

EXECUTIVE SUMMARY

ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PLAN FOR PUBLIC HEARING FOR **Bailadila Iron Ore Deposit-4**

"Bailadila Iron Ore Deposit-4 Mine (M.L. Area = 646.596 Ha) with a production capacity of 7.0 MTPA ROM Iron ore and 6.41 MTPA Waste Excavation (Total Excavation 13.41 MTPA) along with 2000 TPH Crushing plant inside mining lease area located in Bailadila reserve forest, Tehsil Bade Bacheli, District South Bastar Dantewada, State Chhattisgarh of M/s. NMDC – CMDC Limited (NCL)."

Is Interlinked With

"Screening Cum Beneficiation Plant (750 TPH of 4 lines each) along with 2200 TPH Downhill Conveyor and Loading Facilities in 100.077 Ha. Forest area and 22.4658 ha. Revenue land (Govt., Private and Bade Jhad Ke Jungle) located at outside the Mining Lease area of Bailadila Iron Ore Deposit-4 at Village; Bhansi, Tehsil: Bade Bacheli, District South Bastar Dantewada, Chhattisgarh of M/s. NMDC-CMDC Limited (NCL)."

Baseline Data Collection Period: 1st March-2022 to 31st May-2022

NMDC – CMDC LIMITED

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EXECUTIVE SUMMARY

1.1 Introduction

NMDC-CMDC Ltd. (NCL) was incorporated on 1st July 2006 between NMDC and CMDC Ltd. as a Joint Venture Company. 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 along with 2000 TPH Crushing plant inside mining lease area along with Screening Cum Beneficiation Plant (750 TPH of 4 lines each), 2200 TPH Downhill Conveyor and Loading Facilities in 100.077 Ha. forest area and 22.4658 Ha. revenue land (Govt., Private and Bade Jhad ke Jungle) located at outside the Mining Lease area of Bailadila Iron Ore Deposit-4 at Village: Bhansi, Tehsil: Bade Bacheli, District South Bastar Dantewada, Chhattisgarh by M/s NMDC-CMDC Limited (NCL). The Bade Bacheli is very well connected by SH/NH road and rail.

MoEF&CC vide its office memorandum J-11013/41/2006-IA. II(I) dated 24th December 2010 has issued procedure to be adopted henceforth for consideration of integrated and interlinked projects.

The two interlinked projects are as under:

"Bailadila Iron Ore Deposit-4 Mine (M.L. Area 646.596 Ha) with a production capacity of 7.0 MTPA ROM Iron ore and 6.41 MTPA Waste Excavation (Total Excavation 13.41 MTPA) along with 2000 TPH Crushing plant inside mining lease area located in Bailadila reserve forest, Tehsil Bade Bacheli, District South Bastar Dantewada, State Chhattisgarh of M/s. NMDC – CMDC Limited (NCL)" falls under the Schedule "Mining of Minerals Open Cast Mining -1 (a)" of Category-'A' as per Environmental Impact Assessment (EIA) Notification SO 1533, of 14-09-2006 and its subsequent amendment.

is interlinked with

"Screening Cum Beneficiation Plant (750 TPH of 4 lines each) along with 2200 TPH Downhill Conveyor and Loading Facilities in 100.077 Ha. forest area and 22.4658 Ha. revenue land (Govt., Private and Bade Jhad ke Jungle) located at outside the Mining Lease area of Bailadila Iron Ore Deposit-4 at Village; Bhansi, Tehsil: Bade Bacheli, District South Bastar Dantewada, Chhattisgarh of M/s. NMDC-CMDC Limited (NCL)" falls under the Schedule "Mineral Beneficiation - (2b)" of Category-'A' as per Environmental Impact Assessment (EIA) Notification SO 1533, of 14-09-2006 and its subsequent amendment.

ToR for Bailadila Iron Ore Deposit-4 Mine and Screening cum Beneficiation Plant outside the mining lease of Deposit-4 were issued vide No. IA-J-11015/104/2021-IA-II(NCM) dated 11.03.2022 and vide F. No. IA-J-11011/23/2022-IA-II(IND-I) dated 21.02.2022 respectively.

Single Public consultation will be held based on the EIA report thus prepared for both components as per the provision of EIA notification 2006.

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

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Ltd. for the purpose of Prospecting and Mining of Iron Ore. Further, Ministry of Mines, GoI on 18.02.2021 has issued amendment for the revised coordinates in the earlier issued Gazette Notification for reservation of Bailadila Iron Ore Deposit-4.

