



NMDC LIMITED

EXECUTIVE SUMMARY

OF

EIA / EMP REPORT

FOR

PROPOSED 10 MTPA

IRON ORE SCREENING & BENEFICIATION PLANT – II

AT DONIMALAI IRON ORE COMPLEX

BELLARY DISTRICT, KARNATAKA



**MECON LIMITED
RANCHI – 834002
INDIA**

EXECUTIVE SUMMARY

1.0 PROJECT DESCRIPTION

NMDC Limited is a Government of India undertaking under the Ministry of Steel. NMDC is engaged in exploration of iron ore and is the largest producer of iron ore. Presently NMDC operates the Bailadila Iron Ore Mines (Kirandul and Bacheli Complexes) in South Bastar District of Chhattisgarh, Donimalai Iron Ore Complex and Kumaraswamy Iron Ore Mines in Bellary District, Karnataka and Majgawan Diamond Mining Project, Panna Dist., Madhya Pradesh. NMDC is presently setting up a 3 MTPA green-field integrated steel plant at Nagarnar, Bastar Dist., Chhattisgarh, which is at an advanced stage of construction.

NMDC has proposed to set up a new iron ore screening cum beneficiation plant adjacent to the existing Screening cum Beneficiation Plant outside Donimalai Mining Lease area in forest land. The new screening cum beneficiation plant will process the ore from both Donimalai and Kumaraswamy iron ore mines of NMDC Limited. Initially, the plant will be commissioned with 7 Mt/yr and will be expanded to handle additional 3 MTPA of ore. The ultimate capacity of the plant will be 10 Mt/yr. The beneficiated ore from the plant will be sold in the market as being done presently.

The salient features of the project are:

Proposal	Setting up a new 10 million tonnes per annum (MTPA) capacity iron ore screening cum beneficiation plant at Donimalai for Donimalai and Kumaraswamy Iron Ore Mines, Bellary District, Karnataka.
Location of Project	In Donimalai Reserve Forest. Adjacent to existing Iron Ore Screening cum Beneficiation Plant of Donimalai Iron Ore Mines in Sandur Taluk, Bellary District, Karnataka
Project Area	75.920 ha (<i>13 ha for plant + 62.30 ha for tailings ponds + 0.62 ha for tailings pipelines, OHE lines and other infrastructure</i>)
Latitude	15°04'28.53" N to 15°03'20.74" N
Longitude	76°36'10.70" E to 76°36'51.19" E
Land Use	Entirely Forest Land
Capacity	Total Throughput 10 MTPA of Iron Ore. Project to be implemented in 2 phases. In Phase – I: 7 MTPA. Phase-II: 3 MTPA additional.
Method of Working	Screening, classification with water followed by dewatering & desliming
Electricity Demand	Peak Demand - 1.5 MVA. Annual energy consumption – 7.2×10^6 kWh. Power will be drawn from grid.
Solid Waste Generation	69417 m ³ /yr of tailings in Phase I. 99167 m ³ /yr at full capacity.
Waste Disposal	Pumped to tailings pond(s) located in project area
Life of Tailings Ponds	37 Years



Water Demand	60979 m ³ /day industrial water + 5 m ³ /day potable water.
Water Source	Recycled water: ~52,197 m ³ /day; Taranagar Dam: ~8787 m ³ /day
Manpower	81 (10 executives + 71 workers)
Infrastructure	Mostly existing. Road, power lines, water supply pipeline have to be extended into project site.
Mineral Transport	The iron ore after crushing at Kumaraswamy and Donimalai iron ore Mines will be transported to proposed plant by cross-country covered downhill conveyor. The beneficiated ore will be transported through covered conveyors to existing loading plant for despatch to customers through railway wagons at Ranjitpura Railway siding.
Proposed Investment	Rs.399.75 Crores

2.0 PROJECT DESCRIPTION

The Ore is fed either from downhill conveyor 723 through Belt Feeder (800) for Kumaraswamy ore or from reversible conveyor 727 for Donimalai ore at TH-3 to silos through tripper conveyor (801) provided with travelling tripper (802). The ore is extracted from these four RCC silos (which are about 40m height with storage capacity of 4,000 tons each) by Apron Feeder and fed to the 4 screening lines.

