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D9.3 –Tanzania Case Study

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Mrs T. Ramsaroop[1], Mrs N. Hoosen-Bally[1], Dr Hudson Mtegha[1], Mr Royston Lobow[1], Mr Mahlodi Kolomela[1], Dr D.P. Kafumu[2], Dr Willison Mutagwaba[3], Dr Silas O'lang, Mr David Perkins, Thomas Fullgraf[4]

[1]DMT Kai Batla
[2]Earth Sciences Institute of Shinyanga (ESIS)
[3]MTL Consulting
[4]BRGM

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Abbreviations and Acronyms

Acronym	Description
ACP	African, Caribbean, and Pacific
AfCFTA	African Continental Free Trade Agreement
AGOA	African Growth and Opportunity Act
AMGC	African Minerals and Geosciences Centre
ASM	Artisanal and Small-scale Mining
CHADEMA	The Party for Democracy and Progress
CET	Common External Tariff
CHRAGG	Commission for Human Rights and Good Governance
CIT	Corporate Income Tax
COMESA	Common Market for Eastern and Southern Africa
CPI	Consumer Price Index
CSR	Corporate Social Responsibility
CUF	Civic United Front
DIArb	Dar es Salaam Centre for International Arbitration
DSA	Debt Sustainability Analysis
DTA	Double Taxation Agreements
DWHTR	Domestic Withholding Tax Rate
EAC	East African Community
EARS	East African Rift System
EBA	Everything But Arms
ECRM	Extended Critical Raw Materials
EFG	European Federation of Geologists
EITI	Extractive Industries Transparency Initiative
EIU	Economist Intelligence Unit
EMP	Electro Magnetic Pulse
EPA	Economic Partnership Agreement
ESG	Environmental, Social and Governance
EU	European Union
EV	Electric Vehicle
FDI	Foreign Direct Investment
FEMATA	Federation of Miners Association of Tanzania
GDP	Gross Domestic Product

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GSP	Generalized System of Preferences
GRI	Global Reporting Initiative
GSSB	Global Sustainability Standards Board
HIPC	Heavily Indebted Poor Country
HIV/AIDS	Human Immunodeficiency Virus
HDI	Human Development Index
IASB	The International Accounting Standards Board
IAT	The Institute of Arbitrators Tanzania
ICT	Information and Communication Technology
ILO	International Labour Organisation
IMF	International Monetary Fund
IMTT	Integrated Mining Technical Training
IFEM	Interbank Foreign Exchange Market
ISSB	International Sustainability Standards Board
ITC	International Trade Centre
JORC	Joing Ore Reserve Committee
LoM	Life of Mine
LREE	Light Rare Earth Elements
MoLEYD	Ministry of Labour, Youth and Employment Development
MIGA	Multilateral Investment Guarantee Agency
NAM	Non-Aligned Movement
NEC	National Electoral Commission
NEER	Nominal Effective Exchange Rate
NEMC	National Environment Management Council
NHRAP	National Human Rights Action Plan
NGOs	Non-governmental Organisations
NISC	National Investment Steering Committee
NSSF	National Social Security Fund
NSGRP	National Strategy for Growth and Reduction of Poverty
NTB	Non-Tariff Barriers
OACPS	Organisation of African, Caribbean and Pacific States
OECD	Organisation for Economic Cooperation and Development
PAYE	Pay as You Earn
PGM	Platinum Group Metals
PPG	Public and Publicly Guaranteed

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PPPs	Public-Private Partnerships
REE	Rare Earth Elements
REER	Real Effective Exchange Rate
RISDP	Regional Indicative Strategic Development Plan
SADC	Southern African Development Community
SAGCOT	Southern Agricultural Growth Corridor of Tanzania
SASB	Sustainability Accounting Standards Board
SDL	Skills Development Levy
SEAMIC	Southern & Eastern African Mineral Centre
SEZ	Special Economic Zones
STAMICO	State Mining Corporation
TAC	Tanzania Arbitration Centre
TANALEC	Tanzania Electrical Company
TIC	Tanzania Investment Centre
TNBC	Tanzania National Business Council
TRA	Tanzania Revenue Authority
TZS	Tanzanian Shillings
UN	United Nations
UNCITRAL	United Nations Commission on International Trade Law
UNECA	United Nations Economic Commission for Africa
VAT	Value-Added Tax
WHT	Withholding Taxes
WTO	World Trade Organization
WP	Work Package
ZEC	Zanzibar Electoral Commission

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Executive Summary

This report provides the reader with an overview of the key aspects regarding mineral resources, supporting regulations and institutions, as well as any related provisions in the prospecting and developing of Critical Raw Materials (CRMs) in Tanzania. The report is an integral part of the larger AfricaMaVal project and, in that context, provides this country overview specifically aimed at European Union (EU) investors and decision-makers. The report demonstrates Tanzania's suitability as a choice for stable future CRM supply to the EU and has been developed through a network of Tanzanian and African consultants familiar with the operational environment of the country under consideration. The outcomes of the case study are highlighted in this section and further detailed within the chapters that follow.

CH.1 - Extended Critical Raw Materials (ECRM) supply potential of Tanzania

Tanzania is endowed in various minerals, including Extended-CRMs (ECRMs). The focus of this report will be ECRMs, including aluminium (bauxite), beryllium, cobalt, copper, lithium, natural graphite, nickel, niobium, magnesium, manganese, tantalum, tin, titanium, tungsten, and vanadium. Other minerals are barite, borate, fluorspar, rock phosphate, Rare Earth Elements (REE) i.e. scandium, yttrium, lanthanum, cerium, praseodymium, neodymium, promethium, samarium, europium gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium (particularly Light Rare Earth Elements (LREE) and PGMs (Platinum Group Metals) i.e. platinum, palladium, rhodium, iridium, ruthenium and osmium. The mineral resource endowment of Tanzania is favoured by the Archaean Tanzania Craton, Palaeoproterozoic Ubendian, Neoproterozoic Usagaran, Mozambican mobile belts, Mesoproterozic Karagwe–Ankolean, Phanerozoic sediments (Karoo), Coastal basin and Cenozoic volcanics.

Upon assessment, at present, graphite is targeted to have a higher potential than other ECRMs shortlisted for Tanzania. Graphite has been selected due to geological conditions conducive to:

(1) the formation of graphite deposits;

(2) substantial known graphite deposits with large-scale and high-quality graphite resources in various regions of the country; and

(3) an increasing demand for graphite, which is a critical component in various industries, including electric vehicles (EVs) energy storage, and the production of lithium-ion batteries. Here it represents almost 50% of the materials needed by weight.

Copper concentrate and phosphate are the only ECRMs currently produced at a large-scale mining level in the country. The rest of the ECRMs are produced by Artisanal and Small-scale Miner (ASM) activities spread across the country. Most of the ECRMs are exported in

unprocessed raw product to China, India, Europe, Japan, and some in the East African region. The only mine that has the capacity to process ore, is the Minjingu Phosphate Mine. There are however plans for expansion programmes to reach a market beyond the East African Community (EAC) (MFFL, 2023), with no other smelting or refining capabilities of ECRMs in Tanzania.

CH.2 - Assessment of the ECRM value chain

The development of the ECRM value chain in Tanzania is very limited due to the historical preference of exporting raw materials. Very few factories and industries can utilize local ECRMs due to the limited number of mines that produce them, particularly for the local market. ECRM-based manufacturers identified are therefore propelled into importing ECRMs rather than obtaining them from within the country.

While phosphate has a recognizable value chain network, copper is exported as a concentrate to Japan and China. There is also some other production of copper ore, natural graphite, tin ore (cassiterite), lithium, cobalt, tantalum, tungsten, magnesium ore (magnesite), manganese and aluminium ore (bauxite) from ASM activities that are exported to Kenya, Rwanda, India, and China. No ECRM recycling projects have been identified for Tanzania during the period of writing this case study report.

It is important to note the fluidity of the distinction between the formal and the informal mining; for mining activities range from fully formalized to fully informal. Like other countries, Tanzania has been working on formalizing mining by regulating the sector and operating in a transparent, legal, and environmentally responsible manner. However, complicating the process is the presence of ASM activities which are difficult to regulate. The dominance of ASM activities in Tanzania is linked to adverse environmental and social impacts due to the informal and unregulated nature typified by these operations.

Tanzania has been attempting to strengthen the economic ties between the formal and artisanal sectors. For Tanzania's mining sector to grow sustainably, bottlenecks must be addressed, and the links between the various phases of the mining value chain must be strengthened. Reforming policies, building infrastructure, involving the community, and promoting ethical mining methods, among other things, may be necessary to achieve this. The promotion of value addition activities related to ECRMs in Tanzania provides the country a unique opportunity to act as a catalyst for developing and sustaining value chain activities. This can be done by supporting the direct mining operations and businesses and developing downstream activities.

CH.3 - Investment/financing prospects for ECRM projects in Tanzania

Tanzania initially underperformed economically after gaining independence, leading to severe economic distress by the 1980s. Subsequent structural adjustments and policy reforms allowed

Tanzania to establish macroeconomic stability. This stability created an environment conducive to Foreign Direct Investment (FDI), leading to sustained high economic growth, often ranking among Africa's fastest-growing economies. In 2021, Tanzania had a Gross Domestic Product (GDP) of $64.16 billion (in constant 2015 prices), making it the second-largest economy in East Africa and ranking among the top 10 economies in sub-Saharan Africa (Statista, 2023). The mining sector accounts for just 4.5% of total GDP showing a low reliance to minerals. However, it is comparatively a high contributor to FDI in the country.

CH.4 - Assessment of environmental, social, and governance challenges

Generally, the Mining Industry in Tanzania uses the Global Reporting Initiative (GRI) guidelines as per the Global Sustainability Standards Board (GSSB) for Environmental, Social and Governance (ESG) compliance. ESG reporting compliance in Tanzania is still voluntary and mostly implemented by foreign mining companies. In 2017, several legislations aimed at protecting the country's natural resources and employment opportunities for Tanzanian citizens were introduced by parliament. These new Acts introduced new conditions for exploration and mining companies, such as the following, but not limited to: restrictions on export of raw materials; sourcing of goods and services to give preference to indigenous Tanzanian companies; and incentivising contractors, subcontractors and licenses undertaking mining activities that employ and train local citizens.

Following a change in Government in 2020 and subsequent reviews of the mining regulations, issues which had stagnated growth of the sector were somewhat resolved. This has prompted positive feedback from foreign investors. Whilst modern mining in Tanzania dates to the late 1990s, the current principal legislation for the governance of the mining sector is the Mining Act CAP 123, (R.E.2019). The latest amendments were made in 2022 (The Miscellaneous Amendments (No.3) Act, 2022). The Environmental Management Act (EMA) (No.20), 2004, is the principal legislation in Tanzania, providing the legal and institutional framework for sustainable management of the environment.

CH.5 - Business network between the EU and Tanzania

Tanzania is a member of several international organizations, including the United Nations, the Commonwealth, the World Trade Organization, the African Union, the East African Community, and the Southern African Development Community. Ownership requirements for businesses and mining operations in Tanzania are established to promote local participation and ensure that Tanzanian citizens benefit from the mining industry.

The local content policy in Tanzania (Ministry of Minerals, 2018) relating to mining is robust and rigid, in its requirements and through its implementation. Miners in Tanzania have the option and are encouraged to beneficiate and undertake fabrication. The local content model is viewed

as a mine to market integrated model with the purpose of growing Tanzanian business into downstream activities.

CH.6 - Energy and digital transition: a strategy for the EU and Africa Partnership

Tanzania is one of the four countries poised to benefit from the 111.5 million Euros in funding provided by the EU (European Commission, 2023b). This funding has been earmarked to target the mining sector, and it is part of the broader Organisation of African, Caribbean and Pacific States (OACPS)-EU Development Mineral Programme. This initiative is pivotal for Tanzania as it aligns with the broader objectives of the AfricaMaVal project initiated by the EU. Tanzania's plans and strategies related to the mining sector align well with the EU's twin transition (which aims to transform the EU economy to a combination of green and digital model) and responsible sourcing of critical minerals. They emphasize economic growth, job creation, sustainability, good governance, and value addition, which are all in line with the EU's broader objectives. These plans demonstrate Tanzania's commitment to responsible mineral sourcing and its contribution to regional economic development.

CH.7 - Opportunities for responsible investments

Eight investment opportunities or projects were identified in Tanzania for consideration. The details of these projects are presented in Table 22 and include: 1) Bunyu Project, 2) Grafica Graphite Project, 3) Mahenge Graphite Project, 4) Nachu Graphite Project (NGP), 5) Pula Graphite Partners, 6) Changube Copper Project, 7) Bahi (Sedimentary) and Sengeri (Igneous) Phosphate projects, and 8) Kyerwa Tin Project.

1. Extended Critical Raw Materials (ECRM) supply potential of Tanzania

Tanzania is endowed with various minerals, including ECRMs. The focus of this report will be ECRMs, including *aluminium (bauxite), beryllium, cobalt, copper, lithium, natural graphite, nickel, niobium, magnesium, manganese, tantalum, tin, titanium, tungsten, and vanadium. Other minerals are barite, borate, fluorspar, rock phosphate, REE (particularly LREE) and PGM.*

The global green energy transition and subsequent demand for ECRMs has prompted a mineral exploration boom in Tanzania. Some key statistics include:

- Between 2019/2020 - 70% of all issued exploration licences were on ECRMs and gold and other minerals were the remaining 30% (MC 2022, 2023a & 2023b).
- In 2021 - estimated graphite reserves of 18 Mmt ranked 5th in the world (Statist, 2020). These reserves are growing with an increase in JORC certified projects on the rise.
- Kabanga Nickel project resource (58 Mmt) is about 19% of the world reserves and may begin producing for the global market by 2025 (Bhadare, 2021).

1.1. Inventory of the ECRMs

1.1.1. Geological setting

The mineral resource endowment of Tanzania is favoured by the Archaean Tanzania Craton, Palaeoproterozoic Ubendian, Neoproterozoic Usagaran, Mozambican mobile belts, Mesoproterozic Karagwe–Ankolean, Phanerozoic sediments (Karoo), Coastal basin and Cenozoic volcanics (URT, 2005; GST, 2015; MMa, 2021), as shown in Figure 1.

The presence of widespread ultramafic layered intrusive complexes within the Ubendian Rock System (western Tanzania) provides great opportunity for the discovery of PGM polymetallic mineralization (PGM, Co, Ni-Cu rich massive sulphides (Njombe, Mpanda and Kigoma mineral fields)). The Nyanzian rock system (Nzga, Kahama and Musoma districts) and Karagwe-Ankolean Rock Systems (Karagwe and Ngara districts) occur in the south-east and western sides of the Lake Victoria.

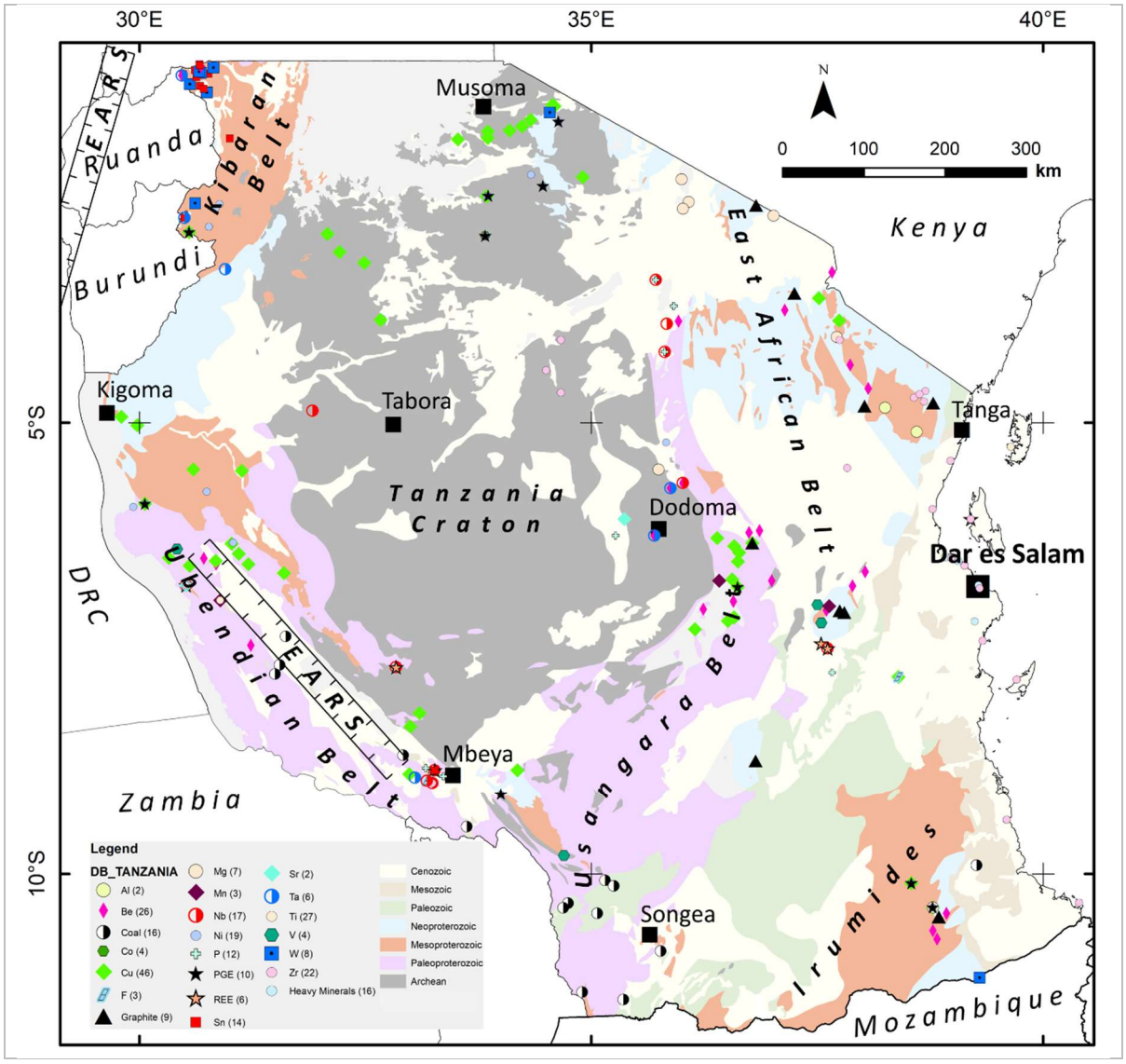

Figure 1: General geology of Tanzania and the ECRM occurrences recorded in the SIG-Afrique of BRGM.

Different types of minerals occur in a diverse geological terrain in Tanzania, but of importance in this report are the ECRMs that include aluminium (bauxite), beryllium, cobalt, copper, lithium, natural graphite, nickel, niobium, magnesium, manganese, tantalum, tin, titanium, tungsten, and vanadium. Other minerals are barite, borate, fluorspar, rock phosphate, REE (particularly LREE) and PGMs (MMa, 2021).

Table 1 provides an indication of the specific occurrences of ECRMs in the country. High potential opportunities are also identified, and criteria for selection are discussed in Section 1.2.1.

Commodity	Description
Barite	Occurs in places such as the North Mara goldfields, Ilagala area in Kigoma region (Western rift), Sikitko Kapapa and Kalamba river (in the Mpanda mineral fields, Kingorowira in Morogoro region, Lupa goldfield in Ntumbi area and Lupa river, Matumbi hills and Wingoyongo areas (in the Karroo coalfields); the Gowelela area

Commodity	Description
	in the Karoo coalfields (GST, 2015) and the Western arm of the Eastern African Rift Valley of Tanzania carbonatites like Ngualla, Panda Hil and Wigu (URT, 2008b; GST, 2015).
Bauxite	Deposits in North-eastern Tanzania occur as residual deposits on two geomorphologic related plateaus of Mabughai-Mlomboza and Kidundai at Magamba in Lushoto, Usambara Mountains. The bauxite deposits contain Al_2O_3 (40–69 wt. %), Fe_2O_3 (3–10 wt.) (Mutakyahwa et al., 2003).
Beryllium	Granulites on the Usagaran, Mozambican and Ubendian mobile belts systems host beryl and subsequently, ore for beryllium. Beryl has been found in Mang'ola area in Mbulu district and in Ponda near Sumbaanga town (URT, 2005).
Borates	Occur in the lustrine playa lakes and paleo-lakes brines of Central Tanzania (Bahi, Manyoni and Singida districts), as well as in the EARS in Lake Eyasi, Lake Manyara, Lake Natron and Engaruka basin depressions in association with gypsum and diatomite deposits (URT 2005).
Cobalt	Found mainly in the Mesopalaeozoic Kibaran Belt (Karagwe-Ankolean rocks) associated with (ultra)mafic intrusions mineralized as massive Ni-Co Sulphides. Cobalt also occurs in Ni-Co bearing weathering products of ultramafic rocks to form Co-rich laterites in the Nyanzian rock systems and high-grade rocks of the Dodoman Craton (URT, 2005; GST, 2015). Cobalt ore sometimes occurs within layered ultramafic complexes of multi-element deposits in association with PGM. Such occurrences are known in the Zanzui area, Simiyu region; Kapalagulu PGM deposits in Kigoma regions and Luwumbu area, Makete district (GST, 2015 and URT, 2005).
***Copper**	Found in the extensive Nyanzian meta-sediments goldfields (Lake Victoria basin) that hosts massive Cu-Ni-Co sulphides and mafic to ultramafic lithologies in the Ubendian, Usagaran and Mozambican mobile belts (North-eastern, Eastern and South-western Tanzania). These are ideal locations for Cu-Ni sulphide mineralization that can yield economic copper metals.
Fluorspar	Fluorspar (fluorite ore) deposits are found in association with niobium deposits of Panda Hill in Mbozi district and REE Deposits of Ngualla in Songwe Region. Both these deposits are JORC compliant projects but do not take into consideration the mining of fluorspar.
***HREE and LREE**	REE are found within the EARS (Western Arm that stretches from lake Nyasa in the south to Kigoma in the north and the Eastern Arm that stretches from Lake Nyasa in the south to Lake Natron in the north). The EARS carbonatite intrusions host all the REE, niobium, phosphate, and fluorspar minerals in Tanzania (GST, 2015 and URT, 2005; Boniface, 2017).
***Lithium**	Occur in three places in pegmatites of the Dodoman Craton (two places) and in the intrusive pegmatites in the Karagwe Ankolean (one place) (URT, 2005; URT, 2015). Lithium (and borates) from salt brines in the rift valley systems also present an exploration opportunity in Tanzania (Saltworks Consultants Pty Ltd, 2017)).

Commodity	Description
Magnesium	Magnesite, a magnesium ore, is formed in hydrothermal veins in high grade metamorphic rocks of the Usagaran System.
Manganese	High-grade metamorphic rocks of the Usagaran and Ubendian mobile belts host most of the manganese deposits (GST, 2015).
***Natural graphite**	Found in the high grade graphitic-gneisses metamorphic rocks within the Usagaran and Mozambican belts (The East African Orogeny) covering an entire mobile belt strip of over 300km wide extending from Indian Ocean coastline to Morogoro and stretching from Tanga in the north to the Mozambican border in the south (Ruvuma River). The East Africa Orogeny contain among the best qualities of graphite in the world (Moye et al., 2021) and have ignited a graphite exploration projects wave along the mobile belt into Mozambique.
Nickel	Found in a variety of geological terrains including the following: mafic/ultramafic intrusions in a meta-sedimentary complex of the Mesopalaeozoic Kibaran Belt; massive sulphide mafic/ultramafic intrusions in a meta-sedimentary complex of the Nyanzina system. Ultramafic massive sulphide intrusive in high grade metamorphic rocks; and in sheared serpentinised of the Mozambican mobile belt. Nickel also occurs in layered ultramafic intrusives composed of norite, dunite, harzburgite, and gabbro rocks; and layered ultramafic meta-anorthositic complex Intrusives of the Ubendian system.
Niobium	Occurs in Carbonate intrusions in fenitised Proterozoic gneiss and granulite rocks and in Mid-Cretaceous volcanic carbonatite intrusion which has intruded into gneisses and amphibolite (Boniface, 2017).
PGMs	The Kapalagulu and Luwumbu PGM deposits in Tanzania are typical examples of ultramafic intrusions containing a massive sulphide succession within the Ubendian mobile Belt rock system of Tanzania. (URT, 2005 & GST, 2015).
***Phosphate Rock**	Phosphates occur in different geological environments that are young biogenic sedimentary sediments and in REE and niobium bearing carbonatites within the EARS (Boniface, 2017; Figures 3 & 4). The young sedimentary phosphates originate from birds and bats guano cerements. The Minjingu Rock Phosphate is in the proto-lake Manyara Island in which migratory birds may have come annually from Europe to breed for hundreds of years during the Pleistocene thus depositing a huge amount of guano that overtime geological processes turned it into rock phosphate (Szilas, et al. 2008). Other guano deposits are in the Sukumawera Songwe travertine caves and rock phosphate deposits occurring as apatite minerals in carbonatite rocks at ZiZi and Mbalizi areas (Boniface, 2017; Szilas, et al. 2008; URT, 2005, 2008; Chesworth, et al. 1988).
Tantalite	Tantalum ore is found in association with tin and tungsten polymetallic mineralization at Kyerwa cassiterite (tin) deposit.
***Tin**	Deposits are found in the Kibaran rock system in the Kagera region (URT, 2005; GST, 2015).

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Commodity	Description
***Titanium**	Pleistocene to Holocene placer beach sands in a 100 km wide Indian Ocean coastline stretching from Tanga to Mtwara hosts heavy mineral sands that contain titanium in rutile (TiO_2) and ilmenite ($FeTiO_3$) resistant mineral.
Tungsten	Found in association with tin deposits of Kyerwa in the Kagera region.
Vanadium	Found in association with titanium of iron ore deposits at Liganga and Maganga Matitu in Rudewa Njombe region.

Table 1: Mineral occurrences and potential (*high potential opportunities) in Tanzania.

1.1.2. Known ore deposits and occurrences

This section introduces some of the known mineral deposits or occurrences in Tanzania, in accordance with the current EU ECRM list. Most of these deposits are classified under the exploration stage, with few having reached the stage of mining. Table 2 shows a list of the main deposits or occurrences and their development stage, for each ECRM. For more details, please refer to Appendix A.

No	EU List of ECRM	Name of Deposit or Occurrence	Development Stage
1	Barite	In various locations in hydrothermal infillings of goldfields	Geological occurrences
2	Bauxite (Aluminium)	Magamba - Lushoto, and Amani - Muheza Tanga region	Initial Exploration
3	Beryllium	Various geological occurrences in metamorphic terrains	Geological occurrence
4	Borate	In playa lacustrine lake brines in central Tanzania and in the East Africa Rift System Lake depressions.	Geological occurrence
5	Cobalt	Kabanga - Ngara, Kagera	JORC compliant Feasibility study ready for mine construction
		Zanzui - Bariadi, Simiyu	Advanced exploration stage
		Haneti - Kondoa, Dodoma	Initial Exploration
6	Copper	Bulyanhulu - Kahama, Shinyanga	Mining
		Buzwagi - Kahama, Shinyanga	Mining (Mine closed in 2019)
		Tambi and Kinusi - Mpwapwa, Dodoma	ASM mining
		Several other occurrences	Geological occurrences
7	Fluorspar	Panda Hill- Mbozi, Songwe	Initial Exploration
		Ngualla - Songwe	Initial Exploration
8	REE (HREE's and LREE's)	Ngualla - Songwe,	JORC compliant Feasibility study ready for mine construction
		Sengeri - Tunduma, Songwe	Initial Exploration
		Nakonde - Songwe	Initial Exploration
		Wigu Hill - Morogoro	Initial Exploration

No	EU List of ECRM	Name of Deposit or Occurrence	Development Stage
		Lihogosa Swamp - Njombe	Occurrence
		Zizi - Mbeya region	Occurrence
9	Lithium	Hombolo - Chamwino, Dodoma	Initial Exploration
		Mohanga - Dodoma Rural District	Initial Exploration
		Karagwe – Kagera Region	Occurrence
		Possible deposits to be determined	Possible target occurrences areas in lake brines of the EARS
10	Magnesite (Magnesium)	Chambogo - Same, Kilimanjaro	Old Mine (Reopened in the 1980s)
11	Manganese	Several occurrences	Geological occurrence
12	Natural Graphite	Nachu, Ruangwa - Lindi	JORC compliant Feasibility study ready for mine construction
		Nguema, Chilalo -Lindi	JORC compliant Feasibility study ready for mine construction
		Volt, Mbunyu -Masasi, Lindi	JORC compliant Feasibility study ready for mine construction
		Tanzgraphite Epanko - Morogoro	JORC compliant Feasibility study ready for mine construction
		Faru Minerals, Mahenge - Morogoro	JORC compliant Feasibility study ready for mine construction
		Jumbo, Ruangwa - Lindi	JORC compliant Feasibility study ready for mine construction
		Mererani Tanzanite -Simamnjiro	A tanzanite mine being re-evaluated
		Several (11 sites) other occurrences in the metamorphic terrains are at initial exploration stages under different Exploration Companies	Advancement, Mahenge - Morogoro Pula, Ruangwa – Lindi Nazareth, Ruangwa – Lindi Dayou, Handeni – Tanga PACCO, Ruangwa – Lindi United, Handeni – Tanga East Africa, Handeni – Tanga Tanzanagraph, Ulanga – Morogoro Kilimanjaro, Simanjiro – Manyara Grafica, Mahenge – Morogoro Gemini, Ruangwa- Lindi
13	Nickel and Cobalt	Kabanga - Ngara, Kagera	JORC compliant Feasibility study ready for mine construction
		Dutwa - Bariadi, Simiyu	Advanced exploration stage

No	EU List of ECRM	Name of Deposit or Occurrence	Development Stage
		Ntaka – Nachingweya, Lindi	Advanced exploration stage
		Haneti - Kondoa, Dododma	Advanced exploration stage
	Nickel and Platinum Group Metals	Kapalagulu - Uvinza, Kigoma	Advanced exploration stage
	Nickel and Cobalt	Zanzui - Bariadi, Simiyu	Advanced exploration stage
14	Niobium	Pandahill – Mbozi, Songwe	JORC compliant Feasibility study ready for mine construction
		Nachendazwae - Tunduma, Songwe	Initial Exploration
		Gallapo - Mbulu, Manyara	Initial Exploration
15	Platinum Group Metals	Kapalagulu -Uvinza, Kigoma	Initial Exploration
		Luwumbu - Makete, Njombe	Initial Exploration
		Mibango -	Initial Exploration
16	Phosphate rock (P2O5)	Phosphate Mine - Minjingu, Arusha	Mining
		Zizi Carbonatite – Zizi Mbeya	Geological Occurrence
		Songwe Scarp - Mkwajuni, Songwe	Geological Occurrence
		Mbalizi Carbonatite – Mbalizi, Mbeya Urban	Geological Occurrence
		Sukumawera Caves – Songwe river Songwe Region	Bat Guano phosphate
17	Tantalum	Several occurrences to be determined	Geological occurrence
18	Tin (Cassiterite) and Tungsten (Ferberite)	Kayanga - Kyerwa, Kagera	Initial exploration and presence of Artisanal and small-scale mining activities
19	Titanium and Vanadium	Liganga - Ludewa, Njombe	JORC compliant Feasibility study ready for mine construction
20	Titanium (Heavy sands with rutile and ilmenite)	Fungoni Heavy Sands- Dar es Salaam	JORC compliant Feasibility study ready for mine construction
21	Titanium and Vanadium	Maganga Matitu - Ludewa, Njombe	Advanced exploration
22	Tungsten (Ferberite)	Found in association with tin deposits of Kyerwa in the Kagera region.	Geological occurrence

Table 2: Tanzania ECRM checklist based on the Eu ECRM 2020's List1

Refer to Appendix A for a detailed list of known mines, ore deposits and occurrences.

[1] Source: (DMT, 2022; MMa, 2021; MC 2022, 2023; URT, 2005, 2008a&b; GST 2015; Chesworth, et al. 1988; Hatibu et al. 2021)

1.2. Prospectivity and mineral high potential mapping

The selection of ECRMs for mineral prospectivity is a crucial step in the field of mineral resource exploration and development. ECRMs, as minerals of high economic importance due to their various industrial, technological, and geopolitical significance; are minerals essential for the manufacturing of a wide range of products, including electronics, renewable energy technologies, aerospace components, and more. As a result, identifying areas with high prospectivity in Tanzania is a priority for government, mining companies, and the geological survey.

1.2.1. Selection of the ECRM for mineral prospectivity

Among the 36 ECRMs present in Tanzania, six were selected, due to the favourable geological setting for their mineralisation for mineral potential mapping (MPM) to demonstrate the principle of the method (**Be, Graphite (Gr), Ni**, **Nb, P** and **Sn**). A special study was performed on graphite occurrences in eastern Tanzania considering additional airborne radiometric data (potassium, uranium) although being of poor quality. The lack of important geoscientific data (e.g. aerial and ground geophysics, satellite data, soil, and stream geochemistry) and the relatively low resolution of the geological map used for this study (1:2M) implies only limited interest of the weakly constrained mineral potential maps for exploration. There was no use to illustrate this for the whole range of ECRM's. Only ECRM's with more than 10 occurrences were preselected and out of these those, which are representative for different types of deposits (magmatic, sedimentary).

The MPM was carried out using the disc-based association (DBA) grid method coupled with Random Forest (RF) method (*Vella, 2023*); the algorithm applying these principles has been labelled "FAMME" by the author. The method is based on the analysis of the local spatial associations of geological variables and features of various nature to describe the relationships between the predictors and the mineralization. This allows the identification of geological environments in the study area around each node of the DBA grid, and the integration of both quantitative and non-quantitative spatial data, such as geophysical anomaly maps and location of geological map units, respectively. In a second step, the RF classification method is used to perform a generalization of complex geological environments and features and evaluate their likelihood to host potential mineralization occurrences by giving a score between 0 (low potential) and 1 (high potential).

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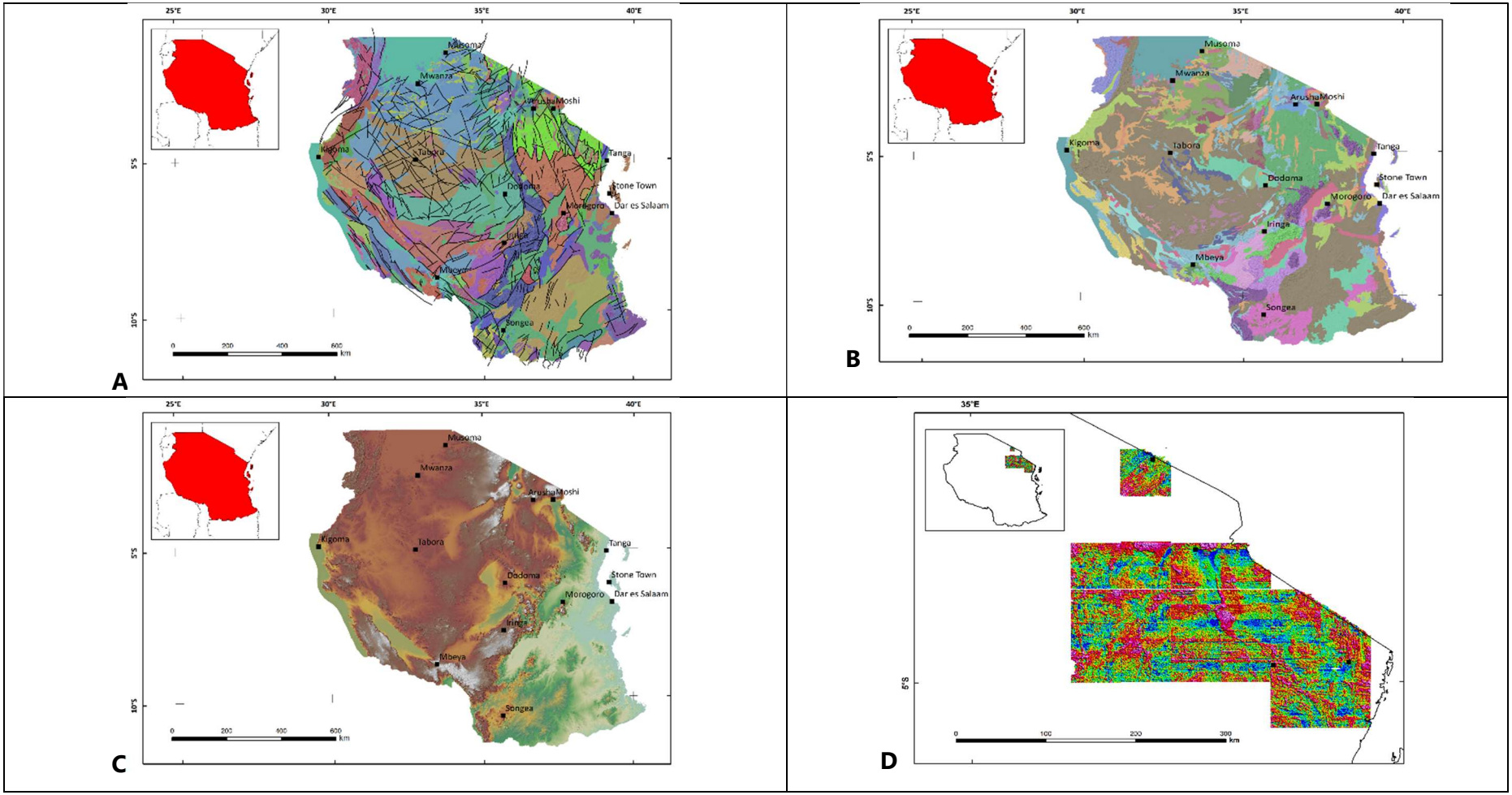

Figure 2: Database for the MPM of Tanzania A) 1:2M geological map/structural data; B) 1:500k SOTER Soil map; C) SRTM/slope; D) K and U radiometric data

The data for the MPM Tanzania comprised the following (Figure 2):

- SIG-Afrique mineral resources database – BRGM
- SIG-Afrique 1:2M geology - BRGM
- SIG-Afrique 1:2M structural data (faults, thrusts) – BRGM
- UNCCD 1:500k SOTER – soil map of southern Africa
- SRTM
- Slope
- For the graphite study in eastern Tanzania: degraded U, K data of the AOI in eastern Tanzania which were purchased in png format (RGB)

The DBA grid for predictive modelling is mainly defined by **five parameters**:

- Size of cell – d;
- Buffer for lithologies – R;
- Buffer for mineral occurrences – R1. It can be null (= false), in this case the search radius will be restricted to the cell size (d)
- Buffer for faults – R2. It can be null (= false), in this case the search radius will be restricted to the cell size; it can also take into account the distance of the cell to the neighbouring faults (distance)
- Buffer for soils – R3. It can be null (= false), in this case the search radius will be restricted to the cell size

In order to maximize the grid resolution while minimizing overlaps and cells with only one lithology, the parameters of DBA grid for the four selected commodities in individual areas of interest (AOI) used in this study are as indicated in Table 3.