Mineral Resource Department (MRD), Government of Chhattisgarh (GoCG) on 26.06.2021 has issued a Letter of Intent (LOI) for grant of Mining Lease for the said area of Bailadila Iron Ore Deposit-4 for a period of five years.

Subsequently, MRD, GoCG on 07.08.2021 has issued an amendment in the Letter of Intent (LOI) prescribing the requirement of approved Mining Plan.

Further, MRD, GoCG on 04.05.2022 has issued an amendment in the Letter of Intent (LOI) mentioning period of the mining lease as 50 years.

The total mining lease area earmarked for Bailadila Iron Ore Deposit-4 is 646.596 Ha. Total mining lease area is forest land. To develop Screening cum Beneficiation Plant along with 2200 TPH Downhill Conveyor and Loading facilities an area of 100.077 Ha. forest area and 22.4658 Ha. revenue land (Govt., Private and Bade Jhad ke Jungle) has been identified. Application for diversion of the Forest Land has been submitted vide proposal no. FP/CG/MIN/146694/2021 dated 04.10.2021 for total area of 688.3695 Ha. (570.10 Ha inside mining lease, 100.077 Ha outside mining lease in the reserve forest and 18.1925 Ha Bade Jhad ke Jungle). An area of 76.496 Ha demarcated as Tree Fern Area inside the mining lease is not included in the forest diversion proposal.

The Mining Plan was approved from IBM vide letter no. Dantewada/Fe/Khanij-1292/2021/-Raipur dated 24-09-2021.

1.2 Project Description

The Bailadila Deposit-4 Mining Lease area is located near village Bachel/Bhansi, Tehsil Bade Bachel, District Dantewada, State Chhattisgarh. It is located at Bailadila range of hills 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 to Geedam. Bachel is nearest town. Dantewada is district headquarters. Bailadila Iron Ore Deposit-4 having lease area of 646.596 Ha is located in the Topo Sheet No. E44J2 between longitude 81°12'02.90192"E to 81°13'07.02661"E and between latitude 18°41'26.17920"N to 18°43'38.52758"N.

Based on ToR issued by MoEF&CC, GoI (EAC IND-I) vide Letter No. IA-J-11011/23/2022-IA-II(IND-I) dtd. 21/02/2022 NMDC-CMDC Ltd has incorporated Dry Disposal Tailing System (Hydraulic filter-based technology) in the beneficiation process of the Bailadila Iron Ore Deposit-4 Project.

The ML area extended over on area of 646.596 ha in the Forest Land with iron ore production capacity of 7.0 MTPA. However, out of the 646.596 Ha Forest Land, proposal for land diversion is moved only for an area of 570.1 Ha. Remaining Forest area, within the Mining Lease area will not be diverted for the Mining Purposes. Further, an area of 100.077 Ha. forest area and 22.4658 Ha. revenue

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land (Govt., Private and Bade Jhad ke Jungle) outside the Mining Lease will also be required for the development of Screening cum beneficiation plant, Loading plant & railway siding, stockpiles, water settling/recirculation ponds and offices etc.

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.

Initially the mine will be developed for 1195600 Tonnes per annum in the first year and later on 2.0 MTPA of ROM production from second to fifth year. Thereafter the capacity of the mine will be gradually augmented to 7.0 MTPA of ROM.

Deposit-4 mine has been designed for operation as fully mechanized opencast mine using shovel-dumper combination and various processes are - drilling, blasting, excavation, quality control, ore processing (crushing with 2000 TPH) & transportation of ore through Downhill conveyor and waste disposal. However, during the 1st five years of Mining operation various processes like drilling, blasting, excavation, quality control, ore processing (crushing & screening with 400 TPH mobile crushing and screening units), loading of finished products and waste disposal etc. are planned with smaller mining machineries.

Waste (Shale and Banded Hematite Quartzite) will be dumped in the Waste Dump outside ultimate pit limit.

The deposit will be exploited by deploying shovel-dumper combination. The deep-hole drilling and blasting technique will be adopted for rock fragmentation.