The ore extracted through apron feeders (805) is fed to double deck primary screens (808) (with 30mm & 20mm apertures) through belt conveyor (806).

The oversize material of primary screens (808) is fed to tertiary crusher (822) to crush (-) 100mm ROM to (+) 30mm. Two nos. (1 working & 1 standby) 7' cone crushers with operating capacity of 750TPH each are envisaged. The middle fraction and the under size material of primary screen (808) are fed to Calibrated Lump Ore (CLO) conveyor (809) and secondary screens (811) respectively. Primary screen (808) and secondary screen (811) will have a design capacity of 750 TPH and 550 TPH respectively.

The crushed ore of tertiary crusher (822) is fed to double deck tertiary screen (824) (with 30mm and 6mm apertures), wherein the oversize material (+ 30mm) is re-circulated to tertiary crusher (822). The middle fraction of tertiary screen (824) (-) 30 (+) 6mm and under size fraction (- 6mm) of tertiary screen (824) are fed to CLO product conveyor (809) and fines product conveyor (829) respectively. Tertiary screen (824) (1 working and 1 standby) will have a design capacity of 750 TPH.

Under size of secondary screen (811) is fed to classifier (835) of wet circuit system (Beneficiation system). Suitable gate arrangement is envisaged at the bottom of under size chute of secondary screen (811), which diverts material to launder leading to classifier circuit when operating on wet mode. Under dry mode the gate will be lifted / opened to divert the material to fines conveyor (829).



Conveyor (813) receiving middle fraction [(-) 10 mm (+) 6 mm] of secondary screen (811) is envisaged with reversible operation to feed the material either to fines conveyor (829) or CLO conveyor (832) based on the requirement.

The proposed CLO conveyor (832) will have two-way discharge chute with prism gate arrangement, which will either feed the material to existing Lump ore conveyor (501), which conveys the material to the existing loading plant or to new lump ore conveyor (future) which will convey the material to new loading plant (future).

The proposed Fine ore conveyor (829) will have two-way discharge chute with prism gate arrangement, which will either feed the material to existing fine ore conveyor (411), which conveys the material to the existing loading plant or to new fine ore conveyor (future) which will convey the material to new loading plant (future).

Classifier (835) underflow is fed to dewatering screen (836) and the overflow to desliming hydro-cyclones (841). The overflow of dewatering screen (836) is fed to fines conveyor (829) and the underflow is diverted to desliming cyclones (841). The densifying cyclones overflow (with separation size of 44 Microns/325 Mesh) is diverted to thickener and the underflow to filtrate unit to recover some fines, which in turn is fed to fines conveyor (829). The iron ore tailings generated from the plant shall be impounded in proposed Tailing ponds.

3.0 DESCRIPTION OF THE ENVIRONMENT

The study area covered 10 km radius area around the project site. Baseline environmental data generation was carried out during full winter season, 2014 - 15 covering December, 2014, January, 2015 to February, 2015. Primary data was also augmented by data from secondary sources. The baseline environmental data generation covered micro-meteorology, land use, air quality, water quality, noise levels, soil quality, ecology, traffic density and socio-economic environment. Information on climate and population were collected from secondary sources.

Micro-Meteorology

A meteorological station was set up at the existing iron ore screening cum beneficiation Plant i.e. adjacent to the proposed project site. Air temperature, wind-speed and direction and relative humidity were recorded at one hour intervals continuously throughout the monitoring period. Rainfall was recorded on a daily basis.

