EXECUTIVE SUMMARY
OF
DRAFT ENVIRONMENTAL IMPACT ASSESSMENT / MANAMGEMENT PLAN REPORT.
BASELINE PERIOD: SUMMER SEASON - 2022
(March 2022 to May 2022)

For

CAPACITY EXPANSION OF BAILADILA IRON ORE MINES, KIRANDUL COMPLEX
DEPOSIT - 14 (322.368 Ha) & DEPOSIT-14 NMZ ML (506.742 Ha)

INCREASE OF ROM IRON ORE PRODUCTION FROM 10.50 TO 18.5 MTPA (TOTAL EXCAVATION FROM 12.3 MTPA (10.5 MTPA ROM IRON ORE + 1.8 MTPA WASTE EXCAVATION) TO 24.2 MTPA (18.5 MTPA ROM IRON ORE + 5.7 MTPA WASTE EXCAVATION) ALONG WITH CONSTRUCTION OF 2 NOs OF 3000 TPH CRUSHING PLANTS AND NEW DOWNHILL CONVEYORS WITHIN THE MINE LEASE AREAS OF 829.11 Ha BAILADILA RESERVED FOREST

At

Kirandul, South Bastar Dantewada District, Chhattisgarh

By

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1.0 INTRODUCTION

NMDC Ltd (A Government of India Enterprise) is operating Iron Ore Mining projects at Kirandul in Bailadila i.e., Deposit-14 Mining Lease, Deposit-14 NMZ Mining Lease and Deposit-11 Mining Lease located in Tehsil– Bade Bacheli, District– South Bastar Dantewada of Chhattisgarh State. The mining leases are located in Bailadila Reserved Forest, Dantewada Forest Division, Chhattisgarh. The city of Kirandul is very well connected by SH/NH road and rail.

The mining lease of Bailadila Deposit-14 is 322.368 Ha, Deposit-14 NMZ is 506.742 Ha and Deposit-11 is 874.924 Ha (consists of Deposit-11A: 233.509 Ha, 11B: 535.003 Ha and Deposit-11C: 106.412 Ha). An integrated Environmental Clearance was obtained from MOEF&CC vide letter no: J-11015/483/2007-IA-II(M) dated 11/09/2007 for Bailadila Deposit 14, 14 NMZ & 11C Project for 12.00 MTPA ROM Iron Ore over an area of 935.522 Ha. Subsequently, NMDC obtained Amendment to Environmental Clearance vide F.no: J-11015/483/2007-IA.II(M) dated 1/12/2021 for Bailadila Deposit-14/11C project (935.522 Ha, 12.00 MTPA ROM iron ore) by exclusion of Deposit-11C part (Area 106.412 Ha and 1.50 MTPA Iron ore) and modifying to Bailadila Deposit-14 and 14 NMZ (829.11 Ha, 10.50 MTPA) as per specific condition no: 1 and 2 of Terms of Reference letter no: J-11015/70/2018-IA.II(M) dated 24/09/2019 issued by MoEF&CC for Deposit-11 Mining Lease.

As per para 4 and 14 of Amendment to EC dated 01/12/2021, the ROM Iron production capacity of Deposit-14 (322.368 Ha M.L) is 5.00 MTPA ROM Iron Ore and Deposit-14 NMZ (506.742 Ha M.L.) is 5.5 MTPA ROM Iron Ore.

NMDC proposes for capacity expansion of Bailadila Deposit-14 and 14 NMZ from existing Iron Ore production 10.50 MTPA to 18.50 MTPA with waste excavation from 1.80 to 5.70 MTPA. The capacity expansion from Deposit-14 will be from 5.00 MTPA to 10.00 MTPA Iron ore with waste excavation from 1.00 to 3.80 MTPA. The capacity expansion from Deposit-14 NMZ will be from 5.50 MTPA to 8.50 MTPA Iron ore with waste excavation from 0.80 to 1.90 MTPA. The total excavation will increase from 12.30 to 24.20 MTPA. The capacity expansion also proposes for construction of two new 3,000 TPH crushing plants, one each in Deposit-14 and Deposit-14 NMZ Mining lease along with downhill conveyor system. The proposed capacity expansion will be carried out in existing Mining leases only.