In the initial five years of mining when the mine production capacity would be limited to 2 MTPA, it is proposed to deploy smaller equipment for mine working. During initial five years, drilling would be carried out using 150 mm diameter drill machine whereas ore production and waste removal will be done by 3.2 cum bucket excavator with 25 T capacity dumpers. After five years, when mine capacity will be upgraded to 7 MTPA, it is proposed to replace smaller equipment with higher capacity equipment. From 6th year onwards, drilling would be carried out using 250 mm dia. drill machine whereas ore production and waste removal will be done by 8.0 cum bucket excavator (derated from 10 cum bucket excavator) with 100 T dumpers.

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.

Screening cum Beneficiation Plant will be 750 TPH of 4 lines each along with 2200 TPH Downhill Conveyor System and Loading Facilities in 122.5428 Ha. area outside the Mining Lease area of Bailadila Iron Ore Deposit-4 at Village: Bhansi, Tehsil: Bade Bachel, District South Bastar Dantewada, Chhattisgarh.

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Proposed new Screening Plant @EL 580m consists of 4 Nos. screening lines having 4 Nos. of double deck vibrating screens of design capacity of 750 TPH (primary screens) and 4 Nos. Secondary Vibrating Screens of 550 TPH capacity.

The screening plant covers open stockpile, a four-line screening plant & tertiary crushing plant, wet circuit system, conveyor system, electrical sub-station, electrical building / control room, office & stores buildings, maintenance sheds, canteen & rest rooms, sprinkler water & dry fog system pump houses, raw water reservoirs, recirculation water tank & pumping systems, dry tailings disposal system etc.

Deposit-4 will be developed for production of 7.0 MTPA Iron ore by producing 5.5 MTPA & 1.5 MTPA in dry mode and wet mode respectively. During the monsoon season, dry screening of ore in secondary screen will be difficult due to binding of screen deck by high moisture sticky iron ore. Also, jamming of the connecting chutes hamper the total production. Sometimes operation of screening plant even for 08 hours in a day with rated capacity is very difficult due to above mentioned problems. To overcome this problem, it is envisaged to incorporate Wet Screening facility in Secondary Screens during monsoon season.

In the process of wet classification, the adhered fine particles on coarse ore as well as natural & generated ultrafine particles of Iron, silica and alumina are being reported as slimes and Fe grade is generally below 60% Fe. These slimes will be dry stacked for blending with high grade fines.

The crushed iron ore (-150mm) will be feed to the screening cum beneficiation plant situated outside the mining lease and same will be transported to screening cum beneficiation plant through the downhill conveyor belt from the crushing plant situated inside the mining lease of Deposit-4. During initial five-year period, when plant and railway siding will be under construction, iron ore produced will be transported to the customers through road. Though, after initial five years period when loading plant/railway siding of Deposit-4 will be constructed and commissioned, iron ore will be transported through rail, however, this will further depend on completion of the work of doubling of KK rail line and connection of Rawghat to Jagdalpur through rail. In view of this, 20% of total project capacity may be transported through road in foreseeable future beyond the initial five years period.

The salient features of Bailadila Iron Ore Deposit-4 is given in **Table – 1.1.**

TABLE- 1.1

Salient Features of Bailadila Iron Ore Project Deposit-4		
Sl. No.	Description	Particulars
1	Mining Lease Area	646.596 Ha.
2	Infrastructure Area Outside the Mining Lease of Bailadila Deposit-4.	122.5428 Ha. (100.077 Ha. forest area and 22.4658 Ha. revenue land (Govt., Private and Bade Jhad ke Jungle)
3	Type of mine	Open Cast Mine

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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	1:0.625
8	Waste Excavation (Maximum)	6.41 MTPA (Estimated by mine scheduling software MineSched)
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 7.5 KM
17	Screening Plant with Beneficiation Facilities	4 lines of 750 TPH
18	Tertiary Crushing	2 lines of 800 TPH
19	Loading and Stacking Facilities	3000 TPH Loading Facilities with Lump Stockpile of 3.2 LT and Fine Ore Stockpile 2.3 LT
20	Average no. of working days / Number of Shifts / Working Hours for Screening cum Beneficiation 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 8,630 KLD (Wet Screening for 4 months of monsoon period). Considering the future requirements including the proposed township, Water requirement is envisaged to be around 20,000 Cu.m per day at the peak rated capacity which will be met from the source of existing Sankani Nalla and Nerli Nalla (Sankani Nadi).
23	Total Project Cost (For entire Bailadila Iron Ore Deposit-4 including ancillary facilities located outside the Mining Lease Area)	Rs. 4091.33 Crores (approx.) (Approx. Rs. 1156.163 Crores inside ML area and approx. Rs. 2935.167 Crores outside ML area)