Parameter/ECRM	Be	Gr_all	Gr_AOI	Ni	Nb	P	Sn
d [m]	2000	2000	800	2000	2000	2000	2000
R [m]	10000	10000	4000	10000	10000	10000	10000
R/d	5	5	5	5	5	5	5
Total cells	220970	220970	12364	220970	220970	220970	220970
R_1 [m]	2000	2000		2000	1000	2000	2000
R_2 [m]	750	750	750	750	750	750	750
R_3 [m]	false	false	false	false	false	false	false
srtm	yes	yes	yes	yes	yes	yes	yes
slope	yes	yes	yes	yes	yes	yes	yes
K	no	no	yes	no	no	no	no
U	no	no	yes	no	no	no	no

Table 3: The applied parameters for the MPM's of Tanzania; "yes/no" = data used/not used for the analysis

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1.2.2. Mineral potential maps for the ECRM's Be, Gr, Ni, Nb, P and Sn

Seven mineral potential maps were produced for the six ECRM's **Be, Gr, Ni, Nb, P**, and **Sn**. The results of the DBA-RF (TN, FN, FP, TP = confusion matrix) together with the critical parameter for the assessment of the model are shown in

	TN	FN	FP	TP	TPR	FPR	PPA [%]	Prec. [%]	Acc. [%]	J-score	Thresh.
Be	219950	1	956	63	0.98	0.00	0.5	6.18	99.6	0.98	0.54
Gr_all_T1	219357	1	1588	24	0.96	0.01	0.7	1.49	99.3	0.95	0.55
Gr_all_T2	220877	0	68	25	1.00	0.00	0.04	26.88	100.0	1.00	0.65
Gr_AOI	55398	0	39	48	1.00	0.00	0.16	55.17	99.9	1.00	0.60
Ni	220333	0	573	64	1.00	0.00	0.3	10.05	99.7	1.00	0.50
Nb	220157	0	763	50	1.00	0.00	0.37	6.15	99.7	1.00	0.43
P	220846	1	92	31	0.97	0.00	0.1	25.20	100.0	0.97	0.64
Sn	219903	1	1029	37	0.97	0.00	0.5	3.47	99.5	0.97	0.66

Table 4.

	TN	FN	FP	TP	TPR	FPR	PPA [%]	Prec. [%]	Acc. [%]	J-score	Thresh.
Be	219950	1	956	63	0.98	0.00	0.5	6.18	99.6	0.98	0.54
Gr_all_T1	219357	1	1588	24	0.96	0.01	0.7	1.49	99.3	0.95	0.55
Gr_all_T2	220877	0	68	25	1.00	0.00	0.04	26.88	100.0	1.00	0.65
Gr_AOI	55398	0	39	48	1.00	0.00	0.16	55.17	99.9	1.00	0.60
Ni	220333	0	573	64	1.00	0.00	0.3	10.05	99.7	1.00	0.50
Nb	220157	0	763	50	1.00	0.00	0.37	6.15	99.7	1.00	0.43
P	220846	1	92	31	0.97	0.00	0.1	25.20	100.0	0.97	0.64
Sn	219903	1	1029	37	0.97	0.00	0.5	3.47	99.5	0.97	0.66

Table 4: Results of data driven mineral potential mapping in Tanzania applying the FAMME algorithm

Note: *True Positive (TP) and True Negative (TN) correspond to the number of grid cells, which are correctly predicted by the RF model (i.e. mineralized and non-mineralized cells, respectively). Inversely, False Positive (FP) and False Negative (FN) correspond to the number of grid cells, which are incorrectly predicted by the RF model (i.e. mineralized instead of non-mineralized cells and non-mineralized instead of mineralized cells, respectively).* ***FP indicate cells with high mineral potential****, which so far are not indicated in the mineral occurrence data base. From these data the following useful parameters are calculated: True positive rate (TPR, also "recall") = TP/(TP+FN), False positive rate (FPR) = FP/(FP+TN), Percentage of prospective area (PPA) = (TP+FP)/All, Precision = TP/(TP+FP), Accuracy = (TP+TN)/All and J-score = TPR – FPR.*

The statistically seven most favourable factors (in decreasing importance) for exploration of each commodity are shown in Table 5.

	F1	F2	F3	F4	F5	F6	F7	F7
Beryllium	slope	srtm	Nb	ACu	CMe	LVx	20	514
Graphite_T1	srtm	1049	FRr	509	slope	CMo	501	LVx
Graphite_T2	1049	FRr	srtm	slope	509	CMo	501	LVx
Graphite_AOI	slope	fault	1041	srtm	501	LPe	potassium	1046
Nickel	Cu	srtm	slope	411	103	213	215	CMo
Niobium	srtm	slope	P	Be	8	21	384	999
Phosphate	8	Nb	srtm	CMo	slope	21	521	SNg
Tin	LPu	192	300	srtm	slope	3	Nb	CMo

Geological units	
3	Cenozoic lacustrine sediments
8	Neogene alkaline volcanism
20	Usagaran mixed metasedimentary rocks (..., graphite schist, ...), mafic
21	Ubendian - various metasedimentary rocks
103	post-Pan-African Ikorongo Group: sedimentary rocks
192	Kibaran metasediments
213	Ubendian ortho- and paragneiss I
215	Ubendian ortho- and paragneiss II
300	Tonian Tin granite
384	Neoarchaean western granite complex
411	Kibaran mafic and ultramafic rocks
501	EAO - mafic and felsic 2-pyroxene granulite
509	Neoproterozoic Furua Complex: marble with intercalated metabasalts
514	Pan-African mylonite
521	Mixed gneiss (with Archean relics)
1041	EAO - quartzite
1046	Neoproterozoic dolomitic marble (upper nappe of the EAO)
1049	Kurase Group: migmatitic gneiss, granite, schist

Soils	
ACu	Humi-Umbric Acrisols
CMe	Eutric Cambisols
CMo	Chromi-Ferralic Cambisols
FRr	Rhodic Ferralsols
LPe	Eutric Leptosols
LPu	Humi-Umbric Leptosols
LVx	Humi-Rhodic Luvisols
SNg	Calci-Gleyic Solonetz
Mineral occurrences	
Be	Beryllium occurrence
Cu	Copper occurrence
Nb	niobium occurrence
P	Phosphate occurrence

Table 5: Favourable factors (in decreasing importance) for the exploration of the selected ECRM's. The meaning of the codes is given below.

Beryllium (Be)

The *SIG-Afrique* database of BRGM indicates 19 beryl occurrences in Tanzania, which are widely distributed in areas off the central Tanzania Craton, whereas in the craton they have not been identified so far. Most of them are in the eastern part of the country, which is underlain by Meso to Neoproterozoic basement rocks.

The resulting MPM shows, besides locations with known beryl occurrences, high potential in the continuation of these localities. However, because of low resolution maps without pegmatite occurrences and random occurrences, the result is considered as rather poorly constrained (Figure 3).

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The DBA-RF model of test 1, taking all parameters into account, has an accuracy of ~99.6 % and indicates that about 0.5 % of Tanzania has potential for beryllium. The statistically most favourable factors are, in decreasing order: **slope**, **srtm**, **Nb** (niobium), **ACu** (Humi-Umbric Acrisols), **CMe** (Eutric Cambisols), **LVx** (Humi-Rhodic Luvisols), **20** (Usagaran mixed metasedimentary rocks, mafic rocks) and **514** (Pan-African mylonite). The parameters slope, srtm and soils are generally only loosely related to the presence of pegmatites (if at all) and therefore considered as inadequate tools for their targeting.

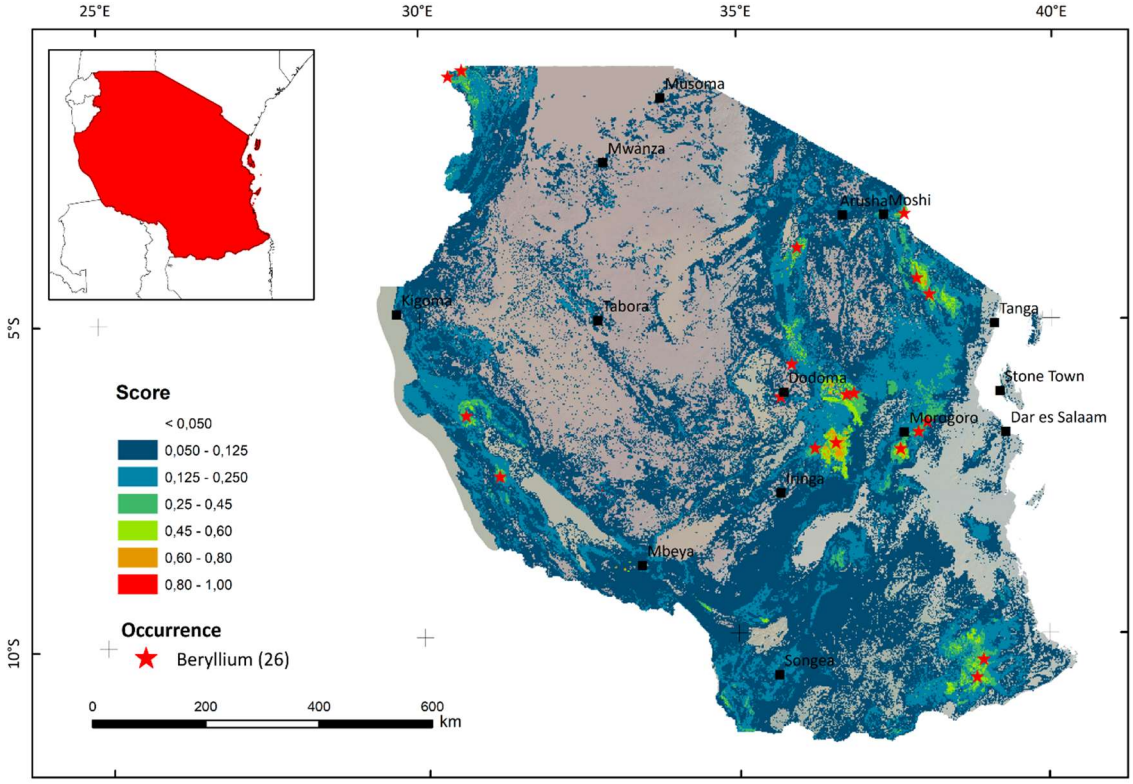

Figure 3: Mineral Potential Map of Tanzania for beryllium (Be) of test 1. The known occurrences (19) are indicated as red star.

Graphite (Gr)

Two DBA-RF tests were performed with slightly varying hyperparameters (Figure 4). The DBA-RF model of Test 1 has an accuracy of 99.3 % and indicates that about 0.7% of Tanzania is prospective for graphite applying the optimized threshold of 0.55. The statistically most favourable factors are, in decreasing order: **srtm, 1049** (Kurase Group: migmatitic gneiss, granite, schist), **FRr** (Rhodic Ferralsols), **509** (Neoproterozoic Furua Complex: marble with intercalated metabasalts), **slope, CMo** (Chromi-Ferralic Cambisols), **501** (EAO - mafic and felsic 2-pyroxene granulite), and **LVx (**Humi-Rhodic Luvisols).

In Test 2, the DBA-RF model has an accuracy of 100 % (i.e. it is over fitted) and indicates that only about 0.04% of Tanzania is prospective for graphite applying an optimized threshold of 0.65. The statistically most favourable factors are, in decreasing order, **1049** (Kurase Group: migmatitic gneiss, granite, schist), **FRr** (Rhodic Ferralsols), **srtm**, **slope**, **509** (Neoproterozoic Furua Complex: marble with intercalated metabasalts), CMo **CMo** (Chromi-Ferralic Cambisols), **501** (EAO - mafic and felsic 2-pyroxene granulite), and **LVx (**Humi-Rhodic Luvisols).

The favourable factors for graphite remain therefore the same but their relative importance (or ranking) changes between the two tests.

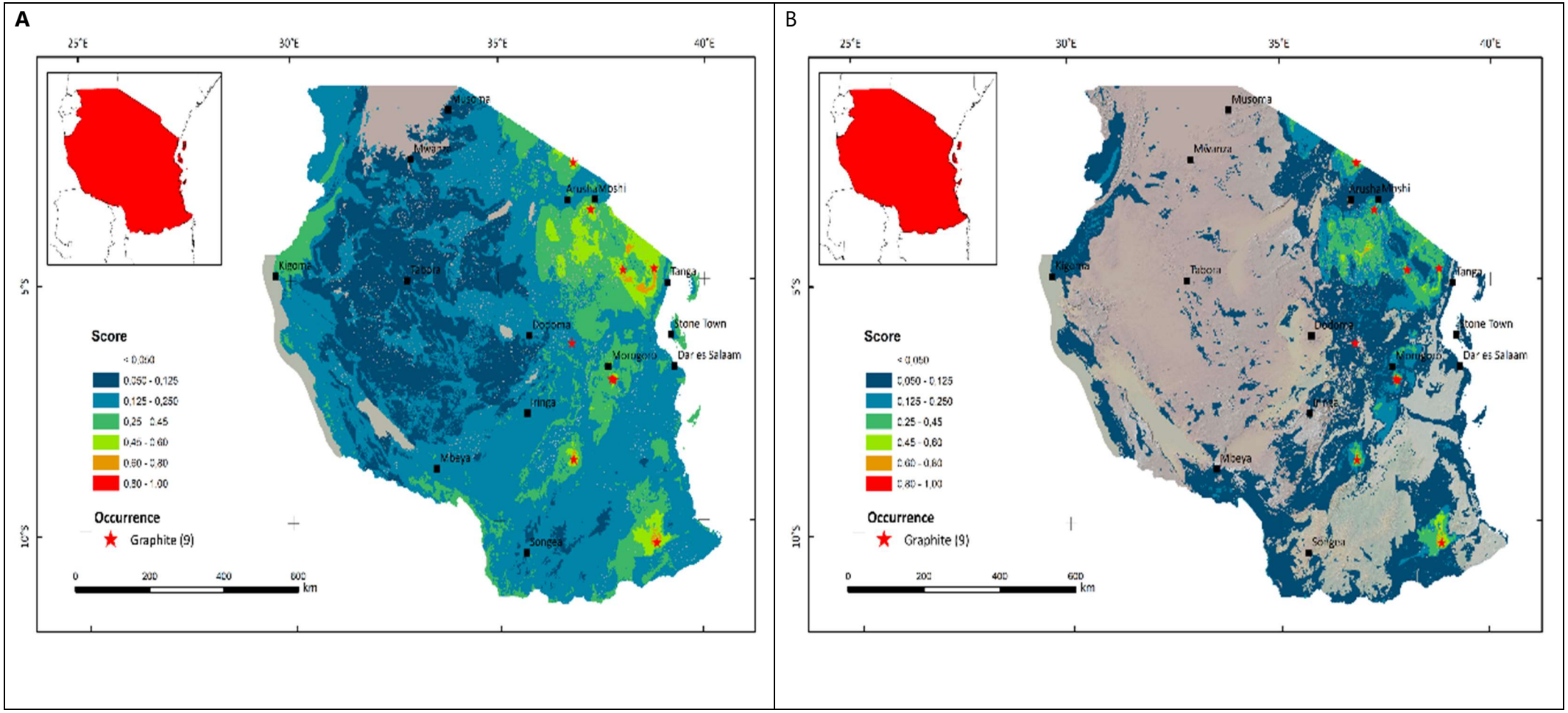

Figure 4: Mineral Potential Map of Tanzania for graphite (gr). Known occurrences (9) are indicated as red stars.

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A third test has been carried out in a smaller area in eastern Tanzania, for which airborne geophysics uranium and potassium data were purchased through the Tanzania Geological Survey. The data were degraded, provided as quarter sheets in RGB format, and remained unbalanced after merging them into one layer and therefore are of poor quality (Figure 5).

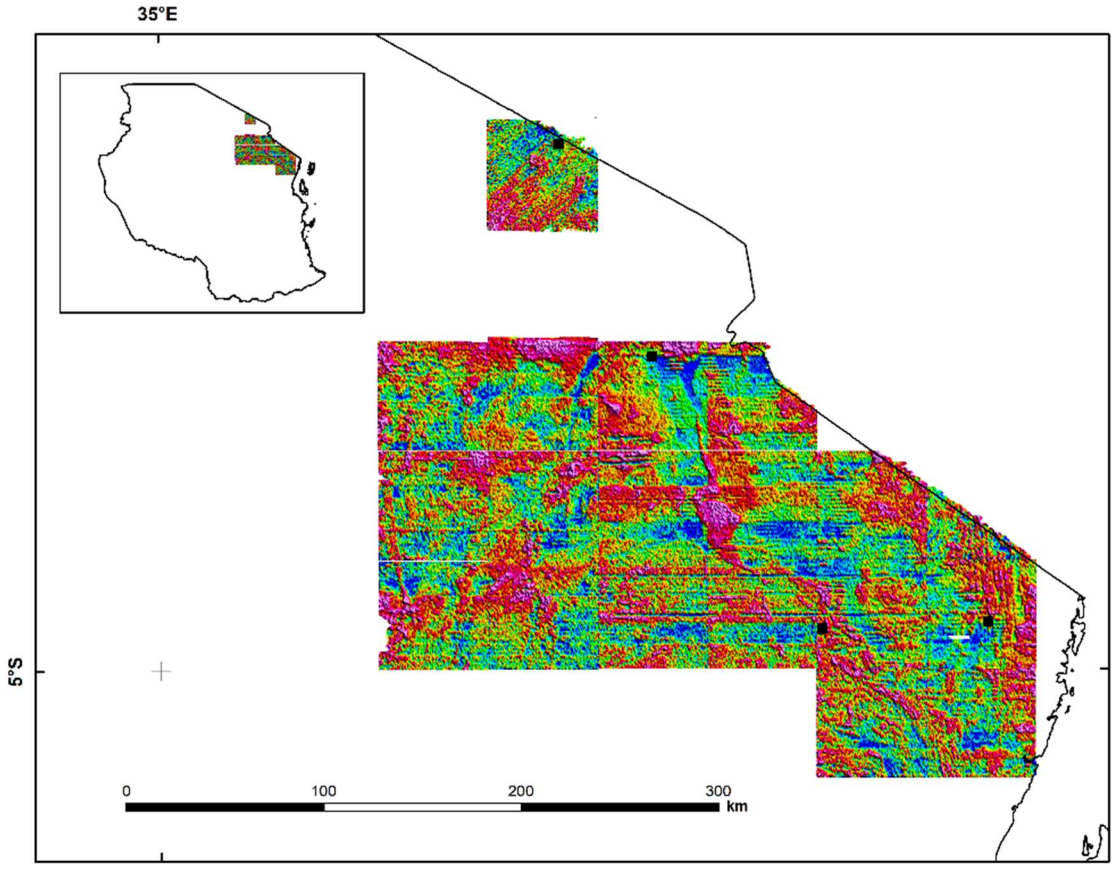

Figure 5: Airborne radiometric data (here potassium) for the graphite study in the AOI of eastern Tanzania

The additional test serves to demonstrate the change in the MPM by adding these supplementary data. The resulting mineral potential map is shown in Figure 6.

In comparison with the countrywide map (using less data), the AOI displays a reduced surface for graphite potential in the area of interest, which is of cost saving in exploration. The DBA – RF model has an accuracy of 99.9% and indicates that 0.16% of the AOI prospective for graphite using a threshold of 0.6. The favourable parameters for exploration of the commodity are, in decreasing order, **slope**, **fault**, **1041** (EAO – quartzite), **srtm**, **501** (EAO - mafic and felsic 2-pyroxene granulite), **LPe** (Eutric Leptosols), **potassium**, **1046** (Neoproterozoic dolomitic marble (upper nappe of the EAO).

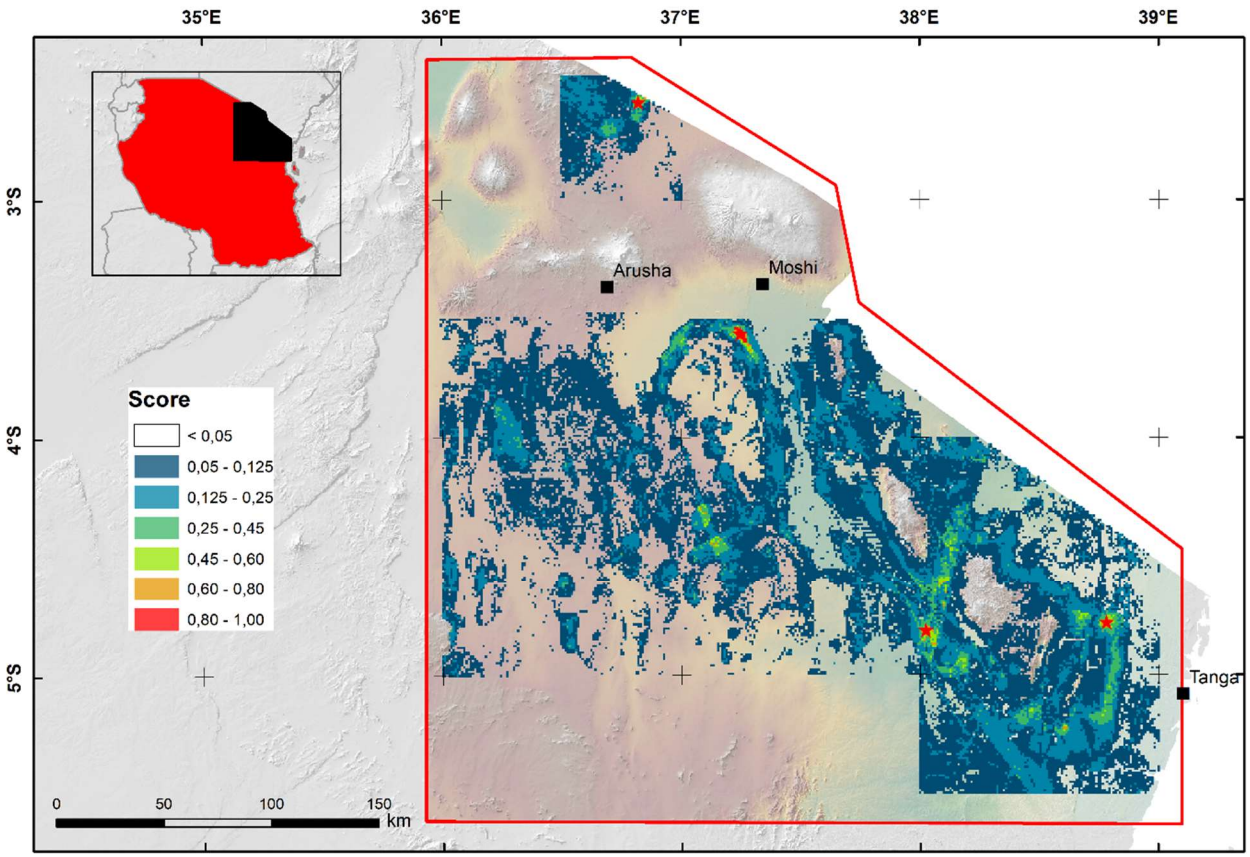

Figure 6: Mineral Potential Map of eastern Tanzania for graphite; known occurrences (4) are shown as red stars.

Nickel sulphides (Ni)

The data to produce the MPM comprised the BRGM 1:2M scale geological map and structural data of Tanzania, the mineral occurrence database (SIG-Afrique), the UN-CCD 500k SOTER soil map of southern Africa, the SRTM and the slope.

The resulting MPM shows high potential around most of the known occurrences in the north of the Tanzania Craton, the western and southern parts of the Kibaran Belt, in the NW part of the Ubendian Belt and in the area southeast of Mbeya with underlying Archaean and Palaeoproterozoic rocks (Figure 7). Two occurrences in the Kibaran Belt are marked by low scores only and for unknown reasons. Low to medium potential is shown in a wide network covering the Tanzania Craton and the Palaeoproterozoic Ubendian and Usagara belts whereas the East African Belt and Irumides in eastern Tanzania have very low or no potential for the commodity.

The DBA-RF model has an accuracy of ~99.7% and suggests that about 0.3% of Tanzania is prospective for nickel, applying the optimised threshold of 0.5. The statistically most favourable factors are, in decreasing order: **Cu** (copper), **srtm**, **slope**, **411** (Kibaran mafic and ultramafic rocks), **103** (sedimentary rocks of the post-Pan-African Ikorongo Group), **213**, and **215** (Ubendian ortho- and paragneiss I and II).

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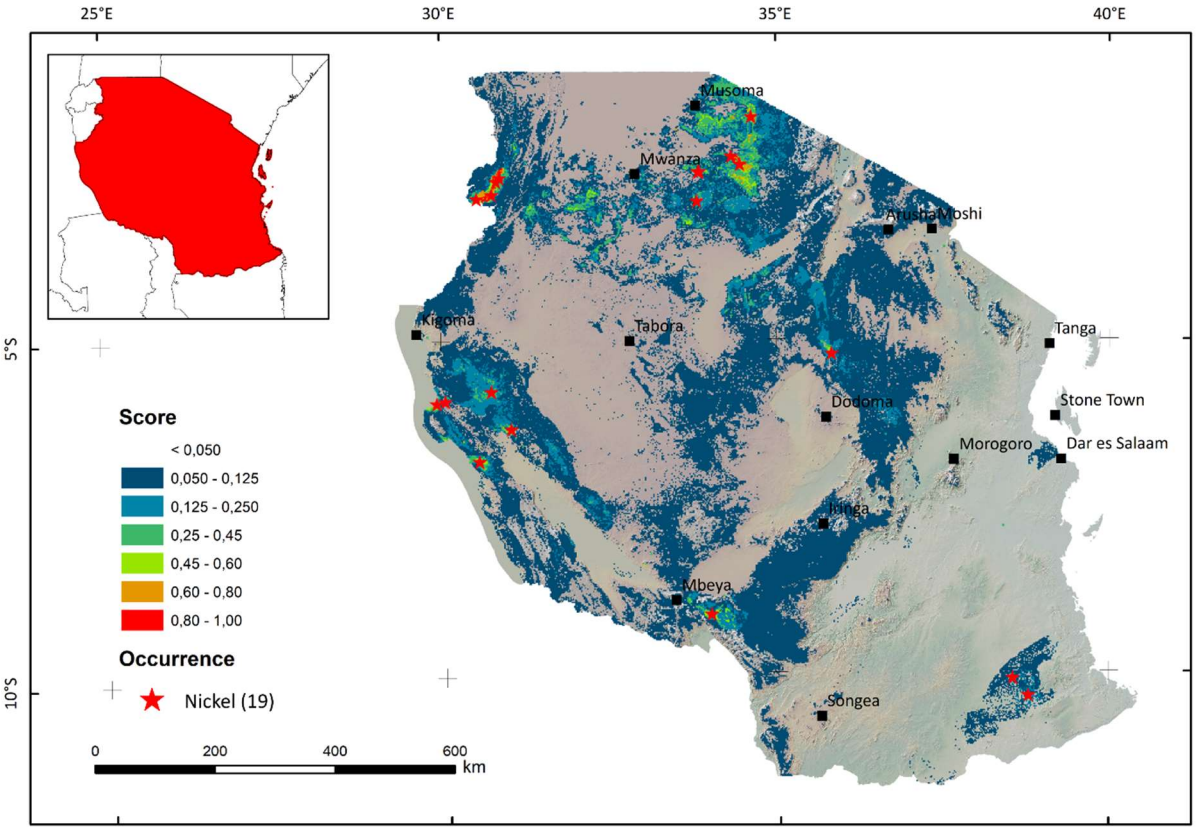

Figure 7: Mineral Potential Map of Tanzania for nickel sulphides (Ni); known occurrences are shown as red stars.

Niobium (Nb)

Tanzania, 17 Nb and 8 Ta occurrences are recorded in the BRGM database (SIG Afrique), which like Li and Be are located principally in the central Tanzania Craton. The same problems of statistical treatment and mineral predictivity apply as for other pegmatite hosted commodities.

The MPM shows that areas with medium to high Nb-potential are located mainly around the known occurrences in the Kibaran Belt of NW Tanzania (Figure 8). A smaller field is shown east of Mbeya and probably associated with Neoproterozoic rift-related alkaline intrusions that occur across Malawi (Bailly et al. 2022) from where they straddle into southern Tanzania. A third field 50 km north of Dodoma and a fourth ca 150km west of Arusha are located in the East African Rift System and may be associated with the alkaline volcanism therein. Some mineral potential is indicated also the central part of the Zimbabwe Craton, largely due to one isolated mineral occurrence. No mineral potential is shown in the southeast of Tanzania, underlain by the Irumide Belt and East African orogen, and in the northern part of the Tanzania Craton.

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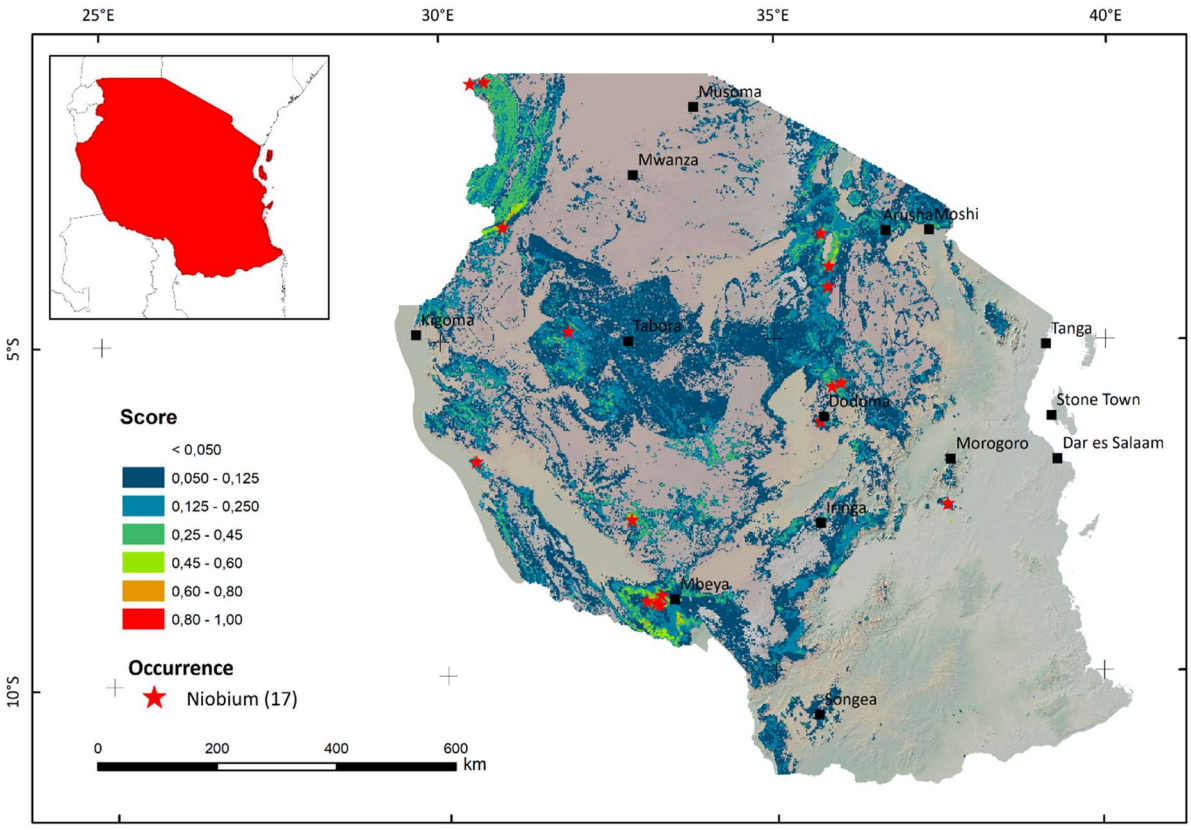

Figure 8: Mineral Potential Map of Tanzania for Niobium (Nb); known occurrences (17) are shown as red stars.

The DBA-RF model has an accuracy of ~99.7% and indicates that about 0.37% of Tanzania is prospective for niobium, applying the optimized threshold of 0.43. The statistically most favourable factors are, in decreasing order: **srtm**, **slope**, **P** (Phosphate), **Be** (Beryllium), **8** (Neogene alkaline volcanism), **21** (Ubendian - various metasedimentary rocks), **384** (Neoarchaean western granite complex), **999** (no label). Structures have no influence which is probably due to poor data. This indicates the close relationship of Niobium with other minerals that are often associated with pegmatites or alkaline igneous rocks (apatite, beryl) but on the other hand also indicates parameters that are completely irrelevant for Nb exploration (srtm, slope, Ubendian paragneiss etc).

Phosphate (P)

The BRGM database records 12 occurrences in Tanzania of which the deposit at Minjingu in the East African Rift System is the most promising for direct application.

The data to produce the MPM comprised the BRGM 1:2M scale geological map and structural data of Tanzania, the mineral occurrence database (SIG-Afrique), the UN-CCD 500k SOTER soil map of southern Africa, the SRTM and the slope.

The MPM shows areas with medium to high P-potential mainly in south and east of the Tanzania Craton, which is underlain by the Usangara and East African Belts (Figure 9). However, apatite is genetically rather associated with small Neoproterozoic and Cenozoic

alkaline intrusions that due to their small size often do not appear on the 1:2M geological map or, alternatively Mesozoic to Cenozoic phosphate-bearing sediments that were deposited in the Karoo, Cretaceous and East African rift basins.

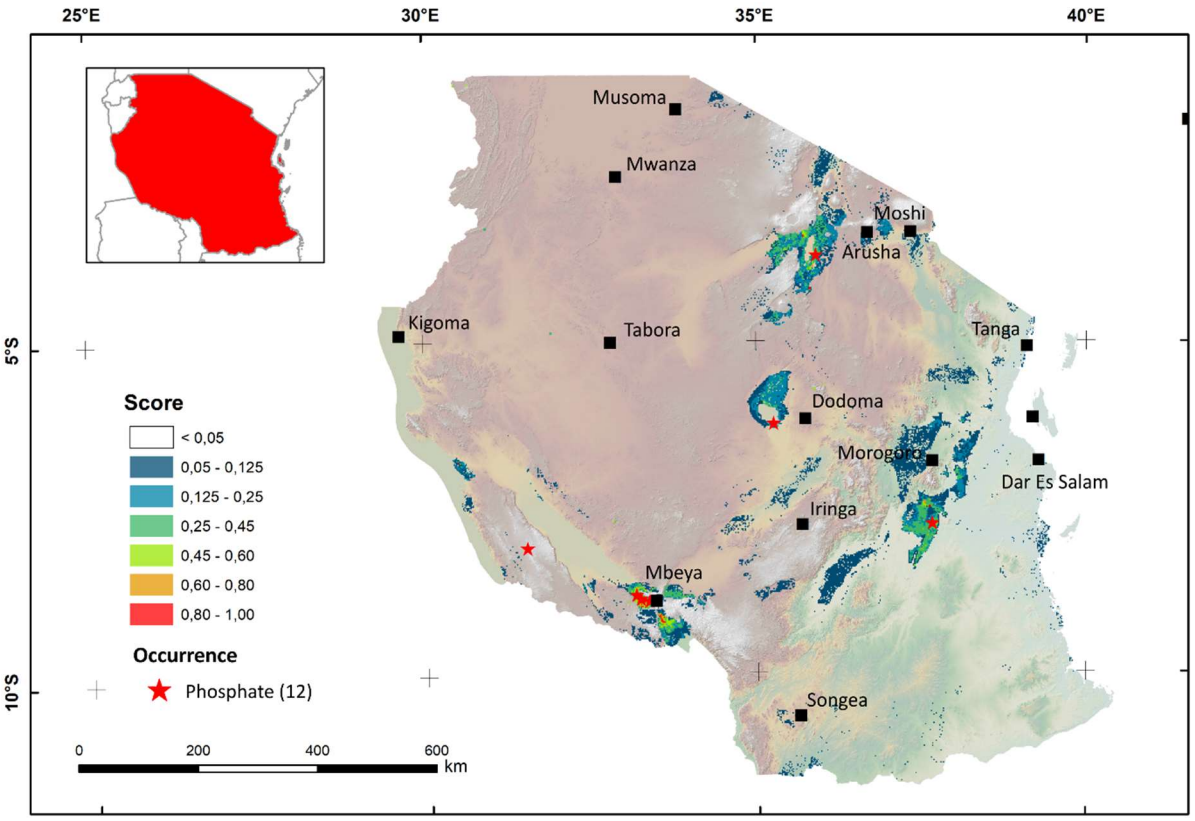

Figure 9: Mineral Potential Map of Tanzania for phosphate (P); known occurrences are shown as red stars.

The DBA-RF model has an accuracy of ~100% (i.e. it is overfitted) and indicates that about 0.1% of Tanzania is prospective for phosphate, applying the optimised threshold of 0.64. The statistically most favourable factors are, in decreasing order, **8** (Neogene alkaline volcanism), **Nb** (niobium), **srtm**, **CMo** (Chromi-Ferralic Cambisols), **slope**, **21** (Ubendian paragneiss), **521** (Mixed gneiss with Archean relics), and **SNg** (Calci-Gleyic Solonetz).

Tin (Sn)

Tin occurrences in Tanzania, are limited to the northeastern extreme of the country underlain by the Kibaran belt. The Kaborishoke Kwerya Tin Mine, located in the Kagera region, has been closed and there are no plans to re-open it. The mine, which specifically targets tin, holds significant geological and historical importance in the area (https://thediggings.com/mines/usgs10183461). The database of BRGM (SIG Afrique) records 14 entries of the commodity.

The data to produce the MPM comprised the BRGM 1:2M scale geological map and structural data of Tanzania, the mineral occurrence database (SIG-Afrique), the UN-CCD 500k SOTER soil map of southern Africa, the SRTM and the slope.

The MPM confirms that the main area with tin potential is in the northwestern corner of Tanzania (Figure 10). A second small field is shown west of Mbeya and probably associated with Neoproterozoic alkaline intrusions that are known across the border from Malawi.

