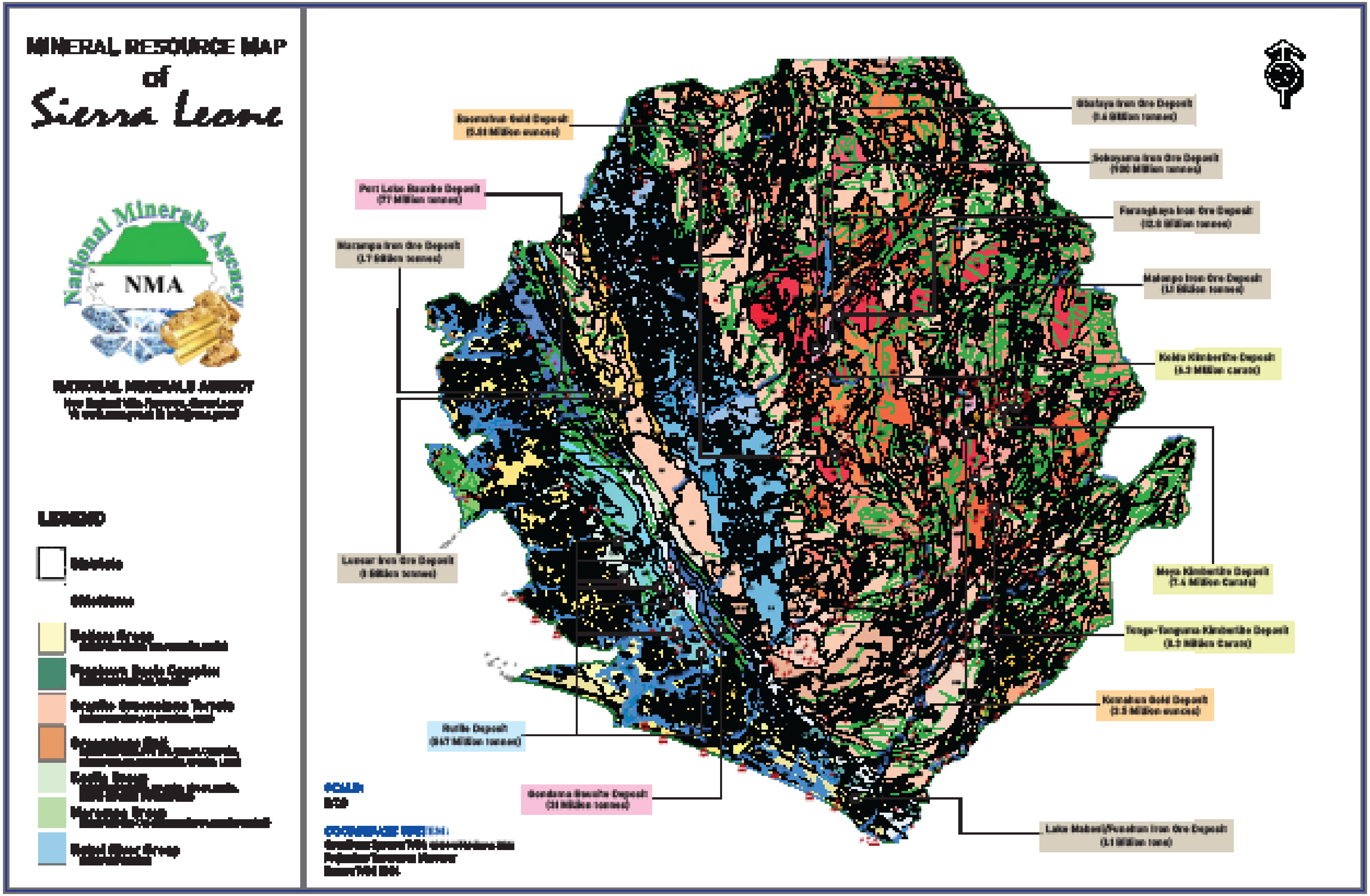
SIERRA LEONE

Serving and Developing the Minerals Sector
for a better Sierra Leone

CONTACT INFORMATION

The Ministry of Mines and Mineral Resources
5th Floor, Youyi Building
info@mommr.gov.sl
website: www.mommr.gov.sl

The National Minerals Agency
New England Ville, Freetown, Sierra Leone, West Africa
Email: info@nma.gov.sl
Website: www.nma.gov.sl


MINERAL RESOURCE MAP
of
Sierra Leone
National Minerals Agency
NMA
NATIONAL MINERALS AGENCY
LEGEND
Baomahun Gold Deposit
Port Loko Bauxite Deposit
(77 Million tonnes)
Marampa Iron Ore Deposit
Lunsar Iron Ore Deposit
Rutile Deposit
Gondama Bauxite Deposit
Kono Kimberlite Deposit
Tongo-Tonguma Kimberlite Deposit
Komahun Gold Deposit
SCALE

The Ministry of Mines and Mineral Resources

VISION

To excel in the management of mineral resources and to ensure maximum benefit from our minerals resources to all Serra Leoneans.

MISSION

To promote mining investment and regulate the mining industry, through the adoption and implementation of appropriate policies and programmes.

The National Minerals Agency

VISION

To ensure maximum benefits for all Sierra Leoneans from the country's natural resources.

MISSION

To professionally develop the mines and minerals sector by effectively administering and regulating mineral rights and minerals trading, providing geological survey and other technical support services and promoting the rights of communities.

CONTACT INFORMATION

The Ministry of Mines and Mineral Resources
5th Floor, Youyi Building
info@mommr.gov.sl
website: www.mommr.gov.sl

The National Minerals Agency
New England Ville, Freetown, Sierra Leone, West Africa
Email: info@nma.gov.sl
Website: www.nma.gov.sl

MESSAGE

FROM THE MINISTER OF MINES AND MINERAL RESOURCES

Julius Daniel Mattai

Exploring and exploiting Sierra Leone's finite and non-renewable mineral resources present opportunities and challenges. They generate revenues, create jobs, build infrastructure, drive socio-economic growth and contribute to broad-based sustainable development. However, robust reforms and effective regulation and management of the mines and minerals sector are imperative to ensure we transform Sierra Leone into a competitive and profitable mining ecosystem and attract credible and major investors.

In 2019, we launched three new policy documents (i.e. Sierra Leone Minerals Policy, Geo-data Management Policy of Sierra Leone and Artisanal Mining Policy for Sierra Leone) to attract private investments in exploration and mining; emphasise the integration of the mineral sector with the rest of the economy; establish a fiscal regime that balances benefits with investments competitiveness; support mineral beneficiation and marketing; guide investors towards sustainable exploitation of mineral resources in a win-win manner, and enable Sierra Leone to derive maximum benefits from its mineral deposits.

We continue to rely on our mineral resources as the primary driver of economic activity to promote employment, provide investment opportunities, finance infrastructure, education and healthcare, meet other social needs and contribute to Sierra Leone's growth and sustainable development. We are currently at the final stages of enacting new mining laws and instituting new legislative and regulatory processes that are fair, transparent, timely and efficiently administered. We have removed unnecessary trade barriers (e.g., restrictions on profit repatriation, currency restrictions, etc.) and established transparent, stable, predictable, fair taxation and fiscal regimes. We are working with mining companies and other stakeholders to implement community development projects in communities affected by mining.

In 2020, we completed a comprehensive, nationwide, high-resolution, low-altitude airborne geophysical (aeromagnetic and radiometric) survey to help determine the full extent of the country's mineral potentials and provide a wealth of geophysical and geological data and information that will strengthen our geological knowledge for decades to come.

These geophysical and geological datasets, which are now accessible (at an affordable cost) through a Web-based Enterprise Geoscientific Information Management Systems (eGIMS), form a criticalcomponent of our strategy to encourage investment in the minerals sector and to help position Sierra Leone as a new destination for mining investment. We have also developed and deployed a sophisticated Geoscience Portal and a vastly improved Mining Cadastre Administration System (MCAS) to provide transparent, accessible and timely access to quality data and information on precious minerals trading, geoscientific surveys, exploration and mining licences and fiscal metrics in the management of mineral rights in Sierra Leone.