(Source: Mine Planning-NMDC-CMDC Limited)

1.3 Description of the Environment

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 baseline environmental data for preparation of EIA/EMP report for Bailadila Iron Ore Deposit-4 & Screening cum Beneficiation Plant was carried out for 3 months i.e. from 1st March-2022 to 31st May-2022 representing Pre-Monsoon season

1.3.1 Land Use

The land use pattern of the study area for Bailadila Iron ore mine Deposit-4 indicates that 31.64% of the area is under dense forest land and the remaining area is accounted for by Mining Area, Rocky/Barren Area, Waterbodies, Streams, settlements etc. The land use pattern of the study area for screening cum beneficiation plant indicates that 44.15% of the area is under dense forest land and the remaining area is accounted for by Mining Area, Rocky/Barren Area, Waterbodies, Streams, and Settlements etc.

1.3.2 Soil Quality

Six soil samples were collected from mining lease area, screening cum beneficiation plant area, agriculture areas, forest areas, etc., and analysed for various physico-chemical and organic parameters. It is found that the pH of soil is normal ranging 6.66-7.21, average nitrogen (N) values were in medium to high range (56.90-132.5 kg/ha), average potassium (K) value is also in the range of low to high (80.50-130.4 kg/ha). The average phosphorus (P) values were found to be medium (11.10-17.10 kg/ha) range.

1.3.3 Climatology and Meteorology

Meteorological data was recorded hourly for three months. Calm condition prevailed over 12.40 % of the time of the study period. The first predominant wind direction was from South-West to North-East over approx. 5.5 % of the time in which speed of 0.30 to 3.0 m/s was recorded and second predominant wind direction was from North-West to South-East over approx. 5.0 % of the time in which speed of 0.3 to 3.0 m/s was recorded. Maximum & minimum temperature recorded were 39.19^oC & 18.44^oC respectively.

1.3.4 Ambient Air Quality

The ambient air quality monitoring was carried out during the study period at fourteen locations, covering twelve for mining & allied activities (core & buffer zone) and eleven for screening cum beneficiation plant core & buffer zone) at different locations representing upwind, cross wind, and downwind directions. Out of 12 locations considering core & buffer zone of mining lease area, the maximum Respirable Particulate Matter (PM₁₀) was found to be 71.50 µg/m³ at Akashnagar and 71.40 µg/m³ at Padapur followed by 67.53 µg/m³ at ML area. The particulate and gaseous pollutants are found well within the National Ambient Air Quality standards 2009.

1.3.5 Water Quality

Total 8 ground water sampling locations were selected for Mining lease area and 7 sampling locations for Screening cum Beneficiation Plant area. In which 7 locations are common for each other in both 10 Km map. Total 8 surface water locations selected for surface water study in which 6 sampling locations selected for Mining lease area and 6 sampling locations for Screening cum Beneficiation Plant area (in which 4 locations are common for each other at 8 locations in both 10 Km map). All the samples were found well within the prescribed limits. The result of ground water shows that all the parameters are well within the acceptable limit of IS: 10500. The analysis result of surface water shows that all the parameters are well within the prescribed limit of IS: 2296 (Class C) i.e. for surface water quality.

1.3.6 Ambient Noise Levels

Total 8 sampling locations selected for Mining lease area (One in core zone, 7 in buffer zone) and 8 sampling locations for Screening cum Beneficiation Plant area (One in core zone, 7 in buffer zone). In which 3 locations are common for each other in both 10 Km map. The noise levels at all locations were found well within the limits of Ambient Air Quality Standards w.r.t. Noise.

1.3.7 Flora & Fauna

There is no biosphere reserve, national park, tiger reserve, elephant reserve, wildlife sanctuary, or bird sanctuary within the study area. Two reserve forests fall in study area. (i) Bijapur Reserve Forest (ii) Bailadila Reserve Forest. Majority of the landscape in the Mining Lease area is characteristic of having dense forest with patches of degraded natural landscape. Mining lease area are dominated by Terminalia tomentosa, Syzygium cumini, Acacia catechu, Cassia fistula.

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 seven Schedule-1 species reported in the Dantewada Forest Division namely Sloth Bear, Indian Pangolin, Panther, Python, Bengal Monitor Lizard, Bastar Hill Myna and Common Peafowl. A draft Wildlife conservation & management plan has been prepared and will be submitted for approval of Chief Wildlife Warden shortly. An amount of Rs. 19.98 Crs. has been allotted towards Wildlife Conservation & Management Plan.

