Ministry Of Mines
And Steel Development

MINISTRY OF MINES AND STEEL DEVELOPMENT

(with Infrastructure Concession Regulatory Commission)

CONCESSION OF ITAKPE MINES AND BENEFICIATION PLANT

BUSINESS CASE September 2022

Submitted by PREMIUM STEEL AND MINES LIMITED

PREMIUM STEEL & MINES LTD

DASTUR

Premium Steel Mines Limited | Concession of National Iron Ore Mining Company Limited (NIOMCO)

Business Case Report

PSML-001

Version Control	
Document Version	PSML-001
Status	Final Draft
Filename/Project ID	Business Case – PSML
Last Saved	25 September 2022
Prepared for	Premium Steel Mines Limited
Prepared by	QuentinHill Advisory Limited
Date Approved	26September 2022

TABLEOFCONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

ASC	Apparent Steel Consumption
CAPEX	Capital Expenditures

CAPM	Capital Asset Pricing Model
DSCR	Debt Service Coverage Ratio
DSRA	Debt Service Reserve Account
EBITDA	Earnings Before Interest, Taxes, Depreciation and Amortisation
EIA	Environmental Impact Assessment
EPC	Engineering, Procurement and Construction
FGN	Federal Government of Nigeria
FBC	Full Business Case
FTE	Full-Time Equivalent
GDP	Gross Domestic Product
ICRC	Infrastructure Concession Regulatory Commission
IRR	Internal Rate of Return
MDA	Ministries, Departments and Agencies
MMSD	Ministry of Mines and Steel Development
NPV	Net Present Value
OPEX	Operating Expenditures
PCG	Partial Credit Guarantee
PLCR	Project Life Coverage Ratio
PPP	Public-Private Partnership
PRG	Partial Risk Guarantee
UNCTAD	United Nations Commission for Trade and Development
USD	United States Dollar
WACC	Weighted Average Cost of Capital

SECTION 1: EXECUTIVE SUMMARY

1.1 Introduction

This Business Case report presents the essential details of the Unsolicited Proposal by Premium Steel Mines Limited (PSML) to the Ministry of Mines and Steel Development (MMSD), for the concession of National Iron Ore Mining Company (NIOMCO) under a Public-Private Partnership (PPP) framework. The Business Case demonstrates the need for the project; the underpinning policy imperatives; the project objectives and performance measures involved; and analysis of all relevant technical, legal, financial, commercial and management considerations involved in the implementation of the project.

The metals sector is considered as one of the most valuable sectors of an industrialized economy. Because of its linkage to other sectors of development and its enormous capacity to support and simulate growth in virtually all economic sectors, the consumption rate of steel and other metal products is regarded as a major index of industrialization of a nation. Using this yardstick, Nigeria is lagging far behind in industrial development, when compared with some developing nations.

By the current estimate, the annual per capita consumption of steel and aluminum in Nigeria are about 10kg and 0.3kg respectively, while the world average for the two metals are 130kg and 5kg respectively. Nigeria lags In Apparent Steel Consumption (ASC), when compared with countries like Algeria (42kg/capita), Egypt (38kg/capita), and Zimbabwe (25kg/capita). This is an indication that Nigeria, with an estimated population of over 180 million, has a huge gap and enormous potential domestic market that can sustain rapid growth in the metals and related product sector.

Nigeria is richly endowed with extensive deposits of Iron, Lead and Zinc ores, but is yet to reach its full potential in the development and consumption of key metallic products as iron, steel, copper, aluminum, tin, lead, zinc etc. The development, exploitation, beneficiation, and exportation of these metals can jumpstart rapid industrialization and economic growth. In the drive for industrialization, it is more profitable to smelt the ores to produce steel, lead, zinc as well as their various commercial alloys, for local consumption and export to enhance foreign exchange earnings.

1.2 Project Background

The background to the project is presented by a review of the status of various plants that were set up by both Federal Government of Nigeria (FGN) for mining, processing, smelting, and fabricating the metals and alloys of technical and commercial interest.

National Iron Ore Mining Company (NIOMCO)

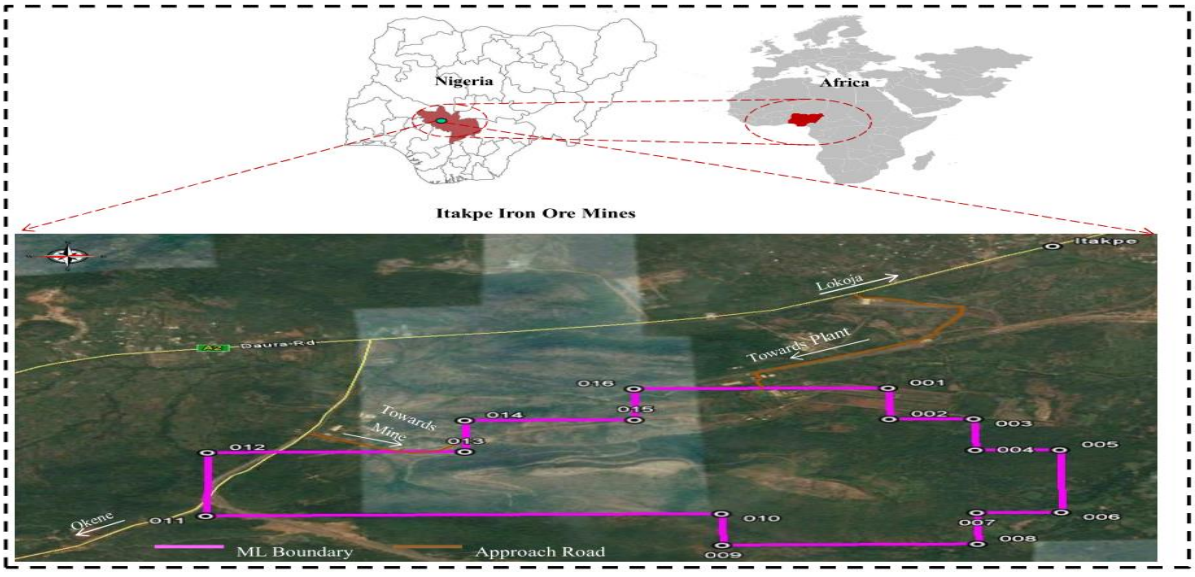
The Itakpe iron ore mine [established in 1979 as Associated Ores Mining Company Limited (AOMC), but eventually became National Iron Ore Mining Company (NIOMCO)] came into

existence because of the FGN's desire for rapid industrialization of the country through the iron and steel industry. The objectives for NIOMCO were to:

- Produce and supply 40% of the iron ore requirements of the Delta Steel Company, Aladja (Warri) (DSC), Nigeria amounting to 550,000 tons per year assaying 67 to 68% Fe, as per initial design of Itakpe plant
- Produce and supply 100% of the iron ore requirements of the Ajaokuta Steel Company Limited (ASCL) amounting to 2.15 x 106 tons per year assaying 63% Fe
- Export the concentrates to the international market after local needs have been satisfied
- Represent the interest of the Federal Government of Nigeria in foreign iron ore mining projects
- Arrange and coordinate the exploitation of other locally available raw materials required by the major steel plants.

The Itakpe iron ore deposit is the principal source for the iron and steel industry. However, due to the low grade of its iron ore (36%), beneficiation is required. The beneficiated iron ore from Itakpe is expected to feed the Delta Steel Company Aladja in Delta State and Ajaokuta Steel Complex, Ajaokuta in Kogi State.

NIOMCO is charged with the responsibility of mining and processing iron ore to produce concentrate and super-concentrate for Ajaokuta and Delta Steel Companies respectively. The first phase of the beneficiation plant consisting of three lines to produce concentrates for Ajaokuta Steel Plant was commissioned but no longer in operation.



The super-concentrate production lines were subsequently installed. Major activities of the company included over burden stripping (ore exposure), pre-exploitation core drilling, ore production and beneficiation. There plans to link Ajabanoko ore mine to the Itakpe Beneficiation Plant through a railway extension, an access road, and a conveyor belt system. The company was concession to Global Steel Holding Limited (GSHL) for a period of ten (10) years effective from March 2005, but no mining and steel production took place, as the contracting parties were engaged in legal battle.

Ajaokuta Steel Plant

The Ajaokuta Steel Plant, an integrated steel plant, which is based on the Blast Furnace/Basic Oxygen Furnace route of steel production, was designed to produce 1.3 million tonnes of cast blooms per annum in the first phase, with inbuilt facility to expand to 2.6 million tonnes and 5.2 million tonnes in the second and third phases respectively. All the steel produced in the first phase (1.3 million tonnes) was to be processed into long products, while the additional production from the second and third phases were to be dedicated for flat steel production and capacity enhancement respectively.

In May 2007 the Concession Agreement was converted into a Share Purchase Agreement resulting to 60:40 ownership ratio between Global Steel Holdings and the Federal Government respectively.

Delta Steel Plant

The Delta Steel Plant, a midrex Direct Reduction integrated steel plant, was built as a turnkey project and commissioned in 1982 to produce 1 million metric tonnes of liquid steel per annum. The plant however, only attained a maximum production capacity of 25% in 1985. Production declined progressively thereafter until 1996 when the plant was finally shut down due to non-availability of funds. The company was in 2005 privatized to GINL, but the deal was later terminated, and the company was subsequently acquired by Premium Steel Mines Limited.

NIOMCO mines were supposed to cater 2,15 MTPA, super concentrate / BF concentrate Iron ore fines to Nigerian Steel Plants, the Distribution was 0.55 MTPA to erstwhile Delta Steel plant and balance 1.6 MTPA to Ajaokuta Steel Plant. With enhanced capacity of former Delta Steel Plant, now acquired by PSML the requirement of super concentrate has gone up to 3.0 MTPA.

The PSML, First DRI plant will be tentatively starting by October 2023 and second DRI plant after gap of three months. PSML will be requiring 3 MTPA of super concentrate.

As a business strategy it has been proposed to convert all the existing three lines to super concentrate lines and install new fourth super concentrate line on existing civil foundations, to produce the balance super concentrate requirement. NIOMCO had committed to deliver 1.6 MTPA, BF grade concentrate to Ajaokuta Steel Plant, it is proposed to install most modern additional Lines / Line.

Premium Steel and Mines Limited (PSML) proposal is for the concession of NIOMCO for a period of 30 years, to rehabilitate, operate, and transfer NIOMCO under a Public-Private Partnership (PPP) framework. Under the arrangement, PSML will completely refurbish NIOMCO plant and facilities and install the new modern equipment needed to upgrade it plant capacity. The Itakpe mine beneficiation plant for super concentrate (67-68% Fe) and concentrate (63-64% Fe) will start in phases.

1.3 Project Description

1.3.1 Technical Description of the Project

Premium Steel Mine Limited (the Project Proponent and Sponsor) has submitted a proposal to the *Ministry Mines and Steel Development (MMSD)* for a 30-year concession of National Iron Ore Mining Company (NIOMCO) and completely refurbish the facilities and install modern equipment needed to upgrade the capacity, including the Beneficiation Plant.

The PSML, First DRI plant will be tentatively starting by October 2023 and second DRI plant after gap of three months. PSML will be requiring 3 MTPA of super concentrate. As a business strategy it has been proposed to convert all the existing three lines to super concentrate lines and install new fourth super concentrate line on existing civil foundations, to produce the balance super concentrate requirement. Niomco had committed to Deliver 1.6 MTPA, BF grade concentrate to Ajaokuta Steel Plant, it is proposed to install most modern additional Lines / Line. This line can be installed / commissioned keeping in mind the reactivation schedule of Ajaokuta steel plant.

Phase 1	In **Phase-1**, Line 3 originally designed for delivering 67-68% Fe super concentrate will be reactivated to produce **0.7 MPTA of iron ore**. Line-3 can be made operational within 6 months of project start and will yield much needed iron ore for the Nigerian steel plants. The capital expenditure on phase 1 will be USD 56.5 million.
Phase 2	The combined output from Line 1, 2 and 3 will produce super concentrate of over **2.15 MTPA of iron ore**. The capital expenditure on phase 2 will be USD 105.8 million.
Phase 3	In **Phase-3**, a completely new Line-4 will be installed producing 0.85 MTPA super concentrate it is envisaged to erect a

	completely new line to deliver super concentrate of 67-68% FE. The capital expenditure on phase 3 will be USD 141.8 million.
Phase 4	**Phase 4**: To meet the iron ore requirement of the Ajaokuta Steel Plant (about 1.6 MTPA, sinter feed iron ore fines/concentrate), it is envisaged to install two (2) nos. of new concentration line along with separate new crushing and screening plant and development of mines for additional production as follows: Targeted Concentrate Production (Sinter Feed). 1.60 MTPA Nos. of Concentration Line: 2 Production Capacity: 125 TPH Make – Koch Germany / Metso / Primetals / FL Smidth.

Commissioning Schedule: 24 Months from the date of contract finalization, it will be planned in-line with reactivation Schedule of Ajaokuta Steel Plant.

The concession of NIOMCO should be a priority for the Federal Government to maximize the use of the mine for the benefit of sector and other economic stakeholders. The expected development of the proposed from the consideration of the recommendations will have full impacts on the economy, environment, and society.

1.3.2 Key benefits of the Project

The significance and value of the project lies principally in the opportunity to build the infrastructure and capability to meet the requirements of the steel industry, which is the backbone of a growing economy like Nigeria. The subsectors which will benefit include automotive, construction, engineering, consumer goods and other critical areas that provide the necessary impetus for growth, while creating thousands of new job opportunities over its lifetime.

The main benefits of the project are summarized as follows:

- Give impetus to the country's ambition to create a globally competitive sector capable of contributing to wealth creation, providing jobs, and advancing social and human security.

- Utilize the nation's mining assets to drive domestic industrialization initially, and then migrate to winning in global markets.

- Support the Federal Government's Nigerian Mining Sector Road Map (2016) through a value-chain based growth plan.

1.3.3 Constraints to Implementing Project

Whereas the project is of the highest importance and priority for the Federal Government, in terms of the potentials for rapid industrialization and economic growth, the major obstacle to implementing the project is the lack of the required capital investments by the MMSD to finance the project. The country is currently going through economic recession with attendant socio-economic challenges, especially the difficulty of financing development of important infrastructure projects. The economy has weakened more than anticipated due to a significant reduction in oil production and export, a restrictive foreign exchange policy, and delayed fiscal stimulus.

The effect of all these is a significant drop in revenue inflow to the Federal Government, which in turn is reflected both in diminishing external reserves as well as distributable income to all tiers of Government. To end the lingering economic recession, the Federal Government had resorted to taking foreign loans, which has been met with much skepticism due to public aversion to the country's continuing rising debt profile.

However, the financial resources currently available to the MMSD from national budgetary allocations are grossly insufficient to enable it to implement this project. This situation constitutes a serious constraint to implementing the project.

1.3.4 Proposed Project Delivery Structure

The demand for capital investment for infrastructure development in Nigeria is huge and growing daily, while the financial and implementation capacity of Government is inadequate. For this reason, Governments (both at the Federal and State level) have adopted Public-Private Partnership (PPP) framework for development of infrastructure.

The recommended PPP project delivery structure is Concession Rehabilitate Operate and Transfer (ROT) model. Under this arrangement, PSML will invest an initial sum of approximately US$300 million in the project on behalf of the MMSD. The investment will be recouped over a 30-year concession period.

The need for private sector investment to bridge the resource gap and the efficiency gains that the private sector will bring to bear on the project, are the main justifications for proposing the implementation of the project through a PPP model.

1.3.5 Experience and Credentials of the Project Proponent

Premium Steel Mines Limited (PSML)

The project proponent and primary sponsor, Premium Steel Mines Limited (formerly known as Delta steel Company (DSC)) is an integrated steel manufacturing company located in Aladja, near Warri, Delta State and operates the foremost integrated steel plant in the sub-Saharan region. The plant is strategically located with proximity to natural gas fields, navigable sea channels, and high-capacity electric power generating stations. It's the largest producer of quality steel rebars in Nigeria with an installed capacity of 1.3 Mn metric ton. The organization maintains stringent quality control norms. It is equipped with a self sufficient labs with the latest testing equipment. There is a structured inspection procedure during production so that defect if any are eliminated at source. It has the facility to make mechanical property testing in conjunction with the production process and thus certifies product quality online. All products are accompanied with full test certificates on the mechanical and chemical properties of the rebars.

Operational Excellence

PSML has deployed the most recent technologies and production equipment with emphasizes on production of steel of international standards, whilst focusing on local human development and gainful employment. The company operates based of continuous innovation, high productivity, social responsibility, highest safety standards and participative growth. With an experienced management team that has several decades of experience in Greenfield construction and operational management of large scale, fully integrated steel plants and their successful operations.

The company is part of a large, diversified conglomerate that is engaged in agriculture, food products, automobiles, plastics, packaging, steel manufacturing, real estate, and services in 18 countries worldwide. West Africa steel has a well-entrenched distribution network in Nigeria and other countries in the region. The group's promoters/senior management bring in 40 years of expertise managing multiple businesses in sub–Saharan Africa and notably in Nigeria. The group employs several thousand employees in sub–Saharan Africa and has a long history of corporate social responsibility, working in conjunction with local communities in their welfare programs.

Project Execution

The capability to design, build, operate and maintain a world-class project of this magnitude with state-of-the-art equipment is one that few global operators truly possess. To design one capable of accommodating the rapidly growing and dynamic Nigerian market takes commitment and ambition on both a global and local level. To achieve this objective, PSML has entered strategic partnership with M. N. Dastur & Company (P) Ltd., Kolkata (DASTUR), an internationally reputed company providing Consulting Engineering Services to the minerals, metals, power, and energy sectors, as the Consulting Engineers for the project.

DASTUR

Founded in 1955 by the visionary Dr Minu Nariman Dastur, Dastur is today one of the largest independent consulting engineering organisations in the world that enjoys a global reputation built on trust. The organization has a multidisciplinary team of professionals with in-depth understanding of the latest trends, combining creativity with initiatives. Dastur specialises in project formulation and planning, techno-economical appraisal, design and detailed engineering, procurement assistance services, project management, inspection, supervision of construction and erection, environmental engineering and pollution control and management consultancy in the above areas.

With unmatched knowledge of processes and technologies, result-oriented solutions, proficiency to design, engineer and manage projects of any type or scale, core competencies in integrated design and engineering consultancy from 'concept to completion', for a wide range of projects in metallurgical, mining, chemical, cement, power, environment, infrastructure, and other allied industries. Dastur is headquartered in Kolkata with offices in Chennai, Mumbai, Bangalore, New Delhi, Bhubaneswar, and Hyderabad. International operations are based out of Düsseldorf in Germany, Tokyo in Japan, Abu Dhabi in UAE, and New Jersey in USA.

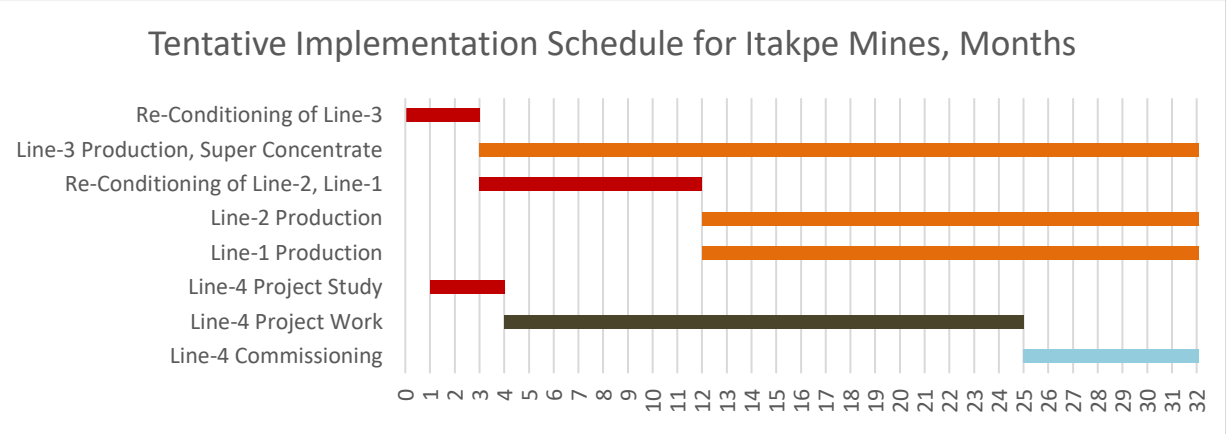
In 2008, Dastur added a new dimension to its business offerings in the form of Dastur Business & Technology Consulting (DBTC), to focus on meeting emerging challenges in the rapidly changing global business and technology. DASTUR specialises in project planning and appraisal, economic evaluation, design and detailed engineering, procurement assistance services, project management, inspection, supervision of construction and erection, environmental engineering and pollution control, energy management and optimisation, human resources development, and management consultancy.

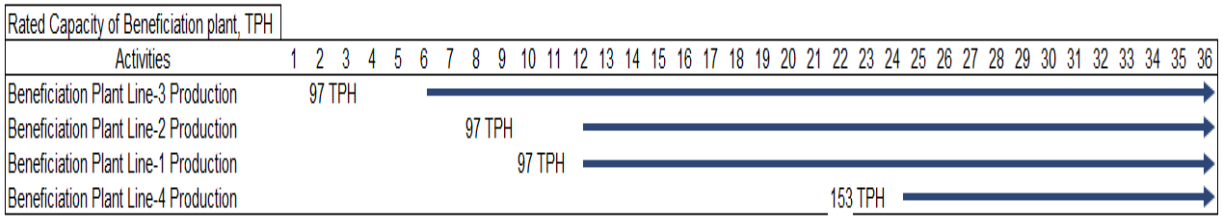
Over the years, DASTUR has built up a multi-disciplinary team of over 1,200 professionals and technical staff with varied experience, fully abreast of the 'state-of-the-art' technologies, with intimate understanding of the latest trends, combining creativity with initiative. DASTUR provides a unique blend of experience and talent, catering to the specific requirements of each project. DASTUR is an ISO 9001 certified organisation and is internationally recognised as one of the largest independent consulting engineering organisations in the world.

A comprehensive list of Dastur's project experience in Report Preparation and Engineering Services, and Engineering/Procurement Assistance Services, etc. is provided as an Appendix to this report.

PSML places a very high value on leadership. Our leadership team is comprised of experts in diverse areas from across the world, including construction, financing, technical operations, manufacturing, mineral metals logistics and extraction. The plant management will be chosen with great care and special attention will be taken to hire and deploy only qualified and motivated staff. The company will also contract the services of reputable firms for operational supporting in the field of engineering and project management.

The proposed project implementation schedule is as shown in the Gannt chart below.





1.3.6 Project Finance

The project will cost approximately $300 million to implement, from design, construction to start-up, which will be financed by raising equity and debt financings. The cash flow model is calculated on an after-tax basis for a 30-year project life. The pay-out of the capital investment on a project basis is ..... years and the calculated rate of return is over ....%. Testing the project economics against changes in the primary input variables (capital cost, operating cost and gold price) indicates that the project is very robust and even with significant increases in costs or reductions in revenue sources the project has a positive rate of return.

Particulars	
Debt-equity	4:1
Interest rate per year (Term Loan)	11%
Interest rate per year (Working Capital)	11%
Moratorium	6 Months
Loan repayment schedule	7 years

PSML's strong balance sheet and track record of successful investments are indicative of the strong financial capability to fund this project. Financing for the project will be effected through a combination of equity and debt to be provided and sourced respectively by PSML. On the debt side, PSML has very good access to international financing facilities. The company is in advance stages of discussions with its bankers who, based on these preliminary discussions, have indicated an interest to provide financing al facility for the project. The financing package could be made available prior to financial closure, based on the completion of the Full Business Case.

1.3.7 Project Risks

While the project demonstrates excellent potential economic returns it is not without its risks. These are discussed below. The various risks associated with the project have been identified and evaluated, and the appropriate risk allocation structure and mitigation measures for optimal risk management determined. Of the identified risks, construction, financing, and revenue risks are considered high in occurrence, but these can be considerably mitigated through appropriate measures. Operations and maintenance risks are considered low in occurrence; whilst regulatory, political and security risks are considered extremely low.

1.4 Approach and Methodology to the Business Case

The purpose of the Business Case is to provide evidence-based information in relation to the project and proposed investment, to establish its technical, economic, legal, commercial, and financial viability as PPP project.

The Business Case was developed on behalf of PSML by a team of external Advisors led by Quentinhill Advisory Services Limited. The Advisory Team included Technical, Legal and Financial components. As part of their mandate, the Advisors conducted the usual range of project appraisal, including field research, feasibility review, and technical analysis to provide the technical specifications and independent market assessment to produce relevant current and forecasted financial data to develop the financial model and other sensitivity analysis for the Business Case.

The Business Case has been prepared in compliance with the Infrastructure Concession and Regulatory Commission Act and consistent with the requirements and relevant guidelines of the ICRC. The document is based broadly on a "Five-case model", i.e., the Strategic Case, the Economic Case, the Commercial Case, the Financial Case, and the Management Case; based on the project proponents' view of the opportunity.

The conclusions and recommendations presented in the document are based around the issues indicated in the model.

1.5 Conclusion

PSML has presented in this Business Case, a detailed appraisal of the project within a wider business case, and provided an assessment of strategic fit, option appraisal, achievability,

value for money and affordability. We have also provided an economic appraisal and other information including the proposed arrangements for financing, procurement, management of the associated services, and monitoring and evaluation of the project.

Great efforts have been put into the preparation of this BC because of the importance attached to the proposal. We have carefully identified a viable project delivery option that aligns with the strategic objectives of the Federal Government and contributes the most to the MMSD priorities at project level. The Business Case process analyzed many different options and provided a recommendation on the best option and capital funding; and identified what resources (costs) and benefits are required for implementation

PSML believes that this project will bring tremendous benefits for the Federal Government. The significance and benefit of the project lies in infrastructure development in terms of unleashing the industrialization potentials of the country. The other socio-economic benefits of the project include provision of a new source of investment capital for required infrastructure project, thereby reducing sovereign borrowing and associated risks; accelerate investments in infrastructure development; no investment obligation on the part of Government to implement the project, rather Government will earn additional revenue from the project; and provision of employment opportunities for Nigerians.

We believe that approving this project will be a major catalyst for economic growth in the country.

The ICRC Act envisages Unsolicited Proposals, where such an approach demonstrates substantial technical or financial innovation or meet an unidentified need. For this reason, the Act and National Policy on PPP do not exclude unsolicited proposals but rather requires that the fundamentals of a competitive and transparent procurement process and procedures must be preserved even in such a situation.

PSML is of the view that the unique nature of the project (involving a critical national asset) makes a strong case for the ICRC to invoke Section 5(b) of the ICRC Act and approve a single concessionaire selection process, which would enable the MMSD enter direct negotiation for award of the concession to PSML, without the requirement for competitive bidding, since PSML meets all the pre-qualification requirements and has demonstrated its technical and financial capabilities to successfully implement the project.

SECTION 2: STRATEGIC AND LOCAL CONTEXT OF THE PROJECT

2.1 Policy Context and Strategic Objectives

Policy Appraisal

The policy of the Federal Government with regards to the mining and minerals sector is focused on the transformation of the country into the preferred mining destination for global capital and requires the promotion of the country's mineral endowments and the existence of more investor-friendly fiscal, legal and regulatory framework.

The legislative framework of this policy is embedded in the Nigerian Minerals and Mining Act 2007. The important features of this framework are:

- The clear separation of roles of the Government from that of the private sector: Government shall restrict its roles to that of Administrator-regulator while the Private Sector shall be the owner-operator in the mining industry.
- Enactment of transparent laws, regulations, and guidelines for the regulation of the industry
- Provision for the security of tenure for holders of mining leases and efficient administration of mineral titles through the setting up of Mining Cadastral Office
- Creation of a favourable fiscal regime that will be beneficial both to the holders of the mining leases, the government and the communities living on the land where minerals are exploited
- Setting up of institutional frameworks for the generation, storage, and dissemination of geological and mining information.
- Provision of transparency and access by the public to mining sector information.
- Provision of clear safeguards for health and safety and intergenerational equity with respect to the environment
- The provision of rules for succession and transferability of mining titles.

Beneficiation

Government recognizes the importance of beneficiation in adding value to commodities produced in the country. In addition to adding value, beneficiation will allow the commodities to meet appropriate standards for use where the natural products do not meet the requirements for specified use.

- Government is committed to promoting investment in mineral beneficiation activities through ensuring competitive and stable costs of public services and goods.
- Government will continue to support research with a view to developing new or improved beneficiation techniques and to developing new applications for locally produced mineral products.

- The Ministry and other Science and Technology Agencies will endeavour to establish joint-venture research and training programs with universities and the private sector to produce the necessary skilled manpower required for mineral beneficiation developments.

Specific Objectives Government will:

- Establish a greater degree of co-operation and co-ordination between the relevant Ministries, Departments and. Agencies in respect of mineral beneficiation.
- Promote incentives and benefits for projects that support further local downstream beneficiation.
- Promote investment in mineral beneficiation activities through ensuring competitive and stable costs of public services and goods, such as electricity and transport.
- Continue to support research with a view to developing new or improved beneficiation techniques and to developing new applications for locally produced mineral products.
- Support the establishment of joint-venture research and training programs among government institutions, universities, and the private sector to produce the necessary skilled and productive manpower required for mineral beneficiation developments.
- Review policies and regulations that constrain the downstream development, for example in the local jewelry manufacturing industry.

To ensure efficient development of these resources, the Government has taken several steps and is implementing new reforms in the solid mineral sector to attract and encourage investors (local and foreign) to explore and develop these resources. The Fiscal Regime comprises of a Royalty and Tax System is in accordance with International best practice.

The overriding objectives of the National Metals Policy are to:

- Achieve a substantial increase in the per capita consumption of the major commercial metals and alloys.
- Become a major regional and global producer of aluminium and steel products with a production target of 500,000 tonnes per year of primary aluminium and 12 million tonnes per year of steel products by the year 2020.
- Encourage the setting up of primary smelting and processing plants in the non-ferrous metals sub-sector.
- Attract private investment and expand value adding in downstream industries.

- Accelerate growth of the export of value-added metals and related products through increased processing of metals and metal products.

The specific objectives include:

- Growth and sustainable development of the metals industry.
- Local production of metals for domestic, industrial purposes and infrastructure development.
- Promotion of export of locally produced metal products.
- Creation of investment friendly environment for the metals sector.
- Creation of a legal and regulatory framework to control operations in the metals sector.
- Maintenance of environmental best practices and industrial safety.
- Provision of appropriate social and economic policies by Government.
- Encouragement of private sector participation.
- Provision of institutional framework for sustainable development of the metals industry.
- Development of manpower to meet the challenges of the metals industry.

The Minerals and Mining Act, 2007 offers a list of fiscal incentives that competes favourably with the best global standards, including the following:

- Exemption from customs and import duties in respect of plant, machinery equipment, accessories imported exclusively for mining operations.
- Expatriate quota and resident permits in respect of approved expatriate personnel.
- Permission granted exporters of mineral products to retain part of their foreign exchange earning in a domiciliary account for the purpose of acquiring spare parts and other mining inputs.
- Free transferability of funds

The basic principles underlying the fiscal policy for the mineral sector are to obtain optimum benefit for the country from its mineral resources; promote economic growth and development and encourage private investment in the sector; improve quality of life of the people; create direct and indirect employment; and establish efficient management of the sector.