We are also increasingly changing the way we do business in mining —starting with adapting to the evolving skills of our staff and mine workers and a better understanding of how technology can ensure our mineral resources are used optimally and that mining operations become safer and more productive. We are investing in science and technology and using our untapped mineral wealth and human resources to invent, innovate and create wealth.

Through improved and effective public-private partnerships (PPPs), we are creating an ecosystem for boosting mining and targeted skills development, with a focus on Science, Technology, Engineering and Mathematics (STEM) and Technical and Vocational Education and Training (TVET), to undertake major mining-related infrastructural projects, particularly in power, water, roads, ports, and telecommunications; help improve health and safety measures, reduce or mitigate adverse environmental impacts; and to optimise efficiency and profitability in the mining sector. We are making technology and innovation a strategic priority to cut and polish our diamonds, smelt and refine our gold and beneficiate our iron ore and bauxite.

Beyond its mineral resources, Sierra Leone's most valuable asset is its young and dynamic population, meaningfully engaged and empowered to deliver broad-based sustainable development and meaningful socio-economic growth and prosperity for all Sierra Leoneans. An increase in human capital resources at the national level steadily improves the business climate, boosting the mining sector's output and making Sierra Leone an attractive destination for foreign direct investment in mining.

MESSAGE

FROM THE DIRECTOR GENERAL
NATIONAL MINERALS AGENCY
Ing. Hadji Dabo

I am pleased to inform you that Sierra Leone continues to make significant progress in consolidating its reputation as a favourable destination for mining investment. In the past five years, we have pursued policies and programmes aimed at making Sierra Leone an even more attractive transforming the minerals sector to guarantee good returns on investment, while at the same time ensuring that our people derive maximum benefits from our mineral wealth.

In our efforts to transform the minerals sector for a better Sierra Leone, we have revised the principal legislation governing the minerals sector to provide for a more comprehensive, transparent and predictable regime to attract credible investors. Our laws and policies are consistent with pertinent regional and international policies, regulatory frameworks and initiatives, including the Africa Mining Vision (AMV) and the ECOWAS Model Mining and Minerals Development Act (EMMMDA) and the UN Sustainable Development Goals 2030 (SDGs).

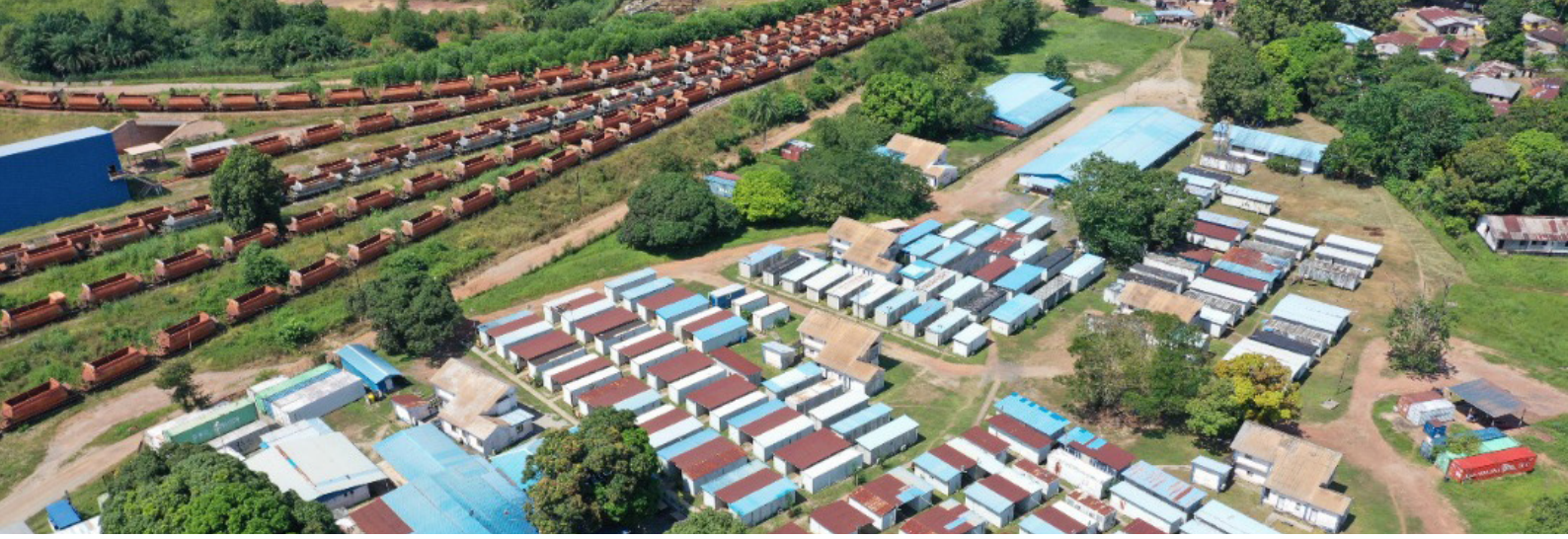
It is noteworthy to mention that, under the auspices of the Extractive Industries Technical Assistance Project II (EITAP 2), a World Bank funded project, the required funding was provided to undertake a Nationwide Airborne Geophysical Survey in 2019; the outcome of this exercise will provide for achieving a more informative knowledge on mineral occurrences in our country. The next steps to this initial effort will be the undertaking of both geochemical and geological surveys, all of which efforts will lead to the development of comprehensive (quantitative, qualitative and spatial) mineral resource information.

The ready availability of this comprehensive geoscientific data and information to the public and potential credible private investors will effectively cut down on time, costs, risks and preparatory work for both greenfield mine start-ups and brown-field mine reworks.

Sierra Leone has a long history of mining dating back to the 1930s, and over the years several companies have successfully explored for and mined minerals such as diamonds, gold, bauxite, iron-ore and rutile in significant quantities. We are world renowned for the quality and quantity of our diamonds, with over 20,000km2 of diamond fields in the eastern, southern and northern regions of the country. We have one of the world's largest deposits of natural rutile; we can boast of a JORC-compliant iron ore resource of 12.8 billion tonnes in just one part of the country, with significant deposits in other areas. We currently have large-scale mining operations for iron-ore, rutile and bauxite across the country, producing millions of tonnes of these minerals annually.

The above, coupled with results from ongoing exploration work, indicates that Sierra Leone is richly endowed with minerals deposits, which offer significant opportunities for high returns on investment, and we welcome investors to explore these opportunities.

We are therefore excited to welcome you to explore these opportunities and work with the Government and the people of Sierra Leone as we march towards a bright and prosperous future that guarantees mutual benefits for all.



SIERRA LEONE IN BRIEF

Sierra Leone is a resource-rich country endowed with minerals such as iron ore, rutile, diamonds, bauxite, gold, platinum, zircon, ilmenite, chromite and columbite-tantalite (coltan). In addition, the country recently conducted a successful nationwide airborne geophysical survey that will help in further understanding the geology and mineral potential of the entire country.

Currently, there are 23 Large-scale mines (for diamonds, gold, rutile, bauxite, coltan and iron ore) and 37 Small-scale mines, mainly for gold, coltan, mineral sands and diamonds. Seven (7) of these Large-scale mining companies are operational (either commencing commercial production or ramping up). Six (6) are in development stage (in preparation to commence commercial production) and four (4) under care and maintenance (neither operating nor developing).

The main legislation that governs the sector has been reviewed and updated to ensure that its provisions are transparent, stable, comprehensive and predictable in terms of governance, administration and management, consistent with industry best practice. The new Mines and Minerals Development Act 2022 provides a clear and comprehensive governance and oversight framework, whilst addressing investors' interests and rights of communities. This Act further consolidates Sierra Leone's reputation as a favourable destination for mining investments.

The country maintains a Mining Cadastre Administration System (MCAS) and an Online Portal that support the effective, efficient and transparent administration and management of mineral rights. The portal displays revenue and other useful information pertaining to mineral rights, and this portal can be easily accessed from anywhere, at any time and on any internet-based device. It also maintains an advanced, standardised, integrated and interoperable enterprise Geodata Information Management System (eGIMS) to facilitate, capture, assemblage, management, manipulation, analysis, modelling, mapping, representation and display of all forms of geoscientific data and information for robust decision making in the mines and mineral sector.

