DAITARI IRON ORE MINING PROJECT

EXECUTIVE SUMMARY

FOR

ENVIRONMENTAL IMPACT ASSESSMENT
AND
ENVIRONMENTAL MANAGEMENT PLAN

ODISHA MINING CORPORATION LIMITED

CONTENTS

EXECUTIVE SUMMARY

Odisha Mining Corporation Limited (OMC) was jointly established by the Union and State Governments in 1956 as the first state Public Sector Unit (PSU) in mining sector in the country for exploration, exploitation and marketing of minerals. In the year 1962, OMC became wholly owned by the State Government. Odisha Mining Corporation Ltd. has been classified as a "Gold" Category State PSU.

OMC hold/operates 36 mining leases consisting of 11 iron ore leases, 3 manganese ore leases, 5 iron & manganese ore leases, 11 chromite leases, 1 limestone lease, 4 gemstone (semi-precious ruby/corundum) and 1 Bauxite lease only in Odisha state. The major minerals mined by OMC are chrome, iron and manganese ore which cater to the requirement of mineral based industries such as steel, sponge iron, pig iron, ferro-manganese, ferro-chrome etc. At the present rate, OMC is producing about 10% of total iron ore production and about 30% of the total chrome ore production of the state.

Daitari ML measures an area of 1018.3085 ha, comprising of 846.39950 ha of forest land and 171.909 ha of non-forest land. The present proposal envisages expansion of Daitari Iron ore mining project through enhancement of production capacity of 3 MTPA to 6 MTPA. The method of mining shall be Opencast Mining (Fully mechanized).

1.0 INTRODUCTION

Daitari Iron Ore Mining lease is located in village Talpada, Rebana Reserve Forest in Harichandanpur tehsil, Keonjhar & Daitari Protected Forest in Jajpur districts of Odisha. The mines is well connected by all-weather metal road from different cities of Odisha. The lease area is at a distance of 53 km from Jajpur, 169 km from Keonjhar and 166 km from Bhubaneswar respectively. Nearest East Coast passenger railway station on Howrah-Chennai main broad guage line is at Jajpur-Keonjhar road which is at a distance of 53 km from Daitari Iron Ore Mines while the nearest passenger station on Bhubaneswar-Kendujhar BG line is at Tomka which is at a distance of around 9 km. The deposit is covered under Survey of India toposheet no. 73 G/16 or F45N16 and bounded between latitudes: 21°05'33.09701"– 21°07'08.80495"N & longitude 85°46'01.89311"– 85° 49'17.01804"E.

The lease deed was executed for an area of 1812.99 ha on 27.01.1966 for a period of 30 years, which expired on 26.01.1996. Application for further renewal of the lease for a period of 20 years w.e.f. 27.01.1996 was made on 21.01.1995 for a lease area of 1812.99 ha. In the meantime, OMC decided to retain only 190.20 ha area and surrender balance part of the mining lease area and accordingly a revised renewal application was filed by OMC on 22.05.1997 for an area over 190.20 ha.

Mining plan under Rule 22 (1) of MCR 1960 for a lease area of 190.20 ha was approved by IBM vide letter No.314(3)/97/MCCM(C)/MP-10, dated 14.09.1998. Subsequently, the Scheme of Mining along with Progressive Mine Closure Plan (PMCP) for the period from 2003-2008 over an area of 190.20 ha was submitted by

the lessee and approved by Indian Bureau of Mines vide letter No. 314(3)/97/ MCCM(C)/S-22/2003 dated 11.07.2006.

Later on OMC management again decided to retain the original lease area of 1812.99 ha without surrendering any part of the lease and requested Principal Secretary to Govt. of Odisha, Department of Steel & Mines Bhubaneswar to renewal of the mining lease over an area of 1812.99 ha vide letter no. 3156/OMC/G&S/2006 dated09.02.2006. OMC also wrote similar letter to Director of Mines (Odisha) on 15.02.2012 to grant 1strenewal of lease over an area of 1812.99 ha. Scheme of Mining along with PMCP for the period 2008-2013 and for an area of 1812.99 ha was approved by IBM vide letter No. 314(3)/2008/MCCM (CZ)/MS-12, dated 06.10.2008.

Approved Mining Plan for an area of 190.20 ha was modified for the revised lease area of 1812.99 ha. The same was approved by Indian Bureau of Mines vide their letter No. 314(3)/2008/MCCM (CZ)/MP-16 dated 06.10.2008. Last scheme of mining of Daitari iron ore lease for a period of 2013-2016 over an area of 1812.99 ha has been approved by IBM vide letter no. 314(3)/2012-MCCM(CZ)/MS-52/223 dated 12.07.2013.