As per Environmental Impact Assessment (EIA) Notification SO 1533, of 14-09-2006, the proposed capacity expansion falls under the Schedule "Mining of Minerals Open Cast Mining -1 (a)" and "Mineral Beneficiation - (2b)" of Category-'A' as the Mining Lease area is greater than 250 Ha. Hence it necessitates obtaining the Prior Environmental Clearance from Ministry of Environment and Forests & Climate Change (MoEFCC), New Delhi. Based on application submitted by NMDC in parivesh portal on 13/1/2022, MOEFCC has issued combined Terms of reference vide F.No: J-11015/483/2007-IA.II(M) dated 22/03/2022 for Deposit 14 & 14 NMZ as the environmental implications are common in the vicinity of the mine lease area and further indicated that consideration of Environmental Clearance (EC) will be as per the mine lease area only.

The environmental setting of Deposit-14 and 14 NMZ Mining Leases area is given in **Table - 1.0.** The SOI Toposheet showing the Mining Lease area with baseline monitoring locations in 10km radius study area is enclosed in **Figure-1**.

TABLE-1
ENVIRONMENTAL SETTING OF DEPOSIT-14 & 14 NMZ MINING LEASES

Feature	Details
Longitude & Latitude	**Deposit-14 ML:** Latitude:18°36'11.202"to 18°37'34.601" N Longitude: 81°13'15.946" to 81°14'44.679" E **Deposit-14 NMZ ML:** Latitude: 18°36'44.0492" to 18°38'31.8650" L Longitude: 81°13'54.6335" to 81°15'24.1185" E
Beneficiation Plants (at Deposit-14 NMZ ML)	
Screening Plant-I	Latitude: 18°37'19.26"to 18°37'20.15" N Longitude: 81°15'7.81" to 81°15'9.87" E
Screening Plant-II	Latitude: 18°37'24.92"to 18°37'27.42" N Longitude: 81°15'6.42" to 81°15'8.62" E
SoI Toposheet	E44J2 &J6 (New) & 65/F2 &F6 (Old)
Temp. ^{0}C	14.3 – 36.3
Relative Humidity %	16 - 55
Annual rainfall, mm	2600
Nearest Villages / Gram Panchayat(s)	Kirandul - Adjacent – E Kodenar – 1.8 Km – E Perpa - 2.08 km – ESE Cholnar – 2.34 Km – E Gumiyapal – 2.35 Km – E Pirnar - 2.70 km – SE Bade Bacheli – 3.21 Km, NNE Hiroli – 3.22 km – SE Madakmaras – 3.46 km – SE Kadampal – 4.00 Km – E Madadi – 4.3 Km, E
Nearest Town	Kirandul Township – adjacent Bacheli township, 6.7 Km, N
Nearest water bodies	Kirandul Nala – (passing through the SE direction) Malanger Nadi – 1.2 km – S Madadi Nadi – 2.7 km – E Galli Nala – 4.4 km – WNW Kadampal tailing dam – 4.3 km – ENE Koyar nadi – 5.24 Km - ENE Jhiram Nadi – 7.8 km – WNW Berudi Nadi – 7.6 km – WNW
Nearest Highway	NH-63-Jagdalpur - Nizamabad - 504 km – N (by road) State Highway (SH-5) - Geedam - Sukma -91 km- N (by road)
Nearest Railway station	Kirandul 0.6 km - E.
Nearest Air Port	Maa Danteshwari Airport at Jagdalpur – 126 km – ENE (by road)
Nearest Mines/Industries	**NMDC's Iron Ore Mines** Bailadila Deposit: 11 – Adjacent - N Bailadila Deposit: 10 – 5.7 km – N Bailadila Deposit: 5 5.9 km – NW **NMDC Standalone plants** Screening Plant-III (under construction)- Adjacent and located at outside M.L of Deposit-14 NMZ - SE **NMDC-CMDC Limited's Iron ore Mine** Deposit– 13 – 0.8 km – WSW (yet to start operations) **Others** Beneficiation Plant of AMNS -1.8 km – SE
Nearest Forest	Bailadila RF – (Deposit-14 and 14 NMZ Mining Leases fall in Bailadila RF) Bijapur RF – 4.3km – WNW
Nearest National Parks, Wildlife sanctuaries etc	None within 10 km Radius
Historical places	None within 10 km radius

Note: All distances mentioned are aerial, from nearest Mining Lease Boundary

2.0 PROJECT DESCRIPTION

The capacity expansion of Bailadila Iron Ore Mining Leases viz. Deposit-14 and Deposit-14 NMZ are independent leases and supply raw material, i.e., iron ore, to various steel and pellet plants situated in the state of Chhattisgarh and also in other states. The mining leases share common infrastructure facilities created at Kirandul, such as the loading plant, the Township, etc.