Sierra Leone

Capital	Freetown
Population	7.5 million (Statistics Sierra Leone 2021 Mid Term Population and Housing Census)
Government	Presidential Republic
Politics	Two main political parties. Five successful democratic elections held. Next elections due June 2023
Language	English (official), Krio (lingua franca)
Economy	GDP (nominal) US$4.3 billion (2022) GDP per capita (nominal) US$513 (2022)
Main Industries	Agriculture (rice, coffee, cocoa) Mining (diamonds, iron ore, rutile, bauxite, gold,)
Recent Events	Ranked one of the peaceful African countries Improved transparency and accountability index

THE NATIONAL MINERALS AGENCY

The NMA was established to promote the development of the minerals sector by effectively and efficiently managing the administration and regulation of mineral rights and minerals trading in Sierra Leone; to provide technical and other support to the minerals sector including geological survey and data collection activities; and to promote the rights of communities.

Staffed by qualified and competent professionals, the NMA operates as a world-class professional and technical regulatory organisation working with the Ministry of Mines & Mineral Resources to serve the mining sector and its communities, and ensure optimum revenue for Sierra Leone from mineral resources. The Agency has six Directorates: Directorate of Geological Survey; Directorate of Mines; Directorate of Precious Minerals Trading; Directorate of Communication and Community Affairs; Directorate of Technology and Information Management and Directorate of Finance and Administration.

The Directorate of Geological Survey undertakes geological mapping of Sierra Leone; reconnaissance and exploration operations to locate mineral deposits; compiles, publishes and disseminates data and information concerning the geology and mineral resources of Sierra Leone; and the maintains a library of geological information dating back to over 70 years. The Directorate regulates and provides technical support to exploration companies.

The Directorate of Mines is responsible for mineral rights administration, including management of the processes for acquisition of mineral rights in Sierra Leone. It is also responsible for monitoring mining operations, enforcing compliance with mining laws and regulations, and promoting responsible and sustainable mining practices. The Directorate regulates and provides technical support to mining companies.

The Directorate of Precious Minerals Trading oversees the trade in precious minerals, including the valuing of diamonds and assaying of gold to determine government royalties and other taxes. The Directorate provides support to precious minerals traders, dealers and exporters. It is also the Focal Point for the Kimberley Process Certification Scheme (KPCS) and ensures that all diamond exports are done in line with the KPCS requirements.

The Directorate of Communication and Community Affairs protects and promotes the rights of mining affected communities, supports the successful implementation of local content in the minerals sector, and facilitates information sharing among stakeholders in the minerals sector. The Directorate provides support to exploration and mining companies to address community issues, promote peaceful co-existence, implement local content, and implement community development projects in mining communities. It also provides information to the public about the activities of the NMA, and developments in the minerals sector.

The Directorate of Technology and Information Management is responsible for the overall design, development and implementation of the Agency's data, information, knowledge and ICT needs. It ensures that all authorized NMA entities and the mineral right holders, civil society organizations and all relevant stakeholders have timely access to mining cadastre, geoscientific data and information, including data interpretations, articles, images, reports and maps.

The Directorate of Finance and Administration is responsible for the overall financial and management accounting of the Agency's operations.

SIERRA LEONE LAUNCHES NATIONWIDE AIRBORNE GEOPHYSICAL SURVEY DELIVERABLES

The geophysical survey data is derived from a countrywide high-resolution airborne magnetic and radiometric survey funded by the World Bank through the EITAP 2. The survey, which commenced in January 2019, was completed in 2020. The survey was flown by Xcalibur Airborne Geophysics (XAG). This South African based company undertook the data acquisition, and compilation and data Interpretation was made by Patterson Grant and Watson (PGW), a Canadian based firm. Quality Assurance and Quality Control was done by Reid Geophysics Limited (RGL), a UK based firm.

Two survey blocks were flown at 150 m line spacing that covered the entirety of onshore Sierra Leone. The nominal terrain clearance was 50 m above ground, and a total of 547,543 line kilometres of data were acquired.

Four main interpretation products were prepared from the survey:

1. A surface geological map produced for ten map sheets at 1:250,000 and countrywide at 1:750,000 scale.
2. A basement geology map product produced for four sheets at 1:250,000 and countrywide at 1:750,000 scale.
3. Mineral favourability maps for gold, bauxite, rutile and nickel produced countrywide at 1:500,000 scale.
4. Manual kimberlite and iron target maps produced countrywide at 1:500,000 scale.

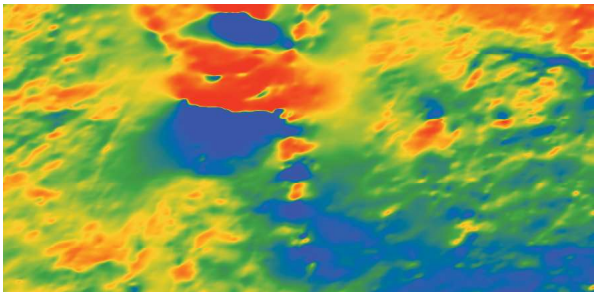
About 200 datasets were produced from the survey including but not limited to the following;

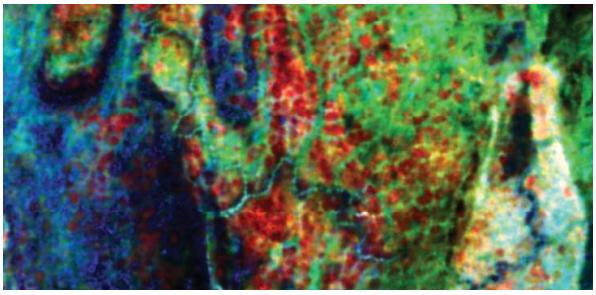
- inverted equator-reduced derivative grids from the total magnetic intensity
- ternary images and principal component grids from radioelement grids
- topographic characteristic grids (e.g. slope, aspect, curvature) from the digital elevation model
- mosaiced Landsat 8 bands, colour composite imagery and band ratios
- Lineaments (peaks, troughs and edges) from the magnetic data
- Depth to magnetic sources from source-parameter imaging and located Euler deconvolution
- 3D VOXI inversion of the magnetic data

Please visit the public facing Sierra Leone Geoscience portal which has a small set of sample data which you can view and download at: https://sierraleone-geoportal.services/gdp/search

The full list of data available from the survey can be accessed at:
https://nma.gov.sl/geophysical-data-interpretation-deliverables

CORE AND PROCESSED GEOPHYSICAL DATA





Core Geophysical Grids - Radiometrics		
Item	**Description**	**Units**
1	Dose rate	nGy/h
2	Potassium	%
3	Equivalent uranium	ppm
4	Equivalent thorium	ppm

Core Geophysical Grids - Magnetics		
Item	**Description**	**Units**
1	Total magnetic intensity	nT
2	Analytic signal	nT/m
3	TMI reduced to the equator (inverted)	nT

Processed Geophysical Grids - Radiometrics		
Item	**Description**	**Units**
1	Equivalent uranium/equivalent Thorium	-
2	Equivalent uranium/potassium	X 10^{-4}
3	Equivalent thorium/potassium	X 10^{-4}
4	Principal component analysis, first component	-
5	Principal component analysis, second component	-
6	Principal component analysis, third component	-

Processed Geophysical Grids - Magnetics		
Item	**Description**	**Units**
1	First vertical derivative of RTEI	nT/m
2	Second vertical derivative of RTEI	nT/m^2
3	Vertical tilt angle from RTEI	radians
4	Horizontal tilt angle from RTEI	radians
5	Total horizontal derivative of RTEI	nT/m^2
6	X gradient of RTEI	nT/m^2
7	Y gradient of RTEI	nT/m^2
8	RTEI upward continuation, 200 m	nT
9	RTEI upward continuation, 1000 m	nT
10	RTEI upward continuation, 5000 m	nT

Processed Geophysical Images - Radiometrics		
Item	**Description**	**Units**
1	Radiometric ternary image, CMY colour model	-
2	Radiometric ternary image, RGB colour model	-
3	Dose rate	nGy/h
4	Potassium	%
5	Equivalent uranium	ppm