The Environment Clearance for Daitari iron ore mining project has been accorded by Ministry of Environment, Forest and Climate Change (MoEFCC) vide letter no.J-11015/1003/2007-IA.II (M) dated 22.09.2010 for a production capacity of 3MTPA.Further, the aforesaid EC letter was amended w.r.t. "grant of temporary permission of two years for completing the installation of conveyor belts and rail heads in the Daitari Iron Ore Mining Project" vide letter no.11015/1003/2007-IA.II (M) dated 31.03.2017.

Consent to Operate have also been granted by the State Pollution Control Board, Odisha under the Air & Water (Prevent & Control of Pollution) Act vide letter no. 2569/IND-I-CON-246 dated 08.02.2016, which is valid till 31.3.2020. Consent to Establish has also been granted by the State Pollution Control Board, Odisha under the Air & Water (Prevent & Control of Pollution) Act vide letter no. 504/IND/-II-CON-47666 dated 12.01.2009. The lessee also has surface right over an area of 520.30 ha.

Later it was again proposed by OMC to retain 1018.3085 ha and surrender the remaining area (794.6815 ha) to the state government. Permission from the state government for obtaining renewal of the lease over 1018.3085 ha has been taken. Accordingly, OMC prepared the Final Mine Closure Plan (FMCP) for the proposed area to be surrendered i.e. 794.6815 ha and the same was approved by IBM vide letter no. 314(3)/2012-MCCM (CZ)/FMCP6/453 dated 15.03.2013. Certificate under rule 29A of MCR 1960 has been issued by Regional Controller of Mines, Bhubaneswar vide letter no. FMCP/FM/05-ORI/BHU-2012-13 dated 25.06.2013.Precise area plan for the balance retained area of 1018.3085 ha was approved by the Directorate of Mines, Odisha vide letter no. No.MIV (B)-59/04-2897/DM dated 23/02/2013.

The stage-II FC for the lease has been accorded for an area of 95.60 ha by MoEFCC (FC Division) vide letter no. 8-164/97-FC dated 25th-27thJanuary 2005. Stage-I FC for 106.016 ha (Daitari Conveyor Corridor proposal) has been accorded by MoEFCC (which includes 4.467 ha within the ML area) vide no. 8-27/2017-FC dated 27.09.2017. Stage-I FC for balance 746.3325 ha forest land involved in the project is under process vide Proposal no. FP/OR/MIN/9112/2015.

Ministry of Environment and Forests & Climate Change (MoEF&CC) has recommended the Terms of Reference (ToR) dated 16.01.2019. EIA study has been carried out considering the baseline data generated during winter season (Dec-Jan-Feb 2018-19) and by complying the conditions stipulated in approved ToR.

Details of violation

Daitari iron ore mines has produced in excess of approved limit of production under EC/ FC, Mining Plan/ CTO. In this regard, the details of action initiated under Environment (Protection) Act, 1986 has been communicated to MoEFCC vide letter no. ENV-I-83/2018/5059/F&E dated 08.03.2019.

Further, pursuant to the interim order dated 16.05.2014 of the Hon'ble Supreme court in the matter of W.P.(C) No. 114 of 2014 Common Cause vs. Union of India and others, the Deputy Director Mines, Jajpur Road Circle raised a demand notice for Rs. 7,37,12,42,092/- against violation of Sections 21 (5) of the MMDR Act, 1957 for production without /in excess of EC during 2000-01 to 2010-11 and for Rs. 17,28,76,661/- for violation of Sections 21 (5) of the MMDR Act, 1957 for production made without obtaining FC during 07.01.1998 to 31.03.2011. Further, demand notice is raised by Deputy Director of Mines, Jajpur Road Circle for Rs. 36,95,53,235/- against the Ores/minerals raised without CTO/Mining Plan.

Against such demand, OMC has paid the entire dues raised towards violation relating to EC and FC within 31.12.2017 as per the order dated 02.08.2017 passed by the Hon'ble Supreme Court in W.P.(C) No. 114/2014 amounting to Rs. 7,54,41,18,753/- [Rs. 7,37,12,42,092/- (for EC) + 17,28,76,661/- (for FC)]. The demand raised towards violation of MP/CTO amounting to Rs. 36,95,53,235/- has also been paid along with interest. Same has been communicated to MoEFCC vide letter no. 1620/SM/IV(AB)SM-14/2019 dated 06.03.2019 by Department of Steel & Mines, Govt. of Odisha.

Also, OMC has submitted an affidavit, in compliance of the MoEFCC's O.M. No. F: 3-50/2017-IA.III (Pt.), dated 30.05.2018 on the judgment of Hon'ble Supreme Court, dated the 2nd August, 2017 in Writ Petition (Civil) No. 114 of 2014 in the matter of Common Cause versus Union of India.

