



**Botswana  
Geoscience  
Institute**  
Excellence in Geoscience

# **BOTSWANA GEOSCIENCE INSTITUTE**

## **ANNUAL REPORT**

**2 0 2 3**



[www.bgi.org.bw](http://www.bgi.org.bw)









## **THEME**

Prospectivity /

### **Systematic Search for Minerals**

Our journey to enhance and promote the prospecting landscape in Botswana continues through our 2023-28 Strategic Business Plan. We focus on transforming and improving Botswana's Best Mineral Potential Index (BPMPI) and Geoscience Data Index (GDI) to 70% or better.

## **ABOUT THIS REPORT**

This is an integrated business Annual Report of Botswana Geoscience Institute (BGI) that aims to provide concise, relevant and reliable information addressing the Institutes' mandate, objectives and activities. The report also provides detailed Audited Financial Statement of BGI for the Financial Year 2022/23.

This Annual Report is published according to Section 31 of the Botswana Geoscience Institute Act 2014.

The online version of this Annual Report is available to provide access to geoscience information and cater for readership preference to BGI wider stakeholder network, nationally and across the globe.

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## TABLE OF CONTENTS

INTRODUCTION	5
CHAIRPERSON'S REPORT	11
CHIEF EXECUTIVE OFFICER'S REPORT	13
BUSINESS LEADERSHIP AND GOVERNANCE	15
BGI BOARD OF DIRECTORS	16
BOARD MEMBERS APPOINTMENTS AND TERM OF OFFICE	21
RESPONSIBILITIES OF THE BOARD	22
BOARD COMMITTEES	22
EXECUTIVE MANAGEMENT COMMITTEE	23
ATTENNDANCE AND MEETINGS	26
BUSINESS PERFORMANCE REVIEW	30
LABORATORIES SERVICES AND QUALITY	64
PARTNERSHIPS, COLLABORATIONS AND NETWORKS	68
DATA MANAGEMENT	72
RISK MANAGEMENT	74
HUMAN CAPABILITY AND ADMINISTRATION	75
AUDITED FINANCIAL STATEMENTS	79





## **ABOUT BOTSWANA GEOSCIENCE INSTITUTE**

Botswana Geoscience Institute – (BGI) was established to innovatively apply science and technology to understand the earth for the greater benefit of Botswana and its citizens and broaden the nation's economic base along the mineral sector. The Institute is mandated to undertake research in the field of geosciences, provide specialised geoscientific services and advice in all matters of geoscience and geohazards. The Institute is also responsible for promoting the search for, and exploration of any mineral in Botswana and it is a custodian of all geoscience information.

The Institute Mandate is detailed in the Botswana Geoscience Institute Act, 2014 and is operationalised through a five (5) Year (2018 - 2023) Strategic Plan adopted in 2018 and revised in March 2020. The BGI mandate is entirely linked to the country's national development goals and strategic imperatives.

The establishment of BGI has presented Botswana with a unique opportunity to set up a geoscience organisation that can meet the needs of its stakeholders and customers. BGI therefore is projected to become a trusted adviser in all matters of geoscience in Botswana. This Institute is expected to achieve this by applying diverse professional expertise, historical and tested knowledge, nationwide earth observation infrastructure and strong partnerships and collaborations globally.

In line with Botswana Government's policy and intent to lure investors to Botswana and thereby increase foreign direct investment, BGI is expected to open avenues for collaboration in research and mineral discovery and the overall sustainable development of Botswana's mineral sector and related activities such as the monitoring of geohazards.

## **VISION**

To be a renowned Geoscience Centre

## **MISSION**

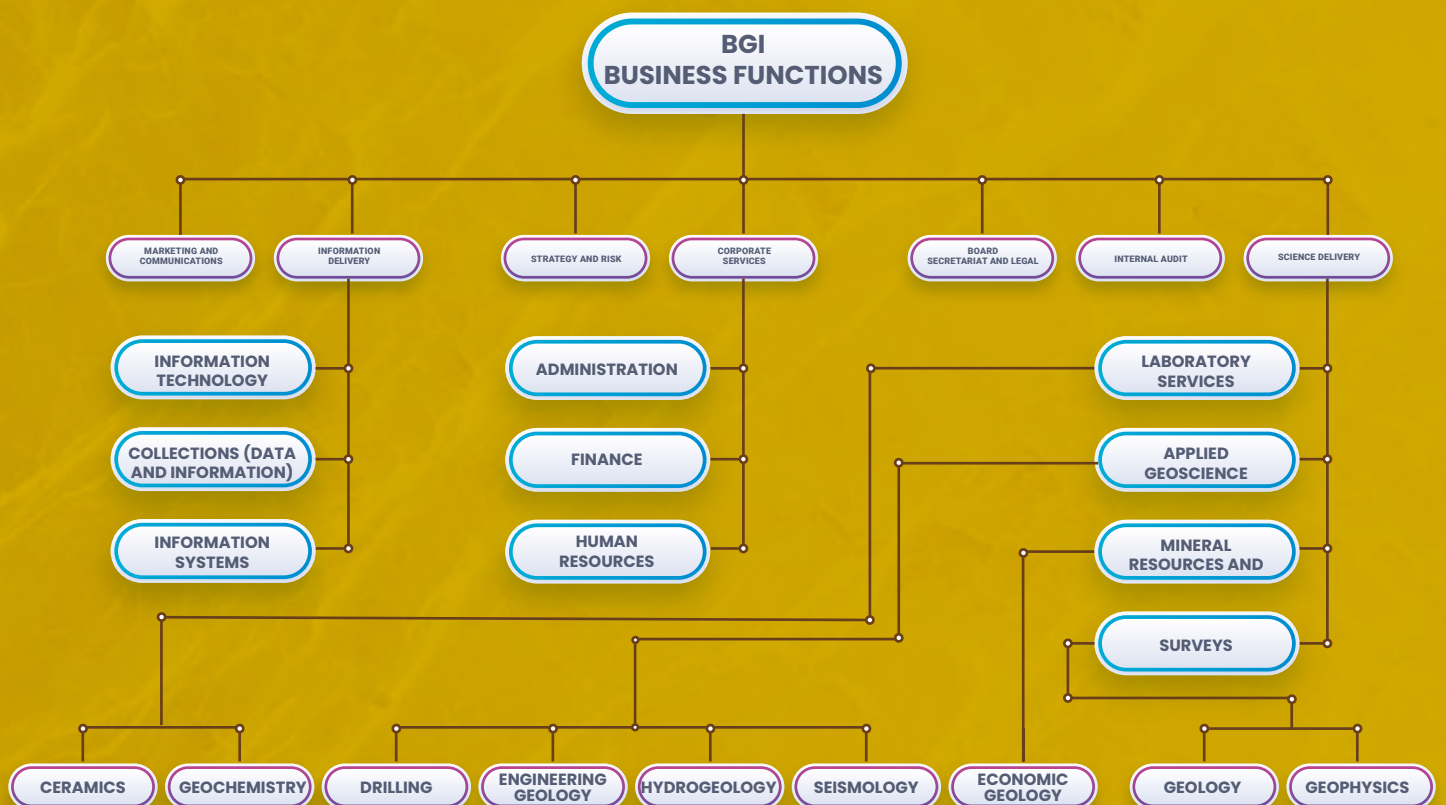
We create economic value through advancing, promoting and disseminating geoscientific knowledge for the benefit of Botswana and our global partners

## **BRAND PURPOSE**

Our purpose, expressed in our mantra, "Excellence in Geoscience" expresses our determination to surpass expected levels of distinction in our practice of geoscience research.



# BUSINESS STRUCTURE





## **PRACTICE OF GEOSCIENCE RESEARCH IN BOTSWANA**

### **1943-2014 - THE MEMORABLE YEARS**

The establishment of Botswana Geoscience Institute is a result of decades of pioneering geological survey and exploration. Since 1943, Government of Botswana, from its protectorate era, constantly adapts to keep up with economic and social demands of its people.

Botswana Geoscience Institute's forbear, Department of Geological survey, established the practice of geological survey and exploration until 2014 when it was mothballed to allow the formation of BGI, with a view to improve efficiencies and contribute immensely to applied research, producing geoscience knowledge and providing technical and scientific expert analysis. BGI's challenge today is to contribute workable solutions to meet 21st century socio-economic needs.



### **1943-1950 (HIGHLIGHTS)**

Investigations of groundwater commences during the Bechuanaland Protectorate era. This was the first work considered geological in nature, to address the nation's water needs and supply.

A Geological Survey was established in Bechuanaland Protectorate. Roles of the Geological Survey would include mineral survey and mapping, based in Lobatse.

The first phase of coal exploration started and led to discoveries of deposits at Morupule, Kgase and Mmamabula .



### **1967-1976 (HIGHLIGHTS)**

The post-Independence era ushered in discoveries of base metals and diamonds, which positioned Botswana high on the list of priorities for several mining companies. All these led to discoveries of diamonds and base metals in the country. present-day .

The mandate of Geological Survey was formally undertaken by the Department of Geological Survey and Mines under the Ministry of Commerce, Industry and Water Affairs.

A multidisciplinary Kalatraverse Project was carried out to map a trip of land across the Kalahari desert from the Orapa area and Ghanzi ridge.

The Aeromagnetic Survey was completed in the Western part of Botswana and the national Gravity survey led to the publishing of the second edition of the 1:1,000,000 national geological map in 1984.





## **1998-2014 (Highlights)**

Significant strides in geological mapping in the eastern part of Botswana and coloured 1:125,000 geological sheets with internal brief explanations and accompanying bulletins/ memoirs were achieved.

Aero Magnetic surveys of eastern and western Botswana were flown at 4km and 1km line spacing and covered with high-resolution magnetic data at 200 - 250mm line spacing.

Molopo farms' economic geology project to reassess the base and precious metals potential begins.

Until 2014 when BGI was formed, the practice of Geological Survey progressed and advanced with notable achievements such as; geological mapping, geophysics, economic geology, hydrogeology, environmental geology, laboratory and drilling facilities and the National Geoscience Information Centre (NGIC).

Botswana Parliament passed Botswana Geoscience Institute Act in 2014 leading to the commencement of a



## **2014-2022 - A RENEWED FOCUS THE ORIGIN**

Government of Botswana (GOB) appoints BGI's first Board of Directors. GOB also approved transfer of Department of Geological Survey assets to Botswana Geoscience Institute estimated at over P128,171,477 in fulfillment of Section 37 of the BGI Act of 2014.

Other key operations such as Prospecting License function was transferred from Department of Geological Survey to Department of Mines whereas Hydrogeological monitoring function, was transferred from Geological Survey to Department of Water and Sanitation (formerly Department of Water Affairs).

## **THE TURNING POINT**

Board of Directors adopted the Institute's maiden five-year Corporate Strategy in 2018. This Strategy was reviewed in January 2020 as it is best practice and its final year of implementation being the financial year 2022-23.

Though the Institute started off by pursuing the completion of projects initiated under DGS era, refined initiatives under BGI such as digitisation and systems deployment and commencement of projects identified in the National Development Plan-NDP 11 (Interpretation of Aeromagnetic data of Northern Botswana and Development and implementation of the National Integrated Geoscience Information System (NIGIS) were pursued.

This period saw acceleration in human capacity development which involved registration and grading of BGI Geoscientists at international professional bodies such as South African Qualifications Authority (SAQA), South African Council for National Science Professions (SACNASP) and Southern African Development Community Accreditation Services (SADCAS). The Institute also established the Research and Editorial Committee (ERC) to champion and quality assure BGI research project outputs.

The Institute is focused on creating a sustainable future through its partners, establishing processes and technological infrastructure necessary to expedite its mandate and sustainable growth. Significant milestones in the period of transition are a solid foundation to create value for the nation and partners.



## ACRONYMS

<b>AFTAC</b>	Air Force Technical Applications Centre
<b>BGI</b>	Botswana Geoscience Institute
<b>BGI ERC</b>	Botswana Geoscience Institute Research and Editorial Committee
<b>BITRI</b>	Botswana Institute of Technology Research and Innovation
<b>BIUST</b>	Botswana International University of Science and Technology
<b>BOPEU</b>	Botswana Public Employees Union
<b>BSN</b>	Botswana Seismological Network
<b>DGS</b>	Department of Geological Survey
<b>EDD</b>	Economic Diversification Drive
<b>GoB</b>	Government of Botswana
<b>IATA</b>	International Air Transport Association
<b>IMS</b>	Institute of Mine Seismology
<b>ISO</b>	International Organization for Standardization
<b>IRIS</b>	Incorporated Research Institutions for Seismology
<b>JOGMEC</b>	Japan Oil, Gas and Metals National Corporation
<b>LIMS</b>	Laboratory Information Management System
<b>MTC</b>	Management Tender Committee
<b>NDP</b>	National Development Plan
<b>NGIC</b>	National Geoscience Information Centre
<b>NIGIS</b>	National Integrated Geoscience Information System
<b>ODR</b>	Okavango Delta Region
<b>OHMS</b>	Open House Management Solutions
<b>PGMs</b>	Platinum Group Metals
<b>QDS</b>	Quarter Degree Sheets
<b>REE</b>	Rare Earth Element
<b>SADCAS</b>	Southern African Development Community Accreditation Services
<b>SEG</b>	Society of Exploration Geophysics
<b>SGCI</b>	Science Granting Councils Initiative
<b>TSPs</b>	Tirelo Setshaba Participants
<b>UB</b>	University of Botswana
<b>UZ</b>	University of Zimbabwe
<b>QAQC</b>	Quality assurance and Quality control
<b>HPO</b>	High performance organisation









## CHAIRPERSON'S STATEMENT



### PROFESSOR MOTSOPTSE PHILLIP MODISI.

The Annual Report and Audited Annual Financial Statements sets out our work over the financial year 2022/2023. It gives me pleasure, on behalf of the Board, to report that we made headway towards attainment of our mission. The year under review was a transitional phase, both at the national and Institutional levels. We developed and delivered well on our transitional plan to the new 2023-2028 roadmap. The 2023-2028 Strategic Business Plan (SBP) presents mineral prospectivity as integral to implementing the BGI mandate. We garnered support at the national level to propel prospectivity. Through the transitional national development plan (TNDP), the Shareholder funded six (6) of our projects for implementation in the next financial year.

#### Corporate Governance

Following pronouncements of the new Public Procurement Act (PPA) no. 24 of 2021, the Board resolved to dissolve the Board Tender Committee. To that effect, our co-opted member of the Tender Committee, Mr. Othusitse Lebulutse's membership ceased. We realigned membership to other Committees for effective, targeted guidance on the various business operations. In November 2022, we bid farewell to our member, Ms. Bogadi Mathangwane whose contract ended after serving for the past five years.

We continued to subject our operations to King IV™ Code on Corporate Governance and to other corporate governance requirements by relevant local bodies.

#### 2023-2028 Strategic Business Plan

In July 2022, we approved a transformational strategic plan, to focus the business on enhancing mineral prospectivity. This comes at a time when demand for various minerals, most importantly strategic minerals (Rare Earth/Energy metals included) is high, globally. Our new direction focuses the Institute on enhancing geoscience knowledge management, partnerships and collaborations, funding, and financial sustainability through a re-energized business and operating model.

#### Risk and Safety

We have no appetite for compromising employee, customer or public safety and welfare through our services. We continued to manage all strategic and operational risks with potential to destabilise our output and impact.

#### Strategy and performance

Botswana has amassed a wealth of geoscience data dating from 1948 during Department of Geological Survey era. BGI as its custodian has built online digital platforms to safeguard, benefit, and disseminate it to promote mineral prospecting in Botswana. Geological, geophysical and borehole (including groundwater) data and information including exploration reports are now available online for Botswana and investors on BGI websites. We completed the National Geographic Information System (NIGIS) for enhanced geoscience data storage and security. We facilitated the launching of the Mining Cadaster for the administration of mining and prospecting licenses. These have improved the transparency and operational efficiencies in processing and availing prospecting and geoscience data online to incentivize investment in exploration and mining.

At the end of NDP 11, BGI completed the interpretation of aeromagnetic data of northern Botswana. The project led to the improvement of geological mapping coverage from 46% to 82% and identification of thirty-five (35) mineral prospects covering an area of 42 000 km<sup>2</sup>.



### **Partnerships/Collaborations**

Our strategic partners remained committed to our course. BGI collaborates with several local and international, private and state-owned organizations, to conduct baseline exploration. Projects include the investigation of Rare Earth Metals at Semarule; with JOGMEC spending BWP 2.8 million and Ministry of Communications, Knowledge and Technology (MCKT) at Kokong and Shoshong expenditure at BWP 3.1 million. These partnerships are yielding remarkable results in our business.

### **Looking ahead**

FY 2022/23 marked the beginning of our second Strategic Plan 2023-2028. We enter FY 2023/24 with renewed focus to elevate mineral prospectivity as the heartbeat of geoscience research in Botswana. We ride on the foundation built over the years, renewed executive leadership and ambition for sustained delivery of the mandate.

### **Finance and External Audit**

We note the clean audit for our Financial Statements, a testament to our unwavering adherence to fiscal integrity, accountability, and exemplary governance. This achievement reflects the Board's steadfast oversight and the dedication of BGI's management and staff in upholding rigorous financial controls, even amid challenges such as revenue generation shortfalls and delayed

commercialization initiatives. The clean audit underscores our collective commitment to transparency and prudent stewardship of public resources, reinforcing trust among our stakeholders, including government, partners, and the citizens of Botswana.

### **Closing**

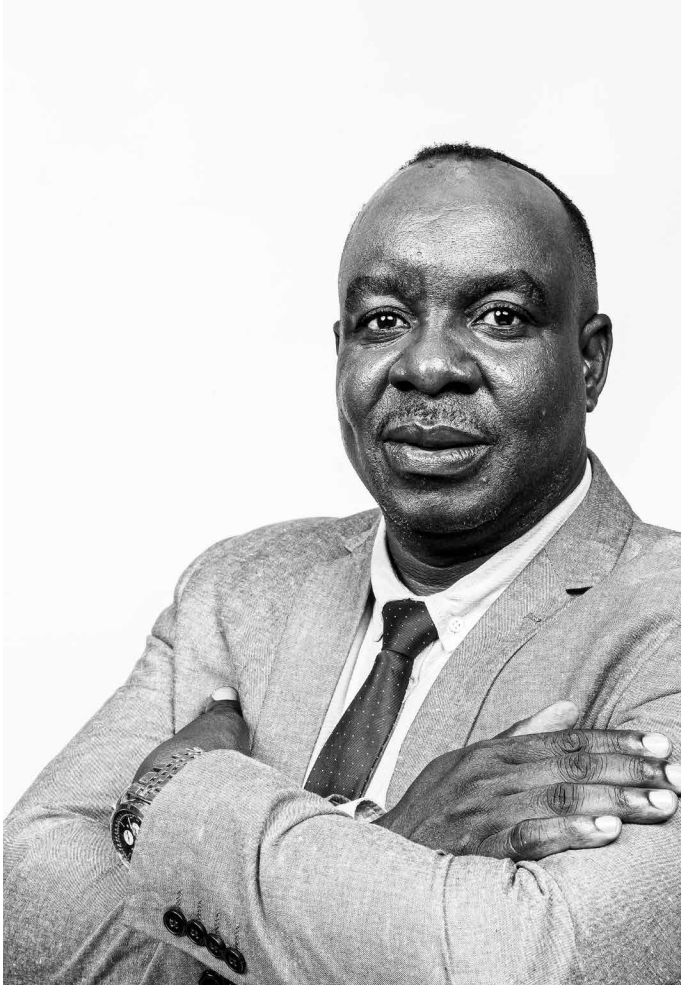
In closing, I thank our shareholders and all our stakeholders for their support in progressing our strategic objectives. I extend my deep appreciation to fellow Board members, for relentless leadership and dedicated participation in the exciting new phase. I want to express my gratitude to all BGI employees under the leadership of Mr. Olefile C. Mashabila for his invaluable service to BGI.

### **Professor Motsoptse Phillip MODISI.**

Board Chairperson  
BGI



## CEO'S STATEMENT



### MR. OLEFILE CISCO MASHABILA

As we reflect on the 2022/23 financial year, I am pleased to present a comprehensive overview of the Botswana Geoscience Institute's performance, strategic achievements, and challenges. This period was characterized by our unwavering commitment to advancing Botswana's geoscientific capabilities while aligning with national priorities such as the RESET AGENDA.

#### COVID-19 Management and Workplace Safety

The Institute successfully maintained operational resilience despite external headwinds. Our COVID-19 management framework remained robust, with a 94% vaccination rate sustained across the organization and only two recorded cases during the year. Enhanced workplace safety protocols and proactive health monitoring ensured business continuity, reflecting our prioritization of employee welfare and adaptive risk management.

#### Financial Performance and Commercialization

Financially, BGI navigated a challenging landscape marked by revenue shortfalls. While we received a subvention of P54.16 million against a budget of P58.70 million, commercialization initiatives fell short of expectations, generating P1.3 million against a target of P4.5 million. Delays in external funding, notably the deferred USGS collaboration, and underperformance in drilling services impacted revenue. However, significant strides were made in laying the groundwork for future self-sufficiency. The near-completion of laboratory accreditation—progressing to 92% with SADCAS's provisional endorsement—and the impending acquisition of BCL and Tati Laboratories signal transformative potential for our commercial capabilities. These efforts, supported by T-NDP funding, position BGI to unlock new revenue streams in the coming fiscal year.

#### Human Capital Development and Talent Management

Human capital management remained a critical focus area. With 113 positions filled against a funded complement of 127, attrition of technical cadres to mining competitors persists. To address this, we are developing a comprehensive Talent Attraction and Retention Programme, while advancing skills development through partnerships with international donors. Three employees are pursuing advanced degrees under full Japanese government scholarships, and four others are benefiting from MCKT-sponsored programs. Industrial relations saw measured progress, with ongoing constructive dialogue between management and unions on pension fund transitions, fostering a stable and collaborative workplace environment.

#### Operational and Technological Advancements

Strategic project implementation remained a cornerstone of our operational success. The completion of the National Integrated Geoscience Information System (NIGIS) and Mining Cadaster, achieving 100% delivery, has revolutionized data accessibility, driving a 22% increase in exploration applications. Our digital transformation agenda reached a milestone with the full conversion of 62,666 analog records, enhancing data-driven decision-making.

The establishment of the Project Management Office (PMO) ensures future initiatives align with global best practices. Geoscience research thrived through partnerships, including a P6.4 million geohazard research project in Kweneng District, which underscores our role in safeguarding communities and infrastructure.

#### Strengthening Partnerships and National Impact

Collaborations with entities such as JOGMEC and MCKT amplified our impact, while progress in elevating Botswana's mineral prospectivity, evidenced by the anticipated rise in the Fraser Institute's Best Practice Mineral Potential Index (BPMPI) to 35%, reflects our strategic alignment with national economic goals.



### **Challenges and Lessons Learned**

Challenges in revenue generation and talent retention have informed our forward-looking strategy. The approved 2023–2028 Strategic Business Plan prioritizes mineral exploration promotion, lab commercialization, and human capital optimization. By aligning skills development with strategic objectives through our Talent Management Framework, we aim to cement BGI's role as a catalyst for sustainable mineral-led growth.

### **Conclusion**

In closing, I extend profound gratitude to the BGI Board, staff, and partners for their dedication. Special acknowledgment is due to the Ministry of Mineral Resources, Green Technology, and Energy Security for their steadfast support. As we embark on the new business strategy, BGI remains resolute in its mandate to drive innovation, sustainability, and prosperity for Botswana.

Thank you

**Olefile Cisco Mashabila (Mr.)**

Chief Executive Officer

# BUSINESS LEADERSHIP AND GOVERNANCE

BGI is governed by a Board consisting of eight (8) non-Executive members. The Chief Executive Officer is an Ex-Officio Member of the Board. He is bound by a contract of employment with agreed set targets which are appraised by the Board from time to time.

According to Botswana Geoscience Act, 2014, the selection and appointment of members of Board of Directors, lies with the Minister of Minerals and Energy. The Board members' appointments are based on prescribed skills and experience in various

disciplines, which accordingly assist in ensuring BGI discharges its mandate within the stipulated provisions of the Botswana Geoscience Institute Act. Such disciplines include, Geological Engineering, Sciences, Law, Market Regulation, Finance and Accounting, Management and Business administration.







## **PROFESSOR MOTSOPTSE PHILLIP MODISI**

**Board Chairperson**

Professor Motsoptse Phillip Modisi is the Botswana Geoscience Institute Board Chairperson appointed to this role with effect from 15 August 2019 for a period of 4 years. He holds a Ph.D. in Geology from McMaster University, M.Sc., in Geology from South Dakota School of Mines and Technology and B.Sc. (Hons) in Geology from University of Ibadan.

Professor Modisi has extensive experience in the field of Geology that includes lecturing at the University of Botswana and serving under different capacities such as Head of Geology Department, Dean of Faculty of Science and Acting Director in the Office of Research and Development, among others.

Professor Modisi has worked for the Department of Geological Survey, now transformed into the Botswana Geoscience Institute where he served under different roles starting from Assistant Geologist and progressed through the ranks up to the role of Assistant Director.

His service to the nation also includes, being Member of Botswana College of Agriculture (now Botswana University of Agriculture and Natural Resources), Governing Council, Chairperson of Botswana College of Agriculture Appointments and Promotion Committee and being an External Examiner for the Botswana International University of Science and Technology from 2016 to 2017. He is a member of several organizations including the Botswana Academy of Science, Botswana Geoscientists Association and the Astronomical Society of Botswana.

He is an astute publisher as shown by his articles in geology journals, chapters in books and published monographs.



## **DR. SEBUSI ODITITSE**

**Vice-Chairperson**

Dr. Odisitse has MSc and PhD in Chemistry from the University of Cape Town, South Africa and BSc in Chemistry and Physics from the University of Botswana. He joined Botswana International University of Science and Technology (BIUST) as lecturer in the Department of Chemical and Forensic Sciences. He previously worked at Botswana Institute for Technology Research and Innovation as a Researcher, Nanomaterials, under the Natural Resources and Materials Division.

He has more than two decades of years' experience in teaching, lecturing and as a researcher specializing in Chemistry. He is the author and co-author of international scholarly/ scientific journal articles and technical papers in chemistry, especially Bioinorganic and Materials Chemistry. He is a member of Royal Society of Chemistry (UK), American Chemical Society (USA) and South African Chemical Institute (SACI). He is also a member of The Institute of Directors in South Africa (IoDSA). He serves in national Boards such as Botswana Institute for Technology Research and Innovation (BITRI) and national committees as well as university boards and committees.





**MR. OGONE OSCAR MOKOKO  
GABOUTLOELOE, ESQ. SR. PCH**  
Board Member

Mr. Gaboutloeloe, Esq. Sr. PCH is an admitted Attorney and a Notary Public of the High Courts of Botswana, with an LLB obtained from University of Botswana, an MSc in Strategic Management and a Master of Commerce in Trade Law and Policy obtained from the University of Cape Town.

He is presently employed by Botswana Meat Commission – BMC, as Legal Counsel and Secretary to the Board of Commissioners. He was previously General Counsel and Director Legal Services for Air Botswana, and before that, he worked for Botswana Post for over half a decade in various roles including as Head of Government Relations, Regulatory Affairs, International Postal Affairs, and Corporate Strategy and External Relations. Mr. Gaboutloeloe's professional experience has been across diverse sectors, first as a practising attorney, then at a Non-Governmental Organisation, medical insurance providers, a private hospital, the Botswana Unified Revenue Services, and the Public Procurement and Asset Disposal Board.

Mr. Gaboutloeloe is a lifelong member of the Scout Movement, and presently sits on the National Scout Commission as Legal Advisor to Botswana Scouts Association. His experience in Board membership has been gained through various Boards including Non-Governmental Organisations, a private sector property investment consultancy firm and as a member of National Labour Advisory Board. He has had several appointments in international postal and aviation associations and bodies.

Mr. Gaboutloeloe has contributed two chapters to 'The Future is in the Post', a Postal Industry journal. He has been a member of the Law Society of Botswana of good standing and a member of the FIFA club licensing committee, the First Instance Board (FIB) of the Botswana Football Association. He is a recipient of the national award Presidential Certificate of Honor (PCH) for his dedication to the development of Botswana. He serves in the Botswana Geoscience Institute as Chairperson of the Board Tender Committee.







**MS. TEBOGO MMOSHE**  
Board Member

Ms. Tebogo Mmoshe is a Chartered Accountant (ACCA) and a Fellow member of the Botswana Institute of Chartered Accountants. She has an MBA obtained from University of Derby, UK, BSc (Hons) in Applied Accounting from Oxford Brookes University, UK. She is a Certified Risk Analyst by International Academy of Business and Financial Management (IABFM). She went through the Executive Development programme by University of Cape Town (UCT) Graduate Business School, South Africa and has Diploma in Communications from Commonwealth Telecommunications Organisation.

She is currently holding a position of Director Compliance and Monitoring at Botswana Communications Regulatory Authority before that she was the Head of Finance. Previously, she worked at Botswana Unified Revenue Service as Acting General Manager and Botswana Meat Commission as Internal auditor.



**MS. ONTLAMETSE MOKOPAKGOSI**  
Board Member

Ms. Mokopakgosi has MA in Health Policy, Planning and Management from University of Leeds, UK, and a Bachelor of Arts in Social Science, (Economics and Demography), from the University of Botswana.

In June 2016 she joined the Human Resource Development Council (HRDC) as Manager, Human Resource Development Planning. She previously worked as Deputy Permanent Secretary at the Ministry of Mineral Resources, Green Technology and Energy Security and the Ministry of Health responsible for Corporate Services. She previously served as a member of the National Vision Council, Public Service Training Advisory Committee, and SADC Human Resource Planning Sub-Committee.

Ms. Mokopakgosi is a co-author of "National Health Accounts for Botswana: 2000-2012" and "Public-Private options for expanding access to human resources for HIV/AIDS in Botswana", October 2007, publications.





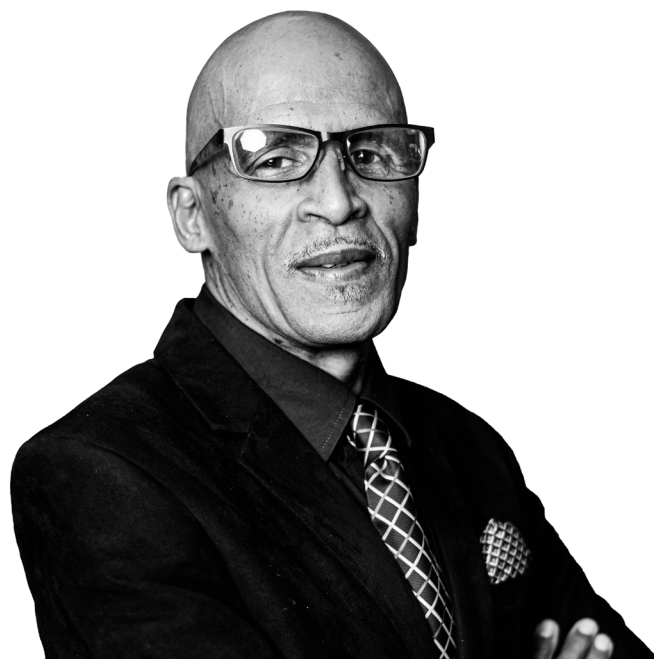
**MS. BOGADI T. MATHANGWANE**  
Board Member

Ms. Mathangwane was appointed to Botswana Geoscience Institute Board of Directors on November 01, 2017, for a period of five (5) years up to October 31, 2023.

