



REPUBLIC OF SIERRA LEONE

THE GEO-DATA MANAGEMENT POLICY OF SIERRA LEONE

November 2018

Contents

Foreword	2
Definitions	3
Acronyms	6
1 Introduction	7
1.1 History and Evolution of Geo-data management in Sierra Leone	7
1.2 Geo-data management in today's market	7
1.3 Rationale for the Geo-data Management Policy	9
1.4 Scope of the Geo-data Management Policy.....	10
2 Geo-data Linkages in Sierra Leone	10
2.1 Geo-data and investment	10
2.2 Geo-data and government	10
2.3 Geo-data and environment	11
2.4 Geo-data infrastructure	11
3 Policy Goal and Objectives	12
3.1 Policy Goal	12
3.2 Policy Objectives	12
4 Policy Statements and Strategies	12
4.1 Clarify types of Geo-data	12
4.2 Geo-data Legislative Framework.....	14
4.3 Strengthen Geo-data institutions	16
4.4 Improved Geo-data acquisition and analysis	18
4.5 Use, Transfer and Sale of Geo-data	21
4.6 Introduce modern Geo-data management practices	23
4.7 Ensure security of Geo-data	24
4.8 Build regional and international partnerships.....	26
4.9 Improve access to finance for Geo-data management.....	27
4.10 Build Sierra Leonean Geo-data management capacity	28
4.11 Public information and building Sierra Leonean Geo-data management awareness	30
5. Strategy to Guide Geo-data Management Policy Implementation	31
5.1 Institutional arrangements	31
5.2 Geo-data management infrastructure	32
5.3 Legislative framework and enforcement mechanisms	32
6. Monitoring and Review	32

Foreword

This Policy seeks to show how Government intends to manage geological information in ways that will help all actors – Country, Companies, Communities – get a good deal from mineral assets. The preparation of this policy could not have happened at a better time than now when Government, with support from the World Bank, has embarked on a nationwide airborne geophysical survey. Prudent management of geological data that will be collected during this survey will be critical to Government’s long-term minerals development strategy and this Policy provides the framework within which Government will manage geological data.

Though the economy of Sierra Leone has been dependent on the mineral sector for decades, there has never been a comprehensive policy to guide Government’s geo-data acquisition and management strategy. In many ways, Government relied on geological information provided by exploration companies which have not always been helpful to effective mineral development and country planning strategy of Government. By adopting this Geo-data Management Policy, Government expresses its strong commitment yet, to improved governance and management of the mineral sector.

All efforts have been made to ensure that this Policy clarifies Government’s position on how Sierra Leone’s geological data will be managed. Further, this policy clarifies the role that all MDAs relevant to Geo-data management will play in ensuring that accurate Geo-data contributes to prudent mineral development practices and support broader development planning of Sierra Leone. Despite this effort, I am certain that there may be gaps which are yet to be filled. To ensure that this Policy achieves its objectives, it will be subject to review and updates as and when necessary and in any case, at least five years after its adoption.

This Policy is a very useful resource to guide review of provisions in the Mines and Minerals Act 2009 that are relevant to geo-data management.

.....
Hon. Morie Komba Manyeh (Ph.D)
Minister
Ministry of Mines and Mineral Resources

Definitions

Analogue means data represented in a physical way such as hard copy files, reports and maps, and may include objects such as samples, and such data can be stored in vinyl records, magnetic tapes, VCR¹ cassettes or other non-digital media. Analogue data exist without being measured.²

Artisanal mining in Sierra Leone is legally defined as “operations that do[es] not exceed a depth of ten meters”. The law also prescribes that 100% of artisanal mining be conducted by Sierra Leonean individuals or legal entities and licensed for operations are to be conducted on ½ hectare or less for one year, renewable for up to three one-year terms. The use of machines is prohibited in artisanal mining operations. (Note: Minerals Policy recommendation is to revisit this definition as part of legal review).

Deposit means any naturally or artificially occurring concentration of minerals.

Digital means data that represents other forms of data using specific machine language systems that can be interpreted by various technologies. The most fundamental of the machine language systems is a binary system, which simply stores complex audio, video or text information in a series of binary characters traditionally ones and zeroes or “on” and “off” characters.

Dredging is the act of bringing up or clearing up something from a river, stream, harbor, shoreline or other waterway using equipment or processes. Dredging in mining terms is the act of mining alluvial mineral deposits from the river channel.

Exploration means any activity carried out to discover minerals, oil or gas, to demarcate the quality and quantity of deposits contained within a licence area, or to evaluate the possibilities of their exploitation.

Extractive Industries Transparency Initiative (EITI) means an international convention in which Sierra Leone is a participant comprised of representatives from government, private sector and civil society to monitor mineral revenues.

Geo-data means information, individual items, samples and records obtained by observation, measurement, sampling and description of the Earth’s surface and subsurface,

¹ Video cassette recorder

² Source: Techopedia

both onshore and offshore, and having an association with a location relative to the Earth including geographical and geological information.

Geo-database means a database containing geoscientific, geographical, geophysical (i.e., gravity/magnetic), and spatial data and related information.

Ground truthing means the collection of information by direct observation.

Large-scale mining in Sierra Leone means mining that is conducted by mining companies and requires large investment and a high-level of mechanization; by law large-scale mining may be conducted by Sierra Leonean or foreign operators with no prescribed hectare (not exceeding an area of 125 square kilometers according to section 108 (3b) of the Mines and Minerals Act of 2009, which states that the area of a large-scale mine shall not exceed the area allowable under an exploration licence) limitations for up to twenty-five years, renewable for up to fifteen-year terms. (Note: Minerals Policy recommendation is to revisit this definition as part of legal review).

Licence means the legal rights over an area defined by specific UTM coordinates to conduct reconnaissance, exploration and/or mining (exploitation/production) of minerals or oil and gas granted pursuant to the provisions of the laws of Sierra Leone.

Metadata means a set of data that describes and gives information about other data.

Mineral means any substance, whether in solid, liquid or gaseous form, occurring naturally in or on the earth, in or under the water or in mine residue deposits and having been formed by or subjected to a geological process, including elements and compounds, metals and ores, gemstones, sand, stone, rock, gravel and clay, as well as soil but excludes water, natural oil, natural gas, oil and gas, topsoil and peat that can potentially be extracted for commercial gain.

Mining may also be referred to as “exploitation” or “production” and means any upstream activity that may include but is not limited to: prospecting, exploration, pre-production, exploitation, whether on surface or sub-surface or in water courses by means of which feasibility studies, pre-production development, extraction and processing of minerals take place from an identified deposit.

ONE geology means an international initiative of the Geological Surveys of the world that was launched in 2007 and that aims to improve the accessibility, interoperability and usefulness of global geoscience data via the worldwide web.

Processing means ore dressing and/or metallurgical processes applied to ore or other minerals substances which results in obtaining of products for sale including but not limited to smelting, crushing, concentration, beneficiation, washing, and refining.

Protected Area means a location that receives legal protection because of its recognized natural, ecological and/or cultural values.

Quarry means a place where industrial minerals such as aggregate (“construction materials”) or dimension stone are extracted in surface excavations and may include processing of these products and for purposes of this policy is not considered to be an artisanal mine.

Regulation means rules prepared as part of the legislative framework that are legally enforceable by appropriate government agencies.

Small-scale mining in Sierra Leone means the intentional mining of minerals in mechanized operations not exceeding twenty meters in depth or involving the sinking of shafts, driving of adits, or other various underground opening. (Note: Minerals Policy recommendation is to revisit this definition as part of legal review).

Standard means officially approved criteria designed to guide how certain activities are implemented in mining activities to safeguard specified issues such as environment, labour, social protection, equipment.