Processed Geophysical Images - Radiometrics (Cont'd)		
Item	**Description**	**Units**
6	Equivalent thorium	ppm
7	Equivalent uranium/equivalent thorium	-
8	Equivalent uranium/potassium	X10^4
9	Equivalent thorium/potassium	X10^4

Processed Geophysical Images - Magnetics		
Item	**Description**	**Units**
1	Total magnetic intensity	nT
2	Total magnetic intensity, sun shaded inclination 45°, declination 45°	nT
3	Analytic signal	nT/m
4	Analytic signal, sun shaded inclination 45°, declination 45°	nT/m
5	TMI reduced to the equator (inverted)	nT
6	TMI reduced to the equator (inverted), sun shaded inclination 45°, declination 45°	nT
7	First vertical derivative of RTEI	nT/m^2
8	First vertical derivative of RTEI, sun shaded	nT/m^2
9	First vertical derivative of RTEI, black and white	nT/m^2
10	Second vertical derivative of RTEI	nT/m^2
11	Second vertical derivative of RTEI, sun shaded	nT/m^2
12	Second vertical derivative of RTEI, black and white	nT/m^2
13	Tilt derivative of RTEI	radians
14	Tilt derivative of RTEI, sun shaded inclination 45°, declination 45°	radians
15	X gradient of RTEI	nT/m^2
16	X gradient of RTEI, sun shaded inclination 45°, declination 45°	nT/m^2
17	Y gradient of RTEI	nT/m^2
18	Y gradient of RTEI, sun shaded inclination 45°, declination 45°	nT/m^2
19	RTEI upward continuation, 200 m	nT
20	RTEI upward continuation, 1000 m	nT
21	RTEI upward continuation, 5000 m	nT
22	Residual of RTEI upward continuation, 200 m	nT
23	Residual of RTEI upward continuation, 1000 m	nT
24	Residual of RTEI upward continuation, 5000 m	nT

Please visit the public facing Sierra Leone Geoscience portal which has a small set of sample data which you can view and download at: https://sierraleone-geoportal.services/gdp/search

The full list of data available from the survey can be accessed at:
https://nma.gov.sl/geophysical-data-interpretation-deliverables

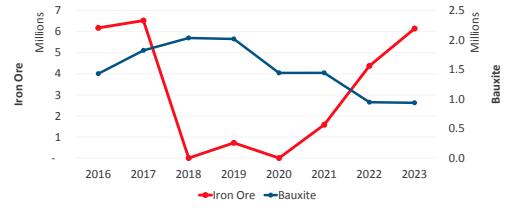
MINING in SIERRA LEONE

Sierra Leone has a long history of mining, starting with diamond mining in the 1930s and gold mining even before that. Exploration results show several mineral deposits around the country including gold, bauxite and rutile. While production of bauxite, rutile, diamonds, and gold continues, several exploration operations are on-going to determine mineral deposits elsewhere.

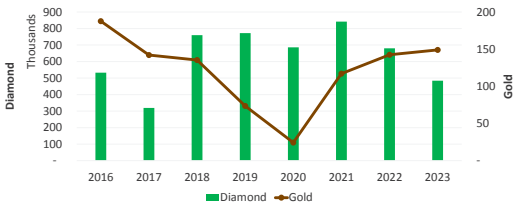
MINERALS PRODUCTION

MINERALS PRODUCTION

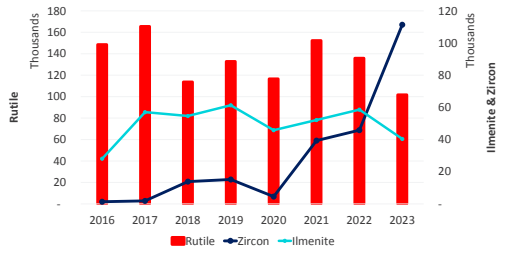
Iron Ore & Bauxite [Dry Metric Tonnes]



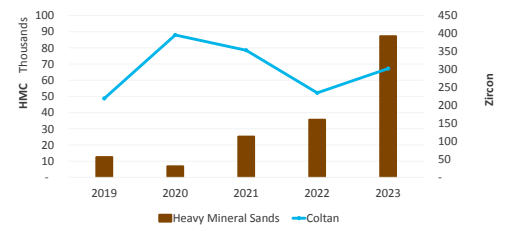
Diamond [Carats] & Gold [Kilograms]



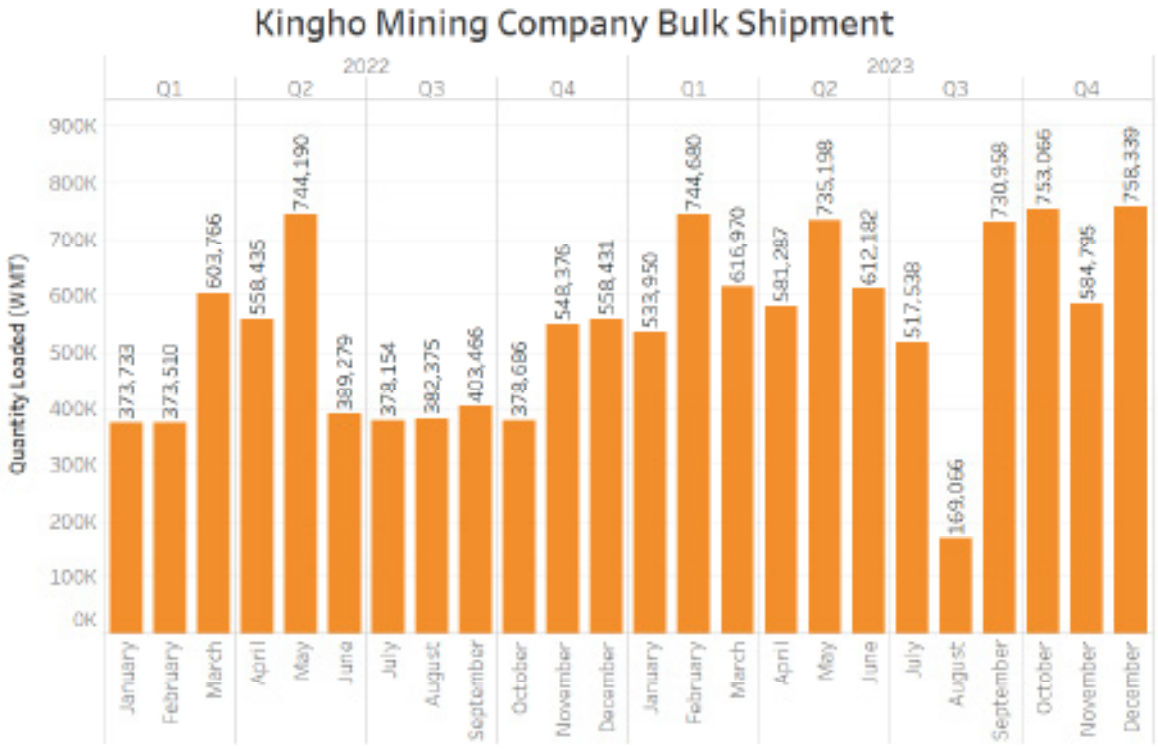
Rutile, Ilmenite & Zircon [Dry Metric Tonnes]