2.0 PROJECT DESCRIPTION

The project envisages expansion of Daitari iron ore mining project from rated capacity of 3.0 MTPA to 6.0 MTPA of iron ore. The method of mining shall be Opencast Mining (Fully mechanized).

Excavation

The deposit is worked by opencast mining method with formation of benches. Working benches are kept 10m high and minimum 20m wide. Bench slope has been considered as 70°. Envisaged maximum ultimate pit slope of the Daitari Iron Ore Mines is 36°. Ramps of 10 m width at a gradient of 1 in 16 have also been planned. Drilling will be carried out using 150 mm & 115 mm diameter drill with 4.0 m & 3.0 m burden & 3.5 m & 4.5 m spacing respectively. Holes will be charged with slurry/SME explosives & will be initiated using NONEL. Mining operations will be confined to Hilltop area during the plan period.

Blasted material will be loaded into 16-25 t tippers or 35 t capacity dumpers using 1.5 – 4.5 m^3 capacity excavators and will be transported to the existing 150 tph & 230 tph crushing & screening plants, 800 tph OHP and proposed new 1000 tph crushing & screening plants for production of CLO (10-40mm), fines (-10mm). Finished ore of CLO (10-40mm) & fines (-10mm) produced through 800 tph OHP & proposed crushing & screening plant will be conveyed to Baliparbat Stock yard through belt conveyors & finished product of existing 150 tph & 230 tph crushing & screening plant will be transported through Ghat roads (duly wetted and/or covered with tarpaulin).

The finished product shall be loaded by loaders of 0.91 – 1.5 cu.m capacity at Baliparbat stack yard & transported through 16 - 25 t tippers to railway siding for wagon loading. Direct loading onto buyer's trucks shall also be done at Baliparbat stock yard for outbound sales.

A total of 180.69 Mm^3 of wastes will be generated from entire Daitari iron ore lease upto conceptual stage.

Material containing 45-55% Fe has been considered as subgrade. Around 31.67 Mt of subgrade ore containing an average grade of 49.30% Fe will be generated. Out of the above subgrade, 10.98 Mt and 20.69 Mt will be generated from hilltop & Sindurmundi blocks respectively. Entire subgrade generated upto conceptual period has been planned to be blended with high grade ore therefore, no subgrade stack is required.

A total of 0.127 Mm^3 of topsoil will be generated from the lease area from 2020 onward still conceptual period which will be utilized for concurrent afforestation over the dumps & also for avenue plantation due to very low shelf life of the lateritic soils.

ROM ore from the Daitari Hill Top iron ore Deposit shall be subjected to crushing & screening. A part of the production (ROM) shall be crushed & screened by dry process for which two dry screening & crushing plants are installed in the lease area. The capacity of screening plant is 150 tph and that of dry crushing & screening plant is 230 tph. Recovery of these plants is 100% of feed quantity of ROM. Balance ROM is processed through 800 tph capacity OHP.

Considering of 74.25 million tonnes of proved category (UNFC code 111) & 80.71 million tonnes of probable reserve (UNFC code 122), the expected life of the mine at the above mentioned rated capacity will be around 28 years.

The total peak water demand for the project is about 1080 m^3/day, out of which, about 750 m^3/day of potable water shall be drawn from bore wells (600 m^3/day for the township and 150 m^3/day for drinking and domestic purposes at the mine site). Further, 132 m^3/day including 100 m^3/day of water is required for green belt development shall be catered through recovered treated water from STP of the township. NOC from CGWA, Ministry of Water Resources has been obtained for Daitari Iron Ore Mine of OMC to abstract 750 cu.m/day ground water through 11 nos. of borewell. Also, 0.081 cusec (198 cu.m/day) of surface water (Water Reservoir on U/s of Kukurangi nala) has been allocated by Dept. of Water Resources, Govt. of Odisha.

The leasehold area hosts statutory facilities viz. crèche, canteen, first-acid centre, vocational training centre etc. and also Administration block, servicing and repairing shops, fuel pump station and a small medical unit. Residential accommodations of staff and executives have been provided. The power shall be drawn from the grid.

Considering the statutory and various departments operational requirement a total of 1250 persons comprises of regular 350 nos. and contractual 900 consisting executive and non-executive manpower has been proposed to be deployed. The envisaged project is also expected to generate additional substantial indirect employment in other sectors.

