th year
10. **Human – Wildlife conflict management** Arrangement of utility vehicle for the field to transport of man, materials used in Human- Wildlife conflicts. With POL and maintenance for 10 years
11. **People's awareness** Empowering and sensitizing people for protection of wildlifeand Eco-development works etc

Following Suggested works to be carried out by the User agency in villages inImpact and nearby area from CSR fund:

Development of Biodiversity used by the local communities, like vegetable andfruits-organic farming i.e. apiculture and aqua culture, particularly and their associated

(i) Organic Vegetable and fruit farming Program in 24 villages

(ii) Village level Fish Farming in adjacent 24 villages

(iii) Apiculture - Honeybee Farming in 24 villages for 35 villagers each

These above-mentioned activities shall be taken up from **CSR fund**, plan for this shall be prepared by concerned DFO and utilize the fund.

Other recommendations which are to be carried out by **user agency** are as follows

- Wetland habitat development in back filled area.

The financial requirement of various interventions suggested in the plan is consideredas per current labor wage rate in the Dantewada district and financial norms of various forestry activities.

Escalation in budgetary provision shall be proposed as per the prevailing future rate of inflation and Divisional Forest officer Dantewada division shall demand it from User agency as and when required.

The Plan period of 15 years proposed from the date of approval of this revised plan..All the activities given in the financial outlay of plan will be implemented by State Forest Department with budgetary provision arranged by user agency M/S NMDA-CMDC (NCL)

Proposed financial provisions – **Rs. 1997.732 Lacs** (Year wise proposed expenditure given in table below)

IMPORTANT:

i) All the activities given in the financial outlay of plan will be implemented by State Forest Department through Divisional Forest Officer Dantewada with availability of budgetary provision by user agency M/S NMDA-CMDC (NCL)

ii) Area for development as suggested in plan shall be finalized by the Divisional Forest Officer of Dantewada Forest division after thorough field visit and verification for site specific development plan.

iii) Any changes in proposed plan shall be allowed to the Divisional Forest Officer of Dantewada Forest division after getting due approval from Chief Conservator of Forest Jagdalpur Circle.

iv) Utilization of such budget should be well planned by Divisional Forest Officer

Dantewada Division and done after taking due approval from Chief Conservator Of Forest Jagdalpur Circle.

Formation of Research, Monitoring and Evaluation Committees:

As per the recommendation in BAR there is need to engage many subject experts/ specialists/ expert NGOs to monitor and evaluate the execution of plan for which financial provisions arein made herewith.

As suggested in BAR a thorough action plan for research, monitoring and evaluation activities are to be prepared by the department. Periodical reports on progress of the recommendations shall be prepared and published.

For peoples participation, a monitoring committee will be formed in Division level under the Chairmanship of the D.F.O. . The other members will be concerned SDO, Range Officers anda representative of Village Forest Committee.

Monitoring committee will meet at least twice in a year to review implementation of the prescriptions of this plan and sort out bottlenecks also the committee will evaluate level of human-animal conflict indicators like human injuries and death of human in the zone of influence, incident and extent of fire, area burnt, grazing pressure and illegal felling.

Proposed Expenditure for Wildlife Management and Conservation Plans in Bailadila Iron Ore Deposit No.- 4, Dantewada Forest Division

Proposed Expenditure (Rs. In lacs)																
Sr. No	**ITEM**	**Year1**	**Year2**	**Year3**	**Year4**	**Year5**	**Year6**	**Year7**	**Year8**	**Year9**	**Year 10**	**Year 11**	**Year 12**	**Year 13**	**Year 14**	**Year 15**	**Total (Rs in lacs)**
1	(A) Improvement of water availability by digging of ponds and water holes.	**25.0**	**25.0**	**25.0**	**25.0**	**25.0**	**25.0**	**20.0**	**20.0**	**20.0**	**10.0**	**10.0**	**5.00**	**5.00**	**5.00**	**5.00**	**250.0**
	(B) Improvement and maintenance of existing water sources	**10.0**	**10.0**	**10.0**	**10.0**	**10.0**											**50.0**
	(C) Soil water conservation works (LBCD, BCD, Gulley plucking, Dams)	**15.0**	**15.0**	**15.0**	**15.0**	**15.0**	**15.0**										**90.0**
2	(A) Removal of invasive Alien species hindering the growth and regeneration of valuable species for wild life. (800 Ha)	**10.0** **100 Ha**	**10.0** **100 Ha**	**10.0** **100 Ha**	**10.0** **100 Ha**	**10.0** **100 Ha**	**10.0** **100 Ha**	**10.0** **100 Ha**	**10.0** **100 Ha**								**80.0**

	(B)Mopping up the same area to remove the reminants		**4.0** **100 Ha**	**4.0** **100 Ha**	**4.0** **100 Ha**	**4.0** **100 Ha**	**4.0** **100 Ha**	**4.0** **100 Ha**	**4.0** **100 Ha**	**4.0** **100 Ha**							**32.0**
3	(A) Pasture development by removing alien species in natural grass lands and also in potential grass lands where the density of canopy <0.4 (500 Ha)	**10.0** **50 Ha**	**10.0** **50 Ha**	**10.0** **50 Ha**	**10.0** **50 Ha**	**10.0** **50 Ha**	**10.0** **50 Ha**	**10.0** **50 Ha**	**10.0** **50 Ha**	**10.0** **50 Ha**	**10.0** **50 Ha**						**100.0**
	(B) Pasture development by Planting / sowing of palatable grass seeds/ slips (500 Ha)	**16.0** **50 Ha**	**16.0** **50 Ha**	**16.0** **50 Ha**	**16.0** **50 Ha**	**16.0** **50 Ha**	**16.0** **50 Ha**	**16.0** **50 Ha**	**16.0** **50 Ha**	**16.0** **50 Ha**	**16.0** **50 Ha**						**160.0**
	(C) Maintenance works for first Three years (500 Ha)	**0**	**1.5** **50**	**3.0** **100**	**4.5** **150**	**4.5** **150**	**4.5** **150**	**4.5** **150**	**4.5** **150**	**4.5** **150**	**4.5** **150**	**4.5** **150**	**3.0** **100**	**1.5** **50**	**0**	**49.5**
4	(A) Improvement of stock by dressing of existing stumps of browsable species and cut back (TheDFO should inspect the area and after proper	**7.5** **50 Ha**	**7.5** **50 Ha**	**7.5** **50 Ha**	**7.5** **50 Ha**	**7.5** **50 Ha**	**7.5** **50 Ha**	**7.5** **50 Ha**	**7.5** **50 Ha**	**7.5** **50 Ha**	**7.5** **50 Ha**						**75.0**

	marking and hammering, the dressing of live stumps can be permitted) and Gap plantation of fruit bearing trees like Aonla, Jamun, Bel, Ghular, Bargad, and Peepal by planting in 1st ear itself) (500 Ha)															
	(B) Maintenance of fruit trees plantation for 5 years		**2.0** **50**	**4.0** **100**	**6.0** **150**	**8.0** **200**	**10.0** **250**	**10.0** **250**	**10.0** **250**	**10.0** **250**	**10.0** **250**	**10.0** **250**	**8.0** **200**	**6.0** **150**	**4.0** **100**	**2.0** **50**	**100.0**
5	Monitoring and Evaluation of works						**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**20.0**
6	**Fire Protection**	**10.0**	**10.0**	**10.0**	**10.0**	**10.0**	**10.0**	**10.0**	**10.0**	**10.0**	**10.0**	**10.0**	**10.0**	**10.0**	**10.0**	**10.0**	**150.0**
7	**(A) Habitat improvement activities - food resource enhancement for Sloth Bear and FHA i.e. 30 plots @ 4 Ha each (120 Ha.) Please Refer Table no 7.1 and 7.2 in Chapter no. 7 for selection of plant species for habitat enrichment.**	16.0 20 Ha	16.0 20 Ha	16.0 20 Ha	6.4 8 Ha	6.4 8 Ha	6.4 8 Ha	6.4 8 Ha	6.4 8 Ha	3.2 4 Ha	3.2 4 Ha	3.2 4 Ha	3.2 4 Ha	3.2 4 Ha	0	0	**96.0**