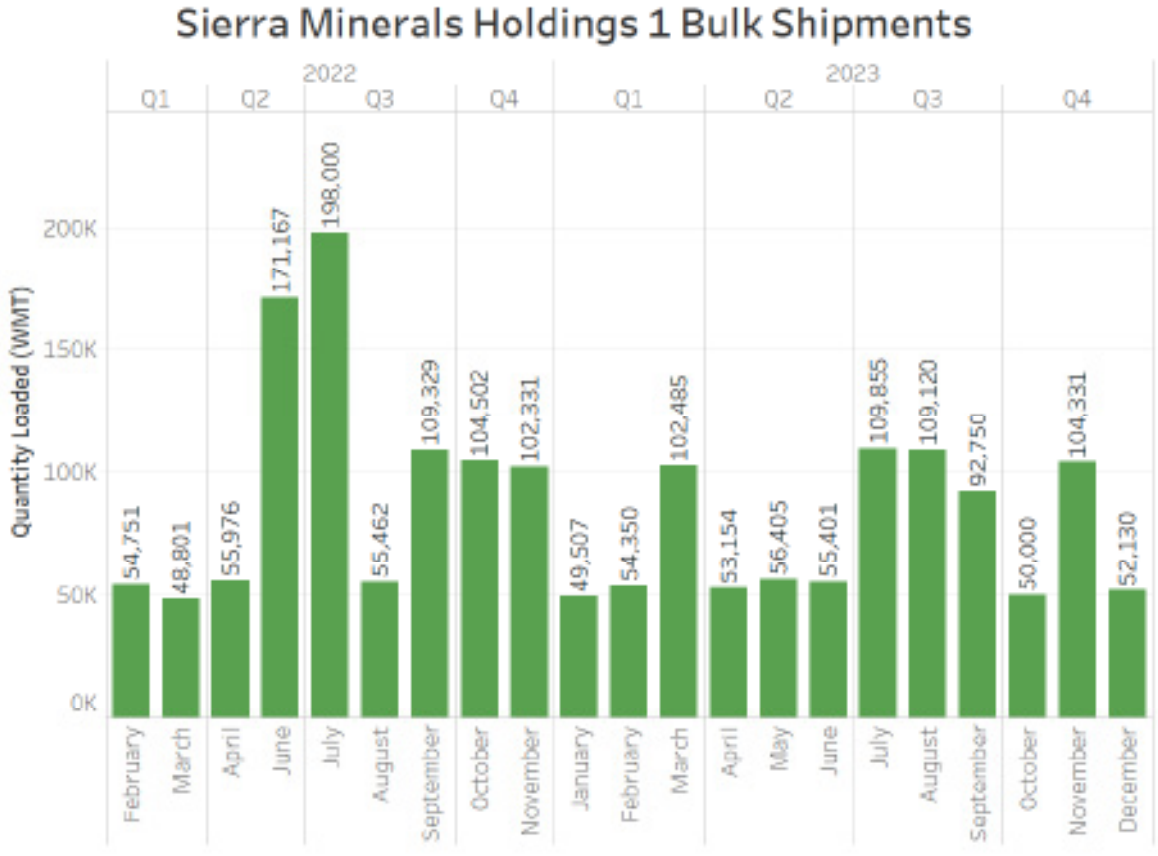


HMC & Coltan [Dry Metric Tonnes]

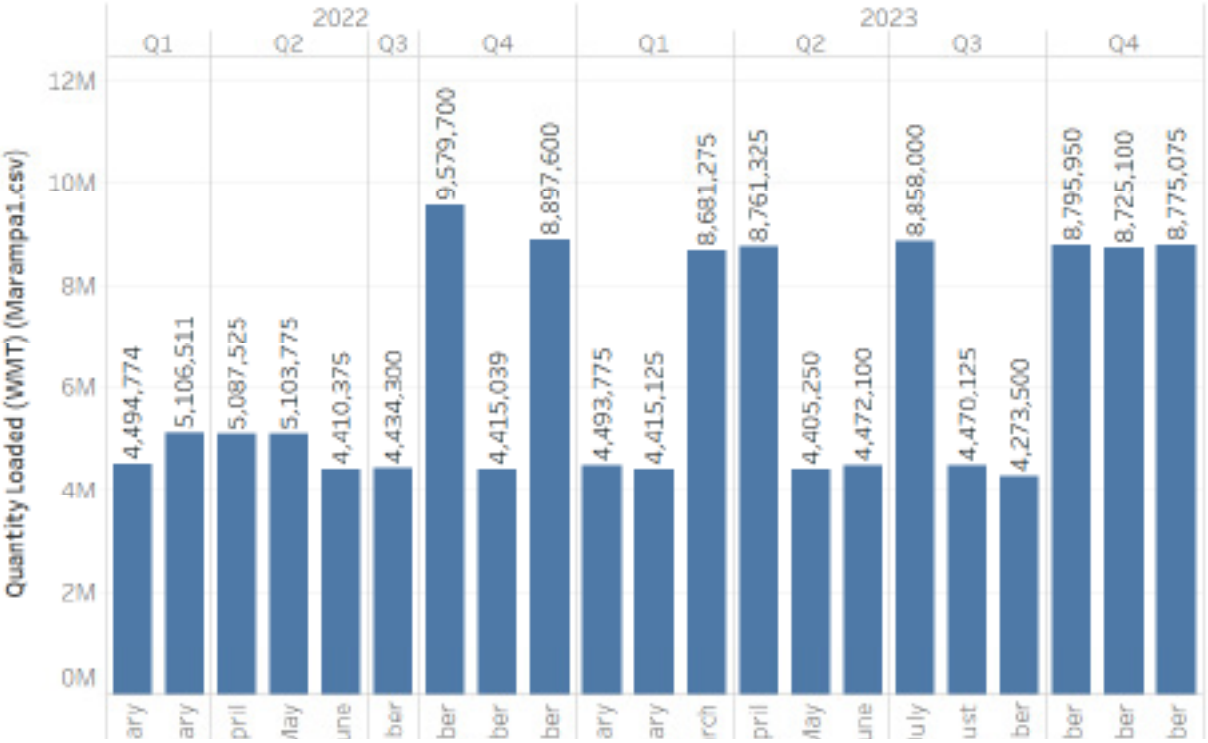


Bulk Mineral Export Statistics

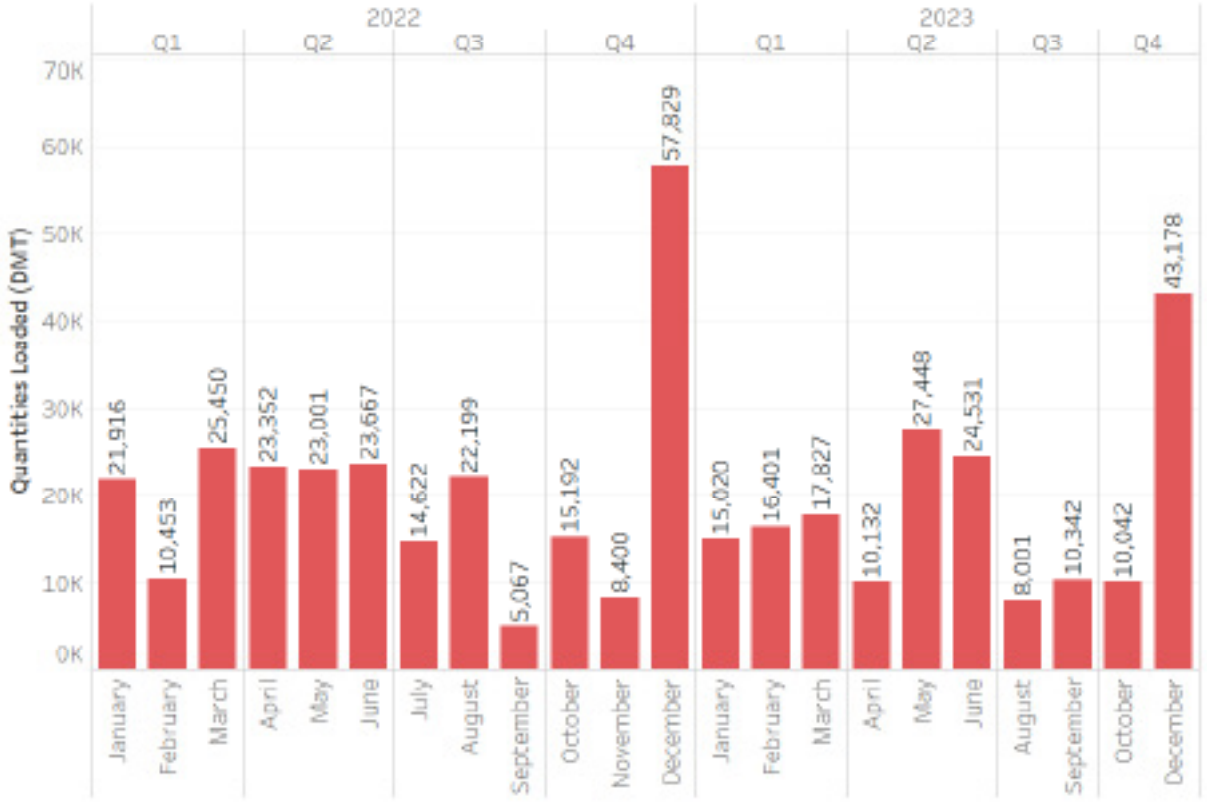




Marampa Mines Limited Bulk Shipment



Sierra Rutile Bulk Shipments




GARMIN

KEY MINERALS IN SIERRA LEONE

To date, Sierra Leone's mineral resource potential is mainly unexplored. Still, due to strengthened governance and an increase in geoscientific information and knowledge, this is now set to improve significantly and play a major role in the country's development while offering significant investment opportunities in the mining sector.

