

Executive Summary

1 INTRODUCTION

M/s Paonarkhari Minerals and Chemicals Pvt. Ltd. was established in 1995 for processing of Manganese ore / other ores and is registered as a small scale industry with the District Industries Centre Bhandara with a licensed capacity of 5000 MTPA throughput. The unit is involved in purchasing of raw material (i.e. Manganese ore of required grade) from MOIL Ltd. and Product (i.e. roasted, calcined or reduced ore) is supplied to manufacturers of Manganese Sulphate, which is used in fertilizers. Paonarkhari Minerals and Chemicals Pvt. Ltd. (PMC) propose to expand its existing unit by increasing its production capacity from 3500 MTPA (combined capacity of MnO, MnO₂ and ground minerals) to 12000 MTPA at Paonarkhari, Distt. Bhandara, Maharashtra. The proposed expansion will be within its existing plant premises by upgrading existing equipments.

2 Project Description

The salient features of the proposed project are given in the **Table 1**. The area for proposed expansion is within the existing plant premises. The site is well connected by road and is approximately 17 km (North) from Tumsar city. The project site is located at Paonarkhari village of Bhandara District, Maharashtra. The project site is located about 5.8 km away from the interstate boundary of Madhya Pradesh and Maharashtra. Study area of 10 km radial distance (from the project site) was taken into consideration to carry out the Environmental Impact Assessment (EIA) study for the proposed project.

Table 1: Salient Features of the Project

Items	Details
Location	Village- Paonarkhari, Post- Gobarwahi, Taluka-Tumsar, District-Bhandara, Maharashtra.
Latitude and Longitude	Latitude 21° 32' 03.64" N Longitude : 79°42'33.97" E
Plot area	17,600 m ²
Proposed production capacity	12000 MTPA of combined capacity of MnO, MnO ₂ and ground minerals.
Power requirement & source	Power requirement Existing:54KW Proposed :200 KW Source: Maharashtra State Electricity Distribution Co. Ltd. (MSEDCL), Tumsar
Power backup	1 no. of D.G. set of capacity 40 KVA is available to meet emergency power requirement
Water requirement & source	Existing: 20 m ³ /day Proposed: Applied to Central Ground Water Board to extract

	30 m ³ /day of ground water for industrial and other use.
Project cost	Rs. 105 Lakh

3 Raw Material Requirement and Availability

List of raw materials and its respective quantities to be used for the proposed project is listed below along with its source:

Table 2: Raw Material Requirement and its Source

S. No.	Raw Material	Current Requirement (Combined Capacity 3500)	Requirement After Expansion (Combined Capacity 12000)	Source
1.	Manganese Ore	5000 M/Ton	15000 M/Ton	Dongri Buzurg mine
2.	Fuel Wood	400 M/Ton	2400 M/Ton	Maharashtra Forest Dept. in Bhandara and Gondia.
3	Mineral Coal	320 M/Ton	1920 M/Ton	Western Coal Fields Ltd.
4	Charcoal	40 M/Ton	240 M/Ton	-
5	Coke	255 M/Ton	1535 M/Ton	Suppliers located at major integrated steel plants

4. Baseline Environmental Status

4.1 Topography

The entire district lies in southern lowlands, as lightly undulating plain, comparatively well cultivated and drained by the Wainganga, Bagh, Deo, Ghisri and Son rivers. The Wainganga River separates the Madhya Pradesh district from Seoni while the rivers Bawanthadi and Bagh define the inter-state boundary between Maharashtra and MP.

4.2 Geology

Regionally the lithological units available in this part of the district are from Archaen Group Peninsula. The geological formation of Archaen group in this region is classified as sausar series. The sausar series covers geological formation in Raipur-Durg, Bilaspur, Balaghat, Nagpur-Bhandara, Nagpur-Chhindwara, Jabalpur area etc.

4.3 Hydrology

Bhandara district is known as district of lakes and situated in Wainganga basin. The Wainganga and Bawanthadi rivers bound the major part of the northern territory of the district. The main sources of water in the study area are bore wells, tube wells and piped water supply. The study area falls under the Wainganga basin.

4.4 Soil Quality

The soil of the district is varied in nature, which had arisen out of the tropical sub-humid weathering of crystalline metamorphic and igneous rocks. pH of the soil ranged from 6.92-7.79 (neutral range), thus conducive for the growth of plants. The soil has clayey loamy textural composition, with sand, silt and clay varying in the range of 42.40-46.1% w/w, 25.8-29.11% w/w and 27.62-30.12% w/w, respectively. The bulk density of the soil varied from 1.38 to 1.55 g/cc. The organic matter in the soil ranged from 1.05 to 1.59% w/w it shows that the soil is productive for growth of plants.