Deposit -14 and Deposit -14 NMZ are located at the extreme southern end of the eastern ridge of the Bailadila range. The exploration study reveals that the reserves are 399.75 million tonnes in Deposit-14 and 217.42 million tonnes as per UNFC classification 111, 121 & 122 as on 01/04/2022. The proved reserves extend to a depth of 861 MRL in Deposit-14 and 834 MRL in Deposit-14 NMZ. It has been established that about 115 MT of iron ore is blocked due to the existing crushing plant at (+) EL 1137 m at the Deposit-14 ML and about 40 MT of iron ore is blocked due to the existing crushing plant at (+) EL 1050 m at the Deposit-14 NMZ ML.

Considering the availability of iron ore reserves, it is proposed to enhance iron ore production from the existing 5 MTPA to 10 MTPA at Bailadila Deposit-14 and from the existing 5.5 MTPA to 8.5 MTPA at Bailadila Deposit-14 NMZ Mining lease. The above expansion also necessitates the installation of a new crushing plant of higher capacity to handle the increase in ROM iron ore excavation.

Accordingly, for further mine development and to excavate overall reserves, it is proposed to construct a new 3000 TPH crushing plant at P Plot area (EL: 1020m) inside the lease area of Deposit-14 and a new crushing plant of 3000 TPH capacity at the southern side of the existing pit at 900m RL inside the lease area of Deposit-14 NMZ, along with downhill conveyor systems which connect to the existing screening plants in the mining lease of Deposit-14 NMZ. Once new crushing plants and associated downhill conveyor systems are stabilized, the old infrastructure will be dismantled and the ore underneath these structures will be excavated. The operation of Deposit-14 and 14 NMZ ML with proposed capacity expansion is necessary to meet the growing demand for iron ore to meet the demand of steel and pellet plants in the state of Chhattisgarh and other states.

The mining operations in the Deposit-14 and 14 NMZ mining leases are opencast and highly mechanized. The activities in Deposit-14 are mainly drilling, blasting, excavation, and crushing. The crushed ore is transported to screening plants located in the Deposit-14 NMZ Mining lease for further processing through the existing downhill conveyor system. Whereas in Deposit-14 NMZ, apart from the above mining activities, the processing of ore coming from Deposit-14 mine, 11C mine, and 11B mine is also being carried out in existing screening plants-I & II. No capacity augmentation of SP-I and II is proposed under the expansion proposal. The Screening Plant-III is also under construction at Kirandul as a standalone project. The screening plants-I & II are designed for both wet screening and dry screening.

The same mining technology and ore processing shall be continued with addition of new Heavy Earth Moving Machinery and new crushing plants

along with over land downhill conveyor system during capacity enhancement. Under expansion, over land downhill conveyor connecting new crushing plant at Deposit-14 to Screening plants in Deposit-14 NMZ Mining lease will be constructed. At Deposit-14 NMZ Mining lease, a new overland Downhill Conveyor is proposed to be constructed upto the existing conveyor-126.

The iron ore products from the screening plant are transported through a covered conveyor system to the loading plant located outside the Mining Lease area at Kirandul. NMDC has already created integrated infrastructure facilities outside the mining lease area, such as a loading plant and MV siding for transportation of iron ore through railway wagons.

The present EC capacity of all the working mines in Kirandul and Bacheli of NMDC is 37.8 MTPA. The existing railway line has an evacuation capacity of 28 MTPA, which is being increased to 40 MTPA by the doubling of the KK Railway line between Kirandul and Jagdalpur. 8.0 MTPA of ore is being taken by the AMNS plant at Kirandul through a conveyor. About 1.00 MTPA can be transported through the existing SH/NH road network. After expansion, the additional ore of 8.00 MTPA will be transported by rail.

The salient features of Bailadila Deposit-14 and 14 NMZ mining leases are given in **Table – 2.0.**

TABLE- 2.0
SALIENT TECHNCIAL FEATURES OF DEPOSIT-14 AND DEPOSIT -14 NMZ MINING LEASES

S.No	DETAILS	DEPOSIT-14	DEPOSIT-14 NMZ
1	Mining Lease Area	322.368 HA	506.742 HA
2	Mining lease validity	11.09.2035	06.12.2035
3	Type of Mine	Open Cast Mine	
4	Mineral to Be Mined	Iron Ore	
5	Strike length / width of ore body	2000 M/ 200– 1250 M	2000M / 180 – 880 M
6	Dip	40°-65°	50 ° -70 °
7	Total mineral reserves / grade (as on 01/04/2022)	399.75 MT / 64.57% Fe	217.42 MT / 64.96% Fe
8	Blockage of iron ore surrounding the existing Crushing Plant, million tons	115.00 MT	40.00 MT
9	Method of mining	Fully Mechanized Open Cast Method	
10	Topmost bench (MRL)	1157	1138
11	Lower most RL of ore body (proved upto depth)	861	834
12	Average Width meter (min. /max.)	200/1250	180/880
13	Average Depth meter (Min. /Max.)	54/336	72/304
14	Bench Height / Width	12 M / 25 - 30 M	12 M / 25 - 30 M
15	Top and Bottom Bench	1157 MRL and 1029 MRL	1138 MRL and 1018 MRL