	(B) 5 years maintenance of food resource enhancement area for Sloth Bear and FHA i.e., 30 plots @ 4 Ha each (120 Ha.)	0	2.8 20 Ha	5.6 40 Ha	8.4 60 Ha	9.52 68 Ha	9.52 68 Ha	10.64 76 Ha	8.96 64 Ha	7.28 52 Ha	5.6 40 Ha	5.04 36 Ha	4.48 32 Ha	3.92 28 Ha	3.36 24 Ha	0	**85.12**
8	**(A) Budgetary provision for Development of Reptile habitat niche- 7 locations20 niches and maintenance from 8th year upto 12th year . Please refer point no. 7.12.2 for plan in Chapter no. 7**	5.0 5 Niches	5.0 5 niches	2.0 2 niches	2.0 2 niches	2.0 2 niches	2.0 2 niches	2.0 2 niches	1.0	1.0	1.0	1.0	1.0	0	0	0	**25.00**
	(B) Budgetary provision for Development of Denning niche for small mammals'Rock boulder den 7 locations 10 niches and maintenance from 8th year upto 12th year Please refer point no. 7.12.2 for plan in Chapter no. 7	3.0 3 dens	2.0 2 dens	1.0 1 den	1.0 1 den	1.0 1 den	1.0 1 den	1.0 1 den	1.0	1.0	1.0	1.0	1.0	0	0	0	**15.0**

	(C) Budgetary provision for Development of Denningniche for small mammals'earthen den' 7 locations 10 niches and maintenance from 8th year upto 12th year . Please refer point no.7.12.2 for plan in Chapter no. 7	3.0 3 dens	2.0 2 dens	1.0 1 den	1.0 1 den	1.0 1 den	1.0 1 den	1.0 1 den	1.0	1.0	1.0	1.0	1.0	0	0	0	**15.0**
	(D) Budgetary provision for Monitoring of dens	0	0	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0	0	0	0	0	0	**3.5**
	(E) Budgetary provision for Development of earthenand rock dens after monitoring	0	0	0	0	15.0 15 dens	15.0 15 dens	0	0	0	0	0	0	0	0	0	**30.0**
9	**(A) Status Survey of Snake Species. Initiate baseline surveys of snake in the nearest five protected forests sharing the buffer zone**	2.0	2.0	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	0	0	0	0	0	**15.0**

	(B) Monitoring and assessment of the survey in 2nd year onwards	0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0	0	0	0	**10.0**
	(C) Based on the availability of the species, the survey can be extended to the rests of next five in 3rd year	0	0	2.0	0	0	2.0	0	0	2.0	0	0	2.0	0	2.0	0	**10.0**
	(D) Monitoring and assessment of the status survey in 4th, 6th, 8th and 10th year	0	0	0	2.0	0	2.0	0	2.0	0	2.0	0	0	0	0	0	**8.0**
10	Arrangement of utility vehicle for the field to transport of man, materials used in Human- Wildlife conflicts. With POL and maintenance for 10 years	**25.0**	**5.0**	**5.0**	**5.0**	**4.0**	**4.0**	**3.0**	**3.0**	**3.0**	**3.0**	**0**	**0**	**0**	**0**	**0**	**60.0**
11	Empowering and sensitizing people for protection of wildlife andEco-development works etc.	10.0	10.0	8.0	8.0	8.0	6.0	6.0	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	**100.0**

12	**Budget for Status survey of threatened mammals and intensive monitoring at least once in two years.**	4.0	2.0	0	2.0	0	2.0	0	2.0	0	2.0	4.0	0	2.0	0	2.0	**22.00**
13	Special Conservation Activities Near Indravati Tiger Reserve Recommended For Wildlife																
	(A) Identify the suitable land for habitat development for Bastar hill Myna under Ex situ Conservation	15.0	15.0	10.0	10.0	10.0											**60.00**
	(B) Habitat improvement activities – food resource enhancement for Wild Buffalo i.e.,15 plots @ 4Ha each (60 Ha.) Browsable Species are to be chosen for gap plantation.	16.00	16.00	16.00	0	0	0	0	0	0	0						**48.00**
		20 Ha	20 Ha	20 Ha	0	0	0	0	0	0	0						
	(C) 5 years maintenanceof food resource enhancement area for	0	2.8	5.6	8.4	8.4	8.4	5.6	2.8	0	0						**42.00**
		0	20 Ha	40 Ha	60 Ha	60 Ha	60 Ha	40 Ha	20 Ha	0	0						

	Wild Buffalo i.e., 15 plots @4 Ha each (60 Ha.)															
	(D) Awareness among people for Tiger conservation in near by areas.	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**15.00**
	Total	**203.5**	**193.6**	**191.2**	**176.7**	**189.82**	**176.82**	**133.14**	**131.16**	**111.48**	**97.3**	**59.24**	**48.68**	**41.62**	**34.36**	**27.5**	**1816.12**
	10% Escalation	**20.35**	**19.36**	**19.12**	**17.67**	**18.982**	**17.682**	**13.314**	**13.116**	**11.148**	**9.73**	**5.924**	**4.868**	**4.162**	**3.436**	**2.75**	**181.612**
	Grand Total	**223.85**	**212.96**	**210.32**	**194.37**	**208.802**	**194.502**	**146.454**	**144.276**	**122.628**	**107.03**	**65.164**	**53.548**	**45.782**	**37.796**	**30.25**	**1997.732**

List of Flora found in Dantewada Forest Division (Based on Divisional working Plan)