4.5 Land Use Land Cover

The land use land cover map for the study area was prepared by processing the standard False Color Composite (FCC) of Landsat 7 satellite imagery with 30×30 m resolution for the month of September 2013. About 48.7 % of the study area was covered by forest, which is characterized by mixed vegetation. Next to forest, about 36.81% area was comprised of agricultural land. About 4.18% of the study area is covered by Water bodies and 9.75% of the study area consists of built up. Dry river bed comprises 0.56 % of the study area.

4.6 Water Quality

Surface Water Quality Monitoring was carried out at four different locations within the study area, namely, Yederbuchi Village Pond , Paonarkhari Village Pond, Bawanthadi River and Gobarwahi Village Pond. The pH of the surface water was in the range of 7.1 to 7.8. The hardness and conductivity ranged from 45.1 to 75.2 mg/l and 108 to 178 μ S/cm, respectively. The physico-chemical analysis revealed that all the parameters are well within the prescribed limit

Ground water quality monitoring was carried out to study the various physico-chemical characteristics of water at five different locations within the study area, namely Inside Plant Borewell-I, Inside Plant Borewell-II, Ganeshpur Hand Pump, Gobarwahi Village Hand Pump and Pawanar khari Village Handpump. The pH of the ground water was slightly alkaline ranging from 7.2 to 7.9. The total dissolved solids of the sampled water was in the range of 245 to 409 mg/l. The concentration of Calcium and Magnesium were in the range of 60.5-74.7 mg/l and 17-29 mg/l, which is within the permissible limit of 75 and 30 as per IS 10500:2012, respectively.

4.7 Climate

The climate of the district is characterized by a hot summer and general dryness throughout the year except during the south-west monsoon season, i.e., from June to September. The climate of the Bhandara district is very extreme. The annual maximum and minimum temperature of the district is 45.0°C and 6.0°C. (CGWB, 2010).

The analysis of the average wind pattern shows predominant wind blowing towards South West direction. The average wind speed during study period was 1.67 m/s. The calm wind (wind speed < 0.5 m/s) conditions prevailed for 7.55 % of the total time.

4.8 Ambient Air Quality

Six sampling stations were chosen for monitoring of ambient air quality within the study area. These were within 10 km distance from proposed expansion locations. The air quality

parameters like PM₁₀, PM_{2.5}, SO₂, and NO_x were monitored. The values were within the permissible limits as per the NAAQ standard, 2009.

4.9 Noise

The noise level was monitored at eleven locations within the study area and was within the permissible limits of Ambient Air Quality Standards in respect of Noise, The Noise Pollution (Regulation and Control) Rules, 2000.

4.10 Biological Environment

The list of common flora and fauna present in the project area are given in **Table 3** and **4**.

Table 3: Comprehensive List of Plant Species in Study Area

Local Name	Scientific Name
Hariali Ghas	<i>Cynodon dactylon</i>
Khair	<i>Acacia catechu</i>
Tarota	<i>Cassia tora</i>
Palash	<i>Butea monosperma</i>
Peepal	<i>Ficus religiosa</i>
Teak	<i>Tectona grandis</i>
Aonla	<i>Emblica officinalis</i>
Bel	<i>Aegle marmelos</i>
Salai	<i>Boswellia serrata</i>
Haldu	<i>Adina cordifolia</i>
Tendu	<i>Diospyros melanoxylon</i>
Shisham	<i>Dalbergia sissoo</i>
Eruni	<i>Zizyphus oenoplia</i>
Chilhati	<i>Mimosa hamata</i>