She holds an integrated master's degree in Water Resources from Iowa State University in the US and BSc Honors double major in Applied and Analytical Chemistry from the UK. She is currently working as Director for Botswana Government in the Ministry of Lands and Water Affairs in the Department of Water and Sanitation.

Ms. Mathangwane has extensive knowledge in areas of integrated water resources management with emphasis in water conservation, water demand management, water quality and trans-boundary water resources management. She has also facilitated and directed mega national and regional water and sanitation projects some of which were funded by different international cooperating Partners.

She is a Coordinator of Transboundary water resources, a member and sits in the advisory committees of the SADC River Basin Commissions of which Botswana is party to. She was conferred with prestigious international award: **"LEADERSHIP AWARD FOR OUTSTANDING CONTRIBUTION TO WATER EFFICIENCY"** at the 2015 World Corporate Social Responsibility (CSR) Congress held at Taj Lands' End, Mumbai, India. This Award was in recognition of her notable contribution to water use efficiency nationally, regionally, and internationally.



**MR. HAROLD VAN ZYL**  
Board Member

Mr. Harold Van Zyl was appointed to Botswana Geoscience Institute Board of Directors on August 01, 2020, for a period of four (4) years up to March 31, 2024.

Mr. van Zyl holds a B.Sc. in Geology obtained from University of Botswana. He also holds several post graduate qualifications from University of Witwatersrand, University of Stellenbosch and University of Johannesburg, in Mining Engineering, Leadership and Management. He currently runs his own company Harkoo (Pty) LTD responsible for all Managerial and Technical Services. Mr. van Zyl Started his career as a regional geologist at the Department of Geological Survey joined Falconbridge Explorations (Botswana).

Mr. Van Zyl also worked for BCL Limited, a Mining and Smelting organization as Divisional Manager-Resource Planning and a Member of BCL Executive Management Team. This was a portfolio responsible for all technical services and safety, health and environment. He is very passionate about corporate social responsibility (CSR) and led some of BCL CSR initiatives such as availing school furniture for a reception class at Lepokole Primary School.

Mr. Van Zyl has over 30 years of experience as a Geologist, specialising in Regional Geology, Mining Geology and Exploration with a solid business background and extensive knowledge of mining economics, risk management and financial reporting.





**MR. THABO BALOPI**  
Board Member

Mr. Thabo Balopi was appointed to Botswana Geoscience Institute Board of Directors on April 01, 2021, for a period of four (4) years. Mr. Balopi is employed by Debswana Diamond Company as Head of Transformation and Innovation with extensive knowledge and skills in the mining & metals industry. In particular, he is skilled in kimberlites and base metals with key competencies in mantle petrology, drilling methods and techniques, modelling and estimations, rock mechanics, groundwater management and project management, among others.

Mr. Balopi holds a Master of Engineering (MEng.) focused in Mining and Mineral Resources Management from University of the Witwatersrand, South Africa, and BSc (Hons) in Mining Geology from Royal School of Mines, Imperial College of Science, United Kingdom.

He previously worked for Tati Nickel Mining Company as Section Manager-Mineral Resource Evaluation and De Beers Group of Companies as Senior Mineral Resources Analyst based in Johannesburg, South Africa. He then took over the role of Senior Mineral Resources Manager at Orapa, Letlhakane and Damtshaa mines followed by Senior Mineral Resources Manager at Jwaneng Mine before becoming the Group Head of Mineral Resources Management at the Debswana Corporate Centre.



**MR. OLEFILE CISCO MASHABILA**  
Chief Executive Officer

Mr. Olefile Cisco Mashabila was appointed BGI Chief Executive Officer on September 01, 2021.

Mr. Mashabila joins BGI from Debswana Mining Company (Orapa, Letlhakane and Damtshaa Mines), where he worked under different capacities in Mineral Resources Management (MRM) Department, Technical Assistant to the General Manager and as Senior Mineral Resources Manager, the position he held for the past five (5) years. He previously worked at BCL and Tati Nickel Mining mines, also in Geology and Mineral Resources departments.

He brings to BGI his treasure/wealth of knowledge, skills, and expertise, which include but not limited to strategic business planning and leadership, risk management, mineral resources & reserve management, data & information analysis and project management (planning and execution).

He holds MSc (Engineering/MRM) from the Witwatersrand University, MSc Strategic Management (University of Derby, UK) and BSc Geology from the University of Botswana. He possesses a Palladium Kaplan – Norton Balanced Scorecard Certification and he is affiliated to the South Africa Council for Natural Scientific Professionals (SACNASP) and Southern African Institute of Mining and Metallurgy (SAIMM).

## BOARD MEMBERS APPOINTMENTS AND TERM OF SERVICE

Minister of Mineral Resources and Energy, acting in accordance with Botswana Geoscience Institute Act Section 6 (5), appointed the BGI Board as indicated below table. These Members are appointed by reason of their expertise and experience in the areas relevant to the function and Mandate of the Institute.

NAME	PROFESSION/ QUALIFICATION	POSITION BOARD, (e.g. Board Chairperson, Audit\HR Committee Chairperson or Ordinary Member)	DATE OF FIRST APPOINTMENT	EXPIRY DATE
Professor Motsotse Phillip Modisi (MPM)	PhD in Structural Geology	<ul style="list-style-type: none"> <li>Chairperson of the Board</li> </ul>	15 August 2019 First term of apportionment	14 August 2023
Dr. Sebusi Odisitse (SO)	PhD in Chemistry	<ul style="list-style-type: none"> <li>Vice Board Chairperson</li> <li>Chairperson, Board Technical Committee</li> <li>Member of Board Finance, Audit &amp; Risk Committee</li> <li>Member of Tender Committee</li> </ul>	Re-appointed for second term in July 2020	14 August 2023
Ms. Tebogo Mmoshe (TM)	MBA, BSc (Hons) in Applied Accounting and ACCA	<ul style="list-style-type: none"> <li>Chairperson, Board Finance, Audit and Risk Committee</li> </ul>	Re-appointed for second term in July 2020	14 August 2023
Mr. Ogone M. Gaboutloeloe (OMG)	Law, Bachelor of Laws (LLB), Master of Science in Strategic Management and Master of Commerce in Management Practice specializing in Trade Law and Policy	<ul style="list-style-type: none"> <li>Chairperson, Board Tender Committee</li> <li>Member of Finance &amp; Audit Board Committee</li> </ul>	Re-appointed for second term in July 2020	14 August 2023
Ms. Ontlametse Mokopagosi (OM)	MA in Health Policy, Planning and Management	<ul style="list-style-type: none"> <li>HR Board Committee Chairperson</li> <li>Member of Finance, Audit &amp; Risk Committee</li> <li>Member of Tender Committee</li> </ul>	Re-appointed for second term in July 2020	August 2023
Ms. Bogadi T. Mathangwane (BTM)	Master's Degree in Water Resources from Iowa State University, USA	<ul style="list-style-type: none"> <li>Member of Board Technical Committee,</li> <li>Member of Board Tender Committee</li> <li>Member of Board HR Committee</li> </ul>	November 01, 2017. First term of apportionment	30 October 2022
Mr. Harold Van Zyl (HVZ)	B.Sc., [Geology]	<ul style="list-style-type: none"> <li>Member of Board Technical Committee</li> <li>Member of Tender Committee</li> <li>Member of Board HR Committee</li> </ul>	01 August 2020, first term of appointment	31 July 2024
Mr. Thabo Balopi (TB)	Master of Engineering (MEng) focused in Mining and Mineral Resources	<ul style="list-style-type: none"> <li>Member of Board Technical Committee</li> </ul>	01 April 2021, first term of appointment	31 March 2025

## RESPONSIBILITIES OF THE BOARD

BGI Board of Directors is responsible for the general control of the performance and management of the undertakings and affairs of the Institute. In particular, BGI Board of Directors' responsibilities are.

Determine corporate policy and provide strategic direction for giving effect to the objectives of the BGI Act.

- Determining the general performance of the Institute.
- Ensures compliance with applicable Laws and Regulations,
- Approve significant capital expenditure projects, selection of service providers and major financial proposals.
- Advise the Minister to change, review or formulate geosciences related policies and strategies where necessary, and
- Do such other things as provided by the BGI Act or as may be necessary to the proper implementation of the BGI Act.



## BOARD COMMITTEES

### Board Committees

The Board is accountable for the Institute's activities and deals with all organisations business and achieves this through specifically delegated Committees. The Board has (4) standing specialist committees.

1. Finance, Audit and Risk Committee,
2. Technical Committee
3. Human Resource Committee and
4. Tender Committee (active until 06 September 2022)

### FINANCE, AUDIT AND RISK COMMITTEE

This Committee is responsible for ensuring that Executive management creates and maintains an effective control environment for BGI, and that management encourages the necessary respect for internal controls among all employees. The Committee reviews Financial Controls, Accounting Systems, and reporting to the shareholder.

This responsibility of the committee is achieved through.

- Assessing the Policies and procedures of the Institute to ensure that, that the accounting systems and related controls are adequate and functioning effectively.
- Identifying major risks to which the Institute is exposed and verify that the related internal control systems are adequate and functioning effectively.
- Reviewing the financial statements of the Institute to provide assurance those financial disclosures made by the Board and management portray the Institutes financial conditions, results of operation and long-term commitments.
- Overseeing both the internal and external audit process, together with reviewing effectiveness of both auditors.

The members of the Finance Audit and Risk Committee for the year under review were.

<b>Ms. Tebogo Mmoshe</b>	Chairperson
<b>Dr. Sebusi Oditse.</b>	Member
<b>Mr. Ogone O. M. Gaboutloeloe</b>	Member
<b>Mr. Thabo Balopi</b>	Member
<b>Ms. N. P. Nuku-Basaakane</b>	Co-opted member

### TECHNICAL COMMITTEE

In General, this Committee of the Board provides oversight on technical matters of the Institute, project development and management, and systems and technology acquisition.

The Committee may also consider project economic analysis, appraisal of technical risk factors, appropriate longer-range (as well as early stage) preparations for project development and implementation, as well as such other matters as may be requested by the Board.

<b>Dr. Sebusi Oditse</b>	Chairperson
<b>Ms. Ontlametse Mokopakgosi</b>	Member
<b>Mr. Harold van Zyl</b>	Member
<b>Mr. Thabo Balopi</b>	Member

### HUMAN RESOURCE COMMITTEE

The Committee was set up to regulate both substantive and procedural administration of staff and employee welfare issues, which include recruitment processes, industrial relations matters, remuneration and other compensation as may be necessary. Specifically, the Committee undertakes the following:

- Deliberate and decide on policy issues relating to remuneration and benefits, salaries, and other related matters.
- Determine for Board approval, the remuneration policy for all BGI staff.
- Determine targets and objectives for any performance to related pay schemes.
- Recommend to the Board Executive Management appointments.

The Committee is composed of the following:

<b>Ms. Ontlametse Mokopakgosi</b>	Chairperson
<b>Ms. Bogadi Mathangwane</b>	(until 30 October 2022) Member
<b>Mr. Ogone O. M. Gaboutloeloe</b>	Member
<b>Mr. Harold Van Zyl</b>	Member
<b>Mr. Sipho Mbebe</b> (deceased on 02 July 2023)	Co-opted member

### TENDER COMMITTEE

The Committee ensures that all tenders within the authority of the Board are addressed in a transparent and procedural manner to enhance an effective control environment in the Institute's procurement process and that the Board encourages the necessary respect for control by management and employees of the Institute.

On 06 September 2022, the BGI Board passed a resolution to dissolve the Board Tender Committee in line with the Public Procurement Act (PPA) no. 24 of 2021. Until then, members of the Committee were as follows:

<b>Mr. Ogone O. M. Gaboutloeloe</b>	– Chairperson
<b>Ms. Bogadi Mathangwane</b>	– Member
<b>Ms. Ontlametse Mokopakgosi</b>	– Member
<b>Mr. Harold Van Zyl</b>	– Member
<b>Mr. Othusitse Lebuletswe</b>	– Co-opted member

## EXECUTIVE MANAGEMENT COMMITTEE

The BGI Board, subject to predefined limits, has delegated its executive authority to the Executive Management Committee, (EXCO), headed by the Chief Executive Officer (CEO).

The EXCO is responsible for proposing strategic alternatives to the Board and is accountable for the implementation of strategies, policies, and other decisions approved by the Board. It manages the business and affairs of the Institute, implements strategic decisions, prioritises the allocation of capital, technical and human resources and establishes best management practices.

## EXECUTIVE MANAGEMENT COMMITTEE

During the year under review, the roles of Director-Corporate Services and Manager Internal Audit were filled whereas the role of Manager Strategy and Risk remained vacant. Mr. Serero was deployed from Information Technology as a temporary measure.



**MR. OLEFILE CISCO MASHABILA**  
Chief Executive Officer



**MR. PUSOAKANYANG**  
Director, Science, Delivery;



**MS. LESEGO P. PETER**  
Director, Information Delivery



**MR. KEVIN K. MASUPE**  
Director, Corporate Services



**MR. JAMES B. MOŁOSANKWE.**  
Manager, Marketing & Communications



**MS. ONKEMETSE SAMUEL**  
Manager, Internal Audit



**MS. CHANDAPIWA MOGOBE**  
Manager, Strategy and Risk

\*Ms. Mogobe continued as Secretary to the Board on acting basis for the period under review, pending the recruitment of the substantive Manager, Legal Services and Board Secretary.



## ATTENDANCE AND MEETINGS OF THE BOARD

The Board met on seven (7) occasions, including the Strategy Review three (3) day session during the financial year 2022/23 to consider strategic and policy matters and progress of the Institute. Members of the Board and as part of the respective Committees attended the following meetings.

Type	Date	Attendance								
	MPM	SO	OMG	OM	TM	TB	HVZ	BM	OCM(CEO)	
<b>Strategy Review</b>	03.05.2022-05.05.2022	✓	✓	✓	X	✓	✓	✓	✓	✓
<b>Board Q4 2021/22</b>	15/06/22	✓	X	✓	✓	X	X	✓	✓	✓
<b>Board Q1 2022/23</b>	6/9/2022	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Special Board</b>	22/07/22	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Board Q2 2022/23</b>	29/11/22	✓	✓	✓	✓	✓	✓	✓	X	✓
<b>Special Board</b>	23/02/23	✓	✓	✓	✓	✓	✓	✓	X	✓
<b>Board Q3 2022/23</b>	23/03/23	✓	✓	✓	✓	✓	✓	✓	X	✓

## ATTENDANCE AND MEETINGS OF BOARD COMMITTEE MEETINGS

Type	No. of meetings	Attendance							
	SO	OMG	OM	TM	TB	HVZ	BM	OCM(CEO)	
<b>Finance, Audit &amp; Risk Committee</b>	4	4/4	3/4	NA	NA	3/4	NA	NA	4/4
<b>Human Resources Committee</b>	4	NA	3/4	4/4	NA	NA	4/4	4/4	4/4
<b>Technical Committee</b>	4	4/4	NA	3/4	NA	3/4	4/4	3/4	4/4
<b>Tender Committee</b>	2	2/2	1/2	2/2	NA	NA	NA	2/2	4/4

NA – Not a member

## CO-OPTED BOARD MEMBERS ATTENDANCE OF MEETINGS

NAME	Position	Special Board Consultative Meetings, (incl. Strategy Review)	Finance, Audit & Risk Committee	Human Resources Committee	Tender Committee
Mr. Othusitse Lebuletswe	Member – Board Tender Committee	2/2	NA	NA	2/2
Mr. Sipho Mbebe	Member – Board Human Resource Committee	2/2	NA	3/4	NA
Ms Nomsa Nuku-Basaakane	Member – Finance, Audit and Risk Committee	½	¾	NA	NA

## REMUNERATION OF MEMBERS OF THE BOARD

NAME	POSITION	AMOUNT (BWP)
Professor Motsoptse P. Modisi	Chairperson	32,475.00
Dr. Sebusi Odisitse	Vice Chairperson	33,664.00
Mr. Harold van Zyl	Member	
Mr. Ogone O. M. Gaboutloeloe	Member	30,460.00
Ms. Tebogo Mmoshe	Member	20,380.00
Ms. Ontlametse Mokopagosi	Member	19,900.00
Ms. Bogadi Mathangwane	Member	27,680.00
Mr. Thabo Balopi	Member	35,680.00
Mr. Olefile C. Mashabila	CEO	Not applicable

Members of the Board and co-opted members are eligible for sitting allowance for all meetings attended. Except for the Chief Executive Officer, members of the Board are not entitled to monthly or annual salaries. Below is the detail of Board sitting allowance payments for the year under review.

## CO-OPTED BOARD MEMBERS REMUNERATION

NAME	POSITION	AMOUNT (BWP)
Mr. Sipho Mbebe	Member – Board Human Resource Committee	26,860.00
Ms. Nomsa Nuku-Basaakane	Member – Finance, Audit and Risk Committee	24,340.00
Mr. Othusitse Lebuletswe	Member – Board Tender Committee	22,907.00

## CORPORATE GOVERNANCE REPORT

The Board remained a trusted fiduciary advisor to the Shareholder and is responsible for stewardship of the Institute in conducting its business. The Board Secretariat and the Chief Executive Officer, ensures that the day-to-day business of the Institute complies with the laws and regulations of Botswana.

## KING IV™ REPORT APPLICATION

BGI Board subjected itself to the principles of King IV™ Code on Corporate Governance to ensure alignment with the precepts of governance and accountability. King IV™ builds on King III™ which is recommended by Botswana Accountancy Oversight Authority (BAOA), that provides oversight on accounting and auditing services, standard, quality, and credibility on financial and non-financial information by Public Interest Entities (PIEs) such as BGI.



The table below, shows a voluntary application of King IV™ Code of Corporate Governance principles by the Board during the Financial Year that ended March 31, 2023.

KING IV™ CORPORATE GOVERNANCE PRINCIPLES	STATEMENT OF APPLICATION/EXPLANATION	STANDARDS/POLICIES INSTRUMENTS AND PROCESSES
<b>PRINCIPLE 1:</b> Leadership, Ethics and Corporate Citizenship	<p>Emphasis is on Strategy, Policy, Oversight, and accountability. BGI Board of Directors appointed in terms of BGI Act, 2014 has generally met the expectations under this principle</p> <p>The Board set the strategic direction and has approved annual budgets, major contracts and brought leadership and commitment to the Institute. It has effectively led the Institute affairs in accordance with its statutory Mandate.</p> <p>BGI Board, through the Strategy and Risk Management Office has identified the institute's strategic and operational risks and maintain business wide risk registers.</p> <p>The Board continuously strive to ensure leadership in holding quarterly meetings to review performance against of key strategic focus areas and policies.</p>	<ul style="list-style-type: none"> <li>• BGI ACT</li> <li>• 2023-2028 BGI Strategic Business Plan (SBP)</li> <li>• SBP 2022/2023 Operational Plan</li> <li>• 2022/2023 Annual Budget</li> <li>• 2022/2023 Audited Financial Statements</li> <li>• Annual Report</li> <li>• Declaration of assets</li> <li>• Conflict of Interest declarations</li> <li>• Disclosures of Directors remuneration</li> <li>• Procurement Procedures and Guidelines</li> <li>• Declaration of gifts and presents</li> <li>• Fiduciary Duties and Committees Terms of Reference</li> <li>• Quarterly Progress Reports</li> </ul>
<b>PRINCIPLE 2:</b> Organisational ethics.	<p>The Board understands its Role as the Custodian of ethics and values that govern the Institute. The Board, subject to predefined conditions, has delegated its executive authority to the Executive Management.</p> <p>The Governance tools, (Board Charter and Shareholder Compact) are yet to be signed. These tools are important as they assist in aligning Shareholders expectations, strategic objectives, vision and mission, expected performance levels and sustainability considerations with the Board.</p> <p>BGI BFARC is responsible for assessing the policies and procedures of the Institute to ensure that the accounting systems and related controls are adequate and functioning effectively.</p>	<ul style="list-style-type: none"> <li>• Shareholder Compact</li> <li>• Board Charter</li> <li>• BGI Strategic Plan</li> <li>• Board Committees</li> <li>• A Comprehensive Risk Register/Log</li> <li>• Record of meetings' attendance and remuneration</li> <li>• Disclosures on Board Members Academic and Professional Qualifications</li> <li>• </li> </ul>

<p><b>PRINCIPLE 3:</b> Responsible Corporate Citizenship</p>	<p>The Board understands that corporate citizenship starts with running a successful geoscience organisation by producing the right solutions for its customers and making valuable contribution to economic development of the country through implementation of various projects.</p> <p>BGI's commitment as corporate citizen goes beyond the economic realms of its operations. This, commonly known as Corporate Social Investment in the form of donations and other kinds of financial assistance, made for altruistic purpose. This is an area that requires attention by creating a deliberate effort supported by a judicious budget.</p> <p>However, the Institute strives to intervene in calls by stakeholders such as conducting a geotechnical assessment and monitoring of geohazards.</p>	<ul style="list-style-type: none"> <li>• Corporate Strategy (Strategic Plan)</li> <li>• Operational Plan</li> <li>• Procurement Procedures and Guidelines</li> </ul>
<p><b>PRINCIPLE 4:</b> Strategy and Performance</p>	<p>The Board is bound by Section 31 of Botswana Geoscience Institute Act no 29 of 2014 to produce the Annual Report within a prescribed period. The Audited Financial statements are audited by a competent Audit firm appointed by the Board in line with Section 29 and 30 of BGI Act.</p> <p>The Annual Reports are published in line with expected standards of disclosure and creating sustainable organisations.</p>	<ul style="list-style-type: none"> <li>• Corporate Strategy</li> <li>• Operational Plan</li> <li>• Annual Budget</li> <li>• Audited Financial Statements</li> <li>• Annual Reports</li> <li>• Performance Management and review system</li> </ul>
<p><b>PRINCIPLE 5:</b> Integrated Reporting</p>	<p>The Board is bound by Section 31 of BGI Act no 29 of 2014 to produce the Annual Report within a prescribed period. The Audited Financial statements are audited by a competent Audit firm appointed by the Board in line with Section 29 and 30 of BGI Act.</p> <p>The Annual Reports are published in line with expected standards of disclosures and creating sustainable organisations.</p>	<ul style="list-style-type: none"> <li>• BGI Act</li> <li>• BGI Annual Reports</li> <li>• BGI Audited Financial Statements</li> <li>• Directors Academic Qualifications disclosures</li> </ul>
<p><b>PRINCIPLE 6:</b> Governing Structures and Delegation</p>	<p>Pursuant to BGI Act, The Board has established specialists' committees and delegated some of its functions and responsibilities for the purpose of performing its functions. Section 19 of BGI Act stipulates such fiduciary duties and Terms of Reference (ToRs) for Board Committees for ease of reference, application, and compliance.</p> <p>The Board, subject to predefined conditions, has delegated its executive authority to the Management headed by the Chief Executive Officer, while they provided leadership.</p>	<ul style="list-style-type: none"> <li>• BGI Act</li> <li>• Company's Act</li> <li>• Shareholder Compact</li> <li>• Board Charter</li> <li>• Fiduciary Duties and Committees Terms of Reference</li> </ul>
<p><b>PRINCIPLE 7:</b> Composition of the governing body</p>	<p>BGI is governed by a Board of appointment by the Minister of Minerals and Energy in accordance with Botswana Geoscience Act, 2014.</p> <p>The selection is based on prescribed diverse skills and experience in various disciplines, which accordingly assist in ensuring BGI discharges its mandate within the stipulated provisions of the Botswana Geoscience Institute Act. Such disciplines include, Geological Engineering, Sciences, Law, Market Regulation, Finance and Accounting, Management and Business administration</p>	<ul style="list-style-type: none"> <li>• BGI Act</li> <li>• Company's Act</li> <li>• Shareholder Compact</li> <li>• Board Charter</li> </ul>



<b>PRINCIPLE 8:</b> Committees of the governing body	Pursuant to BGI Act the Board has (4) standing specialist committees. These are Finance, Audit and Risk Committee, Technical Committee; Human Resource Committee and Tender Committee	<ul style="list-style-type: none"> <li>• BGI Act</li> <li>• Fiduciary Duties and Committees Terms of Reference</li> </ul>
<b>PRINCIPLE 9:</b> Evaluation of the performance of the governing body	<p>Though the Board Charter and Shareholder Compact were yet to be approved, they set the basis for the Board performance evaluation.</p> <p>Effective collaboration through cross-membership between committees, coordinated scheduling of meetings has ensured duplication and fragmented functioning.</p>	<ul style="list-style-type: none"> <li>• Shareholder Compact</li> <li>• Board Charter</li> <li>• Fiduciary Duties and Committees Terms of Reference</li> <li>• Internal Audit function</li> <li>• External Auditors</li> </ul>
<b>PRINCIPLE 10:</b> Appointment and delegation management	Board has appointed a CEO and his responsibilities include to lead strategy implementation, report to the Board, and agree membership of other governing bodies. The CEO also has been delegated to appoint executive management and to oversee that key management functions are led by competent and appropriately authorized individuals and are adequately resourced.	<ul style="list-style-type: none"> <li>• BGI Act</li> <li>• External Auditors</li> <li>• Access to External Legal Advice</li> <li>• External Recruitment</li> <li>• Delegation of authority</li> </ul>
<b>PRINCIPLE 11;</b> Risk governance	<p>The Board assumed overall responsibility for risk governance through overseeing the identification of key risk areas and key performance indicators of BGI's business. The Institute's risk appetite was assessed to guide adoption of an enterprise-wide risk management methodology.</p> <p>The Board considered appropriateness of risk responses and guided Management to initiate outstanding controls, develop corporate wide operational risk registers, enterprise risk management policy and risk management framework.</p>	<ul style="list-style-type: none"> <li>• Risk Management Framework and Policy</li> <li>• Risk Management Plan</li> <li>• Enterprise Risk Register</li> <li>• Business Continuity Framework and Policy</li> <li>• Annual Internal Audit Plan</li> <li>• Information, Technology and Communication Strategy</li> <li>• Procurement Procedures and Guidelines</li> </ul>
<b>PRINCIPLE 12;</b> Technology and information governance	<p>The Board approved the Information, Technology and Communication Strategy that focuses on the current and envisioned ICT environment to support BGI's Strategic Plan. The strategy also covers ICT governance to ensure effective implementation and compliance.</p> <p>Through adoption of a robust IT governance framework, ICT related risks are effectively managed, and additional controls identified in support of the enterprise risk and business continuity management methodology.</p> <p>The Board assumed overall responsibility for IT Governance. Director, Information Delivery guides and advices on IT governance framework and to monitor significant investments and expenditure.</p>	<ul style="list-style-type: none"> <li>• Information, Technology and Communication Strategy</li> <li>• ICT Security Policy</li> <li>• Technology Road Map</li> </ul>

<p><b>PRINCIPLE 13;</b> Compliance governance</p>	<p>The Board, endeavours to ensure that the business of the Institute complies with the laws of Botswana and other standards</p> <p>The Board secretary provides independent guidance to the Board on their fiduciary duties and draws their attention on relevant legislation such as Declaration of Asserts.</p> <p>BGI ensures compliance with the BGI Act and all other Statutes relating to its business. In addition, complies with Government of Botswana policies and directives on local economic empowerment such as, Economic Diversification Drive (EDD), supporting marginalized groups such as people living with disabilities, women youth and those in rural settlements.</p>	<ul style="list-style-type: none"> <li>• BGI Act</li> <li>• Declaration of Assets and Liabilities Act.</li> <li>• Financial Reporting Act</li> <li>• Economic Diversification Drive (EDD)</li> <li>• Public Procurement and Asset Disposable Act</li> <li>• Public Procurement and Asset Disposable Directives</li> <li>• Mines and Minerals Act</li> <li>• International Financial Reporting Standard (IFRS)</li> <li>• BGI Annual Reports</li> </ul>
<p><b>PRINCIPLE 14;</b> Remuneration governance</p>	<p>The Board, through the Human Resources Committee has developed Remuneration Policy and structures to fairness, responsibility and transparency. The policy aims to attract and retain human capital, promote achievement of strategic objectives, positive outcomes, an ethical culture and responsible corporate citizenship</p>	<ul style="list-style-type: none"> <li>• Remuneration Policy</li> </ul>
<p><b>PRINCIPLE 15;</b> Assurance</p>	<p>The Board has an established an independent and effective Finance, Audit and Risk Committee Chaired by a member with MBA &amp; ACCA and a Fellow Member of the Botswana Institute of Chartered Accountants</p> <p>Internal Auditor conducts the Institutes independent assessments and submits the Reports to the Finance, Audit and Risk Committee (BFARC) for review and actions. BFARC ensures that External Auditors provide the overall assurance according to International Financial Reporting Standard. The Board was yet to approve a Combined assurance model which has been prioritised for next financial year.</p>	<ul style="list-style-type: none"> <li>• Finance, Audit and Risk Committee</li> <li>• Internal audit charter</li> <li>• External Auditors</li> <li>• Internal Auditor's Annual Plan</li> <li>• Internal audit charter</li> <li>• Internal audit procedure manual</li> </ul>
<p><b>PRINCIPLE 16;</b> Stakeholders</p>	<p>The Board, through the Chief Executive Officer, has maintained an active dialogue with various Government Ministries and Departments and other stakeholders Issues raised during meetings with stakeholders are attended expeditiously, addressed appropriately. Management on regular basis initiate platforms to engage stakeholders on issues on common interest and the Institute's business operations</p> <p>Through the Office of the Chief Executive Officer, the board strive to share information transparently with all stakeholders. Annual Reports are distributed to the rest of the stakeholder community.</p>	<ul style="list-style-type: none"> <li>• Communications Plan</li> <li>• Stakeholder Engagement Plan</li> <li>• Performance Improvement Team (MPIC) of MMGE</li> <li>• Community engagements</li> <li>• Annual Reports</li> <li>• Web-based communication (social media, Website, online Portals)</li> </ul>



A detailed photograph of a geological rock face. The rock shows distinct horizontal layering and fracturing, with colors ranging from light tan to dark brown. A geological hammer with a wooden handle and a metal head is placed vertically against the rock face in the lower center to provide a sense of scale. The hammer's head is positioned near the top of the text box, and its handle extends downwards. The text 'Business Performance Review' is overlaid on the left side of the image, partially covering the rock face and the hammer's handle.