(A)Tree			
SL No.	**LocalName**	**Botanical Name**	**Family Group**
1	Aal	Morinda tinctoria, Roxb.	Rubiaceae
2	Achar (Char)	Buchanania Ianzan Spreng.	Anacardiaceae
3	Am	Mangifera indica, Linn.	Anacardiaceae
4	Amaltas	Cassia fistula, Linn.	Leguminosae
5	Amta	Bauhinia malabarica, Roxb.	Leguminosae
6	Anjan	Hardwickia binata, Roxb.	Leguminosae
7	Aonla	Emblica officinalis, Gaertn	Euphorbiaceae
8	Arjun (Koha)	Terminaliarjuna W.et.A.	Combretaceae
9	Baheda	Terminalia bellerica, Roxb.	Combretaceae
10	Bar	Ficus bengalensis, Linn.	Moraceae
11	Baranga (pula)	Kydia calycina, Roxb.	Malvaceae
12	Bel	Aegel marmelos, Corr.	Rutaceae
13	Ber	Zizyphus mauritiana Lamk.	Rhamnaceae
14	Bhilma (Bhilwa)	Semecarpus anacardium, Linn.	Anacardiaceae
15	Bhirra	Chloroxylon swietenia. D.C.	Meliaceae
16	Bija sal (Bija)	Pterocarpus marsupium, Roxb.	Leguminosae
17	Chichwa	Albizzia odoratissima, Benth	Leguminosae
18	Chilla (Nirmali)	Strychnos, Linn.	Loganiaceae
19	Dhaman	Grewia tiliaefolia Vahl	Tiliaceae
20	Dhaora (Dhaoda)	Anogeissus latifolia, Wall.	Combretaceae
21	Dhobin	Dalbergia paniculata, Roxb.	Leguminosae
22	Dudhi	Wrightia tinctoria, R.Br.	Apocynaceae
23	Galgal (Gongal, Ghodi)	Cochlospermum religiosum, Linn.	Bixaceae
24	Gamari (Siwan)	Gmelina arborea, Roxb.	Verbinaceae

25	Garari (Karra)	Cleistanthus collinus, Benth	Euphorbiaceae
26	Gilchi	Casearia, Dalz	Samydaceae
27	Ghont	Zizyphus, Willd	Rhamnaceae
28	Gular	Ficus glomerata, Roxb.	Moraceae
29	Haldu	Adina cordifolia, Hook F.	Rubiaceae
30	Harra	Terminalia chebula, Retz.	Combretaceae
31	Harsingar	Nyctanthes arbortristis, Linn.	Oleaceae
32	Hiwar	Acacia leucophloea, Willd	Leguminosae
33	Imli	Tamarindus indica, Linn.	Leguminosae
34	Jamun	Syzygium cumini, (Linn) Skeels.	Myrtaceae
35	Jhingan (Moyanm Mode)	Lannea coromandelica, (Houtt)	Anacardiaceae
36	Kachnar	Bauhina variegata, Linn.	Leguminosae
37	Kadamb	Anthocephalus cadamba, Miq. (New name (Anthocephalus indicus), A. Rich	Rubiaceae
38	Kaim (Kalam, Mundi)	Mitragyna parviflora, (Roxb) Korth.	Rubiaceae
39	Kakai	Flacourtia indica, (Burm F.) Merr.	
40	Kalla (Karmata)	Dillenia pentagyna, (Roxb)	Dilleniaceae
41	Karanj	Pongamia pinnata, (Linn) Pierre Pongamia glabra, Vent	Leguminosae
42	Kari	Saccopetalum tomentosum Hk. F. & Thoms	Annonaceae
43	Kasai	Bridelia retusa, Spreng.	Euphorbiaceae
44	Kekad	Garuga pinnata, Roxb.	Burseraceae
45	Khair	Acacia catechu, Willd.	Leguminosae
46	Kulu	Sterculia urens, Roxb.	Sterculiaceae
47	Kumbhi	Careya arborea, Roxb.	Myrtaceae
48	Kusum	Schleichera oleosa (Lour) Oken	Sapindaceae
49	Lendia (Geja)	Lagerstroemia parviflora, Roxb.	Lythraceae
50	Mahua	Madhuca indica, Gmel.	Sapotaceae
51	Mokha	Schrebera swietenioides, Roxb.	Oleaceae

52	Neem	Azadirachta indica, A. Juss.	Meliaceae
53	Padar-Bada	Sterospermum suaveolens, D.C.	Bignoniaceae
54	Padar-chhota	Stereospermum personatum (Hassk) Chatt.	Bignoniaceae
55	Palas	Butea monosperma, (Lamk) Taub.	Laguminosae
56	Papra	Gardenia latifolia, Ait.	Rubiaceae
57	Phetra-Kala	Randia uliginosa, D.C.	Rubiaceae
58	Phetra-Safed	Gardenia turgids, Roxb.	Rubiaceae
59	Pipal	Ficus religiosa, linn.	Urticaceae
60	Rohan	Sovamida febrifuga, A. Juss	Meliaceae
61	Roli (Sinduri)	Mallotus, muell.	Euphorbiaceae
62	Sagon	Tectona grandis L.	Verbenaceae
63	Saja (Ain, Adan)	Terminalia alata, Hayne ex Roth	Combretaceae
64	Salai	Boswellia serrata, Roxb.	Burseraceae
65	Sarai (Sal)	Shorea robusta, Gaertn	Dipterocarpaceae
66	Semal	Bombax ceiba, L.Salmalia malabaricum D.C. Schoot & Endl.	Malvaceae
67	Sisham	Dalbergia latifolia, Roxb.	Leguminosae
68	Sindhi (Khajur)	Phoenix sylyestris, Roxb.	Palmae
69	Siris-Kala	Albizzia lebbek, Benth	Leguminosae
70	Siris-safed	Albizzia procera, Benth	Leguminosae
71	Sissoo	Dalbergia sisoo, Roxb.	Leguminosae
72	Sulphi	Carryota urens, Linn.	Palmea
73	Suria	Xylia xylocarpa, Roxb.	Leguminosae
74	Tad (Toddy)	Borassus flabellifer, Linn	Palmae
75	Tendu	Diospyros melanoxylon, Roxb. (Diospyros tomentosa, Roxb.)	Ebenaceae
76	Tinsa	Ougeinia oogeinensis, (Roxb) Hochreut	Leguminosae

(B) Herbs and Shrubs

SL. No.	CommonName	Botanical Name	Family
1	Aak	Calotropis-gigantea, R. Br.	Asclepiadaceae
2	Akol	Alangium-salvifolium, (Lin.F.) Wang	Cornaceae
3	Baibirang	Embilia robusta, Roxb.	Myrsinaceae
4	Banbhendi	Hibiscus ficulneus, Linn.	Malvaceae
5	Bandhania	Peucamum nagpurense, Prain	_
6	Bankapas	Azanza lampas, (Cav.) Alef.	Malvaceae
7	Banrahar	Meghania semialata (Roxb.) Muker.	Leguminosae
8	Bantulsi	Eranthemum pulchellum, Roxb.	Acanthaceae
9	Bhuineem	Andrographis paniculata, Nees.	
10	Chirchira	Achyranthes arpera, Linn.	Amaranthaceae
11	Chhind	Phoenix acaulis, Roxb.	Palmae
12	Chiraita	Swertia angustifolia, Ham.	-
13	Dudhi	Holarrhena antidysenterica, Wall.	Apocynaceae
14	Duma	Clerodendron serratum, Spreng.	Verbenaceae
15	Ghirol	Indigeofera pulchella, Roxb.	Leguminosae
16	Gursakri	Grewia hirsuta, Vahl.	Tiliaceae
17	Hardi	Curcuma longa, Linn.	Seitamineae
18	Harsingar	Nyctanthes arbortristis, Linn.	Oleaceae
19	Hathikand	Leea marcrophylla, Roxb.	Vitaceae
20	Indrajata	Petalidium barleriodes, Nees.	Acanthaceae
21	Kakai	Flacourtia indica, (Burn.f.) Merr.	Bixaceae
22	Karonda	Carissa opaca, Stapf.	Apocynaceae
23	Khatua	Antidesma diandrum, Roth.	Euphorbiaceae
24	Latkani	Desmodium laxiflorum, D.C.	Leguminosae
25	Marorphali	Helicteres-isora, Linn.	Sterculiaceae
26	Neel	Indigofera arborea, Roxb.	Leguminosae
27	Nirgundi	Vitex negundo, Linn.	Verbenaceae
28	Phendra	Gardenia turgida, Roxb.	Rubiaceae