Table 4: List of Fauna in the Project Area

Local name	Scientific Name	IUCN Status/WPA Schedule No.
House sparrow	<i>Passer domesticus</i>	WPA: Schedule-IV
Indian Rat	<i>Rattus rattus</i>	WPA: Schedule V
Indian Toad	<i>Duttaphrynus melanostictus</i>	WPA: Schedule II
House crow	<i>Corvus splendens</i>	WPA: Schedule V
Garden Lizard	<i>Calotes versicolor</i>	WPA: Schedule II
Little Cormorant	<i>Phalacrocorax niger</i>	IUCN :Least Concern
Indian Myna	<i>Acridotheres tristis</i>	WPA: Schedule-IV
Pigeon	<i>Columba livia</i>	IUCN :Least Concern
Hare	<i>Lepus nigricollis</i>	IUCN :Least Concern
Weaver Bird	<i>Ploceus philippinus</i>	WPA: Schedule-IV
Common Langur	<i>Presbytis entellus</i>	WPA: Schedule-II
Barking Deer	<i>Muntiacus vaginalis</i>	WPA: Schedule-III
Chital	<i>Axis axis</i>	WPA: Schedule-III
Pheasant	<i>Phasianus colchicus</i>	WPA: Schedule-IV

No National Park, Wildlife Sanctuary was present within 10 km of the study area. A Reserved Forest was present within 5-6 km from the project site.

4.11 Socio-Economic Environment

Project area specific details with respect to the socio-economic environment were collected during field visit and through public consultations. Public consultation was conducted in six villages namely Paonarkhari, Gobarwahi, Ganesh Pur, Yederbuchi, Chicholi and Chandmara in Maharashtra district and Kodbi, Pandhari, Ganeshpur(Hamesha) and Bamhani in Madhya Pradesh district.

The project site comes under the Tumsar taluka of Bhandara district of Maharashtra. The total area of Bhandara district is 3716.65 sq. km. The Bhandara district is sub divided into seven taluka, namely, Bhandara, Mohadi, Tumsar, Lakhni, Sakoli, Pauni, and Lakhandur. The project site comes under the Tumsar Taluka. There are about 150 villages in the Tumsar taluka. Total population of the Bhandara district according to 2001 census was 1136146 out of which 573445 were males and 562701 were females. Of the total population, 84.5% is residing in rural area and 15.5% is residing in urban area. The density of the population according to the 2001 census was 306 persons/Sq. Km, which is below the average density of Maharashtra State. The literacy rate of the district is reported to be 78%. Major portion of the population derives their livelihood from agricultural sector. Apart from agriculture some villagers are also engaged in poultry, inland fisheries and labour work.

Only Chicholi, Paonarkhari, Yederbuchi and Gobarwahi in Tumsar Subdistrict and Bamhani in Katangi subdistrict have middle and higher Secondary schools within their habitations. College is more than 5 to 10 km far from all the habitations. Medical facilities in all the habitations are very poor. The postal and communication services in all the habitations of Tumsar sub district is good but in Katangi sub district only Bamhani Village have postal and communication services available.

5. Identification of Impacts and Mitigation Measures

The impacts and mitigation measures with respect to the construction and operation phases of the proposed project are given in **Table 5**.

Table 5: Proposed Environmental Mitigation Measures

S. No.	Component	Impact	Mitigation Measures
Construction Phase:			
1.	Air	<ul style="list-style-type: none"> • Generation of Dust, CO₂, SO_x, NO_x 	<ul style="list-style-type: none"> • Covering of raw ore with tarpaulin during transportation and storage. • Use of water sprinklers. • Personal Protective equipment for labours. • Proposed project site is inside the existing industry premises. No impact on general public.
2.	Noise and Vibration	<ul style="list-style-type: none"> • Increase in the noise levels due to movement of vehicles and construction activities. • Vibration due to 	<ul style="list-style-type: none"> • Proper service and maintenance of machines and vehicles to control noise. • Personal protective equipments for labours.

S. No.	Component	Impact	Mitigation Measures
		<p>movement of vehicles and construction activities.</p> <ul style="list-style-type: none"> Noise due to working of machineries like compressor, compactors, concrete plant, cranes and transportation materials 	<ul style="list-style-type: none"> Construction activity will be carried out in day time only. Project site is inside the existing industry premises, hence no impact on general public.
3.	Water	<ul style="list-style-type: none"> Water pollution due to disposal of untreated sewage 	<ul style="list-style-type: none"> Proper sanitation facilities in the construction site. All the spent water from washing of ore will be collected in settling tank and recycled and will be reused for quenching. The wastewater from quenching will be collected in tanks and passed through cooling towers and will be reused for quenching. The sludge from washing cradles is pumped in a settling tank and sold as raw material to the manufacturers of ferro industries.
4.	Land	<ul style="list-style-type: none"> No change in Land use pattern as project site is inside the existing industrial complex. Land is already developed for industrial use. Pollution of land due to discharge of untreated sewage and solid wastes. 	<ul style="list-style-type: none"> Sanitation facilities in the construction site as well as labour camps. Treatment and disposal of solid waste as per MPCB guidelines.
5.	Biological <ul style="list-style-type: none"> Flora Fauna 	<ul style="list-style-type: none"> Disturbance due to increase in noise. 	<ul style="list-style-type: none"> Green belt development.
6.	Socio-Economic	<ul style="list-style-type: none"> Employment of construction workers 	<ul style="list-style-type: none"> People from the study area to be employed as far as possible
7.	Occupational Health and Safety	<ul style="list-style-type: none"> Auditory ailment due to noise. Respiratory ailment due to dust emission. 	<ul style="list-style-type: none"> The use of personal protective equipments will be made stringent. Water sprinkling system for dust generating area.