# **Business Performance Review**



# THE INTERPRETATION OF AEROMAGNETIC DATA OF NORTHERN BOTSWANA



## INTRODUCTION

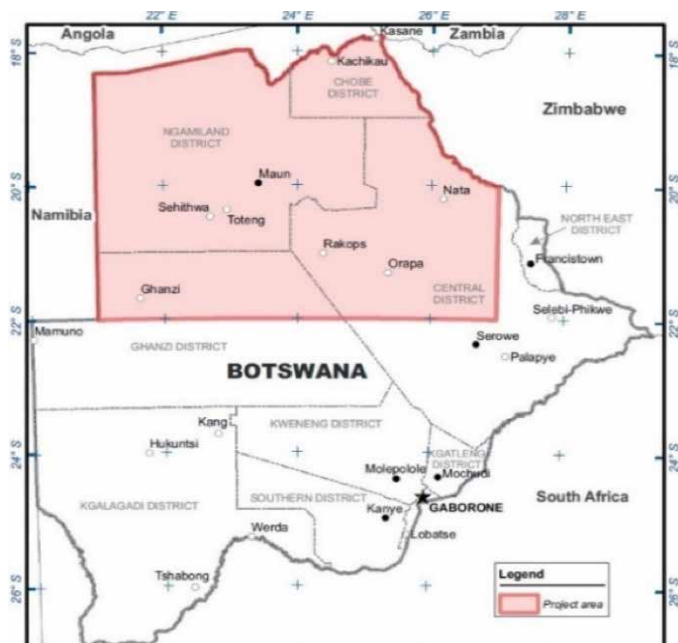
In June 2020, a consortium comprised of a Canadian company, Paterson, Grant & Watson Ltd (PGW), and two Botswana companies, Water Resources Consultants (WRC) Pty Ltd and SkyTrack Pty Ltd, were contracted by the Botswana Geoscience Institute (BGI) to undertake the project "Consultancy Services for the Interpretation of Aeromagnetic Data of Northern Botswana". The project's primary objective was to interpret aeromagnetic data covering Northern Botswana at a scale of 1:250,000, comprising all quarter-degree sheets that have not been mapped previously and to update those that were partially mapped. The project aimed to advance the geological knowledge in the area by mapping the subsurface geology and structure of the area concealed by the thick Kalahari sands, to unlock mineral potential and provide comprehensive data/information to foster private sector investment in mineral exploration and/or exploitation.

Secondary objectives of the project included:

- Identification of basement structures and related hydrological features of importance for the occurrence and movement of groundwater.
- Map lithologies and structures associated with base metals, semi-precious and precious metals, as well as PGMs mineralization or occurrences.
- Outline zones of anomalous physical properties typically indicative of or associated with specific mineral concentrations.
- Update the National Geological Map of Botswana.
- Provide training through professional skill transfer and exposure of local professionals to systematic large-scale geophysical/geological interpretation work, including 2D and 3D geophysical modelling.

## PROJECT AREA

The project area is bound by longitudes 21.0°E and 27.0°E and extends from a latitude of 22.0°S to the northern Botswana border (Figure 1). In total, it encompasses an area of approximately 247,052 km<sup>2</sup>.

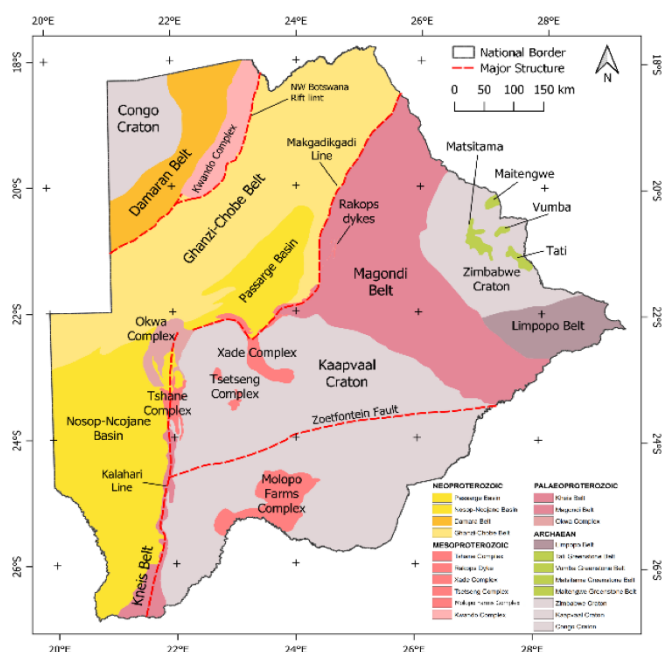


Project location within Botswana

## GEOLOGICAL BACKGROUND

Northern Botswana sits at the nexus of several major tectonic terranes and structures developed since Archaean times and continuing to the modern day (Figure 2). The oldest terranes are the Archaean Congo and Zimbabwe Cratons in the northwest and east of the country, respectively. These are separated by the Proterozoic Okwa-Magondi Belt and the younger Northwest Botswana Rift, including the Damara Belt. Mafic-ultramafic Mesoproterozoic intrusives occur throughout central Botswana along the boundaries of the rift. Damaran tectonism overprints much of northwestern Botswana, deforming and obscuring older units and structures. This tectonism is overprinted by more recent Karoo-aged sedimentation and volcanism associated with the breakup of Gondwana from the Late Carboniferous to Early Jurassic period. A relatively thin veneer of recent Cenozoic sedimentation from the Kalahari Group covers most of Northern Botswana, limiting exposure to isolated and disparate outcrops. Active tectonism continues with the progressive development of the East African Rift system through the area, incorporating the development of nascent rifts in the Okavango Delta.





Tectonic domains and major basement structures of Botswana

## DATASETS

Geophysical, geological, and remote sensing data available within Northern Botswana were collated, reprocessed and interpreted to produce new Pre-Kalahari basement geology maps, a mineral potential map, surficial interpretation maps and Kalahari and Pre-Kalahari hydrogeology maps in Northern Botswana.

## GEOPHYSICAL DATA

Aeromagnetic data with near complete coverage of the project area were available with a 50 m grid cell size from the National Residual Magnetic Intensity (RMI) grid of Botswana. This grid is the product of the Botswana tie-line project and is a compilation of some 70 higher-resolution airborne magnetic surveys levelled to a common magnetic datum (Xcalibur, 2012). Thirteen additional aeromagnetic surveys were levelled and merged into the national grid as part of this project to improve data resolution where new data was available (Figure 3a). Grid filters (Figure 3b), source depth estimates and regional and targeted magnetic inversion models were subsequently produced from the RMI grid for the basement interpretation.

A regional gravity grid was produced for Northern Botswana by reprocessing and levelling five ground gravity surveys comprising 6143 stations within the project area. The regional Bouguer anomaly map has a grid cell size of 2.5 km (Figure 3c). Grid filters and density inversions were subsequently computed from the grid.

Three airborne gamma-ray spectrometry (radiometric)

and nineteen airborne electromagnetic (frequency and time-domain) survey dataset were also used. The data coverage of these surveys were generally limited to small, disconnected areas however, larger regional surveys were available, covering the Okavango region (time domain electromagnetic) and the western side of the Zimbabwe Craton (radiometrics).

## GEOLOGICAL DATA

Scanned geological maps at scales ranging from 1:125,000 to 1:1,000,000, largely published in the mid-to late-1990's or earlier, and their digital files within and adjacent to the project area were used. Detailed maps at scales 1:125,000 and 1:250,000 were limited to the southern side of the project area along the Ghanzi Ridge, and in the Zimbabwe Craton, Deception and Rysana pans areas. The 1:1,000,000 scale Pre-Kalahari Geological Map of Botswana covered the entire project area and formed the foundation on which the new interpretation was based (Keys and Ayres, 2000).

## BOREHOLE DATA

Borehole data was sourced from the BGI, Department of Water and Sanitation (DWS), existing groundwater investigation reports by various consulting companies, as well as mining and exploration companies (Figure 3d). A total of 5,850 boreholes containing various geological and hydrogeological information was obtained in different formats such as Excel spreadsheets, scanned hardcopies of borehole completion certificates and scanned groundwater investigation reports. The data was digitized and compiled into a database which included information such as borehole number, completion date, coordinates, elevation, lithological information, water strike depth, estimated yield, rest water levels and water quality data, among others. Of the 5,850 compiled boreholes, 2,506 contained lithological descriptions and 1,486 intersected sub-Kalahari bedrock units (Figure 3d). Boreholes with lithological information were coded according to Supergroup, Group and Formation and hydrogeological data for each borehole was assigned to the relevant Formation/Group based on water strike levels.

## REMOTE SENSING DATA

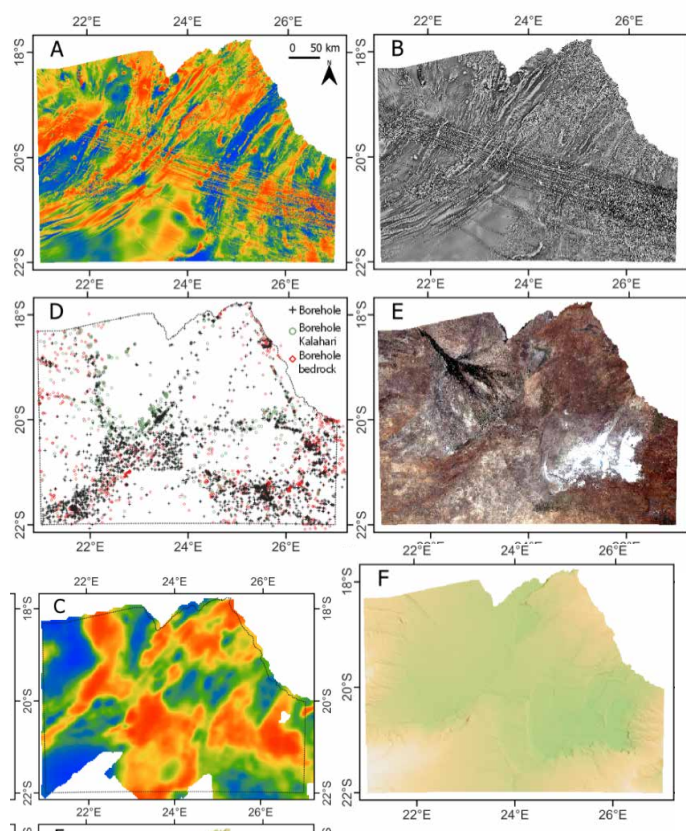
Multispectral satellite imagery covering the project area were produced from Landsat-8 Operation Land Imager (OLI) and Sentinel-2 Multi Spectral Instrument (MSI; Figure 3e). Cloud-free level-2 (Landsat-8) and level-2A (Sentinel-2) imagery acquired during the dry season were processed to produce seamless multispectral mosaics. Band ratios and principal component analysis were subsequently computed from the mosaic imagery.

Shuttle Radar Topography Mission (SRTM) Version 3.0 Global 1 arc-second data covering the entire project area was also acquired and processed to a seamless digital elevation model (DEM; Figure 3f), and a variety of topographic derivatives were subsequently computed.

## PHYSICAL PROPERTY DATA

Magnetic susceptibility and density physical property data was sourced from the published literature and relinquishment prospecting license reports. A few magnetic susceptibility measurements were also acquired during fieldwork.

## FIELD ACTIVITIES



Selected geophysical, borehole and remote sensing data used for the project. A. Residual magnetic intensity reduced to the pole B. First vertical derivative of RMI C. Bouguer anomaly map D. Location of borehole data E. Sentinel-2 true colour composite F. SRTM-1 arc second digital elevation model

The project area is characterized by extensive Kalahari Group coverage with little relief. Relatively isolated areas in the Tsodilo, Chinamba, Goha, and Gchwhiba hills and Matsitama Belt were identified from satellite imagery as outcrop exposure and were visited during the fieldwork. The outcrops were studied, described, samples collected, and magnetic susceptibility measurements taken. Additionally, twenty boreholes were logged at the Lobatse BGI core shed, and magnetic susceptibility measurements taken.

## METHODOLOGY BASEMENT AND SURFICIAL INTERPRETATION

All data products were imported into a GIS environment and interpreted manually to produce the Pre-Kalahari geological interpretation. The interpretation reflects bedrock units undercover and at the surface, where exposed. The magnetic data owing to the near complete coverage and high resolution were fundamental to the interpretation and were controlled by lithological information from the borehole database. It is important to note that unless borehole information proved otherwise, it is assumed the magnetic basement underlies the Kalahari cover.

A similar approach was used to generate the surficial interpretation maps of cover units and geomorphic features. Satellite imagery, DEM, and borehole information largely led interpretation of these products.

## MINERAL POTENTIAL

A new compilation of mines and mineral occurrences across Botswana, sourced from government publications, industry reports and journal articles, was produced and facilitated an improved understanding of mineral systems within the project area. This information was complemented by the geophysical interpretation which elucidated the distribution of Pre-Kalahari lithologies and a more complete picture of the structure, some of which plays an important role in controlling mineralization.

## HYDROGEOLOGY INTERPRETATION

Hydrogeology maps of the Kalahari and Pre-Kalahari were generated from basement and surficial interpretations, hydrogeology parameters recorded in the borehole data, topographic and satellite imagery datasets and information provided by the Department of Meteorological Services.

## NATIONAL GEOLOGICAL MAP

A new National Pre-Kalahari Geological Map of Botswana was produced by merging the Pre-Kalahari Geological Map of the Republic of Botswana (1998) with the Central Kalahari Aeromagnetic Interpretation Project (2006) and basement interpretation resulting from this project. A common national litho-stratigraphic framework was created based on the document Survey of Botswana Guidelines of Codes used in Geological Databases (Kellner,



2001). The solid geology and structure layers from each project were then merged, and geophysical data was used to resolve discrepancies between projects. Contacts and structures away from the project suture paths were largely left unchanged.

## **RESULTS**

### **BASEMENT AND SURFICIAL INTERPRETATIONS**

The oldest rocks interpreted in Northern Botswana are the Archaean rocks of the Congo Craton in northwest Botswana and the Zimbabwe Craton in eastern Botswana. Lithological units of the Congo Craton in northwest Botswana are nowhere exposed and underlie folded metasedimentary rocks of the Tsodilo Hills and Xaudum Groups, and its presence is suggested by new exploration borehole intersections and geochronological data.

The Zimbabwe Craton is subdivided into supracrustal rocks of the Matsitama Group and granitoids and gneisses of the Mosetse River Group. It is exposed in the far east of the project area but is covered by variably thick Karoo strata along its northern, western and southern edges. The craton abuts the Palaeoproterozoic Magondi Orogenic Belt to the west which is exposed in isolated outcrops in the Sua Pan area, but it is largely covered by Karoo strata. North-to-northeast trending medium to long-wavelength geophysical anomalies define the structural nature of the Magondi Belt within northern Botswana.

In northwestern Botswana, the Paleoproterozoic Quangwadum Basement Complex (QBC) occurs south of the Congo Craton and separates more strongly deformed interior Damara Belts units and weakly deformed Neoproterozoic platform strata on the Congo Craton. The Complex is well exposed in the Quangwadum (Xangwa) Valley immediately north of the Aha Hills, though it is largely buried elsewhere and is defined from its distinct magnetic textures.

The metasedimentary Tsodilo Hills Group unconformably overlies the QBC. These rocks may be older than the Damara Sequence of Botswana and Namibia and are comparable to Palaeoproterozoic to Mesoproterozoic metasedimentary rocks in eastern and southern Zambia and in the Angola-Kasai Shield of southern Angola. The group was deformed during the Damara orogenesis to form northwest-trending folds, thrusts and shears well recorded in the geophysical data and defined on the new maps. Possible Post-Pan-African-aged bodies intrude the Tsodilo Hills Group and adjacent Kwando Complex and are associated with large undeformed circular to oval magnetic anomalies. These bodies are unexposed, and drilling is required to confirm lithologies.

The unexposed and undated Chihabadum Complex occurs

south of the QBC on the inland branch of the Damara Belt, structurally juxtaposed against the Koanaka Group. Granite and granitoid gneisses have been intersected in exploration boreholes and the complex is primarily defined from the aeromagnetic data.

The Roibok Group separates two lithologically different terranes within the Damara Belt, the supracrustal Sinclair and Ghanzi groups to the southeast, which form the Ghanzi-Chobe Belt (or zone), from various magmatic and migmatitic rocks locally overlain by carbonate and siliciclastic sedimentary rock to the northwest (i.e. Tsodilo Hills, Xaudum, and Koanaka groups, Chihabadum and Quangwadum complexes). The Roibok Group is strongly deformed, does not outcrop, but is geophysically distinct.

Northeast of the Roibok Group is the Mesoproterozoic Kwando Complex. The complex is also not exposed and has been intersected by very few boreholes. In the geophysical data, the Complex is strongly deformed and contains late ENE-WSW trending regional fractures.

The Ghanzi-Chobe Belt consists of the basal Mesoproterozoic volcano-sedimentary of the Kgwebe and the laterally equivalent Goha Hills formations, unconformably overlain by clastic and carbonate rocks of the Neoproterozoic Ghanzi Group (comprising the basal Nwako Pan, D'Kar and Mamuno/Chinamba Hills formations). These sequences thicken eastward to greater than 10 km in the Passarge Basin in the south-central project area. The eastern edge of the Ghanzi-Chobe Belt within the project area is defined by the Makgadikgadi Line, which trends northeast through much of Botswana and adjoins the north-south-trending Kalahari Line in the area of the Okwa Complex, south of the current project bounds. Several Mesoproterozoic complexes are present along these structures, including the mafic-ultramafic Xade Complex located along the southern edge of the project area. The Xade complex trends northeast and resolved into the more north-northeast trending Rakops Dykes. Both the Xade Complex and Rakops Dykes are covered by Karoo-aged volcanic and sedimentary sequences ranging from <100 m to ~900 m thick.

Large areas of northern Botswana are covered by the Karoo Supergroup, which successively comprises the Dwyka, Eccu, Beaufort and Lebung groups, deposited unconformably for the crystalline basement during the breakup of Pangea. The onset of sedimentation is placed in the Late Carboniferous with continued deposition until the Middle Jurassic when sediment accumulation was replaced by flood basalts which deposits the Stormberg Group. In northeastern Botswana, the Karoo strata is relatively continuous, and large swaths are covered by Stormberg Group basalt, which dominates the magnetic response. In northwestern Botswana, Karoo strata generally only occur as isolated deposits above the Pre-Karoo crystalline basement. Sedimentary Karoo-sequences lack magnetic responses and can only be

defined where intersected in boreholes.

Significant numbers of Jurassic-aged Okavango Swarm dolerite dykes occur within the northern part of Botswana and are largely concentrated in a 65 – 100 km wide southeast trending zone which extends from the Namibian border through northern Botswana into Zimbabwe and South Africa.

The Kalahari Group cover the majority of the project area. The group is absent along the Ghanzi Ridge, in parts of the Zimbabwe Craton and in relatively isolated hills and river valleys throughout the project area. Thickness elsewhere varies from a few metres to >200 m thick. The group comprises various sediment types due to accumulation in dominantly aeolian, fluvial, and lacustrine environments. Depositional subdivisions and geomorphic features of the group have been defined on the surficial maps.

## **MINERAL POTENTIAL**

Thirty-five priority areas for mineral prospectivity, with a total surface area of 40,622 km<sup>2</sup> (including overlaps), were identified and divided across eleven mineral classes. This included 12 high-priority areas, focused on known mines and deposits, and extensions that are highly prospective across seven mineral classes and 23 lesser potential areas, focused on mineral occurrences and metallotects, across ten mineral classes. A comprehensive review and nationwide compilation of the mines, mineral occurrences and industrial minerals, which incorporated government publications, academic and scientific articles, and data gleaned from company reports and websites, was also created, and various resource estimates were made, where available, to provide the framework for determining the mineral potential of the project area for a variety of commodities and deposit types.

## **HYDROGEOLOGY INTERPRETATION**

Groundwater resource potential maps covering Northern Botswana for the Kalahari and Pre-Kalahari aquifers were produced to illustrate the groundwater potential of the area and potential groundwater quality based on the best available (existing) borehole data for planning purposes. The maps indicate potential aquifer productivity, potential

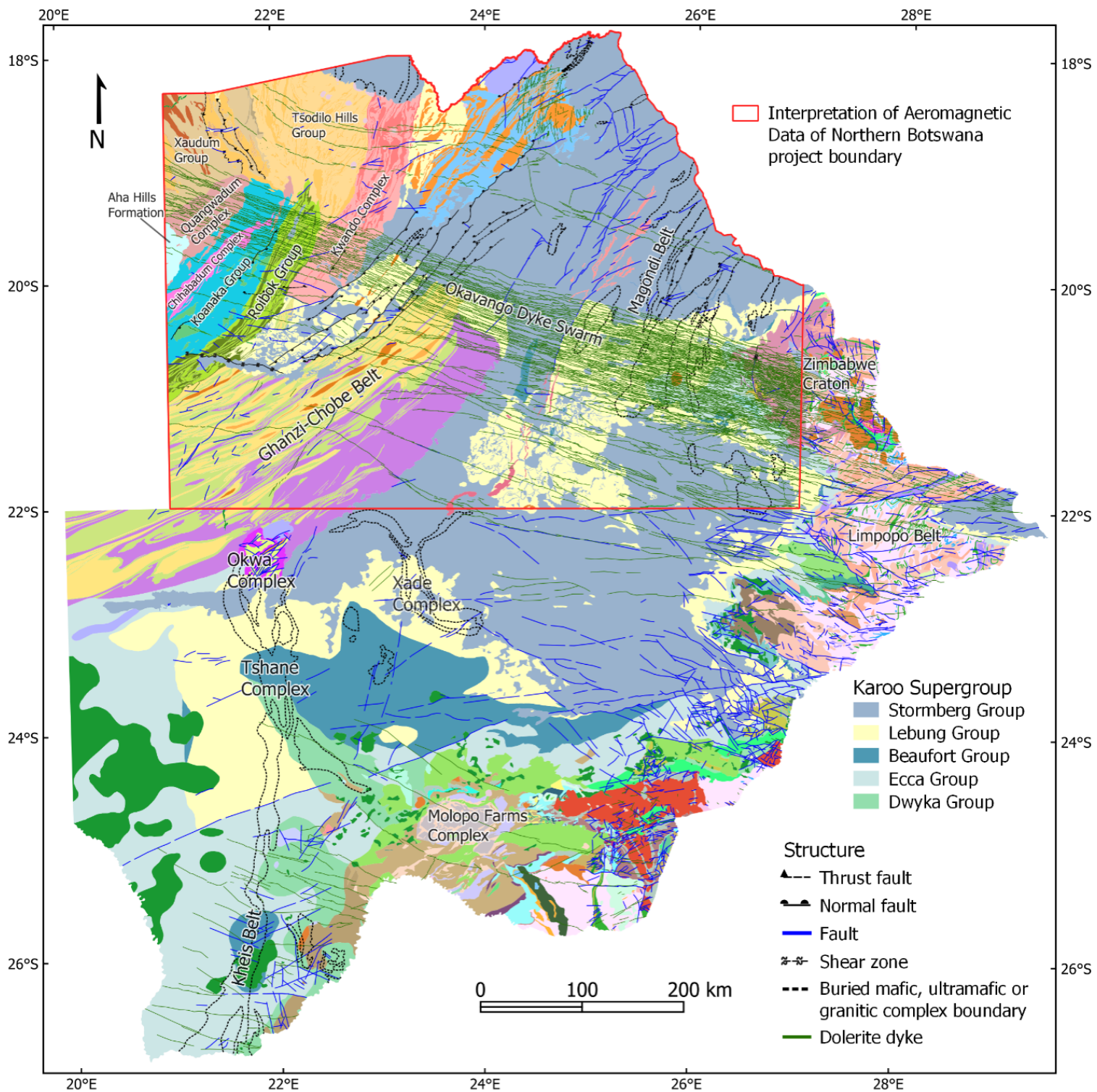
groundwater quality, depth to first water strikes and groundwater flow directions in generalized terms and thus provide information of a regional nature on the known aquifers in the area. These maps should assist planners and developers in selecting those areas most favourable for groundwater development.

## **SUMMARY**

The current project incorporated new data and significantly enhanced the geological and geophysical understanding of Northern Botswana. Deliverables achieved by the project included:

- Pre-Kalahari geological interpretation maps covering Northern Botswana at scales 1:250,000 (23 sheets), 1:125,000 (10 sheets), and 1:1,000,000 (1 sheet)
- Surficial interpretation maps covering Northern Botswana at scales 1:250,000 (23 sheets) and 1:1,000,000 (1 sheet)
- A structural interpretation map covering Northern Botswana at scale 1:1,000,000
- A mineral potential map covering Northern Botswana at scale 1:1,000,000
- Groundwater potential maps covering Northern Botswana at scale 1:1,000,000 for the Kalahari aquifer and Pre-Kalahari aquifer
- An updated National Pre-Kalahari Geological Map of Botswana at scale 1:1,000,000
- An updated National Geological Bulletin of Botswana incorporating more than 20 years of geoscientific work
- Digital GIS database of all the above product









# Earthquake Monitoring



## EARTHQUAKE MONITORING

During the course of the April 2022–March 2023 Financial Year, the main activities of the Seismology Section of Botswana Geoscience Institute (BGI) focused on the operation and maintenance of a countrywide network of 21 digital, broadband, three-component, telemetry-enabled and autonomously recording state-of-the-art seismographic stations of the Botswana Seismological Network or BSN (Figure 1). The scientific objective of the BSN is to detect and locate earthquakes in Botswana, the surrounding area and from all over the world on a continuous and long-term basis in order to understand the causes of earthquakes, and to advance strategies for minimizing loss of human life, property damage and socio-economic disruption due to in the region. The BSN seismological observatory provides high quality time series datasets from local, regional and teleseismic earthquakes to contribute to the improvement of knowledge of the multiscale seismicity of the world.

The BSN is part of the International Federation of Digital Seismograph Networks or FDSN (<https://www.fdsn.org/networks/request/>), where it has been assigned the international network code BX and Digital Object Identifier (DOI) 10.7914/SN/BX. Network codes are assigned by the FDSN in order to provide uniqueness to seismological data streams. The FDSN is a global organization the membership of which comprised groups of network operators that are responsible for the installation and maintenance of seismographs either within their geographic borders or globally. Membership in the FDSN is open to all organizations that operate more than one broadband station, and members agree to provide free and open access to their data. This cooperation helps scientists all over the world to further the advancement of earth science and particularly in the study of global seismicity.

Since the commencement of a temporary project of the Network of Autonomously Recording Seismographs Botswana (NARS-Botswana), which was conducted between 2013 and 2018 by the Seismology Group of Utrecht University (The Netherlands), the Department of Earth Systems Analysis of the Technical University of Twente or ITC (The Netherlands), the Africa Array (AA), and the Department of Geological Survey of the Republic of Botswana (DGS), up to the present time, stations of the BSN have enabled more detailed information on the seismicity of Botswana and the rest of southern Africa to be obtained on a continuous basis. While the level of seismicity in Botswana is relatively low in comparison with earthquake-prone regions of the world such as Japan, Chile and California, the country remains exposed to earthquake risk as a result of moderate to large earthquakes that have occurred in the country particularly in the Okavango Delta region that experiences the highest level of natural seismic activity in Botswana.

The main deliverables from the BSN project have been the publication of biennial Botswana Seismological Network Bulletin series containing locations, magnitudes, and phase data for all earthquakes (local, regional and teleseismic events) detected and located by the BSN stations during the April 2022–March 2023 reporting period. Delivery of the seismic bulletins during the present reporting period has been delayed due to financial constraints that led to the non-renewal of the SeisComP software licenses. Seismic bulletins provide a base for improved understanding of the distribution, variation and causes of the earthquakes in the region. The seismicity information is useful in the assessment of seismic hazard and the potential for future damaging earthquakes in the country, and to contribute to the development of seismic disaster risk reduction strategies. The availability of high-quality data from the BSN project provides a wide window of opportunities for undertaking fundamental research in earthquake seismology, including characterization of regional, national, and micro-zoned and seismic hazard maps, as well as detailed imaging of the earth structure beneath Botswana based on a variety of techniques of seismic tomography.

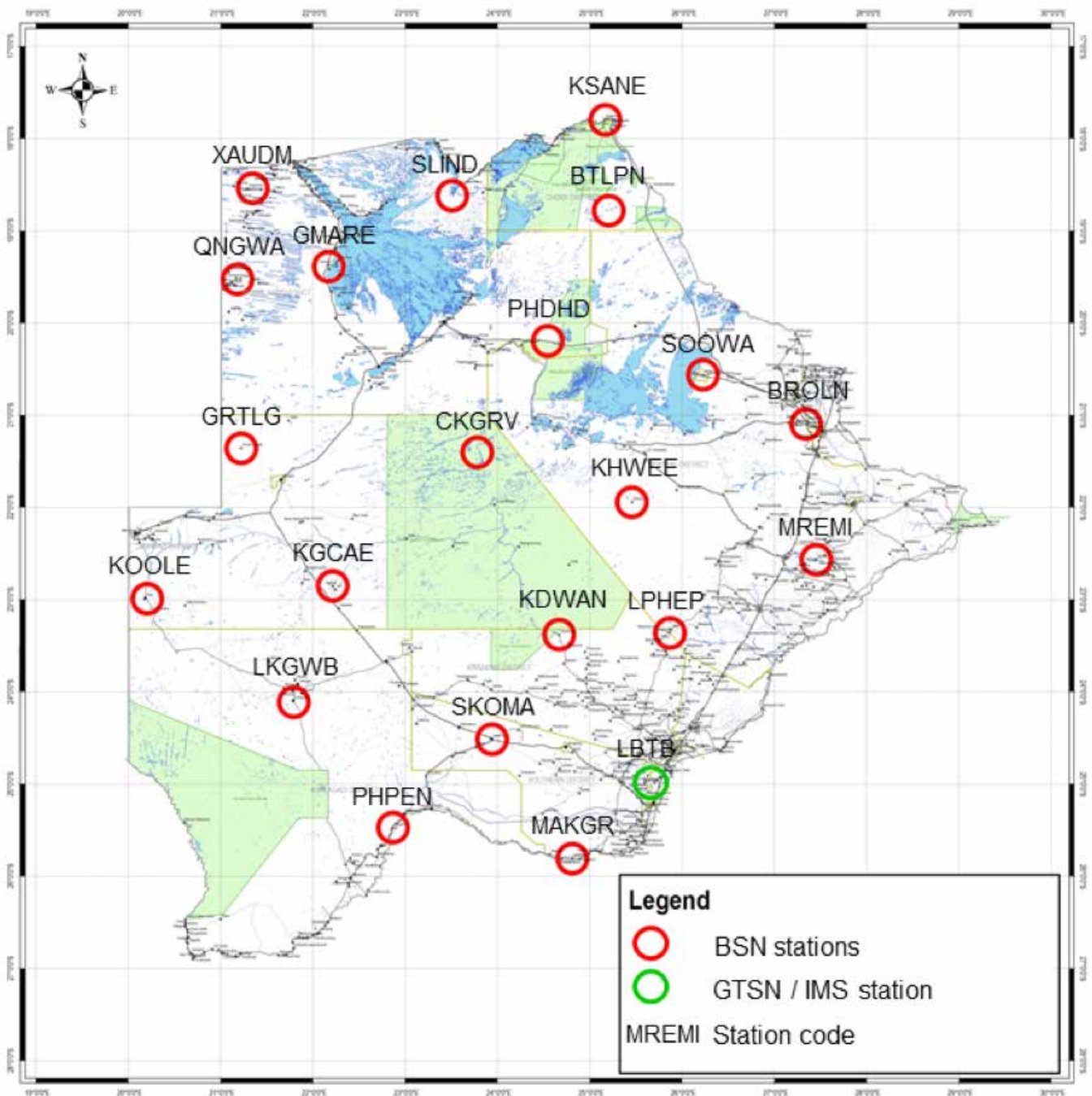
## FORENSIC SEISMOLOGY

Besides monitoring earthquakes in the country, the BGI Seismology Group operates and maintains a seismic station known as LBTB located at Magotlhwane as indicated in green circle symbol in Figure 1. The LBTB station forms part of the Global Seismographic Network or GSN (initially referred to as the Global Telemetered Seismograph Network or GTSN), which is a globally distributed state-of-the-art digital seismic network that provides free, realtime, open access data through the Seismological Facility for the Advancement of Geoscience (SAGE) Data Management Center (DMC). The state-of-the-art data SAGE DMC Facility is located near the University of Washington in Seattle, USA and serves to archive and distribute seismic waveform data to support the seismological research community. The Magotlhwane seismic station is also part of the global International Monitoring System (IMS) of the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO). The IMS, when completed, will consist of 50 primary and 120 auxiliary seismic monitoring stations, 11 hydro-acoustic stations detecting acoustic waves in the oceans, 60 infra-sound stations using microbarographs (acoustic pressure sensors) to detect very low-frequency sound waves, 80 radionuclide stations using air samplers to detect radioactive particles released from atmospheric explosions and/or vented from underground or under-water explosions, and 16 radionuclide laboratories for analysis of samples from the radionuclide stations. Data from all stations are transmitted to the CTBTO International Data Centre (IDC) located in Vienna, Austria through a global private data network known as Global Communication Infrastructure or GCI, which is largely based on satellite (VSAT) links.