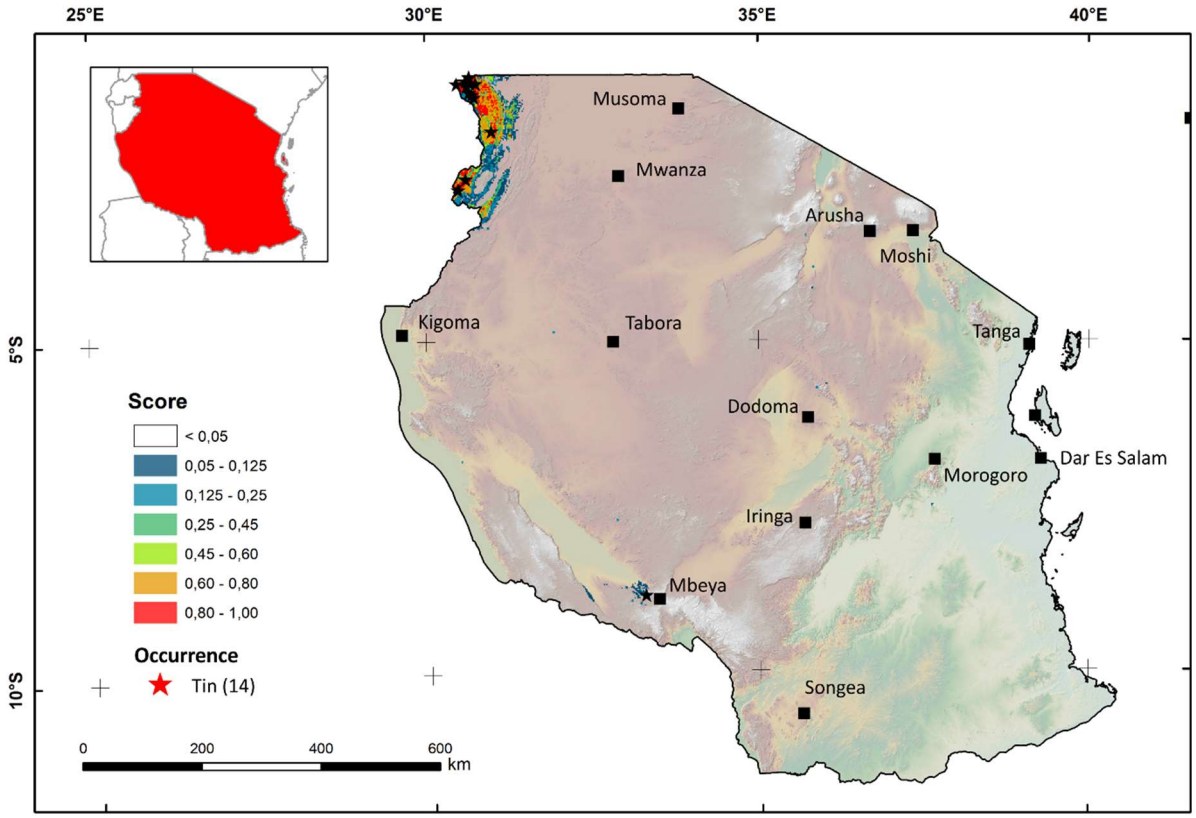

Figure 10: Mineral Potential Map of Tanzania for tin (Sn); known occurrences are shown as red stars.

1.2.3. Mineral high potential areas

This section explores the key considerations and factors that come into play when selecting ECRMs for prospectivity. It involves a multidisciplinary approach that was used to determine areas with the greatest potential for prospectivity. With the analysis completed in the previous chapter, graphite is targeted to have a higher potential than other ECRMs shortlisted for Tanzania. Graphite, due to its significant reserves and the growing demand for this mineral worldwide, has been assessed as follows:

- **Geological Conditions:** Tanzania's geological conditions are conducive to the formation of graphite deposits. This natural advantage makes the exploration and extraction of graphite feasible and cost-effective.
- **Graphite Reserves:** Tanzania is known to have substantial graphite deposits, with large-scale and high-quality graphite resources in various regions of the country. These reserves are attractive for mining companies and investors looking to capitalize on the demand for graphite.

- **Demand for Graphite:** Graphite is a critical component in various industries, including electric vehicles (EVs), energy storage, and the production of lithium-ion batteries where it represents almost 50% of the materials needed by weight. With the global shift towards cleaner and more sustainable technologies, the demand for graphite, particularly in the form of battery-grade graphite, is on the rise. This trend presents significant opportunities for countries with significant graphite resources like Tanzania.

It is important to note that while graphite has high potential in Tanzania, the development of the industry must also consider environmental and social sustainability, as well as responsible mining practices to ensure that the benefits are maximized while minimizing negative impacts. Additionally, market dynamics, technological advancements, and global demand for graphite can influence the overall potential and success of the industry in Tanzania. Figure 4 and 6 show areas where graphite mineralization potential is high.

1.3. Ore processing and refining capacities in Tanzania

Copper concentrate and phosphate are the only ECRMs produced at a large-scale mining level in the country. Copper is mined by Barrick Inc. Gold mines (Bulyanhulu and Buzwagi) and phosphate is mined and processed into fertilizer by the Minjingu Mines and Fertilizer Limited. The rest of the ECRMs are produced by ASM activities spread across the country. Most of the ECRMs are exported in unprocessed raw product to China, India, Europe, Japan, and some in the East African region. The only mine that has the capacity to process ore, is the **Minjingu Phosphate Mine**, which refines (granulation) phosphate to make fertilizer for the Tanzania and East African market (100,000 MT per annum of various types of compounded fertilizer). There are however plans for expansion programmes to reach a market beyond the East African Community (EAC) (MFFL, 2023), with no other smelting or refining capabilities of ECRM in Tanzania.

Mine	Status and Plans
Bulyanhulu Gold Mine	• Cu concentrate (capacity = 20,000tpa) • Copper concentrate is exported to Japan and China for smelting and sold abroad. • Planning for a Ni and Cu smelting facility by 2026; when Kabanga Nickel Project comes on stream (Kabanga Nickel Website; IPPMedia 2023)
Kabanga Nickel Project	• Planning to construct a Ni and Cu smelting facility by 2026 at Kahama, Shinyanga when Nickel mine is commissioned)
Liganga Ti, V mining	• Plans to process V and Ti into concentrates for smelting and refining in the country when mining begins (NDC, 2021)
Nachu Graphite project	• Planned for production of graphite-based technology products like EV batteries in country (Tanzania Invest, 2023c, 2003d).

Mine	Status and Plans
Ngualla REE Project	• Plan for the establishment of the REE multi-commodity refinery for the REE minerals, niobium, phosphate, and fluorspar in Tanzania or at Peak's Teesside site in the UK (LISCORP website, 2022; Ngualla website, 2022)

Table 6: Mine Processing and refining capacities

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2. Assessment of the ECRM value chain

The development of the ECRM value chain in Tanzania is very limited due to the historical preference of exporting raw materials. Very few factories and industries can utilize local ECRMs due to the limited number of mines that produce them, particularly for the local market. ECRM-based manufacturers identified within this section are therefore propelled into importing ECRMs rather than obtaining them from within the country.

Through the **IDRC Canadian funded Agro-Geology Project**; there have been efforts to expand the phosphate sub-sector to the agricultural industry in the late 1980s. The project aimed at the possibility of applying rock phosphates directly to farms (Chesworth et al. 1988). The project was however considered unsuccessful and to date, this value chain remains limited.

Whereas phosphate has a recognizable value chain network, copper (produced by the gold mining company Barrick Inc.), is directly exported as a concentrate to Japan and China. There is also some other production of copper ore, natural graphite, tin ore (cassiterite), lithium, cobalt, tantalum, tungsten, magnesium ore (magnesite), manganese and aluminium ore (bauxite) from ASM activities that are exported to Kenya, Rwanda, India, and China. It is however noted that only copper and phosphate are produced in substantive amounts in Tanzania.

2.1. Characterisation of the value chain for primary and secondary raw materials

Characterizing the value chain for primary and secondary raw materials requires an examination and understanding of the method by which resources are extracted, processed, and utilized. This characterisation assists in identifying key participants, activities, and potential areas for improvement.

To characterize the value chain for primary and secondary raw materials, it is essential to identify key stakeholders, assess environmental and social impact at each stage, and identify opportunities for resource efficiency, sustainable practices, and innovation. It is crucial to consider variables like environmental sustainability, circular economy principles, and social responsibility in the characterisation process.

Although it is urged that African nations like Tanzania step up their efforts to look for ECRMs, the sector is not yet integrated into either local or global value chains (African Development Bank - AfDB, 2021). The early stages of the ECRM sector's development are characterized by little to no local production, recycling, or value addition. Figure 11 shows the standard mineral mining maturity model.

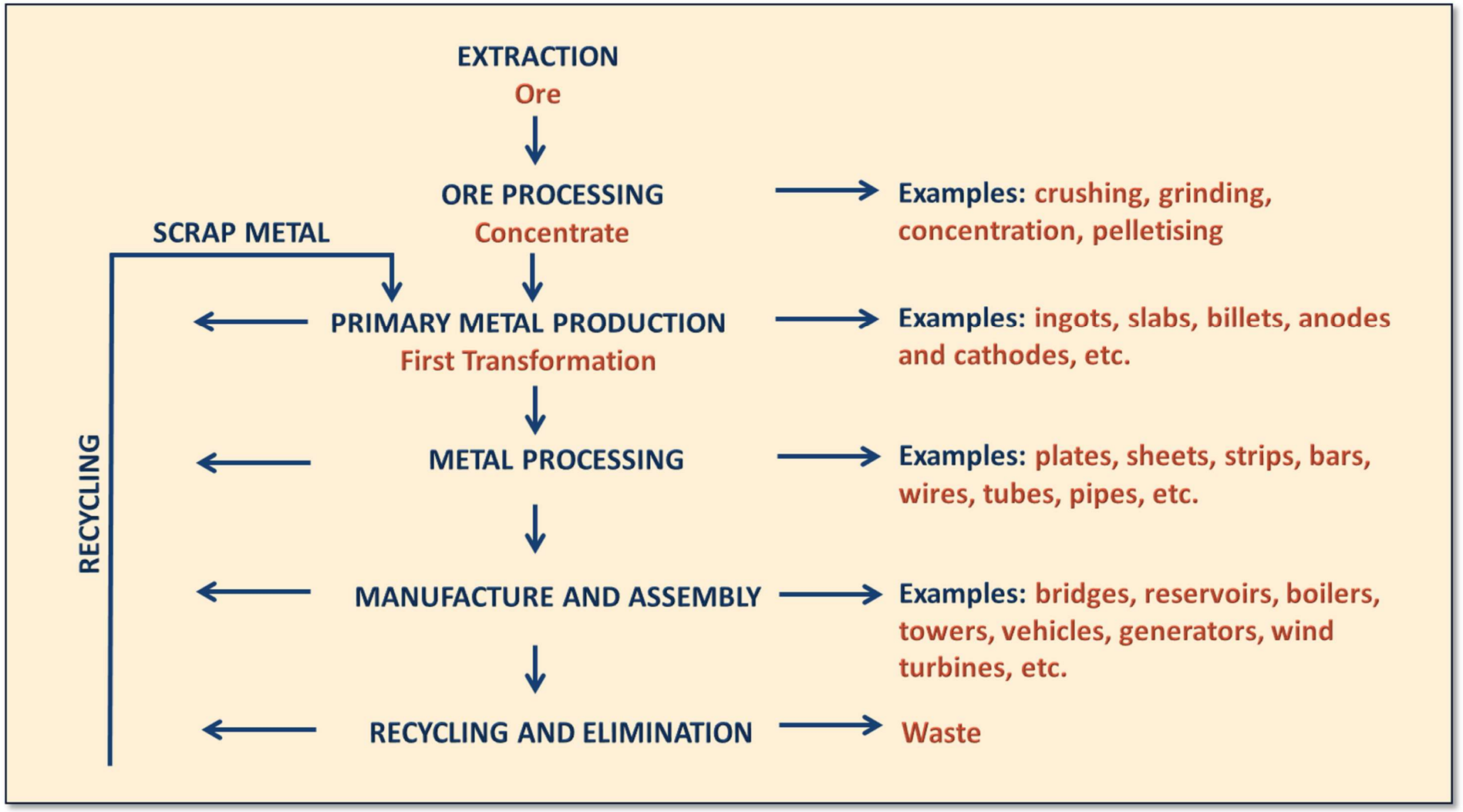

Figure 11: Mining Projects Maturity Model

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2.1.1. List of the mining and recycling projects

The maturity levels of copper and phosphate ECRM projects in Tanzania are presented below.

The **Bulyanhulu Gold Mine** (Cu mining) is mainly focused on operational efficiency and without any link to the local value chain (export the ECRM commodities).

The **Minjingu Phosphate Mine and Fertilizer Company** of which its operations include a mine and processing factory has extended its activities to incorporate partners in the agricultural sector.

Recycling Projects

No ECRM recycling projects have been identified for Tanzania during the period of writing this case study report.

2.1.2. Status of economic links between the formal and informal sectors

Formal Sector: mining operations that are carried out in accordance with the nation's mining laws, rules, and licensing requirements are referred to as formal mining. It covers mining operations that the Tanzanian government has approved and recognized lawfully. The following are some essential aspects of Tanzanian formal mining (ITA, 2022):

- Legal Recognition: Formal mining operations are legally recognized in Tanzania, and miners are in possession of current licences or permits issued by the appropriate government agencies. These licences, which must be applied for formally, outline the terms and conditions under which mining operations may be carried out.
- Compliance with Regulations: All applicable mining laws, regulations, and environmental requirements must be complied with by formal mining activities. To safeguard workers, communities, and the environment; this includes abiding with safety, environmental, and labour rules.
- Payment of Fees and Royalties: Official mining operations must pay the government a variety of fees, royalties, and taxes, which adds to the nation's revenue. Typically, these payments consist of a mix of levies, mining royalties, and license fees.
- Environmental and Social Responsibilities: Formal mining operations are frequently the subject of environmental and social impact studies, and they are required to adopt responsible mining techniques to reduce negative effects on the environment and nearby communities.
- Record Keeping and Reporting: Official mining operations must frequently report to government officials and keep records of their activities. This promotes accountability and openness in the industry.

- Investment and Infrastructure: To ensure effective and secure resource extraction, formal mining operations frequently entail large expenditures in mining infrastructure, machinery, and technology.
- Market Access: Official miners have better access to regional and global markets, enabling them to sell their products at competitive prices and in accordance with trade agreements.

It is important to note the fluidity of the distinction between the formal and the informal mining; for mining activities range from fully formalized to fully informal. Like other countries, Tanzania has been working on formalizing mining by regulating the sector and operating in a transparent, legal, and environmentally responsible manner. However, complicating the process is the presence of ASM activities which are difficult to regulate. The dominance of ASM activities in Tanzania is linked to adverse environmental and social impacts due to the informal and unregulated nature typified by these operations.

Informal Sector: Informal and unregulated mining conducted without the necessary legal authorization is called small-scale mining (ASM) (Mutagwaba et al., 2018). It is characterized by the following features:

- Lack of Legal Authorization: The government often does not formally recognize or authorize informal mining operations. It is possible that miners working in the informal sector do not have the necessary permits, leases, or licences.
- Limited Regulation: Informal miners frequently work without thorough regulatory supervision, resulting in issues with safety, environmental protection, and poor working conditions.
- Small-Scale Operations: Compared to massive, automated mining operations, informal mining activities typically take place on a smaller scale. This covers pursuits like quarrying, mining for gemstones, and artisanal gold panning.
- Low Investment: Informal mining operations frequently have a restricted budget and make use of simple, manual equipment. They have limited access to cutting-edge mining machinery and technology.
- Resource Extraction for Livelihood: Individuals and communities who engage in informal mining frequently rely on it as a source of income and a way of life. They may be able to sustain themselves and their families in this way.
- Environmental and Social Concerns: The informal mining sector is associated with environmental challenges, including land degradation, deforestation, and pollution. Additionally, labour conditions and health and safety standards are often suboptimal.

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- Revenue Leakage: Since illegal mining activities are exempt from formal taxation, royalties, and fees, the government could miss out on potential money from these activities.
- Land Tenure Issues: Disputes over who has the right to mine on a particular tenure of land can arise in regions with informal mining, making land rights and ownership a difficult subject.

The Tanzanian government and various stakeholders have made efforts to legitimize and regulate the informal mining industry. While ensuring that the sector contributes to the nation's development in a responsible and sustainable way, these initiatives seek to improve environmental, social, and economic consequences.

A typical step in the formalization process is to grant artisanal miners permits, train them, and encourage safer and more ecologically friendly mining techniques. While this formalization is still taking place, Tanzania's informal mining industry continues to play a considerable role in the country's mining landscape, particularly in areas with abundant mineral resources.

Tanzania has been attempting to strengthen the economic ties between the formal and artisanal sectors, like many other nations with sizable artisanal and small-scale mining (ASM) industries (Pedersen et al., 2019). This is a complex and developing process with many difficulties and initiatives. The state of Tanzania's economic ties between the formal and artisanal sectors are presented as follows:

- Government Initiatives: To improve the management of mineral resources, the Tanzanian government has been taking initiatives to legitimize and regulate the artisanal mining sector. This involves initiatives to collect revenue from artisanal mining businesses and guarantee adherence to safety and environmental regulations.
- Licensing and Formalization: To formalize artisanal mining activities and make it simpler for miners to operate legally, the government has introduced licensing schemes. The goal of this procedure is to integrate unregulated miners into the formal economy.
- Cooperative Models: To facilitate access to formal markets, some artisanal miners have banded together to form cooperatives for various benefits including access to better technology, training, and credit.
- Supply Chain Integration: Integration of artisanal miners into mineral supply chains has been a focus of efforts. Initiatives to ensure that artisanal miners' minerals can be traceable and certified as "conflict-free" or responsibly sourced, which is crucial for international trade, are included in this.
- Challenges Remain: Despite these efforts, there are still challenges. Informality, a lack of access to financial institutions, poor infrastructure, and little technical capability are

frequently traits of artisanal mining. The regulatory environment can also be complicated, and enforcement practices can differ.

- Land Tenure Issues: Land rights are a significant issue in artisanal mining, as miners may not have secure tenure over the land they work on. Land tenure conflicts can hinder formalization efforts.
- Mineral Trade and Export: Ensuring that minerals from artisanal mining operations meet international standards and regulations for export is an ongoing concern. Compliance with international due diligence requirements is crucial.
- Community Development: Formalization and better economic links between sectors should ideally result in improved community development and reduced social and environmental impacts. However, this aspect often requires focused attention.

Gold and gemstones are the major commodities associated with ASM production in Tanzania. The sector employees between 1 and 1.5 million people based on the most recent estimation and is the second livelihood opportunity in rural areas after agriculture. In terms of ECRMs, some production and exports are registered for commodities like copper, tantalum, tin, and tungsten. However, stakeholders' engagement to date confirms limited availability of information on the profile of the ASM sector for ECRM, and most initiatives continue to focus on gold and gemstones production. Efforts including some promoted by the government, have focused on formalisation of the sector, and supporting access to finance, for example through microfinance services tailored to the ASM sector. A more detailed analysis of the ASM sector role in the production of ECRMs in Tanzania, including major challenges and investment opportunities on production, social, governance and environmental impacts and value chain, will be available as part of deliverable 7.2 of the AfricaMaVal project.

For the period of 2019 to 2022, there has been informal ASM mining of copper ore, natural graphite, bauxite (aluminium), and cassiterite (tin concentrate) and spodumene (lithium ore), ferberite (tungsten concentrate), nickel, cobalt, magnesite (magnesium ore) and manganite (manganese ore). However, the linkage between the formal and informal stakeholders has been limited.

By exception, the phosphate sub-industry is directly linked to informal small-scale farmers as they use fertilizers manufactured by the Minjingu Mines & Fertilizer Limited (MMFL, 2023).

2.2. Identification of the bottlenecks along the value chain

2.2.1. List of the main bottlenecks and the links between them

Despite the recent boom in ECRM commodity demand, Tanzania's mineral value addition remains low, rendering a poor attainment of a substantive value chain state in Tanzania. The mining value chain in Tanzania, like in many other countries, consists of various stages, from exploration and extraction to processing and export. Along this value chain, there are several

bottlenecks and interdependencies that can affect the efficiency and productivity of the mining sector. Table 4 presents the main bottlenecks and links between them.

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	Bottleneck	Links
1.	**Exploration and Licensing Bottlenecks:** Lengthy and complex licensing processes.	Delays in acquiring exploration and mining licenses hinder the development of mining projects. Limited ECRM mining projects in the country and many with development plans not linked to local markets.
2.	**Artisanal and Small-Scale Mining (ASM) Issues:** Lack of formalization of the ASM sector.	Informal ASM operations can result in revenue loss and environmental issues.
3.	**Infrastructure Challenges:** Insufficient transportation and energy infrastructure.	Inadequate infrastructure hampers the movement of goods/equipment, raising costs and slowing down operations.
4.	**Environmental and Social Concerns:** Environmental regulations and community relations.	Failure to comply with environmental and social standards can lead to legal and reputational risks.
5.	**Processing and Value Addition:** Limited in-country processing and value addition. No value addition, manufacturing, recycling industries and factories based on ECRMs available in the country.	Exporting raw materials result in lost opportunities for revenue generation and job creation.
6.	**Mineral Trade and Export Issues:** Compliance with international standards and due diligence. FDI is skewed towards exports of ECRM to support a hi-tech industry in developed countries.	Failure to meet international trade requirements can restrict market access and create reputational risks.
7.	**Revenue Collection and Management:** Inadequate revenue collection and management.	Weak revenue collection can result in underfunding for infrastructure and social programs.
8.	**Land Tenure and Conflict:** Land tenure disputes and conflicts.	Land tenure issues can lead to project delays and operational disruptions.

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	Bottleneck	Links
9.	**Regulatory Framework:** Complex and inconsistent regulatory environment.	Regulatory uncertainties can discourage investment and impede operational efficiency.
10.	**Skills and Workforce Development:** Shortage of skilled labour and workforce development.	A lack of skilled personnel can hinder mining operations and safety.
11.	**Technology and Innovation:** Limited access to modern mining technologies and innovation.	Technological constraints can result in lower productivity and efficiency.
12.	**Market Price Volatility:** Fluctuations in global commodity prices.	Price volatility affects the profitability of mining operations and investment decisions.
13.	**Political and Regulatory Stability:** Political and regulatory instability. No enabling policy and legislation to regulate and promote ECRM exploitation and utilization.	A stable political environment is crucial for attracting investment and sustaining mining projects.
According to the UN (2016), the following generic aspects also remain bottlenecks that hinder the establishment of a high-quality value chains in developing countries such as Tanzania		
14.	The lack of capital or poor access to financial resources for investments in exploration, mining, and value addition, therefore leaving an industry heavily dependent on FDI.	
15.	The lack of technology in Tanzania (including inadequate ICT facilities).	
16.	High tax rates (including impute duties and heavy customs procedures) that block smooth inflow of FDI in Tanzania.	
17.	Poor investment climate due to inadequate business governance to attain appropriate labour skills, meeting standards and other regulatory requirements.	

Table 7: Main bottlenecks and the links between them

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World Bank - World Governance Indicators

The WGI provides valuable insights into the quality of governance across various dimensions, including rule of law, government effectiveness, regulatory quality, and control of corruption. These indicators offer a broader context for assessing the socio-political environment in which critical minerals are extracted, processed, and traded. By considering governance factors, analysts can gauge the stability, transparency, and efficiency of regulatory frameworks, minimizing the risks associated with geopolitical instability, corruption, and inadequate legal structures. The scoring goes from -2.5 to 2.5, with -2.5 reflecting a negative governance environment. Overall, Tanzania scores relatively poorly on all metrics, with all the scores in the negative. Table 8 summarizes the 2022 indicators and the potential impacts on the CRM value chain.

Indicator	Score (-2.5 to 2.5)	Impact
Voice and accountability	-0.7	This can affect transparency and lead to poor outcomes due to stakeholders not being able to assert their concerns.
Regulatory quality	-0.6	Poor regulatory quality can result in adverse impacts on the environment and mining communities. It can also result in difficulties obtaining the necessary permitting due to governmental inertia and backlogs of a poorly regulated system.
Rule of law	-0.4	Vulnerabilities introduced by poor rule of law, there is an increased risk of supply chain disruptions
Government effectiveness	-0.4	Weak governance may discourage domestic and foreign investments in mineral exploration and extraction. Investors may be hesitant to commit funds to projects in regions with unreliable regulatory frameworks and poor infrastructure development
Control of corruption	-0.3	High corruption rates can lead to increased harm to communities and the environment. It can also create a hostile operating environment for businesses and other organisations.

Table 8. 2022 WGI indicators and their impacts on the CRM value chain

Tanzania must therefore be assisted to circumvent bottlenecks in the ECRMs value chain and support investment proposals should include:

- Funding exploration companies in undertaking projects of ECRM in Tanzania;
- Funding mining companies to set up smelting and refining facilities within the country;
- Establishment of ECRM based value addition, manufacturing and recycling factories and industries that source primary and secondary raw materials from within the country; and
- Government policy and legislation to regulate and promote ECRM exploitation, value addition and manufacturing.

A consistent supply of raw materials from the developing world is sought after by geopolitics of commodity availability in industrialized countries. For Tanzania's mining sector to grow sustainably, these bottlenecks must be addressed, and the links between the various phases of the mining value chain must be strengthened. Reforming policies, building infrastructure, involving the community, and promoting ethical mining methods, among other things, may be necessary to achieve this. For the benefit of all stakeholders involved, it is crucial for stakeholders, including the government, industry, and local communities, to work together and address these concerns.

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3. Investment/financing prospects for ECRM projects in Tanzania

3.1. Fiscal, legislative, and regulatory context for in-country financings

Fraser Institute's annual survey of mining and exploration companies, in 2022, ranked Tanzania 52nd place out of 62 countries with similar countries such as Botswana, Ghana, and South Africa ranking 10th, 33rd, and 57th respectively. Recognising keen investor interest in Tanzania, especially given the countries rich mineral resource endowments and geological prospectivity, the country is committed to improve the business climate and identified attracting FDI as a key priority.

A total of 47 banks operates in Tanzania and are categorized as commercial banks (34), community banks (4), microfinance banks (4), development banks (2), non-bank financial institutions (1), housing financing companies (1), and mortgage refinancings companies (1). A list of financing institutions in this regard is presented in

Large			
Azania Bank Ltd	Diamond Trust Bank (T) Ltd	National Microfinance Bank (T) Ltd (NMB)	Stanbic Bank (T) Ltd
Citibank (T) Ltd	Exim Bank (T) Ltd	Standard Chartered Bank (T) Ltd	National Bank of Commerce
CRDB Bank Plc			
Medium			
ABSA Bank Tanzania Limited	Bank of Baroba (T) Ltd	First National Bank (T) Ltd	The People's Zanzibar Ltd
Akiba Commercial Bank Limited	Bank of India (T) Ltd	I&M Bank (T) Ltd	United Bank for Africa (Pty) Ltd
Amana Bank Ltd	Dar es Salaam Community Bank	Kenya Commercial Bank (T) Ltd	Canara Bank (T) Ltd
African Banking Corporation (T) Ltd	Ecobank (T) Ltd	Mkombozi Commercial Bank Plc	China Dasheng Bank
Bank of Africa (T) Ltd	Equity Bank Tanzania Ltd	NCBA Bank Tanzania Ltd	Habib African Bank Ltd
Regional and Small			

Guaranty Trust Bank (T) Ltd	Letshego Bank (T) Ltd	Mwalimu Commercial Bank	Tanzania Commercial Bank Ltd
International Commercial Bank (T) Ltd	Maendeleo Bank Plc	Mwanga Hakika Bank	Uchumi Commercial Bank Ltd
NBFI's			
TIB Development Bank Limited	Tanzania Agriculture Development Bank		

Table 9.

- **Stanbic bank** of Tanzania is a member of Tanzania Chamber of Mines and one of its priorities is to contribute to the growth of the mining sector by providing financing and advisory services.
- **Azania bank** in partnership with the State Mining Corporation (Stamico) have agreed to support ASM gain access to credit facilities and financing choices.
- **The National Microfinance Bank (NMB)** is also supporting ASM in the country when it allocated more than 120 billion Tanzanian Shillings (TZS) to provide miners with loans to purchase mining equipment to increase productivity in the mining sector.

Large			
Azania Bank Ltd	Diamond Trust Bank (T) Ltd	National Microfinance Bank (T) Ltd (NMB)	Stanbic Bank (T) Ltd

Citibank (T) Ltd	Exim Bank (T) Ltd	Standard Chartered Bank (T) Ltd	National Bank of Commerce
CRDB Bank Plc			
Medium			
ABSA Bank Tanzania Limited	Bank of Baroba (T) Ltd	First National Bank (T) Ltd	The People's Zanzibar Ltd
Akiba Commercial Bank Limited	Bank of India (T) Ltd	I&M Bank (T) Ltd	United Bank for Africa (Pty) Ltd
Amana Bank Ltd	Dar es Salaam Community Bank	Kenya Commercial Bank (T) Ltd	Canara Bank (T) Ltd
African Banking Corporation (T) Ltd	Ecobank (T) Ltd	Mkombozi Commercial Bank Plc	China Dasheng Bank
Bank of Africa (T) Ltd	Equity Bank Tanzania Ltd	NCBA Bank Tanzania Ltd	Habib African Bank Ltd
Regional and Small			
Guaranty Trust Bank (T) Ltd	Letshego Bank (T) Ltd	Mwalimu Commercial Bank	Tanzania Commercial Bank Ltd
International Commercial Bank (T) Ltd	Maendeleo Bank Plc	Mwanga Hakika Bank	Uchumi Commercial Bank Ltd
NBFI's			
TIB Development Bank Limited	Tanzania Agriculture Development Bank		

Table 9: Financing institutions in Tanzania

Incentives

The government offers incentives and assistance through the Tanzania Investment Centre and maintains ongoing dialogue with the private sector through the Tanzania National Business Council (TNBC).

Foreign investors generally enjoy treatment like domestic investors, but some limitations persist in certain sectors. There are no geographical restrictions on private establishments with foreign participation, no restrictions on the number of foreign entities operating in any sector, and no specific sectors requiring approval for FDI but not for domestic investment. However, Tanzania discourages foreign investment in some sectors through limitations on foreign equity ownership

and other activities. Although foreign ownership limitations in the mining sector were relaxed in 2020, they were not eliminated.

Strategic projects

The **Tanzania Investment Act No. 10 of 2022** is a criterion for investments to qualify as strategic investments or special strategic investments, through requirements like creating at least 1,000 local jobs, increasing exports by at least 50%, stimulating production, introducing new technologies to Tanzanians, and aligning with socio-economic priorities. The minimum investment capital threshold for Tanzanian and foreign-owned businesses is $50,000 and $500,000 respectively.

The **Finance Act, No. 5 of 2022**, granted the Minister for Finance powers to impose, alter taxes, duties, and fees. It exempted certain income (special strategic investments, gains from the realization or transfer of mineral rights, etc.) from taxation. The Act introduced changes that may deter investors, including the removal of the appeal channel from the TIC to the Minister of Industry and Trade. Provisions related to technology transfer agreements were removed, and the automatic immigration quota for expatriate workers was abolished.

Foreign currency accounts and currency convertibility

Tanzania's Foreign Exchange Regulations (G.N. No. 294 of 2022) allow residents and non-residents to open and maintain foreign currency accounts with Tanzanian banks or financial institutions. These accounts enable the holding, selling, and purchasing of foreign currency, but trading outside the interbank foreign exchange market, especially with foreign banks, is restricted. Tanzania, as an IMF member, is obligated to facilitate currency convertibility for current transactions, and the regulations issued in May 2022 cover foreign currency and gold dealings, current account transactions, and capital and financial account transactions.

The regulations permit various transfers, such as net profits, repayment of foreign loans, royalties, foreign technology fees, and remittances through authorized banks in freely convertible currency. Exporters must receive proceeds from their exports in foreign currency through local banks within 7 days of completing customs procedures, with a maximum payment period of ninety days. Remittances for services provided outside Tanzania are allowed, subject to compliance requirements, simplifying dividend remittances under certain conditions. Foreign investors have the right to repatriate returns from their investments.

However, the government's introduction of Non-Tariff Barriers (NTBs) could create bureaucratic hurdles and delays in transactions, potentially complicating the conversion of local currency into foreign currency. While the regulations themselves do not explicitly prohibit fund transfers abroad, NTBs may result in delays and complications in the process.

Thin Capitalization Rules

Thin capitalization rules are tax regulations that limit the amount of interest expense a company can deduct for tax purposes when the company is heavily financed with debt, especially debt from related parties. These rules are designed to prevent profit shifting and base erosion through excessive interest deductions. In Tanzania, thin capitalization rules were introduced in the Income Tax Act, 2004: Debt-to-Equity Ratio, Related Party Debt, Transfer Pricing Rules and Interest Deductibility.

Foreign/local currency accounts regime in Tanzania

The country has specific regulations and guidelines regarding these accounts, which are aimed at maintaining financial stability, controlling foreign exchange rates, and encouraging economic growth.

Foreign Currency Accounts in Tanzania**:** These accounts can be useful for international trade, investments, and hedging against currency fluctuations. Individuals can open foreign currency accounts for personal use, while businesses can hold such accounts for various purposes, including trade and investments.

It is important to note that the regulations governing foreign currency accounts in Tanzania can be stringent. Rules include restrictions on who can open foreign currency accounts, the permissible sources of foreign currency deposits, and limits on foreign currency transactions. Such regulations are in place to curb capital flight and excessive currency speculation, which could destabilize the national economy.

Local Currency Accounts in Tanzania: These accounts are primarily denominated in Tanzanian Shillings (TZS) and are suitable for everyday transactions, local trade, business operations, and personal savings. Various forms of these accounts, including savings, current, and fixed deposit accounts, are available, and they are overseen by the central bank to ensure compliance with regulatory guidelines.

Tanzanian companies have limited options for holding offshore accounts in foreign jurisdictions, often chosen for favourable tax regulations, privacy, or ease of doing business. While Tanzanian companies can establish offshore entities in these jurisdictions, repatriating offshore funds to Tanzania involves strict controls and reporting requirements, as the country aims to combat tax evasion and ensure tax compliance.

Onshore accounts denominated in hard currency are allowed for Tanzanian companies under certain conditions and regulations. Companies engaged in international trade, receiving foreign currency income, or needing foreign currency for specific transactions can open hard currency accounts but must adhere to guidelines of the Bank of Tanzania.

Arbitration in Tanzania (The Arbitration Act, 2002):

International arbitration in Tanzania is primarily regulated by the Arbitration Act, 2002, which is based on the United Nations Commission on International Trade Law (UNCITRAL) Model Law. This aligns Tanzania's arbitration practices with international standards, making it an appealing option for international parties looking for a fair and efficient dispute resolution process.

Key points regarding international arbitration in Tanzania include:

- Arbitration Agreements: Parties can agree to arbitration in their contracts, specifying the arbitration rules and the seat of arbitration.
- Arbitral Institutions: The most prominent institution for international arbitration in Tanzania is the Dar es Salaam Centre for International Arbitration (DIArb). It provides administrative support and facilities for international arbitrations. DIArb is designed to meet the standards set by international arbitration institutions, promoting transparency and impartiality.
- Confidentiality: International arbitration proceedings in Tanzania offer confidentiality, which is often preferred by parties wishing to protect sensitive business information.

Key aspects of local arbitration in Tanzania include:

- Domestic Arbitration Agreements: Parties in domestic contracts can opt to include arbitration clauses in their agreements, specifying the arbitration rules and appointing authorities.
- Arbitral Institutions: The Institute of Arbitrators Tanzania (IAT) plays a significant role in promoting local arbitration, offering arbitration services and arbitrator training.
- Enforcement of Arbitral Awards: To enforce an award, a party must apply to the Tanzanian High Court, meeting legal requirements for enforcement, which generally respects and enforces arbitral awards.
- Mining Disputes Resolution: The Mining Commission, established under the Mining Act, 2010, resolves disputes related to mining operations and activities. It operates according to the Mining (Disputes Resolution) Rules.
- Commercial Disputes in Mining: Commercial disputes concerning mining activities are typically adjudicated in the Commercial Division of the High Court, with the possibility of appeals to the Court of Appeal of Tanzania.
- Arbitration Act: Tanzania has enacted the Arbitration Act [Cap 15 R.E 2020], replacing the 1931 Arbitration Act. This new act establishes a robust regulatory framework for arbitration, including accreditation of arbitral practitioners and the Tanzania Arbitration Centre (TAC) for domestic and international disputes.

- Accessible Dispute Resolution: The new Arbitration Act enhances investor confidence in dispute resolution and provides an accessible alternative to reduce case backlogs in national courts. It also clarifies the distinction between domestic and international commercial arbitration.

3.2. Macroeconomic context for in-country financings

Tanzania initially underperformed economically after gaining independence, leading to severe economic distress by the 1980s. Subsequent structural adjustments and policy reforms allowed Tanzania to qualify for debt relief under the Heavily Indebted Poor Country (HIPC) Initiative in 2000, establishing macroeconomic stability. This stability created an environment conducive to FDI, leading to sustained high economic growth, often ranking among Africa's fastest-growing economies. Judicious monetary policies stabilized inflation, the TZS value, and foreign reserves. Despite historically high global trade integration, Tanzania has recently experienced a depressed trade-to-GDP ratio and a recurrent negative trade balance. Overall, from a macroeconomic standpoint, Tanzania presents an attractive environment for business.

Gross Domestic Product and annual growth rates

In 2021, Tanzania had a GDP of $64.16 billion (in constant 2015 prices), making it the second-largest economy in East Africa and ranking among the top 10 economies in sub-Saharan Africa (Statista, 2023). The country consistently saw annual GDP growth rates ranging between 4.5% and 7.7% from 2000 to 2021. The COVID-19 pandemic temporarily slowed economic growth, with a 2% rate in 2020, but Tanzania rebounded with a 4.3% growth rate in 2021, slightly above the Sub-Saharan Africa average of 4.2% (World Bank, Tanzania Economic Update 2022). Tanzania's population has grown consistently, reaching over 63.5 million in 2021, with a growth rate of 3% or more over the past decade. High population growth poses challenges, including increasing dependency ratios. Economic mobility remains a challenge, but the country's strong macroeconomic performance is reflected in a per capita GDP of $1,036 in 2021.

Sectoral breakdown of GDP

The sectoral breakdown of GDP in Tanzania has seen limited change in recent years (Figure 12). Agriculture continues to be the dominant sector, especially in rural areas, while manufacturing mainly focuses on processing agricultural products and faces constraints in diversification due to various factors. Industry and construction have slightly increased their share of GDP, driven by growth in mining, quarrying, and construction, particularly from increased public infrastructure investments. The services sector's contribution to GDP has decreased by approximately 4% from 2015, with the sector accounting for around 36.5% of GDP in 2021.