S. No.	Component	Impact	Mitigation Measures
Operation Phase:			
1.	Air	<ul style="list-style-type: none"> • Increase in the air pollutant concentration. • Dust generation possibility is minimum as raw material will be transported in lumps form by trucks with covered tarpaulin and finished product will be transported in recycled HDPE bags. 	<ul style="list-style-type: none"> • Use of wet scrubbers and bag filters to control dust and fugitive emissions to comply with the limits of MPCB regulations • Personal protective equipments for employees. • Strict implementation of Hazardous Waste Rules Act 1989, while storage/handling/transportation of hazardous substances. • Regular monitoring of emissions. Provide high efficiency scrubbers.
2.	Noise and Vibration	<ul style="list-style-type: none"> • Increase in the noise levels due to operation of equipments. • Vibration during milling, grinding, screening and operation of manufacturing unit. 	<ul style="list-style-type: none"> • Equipments with noise level below 80db only will be used. • Proper service and maintenance of machines to control noise. • Personal protective equipments for employees like anti vibration gloves and ear plugs. • Project site is inside the existing industrial complex. No impact on general public. • Use of low noise prone equipment. • Isolation of the noise prone unit from the employee area to avoid continuous exposure of working personnel to noise. The administrative control would have a major role to monitor noise, take remedial measures and ensure that no plant personnel are over exposed to noise. • Shock absorbing techniques will be adopted to reduce vibration impact; • All the openings like covers, partitions will be acoustically sealed;

S. No.	Component	Impact	Mitigation Measures
			<ul style="list-style-type: none"> • Inlet and outlet mufflers will be provided, which are easy to design and construct; • Ear plugs will be provided to workmen working near high noise generating sources; • Noise levels will be reduced by the use of absorbing material on roof walls and floors; • Provision of separate cabins for workers/operators
3.	Water	<ul style="list-style-type: none"> • Impact on ground water due to abstraction will be negligible as no ground water will be abstracted for the proposed process. • No industrial effluent will be discharged, which makes this production process as Zero Discharge Production Process. 	<ul style="list-style-type: none"> • Proper sanitation facilities in the plant area. • All the spent water from washing of ore is collected in settling tank and is recycled. • The wastewater from quenching is collected in tanks and passed through cooling towers and is reused. • The sludge from washing cradles is pumped in a settling tank. Particles are settled in tank and are either re-used or sold as raw material to the manufacturers of ferro industries.
4.	Land	<ul style="list-style-type: none"> • Pollution due to discharge of sewage waste. • Raw material will be transported in lumps form by trucks with covered tarpaulin and finished product will be transported in recycled HDPE bags. 	<ul style="list-style-type: none"> • Sanitation facilities in the construction site as well as labour camps. • Treatment and disposal of solid waste as per MPCB guidelines.
5.	Biological <ul style="list-style-type: none"> • Flora • Fauna 	<ul style="list-style-type: none"> • Disturbance due to increase in noise. 	<ul style="list-style-type: none"> • Operational activities of heavy machineries and transportation only in daytime. • Green belt development.
6.	Socio-Economic	<ul style="list-style-type: none"> • Employment to local people 	<ul style="list-style-type: none"> • People from the local area to be employed as far as possible
7.	Occupational	<ul style="list-style-type: none"> • Auditory ailment due to 	<ul style="list-style-type: none"> • Equipments with noise level

S. No.	Component	Impact	Mitigation Measures
	Health and Safety	noise generated from the production unit . • Accidents due to handling/storage/ transportation of hazardous materials.	below 80db only will be used. • Wearing of personal protective equipments like gas masks, ear muffs etc. will be strictly enforced. • Training/awareness programme about the handling / storage / transportation of hazardous materials. • First aid training for chemical /fire hazard related accidents.