## MINING-INDUCED SEISMICITY

The BGI has also undertaken to monitor mining-induced seismic activity related to the former copper-nickel mine of the BCL in the Selebi-Phikwe area (SPA). The SPA local micro-seismicity was initially reported in Selebi-Phikwe in mid-December 2018. Upon request by the Department of Mines, the BGI carried out a short-term microseismic monitoring in June 2019 through the engagement of Aqualogic/OHMS Consultants. The short-term consultancy

ended in May 2020, and this was followed by long-term microseismic monitoring consultancy undertaken by the Institute of Mining Seismology (IMS). The scope of the long-term of micro-seismic monitoring in Selebi-Phikwe was to detect, record and characterize microseismic events by providing the seismic waveform data, event magnitudes, locations, frequency and distribution, associated local risk and provide recommendations in terms of appropriate mitigation measures.



Map showing the distribution of the BSN stations (red circles) deployed throughout Botswana. The green circle annotates the international seismological station LBTB, which is part of the Global Telemetered Seismograph Network (GTSN) as well as one of the 120 auxiliary seismic stations of the International Monitoring



## ASSESSMENT OF MINERALS IN SOUTH EASTERN BOTSWANA

This was a reconnaissance survey to explore areas with mineral potential in southeastern part of Botswana by determining whether anomalous geochemical distribution patterns can be identified from soil and rock samples. Physical and chemical characteristics of anomalous patterns that were identified in the prospecting areas will be studied in detail to determine whether they indicate larger potential exploration targets than do surface geological features. Patterns obtained in areas of little or no outcrop were studied for information on underlying geologic structures as well as for use as prospecting guides to potential exploration targets. The principal indicator elements sought were lead, zinc, copper and manganese.

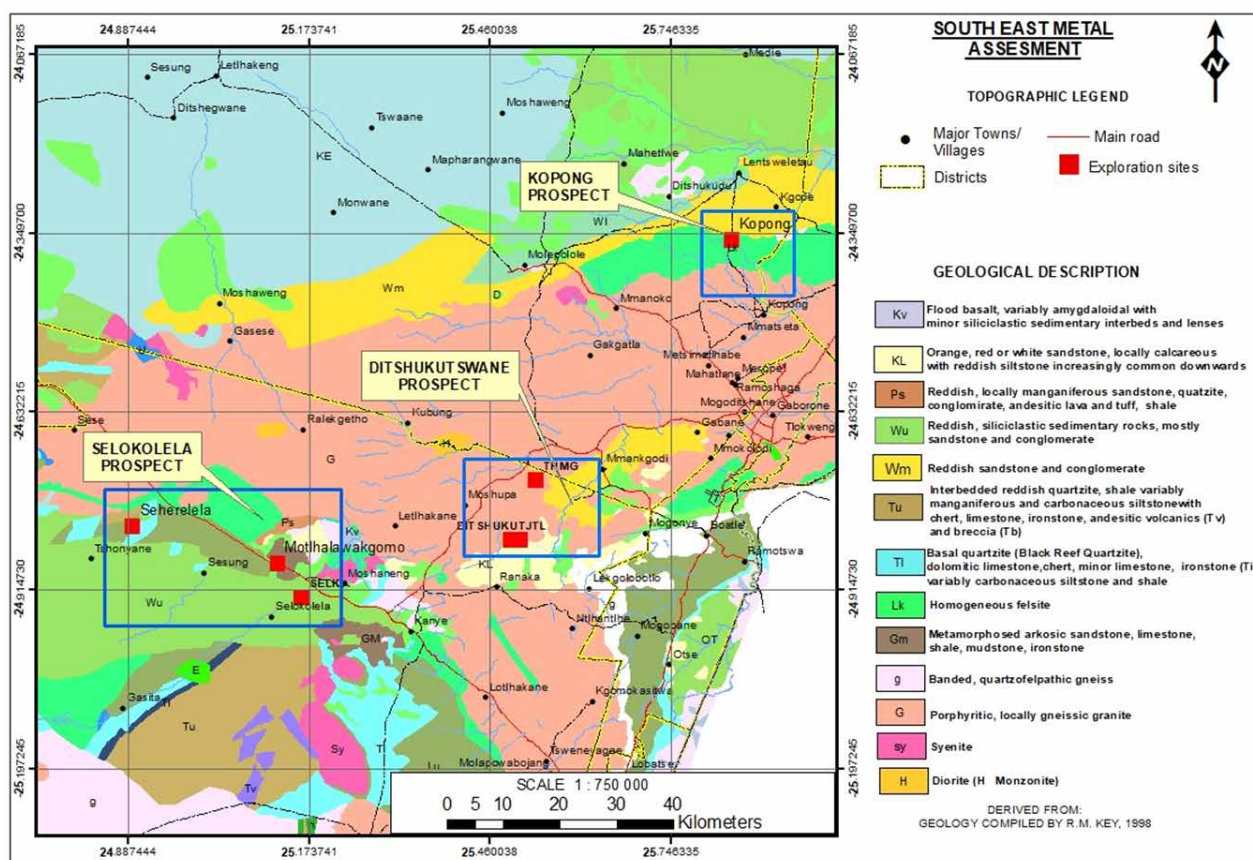
This reconnaissance survey focused on areas identified to be hosting mineralization, identified during revision of South Eastern Botswana that focused on, standardization and formalization of lithostratigraphic units in the South-

east part of Botswana. This revision mapping also included interpretation of existing geoscience datasets as well as the integration of historical geological quarter degree sheets (QDS) to produce seamless and updated geological maps and reports of southeast part of Botswana.

The current project entailed interpretation and integration of historical geoscience datasets (exploration, geophysics (aeromagnetic and gravity data) geochemistry, remote sensing, aerial photos, and borehole data) to identify areas of potential mineral discoveries and their derived/processed products over a regional scale is investigated for possible mineralization in southeast Botswana.

## LOCATION

The project covered southeast part of Botswana which was split in three exploration sites; Ditshukutswane prospect, Selokolela prospect and Kopong prospect (Figure 1). Ditshukutswane prospect comprise Thamaga, Tjwetle, Mmakokwe and Ditshukutswane area. Selokolela prospect include Motlhalawakgomo, Seherelela and Selokolela areas while Kopong prospect covers a wide study area.



## FIELD OBSERVATION AND ROCK SAMPLING

**Tjwetle Area:** the area comprises two old trenches with a length of about 7 meters each. Both trenches are located at the foot of a whitish chert brecciated low lying hill. The

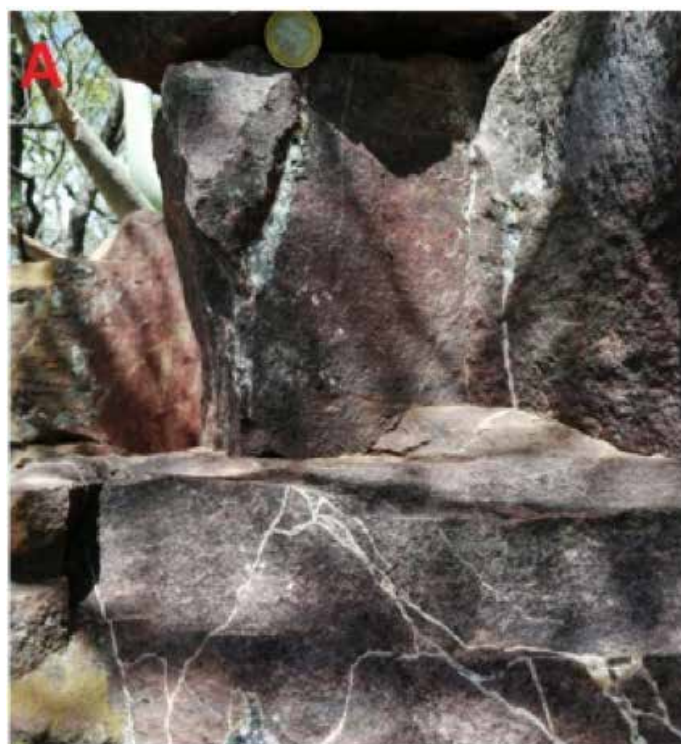
area comprises of chert and quartz calcite veins, which were tainted reddish by hematite in some areas. In some places, the chert breccia was filled with manganese oxide cutting across the chert breccia. Five rock samples along the trench and within the low-lying hill were collected.



**Thamaga Hill:** the area comprise of a thick package of metamorphosed Waterberg sandstone, comprising whitish quartz veins, which cut the host rock vertically. Massive quartz veins are located within the fault breccia. The quartz veins comprise a variety of hematite characterized by aggregates of silvery, metallic, specular hematite flakes, with chloride filling along minor veins. Four samples comprising heavy mafic minerals.



**Ditshukutswane Hill:** the area comprises of a hill which is approximately 30 meters high. The hill has two old trenches of about 4 meters deep and a length of about 10 meters. The topmost part of the trench comprises a reddish-brown sandstone with unmineralized quartz veins with specularite. Below the sandstone sits a metamorphosed purplish sandstone, with manganese oxide veins cutting across. The whole package sits conformably on top of Kanye volcanics. Five samples from mineralized zones, within the trenches for Geochem





**Selokolela and Motlhalawakgomo:** The Selokolela and Motlhalawakgomo manganese mineralization occurs within chert dolomite breccia. The area comprises chert breccia with milky white angular chert fragments, which is cemented by reddish haematite. The manganese oxide occurs as veinlets forming a net texture and cutting across the chert breccia. In other localities, the chert breccia comprises reddish jasper minerals. twenty samples were collected in Selokolela and three samples in Motlhalawakgomo and submitted for analysis.

**Seherelela:** This site is covered by variable thickness of sediments, which mostly comprise unconsolidated reddish sand. Manganese oxides mineralization precipitated on the permeable and porous sandstone as nodules below the reddish unconsolidated sand. The area comprises two old pits that were previously used for bulk sampling with a depth of about 30 meters. Seven mineralized samples were collected from the pit. The area is characterized by gossans: rust-coloured oxide and hydroxide minerals of iron and manganese that normally cap an ore deposit. Thick quartz veins with specularite ( $\text{Fe}_2\text{O}_3$ ) and some disseminated manganese oxide sit adjacent to the manganese oxide ore. A total of 76 geochem samples (rocks, soil and ant-mounts) were collected in a 5 square kilometer radius for chemical analysis.

**Kopong:** The area is situated along the road cut which exposes different types of rock units. This unit consists of angular dark brown chert breccia with milky-white angular chert fragments cemented together by brown haematitic material on the surface. This is followed by Mn-shale, which is generally reddish in colour because of Fe-oxide and veins filled with Mn-oxide in places. A medium to coarse grained conglomerate with a granular texture forms a base of the shale unit. The rocks are baige to reddish brown with subhedral clasts of quartz. A total of thirty nine were collected in Kopong prospecting area.

## CONCLUSION

The collected samples will be analyzed to determine their chemical composition and contents of minerals, trace elements, and important heavy elements for mineral exploration. Geochemical data will be analyzed using ArcGIS to create geochemical maps, which will be used to enhance mineral exploration in Botswana.





## ASSESSMENT OF RARE EARTH ELEMENTS IN THE SEMARULE IGNEOUS COMPLEX, SOUTH-EAST BOTSWANA

### INTRODUCTION

Alkaline igneous complexes are known to host economically significant deposits of REE and Nb, which are important for modern high-tech and “green” industry. The geopolitical controls on the supply of rare earth elements (REE) has made them a focus of global consideration, which has led to them being listed as critical metals (Smith, et al., 2016).

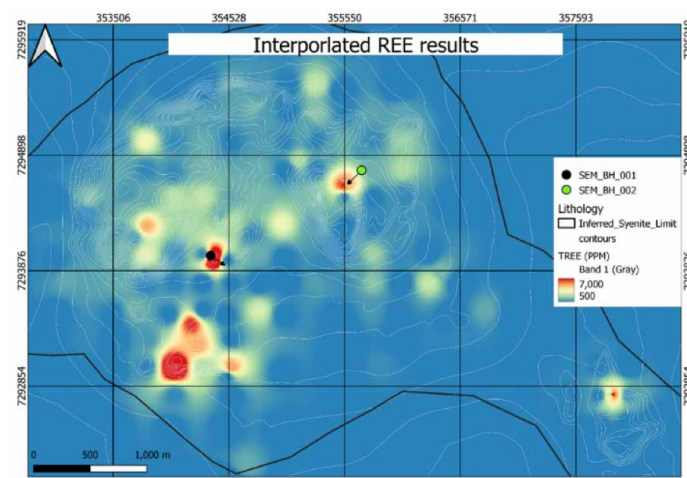
This has prompted a considerable interest in identifying new REE deposits in the world, to curb the near monopoly over their supply of these critical elements. Alkaline igneous complexes are well known to host REE, and several deposits of such are at advanced stages of exploration. In Botswana, not much has been done in terms of exploration for REE despite the favourable geological environments likely to host such mineralization. The Semarule Igneous intrusion (SIC) hosts peralkaline rocks which containing >2000 ppm TREE (Lasty et al., 2012). The objectives of this project include; delineation of a subsurface geochemical REE anomaly, stratigraphic characterization and vertical extent of the syenite intrusion through drilling, and geochemical analysis of the drill hole (s) to delineate a possible downhole REE anomaly.

SIC is a 3km wide anorogenic intrusion within the Neoarchean Gaborone granite of the Kaapvaal craton (Lusty, et al., 2012). According to Lusty et al. (2012), the intrusion has an elongate WNW–ESE-trending shape, suggesting the emplacement was controlled by a pre-existing fracture although the exposed rocks form a crescent-shaped feature. Intrusion is concentrically zoned on the outer northern parts mainly consisting a quartz-syenite (Lusty et al., 2012). The inner part on the other hand, is more complex and has more compositional variation of a medium-grained syenite, coarse to pegmatitic syenite and zoned syenite veins (Lusty, et al., 2012). The complex is later intruded by a sub horizontal dolerite sheet in the north western and eastern parts of the intrusion (Lusty, et al., 2012).

### PHASE II (DRILLING)

Drilling of the first borehole, SEM\_BH\_001 was carried out in 2022. This borehole was mainly influenced by geochemical data from the previous surface sampling. The borehole was mainly dominated by porphyritic syenite with segregation of the mafic minerals, the syenite intrusion was more layered. Most of the syenites are mainly cumulates, and the highly differentiated quartz-syenites. Borehole sitting was achieved through use of geochemistry correlated with geophysics. SEM\_BH\_001 sitting on a TREE high anomaly of ~13,000 ppm TREE from

porphyritic syenites which are mafic rich (Figure 1). SEM\_BH\_002 is positioned near TREE medium but propagates/ inclines towards a TREE of about 6000 ppm TREE hills.

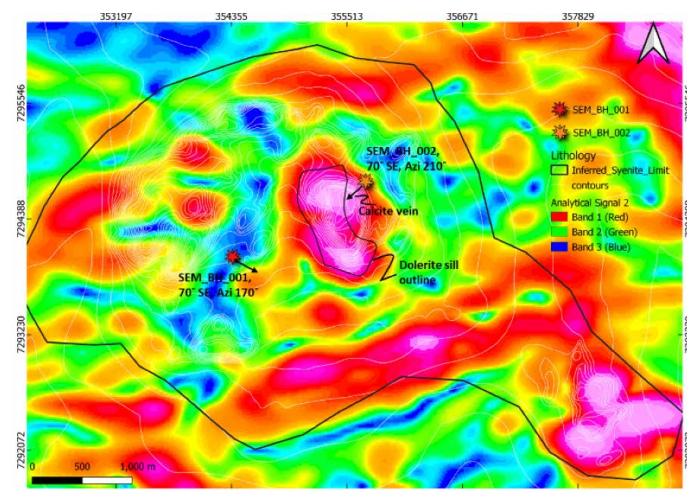


**Figure 1:** Rare earth elements interpolated geochem results, with drilled and planned borehole.

### TECHNICAL FINDINGS

Borehole (SEM\_BH\_002) comprise exfoliated patterns of weathered dolerite on the surface, which led to common rounded dolerite boulders from 0-12.5 m. From 12.5-20.5 m the borehole comprises fine grained holocrystalline dolerite with vertical quartz veins. Dolerite forms a sharp contact with pinkish coarse grained syenite at 21 m. Generally, the borehole comprises reddish-brown coarse grained syenite from 21 m up to 30 m. The rock is generally composed of typical syenite minerals, which is chiefly of alkali feldspar with less than 5% quartz, clinopyroxene and mafic minerals (hornblende). In places, the rock is intruded by medium grained pale pinkish granite with calcite veinlets.

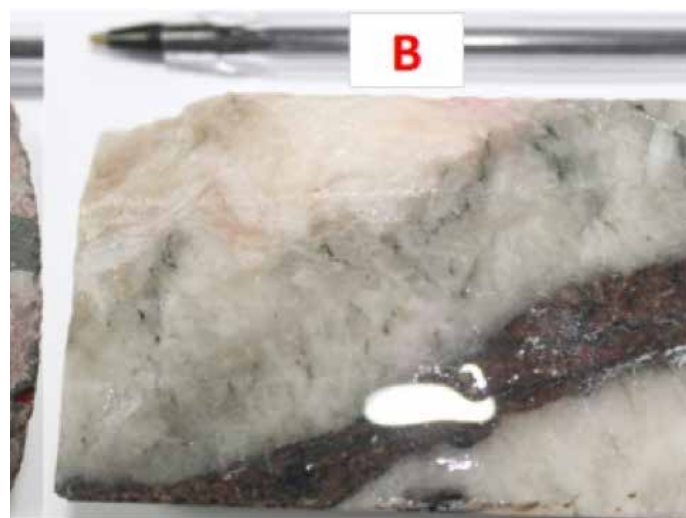
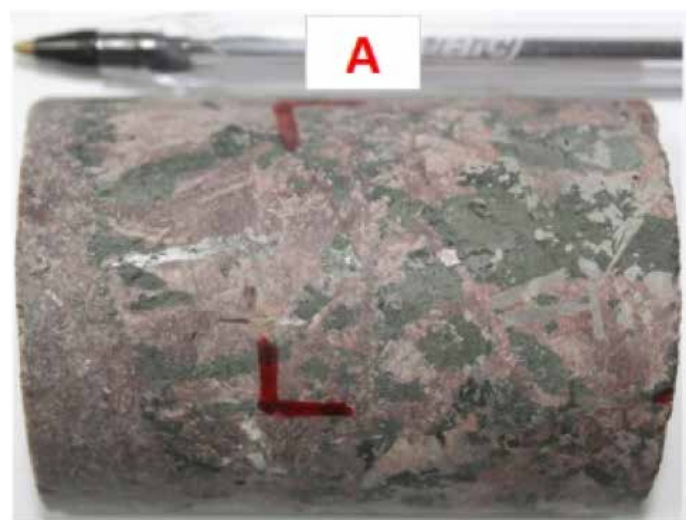
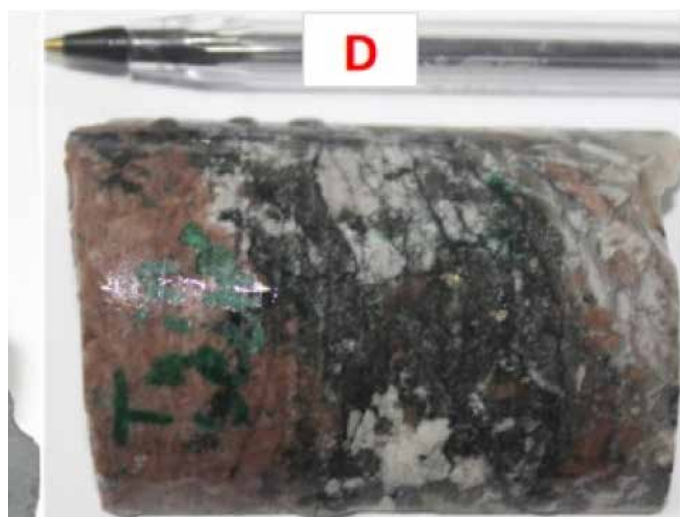
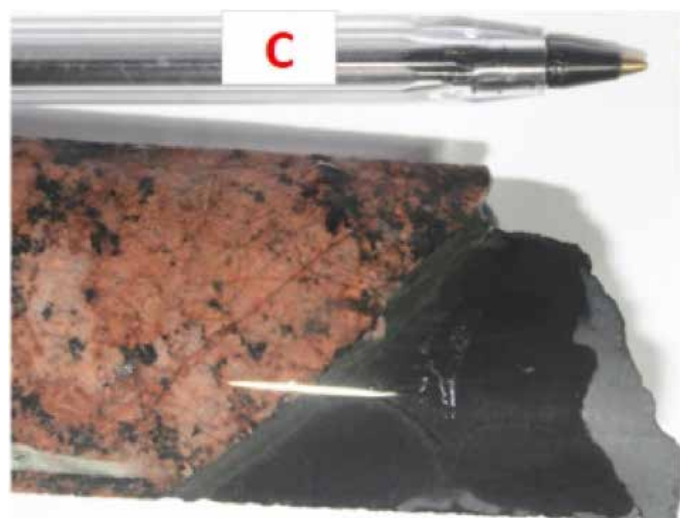
Some lithological variations have been encountered at 31.5 m, which encompass Quartz-syenite lithological unit. This zone has some sporadic disseminated pyrite, which occurs along. The reddish brown quartz-syenite alternate with greyish brown syenite, forming sharp contacts in places.





**SEM\_BH\_002** is located towards NE of the hill, represented by a high magmatic anomaly on aeromagnetic analytical signal image.

The borehole is mainly dominated by porphyritic syenite, coarse and fine grained equigranularity syenite with occasional mafic mineral segregation, pegmatitic dykes, hydrothermal veins and carbonatite dykes (~50 cm). Observed minerals include magnetite, titanite, pyroxene, allanite, pyrite, amphibole, feldspars, calcite, actinolite, apatite and chlorite. Sampling has been completed and 54 samples were collected for geochem analysis (ICP-MS) and REE mineral localization using SEM (BSE).



**Sample A:** Reddish brown equigranular mafic rich dyke intruding a Reddish brown Fine grained syenite with altered mica biotite and amphibole hornblende into greenish chlorite/epidote. B: Reddish brown equi-granular syenite medium grained 25% mafic minerals has a quartz calcite vein. C: contact between a finely grained mafic rock and k-feldspar rich syenite. D: reddish brown syenite with a quartz calcite vein ( Qz-Cal-Chl-Mag).

## CONCLUSION

Semarule peralkaline rocks have shown a significant enrichment in REEs, seen through surficial samples collected. Borehole SEM\_BH\_001 has also shown prominent enrichment in the mafic rich syenites with 14 samples from 25 samples showing over 3000 ppm TREE, one outlier was from a weathered syenite at 11m showing ~36000 ppm TREE. This borehole showed mainly the typical igneous forming minerals like K-feldspars, Plagioclase, Pyroxenes and hornblende with quartz veining and accessory minerals like titanite and allanite.

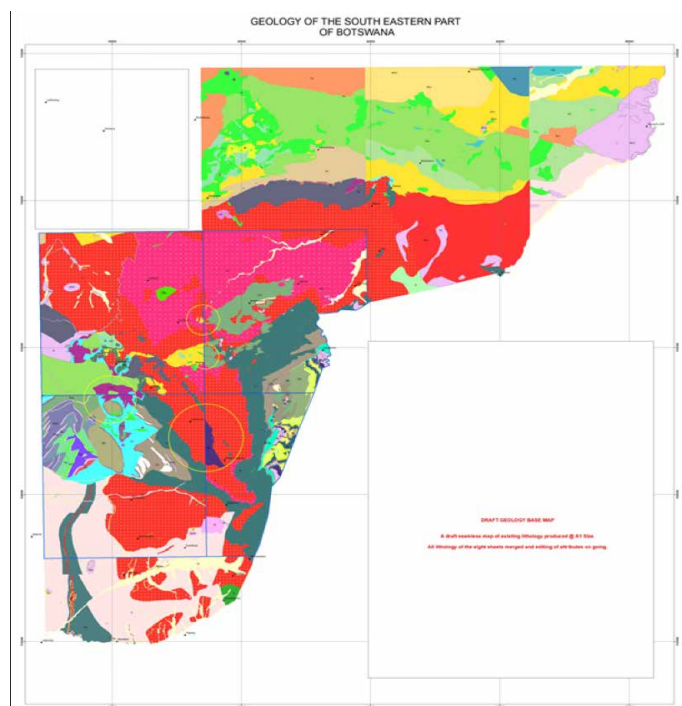
SEM\_BH\_002 compared to the first borehole has the typical igneous minerals and as the borehole propagates, calcite minerals are seen fractionated within the syenite. Calcite mineral usually occurs as a secondary mineral in igneous systems, however in this case it occurs as a primary mineral. If calcite occurs as a primary mineral in an igneous system, this can only be attributed to a carbonatitic differentiation

## REVISION MAPPING OF SOUTH EAST BOTSWANA

### PROJECT DESCRIPTION AND RATIONALE OF THE STUDY

This is a Joint project between Botswana Geoscience Institute (BGI) and Japan Oil and Metals National Corporation (Jogmec) which kicked off 2 years ago. The project is aimed at revising eight (8) 1:125 000 Lobatse-Mmathethe-Kanye-Gaborone-Phitsane - Molepolole-Mochudi and Marico Quarter Degree map sheets in Southeast Botswana, through a multidisciplinary approach involving application of remote sensing data analysis, field mapping, interpretation of Aeromagnetics and GIS techniques. So far, seven (7) maps have been revised. However, this current work only covers the Lobatse-Mmathethe, Kanye and Gaborone QDS maps. This report therefore details the findings of the investigations on the geology of the latter (rock descriptions and field relations) and progress on production of revised geological maps. The main objective of this research is to integrate the datasets to update the geological maps. BGI undertakes revision mapping whereas Jogmec provides financial support as well as QGIS and remote sensing skills and techniques. *Map production is at its completion stage pending finalisation of the maps, printing and project closure and dissemination by March 2023.*

Quarter Degree Map Sheets covering SE Botswana were produced during the 1970' and 80's and therefore need to be revised taking advantage of modern technologies, equipment and access into the areas. Different workers mapped the areas and as a result, there are lithological discontinuities across QDS boundaries. The discontinuities are due to different geological interpretations (ideologies), lack of standard colours codes used to represent lithological units in map sheets and imprecise location systems used at the time (Fig 1). The mapping was done at different times and hence the quality is inadequate for modern planning, environmental, hydrological and resources needs.



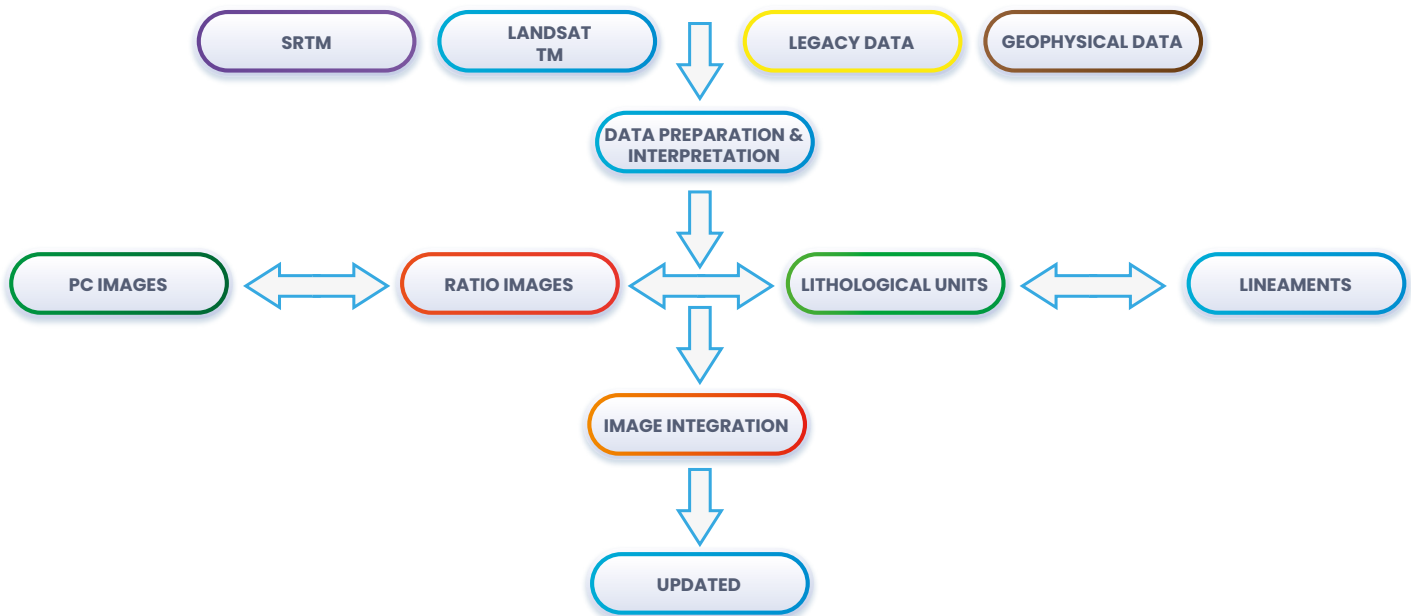
**Figure 1.** Merged geological maps of SE Botswana showing the different colours used and inconsistencies across map boundaries.