3.0 DESCRIPTION OF THE ENVIRONMENT

3.1 Physiography and Drainage

The mine lease is located on the top of a steep hill range, the Daitari Range. Daitari Range rises sharply from funnel shaped Sukinda Valley, in the south. The Hill Range rises sharply from about 140 m above mean sea level to more than 800 mRL. There are peaks exceeding 800 mRL in the Daitari hill range. At places Daitari hill ranges are marked by very steep slopes including some bare rocky cliffs on the south. Further south, part of Sukinda valley is another hill range, the Mahagiri hill range, which too is very steep and rises to more than 600 mRL. In the Mahagiri hill range also there are a few bare rocky cliffs. On the northern side, the Daitari hills slope down to about 180 mRL. The northern area is hilly with several hillocks having gullies between them. North of the hills are densely forested.

There is no national park, biosphere reserve, sanctuary, habitat for migratory birds, archeological site, defense installation and airports within 10 km of the periphery of the lease area. The area does not fall in seismically active or landslide prone zone.

The area exhibits a dendritic pattern of drainage. The south-eastern part of the lease area is drained by a number of seasonal channels which drain into Talangi Nala which in turn drains into the Damsal Nala, which is the principal drainage channel of the Sukinda valley. The south-western part of the lease area is drained by seasonal channels draining into Patna Nala – another tributary of Damsal Nala. The Damsal Nala, flows from east to west along the length of Sukinda valley. The northern half of the lease area is drained by several seasonal channels, which drain into a water reservoir about a km north of the lease area. A perennial stream, Kukurangi Nala emerges from this reservoir and flows initially towards the north-east but subsequently turns towards the south-east and joins another perennial river, Kusai Nadi. Kusai Nadi receives drainage channels from the western, northern (including a

perennial stream Bagai Nadi from the north) and eastern parts of the study area. It flows initially from the north-west to south-east but turns towards the east.

3.2 Land Use

Existing land use in the study area hasbeen studied through satellite image processing. The data used for analysis is RESOURCESAT-2 LISS IV with satellite data of 5.8 m resolution dated 13.01.2019.

Forest land is the predominant land use covering ~43.58% of the study area followed by fallow land covering ~14.65%. Surface water bodies ~0.83%, Settlements ~2.01%, agricultural land ~17.83% of the study area.

3.3 Climate and Meteorology

The study area lies in tropical region where climate is characterized by very hot summers and mild winters. Summer is typically from March to June when daily average maximum temperature ranges from a maximum of 39°C during daytime to a minimum of 22°C at night. Winter is from November to February when daily average maximum temperature during day time goes up to 32°C and minimum temperature at night becomes as low as 15°C. Another IMD observatory at Cuttack is also located at a distance of ~70 km from the project site.

The average annual rainfall as recorded at IMD observatory at Keonjhar is 1269.1 mm. The Southwest monsoon lasts from mid-June to mid-September and the area gets more than 75% of the annual rainfall during this period.

3.4 Air Quality

07 Ambient Air Quality (AAQ) monitoring locations were selected. Of these stations, 1 was within the core zone, while the rest were outside the mining lease. Samples of 24 hourly duration were taken for monitoring PM_{10}, $PM_{2.5}$, SO_2 and NOx. All the values of $PM_{2.5}$, SO_2 and NO_x were found to be well below the prescribed standards at all the stations barring some of the maximum readings of PM_{10} values.

3.5 Water Resources and Quality

Sources of water in the study area are surface water in streams and river and ground water. The study area has a distinct dendritic drainage pattern due to hilly terrain. Daitari hill range acts as a water divider where the surface run off from the north, north-east of Daitari drains to the Baitarani River. The surface run off are collected by Kukrangi Nala through several streams and discharged at Pancham in to the Kusei Nala, a major tributary of the River Baitarani. The south, south–west slopes drains to the River Bramhani where the surface run off is collected by the Damsal Nala and Ganda Nala, two major tributaries of River Bramhani.

Water samples from different monitoring locations have been collected during Winter season, 2018-19 from three (3) surface water locations and three (3)

ground water locations. Surface, ground and drinking water quality meets the norms specified in IS:10500 (2012).

Water management (including storm water drainage) scheme (by a network of garland drains/ diversion ditches and catch-pits) has been planned. The overall drainage planning has been done in a manner which follows the existing pre mining drainage routing to the extent possible, maintaining the overall slope in the direction of pre-mining flow direction so the run off distribution is not affected.

3.6 Noise Levels

In order to have an idea about the existing noise level of the study area, noise monitoring has been carried out at nine locations. Ambient noise levels were within the norms for "Residential Areas" specified in Noise 2000 Standards of Environmental Protection Rules.

3.7 Ecology

The core zone is a part of parts of Rebana R.F. and Daitari P.F. In this part of the R.F. & P.F., the forests are quite dense and composed mostly of Sal (Shorea robusta), Tendu (Diospyros melanoxylon), Char (Buchanania lanzan) Asan (Terminalia tomentosa), Kusum (Schleichera oleosa), Mahul (Madhuca indica), Mango (Mangifera indica) etc.