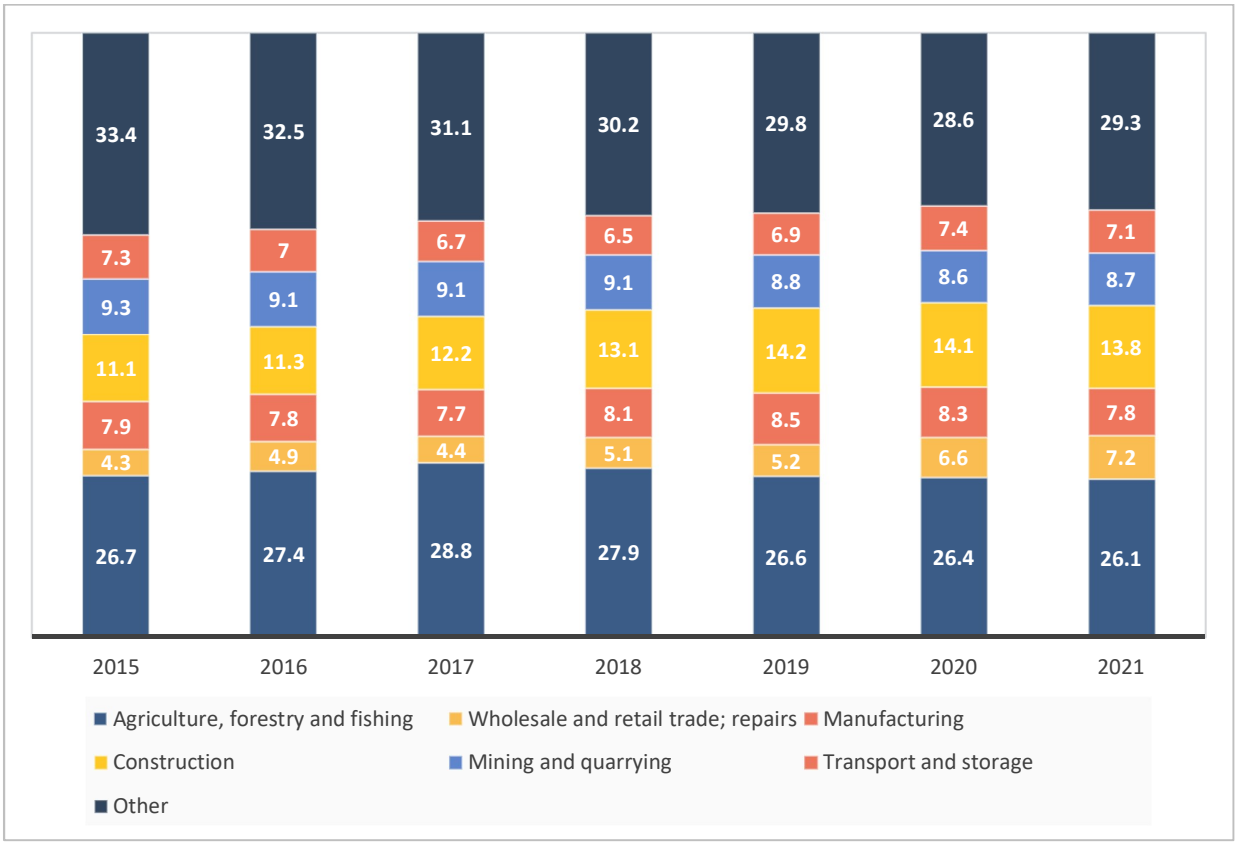

Figure 12: Share of GDP by main economic activity 2015-2021 (at current prices) (Source: Tanzania Bureau of National Statistics)

Foreign Direct Investment (FDI)

Tanzania has become a preferred destination for FDI in Africa due to its sound macroeconomic policies, successful privatization programs, and abundant natural resources. In 2021, FDI inflows amounted to $922 million, higher than the $685 million in 2020 but still below the peak of $2.087 billion in 2013 (Figure 13). Barriers to investment include low levels of industrial development, environmental concerns, lack of transparency, inconsistent application of legislation, inflexible labour laws, limitations on foreign land investment, and sector-specific investment screening requirements. Tanzania's total FDI stock in 2021 was $17.1 billion, equivalent to about 24.4% of GDP, indicating a high level of economic integration into the global economy. The manufacturing, mining, and energy sectors are the primary recipients of FDI (Lloyds Bank, 2023).

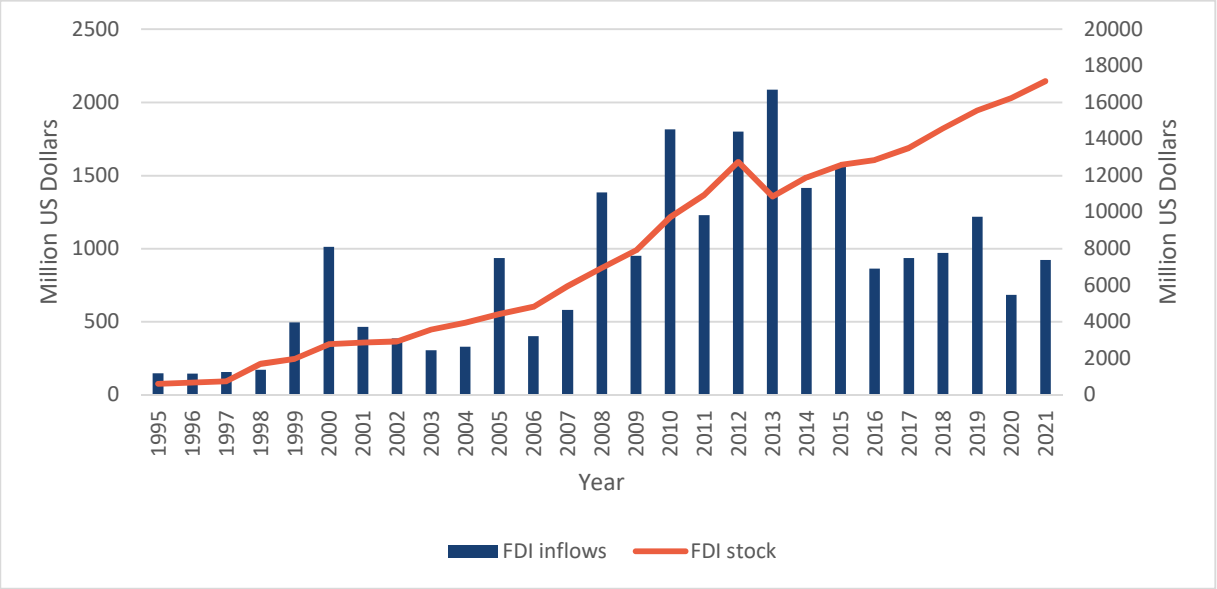

Figure 13: Foreign Direct Investment inflows and stock at current prices (1995-2021), (UNCTAD).

Monetary policy

The Bank of Tanzania, established in 1965, is the country's central bank, operating under the 2006 Bank of Tanzania Act. Its main objective is to maintain domestic price stability to support balanced economic growth, targeting a 5% inflation rate. The bank uses market-based instruments to manage money supply growth, interest rates, and exchange rates. It has transitioned to inflation targeting with interest rates as its operational target, replacing the previous reserve-money targeting approach, reflecting changes in Tanzania's financial markets and economic conditions. This transition aims to enhance transparency, monetary policy effectiveness, and the development of Tanzania's financial sector while maintaining the bank's independence and fiscal discipline.

Inflation

In Tanzania, prior to macro-economic reforms, high double-digit inflation rates were common, peaking at 34% in 1994. Reforms led to single-digit inflation in 1999, and apart from a brief period during the 2008 global financial crisis, inflation has remained in single digits for the past decade. In 2021, CPI inflation was estimated at 3.7%. The African Development Bank projects inflation to rise to 4.4% in 2022 and 3.8% in 2023, mainly due to higher energy prices driven by the Russian invasion of Ukraine. The World Bank anticipates a slightly higher inflation rate of 5.2% in 2022, still within the official target of 5%, and expects moderate price pressures in the medium term. Tanzania's headline inflation rate remains the lowest among East African Community members.

Trade

International trade is crucial for a modern economy, promoting specialization in areas of comparative advantage. Tanzania's trade-to-GDP ratio, the sum of exports and imports of goods and services as a percentage of GDP, has fluctuated over the years. It reached its peak in 2011 at 56% of GDP but declined to 30% in 2020 due to factors like global economic conditions and domestic trade policies. Tanzania's main imports include machinery, transportation equipment, and petroleum products, while exports consist of minerals, agricultural products, and more. China, Germany, India, and others are significant trading partners. Tanzania has consistently run a trade deficit, with the value of imports exceeding exports, driven by factors like increased oil imports for power generation and fluctuations in commodity prices. The impact of this recurring trade deficit on the economy depends on various complex factors.

Foreign Exchange & Reserves

The Bank of Tanzania actively manages foreign exchange reserves to support a market-driven exchange rate and ensure an orderly foreign exchange market. They aim to maintain exchange rate flexibility while having sufficient foreign reserves for balance of payment purposes. The exchange rate remained stable in the first half of 2022/23, trading at an average of TZS 2,318.33 to the US dollar. This stability was attributed to market confidence, low inflation compared to trading partners, and increased transparency in foreign exchange operations. Prudent foreign exchange management has contributed to this stability, helping preserve export competitiveness and keeping inflation and interest rates low. The Bank of Tanzania maintains foreign exchange reserves equivalent to at least four months of imports and international transactions, signalling macroeconomic stability and confidence for investors and creditors.

National Debt

As of the end of 2022, Tanzania's national debt stood at $40.1 billion, with a $1.9 billion increase from the end of June the same year. External debt comprised 72.4% of the total national debt, while public debt (combining external and domestic debt) made up 80.6% of the national debt. Within the public sector, which includes the government and public corporations, external debt represented 73.3%. Multilateral institutions were the largest creditors, accounting for 47% of the debt, followed by commercial creditors at 28.2%, bilateral creditors at 7.7%, and export credit entities at 17.7%.

A Debt Sustainability Analysis (DSA) from late third-quarter 2021 and an IMF update in mid-2022 found that Tanzania's public debt and publicly guaranteed (PPG) debt remained relatively low. The PPG debt was 39.7% of GDP at the end of the 2020/21 financial year, slightly up from 38.0% in the previous year. However, this marked a more than 13% increase over a decade.

The analysis indicated that Tanzania's risk of debt distress had risen to "moderate," mainly due to weakened debt-service capability due to the Covid-19 pandemic's impact on exports. Although the economy was recovering from the pandemic, risks remained tilted to the downside, according to the IMF. However, external debt burden indicators, except for a one-off breach caused by the collapse in tourism receipts during the pandemic, remained below policy-determined thresholds and were expected to remain controlled in the medium term, making default highly unlikely. Nevertheless, the IMF recommended that Tanzania prioritize external financing on concessional terms, when possible, enhance revenue mobilization, improve public investment management, and accelerate the reform agenda outlined in the Five-Year Development Plan to maintain fiscal and debt sustainability.

Risk

In August 2022, the Economist Intelligence Unit (EIU) assessed Tanzania's risk factors. They gave Tanzania a B-rating for political risk, noting positive governability. However, they highlighted risks related to corruption, macro-economic factors, and global economic challenges.

Tanzania received a B-rating for economic structure risk due to its heavy reliance on mineral exports and a significant current account deficit. Both the EIU and the IMF expressed concerns about risks in the banking sector, given its relatively early development stage. The currency risk was rated BB, reflecting monetary stability and a well-managed exchange-rate regime. Tanzania earned a B-rating for sovereign risk, supported by manageable public debt, good access to finance, and a strong commitment to debt repayment, reducing the risk of default. Tanzania's membership in the World Bank's Multilateral Investment Guarantee Agency (MIGA) provides access to political risk insurance and technical assistance to attract FDI.

Regional economic integration

Tanzania is part of two regional economic communities: the East African Community (EAC) and the Southern African Development Community (SADC). In the EAC, member states, aim to deepen economic, social, and political cooperation to achieve balanced growth and development. They have achieved milestones like the Customs Union (2005), Common Market (2010), and the Monetary Union Protocol (2013), which promote free movement of goods, persons, labour, and harmonization of investment incentives.

The SADC also focuses on industrial development and market integration. Various programs like the Regional Indicative Strategic Development Plan (RISDP) 2020-2030, the SADC Industrialisation Strategy and Roadmap 2015-2063, and the SADC Regional Mining Vision (RMV) and Action Plan 2019 aim to boost intra-SADC trade and investment. However, progress toward a common market, customs union, and monetary union in SADC has been slow due to significant

obstacles. These regional affiliations aim to enhance regional economic cooperation and integration.

Imports/Exports and customs clearance

Tanzania is a member of the World Trade Organization (WTO) since 1995 and participates in various regional trade agreements through its membership in EAC and SADC. It also benefits from nonreciprocal unilateral trade preferences like the Everything but Arms (EBA) by the EU, the African Growth and Opportunity Act (AGOA) of the US, and Generalized System of Preferences (GSP) schemes from fifteen countries. These arrangements provide Tanzania with improved market access to various markets. Tanzania signed the Kigali Declaration for the African Continental Free Trade Agreement (AfCFTA) in March 2018.

Non-tariff barriers pose challenges for Tanzanian businesses involved in cross-border trade, affecting their competitiveness. Delays, high fees, procedural obstacles, and the need for permits, licences, and certifications hinder exporters. Regulatory reforms and government initiatives have partially resolved some trade obstacles, but customs and port authorities are the main hindrances for importers. Underdeveloped infrastructure also presents significant challenges, causing unpredictable delays and extra costs for importing goods into the country.

Import procedures are governed by the EAC Customs Management Act, 2004, which mandates the appointment of a licensed clearing and forwarding agent and online documentation submission through the Tanzania Customs Integrated System (TANCIS) at least seven days before goods arrive. Prohibited and restricted imports and exports are outlined in the Second and Third Schedules of the Act, covering items like counterfeit currency, hazardous goods, narcotics, and more. Tanzania has imposed export bans, like on grain in 2017 and mineral ores in 2017, which were lifted in 2020 after negotiations with major producers and resolving tax disputes. Such experiences highlight the impact of regulatory changes and policy uncertainty on investment and economic growth.

3.2.1. Taxation and royalties

Revenue collected by the Government from mining companies through taxes and royalties are categorised as follows:

- Income Tax
- Withholding Tax
- Employment Tax
- Value Added Tax
- Customs Duty
- Excise Duty

Royalties payable by an authorised miner is charged on gross value of the minerals produced. Where an authorised miner sells his production to a licensed dealer, the royalties are paid by the licensed dealer.

A summary of the key provisions on the above taxes and royalties are provided in Table 10.

Relevant Tax	Key Provisions
Income Tax	• Taxes on income include Corporate Income Tax (CIT), Withholding Taxes (WHT), Employment Tax and Rental Taxes • CIT is charged at 30% • Companies newly listed with the Dar es Salaam Stock exchange with at least 30% equity issued to the public are charged 25% for 3 years from date of listing • Gains derived from transfer of mineral rights are taxed once at 30%
Withholding Tax	• Charged on interest, dividend, technical services and management fees • Residents: 5% charged on management or technical and/or professional services • Non-residents: technical service fee with a source in Tanzania is charged at 15% • 15% should be withheld by the employer from non-resident employees and on annual director's fees payable to a non-executive director • For dividends, 5% is charged for companies listed on the DSE or 10% for non-listed • For interest, rent or a commuted pension paid to a resident or interest, or rent paid to a non-resident, WHT of 10% • 15% is charged for all other payments related to interest, natural resource payment, rent or royalty
Employment Tax	• Personal income tax or Pay as You Earn (PAYE) and Skills Development Levy (SDL) • Resident employees PAYE range from zero to 30% depending on employment income • Non-residents are taxed at a flat rate of 15% on employment income • Skills Development Levy is chargeable at 6% of the total wage bill
Value Added Tax (VAT)	• Value Added Tax (VAT) in Tanzania is single rate regime set at 18% • Goods exported within the meaning of the term "export" in the law are zero rated • All minerals exported by mining companies are zero rated for VAT • Import of goods by registered and licensed explorer or prospector for the exclusive use in oil, gas or mineral exploration or prospection activities are exempt from VAT • Mining, oil, and gas companies with binding agreement with government are entitled to VAT relief
Capital Gains Tax	• CGT is at the rate of 30% income tax.

<table>
<tr><th>Relevant Tax</th><th>Key Provisions</th></tr>
<tr><td>Custom Duty</td><td>• Mining operators and their contractors are entitled to payment of duty < 5% on import of listed goods after first anniversary of commencement of production
• Listed goods are imported without payment of custom duty during the first anniversary of commencement of commercial production</td></tr>
<tr><td>Exercise Duty</td><td>• Extractive Industry is exempted from excise duty on imported or domestically off-bond purchased oil for mining/exploration purposes
• Exemption is granted only if fuel is imported by the mining company or their agent
• Companies buying tax paid fuel are refunded for fuel consumed in mining operations</td></tr>
<tr><td>Royalty</td><td>• Royalty payable by an authorized miner is charged on gross value of the minerals produced:
<table>
<tr><th>Type of Mineral</th><th>Royalty</th></tr>
<tr><td>• Uranium</td><td>5%</td></tr>
<tr><td>• Gemstone and diamond</td><td>6%</td></tr>
<tr><td>• Metallic minerals such as copper, gold, silver, and platinum group minerals</td><td>6%</td></tr>
<tr><td>• Gold sold at refinery centres</td><td>4%</td></tr>
<tr><td>• Coal used as industrial raw material</td><td>1%</td></tr>
<tr><td>• Gem (cut and polished or engraved gemstone)</td><td>1%</td></tr>
<tr><td>• Other minerals, including building materials, salt, all minerals within the industrial minerals group</td><td>3%</td></tr>
</table>
• Where an authorized miner sells his production to a licensed dealer or broker, the royalties of such minerals are paid by the licensed dealer or broker</td></tr>
<tr><td>Other Fees</td><td>• Sorting and valuation fee is paid for purposes of sorting and valuation of gemstones
• An inspection fee of 1% of the gross value of minerals is charged to any person in possession of minerals prior to clearance for domestic use or export
• In addition to application fee, an annual charge is payable in respect of every mineral right, dealer’s licence or broker’s licence</td></tr>
</table>

Table 10: Key provisions on taxes and royalties

3.3. Political context for in-country financings

Tanzania is considered a unitary presidential democratic republic where the President is both head of state and head of government. The country is further classified as a hybrid regime according to the Economist Intelligence Unit, implying that it is defined by regular electoral fraud preventing fair and free democracies. Such nations have governments that apply pressure on political opposition, non-independent judiciaries, widespread corruption, harassment, and

pressure on media, anaemic rule of law, and pronounced faults in realms of an underdeveloped political culture, low levels of participation in politics and governance functionality issues. This status has, however, improved over time and Tanzania currently hosts about 20 registered political parties, with the political landscape strongly dominated by the CCM.

Episode of authoritarianism

An episode of authoritarianism after the election of President John Magafuli in 2015 saw Tanzania experience sever critics on political opposition and civil society.

Tanzania's commitment to international treaties

Tanzania is a member of several international organizations, including the United Nations, the Commonwealth, the World Trade Organization, the African Union, the East African Community, and the Southern African Development Community. When sanctions or embargoes are imposed by these organizations, Tanzania enacts implementing legislation to enforce them. African Union, SADC, and EAC regulations have direct legal effect in Tanzania, and penalties under them are determined by the Tanzanian government. UN Resolutions are not directly applicable but are incorporated into Tanzanian legislation through orders and regulations.

Tanzania's Constitution allows the National Assembly to deliberate upon and ratify treaties and agreements that require ratification. While some UN conventions and protocols under the International Convention for Suppression of Financing of Terrorism have not been ratified, Tanzanian laws criminalize terrorism and terrorist financing. Key enactments, such as the Anti-Money Laundering Act of 2006, the Prevention of Terrorism Act of 2002, and the Proceeds of Crime Act 1991, provide the legal framework for addressing money laundering and terrorist financing in Tanzania.

Economic and political outlook

Tanzania has achieved positive economic indicators over the past two decades, such as economic growth, FDI, and stable macroeconomic conditions. However, despite these achievements, it still faces challenges related to poverty reduction. The high population growth rate and structural issues within the country's political and economic system contribute to this challenge.

The economic outlook for Tanzania is generally positive, with the IMF predicting a recovery in real GDP growth. To capitalize on its natural resource wealth for poverty reduction, the country needs consistent and investor-friendly economic policies. These policies should streamline bureaucratic procedures, simplify business regulations, and enhance transparency (ECF, 2023).

Responsible mining investors increasingly consider ESG factors when making investment decisions. The government should promote policy, legislative, and regulatory reforms to create a favourable investment climate and ensure that investments are protected. Tanzania is

committed to the EITI to make the extractive sector more competitive and maximize benefits from mining. Structural reforms are needed to promote natural resource-led industrial development, but they must be accompanied by measures that enhance democratic governance and strengthen state institutions. President Samia Suluhu Hassan is expected to lead these efforts, which include addressing internal party issues, constitutional reform, developing natural gas reserves, ensuring fair elections, and revising laws to attract foreign direct investment, particularly in the mining sector. These actions aim to set Tanzania on a path toward democratic and economic prosperity on the global stage.

Ownership requirements

Ownership requirements for businesses and mining operations in Tanzania are established to promote local participation and ensure that Tanzanian citizens benefit from the mining industry. The Mining Public Offering Regulations mandate that holders of special mining licences must ensure that at least 30 percent of their mining operations' shareholding is locally owned, giving Tanzanian citizens a stake in the industry.

To meet this requirement, special mining licence holders must make a public offer through the Capital Markets Securities Authority, allowing Tanzanian citizens to participate in mining ownership. These requirements apply to mining licences with investments of up to US$100,000,000 or the equivalent in Tanzanian shillings. For investments exceeding this threshold, licence holders must list a specific percentage of their shares on a local stock exchange to facilitate broader local ownership.

As part of the license application process, mining operators must submit a local procurement plan, demonstrating their commitment to sourcing goods and services from local Tanzanian suppliers, further contributing to the local economy and sustainable development.

Primary mining licences are granted exclusively to Tanzanian citizens or companies where all members and directors are Tanzanian citizens, ensuring local control over the primary mining sector. A mining licence may be granted to a non-Tanzanian citizen with the condition that at least 50 percent of the license is held directly by a Tanzanian citizen, balancing foreign investment with local participation.

Special mining licence holders must consult with the Minister of Energy and Minerals and offer shares to the public through a listing on the Dar es Salaam stock exchange, making ownership accessible to Tanzanian citizens. Draft regulations proposed in 2013 emphasize the listing of a minimum of 30 percent of shares by special licence holders on either the Main Investment Market or the Enterprise Growth Market, both designed to promote local ownership and investment.

4. Assessment of environmental, social, and governance challenges

Improving mining practices is a global call for sustainable and responsible extraction with a broader stakeholder focus, accounting for environment, employees, customers, and communities. ESG is a comprehensive framework largely utilised by investors and companies to assess the performance and risk based on a set of standards brought about by authorised agencies. The disclosure of ESG data therefore increases transparency, indirectly reduces risks, and potentially identifies opportunities. ESG reporting standards are set by various boards, namely:

- The International Accounting Standards Board (IASB);
- *Global Sustainability Standards Board (GSSB);*
- Sustainability Accounting Standards Board (SASB); and
- International Sustainability Standards Board (ISSB).

Generally, the Mining Industry in Tanzania uses the **Global Reporting Initiative (GRI)** guidelines as per the GSSB. ESG reporting compliance in Tanzania is still voluntary and mostly implemented by foreign mining companies.

4.1. Country-level assessment and context

4.1.1. Context

The modern mining sector in Tanzania can be categorized as a mature sector as it has been operational for nearly 25 years. Over that period, several legislations regulating the social and environmental matters have been enacted and amended accordingly to meet the local and international changes in the industry. The **first mining policy of 1997** and the **mining legislation in 1998** are credited for the stimulation and attraction of foreign investment in the mining sector. However, as time went by, and more experiences were gained locally; some of the provisions were found not to be beneficial for the development of the country's economy as was envisaged in the policy. Issues around local capacity building to participate effectively and ensure economic gains in communities surrounding the mines, were all not well supported in the earlier legislations. These necessitated the **policy change in 2009** and the **mining act of 2010**. Despite the few gaps that were still an issue, the changes in 2010 saw continued growth of the sector, more involvement of local businesses in the supply of goods and services to the industry and stabilization of corporate social responsibility programmes in surrounding communities.

In **2017**, several legislations aimed at protecting the country's natural resources and employment opportunities for Tanzanian citizens were introduced by parliament. These included the following:

- The Natural Wealth and Resources (Permanent Sovereignty) Act (No. 5), 2017;
- The Natural Wealth and Resources Contracts (Review and Renegotiation of Unconscionable Terms) Act (No. 6), 2017; and
- The Written Laws (Miscellaneous Amendments) Act (No. 7), 2017;

These new Acts introduced new conditions for exploration and mining companies, such as the following, but not limited to (Ngcobo and Magai, 2020):-

- Restrictions on export of raw materials;
- Sourcing of goods and services to give preference to indigenous Tanzanian companies; and
- Incentivising contractors, subcontractors and licences undertaking mining activities that employ and train local citizens.

Following a **change in Government in 2020** and subsequent reviews of the mining regulations, issues which had stagnated growth of the sector were somewhat resolved. This has prompted positive feedback from foreign investors. The National Environment Management Council (NEMC) has also established more regional branches and employed mining experts which have expedited environmental approvals. Land use conflicts between large scale mining companies, artisanal and small-scale mining as well as other land users remain a challenge. The formalisation of ASM has a positive outlook, however, shows slow progression. Despite efforts to monitor and assess ESG aspects of mining activities in Tanzania, in practice, the country's ability to promote ESG reporting and to protect public interest has remained limited.

In general, there has been positive response by foreign investors on the reforms that have been undertaken since 2020. These can be seen through more interest in exploration and the increase in issuance of mining licences and commencement of construction of projects that had stalled. The environmental management regulations have stabilized over time and structures to reduce the bureaucracy and hence the time for approval of EIAs, environmental audits and monitoring have been put in place. The National Environment Management Council (NEMC) has established more regional branches and employed mining experts which has made environmental approvals faster. Land use conflicts between large-scale mining companies, artisanal and small-scale mining (ASM) and other land users remain a challenge. The formalization process of ASM although positive, has been rather slow. In the process the Government is continuing with the construction of demonstration centres aimed at training miners to adopt good mining and processing

practices. Non-mining land use conflicts resulting in surrounding communities entering mine licenced areas are mostly related to lack of land use plans in the villages which results in abandoned demarcations of village boundaries. However, good stakeholders' engagement programmes by mining companies and involvement of community leaders in issues of common interest have been found effective in minimizing these conflicts. Rapid population growth in urban and suburban centres coupled with poor planning of these centres also result in land use conflicts especially for projects located in proximity of these centres.

4.1.2. Mineral and mining policies, industry policies

To achieve the goal of the mining sector integration with other sectors for optimised GDP contribution and poverty alleviation, the Government of Tanzania commits to attracting and enabling the private sector to take the lead in exploration, mining, and mineral beneficiation, as well as marketing. The Mineral Policy, 2009 sets its objectives on aspects such as the following:

- Improving the economic environment to attract and sustain local and international private investment in the mineral sector;
- Promoting economic integration between the mineral sector and other sectors of the economy, to maximize the contribution of the mineral sector to the economy;
- Strengthening the legal and regulatory framework for the mineral sector and enhance the capacity for monitoring and enforcement;
- Strengthening the institutional capacity for effective administration and monitoring of the mineral sector;
- Participating strategically in viable mining projects and establish an enabling environment for Tanzanians to participate in ownership of medium and large scale mines;
- Supporting and promoting development of small-scale mining to increase its contribution to the economy;
- Facilitating, supporting and promoting increased participation of Tanzanians in gemstone mining;
- Establishing transparent and adequate land compensation, relocation and re-settlement schemes in mining operations;
- Strengthening involvement and participation of local communities in mining projects and encouraging mining companies to increase corporate social responsibilities;
- Promoting and developing a marketing system of minerals to ensure that miners get right values of minerals traded in formal markets;

- Promoting and facilitating value addition activities within the country to increase income and employment opportunities;
- Promoting research development and training required in the mineral sector and encourage its utilization;
- Developing a local base for technical capacity;
- Improving communication on the mineral sector to the public through education and provision of accurate and timely information;
- Strengthening the institutional capacity of the Geological Survey of Tanzania (GST) to perform its roles and functions effectively and efficiently;
- Strengthening cooperation with the regional and international bodies to take advantages of facilities, resources and information provided by the organisations;
- Promoting safety and maintaining hygiene conditions and protecting the environment in mining areas; and
- Encouraging and promoting women participation in mining activities and strengthening enforcement of laws and regulations against child labour in mining activities.

In realising its objectives, the policy commits the Government to continue giving priority to the mineral sector in the National Strategy for Growth and Reduction of Poverty (NSGRP) and contribute to the achievement of the National Development Vision 2025.

The policy provides strategies for achieving each of the above objectives. A summary of some of the issues that are addressed as part of the strategies and that are relevant to this project i.e., those that support the development of "*EU-Africa partnership ensuring a responsible sourcing of minerals for the European industry while providing for a sustainable local co-development in the best Environmental, Social and Governance (ESG) conditions and creating a long-term's business environment for European and African companies*" include the following:

Conducive economic environment for private sector investment in the mineral sector

The policy recognizes the need for a sound, transparent, and stable macroeconomic environment for promotion of investment and development of the mineral sector. A macroeconomic environment includes conducive fiscal regime, reliable infrastructure, and reliable financial services. To ensure the objectives are realized, the following strategies are outlined:

- The Government will provide a competitive and predictable fiscal regime for the mineral sector;

- The Government in its own or in collaboration with the private sector will provide reliable infrastructure to service the mining industry where feasible; and
- The Government will encourage and promote establishment of reliable and capable financial institutions.

Promote and develop mineral marketing systems

To facilitate minerals trading, the policy recognises the role of reliable, stable, and efficient marketing system in the promotion of growth of both local and international markets and increases foreign earnings and Government revenue. The strategy for realizing this objective commits the Government to:

- Collaborate with stakeholders to develop local mineral markets;
- Harmonize taxes and tariffs on minerals produced in the country to ensure that they are competitive;
- Source foreign markets for minerals and strive to accrue information relating to mineral markets in general; and
- Collaborate with the private sector to develop and improve training institutions on mineral marketing, mineral grading, and valuation.

Promotion of mineral value addition activities

The policy also recognizes the importance of value addition activities in country as a way of creating employment, improve local skills in mining industry and increase income. The policy also recognizes that this can be achieved if there are necessary technical skills, access to capital and adequate infrastructure and facilities. To achieve this objective, the policy commits the Government to:

- Promote investment in the fabrication and manufacturing sectors to stimulate minerals beneficiation;
- Promote investment in lapidary, stone carving and jewellery making; and
- Collaborate with the private sector, regional and international organisations to strategically invest in smelting and refining industries.

Develop and Sustain Co-operation with Regional and International Organisations

The policy recognizes that cooperation with Regional and International Organisations is important for the development of the mineral sector. Tanzania can realise benefits of being a member of regional and international bodies related to mining industry by fully utilising

opportunities provided by these organisations. To ensure development of sustainable cooperation with regional and international organizations, the policy commits the Government to:

- Collaborate with regional bodies of which Tanzania is a member to harmonize its mineral policy with other mineral policies; and
- Continue to work together with regional and international organisations in research, transfer of technology, training, and exchange of information.

The last two objectives of the mineral policy outlined above deal with cross-cutting issues, specifically on *i) Provision of Environmental Management, Health and Safety Measures*; and *ii) Promoting Women Participation and Prohibiting Child Labour in Mining*. The policy strategies for ensuring there is adequate management of safety, occupational health and environment in mining activities commits the Government to:

- Strengthen the institutional capacity in monitoring and enforcement of laws and regulations on safety and occupational health, environmental protection and management in mining areas;
- Require mining companies to set aside funds for environmental rehabilitation and mine closure obligations;
- Continue to harmonize laws and regulations governing safety, occupational health and environmental issues in the mineral sector;
- Continue to collaborate with stakeholders to ensure that small, medium and large-scale miners preserve the environment;
- Continue to provide education on health and safety; HIV/AIDS and environmental management to small, medium, and large-scale miners and their surrounding communities; and
- Administer and monitor exploration, mining, handling, transportation, storage, usage and export of radioactive minerals, explosives, and toxic materials.

The policy recognizes the need to encourage and promote women participation in mining activities as a way of promoting socio-economic development processes in the country. In addition, the exposure of children to harsh mining conditions, affects their well-being and causes them to miss education opportunities is against the laws of the country. As such, the policy stipulates for strengthening enforcement of laws and regulations against child labour in mining activities. The strategies outlined in the policy commits the Government to:

- Continue to promote participation of women in mining activities;

- Ensure that all programmes related to mining, including education and training opportunities, are based on gender equality and equity; and
- Collaborate with stakeholders to strengthen monitoring and enforcement of laws and regulations on child labour in mining activities.

The policy also outlines the role of the Government as being a regulator; promoter and facilitator; service provider; and an investor. As such, the Government is responsible for formulating policy and minerals law, developing regulations, establishing guidelines, and regulating the mineral sector. It is also responsible for promoting and facilitating private investments and provide essential services needed by the mines. The Government may participate strategically in mining activities such as exploration, mineral exploitation, and value addition to stimulate other sectors of the economy and increase benefits to the nation.

4.1.3. Mining regulations

Since modern mining in Tanzania dates to the late 1990s, its regulation is associated with the Mining Act (No. 5), 1998. Following the development of the sector and hence the need to address issues that emerged over time, the 1998 Act was repealed by the Mining Act (No. 14), 2010. The Mining Act (No. 14), 2010 (as amended from time to time) is the principal legislation for the management of all mining activities in Tanzania. The major amendments of this Act were made in 2017 which put in place major changes through Acts stipulated earlier.

A revision of the Mining Act of 2010 and its amendments was then necessitated by these changes and hence a revised version came in force in 2018, i.e., Mining Act CAP 123, (R.E. 2018). This was followed by the publication of the relevant regulations for the operationalization of the legislation. The 2018 revision of the Act was further revised in 2019 and incorporates the amendments done through:

- The Miscellaneous Amendments (No. 2) Act, 2019; and
- The Miscellaneous Amendments (No. 7) Act, 2019;

As such, the current principal legislation for the governance of the mining sector is the “Mining Act CAP 123, (R.E. 2019) (as amended from time to time). However, in continual improvement of the administration of the sector, amendments to the 2019 revision of the Act have been made in 2021 and 2022 through:

- The Miscellaneous Amendments (No. 4) Act, 2021; and
- The Miscellaneous Amendments (No. 3) Act, 2022;

These amendments are incorporated into this discussion.

The control and ownership of minerals in Tanzania is vested in the President in trust for the people of Tanzania, (section 5(1)). As such, under Section 5A-(1), the President may, after consultation with the relevant local authorities, through the Minister responsible for local government and by Order in the *Gazette;* declare any area of Tanzania which is subject to mining operations to be a controlled area. The order made under this Section prescribes the conditions applicable to the controlled area. This is regularly used to set aside areas for artisanal and small-scale mining in the bid for formalization of the sub-sector.

The Minerals administration under the Mining Act are summarised in Appendix B.

4.1.4. Land-use and mineral rights

All land related matters in Tanzania are regulated through the Land Act, Cap. 113 (R.E 2019) and Village Land Act, Cap. 114 (R.E 2019). Key areas of issues related to land use and mineral rights ownership include, but are not limited to surface and mineral rights, compensation for land and co-existence. The issues related to land use and the mineral rights ownership are summarised in

Issues	Description
Surface & Mineral Rights	• Ownership of land entitles one to the surface rights and not to the subsurface minerals in that land • Ownership of minerals is vested in the President in trust for the People of Tanzania
Compensation for Land	• Minerals exploration and mining in land already occupied can only be carried out after compensation for the loss of land and/or properties • Where mineral rights are issued in protected areas, consent from the responsible authority is required
Co-existence	• Coexistence between mineral right & other land users is supported by law • Mineral rights holders required to exercise their rights reasonably not affect injuriously the interest of the occupier of land • A lawful occupier of land in a mining area requires consent of the registered holder of the mineral rights to erect any structure in that area • Where disturbance of the rights of the lawful occupier of land is caused during mining or exploration, the mineral rights holder is liable to pay a fair compensation • Where an ASM licence was in the area prior to allocation of a large-scale mining licence, coexistence of the two mineral rights is protected by law

Table 11.

Issues	Description
Surface & Mineral Rights	• Ownership of land entitles one to the surface rights and not to the subsurface minerals in that land

	• Ownership of minerals is vested in the President in trust for the People of Tanzania
Compensation for Land	• Minerals exploration and mining in land already occupied can only be carried out after compensation for the loss of land and/or properties • Where mineral rights are issued in protected areas, consent from the responsible authority is required
Co-existence	• Coexistence between mineral right & other land users is supported by law • Mineral rights holders required to exercise their rights reasonably not affect injuriously the interest of the occupier of land • A lawful occupier of land in a mining area requires consent of the registered holder of the mineral rights to erect any structure in that area • Where disturbance of the rights of the lawful occupier of land is caused during mining or exploration, the mineral rights holder is liable to pay a fair compensation • Where an ASM licence was in the area prior to allocation of a large-scale mining licence, coexistence of the two mineral rights is protected by law

Table 11: Issues related to land use and mineral rights ownership

4.1.5. Environment

The Environmental Management Act (EMA) (No.20), 2004 is the principal legislation in Tanzania, providing the legal and institutional framework for sustainable management of the environment. Compliance with the EMA is monitored through NEMC. The mining industry in Tanzania imposes pressing environmental challenges through the extraction of minerals, subsequent processing as well as the disposal of waste generated during these activities. Some of these environmental challenges include, but are not limited to:

- **Water pollution** through improper wastewater management practices;
- **Air pollution** during mineral extraction processes; and
- **Deforestation and soil degradation** through land clearing processes for large scale mineral exploration.

In addition, Tanzania still faces challenges with tracking and reviewing the quality of relations between mining companies and affected communities.

The key provisions of the environmental legislation that are relevant to mining are summarised in Table 12.