### METHODOLOGY

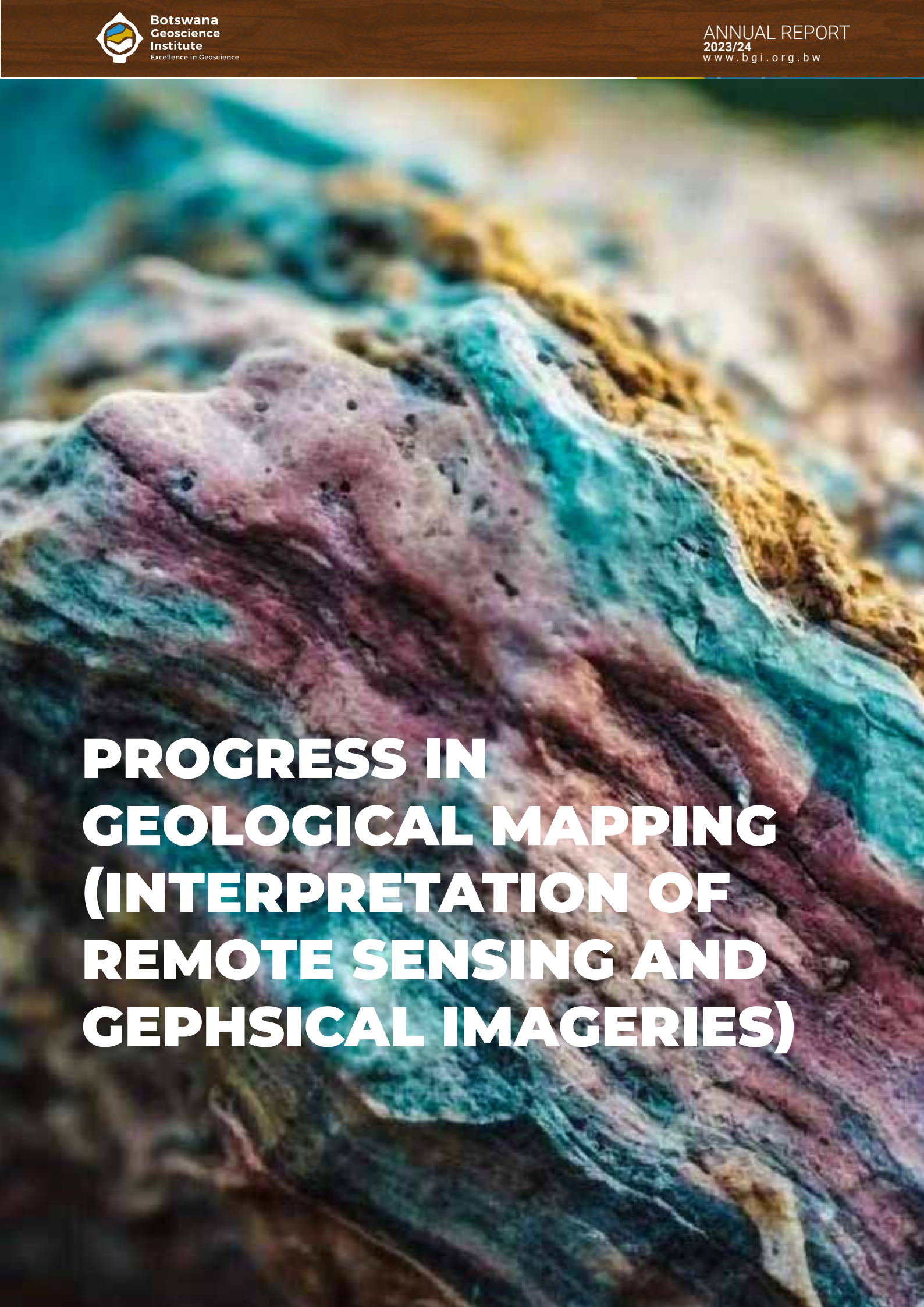
The section provides a list of steps (methodology) applied in updating the geological maps and a workflow (Figure 3)

1. Literature review to derive information about the general geology
2. Data preparation and processing of remotely sensed data; ASTER, LANDSAT, SRTM, Aeromagnetic and total field magnetic data
3. All images georeferenced into one projection system
4. Selection of appropriate band combination for lithological and structural interpretations
5. Fusing of band combinations with SRTM to enhance lithology
6. Interpretations of lineaments from shaded relief images of SRTM and ASTER DEM
7. Augment analysis and extraction of geology, lineaments and faults with Aeromagnetic data
8. Integrate geological features extracted from geophysical interpretations and fused images into one digital format
9. Use of field observation data as cross reference during image interpretations and integration of geological data.
10. Digitization of extracted geological features to produce updated geological map.





**Figure 3.** Work flow for updating the geological maps

A close-up photograph of a rock specimen showing distinct, wavy layers of different colors, including shades of blue, green, yellow, and reddish-brown. The texture appears rough and crystalline.

# **PROGRESS IN GEOLOGICAL MAPPING (INTERPRETATION OF REMOTE SENSING AND GEPHYSICAL IMAGERIES)**

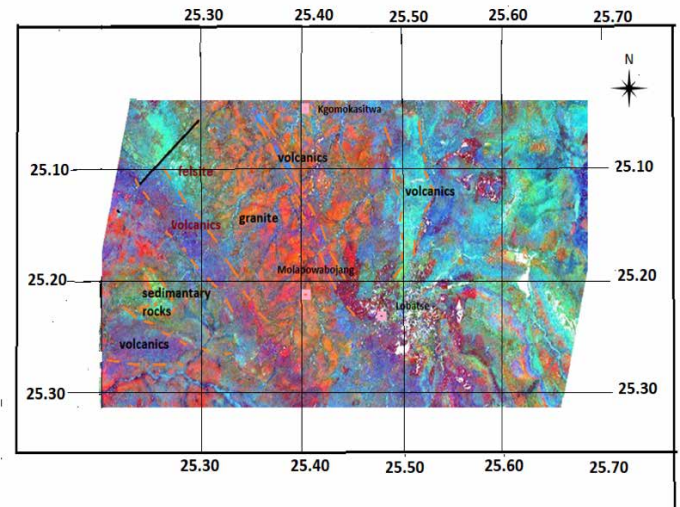


## PROGRESS IN GEOLOGICAL MAPPING (INTERPRETATION OF REMOTE SENSING AND GEPHISICAL IMAGERIES)

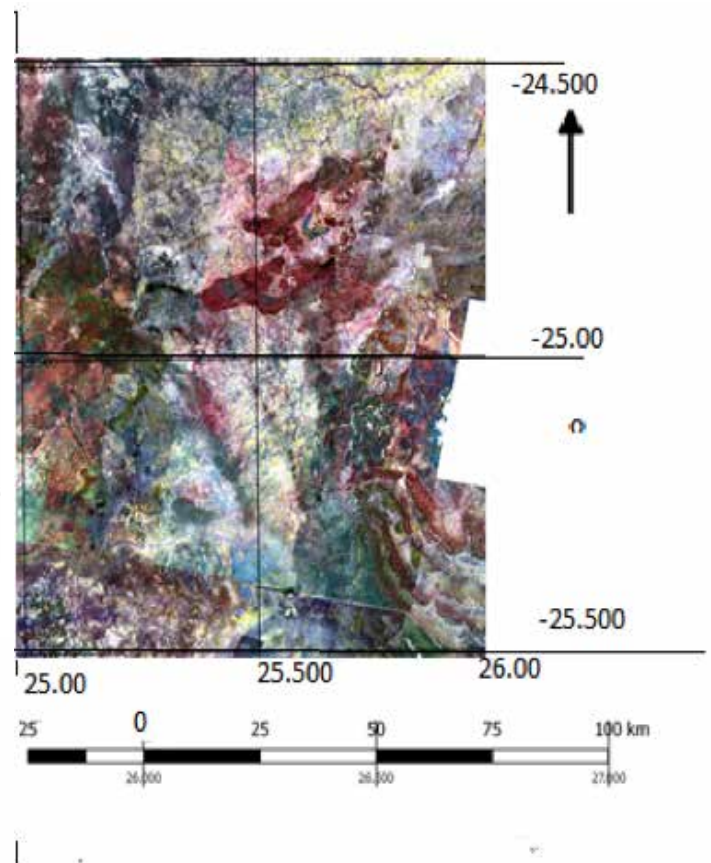
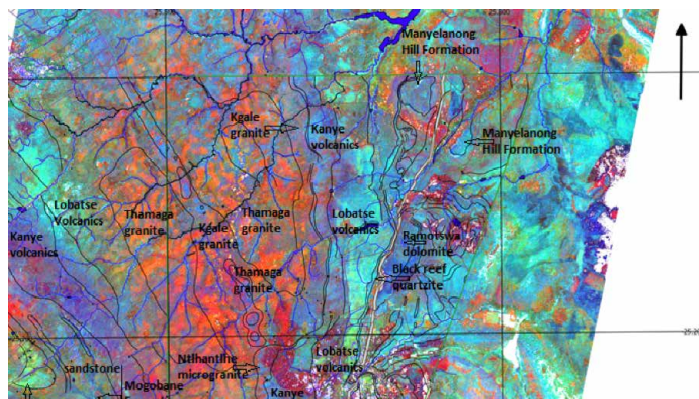
Fieldwork was undertaken during the months of August and September 2022 in selected areas, more especially adjacent to map sheets edges to correct lithological mismatches. Traverses by moto vehicle and on foot were made on tracks at numerous intervals throughout the area.

The field data collected is enhanced with data from the digital processing of the satellite data.

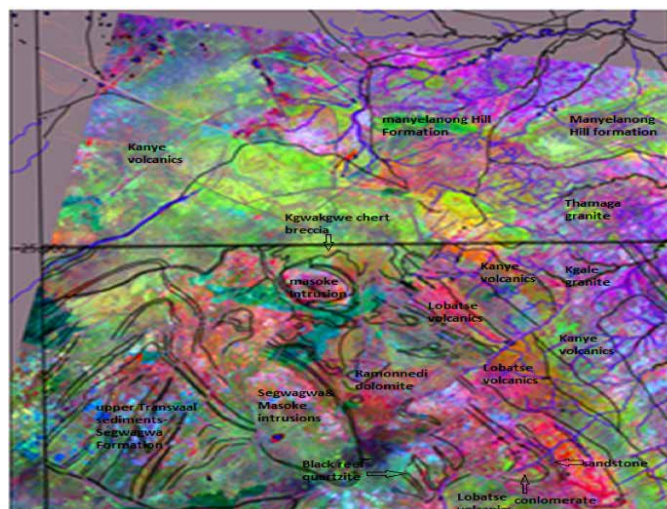
Various datasets were processed, integrated and modelled using QGIS techniques. LANDSAT, ASTER, Synthetic Aperture Radar (SAR) and Aeromagnetics were interpreted using Environment for utilizing Images (ENVI) software to delineate major lithological units and structural features. Band Ratio, False colour Composite (FCC), Principal Component Analysis (PCA), slope and shaded relief images of Digital Elevation Model (DEM) were used for classifying the main units (Figures 4 to 11).



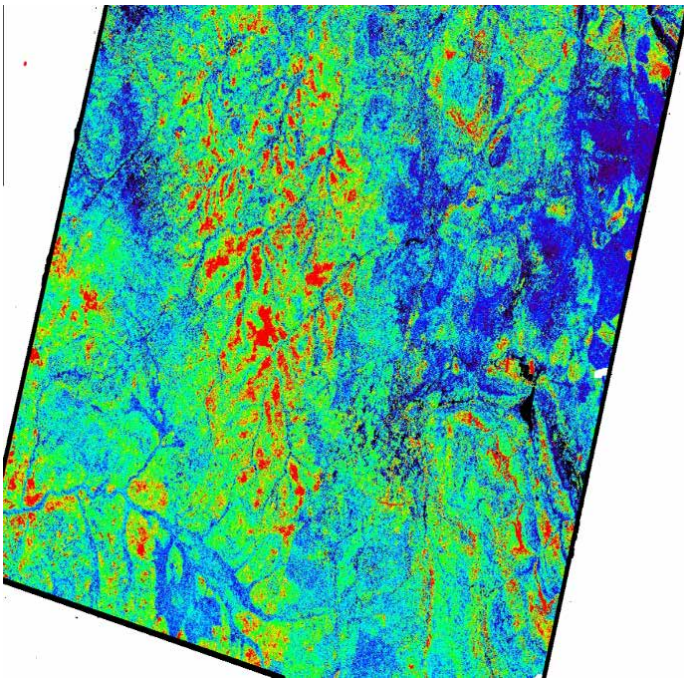
**figure 4 a-c.** Principal Component analysis (PCA) image for lithological interpretations



**Figure 5** ASTER. False colour (band ratio) images of the study area for lithological interpretations (band 468)

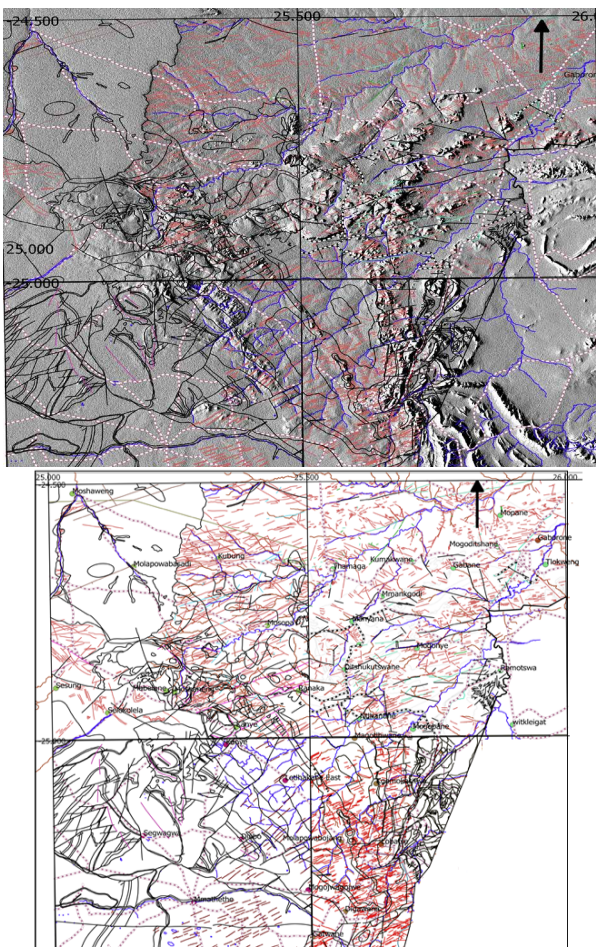




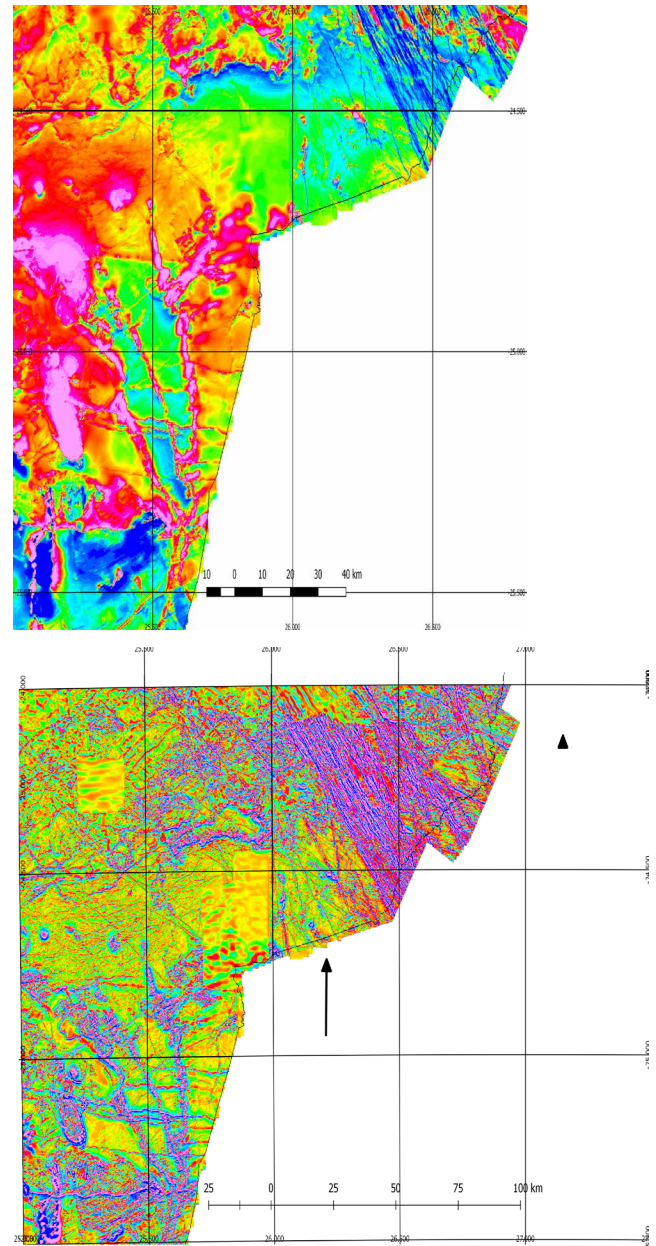


**Figure 6.** Iron index map for lithological discriminations

Lineaments were interpreted from DEM, Shaded relief and vertical derivative of total magnetic field (Figures 7 and 8).



**Figure 7.** Extraction of linear features from an ASTER DEM slope image; black lines represent interpreted lineaments and blue represent streams and rivers



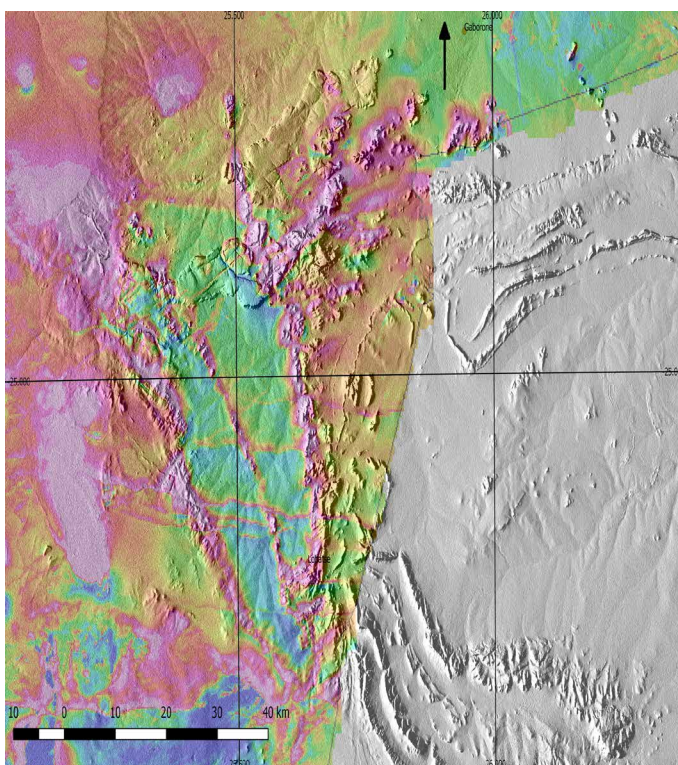
**Figure 8.** Extraction of linear features from A. Vertical derivative and B Total field magnetics



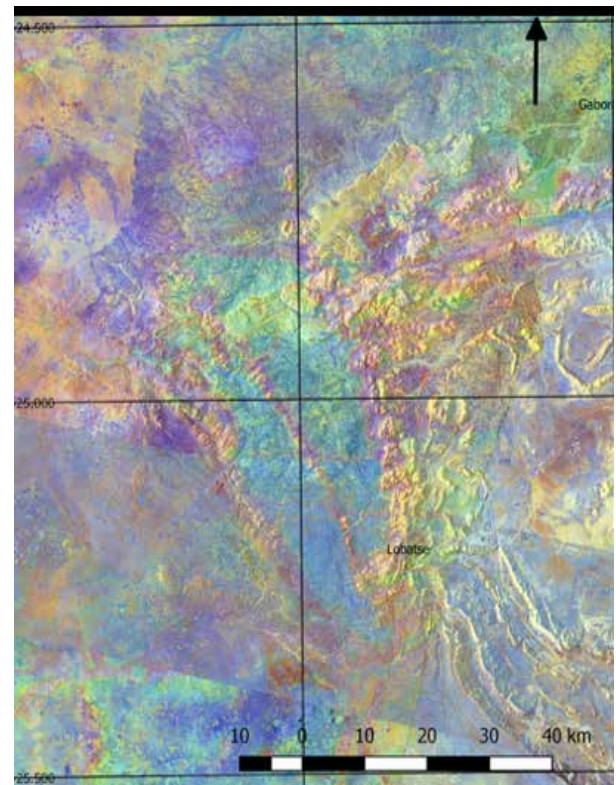
In addition to enhancement, image fusion combines image data into single images to highlight features of interest and analyse complementary geological information. Figure 9 is an example of image fusion in which SRTM slope data has been combined with geological maps, total field magnetic data and Synthetic Aperture Radar (SAR) data.



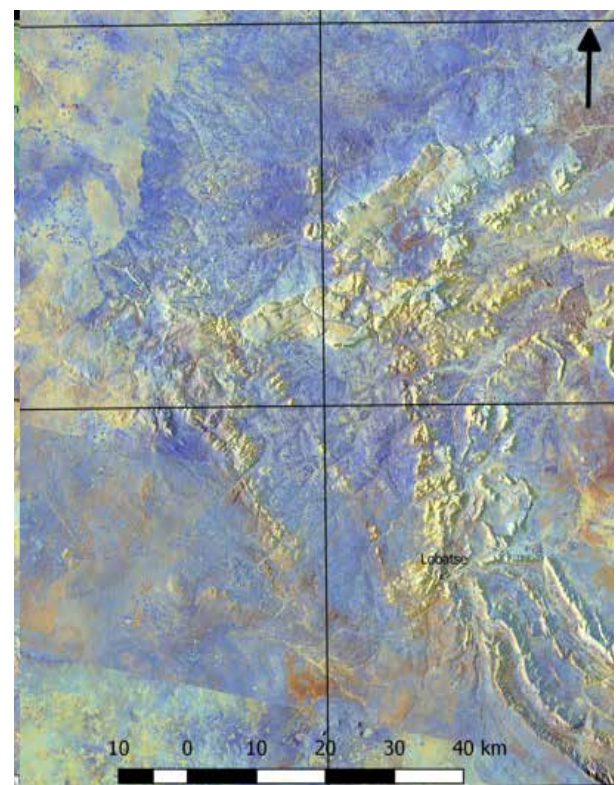
**Figure 9a** SRTM fused with geological maps



**Figure 9b** SRTM and Field magnetic data



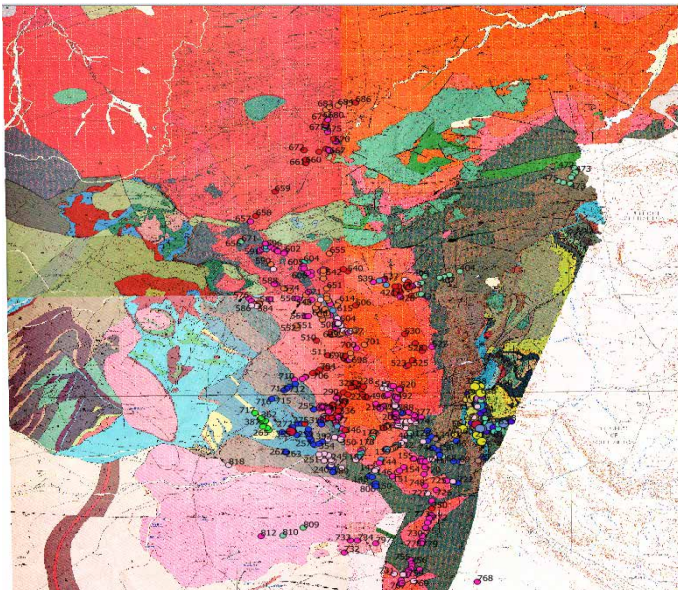
**Figure 9c** SRTM and (SAR)



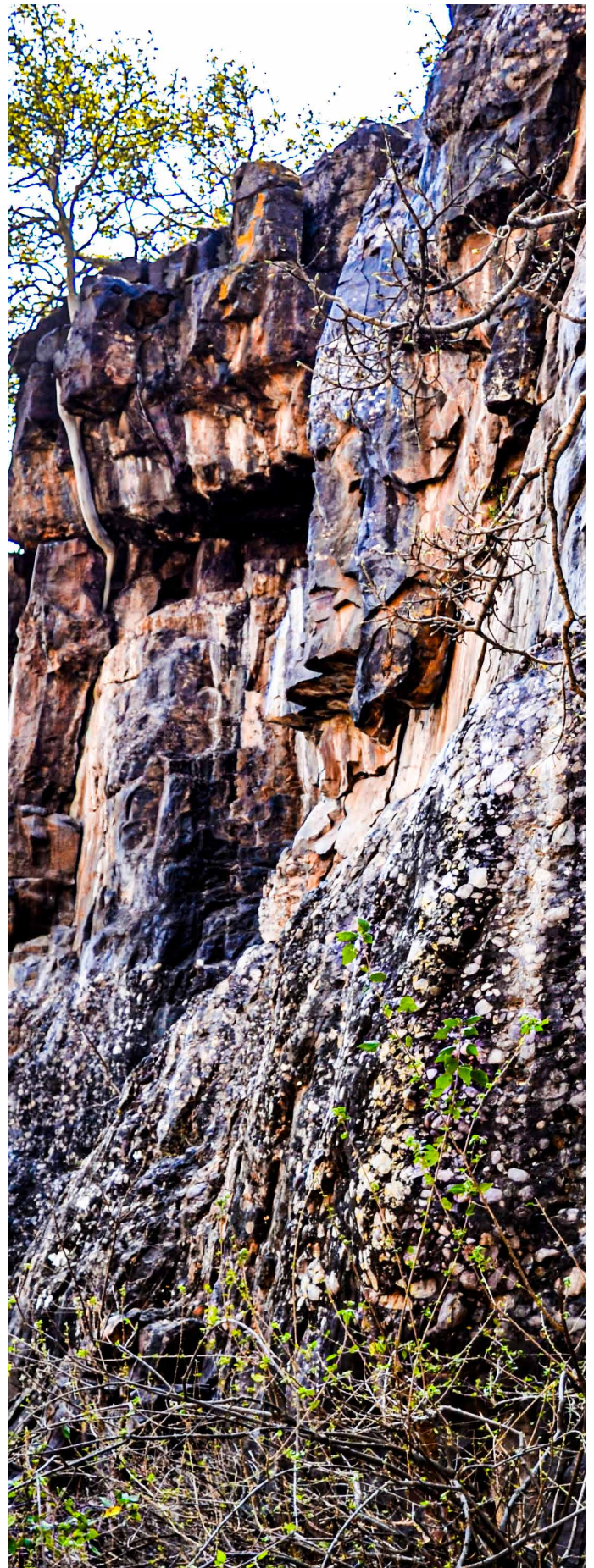
**Figure 9d** (lowered transparency)



Classification in the context of field data is categorizing field data based on similar characteristics. Locality points were classified based on lithology and are colour coded as shown in figure 10. The classification process was done by use of QGIS based classification algorithms. The field data was used in calibrating, guiding and testing interpretations. This is accomplished by overlaying the field observation points on enhanced image base, over which the various visualisations of field data are overlaid, such that areas of agreement and disagreement can be identified for follow-up fieldwork. Digitised geological images may be overlaid on various enhanced images to establish the relationship between mapped geological features and image signatures. Corresponding pattern between both guide the geological interpretation. Discrepancies between the latter provided the rationale for re-interpreting map units and structure. The existing geological maps are crossed with the raster maps created to determine the correctness of interpreted lithologies with respect to observation points obtained from ground truthing. Layers or on the old geological map. The adjustments were made to reconcile differences between the two. Figure 10 show a way to assist in calibration process, in which a geology map is used as a base map.