S.No	DETAILS	DEPOSIT-14	DEPOSIT-14 NMZ
16	Present working bBenches	1157, 1147, 1137, 1125, 1113, 1101, 1089, 1077,1065 & 1053 MRL.	1138, 1126, 1114, 1102, 1090,1078,1066, 1054, 1042, 1030 & 1018 MRL.
17	Ultimate pit bottom	861 MRL	910 MRL
18	Ultimate Pit Slope	< 45°	< 45°
19	Existing Crushers	2000 TPH	2000 TPH
20	Location of existing crushing plant	1137 MRL	1050 MRL
21	Proposed ROM Iron Ore Capacity Enhancement, MTPA	5.00 TO 10.00	5.50 TO 8.50
22	Proposed Waste Excavation, MTPA	1.00 TO 3.80	0.80 TO 1.90
23	Total Excavation (ROM Ore+ Waste), MTPA	6.00 TO 13.80	6.30 TO 10.40
24	Working Days/Shifts/ Hrs Per Shift	305 / 3 SHIFTS / 8 HRS	
25	Location of new crushing plant proposed inside lease area	1020 MRL	900 MRL
26	Specification of Crushing Plant, followed by secondary crusher.	Gyratory Crusher of Size -60" X 89" TPH-3000	
27	Final Products	1. Lump Ore: (-) 150mm to (+) 10 mm. 2. CLO: (-) 40 mm to (+) 06mm. 3. Baila Sized Ore: (-) 20 mm to (+) 10mm 4. Fine Ore: (-) 10 mm	
28	Recovery of Lumps and Fines	Lumps: 51 % (5.1 MTPA) & Fines: 49 % (4.9 MTPA)	Lumps: 47 % (3.99 MTPA) & Fines: 53 % (4.50 MTPA)
29	Grade of Products	Lump + CLO = 66% Fe & Fines = 64% Fe	Lump + CLO (Fe % = 65.80) & Fines (Fe % = 64.84)
30	Expected Life of Mine	41 Years	27 Years
31	Ore to Waste Ratio	1:0.38	1:0.17
32	Waste generation (till lease period)	45.385 MT (11-09-2035)	20.385 MT (06-12-2035)
33	Power Requirement & Sources	191.82 L Kwh. Source: CSEB. Substation at Kirandul	176.25 L Kwh. Source: CSEB. Substation at Kirandul
34	Water Requirement – Expansion, m^3/day	From 2,837.50 to 5,675	From 8,312.50 to 10,635 (dry screening) & From 15,172.50 to 17,495 (wet screening)
35	Source of Water	Kirandul Nala, Bacheli Nala and Malangir Nala.	
36	Area outside ML for infrastructure	---	NMDC acquired 54.854 Ha revenue land outside ML area for Loading plant. Further acquired revenue land of 245 Ha outside ML area out of which 120.10 Ha is for Tailing dam at Kadampal.

S.No	DETAILS	DEPOSIT-14	DEPOSIT-14 NMZ
37	Project Cost (NMDC Board's Approval Obtained in Its 540th Meeting Dated – 12.08.2021.	Rs. 728.67 Crores	Rs. 564.45 Crores
38	Mining Plan approval by IBM	IBM, Raipur vide letter no. Dantewada/Fe/Khanij-1214/2019/Raipur/549 dated 12/12/2019 for the period from 01-04-2020 to 31-03-2025.	IBM, Raipur vide letter no. Dantewada/Fe/KHanij-1216/2019/Raipur/547 dated 11/12/2019 for the period from 01-04-2020 to 31-03-2025
39	Forest clearance approval from MOEFCC and validity extension bt C.G. State Forest Deptt	Extension of existing Forest Clearance was obtained from Govt of Chhattisgarh, Forest Department, Nava Raipur vide letter No. F-5-28/2006/10-2 dated 31/03/2020 co-terminus with extended lease period	Extension of existing Forest Clearance was obtained from Govt of Chhattisgarh, Forest Department, Nava Raipur vide letter No. F-5-10/2016/10-2 dated 31/03/2020 co-terminus with extended lease period

3.0 DESCRIPTION OF THE ENVIRONMENT

The Bailadila Deposit – 14 and 14 NMZ Mining leases are located in Bailadila reserve forest land. Human habitation and settlements are mostly concentrated in the east of study area, which is well connected by road and rail. The agricultural land is situated on the eastern side. The agricultural activities are carried out during the monsoon season only. The Deposit-14 & Deposit-14 NMZ ML are located at the southern end of the eastern ridge and the extreme end of the eastern ridge of the Bailadila range, respectively. The Kirandul nalla originates from the north-eastern slope of this hill and flows towards the NE and joins the Sankini river, which further joins the Dankani river at Dantewada. Malinger stream flows from west to east in the south west of the Deposit-14 mining lease, eventually joining the Kolab River. The drainage pattern is radial, parallel, and sub-dendritic.