It was also to provide for the public and private sectors, laboratory services for rock and mineral identification and mineral beneficiation.

The National Minerals and Metals Policy (2008) seeks to engineer a private sector driven revolution of the Mining Industry. The Policy promotes investment in quality geological surveys to provide and disseminate information and accurate geological data on Nigeria's mineral resources; ensuring transparency in the grant of mineral titles and permits; ensuring compliance with environmental best practices; the promotion of small-scale mining activities and the formation of informal mining activities etc.

2.1.1 The Role of the Government

Several Federal Government institutions and regulatory bodies play a pivotal role in the metal sector, not only in the development of the sector, but also to ensure regulations, standards and procedures are strictly adhered to. Other agencies have the role of the creating an enabling environment to encourage and promote private investments in infrastructural development, human capacity development, and enhance safety through regulations, amongst others.

The key players involved in the sector are as follows:

Federal Ministry Mines and Steel Development (MMSD)

The Federal Ministry of Mines and Steel Development is the major agency of government responsible for the mining industry in Nigeria. It carries out its mandate through several the following departments:

- ***The Mines Inspectorate Department***: The Mines Inspectorate Department is tasked with performing supervisory roles with respect to all activities in the mining industry and ensuring that the provisions of the NMMA are strictly complied with by stakeholders in the mining industry. These roles range from carrying out investigations or inspections in a bid to ascertain that all necessary prerequisites for grant of a mineral title are adequately complied with. They are also responsible to taking custody of and/or disposing of any such minerals which may be forfeited to the Federal Government by an order of court. They also play an advisory role as they have the responsibility of reviewing and recommending to the minister, programs for controlling mining operations.

- ***The Mines Environmental Compliance Department***: It plays the role of reviewing plans, studies and reports required to be prepared by holders of mineral titles with respect to their environmental obligations; monitor and ensure the enforcement of all environmental obligations required to be observed by holders of mineral titles; perform periodic audits of the said environmental requirements and make recommendations to the minister where applicable and; liaise with government agency with respect to social and environmental issues involved in mining operations, mine closure and reclamation of land.

- ***The Small-Scale and Artisanal Mining Department***: This Department is responsible for assisting and providing support for small scale and artisanal mining activities in the country as well as the provision of extension services in the country.

MMSD's Associated Agencies

The following are Agencies under the MMSD which play important roles in the metallurgical industry:

(i) National Steel Raw Materials Exploration Agency

The idea behind establishing the National steel Raw Materials Exploration Agency (NSRMEA) in 1992 is to generate a reliable mineral raw materials data bank for prospective investors in the steel and industrial minerals sector of the Nigerian economy and to undertake effective and efficient exploration of mineral raw materials for the Iron, Steel and Solid Minerals based industries.

(ii) National Metallurgical Development Centre

The National Metallurgical Development Centre (NMDC) was established in 1992 to develop metallurgical processes that will harness the abundant local raw materials in the country for use in the metallurgical industry thereby bringing about the much needed import substitution and to play a decisive role in adapting metallurgical processes for economic production of steel and other engineering alloys including upgrading the qualities of Nigerian Ores for steel and other metallurgical production, particularly through beneficiation of local iron ore.

(iii) Metallurgical Training Institute

The metallurgical Training Institute was designed for the development of a mass of highly skilled, practical and production-oriented middle-level technical manpower to efficiently and effectively maintain the steel and allied metallurgical industries in the steel sector of the economy. This will drastically cut down on Nigeria's dependence on foreign technical training thereby conserving foreign exchange.

Infrastructure Concession Regulatory Commission

In 2005 the Federal Government adopted a new long-term policy of pursuing partnerships with the private sector to expand and increase the country's infrastructure investments. In line with the economic reform agenda and strategy to increase private sector involvement in public social infrastructure services by leveraging private spending against public spending, the Government took the initiative to introduce a Public Private Partnerships (PPP) policy and the establishment of the ICRC

As the regulator of PPP in Nigeria, the ICRC acts as the PPP center for support and expertise, identifies pilot projects together with responsible line ministries, sets national guidelines for implementation, standardizes PPP contracts, provides technical/advisory support to line ministries, and monitors the implementation of PPP projects.

- To build a pipeline of public infrastructure investment projects using the Ministries, Departments and Agencies that are high priorities for FGN and which can attract private sector investment.

- To ensure that a robust, transparent, efficient and equitable process is developed for managing the selection, development, procurement, implementation and monitoring of PPP projects and that this process is applied consistently to all relevant projects.

- To ensure that the advantages and requirements of PPPs are well appreciated at the National level amongst potential investors and by other relevant stakeholders.

The ICRC is responsible for issuing a Certificate of No-Objection for the proposal of the project proponents.

Bureau of Public Procurement

The Public Procurement Act of 2007 established the Bureau of Public Procurement as the regulatory authority responsible for the monitoring and oversight of public procurement, harmonizing the existing government policies and practices by regulating, setting standards and developing the legal framework and professional capacity for public procurement in Nigeria. The BPP is primarily tasked with ensuring the application of fair, competitive, transparent, value-for-money standards and practices for the procurement and disposal of public assets.

The BPP will be responsible for issuing the Project Proponents a Certificate of No-Objection for the proposal.

2.2 Legal, Regulatory and Instititutional Framework

The development and operation of the project must comply with several laws and regulations (including various guidelines made under them). The most relevant of these legal and regulatory requirements are as follows:

(a) Constitution of the Federal Republic of Nigeria

Section 44(3) of the Constitution of the Federal Republic of Nigeria 1999 (as amended) vests the entire property in and control of all minerals, mineral oils and natural gas in, under or upon any land in Nigeria or in, under or upon the territorial waters and the exclusive economic zone of Nigeria in the Federal Government of Nigeria. The Constitution empowered the National Assembly to make laws on the operation and regulation of mines and minerals in the country.

(b) Nigerian Minerals and Mining Act, 2007

The Nigerian Minerals and Mining Act is the principal legislation that regulates the mining sector. The Act vests the control, regulation, and ownership of all mineral resources in the Federal Government of Nigeria. The Minerals and Mining Regulations and the National

Minerals and Metals Policy also govern the sector. The Ministry of Mines and Steel Development ("MMSD" or "the Ministry") oversees the mining sector in Nigeria and administers the provisions of the Nigerian Minerals and Mining Act. The Minerals and Mining Regulations specifies the royalties, fees, and compensation payable by holders of the mining rights.

(c) Land Use Act, Cap. L5 Laws of the Federation of Nigeria 2004

By virtue of this Act all land is vested in the Governor of a state or the Minister in the case of Federal land and held in trust for the public. In the event where there are minerals in a commercial quantity in a land, such land would be acquired by the Federal Government in accordance with the provisions of the Act. Section 28 of the Land Use Act provides for the revocation of a right of occupancy for the purpose of an overriding public interest and more particularly, where a land is required for mining purposes, or any purpose connected there with.

(d) Public Enterprises (Privatization and Commercialization) Act No. 38 of 1999

This Act established the National Council on Privatization (NCP) with the Bureau of Public Enterprises (BPE) as its Secretariat. The Act provides the enabling legislation for the implementation of the privatization and commercialization programme of the Federal Government under which several public enterprises were privatised. With reference to the mining sector, the Federal Government divested its interest from direct mining activities through privatization of the state-owned mining corporations, to actualize its new role as Administrator-Regulator of the sector.

(e) Infrastructure Concession Regulatory Concession (Establishment) Act 2005

Section 1(1) of the Infrastructure Concession Regulatory Commission Act, 2005 (ICRC Act) provides the framework for Ministries, Departments and Agencies (MDA) of the Federal Government to enter contracts or grant concessions to duly prequalified private sector participants for the financing, construction, operation, or maintenance of any infrastructure that is financially viable or development facility of the Federal Government of Nigeria. The ICRC Act establishes the Infrastructure Concession Regulatory Commission which is charged with providing the regulatory and institutional framework by which MDAs can effectively enter PPPs for infrastructure development.

(f) Nigerian Minerals and Mining Regulations (2011)

The Regulation is a subsidiary legislation to the NMMA. The regulation was issued by the Federal Ministry of Mines and Steel Development as allowed by NMMA. The regulation defines the modalities for the regulation of the mineral mining industry, including the acquisition of the relevant mineral titles; it prescribes measures for the protection and safety of workers in the mining industry; environmental safety; provide forms for the purpose of applying the Regulations and any relevant matter covered by it and provide regulation for

compliance with the provisions of the NMMA.

(g) Nigerian Investment Promotion Commission Act, Cap. N117 LFN 2004

The provisions of the NIPC Act apply in relation to mining activities in the event where there is any foreign investment made in respect of any mineral title granted under the NMMA.

(h) Foreign Exchange (Monitoring and Miscellaneous Provisions) Act, Cap. F34 LFN 2004

The Foreign Exchange (Monitoring and Miscellaneous Provisions) Act14: The Provisions of the Foreign Exchange Act would apply where there is an investment in foreign currency in respect of any mineral title granted under the NMMA.

(i) Companies and Allied Matters Act 2020

The Companies and Allied Matters Act, 2020: Where there arises a need to procure a mining license as a body corporate, such body corporate must be registered at the Corporate Affairs Commission in accordance with the provisions of the Companies and Allied Matter Act. The various tax legislations ranging from the Personal Income Tax Act, the Capital gains Tax Act, etc also apply to taxation of operators in the mining sector

2.3 Needs Analysis

The new world economic order and the resurgent of mineral commodity prices with worldwide increases in exploration activities necessitates the development of a policy framework that will ensure an efficient and effective utilization of Nigerian's mineral resources.

Nigeria is endowed with vast mineral resources with huge economic potentials. It is the 13th largest producer of oil in the world and the 5 largest in OPEC. Since 1970 the income generated from oil has totalled more than US$320 billion. In sub-Saharan Africa, Nigeria's economy is the largest but has a GDP of 3.5% per year, which is barely above a population growth of around 2.6%. Over-dependent on oil has left the other sectors of the economy, most notably solid minerals, agriculture, and manufacturing, underdeveloped and impoverished.

The contribution of solid minerals to the GDP has consistently been below 1% for more than a decade, despite of a large domestic market (population is basis for domestic demand for mineral resources, especially industrial minerals). Nigeria is the largest market in sub-Saharan Africa and the potential stretches into the growing West African subregion.

A vibrant steel industry can lead a nation to a path of industrialization and development. Iron ore being the major raw material for the steel industry, is not present in abundance in Nigeria. The Iron ore deposits of Nigeria is given below in Table-4:

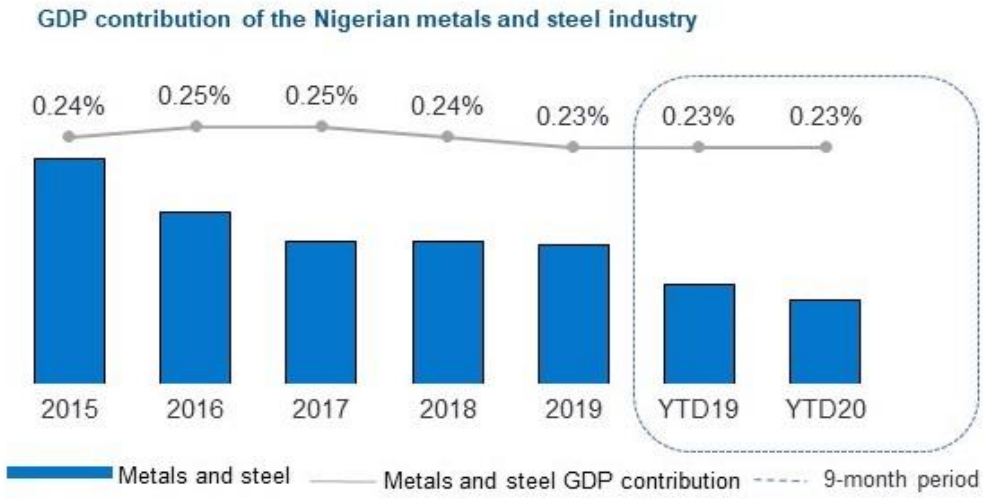
Table 1: Iron Ore Deposits of Nigeria

S/No.	Name of Deposit	Location	State	Geological Description	Ore Type	Estimated Reserves, Million Tonnes	Grade % Fe	Remarks
1.	Itakpe	10km NE of Okene	Kogi	Pre-Cambrian Ferruginous Okene	Magnetite Haematite	200 MT	36	Mining, Beneficiation and sale in progress.
2.	Ajabanoko	8km NE of OKene	Kogi	Pre-Cambrian Ferruginous Quartzite	Magnetite Haematite	60 MT	37	Exploration at advanced stage. Preliminary Mine
3.	Agbado-Okudu	40km N of Lokoja	Kogi	Pre-Cambrian Ferruginous Quartzite	Haematite	30 MT	37	Geological Investigation in progress.
4.	Anomaly K-3	62km W of Ajaokuta	Kogi	Pre-Cambrian Ferruginous Quartzite	Haematite Magnetite	20 MT	37	Geological Investigation in progress.
5.	Anomaly K-2	18km W of Ajaokuta	Kogi	Pre-Cambrian Ferruginous Quartzite	Haematite Martite	12 MT	37	Geological Investigation in progress.
6.	Choko-Choko	45km N of Lokoja	Kogi	Pre-Cambrian Ferruginous Quartzite	Magnetite	--	37	Geological Investigation in progress.
7.	Ebiya	30km W of Ajaokuta	Kogi	Pre-Cambrian Ferruginous Quartzite	Haematite Martite	--	37	Geological Investigation in progress.
8.	Ero	16.5km N of 5km N of	Kogi	Pre-Cambrian Ferruginous Quartzite	Haematite	20 Mt	37	Geological Investigation in progress.
9.	Tajimi	35km NW of Lokoja	Kogi	Pre-Cambrian Ferruginous Quartzite	Haematite	--	36	Geological Investigation in progress.
10.	Kakun (near Kabba))	30km NW of Okene	Kogi	Pre-Cambrian Ferruginous Quartzite	Haematite	--	38	Geological Investigation in progress.
11.	Obajana (near Kabba)	70km NE of Okene	Kogi	Pre-Cambrian Ferruginous Quartzite	Haematite		37	Geological Investigation in progress.
12.	Agbaja	25km of Lokoja	Kogi	Sedimentary Oolitic brown Iron Stone	Siderite / Goethite	1159 MT	47.6	High phosphorus content 1.5 - 3% P_2O_5
13.	Koton- Karfe	20km of Lokoja	Kogi	Sedimentary Oolitic brown Iron Stone	Goethite/Hydro-goethite	803 MT	52.9	As above
14.	Egeneja		Kogi	Sedimentary Oolitic brown Iron Stone	Goethite	369 MT	47.7	As above

S/No.	Name of Deposit	Location	State	Geological Description	Ore Type	Estimated Reserves, Million Tonnes	Grade % Fe	Remarks
15.	Toto-Muro	197km NE of Okene	Plateau	Precambrian Ferruginous Quartzite	Haematite/ Magnetite	N/A	33.5	Under Investigations
16.	Nsude	10km SW of Enugu	Enugu	Sedimentary Iron Ore	Goethite Limonite Haematite	40.6 MT	40	
17.	Patti	55km N of Ajaokuta	Kogi	Sedimentary Oolitic brown Iron Stone	Goethite/Hydro-goethite	37 MT	45.6	Under Investigations

The development of Nigeria's steel industry will Contribute to the country's Gross Domestic Product (GDP), not only directly but also indirectly (through the purchase of inputs and services, as well as supply of information to other industries and an increase in the buying power of the local population) and have a multiplier effect on the Nigerian economy. Further, it will generate employment opportunities, both directly and indirectly (through various ancillary economic activities to support steel operations); and will contribute to reducing the unemployment rate, which was pegged at ~33 per cent in 2021.

Fig.-1 – GDP Contribution of the Nigerian Metals and Steel Industry



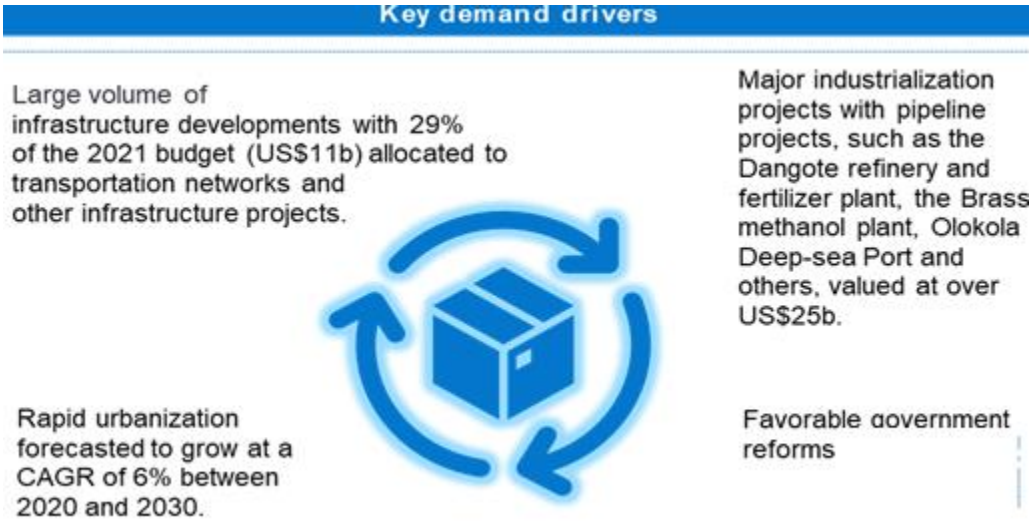
Source: EBMI Research, EY analysis

Despite having large proven iron ore reserves/resources of about 4 billion tons, the country is highly dependent on imports. The size of the Nigerian domestic metals and steel industry was estimated at **$542 m** in 2019 accounting for **only 0.23 per cent of the country's GDP.**

It is forecasted that the demand for steel products in Nigeria to grow between a CAGR of 1 per cent and 5.45 per cent from 2021 to 2025 on the back of the following:

- Government's policy in the form of high tariffs and Forex restrictions to discourage steel importation and drive local production in view of the abundance of raw materials for steel production which include; iron ore, limestone, clays/silica sand.
- The Nigerian Investment Promotion Commission (NIPC) 1995 Act dismantled controls and limits on FDI, allowing for 100 per cent foreign ownership of steel manufacturing companies as well as companies in all other sectors, except petroleum.
- Private sector interest and investments to restore and upgrade the existing steel mills, including KAM's N60bn acquisition of Standard Metallurgical Company (SMC).
- The Nigeria Customs Service (NCS) has banned export of scrap metal that is mostly used by steel manufacturers as raw material to increase the consumption in domestic steel production.
- The world steel consumption is approximately 232.8 kg, whereas in Nigeria the value is quite low and is in the tune of 10 kgs only. The Nigerian Ministry of Mines and Steel Development aims to increase steel consumption per capita from less than 10 kg to 40 kg by 2025 and increase contribution of the steel sector as the basic raw material input for other strategic sectors.

Fig.-2 – Key Demand Drivers



While total steel demand stood **at 2.5 to 4** mtpa, the current level of local steel production **(1 mtpa)** is significantly lower than the demand. The major steel producers depend on a very little amount of locally available scraps and mostly imported scrap and hence have a heavy dependency on foreign exchange availability. Recently few steel producers are also going for coal based DRI plants.

The Nigerian Government has made efforts to establish an indigenous steel industry for over five decades now but has been met with multiple challenges. Hence, the desire to establish a viable steel industry in Nigeria is now of the utmost priority for the Nigerian Government,

especially with the dire need to diversify the economy which is presently dependent mostly on the oil sector.

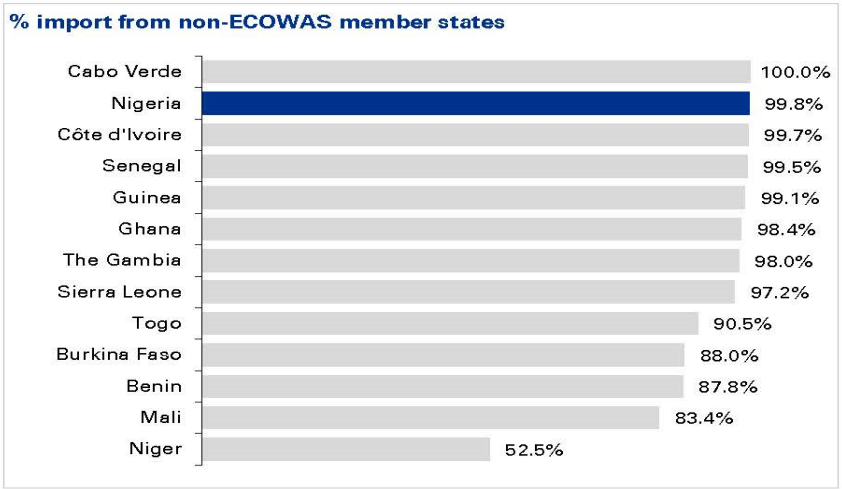
The Nigerian Government imposes a tariff of 50 per cent and 5 per cent on finished and semi finished steel imports respectively, resulting in higher prices for imported steel products.

Fig.-3 – Steel Demand in Nigeria, mtpa

There is a huge opportunity across the ECOWAS region on steel exports. ECOWAS countries currently source an average of 92 per cent of all steel imports from outside of the ECOWAS region. Nigeria, Ghana and Senegal are among the highest contributors to steel imports accounting for 61 per cent.

Finished steel products account for 97 per cent of steel imports (c. 4.7 mtpa) in the ECOWAS market and have an estimated value of $4.6 billion.

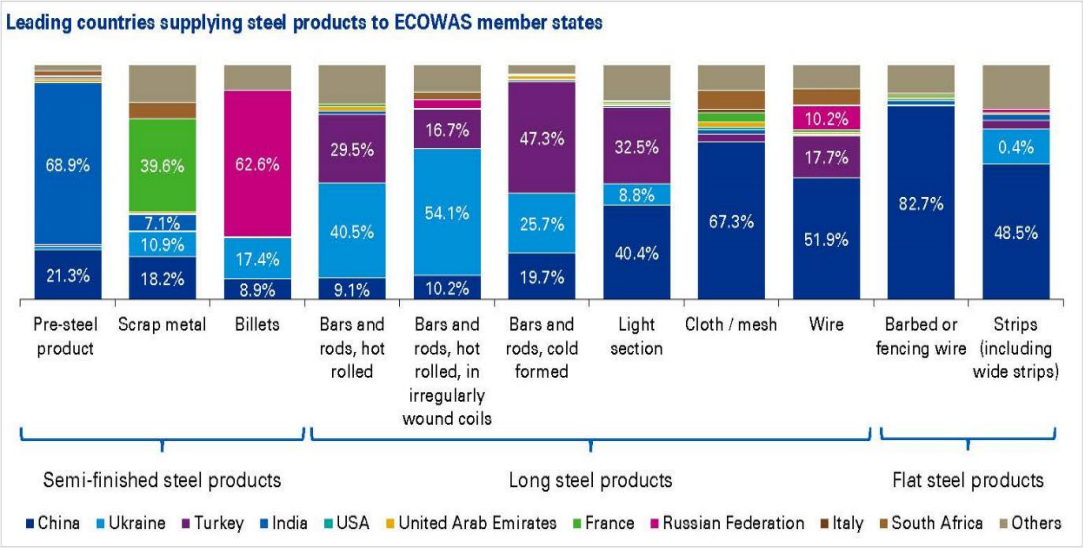
Fig.-4 – Percentage Import from Non-ECOWAS Member States



Effective January 2021, the Nigerian Government signed the African Continental Free Trade Area (AfCTFA)

agreement with other leaders in the African Union to create a new continental free trade area within its 55 member countries, to spur regional trade and commerce.

Fig.-5 – Leading Countries Supplying Steel Products to ECOWAS Member States



PSML intends to play a vital role in the development of the Nigerian economy and its steel industry by recommissioning the steel plant formerly known as the Delta Steel Company (DSC), situated at Ovwian–Aladja in Delta State, Nigeria.

The technical evaluation contains an assessment of the strategic advantages of the Itakpe mines and its importance to PSML as a primary source of raw material, the current state of the beneficiation plant, proposed revival measures, an evaluation of the steel market in Nigeria and the financial viability of the proposed project.

2.4 Service Objectives and Performance Measures

The project is in line with the Federal Government's economic reform agenda and strategy to increase private sector involvement in public infrastructure services by leveraging private spending against public spending. It is envisioned that in the medium- to long-term, the project would deliver on the following objectives:

2.4.1 Financial Objectives

The main financial objectives of the project are as follows:

- Improvement in Government revenue.

- Accelerate investments in the metal sub sector and infrastructure in line with international standards.

- Properly allocate project risk between the public and private sector.

- Enhance governance to improve Value-for-Money.

2.4.2 Efficiency Objectives

The main efficiency objectives of the project are as follows:

- Deployment of modern equipment, technology, and systems.

- Enhance the competitiveness of Nigeria's economy by reducing costs of manufacturing.

- Enable NIOMCO to efficiently play its role in the metal sector value chain.

- Provide incentives to improve efficiency and performance and encourage innovation.

2.4.3 Socio-economic Objectives

The main socio-economic objectives of the project are as follows:

- Provide a new source of investment capital for required infrastructure project, .

- Provide on-the-job training, capacity development for Nigerians, and transfer of technology.

- Introduces discipline and efficiency of private sector methods in the provision of services.

2.5 Actions and Decision Required

The principal governmental agencies which will be involved in any PPP arrangement for the concession of NIOMCO are MMSD and ICRC. The National Policy on Public Private Partnerships (NP4) provides the process and procedure to be adopted by Federal Government MDAs in carrying out all aspects of PPP project development and implementation.

Pursuant to the provisions of the NP4, a detailed investment appraisal is required to be conducted for any infrastructure project for which investment is needed. The investment appraisal by preparing a Business Case (BC) for the project is a key component of this process. Following approval of the BC, procurement of the private sector participant is undertaken with the assistance (if required) of the ICRC PPP Resource Centre.

The procurement stage of the PPP process requires the preparation of an information memorandum and bid documentation, market consultation, and conduct of a competitive and transparent procurement. Before the award of the contract, a Full Business Case (FBC) must be prepared and approved by the Federal Executive Council (FEC) before the private sector participant is engaged.

SECTION 3 - OVERVIEW

3.0 PSML Overview

PSML is located at Ovwian–Aladja in Delta State, Nigeria and spread over ~ 2216 hectares of land; the steel plant was commissioned in 1982 by a consortium of top global engineering firms, including LURGI, Voest-Alpine AG,s MANN, and ABB.

The plant's location presents numerous strategic advantages:

- Proximity to iron-ore, natural gas fields and large-scale electrical power generating stations.
- Ease of receipt of raw materials and dispatch of finished products through its captive jetty.
- The captive jetty is well equipped with material handling equipment.
- A dedicated ~300 km rail line with the 23-ton axle load that connects the Itakpe iron-ore mine in Kogi State to PSML's plant gate.
- Several link roads that connect PSML to various parts of the country.
- A captive 330 kV transmission substation.

3.1 Location

The plant is situated at Ovwian-Aladja, Warri, Delta State, on a large land parcel of ~2,216 hectares. The plant area within the barbed-wire boundary is ~175.71 hectares. PSML's location presents strategic advantages from proximity to iron ore supplies, natural gas fields, large-scale power generating stations, ease of receipt of raw materials and dispatch of finished products by rail, road, and navigable sea channel.

3.2 Connectivity

Jetty

- PSML has a captive jetty that provides access to sea routes to other countries. The facilities at the captive jetty include — ship loaders, billet un-loaders, slew cranes, stacker re-claimer, pellet stacker, conveyor belts and an open area for bulk cargo stacking up to 30,000 ton.

- The jetty has the capacity to handle two vessels of ~15,000 MT simultaneously.

- The jetty is 44 nautical miles from the Atlantic Ocean, with the River Warri touching the northern end of the plant boundary.

The captive port particulars are given below in Table-1:

Table 3.1 Captive Port - Particulars

Captive port — particulars	
Particulars	Details
Length of jetty	794 mtrs
Width	20.4 mtrs
Capacity of jetty	2 big vessels of ~15,000 MT can be handled simultaneously
Facilities and equipment	Two ship unloaders - 25 ton Two sewing cranes - 25 ton Two ship loaders - 25 ton 4 spider grabs - 5 ton Large or standard storage area Three standard warehouses
Discharge rate	4000 MT PWWD SHINC is achievable for heavy melting scrap, billets and iron ore with good quality/condition of ship gears
Turn around time	12 hrs (Preparation time is required to commence discharge)

Airport

Warri Airport is only ~20 km from the plant. PSML also has a helipad within its premises.

Rail

The Itakpe-Warri rail line connects the Itakpe mines and beneficiation plant to the PSML Warri plant's gate. It is a ~300 Km rail line with a 23-ton axle load, facilitating the use of 63-ton payload wagons and 120-ton locomotives. It has a capacity of 8,064 ton per day.

Road

The plant's location is well serviced by several link roads, including the East-West road, DSC-Enerhen road and DSC-Effurun express road. These roads link to every part of the country where PSML's markets and other raw materials

3.3 Access to social infrastructure

The PSML site has a well-developed social infrastructure, including a hospital, primary, secondary and technical schools, crèche (kindergarten), community hall and recreation center.

PSML will be reactivated in three phases starting with the downstream operations

The three-phase strategy is adopted to:

a) Start downstream operations in a timely and efficient manner and then move to refurbish upstream operations.
b) Test the balance of plant functions for any issues.
c) Test the integrity of the supply chain for input material and product output.
d) The three phases have been structured to increase the production of saleable finished products from the present capacity of 0.36 mtpa to 2 mtpa. The phased revival plan will ensure that finished steel production, capital investment and market demand in each phase are economically viable and sustainable.

PSML has achieved financial closure with reputable international and local financial institutions for this project and have roped in the best in class equipment suppliers from USA, Germany, Italy and India.
PSML's reactivation plant is given in Table-2 on the next page.

Table 3.2 – PSML's Reactivation Plan

Phase	Reactivation of existing facilities	Addition of new facilities
PhaseI	▶ One DRI unit will be enhanced to 1 mtpa ▶ Pellet plant will be reactivated ▶ One brand new 1.0 mtpa ARC furnace, ladle furnace and 4/6 strands billet caster (130 mm^2)will be installed ▶ Lime plant ▶ Oxygen plant	

Phase II	▶ Second DRI unit will be enhanced to 1 mtpa taking total HBI output to 2 mpta ▶ Second new 1.0 mtpa ARC furnace , ladle furnace and additional 2 strands of 130 mm^2 and 6 starnds of 165 mm^2 will be installed and1 new CCM with 6 strand.	▶ New 500 tpd Oxygen plant. ▶ The railway line will be extended inside the plant (approx. 1.5 km).
Phase III	▶ New structural mills to utilise the entire steel billets produced.	▶ New medium and light structural mill of 0.8 mtpa and Bar and Rod mill of 0.8 mtpa will be installed.