Bauxite

Bauxite was first discovered in the Southern Province in 1963 by the Geological Survey. The Mokanji-Gbonge bauxite deposit is derived from felspathic gneisses interbedded with quartzite and hypersthene gneiss. Sierra Leone's bauxite resources occur as scattered deposits on isolated hills spanning the entire length of the Kasila Group, covering about 6,600 km2 and extending into Guinea in the north.

Locations of mineable resources are nearby (less than 45 km) to port facilities along the coast and within an existing railway facility in the north of the country. The average grade of bauxite ranges 44- 53 % Al203 and Si02 < 7%. Significant deposits occur between Moyamba and Mano at Krim Kpaka in the Pujehun District, in the north at Kambia and on the road from Falaba to Waia, at Kamakwie and Makumre. Results from the recently acquired airborne geophysical survey indicate other areas of bauxite favorability.

Mineral Sands

Rutile

Sierra Leone has one of the world's largest known deposit of natural rutile with an operating history spanning over 50 years and a project mine life above 20 years. There are hundreds of millions of tonnes primarily located in four groups or deposits distributed across the country. All groups have significant exploration potential that set the stage for considerable investment opportunities and suitably located at least 30-60 km in proximity to the coast. Rutile is mainly produced along with smaller quantities of ilmenite, zircon and garnet in concentrate. The recently acquired airborne geophysical survey data indicates other areas of rutile favorability and therefore prospecting in these areas are highly recommended.

Iron Ore

Sierra Leone has untapped world-class iron deposits across the country. The Tonkolili iron ore deposit located in the Sula Mountains range has a JORC compliant iron ore resources of 12.8 billion tonnes, of which 11.5 billion tonnes comprise of magnetite ore. It is considered as one of the world's largest magnetite deposits. Other deposits situated within and marginal to the Tonkolili Deposit also formed significant resources and contained industrial-grade Fe ore with an average of between 22.18 % and 32.15 % Fe.

The Marampa iron ore deposit forms part of a schist belt with massive beds of specularite schist interstratified with quartz-mica schist. A typical section through the upper part of the deposit shows a capping of cemented hard, red hematite and laminated hard red and bluish-grey ore passing downward into a soft and easy to mine. Schistose specularite hematite and hematite can be upgraded to +65% Fe.

An existing 192 km railway line owned by the Government of Sierra Leone (GoSL) links the significant iron ore deposits and a deep-sea port equipped to accommodate about 20 million tonnes per annum. Results from the recently acquired airborne geophysical survey indicate other areas of iron favorability.

Gold

Gold occurrence is widespread in Sierra Leone. Lode gold deposits are confined to rocks of the Kambui Super Group, mainly those of the Sula Group Supra-crustals that constitute the Greenstone belts of Sierra Leone.

Prospecting activities established the existence of gold in the Lake Sonfon area with gold assay values of up to 0.67 oz/t.

At Baomahun, the gold mineralization is associated with sulphides with an estimated reserve of about 5 million ounces of gold.

At Komahun in the Nimini Hills greenstone belt, significant gold mineralization occurs over an area of about 400 m x 100 m with a mineral resource estimate of a base cut-off grade of 1.8g/t Au with a total of 3.5 million ounces of gold.

Sierra Leone has seen a steady increase in the development of gold mines, with two mines commissioned in Kono (Nimini Hills) and Koinadugu district (Sula Mountains). The vast investments into the gold sector coupled with the competitive mining regulations introduced by the Government have seen a steady increase in gold production in recent years

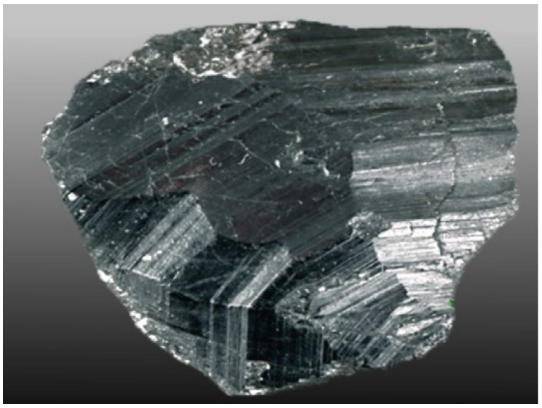
Diamonds

Sierra Leone is known for producing gem-quality diamonds, including some spectacularly large stones of very high value. The largest ever discovered, in February 1972, was a 969.8-carat diamond named the "Star of Sierra Leone". In March 2017, another spectacular large stone was found weighing 709.48 carats in the Nimikoro Chiefdom

of Kono District, Eastern Sierra Leone. The primary host rock for diamonds in Sierra Leone is Kimberlite, which occurs mainly as dykes, small pipes, and dyke-enlargement ring complex structures. Two main areas contain kimberlites, the Yengema-Koidu and Tongo, some 50 km apart. The Yengema-Koidu area consists of three Mesozoic kimberlite pipes (Pipe 1 -2,000 m^2, Pipe 2 – 4,500 m^2 and Pipe 3 – 2,500 m^2), a ring-dike structure, multiple sets of 4 en-echelon kimberlite dykes zones (Dyke Zone A, B, C, and D) and a small blow on Dyke Zone A, and another blow on Dyke Zone B. The Tongo Area consist of dykes which are divided into four zones (Lando, Peyima, Kundu and Anguma Zones), with each containing several short dykes.

There are four (4) large scale diamond mines in Sierra Leone with all four (4) doing underground mining. Alluvial diamond concentrations occur in river channels, flood-plains, terraces, gravel residues in soils and swamps and are mined mainly by artisanal and small-scale miners. Sierra Leone enjoys a constant stream of revenue from artisanal and large-scale diamond mines. Sierra Leone is an active member of the Kimberley Process Scheme, an international certification initiative for rough diamonds designed to promote transparency in the sector.

Coltan



Coltan was first produced in Sierra Leone in 1955 from alluvial deposits in the Valunia Chiefdom, Bo District. They are derived from pegmatites and tourmaline-quartz veins situated within the granite close to the granite greenschist contacts. A reasonable quantity of economic grade occurs in alluvial gravels in various parts of the country. Sierra Leone offers significant investment opportunities in coltan, with only one bedrock discovery made to date. Even though coltan is mined only by artisanal miners, Sierra Leone has seen a steady increase in production to the present high level of over 600 metric tons per year.

Cassiterite (Tin Ore)

According to published and unpublished accounts, a small amount of tin ore (cassiterites) are said to exist in the Kangi Hills in Gberi. The Geological Survey of Sierra Leone (GSSL) prioritized the search for the origins of the cassiterite discovered in heavy mineral concentrations in the 1960s. Between 1968 and 1970, surveys found that granitic pegmatites are the source of the cassiterite. In the vicinity of Gberi, a few old exploratory trenches were dug, roughly 60 meters long and one meter wide. The weathered granitic pegmatites and alluvial samples were both investigated. In December 1973, the GSSL launched surveys to investigate the region around the Kangi Hills for potential resources. Soil mapping and drilling was done to explore the area for prospective cassiterite gravels and placers. Since the entire region was flat and the prevailing drainage system did not encounter buried placers,

there was a chance of occurrence.

Tin was found in alluvial deposits in the basement rocks (granites, gneisses, and migmatites) and supracrustal units making up the Loko Greenstone belt.