The forest / natural vegetation in the project site mostly contains forests reaching up to 15 m in height and girth size up to 1.5 m. The forests in the study area (including the core zone) are classified as Northern Tropical Dry Deciduous Forests. Mining and allied activities and other anthropogenic activities have converted some of the Northern Tropical Dry Deciduous Forests into Dry Deciduous Scrub Forests. The tree density is about 1300 trees per hectare, with large proportion of mature sal trees. The biodiversity is less than that of Daitari P.F., but is still high (Shanon's Index: ~2.5).

Due to mining and allied activities and more biotic pressure (as compared to the remote forest areas in difficult terrain), the only animals found in the core zone are few rodents, small common carnivores, reptiles and birds. Large mammals listed above are found in forests in the buffer zone only and that too several kilometers away from the core zone. Due to mining activities, in general, the availability of animals in the study area is low.

Total Mine lease is 1018.3085 ha out of which 846.39950 ha is forest land and 171.909 ha is non-forest land. Out of the total forest land about 95.60 ha of forest land has already been accorded Stage II FC clearance. Stage-I FC for 106.016 ha (Daitari Conveyor Corridor proposal) has been accorded by MoEFCC (which includes 4.467 ha of Daitari ML area). Stage-I FC for balance 746.3325 ha forest land involved in the project is under process vide Proposal no. FP/OR/MIN/9112/2015.

Out of the 846.39950 ha of forest land within Daitari ML about 11.8305 ha of forest land will be maintained as Safety Zone and the forest in this zone will be untouched

and further plantation will be done in this zone with by State forest Department for which funds has already been deposited with forest department and plantation is already being undertaken in phases. However the loss will be more than compensated by afforestation and also green belt/cover development planned in and around the mine which will rather increase the green cover and vegetation diversity.

In the mining project, green belt will be developed along mine lease boundary, in vacant areas, around office buildings, garage, stores etc., along the side of major roads, on external overburden dumps and on mining upper benches / slope of mine pits after closure of the mine pit. Vegetation density will be increased in some unutilised forest land.

The species for plantation have been selected on the basis of soil quality, place of plantation, chances of survival, commercial value (timber value, ornamental value, etc.), etc. Only indigenous species will be planted. The species for green belt / vegetation cover development will be selected in consultation with State Forest Department and State Soil Conservation Department. Mixed plantations will be carried out keeping optimum spacing between the saplings.

Seedlings nursery will be purchased from the nurseries of the State Forest Department. Saplings will be planted at the rate of 200 trees/ ha for forest land improvement and at the rate of 1600 trees /ha on other areas.

3.8 Socio-economics

The total population of the study area is around 58639. The sex ratio in the study area is, 0.954 (about 954 females per 1000 males). SCs and STs constitute 11.87% and 32.21% of the population respectively. Literacy rate is moderately poor (~51%). Working population constitute 38.11% of the total population. Main and marginal workers constitute 22.68% and 15.43% of total population respectively. It may be noted that the proportion of “Other Main Workers” is about 61.89% of total main workers, which is significant. This is because the mining industry constitutes the largest economic activity in the study area.

Agriculture is characterized by multi-crop culture. The cropping intensity is low to moderate (about 135% only). This indicates that there is optimum utlisation of total land holding.

The people of the study area spend major portion of their disposable income on food items. However, there has been a growing tendency amongst villagers towards increasing expenditure on non-food items.

About 26% and 4% of the members have education at primary level and middle school level respectively. Villagers’ interest towards education has been increasing due to hope of getting jobs especially in the non-agricultural sources which are going to come up in this region as a result of the mining projects.

4.0 ANTICIPATED IMPACTS AND MITIGATION MEASURES

4.1 Land Environment: Anticipated Impacts and Mitigation Measures

Topography and Land degradation

The core zone (ML area) has already undergone topographical changes though limited to the already broken-up area (95.60 ha) in the hilltop area since sixties. As mentioned, the mine lease is located in the northern flank of the Daitari hill range.

It can be seen that out of 1018.3085 ha, at present 214.2501 ha land has already been utilized. At the end of plan period i.e. 2019-20, land utilization shall increase to 218.4127 ha. At end of mining, total 1006.4415 ha shall come under active utilization.

Waste disposal

No waste will be generated during the plan period (i.e. 27.01.2016 to 31.03.2020). However, a total of 180.69 Mm^3 of wastes will be generated from entire Daitari ML upto conceptual stage. Considering the above, waste management has been meticulously planned. Thus, 12.87 Mm^3, 4.30 Mm^3, 30.27 Mm^3 & 4.24 $Mm^3$of waste generated upto conceptual stage will be dumped in external waste dumps WD1a, WD1b, WD1c and WD1d proposed near Talpada Village (NW part of the lease). Additionally, about 9.01 Mm^3 of waste has been proposed to be dumped in waste dump WD2a & WD2b in the SW Part of the lease.