1.3.8 Social Environment

As per census 2011 data, the study area consists of about 27 villages, with 14554 households and 59684 population. The sex ratio in the study area is 969. 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%. The literacy rate is 56.56%. NMDC-CMDC Ltd. will support to education in the nearby villages under CSR funds.

1.4 Anticipated Environmental Impacts

Mining being a site-specific activity, excavation is bound to be done at a place where minerals actually exist. Opencast mining operations with crushing and screening activities result in air pollution in the form of particulate and gaseous pollutants. Adequate mitigation measures will be implemented to control air pollution. The impact due to proposed Bailadila Iron Ore Deposit-4 project has been predicted using AERMOD with digital elevation model option.

Emission sources considered include transportation activity. 3D terrain modelling has been done. The modelling results indicate that the maximum incremental Ground Level Concentrations (GLC) of PM₁₀, PM_{2.5}, NO₂ & SO₂ with controlled measures will be about 18µg/m³, 8.46µg/m³, 11.4µg/m³ & 7.58µg/m³ respectively. The overall resultant concentrations (GLC's + baseline) were found well within the NAAQ 2009 standards.

The water will be mainly required for dust suppression in mining areas and ore processing plants. Two Effluent Treatment Plant of 10 KL capacity each will be put into operation for treatment of suspended solids and oil & grease generated due to the washing of HEMM. A 200 KLD STP will be installed within screening plant to treat domestic waste water. The mining operations will be 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.

R&R issues are involved for proposed screening cum beneficiation plant. About 15 - 16 Nos. families will be affected in the revenue land / forest revenue land area of the project. These families will be compensated, resettled and rehabilitated socially, culturally and economically as per extant provisions of the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act-2013 and rules thereof. Guidelines given in the Ideal Rehabilitation Policy 2007 of State of Chhattisgarh will also be followed.

1.5 Mitigation Measures

Drilling Operations

When the blast holes will be drilled, the cuttings from the holes will be flushed out of the holes by passing the compressed air through drill rods and the cuttings will be 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. During drilling operation sharp bits will be used and wet drilling system will be practiced.

Blasting

The air gets polluted during blasting operations will be in the form of chemical gasses produced during the explosion and dust generated during blasting. However, in the mine the number of holes blasted during any blast event will not exceed a maximum of 30/40 holes per blast and on an average about 20 per blast,

thus the gasses generated during explosion will not likely to contribute much to the air pollution. As such no ill effects will be there due to chemical gases produced during the explosion and dust generated during the blast either on vegetation or on the residents of the nearby township or residential houses. Optimal use of explosives, controlled blasting techniques with the use of NONEL (Non-Electric Detonators), optimization of initiation systems will be adopted. Regular water sprinkling before and after the blasting in the surrounding area of the blasting face will be adopted.

Excavation in Ore and Waste

During ore or waste excavation, hauling of ore/waste, feeding of ROM in crusher and dumping of waste in waste dump yard during dry months, some dust will be generated. Blasted ore and waste will be reclaimed from blasted muck pile by shovels and same will be transported from mine face to the crushing plant/waste dump by 100 tonnes capacity dumpers. To lessen the generation of dust during excavation, the excavators will have inbuilt mechanism of air-conditioned cabin to protect the operator from fugitive dust and water will be sprayed on the blasted muck pile. Also, main mine haul roads where dumper will ply, will also be sprayed with water through 28 KL capacity water sprinklers (four nos.) during dry seasons. Thus, there will be negligible dust generation during excavation and haulage of ore and waste.

Crushing Operation

Fugitive dust will be generated in the crushing plant during dry months when the ROM ore will be crushed in the crushers and will be carried to the primary surge pile through conveyer. In order to ensure effective dust suppression, water will be sprayed in the form of a mist in the crusher. Since crushing will be done by the equipment which will be housed in an enclosure, there will be no threat of air pollution to the surrounding areas due to the crushing plant as the GI sheet enclosure premises. The atomized water sprinklers aided with compressed air will be installed at the point of ore dumping platform at Deposit-4 crushing plant for effective dust suppression.

Down Hill conveyor Operation

Crushed ore from the crusher will be transported through a system of closed conveyor belts to screening cum beneficiation plant for further processing. This system will be developed in order to control the dust generation during transportation of ore from one place to another. The conveyor system will be stretched from crushing plant to screening plant covering a distance of around 8.7 km. It will be ensured that conveyor system will work efficiently and therefore able to control dust emission.