Geochemical reconnaissance survey and mapping conducted by the Directorate of Geological Survey in 2022 delineated areas of increased Tin ore potential in Togbohun, Siria, Makoko and Gboronka, Sanda Loko Chiefdom, Karene District.

Spodumene Mineralization (Lithium Ore)

In the Loko Hills (Kamakwei region), earlier explorers studied the supracrustal rocks. Numerous late-tectonic granitic and highly weathered pegmatitic intrusions can be found in these rocks; some intrusions are enriched in tantalum (as coltan), mica, and other minerals/elements, while others are enriched in lithium (as spodumene).

Multiple old trenches measuring 60 meters long by 1 meter wide and oriented east-west have been excavated for cassiterites since 1964 are still whole and in place in Gberi, Kanj Hills in the Bombali District, Northern Sierra Leone. Some of these trenches from observations, have been recently reopened to expose prospective lithium ore mineralization prior to a field reconnaissance visit.

First-pass geological mapping done recently by the Geological Survey Directorate indicates the presence of coarse spodumene mineralization which is strongly linked with pegmatites. The pegmatites may also contain columbite-tantalite, cassiterite, and pollucite (caesium), as well as mica-rich-quartz veins hosted in dolerites surrounded by late kinematic granitoids and lithological suites from the Rokel River Group. Based on analytical results from ALS Global Laboratories from surface sampling, there was evidence to confirm anomalous values of Lithium (Li) and Rubidium (Rb) from samples collected in the area, indicating lithium and rubidium mineral occurrences. The area currently holds a large-scale mining Licence for lithium ore.

Chromite

Deposit and Mineralization in Sierra Leone

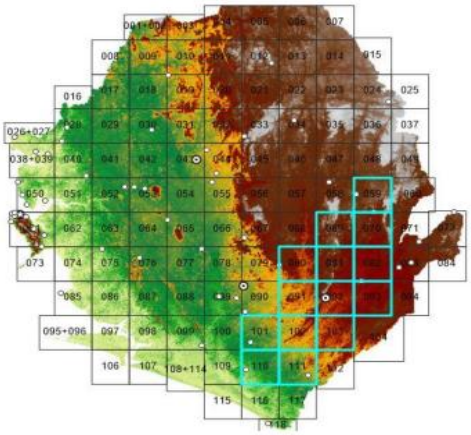
The Geological Survey made the initial discovery of chromite in Sierra Leone in 1929 when deposits were found in the Kambui Hills above N'gerihun, a village on the Kenema-Panguma Road approximately 5 miles northeast of the former railway at Hangha and in Jalauhun, about 12 miles south of Blama. The Geological Survey also discovered another deposit close to the settlement of Tuba in the Perri Chiefdom, east of Bandajuma on the eastern slopes of the Gori

Hills, and not far from the location where the Potoru-Zimi road crosses the Moa River.

Total production over the years was estimated to be about 330,900 tons of ore with an almost equal portion of Lump to concentrate ratio with the lump being sold without further treatment. The ore has a relatively low chromic oxide content which averages between 43 and 44 % Cr2O3 but the iron-chrome ratio was favorable.

Areas of Mineralization in Sierra Leone

- Bendu-Yawei (Sheet 70) previous exploration work revealed that good quality chrome spinel ore body of about 28.9 m long and 2.3 m wide was discovered and enclosed in granite. This appears to be an ultrabasic body which has been overwhelmed by granite.
- Nyandeama (Sheet 70) - A chromite body was also found in synkinematic granite at Nyandeama near Bendu but was considered too small to be of any importance.
- Senduma is approximately 12 miles south of Blama. The typical massive Chromite at Jaluahun after K C Junner 1958 suggests that it's finer grained than the Chromite at Hangha.
- On the Pujehun to Potoru road some 4.5 miles from the Pujehun Town.



Map sheet showing Chromite Ore Mineralizatior

Disseminated chromite in serpentine talcose schist

Monazite

The Directorate of Geological Survey notes from previous reports in the library on monazite, pyrochlore, columbite, zircon, and other minerals from the Gola Forest area after a brief discovery through geochemical investigation in Sierra Leone at the time.

N.W Wilson (Assistant Director of Geological Survey in 1961 spent several weeks on the west of Gola Rain Forests while conducting mapping in Bagla

Hills and Bagbe, Nomo and Tunkia Chiefdoms, Kenema District and to Bembeye Ridge, Jawi and Malema Chiefdoms, Kailahun District.

Aerial photographs of parts of the country over which an aero-geophysical survey by Canada Aero-Service was carried out (reports unavailable). It is believed that the report made it possible to locate the Belebu and Lalehun anomalies in the Gaura and Tunkia Chiefdoms. Anomalies were found south of Lalehun and east of Belebu some two or three miles away.

The anomaly at Belebu strikes NNE, is 4,500 meters long, and has a core that is 3,600 meters east of Belebu. The anomaly is once more caused by monazite lost from coarse-grained younger granite comparable to that at Lalehun.

The following is a mineralogical analysis of concentrates done by Dean of the Mineral Resources Division using samples that Huhta gathered from Lalehun and Belebu;

	Lalehun		Belebu	
Mineral Component	No1	No.2	No.1	No.2
Ilmenite and magnetite	23.9	22.6	29.1	30.9
Monazite	39.0	44.8	42.4	40.9
Zircon	24.8	25.9	7.7	7.9
Quartz	12.3	6.7	16.6	11.4
Garnet (Almandine)	-	-	1.8	0.6
Rutile	-	-	-	Tr
Lateritic nodule (+1/8")	-	-	-	8.9
	100.0	100.0	100.0	100.8
Radiometric assay eg				
ThO2	2.94	3.44	3.74	2.70

The Tewo anomaly is particularly noteworthy because it is the only area up to 1800 meters wide and about a mile to the north-east of a diabase intrusion (with some gabbro) that starts near Jagbwema on the Maho, crosses the Zimmi-Kenema motorway 1200 meters north of Peri, and then continues as a range of hills east of Boyama before coming to an end near Gawuyema. The Tewo anomaly may have been generated by some alkali rock, as this diabase is consanguineous with diabase, gabbro, norite, and harburgite extending northward from the Bagbe Alkalic Complex. (Geological Department Report from 1960–1961.

Other possible deposits and Mineralization in Sierra Leone

- Sula Mountains: Monazite with columbite-tantalite, gold, diamonds, garnet, corundum and magnetite in dispersion streams.
- Kangari Hills (Northcentral): Monazite with columbite-tantalite, gold, diamonds, garnet, corundum and magnetite in dispersion streams and in decomposed pegmatitic gneisses.
- Kambui Hills: Monazite with columbite-tantalite, gold, diamonds, garnet, corundum and magnetite in dispersion streams Monazite, zircon, rutile.

- Turner's Peninsula: Coastal black mineral sands on the 96 km-wide and 6.4 km-wide Turner peninsula in southwestern Sierra Leone.
- Bagbe Alkali Complex, Gola Forest (Southeast): Pyrochlore (ore of tantalum, niobium), allanite (yttrium, cerium silicate). Thorium commonly substitutes for cerium) and columbite.
- Imperi and Gbangbama Hills (Southwest): Monazite in heavy mineral concentrates, in alluvial deposits and decomposed gneisses. Associated with rutile, ilmeno-rutile, zircon. Uranium and thorium atoms substituting titanium, tantalum and zirconium, in ilmeno-rutile and zircon.

NIkel

Deposits and Occurrence in Sierra Leone Freetown Complex

According to Holman et al (1954), samples collected from the gabbro slopes near Devil Hole (east of Freetown) contained anomalously high values of nickel.

A series of gabbro samples were collected at intervals of approximately 60m along a stream to the south-west of the anomaly. These were later tested in the laboratory for their nickel content. It was shown that the concentration of nickel in the rock depended largely upon the percentage of olivine in the rock and that the nickel is contained in the olivine. Although traces of nickel were found in thirteen of the eighteen samples tested, a distinct group of high values was located some 600 to 822m upstream from the small concrete Dam in the stream.