29	Rasna	Blepharispermum Subsessile.	-
30	Tekhur	Curcuma angustifolia, Roxb.	Seitamineae

(C) Climbers			
SL. No.	**CommonName**	**Botanical Name**	**Family**
1	Baichandi	Dioscorea hispida, Dennst.	Dioscoreaceae
2	Chil-Badi	Acacia caesia, W. and A.	Leguminosae
3	Chil-Choti	Acacia pennata, Willd.	Leguminosae
4	Chitaki	Symphorema polyandrum, Wight.	-
5	Dhimarbel	Ichnocarpus frutescens, Br.	Apocynaceae
6	Gunj	Abrus precatoilus, Linn.	Leguminosae
7	Kadukanda	Dioscorea belophylla, Voigt.	Dioscoreaceae
8	Kanta kuli	Zizyphus rugosa, Lamk.	Rhamnaceae
9	Keoti	Ventilage calyculata, Tul.	Rhamnaceae
10	Kewanch (Kanchkuri)	Mucuna prurita, Hook.	Leguminosae
11	Mahul	Bauhunia vahlli, W. & A.	Leguminosae
12	Malkangni	Celastrus paniculata, Willd.	Celastraceae
13	Makor	Zizyphus ocnoplia, Mill.	Rhamnaceae
14	Musalkand	Dioscorea pentaphylla, Linn.	Dioscoreaceae
15	Nasbel	Butea parviflora,	Leguminosae
16	Palasbel	Butea superba, Roxb.	Leguminosae
17	Piverbel	Combretum decandrum.	Combretaceae
18	Ramdaton	Smilax zeylanica, Linn.	Liliaceae
19	Shatoori (Satawar)	Asparagus racemosus. Willd.	Liliaceae

(D) Bamboo

SL. No.	Common Name	Botanical Name	Family
1	Bans	Dendrocalamus Strictus, Nees.	Gramineae
2	Kanta bans (Chhadi-Bans)	Bambusa arundinacea, Willd.	Gramineae
3	Panibans	Oxytenanthera nigrociliat, Munro.	Gramineae

(E)Epiphyte

SL. No.	Common Name	Botanical Name	Family
1	Vanda	Vanda roxburghii	Loranthaceae

(F) Paracites

SL. No.	Common Name	Botanical Name	Family
1	Amarbel	Cuscuta reflexa	Convolvulaceae
2	Viscum articulatum	Viscum articulatum	Loranthaceae
3	Banda	Loranthus longifloris	Loranthaceae

(G) Grasses

SL. No.	Common Name	Botanical Name
1	Bhabar (Bagai)	Eulaliopsis binata, Retz.
2	Bhurbhuci	Eragrostis tenella, Roem.
3	Chhir (Dab)	Imperata cylindrica, Beauv.
4	Chilla (Latkani)	Seraria Verticilata, Beauv.
5	Doob	Cynodon dectylon, Pers.
6	Kans (Padyar)	Saceharum spoutaneum, Linn.
7	Khas (Usari)	Vetiveria zizanoides, Nash.
8	Kondon (Kodra)	Paspalum scrodicularum, Linn.
9	Kusal (Lampa)	Heteropogon contortus, Beaur.
10	Kutki (Kosra)	Panicum miliare, Link.
11	Madia	Eleusina coracana, Gaertn.
12	Marvel Chhoti	Dichantium annulatum. (Forsk) Stapf.
13	Marvel Mothi	Dichantium caricosum, A. Camus.
14	Phul Bahari	Thysanola maxima, Katze.
15	Rusa (Tikhadi)	Cympopogon martini, Stapf.
16	Sum (Sabai, Nulka)	Eulaliopsis binata (Retz.) C.C. Hubbard.

List of Fauna found in Dantewada Forest Division (Based on Divisional working Plan)

(A) Wild Animals			
SL. No.	**Local Name**	**English Name**	**Scientific Name**
1	Bagh	Tiger	Panthera tigris (Linnaeus)
2	Bandar	Rhesus Macaque (Red faced monkey)	Macaca mullata (Zimmermann)
3	Bandar	Common Langur	Presbytis entellus (Dufrense)
4	Barasingha	Swamp Deer	Cervus duvaceli (Cuvier)
5	Bhendiya	wolf	Canis Lupus pallipes
6	Bhalu	Sloth Bear	Melursus ursinus (Shaw)
7	Chinkara	Indian Gazella	Gazella gazella (Pallas)
8	Chital	Spotted Deer	Axis axis (Evxleban)
9	Chuchunder	Grey musk shrew	Suncus murinus (Linnacus)
10	Chuha (Musa)	Field Rat	Bendicota bengalensis
11	Gaur	Indian Bison	Bos gaurus (H.Smith)
12	Gilheri	Three striped squirrel	Funambulus pennanti (Wroughton)
13	Gilheri	Malabar squirrel	Soiurns species
14	Gilheri	Flyings squirrel	Manis crassicaudata
15	Chowsingha (Jangli-Bakri)	Four horned antelope	Tetracerus quadricornis (Blainville)
16	Jangli-Billi	Jangle Cat	Felis chaus (Guldensteadt)
17	Jangli-Kutta	Indian Wild Dog	Coun alpinus (Pallas)
18	Jangli-Bhaisa	Wild Buffalo	Bubalus bubalis (Linnacus)
19	Khargosh	Indian Hare	Lepus nigricollis (F.Cuvier)
20	Koliha(Siyar)	Jackal	Canis aureus (Linnacus)
21	Kotari	Barking Deer	Muticus muntjac
22	Lakhar bagha	Striped Hyaena	Hyaena hyaena (Linnacus)
23	Lomri	Indian Fox	Vulpes bengalensis (Shaw)
24	Newala	Common mongoose	Herpestes edwardsi (Geeftrey)
25	Otter	The common otter	
26	Nilgai	Blue Bull	Boselaphus tragocamelus
27	Sahi	Indian percupine	Hystrix indica (Kerr)
28	Sambhar	Sambhar	Cervus unicolour (Keer)
29	Suar	Indian wild boar	Sus scrofa (Linnaeus)
30	Tendwa(Gulbagh)	Panther	Panthera pardus (Linnaeus)

(B) Snake			
SL.No.	**Local Name**	**English Name**	**Scientfic Name**
1	Cobra	Cobra	Naja naja (Linnaeus)
2	Ajgar	Python	Python molurus
3	Chuhamar Sarp	Rattle Snake	Ptyas mucosus (Linnaeus)
4	Russel Viper	Viper	Vipera russeli (Shaw)
5	Krait	Krait	Bungamus caeruleus(Schncider)
6	Deo Sarp	Deo Sarp	Bungamus
7	Pani Sarp	Pani Sarp	Natrix piscator (Schneider)

(C) Lizard			
SL.No.	**Local Name**	**English Name**	**Scientfic Name**
1	Monitor Lizard	Monitor Lizard	Varanus monitor (Linnaeus)