Universal Transverse Mercator (UTM) means a coordinate system to give location on the surface of the Earth that is not a single map projection but that uses a horizontal position representation that divides the earth into sixty zones.

Acronyms

AMV	African Mining Vision
BGS	British Geological Survey
CDA	Community Development Agreement
DGS	Directorate of Geological Survey
EITAP	Extractive Industries Technical Assistance Project
EITI	Extractive Industries Transparency Initiative
EPA	Environment Protection Agency
EU-ACP	European Union-Africa Cooperation Project
GIMS	Geographic Information Management System
GIS	Geographic Information System
IT	Information Technology
LDP	Local Development Plan
MDA	Minerals Development Agreement
MMMR	Ministry of Mines and Mineral Resources
MMO	Mines Monitoring Officer
MRU	Mano River Union
NMA	National Minerals Agency
NRA	National Revenue Authority
PanAfGeo	Geoscientific Knowledge and Skills in African Geological Surveys
PD	Petroleum Directorate
SLEITI	Sierra Leone Extractives Industry Transparency Initiative
USA	United States of America
UTM	Universal Transverse Mercator
WAXI	West Africa Exploration Initiative

1 INTRODUCTION

1.1 History and Evolution of Geo-data Management in Sierra Leone

The geology of Sierra Leone hosts diverse mineral resources that include diamonds, iron ore, gold, titanium ore (rutile), aluminum ore (bauxite) and chromite. Such resources, if of suitable size and location to make them economically viable for extraction with appropriate governance, could help drive long-term economic growth. Mining of diamonds, bauxite, iron ore and rutile has supported livelihoods in Sierra Leone for decades, and more recently there has been substantial exploration for coltan and gold. After recent oil and gas discoveries in West Africa, oil and gas exploration has also developed in Sierra Leone's offshore waters; the country is ideally situated for export routes to the world markets as well as supplying the local economy.

Mining and exploration have been significant contributors to the national GDP; still, comprehensive knowledge of the country's mineral, oil, and gas endowments does not exist. As large-scale mineral investments have increased, some attention to potential infrastructure, side-stream and downstream linkages has been given but has not optimized potential linkages or revenue generation. Mutually beneficial sharing of Geo-data amongst government agencies, investors and civil society can result in technically appropriate analysis that supports sound strategic infrastructure and other development, and improve resource valuation toward raising government revenues, underpinned by the mineral and oil and gas Geo-data.

Historically, the Ministry of Mines and Mineral Resources (MMMR) has been the responsible government agency for Geo-data management in Sierra Leone. The National Minerals Agency (NMA) was established by the National Minerals Agency Act of 2012, and has responsibility for management of mineral rights, for technical support to the mineral sector, and for geological survey and data collection activities. The latter functions are carried out by the Directorate of Geological Survey (DGS) within the NMA.

The Petroleum Directorate (PD) was established under the Petroleum (Exploration and Production) Act of 2011 to regulate the oil and gas industry in Sierra Leone and is responsible for Geo-data management relevant to oil and natural gas, and directly reports to the Office of the President.

1.2 Geo-data Management in Today's Market

A systemized and modern approach to Geo-data management is being developed but not yet in place. Somewhat ad hoc processes based on exploration findings and mine development contribute to the Geo-data and information for the country. Geological mapping of Sierra Leone is in development and includes airborne geophysical survey work. Existing maps primarily define large-scale deposit areas with lesser indication of small-scale and virtually no definite information on artisanal deposits.

Still, hundreds of AM licences have been issued in addition to credible reports of expansive illicit operations.

- **Minerals.** In recent years, a Geo-data Information Management System (GIMS) has been established as the data management system operated within the NMA. The primary purpose of the GIMS is to record all exploration reports and related data. (NOTE: this system is separate from the Cadastre that holds basic licence information). In addition, it stores other non- licence related information such as historic maps and data, reports from consulting projects and any associated data. The GIMS consists of a client-server application referred to as the ‘GIMS Intranet’ and a web site known as ‘GIMS Web’. Data are entered and maintained in the GIMS Intranet, while the public-domain subset of the data are periodically exported to GIMS Web³.
- **Oil and Gas.** The Petroleum Directorate (PD) currently holds digital geophysical data (seismic, aeromagnetic, well log data, reports, etc.) stored and managed mainly within geophysical interpretation software such as Kingdom; reports submitted by oil and gas companies operating on the Sierra Leonean continental shelf are maintained in pdf format. Some data remain to be digitized and exists only in hard paper copies; the PD does not maintain a database for general usage.

The NMA/DGS and PD have not been significantly staffed or funded to support adequate, comprehensive Geo-data management. Warehousing and storage facilities are severely limited in addition to insufficient staffing to complete scanning and geo-referencing maps. This contributes to constrained Geo-data management and reliance on mining and exploration companies to store valuable samples and data.

In Sierra Leone, large-scale, small-scale, and artisanal mining is ongoing in more than half of the country’s 190 Chiefdoms, much of which is conducted “blindly” due to a paucity of geological information. There is no comprehensive *geological map* of the country at a scale sufficiently detailed to provide information that could lead to investment decisions. The current geology and mineral potential map is at a scale of only 1:250,000; more detailed geological mapping is limited and some previous work has never been published; only c. 20% of the country is covered by detailed 1:50,000-scale geological maps that are available from the country’s archives. Most of the detailed maps that have been produced are from exploratory work done by exploration companies. These maps have been produced to varying standards and are rarely accessible to the public.

³ Source: BGS. The back-end data server component of the GIMS Intranet application is a spatially-enabled relational database managed using open source PostgreSQL database management software, with the PostGIS spatial plugin (<https://www.postgresql.org>), served from a server on the NMA network. The data areas stored by the GIMS PostgreSQL database.

Historic reliance on minerals development in Sierra Leone has shifted in the last few years as private investors have begun to focus their attention on highly prospective hydrocarbons. Although not yet discovered in commercial quantity, a petroleum system has been defined with oil discoveries offshore Sierra Leone. The area is largely unexplored but is seen by many within the petroleum industry as one of the few remaining areas with significant discovery potential in Africa; a case of when, not if, a commercial success is made in this region⁴.

The contribution of the minerals sector to the Sierra Leonean economy is of demonstrable impact, primarily in the creation of employment and generation of income in urban, rural and remote communities. Despite the opportunities presented by mining throughout the country, poverty rates are extreme, and the economic benefits are not adequately captured. A cadastre system is in place to allow an open and transparent method of all minerals rights in the country, facilitating the payment of fees and notifications for extensions and renewals as and when due. For oil and gas, bidding and licensing processes are similarly in place. The collection and improved use of Geo-data acquired through licences and other collection will not singularly address these missed opportunities but should considerably impact how Government next develops and seeks investment in its mining sector; physical and human capacity improvements are needed.

1.3 Rationale for the Geo-data Management Policy

This policy is prepared to ensure the acquisition, storage, use, and long-term management and preservation of Sierra Leone's Geo-data relevant to minerals, oil and natural gas. Government recognizes that availability of good-quality Geo-data is fundamental to building a comprehensive understanding of the wider potential of the mineral, oil and gas potential of the country, to attract future investment for the development of these resources, and to ensure good governance of these resources.

Enunciation of this Geo-data Management Policy for Sierra Leone is critical to support Government's policy commitment to developing minerals as a driving force for the country's economic growth and development and the potential for oil and gas to similarly contribute. Clear and accurate information about the location, potential quality, and estimated quantity of deposits and resources are essential to support the strategic development that includes levels of investment, potential markets, placement of infrastructure, environmental protection, social impacts, monitoring requirements, and development of human capital.

⁴ Early estimates suggest potential for up to a billion barrels of oil in place.