Sula Mountains

The possibility of residual lateritic nickel deposits being developed on the ultramafic schists of the Sula Mountains greenstone belt was suggested by Laing (1970). As a follow-up to Laing's recommendations, Mahdi (1970) of the Sierra Leone Geological Survey investigated the potential for Lateritic nickel in the Sula Mountains. Banka drill holes were sunk through laterite at a number of localities and results indicated that although the Ni content increased with depth in the laterite, the element was no more concentrated in the residual deposit than in the weathered parent rock.

Gola Forest

Prospecting for nickel by ordinary and geochemical means disclosed only trifling mineralization in the gabbro, norite and harzburgite around Belebu and Tosien Ridge. Pyrrhotite, containing about 0.5% of Nickel is found in small quantity in the rocks belonging to the diabase complex. One piece of harzburgite from the Toisen Ridge contain 16% of Nickel. Portions of the differentiated mafic and ultramafic dyke south west of Mano and north East of Belebu were prospected for nickel but not more than 120ppm of nickel was found in any of the samples collected.

Kambui Hills

A decomposed ultrabasic rock outcropping near Blama has been found to contain 0.48 % of Nickel Oxide.

Platinum Group of Elements (PGE)

Deposit and Mineralization in Sierra Leone

The PGE mining in Sierra Leone dates from the year 1929 with approximately 26 ounces of alluvial Platinum. The probable sources are pyroxene rich anorthositic gabbros and troctolite gabbro. Mining was concentrated along the alluvial flats, but as yet, no platiniferous rocks have been intersected during drilling. Therefore, the source rocks of the platinum have yet to be positively identified. Much of the platinum that had been recovered was in the form of dendritic crystalline growth, which could not have travelled far from their source rock.

Previous Mining Activities

- The platinum which was derived from the Freetown Layered Complex was found in streams along its western seaward side.
- Mining operations were, therefore, confined to streams in 3 specific areas. The earliest mining was carried out in the York-Tokeh area in the Freetown Peninsula where platinum was recovered from the Big Water, Ginda Water, and Alako streams, and also the Tokeh River.
- In 1935, platinum was found in Guma Water, and that area became the center of production until mining activity ceased shortly after the outbreak of the Second World War in 1939. After the war, 699 ounces of platinum were won from the gravel of the Babadorie River near Lumley.
- The total production of platinum from Sierra Leone amounted to 5,255 ounces, and the peak output was 750 ounces in the year 1935, when rich concentration of the metal was discovered in Guma Waters.
- The deposits of alluvial platinum in the beds of the streams in York and Tokeh (Freetown Peninsula) appears to be of considerable economic importance

MINING IN SIERRA LEONE

Quick Facts

1. Sierra Leone is home to large deposite of iron ore, Tonkolili Iron Ore is one of the largest deposites in the world with a JORC Compliant resource of 12.8 billion tonnes. The Marampa deposit also has a JORC compliant resouce of 1.5 billion tonnes.

2. Sierra Leone has one of the world's largest natural deposit of rutile with a JORC-Compliant mineral resource of cira 866.9 Mt (measured = 64.8 Mt indicated = 668.1 Mt and inferred = 134 Mt).

3. Sierra Leone is known for large diamonds. As recent as 2017, two large diamonds (709 carats and 476.7 carats) were found. The "Star of Sierra Leone" was the largest diamond ever found in the Sierra Leone. It weighted 969.8 ct and was found on 14th February 1972.

4. During the period of 2011 to 2021, Sierra Leone exported over 6.5 million carats of diamonds estimated at 1.74 billion dollars from artisanal and industrial mining operations.

5. Existing mining infrastructure includes: a 192 km railway line connecting Tonkolili Iron Ore mine and pepel port, and three mineral ports (Nitti, Pepel and Thofey in river port with capacities 3 Mtpa, 20 Mtpa and 9 Mtpa respectively). Pepel Port has specialised system, two- 200,000 tonnes material handling facilities a butterfly stacker reclaimer and a shiploader

6. The Government of Sierra Leone successfully completed a nationwide Airborne Geophysical Survey in 2021. The Survey generated roughly 548,000-line kilometers of high resolution magnetic and radiometric data across Sierra Leone

7. Kingho Mining Company (the largest Iron Ore operator in Sierra Leone) recently completed the construction of a 2 Mtpa tailings processing plant to produce iron ore concentrate of 62% Fe.

8. In 2022, Marampa Mines Limited Successfully exported 2.06Mt of iron ore concentrate (66% Fe). Expansion to 3.25 Mtpa commenced on 5th May 2022

9. Sierra Rutile's Production of 37 kt, up 32% on Q3 2022. as normal operation resumed following operation challenges. The definitive feasibility Study (DFS) and Enviromental, Safety and Health Impact Assessment (EFHIA) for the Sembehun Project is progressing on schedule.

10. FG Gold is progressing well with the development of the Baomahun Project which has a JORC certified resource of 5.81 Moz of gold across both open pit and underground mining, making it one of the largest gold projects in Africa.

REFORMS

TO ENCOURAGE MINERAL SECTOR DEVELOPMENT

Good governance of the mining sector is critical to attracting the right kind of investment and ensuring that the sector contributes towards increased economic development and reduced poverty in Sierra Leone.

The Government of Sierra Leone has undertaken targeted reforms to ensure that investment in the mining sector becomes less cumbersome. There is a one-stop-shop for business registration at the Office of the Administrator and Registrar General where businesses can be registered in 2 working days.

Sierra Leone can boast of one of the best mining sector policy, legal and regulatory regimes on the continent. We have clear laws and regulations to protect business investment interests and produce a win-win situation for mining investors and the Government and People of Sierra Leone. Using the Natural Resource Charter as a benchmarking tool, we continue to improve our mining sector management regimes to promote and support investment.

Our taxes and royalties are fair and competitive. There are on-going efforts to harmonize tax regimes in accordance with sub-regional and continental initiatives such as the ECOWAS Directives and the African Mining Vision.

The Government of Sierra Leone understands that mining operations can only thrive where there is adequate infrastructure to support it. Thus, we are implementing unprecedented infrastructural development projects, including building and expanding our bridges and road networks; and improving our electricity, water supply and communication systems.

Sierra Leone is an EITI complaint country, and we continue to pursue transparency and accountability principles in the mining sector, as in all other sectors, to ensure that we remain compliant and subject ourselves to scrutiny by our people. As we speak all Mining Agreements are available online.

Sierra Leone is undoubtedly the new destination mining investment on the continent, and we continue to explore ways of improving on the ease of doing business to make life easy for investors.

We look forward to welcoming you.

WHY INVEST IN MINING IN SIERRA LEONE?

Geology

Existence of a comprehensive nationwide high-resolution airborne geophysical (magnetic and radiometric) surveys, which will assist investors in quickly and confidently selecting prospective areas for mining investment at a significantly reduced cost.

Legal Framework – Investment incentives & guarantees

Sierra Leone reviewed its principal mining legislation in 2022, and the new Mines and Minerals Development Act of 2022 provides attractive fiscal incentives for investment, and also guarantees against nationalization & expropriation. A member of the Economic Community of West African States (ECOWAS), the Mano River Union and the African Union, also entered into bilateral investment treaties with the United Kingdom and Germany and a party to the 1965 Convention on the Settlement of Investment Disputes between States and Nationals of Other States

Infrastructure

- The Country can export goods under the AGOA and the top partner countries to which Sierra Leone Exports Minerals include China, India, Seychelles, France and South Africa.
- Four sea ports are regarded as major ports of national significance, three commodity ports (Nitti, Pepel and Thofeyim) that are operated by respective mining companies including the Port of Freetown. The port at Sherbro Island also caters for some commercial traffic, but is not significant.
- Sierra Leone's energy demand in is expected to grow by between 5% and 8.5% each year for the next 5 years.

Security

Peace, political and economic stability
Sierra Leone is now a peaceful & politically stable country. Political stability is crucial as it provides protection to investors

Sierra Le one recorded a 20.7% GDP growth rate in 2013/2014, making the country the second fastest growing economy in the world. Inflationary pressures continue to ease as inflation has dropped to 8.7% in April 2021 (compared to 14.8% and 15.7% at the end of 2019 and 2020 respectively)