The study area consists of a core zone (mining lease area) and a buffer zone of 10 km radius from the mining lease boundary. The baseline environmental monitoring studies were carried out during the summer season of 2022, covering the months of March, April, and May. The various environmental parameters monitored are ambient air quality, water quality, ambient noise levels, soil quality, ecology (terrestrial and aquatic), land use, and demographic and socio-economic conditions.

3.1 LAND USE

Deposit-14 ML Area-322.368 Ha & Deposit-14 NMZ ML Area-506.742 Ha are located in Bailadila Reserved Forest. The land use pattern of the study area indicates that 59% of the area is under forest land and the remaining area is accounted for by built up land, land with scrub and without scrub, barren land, mining areas, water bodies etc.

3.2 SOIL QUALITY

Eight soil samples were collected from mining lease areas, agriculture areas, forest areas, etc., and analysed for various physico-chemical and organic parameters. It is found that the soils are of moderate fertility and with a minimum application of fertilisers and manure, the fertility of soil can be improved for better yields.

3.3 CLIMATOLOGY AND METEOROLOGY

The climatic condition of the Bailadila region is semi-arid. As per the site-specific meteorological data recorded during the summer season of 2022, the maximum and minimum temperatures were recorded as 14.3 0C & 36.3 0C in the months of May and March respectively. Similarly, the maximum humidity level in March was 55 percent, with a minimum of 16 percent in May. The average wind speed recorded in the season was 3.58 m/s. The predominant wind direction for the study period is WSW-SW-SSW for 48.82% of the time. The average annual rainfall in the Bailadila region is around 2600 mm, about 85% of which falls between July and September.

3.4 AMBIENT AIR QUALITY

The ambient air quality monitoring was carried out during the study period at eight locations, covering three in the core zone (mining and allied activities) and four in the buffer zone at different villages representing upwind, cross wind, and downwind directions, and one in a sensitive location, i.e., Project Hospital, Kirandul. The $PM_{2.5}$ and PM_{10} were observed to vary from 25 $\mu g/m^3$ to 32 $\mu g/m^3$ and 63 $\mu g/m^3$ to 71 $\mu g/m^3$ respectively. The SO_2 and NO_x were observed to vary from 12.30 $\mu g/m^3$ to 13.7 $\mu g/m^3$ and 13.9 $\mu g/m^3$ to 15.6 $\mu g/m^3$ respectively. The CO is observed less than 1 ppm (<1144 ug/m^3). The particulate and gaseous pollutants are found well within the National Ambient Air Quality standards 2009.

3.5 WATER QUALITY

The streams such as Kirandul nalla, Malinger nadi, and Bacheli nalla flowing in the study area are perennial in nature, which forms the potential source of water for the project's use. Six surface water samples have been collected and analysed as per CPCB standards. Seven ground water samples from bore wells from different villages and one tap water were collected in the study area and analysed for parameters with IS–10500 drinking water standards. All the samples were found well within the prescribed limits.

3.6 AMBIENT NOISE LEVELS

The streams such as Kirandul nalla, Malinger nadi, and Bacheli nalla flowing in the study area are perennial in nature, which forms the potential source of water for the project's use. Six surface water samples have been collected and analysed as per CPCB standards. Seven ground water samples from bore wells from different villages and one tap water were collected in the study area and analysed for parameters with IS–10500 drinking water standards. All the samples were found well within the prescribed limits.

3.7 FLORA & FAUNA

The study area consists of forest land towards the S-SSW-W-NW-N sector. A small part of forest is also located in the eastern direction of the study area. The forest area falling towards the NW-SW of the study area has a very dense forest area that belongs to Bailadila and Bijapur reserve forest areas. On the eastern side of the study area, distinct habitats can be demarcated. The eastern and western outer slopes merge with the plains, and cultivation appears in patches.