It was noted that air temperature ranged between ~43.5°C and ~22°C. The predominant wind directions were north-north-west and north. Calm conditions prevailed for almost 84% of the monitoring period. During the monitoring period no rainfall was recorded.

Land Use

The entire project area is located in Donimalai Reserve Forest (open mixed jungle). In the study area, land uses include, Forest Land, Agricultural Land, Scrub Land, Fallow / Grass Land, Stony Wastes and Mines, Rural and Urban Settlements, Surface Water Bodies, Roads and Railways.

Air Quality

Ambient air quality was monitored at ten locations. Samples were collected for Particulate Matter (PM₁₀), Sulphur-di-oxide (SO₂) and Oxides of Nitrogen (NO_x) 24 hours continuously twice a week for twelve weeks (i.e. 24 samples) at each location. The results were compared with the National Ambient Air Quality Standards, 2009 for "Industrial, Residential, Rural and Other Areas". It was found that that at the villages, ambient air quality parameters were within the norms.

Water Quality

Water quality monitoring covered surface water (4 locations), ground water from 4 locations, effluents (discharge from existing tailings pond) and drinking water supplied at the existing beneficiation plant canteen. The results of surface water, ground water and drinking water analysis were compared with the standards for drinking water [IS:10500 (as amended in 2012)]. The results of effluent analysis were compared with "General Standards for Discharge of Environmental Pollutants to Inland Surface Waters" as prescribed by Ministry of Environment, Forest and Climate Change (MoEFCC), Govt. of India.

Analysis of surface water indicates that water from three of the four locations is more or less suitable for drinking. However the water from the stream flowing down from the mine area and passing just behind NMDC's main Administrative Building contains excess of iron.

Analysis of ground water samples indicates that ground water from all four locations is unsuitable for drinking because of excessive hardness and magnesium content. This is most likely because of the local geology.

Over flow water from the existing tailings pond was found to conform to the limits.

Noise levels

Ambient noise levels were recorded at one hour intervals continuously for 24 hours at 9 locations in the study area. At eight of the noise monitoring stations, day time noise levels were within the standards for Residential Areas prescribed by Central Pollution Control Board. At night, noise levels exceeded the standards at three locations on account of truck traffic.

Work zone noise was measured at one hour intervals continuously for 8 hours (1 shift) at five locations within the Donimalai iron ore complex including at the existing



beneficiation plant and at the railway siding. At all work zone noise monitoring locations, the noise levels were within the maximum limit of 90 dB(A) for 8 hours exposure specified by Directorate General of Mines Safety (DGMS).

Ecology

There are no Biosphere Reserve, National Park, Elephant Reserve, Tiger Reserve, Sanctuary or habitat for migratory birds in the study area.

The entire proposed project area is located in Donimalai Reserve Forest. The area earmarked for the beneficiation plant proper is on the slope of an escarpment. The areas earmarked for the tailings ponds are natural depressions. Due to low rainfall, the vegetation is rather sparse and most of the trees are small. The tree density ranges from 400 – 800 trees per ha in the proposed plant area. In the northern tailings pond area the tree density varies from 600 – 900 trees per ha. At the southern tailings pond site, a check dam had been constructed across a natural seasonal drainage channel. This dam has now filled up with debris. However the tree density and diversity is higher compared to plant site and the northern tailings pond site. The project area is adjacent to a large open cast mine. The only animals in this part of Donimalai R.F. are common small types. However there are several species of birds.

The study area comprises of forests, agricultural lands, waste lands (scrub, pastures and stony cliffs), iron ore mines and settlements. Due to low rainfall (~530 mm per year), the vegetation is sparse. The forests are open type with few tall trees. Maswada (*Chloroxylon switenia*) and teak are the most common type of trees in the forests. The bio-diversity of animals is low. Leopards, sloth bears and black-bucks are found in the study area, but well away from the proposed project area.