(D) Crocodile			
SL.No.	**Local Name**	**English Name**	**Scientific Name**
1	Magar	Crocodile	Crocodilus crocodilus
2	Ghadiyal	Ghadiyal	Gavialis gangeticus

(E)Fishes		
SL. No	**Comman Name**	**Scientific Name**
1	Catla	Catla catla (Ham.)
2	Chanda	Chanda ranga (Ham.)
3	Magur	Clarias batrachus (Ham.)
4	Singh	Heteropneustes fossilies (Bloch)
5	Rohu	Labio rohit
6	Mahasir	Walago sffu
7	Kotri	Forfor gundius

(F) Birds			
SL.No.	**Local Name**	**English Name**	**Scientfic Name**
1	Bater, lowwa	Iangle Bush Quail	Perdicula asiatica (Latham)
2	Bater	Grey Quail	Coturnix coturnix (Linnaeus)
3	Baya	Baya weaver bird	Poceus philippinus (Linnaeus)
4	Bhangraj	Racket-Tailed Drenge	Dicrurus adsimilis (bechatein)
5	Bulbul	Red vented bulbul	Pyconotus cafer (Linnaeus)
6	Cheel	Common pariah kite	Milvus migrans (Beddaert)
7	Chhota Kilkila	Small blueking fisher	Alcedo atthis (Linnaeus)
8	Dudharaj	Paradise flycatcher	Tirpsiphone paradisi (Linnaeus)
9	Gai-Bagula	Cattle-Egret	Bulbulcus ibis (Linnaeus)
10	Gauriyya	House sparrow	Passer domesticus (Linnaeus)
11	Ghughu	Indian great horned owl	Bubo bubo (Linnaeus)
12	Gidh	Bengal vulture	Gyps Bengalensis (Gmelin)
13	Giria	Cotton teal	Nettapus coromadelianus (Gmelin)
14	harial	Common green Pigeon	Treron phoenicoptera (Latham)
15	Hoppoe	Hoppoe	Upera epops
16	Jangli Kowwa	Indian Jangle Crow	Corvus macrothyches (Walgler)
17	Jangli Murgi	Grey Jangle Fowl	Gallus Sonneratii (Temminck)
18	Jangli Murgi	Red Jangle fowl	Gallus Gallus (Linnaeus)
19	kabutar	Blue-rock Pigeon	Columba livia (Gmelin)
20	Kali Mayna	Bastar Hill Myna	Grecula religiosa (Linnaeus)
21	Katphora	Rufous wood peeker	Micro Ptirnus brachyurua
22	Katphora	Indian Golden backed peeker	Dinopium Javanense
23	Katphora	Lisser Golden backed peeker	Dinopium-benghalense
24	Katphora	Great Black wood peeker	Dryocopus Javensis
25	Kowwa	House crow	Carvus splondens (Vicillot)
26	Koel	Koel	Eudynamys scolopaceae (Linnaeus)
27	Mor, Mayur	Common Peafowl	Pave Cristatus (Linnaeus)

28	Myna	Indian myna	Acridotheres tristis (Linnaeus)
29	Nakta	Comb Duck	Sarkidicrnis melanotos Pennaeus)
30	Nilkanth	Blue Jay (Roller)	Coracias benghalensis
31	Nilkanth-Basant	Blue throated barbet	Megalaima asiatica
32	Pan-dubki	Lesser Whistling Teak	Dendrocygna Javanica (Horsfield)
33	Sarus	Sarus Crane	Grus antigone (Linnaeus)
34	Teetar Kala	Painted Partiridge	Francolinus Pictus (Jardine &Selby)
35	Teetar Safed	Grey Partridge	Francolinus Pondiceriunus(Gmelin)
36	Tota	Large Indian Parakeet	Psitta-cula eupatria (Linnaeus)
37	Ullo	Barn Owl	Tyto alba (Scopoli)
38	Ullo	Brown fish Owl	Bubo Zeylenensis (Gmelin)

FOREST COMPARTMENT IN 10 Kms RADIUS

S.NO.	CIRCLE	DIVISION	RANGE	BEAT	COMPARTMENT NO.	LEGAL STATUS	AREA IN HECTARES
1	2	3	4	5	6	7	8
1	JAGDALPUR	BIJAPUR	GANGALOOR		1697P		141.6400523
2	JAGDALPUR	BIJAPUR	GANGALOOR		328		309.7455693
3	JAGDALPUR	BIJAPUR	GANGALOOR		OA 1184	OA	252.5708774
4	JAGDALPUR	BIJAPUR	GANGALOOR	GANGALOOR	338	RF	306.0758693
5	JAGDALPUR	BIJAPUR	GANGALOOR	HIROLI	339	RF	352.8193372
6	JAGDALPUR	BIJAPUR	GANGALOOR	HIROLI	340	RF	310.4295011
7	JAGDALPUR	BIJAPUR	GANGALOOR	HIROLI	343	RF	237.9151359
8	JAGDALPUR	BIJAPUR	GANGALOOR	HIROLI	344	RF	336.0521334
9	JAGDALPUR	BIJAPUR	GANGALOOR	HIROLI	345	RF	252.757621
10	JAGDALPUR	BIJAPUR	GANGALOOR	HIROLI	346	RF	388.2305533
11	JAGDALPUR	BIJAPUR	GANGALOOR	HIROLI	347	RF	260.5907201
12	JAGDALPUR	BIJAPUR	GANGALOOR	HIROLI	348	RF	242.8171155
13	JAGDALPUR	BIJAPUR	GANGALOOR	HIROLI	349	RF	322.0621232
14	JAGDALPUR	BIJAPUR	GANGALOOR	HIROLI	350	RF	437.3882078
15	JAGDALPUR	BIJAPUR	GANGALOOR	HIROLI	351	RF	256.7779988
16	JAGDALPUR	BIJAPUR	GANGALOOR	HIROLI	362	RF	292.899936
17	JAGDALPUR	BIJAPUR	GANGALOOR	HIROLI	363	RF	347.7170337
18	JAGDALPUR	BIJAPUR	GANGALOOR	HIROLI	364	RF	284.4047697
19	JAGDALPUR	BIJAPUR	GANGALOOR	HIROLI	365	RF	248.1487538
20	JAGDALPUR	BIJAPUR	GANGALOOR	HIROLI	366	RF	1040.898642
21	JAGDALPUR	BIJAPUR	GANGALOOR	HIROLI	367	RF	195.063141
22	JAGDALPUR	BIJAPUR	GANGALOOR	HIROLI	368	RF	314.6880813
23	JAGDALPUR	BIJAPUR	GANGALOOR	HIROLI	369	RF	320.6028312
24	JAGDALPUR	BIJAPUR	GANGALOOR	HIROLI	370	RF	428.2069427
25	JAGDALPUR	BIJAPUR	GANGALOOR	PIDIYA	324	RF	318.1378936
26	JAGDALPUR	BIJAPUR	GANGALOOR	PIDIYA	326	RF	299.10546
27	JAGDALPUR	BIJAPUR	GANGALOOR	PIDIYA	327	RF	393.4659974
28	JAGDALPUR	BIJAPUR	GANGALOOR	PIDIYA	329	RF	350.6672813
29	JAGDALPUR	BIJAPUR	GANGALOOR	PIDIYA	330	RF	394.2441674
30	JAGDALPUR	BIJAPUR	GANGALOOR	PIDIYA	331	RF	331.2941921
31	JAGDALPUR	BIJAPUR	GANGALOOR	PIDIYA	332	RF	268.5708652
32	JAGDALPUR	BIJAPUR	GANGALOOR	PIDIYA	333	RF	276.5474598
33	JAGDALPUR	BIJAPUR	GANGALOOR	PIDIYA	334	RF	340.3398645
34	JAGDALPUR	BIJAPUR	GANGALOOR	PIDIYA	335	RF	325.4248575
35	JAGDALPUR	BIJAPUR	GANGALOOR	PIDIYA	336	RF	258.6118191
36	JAGDALPUR	BIJAPUR	GANGALOOR	PIDIYA	341	RF	253.1289895
37	JAGDALPUR	BIJAPUR	GANGALOOR	PIDIYA	342	RF	259.1161458
38	JAGDALPUR	BIJAPUR	GANGALOOR	PUSNAR	352	RF	318.6364274
39	JAGDALPUR	BIJAPUR	GANGALOOR	PUSNAR	353	RF	207.0740408
40	JAGDALPUR	BIJAPUR	GANGALOOR	PUSNAR	354	RF	306.3745557
41	JAGDALPUR	BIJAPUR	GANGALOOR	PUSNAR	358	RF	310.9226165