PSML will be dependent fully on the locally available iron ore as core raw material. The iron ore deposite in Itakpe mines are essential for the success of the steel plant and to kickstart the Nigerian Steel and infrasturcutre industry.

Figure 3.1 – State-of-the-Art Technology

The above pictorial representation depict the state-of-art technology in terms of yield, cost and green steel making on sustained basis. As of now, the existing steel making process in Nigeria is lower in scale, higher in cost of production, and over and above less eco-friendly. The PSML's envisaged technology for steel production is envisaged to serve the alloy steel/clean steel production which will help automotive industry, food industry, oil industry, agry-based equipment manufacturers and other associated industry for infrasture developments in a

significant way as it will reduce the dependency of imports for such industries on a long term and on sustainable basis.

Exihibit 10, Casting strand

Exhibit 10, Casting strand

Exihibit 10, Casting strand

Exhibit 10, Casting strand

Exihibit 10, Casting strand

Exhibit 10, Casting strand

Exihibit 10, Casting strand

Exhibit 10, Casting strand

Exhibit 9, CCM casting

Exhibit 10, Casting

Exhibit 11, Casting strand

Exhibit 12, Casting strand

Exhibit 13,Dri Plant 1

Exhibit 14, DRI plant 2

3.4 Itakpe Iron Ore Mines and Beneficiation Plant

National Iron Ore Mining Company Ltd. (NIOMCO) was established in the year 1987 for exploration and exploitation of iron ore deposit at Itakpe (Itakpe Iron Ore Mines located in north-central Kogi State of Nigeria), beneficiation of run-of-mine (r.o.m) iron ore and supply of upgraded concentrate thus produced to Nigeria's major steel plants at Ajaokuta (Ajaokuta Steel Plant) and erstwhile Aladja (Delta Steel Plant) now acquired by PSML.

As per the available information, the existing beneficiation plant have three (3) lines of concentration units, which is supposed toupgrade r.o.m ore analyzing about 36 per cent Fe and envisaged to produce about 2.15mtpa of 64 per cent Fe grade concentrate. Further, there is a single line of super concentartion unit, which is envisaged to process the concentrate of single line through further re-grinding and up-gardation and produce pellet feed concentarte/ super concentrateanalyzing about 67 per cent Fe.

PSML is expanding its Warri Steel Plant capacity to about 2 mtpa (liquid steel). The current two number Midrex modules will also be upgraded 1 mtpa each totalling 2 mtpa DRI, which requires 3 mtpa of pellet resulting in requirement 3.1 mtpa of pellet feed super concentrate (Fe~67). Hence, PSML is in need of 3.1 mtpa of super concentrate from Itakpe mines. The existing line 1 and 2 are designed to produce iron ore concentrate of Fe about 64 per cent rendering it suitable for sinter feeding. These lines camn be upgarded to produce super concentrate (Fe~67 per cent) by addition of regrinding mill and floation process. A team of industry experts will be deputed to upgrade/modify the existing lines to produce super concentrate.

At present, PSML is having a pellet plant of 1.43 mtpa capacity at Warri. PSML is in the planning of installing a second pellet plant of almost similar capacity, either at Itakpe mines or at Warri, depending upon the availability of super concentrate from the mines for another 15 years or more.

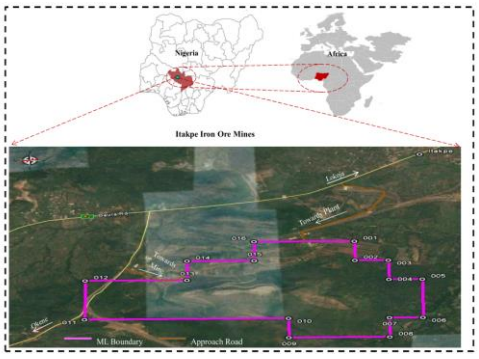
The plant was idle for a considerable time. During the recent site visit dated 1st Septemeber 2022, it has been observed that the Itakpe management has kept the mining and beneficiation equipment in pretty well condition which can be made functional with suitable overhaluing and maintenance.The proposed expert team will give a detailed report after their visit to Itakpe. To restart the operation along with production of requisite superconcentrate considering the captive consumtion of the same in PSML's pellet plant at Warri, significant amount of refurbishment work in the existing three lines of concentration plant and one line of super concentration plant along with installation additional equipment/replacement of existing equipment, shall be required along with installation of new two (2) lines of super concentration units. The present preliminary note has been prepared based on the available information along with an estimation of high-level capital invesment and operating expenses. Further, detailed due-diligence/ feasibility studies need to be carried outduring subsequent stages of engineering and actual implementation of the project.The condition of the mining equipment available in the mine as well as the beneficiation circuit need to be validated before going for further engineering.

3.5 Itakpe Iron Ore Deposit

Itakpe iron ore deposit is embedded in the Itakpe Hill, and located about 10 km north-east of Okene town, in the North-Central Kogi State of Nigeria. The deposit/site is accessible from the Lokoja-Okene Federal highway passing through the northern as well as western side of the deposit/site (ReferFig.-7 givenbelow). The site is about 250 km from Nigerian Capital Abuja and about 400 km away from the commercial hub Lagos. The geographical coordinates are in latitude 7°36'20" North and in longitude 6°18'35" East.

The topography of the area is a plateau dipping gently to the east down to the river Niger. The plateau is bestrewn with scattered hills which are made up of Precambrian gneisses and granites and which overlook the surroundings by 200 m to 300 m. The Itakpe hill is one of them with a ridge extension of about 3 km in the east-west direction. The maximum elevation at present is about 370 m above the mean sea level, which is around 170 m above the surrounding plateau. A few seasonal streams and rivers are found within the Itakpe area, which almost completely dry out during dry

Figure 3.2 Itakpe Iron Ore Mine – Location Map



3.6 Geology of the Deposit and Mineralization

The deposit of Itakpe hill consists of quartzite with magnetite and hematite (ferruginous quartzite) and is situated in a series of migmatites and gneisses belonging to the basement complex of Precambrian age (about 2,800 million years old) of the Nigerian Shield, which itself an integral part of the platform of Central Africa.

The Itakpe deposit extends approximately 4 km in length and dips 55° to 80° southerly. Fourteen (14) economic layers of iron ore (grouped in three main ore bodies, namely north, central and south) have been delineated within the Itakpe deposit.

Based on the occurrences of ore bodies from south to north, the fourteen economical ore layers have been identified as four groups/ zones, which are mentioned below:

Southern group/zone	..	Layers S_3, S_2 and S_1 (S_2 is the main one)
Central group/zone	..	Layers C_5, C_4, C_3, C_2 and C_1 (C_4 and C_3 are the main one)
Intermediate/middle group/zone	..	Layers I_3, I_2 and I_1 (minor)
Northern group/zone	..	Layers N_3, N_2 and N_1 (N_2 is the main one)

Mineralogically, the ore contains a mixture of magnetite and hematite with ratio varying throughout the deposit. The major gangue mineral present in the ore is quartz. The ore consists of coarse, medium and fine-grainedparticles (Refer Fig.-8 given on the next page).

The general trend of the mineralization is as follows:

a) Magnetite is in contact with waste.

b) There is more magnetite in the fine layers than anywhere else in the deposit as crystallization is finer in magnetite than hematite.

c) The magnetite ore is poorer in grade than hematite.

Figure 3.3 Outcrop of Ore Band showing Coarse (Hematite Rich), Medium (both Hematite and Magnetite Rich) and Fined Grained Particles (Magnetite Rich)

Qualities of Ore

The grade of the ore bodies predominantly varies from 14.8 per cent Fe to 41 per cent Fe with overall average grade of about 36 per cent Fe. The chemical analysis of an average sample of the ore deposit (typical) is given below in Table-3.3:

Table 3.3 – Average Quality of Itakpe Iron Ore

Fe, %	SiO_2, %	Al_2O_3, %	P, %
35.55	42.05	3.20	0.095

3.7 Exploration Work and Estimation of Reserves/Resources

The exploration work of the Itakpe deposit was carried out by a combined team of geoscientists from the exploration division of defunct Nigerian Steel Development Authority (NSDA) and Techno-Export (TPE) of the erstwhile USSR during 1973-76.The exploration activities include topographical survey, geological mapping in 1:5000 scale covering an area of about 5 sq km, core drilling of 37 nos. boreholes with total drilling meterage of 7,306 m, 1,850 cu m of trenches and hydrogeological investigation along with collection of samples for chemical analyses and mineralogical studies.

Based on the above exploration work, the total geological reserves down to the level of (+)50 m RL, was estimated to about 183 million tons falling under 'measured' and 'indicated' categories (145 million tons) and inferred category (38 million tons).The mineable reserves

had been worked out to be of about 102 million tons considering the ultimate pit bottom level at (+)125 m RL. The ultimate pit limit was fixed with annual production of r.o.m ore of about 7 million tons.

3.8 Brief Overview of the Mines

The Itakpe mine was designed and planned by an internationally reputed Consultant M/S. SOFREMINES, France in 1979. The ultimate production target of the mine, based on the projected concentrate/super concentrate demand, was to feed primary crusher with 7 mtpa of r.o.m iron ore and removal of 28 mtpa waste materials.Depending upon the present pellet requirement the capacity is required to be augmented to 10.5 mtpa ore production from the mine to achieve 3.1 mtpa of pellet feed super-concentrate.

The deposit had been developed by opencast mining method. Two pits were planned within the Mining Lease (ML) area namely east pit and west pit.The opencast working was planned to start from the hill crest at 405 m above the mean sea level (MSL) in east pit and 375 m above the MSL in west pit. The proposed pit bottom in both east and west pit was fixed at 125 m above MSL.The height of the benches was considered as 10 m.The mining operations involve blast-hole drilling and blasting, loading and transportation of the blasted materials (oreand waste).These are achieved by use of huge mining and ancillary equipment, such as rotary drills, hydraulic shovels, dump-trucks, excavators, explosives van etc. The view of the mining benches as available is shown in Fig.-13 below:

Figure 3.4 View of the Mining Benches

S/N		Description of Equipment	Model &Make	CAPACITY	H.P	Engine Model	TYRE SIZE
I.	EXCAVATORS						
1	1	Backhoe-Hydraulic	CAT 325 LN	1.9 M^3	172	CAT 3126 B ATAAC	TRK M/C
2	2	Hydraulic Shovel	CAT 5090 B	5.0 M^3	513	CAT 3456 ATAAC	TRK M/C
3	3	Hydraulic Shovel	RH 40E	6.0 cu.m	640	Cummins QSK 19	
II.	WHEEL LOADERS						
4	1	Front End Loader	CAT 950	3 CU.M	170	CAT 3304	20.5R25
5	2	Front End Loader	CAT 992 C	11.5CU.M	690	CAT 3412	45/65-45
7	3	Front End Loader	CAT 992 C	11.5CU.MM^3	690	CAT 3412	45/65-45
8	4	Front End Loader	Komatsu-WA 800	11.5CU.MM^4	695	SA12V140-1A	
9	5	Front End Loader	CAT 966 F	4 CU.M	200	CAT 3306 T	
10	6	Front End Loader	CAT 980C	5 CU.M	275	CAT 3406	26.5R25
III.	DRILLS						
11	1	Blast Hole Drill	ROC L8	61/2"			
12	2	Blast Hole Drill	ROC L8	61/2"			
13	3	Blast Hole Drill	ROC L8	61/2"			
14	1	Crawler Drill	ROC601	1 1/2"	NA	----------	TRK M/C
15	2	Crawler Drill	ROC 601	1 1/2"	NA	----------	TRK M/C
16	3	Crawler Drill	ROC 404	4 1/2"	NA	----------	TRK M/C
17	4	Crawler Drill	ROC 404	4 1/2"	NA	----------	TRK M/C
IV.	COMPRESSORS						
18	1	Compressor	XA 350	750 cfm	225	DEUTZ F8 L 413DD	7.00 R 16

19	2	Compressor	XA 350	750 cfm	225	DEUTZ F8 L 413DD	7.00 R 16
20	3	Compressor	XR 350	750 cfm	300	DEUTZ F10 L 413F	7.00 R 16
21	4	Compressor	XA 125	268 cfm	75	DEUTZ F4 L 913F	7.50 R 16
22	5	Compressor	XA 125	268 cfm	75	DEUTZ F4 L 913F	7.50 R 16
23	6	Compressor	XA 125	268 cfm	75	DEUTZ F4 L 913F	7.50 R 16
24	7	Compressor	XA 350	750 cfm	225	DEUTZ F4 L 913F	7.00 R 16
25	8	Compressor	XAHS 836 Cd	836 cfm	300	CAT C9 Engine	

3.9 Scale of Operation

The feed requirement of the crushing and beneficiation plant on net and dry basis has been worked out to be about 10.5mtpa for producing3.1 mtpa of pellet feed super concentrates. An additional line of beneficiation needs to be installed to achieve the same.

Based on the data/information on Itakpe iron ore deposit as available, the average ore to waste/overburden ratio (stripping ratio) on ton/ton basis is considered as 1:4 for this technical note. Hence, production of about 10.5mtpa iron ore will necessitate removal and handling of waste/overburden of about42mtpa. The equipment selection for unit operation of mining has been considered accordingly.

3.10 Working Duration

The annual effective working hours for mining operation have been computed on the basis of the following assumptions:

Effective working days per year (considering 35 days for holidays and scheduled maintenance)	..	330
No. of working shifts per day	..	3
No. of working hours per shift	..	8
Down-time/non-productive time per shift	..	1.5
Effective working hours per shift	..	6.5

Based on the above assumptions, the effective working hours per year work out to 6,435. For the purpose of this technical note, the annual effective working hours for mining operation has been considered as 6,440.

3.11 Average Raising Rate

In view of the foregoing, the average raising rate of r.o.m iron ore and waste during stabilized mining operation is indicated in Table-8below:

Table 3.4 – Average Raising Rates of r.o.mOre and Waste during Stabilized Mining Operation in tph

S/N	Parameters	
1.	Annual production of iron ore, million tons	10.5
2.	Stripping ratio (ore : waste)	1:4
	Annual quantity of waste, million tons	42
4.	Total excavation, million tons	52.5
5.	Annual operating hours	6,440
6.	Raising rate, r.o.m ore, tph	1630
7.	Raising rate, r.o.m waste/overburden, tph	6520

Since the mines was non-operative for a considerable period of time and information on the existing mining equipment are not adequate at this stage, it is considered for deploying the new and more efficient mining equipment for development of Itakpe mines with requisite scale of operation as mentioned above. Health study of the existing mining equipment shall be carried out by equipment suppliers and required refurbishment of the existing equipment may also be planned to utilize the balance life of the existing mining equipment.

3.12 Pre-Mining Development

As the mine has already been operated earlier, pre-mining development is not considered. However, in first six months, some waste/overburden may be excavated by using the requisite mining machineries to facilitate the r.o.m production during actual production time. Proper development of the benches to be done during this period to facilitate ramping up the production to meet the final super-concentrate production target in the future.

3.13 Unit Operations

The sequence of mining operation in opencast mechanized mining consists of fragmentation/loosening of ore and waste material from in-situ mass, excavation, loading and hauling, and some other miscellaneous work such as dozing, road grading etc. Fragmentation/loosening of in-situ rock mass will be carried out conventionally by drilling and blasting.

3.13.1 Drilling

Drill-blast technique will be mainly adopted for rock fragmentation. It is planned to deploy 150 mm dia. rotary drill for the drilling in ore and overburden. Keeping in view the future expansion plans and standardization of equipment, it is recommended to use 150 mm dia. rotary drill for all the drilling in iron ore and overburden.

3.14.2 Blasting

Based on bench height of 10 m and hole depth of 11 m including ten percent (10%) sub-grade drilling, burden and spacing of blast holes to meet the production requirement are given in the next page:

Burden and spacing

Ore bench	..	4.5 m and 5.5 m
Waste/overburden bench	..	3.5 m and 4.2 m

Trial blast: It may be pointed out that the above parameters are indicative. The same should be finalized after carrying out few trial blasts at the operation stage using the suggested parameters.

Recommended explosives: It is envisaged to use site mixed slurry (SMS) explosives in the holes and blasting through use of non-electric blasting systems as indicated in the available document.

Explosives transportation: An explosive van, 10-ton capacity will be provided for transportation of cordtex fuse, detonators, boosters and SMS from the magazine to the blasting sites. However, it is envisaged that another one explosive van, 10-ton capacity, will be kept at mines site as stand-by.

Figure 3.6 Explosive Carrier Van Machine in Operation in an OC Mine

Storage of explosive: For storage of explosives and other blasting accessories, a magazine of adequate capacity shall be installed in the mines. However, the capacity may be reviewed during the project execution stage.

3.14.3 Loading and Hauling

For excavation and loading, shovel/backhoe excavators and front-end loaders are considered. For hauling of ore upto the crushing plant and overburden/waste upto the waste dump yard requisite nos. of dumpers have been considered. Taking into account the scale of operation involves, standardization of equipment, it is considered that about 15cu m capacity shovel/excavator shall operate both in ore as well as waste excavation along with combination of 200 tons dumpers for movement of ore from the mine to the crushing plant and for transportation of waste materials to waste dump yard.

Figure 3.7 Shovel and Dumper

Miscellaneous Operation –Deployment of Equipment

Besides drills, excavators and dumpers, following equipment will be provided (refer Table-3 below) in each of the mines for maintenance of roads, cleaning of mining benches, management of stockpile and other associated work. Rock breaker attachment would be required for breaking the boulders generated after blasting:

Figure 3.8 Rock Breaker and Road Grader

Figure 3.9 Rock Breaker and Road Grader

The tentative equipment list of miscellaneous operation – mining is given below in Table-9:

Table 3.5 Tentative Equipment list for Miscellaneous Operation - Mining

Equipment	Purpose for which provided
Dozers	Dressing and leveling of top soil overburden and r.o.m. ore stockpile, cleaning bench floors, maintenance of roads etc.
Hydraulic Shovel	For loading from stockpile
Motor grader	Maintenance of roads
Water sprinklers	Sprinkling of water on roads for dust suppression
Fuel tanker	For supplying fuel to the equipment

The tentative list of major equipment for mining operation is provided below in Table-10:

Table 3.6 Tentative List of Major Equipment for Mining Operation

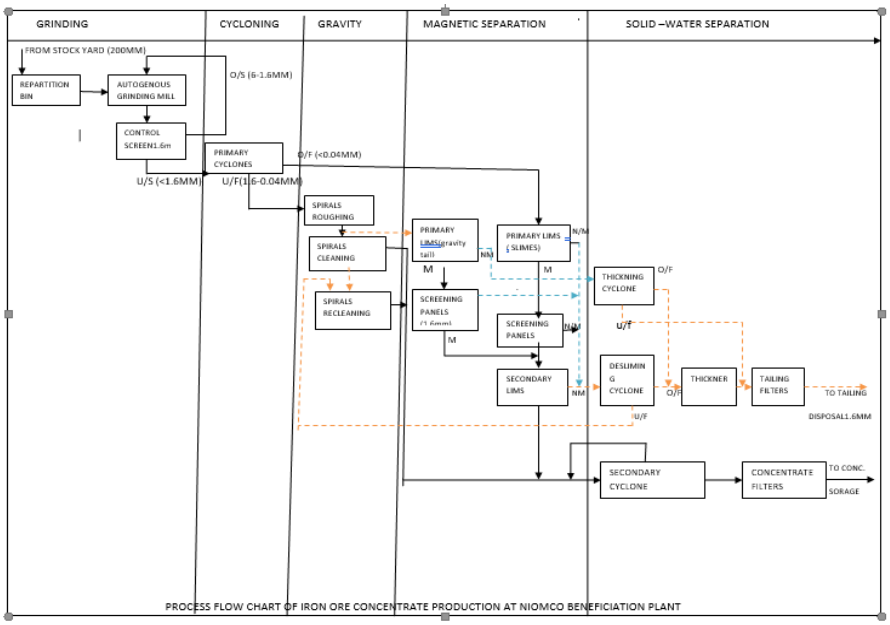
S/No	Equipment	Quantity (Nos.)
1.	Blast Hole Drill (240 mm)	15
2.	Excavator (15cu. m)	7
3.	Dumper (200T)	71
4.	Wheel Loader (11.5 cu. m)	3
5.	Dozer	8
6.	Motor Grader	3
7.	Water Sprinkler (35 KL)	3
8.	Explosive Van (10T)	2

9.	Diesel Tanker (10 KL)	4

3.14 Beneficiation Plant:

The existing beneficiation plant have three (3) lines of concentration units, of whch, two are dedicated to produce sinter feed concentrate (Fe~64 per cent) and the other line is further extended to to produce pellet feed super concentrate (Fe~67 per cent). The total capacity of the benficiation plant is about 2.15 mtpa of 64 per cent Fe grade concentrate. Out of 2.15 mtpa sinter grade concentrate, 0.7 mtpa can be converted to pellet feed superconcentrate.

The superconcentrate requiremnet for the pellet plant of PSML at Warri is estimated to be about 3 mtpa considering initial phase expansion of about 2 mtpa liquid steel production.Accordingly, in itakpe, it is suggested to process the r.o.m ore as per the existing process route through three (3) nos. of concentration line and in addition to that a new fourth line to be installed, and the concentrate thus produced is envisaged to be further treated (re-grinding and up-gradation) for production of about 3 mtpa super concentrate.



PROCESS FLOW CHART OF IRON ORE CONCENTRATE PRODUCTION AT NIOMCO BENEFICIATION PLANT

Considering the above, it is suggested as below:-

- Upgradation of line 1 and 2 to produce super concentrate.
- Line 3 to produce super concentrate as per the present scheme.
- Establish a new line no. 4 to produce super concentrate, thus making the total production of super concentrate to 3.1 mtpa matching the desired amount of pellet feed concentrate to meet PSML steel production target.

3.15 Concentrate and Super Concentrate Production

Following are the assumptions considered for estimating the production of concentrate:

No. of working days per month	..	30
No. of working hours per day	..	20.64
No. of maintenance hours per day	..	3.36
No. of operational months per year	..	12
Overall yield (concentrate), %	..	About 33 to 34
Overall yield (super concentrate), %	..	About 30 to 31

plant operation work out to about 7,430. The existing concentration plant comprises of three (3) lines with installed throughput/feed capacity of about 289 tph in each line on net and dry basis. A new forth line needs to be installed to achive the total throughput capacity of 10.33 mtpa (1390 tph) Considering the yield from the beneficiation plant at 33.33 per cent and the annual working hours at about 7,430, the production of concentrate computes to about 3.45mtpa.

Further, to provide the requisite super concentrate (pellet feed) in line with pellet plant feed requirement at Warri, the concentrate to be produced in three existing and one new lines, is proposed to be further treated in four lines of super concentration units (as per the available information – one line is available which needs refurbishment/additional of equipment and three new lines need to be installed).

The overall yield for super concentrate production has been considered as about 30 to 31 per cent with respect to the feed to the beneficiation/concentration plant (about 10.33 mtpa on dry basis). Accordingly, the production of super concentrate computes to about 3.1 mtpa. The overall chemical analysis of super-concentarte may be as follows as indicated in Table-11:

Table 3.7 Overall Chemical Analysis of Super Concentrate

Fe, %	SiO_2, %	Al_2O_3, %	P, %
65 to 67	<3	<0.45	<0.05

The concept of the overall beneficiation plant (concentration and super concentration units) have been primarily envisaged based on the available information at this stage. Further studies on ore characterisation and beneficiation test work need to be carried out to confirm aboutthe beneficiation amenability of the ore to prduce desired concentrate and super concentrate along with development of optimum process flowsheet. The above work may be carried out during next stage of detailed due-diligence/ feasibility studies, which need to be carried out for subsequent stages of engineering and actual implementation of the project.

3.16 Brief on Crushing, Screening and Concentration Section

The r.o.m ore of about 1,200 mm top size will be crushed in the primary gyratory crusher for a primary size reduction to (-)200 mm. An apron feeder located at the bottom of the gyratory crusher will withdraw the primary crushed product at the regulated rate and convey the material to a single deck vibrating screen for scalping the product at 200 mm. The oversize obtained from the screen is fed to a secondary jaw crusher for producing a product of size (-)200 mm. The composite product, comprising of the crushed product from the jaw crusher and the undersize of the vibrating screen is conveyed by means of apron feeder, located beneath the jaw crusher and belt conveyors, to two numbers stockpiles. The crushed ore is stacked by means of a stacker.

Figure 3.10 Primary Gyratory and Secondary Jaw Crusher

From the stockpiles, secondary crushed ore planned to be reclaimed by means of a bucket wheel reclaimer and transported to a repartition bin. From the repartition bin, material will be divided into four (4) streamsby vibrating feeders located beneath the repartition bin.

Figure 3.11 Bucket Wheel Reclaimer

Each stream\line consist of an autogenerous grinding (AG) mill and operating in closed circuit with a screen bank.The AG mill will grind the product at (-)6 mm.The product of AG mill is screened at 1.6 mm to produce two (2) size fractions. The oversize fraction comprising of (+)1.6 mm is re-circulated back to AG mill by sump and pumps.The undersize of the screen at(-)1.6 mm is classified at 150 microns in a double stage primary cyclone.The coarser fraction of size (+)150 microns obtained as underflow of the cyclones is treated in a series of rougher, cleaner and recleaner spiral concentrators to obtain a final concentrate grade analyzing about 64 per cent Fe.The tailings from the rougher spirals are further treated in a primary lowintensity magnetic separator for recovery of magnetics from the non-magnetics.

Figure 3.12 AG Mill and Cyclone Cluster

Figure 3.13 High Intensity Magnetic Separator and Low Intensity Magnetic Separator

Figure 3.14 Froth Floatation Cell

The finer fraction of size (-)150 microns obtained as cyclone overflow is treated in a separate primary low intensity magnetic separator for recovery of Fe values. The composite magnetics obtained from both the primary magnetic separators is screened at 0.1 mm. The concentrate obtained as undersize from the screen is further upgraded in a secondary low intensity magnetic separator to produce a final concentrate analyzing about 64 per cent Fe. The composite tailings obtained from the magnetic separator is deslimed at 40 microns in a cyclone to remove the ultrafine particles and to prevent the entry of coarser fraction of (-)1.6 mm to the thickener, which would otherwise lead to jamming of the thickener. The finer fraction obtained as overflow is treated in a tailings thickenerfor recovery of process water. The water obtained as overflow from the thickener is re-circulated back to process. The thickened slurry obtained as underflow from the thickener and cyclone is further dewatered in tailings vacuum filter and the dewatered tailings in the form of dry solids is disposed to the tailings dam by belt conveyors and subsequently stacked by stackers located in the tailings dam.

3.26 Brief on Super Concentration Section

Super concentration plant is envisaged to design for further up gradation of iron values in the produced concentrate from the line of concentration for ultimate production of super concentarte, which will be utilised as pellet feed material. A basic flotation circuit with filtration has been envisaged for up gradation of concentrate after grinding to (-)80 micron.

The concentrates produced in the form of slurry from the concentration lines is diverted to a feed tank of super concentration line. A ball mill has been considered for re-grinding of (-)1.6 mm size of concentrate to produce (-)80 micron of super concentrate. A re-circulating cyclone is kept to take out the (+)80 micron of oversize product for recycling back to the ball mill.

After grinding, the ground product [(+)0 micron to (-)80 micron] shall be pumped to a classifying cyclone for separating the ultra fines (+)0 micron to (-)8 micron from the rest with an intention to bypass the ultra fines in the flotation process.

The (+)0 micron to (-)8 micron fraction of the ground concentrate shall go directly to disc filter for filtration after dewatering through a concentrating thickener.The balance fraction

of (+)8 micron to(-)80 micron shall be pumped to conditioning tank for feeding the material to rougher flotation cell.All the reagents and required water are added to mix properly by agitator for conditioning of slurry.The conditioned slurry shall be fed to rougher flotation cell for upgradation. About eighty (80) per cent of the concentrate is collected from bottom of the flotation tank as super concentrate and sent to filter feed tank for filtration. A thickener of requisite diameter is envisaged to be installed to take out the excess water before filtration. The rest fraction of about twenty (20) per cent shall be pumped to cleaner flotation obtained from the rougher flotation overflow. Two nos. of thickeners have been kept for thickening of concentrate of both the fractions viz.(-)8 (+)0 micron and(-)80 (+)8 micron.Two drum filters have been installed for filtration of(-)80 (+)8 micronof super concentrate.Both fractions of the super concentrate are collected from the filter discharged to the conveyor belts for onward transportation to the loading bay.

The tentative list of major equipment for crushing and beneficiation plant (concentration and super concentration sections) is provided below in Table-12:

Table 3.8 Tentative List of Major Equipment for Crushing and Beneficiation plant

S/N	Equipment	Quantity
Crushing and Material Handling Section		
1.	Primary Gyratory crusher	1 No.
2.	Apron feeder	1 No.
3.	Scalping screen	1 No.
4.	Secondary jaw crusher	1 No.
5.	Stacker	1 No.
6.	Reclaimer	1 No.
Concentration Section – 4 Nos. Streams (Equipment provided for 1 stream)		
1.	Vibrating feeder	1 No.
2.	AG mill	1 No.

S/N	Equipment	Quantity
3.	Single deck screen	2 Nos.
4.	Hydrocyclone	2 Sets
5.	Spiral concentrator (Rougher, Cleaner, Re-cleaner)	3 Sets.
6.	Primary and Secondary low intensity magnetic separator	3 Nos.
7.	Single deck screen	1 No.
8.	Tailings desliming cyclone	Lot
9.	Tailings thickener	1 No.
10.	Tailings vacuum belt filter	2 Nos.
11.	Tripper	1 No.
12.	Concentrate scrapper and reclaimer	1 No.
13.	Tailings stacker	3.0 Nos
Super Concentration Section – 4 Nos. of Streams (Equipment provided for 1 Stream)		
1.	Grinding Mill (Ball Mill)	1 No.
2.	Recirculation Hydrocyclone	1 Set
3.	Classifying Hydrocyclone	1 Set
4.	Cleaning and Re-Cleaning Floatation units	Lot
5.	Thickener	2 Nos.
6.	Disc and Drum Filter	Lot

3.17 Availability of Power and Water

As per the available information, the overall power requirement for the proposed facilities at Itakpe mine and plant, is proposed to be made available from NEPA (PHCN) grid substation. Similary water requirement is envisaged to be fulfilled from Osara Dam at desired rate.

3.18 Manpower Requirement

The manpower estimates have been made taking into consideration the following factors:

a) Additional manpower over and above the daily requirement at the rate of twenty-five (25) per cent is provided to cater weekly off, holidays, leave, absenteeism etc. for departments/sections working seven (7) days a week, i.e. critical areas.

b) The operation staff will be required to carry out routine checking of their own plant and equipment as well as minor repairs and adjustments in addition to plant operation. Moreover, during equipment shutdown for maintenance, the operation personnel will assist the maintenance personnel in carrying out the maintenance tasks to maximise the utilisation of manpower.

c) The maintenance personnel will have multi disciplinary skills; for example, mechanic will be able to perform simple machining, welding and gas cutting. Implementation of such concept will optimise the utilisation of human resources and thereby will increase labour productivity of the plant which, in turn, will reduce the cost of production.

d) Some of the services as given below have been considered to be out-sourced for which no manpower has been considered:

i) Canteen and catering services.
ii) Security services.
iii) Major fire-fighting services.
iv) Horticulture and landscaping services.
v) Sanitary and house-keeping services.
vi) Housekeeping.
vii) Disposal of plant wastes and effluents generated from various plant units.
viii) Heavy maintenance and capital repair including refractory maintenance.
ix) Plant civil maintenance.
x) Plant telecommunication maintenance.
xi) Air-conditioning and ventilation maintenance.
xii) Maintenance and repair of automation equipment, computers including its peripherals and any other related services.