Key Areas	Description
Environmental Impact Assessment (EIA)	• All developers of projects specified in the law should undertake, at their own cost, an environmental impact assessment (EIA) • Mining, including quarrying and open-cast extraction are some of the projects to which EIA is mandatory

Procedure for Undertaking EIA & Certification	• Projects must be registered and screened to ascertain the magnitude of the impacts to the environment
	• After screening projects are categorised into:
	  • Category "A" – Projects to which EIA is Mandatory
	  • Category "B1" - Projects regarded as Borderline Projects
	  • Category "B2" - Projects to which EIA is non-Mandatory
	  • "Special Category" Projects or projects where potential risks are uncertain and requires detail specialized study prior to EIA
	  • Mining (Large and Medium scale) and Cement manufacturing are classified as "Category A" Projects
	• Environmental Impact Statement (EIS) should be sent to NEMC for review before being sent to Minister for environment for approval and issue of the EIA Certificate
	• NEMC review includes a site verification visit within sixty days of submission of EIS
	• Any person aggrieved with Minister's decision may appeal through a Tribunal

Experts to carry out EIA	• EIA should be carried out by Experts who are registered with NEMC
EIA & Application for Mining Licence	• Mining act requires applicants for Special Mining Licence & Mining Licence and their renewal to provide an EIA Certificate • Licensing authorities cannot issue a project certificate without proof of EIA Certificate
Transferability	• EIA certificate may be transferred from one holder to another in the event the project changes ownership
Requirement of EIA during Operations	• Substantial changes or modification in operations may require a new EIA • New EIA's may be required if project pauses impacts that were not foreseen in study
Monitoring & Audits	• Monitoring carried out to assess effects to the environmental & non-compliances

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Key Areas	Description
	• Proprietor required to undertake environmental audits and report annually to NEMC
Decommissioning & Closure	• Proponent required to undertake safe decommissioning, site rehabilitation and ecosystem restoration before project closure
Rehabilitation Bond	• Minister for environment to prescribe in Regulations, activities or processes which threaten the environment of which environmental performance bond is required • Minister for mining, in consultation with the Mining Commission to provide for the posting of a rehabilitation bond • NEMC not to discharge an environmental performance bond deposited until safe decommissioning and closure requirements are fulfilled • Currently, all issues pertaining to mine closure are managed through a committee known as "Mine Closure Committee" under Ministry of Mines
Sector Environmental Regulations	• Mining Projects required to comply with environmental regulations of other sectors • Key sector legislations are for water, land, forestry, industrial and consumer chemicals and others
Mining in Protected Areas	• Mining can be carried out in forest reserves with consent of the relevant institutions • Working in game reserve is limited to prospecting and mining of uranium, oil, and gas

Table 12: Key provisions of the environmental legislation that are relevant to mining

4.1.6. Societal and community aspects, cultural heritage

The urban environment is managed by three types of authority, i.e. city, municipal and town councils, whereas the rural areas are managed by 2 levels of authority being district councils with township authorities and the village councils. Mining companies engage with societal and community through:

- **Corporate Social Responsibility Plan (CSR) Programmes** - Mining companies are expected to work closely with local government authorities to ensure a license to operate and engage with communities as part of CSR programmes. Section 105 of the Mining Act requires that every mineral right holder prepares, on an annual basis, a credible CSR plan jointly with the respective local authorities.

- **Local Content Regulations** – Local content plans are one of the requirements for the approval of a Prospecting License, Mining License, Special Mining License and Primary Mining License.

The Cultural Heritage Policy of 2008 provides for the preservations and protection of historic monuments, archaeological, and paleontological objects produced or modified before 1863. The Graves Act (No. 9), 1969 is another legislation that protects the cultural heritage of Tanzania.

4.1.7. Public health and safety

Matters related to public health are regulated through the Public Health Act (No. 1), 2009 and occupational related health and safety are regulated through the Occupational Health and Safety Act (No.5), 2003. In addition, the EMA also addresses aspects of public health.

Other regulatory instruments that deal with public health and safety include the Environmental Management Act (No. 20), 2004 and the sector specific legislations, regulations, and guidelines.

4.2. Mining practices *vs.* Environmental, Social and Governance (ESG) goals

4.2.1. Environmental challenges

The mining industry in Tanzania is facing significant environmental challenges. The issues are largely related to the extraction of minerals and their subsequent processing, as well as the disposal of waste generated by these activities. Tanzania's mining sector's most pressing environmental challenge is **water pollution** caused by improper wastewater management practices that allow contaminants such as heavy metals and other pollutants to enter surface and groundwater sources. A Reuters article by Ng'wanakilala, F. mentions a fine of 5.6 billion Tanzanian shillings (US$2.4 million) imposed on Acacia Mining for alleged pollution highlighting one of the environmental challenges associated with mining in Tanzania. This has a detrimental effect on local ecosystems, leading to decreased biodiversity and loss of habitat for wildlife species that depend on clean water sources for survival.

In addition, **air pollution** from dust particles created during mineral extraction processes can cause respiratory illnesses among nearby communities that rely heavily on natural resources like forests or rivers for sustenance or income generation activities such as fishing or farming.

Furthermore, **soil degradation and deforestation** due to land clearing associated with large-scale mineral exploration projects further exacerbates this problem because it reduces available habitats even more significantly than air pollution alone would do, if left unchecked.

Mining activities such as digging, blasting, and transporting ore can release toxic chemicals into nearby water sources and soil, leading to the contamination that can harm public health and the

environment. Additionally, using heavy machinery and cutting trees for timber and charcoal exacerbate soil erosion and deforestation, leading to biodiversity loss and soil degradation. The government has also initiated plans to address environmental concerns including, introducing more stringent environmental regulations, and encouraging companies to use environmentally friendly technologies.

The mining industry in Tanzania has encountered several environmental impacts' investigations. The results show that mismanaged water pollution results in contamination of water sources that lead to main water sources such as Lake Victoria, an important source of livelihood for most communities, regions and even nationwide. There is a need for greater regulation and enforcement of environmental laws to ensure that mining activities promote sustainable development and do not degrade the natural resources on which communities depend. Some companies publish detailed results of their water quality monitoring programmes, which cover surface water, wastewater, and groundwater in and around the mining concessions. Political leaders have similarly been calling upon public members to work together with their leaders at different levels to develop strategies for saving the ecology and biodiversity and curb deforestation. There are still challenges with tracking and reviewing the quality of mining companies' relationships with affected communities. Companies' reports show limited evidence of systematic action on identifying and addressing how climate change can exacerbate the impacts of its operations on its workforce, affected communities, and the environment.

4.2.2. Socio-economic issues

The mining sector accounts for just 4.5% of total GDP showing a low reliance on minerals, but it is comparatively a high contributor to FDI in the country. However, the mining industry in Tanzania faced several social and economic challenges over the past few years. These issues stem from various factors, including limited access to resources, regulatory and taxation policies in the sector, and environmental concerns related to large and small-scale operations. The lack of access to resources is particularly acute for small-scale miners who often have difficulty obtaining the required capital and technology for production. Other disputes have been on compensation and land rights which has led to a conflict between small scale miners and communities with larger companies operating on their land due to low compensation and disputes over rights and ownership. Whilst the law or publicly documented policy specifies rules for expropriation and compensation to landowners or land users, there are no procedures governing the resettlement of land users when project development interferes with their access to or use of land. However, Section 97 of the Mining Act R.E. 2019 requires a resettlement plan to be developed as per the land laws. The Land Act Cap 113 and the Village Land Act Cap114 on the other hand do not have a requirement for resettlement.

In addition, significant environmental concerns are associated with large-scale operations such as open pit mines. Reports and information from these companies tend to be too technical, leaving some communities near these sites feeling alienated from decision-making processes about how they should be managed. The RMI 2022 report shows that the vast majority of the assessed mine sites cannot demonstrate that they are informing and engaging with host communities and workers on basic risk factors such as environmental impacts, safety issues or grievances. Some 94% of the mine sites score an average of less than 20% on the fifteen basic ESG issues assessed. At the same time, a few mine sites show better practices on some of these issues, proving 'it can be done'.

The Tanzanian government has taken various steps to address these issues. For instance, in recent years, there has been a push for stricter regulations, increased government ownership in mining projects, and efforts to formalize the artisanal mining sector. However, the effectiveness of these measures in mitigating the socio-economic issues associated with mining is an ongoing concern, and achieving a balance between economic development and environmental and social responsibility remains a challenge.

4.2.3. What would be the best practices for responsible mining?

The OECD Guidelines for Multinationals Enterprises and the UN Guiding Principles on Business and Human Rights provide a framework for responsible mineral supply chains that promote respect for human rights (OECD, 2016). In addition, the EITI aims to stimulate demand for responsibly produced minerals. Responsible mineral extraction practices should ideally prioritize protecting human rights, the environment, and the well-being of local communities. This can be done through:

- Addressing sustainability issues through incorporating strong ESG principles in all operations;
- Comprehensive policy reforms, implementation and monitoring;
- Promoting an environment that encourages domestic and foreign investments, while ensuring proper management practices;
- Strengthening disclosure of environmental and social impact assessments and mitigation plans; and
- Amending land legislation to provide for the resettlement of landowners and compensation to land users

5. Business network between the EU and Tanzania

Tanzania is perceived as a gateway to East Africa, hosting the Delegation of the EU (Dar es Salaam), the EAC headquarters (Arusha) and subsequently portraying a secure and stable investment climate.

5.1. Assessment of the upstream and downstream business ecosystem

Tanzania and the EU have a history of collaboration through programs mostly focused on development initiatives such as education, healthcare, and conservation of maritime areas. The business ecosystem in Tanzania and the EU has steadily seen development into agriculture, manufacturing, and the healthcare sectors. During the 2023 Tanzania-EU Business Forum held in Dar es Salaam, 7 trade agreements between the EU and Tanzania focused heavily on the infrastructure and banking sectors (European Commission, 2023a). The landmark agreements provide an indicator of the changing investment and business climate in Tanzania.

5.1.1. Context, formal and informal players

Business networks are the main framework promoting investment from the EU, and involve approaching the European Stakeholders, who work to connect prospective investors with the relevant Tanzanian stakeholders. Key stakeholders in the Tanzanian-EU Business network are provided in

Organization/Entity	Business Mandate
Delegation of the EU to the United Republic of Tanzania and the EAC	• First stop for all European entities interested in investing in Tanzania and the EAC
EU – Tanzania Business Forum	• Specific business forum comprising of EU Member state companies, industry organizations and Tanzanian service providers.
Tanzanian Investment Centre	• Advisory organization that acts as a connective medium between foreign investors and local stakeholders.
Ministry of Industry and Trade	• Provides support in industrial development and trade as well as policy formulation and regulatory compliance for foreign investment in Tanzania.
Ministry of Minerals	• Primary stakeholder regarding mineral extraction, local content, beneficiation, and fabrication of minerals in Tanzania.
State Mining Corporation (STAMICO)	• The state invests alone or participates in mining and processing activities of foreign investors.
Tanzanian Chamber of Mines	• Responsible for private mining companies as an advocacy group regarding policy and overall business climate relating to mining in Tanzania.
Federation of Miners Association of Tanzania (FEMATA)	• Responsible advocacy organization for small scale miners in Tanzania.

Table 13. Table 14 provides a list of institutions in Tanzania within the realm of critical minerals.

Organization/Entity	Business Mandate
Delegation of the EU to the United Republic of Tanzania and the EAC	• First stop for all European entities interested in investing in Tanzania and the EAC
EU – Tanzania Business Forum	• Specific business forum comprising of EU Member state companies, industry organizations and Tanzanian service providers.
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Table 13: Key Tanzanian stakeholders in the Tanzanian-EU Business network

Institution	Mandate
Tanzania Chamber of Mines	• Main aim is to represent the interests of the mining industry and its stakeholders.
Mining Commission	• The Tanzania Mining Commission (TMC) was established to oversee and regulate the mining industry in Tanzania
State Mining Corporation	• Oversees and promotes the development of the mining industry in the country
Ministry of Energy and Minerals	• Responsible for facilitating the development of the energy and mineral sectors
Tanzania Environmental Experts Association	• Provides information to its members on issues of environment regulations and compliance.
National Environment Management Council	• It was established is to undertake environmental enforcement, compliance, review and monitor environmental impact statements, research and awareness raising.
African Environmental Information Network	• A multi-stakeholder capacity building process that aims to harness and enhance access to information and knowledge to support the management of Africa's environmental resources as assets for sustainable development.
Africa-EU Partnership	• To promote cooperation and collaboration between African and European countries in the field of energy
Tanzania Investment Centre	• Promotes and facilitates investment in the country.

Table 14: Institutions for the development of an Africa-focused critical minerals network

5.1.2. Relationships at local or regional levels

The EU has been an investor in Tanzania and the East African region for over several decades. It focuses on growing business primarily in agricultural exports to the European Union and imports of goods and services through unilateral trade agreement with individual EAC members. The EU has also heavily invested in healthcare and social welfare programs relating to education, skills training for young women and empowering communities to develop agricultural activities.

The current trade partnership that exists between the EU and Tanzania is a unilateral trade agreement that encompasses all sectors in Tanzania. The agreement termed "*Everything but Arms",* involves exporting of all types of commodities ranging from agriculture to minerals except for arms/weapons. The trade agreement has grown stronger over decades as import and export volumes increased with a trade balance mostly in European favour. The unilateral trade agreement allows for a foundation in which critical minerals can be exported to Europe, however

bringing local content rules into the equation, critical raw materials in unprocessed form make it difficult to export. This provides an opportunity to build on the trade agreement and involves investment in the critical raw materials downstream space.

Like Tanzania, its EAC members also have unilateral trade agreements. For the regional cluster, the EU tabled the Economic Partnership Agreement (EPA) aimed at trading with the East African Community as a block rather than individual countries. The agreement is yet to be ratified and implemented as three member states are deliberating accepting the terms of the new agreement. Although, the EPA has not been ratified, the intent of the agreement indicates.

Investing in Regional Cooperation

The promotion of value addition activities related to ECRMs in Tanzania provides the country a unique opportunity to act as a catalyst for developing and sustaining value chain activities. This can be done by:

- Supporting the direct mining operations and businesses that generally exist only for the life of the mine (LoM), and
- Developing downstream activities – industrial hubs that are currently existent in other countries such as smelting, refining, and manufacturing (battery cells, clean energy infrastructure components such as solar panels and wind turbines).

With this narrative, Tanzania, and other countries in the EAC region and beyond (like Southern African Development Community (SADC) and Common Market for Eastern and Southern Africa (COMESA)) should seek to promote investment innovation to increase growth beyond LoM. This can be done by collaboration and strategizing to share expertise and resources (financial and raw materials) within the region to create value chain activities in which the mine must be integrated to rest of the economic activities in those countries (Figure 14).

A mine must utilize local infrastructure like railway lines, airlines, water, electricity, etc. It must provide an arena for education, and to transfer of technology and innovation to the local expertise and workforce. The mine must also procure goods and services and employ from the local market.

Also, there must be a link between the mine and local factories and industries in the supply of raw materials. Other sectors must feed from the mine through a clear and transparent value chain network (FMF, 2023).

Figure 14: ECRM Value Chain Diagram (FMF, 2023).

Investment and collaboration in regional (EAC, COMESA, SADC, etc.) cross-border value chain activities are necessary to ensure the availability of raw materials as countries complement one another. In this way, ECRM availability will be secured from country to country during the establishment of local industries and factories to increase the local value chain base of these nations. Tanzania and other countries in the EAC region and beyond (like SADC and COMESA) can promote investment innovation through the creation of a conducive environment found on a three-pillar strategy:

Pillar 1 **Political**	To create a single market; political leadership should organize a roundtable dialogue to discuss and initiate the following: Harmonization of legal, fiscal, and institutional policy framework by creating common external tariff, tax convergence, free circulation of goods, capital and persons, and common standards that apply to ECRM and other mineral resources. This will create regional fiscal policies for the ECRM resources sector, that harmonize ECRM resources contracts to facilitate investment in the sector and as well as develop regional dispute resolution mechanisms in the ECRM resources sector.
Pillar 2 **Regional capacity building and implementation**	Initiate and implement a cooperation in capacity building in institutions (universities, technical institutes, research organisations); to share and acquire training capacities increasing required skills at the various levels of specialization. Establishing a set of regional directives, creating technical, economic, and social monitoring unit for the sector, and developing a regional capacity building programme based on networking between national institutions and specialization for some of them to ensure cross-border trade in high-value products. Developing regional networks to monitor the ECRM resources sector by conducting studies to update geological, economic, and technological data on the sector – a regional databank for the mineral resources sector.
Pillar 3 **Regional infrastructure**	To ensure regional functioning infrastructure is developed and used efficiently, share energy infrastructure for industrial sites through regional connections and common hydroelectric plants that feed regional power pools. Create a network of roads, railways, harbours, ports, and telecommunications and ensure it is efficiently shared and the land locked countries use the infrastructure profitably.

5.1.3. Overview of the local or regional clusters

Apart from trade with the EU, Tanzania, which is favourably located in east Africa has several local and regional clusters that play a significant role in the country's economy and development. Key clusters in Tanzania include:

- **Agriculture Cluster**: one of the most prominent clusters, with sub-clusters including coffee, tea, tobacco, cashew nuts, maize, and rice. The Southern Agricultural Growth Corridor of Tanzania (SAGCOT) is a notable initiative to promote agricultural investments in the southern regions of the country.
- **Mining Cluster**: the mining sector is significant, with gold historically being a major focus.
- **Tourism Cluster**: vital to the economy, with renowned attractions like Mount Kilimanjaro, Serengeti National Park, Ngorongoro Conservation Area, and Zanzibar. Arusha, Moshi, and Dar es Salaam are key hubs for tourism and hospitality.
- **Manufacturing Cluster:** Tanzania has been working on developing its manufacturing sector, with industrial zones in Dar es Salaam, Mtwara, and other areas. The textile and garment industry in the Mwanza region is growing, with initiatives like the Special Economic Zones (SEZs) promoting industrial development.
- **Fishing Cluster**: Tanzania has a coastline along the Indian Ocean, and fishing is a significant industry, particularly in areas like Mtwara, Tanga, and Dar es Salaam. The country exports various seafood products to international markets.
- **Information and Communication Technology (ICT) Cluster**: Tanzania is developing its ICT sector, and the city of Dar es Salaam is the main ICT hub. The establishment of tech hubs and incubators is fostering innovation and entrepreneurship in the sector.
- **Zanzibar Spice Cluster**: the semi-autonomous region of Tanzania, is famous for its spice production, including cloves, cinnamon, nutmeg, and black pepper. The spice industry is a crucial part of Zanzibar's economy and cultural identity.
- **Renewable Energy Cluster**: Tanzania is working on expanding its renewable energy sector, with a focus on hydroelectric, solar, and wind energy. The development of the Stiegler's Gorge Hydropower Project and various solar power initiatives are examples of investments in this cluster.
- **Construction and Real Estate Cluster:** a growth sector, driven by infrastructure development projects and urbanization. Major cities like Dar es Salaam are witnessing rapid construction and property development.

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These clusters reflect the diversity of economic activities in Tanzania, with opportunities for investment and development. Some of these clusters would share infrastructure developed or enhanced for the requirements of the critical minerals' projects. However, it is essential to note that the economic landscape can change over time due to various factors, including government policies, global market dynamics, and regional development initiatives.

5.2. Building new B2B relations

5.2.1. Promoting local content and enabling mining cluster actors

The local content policy in Tanzania (Ministry of Minerals, 2018) relating to mining is robust and rigid, in its requirements and through its implementation. Miners in Tanzania have the option and are encouraged to beneficiate and undertake fabrication. The local content model is viewed as a mine to market integrated model with the purpose of growing Tanzanian business into downstream activities.

This, however, is also seen as an impediment to investment particularly regarding the shortage of competency and capability from Tanzanian downstream stakeholders. To address this, local companies are encouraged to engage with competent institutions and specialized processors to increase downstream beneficiation and fabrication through partnerships and on-site skills training through the various business forums that currently exist. Similarly, foreign investors particularly are encouraged to utilize the EU-Tanzania business forum, the respective government organizations, and the Tanzanian Investment Centre to find local partners to yield mutually beneficial partnerships through collaboration.

An example of a structured relationship is highlighted in the mining industry where foreign minerals exploration companies conducting mineral exploration in Tanzania employ and train members of the surrounding community or local exploration firms to map out deposits and to apply various sampling techniques during an exploration program. The process of enabling mining clusters in Tanzania from a European perspective must involve local community participation in the projects and partnering with local, low-skilled downstream stakeholders with the intent of enhancing competency through skills transfer programs. By forming strategic partnerships with Tanzanian prospectors and special mining license holders, downstream progression can be unlocked early on.

The model has been tested and proven through the Integrated Mining Technical Training (IMTT) Program where mining companies collaborated with public and private sector companies to build competency and skills in the extractives sector.

Duplicating the IMTT model is critical in enhancing local capacity, however this must not end at technical skills transfer, rather must be extended to R&D involving university collaborations between European technical institutes and Tanzanian universities. Through collaboration on

developing R&D, Tanzanian universities can empower themselves and develop a skills base with high technical capabilities and competency. In the short term, exchange programs for students and academics can achieve the desired outcome for skills transfer and develop the platform for further R&D collaboration. A list of key institutions that can develop research, development and innovation intellectual property are provided in Table 15.

Institution	Focus	Website
University of Dar es Salaam – School of Mines & Geosciences	Providing education and research in the fields of mining, geology, and related sciences	https://www.udsm.ac.tz/web/index.php/schools/somg
University of Dodoma – Department of Geology	Providing education and research in the fields of mining, geology, and related sciences	https://www.udom.ac.tz/programme/view?id=VFhwTlBRPT0=
African Minerals & Geosciences Centre – (Formerly Southern & Eastern African Mineral Centre)	Acting as an independent regional centre of knowledge and information for southern and eastern Africa	https://www.seamic.org/index.php
Sokoine University of Agriculture – Soil & Geological Sciences Department	Providing training to undergraduate and postgraduate students, consultancy services to government departments, farmers, private firms, and NGOs on matters related to soil and geological sciences.	https://www.sua.ac.tz/soil-and-geological-sciences-department
Nelson Mandela African Institution of Science and Technology	Delivering and promote high quality and internationally competitive teaching and learning, research and innovation, and public service in Science, Engineering, Technology, and Innovation (SETI).	https://nm-aist.ac.tz/
Ardhi University	Providing innovative and integrated learning, research and public services that advance sustainable development at national level and beyond.	https://www.aru.ac.tz/
Tumaini University Makumira	Tumaini University Makumira is primarily focused on providing quality education and training in various fields including social sciences and business management	https://makumira.ac.tz/
State University Zanzibar	Offering the demand driven programmes to produce high-quality graduates in the field of Natural and Social Sciences that respond to the needs of modern society	https://www.suza.ac.tz/
Darwin Education Agency Limited	Providing quality education on the mining industry in areas such as: machinery production and design, mine design, mine construction	https://dea.co.tz/

Table 15: Integrated Mining Technical Training (IMTT) Program Education and training programmes

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Organisations across the African continent and in Europe to host interns and apprentices with upstream and downstream players in the extractive industry

Facilitating internships and apprenticeships in the extractive industry is essential for building capacity and fostering responsible practices. There are various organizations across the African continent and in Europe that may be involved in hosting interns and apprentices in the extractive industry (

Table 16).

Organisation	Focus
African Minerals and Geosciences Centre	AMGC provides training and capacity-building programs in the field of geosciences and mining.
African Union Commission	May offer internship and apprenticeship opportunities in various fields, including those related to natural resources and mining.
European Federation of Geologists	EFG or similar geological associations in Europe may facilitate internships for geology and earth sciences students interested in the extractive industry.
United Nations Economic Commission for Africa	UNECA may provide opportunities for interns interested in sustainable development, including extractive industries.
African Development Bank (AfDB)	Offers internships for students in various fields, including those interested in the economics and development aspects of the extractive industry.
European mining companies	Many European mining companies have internship and apprenticeship programs for students interested in gaining hands-on experience in the extractive industry. Examples include BHP, Rio Tinto, and Anglo American.
Universities and research institutions	Universities and research institutions in Africa collaborate with industry partners to offer internship opportunities for students studying mining, geology, and related fields. This can be extended to European partners.
Local and national mining associations	Mining associations in Africa and Europe may have programs to connect students with internship and apprenticeship opportunities in the industry.
Non-Governmental Organizations	Some NGOs focus on responsible mining practices and may offer opportunities for interns interested in the social and environmental aspects of the extractive industry.
Government agencies	Ministries and agencies responsible for mining and natural resources in African and European countries may provide internship opportunities for students interested in policy and regulatory aspects of the industry.

Table 16: Some organisations across the African continent and in Europe that may host interns and apprentices with upstream and downstream players in the extractive industry

5.2.2. Strengthening African Mining Clusters

Incentivizing investment in Tanzania is important to establish entrepreneurial capacity and unlock potential in the mining sector. The positive economic growth numbers alone showcase Tanzania as a premium investment hub (TIC, 2023). Considering the business network that is currently growing, a prospective European investor is assured that business network will receive adequate support in the investment venture.

Local content policy is clear, in that it requires local capacity building as well as local participation in activities across the mining value chain. Thus, bringing in local content regulations highlights that a prospective investor would require additional effort to engage and build a partnership with local stakeholders that may not necessarily have the required competency or capability that the investor is looking for.

The EU and its banks have embarked on financial deals aimed at increasing entrepreneurial endeavours particularly in the mining sector. Interested Tanzanian stakeholders receive increasing access to local funding for mining project development, thus laying a foundation for a prospective European investor to partner with them. From the Tanzanian side, a new Investment Act ratified in late 2022 now provides a shield for investors through security of investment and access to international arbitration which was not present in the old act.

Existing alternative financing models

Existing alternative financing models can help address challenges related to funding, infrastructure development, and environmental sustainability. Some strategies and models that can be used to achieve this goal include, but are not limited to: -

- Public-Private Partnerships (PPPs): Encourage collaboration between the government, private sector, and development partners to finance infrastructure projects, such as roads, railways, and energy supply, that are essential for the mining sector's growth. Establish clear regulations and incentives to attract private sector investment in mining infrastructure.
- Carbon Credits and Environmental Financing: Explore opportunities to earn carbon credits through sustainable mining practices and reforestation efforts. Use the proceeds from carbon credits and environmental financing to support environmental restoration and conservation efforts in mining areas.
- Mining Cluster Development Agencies: Create specialized agencies or organizations responsible for coordinating the development of mining clusters. These agencies can

work with various stakeholders, including the government, mining companies, and local communities, to ensure the holistic development of mining areas.

6. Energy and digital transition: a strategy for the EU and Africa Partnership

Tanzania is one of the four countries poised to benefit from the 111.5 million Euros (approximately 307.9 billion Tanzanian Shillings) in funding provided by the EU (European Commission, 2023b). This funding has been earmarked to target the mining sector, and it is part of the broader OACPS-EU Development Mineral Programme. The initiative seeks to enhance the mining environment and empower small-scale miners, focussing on engaging young people and women in the sector. The program is set to span three years, from 2022 to 2024. The announcement of Tanzania's inclusion in this project was made by the OACPS Secretariat based in Brussels, Belgium. In addition to Tanzania, three other countries from the African, Caribbean, and Pacific Community—Burkina Faso, the DRC, and Suriname—have also been selected to participate in the second phase of this program.

This initiative is pivotal for Tanzania as it aligns with the broader objectives of the AfricaMaVal project initiated by the EU. The Africa-EU Energy Partnership (AEEP) was launched in 2007 as a collaborative effort between African and European Heads of State at the AU-EU Summit in Lisbon, Portugal. The AEEP serves as a central partnership of the Joint Africa-EU Strategy, fostering cooperation in the energy sector. Its overarching goal is to facilitate universal access to affordable, sustainable, and modern energy services in Africa, including in rural areas. This is seen as a prerequisite for achieving inclusive development and generating employment opportunities.

Tanzania, as one of the beneficiaries of EU support, is focusing on several key aspects within the AEEP framework. One vital area of investment is in energy infrastructure, particularly in the enhancement of rural energy access. This includes projects such as mini-hydro installations, biogas digesters, and solar systems. Furthermore, investments are directed toward the development of transmission and distribution infrastructure to enhance the overall energy landscape in Tanzania. These efforts are in alignment with the Tanzania Electricity Supply Industry Reform Strategy and Roadmap. This is particularly salient in the context of CRMs as infrastructure constraints are one of the major challenges for the development of this sector.

Additionally, the EU is actively supporting capacity and skills development in the extractive sector, specifically in the oil and gas industry. It is a major contributor to the Tanzanian Extractive Industry Transparency Initiative (EITI), which aims to promote transparency and good governance in the extractive sector. This is crucial for responsible sourcing of minerals and resources in Tanzania.

A noteworthy feature of EU-funded energy projects in Tanzania is its emphasis on productive energy use for job creation. For instance, projects like small-scale hydropower initiatives in the

Southern Highlands and solar-hybrid mini-grids in Lake Victoria are designed to stimulate economic activities and job creation. Moreover, job creation, particularly among women, is promoted through capacity building and the training of professional Energy Auditors and Energy Management Specialists.

Tanzania's inclusion in the OACPS-EU Development Mineral Programme and its alignment with the broader objectives of the AfricaMaVal project demonstrates the EU's commitment to fostering responsible sourcing and sustainable development in the country. These initiatives not only aim to improve the mining sector but also to enhance the overall energy infrastructure, support job creation, and empower marginalized groups such as young people and women, contributing to Tanzania's long-term socio-economic growth.

Additionally, the EU supports research and innovation initiatives in Tanzania. This includes collaborations in areas such as scientific research, education, and technology transfer. Examples of these initiatives are listed below.

- Horizon 2020: The program is one of the world's largest research and innovation initiatives and includes Tanzania amongst other countries. It provides opportunities for Tanzanian researchers and organizations to participate in collaborative projects with EU counterparts in various research areas.

- EDULINK: The program supports higher education, research, and innovation in African, Caribbean, and Pacific (ACP) countries, including Tanzania. It fosters partnerships between the EU and Tanzanian universities and institutions to enhance research and academic cooperation.

- Digital4Tanzania: The support programme aims to enhance employability and entrepreneurship through digital skills development, foster green jobs creation through SMEs development, support Government systems to deliver effective policy development and implementation, and render the business environment more conducive to private sector growth and increase investment and trade.

- Team Europe launched an initiative to support the government, civil society, and private sector in tackling gender-based violence. Proposals also include a green cities initiative which will aim to create green infrastructure, disaster risk reduction and preparedness, local economic development, improved public service delivery and e-governance potential of the ocean and coastal economy and preserving its biodiversity.

Overall, the relationship between the EU and Tanzania at the local and regional levels is multifaceted, covering a wide range of areas from development cooperation to trade, governance, and environmental issues. This partnership is designed to promote economic and social development in Tanzania and enhance regional integration in East Africa.

Existing enabling platforms and networks in Tanzania

- Tanzania Mineral Dealers Association (TAMIDA): an organization focused on promoting ethical practices and responsible sourcing within the mineral trade in Tanzania.
- Tanzania Mineral Audit Agency (TMAA): plays a crucial role in ensuring transparency and accountability in the mining sector. It audits and monitors mineral production, export, and trading to prevent illegal activities and promote responsible sourcing.
- Tanzania Extractive Industries Transparency Initiative (TEITI): part of the global EITI initiative and works to enhance transparency and accountability in the extractive industries, which includes mining.
- Mining Commission of Tanzania: a government agency that regulates and oversees the mining industry. It can influence responsible sourcing through its regulations and policies.
- Tanzania Mineral Dealers Network (TAMDEN): a network of mineral dealers and stakeholders that may promote responsible practices in the downstream mineral trade.
- Tanzania Chamber of Mines: organization represents mining companies in Tanzania and may have initiatives or guidelines related to responsible sourcing.
- Delve: collaborates with various stakeholders, including government agencies, mining companies, and local communities, to develop and implement strategies that prioritize equitable economic benefits, minimize the environmental impact, and uphold human rights standards. Their efforts not only seek to enhance the profitability of the mining sector but also to ensure it positively contributes to the well-being of Tanzanian society and the preservation of its natural resources.

Summarised are some key aspects of the relationship between the EU and Tanzania at the local or regional levels:

Development Cooperation: The EU is one of Tanzania's major development partners. It provides financial support to the country through various development programs and projects. This cooperation focuses on areas such as poverty reduction, healthcare, education, infrastructure development, and good governance.

Trade Relations: Tanzania, along with other countries in the EAC, benefits from the EU's preferential trade agreements. The EAC and EU have a comprehensive Economic Partnership Agreement (EPA) that facilitates trade, promotes regional integration, and supports economic development in the region.

Regional Integration: The EU supports regional integration efforts in East Africa. The EU provides funding and technical assistance to promote economic integration, infrastructure development, and the free movement of goods and people within the EAC.

Economic and Investment Cooperation: The EU promotes investment and economic cooperation in Tanzania. European companies invest in various sectors in Tanzania, and the EU provides support for improving the business environment and attracting more investment to the country.

Human Rights and Democracy: The EU is engaged in promoting human rights, good governance, and democracy in Tanzania. It supports civil society organizations and initiatives aimed at strengthening democratic institutions and the rule of law.

Climate Change and Environmental Cooperation: Tanzania, like many African nations, is vulnerable to the effects of climate change. The EU supports environmental and climate change mitigation and adaptation programs in the country to address these challenges.

Humanitarian Assistance: The EU provides humanitarian aid to Tanzania in times of crisis, such as natural disasters and refugee crises. This assistance helps address immediate needs for food, shelter, and healthcare.

Migration and Mobility: The EU works with Tanzania and other African nations on issues related to migration and mobility. This includes discussions on legal pathways for migration, addressing irregular migration, and supporting the rights of migrants.

Roadmaps, Strategies and Plans

Tanzania, like many African countries, has set forth various roadmaps, plans, and strategies to guide its development, with a focus on the mining sector, which plays a pivotal role in its economic growth and development (Table 17). To understand how these plans relate to the European Union's (EU) twin transition (which aims to transform the EU economy to a greener and more digital model). and responsible sourcing of critical minerals, we must first examine the general points of each plan and discuss their alignment with these broader goals.

Strategy /Plan	Objective(s)	Alignment with the EU's twin transition:	Opportunities
Five-Year Strategic Plan for Mining Commission (2019/20 – 2023/24):	• These objectives primarily focus on HIV/AIDS reduction, anti-corruption measures, improving the contribution of the mining sector to the national economy, ensuring sustainability, and enhancing the capacity of the Mining Commission.	• HIV/AIDS reduction and improved support services reflect a commitment to social responsibility and sustainability, mirroring the EU's focus on responsible sourcing. • Anti-corruption measures align with the EU's emphasis on ethical and transparent practices. • Enhancing the mining sector's contribution to the national economy complements the EU's goal of economic growth through responsible sourcing. • A focus on sustainability and capacity building is in line with the EU's twin transition objectives.	• Opportunities lie in collaboration within the East African Community (EAC) and the Southern African Development Community (SADC) can enable knowledge and resource sharing, joint investment projects, and harmonization of policies to accelerate industrialization and mineral value addition in the region.
Tanzania Development Vision and Long-Term Perspective Plan (2011/12-2025/26)	• These plans emphasize the strategic importance of the mining sector for economic growth, industrialization, and job creation. They also aim to increase revenue generation, promote value addition, and enhance environmental sustainability and governance.	• The focus on industrialization and job creation aligns with the EU's goal of transitioning to a greener and more digital economy. • The emphasis on value addition and beneficiation resonates with the EU's responsible sourcing approach, promoting in- country processing. • The commitment to environmental sustainability and good governance mirrors	• Opportunities here also lie in collaborating with other EAC member states to develop joint industrial projects and share best practices in sectors such as technology transfer, capacity building, and regional industrial development banks.

Strategy /Plan	Objective(s)	Alignment with the EU's twin transition:	Opportunities
		the EU's efforts to ensure responsible and sustainable mineral sourcing.	
National Five-Year Development Plan (2021/22-2025/26)	• This plan seeks to strengthen the management and control of mining, empower small-scale miners, promote mineral value addition and beneficiation, identify rare minerals, and enhance cooperation in the mining industry.	• Strengthening management and control in mining aligns with responsible sourcing practices. • Empowering small-scale miners is consistent with social responsibility. • Promoting value addition and beneficiation resonates with the EU's approach to responsible mineral sourcing. • Identifying rare minerals reflects a commitment to responsible sourcing and sustainable development.	• Opportunities lie supporting ESG practices • Supporting and participating in downstream activities in CRMs required for the twin transition
East African Community (EAC) Industrial Policy and Strategy (2012 - 2032)	• The EAC policy aims to foster economic growth, job creation, and industrialization in the region, with a focus on key sectors such as agro-food industries, leather, and pharmaceuticals.	• By fostering industrialization, the EAC policy contributes to economic growth and aligns with the EU's transition goals. • Promoting technology transfer and capacity building supports the EU's emphasis on a green and digital transition. • Opportunity: Collaborating with EAC partner states to establish regional financial instruments, intellectual property rights regimes, and technology transfer centres to promote innovation and enhance access to financing for industrial projects	• Supporting regional infrastructure and capabilities in CRMs space

Strategy /Plan	Objective(s)	Alignment with the EU's twin transition:	Opportunities
Southern African Development Community (SADC) and African Union (AU) Agreements	• These agreements, including the SADC Industrial Development Policy Framework, RISDP, SADC Industrialization Strategy and Roadmap, Regional Mining Vision, and the AU's Africa Vision 2063 and AIDA, all have broad objectives to promote industrial development and economic growth in Africa.	• These agreements collectively contribute to regional development and growth, which aligns with the EU's goals of responsible sourcing and a green and digital transition.	• Tanzania can engage with SADC member states to explore synergies in infrastructure development, trade facilitation, and the development of regional industrial value chains, considering that some SADC countries also have significant mining sectors.

Table 17: Tanzania's roadmaps, plans, and strategies

Tanzania's plans and strategies related to the mining sector align well with the EU's twin transition and responsible sourcing of critical minerals. They emphasize economic growth, job creation, sustainability, good governance, and value addition, which are all in line with the EU's broader objectives. These plans demonstrate Tanzania's commitment to responsible mineral sourcing and its contribution to regional economic development. Within the CRM value chain, the focus lies primarily in exploration, extraction, and sustainable mining practices, as these stages have the most significant environmental and social implications. National strategies and roadmaps, along with cooperation between ministries and national agencies, are crucial in ensuring responsible sourcing from the earliest stages. The current policy instruments do not relate directly to digitalisation and green technologies.