The vegetation occurring in the area belongs to southern tropical dry deciduous forests (Class-5A), which intermingles with the northern tropical dry deciduous type (Class-5B) according to the Champion and Setu classification of forest types in India 1968. Plot quadrat and belt transect studies were conducted during the study period to find out the floral diversity in the core and buffer zone. The lease area is dominated by Anogeissus latifolia and Terminalia tomentosa.

The hill top (core zone) has laterite capping, resulting in stunted growth of trees, followed by herbs and shrubs. The slopes and base of the mining lease area have natural vegetation which is mainly of Terminalia sp, Anogeissus latifolia, Boswellia serrata, Albizia margianta, Diospyros melanoxylon, etc. The buffer zone is undulating. The hillocks and slopes are either denuded of vegetation or covered with trees, most of which are natural or otherwise replanted by mono-cultures of teak, eucalyptus, and mango, etc.

The forest vegetation provides habitation for faunal species such as birds, butterflies, moths, rodents, hares, reptiles, and lizards. The forests not only provide habitation but also provide nesting and grazing for herbivores. There is a presence of six Schedule–1 species reported in the Dantewada Forest Division, as per The Wildlife (Protection) Act, 1972 (9th September, 1972): Sloth Bear, Panther, Python, Bastar Hill Myna, Common peafowl and Whistling Teal. NMDC has already prepared a bio-diversity conservation plan for Deposit-14/11C & 11B of Kirandul complex and got approval from the Chief Wildlife Warden (CWLW), Raipur and deposited the amount of Rs.13.68 Cr in ADHOC CAMPA AC on 30/1/2017.

The Wildlife Conservation Plan for the entire Dantewada Forest Division has also been prepared and got the approval of CWLW, Raipur on 7/1/2013 and deposited Rs. 15.50 Cr to the Forest Deptt on 30/4/2014. A separate site-specific conservation plan with budgetary support of Rs.10.25 Cr was submitted to DFO, Dantewada on 04.02.2021 for obtaining approval of the plan from PCCF (WL)/Chief Wild Life Warden, Forest Department, Nava Raipur. There is no biosphere reserve, national park, tiger reserve, elephant reserve, wildlife sanctuary, or bird sanctuary within the study area.

3.8 SOCIAL ENVIRONMENT

As per census 2011 data, the study area consists of about 35 villages and 2 municipalities, with a 64,732 population. 9.80% of the population is from Scheduled Castes (SC) and 52.94% comes from Scheduled Tribes (ST). The literacy rate is 56.1%, which is attributed to NMDC, who is extending support to education in the nearby villages under CSR funds. The education city at Jawanga (Geedam) near Dantewada was built by NMDC under CSR and Government funds.

4.0 ANTICIPATED ENVIRONMENTAL IMPACTS

Mining being a site-specific activity, excavation is bound to be done at a place where minerals actually exist. The Deposit-14 Mining Lease and Deposit-14 NMZ Mining Lease are operating mines, while other mines have been in operation for decades in the vicinity. Opencast mining operations with crushing and screening activities result in air pollution in the form of particulate and gaseous pollutants. Adequate mitigation measures are implemented to control air pollution. The impact due to proposed capacity expansion, i.e., an incremental increase in total excavation of 7.80 MTPA from Deposit-14, an incremental total excavation of 4.10 MTPA from Deposit-14 NMZ and two new crusher plants, one each of 3000 TPH at Dept-14 and Dep 14 NMZ, has been predicted using AERMOD with digital elevation model option.

Emission sources considered include transportation activity. The 10 km study area is undulating with altitudes varying between 208 m AMSL and 1255 m AMSL, with a surface relief of 1047 m. 3D terrain modelling has been done. The modelling results indicate that the maximum incremental Ground Level Concentrations (GLC) of PM_{10} with controlled measures will be about 14.74 g/m^3 within the mine lease area and at the boundary the predicted GLC's are observed to be about 5.00 g/m^3. Similarly, the maximum incremental $PM_{2.5}$ with controlled measures will be about 5.16 $\mu g/m^3$ within the lease areas, and at the boundary, the predicted air emission levels are observed to be about 1.0 $\mu g/m^3$. The incremental GLC's of NOx is likely to be 5.42 µg/m3. The overall resultant concentrations (GLC's + baseline) were found well within the NAAQ 2009 standards.

The in-house blasting studies are being carried out using NOMIS seismographs (Mini-Supergraph II) at the time of blasting. From the studies, it is inferred that no vibration was recorded beyond 1000 m.

The water is mainly required for dust suppression in mining areas and ore processing plants. Effluent Treatment Plant of 10 KL capacity has already been put into operation at Deposit – 14 Service Centre and Deposit – 11 C Service Centre, which is adjacent to Deposit – 14 NMZ for treatment of suspended solids and oil & grease generated due to the washing of HEMM. The mining operations are conducted at the hilltop which is at a higher level than the groundwater level. The groundwater level is at 730 MRL and will not be intersected during mining operations.