FOREST COMPARTMENT IN 10 Kms RADIUS

S.NO.	CIRCLE	DIVISION	RANGE	BEAT	COMPARTMENT NO.	LEGAL STATUS	AREA IN HECTARES
1	2	3	4	5	6	7	8
42	JAGDALPUR	BIJAPUR	GANGALOOR	PUSNAR	359	RF	272.2995512
43	JAGDALPUR	BIJAPUR	GANGALOOR	PUSNAR	360	RF	243.5654407
44	JAGDALPUR	BIJAPUR	GANGALOOR	PUSNAR	361	RF	223.7963275
45	JAGDALPUR	BIJAPUR	NELASNAR	BECHAPAL	1895	RF	217.0064783
46	JAGDALPUR	BIJAPUR	NELASNAR	BECHAPAL	1896	RF	290.8486986
47	JAGDALPUR	BIJAPUR	NELASNAR	BECHAPAL	1897	RF	250.3824507
48	JAGDALPUR	BIJAPUR	NELASNAR	MIRTUR	1891	RF	213.8779099
49	JAGDALPUR	BIJAPUR	NELASNAR	MIRTUR	1892	RF	286.9470064
50	JAGDALPUR	BIJAPUR	NELASNAR	MIRTUR	1893	RF	148.9080971
51	JAGDALPUR	BIJAPUR	NELASNAR	MIRTUR	1894	RF	340.4436138
52	JAGDALPUR	DANTEWADA	BACHELI	BACHELI	1715P	PF	36.16791267
53	JAGDALPUR	DANTEWADA	BACHELI	BACHELI	1716P	PF	34.31405439
54	JAGDALPUR	DANTEWADA	BACHELI	BACHELI	1717P	PF	36.6835299
55	JAGDALPUR	DANTEWADA	BACHELI	BACHELI	1826	RF	232.5607104
56	JAGDALPUR	DANTEWADA	BACHELI	BACHELI	1833	RF	190.0174566
57	JAGDALPUR	DANTEWADA	BACHELI	BACHELI	1834	RF	207.6018417
58	JAGDALPUR	DANTEWADA	BACHELI	BACHELI	1835	RF	291.8517286
59	JAGDALPUR	DANTEWADA	BACHELI	BACHELI	1837	RF	334.9465366
60	JAGDALPUR	DANTEWADA	BACHELI	BACHELI	1838	RF	265.7841537
61	JAGDALPUR	DANTEWADA	BACHELI	BACHELI	1839	RF	280.7135272
62	JAGDALPUR	DANTEWADA	BACHELI	BACHELI	1840	RF	256.2294969
63	JAGDALPUR	DANTEWADA	BACHELI	BACHELI	1841	RF	316.0051544
64	JAGDALPUR	DANTEWADA	BACHELI	BACHELI	1842	RF	193.6700738
65	JAGDALPUR	DANTEWADA	BACHELI	BACHELI	1843	RF	303.4061436
66	JAGDALPUR	DANTEWADA	BACHELI	BACHELI	1844	RF	286.2068829
67	JAGDALPUR	DANTEWADA	BACHELI	BACHELI	1851	RF	249.4765159
68	JAGDALPUR	DANTEWADA	BACHELI	BACHELI	1884	RF	336.1913419
69	JAGDALPUR	DANTEWADA	BACHELI	BACHELI	1885	RF	389.90019
70	JAGDALPUR	DANTEWADA	BACHELI	BACHELI	1886	RF	368.5859661
71	JAGDALPUR	DANTEWADA	BACHELI	BACHELI	1887	RF	304.4320849
72	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (N)	1760P	PF	14.30613735
73	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (N)	1761P	PF	113.1682454
74	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (N)	1767P	PF	122.3413893
75	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (N)	1770P	PF	49.26415011
76	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (N)	1806	RF	264.4089736
77	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (N)	1807	RF	305.5249853
78	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (N)	1808	RF	209.9866951
79	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (N)	1809	RF	316.9657655
80	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (N)	1810	RF	246.2242165
81	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (N)	1812	RF	335.4166173
82	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (N)	1813	RF	360.0866471

FOREST COMPARTMENT IN 10 Kms RADIUS

S.NO.	CIRCLE	DIVISION	RANGE	BEAT	COMPARTMENT NO.	LEGAL STATUS	AREA IN HECTARES
1	2	3	4	5	6	7	8
83	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (N)	1814	RF	171.6254467
84	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (N)	1815	RF	338.4339845
85	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (N)	1816	RF	295.3829921
86	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (N)	1817	RF	212.6266938
87	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (N)	1818	RF	220.957256
88	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (S)	1751P	PF	28.57782754
89	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (S)	1753P	PF	12.38297744
90	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (S)	1754P	PF	14.64577064
91	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (S)	1755P	PF	9.118141168
92	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (S)	1762P	PF	28.02421461
93	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (S)	1763P	PF	7.010795391
94	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (S)	1764P	PF	28.49943059
95	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (S)	1765P	PF	20.57506937
96	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (S)	1766P	PF	22.893063
97	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (S)	1811	RF	390.1956205
98	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (S)	1819	RF	253.0918162
99	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (S)	1820	RF	278.1968175
100	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (S)	1821	RF	203.5296177
101	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (S)	1822	RF	215.3142875
102	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (S)	1823	RF	306.7587144
103	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (S)	1824	RF	325.7100841
104	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (S)	1825	RF	296.3093822
105	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (S)	1827	RF	264.884395
106	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (S)	1828	RF	276.9053758
107	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (S)	1829	RF	207.2451191
108	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (S)	1830	RF	258.0386852
109	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (S)	1831	RF	257.714772
110	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (S)	1832	RF	273.153758
111	JAGDALPUR	DANTEWADA	BACHELI	BHASHI (S)	1836	RF	208.241695
112	JAGDALPUR	DANTEWADA	BACHELI	GUMIYAPAL	1698P	PF	23.17622571
113	JAGDALPUR	DANTEWADA	BACHELI	HIROLI	1858	RF	321.4175024
114	JAGDALPUR	DANTEWADA	BACHELI	HIROLI	1859	RF	240.1817097
115	JAGDALPUR	DANTEWADA	BACHELI	HIROLI	1861	RF	308.9467292
116	JAGDALPUR	DANTEWADA	BACHELI	HIROLI	1862	RF	321.828661
117	JAGDALPUR	DANTEWADA	BACHELI	HIROLI	1863	RF	327.0584192
118	JAGDALPUR	DANTEWADA	BACHELI	HIROLI	1864	RF	284.2832314
119	JAGDALPUR	DANTEWADA	BACHELI	KODENAR	1699P	PF	97.79635101
120	JAGDALPUR	DANTEWADA	BACHELI	KODENAR	1712P	PF	84.88294308
121	JAGDALPUR	DANTEWADA	BACHELI	KODENAR	1713P	PF	10.3674695
122	JAGDALPUR	DANTEWADA	BACHELI	KODENAR	1848	RF	230.8015225
123	JAGDALPUR	DANTEWADA	BACHELI	KODENAR	1849	RF	303.4120814