**Figure 10.** A plot of field observation points fused on the old geological maps and classified on the basis of lithology





## BRIEF DESCRIPTION OF GEOLOGY

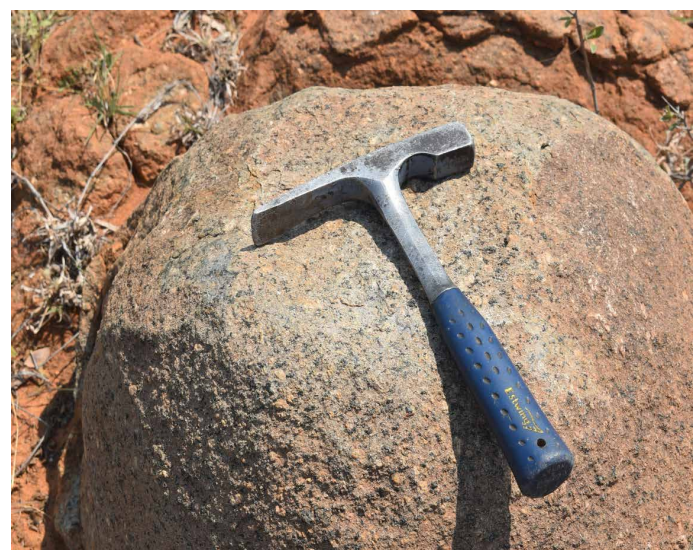
All major lithostratigraphic units in the Lobatse-Mmathethe-Kanye-Gaborone area have been recognised by all previous authors (Crocket, 1969; Wright, 1961, Key et al., 1983). All the names of lithostratigraphic units have been recognised for the Gaborone granite, the Transvaal Supergroup and the Waterberg Supergroup are retained in the current study. The study area falls within the ancient stable Kaapvaal craton which comprises metamorphic and igneous rocks of the Kraaipan greenstone belt lithologies intruded by Archaean to Proterozoic rocks divided into the Lobatse Volcanic Supracrustal (local part-equivalent of the Ventersdorp Supergroup in South Africa), the Kanye Volcanic Formation, the Gaborone and the Mmathethe granites. These rocks are locally overlain by the Proterozoic Transvaal Supergroup represented by a sequence dominated by clastic and chemical sedimentary rocks with only few volcanics (Carney & Aldiss, 1994). Younger deposits of the Proterozoic Waterberg Supergroup in turn overlie these. Rock descriptions of the different units were incorporated into the draft report aided by photo illustrations. Figures 11a-f shows examples of rock types from the study area,



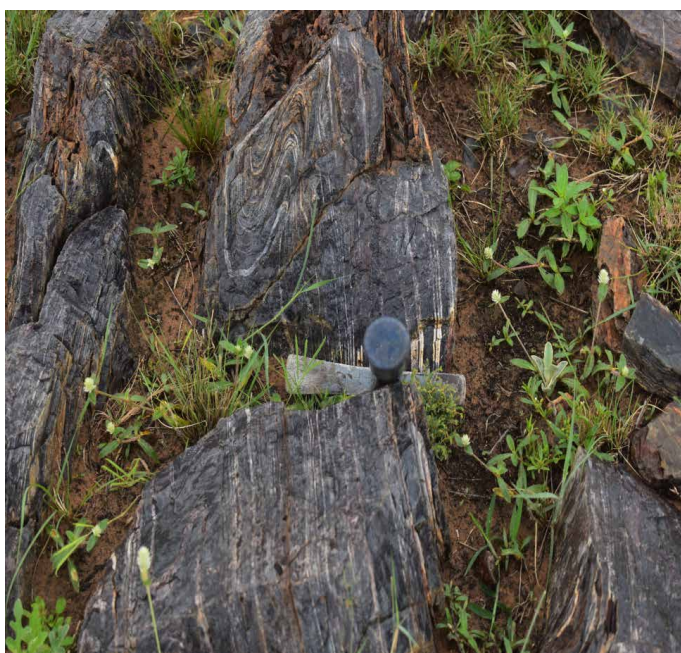
**11b. Conglomerate**



**Figure 11c. Interlayered Thamaga granite**



**11d. Mmathethe granite**  
Above) and Kgale granite Below



**Figure 11a banded BIF of the Mosi Ridge.**





**11e.** Kanye volcanics

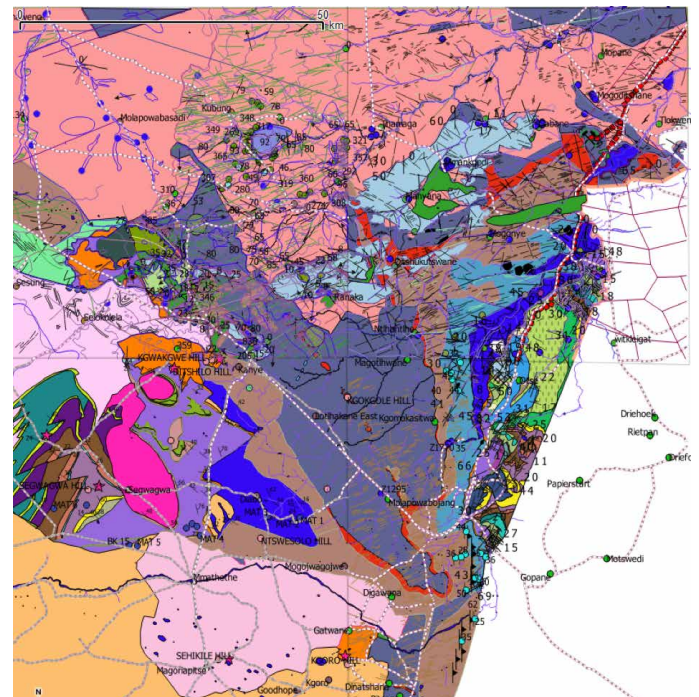


**11f.** Lobatse volcanic

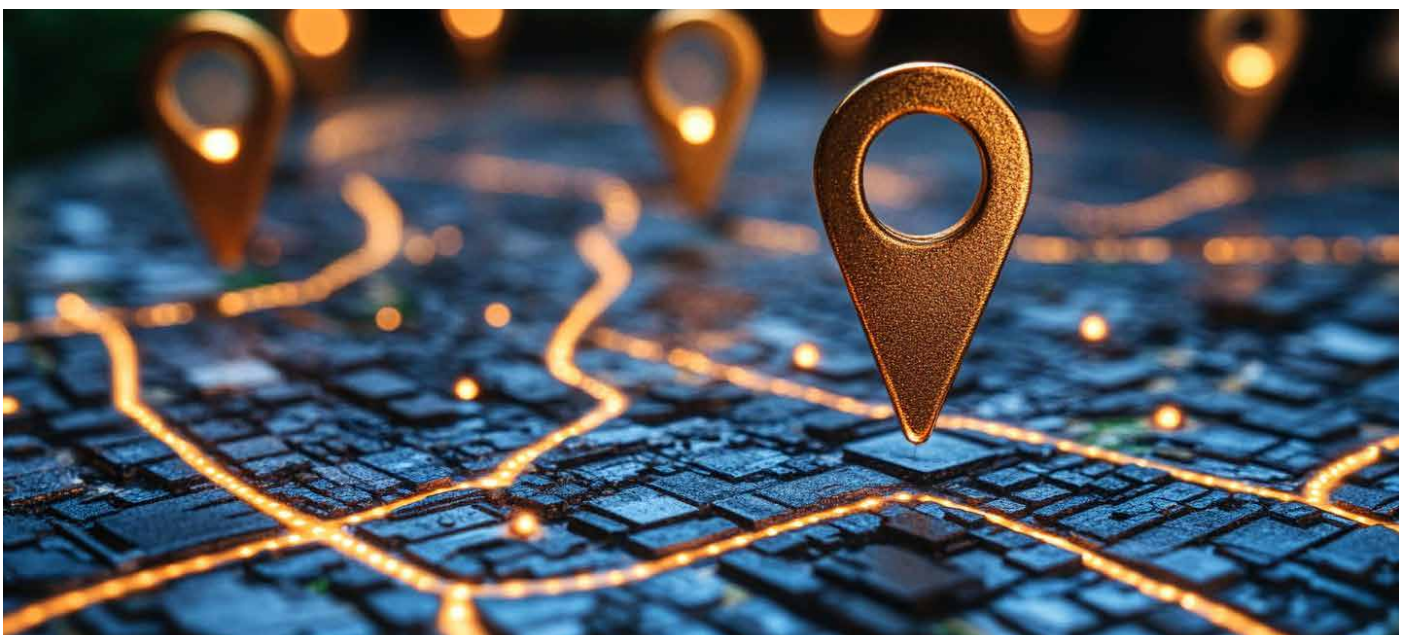
**(Figures 11a-f).** Examples of photo illustrations of rock types from the area

## Map Production

A seamless updated map of the four (4) geological maps that shows no geological mismatches across sheet boundary, similar colour codes for similar (correlated) stratigraphic units and geological symbols was produced (Figure 12). Splitting of the individual maps was done by use of QGIS software. Comparisons between the old and newly updated geological maps are in Figure 13 (a-d). An interim all in one stratigraphy was created awaiting formalisation of lithological units and standasation of geo codes.



**Figure 12.** Final geological map covering the study area (see legend for the new maps below)





THEME  
PROSPERITY

LITHOLOGY	FORMATION	GROUP	SUPERGROUP	AGE
<div>green andesitic lava</div>	TSATSU	WATERBERG		
<div>green micaceous shale</div>	LOMOGAU			
<div>massive white pink quartzite</div>	GATSEPANE			
<div>Bluish grey, black shale, black&amp; white chert</div>	DITOJANA			
<div>black and white chert</div>	MASOKE			
<div>ferrugeneous sandstone and quartzite</div>	SEGWAGWA AND MASOKE INTRUSIONS	SEGWAGWA	TRANSVAAL SUPERGROUP	PALAEO-PROTEROZIC
<div>Ferruginous grey and brown shale</div>	WOODLANDS	TAUPONE		
<div>carbonaceous mudstone and shale</div>	SENGOMA QUARTZITE			
<div>Banded ferrigeneous chert and ironstone</div>	RAMOTSWA DOLOMITE			
<div>seqwaqwa diorite</div>	BLACK REEF QUARTZITE	BLACK REEF QUARTZITE		LATE ARCHAEOAN
<div>slump deposit</div>	NTHANTHE MICROGRATE	GABORONE RANITE		
<div>Sengoma quartzite</div>	KGALE GRANITE			
<div>Taupone dolomite</div>	THAMAGA GRANITE			
<div>massive chert rich and chert poor dolomite</div>	MOGOBANE	LOBATSE		
<div>quartz reef</div>	NYWANE	KANYE		
<div>Black reef quartzite</div>	KANYE			
<div>microgranite</div>	KRAAIPAN			
<div>kgale granite</div>				
<div>Porpheritic granophyre</div>				
<div>thamaga granite</div>				
<div>shale, conglomerate,sandstone</div>				
<div>sandstone (Mogobane FM)</div>				
<div>Mogobane conglomerate</div>				
<div>Lobatse Volcanics</div>				
<div>kanye volcanics proper</div>				
<div>BIF</div>				
<div>gneisses,granites,amp,ultra basic</div>				

Legend for the revised geological maps

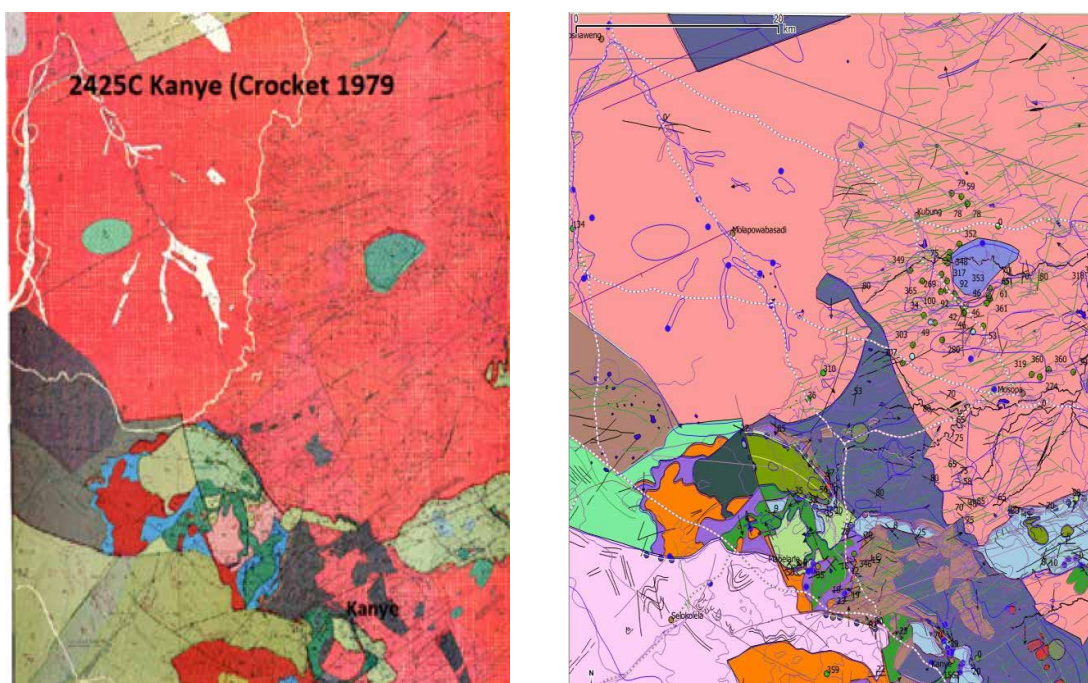
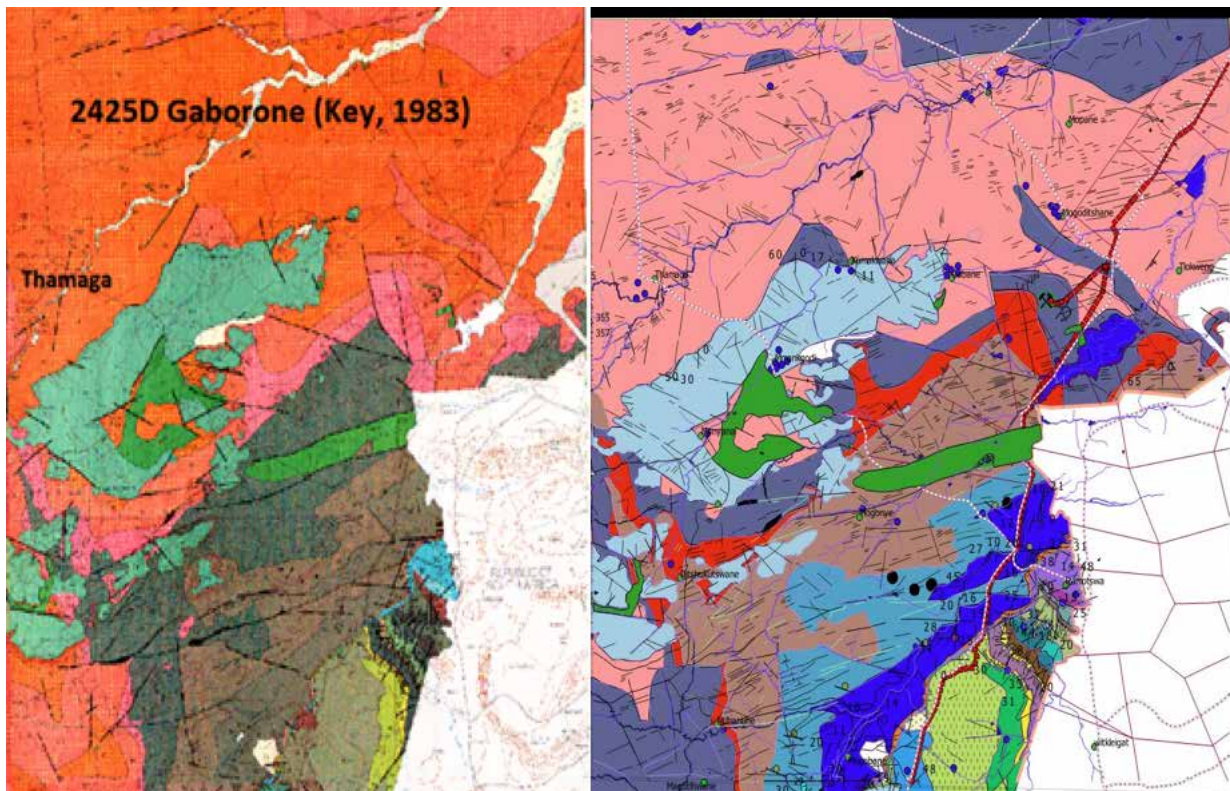
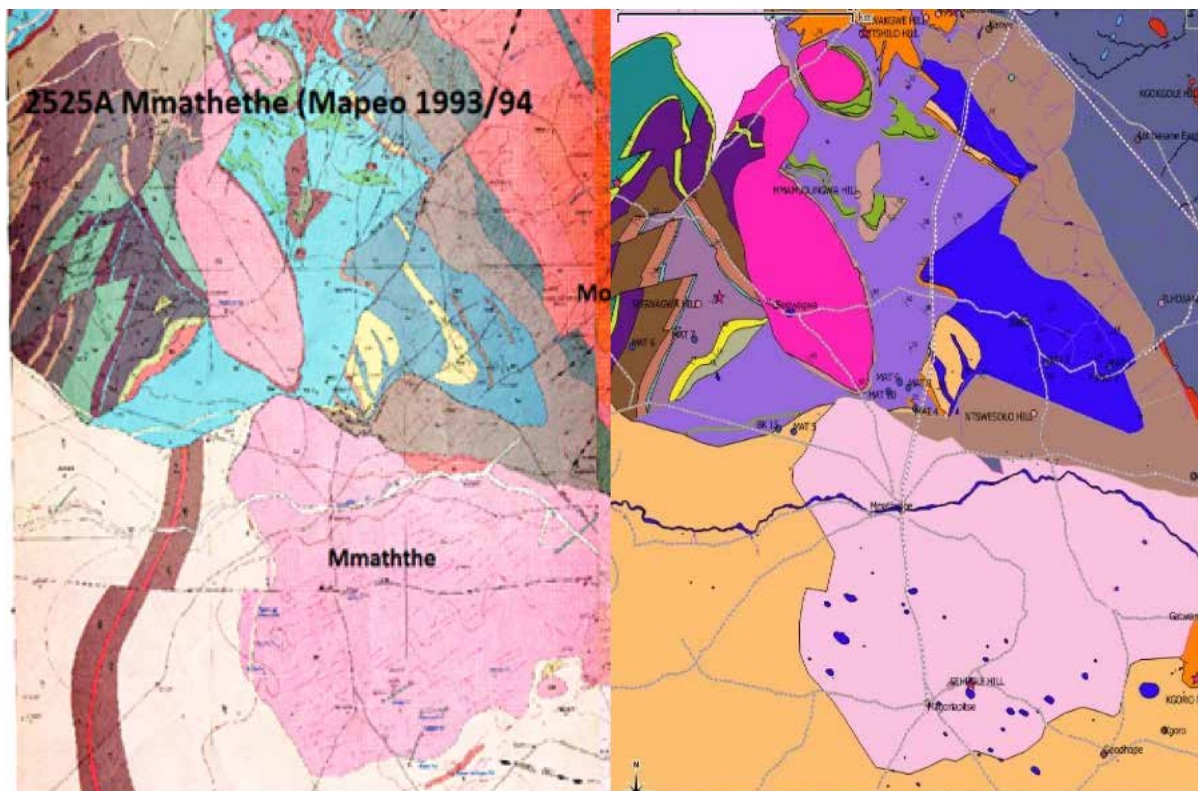


Figure 13a. Comparison between old and new geological map (Kanye QDS)



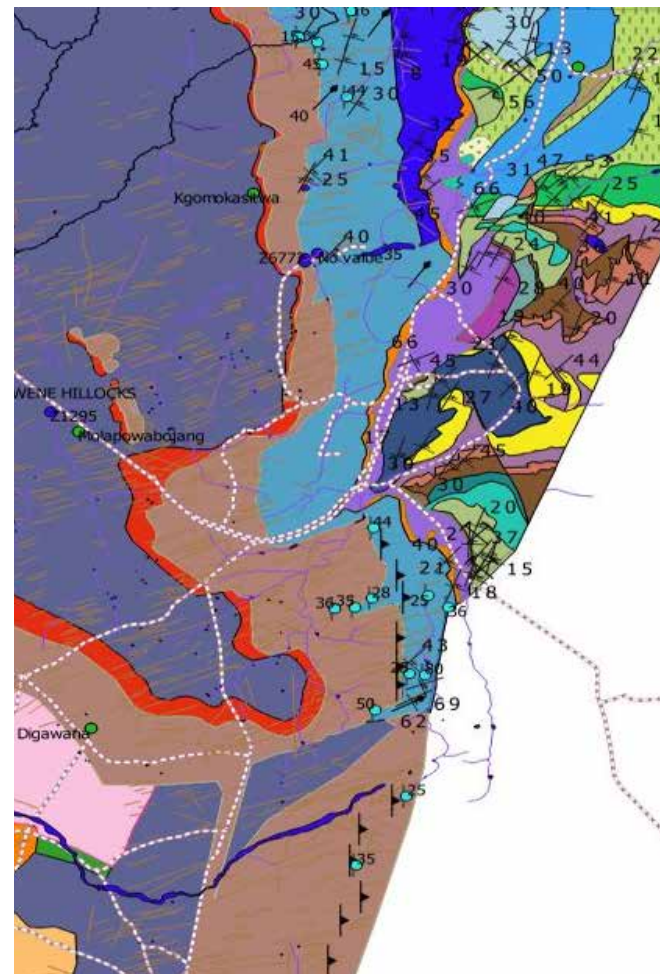
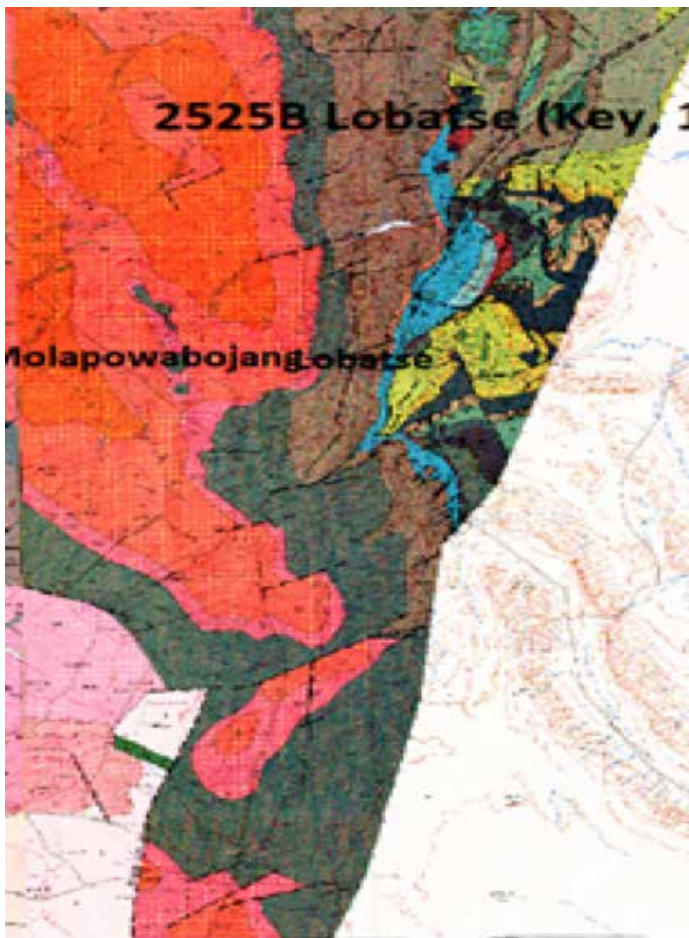


. **Figure 13b.** Comparison between old and new geological map (Gaborone QDS)



. **Figure 13c.** Comparison between old and new geological map (Mmathethe QDS)





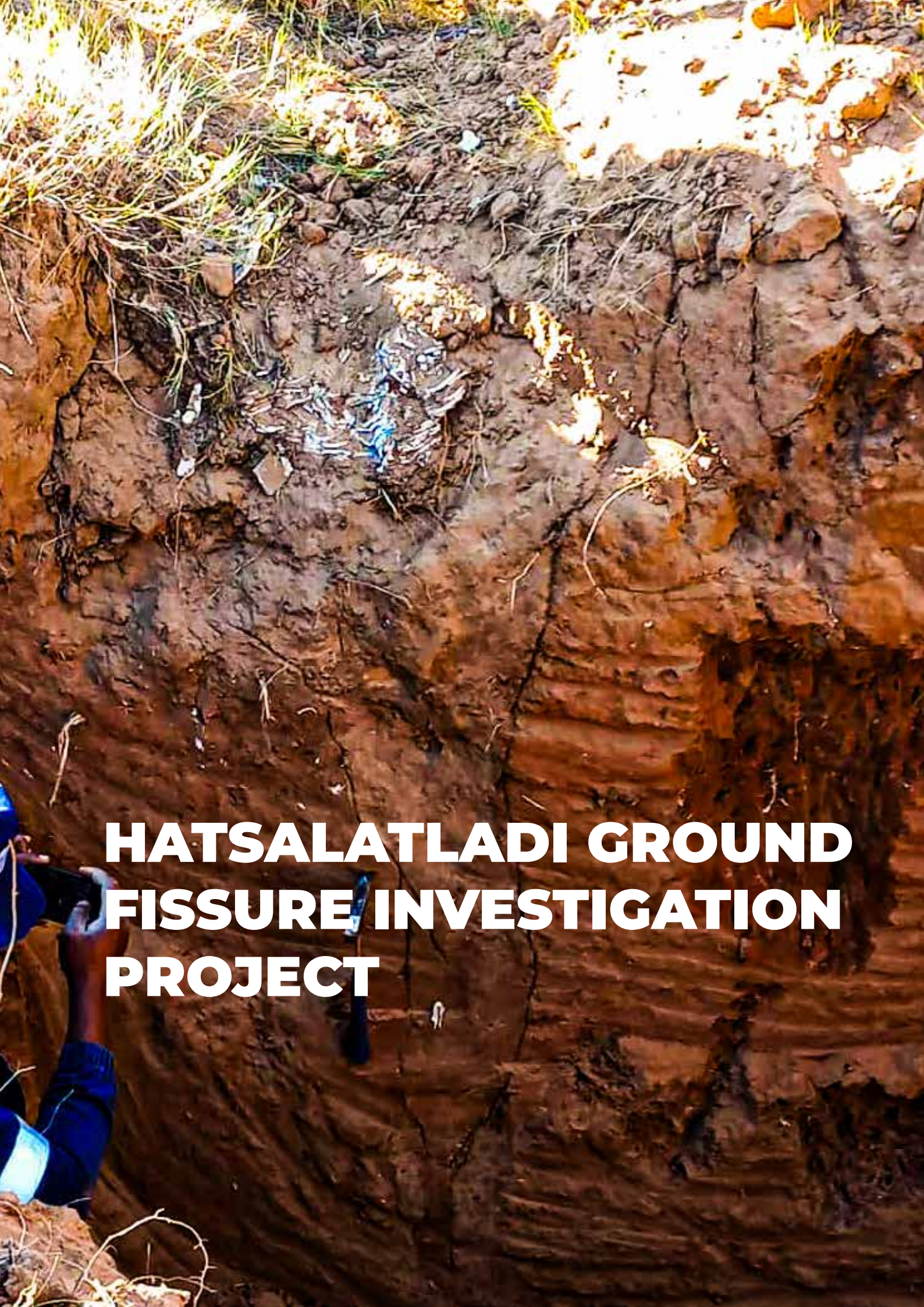
**Figure 13d.** Comparison between old and new geological map (Lobatse QDS)

## FINDINGS AND CONCLUSIONS

The current work discovered a porphyritic granophyre unit south of Molapowabojang village. Current work mapped two bodies of high magnetization instead of one unit in the Kraaipan greenstone belt. Gaining access into privately as demonstrated in the previous section, revising of the quarter degree sheets is almost complete pending finalisation of the maps, printing and project closure by March 2023. Spatial data processing, analysis and integration by use of remote sensing and GIS applications demonstrated the efficiency in distinguishing and identifying rock units as well as mapping geological structure. SAR, ASTER and vertical derivatives images have proven to be suitable for rapid geological mapping. QGIS software has proven to be indispensable and can do without Arc GIS. The skills acquired during this study will enable quicker, reliable and effective revision mapping anticipated to cover the eastern part of Botswana.

The use of PCA, RGB, and Rationing contributed mostly to enhancing geology and has better visualization of rock units, structure (faults/lineaments) and lithological boundaries. The geological formations, geotectonic units and other geological attributes were identified from available datasets. The lithological mismatches across the map boundaries were corrected based on use of remote sensing techniques, guided by field data. The colours of lithological units were randomly selected pending standardization of geological symbols however, the same colour codes were used to represent similar rock types and owned land was a limiting factor. The area to the east, west and south of Lobatse is inundated with private farms and it was not possible to visit them. The discovery of a previously unmapped units and lithological boundary adjustments necessitates systematic field checks to be conducted even in areas showing no geological inconsistencies.





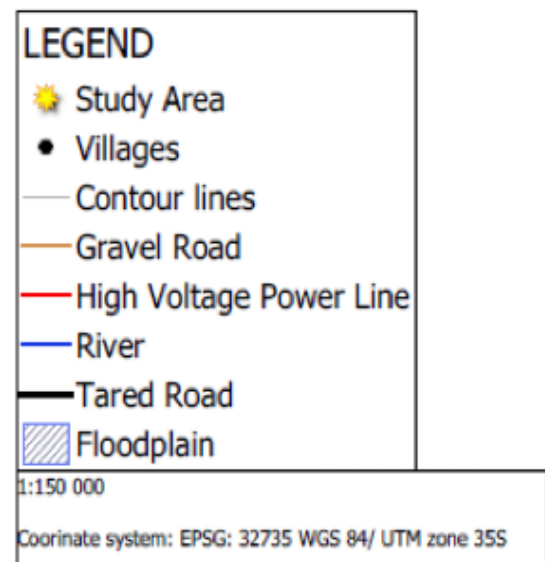
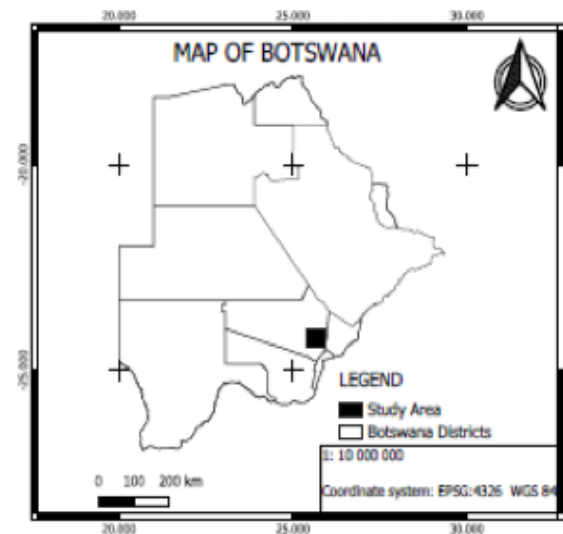
# **HATSALATLADI GROUND FISSURE INVESTIGATION PROJECT**



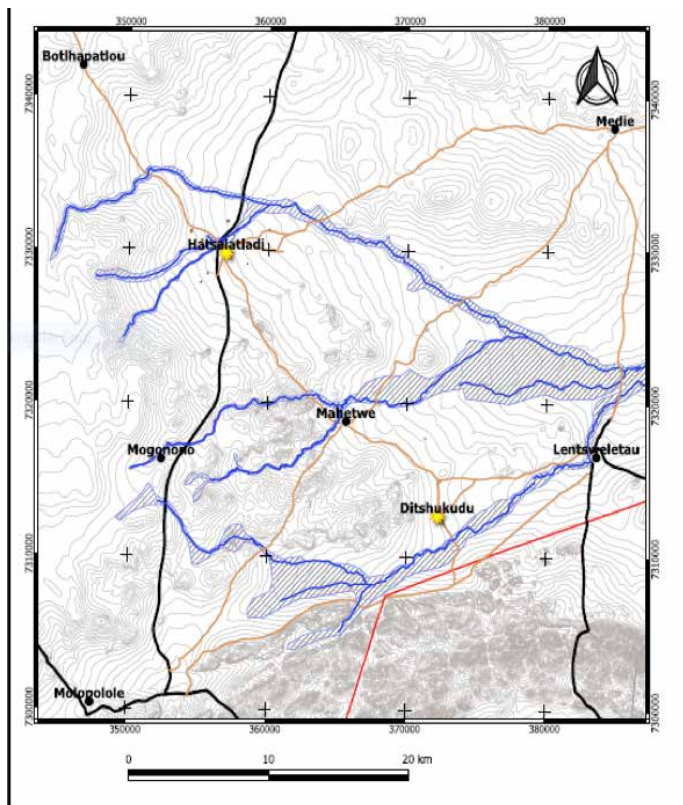
## HATSALATLADI GROUND FISSURE INVESTIGATION PROJECT

### Introduction

Ground fissuring phenomena has been a cause for concern in the Kweneng area for several years. According to the village residents, the problem has persisted long before the village was established. The fissuring which was reported to local research institutions in 2016/2017 after heavy rainfall events has affected the residents and their surroundings by causing damage to property including residential houses, public infrastructure, and ploughing fields. Kweneng District Council has raised concern due to challenges of ground fissuring in newly allocated residential plots. To address the problem of ground fissuring around Hatsalatladi and Ditshukudu villages, the Ministry of Minerals and Energy (MME) funded a detailed investigation project at a cost of BWP 5 976 428.00 in the 2022/23 financial year. The project's main objective is to determine the cause(s) of ground fissuring in and around the affected villages through a multidisciplinary geoscientific research work. Based on the research findings, professional advice will be provided to Kweneng Land Authorities with regards to public safety against geohazards, sustainable landuse planning, and infrastructure development.