EU-Africa partnership risks and opportunities

A European-African partnership in Tanzania holds significant potential for enabling responsible sourcing of critical minerals while fostering sustainable development. Existing EU-African collaborations in the country offer promising models. For instance, the European Union has been actively involved in supporting infrastructure development, such as financing the expansion of key transportation networks and energy infrastructure. These investments not only facilitate the development of critical minerals but also create employment opportunities and improve local living standards. Additionally, collaborative efforts between European and African stakeholders have contributed to policy development aimed at ensuring ethical and transparent mineral extraction practices, thereby mitigating environmental and social risks. This partnership also underscores the importance of environmental custodianship by promoting sustainable mining techniques and environmental safeguards, ultimately enhancing Tanzania's capacity to harness its mineral wealth responsibly and in harmony with its natural surroundings. Together, these initiatives demonstrate the potential for EU-African cooperation to promote responsible sourcing and sustainable mineral development in Tanzania.

Opportunities lie across the mining value chain and include:

- Value Chain Integration: Establishing a partnership that covers the entire value chain, from extraction to processing and manufacturing, can create a more resilient and reliable supply chain. Through collaboration, the EU and Tanzania can diversify the supply chain for CRMs, reducing the vulnerability to supply disruptions. This is crucial for ensuring a stable supply of minerals vital to the European technology and green energy sectors.
- Global Leadership in Responsible Mining: Collaborative efforts can position the EU and Tanzania as global leaders in responsible mining and environmental protection, setting the standard for sustainable resource extraction and encouraging other regions to follow suit.

- Research and Innovation: Joint research initiatives can foster innovation in mineral exploration, processing, and recycling, which can reduce the overall demand for critical minerals and promote a circular economy, aligning with the EU's sustainability goals.

However, there are major challenges that will need to be overcome to foster a successful collaboration. These challenges include:

- Geopolitical Competition: The geopolitical landscape often strains partnerships. Major global powers, such as China and the US, are actively engaged in securing CRMs from African countries, such as Tanzania. This competition can result in conflicting interests and strategies between the EU and Tanzania, leading to challenges in forming a united front to address the CRMs issues. Tanzania may be tempted by offers from other global players, making it difficult for the EU to establish a cohesive partnership.
- Lack of Regulatory Frameworks: The absence of comprehensive and harmonized regulatory frameworks for mining and resource extraction in Tanzania poses a significant challenge. These regulatory gaps contribute to issues such as corruption, environmental degradation, amongst others. The EU seeks sustainable and ethical sourcing of critical minerals, making it crucial to address these regulatory deficiencies.
- Environmental Concerns: Sustainable and ethical sourcing of critical minerals is a priority for the EU, with environmental standards and social responsibilities taking centre stage. Tanzania, while recognizing the importance of these principles, often faces resource development dilemmas, as exploiting mineral resources may be a significant source of revenue. Balancing these concerns with environmental preservation and local communities' rights can strain the EU-Tanzania partnership.
- Infrastructure and Technological Challenges: Tanzania often lacks the necessary infrastructure and technological capabilities for efficient mining and processing of critical minerals. The EU may be willing to invest in infrastructure development but coordinating such efforts can be logistically complex and resource-intensive, posing a challenge to the partnership.
- Socio-Economic Disparities: The distribution of the benefits from mining and resource extraction is often uneven. This issue of socio-economic disparities leads to discomfort among local communities. The planned or future extraction and processing of CRMs therefore present an opportunity to address socio-economic disparities by increasing engagement with local communities and governments.
- Infrastructure and Transport Logistics: Securing and transporting CRMs operations, which are often located in remote and logistically challenging areas, can be a formidable

challenge. Poor infrastructure and transport networks can result in delays, higher costs, and supply chain disruptions, making it harder for the EU to access these minerals reliably.

- Long-Term Investment vs. Short-Term Gains: The EU's focus on sustainable and ethical sourcing of critical minerals may conflict with Tanzania's government desire for quick revenue gains. Balancing long-term investments in responsible mining practices with immediate economic needs can be a significant challenge, potentially straining the partnership.

From the research conducted and as indicated in the previous sections of the report, the EU is already in partnership with the Tanzanian government to help with energy and digital transition. With the EU as a committed partner to Tanzania's sustainable and inclusive economic growth, it has invested in multiple sectors of the Tanzanian economy, including Energy, ICT, Mining, Manufacturing, Banking and Finance, Retail and Trade, Agriculture, etc. Through the EU Global Gateway, the government of Tanzania is being supported to achieve green transition and realise its development imperatives. The EU Gateway is an investment package aimed to support Africa's green and digital revolution.

Tanzania has a basket of different critical minerals which can be exploited and manufactured locally to enhance the government's efforts towards energy and digital transition as well as contribute towards economic and human development. The EU already has a CRM strategy and could assist the government of Tanzania with the development of its strategy as a framework. The process of strategy development and the outcome will help the government realise where there are gaps, and the EU will help close those gaps. For instance, the issue of responsible sourcing requires urgent attention, and it can be addressed through the strategy. Infrastructure development also requires attention, and the strategy would map out plans how to address such a need. As a developing country, Tanzania requires a lot of capacity building which the EU could provide. The country's population is predominantly youth, and they need an assortment of capacity building programmes such as skills development including entrepreneurial skills.

7. Opportunities for responsible investments

Investing in Exploration and Mining

One opportunity is investing in exploration and mining of emerging ECRMs such as phosphate, lithium, graphite, REE, PGM, and base metals (copper and cobalt) Tanzania is still under-explored, and the positive prospectivity outlook presents a very attractive investment opportunity in ECRM exploration and mining in Tanzania (

No	ECRM	Geological Prospectivity
1	Phosphate	Deposits available in carbonatites currently not considered.
2	REE	Lucrative exploration investment opportunity in many carbonatites of Tanzania.
3	Lithium	Deposits can possibly be found in the EARS playa lakes brines as over 90% of lithium mining comes from brines in rift systems.
4	PGM	Multi-element deposits are in Layered Ultramafic Complexes of the Ubendian, Usagaran and Mozambican mobile belts.
5	Base Metals (Ni, Cu, Co)	Multitude of exploration targets are in the Nyanzian Rock System in the Lake Victoria goldfields as well as in in the Ubendian-Usagaran-Mozambican mobile belts.
6	Graphite	Occurs in good quantity and quality in the Usagarana and Mozambican mobile belts.

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Table 18: Investment opportunities in exploration and mining

Investing in Processing and Manufacturing of goods and components

ECRMs are in high demand, particularly driven by the hi-tech cyber world of communication and global energy transition which aims to mitigate climate change by meeting zero emission by 2050. The hi-tech industry and energy transition based on readily available ECRM commodities (cobalt, copper, graphite, nickel, PGM, REE, titanium, vanadium) in the Tanzania offer a huge opportunity for investment in the areas highlighted in

t	ECRM	Value Chain activities
nd	Nickel, copper and cobalt	**ECRM to be refined and smelted from:** • Nickel, copper and cobalt from the Kabanga Nickel Giant project and the Bulyanhulu Gold Mine (Copper Proje • Dutwa, Zanzui, Ntaka, Haneti Exploration projects will add on the Cu, Ni Co feed to the smelter and Refiner pl • Titanium and Vanadium Liganga, Maganaga Matitu and Fungoni Heavy Sand Projects offer a smelting and refi
and ring	Graphite	**Products to be manufactured include:** • Production of graphene sheets for use in hi-tech industries (electronics li-ion batteries, cell phones coatings, s the country or abroad. • Production of powder and accessories for the manufacture electric motor brushes, electrodes, cores of nuclea lubricants for various applications. • Factories to manufacture electric motors, Li-ion batteries, electronic gadgets (TV screens, and cell phones).
and ring	Nickel	**Products to be manufactured include:** • Electric wires in various applications and temperature resistant metal and parts for gas turbines. • Core chambers and components in airplanes and rocket engines. • Production of various alloys for various applications.
and ring	Copper	**Products to be manufactures include:** • Manufacture of electric transmission wires (present East African Cables can use locally produces copper metal • Manufacturing of electric motors solenoid copper windings. • Manufacture of power transformers (TANALEC Transformer Factory in Arusha can use copper metal from the • Production of various metal alloys for various applications.
and ring	REE	To follow (depending on availability)
and ring	PGM	To follow (depending on availability)

Table 19.

No	Investment	ECRM	Value Chain activities
1	Smelting and Refining	Nickel, copper and cobalt	**ECRM to be refined and smelted from:** • Nickel, copper and cobalt from the Kabanga Nickel Giant project and the Bulyanhulu Gold Mine (Copper Project). • Dutwa, Zanzui, Ntaka, Haneti Exploration projects will add on the Cu, Ni Co feed to the smelter and Refiner plants. • Titanium and Vanadium Liganga, Maganaga Matitu and Fungoni Heavy Sand Projects offer a smelting and refining opportunity.
2	Processing and Manufacturing	Graphite	**Products to be manufactured include:** • Production of graphene sheets for use in hi-tech industries (electronics li-ion batteries, cell phones coatings, sensors etc.) within the country or abroad. • Production of powder and accessories for the manufacture electric motor brushes, electrodes, cores of nuclear reactors and lubricants for various applications. • Factories to manufacture electric motors, Li-ion batteries, electronic gadgets (TV screens, and cell phones).
3	Processing and Manufacturing	Nickel	**Products to be manufactured include:** • Electric wires in various applications and temperature resistant metal and parts for gas turbines. • Core chambers and components in airplanes and rocket engines. • Production of various alloys for various applications.
4	Processing and Manufacturing	Copper	**Products to be manufactures include:** • Manufacture of electric transmission wires (present East African Cables can use locally produces copper metal). • Manufacturing of electric motors solenoid copper windings. • Manufacture of power transformers (TANALEC Transformer Factory in Arusha can use copper metal from the local market). • Production of various metal alloys for various applications.
5	Processing and Manufacturing	REE	To follow (depending on availability)
6	Processing and Manufacturing	PGM	To follow (depending on availability)

Table 19: Investment opportunities in processing and manufacturing of goods and components (Priority ECRM readily available in the near future (when graphite, copper, nickel and cobalt mines will come on stream)

Funded by
the European Union

7.1. Proposal of projects

7.1.1. Identification of individual exploration, mining, and refining projects

Eight projects were identified in the Tanzania for consideration. These projects are presented in Table 20, which include the need as identified by the owners. The geographical positions of these projects are demonstrated in Figure 15.

No.	Project Name, Country	Main Commodity and by-products	Project Owner	Project need
1.	Bunyu Project, Tanzania	Natural Flake Graphite, both fine and coarse	Volt Graphite Tanzania, subsidiary of Resources Ltd	Financing for development
2.	Grafica Graphite Project	Main Commodity: Graphite, By-product: Gold	Grafica Resources Limited	Potential JV partner for investment and development
3.	Mahenge Graphite Project	Graphite concentrate	Black Rock Mining Limited	Finance for development
4.	Nachu Graphite Project (NGP)	Graphite	Magnis Energy Technologies	The owner prefers to discuss directly with any interested party
5.	Pula Graphite Partners	Graphite	Pula Graphite Partners Tanzania Limited	Financing and technical support for development
6.	Changube Copper Project	Copper, Gold	State Mining Corporation (STAMICO)	JV partner for early-stage exploration
7.	Bahi (Sedimentary) and Sengeri (Igneous) Phosphate projects	Mineral Phosphate	State Mining Corporation (STAMICO)	JV with technical, financial and skills in phosphate exploration
8.	Kyerwa Tin Project	Tin	State Mining Corporation (STAMICO)	JV partner at early-stage of exploration

Table 20: Shortlisted exploration, mining, and refining projects in Tanzania.

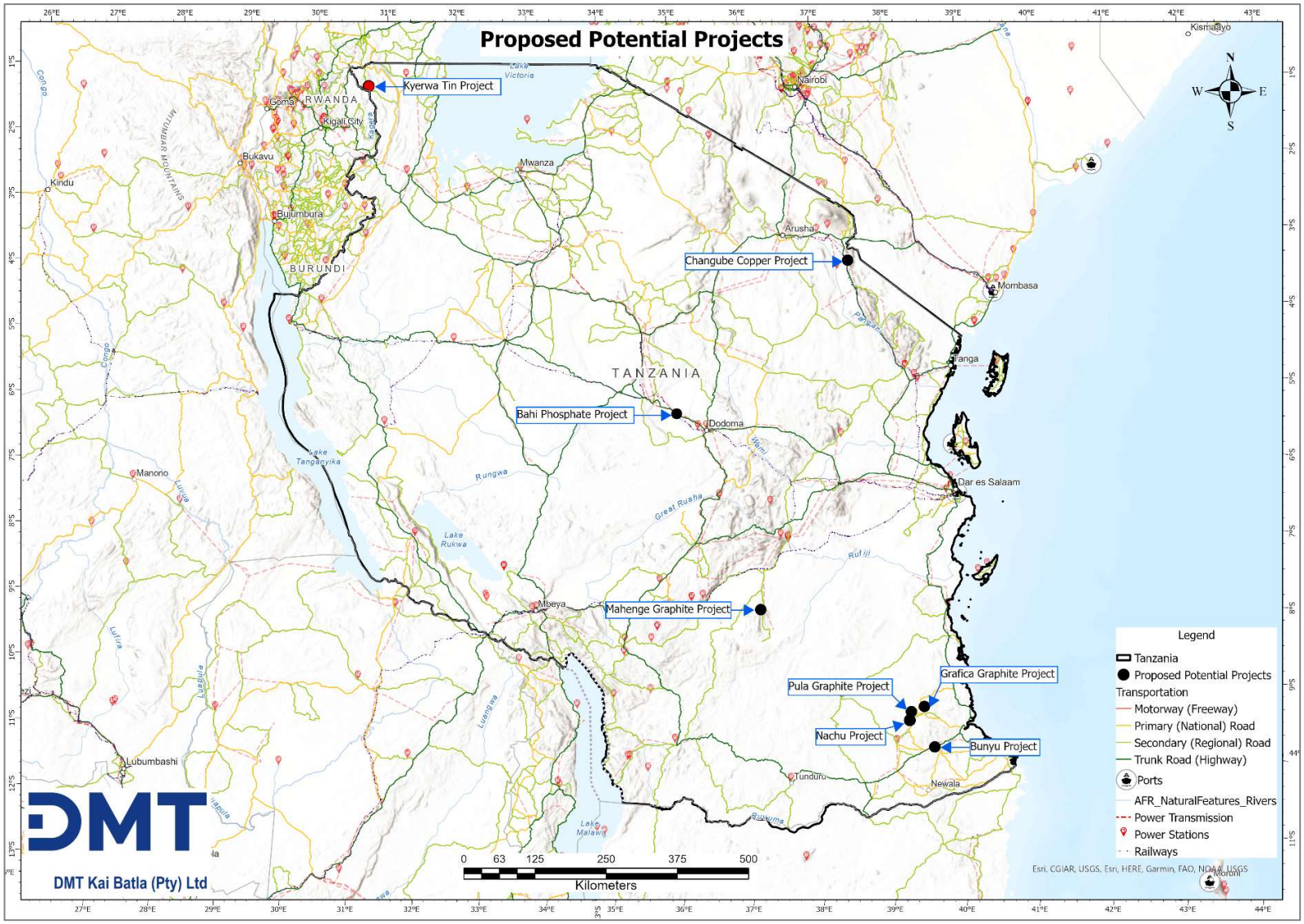

Figure 15: Localities of shortlisted graphite projects in Tanzania.

Funded by
the European Union

7.2. ASM sector country profiles

7.2.1. Country profiles on ASM sector developments and investment

In Tanzania, a large number of small showings of tungsten, tin and copper mineralization is found. Many of which have been mined in the past by small-scale miners going underground or in open pits. In part, these mineral occurrences belong to industrial mining concessions (licence type: mining leases) and the concessions holders buy and resell the production of the artisanal working groups. However, there also exist artisanal mining zones from where the production is directly sold to traders or middlemen. The main obstacles for ASM are the lack of infrastructure, difficult supply to water and the complicated system of commercialization that has multiple stages of governmental involvement.

Because of their structural-tectonic control unknown mineral occurrences for tin and tungsten could be in large anticlines in the roof of granite cupolas. Since Tanzania's known tin and tungsten deposits have proven to be small and low grade there is only a small supply potential for the European market. For the EU, the establishment of business relations to well organized mining companies could provide at best a moderate flow of tin and tungsten concentrates to it.

The development of small graphite and lepidolite mines by ASM that are considered too small for industrial mining could also be an option for EU supply with critical raw materials. The selling of graphite and lithium ore in small lots to Chinese businessperson in Tanzania and East Africa has already proved that there is an economic potential for ASM activities.

The prospectivity of Tanzania for copper mineralization exploitable via ASM is significant and the country already has experience in terms of setting up small-scale copper processing facilities. It would be of interest to evaluate the feasibility of these processing operations in more detail, as a function of formal licensing requirements as well as local supply capacities, logistics and economies of scale.

8. Conclusion

In conclusion, Tanzania presents both opportunities and challenges as a case study for mining investments. On the positive side, the country boasts rich mineral resources, including that of ECRMs, making it an attractive destination for mining investors. The Tanzanian government has taken steps and initiative to create a conducive investment environment, with policies aimed at attracting foreign capital and fostering economic growth.

One of the significant advantages is the abundant natural resources that provide a solid foundation for mining activities. The mining sector has the potential to contribute significantly to Tanzania's economic development, generating revenue, creating jobs, and fostering infrastructure development.

However, alongside these opportunities, there are notable challenges that investors must consider. One of the primary concerns is the regulatory environment, which has experienced changes over the years, creating uncertainties for investors. The government's approach to taxation and regulations can impact the profitability and sustainability of mining projects. Additionally, there have been instances of disputes between the government and mining companies over revenue sharing and other related issues.

Infrastructure limitations, such as inadequate transportation and power supply, pose operational challenges for mining ventures. These constraints can lead to increased costs and delays in project development. Environmental and social issues, including community engagement and responsible mining practices, also require careful consideration when developing ECRMs projects; to ensure sustainable and ethical operations. The Tanzanian government adopts a proactive approach in addressing these challenges and fosters dialogue with stakeholders indicating a willingness to adapt and find mutually beneficial solutions.

In navigating the complexities of investing in Tanzania's mining sector, prospective investors must conduct thorough due diligence, engage in transparent communication with government authorities, and implement robust strategies for environmental and social responsibility. Despite the challenges, the potential rewards of investing in Tanzania's mining sector remain significant, and with careful planning and adherence to best practices, investors can contribute to both the economic development of the country and the sustainable extraction of available ECRMs.

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APPENDICES

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Appendix

A. Mining operations, ore deposits and occurrences of ECRMs in Tanzania

Main Commodity	Operation / Exploration / Occurrences	Name & Locality	Element and ore minerals	Geology	Reserves (R) & projected annual production (AP)	Ownership	Licensing	Reference
Bauxite	Occurrence	Magamba (Lushoto District)	Aluminium - Al Gibbsite – Al (OH)3)	Bauxite a weathering product of metamorphic rocks	Reserves: (37Mt @ 66.9% Al2O3 EST. Production 0.12 Mt/annum (est.)	Owned by Lindian Resources of Australia and Operated by Exploration venture 100% owned East African Bauxite Limited	PL 11176/2018, PL 11177/2018, PL 11178/2018	Source: (Mutakyahwa, et. al., 2003; URT 2005, 2008b; GST 2015; MC 2022, 2023; Lindian Renounces Ltd., 2021).
Bauxite	Occurrence	Amani Bauxite (Muheza District, Tanga Region)	Aluminium - Al Gibbsite - Al(OH)3)	Bauxite a weathering product of metamorphic rocks	No reserve estimate; grade: Al2O3 – (40 - 69wt %);	Exploration venture 100% owned East African Bauxite Limited	PL 11262/2019	
Cobalt	Occurrence	Kabanga Nickel (Ngara District)	Linnaeite (Co,Ni)2(Co, Ni, Fe, Cu)S4	Mesopalaeozoic Kibaran Belt associated with mafic/ultramafic intrusions	Co will be a byproduct in a Ni Measured reserves: 13.5Mt @ 2.48% Ni; 0.34% Cu; 0.21% Co. Production/annum (est)	Operated by Tembo Nickel Corporation Company Limited an owned by Kabanga Nickel UK (84%) and URT (16%)	SML 641/2021	Source: (URT, 2005, 2008b; GST 2015; Kabanga Nickel Website, 2022).
Cobalt	Occurrence	Haneti (Kondoa District)***	Cobalt (Co) Associated with Chrysoprase erosion	Ni bearing weathering products of ultramafic rocks to form Co-rich LATERITES	Occurrence of Co in soil anomalous zone of up to 1.08 % Ni and 0.31 % Co	ASM mine chrysoprase for gem purposes	nd	
Copper	Occurrence (Gold Mines (producing copper concentrates))	Bulyanhulu Gold Mine (Kahama District)*	Copper-Cu Chalcopyrite (Fe,Cu)S2 (ore)	Shear hosted Au quartz-vein deposit Greenstone belt) composed of mafic volcanic flows, pyroclastic and ash flows. Argillite are present between the mafic and felsic rocks.	>28.1 Mt @ 11.3g/t Au; 9.38g/t Ag; 0.669% Cu Production: 25,000tpa	Operated by Twiga Minerals Corporation owned by Barrick Inc. of Canada (84%) and URT (16%).	SML 44/99	
Copper	Occurrence (Gold Mines (producing copper concentrates)	Buzwagi Gold Mine (Kahama District)*	Copper –Cu Chalcopyrite (Fe,Cu)S2 (ore)	A fleece hosted quartz vein deposit in a porphyritic granite host rock.	>61.4Mt @ 1.47g/t AU; 0.114% Cu Production: 10,000tpa	Operated by Twiga Minerals Corporation owned by Barrick Inc. of Canada (84%) and URT (16%).	SML 274/2007	Source: (Barrick website 2023a; URT, 2005, 2008b; GST 2015; MC, 2022, 2023; Chamberlain, 2003). Nd =no data.
Copper	Occurrence	Tambi Copper (Mpwapwa District, Dodoma Region)0	Copper –Cu Chalcopyrite FeCuS2	Copper-bearing ferruginous shales and fine sandstones	Reserve unknown Grades 10.25%Cu	Occurrence with ASM mining activities	Several Primary Mining Licenses for ASM	

Main Commodity	Operation / Exploration / Occurrences	Name & Locality	Element and ore minerals	Geology	Reserves (R) & projected annual production (AP)	Ownership	Licensing	Reference
			Bornite				mining activities.	
			2Cu2S·CuS·FeS					
Copper	Occurrence	Lufusi Copper (Mpwapwa District, Dodoma Region)0	Chalcopyrite FeCuS2	Cu sulphides hydrothermal intrusion in metamorphic rocks of the Usagaran syatem	nd	Occurrence with ASM mining activities	Several Primary Mining Licenses for ASM mining activities.	
Copper	Occurrences	Mkwamba old Mine. (Mpanda District); Katavi Region***	Chalcopyrite FeCuS2	Ultramafic massive Ni-Cu sulphide intrusive in high grade metamorphic rocks of the Ubendian mobile belt	Reserves: 1.95Mt @ 0.6%Cu	ASM gold and copper mining activities	Several Primary Mining Licenses for ASM gold mining	
			Gold (Au)					
Copper	Occurrences	Ntaka hill (Nachingweya District)	Chalcopyrite FeCuS2	Ultramafic massive Ni-Cu sulphide intrusive in high grade metamorphic rocks of the Mozambican mobile belt	20.3Mt@0.58%Ni and 16.79% Ni; 2.99% Cu	ASM mining activities in the past now it is a Nickel project	nd	
Copper	Occurrences	Makongolosi Copper (Chunya district, Mbeya Region)0	Chalcopyrite FeCuS2	Proterozoic gneisses and with some mafic intrusive making up the Lupa goldfields mineralization	No reserves known	Gold mining with no Copper mining	nd	
					Grade 0.9% Cu			
Copper	Occurrences	Chimala [Kigugwe] Copper (Mbarari District, Mbeya Region)	Chalcopyrite FeCuS2	Mata –sediments of Buanji gGroupconsists of conglomerates, shales and occasional sandstone	nd	nd	nd	
Copper	Occurrences	North Pare Mountains Copper (Mwanga District, Kilimanjaro Region)0	Chalcopyrite FeCuS2	Chalcopyrite mineral in Meta-sediments Metamorphic rocks of the Usagaran	Grade 13.95% Cu	Evaluated by Eliton Group now inactive with ASM Cu Mining Activity	nd	
REE	Resource	Ngualla REE Project (Mbeya)**	Bastnäsite - Nd(CO3)F	A REE rich weathered Sovite carbonatite rich in bastnasite mineral	21.3 million tonnes (Mt) @4.75% REO, 480 Mt @0.33% Nb2O3	PR NG Minerals, 87.5% ownership by Peak Resources of Australia	SML601/2021	Source: (URT 2005, 2008b; Peak Resources, 2013, 2021; GST 2015; Boniface 2017; Montero Mining & Exploration, 2011; Witt, et. al. 2019; MC 2022, 2023).
			Fluorite - CaF2					
			Flourspar (F)					
			Phosphate (P)					
REE	Resource / Occurrence	Sengeri Carbonatite REE (Mbozi District Mbeya region)	Bastnäsite - Nd(CO3)F	Mg- carbonatite dykes and breccias carbonatites	nd	nd	nd	
			Phosphate (P)					
			REE					
			Flourspar (F)					
REE	Resource / Occurrence	Nakonde Carbonatite REE (Mbeya Rural District)	Bastnäsite - Nd(CO3)F	nd	Mg- carbonatite contains 1500 ppm La+ Ce+ Nd	nd	nd	
REE	Resource	Wigu Hill Carbonatite (Morogoro Region)***	Bastnaesite,	Weathered dolomitic carbonatite (rauhaugite), hydrothermal solutions rich in RARE, Sr, F, Ba and silica.	3.3Mt @2.%REO	Montero Mining and exploration (Canada)	nd	
			Monazite,					
			Ce-Goyazite					
			Fluorite - CaF2					

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Main Commodity	Operation / Exploration / Occurrences	Name & Locality	Element and ore minerals	Geology	Reserves (R) & projected annual production (AP)	Ownership	Licensing	Reference
REE	Resource	Lihogosa Swamp (Njombe District)	Phosphate (P2O5)	Lateralized Apatite-Epidote granite	6-10 times enrichments in the bauxite laterite deposit	nd	nd	
			REEs					
Lithium	Occurrence	Hombolo Li Project (Chamwino District, Dodoma Region)***	Lithium – Li (element)	Li minerals are found in pegmatite of Dodoman Craton granites	No Reserves established	Auroch Resources (Australia)	nd	Source: (URT 2005, 2008b; GST 2015).
			Lepidolite (K(Li,Al)3(Al,Si,Rb)4O10(F,OH)2)		Grade grade of 1.34 % Li20			
			Rubelite (Na(Al,Li)3Al6(BO3)3Si6O12)					
Lithium	Occurrence	Mohanga Li Project (Chamwino District, Dodoma Region)***	Spodumene (LiAl(SiO3)2)	Li minerals are found in pegmatite of Dodoman Craton granites	No Reserves established	Liontown Resources (Australia)	nd	
					Grade 3.3% Li2O			
Lithium	Occurrence	Karagwe Li Occurrence (Karagwe District, Kagera Region)0	Casitterite mineral associated with lithium (li), tungsten (W) and Ttantlum (Ta).	Pegmatites in granites in the karagwe Ankoleana riock system associated with Sn, W and Ta.	nd	nd	nd	
Magnesium	Occurrence	Chambogo	Magnesium – Mg	Magnesite in hydrothermal veins in high grade metamorphic rocks of the Usagara rocks.	Historical production in the late 1980s was approx. 25,000 tons/annum	individual licenses of Christina G Kessy	PL 11473/2020	Source: (URT 2005, 2008b; GST 2015; MC 2022, 2023).
		Same District)	Magnesite (MgCO3)					
Manganese	Occurrence	Manyoro – Katabi region	Finely banded and folded metamorphic manganese-quartz metamorphic rock of the Phanerozoic Ubedian system,	No reserve estimates.	nd	nd		Sources {GST, 2015 & URT, 2005)
				Grades 7% – 20 % MnO				
Manganese	Occurrence	Matamba - Njombe region	Strongly weathered metamorphic-manganese rich rocks grading into lateritic gossan alterations.	No reserve estimates.	nd	nd	Matamba - Njombe region	
				Grades 7% – 13.3% MnO			98°44’48”S : 33°55’12” E	
Manganese	Occurrence	Kibakwe and Bunduku areas in Dodoma	In Usagaran amphibolite hornblende rich metamorohic rocks	nd	nd	nd	Kibakwe and Bunduku areas in Dodoma	
							60° 43’00” S	
							36° 22’00”	
Natural Graphite	Resource (JORC Certified)	Nachu - Ruangwa District, Lindi**	Graphite	-	174 Mt @ 1.4% graphite	100% owned and operated by URANEX Tanzania Limited (Subsidiary of Magnis Resources of Australia)	SML 550/2015	Source: (TanzaniaInvest Website 2020; URT 2005, 2008; GST 2015; MC 2014, MC 2022, 2023;
					AP: 240,000tpa		JORC compliant	
Natural Graphite	Resource (JORC Certified)	Chilalo – Nachingwea, Lindi**	Graphite	-	20 Mt@ 9.9% graphite	100% owned and operated by Ngwena Tanzania Limited)	ML569/2017	
					AP:50,000 tpa		JORC compliant	

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Main Commodity	Operation / Exploration / Occurrences	Name & Locality	Element and ore minerals	Geology	Reserves (R) & projected annual production (AP)	Ownership	Licensing	Reference
						(subsidiary of Graphex Resources Limited of Australia)		Magnis Website 2016; Park and Dodd, 1994)
Natural Graphite	Resource (JORC Certified)	Bunyu -Masasi, Lindi**	Graphite	-	AP:170,000 tpa	100% owned by Volt Graphite Tanzania Limited (subsidiary of Volt Resources of Australia)	ML00648/2018 ML649/2018 PL10718/2015 JORC Compliant	
Natural Graphite	Resource (JORC Certified)	Epanko – Morogoro. Ulanga District, Morogoro region**	Graphite	-	AP:60,000 tpa	100% owned and operated by Tanzgraphite (TZ) Limited (subsidiary of Kibaran Resources Limited of Australia)	ML 548/2015 JORC Compliant	
Natural Graphite	Resource (JORC Certified)	Mahenge – Morogoro**	Graphite	-	(JORC Coded): 88.1 Mt	Company Name (Operator): Faru Graphite Corporation	ML611/2019 ML612/2019	
					Grades: 7.9% Graphite	Partnership (JV): Blackrock Mining Limited (Australia) (84% shares) and the United Republic of Tanzania (16% shares)	JORC Compliant	
					250,000 to 340,000 tpa			
Natural Graphite	Resource (JORC Certified)	Ruangwa – Lindi**	Graphite	-	AP:40,000 tpa	100% owned and operated by Lindi Jumbo Limited (70%) (aa subsidiary of Walkabout Resources Ltd of Australia) and Aly Mbaraka Mohamed (30%)	ML579/2018 JORC Compliant	
Natural Graphite	Resource	Nazareth Ruangwa Project (Ruangwa District - Lindi Region)***	Graphite		AP:40,000 tpa	100% owned and operated by Nazareth Mining Investment Limited of tanzania	ML586/2018 ML587/2018 Avanced Exloration	
Natural Graphite	Resource	PACCO Ruangwa Project (Ruangwa District, Lindi region)***	Graphite		AP:50,000 tpa	100% owned by Pacco Gems Limited of Tanzania;	ML498/2013 ML 499/2013 Advanced Exploration	
Natural Graphite	Resource	Pula Graphite Project (Ruangwa District, Lindi region)***	Graphite		50,000 tpa	100% owned by Pula Graphite Partners Limited of USA;	PL 10332/2014 Advanced Exploration	
Natural Graphite	Resource	Advancement Mahenge Project (Ulanga, Mahenge District)***	Graphite		AP:40,000 tpa	100% owned and operated by Graphite Advancements (Tanzania) Limited (subsidiary of 11Armadale Capital PLC of Au12stralia)	PL10840/2 PL 10846/2016 Advanced exploration	
	Resource		Graphite		AP:50,000 tpa		ML 613/2019	

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Main Commodity	Operation / Exploration / Occurrences	Name & Locality	Element and ore minerals	Geology	Reserves (R) & projected annual production (AP)	Ownership	Licensing	Reference
Natural Graphite		Tanzos Lindi Project (Ruangwa District, Lindi Region)***				100% owned and operated by Tanzoz Ltd of Tanzania	Advanced Exploration	
Natural Graphite	Resource	Dayou Tanga Project (Handeni District)***	Graphite		nd	Dayou Graphite Mining Company Limited (100%)	ML 622/2019 Advanced Exploration	
Natural Graphite	Resource	United Graphite Tanga Project (Handeni District)***	Graphite		nd	United Graphite Mining Company Limited (100%)	ML 625/2019 Advanced Exploration	
Natural Graphite	Resource	East Africa Harmony Tanga Project (Handeni District)***	Graphite		nd	East Africa Harmony Mining Co. Limited (100%)	ML 615/2019 Advanced Exploration	
Natural Graphite	Resource	Tanzgraphite Ulanga Project (Morogoro Ulanga District)***	Graphite		nd	Tanzgraphite (TZ) Limited (100%)	ML 613/2019 Advanced Exploration	
Natural Graphite	Resource	Kilimanjaro Simanjaro Project (Manyara, Simanjiro District)***	Graphite		nd	Kilimanjaro Outdoor Safaris Limited (100%)	PML0007MYR and PML0008MYR ASM Mining activities	
Natural Graphite	Resource	Grafica Ruangwa Project (Lindi Ruangwa District)***	Graphite		nd	Grafica Resources Limited (100%)	ML 498/2013 Advanced Exploration	
Natural Graphite	Resource	Gemini Ruangwa Project (Lindi Ruangwa District)***	Graphite		nd	Gemini Exploration & Mining Services Limited (100%)	ML 524/2014 Advanced Exploration	
Natural Graphite	Resource	Mererani (old mine) (Simanjiro District)***	Graphite		8.8 Mt @ 8.3 wt% (C)	Owned and operated by the Mining Commission as a Tanzanite mine and graphite as a by-product (currently no production of graphite)	ML 490/2013 Advanced Exploration	
Natural Graphite	Resource	Mererani Graphite Exploration Project (Manyara region)***	Graphite		17.7Mt @ 6.5% (C) for 1.15Mt of graphite.	Owned by Ecograph - former Kibaran Resources Ltd. (Australia). Operated by: Tanzgraphite (TZ) Limited (subsidiary of Kibaran)	Pl11082/2017	
Natural Graphite	Resource	Henan Morogoro Project (Morogoro Rural District)***	Graphite		Nd	Henan Yukuan International Mining nvestiment (T) Co. Ltd	ML 644/2021 Advanced Exploration	
Natural Graphite	Resource	Ulanga District			nd	Graphite Advancements (Tanzania) Limited (100%)	ML 648/2021	

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Main Commodity	Operation / Exploration / Occurrences	Name & Locality	Element and ore minerals	Geology	Reserves (R) & projected annual production (AP)	Ownership	Licensing	Reference
							Advanced Exploration	
Nickel	Occurrence	Kabanga nickel (Ngara)**	Nickel (Ni) in Pentlandite (Ni,Fe)9S8	The Kabanga nickel Occurence occurs in mafic/ultramafic intrusions in a meta-sedimentary complex of the Mesopalaeozoic Kibaran Belt	58 Mt @ 2.62%Ni	Tembo Nickel Corporation a 84%:16% JV between Government of Tanzania and Kabanga Nickel of UK	SML 651/2021 JORC Compliant	(URT 2005, 2008; USGS 2006; Goldstream Mining NL, 2002 & 2007; GST 2015; Wilhelmij and Cabri 2016; MC 2022, 2023; Kabanga Nickel website, 2022)
Nickel	Occurrence	Dutwa Occurences (Simiyu)***	Ni, Co	Massive sulfide mafic/ultramafic intrusions in a meta-sedimentary complex of the Nyanzian system	106Mt @0.91%Ni	Evaluated by African Eagle of Australia now put on sale	Inactive advanced exploration	
Nickel	Occurrence	Ntaka Occurence***	Ni	Ultramafic massive sulphide intrusive in high grade metamorphic rocks of the Mozambican mobile belt	20.3Mt@0.58%Ni and 16.79% Ni; 2.99% Cu	Evaluated by Ntaka Nickel Holdings of Australia	Inactive advanced exploration	
Nickel	Occurrence	Haneti Occurence (Kondoa District)***	Ni, Co, Cu	Ni Laterites derived from ultramafic rocks		Operated by Power Metal Resources (Tanzania) and owned by Katoro Gold LC (UK)	exploration	
Nickel	Occurrence	Kapalagulu (Kasulu District)***	Ni, Co, Cu PGM (Pt & Pd)	A sheared serpentinised Ultramfic intrusive composed of norite, dunite, harzburgite, and gabbro rocks.	20 Mt 0.7 % Ni and 0.4 % Cu and 0.3 % Ni and 0.1 % Cu in the base rock.	Massive Nickel Tanzania Limited (100%)	PL 11724/2021 Exploration	
Nickel	Occurrence	Zanzui Bariadi District)***	Ni, Co	Ultramafic intrusions in the Nyanzian metamorphic metasediments	27.1Mt resource at 0.81% Ni and 0.06% Co	Owner: Archer Exploration Corp (Canada)	Advanced exploration	
Nickel	Occurrence	Luwumbu (Makete District)***	PGE in massive sulphide intrusions Gold (Au)	Ultraamfic layered Intrusives of the Ubendian system. PGE occur in Massive sulphides	No reserve estimates Grade 1.49g/t Pt; 3.85g/t Pd PGE+Au5.1g/t	Massive Nickel Tanzania Limited Evaluated by Goldstream NL and Lonmin in the 2000.s and then it became inactive	Exploration	
Niobium	Occurrence	Panda-Hill deposit (Songwe)**	Niobium - Nb	Carbonatite intrusion in fenitised Proterozoic gneiss and granulite rocks	Nb reserve, P resource (480 Mt@0.33Nb2O5 wt.-%P2O5)	Panda Hill Tanzania Limited (PHT), which is a 50:50 JV between Cradle Resources, and Tremont Investments (Tremont)	ML 237/2006	(URT, 2005, 2008; Boniface 2017; GST 20015; Cradle Website, 2015a&b; MC 2022, 2023)
			Pyrochlore (Nb2P2O5)		And		ML 238/2006	
			Flourspar (F)		178Mt @ 0.5% Nb2O5.		ML 239/2006	
			Phosphate (P)				JORC Compliant	
Niobium	Occurrence	Gallapo Carbonatite (Mbulu District, Arusha Region)	Niobium - Nb Pyrochlore (Nb2P2O5)	Braciated carbonatite and soviet surrounded by fenite tuff and conglomerate	40Mt @0.12% Nb2O5 40Mt @8% P2O5	nd	Nd occurrence	