6. Environmental Monitoring Plan

The parameters and respective frequency of monitoring as part of Environmental Monitoring Plan for both construction and operation phases are tabulated below in **Table 6**:

Table 6: List of Parameters to be monitored during Construction and Operation Phases

(a) Environmental Monitoring (Construction Phase)

Attribute	Location & frequency	Parameters
Air	At major construction sites (total 3 stations) Monthly	PM ₁₀ , PM _{2.5} , SO ₂ and NO _x
Noise	At major construction site and near generator set. Monthly	Equivalent noise level
Water	Three locations – two within plant area and nearest well outside plant area, once in every season	Parameters as per CPCB standards

(b) Environmental Monitoring (Operation Phase)

Attribute	Location & frequency	Parameters
Air	Scrubber outlet, generator set, process stacks, three locations within 100 – 200 m of the project site and two locations within the plant near the production units. Seasonal	PM ₁₀ , PM _{2.5} , SO ₂ , and NO ₂
Noise	Generator set, three locations within 100 – 200 m of the project site, two locations within the plant near the production units. Seasonal	Equivalent noise level
Water	Three locations – two within plant area and nearest well outside plant area, once in every season	Parameters as per CPCB standards
Waste Water	Before and after treatment.	Parameters as per CPCB

Attribute	Location & frequency	Parameters
		standards
Soil	One location within plant area and two locations around the project site within 200 m distance from the unit.	pH, moisture content, texture, organic matter, chloride, SAR, CEC, nitrogen, phosphorous
Occupational Health	-	General and respiratory and liver ailments check up

7. Project Benefits

The proposed expansion project will lead to the following benefits:

- Increase in production of MnO.
- This project will contribute additional revenue to the Central Exchequer in the form of excise duty.
- The project will result in the employment opportunities to the unskilled/skilled local people.
- Thereby, the quality of life of the employed people will increase.

8. Environmental Management Plan (EMP)

The following plans are proposed under the Environmental Management Plan:

- Air Pollution Management Plan
- Storm Water Management Plan
- Effluent Management Plan
- Green Belt Development
- Rainwater Harvesting System
- Corporate Responsibility for Environmental Protection (CREP)

A total capital and recurring cost provision of about INR 29 Lakhs has been kept in the project cost towards the environmental protection, control and mitigation measures and implementation of the EMP. The budgetary cost estimate for the EMP is given in Table 7

Table 7: Environmental Budget

S. No.	Items	Approx. Capital Cost (Rs. Lakhs)	Recurring Cost per yr. (Rs. Lakhs)
1.	Water pollution control (Capital cost of Treatment Plant and recurring cost of water & effluent quality monitoring)	Existing facility will be used	1
2.	Air pollution control (Capital cost of stacks and recurring cost of stack emission monitoring.)	10	1
3.	Noise pollution control (Capital cost of DG room enclosure & acoustic treatment and recurring cost of noise monitoring.)	Existing facility will be used	-
4.	Rainwater harvesting system.	10	-
5.	Storm water drainage system.	Present drainage	1

S. No.	Items	Approx. Capital Cost (Rs. Lakhs)	Recurring Cost per yr. (Rs. Lakhs)
		system is available	
6.	Landscaping.	2	1
7.	Environmental management (recurring cost of annual monitoring, hiring of consultants and payment of various statutory fees.)		3
	Total	22	7

9. Summary and Conclusion

The environmental status of the project site and study area of 10 km radius is delineated with respect to air, noise, water, land, biological and socio-economic environment. The different project activities in the construction and operation phases are identified. To identify the impacts, the interaction between the project activities and different components of environment are classified phase wise. A summary of the identified impacts are given in the following paragraphs.

Since this project is proposed adjacent to existing plant inside the existing premises with well-maintained infrastructure facilities, the impact during construction phase on the nearby settlement will be negligible as the land is already developed for industrial use.

During the operational phase, transportation of raw material, operation of grinding, screening of the machines and the production process could cause a temporary disturbance to local environment which will be prevented with the proposed mitigation measures proposed in Chapter 4.

From the Environmental Impact Assessment, it can be concluded that this proposed project will not have any major significant negative impacts. The minor impacts arising out during construction and operation phases can be mitigated with the help of the proposed Environmental Management Plan.

In general, production of Manganese oxide and Manganese ore will improve the fertilizer production and also generate employment opportunities.