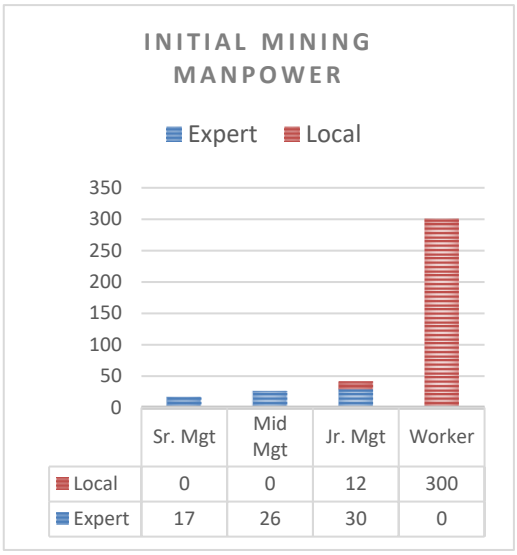
xiii) Loading and unloading of materials, stores handling.

Based on the above considerations, it is estimated that the total requirement of manpower the proposed mine and beneficiation plant is as given in Table-13:

Table 3.9 Summary of Manpower Requirement

Category	No. of persons
Senior Management	17
Middle Management	26
Junior Management	42
Payrole Worker	400
Contractual Worker	265
Total Mines	**750**
Senior Management	24
Middle Management	36
Junior Management	60
Payrole Worker	330
Contractual Worker	220
Total Beneficiation Plant	**670**
Total Man Power	**1,420**

At the initial phase of operation, there will be some preparatory work required for the mine and some maintenance works required for the beneficiation plant and the capacity of both the plant and the mine will ramp up gradually. Hence, manpower requirement will gradually increase with the increase in production.The estimated increase in manpowerin mine is shown below in Fig.-24and that for the beneficiation plant is shown in Fig.-25 on the next page.



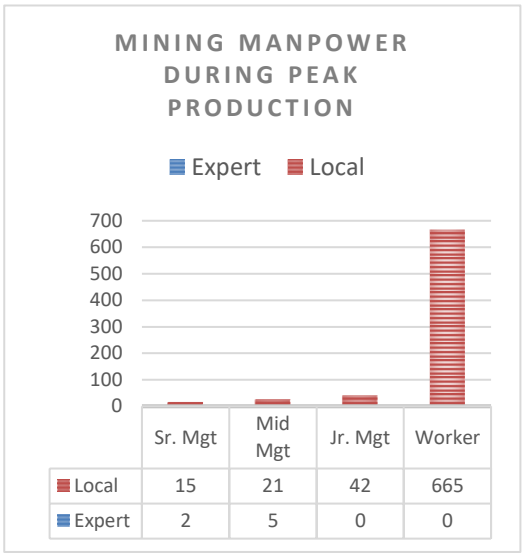
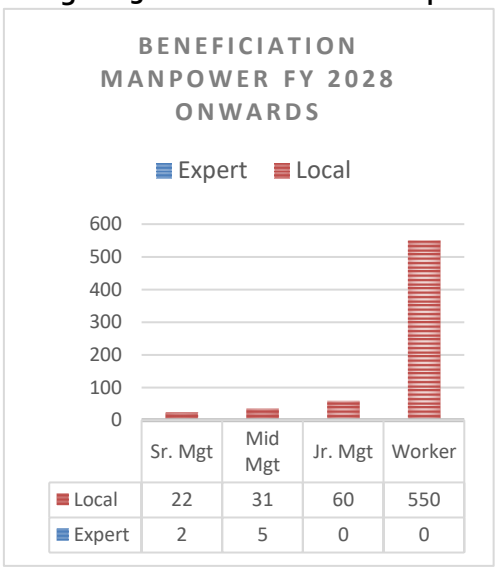


Figure 3.10 Increase in Manpower for Mines



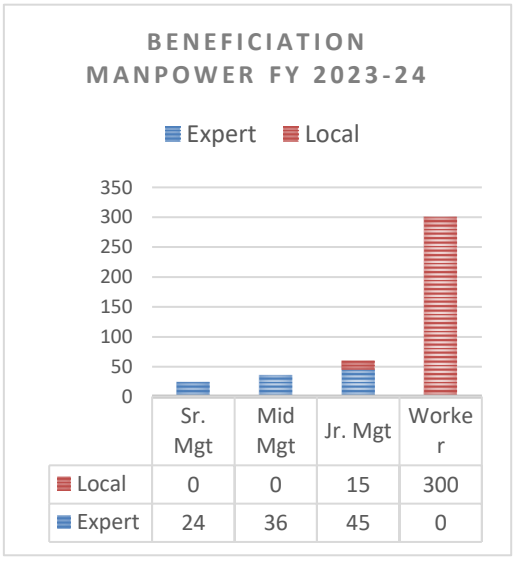
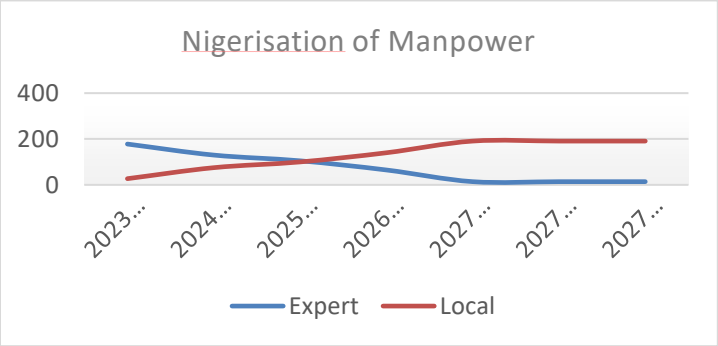


Figure 3.11 Increase in Manpower for Beneficiation Plant

Further to the above, at the start of the project, there will be some foreign experts required which will considerably decrease in course of time both in the mine as well as the beneficiation plant as shown in Figure 3.9.5 below.

Figure 3. 12 Increase in Local Manpower



3.19 Environmental Pollution and Mitigation Measures

The source for various environmental pollutions and corresponding mitigation measures for proposed mining and beneficiation plant operations are briefly described below. The present information provided in this technical evaluation note is based on the available information on the Project site. It is suggested to carry-out the environmental impact analysis for the proposed project and prepare the Environmental Impact Assessment/Audit report as per the statutory requirement, in the subsequent stages of studies and before implementation of the project.

3.20 Mining Operation

The principle sources of pollution for the proposed mining operation would be the handling and stacking of overburden/waste materials to be generated along with ore excavation, dust and gases generated during actual mining operation through deployment Heavy Earth Moving Machineries (HEMM), flow of materials/sediments mostly during rainy season and contamination of the same with the natural water bodies/streams flowing near to the mining areas and noise generated due to the operation of HEMM equipment along vibration generated due drilling and blasting activities as required to lose the materials and rock fragmentation.

To mitigate the principle hazards due to the proposed mining activities as mentioned above, following measures may be taken as far as practicable:

a) Mine waste/overburden materials are envisaged to be stacked in the area earmarked for dumping the mine waste/overburden following the waste/overburden disposal scheme. Necessary plantation activities shall be taken-up as per the statutory requirement to arrest the silt/sediments from

flowing down to the bottom. Further, a set of catch drains will be made to channelize the surface run-off which will be merged to the natural water courses. Peripheral drains all around the waste dumps shall be made to trap rainwater washings out of the dumps, which in turn will reduce the load of suspended solids in the discharged water.

b) The exhaust emission from the mining machineries may result in slight increase of level of SO_2 and NOx. But the increase in the workplace is significant since it is an open cast mine. Proper maintenance as per manufacturer guidelines is to be done to control the emission levels of SO_2 and NOx. To avoid creation of dust, drilling with dust extractor will be used. Dust mask will be provided to protect the workmen who are exposed to prolonged dust. To control the dust related to movement of dumpers in mine haul roads, sprinkling of water in mine haul roads shall be adopted through requisite nos. of water sprinklers.

c) Mining equipment will be maintained as per guideline of the manufacturer to keep the noise level below the permissible limits. Workers will be provided with necessary protective equipment, e.g. ear plug, ear muffs etc. Sufficient green belt is proposed to be provided along the periphery of the mine boundary and along the road and reclaimed area.

d) Care would be taken to keep the vibration levels due to blasting within safe and permissible limits. Based on the experience of field trials of blasting in the mine, charging of holes would be optimized to control the vibration levels. Controlled blasting technique will be used where the working is nearby any surface infrastructure to minimize the effect of vibration to the extent possible.

Beneficiation Plant Operation

Principal sources of pollution in the proposed beneficiation plant would be the handling of r.o.more along with associated crushing and screening system and handling of the slimes/tailings generated from the beneficiation plant. The beneficiation process, being of wet one, will not cause any air pollution as such except fugitive dust emissions in the handling and stacking of dry ore.

To mitigate the principle hazards due to the operation of the crushing and beneficiation plant as mentioned above, following measures may be taken as far as practicable:

a) Dust emissions arising from iron ore handling, crushing/grinding section, roads, stockpiles etc. would be controlled by water sprinkling and dust extraction (DE) system by installing bag filter. All transfer point of conveyor to conveyor, conveyor to equipment and dry circuit of crushing and screening would be provided with compressed air-based water sprinkling system (dryfogging).

b) Plant tailings/slimes are proposed to be disposed of in dry form (within the area identified for tailings/slimes disposal) through appropriate treatment of the same in requisite thickening and filtration system. The above will reduce the threat related to the contamination of the natural water with the water associated with plant tailings (in case of wet disposal of plant tailings).

c) The plant sanitary waste water including canteen effluent is envisaged to be treated in the requisite sewage treatment plant and the treated wastewater would be used for dust suppression and maintenance of plant greenbelt. Thus, all the waste water generated would be either recycled in the process or used in dust suppression and greenbelt, hence, the plant will be designed as "Zero Liquid Discharge" plant. Further, to treat the effluent to be generated from the service centre facility area, suitable effluent treatment plant may be considered.

d) Noise arising from the mechanical machineries, pumps, fans, compressor etc. cannot be eliminated fully but overall aim should be to restrict the ambient as well as work zone noise within the specified norms. The mitigation measures to be adopted for such noise-prone equipment would be to install that noisy equipment in a separate housing so as to enhance the noise attenuation. All operations and maintenance personal working near noise prone areas would be provided with earmuffs and earplugs. Silencer and other noise damping devices shall be considered during de-dusting the equipment. The ambient noise at the plant boundary would be maintained well within the specified norms.

e) Plant safety measures would form an integral part of the environment protection plan of the proposed plant. Workers' safety would be of highest degree of concern so as to avoid any form of personal injury or untoward incident. In-built safety features of the plant and machinery would be made adequate in order to avoid hazardous events causing damage to the life and property.

f) Necessary Greenbelt development planning shall be carried out as per the statutory requirement, which would arrest the fugitive dust emissions and also improve the plant appearance from aesthetics point ofview.

In addition to the above measures, a provision to include a continuous pollution monitoring programme of stack in respect of dust particulates, SO_2 and NOx, ambient air quality, work zone air quality, waste water and noise levels would be carried out so as to comply with the Statutory Regulations and design targets.

3.22 Start-up Plan

For starting up the mine and the crushing and beneficiation plant,PSML has planned to refurbish / recondition some of the equipment which are in a depleted condition due to ageing. The refurbishment work to be done in line with the available process flow sheets provided in Appendix-1. Since the plant has remained idle for a considerable time, the schedule for starting the plant and ramping up the production in steps is deemed reasonable and justified.The implementation schedule for the project is attached as Appendix-2. During the Visit to the beneficiation plant at Itakpe mine the existing process equipment are found to be in good condition. Details of the Mining Heavy Earth Moving Equipment available in Itakpe mine is given below in Table-14:

Table 3.9 Details of Mining Heavy Earth Moving Equipment available in Itakpe Mine

Details of the major beneficiation equipment available at the site are given as below:

1 Primary Crusher

Type ..	Gyratory
Make..	Allis Chalmers - France
Size ..	54" x 74"
Outlet setting	.. 200 mm
Capacity	.. 2500 tph (peak) 2000 tph (nominal)
Drive motor	.. 375 kW

2 Screen

Type ..	Single deck XXH
Make..	KOCH - Germany
Size ..	8' x 16' with 210 mm square openings
Drive motor	.. 30 kW
Capacity	.. 2500 tph(peak)

3 Secondary Crusher

Type ..	Jaw 1080
Make..	Allis Chalmers - France
Size ..	1020 x 800 mm
Outlet side	.. 200 mm
Capacity	.. 400tph (nominal)
Drive motor	.. 110 kW

4 Belt Conveyor BC1.1

Type ..	Steel chord belt
Make..	Semprit - Italy
Dimensions	.. Length – 242 m; width – 1200 mm
Belt speed	.. 2.6 m/s
Drive Motors	.. 2 x 160 kW
Capacity	.. 2275 tph (nominal) 2500 (peak)

5 Belt Conveyor BC1.2

Type ..	Steel chord belt
Make..	Semprit
Dimensions	.. Length 382 m; width – 1200 mm
Belt speed	.. 2.6 m/s
Drive Motors	.. 160 kW
Capacity	.. 2275 tph (nominal)

2500 (peak)

6 Belt Conveyor BC 2

Type ..		Steel chord belt
Make..		Semprit
Dimensions	..	Length 608 m; width – 1200 mm
Belt speed	..	2.6 m/s
Drive Motor	..	22 kW
Capacity	..	2275 tph (nominal) 2500 (peak)

7 Stacker ST1

Make..		KOCH - Germany
Travel Device:		
Travel speed	..	8 m/min to 16 m/min
Max.travel length	..	420 m
Total no. of wheels	..	24
Drive motor	..	10 x 7.5 kW
Boom Belt Conveyor:		
Make..		Semprit
Type ..		Steel chord belt
Dimensions	..	Length 43.5 m; width – 1400 mm
Belt speed	..	3.15 m/s
Drive Motor	..	110 kW
Capacity	..	2275 tph (nominal) 2500 tph (peak)
Hoisting Gear:		
Hoist Range	..	9.5° to +10.5°
Motor rating	..	55 kW
Slewing Gear:		
Slewing Range	..	90° to 90°
Motor rating	..	5.5 kW

4 Reclaimer R1

Make..		KOCH
Travel Device:		
Travel speed	..	1.5 m/min to 15 m/min
Max.travel length	..	400 m
Total no. of wheels	..	32
Drive motor	..	16 x 5.5 kW
Carriage:		
Make..		KOCH
Travel speed	..	0.8 m/min to 4 m/min
Travel distance	..	15.4 m
Motor	..	35 kW
Boom Conveyors 1 & 2:		
Make..		Semprit
Dimension	..	length – 19 m; width – 1000 mm
Speed	..	1.6 m/s
Motor	..	45 kW
Capacity	..	909 tph (nominal); 1000 tph (peak)

Bridge Conveyor:

Make..	Semprit
Dimension	.. Length – 43.9 m; width – 1200 mm
Speed	.. 1.6 m/s
Motor	.. 45 kW reversible
Capacity	.. 909 tph (nominal); 1000 tph (peak)

Bucket wheels:

Wheel speed	.. 3.5 m/s
Motor	.. 45 kW
Capacity	.. 909 tph (nominal); 1000 tph (peak)

5 Transfer Car TC1

Make..	KOCH
Travel length	.. 58 m
Total no. of wheels	.. 12
Motors	.. 12 x 5.5 kW

6 Autogenous Mills – 3 Nos.

Make..	Fives Cail Babcock - France
Type ..	Wet grate discharge
Size ..	26′Ø x 8′ L
Drive motor	.. 2700 kW
Capacity	.. 292 + 10%

7 Screens – 8 Nos. (2 on each line)

Type ..	KOCH rectangular for wet application
Dimension	.. 5 m x 3 m; aperture size 1.6 mm
Drive motor	.. 25.3 kW
Capacity	.. 150 tph (nominal)

8 Spirals

Make..	GE - USA
Type ..	Double Helix
Number	.. Rougher-72; Cleaner – 48; Re-cleaner – 36 per line
Capacity	.. 234 tph (nominal)

9 Magnetic Separators (Primary and Secondary

Three Nos. on each line (two primaries and one secondary).

Make..	Fives Cail Babcock - France
Type ..	Twin drum co-current wet low intensity
Drum size	.. 3 m L x 0.9 m dia. & 1.2 m L x 0.9 m
Drive motor	.. 2 x 5.5 kW & 2 x 3 kW
Capacity	.. 359, 330 & 55 m^3/h

10 Filters (Concentrate and Tailings)

Two for tailings one for concentrates on each line and three total standbye.

Make	..	Filters Phillipe - France
Type	..	Horizontal belt vacuum filters
Dimension	..	34 m L x 1.7 m width.
Drive motor	..	15 kW
Filtering area	..	20 sq.m
Capacity	..	100 tphph

Vacuum pumps supplied separately by same manufacturer as bought out items.

11 Tripper TR1 (Concentrate Stock Yard)

Make	..	KOCH
Travel Device:		
Travel speed	..	4 m/min to 20 m/min
Drive motor	..	2 x 1.1 kW
Conveyor:		
Type	..	Canvas
Dimension	..	11m L; width – 1000 mm
Speed	..	1.26 m/s
Motor	..	15 kW
Capacity	..	600 tph (peak)

12 Scrapper Reclaimer

Make	..	KOCH
Travel Device:		
Travel speed	..	0.5 m/min to 20 m/min
Drive motor	..	4 x 5.5 kW
Arm hoisting gear:		
Speed	..	4 to 16 m/min
Motor	..	9.1 kW
Scraper Chain:		
Speed	..	0.5 m/s
Motor	..	110 kW
Capacity	..	120 to 1100 tph

13 Loading Conveyors

BC 43 & 62

Dimension	..	183.2 m L x 800 mm
Speed	..	2 m/s
Capacity	..	1000 – 1100 tph
Motor	..	110 kW & 75 kW

BC 46:

Width	..	26 m L X 1200 mm
Speed	..	1.6 m/s
Capacity	..	2200 tph (peak)

14 Extractor

Dimension	..	5.5 m L x 1800 mm
Speed	..	0.027 to 0.27 m/s
Motor	..	75 kW
Capacity	..	112 to 2600 tph

15 Tailings Conveyors

	BC71	BC72	BC74
Length	100 m	1500 m	650 m
Width	1000 mm	1000 mm	1000 mm
Speed	1.6 to 2 m/s	1.6 m/s	2 m/s
Motor	75/110 kW	3 x 132 kW	110/132 kW

16 Tailings Stackers

Boom Conveyor	ST2	ST3	ST4
Dimensions	14.75m L x 1 m W	32.5m L x 1 m W	32m L x 1 m W
Speed	2 m/s	2 m/s	2.6 m/s
Motor	45 kW	45 kW	75 kW
Capacity	619 tph	619 tph	619 tph
Travel Device			

Boom Conveyor	ST_2	ST_3	ST_4
Speed	1 to 6 m/min	1 to 6 m/min	1 to 6 m/min
No. of wheels	22	22	22
Motor	12 x 0.71 kW	14 x 0.7 kW	2 x 30 kW

21 Tailings Thickener

Make .. Dorr Oliver - France
Diameter .. 60 m; no other details are available

Exhibits of some of the process equipment are given below:

Exhibit-1–Site Visit to Itakpe

Exhibit 2 – Site Visit to Itakpe

Exhibit-2 – Site Visit to Itakpe

Exhibit-3– Site Visit to Itakpe

Exhibit-4– Site Visit to Itakpe

Exhibit-5–Site Visit to Itakpe

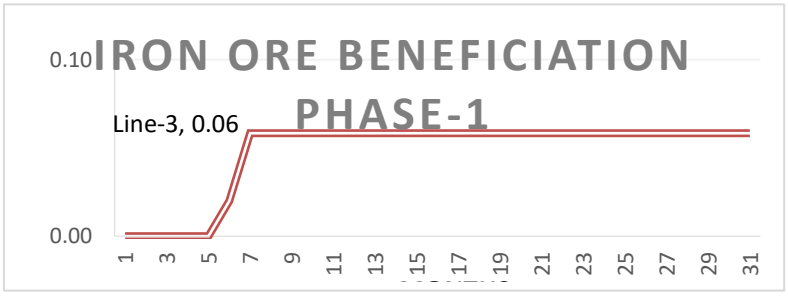
Start-up - Plan

8.0 Operation of Itakpe Mine and the Beneficiation Plant:

PSML requires 3.0 MTPA of super concentrate to feed the pellet plants, existing 1.4 MTPA and the future pellet plant-2 at balance capacities. To cater to these requirements the Itakpe mine beneficiation plant for super concentrate (67-68% Fe) and concentrate (63-64% Fe) will start in phases.

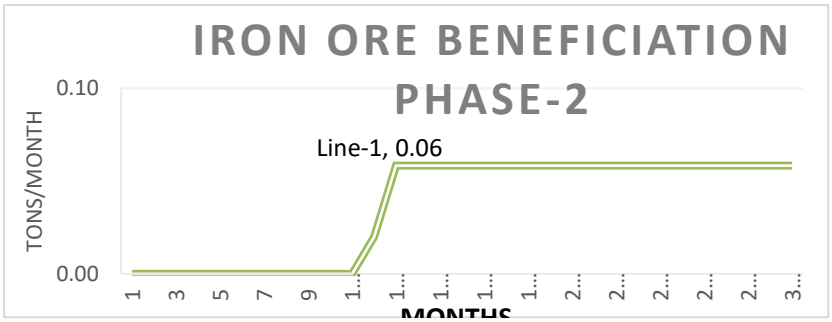
8.1 **Phase-1**

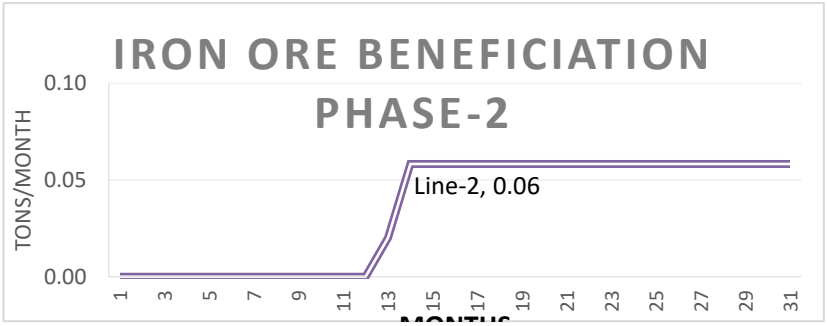
In Phase-1, Line 3 originally designed for delivering 67-68% Fe super concentrate will be reactivated to produce 0.7 MPTA.
Line-3 can be made operational with in 6 months much ahead of PSML requirements, requirement of pellets tentatively planned in Sep'FY-24.



8.Phase-2

With Line-1 and Line-2 originally designed to deliver blast furnace grade super concentrate will be refurbished and reactivated, It will require approximately 12 Months to complete.
Line-3 and Line 1&2 duly upgraded to deliver super concentrate can collectively produce super concentrate upto PSML requirement of +3 MTPA.





8.3 Phase-3

Total requirement of PSML super concentrate is 3 MTPA.
Production capacity of existing line-3along with 1&2 is 2.15 MTPA.
Balance 0.85 MTPA.
For balance 0.85 MTPA super concentrate it is envisaged to erect a completely new line to deliver super concentrate of 67-68% Fe.

Niomco has kept a space provision for installation of 4th Line of super concentrate, Civil foundations are already in place, PSML will be erecting and commissioning a completely new Line-4 in Itakpe Mine area.

8.4 Phase-4

To meet the iron ore requirement of the Ajaokuta Steel Plant (about 1.6 mtpa, sinter feed iron ore fines/concentrate), it is envisaged toinstall two (2) nos. of new concentration line along with separate newcrushing and screening plant and development of mines for additionalproduction as follows:

Targeted Concentrate Production (Sinter Feed) .. 1.60 mtpa

Nos. of Concentration Line .. 2

Overall plant yield for sinter feed

conc. Production .. 33 to 34%

Feed ROM to the Crushing Plant .. About 4.8 mtpa

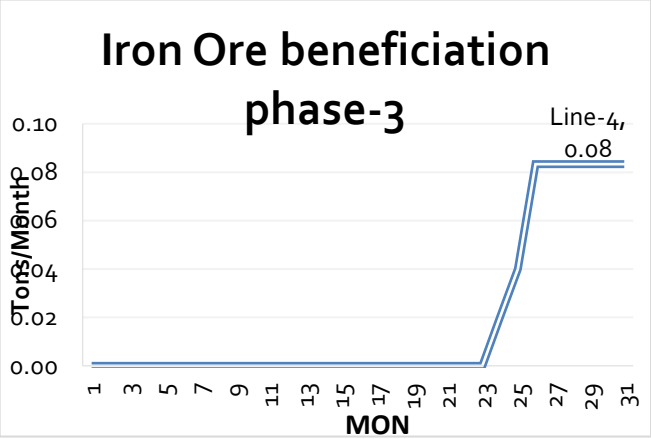
Additional Production from Mines .. About 5.0 mtpa

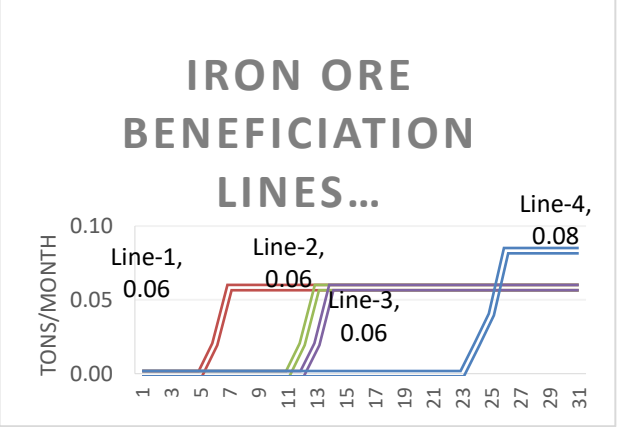
Considering the above, to meet the iron ore requirement of AjaokutaSteel Plant, following new facilities have been envisaged to installwithin the available plant premises:

a) Development of mines for additional production of about 5 mtpa ROMiron ore.

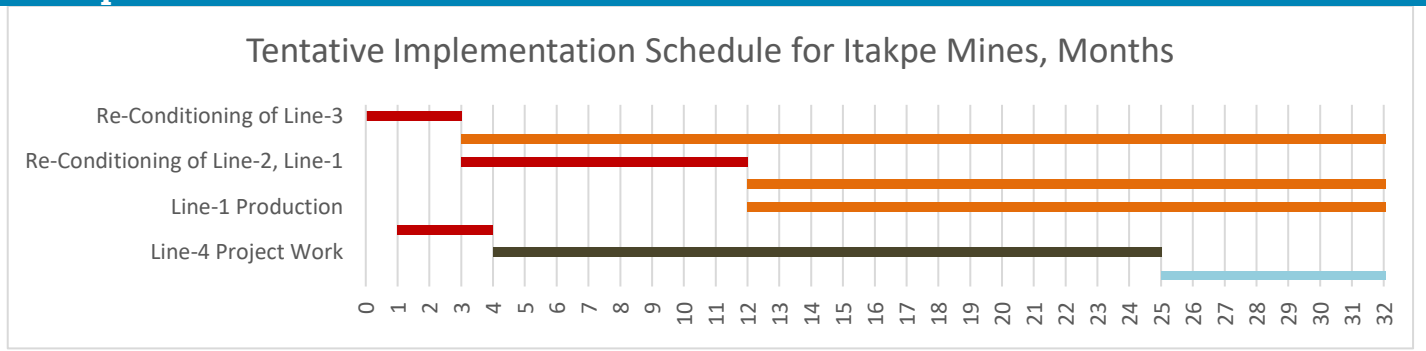
b) Installation of new crushing and screening plant with associatedfacilities for a through-put/feed requirement of about 4.8 mtpa

c) Installation of new 2 nos. of Concentration plant –each with aproductioncapacity (sinter feed iron ore concentrate) of about 0.8mtpa.