1. Dry fog dust suppression system (DSS) will be installed at Primary Crusher and Secondary Crusher area and in Downhill conveyor system.
2. The locations where DSS will be installed along with nozzles are dumper platform, all screen levels, conveyor transfer chutes, intermediate stockpiles, screening plant, loading plant etc.

Screening and Loading Operation

The screening plant will be housed in a huge GI sheet enclosure, which will act as a good shield for the prevention of dust particles escaping out of the plant building. Fixed water sprinklers in the loading plant area will be used. All the HEMMs and other vehicles will be maintained in good condition so as to keep the exhaust emissions well within the limits. All project vehicles will undergo Pollution under Control tests to assess their emissions. Maintenance of vehicles will be carried out to keep emission levels under control.

Control Measures at Mineral Processing Plants

- Water will be sprinkled on the ore before crushing. The atomised water sprinkler aided with compressed air at the point of ore dumping platform will be installed at crushing plant;
- Water sprinklers along with compressed air forming mist will be installed at all transfer points in the mineral processing plant to suppress the dust at Deposit-4;
- All the conveyor belts will be covered and will be equipped with telescoping chutes at transfer points to reduce the vertical fall of ore material;
- The vehicles will be maintained properly and exhaust emission will be checked regularly;
- Speed restrictions will be imposed on the HEMMs and light vehicles to minimize the dust generation in mining and mineral processing plant areas;
- In the Loading plant area, lump ore & fine ore reclaimers will be provided with dust suppression arrangement. The mist water will be sprayed while reclaiming the ore from stockpile for loading into railway wagons through wagon loading system.

Water Pollution & Control:

Garland drains will be constructed at the side & toe of waste dumps. Buttress walls will be constructed at the toe of the active waste dumps to arrest the silt material flowing with water during rainy season. Coir matting and afforestation will be carried out at the dump slope. Two Effluent Treatment Plant of 10 KL capacity each will put into operation for treatment of suspended solids and oil & grease generated due to the washing of HEMM. A 200 KLD STP will be installed within screening plant to treated domestic waste water.

Noise & Vibration Control and Management

Deep hole blasting will be restricted to day time hours only; Proper and timely maintenance of mining machinery; Noise levels will be controlled by using optimum explosive charge per delay and milli second delay detonators and proper stemming to prevent blow out of holes; Speed of moving dumpers and other vehicles running in the mine will be limited to moderate Speed (25 km/hr) to prevent undue noise as per DGMS circulars enforcing safety standards; Provision of user-friendly soft type ear muffs/ear plugs to workers in noise prone area; Proper blast design; Avoiding excess confinement of charges; Proper stemming of holes will be carried out etc.

Waste Management:

There is negligible top soil. Lateritic material, shale and banded iron formations (BIF) analyzing less than 45 % Fe has been considered as waste. Waste (Shale and Banded Hematite Quartzite) will be dumped in the Waste Dump outside ultimate pit limit. Waste will be backfilled in the North Block after extracting all the Ores and associated waste materials of the Deposit during the life of the Mine. Total mineable waste in the Bailadila Deposit-4 is 68.17 MT. The overall stripping ratio of deposit is 1:0.63. The maximum waste excavation of 6414000 Tonnes will be done during the 16th Year of operations.

Overburden Dump Management:

Efforts will be made to stabilize active dumps. The overburdens will be dumped as per the specifications of IBM and MoEF&CC stipulated conditions and the slope of the dump will be maintained at not more than 28°. For stabilizing the dumps, engineering structures will be made, followed by biological measures, to achieve faster restoration. The combinations of grasses, herbs, shrubs, creepers and tree species shall be used in restoration process. Depending upon stability and age, the plantation will be done either by seed broadcasting, hydro-seeding or planting of seedlings. In addition to seed broadcasting and planting of seedlings, planting of suitable herbs and shrubs shall be done on the slopes by making holes in geotextile coir mat.

Benches and trenches will be made to make the slopes of OB dumps gentle, followed by seed broadcasting and planting of seedlings of shrubs, namely *Clerodendrum viscosum*, *Helicteres isora*, *Indigofera cassioides* etc. trees species like *Aegle marmelos*, *Alangium salvifolium*, *Albizia lebbeck*, *Albizia procera*, *Annona squamosa*, *Anogeissus latifolia*, *Cassia fistula*, *Dalbergia sissoo* etc. Root stock/slips of grasses, namely, *Bothriochloa pertusa*, *Cymbopogon flexuosus*, *C. martini*, *C. nardus*, *Cynodon dactylon*, *Dactyloctenium aegyptium*, *Dichanthium annulatum*, *Eleusine indica*, *Heteropogon contortus*, etc.