Balance 120 Mm^3 waste generated upto conceptual period has been planned to be backfilled. Around 16.09 Mm^3 waste has been planned to be backfilled in backfill-1 in the mined out voids of Sindurmundi quarry whereas, 55.41 Mm^3 & 12.87 Mm^3 of waste has been proposed to be backfilled in backfill-2 at Hilltop & Sindurmundi quarry and backfill-3 at Hilltop quarry respectively. Besides, 16.53 Mm^3 & 19.10 Mm^3 waste has been planned to be stacked in in-pit dumps over backfill-1 &backfill-2 respectively. Toe of the in-pit dumps will be at a distance of at least 60m from the edge of backfills.

Garland drain and retaining wall will be constructed at the toe of the dump areas to prevent wash off from the dump. The retaining walls shall be 1 m high and 0.5 m thick. The retaining walls will have weep holes leading to garland drain. The garland drains will be routed through de-silting ponds, before discharging to natural drainage channels.

In the post mining phase, forest buffers around the abandoned quarries shall not leave pronounced physiographical impact. Quarry benches and floors shall be afforested. Plantation shall be carried out on the external dump top and slopes. At the end of mining, a landscape with predominance of forested land merged with existing dense hilly forests on natural slopes shall emerge.

4.2 Impacts on Drainage, Water Resources & Water Quality and Mitigation Measures

Daitari leasehold area is an undulated hilly terrain consisting of high ridges and valleys forming a part of the Tomka-Daitari hill peak at the current level of 830 mRL form the highest point of the area as well as the leasehold. Hence, the area has dendritic pattern of drainage. Daitari hill range acts as a water divider where the surface run off from the north, north-east of Daitari drains to the Baitarani River. The surface run off are collected by Kukurangi nala through several streams and discharged at Pancham in to the Kusai nala, a major tributary of the River Baitarani. The south, south–west slopes drains to the River Bramhani where the surface run off is collected by the Damsal Nala and Ganda Nala, two major tributaries of River Bramhani. However, water courses shall be managed in a manner such that the overall drainage of the core zone region is not affected. Preservation of directional flow in the streams is important to regulate water flow in the disturbed area in a systematic manner.

The industrial water requirement of 330 m^3/d of Daitari Iron Ore mine will be met from water reservoir 198 m^3/d and 132 m^3/d recycled treated water. In the present situation, total 320 m^3/d water shall be discharged to nearby stream after treatment. In addition to the industrial water demand, peak potable water requirement shall be met from borewell @ 750kld.

The mining operation till conceptual will not intersect the ground water table. Water management (including storm water discharge) shall be carried out through a network of garland drains and catch pits) salient features of the drainage management scheme are as follows:

- The overall drainage planning will be done in such a manner that the existing pre-mining drainage conditions should be maintained to the extent possible, so that run off distribution is not affected.
- All water courses shall be restored to their original courses and directed to new courses that will sustain themselves in the future without maintenance.
- Water accumulated in voids shall be used as source of water to help maintaining the water table.
- Garland drains shall be constructed around the external dumps. The garland drains shall be routed through settling tanks to settle out suspended solids in the storm water. The clarified water is reused for green belt development.
- Stone pitching shall be made at suitable places to regulate water flow.
- The settling tank and drains are cleaned periodically, especially during monsoons.

Dumpers shall be washed in a designated area and the effluents shall be routed through drains to a settling pit, which has an oil & grease trap. The clarified water is reused for green belt development.

4.3 Impacts on Air Quality & Mitigation Measures

Air quality impacts from the existing and proposed future mining have been assessed using the ISC3 computer dispersion model. Using the model maximum 24-hour ground-level PM_{10} concentrations at the nearest sensitive receiver to the site was predicted. The results of the model indicate that maximum concentrations of PM_{10} are likely to be occur at within the mine lease.

To reduce dust from haul roads, all roads shall be properly maintained through fixed water sprinklers as well as through vacuum cleaners keeping in view the policy framework of "Zero dust pollution". The un-metalled haul roads within the lease shall be adequately compacted before being put into use. Periodically water will be sprinkled on these roads in amounts just sufficient to wet the surface. External dumps will be covered with a layer of top-soil and water will sprayed on the soil. Grasses will be planted to reduce fugitive dust. Subsequently plantations are developed on the dump. Gaseous pollutants in the exhaust fumes generated by diesel powered machinery will be minimized by ensuring vigorous maintenance adhering to stringent overhaul schedules. The central repair workshop and maintenance garage of Daitari Mine is equipped with all necessary facilities to ensure upkeep and maintenance of engines.