As part of its commitment to the African Mining Vision (AMV) adopted by all African Heads of State in 2009, Sierra Leone seeks to develop and strengthen its Geo-data management policies and practices to ensure that its non-renewable mineral, oil, and gas resources are conserved where necessary, and where developed, are used for the benefit of its citizens and long-term national transformation and growth.

1.4 Scope of the Geo-data Management Policy

This Geo-data Management Policy covers the governance and management of Geo-data and information relevant to minerals and oil and gas on or under land or water. This policy emphasizes minerals and oil and gas but may also be relevant for quarrying, ground water and natural hazards.

This policy provides guidance for all Geo-data relating to Sierra Leone and acquired or created by institutions operating within Sierra Leone including but not limited to the National Minerals Agency (NMA) including the Directorate of Geological Survey, the Petroleum Directorate (PD), and companies operating in the minerals and oil and gas sectors. Legacy (vintage) data, current data, and data to be collected in future should be included.

2 GEO-DATA LINKAGES IN SIERRA LEONE

2.1 Geo-data and Investment

Investors, analysts, and researchers use Geo-data to assess and analyze resource investments. In addition to financial information, Geo-data provides the technical background that significantly impacts the “commerciality” of an investment. The more accurate and developed Geo-data are, the greater likelihood for committed investors to readily enter the mining market. Countries that have non-digital, poor quality digital, or unreliable access to, geoscience data (geological maps, reports and their associated information) and lack suitable capacity (both financial and skills related) for the maintenance and on-going development of these data will not be attractive to investors.

Mining companies now operating in Sierra Leone are required to submit Geo-data (in the form of reports) to the NMA, enforced by the DGS; oil and gas reporting is submitted to the PD. However, some data may not be included in these submissions; these may include samples and core materials. Protocols and regulatory requirements requiring that these data be submitted when licences are relinquished (if not before) should be supported by ensuring that sufficient physical space and facilities are in place to safely store and manage these data.

2.2 Geo-data and Government

Geo-data are part of the country’s information linkages and may be used to publicize the mineral wealth of Sierra Leone and in some cases, to generate revenues for Government. For Government and civil society, Geo-data provides additional insight into overall resource development options

including better understanding of potential areas for near- and long-term investments and for resource planning and conservation.

Mining jurisdictions around the world maintain a national geological survey as part of government as the provider of a geoscience information and laboratory services. In Sierra Leone, the DGS as well as the PD require support to acquire, on a systematic and nationwide basis, data concerning the nature of the underlying geology and earth processes, and to interpret and present such data according to user requirements. Such data comprise the long-term national geoscience knowledge base of the country and information from this knowledge base is essential to national development.

2.3 Geo-data and Environment

Historically, mining has been conducted throughout Sierra Leone; all types of mining have threatened flora and fauna throughout the country including forest, nature, game reserves, sanctuaries, and national park areas, many of which are protected areas. Environmental and social consequences of how Geo-data is used for near and long-term development can be significant; accurate resource mapping and Geo-data analysis can mitigate intrusive resource development and better ensure that exploration activities are supported by Geo-data and not randomly conducted.

The perception of Geo-data is typically that it is reserved for technical experts, however, Geo-data is an essential component to ensuring that minerals development is properly governed and for the strategic development of natural resources, infrastructure, and communities. Where mining is conducted in or near water, by dredging or other techniques, land and water degradation are inevitable. Protected areas and national parks have already been impacted by illicit mining. Ecosystem destruction and deforestation of mining areas impacts quality of life, food, water and is highly problematic. Collection of appropriate Geo-data and analysis is critical toward developing a strategic approach to resource development that ensures environmental safeguards.

2.4 Geo-data Infrastructure

In recent years, significant improvements have been made to Sierra Leone's Geo-data infrastructure, but significantly more infrastructure support is required. For minerals, the necessary infrastructure required to provide ready access to the geoscience data and knowledge of Sierra Leone is facilitated through the Geo-data Information Management System (GIMS) at the NMA⁵ to enable the NMA to integrate reports, data and information supplied by mineral exploration companies. GIMS modules are for storage of geological, geophysical and geochemical data and may well also be capable to store data collected by the DGS during its own survey and mapping programs.

⁵ With funding from the World Bank EITAP.

A centralized data repository does not exist; secure physical storage and warehouse facilities are inadequate to house the cores and samples typically stored as part of a country's national Geo-data library. A small minerals museum is based in Freetown. The sole collection of samples of the diverse geology of Sierra Leone is located at the DGS offices in Freetown; rock and mineral specimens are stored in dedicated cabinets that are difficult to access. Construction of physical storage facilities, as well as reorganization and creation of an inventory is required.

3 POLICY GOAL AND OBJECTIVES

3.1 Policy Goal

The goal of this Geo-data Management Policy is to set out a clear framework for the management of Geo-data and information on a national scale, to underpin the development and governance of Sierra Leone's minerals, oil, and gas and is in line with Government's stated objectives of the Sierra Leone Minerals Policy 2018.

3.2 Policy Objectives

The overarching objective of this Policy is to position Sierra Leone as a data-rich jurisdiction by defining and clarifying the management and governance of Geo-data and information as a critical basis from which minerals and oil and gas shall be explored and developed. The primary Geo-data Management Policy objectives are, with respect to the minerals and oil and gas, to:

- i. Clarify types of Geo-data.
- ii. Strengthen the Geo-data legislative framework.
- iii. Strengthen Geo-data management institutions.
- iv. Ensure improved Geo-data acquisition and analysis.
- v. Clarify policy for the use, transfer and sale of Geo-data.
- vi. Introduce modern Geo-data practices.
- vii. Ensure security of Geo-data.
- viii. Build regional and international partnerships.
- ix. Improve access to finance for Geo-data management and analysis.
- x. Build Sierra Leonean Geo-data capacity.
- xi. Build Sierra Leonean Geo-data awareness.

4 POLICY STATEMENTS AND STRATEGIES

4.1 Clarify types of Geo-data

Current status

As an informational and investment concept, “Geo-data” is poorly understood outside the technical bodies operating in Sierra Leone. Geo-data is presently acquired, stored and analysed by the NMA (particularly the Directorate of Geological Survey), the Petroleum Directorate, and companies operating in the minerals, oil and gas sectors⁶. Currently, Geo-data in Sierra Leone comprises raw observational data, maps, photographs, samples, reports, licensing information and raw and processed data obtained by technical analysis of physical and chemical characteristics. Existing Geo-data have been collected in the field, in the laboratory, and by remote sensing; metadata is rarely included in the country’s databases.

Large-scale mining companies and oil and gas exploration companies are required to submit certain data; such submission requirements are included in the regulations and may be more specifically defined and expanded. While small-scale and artisanal mine operators may review Geo-data it is generally specific to the mining operation for a limited time; notably artisanal miners tend to operate with no formal training or benefit of modern mining technologies. Limited Geo-data collection or analysis is conducted by university or technical institutes; limited Geo-data and related information transfer from mining operations to the rest of the economy has occurred.

Policy statement and implementation strategy

A consistent and comprehensive understanding of what comprises Geo-data will facilitate government’s effort to develop a body of Geo-data that supports well-managed development of minerals, oil and natural gas. This policy sets out broad guidelines for what comprises “Geo-data” in line with modern Geo-data management practice. Primary definitions of the types of Geo-data and information that will be included and considered for the development of the country’s Geo-database are given below, additional categories may continue to develop.