Traffic

Traffic density analysis has been carried at two (2) locations: In front of NMDC's Pellet Plant and near Donimalai Township opposite the CISF Barracks on the Donimalai – Sandur / Hospet Road. At each traffic density analysis location, traffic density was recorded at hourly intervals for 24 hours continuously by counting the numbers and types of vehicle passing through these stations. It was noted that maximum number of vehicles per hour varied between 75 to 291. More than half the vehicles were heavy vehicles, mostly trucks carrying iron ore. It is to be noted that since no ore from Donimalai and Kumaraswamy Mines are transported by trucks, the high truck traffic was on account of other nearby mines.

Socio-Economics

Socio-economic study was carried out by studying Census (2011) Records and by sample survey in nearby villages.

The population within the study area is about 82,200. The sex ratio is 954 women for every 1000 men, which is higher than than the National Average. The literacy rate is



about 63%. As per census data, only about 23% of the people are employed in agriculture. However as per the sample survey carried out in the villages around the project site, ~37% of the people are dependent on agriculture, ~32% in business and ~26% work in mines, industries and allied activities.

In the study area sugar cane is the major crop accounting for about 57% of the Gross Cropped Area followed by maize (~43% of the GCA). Other crops include onions, sun-flower etc. Which are grown in small patches.

From a sample survey amongst the local villagers, it was indicated that about half of the family income is spent on food, about 1/6 is spent on clothes, about 1/8 is saved and about 1/9 is spent on children's education.

4.0 ANTICIPATED IMPACTS AND MITIGATION MEASURES

Solid Waste Management

The main waste which will be generated from the proposed project is iron ore tailings. It has been estimated that tailings generation will be 2.38% of the ore throughput. In Phase – I, the tailings generation is expected to be 69417 m³ per year (1,66,600 t/yr). When working at full capacity (10 Mt/yr), tailings generation is expected to be 99167 m³ per year (2,38,000 t/yr).

The tailings shall be dumped in tailing ponds located in the project area. Thickened tailings disposal has been envisaged to increase water recovery from the tailings. The tailings ponds will have arrangements for collection of overflow water. The water recovered from the tailings pond(s) will be recycled. There shall be two tailings ponds. Initially the northern tailing pond will be constructed and the same shall be used. It has an estimated volume of ~1.162 x 10⁶ m³. This is sufficient for 13 years tailings generation (assuming Phase II of the plant will be in place from the 6th year). The southern tailing pond will be brought to use once the northern tailings pond fills up. It has the capacity to accommodate ~2.385 x 10⁶ m³ of tailings (sufficient for another 24 years of tailings generation).

Drainage and Water Environment

Though there will be alterations in the topography (due to filling up of natural ravines with tailings), the overall drainage pattern will not be affected. The existing surface drainage pattern shall be maintained. Diversion channels shall be constructed for the existing seasonal drainage channels which pass through the proposed tailings pond areas.

The project's make-up water requirements shall be 8787 m³/day, which shall be drawn from Taranagar dam. This water shall be drawn from the existing allocation for Donimalai and Kumaraswamy Mines. No ground water shall be drawn for the project.

The project shall use "Thickened Tailings Disposal" technology to maximise recycling of water. Most effluents generated from the project will be collected and used for industrial



purposes in the project. Only sewage (~4 m³/day) shall be disposed off through septic followed by soak pits.

In the project, iron ore shall be beneficiated solely by a physical process. Tailing pond water is expected to contain only dissolved solids which are already present in the ore. Since the ore constitutes the local rock, seepage water from the tailings pond shall be no different from the seepage water in the rest of the study area. Thus quality of ground water will not change.

Air Pollution and Management

The only air pollutant generated from the proposed project is fugitive dust which will be generated during handling of ROM ore, crushing and screening of ore, handling of beneficiated ore at the railway siding and from the tailings pond.