Water sprinkling operations will be carried out by 2 no. 28 kl sprinklers. The tanker will make two sprinkling trips at the beginning of the working shift and another two trips midway through the working shift. In the mine maximum of 160 m^3/ day of water will be required for dust suppression and drilling in the peak season.

4.4 Ground Vibrations

Blast vibration studies have been carried out at daitari Iron Ore Mine by NIT Rourkela during June 2015. Empirical equations have been derived from trial blasting in the mine. The maximum ground vibration at Talapada village which is the nearest habitation to Hilltop Quarry, on account of the expansion mine has been estimated to be 2.21 mm/s, which is deemed safe for kuccha houses. Blasting will be carried out maximum twice a week and that too during day time and in fair weather. All DGMS regulations shall be strictly followed and 300 m wide safety zone shall be maintained around blasting sites.

4.5 Impacts on Ecology and Mitigation Measures

Total Mine lease is 1018.3085 ha out of which 846.39950 ha is forest land and 171.909 ha is non-forest land. Out of the total forest land about 95.60 ha of forest land has already been accorded Stage II FC clearance. Stage-I FC for 106.016 ha (Daitari Conveyor Corridor proposal) has been accorded by MoEFCC (which includes 4.467 ha of Daitari ML area). Stage-I FC for balance 746.3325 ha forest land involved in the project is under process vide Proposal no. FP/OR/MIN/9112/2015.

Out of the 846.39950 ha of forest land to be diverted about 13.2765 ha of forest land will be maintained as Safety Zone (7.5 Strip along ML Boundary & 10 m strip

on either side of Village Road) and the forest in this zone will be untouched and further plantation will be done in this zone with by State forest Department for which fund has already been given to forest department and plantation is already being undertaken in phases.

Cutting of most of these trees is essential for mining activities. However the loss will be more than compensated by Compensatory Afforestation and also green belt/cover development planned in and around the mine, which will rather increase the green cover and vegetation diversity. However, out of the total 37001 trees, the trees standing in the safety zone of 13.27 ha will not be cut. The tree density in the forest area to be diverted comes to around average 60 trees/ha. It is expected that about 660 trees in the safety zone will not be cut. It will be ensured that at least some mature trees naturally growing in the area will be left. These trees will provide seeds for natural re-vegetation of abandoned quarries which is already taking place in some of the exhausted quarries.

As regards to impact on wildlife, Rebana R.F. and Daitari P.Fs are close to the project site and Mahagiri P.F. is within a range of 3.0 km. There are various mine leases in the study area (mostly in Sukinda valley) in Mahagiri P.F. area, thus these forests supports faunal species which have stabilized to prevailing conditions. Similarly in the core zone the fauna in the vicinity of the mine is restricted to few common small species. There are operating mining blocks of open-cast mines close to the proposed project site, where blasting operations are frequent which may have scared away the fauna from the mine lease area. But after the mine is closed, the plantations developed on the abandoned mine area will attract back at least some of the animals displaced / scared away by the project.

5.0 ANALYSIS OF ALTERNATIVES

The proposal is capacity enhancement of an existing mine. The technology envisaged for the project is proven. The technology is not new, easily available and working successfully in the vicinity of the project and elsewhere. Since the mining activity is site specific and it depends on occurrence of minerals and ores, therefore, alternate sites are not analyzed with respect to this project.

6.0 ENVIONMENTAL MONITORING PROGRAMME

In order to assess the pollution level in and around Daitari ML, different environmental attributes such as meteorology, air quality, water quality, soil quality and noise level are already being monitored by a MoEF&CC recognised laboratory under Environment (Protection) Act, 1986. The monitoring is carried out as per the CPCB guideline and every care has been taken for preservation and transportation of samples to the respective laboratory. The same shall be practiced during the expansion phase also.

7.0 ADDITIONAL STUDIES

7.1 Public Consultation

During the field study an opinion poll was conducted to ascertain local villagers' opinion about the project. ~78.8% the people are optimistic about employment generation due to the proposed expansion project; ~76.9% of the people expect increased peripheral development. ~57.7% of the people are apprehensive about increased pollution from the mine.

7.2 Socio-economic Impacts

The proposed expansion project is expected to introduce a set of activities, which will influence the socio-economic condition of the people of the surrounding areas. Such impacts may be marginal or non-marginal depending on the extent of change caused by the project to alter the existing equilibrium of the socio-economic system. The project is likely to bring benefits for the local people. Analysis of various aspects of the study amply reveals that the proposed expansion activities are going to create considerable impact on the socio-economic conditions of the people in the study area. There will be no displacement of population for the project. The project is unlikely to cause any damage to the agricultural situation of the area. It is likely to benefit the farming community by way of supplementary income through non-farm sources. Local people are likely to get majority of the jobs generated by the expansion project in accordance with their qualifications. The project is also expected to generate substantial indirect employment in other sectors e.g. in the small scale industrial units and service centres etc. which are existing at present and also expected to come in the vicinity of the projects. The indirect employment and income effects are likely to be much larger than the direct effects of the project.