- i. **Geo-data.** Individual items and records obtained by observation, measurement and description of the earth’s surface or subsurface, onshore and offshore may include, but not be limited to:
 - Raw data such as field observations and measurements;
 - Photographs;
 - Samples and core materials;
 - Borehole logs;
 - Analytical data from measurement of both physical and chemical characteristics;
 - Remotely sensed data;
 - Geophysical data including airborne and offshore data;
 - Resource and other mapping; and
 - Data and information on licensing, land use, etc.

⁶ Geodata may also be collected by companies operating in other sectors such as groundwater, and by academics and consultant researchers; these geodata are not covered by this policy.

ii. **Interpretation and other data.** In accordance with good international practice, information developed through the addition of intellectual inputs to interpret data can also be considered as Geo-data and may include:

- Maps (including geological, geochemical, geophysical, geotechnical) and plans, both analogue and digital, historic and current, and
- Written reports and publications in both digital and analogue formats

iii. **Metadata.** Government further recognizes the importance of data describing each data set or “metadata”. Any data added into the national Geo-data management systems should include associated metadata, which follow a defined format that shall be prescribed by regulation and may include, but not be limited to:

- The date of the data collection;
- Individual, institution or organization responsible for the data collection;
- Title or description of the data and how it was derived;
- Data locations and scope;
- For spatial data, coordinate information;
- Format of digital data; and
- Clear information on the ownership of the data and the terms and conditions for its use.

4.2 Geo-data Legislative Framework

Current status

Despite existing legal and regulatory frameworks as well as international conventions and standards, insufficient legal and regulatory attention has been given to Geo-data management and governance in Sierra Leone. The Mines and Minerals Act 2009 creates the legal framework for the minerals sector. Although the Act does not specifically define “Geo-data” or detail specific provisions on data ownership, acquisition, use, storage, transfer and other aspects, some legal guidance with respect to the obligations of licence holders concerning data and information is given. The Petroleum (Exploration and Production) Act of 2011 makes clear that all data are property of the State and assigns Geo-data management aspects to regulations.

Geo-data management has predominantly focused on large-scale minerals mining and offshore oil and gas exploration with some attention to small-scale mining operations. While certain data and information procedural rules are in place, a clear legislative framework to regulate and manage Geo-data is not. Most legal requirements relevant to submission of reports, storage of samples and core and other data management rely on regulations, general Licence requirements and some protocols established by the NMA/DGS and PD. Geo-data submission and handling requirements are either not legislated or should be clarified and strengthened.

For oil and gas, the types of data held by the PD include (1) multi-client (also referred to as “spec data”) which means a service company has acquired data at their own cost, and therefore owns a stake in the dataset; (2) legacy or vintage data; and (3) proprietary data acquired by oil companies, for example, that have relinquished acreage (data relevant to that acreage).

While data ownership and confidentiality rules are fundamentally legislated for minerals and for oil and gas, regulations and protocols have not fully considered the scope or utility of Geo-data in all its forms or the stages at which data are developed. Oil and gas companies are legally entitled to cite their information as “confidential” where it may materially adversely affect or economically impact the holder should such information be released to a third party. Penalties against parties releasing confidential data are legally defined.

Policy statement and implementation strategy

Geo-data will be managed by the relevant agencies (i.e., NMA, PD) for the national public good, and that where possible all Geo-data should be held in appropriate national Geo-databases managed by these agencies. Reconciliation of legal provisions included in the Mines and Minerals Act, 2009 and Petroleum Act, 2011, and other sector-relevant legislation with respect to data and information management will be conducted to ensure that clear and enforceable legislative provisions are in place. Legally clarifying the definition of Geo-data to support its role as the foundation from which minerals, oil and gas are developed will be pursued. Where useful, updating and clarifying legal requirements, definitions and certain implementation aspects of Geo-data management will be achieved through legal and regulatory review. Development of Geo-data management standards and data protocols will require continued expert review and awareness building.

Legislative improvements that will clarify and improve data reporting requirements and facilitate access to geological data will be made. Active measures will be undertaken by the NMA/DGS and PD to prepare, publish, and regularly update Geo-data management rules and regulations to specifically address Geo-data ownership, acquisition, storage and security, use, transfer and other data governance aspects. Geo-data ownership, confidentiality, copyright, and release of data at each stage of investment shall be clarified, i.e.,

- i. **Minerals.** While mining and exploration companies own the data they collect, rules and regulations on how and when those data are provided to the NMA/DGS shall be codified and enforced. Through the Mines and Minerals Act of 2009, the DGS has the option of taking ownership of all records maintained by the holder of a mineral right (Licence), which includes reports, geological and geochemical data, maps, and borehole logs. Although not explicitly stated, this should also include rock core and geological samples collected by the mineral exploration company during its work. This option becomes effective upon termination of the

mineral right, once the exploration company either relinquishes its licence or at the end of the licence period.

- ii. **Oil and Gas.** Existing and proposed legislation shall be reviewed to ensure clear ownership and use guidelines for data relevant to each licence type. Under the Petroleum Law, 2011, the State is legal owner of all oil and gas data whether acquired by private licence holder or government body. It is recognized that most data held by the PD is multi-client data (“spec data”); this prevents the PD from exchanging the data with other government organizations such as the NMA and the PD rely on sales of these data for income. Data requirements for the National Oil Company shall also be clear and similar to private operators.

This Policy shall ensure that appropriate categorization and sharing of Geo-data and related mapping and other information become legal requirements integral to exploration and mining operations. Use and exploitation of mapping data will be promoted through legislative and licensing requirements. Existing legal, regulatory and licence requirements for how Geo-data is collected, categorized and managed shall be strengthened with the ultimate objective that data will be available to the public, taking in consideration financial and legal restrictions appropriate for each dataset. Particularly with respect to technical oil and gas information, legislative requirements will specify the processes through which legacy data and current information may be released to the public including notification processes, objections, fees, and dispute resolution.

4.3 Strengthen Geo-data institutions

Current status

The Ministry of Mines and Mineral Resources (MMMR) is the primary government Ministry responsible to provide policy guidance for mining operations in Sierra Leone. The National Minerals Agency (NMA) was established by the National Minerals Agency Act of 2012, and has responsibility for the management of mineral rights, for technical support to the minerals sector, and for geological survey and data collection activities. The NMA presently has regional offices and is wholly reliant on its approved budget from Government to cover its annual running costs (including purchase of consumables) and associated activities.

- **Minerals.** The NMA comprises five Directorates⁷, one of which is the Directorate of Geological Survey (DGS), responsible for the geological survey and data collection activities

⁷ In addition to the (1) Directorate of Geological Survey, the Directorates of (2) Mines;(3) Precious Minerals and Trading; (4) Finance and Administration and (5) Community Affairs and Public Relations.

of the NMA. The DGS has the primary Geo-data management responsibility for the minerals sector and is responsible for the geological mapping of Sierra Leone, prospecting and exploration operations, the collection, compilation, publication and dissemination of data and information concerning the geology and mineral resources of the country. The DGS maintains the country's technical and laboratory services, minerals library and records facilities, and assists in promotion of the mineral potential of the country.

- **Oil and gas.** The Petroleum Directorate (PD) was established under the Petroleum (Exploration and Production) Act of 2011 to regulate and promote the oil and gas industry in Sierra Leone and is responsible for Geo-data management relevant to oil and natural gas, and directly reports to the Office of the President.⁸The PD comprises a technical department and an administration, legal and finance department⁹. Most of the Geo-data held by the PD relates to Sierra Leone's offshore waters, although some coastal onshore data are also held.

Other governmental institutional players have access to Geo-data; their roles may be better defined and include the Minerals Advisory Board, Mine Wardens (paid by the Public Service Commission), and Mine Monitoring Officers (MMOs – paid under the NMA). Mining Committees operating at the Chiefdom level have considerable power, notably with respect to artisanal information; unofficial “District” Mining Committees that have emerged may also be reviewed. The Ministry of Finance and Economic Development (MoFED) and the Environment Protection Agency (EPA) also have important roles to play in Geo-data governance and management. Other organisations such as universities and consultancies may hold privately-acquired Geo-data; mechanisms should be developed to allow voluntary submission of these Geo-data to the NMA or PD as appropriate.