No R&R issues are involved.

5.0 MITIGATIVE MEASURES

The project already has a Comprehensive Environmental Management Plan for all anticipated environmental impacts, which is under implementation. There is no change in the methodology of mining and processing ore. The increase in pollution load due to proposed capacity expansion will be very minimal due to existing and proposed pollution control measures.

NMDC is already implementing adequate air pollution control measures for present levels of iron ore production. The same measures will be continued with additional water sprinkling at sources proportionate to the expansion.

At enhanced production, 60 and 85 T dumpers will be replaced completely with 100 T capacity dumpers, thereby reducing the number of dumper trips. At present, 6 nos. of 28 KL capacity water sprinklers are being used for dust suppression on haul roads. Furthermore, three additional water sprinklers of 28 KL and one of 50 KL capacity will be deployed during capacity expansion. Regular water sprinkling on other service roads is done by fixed water sprinklers. A total of one truck-mounted mist canon of 8 kl is under procurement for water spraying on light vehicle roads, loading faces, and blasted muck piles. A dry fog dust suppression system (DSS) has been installed at existing crushing plants, downhill conveyor systems and screening plants. Furthermore, a sensor-based water spray system will be installed at the dumper platform of 2 new crushing plants for water spraying during unloading of ROM ore by dumpers into primary crushers/apron feeders. During the non-monsoon season, the dry fog dust suppression system at screening plants at various transfer points will be maintained.

The rainwater flows over the slopes and discharges into the natural drainage system. Kirandul nalla passes through the Deposit-14 NMZ Mining Lease area. This nalla is undisturbed due to mining activities and it will be protected during capacity expansion. 14 check dams have been constructed across various nallas in the Kirandul Complex. Surface run-off from mines is routed to the lowermost benches through garland drains and channels and ultimately leads to check dams constructed on various nallas to arrest the silt load and thereby reduce the impact on the water quality. 26 nos of loose boulder check dams, 14 nos of gabion check dams, 14 nos of stone masonry check dams and 1 number of silt settling tanks are proposed. At present, the screening plant has been operating in dry mode since 2010, hence no effluent is generated and impounded in Kadampal Tailing Dam.

The capacity of the tailing dam is 40 lakh cu m. In the event that the wet screening operations are restored in the screening plant, the slime generation will be sent to the tailing dam through an RCC diversion channel, depending on the adequacy of the dam for impoundment. An alternate arrangement was also provided for the transportation of online slimes through a pipeline to the AMNS Plant at Kirandul.

The waste rock generation from Deposit-14 ML and Deposit-14 NMZ ML upto the lease period i.e. 2035 is 45.385 million tonnes and 20.385 million tons, respectively, which will be dumped in existing waste dumps and proposed waste dump areas and in-pit waste dumps within the lease areas as per the approved Mining Plan. Overall, there will be 4 waste rock dumps (one existing and 3 proposed) occupying an area of 58.387 ha. Loose Boulder Check Dams (LBCD) and Garland drains are already constructed for the existing waste dump located in Deposit-14 ML. Geo-textile (coir matting) is being used for the stabilisation of waste dumps. Once waste rock dumps become passive, the dumps will be stabilised by applying geo-coir matting and planting local and native tree species. Toe walls and Garland drains will be constructed for proposed waste rock dumps in both Deposit-14 and 14 NMZ Mining leases.

At the conceptual stage, a total of 791.91 Ha (Deposit – 14 : 298.368 Ha + Deposit – 14 NMZ : 493.542 Ha) will be brought under afforestation with 17.23 lakh saplings at a capital cost of Rs 185 crores.

About 7.94 lakh tree saplings have been planted inside lease areas in 510 Ha and 1 lakh saplings have been planted outside lease areas in 45 Ha. The gap plantation will be continued, with a goal of planting 10,000 saplings over the next five years. The Kirandul project has also contributed Rs 57.095 crores towards roadside tree and block plantation under the Hariyar Chhattisgarh programme.