Green-belt development Programme

In order to minimise the impact of mining on Environmental component outside the mining lease area, green belt zone will be established in Safety Zone inside the mining lease area. The green belt will act as a barrier to trap the suspended dust particles and also suppress air pollutants. The area proposed for green belt development includes the area under safety zone all along the mine lease boundary. Out of 8.488 ha. of Safety zone area, it is proposed for 3.058 Ha all along the mine lease boundary will be planted with native species at a rate of 2500 plants per hectare in the 1st year (1.248 Ha.) and second year (1.81 Ha.). Rest 5.43 Ha of Safety zone area will be planted @ 1000 plants per ha. of 1.81 Ha. each year in the successive 3rd year, 4th year and 5th year. Plantation in the Dump No.-1 is proposed in the 3rd year of 1.672 Ha. @ 1500 plants per Ha. Gap plantation in the remaining area is proposed @ 1000 plants per ha. of a total area of 48.38 Ha. in the 2nd year (12.08 Ha.), 3rd Year (12.08 Ha.), 4th Year (12.08 Ha.), and 5th Year (12.08 Ha.). It is proposed for plantation of 62000 saplings in the 1st five years for a total area of 58.48 Ha.

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Green area at the infrastructural facilities outside mining lease will be 400575 m² (33% of the total area of outside mining lease) and afforestation/gap plantation will be done as 2500 trees per hectare i.e. a total of 100144 trees for afforestation/gap plantation.

1.6 Environmental Monitoring Program

Regular environmental monitoring of ambient air, meteorology, water quality, ambient noise, soil quality, etc. will be carried out by MoEF&CC/CPCB recognised laboratories in different seasons of the year. Vibration monitoring studies will be conducted by reputed agency and in-house by using seismograph. Ground water levels and quality will also be monitored in four seasons of the year. The monitoring data will be submitted on the Parivesh Portal of MoEF&CC along with six monthly environmental progress reports. Two continuous ambient air quality monitoring stations will be installed for continuous recording of PM₁₀, PM_{2.5}, SO₂, NO₂ & CO on a continuous basis.

1.7 Additional Studies

The complete mining and screening cum beneficiation operations will be carried out under the management, control, and directives of a qualified manager. Moreover, mining and screening cum beneficiation supervisory staff will be imparted basic, refresher, first aid, and frontline supervisory statutory training from time to time. A Disaster Management Plan (DMP) will be 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 will be widely circulated and personnel training through rehearsals or mock drills will be conducted. Training exercises will also be held to ensure that all personnel will be familiar with their responsibilities and that communication links will functioning effectively.

The Occupational Health Centre will be established and the annual budget will be Rs. 56.27 lakhs. The initial and periodic medical examinations will be carried out as per the provisions laid out in the Occupational Safety and Health and Working Conditions Code, 2020.

1.8 Project Benefits

Bailadila Iron Ore Deposit-4 project will provide 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 direct employment will be 700, out of which 315 will be for mining lease area and 385 will be for screening cum beneficiation plant. Indirect employment including contractual employment will be about 1400. Total population expected to be benefited from the proposed mining lease and screening cum beneficiation plant will be around 10500. Indirect employment will be generated through handling of material, transport, banks, schools, restaurant, shops, petty trade etc., which will

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improve social & economic standing of the people in the locality. Further people will also get opportunity to engage themselves and earn by rendering various services to the community which will help, in improving social & economic condition of the local people.

Company will undertake peripheral developmental activities by implementing welfare measures in surrounding area. For this purpose, Company will spend around minimum 2 % of the average net profits of the company during the three immediately preceding financial years for CSR activities.

1.9 Environment Management Plan

The monitoring programme will serve 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.

NMDC-CMDC Ltd. has planned an amount of Rs. 91.21 crores under capital cost for the implementation of the Environmental Management Plan and the recurring cost per annum is about Rs. 5.21 crores.

1.10 Conclusions

The Bailadila Iron Ore Deposit-4 project 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-CMDC Ltd. will implement EMP measures and social welfare measures for the development of the area.