Policy statement and implementation strategy

Both the Directorate of Geological Survey (minerals) and the Petroleum Directorate (oil and gas) have primary functions in Geo-data management; assessment of what measures will help to strengthen their efficiency and whether restructuring or revisions of the structures would benefit its Geo-data management role will be made. The specific capacities, infrastructure and data management aspects must be addressed for each.

Establishment of Geological Survey regional offices at some, or all, of the NMA regional offices will be supported with specific emphasis on Geo-data management activities, including capacity building at the local level. Consideration of regional operations for the PD will also be given. Equipment and physical infrastructure requirements of the institutions charged with Geo-data management will be

⁸ The Sierra Leone National Petroleum Company (SLNPD) is a State-owned company. This organization at present is just a registered company, not active and has no assets or staff. Currently this organization sits within the PD.

⁹ The PD represents the state exclusively in negotiations regarding the exploration, development or production of petroleum; it acts on behalf of the state in petroleum agreements and regulates the upstream industry in Sierra Leone.

assessed with specific emphasis on housing Sierra Leone's samples and cores. Staff capacity requirements are discussed below.

NMA/DGS and PD will review approaches that may improve institutional Geo-data coordination and use, (as described in Section 5 below) to include a Geo-data Management Policy Committee and an Inter-agency Geo-data Management Committee. These bodies will, respectively emphasize technical implementation of this Policy and the coordination and harmonization of Geo-data in Sierra Leone. With the DGS and PD as co-leads, such committees should be established to promote consistent data, metadata standards, system interoperability and cross-government best business practices for geospatial resources, policies, standards, and technology. Limited interaction of the PD with the MMR, NMA/DGS shall be addressed to ensure that a harmonized approach to Geo-data standards and understanding are in place.

4.4 Improved Geo-data acquisition and analysis

Current status

Sierra Leone has improved Geo-data acquisition, but more and more detailed data are required and government capacity to conduct analysis may be strengthened and expanded. It is likely that especially for certain large-scale mineral investments, adequate Geo-data and analysis would have better positioned government to use an international tender process for the award of minerals rights but without certain data and understanding, Government was forced to rely on the "first in line" approach.

Approximately 40% of the country has been covered by good historical geological mapping; a national geological map exists but a national mineral deposit or offshore resource map does not exist. The only national-scale geological data source currently available is the 2004 Geological Map of Sierra Leone¹⁰ at a scale of 1:250 000¹¹. Scientific literature on the country's geology is very limited; some aspects of the 2004 Geological Map appear to contradict information in published papers¹². There is no accompanying report for the 2004 Geological Map, and thus no published information about the limitations and uncertainties associated with the map data; a high-level of uncertainty

¹⁰ Geological Survey of Sierra Leone, 2004

¹¹ This map was compiled by the Council for Geoscience (the South African geological survey), using previous mapping undertaken at a variety of scales (1:50 000 to 1:250 000) that was mostly carried out between 1950 and 1981, by different geologists from the United Kingdom and Sierra Leone; some parts of the country have never been mapped.

¹² e.g. Morel, 1979

associated with large parts of this geological map makes it very difficult to use for targeting mineral exploration¹³.

There has been very little systematic geological, geophysical or geochemical survey work carried out in Sierra Leone in the last 35 years. Historic reports are valuable for new investors and government; in many instances such reports only exist in Sierra Leone in the form of one hard copy; scanning and digitization of this Geo-data is important for future use and review. Companies carrying out mineral exploration in Sierra Leone over the last decades have collected substantial amounts of localized data that has not been made available to the DGS¹⁴. Even if these data could be acquired, their quality is likely to be variable. Easy access to historic mineral exploration and other reports is important as the information is still relevant, often representing the only geological information available for a specific area of the country. As they often provide considerable background information, reports of previous exploration are valuable to mineral exploration companies because any new investor can immediately build on earlier work.

Data relating to the oil and gas industry, such as seismic data, have been collected by companies and are managed by the PD. Seismic data are regarded as key to obtain information about the subsurface for oil and gas exploration. The PD has spent much time and effort in collecting all the seismic/well data offshore; in Sierra Leone where exploration has been focused offshore, seismic data is often the most revealing and confidential data set that an institution can possess. PD use of industry interpretation software suites¹⁵ and data interpretation skills may be strengthened. As the onshore area is considered a region of future hydrocarbon potential, the PD acquired aeromagnetic survey and gravity survey data in 2014 to link the offshore with the onshore potential. Reconciliation of these data will be important as the opening of the onshore area for hydrocarbon exploration could result in some overlapping interest with mining licences already in place across the coastal region of Sierra Leone.

Policy statement and implementation strategy

Modern survey data provides a critical basis for developing Sierra Leone's resources; a modern program of data acquisition is essential. Priorities include: 1) a national airborne geophysical survey, 2) a targeted geological and geochemical mapping program that will produce modern datasets in key areas for targeting mineral exploration, and 3) cataloguing and digitizing data acquired from a range of sources. DGS, PD, and other historic reports and geological maps shall be scanned and converted

¹³ This uncertainty can be attributed to the reconnaissance nature of the original surveys (Morel, 1979); the high degree of tropical weathering that exists in Sierra Leone and thus the limited nature of bedrock outcrops; and the age of the data.

¹⁴ Although they are now actively pursuing licence holders to obtain such data.

¹⁵ i.e., Kingdom

into searchable digital form to facilitate digital access and to ensure their long-term survival and include online access.

The NMA will be responsible for organizing and managing the national core repository. To achieve this, the NMA will support continued strengthening of GS and PD acquisition and analysis capacities. These organisations will ensure core samples submitted by companies (in both minerals and oil and gas) are preserved in this national core repository which will house borehole cores, cuttings, samples, specimens and related subsurface information and which will be curated using best practice. Digital data submitted by companies to the NMA and PD will also be held as part of national Geo-databases. Data submission requirements will be strengthened; embargo periods (time-restrictions) may be introduced so, for example, data are submitted to the national database but not made available to the public for some time. Top priority will be accorded to a more detailed geological mapping of the entire country including an airborne geo-physical survey; technical review of the survey findings and of available satellite images together with ground-truthing will contribute to building new geological maps. Additional support to build capacity to interpret, analyze, catalogue and utilize the data shall be part of the DGS in addition to other Geo-data capacity building initiatives.

Geo-science data and the supporting knowledge infrastructure will be strengthened and made available to deliver information to investors and stakeholders as part of Government's strategy to create an enabling environment for investment. The DGS and PD will prepare guidelines on how new datasets will be managed and made accessible to the public, (including for geophysical airborne survey) with information about data formats and metadata submissions. PD capacity to analyse seismic and other oil and gas data will be strengthened. Consideration of any role non-government actors may have in Geo-data analysis will be given.

Standards will be prepared and strengthened by the NMA/DGS and PD to ensure data acquired for publication must be documented with accurate metadata to describe the methods or techniques used to collect, process and analyse data including a description of its accuracy and precision. Recommendations for the techniques used to collect data will be prepared and should conform to national and international standards including metadata standards. Private exploration companies are obliged to lodge all Geo-data, samples and cores with the DGS and PD, as is relevant, that will contribute to national Geo-databases. Clarified reporting requirements can better integrate mining companies' exploratory findings to build the country's Geo-data holdings. MMMR will monitor and work with investors to ensure collection and safeguarding of Geo-data. Data management guidelines will be prepared by the NMA and PD; where data are generated from the private sector, clear procedures on use and archiving privately-held data will be prepared including on confidentiality and use of Geo-data. Government is committed to increased Geological Survey and IT support to establish and maintain valuable Geo-data.