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Main Commodity	Operation / Exploration / Occurrences	Name & Locality	Element and ore minerals	Geology	Reserves (R) & projected annual production (AP)	Ownership	Licensing	Reference
			Phosphate (P)					
Niobium	Occurrence	Nachendezwaya (Nbeya Rural District)	Niobium - Nb Pyrochlore (Nb2P2O5)	Alkaline complex with soviet core associated with apatite	43,484t @0.03% Nb2O5 51Mt @8% P2O5	nd	Nd Eploration	
PGM	Reserves	Kapalagulu (Uvinza Districts)	PGE in massive sulphides (petlandite, chalcopyrie and cubanite)	The Kapalagulu Intrusion is composed of ultramafic, igneous rock. The rock contains olivine minerals massive Sulfide Succession.	No reserve estimates Grade 1.75g/t Pt.; 3.25g/t Pd PGE+Au5.1g/t	Massive Nickel Tanzania Limited	PL 11724/2021 Exploration	(Goldstream, 2003&2007; URT 2005, 2008; GST 2015; MC 2022, 2023; Wilhelmij and Cabri 2016).
PGM	Reserves	Luwumbu Makete District)***	PGE in massive sulphide intrusions	Ultraamfic layered Intrusives of the Ubendian system. PGE occur in Massive sulphides	No reserve estimates Grade 1.49g/t Pt; 3.85g/t Pd PGE+Au5.1g/t	Massive Nickel Tanzania Limited	Exploration	
PGM	Reserves	Mibangu PGM Project*** (Kasulu District, Kigoma Region)	Ni, PGM, Co, Cu, Au	Ultramafic layered Intrusives of the Ubendian system. PGE occur in Massive sulphides	No Reserve estimates Grade: 0.57m @ 7.1%Ni, 7.4g/t Pt+Pd+Au, 1.1%Cu and 0.25%Co.	Evaluated by Goldstream NL and Lonmin in the 2000.s and then it became inactive	Exploration	
Phosphate Rock	Mine	Minjingu Phosphate Mine*	Phosphate Rock (P2O5)	Bird uano deposit of accumulated excrement and remains of birds. Composition is Phosphorous Pentoxite (P2O5) – Rock Phosphate.	Phosphate Grade 28% , P2O5 and CaO 36% Production per year: 100,000 MT	Minjingu Mines & Fertiliser Limited (MMFL)	ML 129/2002 Mine	GST, 2015, URT, 2005 & Szilas, et al. 2008, Chesworth, et al. 1988; Boniface, 2017; Hatibu et al. 2021.
Phosphate Rock	Occurrence	Sukumawera Phosphate (Mbozi District, Songwe Region)0		Bat guano accumulation in limestone (travertine) caves at Sukaumawe caves	Unknown reserves with a 26% - 38% P2O5 grade	nd	Nd Occurrence	
Phosphate Rock	Occurrence	Zizi Carbonatite Phosphate (Zizi, Morogoro)	Phosphate (P) REE	Phosphate is found as Fluorapatite Ca5 (PO4)3F in within breccia of a CARBONATITE intrusion.	57mt @7.38 P2O5 no estimate of production rate	nd	Nd Occurrence	
Phosphate Rock	Occurrence	Mbalizi Carbonatite Phosphate (Mbalizi, Mbeya Urban)0	Phosphate (P) Niobium (Nb)	A sorvite rich CABONATITE associated with Apatite - Ca5[PO4]3(OH,F,Cl) (Phosphate, Nb)	nd	nd	Nd occurrence	
Tin	Occurrence	Kyerwa, Kagera region	Tin - Sn Cassiteritte (SnO2) Tung stein -Wofromite (WO4)	Pegmatite, pneu-matolytic formations in granites and hydrothermal Karagwe-Ankolean ti Occurences associated with tungsten (W) and lithium (Li) metals	No reserve estimates Grade: 0.2%-0.3% Sn	Kyerwa Tin Company Limited (a subsidiary of STAMICO) in Collaboration with Artisanal and small-scale miners)	A number of Primary Mining Licences (PMLs)	(URT 2005, 2008; GST 2015; MC 2022, 2023; Pirjano, 19926; Prasad, 2006; Guilbert, and Park, 2007).
Tin	Occurrence	Muleba and Kyetwa Districts	Tin - Sn Cassiterite (SnO2) Tung stein -Wofromite (WO4)	Pegmatite, pneu-matolytic formations in granites and hydrothermal Karagwe-Ankolean ti Occurences	No reserve estimates. Grade: 0.2%-0.3% Sn	Upsilon Tanzania Limited (100%)	PL 11672/2021 PL 11673/2021	

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Main Commodity	Operation / Exploration / Occurrences	Name & Locality	Element and ore minerals	Geology	Reserves (R) & projected annual production (AP)	Ownership	Licensing	Reference
				associated with tungsten (W) and lithium (Li) metals				
Titanium	Occurrence	Ludewa (Associated with the Liganga iron Ore resource)**	Iron ore Fe - Titanium – Ti	Titano-Magnetite: Magnetite Fe2O3 (with up to 6 % Ilmenite TIO2) formed in a titan- ferrous meta-anorthosite intrusion of the Ubendian system.	1.2 billion tons @ 13%TiO2, 0.4%V2O5; 50% Fe2O3.	Tanzania China International Minerals Resources Limited (TCIMRL) Company Limited a JV company URT (20%) and Sichuan Hongda Company of China (80%)	SML 533/2014	(NDC 2003, 2021; URT 2005, 2008a&b; GST 2015; MC 2022, 2023); (Pirjano, 19926; Prasad, 2006; Guilbert, and Park, 2007).
		Titanium - Ti	Vanadium – V		Planned production capacity 1-2 Mt/annum of Fe steel; 175,400 t/annum Ti concentrates and 5,000 t/annum V concentrates		SML 534/2014 JORC Compliant	
Titanium	Occurrence	Ludewa (Associated with the Maganga Matitu iron Ore resource)***	Titanium – Ti		nd	Government property under NDC (being tendered)	Nd	
			Vanadium - V				Advanced Exploration	
Titanium	Occurrence	Fungoni (Dar es salaam)**	Titanium - Ti in form of Rutile minerals (TiO2) and Ilmenite minerals (FeTiO3)	in Total Heavy Minerals (THM) along the Indian Coastline	12.3Mt @3.9% THM; 22Mt @ 2.8% THM	Operator a JV company:	Nd	
		The Tanzania Indian Ocean coastline				Nyati Minerals Limited (Tanzania)	JORC Compliant	
		(Tanga Coastline region				Owners: Strandline Resources Ltd. (Australia) (84%), URT (16%)		
		Bagamoyo Coastline region						
		Dar es Salaam coastline						
		Mtwara Coastline region)						

B. Minerals Administration under the Mining Act

	Prospecting Licence (PL)	Gemstone Prospecting Licence (GPL)	Special Mining Licence (SML)	Mining Licence (ML)	Primary Mining Licence (PML	Primary Processing Licence (PPL)	Processing Licence	Smelting Licence; Refining Licence	Dealers Licence; Brokers Licence	Lapidary Licence
State Agency	State Mining Corporation (STAMICO), a wholly owned Government enterprise under the Ministry of Minerals established by the Public Corporation Act CAP 257 through State Mining Corporation Establishment Order No. 163 of 1972 as amended in 2014.									
Description	prospecting licence for metallic minerals, energy minerals, gemstone excluding kimberlitic diamond, kimberlitic diamond, industrial minerals or building materials	For Large scale mining with capital investment not less than US$100M		For medium scale mining with capital investment between US$100,000 & US$ 100M	SSM with minimal machinery/technology with capital investment less than US$ 5M	Issued conduction of ball mill or sluicing operations in SSM	For persons not entitled to process minerals in any area within or outside a mineral right area	Issued to any person who wishes to smelt or refine minerals	For dealing in Gold, metallic minerals, coloured gemstones, diamond, coal, industrial minerals & building materials.	Issued in two categories: large lapidary licence and small lapidary licence issued for gemstones only
Special considerations	PML for gemstones may be granted in an area subject to PL for minerals other than gemstones	Issued upon approval by the Cabinet		ML or PML for building materials granted in area for other minerals;						

	Prospecting Licence (PL)	Gemstone Prospecting Licence (GPL)	Special Mining Licence (SML)	Mining Licence (ML)	Primary Mining Licence (PML	Primary Processing Licence (PPL)	Processing Licence	Smelting Licence; Refining Licence	Dealers Licence; Brokers Licence	Lapidary Licence
				ML for Gemstones & PML granted only to Tanzanians Where special skills are required a non-citizen with <50% share may be allocated Gemstone ML						
		Govt shall have 16% free carried interest & may acquire up to 50%								
Size of area	300 km^2	5 km^2 (gemstones & building materials)	70 km^2 for superficial deposits, 35 km2 for non-superficial	10 km^2 or 1 km2 for building materials & gemstones	10 Ha or 5 Ha for gemstones	N/A	N/A	N/A	N/A	N/A
Fees Payable	Fees and rent payable for all licences are attached as Appendix 1									
Period	4 years – Initial	Life of ore body – as indicated in feasibility study report		10 years – Max;	7 Years – Max;	1 Year	10 years – Max;	25 years – Max;	12 months; Expires on 30th June of each year	5 Years for Large Lapidary; 12 months for small Lapidary
Renewal & Transferability	3 years – 1st Renewal; 2 years – 2nd Renewal; Not renewable after 2nd period of renewal; Renewal within one year before the expiry date;	Renewable; Renewal application 1-year before expiry date; Renewal period not exceeding life of remaining orebody.		Renewable Renewal application in six months before the expiry date; Renewal period not exceeding 10 years;	Renewable Renewal within three months before the expiry date.	Renewable	Renewable	Renewable	Renewable Renewal within one month before expiry date	Renewable
		Mineral rights may be transferred; Holder may apply for area enlargement								
Rights & Obligations	Report on discovery; Adhere to program & expenditure; Prepare & implement Local Content Plan	Employ & train locals; Prepare & update closure plan; Implement RAP; May amend mining & training programs;		Protect environment; Implement RAP; Employ & train locals; Implement local procurement plan;	Prospect & mine in the area; Sell mineral to broker or dealer; Prepare & implement Local Content Plan		Terms and conditions prescribed in licence.		Buy or acquire minerals from the Mineral & Gem Houses; Sell or dispose of minerals as specified in the licence; export minerals specified in the licence	Buy minerals specified in Licence; Undertake value addition; Operate 10 – 30 machines; Transfer skills to locals;

	Prospecting Licence (PL)	Gemstone Prospecting Licence (GPL)	Special Mining Licence (SML)	Mining Licence (ML)	Primary Mining Licence (PML	Primary Processing Licence (PPL)	Processing Licence	Smelting Licence; Refining Licence	Dealers Licence; Brokers Licence	Lapidary Licence
		Prepare & implement Local Content Plan		Prepare & implement Local Content Plan						Keep & maintain accurate records.
		Keep records required under the law at registered official address in Tanzania; Submit operations information quarterly; File annual returns on efforts to enhance performance of the Tanzanian economy								
Restrictions	Cannot remove any mineral from the area without consent;	**<u>For an Individual:</u>** Must be over 18 years Must be citizen of Tanzania or has been ordinarily resident for a period of four years; Not un-discharged or declared bankrupt; Not convicted of dishonesty in the last 10 years. **<u>For a Company:</u>** Has established physical & postal address in the Country; Is incorporated in country or operates Mining Licence; Not in liquidation unless liquidation is for amalgamation; No director who is disqualified under the Mining Law. **<u>General:</u>** Apply for certificate to surrender land; Apply for certificate to abandon land; Won minerals stored on site < 5 days before moving to Government Mineral Warehouse under Govt supervision; All won raw minerals to be mined, sorted, and valued in presence of Mines Resident Officer, an Officer of Tanzania Revenue Authority & relevant state organs. Government have lien in all mineral concentrates; To give procurement preference to goods produced in Tanzania; To prepare a goods & services procurement plan for 5 years;					Set aside certain amount of minerals to process in country;		Issued only to person qualified for issue of PML; No criminal offence relating to buying and selling or possession of mineral or minerals; Brokers can buy or acquire gold or gemstones in designated buying station; Brokers not authorized to export any mineral or minerals.	Applies to Gemstones only; Large Lapidary Licence issued only to person qualified for issue of PML or has >25% shares in Company; Renewal

	Prospecting Licence (PL)	Gemstone Prospecting Licence (GPL)	Special Mining Licence (SML)	Mining Licence (ML)	Primary Mining Licence (PML	Primary Processing Licence (PPL)	Processing Licence	Smelting Licence; Refining Licence	Dealers Licence; Brokers Licence	Lapidary Licence
		prepare a credible corporate social responsibility plan annually; to comply with the integrity pledge.								
	Cumulative licence area < 2000km^2;		Issued if not in default of the PL obligations;		Application to include a local content plan;				No person is eligible for grant of a licence as a broker or dealer in uranium minerals	
Work Commitments	Commence operations within three months; Adhere to prospecting programme appended to prospecting licence; Expend on prospecting the amount prescribed; Submit prospecting records quarterly;	Start mining in 18 months Demarcate & keep area demarcated; Submit annual financial report;		Start mining in 18 months Demarcate & keep area demarcated;						

Special rules for SSM	May convert Primary Mining Licence or licences to a mining licence; Primary Mining Licence allocation in designated areas are allocated according to provisions provided in the Regulations; Application for licence should contain environmental investigations and social study and an environmental protection plan; Primary Mining Licence for sand and other fast depleting building materials shall be valid for a period of one year and may be renewed; When PML is converted to ML the remaining period on PML is not considered.
Gender Issues	A Training & Employment programme that considers gender, equity, persons with disabilities, host communities and succession plan should be prepared by mineral rights holder.
Skills Development Issues	Prepare a detailed programme for recruitment and training of Tanzanians with 12 months of grant of licence; Programme to show commitment to reserve adequate practical training opportunities to students from local training institutions; Submit report on the execution of the recruitment & training programme annually;
Research and Development Issues	One of the functions of the Mining Commission is to promote and conduct research and development in the mineral sector that will lead to increased Government revenue; Among the functions of Tanzania Geological Survey is to collect, arrange and maintain geo-scientific books, records, publications, rock or mineral or fossil or core samples for research, learning and future reference.
Environmental Principles and Liabilities	All licence holders to comply with environmental principles and safeguards prescribed in the Environmental Management Act and other relevant laws; Licence holders are liable for pollution damage without regard to fault; Licence holders and contractors may not claim compensation for damage caused by pollution against a person exempted from liability, except where such person acted willfully or negligently.

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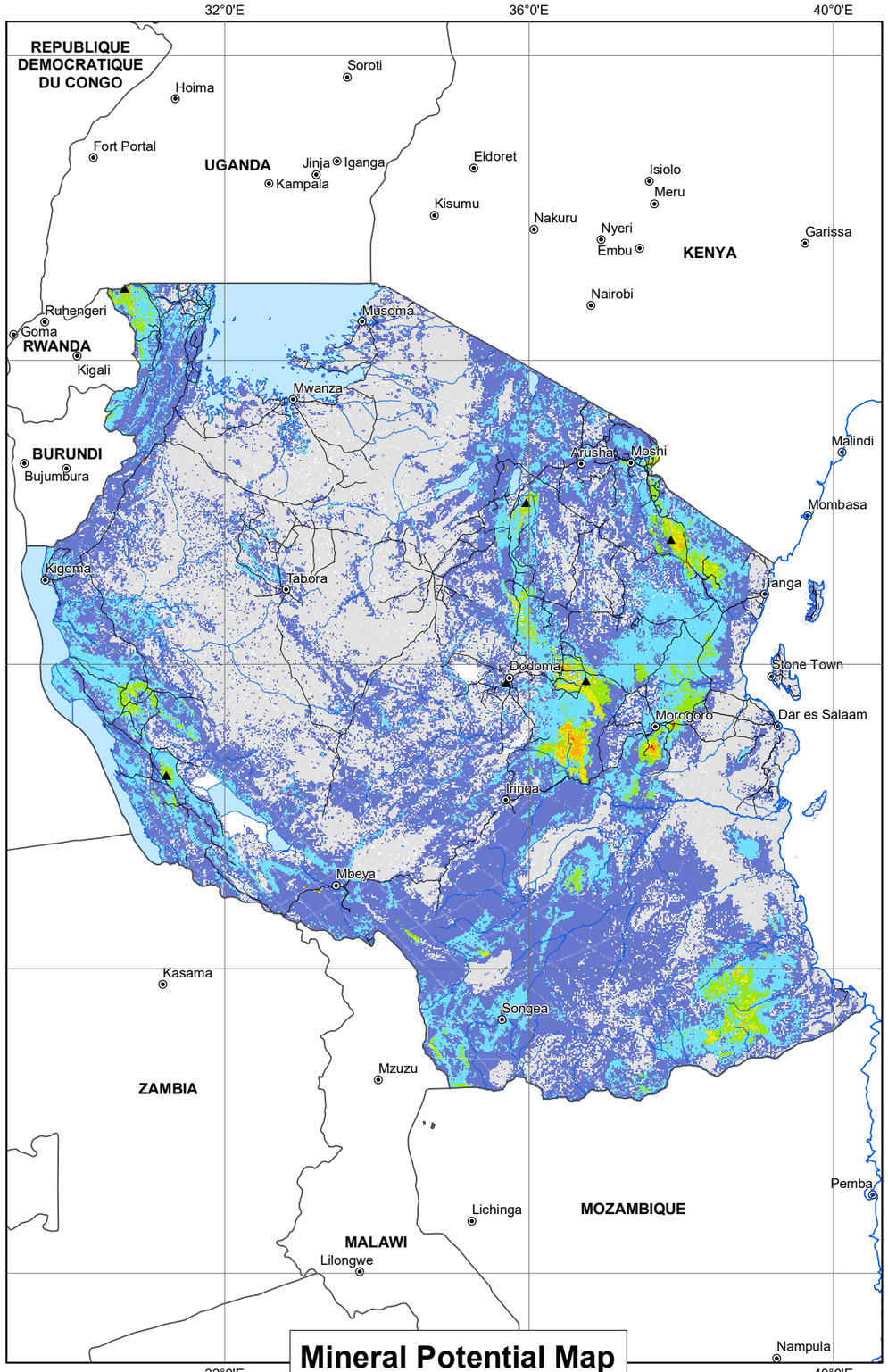
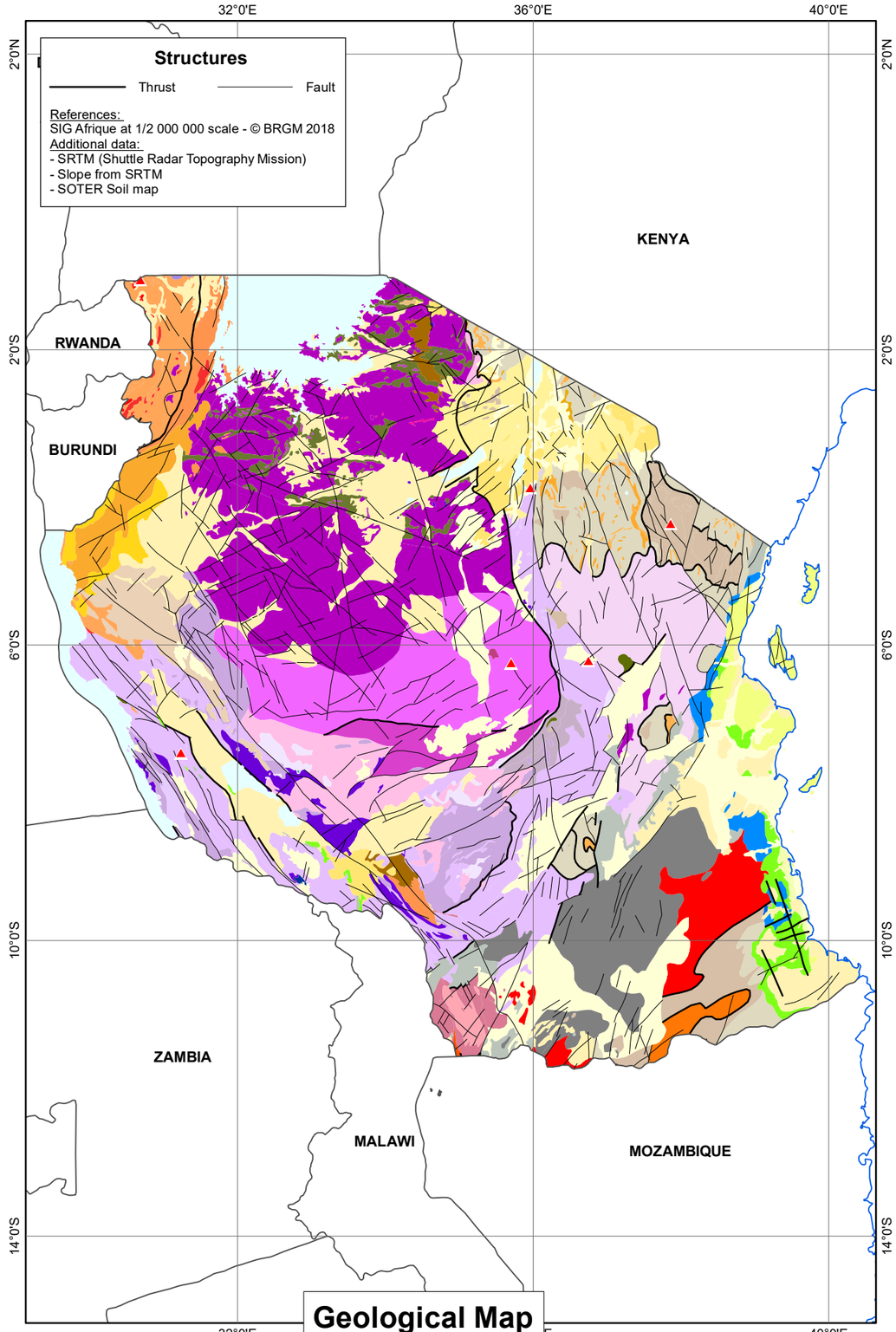
Country: TANZANIA

MINERAL POTENTIAL MAP - *BERYLLIUM (Be)*

Africa MaVal



Mineral Potential Map



Geological Map

Legend

Score

- < 0.05
- 0.05 - 0.125
- 0.125 - 0.25
- 0.25 - 0.45
- 0.45 - 0.60
- 0.60 - 0.80
- 0.80 - 1

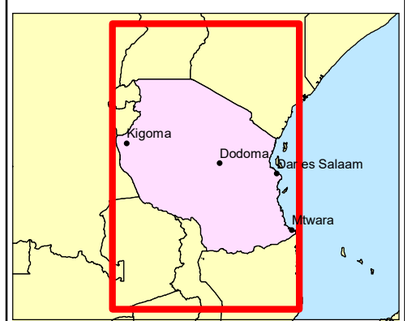
Known occurrences

▲ ▲ Beryllium (Be)
SIG Afrique - © BRGM 2018

Confusion matrix

True negative Cells: 219950 99.54% Non-occurrence in database Non-occurrence predicted	False positive Cells: 956 0.43% Non-occurrence in database Occurrence predicted
False negative Cells: 1 0.00% Occurrence in database Non-occurrence predicted	True positive Cells: 63 0.03% Occurrence in database Occurrence predicted

Best threshold (G-Means): 0.54
Cell size: 2000 m



N 0 100 200 400 Km

Datum : WGS84 (World Geodetic System 1984)

January 2024

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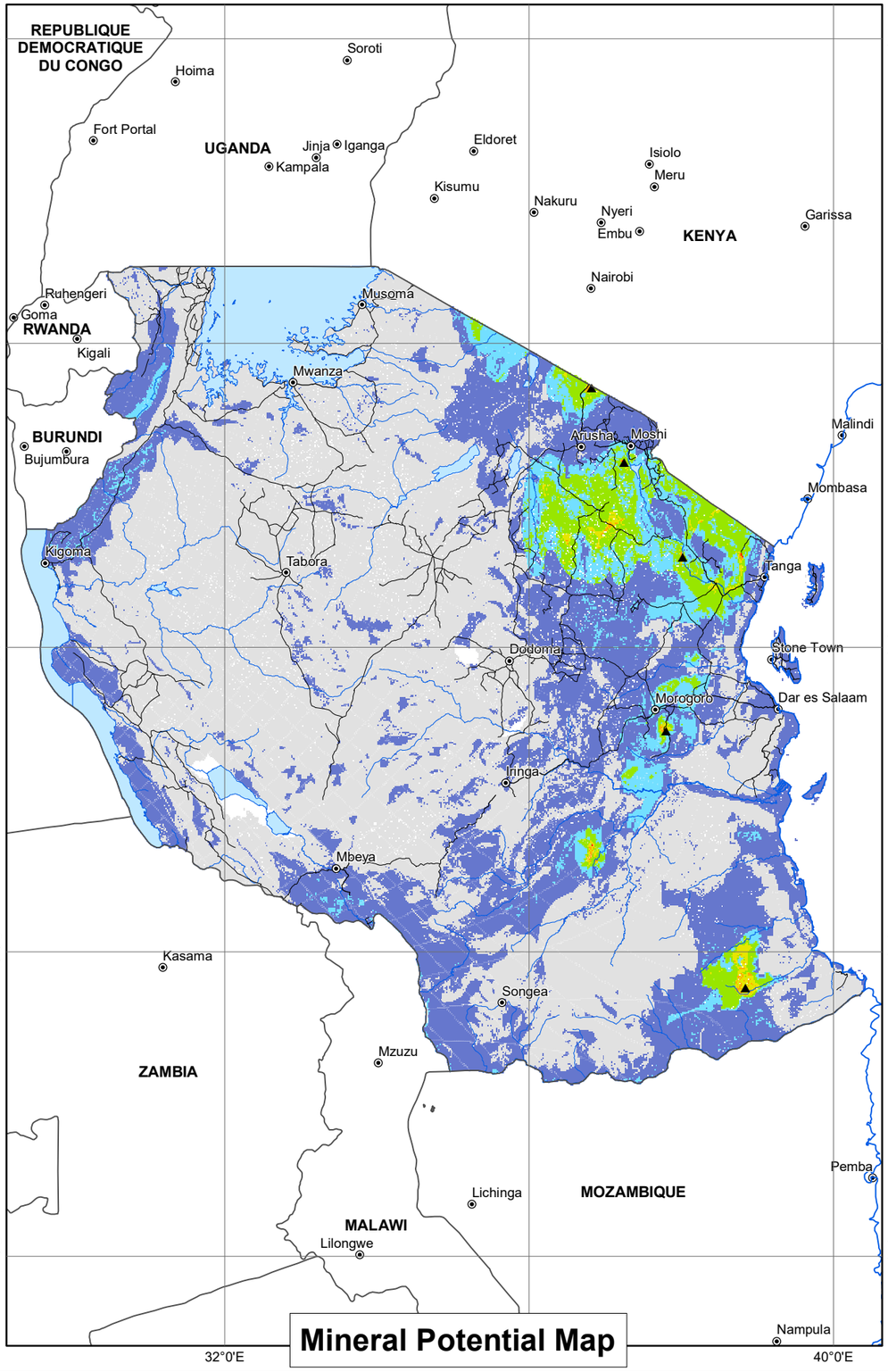
brgm

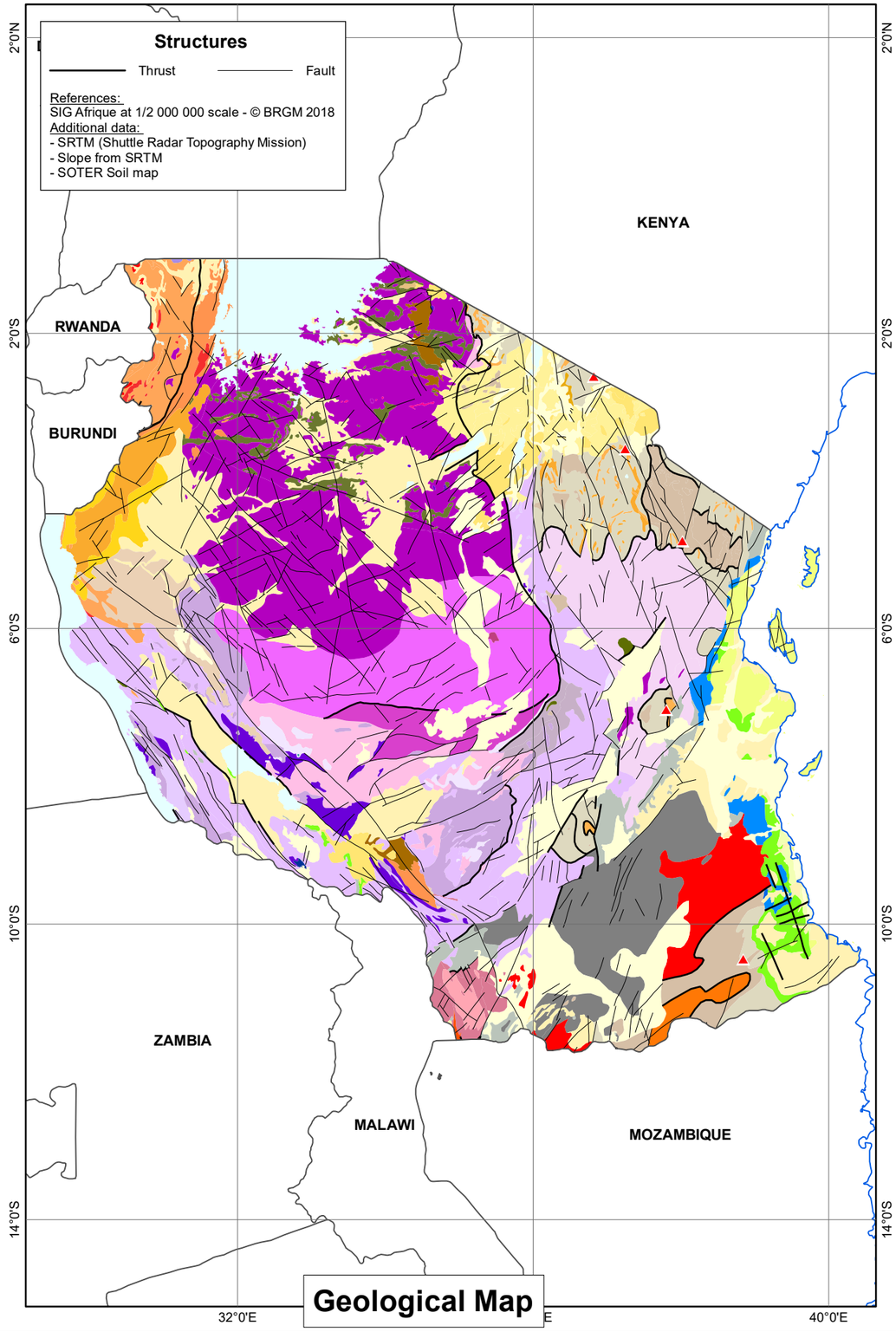
Country: TANZANIA

MINERAL POTENTIAL MAP - *GRAPHITE (Gr)*

Africa MaVal



Mineral Potential Map



Geological Map

Legend

Score

- < 0.05
- 0.05 - 0.125
- 0.125 - 0.25
- 0.25 - 0.45
- 0.45 - 0.60
- 0.60 - 0.80
- 0.80 - 1

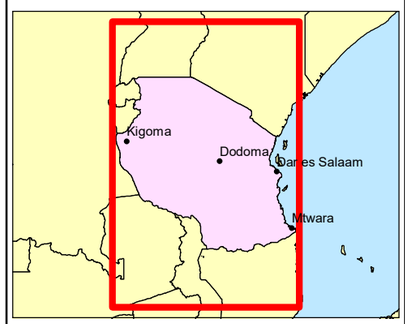
Known occurrences

▲ ▲ Graphite (Gr)
SIG Afrique - © BRGM 2018

Confusion matrix

True negative Cells: 220877 99.96% Non-occurrence in database Non-occurrence predicted	False positive Cells: 68 0.03% Non-occurrence in database Occurrence predicted
False negative Cells: 0 0.00% Occurrence in database Non-occurrence predicted	True positive Cells: 25 0.01% Occurrence in database Occurrence predicted

Best threshold (G-Means): 0.65
Cell size: 2000 m



Datum : WGS84 (World Geodetic System 1984)

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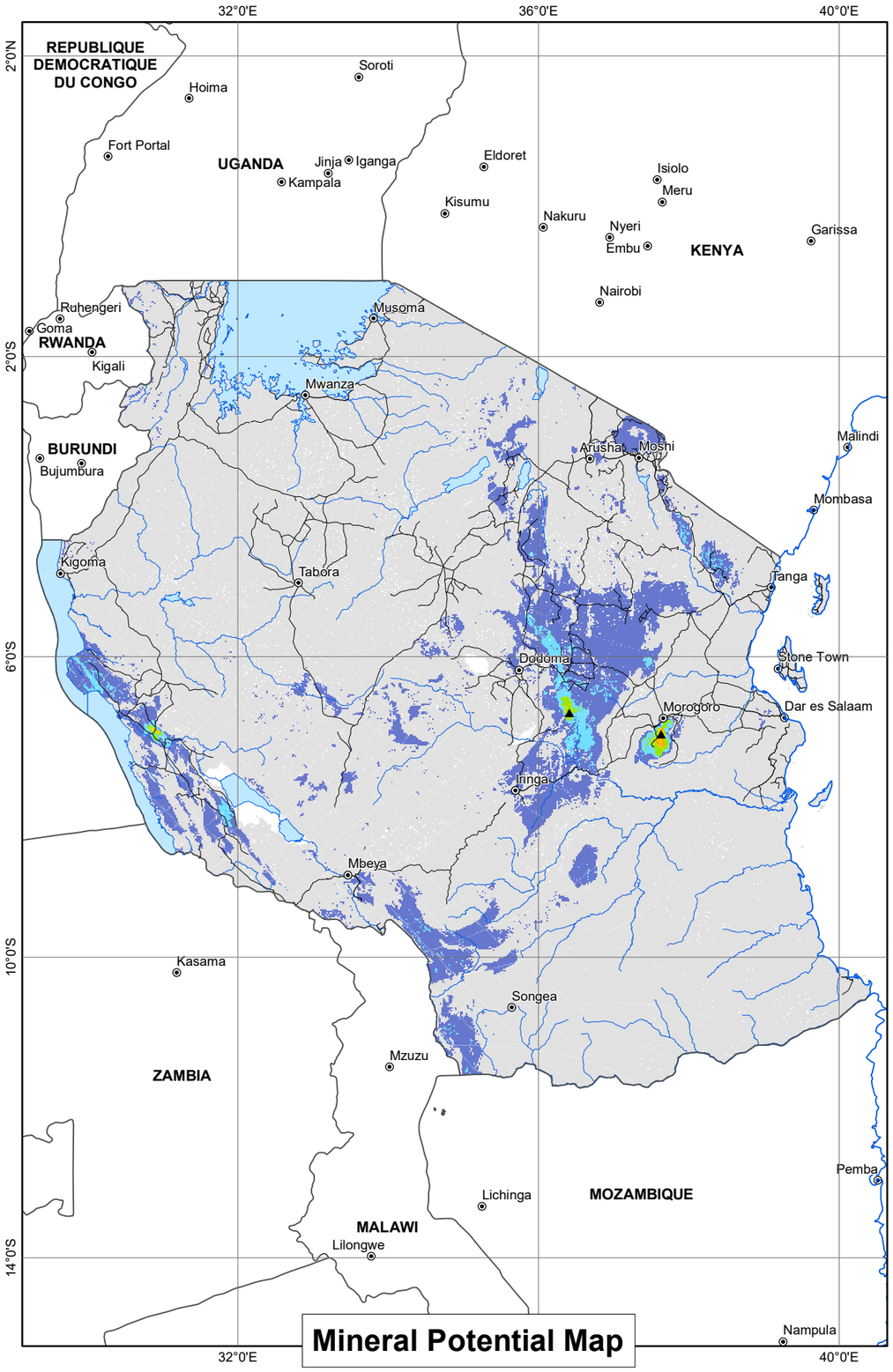
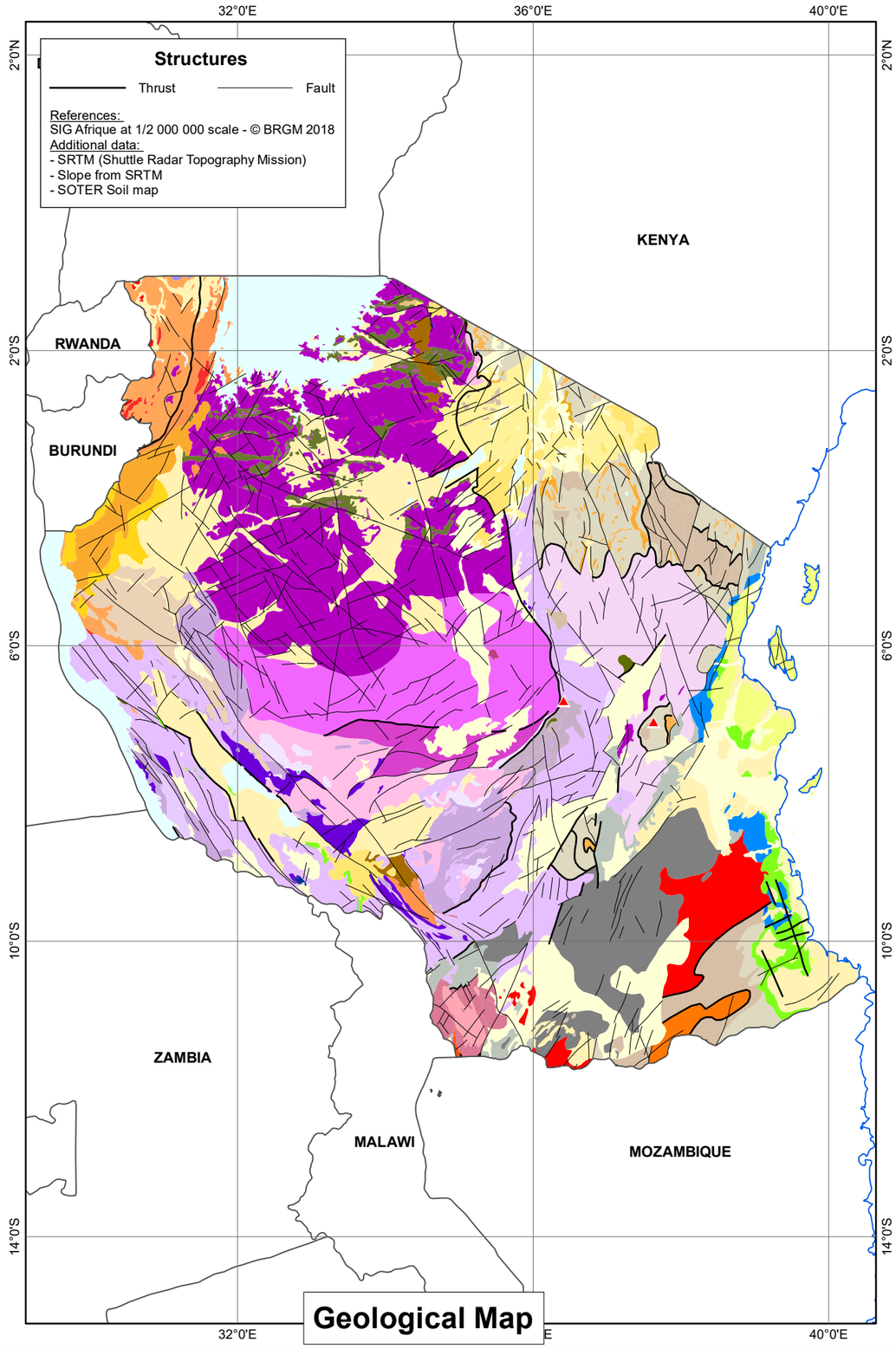
Country: TANZANIA