Project implementation schedule



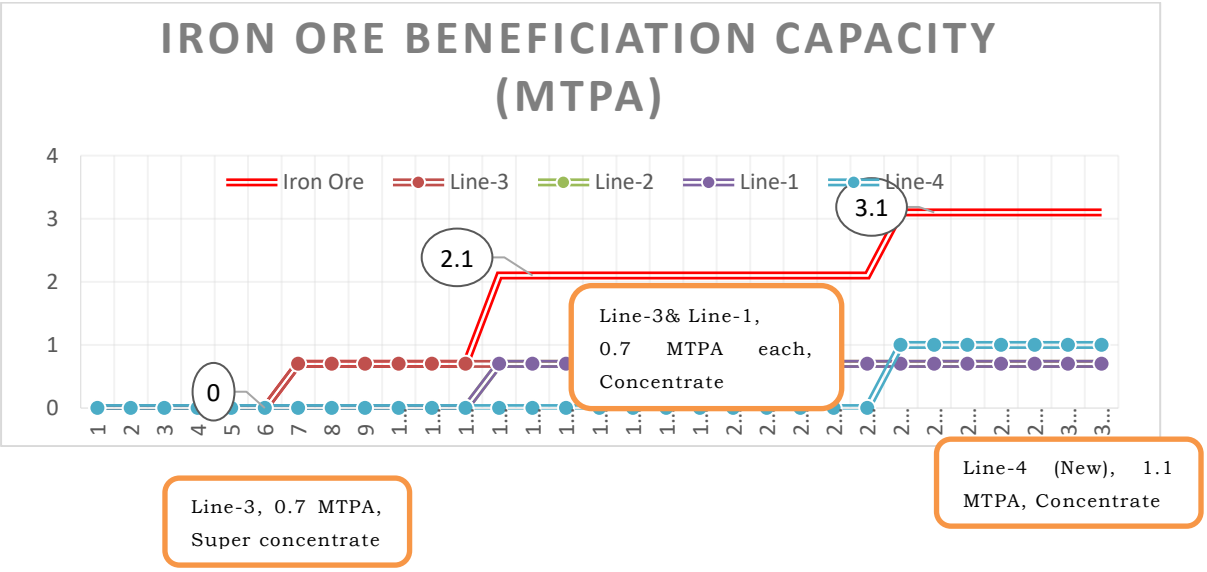
Rated Capacity of Beneficiation plant, TPH

Activities	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
Beneficiation Plant Line-3 Production	97 TPH
Beneficiation Plant Line-2 Production	97 TPH
Beneficiation Plant Line-1 Production	97 TPH
Beneficiation Plant Line-4 Production	153 TPH

Table 3.13 Start-up Plan for the Mine and Beneficiation Plant

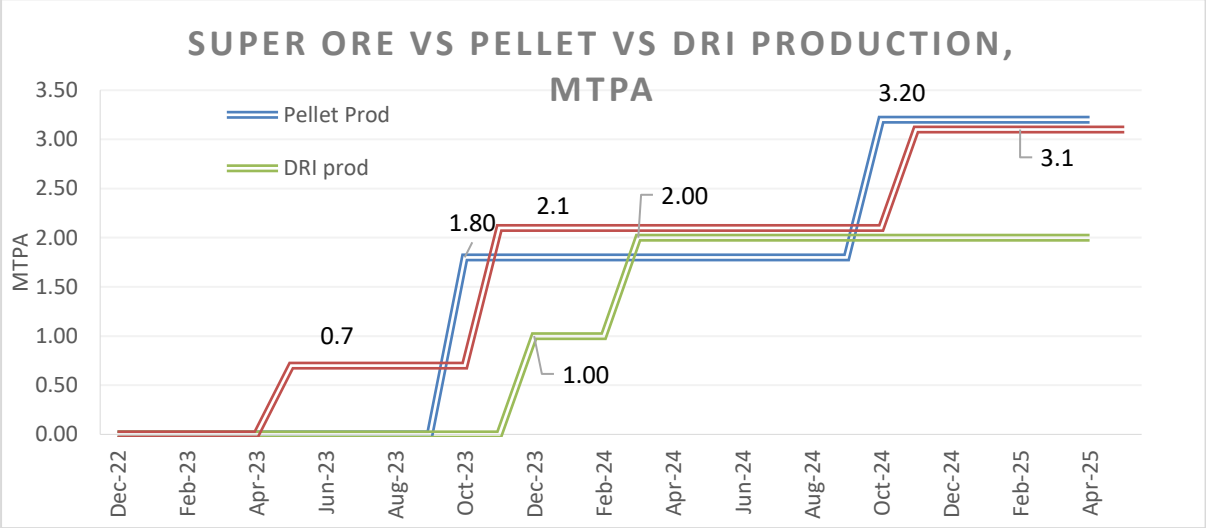
F.Y.	Super Concentrate Requirement (MT)	Iron Ore Requirement (MT)	Pellet Production Capacity (MTPA)	Remarks
2023-24	0.87	2.9	0.36	Line-3 expected start in May-23 and pellet plant to start in Nov'23. Additional super concentrate can be sold in domestic market.
2024-25	2.35	7.9	1.80	Line-2&1 will start at end of FY'23, DRI will start in Dec'23 and March'24. Additional super concentrate can be sold in domestic market.
2025-26	3.10	10.5	3.10	Itakpe Mines will be operating at 3.1 MTPA and All DRI and Pellet Plants are functioning at Rated capacity of 2.0 MTPA and 3.1 MTPA.
2026-27	3.10	10.5	3.10	Itakpe Mines will be operating at 3.1 MTPA and All DRI and Pellet Plants are functioning at Rated capacity of 2.0 MTPA and 3.1 MTPA.
2027-28	3.10	10.5	3.10	Itakpe Mines will be operating at 3.1 MTPA and All DRI and Pellet Plants are functioning at Rated capacity of 2.0 MTPA and 3.1 MTPA.

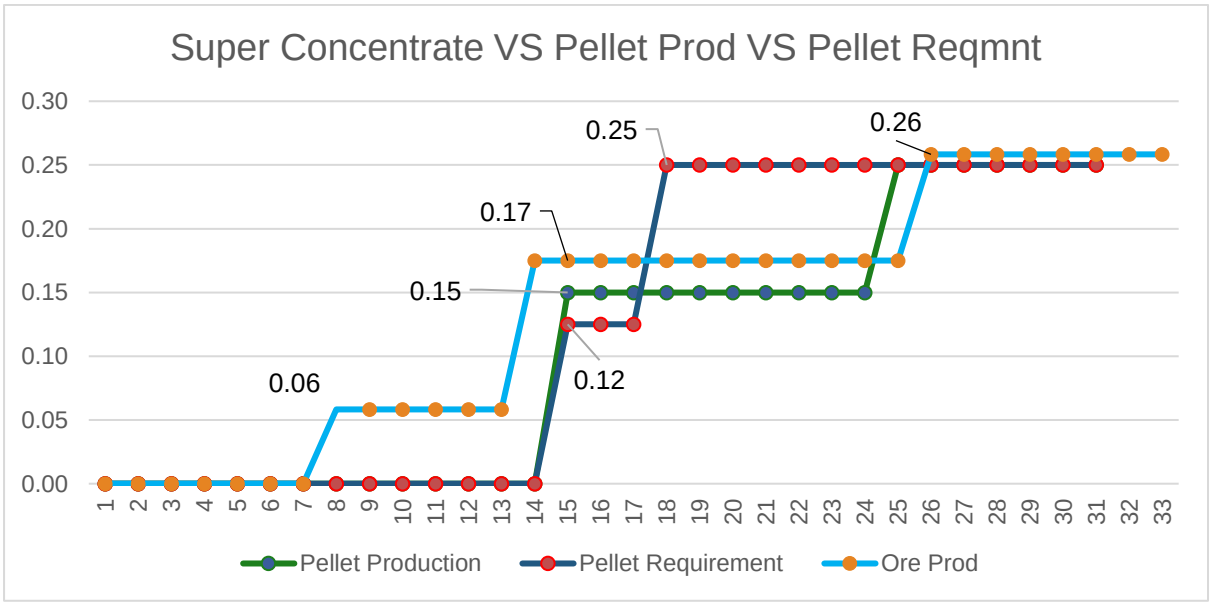
- Commissioning Dates are considered based on the effectiveness of the contract.
- It is considered that contract will be effective from November'2023.
- Final commissioning dates may vary depending upon delay/advance date of contract.



The super concentrate produced at the Itakpe mine needs to be transported to the existing pellet plant at Warri through the already existing rail network.

Further rail link is to be completed to bring the concentrate to the pallet plant site.





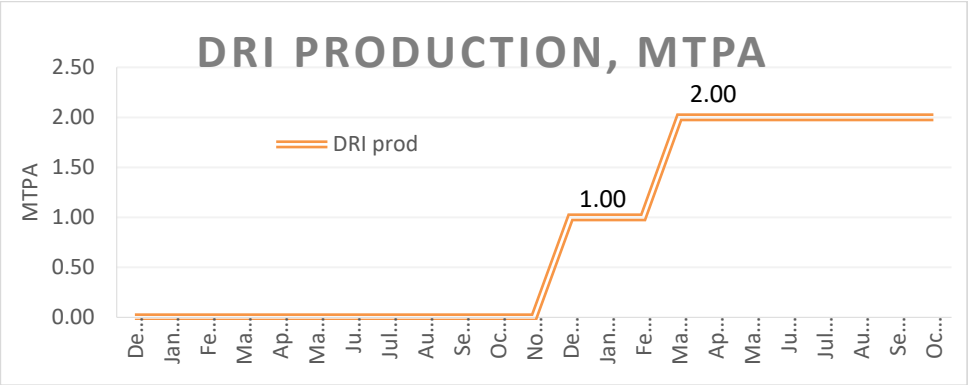
After completion of the Concentration and Super concentration Line-4 at the Itakpe mine, the current pellet plant at PSML Warri is designed to deliver 1.4 MTPA pallets. PSML is in discussion with leading consultants to enhance the capacity from current 1.4 to 1.8 MTPA.

For the balance requirement of 1.2 MTPA, it is required to install a new pellet plant.

New pellet plant will also give direct / indirect employment to local people and other associated benefits. Feasibility studies are under progress to finalize the location of the pellet plant either at the mine end at Itakpe or at the plant end at Warri.

Cost economics will be worked out separately.

Figure 3.14 Production from DRI Units 1&2



DRI Plant-1 with a capacity of 1 MTPA is expected to start in Dec-23 and DRI plant-2 with additional 1 MTPA Capacity is expected to Commission in March-24, This will make PSML DRI production totaling 2 MTPA,
Pellet requirement at this stage will be 3.0 MTPA, However the envisioned Pellet Plant-2 is expected to be ready in 24 months i.eNov'24. The shortfall in the intervening period

With the increase in pellet production to 3.0 MTPA by addition of Pellet Plant-2, the super concentrate requirement will also be increased to 3.1 MTPA at the Itakpe Mines.The existing beneficiation lines in Itakpe combined having a capacity of 2.1 MTPA, this shows there is a capacity gap of 1.1 MTPA, this shortfall will lead PSML to import pellet from Global Market for a period of 8 Months.
Likewise,once the Super concentrate Line- 3 at the Itakpe Mine is commissioned and till Pellet plant-1 gets ready in PSML Warri, Super concentrate can be sold to domestic market for a period of 6 months.

3.25 Cost and Profitability

The estimates of high-level capital and operating costs and financial analysis for the Itakpe Iron ore mine, beneficiation plant and associated facilities are enumerated below. The cost estimates are based on the data/information as available with DASTUR for similar projects and prevailing exchange rates and price levels.

Capital Cost Estimate

The capital cost of the project has been estimated under the following heads:

Hard Cost

The hard cost includes costs of mining machinery (HEMM and spares), plant and equipment for beneficiation (as erected – concentration and super concentration) and associated infrastructural facilities.

DE& ADC and Contingency

Cost towards design, engineering, consultancy services and administration during construction (DE & ADC) have been considered at 2.5 per cent of the hard cost. Provision for contingency has been considered at 5 per cent.

Pre-operative Expenses

A provision is made for pre-operative expenses @ one week's operating expenses for the first stabilized year of operations.

Margin Money for Working Capital

25 percent of the estimated working capital for the first stabilized year of operation has been included in capital cost as margin money for working capital.

Interest during Construction

Interest during construction has been calculated based on the following assumptions:

a) Debt-equity ratio of 4:1
b) Interest rate for debt @ 11 per cent
c) Drawal of fund as per the debt-equity ratio.

Based on the above considerations, the order-of-magnitude capital cost of the project is estimated at around USD 194 Million and a high-level summary of the same is given belowin

Table-11. The capital cost is estimated at an accuracy level of (+/-) 25 per cent considering the present level of available information.

Table 3.15 Capital Cost

S/N	Description	Amount, Mill. USD
A	**Mining**	
1	HEMM, Light Vehicles and Associated Facilities	83
B	**Beneficiation**	
1	Super concentrate Line 3 (Additional Equipment and Refurbishment)	3.0
2	Super concentrate Line 2,1 (New Installation)	18.1
3	Weathered Ore Plant (Additional Equipment and Refurbishment)	1.7
4	Existing Concentration Plant (Additional Equipment and Refurbishment)	46.8
5	Additional Concentrate and Super Concentrate Line 4 (New Installation)	70
C	**Infrastructural Facilities**	35
D	**DE ADC**	12.9
E	**Contingency**	13.5
	Hard Cost	**283.9**
	Pre-operative expense	3.1
	Working Capital Margin	2.0
	IDC	21.1
	Total	**310.1**

Operating Expenses

The operating cost is estimated based on the data/information as available with DASTUR for similar projects and prevailing price levels of utilities and other input materials.

An indicative estimate of the annual operating expenses for the project in the stabilized year of operation is given in Table-12below:

Table 3.17 Operating Expenses

S/N	Description	Amount Mil USD	Per ton Cost USD/ton
A	**Mining+Crushing Cost**		
1	Drilling Cost	17.6	5.7
2	Blasting Cost	16.2	5.2
3	Hauling Cost	51.3	16.6
4	Supporting Equipment	16.8	5.4
5	Manpower Cost	1.0	0.3
6	Overhead	4.8	0.5
7	Royalty cost @ 3% of Ex mines	3.1	1.0
	Total(A)	**110.8**	**34.7**
B	**Beneficiation Cost**		
	Consumables Cost	7.6	2.5
	Power Cost	7.2	2.3
	Water Cost	1.1	0.4
	Repair, Maintenance, Spares & Consumables	0.5	0.1
	Manpower Cost	0.8	0.3
	Overhead	6.7	0.8
	Total (B)	**23.9**	**6.3**
C	**Wagon Transportation cost - 300 Km**	27.9	9.0
	Landed Total Cost at Warri (A + B + C),	**162.6**	**50.0**

Annual Sales Realisation

The annual sales realizations are indicated in Table-13 below:

Table 3.17 Annual Sales Realization

S/N	Saleable products	NSR	Saleable Quantity	Amount
		USD/ton	tons p.a.	Mill. USD
1	Super-concentrated ore	80.2	31,00,000	248.6
	Total			**3.6**

Selling price of super concentrate at Warri port from Brazil is 80.2 USD/t.

EBITDA Analysis

Year-wise EBITDA of the project have been given in Table-14 below:

Table 3.18 Year-wise EBITDA (Million USD)

Item description	Unit	1st year	2nd year	3rd year	4th year
		Mill USD	Mill USD	Mill USD	Mill USD
Production of Ore at Mines	MTPA	3.4	6.2	10.5	10.5
Production of Super-concentrate	MTPA	1.0	1.8	3.1	3.1
Revenue	Mill USD	80.8	147.6	248.6	248.6
Less: Expenses	Mill USD	66.6	103.2	162.6	159.3
EBITDA	**Mill USD**	**14.2**	**44.4**	**86.0**	**89.3**
EBITDA margin	**%**	**17.6%**	**30.1%**	**34.6%**	**35.9%**

Financial Analysis

This section presents the profitability of the project and the projected financial results over a 15-year operation period (LOM) together with profitability estimates such as internal rate of return (IRR) and payback period (PBP). The financials have been worked out based on capital and operating cost estimates as discussed above and the assumptions as indicated below:

Means of Financing

The financing structure considered is indicated in Table-15.

Table 3.19 Means of Financing and Loan Details

Particulars	
Debt-equity	4:1
Interest rate per year (Term Loan)	11%
Interest rate per year (Working Capital)	11%
Moratorium	6 Months
Loan repayment schedule	7 years

Depreciation

The rates of depreciation considered for various facilities are indicated in Table-16 below:

Table 3.20 Depreciation

Facilities	Rate
HEMM	9.50%
Plant and Equipment	4.75%
Others	10.00%

Corporate Tax

Corporate tax has been computed at the prevailing rate of 30 percent on taxable profit with a 2 percent educational cess.

Working Capital Requirement

75 per cent of the working capital requirement is assumed to be met from bank borrowings and the balance from internal accruals.

The estimated year-wise working capital requirement for the project is shown in Table-17.

Table 3.21 Year-wise Working Capital (Million USD)

	1st year	2nd year	3rd year	4th year
Working capital requirement	2.6	4.7	7.9	7.9
Bank borrowing	1.9	3.5	5.9	5.9
Margin Money/ Internal accruals	0.6	1.2	2.0	2.0

Normal Capital Expenditure

To maintain the health of the beneficiation plant to ensure uninterrupted production over 15 years span, a provision in each year has been made for expenditures on addition/modification/replacement requirements from fourth year of operation and onwards.

Profitability Statements

Taking into account the sales realization, the annual operating expenses, the production build-up considered as well as the interest and depreciation charges, the summary of financial highlights in the first year of full production level is presented in Table-18 below:

Table 3.22 Financial Performance in First Full Year of Production

Description	Mil USD
Annual sales realization	248.6
Annual operating expenses	162.6
EBITDA	86.0
Interest	26.0
Depreciation & Amortization	17.5
PBT	42.5
Income Tax	13.0
PAT	29.5

Financial Indicators

The salient financial indicators of the project are given below in Table-19:

Table 3.23 Financial Indicators

S/N	Item	Value
A	ROI (stable year), %	27.7%
B	IRR (post-tax), %	19.5%

Recommendation

With reference to the technical and financial analysis carried out, it can be concluded that the project appears to be viable. However, it merits detailed study before implementation.

4. RISK ANALYSIS

4.1 Methodology

The purpose of the risk analysis is to identify, analyze and understand the key risks which may be encountered throughout the life of the project, from its initial implementation down to the end of the concession.

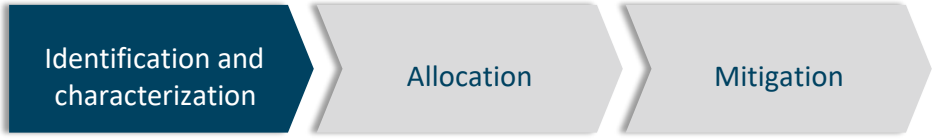
The concession of an infrastructure asset is based on a complex financial and legal structure due to the diversity and number of issues coming into consideration. The very nature of the infrastructure also requires long-term contractual commitments from stakeholders, which obviously increases the number and likelihood of realization of the risks potentially occurring.

To ensure that the concession contract is balanced and viable and ultimately leads to a financial close, it is therefore important to firstly identify all these risks and subsequently allocate each of them to the party best able to control and manage it thanks to specific mitigation instruments it has access to.

Risk management generally follows a three-step process: Identification and characterization; Allocation; and Mitigation.

4.1.1 Identification and Characterization

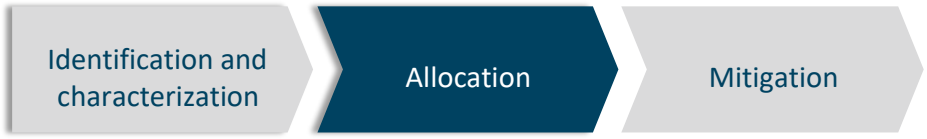
Figure 4.1 RISK ANALYSIS PROCESS – IDENTIFICATION AND CHARACTERISATION



A comprehensive identification of the risks associated with the project should be conducted. Risks are best identified in a risk matrix listing all kinds of risks likely to occur during the project lifecycle.

5.1.2 Allocation

Figure 4.2 RISK ANALYSIS PROCESS - ALLOCATION



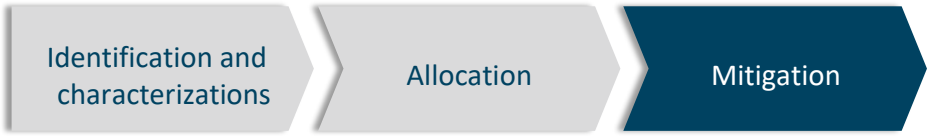
The identification of the risks and their allocation between the private sector and the public sector should comply with the following principle:

"Risks should normally be borne by the party best able to assess, control and manage them or by the party with the best access to the hedging instruments, the greatest ability to diversify the risks or the lowest cost of bearing them."

It is to be noted that each risk borne by the private concessionaire will require additional financial return (risk premium).

4.1.3 Mitigation

Figure 4.3 RISK ANALYSIS PROCESS - MITIGATION



Mitigation strategies are developed to reduce the likelihood of risk occurring and/or reduce its potential impact. These strategies typically include a variety of measures which are specific to each risk: technical, operational, financial etc. The private partner and the public party conduct their own assessment, decide how the risk should be managed and take appropriate insurance policies or other measures accordingly.

The public sector has historically underestimated the impact and likelihood of risk occurrence, which has often resulted in unbudgeted cost overruns; the private sector generally assesses and manages risks in a more optimal manner. Therefore, the risk analysis is a critical step in the identification of the most adequate project procurement.

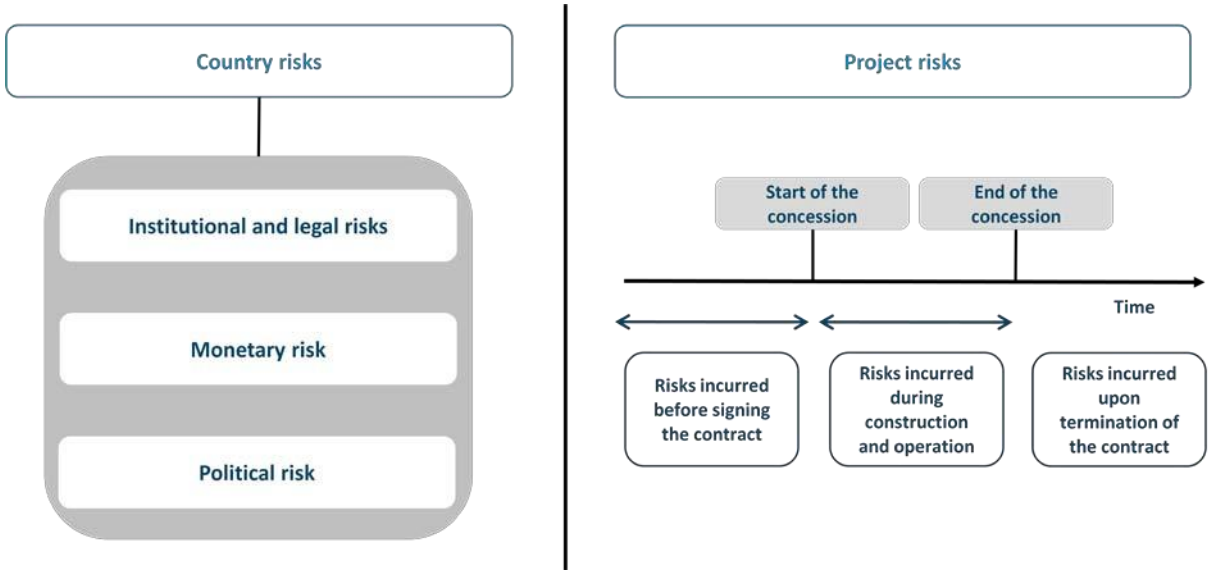
4.2 Risk Identification

The proposed concession project for NIOMCO generates a multitude of diverse and varied risks at different stages of the project lifecycle. Risks are generally divided in two categories:

- Risks which are related to the project environment, commonly designated as country risks
- Risks which are specific to the project, commonly designated as project risks.

The following chart shows a split of those risks by typology.

Figure 4.4 MAIN TYPES OF RISKS



4.2.1 Country risks

The notion of country risk covers three types of risks:

- Institutional and legal risks, which might affect property rights through confiscation, expropriation, or nationalization, with or without compensation.
- Monetary risks, which might affect repatriation of benefits through willful or unwilful restrictions on cross-borders financial transfers and currency conversions.
- Political risks, which might affect compliance by the State or public utility with its public commitments, including financial commitments.

The various stakeholders will lay importance on some of those risks:

- Lawyers will focus more on government fiat, while acknowledging that legal actions against foreign states are complicated in practice.
- Bankers and lenders will rather pay attention to government creditworthiness and monetary policies, even if sovereign guarantees usually provide a sense of comfort.
- Insurers will be more vigilant against political risks, which are difficult to assess and are sometimes assimilated to disaster risks.

4.3 Risk Allocation

The tables below aim at listing all risks potentially incurred during the life of the project and suggesting an allocation thereof between the parties involved, as well as means to mitigate them.

4.3.1 Country risks

Country risks			
Risk typology	**Generating factor**	**Risk allocation**	**Mitigation**
Legal and institutional risk	Change in law and regulatory environment (taxes, environmental standards, etc)	Concessionaire Insurers Contractor	▪ Change in law clauses in the concession agreement ▪ Compensation mechanisms and risk and indemnities clauses in the concession agreement ▪ Recourse to Export Credit Agencies (Coface, Hermes, etc.) and/or other insurance providers (e.g., MIGA); these contracts generally include insurance against regulatory changes. ▪ Insurance policies and government guarantees covering the risk of change in taxation ▪ Renegotiation and termination clauses in the concession agreement
	Change in general legal framework directly and specifically affecting the project company	Government Insurers	▪ Comprehensive and rigorous concession agreement covering as many potential events as possible ▪ Clauses on the possibility of international arbitration in the concession agreement ▪ Insurance policy covering sovereign and/or sub-sovereign risk (Coface, MIGA, etc.)
Monetary risk	Inflation	Concessionaire	Indexation of rates, charges and subsidies on inflation
	Interest rates fluctuation	Concessionaire	Recourse to hedging instruments (futures, swaps, options with caps and floors) in case of hard currency financing

	Exchange rates fluctuation	Concessionaire Government Customers	▪ Recourse to hedging instruments ▪ Transfer of risk to customers thanks to hard currency pricing (the project generates revenues in foreign currencies) or index-based rate policy based on a pass-through clause ▪ Transfer of risk to government thanks to exchange rate guarantee over the term of the concession to be awarded by local monetary authorities on request of the Ministry of Finance ▪ Recourse to local capital
Country risks			
Risk typology	**Generating factor**	**Risk allocation**	**Mitigation**
	Non-convertibility or non-transferability	Concessionaire Insurers	▪ Compilation of historical data on global market risk and country risk (rating agencies, international organizations, think tanks, etc.) ▪ Local government undertakings in relation to convertibility and cross-border transfers of funds ▪ Insurance policy covering non-transferability risk (Coface, MIGA, etc.)
Political risk	Breach or cancellation of contract, expropriation, creeping expropriation, failure to obtain or renew approvals, terrorism	Concessionaire Insurers	▪ Insurance policy covering political risk (Coface, MIGA, etc.) ▪ Clause renegotiated with the concessionaire in the concession contract ▪ Clauses for early termination of the concession contract with compensation arrangements to the benefit of the concessionaire
Force Majeure	Flood, earthquake, riot, strike, etc.	Concessionaire Insurers MMSD	▪ Insurance policy covering floods, earthquake, and other similar risks ▪ Risk of riot, war and hostilities usually borne by the concessionaire, unless Government is directly responsible or involved

Project risks			
Risk typology	**Generating factor**	**Risk allocation**	**Mitigation**
Risks incurred prior to financial close			
Delay in project preparation and implementation	Strong opposition from local community, interest groups and/or current tenants	MMSD	▪ Consultation process with stakeholders and current tenants ▪ Future layout to improve the situation of all current tenants to the extent possible ▪ Upstream legal preparation (e.g. non-renewal of leases to be terminated)
	Delay in developing a business case	MMSD	▪ Careful planning of project preparation schedule ▪ Strong commitment from and coordination between all government entities involved ▪ Selection of competent and experienced advisers to bring in lacking skills
Unsuccessful tender	▪ The project does not attract bidders ▪ The project does not attract the targeted bidders in terms of development policy,	MMSD	▪ Thorough upstream preparation of feasibility studies, tender documents, concession agreement, etc. ▪ Submission of a bankable Outline Business Case to the market ▪ Roll-out of a real project marketing campaign (advertisement in the general and specialised media, organisation of a press conference or a road show, setup of a data room)

4.3.2 Project risks

Project risks			
Risk typology	**Generating factor**	**Risk allocation**	**Mitigation**
	experience, financial clout, etc.		▪ Inclusion of minimum requirements in terms of experience and/or financial solvency of bidders ▪ Setup of a very precise, clear and transparent tendering process ▪ All information available to be transmitted to the bidders in order to avoid adverse selection ▪ Bidders to be granted sufficient time to prepare a proposal
Incapacity of the concessionaire to raise funding	The concessionaire cannot find funding with the adequate terms and conditions.	Concessionaire MMSD	▪ Submission of a bankable Business Case to the market ▪ Inclusion of minimum requirements in terms of experience and/or financial solvency of bidders ▪ Availability of MMSD to provide assistance to the concessionaire and comfort to potential lenders as required
	The concessionaire cannot pledge the assets due to missing approval by MMSD.	MMSD	▪ List of assets available for pledging to lenders clearly stated in the concession agreement ▪ Adequate protective provisions in the concession agreement ▪ MMSD to provide formal approval to pledge the assets in due time
Risks incurred during construction period			
Cost overrun	Within the concessionaire's control (inefficient construction practices, etc.)	Concessionaire EPC contractor	▪ Careful planning and project management ▪ Selection of a seasoned and competent project manager ▪ Choice of a reputable and internationally recognized EPC (Engineering, Procurement and Construction) contractor ▪ Turnkey contract with solid commitments from the EPC contractor (deposits, holdbacks, performance bonds)

			▪ Clearly described indemnification mechanism in the EPC contract ▪ Equity participation of the EPC contractor in the concessionaire consortium
	Outside the concessionaire's control: change in the overall legal framework (taxes, laws, etc.)	MMSD	Adequate protective provisions in the concession agreement
	Outside the concessionaire's control: government action or lack of action	MMSD	Adequate protective provisions in the concession agreement

Project risks			
Risk typology	**Generating factor**	**Risk allocation**	**Mitigation**
	affecting the project (e.g. delays in securing approvals)		
	Seismic risks	Concessionaire EPC contractor	▪ Seismic study to be completed ▪ Introduction of seismicity coefficient in construction cost estimates of the EPC contractor and the concessionaire ▪ Force Majeure clauses in the concession agreement ▪ Adequate insurance policy

	Geotechnical risks	Concessionaire EPC contractor	▪ Communication of all available geotechnical information to the concessionaire ▪ Geotechnical study to be completed ▪ Building design by a specialised firm ▪ Monitoring of degradation of platforms throughout the life of the concession Insurance policy covering geotechnical risks
	Miscommunication between the parties	Concessionaire MMSD	▪ Roles and obligations of the parties in terms of construction of infrastructures and superstructures and procurement of handling equipment to be clearly stated in the concession agreement ▪ Close monitoring of construction works by MMSD ▪ Coordination between major stakeholders
Delay in completion	Wrong construction time estimations by suppliers	Concessionaire EPC contractor	▪ Careful planning and project management ▪ Selection of a seasoned and competent project manager ▪ Choice of a reputable and internationally recognised EPC contractor ▪ Turnkey contract with solid commitments from the EPC contractor (deposits, holdbacks, performance bonds) ▪ Clearly described indemnification mechanism in the EPC contract ▪ Equity participation of the EPC contractor in the concessionaire consortium
	Unexpected events outside the concessionaire's control	Concessionaire EPC contractor	▪ Turnkey contract with solid commitments from the EPC contractor (deposits, holdbacks, performance bonds) ▪ Clearly described indemnification mechanism in the EPC contract ▪ Setup of a project steering committee by public authorities to avoid the risk of administrative delays ▪ Coordination between major stakeholders

Project risks

Risk typology	Generating factor	Risk allocation	Mitigation
Failure of project to meet performance criteria at completion	Quality shortfall, construction defects	Concessionaire EPC contractor	▪ Careful planning and project management ▪ Selection of a seasoned and competent project manager ▪ Choice of a reputable and internationally recognised EPC contractor ▪ Turnkey contract with solid commitments from the EPC contractor (deposits, holdbacks, performance bonds) ▪ Clearly described indemnification mechanism in the EPC contract ▪ Equity participation of the EPC contractor in the concessionaire consortium
Challenge on property and/or perimeter of the assets	▪ Unclear concession agreement ▪ Dissent on the interpretation of the concession agreement	Concessionaire	▪ Layout map defining the perimeter of the concession to be included in the concession agreement ▪ Comprehensive and accurate inventory of assets granted, leased and/or sold as part of the concession to be included in the concession agreement
Environmental risk	Negative impact on fauna and flora	Concessionaire	▪ Environmental Impact Assessment (EIA) study to be completed ▪ Project monitoring in compliance with local environmental regulatory framework
Risks incurred during operating period			
Operating cost overrun	Failure or delay in obtaining licenses, consents and permits	MMSD	Coordination with all relevant government stakeholders to ensure timely approvals
	Change in prices of supplies	Concessionaire	▪ Long-term procurement contracts ▪ Recourse to hedging instruments for major supplies (e.g. commodity hedges, options, futures, etc.)
	Change in staff-related costs	Concessionaire	Transfer of inflation risk to customers through CPI-based pricing or index-based rate policy based on a pass-through clause

	No delivery of supplies on the part of public authorities	MMSD	Adequate protection clauses in the concession agreement for water and/or power
Revenue risk	Change in tariffs	Concessionaire	Financial regulation and renegotiation clauses in the concession agreement
	Higher than expected traffic level (exceeding handling capacity)	Concessionaire	▪ Long-term agreement with existing Lagos Port operators ▪ Financial regulation and renegotiation clauses in the concession agreement

Project risks			
Risk typology	**Generating factor**	**Risk allocation**	**Mitigation**
	Lower than expected traffic level	Concessionaire	▪ Long-term agreement with existing Lagos Port operators ▪ Financial regulation and renegotiation clauses in the concession agreement
Technical risks	Incorrect initial valuation of the assets made available to the concessionaire	MMSD	Protection clauses in the concession agreement covering abnormal degradation of assets made available to the concessionaire due to hidden defects Warranties to be issued by MMSD
	Poor maintenance of the concessionaire's assets	Concessionaire	▪ Clearly described penalty mechanism in the concession agreement ▪ Close monitoring of contract by MMSD ▪ Warranties to be issued by the concessionaire
	Poor maintenance of MMSD's assets	MMSD	▪ Clearly described penalty mechanism in the concession agreement ▪ Warranties to be issued by the concessionaire
Environmental risks	Negative impacts on fauna and flora	Concessionaire (if not complying with the concession agreement) MMSD	▪ Environmental Impact Assessment (EIA) study to be completed ▪ Project monitoring in compliance with local environmental regulatory framework

	Increased traffic congestion	MMSD	▪ Creation of the truck terminal ▪ Strict access control at terminal gates ▪ Increased police surveillance on the roads
Risks incurred upon termination			
Litigation on assets to be transferred	Unamortized assets upon termination	Concessionaire	Concession agreement to clearly specify the assets to be retained by the concessionaire and those to be transferred to MMSD, and at what cost, if any
Operating interruption	No private operator interested in taking over and MMSD left without the human and financial resources to do so	MMSD	Exit clauses in the concession agreement to allow sufficient time for alternatives to be designed and implemented

5. ANALYSIS OF STRUCTURING OPTIONS

There are a wide range of PPP options which can be used in structuring the NIOMCO project. These options vary mainly by ownership of capital assets, responsibility for investment, assumption of risks and duration of the contract.