The quality and accuracy of Geo-data is essential for investors, to inform development, and for Government to forecast potential resource development. Analysis of this Geo-data must be expertly conducted by government staff and, as required, with outside expertise. Technical and financial capacity of relevant regulatory bodies to conduct geological surveys and expert analysis for various minerals, especially critical metals and precious minerals, will be strengthened and include authority to declare specific areas as reserved.

4.5 Use, Transfer and Sale of Geo-data

Current status

Rules and accepted practices for the use, transfer and sale of Geo-data are broadly in place for minerals, oil and gas, but are generally inadequate to address the array of modern Geo-data that is considered in this policy. The majority of Geo-data is used to promote and develop investment. Use of Geo-data for mining-related research and technology development in Sierra Leone may be more actively pursued and supported, for example, by local universities, consultancies, or Think Tanks.

Minerals. Standard practice allows that available Geo-data sought by investors, licence holders or other interested parties in minerals is provided by the Geological Survey, typically at cost. Most data are purchased at the DGS where an order to pay is given and payment made at the Sierra Leone Commercial Bank. There are also examples of data transfer from licence holder to licence holder, commonly resource and mine maps. The majority existing geological maps of Sierra Leone are either held in the NMA or at BGS in the UK. Maps held in the BGS have the copyright of the Government of Sierra Leone and may therefore be scanned and transferred with permission from the NMA.

Information about the types of data available at the DGS is on the web. The GIMS is in place at the NMA and web access is in place, although only limited data are currently available; both the website and web portal have been designed and built with desktop users in mind. Though viewable on mobile devices the user experience of mobile devices is very different from that of desktop, by restricting the mobile user experience in this way it limits mobile users' ability to effectively access the website and web portal for thorough review and analysis; this means a potentially larger base of users are overlooked.

Oil and Gas. Under the 2011 Petroleum (Exploration and Production) Act, all oil and gas information and data collected, prepared and held by a licence holder is the property of the State. The PD holds varying data, i.e.

- *Geophysical data that are multi-client data*, i.e., a service company may obtain data at its own cost and therefore owns a stake in the dataset; if those data are sold by the PD both the PD and the service company are entitled to a share of the income from the sale. *Under Petroleum Act revisions*, a fee is established, payable by petroleum licencees on grant of the licence in respect of the geological and geophysical data held by the PD. The fee is not related

to any actual sale of data and is payable in the same amount irrespective of those data if any held or provided by the PD.

- *Geophysical data that are not multi-client, including legacy data;* for these data types, a system shall be established for released data to be accessed by potential investors with a small fee or registration of interest with the PD.

Policy statement and implementation strategy

The fundamental premise of Geo-data management in Sierra Leone is that *Geo-data is curated for the national good*. Use of Geo-data shall be reasonably regulated with the recognition that those data are for the benefit of sustainably developing the country's minerals, oil and gas.

Data collected will be spatially located, with appropriate metadata, and may be summarized in regional geological, geochemical, geophysical or hydrogeological maps and models, or more specialized combinations of these, together with explanatory reports. The underpinning data collections upon which these products are based, comprising such material as rock, soil and water samples, analytical results of various kinds, field notes and maps, borehole logs and geophysical measurements, are considered as a vital part of the national geoscience information infrastructure of Sierra Leone.

Review of which datasets will be made openly available to the public and which will be kept confidential, sold, or licenced with clear statements on how the different approaches will be managed shall be conducted. Geo-data may be used for discovering new resources, developing existing mineral occurrences for tender, investment promotion, monitoring licences, marketing the country's potential, developing strategic planning, and for research. Except for any restrictions that may be legally imposed, the majority of Geo-data should be available for public access; data licensing and fees may be required, but a certain amount of data should be made freely available via web portals. The DGS and the PD will respectively review policy with respect to exploration data collected by mine companies and for oil and gas exploration purposes; such policy determination should inform updated legislative drafting.

Databases, data portals, catalogues and physical collections will comprise Sierra Leone's Geo-data base. Rules for use, transfer, and sale shall be prepared. Improved access to the GIMS to remove limitations now experienced by mobile users will be considered. Clear data management protocols shall be prepared and published by the NMA/DGS and PD. Existing data held by the NMA such as scanned geological maps shall be made available through the GIMS portal. New data collected should be stored, managed and disseminated through the GIMS and, where appropriate, a PD web portal or data room; the responsible institutions will review the databases to understand what changes, if any, need to be made to fit this purpose. Maintenance plans for the databases shall be put in place.

Regional and sub-regional platforms may be set up for knowledge generation and sharing. Licence holders should be clearly informed of Geo-data collection and submission requirements and appropriate enforcement mechanisms. The use of Geo-data to resolve claim disputes will be supported.

In addition to continued support of the GIMS, Government shall establish a corresponding system for oil and gas that integrates data for the research and monitoring of sustainable production. Future integration that includes water and other resources, land use, waste management and recycling, to formulate practical regulations for minerals and oil and gas developments may be conducted. Use of data will cover all phases of exploration, exploitation, storage and transport of minerals and mine materials, soil and water use, waste storage and removal.

4.6 Introduce modern Geo-data management practices

Current status

Prior to the EITAP programme, Geo-data management practices relied on entrenched ways of data management that had been in place for decades. Government has embraced the benefit of modernizing its Geo-data management practices and via the NMA/DGS is developing a world-class geo-data system and the online repository maintained by the Geo-Data Information Management System (GIMS) will continue to be enhanced.

Technical and laboratory services are established at the DGS. Data are produced, and the interpretation of those data shall underpin modern geological survey and PD activities. Laboratory work will be managed via a Laboratory Information Management System.

Most mineral-related digital and analogue data are presently stored in the NMA Freetown offices with access through the DGS; some data types (e.g., cores) are still held by mining companies as NMA offices have insufficient storage space. For oil and gas, extensive geophysical data are held and accessed through the PD. Comprehensive mapping of the country is not in place, but measures are gradually being taken to improve resource information and data management.

Policy statement and implementation strategy

Improvements to IT infrastructure and systems, Geo-data management, and web portal designs at both the NMA/DGS and PD have made significant advances in this over the last few years and are now adequately setup. However, improvements are still required for the DGS and PD to deal with the increasing demand for geological data. The Geo-data Information Management System (GIMS), based at the Geological Survey and serving as a physical and virtual network, shall continue to be

designed to permit the development and online sharing of the nation's Geo-data. Considerable Geo-data is anticipated from the forthcoming geophysical airborne study that will provide a tangible opportunity to include and process data; equipment and capacity to ensure optimization of these findings must be supported for years to come.

It is expected that other types of maps and programs will evolve to incorporate Geo-data with other data for the benefit of industry, investors and government. Geological mapping programs using geologic maps and 3-D geological frameworks will provide critical data for economic planning, understanding earth surface processes and ground-water availability. This data will contribute to decision-making with respect to potential mineral and oil and gas investments including understanding onshore-offshore sediment processes.

Government will continue to support the technical and laboratory services at the NMA/DGS and PD facilities where in-country, state-of-the-art facilities are being established. Improved data management systems will be put in place to underpin this work.

4.7 Ensure Security of Geo-data

Current status

Digital and analogue and other Geo-data is presently housed at the NMA offices in Freetown and at the PD. Mineral samples are stored at various locations, including at company offices, throughout the country; a core depot/storage facility does not exist. Oil and gas cores are stored internationally on behalf of the PD. New electricity and related infrastructure have been installed at the NMA/DGS offices to ensure physical security of Geo-data. The DGS and PD review the quality of data and where possible, seek enhanced quality or information as may be useful. Consistent and enforceable rules for Geo-data use and confidentiality of Geo-data may be developed.