ROM ore shall be brought the plant site by covered conveyors and stored in covered storage silos, which will reduce release of fugitive dust. Ore shall be extracted from the storage silos and sent to the primary screen first. Water shall be added to the ore at the primary screen itself, which will minimise fugitive dust generation. The entire beneficiation process shall be inside an enclosed building. The plant building shall have dry fug systems to suppress fugitive dust. The finished ore shall be still moist and fugitive dust generation during its handling shall be minimum. The tailings shall be always kept moist to minimise fugitive dust generation. Once a tailings pond fills up or at the end of the project's life, the tailings pond shall be biologically reclaimed.

Land Utilisation

Of the 75.92 ha project area, 1.543 ha will utilised for construction of the actual plant and 0.62 ha will used for tailings pipelines and power lines. 11.457 ha of unutilised forest land will be incorporated into the plant's green belt & plantations. There will be two tailings ponds. Tailings Pond – II spread over 22.07 ha will be developed first. It is expected to meet the project's requirements for 13 years. Subsequently Tailings Pond I will be brought to use. It is spread over 40.23 ha and is expected to be sufficient for another 24 years requirements.

Ecological Impacts and Mitigation

As mentioned above, 2.163 ha area will be cleared for construction of the plant and associated infrastructure. Land for tailings disposal will be cleared only as and when required. The diversity of the project area is low and the area involved is relatively less, the magnitude of loss of vegetation cover will be small. The loss is expected to be partly compensated by Compensatory Afforestation. The tree density of 11.457 ha unutilised Forest Land in the project area will be increased by planting about 5700 trees within 5 years. Once a tailings pond fills up, the layer of tailings will be covered with soil and biologically reclaimed. Both "Artificial Regeneration" and "Aided Natural Regeneration" techniques will be applied for increasing green cover and biological reclamation of tailings ponds.



Occupational Safety and Health

All workers undergo a Pre-employment Medical Examination followed by a Periodical Medical Examination (PME) once every 5 years; for workers older than 45 years, the PME is carried out once in three years. Workers deployed in Crushing Plant undergo audiometric tests every year. HEMM operators undergo refraction tests every year. Canteen staff undergo stool tests every 6 months and sputum test for TB & chest x-ray every year. All workers undergo a comprehensive medical examination before retirement. All medical records are partly computerized. Once a worker's medical file is opened, it is maintained for up to 10 years after his separation from the company.

NMDC has a well equipped 50 bedded hospital located at Donimalai Township. The hospital is operational round the clock. All specialists doctors are available. Super Specialists doctors are visiting on certain days of every week or month. 4 ambulances are available at the hospital round the clock. After 1st Aid, serious casualties are evacuated to NMDC's hospital at Donimalai Township for further treatment. Heady injury cases are referred to Bellary Medical College Hospital or Madhuri Nursing Home (private hospital) at Bellary. If warranted serious injury cases may also be referred to Apollo Hospital at Hyderabad or Bangalore or to Yeshiva Hospital at Hyderabad.

Presently, occupational safety and health surveillance of the mine's workforce is being undertaken by The Occupational Health Centre (OHC) attached to Donimalai Hospital. The OHC has one doctor , one nurse, one audiologist and one ward boy. The OHC works from 0800 hrs. to 1830 hrs., but the staff are always on call. The Hospital's Casualty Deptt. is functional round the clock. The doctor at the OHC has received additional training on occupational safety and health.

As is prevalent in all NMDC mines and plants, all new recruits shall be given basic training on safety before being actually deployed in the plant. Training on occupational safety and health will be imparted by the Safety Officer and the Medical Officer.

The Safety Officer shall be responsible for the purchase and issue of all personal protective equipment (PPE) e.g. shoes, helmets, safety belts, various types of gloves, aprons, dust respirators, ear plugs, goggles etc. to both company employees and contractors' employees. Safety boots shall be issued every 6 months, helmets every 3 years and other PPEs as per requirement. If any PPEs are damaged before their scheduled replacement, fresh equipment shall be issued. All workers deployed inside the plant shall be issued ear-plugs and earmuffs and wearing them shall be enforced. Wherever possible, operators inside the plant shall sit inside acoustic enclosures.