MINERAL POTENTIAL MAP - *MANGANESE (Mn)*

Africa MaVal



Mineral Potential Map



Geological Map

Legend

Score

- < 0.05
- 0.05 - 0.125
- 0.125 - 0.25
- 0.25 - 0.45
- 0.45 - 0.60
- 0.60 - 0.80
- 0.80 - 1

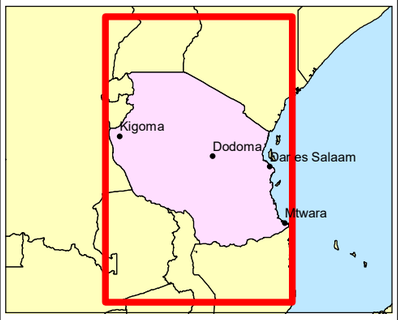
Known occurrences

▲ ▲ Manganese (Mn)
SIG Afrique - © BRGM 2018

Confusion matrix

True negative Cells: 220960 100.00% Non-occurrence in database Non-occurrence predicted	False positive Cells: 1 0.00% Non-occurrence in database Occurrence predicted
False negative Cells: 1 0.00% Occurrence in database Non-occurrence predicted	True positive Cells: 8 0.00% Occurrence in database Occurrence predicted

Best threshold (G-Means): 0.71
Cell size: 2000 m



Datum : WGS84 (World Geodetic System 1984)

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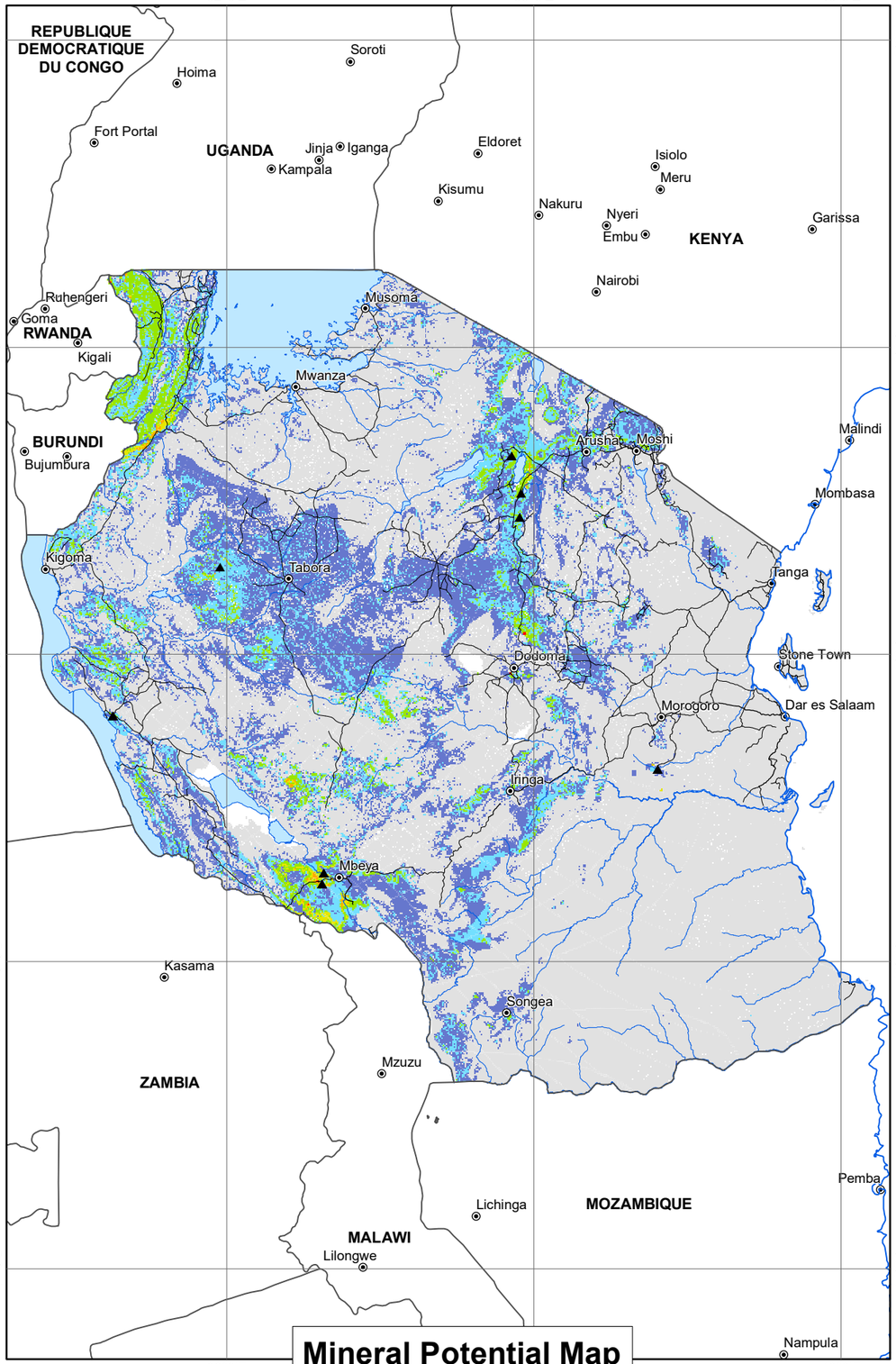
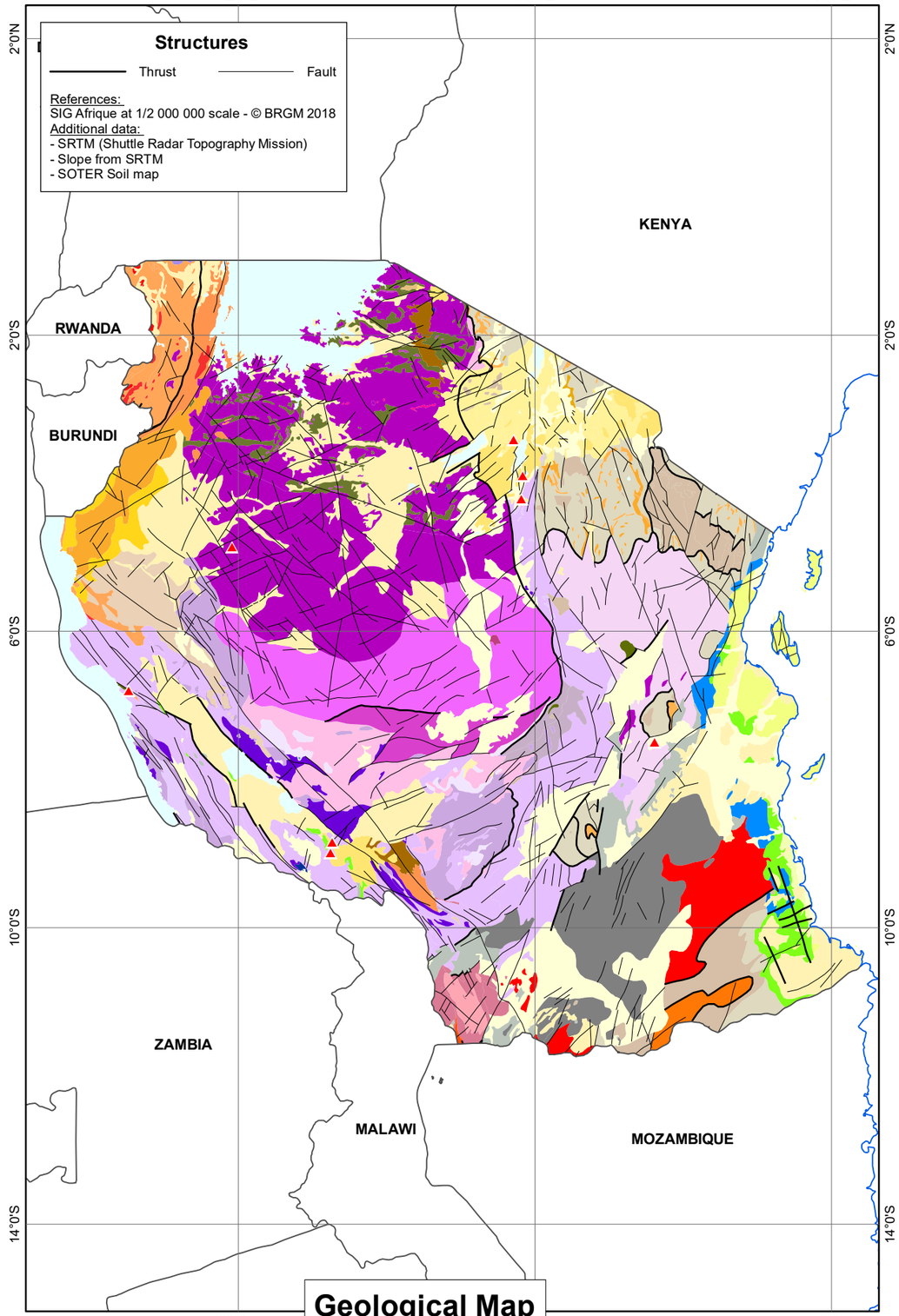
Country: TANZANIA

MINERAL POTENTIAL MAP - *NIOBIUM (Nb)*

Africa MaVal



Mineral Potential Map



Geological Map

Legend

Score

- < 0.05
- 0.05 - 0.125
- 0.125 - 0.25
- 0.25 - 0.45
- 0.45 - 0.60
- 0.60 - 0.80
- 0.80 - 1

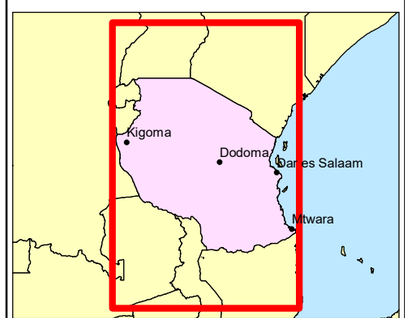
Known occurrences

Niobium (Nb)
SIG Afrique - © BRGM 2018

Confusion matrix

True negative Cells: 220157 99.63% Non-occurrence in database Non-occurrence predicted	False positive Cells: 763 0.35% Non-occurrence in database Occurrence predicted
False negative Cells: 0 0.00% Occurrence in database Non-occurrence predicted	True positive Cells: 50 0.02% Occurrence in database Occurrence predicted

Best threshold (G-Means): 0.43
Cell size: 2000 m



N 0 100 200 400 Km

Datum : WGS84 (World Geodetic System 1984)

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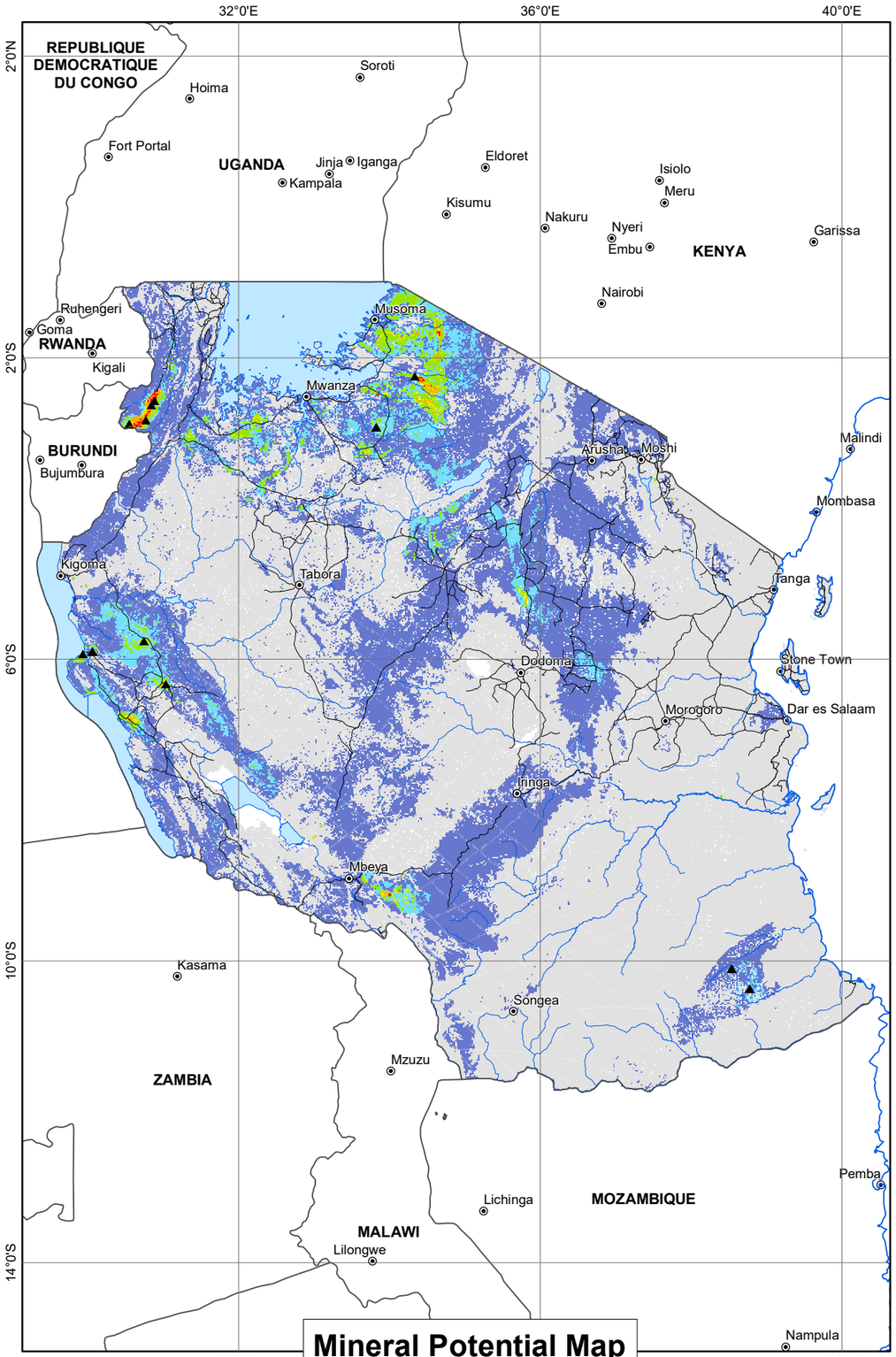
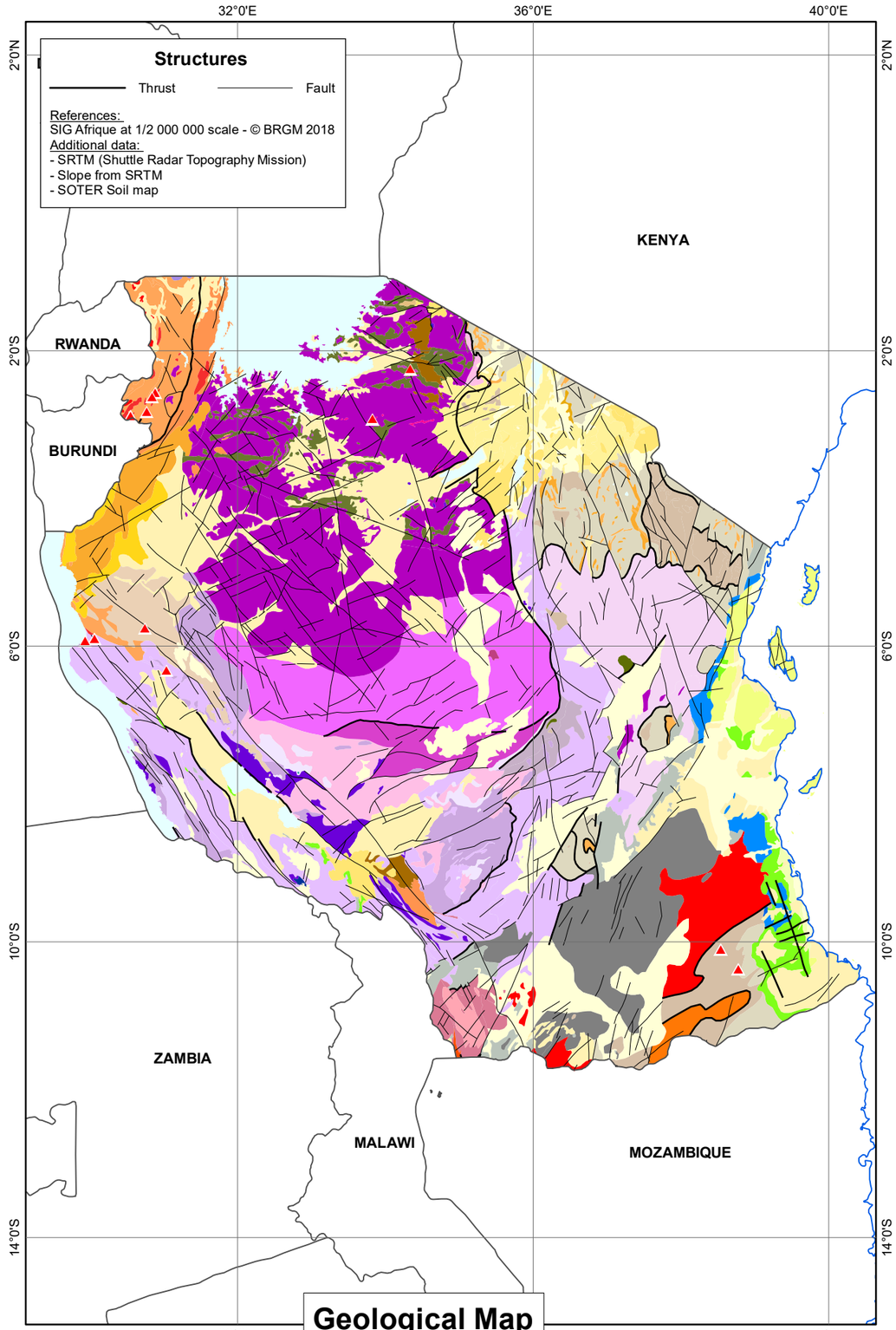
Country: TANZANIA

MINERAL POTENTIAL MAP - *NICKEL (Ni)*

Africa MaVal



Mineral Potential Map



Geological Map

Legend

Score

- < 0.05
- 0.05 - 0.125
- 0.125 - 0.25
- 0.25 - 0.45
- 0.45 - 0.60
- 0.60 - 0.80
- 0.80 - 1

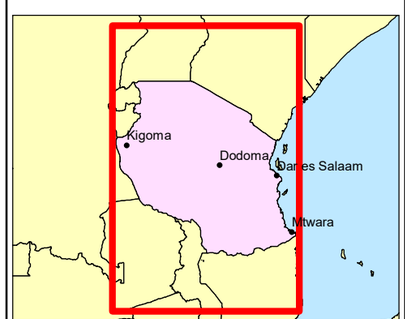
Known occurrences

Nickel (Ni)
SIG Afrique - © BRGM 2018

Confusion matrix

True negative Cells: 220333 99.71% Non-occurrence in database Non-occurrence predicted	False positive Cells: 573 0.26% Non-occurrence in database Occurrence predicted
False negative Cells: 0 0.00% Occurrence in database Non-occurrence predicted	True positive Cells: 64 0.03% Occurrence in database Occurrence predicted

Best threshold (G-Means): 0.50
Cell size: 2000 m



N 0 100 200 400 Km

Datum : WGS84 (World Geodetic System 1984)

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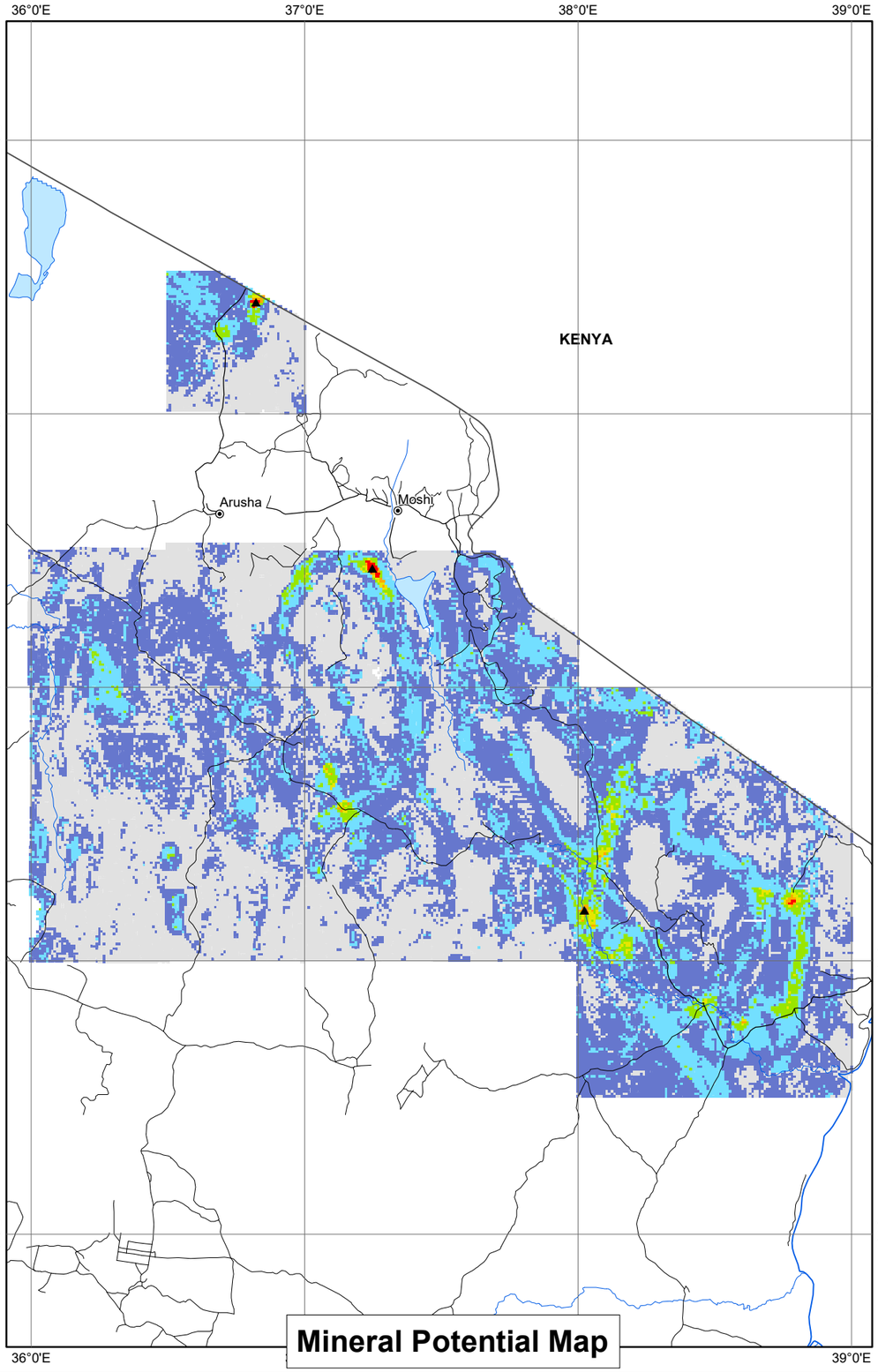
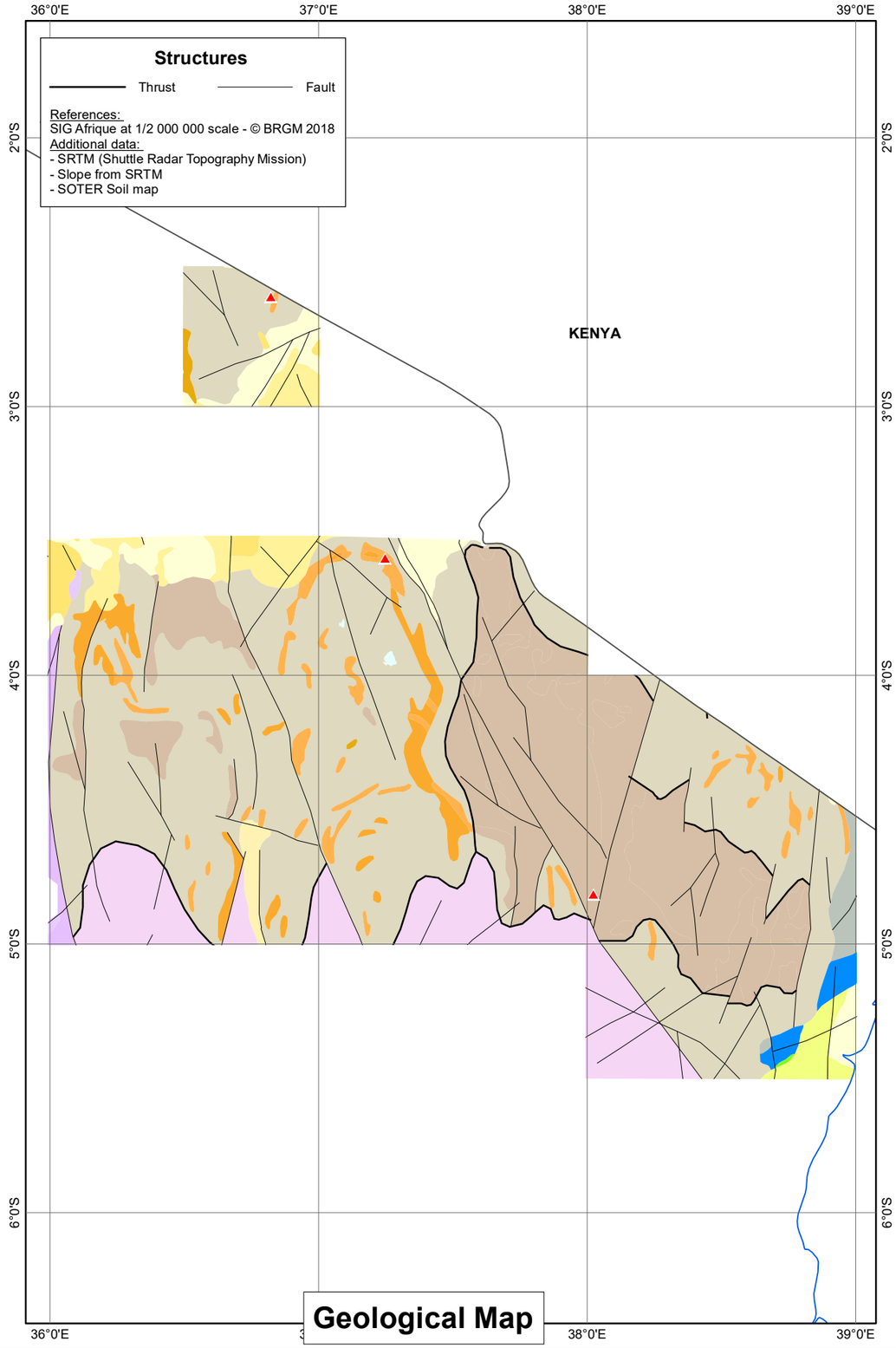
Country: TANZANIA (North East)

MINERAL POTENTIAL MAP - *GRAPHITE (Gr)*



Mineral Potential Map



Geological Map

Structures

Thrust — Fault

References:
SIG Afrique at 1/2 000 000 scale - © BRGM 2018
Additional data:
- SRTM (Shuttle Radar Topography Mission)
- Slope from SRTM
- SOTER Soil map

Legend

Score

- < 0.05
- 0.05 - 0.125
- 0.125 - 0.25
- 0.25 - 0.45
- 0.45 - 0.60
- 0.60 - 0.80
- 0.80 - 1

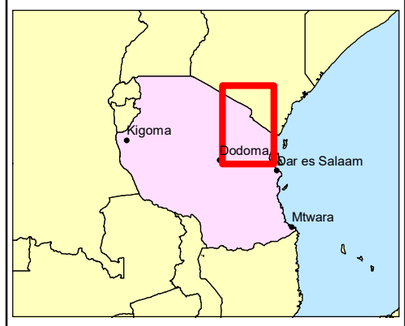
Known occurrences

Graphite (Gr)
SIG Afrique - © BRGM 2018

Confusion matrix

True negative Cells: 55398 99.84% Non-occurrence in database Non-occurrence predicted	False positive Cells: 39 0.07% Non-occurrence in database Occurrence predicted
False negative Cells: 0 0.00% Occurrence in database Non-occurrence predicted	True positive Cells: 48 0.09% Occurrence in database Occurrence predicted

Best threshold (G-Means): 0.60
Cell size: 1000 m



N

0 25 50 100 Km

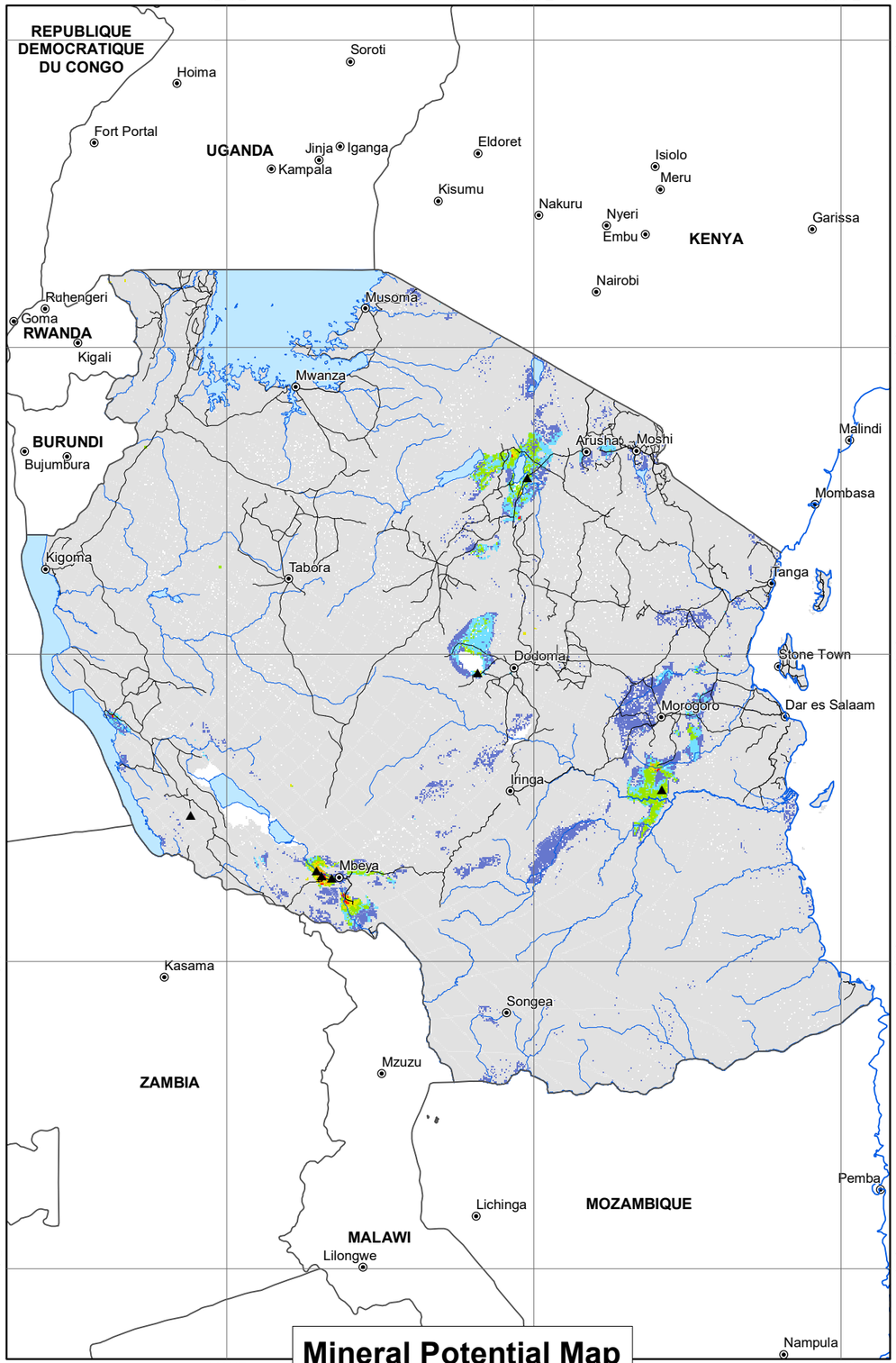
Datum : WGS84 (World Geodetic System 1984)

January 2024

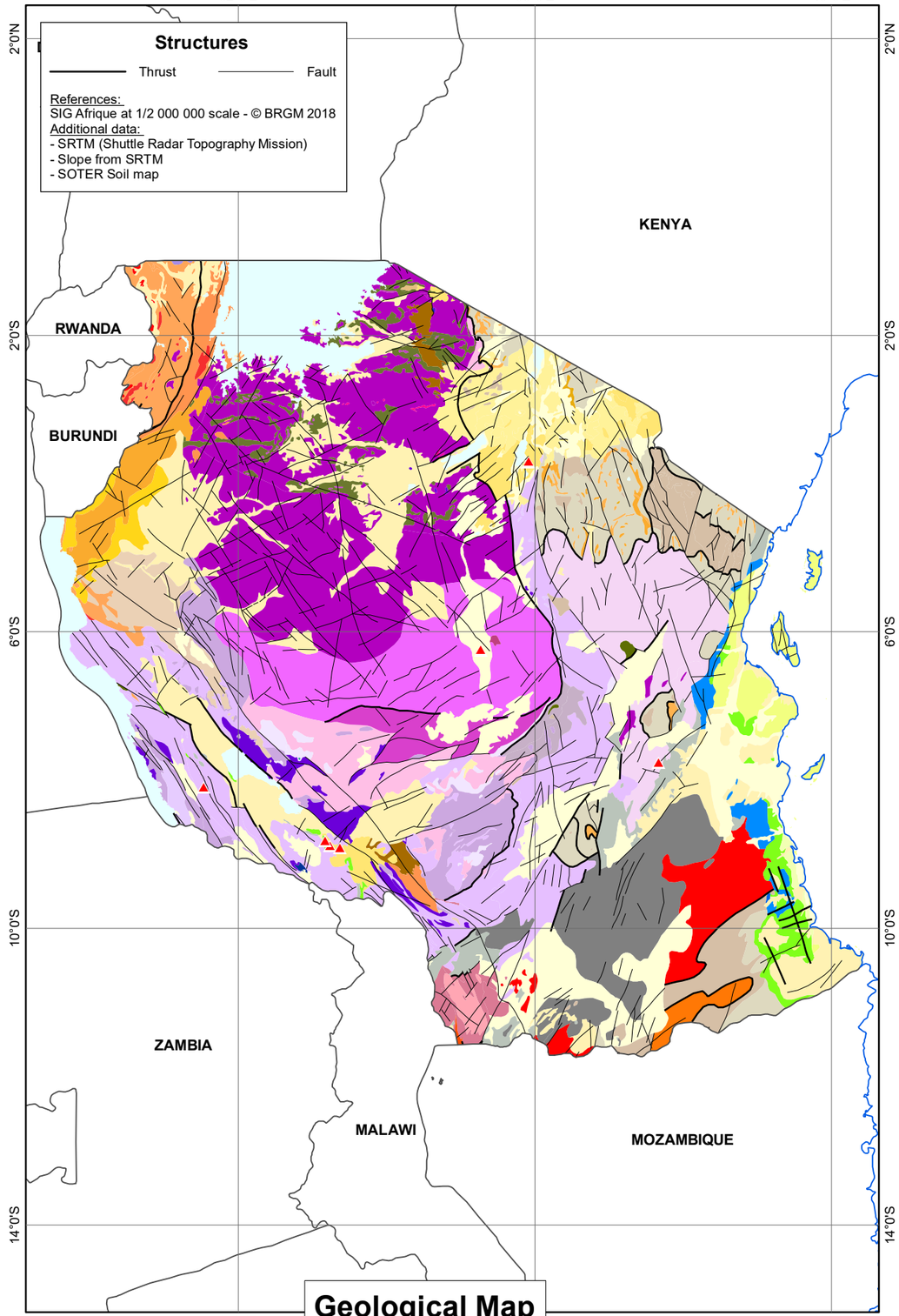
Country: TANZANIA

MINERAL POTENTIAL MAP - *PHOSPHATE (P)*

Africa MaVal



Mineral Potential Map



Geological Map

Legend

Score

- < 0.05
- 0.05 - 0.125
- 0.125 - 0.25
- 0.25 - 0.45
- 0.45 - 0.60
- 0.60 - 0.80
- 0.80 - 1

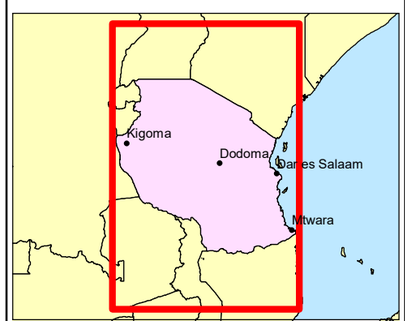
Known occurrences

▲ ▲ Phosphate (P)
SIG Afrique - © BRGM 2018

Confusion matrix

True negative Cells: 220846 99.95% Non-occurrence in database Non-occurrence predicted	False positive Cells: 92 0.04% Non-occurrence in database Occurrence predicted
False negative Cells: 1 0.00% Occurrence in database Non-occurrence predicted	True positive Cells: 31 0.01% Occurrence in database Occurrence predicted

Best threshold (G-Means): 0.64
Cell size: 2000 m



N 0 100 200 400 Km

Datum : WGS84 (World Geodetic System 1984)

January 2024

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