FOREST COMPARTMENT IN 10 Kms RADIUS

S.NO.	CIRCLE	DIVISION	RANGE	BEAT	COMPARTMENT NO.	LEGAL STATUS	AREA IN HECTARES
1	2	3	4	5	6	7	8
124	JAGDALPUR	DANTEWADA	BACHELI	KODENAR	1853	RF	266.7362896
125	JAGDALPUR	DANTEWADA	BACHELI	KODENAR	1854	RF	221.2451339
126	JAGDALPUR	DANTEWADA	BACHELI	KODENAR	1855	RF	290.4894073
127	JAGDALPUR	DANTEWADA	BACHELI	KODENAR	1856	RF	177.1481198
128	JAGDALPUR	DANTEWADA	BACHELI	KODENAR	1857	RF	289.5140902
129	JAGDALPUR	DANTEWADA	BACHELI	KODENAR	1860	RF	238.9310858
130	JAGDALPUR	DANTEWADA	BACHELI	KODENAR	1878	RF	277.0224578
131	JAGDALPUR	DANTEWADA	BACHELI	KODENAR	1879	RF	219.0676591
132	JAGDALPUR	DANTEWADA	BACHELI	MOLASNAR	1731P	PF	36.28003404
133	JAGDALPUR	DANTEWADA	BACHELI	MOLASNAR	1732P	PF	16.92851365
134	JAGDALPUR	DANTEWADA	BACHELI	MOLASNAR	1733P	PF	37.27071293
135	JAGDALPUR	DANTEWADA	BACHELI	MOLASNAR	1734P	PF	14.69545131
136	JAGDALPUR	DANTEWADA	BACHELI	MOLASNAR	1735P	PF	15.1163025
137	JAGDALPUR	DANTEWADA	BACHELI	MOLASNAR	1736P	PF	32.96721785
138	JAGDALPUR	DANTEWADA	BACHELI	MOLASNAR	1737P	PF	161.2439465
139	JAGDALPUR	DANTEWADA	BACHELI	MOLASNAR	1738P	PF	25.44336623
140	JAGDALPUR	DANTEWADA	BACHELI	MOLASNAR	1739P	PF	6.996125938
141	JAGDALPUR	DANTEWADA	BACHELI	MOLASNAR	1740P	PF	80.31087613
142	JAGDALPUR	DANTEWADA	BACHELI	MOLASNAR	1741P	PF	16.90079235
143	JAGDALPUR	DANTEWADA	BACHELI	MOLASNAR	1742P	PF	17.72459913
144	JAGDALPUR	DANTEWADA	BACHELI	MOLASNAR	1752P	PF	45.64982914
145	JAGDALPUR	DANTEWADA	BACHELI	MOLASNAR	1756P	PF	31.28660587
146	JAGDALPUR	DANTEWADA	BACHELI	MOLASNAR	1757P	PF	134.4464959
147	JAGDALPUR	DANTEWADA	BACHELI	MOLASNAR	1758P	PF	83.20063649
148	JAGDALPUR	DANTEWADA	BACHELI	MOLASNAR	1759P	PF	42.42656624
149	JAGDALPUR	DANTEWADA	BACHELI	MOLASNAR	1768P	PF	63.81475597
150	JAGDALPUR	DANTEWADA	BACHELI	NAKULNAR	1723P	PF	31.40752913
151	JAGDALPUR	DANTEWADA	BACHELI	NAKULNAR	1726P	PF	12.61279025
152	JAGDALPUR	DANTEWADA	BACHELI	NAKULNAR	1727P	PF	11.448032
153	JAGDALPUR	DANTEWADA	BACHELI	NAKULNAR	1728P	PF	58.86604483
154	JAGDALPUR	DANTEWADA	BACHELI	NAKULNAR	1729P	PF	94.10386376
155	JAGDALPUR	DANTEWADA	BACHELI	NAKULNAR	1730P	PF	21.48308485
156	JAGDALPUR	DANTEWADA	BACHELI	PANDAPUR	1845	RF	277.5483873
157	JAGDALPUR	DANTEWADA	BACHELI	PANDAPUR	1846	RF	197.3233907
158	JAGDALPUR	DANTEWADA	BACHELI	PANDAPUR	1847	RF	252.7614172
159	JAGDALPUR	DANTEWADA	BACHELI	PANDAPUR	1850	RF	318.7794626
160	JAGDALPUR	DANTEWADA	BACHELI	PANDAPUR	1852	RF	243.8787992