We have in our analysis considered Federal Government's ownership of NIOMCO and considered PPP options which optimize the use of existing assets at the plant through improved operation and modernization. The following PPP options have been considered:

- Concession.
- Management Agreement
- Divestiture
- Joint Venture Agreement.

5.2 Evaluation of potential structuring options

5.2.1 Option 1 – Concession

MMSD may grant a concession to a private sector operator (concessionaire) wherein the concessionaire will be responsible for investments, operations, and full delivery of services. Rights granted under the concession may include development of infrastructure, provision of operating equipment, operation, maintenance and rehabilitation of the plant.

The obligation to raise the capital required to build, upgrade or expand the plants will be placed on the concessionaire. Furthermore, the obligation for additional improvements or expansion program (e.g., to construct more facilities or expand the plant structures) may be passed on the concessionaire and the cost set off against a longer concession term or fees payable to MMSD under the concession. In addition, some or all the demand and revenue risks of the terminal may be transferred to the concessionaire.

Depending on the amount of risks and obligations passed off by MMSD to the concessionaire, the concessionaire may require a long-term concession to enable it to recover its investment and earn an appropriate return over the life of the concession.

As regulator, MMSD would regulate the price and quality of service and determine performance standards which the concessionaire must comply with.

5.2.2 Option 2 – Management Agreement

This consists of the hiring of a private company to manage a public utility. Under this option, MMSD would be responsible for the finance, construction and/or rehabilitation of the infrastructure. The private sector participant will be engaged solely for the operation and maintenance of NIOMCO or any part of the plant. Fees payable to the private sector manager may be set off against tariffs paid by users of the assets or utility.

The advantage of such an arrangement is the efficient management of the assets of NIOMCO and optimal use of the products. However, the fact that MMSD assumes the responsibility for financing the development of the asset's infrastructure and purchase of required equipment does not make this a viable PPP option for MMSD.

5.2.3 Option 3 – Divestiture

This would involve MMSD selling or transferring ownership of NIOMCO such that the private sector participant owns, manages and operates the infrastructure. MMSD and the Federal Government would continue to regulate the way in which the company operates through regulations and licensing procedures. Under such an arrangement, the private entity would be responsible for funding any capital investments required to expand or improve the plant. This option does not fit with the current situation of NIOMCO and immediate priority of the Federal Government and must therefore be disregarded.

5.2.4 Option 4 – Joint Venture Agreement

MMSD may enter a joint venture agreement with a private investor for the financing, operation and maintenance of NIOMCO. MMSD and the private investor will in this case partner to operate the plant through a special purpose vehicle. All profits and risks arising from the joint venture will be shared by MMSD and the private investor. This option will require substantial investment by MMSD and as such may not be a viable PPP option for MMSD.

The categorization of the various PPP models with the main variants and characteristics is shown in table below:

Table 5.1- Different forms of PPP Models

Broad Category	*Main Variants*	*Operation and Maintenance*	*Ownership of Assets*	*Investment*	*Assumption of risk*	*Duration (years of contract)*
Service Contract and Management Contract	Outsourcing	Private	Public	Public	Public	1-3
	Management Support	Private and Public	Public	Public	Public	1-2
	Operation and Management	Private	Public	Public	Public	3-5
Turnkey Contracts		Private	Public	Public	Public	3-5
Delegated Management Contracts	Lease Contract	Private	Public	Public	Semi-private	8-20
	Affermage	Private	Public	Public	Semi-private	5-20
Concession	Franchise	Private/Public	Public	Public/Private	Public and Private	20-30
	DBO	Private	Public	Public	Private	20-30
	BOT, BOO	Private	Public/ Private	Private	Private	20-30

Private Ownership	PFI, Divestiture	Private	Private	Private	Private	Indefinite

Types of Concession Model

Build Own Operate (BOO) - The government grants the right to finance, design, build, operate and maintain a project to a private entity, which retains ownership of the project. The private entity is not required to transfer the facility back to the government.

Build Operate Transfer (BOT) - The private business builds and operates the public facility for a significant period. At the end of the period, the facility ownership transfers to the public. Most road construction projects are awarded on BOT basis.

Build-Own-Operate-Transfer (BOOT) - The government grants a franchise to a private partner to finance, design, build and operate a facility for a specific period. Ownership of the facility is transferred back to the public sector at the end of that period.

Design Build-Operate (DBO) - A single contract is awarded to a private business which designs, builds, and operates the public facility, but the public retains legal ownership. Build-Develop-Operate (BDO) The private business buys the public facility, refurbishes it with its own resources, and then operates it through a government contract.

Build-Own-Lease-Transfer (BOLT) - The government grants the right to finance and build a project which is then leased back to the government for an agreed term and fee. The facility is operated by the government. At the end of the agreed tenure the project is transferred to the government.

Develop Operate and Transfer (DOT) - DOT can be said to be a contractual arrangement whereby favorable conditions external to the new infrastructure project which is to be built by a private developer are integrated into the arrangement by giving that entity the right to develop adjoining property, and thus, enjoy some of the benefits created by the investment such as higher property or rent values.

Rehabilitate Operate and Transfer (ROT) - ROT can be said to be a contractual arrangement whereby an existing facility is turned over to a private entity to refurbish, operate and maintain for a specific period as a franchisee, on the expiry of which, the legal title to the facility is turned over to the government.

Design-Build-Operate (DBO) - Under this model, the private sector design and builds a facility on the turn-key basis. Once the facility is completed, the title for the new facility is transferred to the public sector, while the private sector operates the facility for a specified period.

Design-Build-Finance-Operate/Maintain (DBFO, DBFM or DBFO/M) - Under this model, the private sector designs, builds, finances, operates and/or maintains a new facility under a long-term lease. At the end of the lease term, the facility is transferred to the public sector. In some countries, DBFO/M covers both BOO and BOOT.

Each of the models has its own pros and cons and can be suitable for achieving the major objectives of PPP to a varying degree. There is no single PPP model that can satisfy all conditions concerning a project's location and its technical and financial features.

5.3 Recommendations on Preferred Option

Flowing from the above analysis, we recommend that MMSD award the concession of NIOMCO to PSML based on a Rehabilitate Operate and Transfer (ROT) structure. Under this arrangement, PSML will finance the rehabilitation of the plant, deploy new equipment, operate, and maintain the plant for a period of thirty (30) years. During that period, PSML will be entitled to recoup its investment through the revenue generated and pay to MMSD pre-agreed fees.

At the expiration of the initial term, PSML will have the option of renewing term for a further 10-year period. The ownership and title to NIOMCO plant and facilities would be vested in MMSD and upon expiry of the agreed concession period, ownership of these assets will be officially transferred to the MMSD for a nominal consideration.

5.4 Justification and Benefits of Recommended Option

The main justification and potential benefit of the recommended project delivery option is that project will be implemented without the Federal Government having to commit any resources of its own to the project, thus providing Value for Money. The project will also create a new stream of revenue for the Government from the accruable fees throughout the concession period. Above all, Government will be able to deliver on a critical national economic development project vital for attracting investment and driving growth.

As in most PPP projects, the recommended option will also bring forth the following potential benefits in implementation:

- Access to private sector financial resources, technology, technical expertise, and operating competence
- Mitigation of fiscal and resource limitations
- Prospective operational cost savings for MMSD
- Reallocation of Federal Government resources for other priority needs
- Flexibility in management of Government assets
- Cost-based/market-based fees and charges for greater service sustainability
- Protection of project from possible adverse political interference
- Transfer of risk for project finance to the private sector

5.5 Key Contractual Terms

The execution of a legally binding Agreement between the MMSD and the project proponents is of critical importance to the success of this project. The Concession Agreement will contain the details of all the relevant issues which are significant to the successful implementation of the project. The

provisions of the Contract Agreement will be many and varied, but must be comprehensive at least in their coverage of the following clauses:

- Name of the contracting Parties
- Definitions and Interpretation of key terms
- Effective Date and Tenor
- Recitals: Background to the Contract
- Purpose of the Project and Benefits to Parties
- Parties' Basic Contractual Rights and Obligations
- Financing Structure for the Project
- Operations and Maintenance of Project Assets
- Conditions Precedents
- Parties' Respective Covenants
- Force Majeure
- Documentation and Audits
- Representations and Warranties
- Change in Law
- Event of Default
- Termination
- Compensation
- Notices
- Indemnities and Liabilities
- Governing Law and Dispute Resolution
- Hand Back Provisions
- Authorized Signatories

The most significant of these contractual provisions is the tenor of the Concession Agreement (i.e., the concession period). Based on the huge capital investment required to implement the project, including provision of modern equipment, and ongoing maintenance of the project assets, PSML will require a contract period long enough to be able to break even and recoup its investments and make a marginal profit on the undertaking. Current estimates suggest that in the Base Case scenario, it will require a period of 30 years to recoup our investment and therefore the financial model illustrated in this Business Plan covers 30 years.

It is also to be noted that there is considerable risk associated with such projects requiring considerable investment upfront and recovering it over a long period. To further motivate the project proponent to take up the project and compensate for the significant risk taken, renewal of the Contract for an additional 10-year period is further recommended.

SECTION 6 : FINANCIAL AND ECONOMIC APPRAISAL

This section presents an analysis of the main financial outcomes of the Financial Model based on the technical and structuring options recommended.

6.1 Capital Cost Estimate

6.1.1 Cost and Profitability

The estimates of high-level capital and operating costs and financial analysis for the Itakpe Iron ore mine, beneficiation plant and associated facilities are enumerated below. The cost estimates are based on the data/information as available with DASTUR for similar projects and prevailing exchange rates and price levels.

6.1.2 Capital Cost Estimate

The capital cost of the project has been estimated under the following heads:

6.1.2.1 Hard Cost

The hard cost includes costs of mining machinery (HEMM and spares), plant and equipment for beneficiation (as erected – concentration and super concentration) and associated infrastructural facilities.

6.1.2.2 DE & ADC and Contingency

Cost towards design, engineering, consultancy services and administration during construction (DE & ADC) have been considered at 2.5 per cent of the hard cost. Provision for contingency has been considered at 5 per cent.

6.1.2.3 Pre-operative Expenses

A provision is made for pre-operative expenses @ one week's operating expenses for the first stabilized year of operations.

6.1.2.4 Margin Money for Working Capital

25 per cent of the estimated working capital for the first stabilized year of operation has been included in capital cost as margin money for working capital.

6.1.2.5 Interest during Construction

Interest during construction has been calculated based on the following assumptions:

- Debt-equity ratio of 4:1
- Interest rate for debt @ 11 per cent
- Drawal of fund as per the debt-equity ratio.

Based on the above considerations, the order-of-magnitude capital cost of the project is estimated at around USD 194 Million and a high-level summary of the same is given below

in Table-11. The capital cost is estimated at an accuracy level of (+/-) 25 per cent considering the present level of available information.

Table 6.1 Capital Cost

Sl. No.	Description	Amount, Mill. USD
A	**Mining**	
1	HEMM, Light Vehicles and Associated Facilities	83
B	**Beneficiation**	
1	Super concentrate Line 3 (Additional Equipment and Refurbishment)	3.0
2	Super concentrate Line 2,1 (New Installation)	18.1
3	Weathered Ore Plant (Additional Equipment and Refurbishment)	1.7
4	Existing Concentration Plant (Additional Equipment and Refurbishment)	46.8
5	Additional Concentrate and Super Concentrate Line 4 (New Installation)	70
C	**Infrastructural Facilities**	35
D	**DE ADC**	12.9
E	**Contingency**	13.5
	Hard Cost	**283.9**
	Pre-operative expense	3.1
	Working Capital Margin	2.0
	IDC	21.1
	Total	**310.1**

6.2 Operating Expenses

The operating cost is estimated based on the data/information as available with DASTUR for similar projects and prevailing price levels of utilities and other input materials.

An indicative estimate of the annual operating expenses for the project in the stabilized year of operation is given in Table-12 below:

Table 6.2 Operating Expenses

S/ No.	Description	Amount Mil USD	Per ton Cost USD/ton
A	**Mining+Crushing Cost**		
1	Drilling Cost	17.6	5.7
2	Blasting Cost	16.2	5.2
3	Hauling Cost	51.3	16.6
4	Supporting Equipment	16.8	5.4

5	Manpower Cost	1.0	0.3
6	Overhead	4.8	0.5
7	Royalty cost @ 3% of Ex mines	3.1	1.0
	Total(A)	**110.8**	**34.7**
B	**Beneficiation Cost**		
	Consumables Cost	7.6	2.5
	Power Cost	7.2	2.3
	Water Cost	1.1	0.4
	Repair, Maintenance, Spares & Consumables	0.5	0.1
	Manpower Cost	0.8	0.3
	Overhead	6.7	0.8
	Total (B)	**23.9**	**6.3**
C	**Wagon Transportation cost - 300 Km**	27.9	9.0
	Landed Total Cost at Warri (A + B + C),	**162.6**	**50.0**

6.2.1 Annual Sales Realisation

The annual sales realizations are indicated in Table-13 below:

Table 6.3 Annual Sales Realization

Sl. No.	Saleable products	NSR	Saleable Quantity	Amount
		USD/ton	tons p.a.	Mill. USD
1	Super-concentrated ore	80.2	31,00,000	248.6
	Total			**3.6**

Selling price of super concentrate at Warri port from Brazil is 80.2 USD/t.

6.2.2 EBITDA Analysis

Year-wise EBITDA of the project have been given in Table-14 below:

Table 6.4 Year-wise EBITDA (Million USD)

Item description	Unit	1st year	2nd year	3rd year	4th year
		Mill USD	Mill USD	Mill USD	Mill USD
Production of Ore at Mines	MTPA	3.4	6.2	10.5	10.5

Item description	Unit	1st year	2nd year	3rd year	4th year
		Mill USD	Mill USD	Mill USD	Mill USD
Production of Super-concentrate	MTPA	1.0	1.8	3.1	3.1
Revenue	Mill USD	80.8	147.6	248.6	248.6
Less: Expenses	Mill USD	66.6	103.2	162.6	159.3
EBITDA	**Mill USD**	**14.2**	**44.4**	**86.0**	**89.3**
EBITDA margin	**%**	**17.6%**	**30.1%**	**34.6%**	**35.9%**

6.3 Financial Analysis

This section details all the financial and economic appraisal of the project. Financial assessments in terms of Payback Period and Internal Rate of Return (IRR) were also carried out to determine the viability of the investment. A detailed 2-Statement financial model in terms of Profit & Loss statement and Cash Flow Statement for 20 years is attached as Appendix .....

The financials have been worked out based on capital and operating cost estimates as discussed above and the assumptions as indicated below:

6.3.1 Key General Assumptions

The financial model is based on the following key assumptions:

- Contractual model: 20-year Concession, with royalty payable to the Government.
- Project commences in 2023 with refurbishment of the plant, with first year of revenue after in 2024.
- Capital and Operating Cost to be borne fully by the Concessionaire.

6.3.1.1 Capital Investment

The refurbishment of the plant will be carried out in 3 phases. The capital structure for the investment will be maintained at 70% debt and 30% equity contribution throughout the phases of refurbishment.

A total investment of $369.2 Million Dollars will be made in the project, drawn down as follows:

Phase	Project Year	Scope	Investment (Mil USD)
I	1	Reactivation of Line 3	175.7

II	2	Refurbishment & Reactivation of Lines 1 & 2	130.9
III	3	Installation of a completely new Line 4	62.6
Total Investment			**369.2**

6.3.1.2 *Means of Financing*

The financing structure considered is indicated in Table-15.

Table 6.5 Means of Financing and Loan Details

Particulars	
Debt-equity	4:1
Interest rate per year (Term Loan)	11%
Interest rate per year (Working Capital)	11%
Moratorium	6 Months
Loan repayment schedule	7 years

6.3.1.3 *Depreciation*

The rates of depreciation considered for various facilities are indicated in Table-16 below:

Table 6.6 Depreciation

Facilities	Rate
HEMM	9.50%
Plant and Equipment	4.75%
Others	10.00%

6.3.1.4 *Corporate Tax*

Taxation is computed at 32% of Profit Before Tax, comprising 30% Company Income Tax and 2% Education Tax.

6.3.1.5 Working Capital Requirement

75 per cent of the working capital requirement is assumed to be met from bank borrowings and the balance from internal accruals.

The estimated year-wise working capital requirement for the project is shown in Table-17.

Table 6.7 Year-wise Working Capital (Million USD)

	1st year	2nd year	3rd year	4th year
Working capital requirement	2.6	4.7	7.9	7.9
Bank borrowing	1.9	3.5	5.9	5.9
Margin Money/ Internal accruals	0.6	1.2	2.0	2.0

6.3.1.6 Normal Capital Expenditure

To maintain the health of the beneficiation plant to ensure uninterrupted production over 15 years span, a provision in each year has been made for expenditures on addition/modification/replacement requirements from fourth year of operation and onwards.

6.3.2 Profitability Statements

This section presents the profitability of the project and the projected financial results over a 30-year operation period (LOM) together with profitability estimates such as internal rate of return (IRR) and payback period (PBP).

Considering the sales realization, the annual operating expenses, the production build-up considered as well as the interest and depreciation charges, the summary of financial highlights in the first year of full production level is presented in Table-18 below:

Table 6.8 Financial Performance in First Full Year of Production

Description	Mil USD
Annual sales realization	248.6
Annual operating expenses	162.6
EBITDA	86.0
Interest	26.0
Depreciation & Amortization	17.5
PBT	42.5
Income Tax	13.0
PAT	29.5

6.3.3 Financial Indicators

The salient financial indicators of the project are given below in Table-19:

Table 6.9 Financial Indicators

Sl. No.	Item	Value
A	ROI (stable year), %	27.7%
B	IRR (post-tax), %	19.5%

Long-Term Loan	
Loan Repayment Period	7 years
Interest Rate	11%
Moratorium Period	2 years

6.4 Financial Projections

Profit & Loss Statement

	Year1	Year2	Year3	Year4	Year5	Year6	Year7	Year8	Year9	Year10	Year11	Year12	Year13	Year14	Year15	Year16	Year17	Year18	Year19	Year20
	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31	FY32	FY33	FY34	FY35	FY36	FY37	FY38	FY39	FY40	FY41	FY42
Revenue	**-**	**56**	**168**	**249**	**249**	**249**	**249**	**249**	**249**	**249**	**249**	**249**	**249**	**249**	**249**	**249**	**249**	**249**	**249**	**249**
Operating Cost																				
Mining + Crushing Cost	-	35	89	128	127	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125
Beneficiation Cost	-	14	20	24	22	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Transportation Cost	-	6	19	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
Total Operating Cost	**-**	**56**	**128**	**180**	**177**	**172**	**172**	**172**	**172**	**172**	**172**	**172**	**172**	**172**	**172**	**172**	**172**	**172**	**172**	**172**
EBITDA	**-**	**1**	**41**	**69**	**72**	**76**	**76**	**76**	**76**	**76**	**76**	**76**	**76**	**76**	**76**	**76**	**76**	**76**	**76**	**76**
Depreciation & Amortization	-	17	21	21	21	21	21	21	21	21	18	14	13	13	13	13	10	8	7	7
EBIT	**-**	**-16**	**20**	**48**	**51**	**55**	**55**	**55**	**55**	**55**	**58**	**62**	**63**	**63**	**63**	**63**	**66**	**68**	**69**	**69**
Interest																				
Interest on Working Capital	-	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Interest on Term Loan	-	-	26	28	28	26	22	18	14	10	6	2	-0	-0	-	0	0	0	0	0
PBT	**-**	**-16**	**-6**	**19**	**22**	**28**	**32**	**36**	**40**	**44**	**51**	**59**	**62**	**62**	**62**	**62**	**65**	**68**	**69**	**69**
Tax Expense	-	-	-	6	7	9	10	11	12	14	16	18	19	19	19	19	20	21	21	21
Net Profit	**-**	**-16**	**-6**	**13**	**15**	**20**	**22**	**25**	**28**	**31**	**36**	**41**	**43**	**43**	**43**	**43**	**45**	**47**	**48**	**48**

Cashflow Statement

	Year1	Year2	Year3	Year4	Year5	Year6	Year7	Year8	Year9	Year10	Year11	Year12	Year13	Year14	Year15	Year16	Year17	Year18	Year19	Year20
	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31	FY32	FY33	FY34	FY35	FY36	FY37	FY38	FY39	FY40	FY41	FY42
Cash flow from operating activities																				
PBT	**0**	**(16)**	**(6)**	**19**	**22**	**28**	**32**	**36**	**40**	**44**	**51**	**59**	**62**	**62**	**62**	**62**	**65**	**68**	**69**	**69**
Less Tax Payable																				
Adjustment for																				
Non cash items - Depreciation & Amortization	0	17	21	21	21	21	21	21	21	21	18	14	13	13	13	13	10	8	7	7
Movement in Working Capital	0	(2)	(4)	(3)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Increase/ (Decrease) in WC borrowings	0	2	3	2	0	0	0	0	0	0	0	0	0	0	0	(0)	(0)	(0)	(0)	(0)
Net Cash from operating activities	**0**	**(0)**	**13**	**39**	**43**	**49**	**53**	**57**	**61**	**65**	**69**	**73**	**75**	**75**	**75**	**75**	**75**	**75**	**75**	**75**
Cash flow from investing activities																				
Acquisition Cost	(50)																			
Initial Capex	(126)	(131)	(63)																	
Normal Capex				0	0	0	(1)	(1)	(1)	(1)	(21)	(27)	(21)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Net Cash used in investing activities	**(176)**	**(131)**	**(63)**	**0**	**0**	**0**	**(1)**	**(1)**	**(1)**	**(1)**	**(21)**	**(27)**	**(21)**	**(1)**	**(1)**	**(1)**	**(1)**	**(1)**	**(1)**	**(1)**
Cash flow from financing activities																				
Term Loan Borrowing	123	92	44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Term Loan Repayment	0	0	0	0	0	(37)	(37)	(37)	(37)	(37)	(37)	(37)	0	0	0	0	0	0	0	0
Equity infusion	53	39	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Net cash from financing activities	**176**	**131**	**63**	**0**	**0**	**(37)**	**(37)**	**(37)**	**(37)**	**(37)**	**(37)**	**(37)**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Net increase/(decrease) in cash/cash equiv.	**0**	**(0)**	**13**	**39**	**43**	**12**	**15**	**19**	**23**	**27**	**12**	**9**	**55**	**74**	**74**	**74**	**74**	**74**	**74**	**74**
Beginning Cash	**0**	**0**	**(0)**	**13**	**52**	**95**	**107**	**122**	**141**	**164**	**192**	**203**	**212**	**267**	**341**	**416**	**490**	**565**	**639**	**714**
Closing Cash	**0**	**(0)**	**13**	**52**	**95**	**107**	**122**	**141**	**164**	**192**	**203**	**212**	**267**	**341**	**416**	**490**	**565**	**639**	**714**	**788**

Viability Indicators

	Year0	Year1	Year2	Year3	Year4	Year5	Year6	Year7	Year8	Year9	Year10	Year11	Year12	Year13	Year14	Year15	Year16	Year17	Year18	Year19	Year20
	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31	FY32	FY33	FY34	FY35	FY36	FY37	FY38	FY39	FY40	FY41	FY42
EBIT	**-**	**-**	**-16**	**20**	**48**	**51**	**55**	**55**	**55**	**55**	**55**	**58**	**62**	**63**	**63**	**63**	**63**	**66**	**68**	**69**	**69**
Tax Adjusted EBIT	**-**	**-**	**-11**	**14**	**33**	**36**	**38**	**38**	**38**	**38**	**38**	**40**	**43**	**44**	**44**	**44**	**44**	**46**	**47**	**48**	**48**
Add / (Less): Changes in working capital	-	-	-2	-4	-3	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0
Add: Depreciation	-	-	17	21	21	21	21	21	21	21	21	18	14	13	13	13	13	10	8	7	7
Less: Acquisition cost		-50																			
Less: Capex excl IDC	-	-119	-112	-63	-	-	-	-1	-1	-1	-1	-21	-27	-21	-1	-1	-1	-1	-1	-1	-1
Free Cash Flow to the Firm (FCFF)	**-**	**-169**	**-109**	**-32**	**51**	**56**	**59**	**58**	**58**	**58**	**58**	**37**	**30**	**36**	**56**	**56**	**56**	**55**	**54**	**54**	**54**
WACC	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%
Discounting Factor	1.00	0.89	0.80	0.71	0.64	0.57	0.51	0.45	0.40	0.36	0.32	0.29	0.26	0.23	0.20	0.18	0.16	0.15	0.13	0.12	0.10
Discounted FCFF	**-**	**-151**	**-87**	**-23**	**32**	**32**	**30**	**26**	**24**	**21**	**19**	**11**	**8**	**8**	**11**	**10**	**9**	**8**	**7**	**6**	**6**
Terminal Cash Flow																					
Terminal Value (TV)																					
Discounted TV																					
FCFF+TV	**-**	**-168.9**	**-109.0**	**-32.3**	**50.9**	**56.3**	**59.2**	**58.3**	**58.3**	**58.3**	**58.3**	**37.5**	**29.8**	**36.1**	**56.0**	**56.0**	**56.0**	**55.1**	**54.3**	**54.0**	**54.1**
Discounted FCFF+TV	**-**	**-150.8**	**-86.9**	**-23.0**	**32.4**	**31.9**	**30.0**	**26.4**	**23.6**	**21.0**	**18.8**	**10.8**	**7.6**	**8.3**	**11.5**	**10.2**	**9.1**	**8.0**	**7.1**	**6.3**	**5.6**

NPV	**7.8**
IRR	**12.4%**
Payback Period, years	**8.8**

7. CONCLUSION

7.1 Conclusion

The Business Case study indicates that the project is economically, technically, legally and financially viable.

From an economic point of view, the project will address some of the challenges faced by the steel industry, notably the lack iron ore as raw material for steel plants. It would thus provide a useful input, which should eventually leave all industry stakeholders in a better position.

From a technical point of view, the project seems perfectly feasible and would greatly contribute to rescue and turnaround the present dire state of NIOMCO. The extent of the works to be implemented and the impact of those works on the environmental condition of Itakpe remain to be confirmed by means of more advanced technical feasibility studies.

From a legal point of view, the institutional and regulatory framework seems favourable and current Federal Government policy supports the project. Above all, there is no know legal or regulatory constraint to the implementation of the project. The recommended PPP structuring option is in accordance with extant laws and regulations and could be implemented in a relatively swift manner.

From a financial point of view, the project is profitable and does not require any government or MMSD funding or subsidy. While it is anticipated that the project would generate strong revenue, the inherent risks and quantum investment required are justifications for the proposed 30-year concession period.

APPENDICES

APPENDIX

M.N DASTUR COMPANY – A Brief Profile

In pursuance of the above objective PSML appointed M. N. Dastur & Company (P) Ltd., Kolkata (hereinafter referred to as CONSULTING tgzENGINEERS or DASTUR),DASTUR is an internationally reputed organisation, engaged in providing Consulting Engineering Services to the minerals, metals, power and energy sectors. DASTUR specialises in project formulation and planning, techno-economical appraisal, design and detailed engineering, procurement assistance services, project management, inspection, supervision of construction and erection, environmental engineering and pollution control and management consultancy in the above areas.

DASTUR was founded in 1955 by Dr. Minu Nariman Dastur, the pioneer in providing consulting engineering services in India. The company offers integrated design and engineering consultancy services from concept to commissioning, for a wide range of projects in metallurgical, mining, chemical, cement, power, environment, infrastructure and other allied industries.

DASTUR specialises in project planning and appraisal, economic evaluation, design and detailed engineering, procurement assistance services, project management, inspection, supervision of construction and erection, environmental engineering and pollution control, energy

management and optimisation, human resources development, and management consultancy.

Over the years, DASTUR has built up a multi-disciplinary team of over 1,200 professionals and technical staff with varied experience, fully abreast of the 'state-of-the-art' technologies, with intimate understanding of the latest trends, combining creativity with initiative. DASTUR provides a unique blend of experience and talent, catering to the specific requirements of each project.

DASTUR is an ISO 9001 certified organisation and is internationally recognised as one of the largest independent consulting engineering organisations in the world. In India, it is headquartered in Kolkata with its branch offices in Chennai, Mumbai, Bengaluru, New Delhi, Bhubaneswar and Hyderabad.

DASTUR also has the following overseas subsidiaries:

a) DASTUR Engineering International GmbH, located in Düsseldorf in Germany, Tokyo in Japan, and Abu Dhabi in UAE.

b) DASTUR International Inc. in New Jersey, USA.