Under the 2011 Petroleum Act¹⁶, licence holders are required to maintain specific data at their place of operation and to allow inspection and to submit prescribed data and information to the Petroleum Directorate following specific bi-annual and annual reporting requirements. This includes maps, tapes, and reports of geological and geophysical data. Clear confidentiality provisions are provided including legal guidance for when the PD shall not release information to third parties except with the rights holder permission.

Policy statement and implementation strategy

- i. Physical security.**

¹⁶ i.e., Part XV

- a. **Cores and Samples.** A national Geo-data repository to hold physical data objects such as cores and samples shall be constructed to ensure best practice in the curation of these collections. Upon establishment of a national repository in Sierra Leone, cores belonging to the NMA and PD, that are now stored internationally, will be relocated to the national repository. Review of the physical locations in which cores and samples are stored including temperature control and physical access, notably after business hours, will be conducted from which a plan for enhanced security will be developed and periodically reviewed and updated.
 - b. **Digital and Analogue Data.** Measures will be put in place to ensure security of digital Geo-data and to allow for disaster recovery. Digital Geo-data will be held on centralised servers at the NMA and the PD. Data will be regularly backed up using appropriate procedures such as backup of files to tapes, with backup tapes stored both onsite and at a secure location offsite. Hosting the NMA website and web portal on an external hosted environment presents vulnerability; automated processes, up-to-date software and licensing, and enabled GIMS integrations with the NMA web portal are critical aspects to be addressed to ensure that online data services are not interrupted. Budget security to ensure uninterrupted power supply in Freetown and regional offices is required to maintain DGS and PD Geo-data storage will be actively pursued. Storage of national datasets including back-up and disaster recovery procedures will be developed. Physical space to ensure safe, long-term storage of hard copies of reports and other data shall be identified and supported.
- ii. **Quality control and assurance.** The Geo-data included as part of Sierra Leone's minerals and oil and gas Geo-databases and physical repository will underpin important investment decisions, policy initiatives and strategic planning. It is essential that its accuracy, clarity and content meets a credible standard for review. Protocols will be developed by the NMA and PD to guide standards before data collection, during and after data entry. As part of all licence requirements, clear data and reporting requirements will be included for which licence holders shall be responsible for the duration of the licence to submit to the NMA or PD as appropriate. The Directorate of Geological Survey will be responsible for review and submission of all minerals-related Geo-data into the repository and for cataloguing same and shall include appropriate metadata as will be prescribed under Geo-data management rules. Consideration will be given to the African Mining Vision (AMV) objective to standardize mapping protocols, systems and terminology.
- iii. **Confidentiality.** In developing activities to support Geo-data management, the NMA/DGS and PD will determine what is required to obtain approval to publish or release Geo-data to the public. Until data are approved for release, data are considered provisional or preliminary

and subject to revision. Reviews of data and associated metadata are required before data are approved for release. Protocols for such review processes shall be developed and published. Data shall include a standard disclaimer statement, an identifying number or reference, and be supported by procedures that ensure long-term preservation.

4.8 Build Regional and International Partnerships

Current status

Sierra Leone is in western Africa bordered by the Atlantic Ocean, Guinea to the north and east, and Liberia to the southeast. Through the Mano River Basin Union (MRU) as well as the AMV, Sierra Leone has taken a leadership role in strengthening cross-border and regional harmonization and coordination of mining activities. Geo-information programs being implemented throughout Africa include ONE geology, the PanAfGeo, and more¹⁷.

International investors are licenced to conduct mining in the country, typically obligated to minerals development agreements and community development agreements. Critical to building a comprehensive Geo-data platform for Sierra Leone is its partnerships with international development partners (IDPs) including the partnership with the World Bank to facilitate an airborne geo-physical survey of the country, anticipated to provide significant information and confirmation of the country's mineral and oil and gas resources.

Policy statement and implementation strategy

A core objective of the AMV is to prepare comprehensive knowledge of Africa's mineral endowment. In addition to the AMV, Sierra Leone is a member of the West Africa Exploration Initiative (WAXI) which targets the expansion of research and training in minerals by key institutions in the sub-region and will actively pursue Geo-data programs with WAXI and the AMV.

Government is committed to identifying technical assistance and funding partnerships to ensure that a national laboratory, Geo-data management centre, and technically qualified local staff are available to sector operators and that the NMA and Geological Survey have adequate capacity to manage Geo-data. Government will assess where possible whether universities, technical institutes, and local think tanks can assist in mapping and other aspects of Geo-data management.

¹⁷ Presently, the SL DGS participates in the PanAfGeo and West African Exploration Initiative (WAXI).

Regional and sub-regional Government will partner with key donor agencies to ensure experienced and expert technical support is in place to establish reliable and transparent data acquisition processes and analysis. Geo-data licence requirements, MDA and CDA requirements will be reviewed to ensure global best practice with respect to data collection, use, and reporting by licence holders.

Where possible, regional and international partnerships will be sought to promote information exchange, capacity building, and Geo-data technology transfer. Building linkages with international geological surveys with the NMA/DGS and the PD will be explored and supported. Government shall explore opportunities to not only partner with international players but to establish businesses in the form of Sierra Leonean subsidiaries, consultancies, academic and technical institutes through which Geo-data management activities including research, mapping, and product development may be commercialized.

4.9 Improve Access to Finance for Geo-data Management

Current status

Sierra Leone does not have a formal system of Geo-data management businesses; this work is generally conducted by government departments, specifically the NMA/DGS and the PD. Primary funding relevant to Geo-data management relevant to minerals and oil and gas is via government budget funding earmarked to the NMA for the DGS and to the PD.

Government is committed to funding Geo-data management. In recent years, government has secured donor funding to facilitate the establishment of the DGS technical and laboratory services (via the African Development Bank and World Bank) and development of a Geo-data Information Management System (GIMS). World Bank assistance will fund a geophysical airborne survey. However, geological data collection and interpretation activities remain heavily under-resourced resulting in constrained DGS operations and inadequate capacity building activities. There is not a regularized income stream in place to ensure consistent Geo-data management activities by government or otherwise are funded. Inadequate Geo-data funding has contributed to an ad hoc approach to the collection, analysis and technical use of essential geological and other data.

Policy statement and implementation strategy

Geo-data management in Sierra Leone shall be government-led. Government will prioritize budget review of Geo-data management requirements and identify critical funding requirements for the near- and long-term. Configuration of mechanisms that may directly fund the DGS's and PD's Geo-data management function will be considered and may include a portion of licence fees, royalties, or other direct funding approach.

Government will identify systematic approaches to funding sound Geo-data management activities; where partnerships with other government agencies or the international community may be of use, they will be pursued. Assessment of a potential private sector role including for-profit and non-governmental organizations will be made in line with proven global practices. Government will work with stakeholders to identify opportunities for improved collection and storage approaches that engage the population, create jobs, and contribute to improved assaying, estimation, valuation and knowledge of the country's minerals and oil and gas base.

4.10 Build Sierra Leone Geo-data Management Capacity

Current status

Government and its Geo-data management institutions have made significant improvements in how Geo-data is presently understood and managed in Sierra Leone; still, technical and analytical capacities are limited and physical infrastructure constrained. Regulatory drafting and enforcement may be strengthened. Geo-data management capacity building is government-led.

Policy statement and implementation strategy

This Policy supports the systematic collection and analysis of geological data relevant in Sierra Leone. The NMA/DGS and PD will continue to lead Sierra Leone's Geo-data management activities; staff training is required; capacities must be strengthened.