6.0 ENVIRONMENTAL MONITORING PROGRAM

Regular environmental monitoring of ambient air, meteorology, water quality, ambient noise, soil quality, etc. is being carried out by MoEF & CC/CPCB recognised laboratories in different seasons of the year. Vibration monitoring studies are conducted by CIMFR and in-house using mini-mate instruments. Ground water levels and quality are also being monitored in four seasons of the year. The monitoring data is being submitted on the Parivesh Portal of MoEF & CC along with six monthly environmental progress reports. Two continuous ambient air quality monitoring stations have already been installed in Deposit-14 NMZ Mining lease covering 11C Mine site office and Kirandul township for continuous recording of PM_{10}, $PM_{2.5}$, SO_2, NO_2 & CO on a continuous basis. It is also proposed to install an additional 4 online Ambient Air Quality stations (3 numbers in Deposit-14 ML and one number in Deposit-14 NMZ ML).

7.0 ADDITIONAL STUDIES

The complete mining operations are being carried out under the management, control, and directives of a qualified mines manager holding a First-Class Manager's Certificate of Competency granted by the Director General of Mines Safety (DGMS), Dhanbad. Moreover, mining supervisory staff are being imparted refresher, first aid, and frontline supervisory statutory training from time to time. A Disaster Management Plan (DMP) is in place which will ensure the safety of life, protection of the environment, protection of installation, restoration of production and salvage operations in this same order of priorities. For effective implementation of the DMP, it is widely circulated and personnel training through rehearsals or mock drills is conducted. Training exercises are held to ensure that all personnel are familiar with their responsibilities and that communication links are functioning effectively.

The Occupational Health Centre is established at Project Hospital at Kirandul and the annual budget is Rs. 200 lakhs. The periodic and initial medical examinations are being carried out as per the provisions laid out in the Occupational Safety and Health and Working Conditions Code, 2020. So far, no noise-induced hearing loss has been reported.

8.0 PROJECT BENEFITS

The Kirandul Complex operation provides economic benefits to employees, the local population in the project's vicinity, and the government in the form of royalty (15% of IBM's average sale value), District Mineral Fund (30% of royalty), National Mineral Exploration Trust (2% of royalty), and additional premium (22.5% of IBM's average sale value).

The existing mining projects of NMDC have given social benefits to the surrounding population in the form of educational facilities, roads, communication facilities, transportation, marketing, banking, postal services, and health facilities directly or indirectly. The civic amenities have already been developed due to the existing mines in the Bailadila complex. The location of the mines in the Bailadila Iron Ore Complex has helped to improve vastly the financial resources of the surrounding population by way of petty trade and employment opportunities. The projects encouraged the establishment of various utility services and petty trades, benefiting approximately 5,000 people in the mining areas, primarily in Kirandul.The CSR budget for the FY 2020–21 for Kirandul Complex was Rs. 3725.75 lakhs. There is a very positive impact of CSR activities on the local population. Deposit-14 and 14 NMZ have provided employment to 1003 people, and under expansion, an additional 233 people will be recruited. Preference will be given to local people.

9.0 ENVIRONMENT MANAGEMENT PLAN

The environmental management aspects of the project are being looked after by the Environment Management Division of BIOM – Kirandul Complex. The monitoring programme serves as an indicator for taking suitable mitigative measures in time to safeguard the environment. The EMP includes waste dump management; construction of engineering structures for surface water management; afforestation; dust suppression on haul roads; biological reclamation; etc. The EMP cost incurred in the last 5 years is Rs. 56.12 crore.

Under Expansion, NMDC has budgeted an amount of Rs. 296.91 crores under capital cost for the implementation of the Environmental Management Plan, and the recurring cost per annum is about Rs. 20.715 crores.

NMDC has a well-established environmental policy at corporate level with a commitment to protect the environment. For the Bailadila Deposit14/11C Project, NMDC has integrated Certification for ISO: 9001: 2015 (QMS), ISO: 14001: 2015 (EMS), OHSAS 45001: 2018 (OHSMS), and SA: 8000: 2014 (SAS), as well as various prestigious awards for excellence in the field of Environmental Management and Social Awareness.

10 CONCLUSIONS

The capacity expansion of the Bailadila Deposit-14 NMZ mine will meet the increasing demand for iron ore for domestic steel plants, pellet plants, etc. and contribute to the national and state exchequer in the form of royalty, district mineral fund, national mineral exploration fund, additional premium, and statutory taxes. NMDC will continue to implement EMP measures and social welfare measures for the development of the area. With all existing and proposed environmental practises in place, NMDC proposes the capacity expansion of the Bailadila Iron Ore Project for an increase in ROM Iron Ore production from 10.50 to 18.50 MTPA, along with the construction of two new 3,000 TPH crushing plants, one each in Deposit-14 and Deposit-14 NMZ Mining leases, and new Downhill Conveyors.

FIGURE-1
SOI TOPOSHEET SHOWING THE ML AREA WITH BASELINE ENVIRONMENTAL MONITORING LOCATIONS IN 10KM RADIUS STUDY AREA