Project Study Area





## APPROACH

Ground fissuring is an unusual and complex phenomenon, therefore the project is implemented in collaboration with University of Botswana (UB) and Botswana International University of Science and Technology (BIUST) through existing Memorandums of Agreements (MOUs). Through a collaboration model, the three (3) institutions are leveraging on each other's resources and technical expertise in areas of Geophysics, Geology, Engineering Geology, and Hydrogeology/Hydrology (multidisciplinary approach) to ensure that the project achieves its intended objectives and realization of intended benefits to the funder (MME), Kweneng District Council, communities of the affected villages and all relevant stakeholders.

Botswana Geoscience Institute (BGI) has put measures in place to ensure project success by implementing this project through best Project Management practice under the newly established Project Management Office (PMO). This was done to provide assurance that;

- I. The project is delivered in time, scope, and budget,
- II. The project is delivered under the control of a proper governance structure – through setting up of Project Steering Committee (PSC) where the funder (MME) and client (Kweneng District Council) are represented to provide leadership and governance throughout execution,
- III. Project is delivered to the right quality for informed decision making,
- IV. There is sound communication and stakeholder engagement and management.



Figure 6: Ground Fissures in Hatsalatladi Village



## STAKEHOLDER CONSULTATIONS

Ground fissuring geohazard is matter of serious concern to both the environment and the livelihood of the communities in and around Hatsalatladi and Ditshukudu areas. Therefore, stakeholder engagement and communication initiatives were identified early during project initiation

as project critical success factors. Through the Office of District Commissioner under Kweneng District Council, all stakeholder consultations were conducted at the project initiation phase as shown on Table 2 below. Communication and engagements are continuously happening through our communication plan as outlined in the Project Management Plan document.

Table 2: Stakeholder Engagement Summary

DATE	MEETING PURPOSE	AUDIANCE
31 October 2022	To inform the client (Office of District Commissioner) and Kweneng District Council on the project commencement	BGI (Marketing and Communications, Project Manager, Project Coordinator) Kweneng District Council Office of District Commissioner Kweneng Land Board
3 <sup>rd</sup> November 2022	Extended high-level consultation on commencement of the project in preparation for Kgotla meetings to address the communities	BGI, Kweneng District Council, Land Board Dikgosi from Affected villages Lentsweletau Sub District Council Council Chairman Village Councilors
11 <sup>th</sup> November 2022	Kgotla meetings to address the residents of Hatsalatladi and Ditshukudu	BGI, Kweneng District Council, Land Board Area Member of Parliament Dikgosi from Affected villages Lentsweletau Sub District Council Council Chairman Village Councilors Village Development Committees Village residents Media



Figure 7: One of the Stakeholder consultation meetings (Ditshukudu village)



The background is a dark blue field filled with abstract, futuristic geometric patterns. Concentric circles and arcs in various shades of blue and cyan are prominent. Some arcs are solid, while others are composed of small dashes or segments. Thin, light blue lines with small circular nodes at the intersections are scattered across the background, resembling a network or circuit board. The overall aesthetic is high-tech and digital.

# **NATIONAL INTEGRATED GEOSCIENCE INFORMATION SYSTEM (NIGIS) PROJECT**



## NATIONAL INTEGRATED GEOSCIENCE INFORMATION SYSTEM (NIGIS) PROJECT

The project was an NDP 11 project that covered development of a national system targeted at closing gaps of unavailability of geoscience data within the country. The purpose targeted to integrate all geoscience information/data generated within BGI, exploration companies and other stakeholders such as Department of Mines.

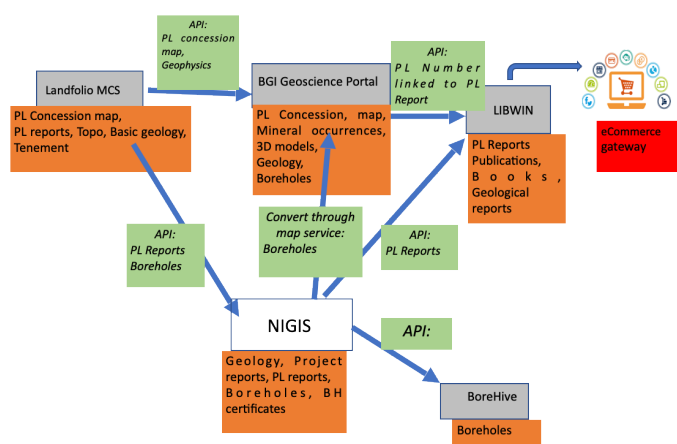
The project commenced in April 2018 and ended in 31<sup>st</sup> September 2022 inclusive of the Mining Cadaster system.

The project was conducted in partnership with BITRI (Botswana Institute for Technology Research and Innovation) and funded at a total budget of P20,680,000.00. The project has been completed, and maintenance of NIGIS and Mining Cadaster System commenced in December 2022. Figure 1 presents resemblance of NIGIS an engine that interacts with other online geoscience platforms.



**Figure 1:** Representation of NIGIS Project

BGI website ([www.bgi.org.bw](http://www.bgi.org.bw)) provides linkage of all the geoscience platforms inclusive of Mining Cadaster and geoscience portal which is an interactive geographic information system (GIS) platform. This was conducted to provide an intuitive web map interface for multidisciplinary geoscience data search, discovery, and access for internal and external systems.



**Figure 2:** NIGIS System Integration Plan

The NIGIS have been integrated with other systems holding geoscience data such as BoreHive (Borehole data system), Mining Cadastre (MCS), and other related systems. The integration plan indicates how geoscience data have been synchronized to allow sharing of different datasets amongst the existing BGI online systems and the Mining cadaster. Systems API's (Application Programming Interface) are being used in the process to allow easy flow of data during system use.

### 1. ONLINE PAYMENT GATEWAY

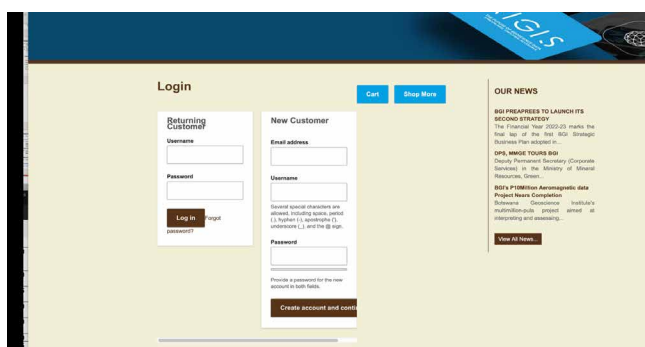
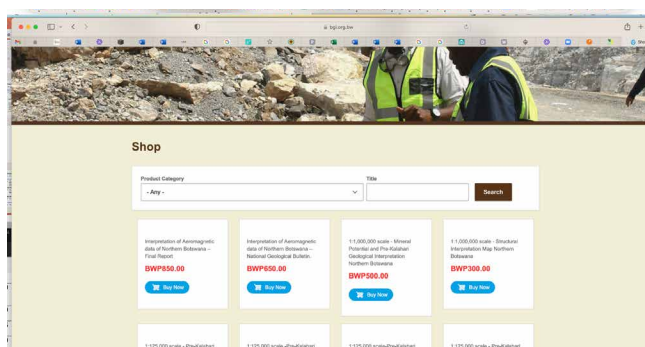
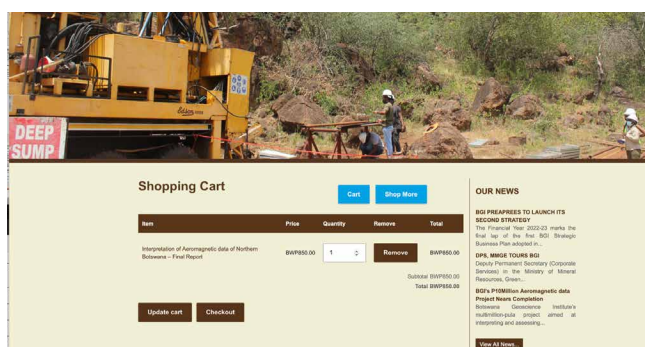
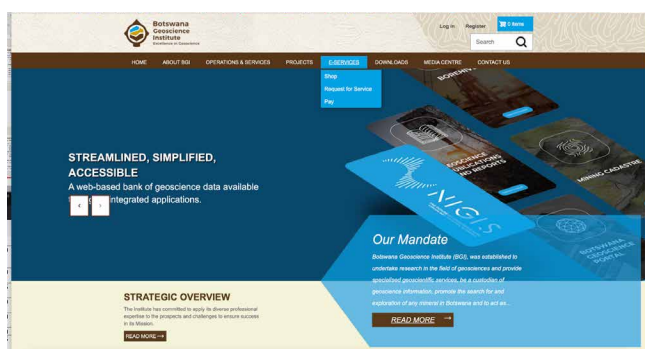
Implementation of online payment tool within BGI organization was built offering guarantee of safety and security of online transactions over BGI platforms. This allows customers to make payments anywhere in the world—whether on phones, online, or in-Banks—in their local currency on desktop, Android, and iOS.

Online payment gateway development process was conducted with FNB Bank, to allow the system to accept payments of multiple currencies with added support through fraud protection, risk management, and transaction reconciliation with BGI SAGE Finance system.

Increased security was reinforced such that there is ease of integration and increased sales throughout the time it in use.

The portfolio of technology driven platforms were upscaled and the use of \*174# and e-services through the website completed and are now fully operational (E-Commerce).





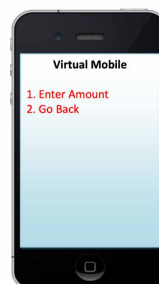
**Figure 3:** Resemblance of, Online Payment Through BGI Website

The mobile payment method (USSD - Unstructured Supplementary Service Data) provides a menu through which the customer selects the organization, followed by selection of the type of products or services up to payment stage. Figure 4 shows how the smartphone is used to pay for the products and services.

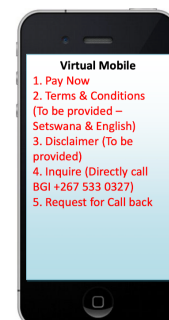
## Pay Course Fees via 174



Select: **6. Botswana Geoscience Institute**



Enter Amount:



Select, **1. Pay for Products & Services**



Enter Reference No:

**Figure 4:** Representation of Mobile Payment (USSD)

The online payment aimed in providing convenience for customers, optimize cash-flow, improve operational processes, and offered advanced secure features towards providing organizational products and services

## 2. DIGITALIZATION

Digitalization as is priority three (3) in the national re-set agenda, was part of the implementing process through transitioning analogue to digital data during which target of 100% of targeted data which comprised of 62,666 records (Publications, consultations reports) was achieved.





**LABORATORIES  
SERVICES**

## X-RAY FLUORESCENCE SPECTROMETER

### LABORATORY TESTING SERVICES TEAM COMPOSITION

1. Manager
2. Senior Officers (3)
3. Analysts (4)
4. Technicians (4)
5. Internship Personnel (4)

### QUALITY POLICY STATEMENT AND OBJECTIVES

The management and personnel of Botswana Geoscience Institute (BGI) Laboratory Testing Services are fully committed to customer satisfaction. This will be achieved by provision of quality physical and chemical testing services of geological materials in accordance with requirements of ISO/IEC 17025:2017 standard. We strive to provide quality, timely and accurate results by using reliable testing technology, competent personnel, and quality control techniques. The laboratory shall carry out its testing activities impartially as required by its customers, regulatory authorities, and accreditation bodies.

### OBJECTIVES

To use **internal quality control techniques such as certified reference materials (CRMs) and or secondary reference materials** for verification of results and use calibrated equipment.

To monitor the validity of our test results (competence) by participating in proficiency testing programs as planned by the PT coordinators it has registered with and do inter-laboratory comparison where PT schemes are not available for a particular test method.

To use customer feedback for improvement of the management system.

To conduct internal audits twice a year or when an opportunity for improvement arises to ensure improvement and compliance with the management system.

To conduct management **reviews at the end of each financial year** to ensure suitability of policies and procedures, and continual improvement of the management system.

To continuously assess training needs and provide relevant training to its personnel to build their technical competence.



## QUALITY MANAGEMENT

### BGI LABORATORY GETS ACCREDITED

The laboratory implemented the requirements of ISO/IEC 17025:2017 standard which states general requirements for the competence of testing and calibration laboratories. Adherence to this standard enables the laboratory to demonstrate competence in testing and generate consistent and valid results, thereby promoting confidence in their work locally and globally. Following rigorous assessment of methods, personnel and processes, the laboratory was awarded accreditation by SADC Accreditation Service (SADCAS) on the 21<sup>st</sup> June 2023 for one test method for determination of six (6) Major Oxides (**CaO, Fe<sub>2</sub>O<sub>3</sub>, MgO, Na<sub>2</sub>O, SiO<sub>2</sub> and TiO<sub>2</sub>**) by X-ray Fluorescence (XRF) Technique.

The following personnel have been assessed and appointed to these roles after meeting the SADCAS requirements in relation to the accredited test method:



### Technical Signatories

: Mr T K Pule  
: Mr M Osele  
: Ms N S Seope

### Nominated Representative

: Ms J N Mmualef

### Deputy Nominated Representative

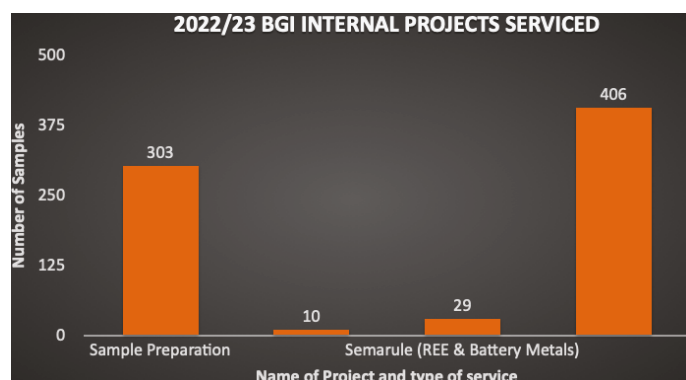
: Mr V S Dikgomo

## TESTING SERVICES

The laboratory provided testing services for several BGI Projects and external customers in the financial year 2022/23 as follows:

### BGI INTERNAL PROJECTS

- **Sample Preparation**  
The laboratory prepared three hundred and three (303) samples for internal projects
- **Geotechnical Project (Hatsalatladi Earth Fissures)**
  - The Laboratory received ten (10) samples from this project, and were analysed for
  - Atterberg Limits, Moisture Content, Specific Gravity, Grading and Geochemical
  - Analysis.
- **REE and Battery Metals Project**  
The Laboratory received twenty-nine (29) samples from the Semarule Project to analyse for Rare Earth Elements (REE) and Battery Metals  
Mineral Resource Assessment and Mapping of South-East Botswana  
Three hundred and seventy-nine (379) samples were received from Kopong and Seherelala for this project. These samples were prepared at the Mineral Dressing Laboratory section and analysis conducted at the Chemistry Laboratory section.



**Figure 1: Analytical Service to BGI Projects**

### External Customers

#### Identification of suspected gold, diamonds and other metals:

This service is offered to provide forensic advice to the police. Mineral identification on diamonds is also offered to DTCB and Diamond Hub. The laboratory received 30 samples from DMPU and 404 from DTCB for diamond analysis. The Laboratory analysed ten (10) suspected gold samples for DMPU.

#### Grading

The University of Botswana (UB) submitted eight (8) samples requesting for Particle Size Distribution, while BITRI and an individual submitted thirty-four (34) and two (2) samples respectively.

#### Sample preparation:

The Laboratory received 230 samples in total for preparation only (Drying, Sieving, Crushing, milling and pulverization) from external customers. The UB submitted one (1) sample, Eastport Venture (226) and Alloys and Metals submitted three (3).

#### Full Brick Testing:

A request was received from Botswana Institute for Technology Research and Innovation (BITRI) to assess the Kimberlite residue for Letlhakane and Jwaneng to check suitability for application mainly on pottery and brick manufacturing. The laboratory received two (2) samples from each area and analysed them for Atterberg limits, Particle Size Distribution, Drying and Fired Shrinkage, Water Absorption, Compressive Strength and Efflorescence

#### Aggregates Testing:

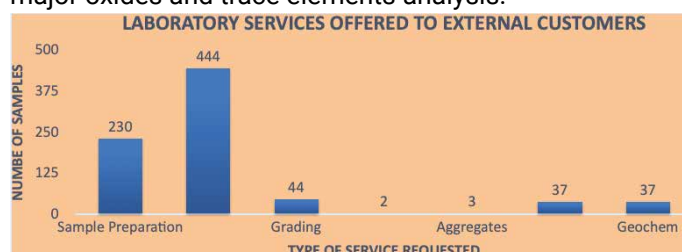
Three samples (3) were received for aggregates testing from three external customers each requesting Aggregate Impact Value (AIV), Los Angeles Abrasion Value (LAAB), Water Absorption and Specific Gravity.

#### Water Analysis:

A total of thirty-seven (37) samples were analysed for heavy metals and major constituents in water for two customers.

#### Geochemical Analysis:

Thirty-seven (37) samples were received and analysed for major oxides and trace elements analysis.



**Figure 2: Analytical Service to external customers**

## ACHIEVEMENTS

The BGI laboratory Testing Services had been awarded Accreditation by SADCAS after assessing its competence in analysing six major oxides by XRF technique. The laboratory analysed nine hundred and eighty-five (985) and prepared five hundred and thirty-three (533) samples during the financial year.

Information accessibility has improved through digitisation, enabling online search of our databases and downloadable reports when requested. Acquisition of reports and maps for the Northern Botswana Aeromagnetic Survey has positively impacted geoscience information availability leading to an increase in the range and currency of data available as it covers areas that previously were not mapped.





## **PARTNERSHIPS, COLLABORATIONS AND NETWORKS**

### STAKEHOLDER / COMMUNITY ENGAGEMENTS AND REGULATORY REQUIREMENTS

#### SCIENCE WEEK

The Institute co-hosted science week the event at BGI premises with the Ministry of Communication, Knowledge, and Technology. The theme for the event was 'Leveraging Science, Technology, Engineering, Arts, and Mathematics for Social-Economic Development'. The event was graced by Lobatse Mayor, Mr Jomo Dithebe. The objective of knowledge sharing on the benefits of science was achieved, with several stakeholders impacted. A similar event was also hosted at the Letlhakeng, where we showcased the organizational products and services, and numerous stakeholders represented how science has improved their products and services. Attendees ranged from community representatives such as the District Commissioner, Secondary schools, Universities, Government Stakeholders, and the Private Sector.

#### ACCREDITATION AWARD CEREMONY

The Institute celebrated its success in accreditation of the Chemistry Laboratory with ISO 17025. The event was graced by Hon. Minister of Minerals and Energy, Mr. Lefoko Moagi and was attended by key players in the minerals and energy sectors. The Certificate was presented by the CEO of SADCAS, Ms. Eve Christine Gadzikwa.

The accreditation scope covers analysis of major oxides in rock and soil by X-Ray Fluorescence (XRF). Accreditation came at a crucial time when the country was gearing towards diversification of the minerals sector. Therefore, the benefits expected are;

- Reduction of geological sample exports and associated loss of geoscience data, thereby enhancing revenue generation;
- Provision of confidence to customers that the results generated are accurate and reliable;
- Increasing customer base for Botswana Geoscience laboratories;
- Attainment of competitive advantage in the geoscience laboratory testing industry.

#### AFRICA MINING SUMMIT

The event was held on the 20th - 21st September 2023 in Gaborone, offering a newer way of gaining new opportunities and customers from the 'Big' Indaba's exhibitions, and conferences.

Africa Mining Summit was conducted to enable more dedicated networking and exhibiting zones, and pre-scheduled match-making meetings using our bespoke 'meeting' software.

The programme focused on, project presentations and panel discussions covering the following:

- The energy transition and demand for strategic metals. Diversifying Africa's energy mix & its impacts;
- Africa's Coal exploitation and roadmap;
- Commodities outlook for 2023 and beyond, Africa and the Global Markets;
- Diamonds, how producing countries can position diamonds by creating shared value;
- How can government policy and legislation be reformed to promote junior mining and exploration; and
- Transforming mining through technology and innovation.

The event enabled attendees to establish partnerships with numerous stakeholders such as African Union Commission and Economic Commission of Africa.

#### GLOBAL EXPO 2023

During the 2023 Global Expo on 11th – 12th October 2023 facilitated by BITC in Gaborone, the BGCEO participated as a panellist of the EU-Botswana Business Forum. The theme of the forum was 'The EU and Botswana Connecting Goods, People and Services for a Sustainable Future'. Mr. Mashabila engaged the global audience on the Thematic Panel 'Emerging the Mine-To-Market Value Chain in Botswana'. This was a great opportunity to posit BGI as a key player in the upstream mineral value chain.

#### ENGAGEMENT WITH THE PERMANENT SECRETARY, MINISTRY OF MINERALS AND ENERGY

The PS, MME hosted BGI on a courtesy visit by the CEO to engage on the health of the Institute and to present the BGI Strategy Business Plan 2023-2028. The Ministry offered relentless support through the newly appointed PS, Mr. Pelaelo Khowe.

#### ZAMBIA INTERNATIONAL MINING AND ENERGY CONFERENCE (ZIMEC) 2023

BGI participated in the Zambia International Mining and Energy Conference and Exhibition was held in Kitwe, Zambia, 1-3 November 2023. The conference was held under the theme 'Investing in Zambia, mine to market, clean energy, and sustainable development of future minerals'.

During the conference, BGI had an engagement with Zambia Geological Surveys (ZGS). Opportunities for collaboration exist for BGI and ZGS in areas of Geoscience data management, aerial surveys, geochemical surveys, critical minerals, core management and geological mapping. There are opportunities for technical skills exchange as evidenced by similarities in project undertakings by both BGI and Zambia Geological Surveys. Both institutions embrace the idea of signing an MOU to reinforce prospective areas for collaboration.

### NATURAL DIAMOND SUMMIT 2023

BGI participated in the Natural Diamond Summit 2023, represented by the office of the CEO. This is an annual event hosted by De Beers Group in collaboration with the Ministry of Minerals and Energy in Gaborone. BGI was invited as a key stakeholder in the natural diamond value chain.

### OACPS CONFERENCE IN ZAMBIA

The Office of the CEO was invited to represent the Ministry at an OACPS Conference in Zambia on 20th – 22nd November 2023. The CEO gave a talk and was a panellist for a session on critical elements required to advance national developmental and sectoral policies for OACPS countries to actively advance the global digital and green

transition.

### NATIONAL GEOCHEMICAL SURVEY STAKEHOLDER MANAGEMENT WORKSHOP

BGI conducted a one-day wider stakeholder management workshop on 29th November 2023 in Gaborone. The purpose of the workshop was to sensitise key stakeholders on the commencement of a National Geochemistry Survey, Phase I funded through the TNDP 12. The aim was to solicit input to deliver a comprehensive project. Stakeholders included representatives from research institutes, academia, exploration companies, regional and town planners, disciplined forces and other participants. The workshop benefit that was gained was awareness of the project expectations of which both the government, prospecting and mining sector will be tasked to participate in implementing the project.

**Table 4:** Tabulation BGI collaborations and partnerships

#	COLLABORATION PARTNER	FOCUS AREA OF PARTNERSHIP/OUT-COMES/ EXPECTATIONS	UPDATE
1.	Botswana Communication Regulatory Authority (BOCRA)	Resource sharing on using cybersecurity tools to augment cyberthreats. Capacity building on CIRT implementation processes. Promotion of technology transfer in partnerships with relevant international certified organisations	Security Incident Maturity Model was conducted which is tied to SIMS3 Cyber Security principles. Cybersecurity review of undertaken assessment on BGI network was conducted. Open-source cybersecurity tools are continually shared.
2.	Botswana International University of Science and Technology (BIUST)	Resource sharing in projects management and capacity building Research and Development of Technologies Promotion of technology transfer in partnership with relevant agencies. Project Specific Agreements Training and Manpower development 5 years period of Collaboration – Renewal clause – since 2018.	BIUST International Linkages Manager was formally appointed as part of the PSC for the Hatslatladi Project. The BIUST geoscience team concluded the first stage of the Hatslatladi field work. Manager IT/IS appointed as a team member for the BIUST satellite data collection user requirements exercise.



3.	IUGS Commission for the Management and Application of Geoscience Information (CGI) <a href="https://cgi-iugs.org">https://cgi-iugs.org</a>	Participates within the CGI working group towards developing and publishing data standards for mineral resources and mining information EarthResourceML. Collaborate with OGC-CGI working group for the geological data standard Geo-SciML. Collaborate with theme groups on implementing geoscience information standards as promoted by IUGS's for global Geological Surveys	Participated on documentation of geoscience data standardisations as used within organisational online platforms. BGI is a recognised member of CGI as shown on CGI website <a href="https://cgi-iugs.org">https://cgi-iugs.org</a> . Participated in the CGI meetings held in Windhoek and Shanghai (25-29/09 and 07-10/11) addressing implementation of data standards relating to interoperability and exchange of geoscience information, through collaborations, development and promotion of geoscience best practice.
4.	Botswana Institute of Technology, Research, and Innovation – (BITRI)	Undertake Research and Development of construction materials from locally occurring limestone. Identification of the existing limestone deposits, prospecting for new limestone deposits, sampling of limestones, investigation of the fit for purpose of prospected limestones in the production of clinker &/ or associated building materials products. Quantification of the fit-for-purpose of limestone resources, for the determination of the commercial viability for exploitation for various uses	Discussions towards implementation of NIGIS 5 conducted and agreements regarding the project ongoing. Collaborated on the symposium addressing Strengthening Research and Innovation Management (SRIM II). Collaboration for identification of critical ingredients for cement production jointly commenced to identify sites; including Mathathane where drilling will commence in Q1 2023/24. Drilling has not commenced due to delay in release of funds.
5.	Ministry of Communications, Knowledge, and Technology	Joint Agreement on REE research and training. Fully Account for the expenditure of the Project Funds using generally accepted accounting principles. Enter in its asset register all assets purchased with the Project Funds. Submit a Technical Report to the Sponsor (Annually).	BGI participated at a Science Week and Career Guidance. BGI presented a paper on REE to the IGARSS conference held in USA.
6.	University of Botswana	Economic Geology and Mineral Resources assessment. Acquisition, processing, analysis and interpretation of Geologic, geophysical, geochemical and remote sensing data. Geoinformatics and data integration. Joint Research, development, and training. Joint implementation of programmes and projects. Organise joint workshops, conferences, and symposia. Exchange of Scientists, scholars, and specialists. Exchange of scientific, scholarly, and technological information and documentation.	UB Geology HoD appointed and continue to support the ongoing Hatsatladi Project. UB participated in BGI Data Management workshop in preparation for the NIGIS 5 Project.

7.	BOTH0 University	Collaborative research Develop joint proposals for funding. Staff and Student exchange (Corporate Training) Student internship and learning support. Organise Joint Workshops, Conferences for knowledge sharing. Facilitation of BGI Staff training and capacity development.	Shared a webinar on available open publishing sites. Conducted student internship on ICT field.
8.	Japan Oil Gas and Metals National Corporation (JOGMEC)	Use of Remote Sensing for Geo-Exploration Capacity building. Joint project in Southeast of Botswana Mapping.	Draft NDA on data sharing shared with JOGMEC who are still to finalise. FY2023/2024 budget approved at 67 000 USD to conclude all ongoing projects.
9.	United States Geological Survey. (USGS)	Joint Research, development, and training. Joint implementation of programmes and projects. Economic Geology and Mineral Resources assessment. Acquisition, processing, analysis, and interpretation of Geologic, geophysical, geochemical, and remote sensing data Geoinformatics and data integration. Organise joint workshops, conferences, and symposia. Knowledge sharing and exchange of scientific, scholarly, and technological information and documentation.	Two collaborative meetings held with USGS to conclude the MoUs for broad partnership on geoscience projects and capacity building. Finalised plans to complete the current critical minerals prospectivity project. BGI also shared geoscience data for analysis. USGS project team visited Botswana during the quarter to conduct sampling.

Outlines status of affiliations governed through memoranda of Agreement, Agreement plans and memberships.





# **DATA AND INFORMATION FOCUS**

## DATA AND INFORMATION FOCUS

### COLLECTIONS SUBMISSION ANNUAL REPORT

BGI has deliberately moved towards leveraging custodianship of geoscience data for business sustainability. Collaboration has played a significant role in driving acquisition of geoscience data, notably third-party data on relinquished open prospecting reports with 2027 reports/BH data, Kraaipan core, and deposited to BGI holdings for public access. Notable acquisition was made from BGI projects including limestone core from the Semarule Project. All the noted acquisitions are available for public access. Review on pricing of data and associated services contributed to a BGI that derives income from its information products and services.

Information accessibility has improved through digitisation, enabling online search of our databases and downloadable reports when requested. Acquisition of reports and maps for the Northern Botswana Aeromagnetic Survey has positively impacted geoscience information availability leading to an increase in the range and currency of data available as it covers areas that previously were not mapped.

### Risk Management

In 2022/2023, the Institute continued to ensure that the control environment is performing optimally. A closer review of Enterprise Risk Management through a risk maturity assessment showed that the business was on an upward trajectory in risk performance. Highlights and areas of improvement were identified and are cited below.

### Risk Governance

An internal risk management committee (Enterprise Risk Management Committee) was set up.

All material risks were reported to BFARC through the ERM report on a quarterly basis.

A Combined Assurance Policy, Framework and Model were adopted and implemented, including implementation of Control Self-Assessment.

### Risk Management Resources

An additional risk professional was hired to strengthen capacity for the growing concerns in the control environment.

Three lines of defense model and combined assurance resources were identified. This was to ensure that the Board and Executive Management made informed decisions based on "one version of the truth".

### Risk Culture

Risk training sessions were carried out to inculcate a culture of risk management within the Institute. A risk culture assessment indicated that the Institute was at level two on the risk maturity scale.

### Risk Monitoring and Reporting

Significant risks and overdue findings were closely monitored by executive management.

Any material breaches of the Risk Appetite Statement (RAS) thresholds were continuously reported to the Board Committee through the quarterly ERM report.