DASTUR has earned global appreciation for its dedication and teamwork. Today, DASTUR is synonymous with excellence in engineering consultancy and business and technology consulting services and have earned the following accreditations:

a) ISO 9001-2008 – Management System Certified Organization

b) ISO 27001:2013 - Information Security Management System Certified Organization

c) ISO 17020:2012 - Accredited Inspection Body

d) ISO 14001:2004 and BS OHSAS 18001:2007 - Environmental and Occupational Health and Safety Management System Certified Organization

DASTUR in the Field of Geology, Mining, Mineral Processing and related Material Handling System

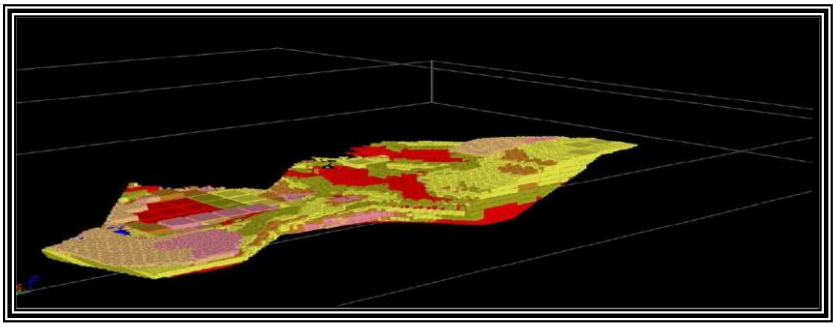
In the field of geology, mining, mineral processing and associated materials handling, DASTUR plays a pivotal role in identification of raw materials and their linkages, evaluation of reserves and grades of different ferrous and non-ferrous deposits, development of mines with associated materials handling system for different metallurgical and allied projects.

The consultancy services rendered by DASTUR in the field of geology, mining, mineral processing and associated materials handling system broadly covers:

Resource Evaluation

- Review, analysis and synthesis of available geological and exploration data
- Preliminassry appraisal of mineral deposits
- Assessment of adequacy of geological exploration
- Formulation of exploration scheme and supervision during exploration
- Preparation of assessment reports for reserves and grades estimated geostatistically
- Development of 3-D ore body model and ultimate mine-pit design.

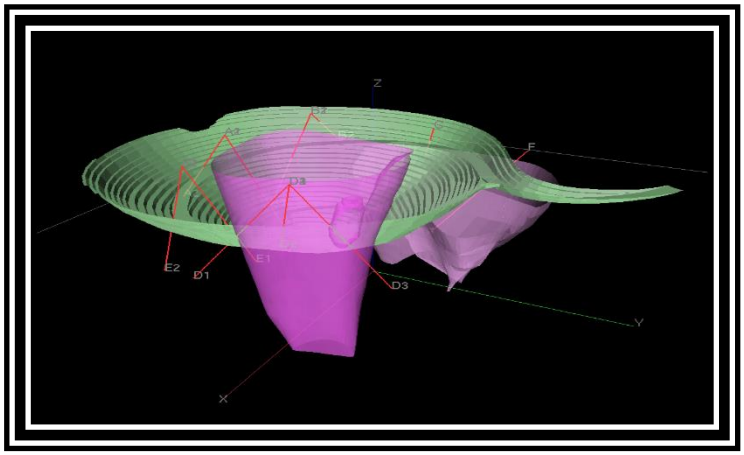
Fig.-2 – 3D Ore Body Model Development



Mine-pit Geotechnical Services

- Formulation of geotechnical exploration scheme.
- Geotechnical investigation for mine pit and adjacent area
- Geotechnical and lithological logging using Log-check geotechnical field sheet and/or other comprehensive formats
- Identification of rock types, rock defects and measurement of RQD, defect angles (viz. alpha and beta), etc
- Geotechnical sampling for Uniaxial Compressive Strength, Direct Shear test and triaxial strength test
- Computation of safe slope angles using limit equilibrium, finite element, distinct/discrete element techniques
- Determination of physico-mechanical and other relevant properties of different rock types at laboratory
- Preparation of final geotechnical report along with recommendation for safe slope analyzing exploration and laboratory test results.

Fig.-3 – Mine Pit Development



3.1 Hydrological Services

- Collection and study of hydrological regulation and finalization of approval requirement from the Regulating Agency/ies
- Collection of available historical data on hydrology
- Development of rainfall-run off model and prediction of run-off under different climatic conditions with different confidence limits
- Identification of surface water sources for mining operation from field survey and first order flow measurements
- Measurement of stages and flows of selected stream(s), study of catchment area characteristics in terms of slope, soil, vegetation, etc, measurement of cross-sectional profiles of stream(s) and determination of surface water quality including measurement of silt concentration
- Integrated water shed modelling of surface water
- Development of dynamic water balance model taking in to account all infrastructural and environmental flows

Mining Services

Development of mining scheme:

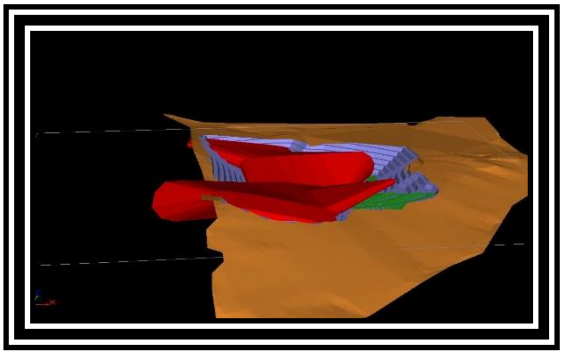
- Mine design parameters
- Pit optimization and ultimate pit design
- Pre-production development work
- Ore and waste raising rate
- Production scheduling
- Mine modelling and preparation of slice plan/year wise excavation plan
- Scheme for waste disposal
- Selection and sizing of equipment for unit operations, viz. drilling, Hauling, loading and other operations

- Railway siding, access road, haul road
- Mine general layout

Ore Processing

- Selection of plant site
- Schedule for ore/coal characterization and beneficiation/washing amenability tests as well as supervision of tests
- Evaluation and interpretation of test data
- Finalization of design and process parameters
- Flowsheet and mass balance
- Selection and sizing of process and auxiliary equipment
- Scheme for waste disposal
- Plant general layout
- Individual shop general arrangement

Fig.-4 – Mine Modelling

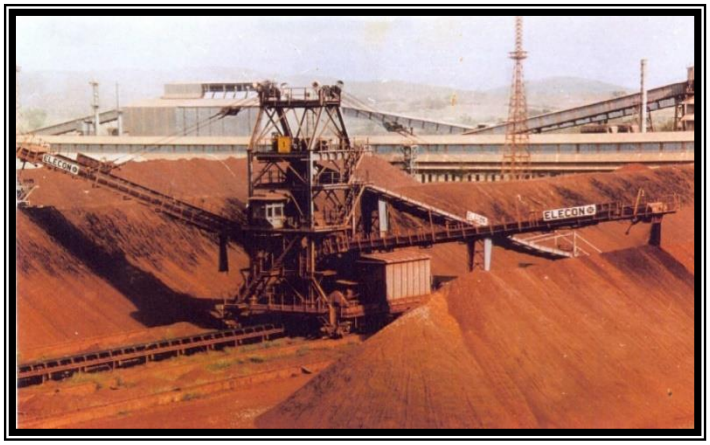


Materials Handling

- Concept development
- System design and selection of equipment
- Procurement service

- Materials handling system comprising of conveyors and associated equipment
- Steep angle conveyors/long distance overland conveying system/single flight downhill conveying system with horizontal and vertical curves
- Rail and port terminals
- Storage yards with mobile equipment
- Crushing and screening stations
- Proportioning and blending system

Fig.-5 – Material Handling



Infrastructure and Logistic Services

- Preparation of Layout
- Road network both within and outside process plant
- Power sourcing and distribution
- Water system – intake design and subsequent supply and distribution

Engineering Services

- Contour survey and soil investigation

- Procurement assistance including preparation of tender documents for major packages
- Design of utility systems and ancillary facilities
- Design and construction drawings for civil, structural and electrical work as well as scrutiny of vendor drawings
- Inspection of plant and equipment prior to delivery
- Construction planning
- Supervision of construction at site
- Project monitoring
- Assistance in trial run and commissioning

List of some major projects (Report Preparation and Engineering Services) are listed in the below mentioned tables (Table-1 and Table-2):

Table-1 – Reports Covering TEFR/TEVR/DPR/ PFR/FR/Market Study.

Year	Client	Assignments/Services
2005	Tungabhadra Minerals	Preparation of Techno-Economic Feasibility Report for Installation of 1.2 MTPA pellet plant and matching capacity beneficiation plant at Karnataka
2006	Janki Corporation Ltd, Bellary	Preparation of Techno-Economic Feasibility Report for Installation of low grade iron ore beneficiation & 0.6 MTPA pellet plant and 10 MW captive power plant at Bellary
2007	Ispat Industries Limited	Preparation of Techno-Economic Feasibility Report for Installation of 4.5 MTPA iron ore pelletisation plant at Visakhapatnam
2007	Tata Steel Limited	Preparation of Detailed Project Report for Development of 10.0 MTPA iron ore mine and ore processing facilities for Chhattisgarh project.
2008	Tanti Holdings Ltd	Preparation of Pre-Feasibility Report for Development of 4.0 MTPA iron ore mine and installation of ore processing plant at Karnataka
2008	NMDC Limited	Preparation of Techno-Economic Feasibility Report for Installation of 2.0 MTPA pelletisation plant with matching capacity slime beneficiation facilities at Bacheli, Chhattisgarh

Year	Client	Assignments/Services
2008	NMDC Limited	Preparation of Techno-Economic Feasibility Report for Installation of pelletisation plant with slime beneficiation facilities at Donimalai, Karnataka
2008	Essel Mining Industries Ltd	Preparation of Techno-Economic Feasibility Report for Installation of 1.2 MTPA low grade iron ore beneficiation plant in Kasia at Barbil, Odisha
2008	Orissa Minerals Development Co. Ltd	Preparation of Techno-Economic Feasibility Report for Development of 2.5 MTPA low grade iron ore beneficiation and pelletisation plant at Thakurani, Barbil
2008	S.B. International	Preparation of Pre-Feasibility Report for Development of iron ore mine and installation of an iron ore beneficiation plant in Nainarmalai, Tamil Nadu
2009	Thakur Prasad Sao & Sons Pvt. Limited	Preparation of Techno-Economic Feasibility Report for 2.0 MTPA low grade iron ore beneficiation and pellet plant at Barbil, Odisha

2010	Tata Steel Limited	Preparation of Project Execution Report for DSO Project at Canada - Development of iron ore mine and installation of 5.5 MTPA beneficiation plant to produce concentrates of 4.0 MTPA
2010	JayaswalNeco Industries Limited	Feasibility Report on development of coal mines, and installation of coal washery, selection and sizing of equipment, development of process flow sheet for coal washery, selection and sizing of equipment including mine support facilities like centralised repair and maintenance facilities with store, utility services, auxiliary facilities and ancillary buildings, capital and production cost estimates and financial analysis.
2010	Tata Steel Limited	Preparation of Feasibility Report Implementation of total beneficiation at Noamundi Iron Mine
2011	KhatauNarbheram& Co.	Enhancement of production capacity to 4.0 MTPA from the current level of 2.2 MTPA Preparation of Resource Assessment Report on iron ore and Feasibility Report on mine planning for production augmentation at Roida-II Iron Ore Mine, Barbil, Odisha
2011	KhatauNarbheram& Co.	Preparation of Feasibility Report for Installation of a new crushing and screening plant and automated truck loading system for evacuation of sized ore at augmented production capacity at iron ore mine at Tonto near Bhadrasai in Barbil region, Keonjhar District, OdishaFeasibility Report
2011	KIOCL Limited, Bangalore	Preparation of Techno-Economic Feasibility Report for Installation of 1.8 MTPA beneficiation plant for processing low grade hematite iron ore in the free land available with M/s Tungabhadra Steel Products Limited (TSPL) at Hospet, Bellary Dist, Karnataka State.
2011	Earthstone Group, Indonesia	Preparation of Techno-Economic Feasibility Report for Installation of 2.0 MTPA low grade magnetite iron ore beneficiation plant for Tourza project in Morocco
2011	Tata Steel Limited	Preparation of Detailed Project Report for Installation of beneficiation plants at Joda and Noamundi with Tata Steel Consulting, UK

2011	Tata Steel Limited	Preparation of Detailed Project Report for Installation of an iron ore crushing, washing and beneficiation plant at Khondbond, Odisha with Tata Steel Consulting, UK
2012	Emars Steel Pvt Ltd	Preparation of Pre-feasibility report on installation of iron ore beneficiation and pellet plant at Joda, Orissa
2012	Steel Exchange India Limited	Preparation of Detailed Project Report for Installation of 0.6 MTPA iron ore pelletisation plant and matching capacity ore beneficiation plant at Sreerampuram, Vizianagaram District, Andhra Pradesh
2012	MPL Mineral Processing Pvt Ltd	Preparation of Techno -Economic Feasibility Report for installation of 0.8 mtpy iron ore pellet plant with matching beneficiation plant at Mudumalagurthy village, Kodumur Mandal, Kurnool district, Andhra Pradesh
2012	Tata Steel Limited	Review of Detailed Project Reports (DPRs); study of different alternatives to reduce construction time and CAPEX; evaluation and vetting of all assumptions, estimations etc.; preparation of detailed bill of quantities, implementation schedule and finalization of mode of execution and packages; identification of critical and long delivery items; evaluation and finalization of vendor list and preparation of comprehensive report for Kotre-Basantpur Coal Block.
2013	Andhra Pradesh Iron Ore Company Ltd	Preparation of techno -economic feasibility report for development of an iron ore mine and installation of a 0.65 mtpa iron ore beneficiation plant at Ongole, Andhra Pradesh
2013	Bua International Limited	Preparation of project report for installation of 1.0 mtpa integrated steel plant in Nigeria including resource estimation, development of iron ore mine, iron ore beneficiation and pelletising plant, natural gas based midrex DR plant, etc.

2013	Global Infrastructure (Nigeria) Limited	Preparation of Techno -Economic Feasibility Report for Revamping of Itakpe Iron Ore Mine of National Iron Ore Mining Company Limited (NIOMCO) for development of 5.78 MTPA capacity iron ore mine along with matching capacity beneficiation plant
2014	Tata Steel Limited (Research & Development Division)	Preparation of Installation of a 20 tph capacity modular on-line slime beneficiation plant at Noamundi
2015	Trimula Industries Limited	Techno-Economic Feasibility Report for development of Meral Coal Block at Daltonganj, Jharkhand
2015	RashtriyaIspat Nigam Limited-Visakhapatnam Steel Plant	Techno-Economic Suitability/ Viability Report on Evaluation of Coal Blocks
2016	Tata Steel Limited	Preparation of Detailed Project Report for Installation of 2 MTPA Dry Crushing Plant at Katamati Iron Ore Mine
2017	Balasore Alloys Limited	Revalidation of Techno-Economic Viability Report on NIOMCO mine and beneficiation plant in Nigeria and preparation of Feasibility Report on expansion of NIOMCO mine and beneficiation plant in Nigeria for annual production of 6 MTPA concentrate
2017	JSW Steel Limited	Preparation of Techno -Economic Feasibility Report for Installation of 2 x 10 mtpa and 1 x 20 mtpa iron ore beneficiation and grinding plants in Sundargarh and Keonjhar districts of Odisha along with iron ore slurry preparation, pumping station and slurry pipelines for transporting iron ore concentrate to steel plant
2018	NMDC Limited	Preparation of Preliminary Report & Detailed Assessment Report for providingConsultancy Services to assist NMDC for participation in e-auction of iron ore blocks in Karnataka
2018	Tata Steel Ltd	Preparation of Detailed project report for a slime beneficiation plant a Noamundi Iron Mines (NIM)
2018	Kalinga Commercial Corporation Limited	Preparation of Feasibility Report for Expansion of ore handling plant at Daitari Iron Ore Mines, Odisha (3.5 mtpa to 5 mtpa)
2019	NMDC Limited	Consultancy services to assist NMDC for participation in the allotment process of Tokisud North Mine (Coal Block) in Hazaribagh District, Jharkhand. Bid Advisory Services (Preliminary Report, Detailed Assessment Report etc.)

2019	Aurobindo Realty & Infrastructure Pvt Ltd	Bid advisory services for technical and commercial bid preparation for selection of Mine Operator for North West Quarry of NTPC Limited's PakriBarwadih coal mining project located in Hazaribagh district of Jharkhand
2019	Yes Bank Limited / ThriveniSainik Mining Pvt Ltd (TSMPL)	Lender's Independent Engineer (LIE) services for TSMPL's coal mining operations as a Mine Developer-cum-Operator (MDO) for National Thermal Power Corporation Limited's (NTPCL) PakriBarwadih Western Quarry Coal Block in Hazaribagh, Jharkhand
2019	NMDC Limited	Consultancy services for participation in e-auction of Gandhalpada Iron Ore Block, Kendujhar District, Odisha Bid Advisory Services (Preliminary Report, Detailed Assessment Report etc.)
2019	Thriveni Earthmovers Private Limited	Installation of 30 mtpa iron ore beneficiation plant in Jharkhand, slurry pipelines for transporting iron ore concentrates from Jharkhand to Paradeep in Odisha and 3 x 8 mtpa pellet plant at Paradeep, Odisha Bankable Techno-Economic Feasibility Report
2019	Tata Steel Limited	Dismantling and relocation/auctioning of existing plant facilities at Sukinda and Gomardih Mines Pre-Feasibility Report
2019	National Aluminium Company Limited	Transportation of bauxite from Sector 2 of Central Block Bauxite Mines to existing MRS (Stream# 1 & 2) and/or mid-point loading on the existing cable belt conveying system at NALCO Mines, Damanjodi Detailed Project Report
2019	NMDC Limited	Consultancy services for techno-financial assessment report of Rohne coal block/mines allotted to NMDC in Jharkhand Detailed Assessment Report

2020	Tata Steel Limited	Debottlenecking of Tailings Dewatering Plant at West Bokaro, Jharkhand Detailed Project Report
2020	Tata Steel Limited	Installation of second stage hydrocyclone for beneficiating the overflow of the existing first stage hydrocyclone at Wet Processing Plant at Noamundi Iron Mine Detailed Project Report
2020	NMDC Limited	Consultancy services for participation in e-auction of Gopndulpara Coal Block in Hazaribagh District, Jharkhand Bid Advisory Services (Preliminary Report, Detailed Assessment Report etc.)
2020	Essar Minmet Limited	Preparation of Bankable Techno-Economic Feasibility Report for installation of 2 x 7 MTPA pellet plant at Paradeep along with matching capacity of iron ore beneficiation plant in Sundergarh or Keonjhar district, Odisha and slurry pipelines for transporting iron ore concentrate from beneficiation plant to the pellet plant
2020	JSW Steel Limited	Preparation of Techno-Economic Feasibility Report Installation of Central Processing Unit at Four (4) Iron Ore Mines in Odisha (Jajang, Nuagaon, Narayanposi and Ganua Iron Ore Mines)
2021	JSW Steel Limited	Installation of iron ore grinding and de-sliming plant at Nuagaon iron ore mine, Odisha Bankable Techno-Economic Feasibility Report
2021	Tata Steel Limited	Installation of Pilot Beneficiation Plant for Coal at Jharia and Iron Ore at OMQ-Noamundi Basic Engineering Report
2021	Odisha Mining Corporation	Capacity Enhancement of the existing OHP at Daitari Iron Ore Mines Feasibility Study Report
2021	Tata Steel Limited	Development of Joda West Iron and Manganese Mines through installation of iron ore processing plant and product evacuation system Feasibility Report
2021	Stelco Inc. Canada	TDDR for an Iron Ore Mine and a Pellet Plant for the Production of DR Grade Pellets in Ontario, Canada (Bending Lake Iron Ore Project in Ontario Province) Technical Due Diligence Report

Table-3.2 – Engineering/Procurement Assistance Services

Year	Client	Assignments/Services
2006	RashtriyaIspat Nigam Ltd, Visakhapatnam Steel Project	Providing Engineering Services for Development of four captive mines of VSP, namely Jaggayyapeta Limestone Mine, Madharam Dolomite Mine, Garbham Manganese Mine and Kintada Quartzite Mine, to meet the requirement for 6.3 MTPA Expansion Stage of the steel plant
2007	The Odisha Mining Corporation Limited	Providing Engineering Services for Modification work in the ore handling plant at Daitari iron ore mines, Odisha
2009	Tata Steel Limited	Providing Engineering Services for capacity augmentation project at Noamundi Iron Mine to meet the iron ore requirement for 10.0 MTPA expansion programme at Jamshedpur
2009	NMDC Ltd	Providing Engineering Services for installing 1.89 MTPA iron ore slimes and fines beneficiation plant and 1.2 MTPA pelletising plant at Donimalai, Karnataka
2010	Kalinga CommercialCorporation Limited	Providing Engineering Services Modification /Augmentation of existing ore handling plant facilities at Daitari iron ore mines
2012	S&T Mining Company Private Limited, Kolkata	Providing Procurement Assistance Services for Setting up a coking coal washery of 1.8 MTPA capacity at Bhelatand Coal Washery Project, Dhanbad District, Jharkhand
2013	Tata Steel Limited	Providing procurement assistance services for installation of 500 tph pre-screened fines conveying system with stacker by-pass arrangement at Joda
2013	Bua International Limited	Providing engineering services for installation of 1.0 mtpa integrated steel plant in Nigeria including resource estimation, development of iron ore mine, iron ore beneficiation and pelletising plant, natural gas based midrex DR plant, etc.
2015	Tata Steel Limited	Providing Engineering Services for De-bottlenecking of slime circuit for long range processing (LRP) plant of Noamundi Iron Mines

Year	Client	Assignments/Services
2015	NMDC Limited	Providing Engineering Services for Installation of 7 mtpy Screening and Beneficiation Plant-II at Donimalai Complex, Karnataka
2016	Tata Steel Limited	Providing Engineering Services for Installation of a 0.2 MTPA Slime Beneficiation Plant at Noamundi
2016	Tata Steel Limited	Providing Engineering Services for Installation of additional crushing circuit and fire hydrant system in wet processing plant at Noamundi
2016	Tata Steel Limited	Providing Engineering Services for Debottlenecking of the slime circuit of Joda East Iron Mines
2018	Indian Metals & Ferro Alloys Ltd.	Installation of ore sizing and handling system (OHS) [Capacity – 4 Lac (metric ton) per year] at Mahagiri chromite miens, Kaliapani, Jajpur, Odisha EPCM Services
2018	The Odisha Mining Corporation Limited	Installation of a new 150,000 tpa chrome ore beneficiation plant at South Kaliapani, Odisha – Completion of the balance portion of the work EPCM Services
2018	JMC Projects (India) Limited	Consulting Engineering Services for bidding purpose for for installation of 2 MTPA iron ore processing plant at NMDC, Bacheli in Chhattisgarh
2019	Hindalco Industries Limited	Installation of a pilot plant for crushing, screening and washing plant at Kujam-II bauxite mines in Gumla District, Jharkhand Basic Engineering and Procurement Assistance Services
2020	Tata Steel Limited	Installation of second stage hydrocyclone for beneficiating the overflow of the existing first stage hydrocyclone at Wet Processing Plant at Noamundi Iron Mine Procurement Assistance Services
2020	Hindalco Industries Limited	Installation of a bauxite crushing, screening and washing plant at Kujam-II bauxite mines in Gumla District, Jharkhand Basic Engineering (Basic Engineering Report) and Procurement Assistance Services (Technical Specifications)

Year	Client	Assignments/Services
2021	JSW Steel Limited	Consultancy design and engineering services for installation of 7 MTPA iron ore beneficiation plant-1 (OBP-1) project at pellet plant-1 (PP-1) at Vijayanagar Works, Tornagallu, Karnataka Basic engineering, procurement services, detail engineering, construction management services including site supervision and pre-commissioning/commissioning services.
2021	NMDC Limited	Installation of new crushing plant and downhill conveyor system of Deposit 14 and 11C of Bailadila Iron Ore Mines, Kirandul Complex, Chhattisgarh to feed crushed ore to any of the existing screening plants (SP-I, SP-II, and SP-III). EPCM Services

The list of some of the major assignments carried out by DASTUR for coal projects is given below in Table-3:

Table-3.3 – List of some of the Major Assignments carried out by DASTUR for Coal Projects

S/N	Client	System Capacity	Assignments/Services
FEASIBILITY STUDY			

S/N	Client	System Capacity	Assignments/Services
1.	Jindal Strips & Power Ltd	3.0 MTPA	Feasibility Report on development of coal mine, installation of coal handling plant and coal washery, preparation of mining scheme, selection and sizing of equipment, development of process flow sheet for coal washery, selection and sizing of equipment including mine support facilities like centralised repair and maintenance facilities with store, utility services, auxiliary facilities and ancillary buildings, capital and production cost estimates.
2.	JayaswalNeco Industries Ltd	3.0 MTPA	Feasibility Report on development of coal mines, and installation of coal washery, selection and sizing of equipment, development of process flow sheet for coal washery, selection and sizing of equipment including mine support facilities like centralised repair and maintenance facilities with store, utility services, auxiliary facilities and ancillary buildings, capital and production cost estimates and financial analysis.
3.	Bhushan Steel & Alloys Ltd	3.0 MTPA	Feasibility Report on development of coal mine and coal washery, preparation of mining scheme, selection and sizing of mining equipment, development of process flow sheet for coal washery, selection and sizing of equipment, capital and production cost estimates.
4.	Tata Steel Limited	8.0 MTPA	Review of Detailed Project Reports (DPRs); study of different alternatives to reduce construction time and CAPEX; evaluation and vetting of all assumptions, estimations etc.; preparation of detailed bill of quantities, implementation

S/N	Client	System Capacity	Assignments/Services
			schedule and finalization of mode of execution and packages; identification of critical and long delivery items; evaluation and finalization of vendor list and preparation of comprehensive report.
5.	Trimula Industries Limited	0.4 MTPA	Techno-Economic Feasibility Report for development of Meral Coal Block at Daltonganj, Jharkhand
6.	RashtriyaIspat Nigam Limited-Visakhapatnam Steel Plant	-	Techno-Economic Suitability/ Viability Report on Evaluation of Coal Blocks
7.	Nova Iron & Steel Limited	1.5 MTPA	Pre-Feasibility Report and Feasibility Report for installation of 1.5 MTPA coal washery at Bilaspur, Chhattisgarh.
8.	Monnet Ispat Energy Limited	2.5 MTPA	Techno-Economic Viability Report for installation of 2.5 MTPA non-coking coal washery at Angul, Odisha.
9.	Jindal Steel & Power Ltd	2 MTPA	Techno-Economic Viability Report for installation of 2 MTPA coal washery at Raigarh, Chhattisgarh.
10.	NMDC Limited	-	Consultancy services to assist NMDC for participation in the allotment process of Tokisud North Mine (Coal Block) in Hazaribagh District, Jharkhand. Bid Advisory Services (Preliminary Report, Detailed Assessment Report etc.)
11.	Aurobindo Realty & Infrastructure Pvt Ltd	-	Bid advisory services for technical and commercial bid preparation for selection of Mine Operator for North West Quarry of NTPC Limited's PakriBarwadih coal mining project located in Hazaribagh district of Jharkhand

S/N	Client	System Capacity	Assignments/Services
12.	Yes Bank Limited / ThriveniSainik Mining Pvt Ltd (TSMPL)	-	Lender's Independent Engineer (LIE) services for TSMPL's coal mining operations as a Mine Developer-cum-Operator (MDO) for National Thermal Power Corporation Limited's (NTPCL) PakriBarwadih Western Quarry Coal Block in Hazaribagh, Jharkhand
13.	NMDC Limited	-	Consultancy services for techno-financial assessment report of Rohne coal block/mines allotted to NMDC in Jharkhand Detailed Assessment Report
14.	NMDC Limited	-	Consultancy services to assist NMDC for participation in the allotment process of Gondulpara Coal Block in Hazaribagh District, Jharkhand. Bid Advisory Services (Preliminary Report, Detailed Assessment Report etc.)
II.EPCM/ENGINEERING CONSULTANCY SERVICES			
1.	RashtriyaIspat Nigam Ltd, (RINL), Visakhapatnam	750/500 tons/hr.	Installation of wagon unloading, mechanised storage and reclamation system through stacker and reclaimer for supply to coke ovens plant and power plant.
2.	Steel Authority of India Ltd., (SAIL), RSP, Rourkela	600/350 tons/hr.	Installation of wagon unloading, mechanised storage and reclamation system through stacker and reclaimer for supply to coke ovens plant and power plant.
3.	Durgapur Projects Ltd, Durgapur	300 tons/hr.	Revamping work related to coal unloading, storage and supply to coke ovens and power plant.
4.	Tata Sponge Iron Ltd, Joda	175 tons/hr.	Installation of coal handling system with crushing and screening facilities for supply to rotary kilns of direct reduction plant.

S/N	Client	System Capacity	Assignments/Services
5.	Tata Steel Ltd, West Bokaro Colliery, Ghatotand, West Bokaro	750/450 tons/hr.	Installation of new ROM coal handling plant comprising crushing, screening, storage in silos, reclamation and subsequent dispatch to existing coal washery No.3 including central maintenance complex, daily maintenance complex and power distribution and water supply system for south eastern block of West Bokaro division of Tata Steel.
6.	Haldia Met Coke & Power Co. Ltd., Haldia	1200/600 tons/hr.	Installation of wagon unloading, mechanised storage and reclamation system through stacker and reclaimer for supply of coke oven plant.
7.	National Aluminium Company Ltd., Angul	800 tons/hr.	Installation of unloading, mechanised storage and reclamation system through stacker and reclaimer for supply to power plant.
8.	Jindal Steel & Power Ltd, Tamnar	4.0 MTPA	Installation of non-coking coal washery comprising crushing and screening, coal beneficiation, product dewatering, product storage and transportation, utility services and auxiliary facilities including support facilities like centralised repair and maintenance shop.
9.	S&T Mining Company Private Limited, Kolkata	1.8 TPA	Procurement services, comprises of carrying out basic engineering, preparation of technical specifications, evaluation of bids, preparation of technical evaluation of tenders and recommendation and selection of successful bidder and placement of order, for setting up a coking coal washery

Apapa Road, Iganmu, Lagos, Nigeria
Tel : +234 8141337518
Email : info@premiumnigeria.com
Web : www.premiumnigeria.com
RC : 1231651

June 6, 2022

SAFETY & OCCUPATIONAL HEALTH POLICY STATEMENT

1. Premium Steel and Mines Limited reaffirms its commitment to providing safe work place environment to its personnel and other stakeholders as an integral part of its business philosophy and values.
2. We will continually enhance our Safety & Occupational Health (SOH) performance in our activities, products and services through a structured SOH management framework.

Towards this commitment, we shall:

- Ensure with applicable SOH legislations and other requirements
- Establish and achieve SOH objectives
- Prevent/minimize SOH risks through continual improvement in process and practices at all levels and functions for prevention of injury and ill-health of the personnel
- Ensure that SOH is integrated in all managerial decisions including procurement of materials; selection of machinery/equipment; selection/ placement of personnel and setting up of projects
- Enhance awareness, skill and competence of our personnel so as to enable them demonstrate their involvement, responsibility and accountability for sound SOH performance
- Carry out Risk Assessment associated with operations and take remedial measures proactively and implement system of Health and Safety Audits
- Review this SOH Policy periodically and to be communicated to all persons working under the control of the organization and shall be available to the interested parties.