The NMA/DGS will be strengthened as the central organization for geological, geophysical and geochemical mapping, Geo-data generation, storage, research and analysis. Newly constructed facilities and modern equipment installed at the DGS are expected to contribute to improved Geo-data management, specifically its handling, cataloguing, analysis and storage. The NMA/DGS shall enhance its research and development capacity in partnership with local academic and technical institutes and where useful, with other provinces within the country. Development of existing data management systems (e., the GIMS at the NMA) and new databases (e.g., at the PD) with improvement of data portals for online access to data will be supported.

The NMA/DGS and the PD maintain staff responsible for the acquisition and analysis of Geo-data where capacity may be strengthened. Continued strengthening of the DGS and PD to ensure that core samples are submitted by companies, including building a physical data repository which will house borehole cores, cuttings, samples, specimens and related subsurface information using best practice, is essential. PD capacity to use industry interpretation software, conduct data interpretation, and fieldwork training shall be emphasized.

To improve Geo-data collection Government will work in partnership with companies working in the minerals, oil and gas sectors, and local authorities. Inspectorate capacity specific to data requirements will be strengthened using a certification appointment system for Inspectors (compliance monitors) to ensure technical competency to monitor operational and data aspects of mining. Practical aspects such as provision of inspectorate transportation, GIS and other tools will be addressed. Government will seek to develop mine leadership and miners associations in how they can use and may contribute to Geo-data, i.e., improved mapping. The capacity of the DGS and PD to carry out exploration work will be improved to augment geophysical and other data collection and help to build up a credible geo-database and maps. Activities associated with the collection, processing and interpretation of the data will contribute to building the technical skills of DGS staff. Appropriate marketing of the survey results through conference presentations and promotional literature will be an integral part of capacity building.

4.11 Public Information and Building Sierra Leone Geo-data Management Awareness

Current status

With respect to minerals, information stored as part of the GIMS is available for public access. In recent years, Sierra Leonean mining technical and informational capacity has improved with the establishment of inter-agency working groups, improved education and training, increased private sector investment, and strengthened donor partnerships. In 2016 the NMA established a Department of Community Affairs, Communications and Public Relations. Linkages between national mine institutions, regional, local and Chiefdom authorities have improved although Geo-data understanding and capacity levels considerably vary. In the absence of sound Geo-data about mineral and oil and gas resources, sensationalized and other suspect information often result in unwarranted mining and development expectations that are not justified.

Under the 2011 Petroleum Act, the Petroleum Register is available for public access and copies of information may be obtained following prescribed fees. The PD website is live at <http://pd.gov.sl/> and is available online for external users. PD central management of users and computers will be strengthened. A data room has been established for investors to visit the PD and view data to make an assessment for acquiring any licences.

Policy statement and implementation strategy

Government will build on capacity improvements to augment Geo-data management awareness, understanding and expertise. As Government implements its new Minerals Policy, various capacity building and stakeholder initiatives shall be supported. Inclusion of Geo-data management information as part of local development planning for mining communities, environmental, land and other agency work, Sierra Leone Extractive Industries Transparency Initiative (SLEITI) working groups and other stakeholders will broaden national awareness and understanding around Geo-data.

Government is committed to formalization and harmonization and enforcement of mining activities and shall incorporate Geo-data collection and analysis where possible. Broader public awareness may become part of the MMR Policy role.

Regulation and capacity building relevant to the entirety of Geo-data will be strengthened in ways that improve resource knowledge, strengthen mine development, enhance investments and revenues, strategically link to infrastructure and other development, and improve mining practices. Assessment of the roles that university and technical institutes may play in Geo-data management as well as review of Geo-data storage, access and use facilities will be explored. Consideration of localized data practices will be given with the aim of consolidating data to establish a comprehensive national Geo-database.

Basic Geo-data information materials including maps shall be prepared for dissemination to government, non-government, and other stakeholders to improve local knowledge of mineral and oil and gas resources in the country. Targeted Geo-data information will be prepared for mining segments (i.e., gold) that accurately reflects resource data.

Consideration of non-government roles to build national capacity for Geo-data management with specific review of research and analysis will be given, specifically the role for university and technical institutes to more systematically be engaged in the review and analysis of Geo-data. As the Geo-data portfolio of the country is developed, building policy-makers, media and civil society awareness and capacity to understand the types of Geo-data and use for same should contribute to broader engagement in, more understanding of, and realistic expectations for resource development.

5. STRATEGY TO GUIDE GEO-DATA MANAGEMENT POLICY IMPLEMENTATION

5.1 Institutional Arrangements

- **The Ministry of Mines and Mineral Resources (MMMR)** is the primary Ministry responsible to provide policy guidance for mining operations in Sierra Leone.
- **The National Minerals Agency (NMA)** has responsibility for the management of mineral rights, for technical support to the minerals sector, and for geological survey and data collection activities; the Directorate of Geological Survey (DGS) implements the geological survey and data collection activities of the NMA.
- **The Petroleum Directorate (PD)** is responsible for Geo-data management relevant to oil and natural gas, and directly reports to the Office of the President.

Strengthened Geo-data management capacity of the NMA/DGS and PD staff and awareness building amongst other government agencies is a priority to implement this policy. NMA shall, with the DGS and PD, establish the following.

- (1) **The Geo-data Management Policy Committee** - *a technical body*, specific to extractive industries and specifically ensuring coordination and information sharing between NMA/DGS and PD, comprised of technical experts nominated from each technical institution including NMA/DGS, PD, and shall be responsible for the overall oversight and implementation of policy actions supported in this Policy and Policy Action Matrix; additional expertise may be included in the Committee, to be detailed in the Committee criteria and operating procedures; and

(2) **The Inter-agency Geo-data Management Committee** - a *coordination body*, led by the NMA, broadly comprised of representatives from various Ministries and government agencies that have a role in or are impacted by Geo-data management including but not limited to environment, finance, land, local and traditional authorities, charged with ensuring coordinated Geo-data policy approaches, awareness building and communicating a harmonized national Geo-data management policy.

5.2 Geo-data Management Infrastructure

To ensure implementation of this policy, it is imperative that NMA/DGS and the PD's technical and financial capacity are strengthened to ensure adequate Geo-data management infrastructure is in place. This requires Government funding of equipment, training, transport, storage facilities and building regional office expertise. Staff strengthening specific to Geo-data management must immediately include data collection, storage, analysis, survey and mapping review for Sierra Leone to establish a comprehensive mineral and oil and gas resource knowledge base. The NMA shall be responsible for the construction and operation of a national repository for cores and samples located at an appropriate location and managed in accordance with international best practice.

5.3 Legislative Framework and Enforcement Mechanisms

As part of its overall Geo-data Management Policy commitment, NMA/DGS and the PD working with the appropriate departments will strengthen and where necessary, develop Geo-data management regulations, standards, protocols and quality assurance requirements relevant for licence holders, government agencies and other stakeholders to clarify institutional roles, provide content and time-based reporting requirements, guidance on data embargos and fees, and ensure data review and analysis. New and amended minerals, oil and gas legislation shall be carefully reviewed and to the extent possible, harmonized to ensure consistent handling of Geo-data.

6. MONITORING AND REVIEW

The *Geo-data Management Policy Committee* shall conduct regular monitoring of policy implementation and will conduct initial review of this policy every three years from the date of its adoption or more frequently as may be required and provide summary findings to the inter-agency working group for broader review. Geo-data management policies and requirements will be made available on the MMR, NMA/DGS and PD websites and made available and communicated to stakeholders including ministries, mine companies, mine communities, universities and technical institutes, and private sector.