The Occupational Health and Safety Medical Officer is responsible for early identification of onset of occupational diseases and recommend necessary remedial action to prevent further damage. In case of health impairment due to illness or injury suffered at work place, NMDC will compensate the affected worker(s) in accordance with the applicable formula given in the Workmen's Compensation Act. Even after the project's closure, if any worker is diagnosed with a disease resulting from exposure to hazards while working at the project, he will be compensated as per prevailing company rules.

At the existing beneficiation plant and mine sites there are First Aid Centres. These are always manned. An ambulance is always available for casualty evacuation at each mine and the existing beneficiation plant. All Blasters, Mining Mates, Foremen, 2nd Class Mines Managers and 1st Class Mines Manager have been trained in 1st Aid. The proposed Beneficiation Plant-II too shall have a First Aid Centre which shall be manned round the clock.

Rules and Safety guidelines specified in the Factories Act shall be followed. Instructions issued by the local Factories Inspector shall be meticulously followed.

5.0 ADDITIONAL STUDIES

Public Consultation

During the field study through questionnaire survey, villagers' opinion about the project was also considered. About 83% of the respondents expect the project to generate employment, about 34% expect increased business opportunities, while about 26% expect peripheral development. About 60% of the respondents are apprehensive about increased pollution. Another about 26% are apprehensive about loss of land and homestead while about 23% are apprehensive about incidence of diseases.

Socio-Economic Impacts

Economy of the study area is dominated by agriculture and industry. The proposed project is not going to cause any damage to the existing rural agrarian economy of the study area, instead it may help agriculture by way of providing supplementary income which may result in increased investment in agriculture and consequently, agricultural production.

People have a tendency to allocate higher and higher amount of income on consumer goods. The project is expected to foster the existing trend of shift in the pattern of demand of the local people from food to non-food items as a result of the modernising influences.

The project has strong positive employment and income effects, both direct as well as indirect.



The project is going to create positive impact on consumption behaviour by way of raising average consumption level of the people of the study area and income through multiplier effect.

6.0 ENVIRONMENTAL MONITORING AND MANAGEMENT

NMDC has an Environmental Department (ED) at Donimalai Mines as well at its Head Office manned by Environmental Engineers, Scientists and Horticulturist. The ED at the site is responsible for day-to-day implementation of environmental practices and compliance of environmental regulations. The regular monitoring of environmental attributes in and around the project is outsourced to accredited laboratories and the results are submitted to the concerned statutory bodies.

7.0 BENEFITS OF THE PROJECT

The proposed project will improve the supply of high grade iron ore (>61% Fe) for the domestic steel plants, especially those located in southern India which is likely to stimulate growth of the domestic steel industry.

Removal of at least some of undesirable material from the ore at the mine itself will reduce pressure on the rail transport system and reduce consumption of refractory materials at the steel plants thereby reducing production costs.

The proposed project has positive employment and income effects, both direct as well as indirect. Local people will be employed as much as possible subject to rules and procedures in vogue in NMDC.

NMDC takes an active role in CSR activities for peripheral development of the region. The proposed project shall strengthen the socio economic level of the predominantly rural region. During 2014 -15, NMDC spent Rs. 11.066 crores for CSR activities in the region. CSR activities undertaken by NMDC include holding of free medical camps and supply of medicines to villagers, construction and repair of roads, development of infrastructure for supply of clean drinking water, providing food coupons to casual labourers, arranging of buses for school children, material assistance to schools and school children, sponsoring mid-day meals for school children, financial support to festivals and cultural activities, financial support for development of social infrastructure etc. NMDC shall continue such works in consultation with local villagers and administrative officials.

The proposed expansion may help agriculture by way of providing supplementary income which may result in increase investment in agriculture and consequently, agricultural production.

The project will generate revenue for central and state exchequer.