7.3 Risk Assessment

Risk assessment shall be carried out on regular basis and based on the same disaster management plan shall be prepared. During the operation of the mine, the risks which have been identified are failure of slope in the pits and external dumps, fly rock from blasting, surface fire and danger due to handling of explosives.

The quarry and dump slopes shall be monitored at regular intervals to check for any possible failure. The drainage system over the lease area shall ensure that storm water does not accumulate in the lease area and therefore hydrostatic pressure remains low. The slopes of external dumps shall be maintained at an overall angle of less than 28° with individual lifts at less than 37°. The optimum blast design has been worked out on the basis of trial blasting studies. All precautions related to control of fly rock, as prescribed by DGMS, will be taken during the blasting operations.

Spillage of HSD and resultant fire constitutes a potential risk. The quantity of the maximum fuel oil which can spill is not much and can be easily controlled. Sufficient nos. of portable fire-extinguishers shall be provided in office building and canteen to take care of any eventuality.

The explosives which will be used at Daitari mine shall be stored in the explosive magazine located inside the mining lease. The storage and handling of explosives will be carried out strictly in accordance with the Dept. of Explosives guidelines.

8.0 BENEFITS OF THE PROJECT

The project will provide a fillip and impetus to the agriculture sector, physical infrastructures like roads, railways, electricity generation, and distribution along with the social infrastructures like education, health sector, water supply and training etc. among the other things.

The proposed expansion shall provide an opportunity of continuing direct employment for 1250 persons (Departmental: 350; Contractual: 900) and indirect employment of ~6000 persons which will help in development of downstream/ancillary industries which again in turn will aid in socio-economic boost.

The developmental activities planned for these villages includes basic amenities like medical & health services, providing drinking water facility, basic education & self-employment, roads & connectivity, sanitation, community centres, livelihood generation, sports facilities etc.

During the last three years i.e. 2016-2019 a total of Rs. 11.93 crores was spent by Daitari Mines for CSR activities, which include Income generation & livelihood, Community Development, Health & Sanitation, Infrastructure, Education & Skill Development & Sports & Cultural activities.

OMC has recently formulated and adopted CSR Policy wherein upto 5% of the net profit of the Organization made in last three previous years is set aside for CSR activities.

The positive points are (i) Employment generation potential (ii) Peripheral development and creation of social capital (iv) Boost in agricultural sector and (v) Increased awareness for education etc.

9.0 ENVIRONMENTAL COST BENEFIT ANALYSIS

Environmental cost benefit analysis has not been recommended at the scoping stage. Hence it is not required as per the ToR granted by Ministry of Environment, Forests and Climate change, Impact Assessment division vide Letter No. F.No. 23-236/2018-IA.III(V) dated 16.01.2019.

10.0 ENVIRONMENTAL MONITORING AND MANAGEMENT

In line with OMCL'S corporate Environmental Policy, Daitari Mine have given maximum importance towards adoption of latest technologies for keeping the pollution to minimum possible level. A "Environmental Management Cell (EMC)" has been formed to carry out day to day environmental monitoring/inspection requirements at Daitari Iron Ore mine.

During the operational phase EMC of the mines shall undertake all the monitoring work to ensure the effectiveness of environmental mitigation measures. The EMC will also co-ordinate with other departments like Mining, Geology, Horticulture, Community development Water supply department etc. and carry out liaison work with external agencies like State & Central Pollution Control Boards.

11.0 DAMAGE ASSESMENT, REMEDIATION PLAN AND NATURAL & COMMUNITY RESOURCE AUGMENTATION PLAN (NCRAP)

The objective of Damage Assessment Report (DAR), Remediation Plan (RP) and Natural & Community Resource Augmentation Plan (NCRAP) includes the analysis study of the environmental changes / effects (damage) due to production on account of violation and to identify the corrective measures to compensate or restore or replace those resources such as "Land, Biota, Air, Water and others in order to mitigate the adverse effects on such resources". The environmental damage has been scientifically analyzed / assessed considering various environmental indicators and the negative changes taken place due to production in excess of approved limit under EC/FC/Mining Plan/CTO etc. from Daitari Iron Ore Mining Project. Remediation plan to ameliorate the environmental damage caused due to violation and a Natural & Community Resource Augmentation Plan (NCRAP) to compensate the environmental / ecological damage and for providing economic benefits to the local community has been studied.

***