FOREST COMPARTMENT IN 10 Kms RADIUS

S.NO.	CIRCLE	DIVISION	RANGE	BEAT	COMPARTMENT NO.	LEGAL STATUS	AREA IN HECTARES
1	2	3	4	5	6	7	8
161	JAGDALPUR	DANTEWADA	BACHELI	PANDAPUR	1880	RF	368.62028
162	JAGDALPUR	DANTEWADA	BACHELI	PANDAPUR	1881	RF	286.3630361
163	JAGDALPUR	DANTEWADA	BACHELI	PANDAPUR	1882	RF	231.3934476
164	JAGDALPUR	DANTEWADA	BACHELI	PANDAPUR	1883	RF	225.4575446
165	JAGDALPUR	DANTEWADA	BACHELI	PANDAPUR	1888	RF	329.9350536
166	JAGDALPUR	DANTEWADA	BACHELI	PANDAPUR	1889	RF	319.46793
167	JAGDALPUR	DANTEWADA	BACHELI	PANDAPUR	1890	RF	245.4884518
168	JAGDALPUR	DANTEWADA	BACHELI	PANDEWAR	1769P	PF	76.39713112
169	JAGDALPUR	DANTEWADA	BACHELI	PANDEWAR	1771P	PF	248.4919625
170	JAGDALPUR	DANTEWADA	BACHELI	PANDEWAR	1772P	PF	82.33507775
171	JAGDALPUR	DANTEWADA	BACHELI	PANDEWAR	1773P	PF	191.2713958
	JAGDALPUR	DANTEWADA	BACHELI	PANDEWAR	1800	RF	248.0029746
2	JAGDALPUR	DANTEWADA	BACHELI	PANDEWAR	1801	RF	209.2016277
4	JAGDALPUR	DANTEWADA	BACHELI	PANDEWAR	1802	RF	315.8107178
3	JAGDALPUR	DANTEWADA	BACHELI	PANDEWAR	1803	RF	324.4373798
9	JAGDALPUR	DANTEWADA	BACHELI	PANDEWAR	1804	RF	338.5280057
7	JAGDALPUR	DANTEWADA	BACHELI	PANDEWAR	1805	RF	302.5046968
150	JAGDALPUR	DANTEWADA	BACHELI	PURNGEL	1865	RF	282.5112852
149	JAGDALPUR	DANTEWADA	BACHELI	PURNGEL	1874	RF	236.9372535
153	JAGDALPUR	DANTEWADA	BACHELI	PURNGEL	1875	RF	235.1996272
147	JAGDALPUR	DANTEWADA	BACHELI	PURNGEL	1876	RF	317.1431395
142	JAGDALPUR	DANTEWADA	BACHELI	PURNGEL	1877	RF	370.1633685
130	JAGDALPUR	DANTEWADA	BACHELI	TIKANPAL	1710P	PF	14.16806095
118	JAGDALPUR	DANTEWADA	BACHELI	TIKANPAL	1714	PF	86.38550964
120	JAGDALPUR	DANTEWADA	BACHELI	TIKANPAL	1718P	PF	65.61090506
114	JAGDALPUR	DANTEWADA	BACHELI	TIKANPAL	1719	PF	61.8015198
6	JAGDALPUR	DANTEWADA	DANTEWADA	DANTEWADA	1385P	PF	101.6355608
155	JAGDALPUR	DANTEWADA	DANTEWADA	DANTEWADA	1386P	PF	74.28887576
5	JAGDALPUR	DANTEWADA	DANTEWADA	DANTEWADA	1387P	PF	102.9184883
13	JAGDALPUR	DANTEWADA	DANTEWADA	MASENAR	1388P	PF	328.2677439
33	JAGDALPUR	DANTEWADA	DANTEWADA	MASENAR	1389P	PF	17.33380441
15	JAGDALPUR	DANTEWADA	DANTEWADA	MASENAR	1390P	PF	38.10499195
22	JAGDALPUR	DANTEWADA	DANTEWADA	MASENAR	1399	RF	163.9312066
17	JAGDALPUR	DANTEWADA	DANTEWADA	MASENAR	1400	RF	195.1370273
24	JAGDALPUR	DANTEWADA	DANTEWADA	MASENAR	1401	RF	242.3121727
30	JAGDALPUR	DANTEWADA	DANTEWADA	MASENAR	1402	RF	137.0840455
37	JAGDALPUR	DANTEWADA	DANTEWADA	MASENAR	1403	RF	221.1838372
34	JAGDALPUR	DANTEWADA	DANTEWADA	MASENAR	1404	RF	258.4668013
44	JAGDALPUR	DANTEWADA	DANTEWADA	MASENAR	1405	RF	195.5968679
TOTAL AREA IN HECTARES							**43265.83561**

LIST OF VILLAGES IN 10 Kms RADIUS

S.NO.	DISTRICT	BLOCK	VILLAGE
1	2	3	4
1	BIJAPUR	BIJAPUR	Bechapal
2	BIJAPUR	BIJAPUR	Chhotehiroli
3	BIJAPUR	BIJAPUR	Dumirpalnar
4	BIJAPUR	BIJAPUR	Dumkameta
5	BIJAPUR	BIJAPUR	Edaspadar
6	BIJAPUR	BIJAPUR	Hiroli
7	BIJAPUR	BIJAPUR	Hurrepal
8	BIJAPUR	BIJAPUR	Idenar
9	BIJAPUR	BIJAPUR	Indrinar
10	BIJAPUR	BIJAPUR	Kawadgaon
11	BIJAPUR	BIJAPUR	Kondapal
12	BIJAPUR	BIJAPUR	Porewada
13	BIJAPUR	BIJAPUR	Pusnar
14	BIJAPUR	BIJAPUR	Timmenar
15	BIJAPUR	BIJAPUR	Yatepal
16	DAKSHIN BASTAR DANTEWADA	DANTEWADA	Badebacheli
17	DAKSHIN BASTAR DANTEWADA	DANTEWADA	BadeKameli
18	DAKSHIN BASTAR DANTEWADA	DANTEWADA	Bainpal
19	DAKSHIN BASTAR DANTEWADA	DANTEWADA	Basanpur
20	DAKSHIN BASTAR DANTEWADA	DANTEWADA	Behnar
21	DAKSHIN BASTAR DANTEWADA	DANTEWADA	Bhansi
22	DAKSHIN BASTAR DANTEWADA	DANTEWADA	Degalras
23	DAKSHIN BASTAR DANTEWADA	DANTEWADA	Dhurli
24	DAKSHIN BASTAR DANTEWADA	DANTEWADA	Dugeli
25	DAKSHIN BASTAR DANTEWADA	DANTEWADA	Gamawada

LIST OF VILLAGES IN 10 Kms RADIUS

S.NO.	DISTRICT	BLOCK	VILLAGE
1	2	3	4
26	DAKSHIN BASTAR DANTEWADA	DANTEWADA	Ganjenar
27	DAKSHIN BASTAR DANTEWADA	DANTEWADA	Jharalawa
28	DAKSHIN BASTAR DANTEWADA	DANTEWADA	Jhirka
29	DAKSHIN BASTAR DANTEWADA	DANTEWADA	Kadampal
30	DAKSHIN BASTAR DANTEWADA	DANTEWADA	Kamaloor
31	DAKSHIN BASTAR DANTEWADA	DANTEWADA	Khutepal
32	DAKSHIN BASTAR DANTEWADA	DANTEWADA	Kirandul
33	DAKSHIN BASTAR DANTEWADA	DANTEWADA	Kodnar
34	DAKSHIN BASTAR DANTEWADA	DANTEWADA	Kuhchepal
35	DAKSHIN BASTAR DANTEWADA	DANTEWADA	Kumharras
36	DAKSHIN BASTAR DANTEWADA	DANTEWADA	Kundeli
37	DAKSHIN BASTAR DANTEWADA	DANTEWADA	Kuper
38	DAKSHIN BASTAR DANTEWADA	DANTEWADA	Lawa
39	DAKSHIN BASTAR DANTEWADA	DANTEWADA	Madadi
40	DAKSHIN BASTAR DANTEWADA	DANTEWADA	Mangnar
41	DAKSHIN BASTAR DANTEWADA	DANTEWADA	Masenar
42	DAKSHIN BASTAR DANTEWADA	DANTEWADA	Molasnar
43	DAKSHIN BASTAR DANTEWADA	DANTEWADA	Nakulnar
44	DAKSHIN BASTAR DANTEWADA	DANTEWADA	Nerli
45	DAKSHIN BASTAR DANTEWADA	DANTEWADA	Padhapur
46	DAKSHIN BASTAR DANTEWADA	DANTEWADA	Pandewar
47	DAKSHIN BASTAR DANTEWADA	DANTEWADA	Pinabacheli
48	DAKSHIN BASTAR DANTEWADA	DANTEWADA	Porokameli
49	DAKSHIN BASTAR DANTEWADA	DANTEWADA	Renganar
50	DAKSHIN BASTAR DANTEWADA	DANTEWADA	Samgiri
51	DAKSHIN BASTAR DANTEWADA	DANTEWADA	Udela

Project by

M/S NMDC-CMDC LIMITED (NCL)