Mr. Atul Misra
MD/Chief Executive Officer

Apapa Road, Iganmu, Lagos, Nigeria
Tel : +234 8141337518
Email : info@premiumnigeria.com
Web : www.premiumnigeria.com
RC : 1231651

June 6, 2022

ENVIRONMENT POLICY STATEMENT

1. Premium Steel and Mines Limited, a leading steel producer company in sub Saharan Africa in the private sector, aspires to become a globally admired organization as well leading manufacturer in Africa that enhances the quality of life of all stakeholders through sustainable development with utmost care for the environment and needs of the society.
2. The company aims to be the most efficient and reliable steel producer; and carry out its business/operations with utmost regard for safety and care for the environment and abides by the laws & regulations concerning the environment policy of Federal Government of Nigeria.

Premium Steel and Mines Ltd is committed to:

- Working towards Environment Protection, Prevention of environmental pollution, and Environment Improvement around its business units.
- Adopting sound Environment Management practices to achieve sustainable growth
- Complying with all applicable Federal Government of Nigeria statutory and other norms/requirements for environmental protection.
- Instituting and implementing systems to deal with environmental issues, ensuring compliance and reporting
- Evaluating effectiveness of system through regular audits and management reviews
- Continuous improvement in our environmental performance.

Mr. Atul Misra
MD/Chief Executive Officer

PREMIUM
STEEL & MINES LTD

Apapa Road, Iganmu, Lagos, Nigeria
Tel : +234 8141337518
Email : info@premiumnigeria.com
Web : www.premiumnigeria.com
RC : 1231651

June 6, 2022

HSE STRATEGIC OBJECTIVES

The company shall continually maintain the following HSE objective to reduce /Eliminate accidents in its operation and to achieve and sustain Goal Zero in all round operations towards a safe work environment.

This will be achieved by vigorously pursuing and ensuring the following: -

- Avoid injury to personnel and preserve the safety and health of its workers, subcontractors, and third parties.
- Minimize the impact of activities on the environment.
- Maintain sensitivity to the needs and concerns of the host communities in order that activities are not disrupted.
- Ensure high security of personnel, equipment etc. at all time.
- Ensure no fatality during operation.
- Ensure No LOST Time Injury (LTI).
- Ensure compliance to HSE rules and regulations
- Ensure team work in all operations
- Ensure timely delivery of Projects with respect to compliance with applicable standards.
- Ensure Goal Zero at all time.

Mr. Atul Misra
MD/Chief Executive Officer

Apapa Road, Iganmu, Lagos, Nigeria
Tel : +234 8141337518
Email : info@premiumnigeria.com
Web : www.premiumnigeria.com
RC : 1231651

June 6, 2022

TRANSPORTATION POLICY

Transport is a key mechanism in promoting, developing and shaping the industry.

Transport policy arise because of the importance of transport in virtually every aspect of the company's business.

PREMIUM STEEL AND MINES LIMITED has a comprehensive transport plan aimed at Goal zero at the time.

PSML shall be committed to:

- Complying with Local and international laws such as: federal Road Safety Commission regulations and Nigeria Marine and safety Agencies
- Develop training to improve transportation competencies of Drivers
- Report key performance indicators to benchmark against high performing organizations
- Communicate and collaborate with federal Road safety and Regulatory Agencies
- Identifying and sharing best practices among Industries
- Encourages the use of sustainable forms of transport to reduce the impact on the environment and tracking Climatic Change.

Mr. Atul Misra
MD/Chief Executive Officer

Apapa Road, Iganmu, Lagos, Nigeria
Tel : +234 8141337518
Email : info@premiumnigeria.com
Web : www.premiumnigeria.com
RC : 1231651

June 6, 2022

DISCIPLINARY POLICY

PREMIUM STEEL AND MINES LIMITED has developed a disciplinary policy that will apply to violation of HSE matters and health program of the company. Disciplinary policy is a tool to ensure enforcement of the rules and procedures for a safe and healthful working environment. The disciplinary policy will be applied to all employees of PREMIUM STEEL AND MINES LIMITED.

VERBAL WARNING

Management or supervisors may issue verbal warnings to employees that commit minor infraction or violations of the safety rules or safe work practice. Continued violation or verbal warning will lead to more stringent action.

WRITTEN WARNING

Management or supervisors may issue written warning for any of the following:

- Repeated minor violations of safety rules or procedures
- Single serious violations of rules or procedures that could have potentially resulted in injury to self or another employee, or could have caused damage to company property.
- Activities that could potentially result to asset or environmental damage.

TERMINATION

Supervisor may recommend and management may concur on the termination of any employee for repeated serious violation of any of the above circumstances

DOCUMENTATION

PREMIUM STEEL AND MINES LIMITED will establish employees' files. Violation of company rules and/or safety rules, regulations or procedures will be documented by filling out a report on the employee. The report will state the type of violation and corrective action taken. The employee must read and sign the report acknowledging that they understand the seriousness of the violation.

Mr. Atul Misra
MD/Chief Executive Officer

Apapa Road, Igamnu, Lagos, Nigeria
Tel : +234 8141337518
Email : info@premiumnigeria.com
Web : www.premiumnigeria.com
RC : 1231651

June 6, 2022

STOP WORK AUTHORITY POLICY STATEMENT

It is the Health, Safety and Environment (HSE) policy of **PREMIUM STEEL AND MINES LIMITED** to maintain a safe and secure work environment against any risk or exposure to personal harm, property damage or adverse effects to the environment.

As such, it is the duty and the right of everyone employed and engaged by **PREMIUM STEEL AND MINES LIMITED** to exercise a **STOP WORK** policy whenever any employees, members of the public, or the local environment are at risk. Management supports the decision of its employees in the diligent execution of this policy.

STOP WORK shall be applied if any situation arises due to an unsafe action or behavior or omission or non-action of any party involved in the operation, and if such situation were permitted to continue, may potentially lead to the occurrence of an incident/accident. Any person regardless of position, seniority or discipline has the right and duty to apply the **STOP WORK** policy if in his/her opinion or judgment, such activity is deemed to be a potential incident.

There shall be no blame or fault put on any employee call for a **STOP WORK** order for any safety related issues on site upon investigation. The **STOP WORK** order must be applied in good faith. Timing is a critical factor. There should not be any delay in calling for a **STOP WORK** order if the need arises.

Work that has stopped due to a **STOP WORK** order shall not be resumed until all safety aspect are cleared to the satisfaction of the employee who initiated the **STOP WORK** order or the employee responsible for the **STOP WORK** order to be initiated, in the first place.

Mr. Atul Misra
MD/Chief Executive Officer

Apapa Road, Igamma, Lagos, Nigeria
Tel : +234 8141337518
Email : info@premiumnigeria.com
Web : www.premiumnigeria.com
RC : 1231651

June 6, 2022

GSM WHILE DRIVING POLICY

The reality of hazards inherent in driving while using GSM phone warrants the implementation of the following policy statements in our journey management system;

- PREMIUM STEEL AND MINES LIMITED management takes and considers the use of cell phone while driving as a violation /unacceptable.
- The use of phone whether in hands free or handheld modes while driving is not allowed for all categories of staff
- Passengers are authorized to stop such driver from continuing until the phone is completely put off or terminate the discussion.
- Offenders shall be subject to face disciplinary /investigation panel and shall be penalized in line with our consequence management system.

Mr. Atul Misra
MD/Chief Executive Officer

Apapa Road, Iganmu, Lagos, Nigeria
Tel : +234 8141337518
Email : info@premiumnigeria.com
Web : www.premiumnigeria.com
RC : 1231651

June 6, 2022

EMERGENCY RESPONSE POLICY

PREMIUM STEEL AND MINES LIMITED shall identify, prevent and manage emergency situations which threaten the health and Safety of staff, the Environment, Companies Reputation and Assets.

The Objective of the policy are:

- Prepare, train, and exercise response team members to ensure they respond effectively to an emergency scenarios
- prepare for and respond effectively to an emergency scenarios through the appropriate use of available resources
- provides a framework for enhancing the safety and security of its operations
- mitigates the long -term effects of an emergency on its operations and mission

PREMIUM STEEL AND MINES LIMITED is committed to:

- Saving Life
- Caring for the Injured Person
- Limiting damage to Assets.
- Regular Exercise shall be carried out to confirm effectiveness of any identified improvement plan to be implemented.
- Close Liaison shall be maintained with appropriate authorities
- Emergency Drill shall be carried out once a month to keep the workers fit in case of Emergency.

Mr. Atul Misra
MD/Chief Executive Officer

Apapa Road, Igamma, Lagos, Nigeria
Tel : +234 8141337518
Email : info@premiumnigeria.com
Web : www.premiumnigeria.com
RC : 1231651

June 6, 2022

ACCESS POLICY

It is the policy of PREMIUM STEEL AND MINES LIMITED that all visitors to any location (Within the Plant) where the company carries out its activities must adhere to the guidelines stipulated at points of entry to safeguard life and property.

To ensure the implementation of this policy, access will be granted at entry points into company facilities only when;

Seat Belts are worn at the point of entry/exit. The "NO seat belt, No Entry/Exit" rule shall be enforced at the PSML premises.

Proper log -in and issuance of visitors / contractors Gate pass with Colour coding shall be enforced at every gate

Properties are declared at entry points to company facilities and personnel submit themselves for proper indoctrination.

Access shall be denied if there is non-compliance with any of the above.

Mr. Atul Misra
MD/Chief Executive Officer

Apapa Road, Iganmu, Lagos, Nigeria
Tel : +234 8141337518
Email : info@premiumnigeria.com
Web : www.premiumnigeria.com
RC : 1231651

June 6, 2022

WASTE DISPOSAL POLICY

Waste segregation shall be enforced at source. PSML shall carry out / execute their job in an environmental friendly manner. To this end, all waste generated shall therefore be collected, handled and disposed of in an environmentally safe manner in order not to cause injury or damage to Plants, Animals, Soil, Water and Air.

Solid such as skills/slags shall be dumped at the Slag yard, industrial wastes such as electrode stumps, scrap metal shall be deposited at the metal yard and kitchen wastes shall be collected in bins marked accordingly. Non – degradable wastes (but combustible wastes) shall be incinerated while proper precautions shall be taken not to cause air pollution.

Non-combustible waste shall be collected and disposed at our clients or Government approved dump site.

Waste generated shall be disposed off according to colour code with respect to the waste stream

Dumping of waste into creeks, rivers and other water courses are not allowed. Proper precautions shall be taken to avoid discharge or all pollution.

Mr. Atul Misra
MD/Chief Executive Officer

Apapa Road, Igamnu, Lagos, Nigeria
Tel : +234 8141337518
Email : info@premiumnigeria.com
Web : www.premiumnigeria.com
RC : 1231651

June 6, 2022

DRUG/ALCOHOL POLICY

It is the policy of PREMIUM STEEL AND MINES LIMITED about drug and alcohol and in compliance with all relevant government and clients' rules and regulations that it is a termination offence for any employee of PREMIUM STEEL AND MINES LIMITED to be in possession or under the influence of intoxicating beverages /illegal drugs at the worksite.

- No illegal drugs, pyrotechnics and other drugs not approved by the regulatory body of the country i.e. contraband is prohibited in company area.

Drugs prescribed by doctors shall be in a container/bottle to avoid loss of potency or evaporate concentration that can be harmful.

- As a control measure, staff shall be subjected to random alcohol test, Viz-a-viz; all PSML and contractors Staff. Any staff or contract staff found to have consumed alcohol before, during and after work shall be sanctioned accordingly.
- Violators of this policy will face appropriate disciplinary action which may include termination of job for workers and for visitors they will be sent out of the premises by security personnel.
- The use, possessions, distribution, purchase or sale of any controlled substance by any person while on company premises/, engaged in company business or while operating company equipment is prohibited.
- No company transport facility shall be manned or operated by anyone under the influence of alcohol.
- Any employee under the influence of any drug that causes discomfort to him/her should alert the safety officer or person in charge (PIC) for appropriate medical diagnosis by a professional.

Drug Counselling/Rehabilitation

In recognition that any form of drug abuse is dangerous to the health and well-being of all PSML Personnel, the Management shall conduct periodic educational workshops and to provide counselling as necessary.

Mr. Atul Misra
MD/Chief Executive Officer

Apapa Road, Igammu, Lagos, Nigeria
Tel : +234 8141337518
Email : info@premiumnigeria.com
Web : www.premiumnigeria.com
RC : 1231651

June 6, 2022

SMOKING POLICY

PREMIUM STEEL AND MINES LIMITED recognises smoking as being injurious to health, therefore shall actively discourage smoking.

The smoking of Cigars, cigarettes, or pipes is prohibited in all PREMIUM STEEL AND MINES LIMITED facilities.

Smoking is highly prohibited in all PREMIUM STEEL AND MINES LIMITED work site except in areas that have been specifically designated and approved by management, such areas shall be pasted with "Designated Smoking Areas" sinages.

Employees shall not carry a lilted cigarette which could act as an ignition source and cause a serious fire risk in both restricted and unrestricted areas of PREMIUM STEEL AND MINES LIMITED work site

Smoking is highly prohibited within company; especially areas containing compressed gas cylinders and fuel/diesel dumps. Matches and lighters (ignition sources) are not to be taken into the company restricted area as defined in any location within 50' (feet) of hydrocarbon processing storage compressed gas cylinder.

Mr. Atul Misra
MD/Chief Executive Officer

Apapa Road, Iganmu, Lagos, Nigeria
Tel : +234 8141337518
Email : info@premiumnigeria.com
Web : www.premiumnigeria.com
RC : 1231651

June 6, 2022

SECURITY POLICY

It is the policy of PREMIUM STEEL AND MINES LIMITED to carry out all her activities in a way and manner that her employees, subcontractors and equipment are properly secured from hostile environment. All our activities are conducted in line with our security guidelines, requirement of our clients and other government relevant laws.

To be able to accomplish these targets stated above, we shall maintain good image with the host communities around our project locations. In addition, we shall maintain close contact with government security agencies, private and local security and request for their assistance where necessary.

All Security Officer(s) at our various locations and worksites shall report all security matters to the Chief Security Officer (CSO) who will liaise with the Head of HSE and Managing Director/CEO.

All PSML vehicles/Trucks moving within or outside company location may be accompanied by Government Security Force (GSF) when necessary.

All personnel other than the Managing Director/CEO must subject themselves for check at the security post/

Personal materials/items brought into PSML locations must be declared at security post before entry is allowed. Also, no material shall leave the company premises without Authorisation by a top management accompanied by a waybill.

When necessary Government Security Force (GSF) shall aid the private security personnel working in our locations.

Mr. Atul Misra
MD/Chief Executive Officer

Apapa Road, Iganmu, Lagos, Nigeria
Tel : +234 8141337518
Email : info@premiumnigeria.com
Web : www.premiumnigeria.com
RC : 1231651

June 6, 2022

HSE AUDIT POLICY

PREMIUM STEEL AND MINES LIMITED shall implement a comprehensive routine HSE audit programme including hazard management audit during a project life span. The company shall review the HSE performance during joint HSE meetings, Management Review Meeting, Project Progress on monthly, quarterly and Bi-annually.

HSE audit shall be performed by a trained auditor with a minimum Auditors training.

The procedure shall be reviewed automatically following accidents and incidents involving its workforce. Constructive comments and feedback are welcomed at any time, and shall be documented and actioned, where all recommendations from audits, inspections and meetings are collated to ensure action items are closed out and provide feedback mechanisms.

Scheduled inspections and audits shall be carried out by the top management and management staff of the company and the HSE Representative to ensure compliance of its workforce with HSE requirements in the project/facilities been inspected.

ANNUAL HSE AUDIT/INSPECTION PLAN

- HSE Audit / Inspection will remain a HSE Management strategy throughout the execution of project and or company various facilities.
- The aim shall be to identify HSE lapses and make recommendation for the elimination and control of hazard identified.
- Management shall continuously follow schedule to monitor compliance and support the implementation of recommendation made without delay.
- Site Supervisor/Engineer shall carry out a Site Inspection on regular basis to ensure compliance to Clients HSE Requirements and foster a healthy and enabling working environment in line with Standard and Procedure.

Mr. Atul Misra
MD/Chief Executive Officer

PREMIUM STEEL CSR POLICY

1. CONTEXT

Estimates indicate that the Nigerian population has passed 200 million in 2019, at a growth rate of 2.7% annually over the last decade. Over 50% of the population are children and youth. With such a surge in population, Nigeria faces the challenges of accommodating growing demands and needs in infrastructure, education, and healthcare. According to the World Bank report "A Better Future for All Nigerians: Nigeria Poverty Assessment 2022", as many as 4 in 10 Nigerians live below the national poverty line (almost 83million people). Poverty impacts the quality of life, reducing security and living standards, increasing hunger and mortality rate, and stunting growth in children, as well as skewing household priorities by placing education and healthcare lower on the list of essentials. In addition, the World Health Organization ranks Nigeria's healthcare system as the fourth worst globally.

Premium Steel & Mines Ltd. is based in Udu, Delta State, Nigeria. Udu Local Government area consists of 32 villages and communities with a population of approximately 285,000 residents. Considering the situation in the country and community needs in the regions where it serves or operates, Premium Steel & Mines Ltd. focuses its Corporate Social Responsibilities on alleviating poverty and targeting its subsequent effects. The Company supports and works to improve the education and healthcare systems and invests in building youth skills for increased employability.

2. CULTURE

Premium Steel & Mines Ltd. (PSML) strongly believes that the well-being of its staff and the communities it serves is paramount to its existence. The Company strives to develop, sustain, and improve the living standards of its people to help them enjoy healthy and prosperous lives. PSML's goals in this regard include the social development of communities and environmental sustainability. The Company strives to positively impact and influence its employees and partners and foster a sense of social commitment for stakeholders.

2.1 VISION

PSML's vision is "To become the leading manufacturer of steel and allied products in sub-Saharan Africa, through the deployment of global best practices and maintaining the highest levels of ethics and integrity".

2.2 MISSION

Our mission is to achieve the vision by:

- producing safe, sustainable steel
- delivering values to our infrastructure customer
- sustainable environment-friendly practices
- innovation in process and technology, productivity, and modern management practices
- value creation to customers in terms of product mix, quality, and delivery time
- hiring, developing, and retaining the best people
- caring for the stakeholders, and communities with a positive impact
- driving business excellence in all the processes
- demonstration of the values of sustainability, quality, and leadership with the highest ethics & standards

2.3 VALUES

- ***Integrity***

Conduct business with all honesty and transparency

- ***Excellence***

Match and exceed the highest standards of work practices and quality of products

- ***Responsibility***

Meet all commercial, moral and social obligations towards customers, partners, governments, communities, financial institutions, and all stakeholders.

PURPOSE

The purpose of Premium Steel & Mines Ltd.'s (PSML) Corporate Social Responsibility (CSR) policy is to guide its activities, ensuring itunderstands, respects and meets its commercial, moral, and social obligations to the communities in which it operates. This policy emphasizes PSML's fundamental role in the growth and development of nation-building through local community engagement and initiatives, improving community welfare and the living condition of the people, and fighting social exclusion and poverty.The policy sets forth a strategic framework for its CSR initiatives.

SCOPE

This policy is relevant to Premium Steel & Mines, Ltd. operations and all full-time employees within our teamin Nigeria.

1 DEFINITION

PSML abides by the World Business Council for Sustainable Development's definition of Corporate Social Responsibility (also referred to by its acronym CSR).

"CSR is the continuing commitment by business to behave ethically and contribute to economic development while improving the quality of life of the workforce and their families as well as the local community and society at large."(World Business Council for Sustainable Development, 2000)

Corporate Social Responsibility refers to the moral obligation and set of standards to which a Company subscribes to positively impact society, contribute to sustainable development, and promote a peaceful and equitable world.

OUR TARGET(S) & COMMITMENTS

Community is at the heart of PSML's operations. The Company understands the important socioeconomic role it plays in supporting local, national, and global efforts to help make lives better, and aims to leave a positive impact on the communities, culture, and societies in which it operates. PSML conducts open and constructive dialogue in its communities. Through a comprehensive understanding of local communities, it supports, invests, and participates in projects that create beneficial outcomes for the communities, the Company, and its employees. PSML complies with applicable local and national regulations and is guided by relevant internationally recognized principles.

The Company shall annually allocate a percentage (%) of its average net profits before tax towards CSR activities for the upcoming three financial years (2025). The Company will invest efforts and funds in fostering ahealthy and prosperous environment to improve the quality of life of the communities it serves. Community programs shall involve working with local stakeholders such as schools, governments, and/or non-government organizations or initiatives in the local area that are not for profit and support a cause. The Company may also utilize its products, services, and expertise for its CSR activities to benefit the wider community.

6.1 GEOGRAPHIC FOCUS

PSML focuses its CSR efforts and developmental activities predominantly in the rural and urban areas of the Nigerian states in which it is located. Although the Company ensures that all communities benefit from its CSR activities, PSML targets mainly socially and economically marginalized groups, such as women/girls.

6.2 CSR PILLARS

PSML's CSR efforts are focused on four main pillars with four ongoing programs that focus on inspiring and empowering youth through educational development and provision of employment for qualified youth in target communities; as well as securing community health and wellbeing through the construction and improvement of the healthcare system. (*See **Appendix A** for an overview of PSML initiatives and targets.)*

CSR Program	CSR Pillar	UN Sustainable Development Goal (SDG)
Employability Trainee Programs	Poverty Alleviation Youth Empowerment	SDG 1 No Poverty SDG 8 Decent Work & Economic Growth
Healthcare Intervention Programs	Healthcare Improvement Poverty Alleviation	SDG 1 No Poverty SDG 3 Good Health & Wellbeing
Scholarship Funds and Education Programs	Access to Quality Education Poverty Alleviation Youth Empowerment	SDG 1 No Poverty SDG 4 Quality Education
Youth Empowerment Programs	Poverty Alleviation Youth Empowerment	SDG 1 No Poverty SDG 4 Quality Education SDG 8 Decent Work & Economic Growth

6.3 KEY DRIVERS

PSML dedicates an annual budget (see clause 6) to support its CSR policy which focuses on three main objectives.

1	2	3
Enhance relationships with all stakeholders – government, the media, civil society groups, and community leaders – through the implementation of a well-defined CSR agenda.	Support the socio-economic development of its host community	Be heard and seen as a driver for implementing greener business operations

1 CSR MANAGEMENT APPROACH

PSML continuously endeavors to conduct business responsibly, considering its impacts on the economy, environment, and society, reflecting its social accountability, and respecting applicable laws and regulations. PSML's CSR management approach focuses on identifying key areas where it can create a real positive impact on the communities it serves and other stakeholders while staying true to its core purpose. As part of its CSR management approach, PSML has developed this CSR policy which sets forth a clear framework with pillars, programs, and themes to guide all community engagement initiatives.

Six guiding principles drive PSML's approach to CSR (*See **Appendix B***):

1. Affirmative Action
2. Communication
3. Impact
4. Innovation
5. Partnerships
6. Volunteerism

1. RESPONSIBILITY

Responsibility for PSML CSR efforts and implementation of this policy falls on the Company's in-house CSR department and through its foundation, societies, and trusts. In addition, the Company shall partner with credible organizations – individually or as a consortium – to design, fund, implement and review CSR projects in line with the provisions of the Companies and Allied Matters Act (CAMA) and rules there under. Partner agencies will be selected based on well-defined selection criteria.

2. GOVERNANCE MECHANISM

PSML understands the importance of establishing a governance structure to ensure the effective management and implementation of the CSR policy and efforts.

Board of Directors

PSML's Board of Directors is at the helm of the Company's governance mechanism, steering the CSR vision while holding overall responsibility to ensure that funds allocated to CSR activities are utilized ethically and precisely for the declared purposes in the manner approved by the Board.

Chief Financial Officer

PSML's Chief Financial Officer (CFO) shall annually certify to the Board of Directors the utilization of funds earmarked for CSR Activities.

CSR Department / CSR & Sustainability Committee

The CSR department is responsible for managing the day-to-day CSR operations, initiatives, and programs, reporting to the CEO. The CSR & Sustainability Committee, reporting to the Board of Directors, takes on a strategic role in monitoring the Company's efforts, progress, and challenges, as well as reviewing CSR project proposals and policies. At times, the Committee may recommend donating or making grants to funds set up by the State Governments or to non-profit organizations and other institutions whose activities align with PSML's CSR programs and activities.

3. REVIEW OF POLICY

This CSR policy document will be reviewed annually and/or upon any specific need, such as upon the development of new CSR legislation. Changes shall be made, if necessary, and must be approved by the CSR & Sustainability Committee and the Board of Directors.

Appendix A: CSR Interventions

CSR Themes	CSR Initiatives& Targets	CSR Pillar	SDGs
Education	• Setting up and running educational institutions and hostels • Setting up and running mid-day meal kitchens • Augmenting and supporting infrastructure in educational institutions • Offering scholarships and financial assistance to needy and meritorious students • Advocating best practices and improving the quality of education in existing schools • Developing educational material and methodologies • Training of teachers and headmasters • Bridging drop-out children and mainstreaming them to formal schools • Promoting education for mainstreaming disabled children • Supporting and promoting co-curricular activities	✓ Access to Quality Education Healthcare Improvement ✓ Poverty Alleviation ✓ Youth Empowerment	**SDG 1** No Poverty **SDG 4** Quality Education **SDG 10** Reduced Inequalities
Health	• Setting up and running clinics and hospitals • Running mobile medical vans and ambulances • Organizing health camps • Providing financial assistance to patients in need (on a case-to-case basis) • Undertaking and supporting research on health-related issues • Ensuring access to potable drinking water and hygienic sanitation • Promoting awareness about various health issues and generating demand for health services to: o Reduce infant and maternal mortality o Prevent and treat communicable diseases (ex. malaria, tuberculosis, and HIV/AIDS) o Workon adolescent and reproductive sexual health issues	Access to Quality Education ✓ Healthcare Improvement ✓ Poverty Alleviation Youth Empowerment	**SDG 1** No Poverty **SDG 3**Good Health & Wellbeing **SDG 6** Clean Water & Sanitization

Livelihoods	• Providing expert training and knowledge transfer to empower local employees and also enhance employability • Setting up and running skill development centers, industrial training centers, diploma and polytechnic institutes, community colleges, etc. • Sponsoring candidates for skill development and vocational training programs offered at identified institutions • Coaching candidates to appear for entrance examinations of different institutions • Creating, training, and supporting entrepreneurs • Supporting persons with disabilities to lead a life of self-dependence and dignity • Creating, training, and supporting self-help groups, federations, co-operatives, societies, and similar institutions • Building capacities of farmers on improved methods of agriculture and other allied sectors • Developing water harvesting structures and irrigation facilities • Supporting farmers with quality inputs, technical know-how, and timely information • Creating markets and marketing linkages for farm and forest-based produce	✓ Access to Quality Education Healthcare Improvement ✓ Poverty Alleviation ✓ Youth Empowerment	**SDG 1** No Poverty **SDG 2** Zero Hunger **SDG 8** Decent Work & Economic Growth **SDG 10** Reduced Inequalities
Rural Development	Rural development projects of building and maintaining community-based rural infrastructure like roads, bridges, culverts, drains, rural electrification, water infrastructure, community centers, youth clubs, etc.	Access to Quality Education Healthcare Improvement ✓ Poverty Alleviation ✓ Youth Empowerment	**SDG 1** No Poverty **SDG 9** Industry, Innovation, & Infrastructure

Sports	• Setting up and running academies and sports training centers for supporting grassroots sports talent • Organizing sports tournaments and coaching camps for the community • Supporting sportspersons to participate in state, national and international events • Offering scholarships and sports equipment to deserving sportspersons • Promoting adventure sports • Organizing leadership and motivational camps • Constructing stadia and sports infrastructure	Access to Quality Education Healthcare Improvement Poverty Alleviation Youth Empowerment	
Ethnicity	• Preserving and promoting tribal languages, scripts, and literature • Preserving and promoting fine arts and performing arts • Preserving and promoting indigenous sports • Preserving and promoting various aspects of folk and tribal cultures • Organizing cultural events • Restoring and renovating memorials, monuments, and heritage structures • Undertaking and supporting research on anthropological and ethnic issues	Access to Quality Education Healthcare Improvement Poverty Alleviation Youth Empowerment	
Environment	• Integrating state-of-the-art technologies that reduce energy consumption and emissions • Undertaking plantations and afforestation activity • Promoting renewable sources of energy • Recharging groundwater levels • Conserving biodiversity and supporting research, awareness, and advocacy on issues related to biodiversity • Promoting awareness about environmental issues	Access to Quality Education Healthcare Improvement Poverty Alleviation Youth Empowerment	**SDG 12** Responsible Consumption & Production **SDG 13** Climate Action **SDG 14** Life Below Water **SDG 15** Life on Land
Disaster Relief	• Extending relief measures during times of natural disasters anywhere in the country • Undertaking and supporting rehabilitation measures post-disasters	Access to Quality Education Healthcare Improvement Poverty Alleviation Youth Empowerment	**SDG 9** Industry, Innovation, & Infrastructure **SDG 17** Partnerships

Support to Technology Incubators	Funding research projects at technology hubs for environmental and social sustainability	✓ Access to Quality Education Healthcare Improvement Poverty Alleviation ✓ Youth Empowerment	**SDG 4** Quality Education **SDG 8** Decent Work & Economic Growth

Appendix B: Guiding Principles for CSR

PSML abides by six guiding principles for all its CSR programs and initiatives.

Impact – All CSR initiatives will have well-defined Key Performance Indicators (KPIs) to measure the impact on target communities and groups. For high-impact projects, independent, third-party advisors will evaluate. Their feedback will serve as input to redesign or roll out further initiatives.

Partnerships – Based on well-defined selection criteria, the Company will collaborate with business partners, other PSML Group Companies, like-minded corporate organizations, funding agencies, nongovernment organizations, community-based organizations, governments, and government organizations. Partners will bring complementary resources, expertise, and influence which PSML will leverage to force-multiply its CSR initiatives.

PSML will engage closely with **Stallion Empowerment Initiative** and work jointly on projects which align with its CSR strategy, pillars, and operational areas. The Company will also leverage the products and services of PSML Group Companies for its CSR initiatives.

Affirmative Action – The Company will design targeted interventions for the local communities to promote education, employability/employment, and entrepreneurship. The Company will also promote ethnicity to preserve the cultural fabric of these communities.

Volunteerism – PSML will provide its employees, their families, and the PSML ecosystem opportunities to volunteer in activities that benefit the communities in which they live and work and support the Company's CSR efforts. This will deepen the connection with the local community and leverage in-house skills to address social challenges, creating both social and business impact.

Communication – The Company will foster open two-way communication to map stakeholder needs, expectations, and aspirations, and gather and assess feedback and satisfaction levels to design and improve initiatives.

Innovation – PSML will develop innovative solutions to solve seemingly intractable social problems. These solutions will encompass technology and models for sourcing, partnering, and delivery of initiatives.