The significant risks identified and monitored are cited below through the TOP 10 Risk Log;

No.	Risk Name	Risk Cause	Risk Mitigation/ Action Plans	Inherent Risk	Residual Risk
R1	Spread of COVID 19 in the workplace leading to;  1. Ill health 2. Loss of production time. 3. Delayed in service delivery and completion of projects	1.Congestion 2.Contact with infected surfaces 3.Airborne infection 4.Contact with infected people 5.No vaccination	1. Total elimination of sharing of office space and equipment. 2. Review remote working conditions as part of the HR Strategy	23	12



R2	<p>Loss of data and information leading to;</p> <p>1.Loss of revenue 2. Bad reputation 3.Loss of data integrity</p>	<p>1. Cybercrime / attacks 2.Corruption 3. System failure (obsolete infrastructure) 4. Malicious human activity 5.Natural Disasters (e.g.. fire) 6. Mishandling of Collections 7.Inappropriate disposal of collections.</p>	<p>1. Utilisation of cyber security techniques to protect systems and data 2. Conduct Data Protection Impact Assessment 3. Implement Data Protection Act 4. Seasonal clearing of repositories 5. Focused risk assessment and action plan development 6. Action Plan implementation</p>	23	14
R3	<p>Project delays / Project Failure leading to;</p> <p>1.Loss of stakeholder confidence 2. Existential threat 3. Reduction in geoscientific knowledge 4.Bad reputation.</p>	<p>1.No systematic project methodology. 2. Inadequate funding and slow implementation due to obsolete equipment.</p>	<p>1.Draft Project Management Policy. 2.To institutionalize a PMO 3. Setup PMO</p>	24	14
R4	<p>Limited breadth of technical skills leading to;</p> <p>1. Loss of stakeholder confidence 2.Delayed project completion</p>	<p>1.Skills gaps in the geoscience market. 2.Lack of exposure on specific relevant competencies.</p>	<p>1. Skills gap audit &amp; competency profiling 2. Develop research expertise 3.Local and Virtual Training</p>	23	14
R5	<p>Contamination of Samples leading to;</p> <p>1.Inaccurate results 2.Loss of investment in the exploration sector</p>	<p>Poor handling of samples during (sampling, transportation and preparation)</p>	<p>1.Provision of user-friendly jaw crusher that can easily be cleaned to avoid contamination of samples during preparation 2.Sampling QCQA Protocols and processes 3.Adherence to set standard on samples preparation and minimizing possible contamination</p>	21	12
R6	<p>Misinformation of Mineral Endowments of Botswana leading to;</p> <p>1.Bad Reputation 2. Low prospectivity ratings 4. Low FDI</p>	<p>1. Lack of geoscience Governance Protocols 2. Failure to follow reporting codes – JORC 3. Lack of Geoscience data 4. Inaccurate Geoscience data Incompetency</p>	<p>1. Compliance to Data Management Policy 2. Data base Audits 3. Training on reporting codes 4. Professional registrations</p>	23	14
R7	<p>Disengaged, disgruntled and demotivated employees leading to;</p> <p>1. Low productivity 2.Low organisation performance 3.Loss of investor and shareholder confidence</p>	<p>1.Misaligned structure to strategy. 2.Corporate culture.</p>	<p>1.Engagement Survey and Implementation Plan. 2. Harmonious monitoring of industrial relations. 3. Conduct High Performance Organisation Readiness Survey.</p>	17	14

R8	<p>Insufficient funding for the strategy and operations leading to;</p> <ol style="list-style-type: none"> <li>1. Failure to achieve BGI mandate</li> <li>2. Poor service delivery</li> <li>3. Loss of business</li> </ol>	<ol style="list-style-type: none"> <li>1. Limited financial resource streams.</li> <li>2. Unplanned research projects</li> <li>3. Budget cuts</li> <li>4. No seed funding for revenue generation.</li> </ol>	<ol style="list-style-type: none"> <li>1. Implement Financial Resourcing Plan.</li> <li>2. Identify revenue streams &amp; collaborative projects.</li> <li>3. Improve cost efficiency measures.</li> <li>4. Build business case for BGI funding.</li> <li>5. Prioritise and Implement commercialisation initiatives.</li> </ol>	21	14
R9	<p>Inadequate and/or slow technology adoption leading to; limited productivity, incompatibility of historical outputs and loss of customer goodwill.</p>	<ol style="list-style-type: none"> <li>1. Insufficient investment due to limited budget.</li> <li>2. Limited awareness about new technologies.</li> </ol>	<ol style="list-style-type: none"> <li>1. Utilisation of collaborative platforms.</li> <li>2. Implement cost effective measures such as Open Source.</li> <li>3. Corporate Budget Prioritisation &amp; commercialisation.</li> <li>4. Build integrated technology platforms.</li> <li>5. Collaborate with partners to co-fund, support, and execute the ICT Strategy.</li> </ol>	17	9
R10	<p>Failure to Accredite Labs due to leading to</p> <ol style="list-style-type: none"> <li>1. Harmed reputation</li> <li>2. Loss of confidence in BGI products</li> <li>3. Limited research capabilities.</li> <li>4. Failure to attract business.</li> </ol>	<ol style="list-style-type: none"> <li>1. Equipment/facility breakdown</li> <li>2. Aging equipment.</li> <li>3. Inability to implement Quality Management System (QMS): ISO17025 Requirements.</li> </ol>	<p>Develop &amp; implement Accreditation Plan. Equipment/facility maintenance plans. Capacity building. Proficiency Testing. ISO Certification.</p>	21	18

### Business Resilience

The institute continued to focus on employee safety through identification of hazard and coming up with interventions.

The Business Continuity Policy Framework was developed and approved. Cascading to business units is ongoing to enable development of departmental BCPs.

Disaster Recovery Site is operational to ensure that in case of a disaster the institute is able to recover within the shortest possible time and this will ensure continuous service to clients.

The institute has worked with strategic partners such as the Lobatse Town Council to train staff members on fire drills and first aid. Further investments have been made on fire suppression system to ensure that material assets are not lost in case of a fire disaster.





# **MANAGEMENT OF HUMAN CAPABILITY AND ADMINISTRATION**



## MANAGEMENT OF HUMAN CAPABILITY AND ADMINISTRATION

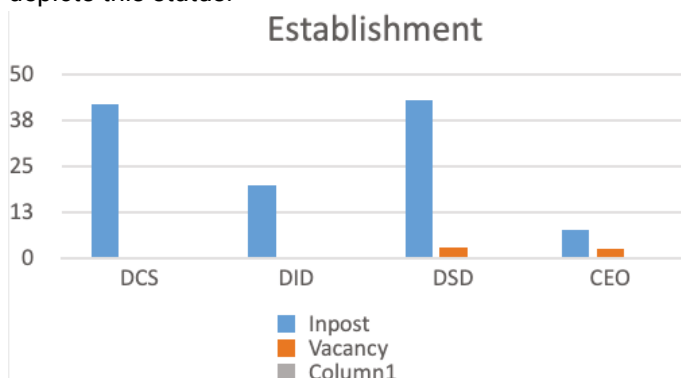
### HUMAN RESOURCES AND ADMINISTRATION

#### Introduction

Botswana Geoscience Institute recognize the importance of its employees in today's business environment hence endeavours to have finest staff who are high performers and well trained to drive the achievement of the Institute mandate. In managing the workforce, BGI strives to align with the existing labour/employment laws.

#### Talent Acquisition and Retention

The Institute talent acquisition exercise focused on long term human resources planning and finding appropriate candidates for positions within the Institute. At the start of the year, 118 positions were funded and 113 of these were filled while 5 positions were vacant. Figure 1 below depicts this status.



#### Staff Retention/Turnover

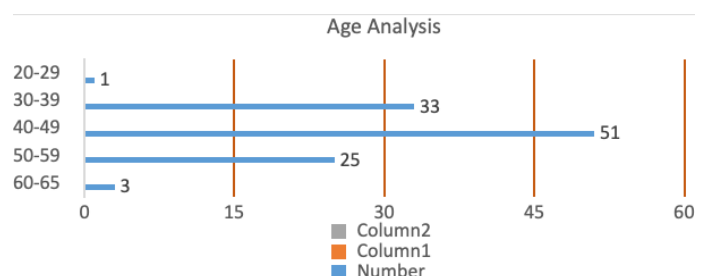
The fiscal year 2022/2023 closed with a Staff retention rate of 96% recorded against a target of 97%. The rate is 2% less than the rate recorded for the last financial year and it is attributable to the voluntary exits by staff which obtains amongst the technical staff.

#### Youth Engagement

As part of youth empowerment in the Geoscience space and other fields within the Institute and in line with the Government's commitment towards youth (Vision 2036), the Institute hosted fourteen (14) interns and four (4) Tirelo Sechaba Participants (TSPs). The intention of this initiative is to equip youth with the necessary knowledge and skills in their respective career paths to ready them for the market.

#### Gender and Analysis

It is inevitable to refer to gender analysis in the workplace because workplace gender equality is associated not only with improved national productivity, economic growth or increased organizational performance but it is also used as a tool to attract talent and retain employees. BGI has made strides in this space. Out of one hundred and thirteen (113) employees in-post at the closure of the year, thirty-one (31) were women and this translated to 27%. Further, the Institute notes the importance of age diversity in the workplace as it improves performance through the existing skillsets hence the decision to monitor it. Figure 4 and 5 demonstrates the current age diversity in the Institute for the period under review.



#### Performance Management

The process of performance management continues to be relevant in the management of the Institute. Specifically, it is essential to build workforce excellence that is required to achieve the Institute's objectives. An effective exercise is under pinned by a strong performance culture supported by individual employees together with management capabilities and accountability. The Institute management continues to place great emphasis in monitoring employee performance.

#### Training and Development

Employee training and development has long been a key element in the Institute as it is primarily intended to close performance gaps, these include gaps identified in critical skills such as research and project management. The two sets of skills are important to the Institute for its research work and the implementation is through short and term long-term training, Donor Funded scholarships and parttime studies. The Institute further collaborated with other institutions such as JOGMEG, CTBT, BIUST, BITRI and the Ministry of Communication, Knowledge, and Technology in order to strengthen research capabilities.

#### Employee Relations

The Institute's collaborative relationship with the Union has been instrumental in the employee/employer relations space and this is evident in the number of critical issues that the two parties have considered and concluded during the period under review. Specifically, the productive negotiations and mutually beneficial collective agreements on issues such as grievance resolution and the establishment of BGI pension fund.



### Safety, Health and Environment

Health and wellness of staff underpin the Institute's ability to achieve its strategic goals. In recognizing this, the Institute aligned its health and wellness strategy with its new operating model. This is intended to create a conducive and enabling environment where employees are empowered and engaged. Within the SHE spaces the following were implemented:

- Staff health screening
- Fire Drills
- Fire Marshall training

And the Institute recorded one (1) safety incidence.



**Botswana  
Geoscience  
Institute**  
Excellence in Geoscience

**BOTSWANA GEOSCIENCE INSTITUTE  
ANNUAL FINANCIAL STATEMENTS  
FOR THE YEAR ENDED 31<sup>ST</sup> MARCH 2023**





**BOTSWANA GEOSCIENCE INSTITUTE**  
**Annual Financial Statements for the year ended 31 March 2023**  
**General Information**

<b>Country of incorporation and domicile</b>	Botswana	
<b>Nature of business and principal activities</b>	Responsible for research in the field of geosciences, providing specialised geoscientific services and promoting the search for, and exploration of any minerals in Botswana.	
<b>Directors</b>	Prof. Motsotse Modisi	Chairperson of the Board
	Dr. Sebusi Oditse	Deputy Chairperson of the Board
	Ms. Tebogo Mmoshe	Member
	Ms. Ontlametse Mokopakgosi	Member
	Ms. Bogadi Mathangwane	Member
	Mr. Ogone M. Gaboutloeloe	Member
	Mr. Harold Van Zyl	Member
	Mr. Thabo Balopi	Member
	Mr. Olefile C. Mashabila	Chief Executive Officer
	Mr. Othusitse Lebuletswe	Co-opted Member
	Ms. Portia Nnuku-Basaakane	Co-opted Member
	Mr. Sipho Mbebe	Co-opted Member
<b>Registered office</b>	Plot 11566 Khama 1 Avenue Lobatse	
<b>Postal address</b>	Private Bag 14 Lobatse	
<b>Bankers</b>	First National Bank Botswana Limited Botswana Savings Bank	
<b>Auditors</b>	Mazars Certified Auditors	
<b>Board Secretary</b>	Chandapiwa Mogobe (Acting)	

## **BOTSWANA GEOSCIENCE INSTITUTE**

### **Annual Financial Statements for the year ended 31 March 2023**

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The reports and statements set out below comprise the annual financial statements presented to the shareholder:	<b>Page</b>
Board Members Approval	82
Independent auditors report	83 - 85
Statement Of Financial Position	86
Statement Of Financial Performance	87
Statement Of Changes In Funds	88
Statement Of Cash Flows	89
Accounting Policies	90 - 96
Notes of The Annual Financial Statements	97 - 106
The following supplementary information does not form part of the annual financial statements and is unaudited:	
Detailed Income Statement	107 - 108



## **BOTSWANA GEOSCIENCE INSTITUTE**

### **Annual Financial Statements for the year ended 31 March 2023**

#### **Members of Board Responsibilities and Approval**

The Members of Board are required in terms of the Botswana Geoscience Institute Act, No. 29 of 2014 to maintain adequate accounting records and are responsible for the content and integrity of the annual financial statements and related financial information included in this report. It is their responsibility to ensure that the annual financial statements fairly present the state of affairs of the institute as at the end of the financial year and the results of its operations and cash flows for the period then ended, in conformity with International Financial Reporting Standards. The external auditors are engaged to express an independent opinion on the annual financial statements.

The annual financial statements are prepared in accordance with International Financial Reporting Standards and are based upon appropriate accounting policies consistently applied and supported by reasonable and prudent judgements and estimates.

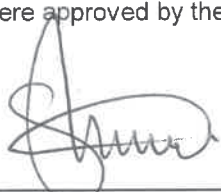
The Members of the Board acknowledge that they are ultimately responsible for the system of internal financial control established by the institute and place considerable importance on maintaining a strong control environment. To enable the Members of the Board to meet these responsibilities, the board set standards for internal control aimed at reducing the risk of error or loss in a cost-effective manner. The standards include the proper delegation of responsibilities within a clearly defined framework, effective accounting procedures and adequate segregation of duties to ensure an acceptable level of risk. These controls are monitored throughout the institute and all employees are required to maintain the highest ethical standards in ensuring the institute's business is conducted in a manner that in all reasonable circumstances is above reproach. The focus of risk management in the institute is on identifying, assessing, managing and monitoring all known forms of risk across the institute. While operating risk cannot be fully eliminated, the institute endeavours to minimise it by ensuring that appropriate infrastructure, controls, systems and ethical behaviour are applied and managed within predetermined procedures and constraints.

The Members of the Board are of the opinion, based on the information and explanations given by management, that the system of internal control provides reasonable assurance that the financial records may be relied on for the preparation of the annual financial statements. However, any system of internal financial control can provide only reasonable, and not absolute, assurance against material misstatement or loss.

The Members of the Board have reviewed the institute's cash flow forecast for the year to 31 March 2024 and, in light of this review and the current financial position, they are satisfied that the institute has or had access to adequate resources to continue in operational existence for the foreseeable future. The institute is in a net deficit position and intends to mitigate these deficits in the next fiscal years.

The external auditors are responsible for independently auditing and reporting on the institute's annual financial statements. The annual financial statements have been examined by the institute's external auditors and their report is presented on pages 4 to 6.

The annual financial statements set out on pages 7 to 27, which have been prepared on the going concern basis, were approved by the Board on .....14/08/2023..... and were signed on their behalf by:



**Mr. Olefile C. Mashabila**



**Prof. Motsotse Modisi**



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Email: gbe.info@mazars.co.bw  
www.mazars.co.bw

## INDEPENDENT AUDITOR'S REPORT

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### To the Members of Botswana Geoscience Institute

#### Opinion

We have audited the annual financial statements of Botswana Geoscience Institute set out on pages 7 to 27, which comprise the statement of financial position as at 31 March 2023, statement of financial performance, statement of changes in funds and statement of cash flows for the year then ended, and notes to the annual financial statements, including a summary of significant accounting policies.

In our opinion, the annual financial statements present fairly, in all material respects, the financial position of Botswana Geoscience Institute as at 31 March 2023, and its financial performance and cash flows for the year then ended in accordance with International Financial Reporting Standards.

#### Basis for Opinion

We conducted our audit in accordance with International Standards on Auditing (ISAs). Our responsibilities under those standards are further described in the Auditor's Responsibilities for the Audit of the financial statements section of our report. We are independent of the institute in accordance with the International Ethics Standards Board for Accountants Code of Ethics for Professional Accountants (Part A and B) (IESBA Code) and other independence requirements applicable to performing audits of financial statements in Botswana. We have fulfilled our ethical responsibilities in accordance with the IESBA Code and in accordance with other ethical requirements applicable to performing audits in Botswana. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

#### Material Uncertainty Related to Going Concern

We draw attention to Note 18 to the annual financial statements, which indicates that the institute incurred a net deficit of P7,147,834 during the year ended 31 March 2023 (P3,250,634 in the previous year). As of that date the entity's current liabilities exceeded its current assets by P3,607,550 (current assets exceeded current liabilities in the previous year by P3,540,285). The note states that these events or conditions, along with other matters as set forth in Note 18 to the annual financial statements, indicate that a material uncertainty exists that may cast significant doubt on the institute's ability to continue as a going concern. Our opinion is not modified in respect of this matter.



## INDEPENDENT AUDITOR'S REPORT

### Key Audit Matters

Key audit matters are those matters that, in our professional judgement, were of most significance in our audit of the annual financial statements of the current period. These matters were addressed in the context of our audit of the annual financial statements as a whole, and in forming our opinion thereon, and we do not provide a separate opinion on these matters.

In addition to the matter described in the Material Uncertainty Related to Going Concern section, we have determined the matters described below to be the key audit matters to be communicated in our report.

### Key audit matter

#### Impairment of Asset Held for Sale

IFRS 5 require that an entity shall recognize an impairment loss for any initial or subsequent write-down of the asset (or disposal group) to fair value less costs to sell, see Note 1.4.

At year end the entity had assets which were transferred as held for sale with a cost value of BWP4,257,800, see Note 8. The carrying amount of these assets may have not considered the fact that these assets may have been impaired. This was considered as a key audit matter because determining the fair value of these assets may require judgement therefore the financial statements may contain misstatements due to that reason.

#### How the audit addressed the KAM

In addressing the key audit matter, we have performed the following procedures:

- Evaluated the assets transferred to non-current assets held for sale in line with applicable IFRS to determine if the assets meet the conditions to be classified as such.
- Performed an impairment test by comparing the carrying value of asset held for sale with the fair value less cost to sell to see if the balance in the financial statements is not overstated.
- Evaluated the fair value of the assets basing on various assumptions used to ensure that the fair value used for the assessment is reasonable and consistent with IFRS 13, Fair value measurements.
- We evaluated the financial statements to determine if the amount for non-current asset held for sale is properly presented and disclosed in the financial statements.

### Other Information

The Members of Board are responsible for the other information. The other information comprises the detailed income statement set out on pages 28 to 29. The other information does not include the annual financial statements and our auditor's report thereon.

Our opinion on the annual financial statements does not cover the other information and we do not express an audit opinion or any form of assurance conclusion thereon.

In connection with our audit of the annual financial statements, our responsibility is to read the other information and, in doing so, consider whether the other information is materially inconsistent with the annual financial statements or our knowledge obtained in the audit, or otherwise appears to be materially misstated. If, based on the work we have performed, we conclude that there is a material misstatement of this other information, we are required to report that fact. We have nothing to report in this regard.

### Responsibilities of the Directors for the Annual Financial Statements

The Members of Board are responsible for the preparation and fair presentation of the annual financial statements in accordance with International Financial Reporting Standards and for such internal control as the members determine is necessary to enable the preparation of annual financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the annual financial statements, the Members of Board are responsible for assessing the institute's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless the Members of Board either intend to liquidate the institute or to cease operations, or have no realistic alternative but to do so.

## INDEPENDENT AUDITOR'S REPORT

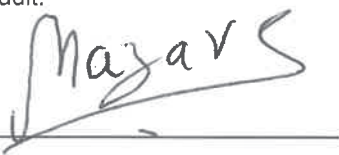
### Auditor's Responsibilities for the Audit of the Annual Financial Statements

Our objectives are to obtain reasonable assurance about whether the annual financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with International Standards on Auditing will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these annual financial statements.

As part of an audit in accordance with International Standards on Auditing, we exercise professional judgement and maintain professional scepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the annual financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the institute's internal control.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by the members of board.
- Conclude on the appropriateness of the Members of Board use of the going concern basis of accounting and based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the institute's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the annual financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the institute to cease to continue as a going concern.
- Evaluate the overall presentation, structure and content of the annual financial statements, including the disclosures, and whether the annual financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

We communicate with the Members of Board regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.



**Mazars**  
**Certified Auditors**  
**Devaprasad Arakkal (CAP 0036 2023)**

Date..... 20/09/2023  
**Gaborone**



**BOTSWANA GEOSCIENCE INSTITUTE**  
**Annual Financial Statements for the year ended 31 March 2023**  
**Statement of Financial Position as at 31 March 2023**

Figures in Pula	Note	2023	2022
<b>Assets</b>			
<b>Non-Current Assets</b>			
Property, plant and equipment	3	182,930,404	191,414,469
Intangible assets	4	556,870	1,428,986
		<b>183,487,274</b>	<b>192,843,455</b>
<b>Current Assets</b>			
Inventories	5	241,658	306,964
Trade and other receivables	6	243,214	372,522
Cash and cash equivalents	7	12,243,466	18,801,683
		<b>12,728,338</b>	<b>19,481,169</b>
Non-current assets held for sale	8	2,144,701	-
<b>Total Assets</b>		<b>198,360,313</b>	<b>212,324,624</b>
<b>Funds and Liabilities</b>			
<b>Funds</b>			
Accumulated surplus (deficit)		(3,607,547)	3,540,287
<b>Liabilities</b>			
<b>Non-Current Liabilities</b>			
Deferred - Capital Grants	9	185,631,972	192,843,453
<b>Current Liabilities</b>			
Trade and other payables	10	9,703,314	13,742,846
Deferred Income - Other Grants	11	6,632,574	2,198,038
		<b>16,335,888</b>	<b>15,940,884</b>
<b>Total Liabilities</b>		<b>201,967,860</b>	<b>208,784,337</b>
<b>Total Funds and Liabilities</b>		<b>198,360,313</b>	<b>212,324,624</b>

**BOTSWANA GEOSCIENCE INSTITUTE**  
**Annual Financial Statements for the year ended 31 March 2023**  
**Statement of Financial Performance**

Figures in Pula	Note	2023	2022
Grant Income	12	64,301,207	73,061,492
Other operating income	13	9,489,632	9,455,782
Other operating gains (losses)	14	24,470	(86,522)
Other operating expenses		(81,070,308)	(85,844,001)
<b>Operating deficit</b>	15	<b>(7,254,999)</b>	<b>(3,413,249)</b>
Investment income	16	107,165	162,615
<b>Deficit for the year</b>		<b>(7,147,834)</b>	<b>(3,250,634)</b>



**BOTSWANA GEOSCIENCE INSTITUTE**  
**Annual Financial Statements for the year ended 31 March 2023**  
**Statement of Changes in Funds**

Figures in Pula	Accumulated surplus (deficit)	Total Funds
Balance at 01 April 2021	6,790,921	6,790,921
Deficit for the year	(3,250,634)	(3,250,634)
Balance at 01 April 2022	3,540,287	3,540,287
Deficit for the year	(7,147,834)	(7,147,834)
Balance at 31 March 2023	(3,607,547)	(3,607,547)

**BOTSWANA GEOSCIENCE INSTITUTE**  
**Annual Financial Statements for the year ended 31 March 2023**  
**Statement of Cash Flows**

Figures in Pula	Note	2023	2022
<b>Cash flows from operating activities</b>			
Deficit for the year		(7,147,834)	(3,250,634)
<b>Adjustments for:</b>			
Depreciation and amortisation (Note 3&4)		7,567,054	7,804,722
Losses (gains) on disposals, scrappings and settlements of assets and liabilities		(24,470)	86,522
Interest received		(107,165)	(162,615)
Impairment losses and reversals (Note 8)		732,051	-
Movement in deferred income - capital grants		(7,211,479)	(6,148,122)
<b>Changes in working capital:</b>			
Inventories		65,306	138,461
Trade and other receivables		129,308	560,390
Trade and other payables		(4,039,534)	231,197
Deferred Income - Other Grants		4,434,536	(1,803,106)
<b>Cash generated from (used in) operations</b>		<b>(5,602,227)</b>	<b>(2,543,185)</b>
Interest income		107,165	162,615
<b>Net cash from operating activities</b>		<b>(5,495,062)</b>	<b>(2,380,570)</b>
<b>Cash flows from investing activities</b>			
Purchase of property, plant and equipment	3	(1,087,625)	(1,932,241)
Sale of property, plant and equipment	3	24,470	219,688
Purchase of other intangible assets	4	-	(30,567)
<b>Net cash from investing activities</b>		<b>(1,063,155)</b>	<b>(1,743,120)</b>
<b>Total cash movement for the year</b>		<b>(6,558,217)</b>	<b>(4,123,690)</b>
Cash at the beginning of the year		18,801,683	22,925,373
<b>Total cash at end of the year</b>	7	<b>12,243,466</b>	<b>18,801,683</b>



## **BOTSWANA GEOSCIENCE INSTITUTE**

### **Annual Financial Statements for the year ended 31 March 2023**

#### **Accounting Policies**

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#### **1. Significant accounting policies**

The principal accounting policies applied in the preparation of these annual financial statements are set out below.

##### **1.1 Basis of preparation**

The annual financial statements have been prepared on the going concern basis in accordance with, and in compliance with, International Financial Reporting Standards ("IFRS") and International Financial Reporting Standards Interpretations Committee ("IFRS IC") interpretations issued and effective at the time of preparing these annual financial statements.

The annual financial statements have been prepared on the historic cost convention, unless otherwise stated in the accounting policies which follow and incorporate the principal accounting policies set out below. They are presented in Pulas, which is the institute's functional currency.

These accounting policies are consistent with the previous period.

##### **1.2 Significant judgements and sources of estimation uncertainty**

The preparation of annual financial statements in conformity with IFRS requires management, from time to time, to make judgements, estimates and assumptions that affect the application of policies and reported amounts of assets, liabilities, income and expenses. These estimates and associated assumptions are based on experience and various other factors that are believed to be reasonable under the circumstances. Actual results may differ from these estimates. The estimates and underlying assumptions are reviewed on an ongoing basis. Revisions to accounting estimates are recognized in the period in which the estimates are revised and in any future periods affected.

##### **Critical judgements in applying accounting policies**

Board members did not make critical judgements in the application of accounting policies, apart from those involving estimations, which significantly affect the financial statements.

##### **Key sources of estimation uncertainty**

##### **Useful lives of property, plant and equipment**

The Institute reviews the estimated useful lives of property, plant and equipment when changing circumstances indicate that they may have changed since the most recent reporting date. During the current year, the members determined that the useful lives of certain items of surveillance equipment should be shortened, due to developments in technology.

##### **1.3 Property, plant and equipment**

Property, plant and equipment are tangible assets which the company holds for its own use or for rental to others and which are expected to be used for more than one year.

An item of property, plant and equipment is recognized as an asset when it is probable that future economic benefits associated with the item will flow to the company, and the cost of the item can be measured reliably.

Property, plant and equipment is initially measured at cost. Cost includes all of the expenditure which is directly attributable to the acquisition or construction of the asset.

Expenditure incurred subsequently for major services, additions to or replacements of parts of property, plant and equipment are capitalized if it is probable that future economic benefits associated with the expenditure will flow to the company and the cost can be measured reliably. Day to day servicing costs are included in profit or loss in the year in which they are incurred.

Property, plant and equipment is subsequently stated at cost less accumulated depreciation and any accumulated impairment losses, except for land which is stated at cost less any accumulated impairment losses.

## **BOTSWANA GEOSCIENCE INSTITUTE**

### **Annual Financial Statements for the year ended 31 March 2023**

#### **Accounting Policies**

#### **1.3 Property, plant and equipment (continued)**

Depreciation of an asset commences when the asset is available for use as intended by management. Depreciation is charged to write off the asset's carrying amount over its estimated useful life to its estimated residual value, using a method that best reflects the pattern in which the asset's economic benefits are consumed by the company. Leased assets are depreciated in a consistent manner over the shorter of their expected useful lives and the lease term. Depreciation is not charged to an asset if its estimated residual value exceeds or is equal to its carrying amount. Depreciation of an asset ceases at the earlier of the date that the asset is classified as held for sale or derecognized.

The useful lives of items of property, plant and equipment have been assessed as follows:

Item	Depreciation method	Average useful life
Buildings	Straight line	50 years
Plant and machinery	Straight line	6-7 years
Furniture and fixtures	Straight line	10 years
Motor vehicles	Straight line	5 years
Office equipment	Straight line	4-20 years
Laboratory equipment and instruments	Straight line	15 years

The residual value, useful life and depreciation method of each asset are reviewed at the end of each reporting year. If the expectations differ from previous estimates, the change is accounted for prospectively as a change in accounting estimate.

Each part of an item of property, plant and equipment with a cost that is significant in relation to the total cost of the item is depreciated separately.

The depreciation charge for each year is recognized in profit or loss unless it is included in the carrying amount of another asset.

Impairment tests are performed on property, plant and equipment when there is an indicator that they may be impaired. When the carrying amount of an item of property, plant and equipment is assessed to be higher than the estimated recoverable amount, an impairment loss is recognized immediately in profit or loss to bring the carrying amount in line with the recoverable amount.

An item of property, plant and equipment is derecognized upon disposal or when no future economic benefits are expected from its continued use or disposal. Any gain or loss arising from the derecognition of an item of property, plant and equipment, determined as the difference between the net disposal proceeds, if any, and the carrying amount of the item, is included in profit or loss when the item is derecognized.

#### **1.4 Non-current assets (disposal groups) held for sale**

Non-current assets and disposal groups are classified as held for sale if their carrying amount will be recovered through a sale transaction rather than through continuing use. This condition is regarded as met only when the sale is highly probable and the asset (or disposal group) is available for immediate sale in its present condition. Management must be committed to the sale, which should be expected to qualify for recognition as a completed sale within one year from the date of classification.

Non-current assets (or disposal groups) held for sale (distribution to owners) are measured at the lower of their carrying amount and fair value less costs to sell.

A non-current asset is not depreciated (or amortised) while it is classified as held for sale (held for distribution to owners), or while it is part of a disposal group classified as such.



## **BOTSWANA GEOSCIENCE INSTITUTE**

### **Annual Financial Statements for the year ended 31 March 2023**

#### **Accounting Policies**

#### **1.4 Non-current assets (disposal groups) held for sale (continued)**

Non-current assets (or disposal groups) are classified as assets held for sale when their carrying amount is to be recovered principally through a sale transaction and a sale is considered highly probable. They are stated at the lower of the carrying amount and fair value less costs to sell unless the assets are investment properties measured at fair value or financial assets in the scope of IFRS 9 in which case they are measured in accordance with those standards. Once classified as held for sale, the assets are not subject to depreciation or amortisation.

#### **1.5 Intangible assets**

An intangible asset is recognized when:

- it is probable that the expected future economic benefits that are attributable to the asset will flow to the entity; and
- the cost of the asset can be measured reliably.

Intangible assets are initially recognized at cost.

Intangible assets are carried at cost less any accumulated amortisation and any impairment losses.

The amortisation period and the amortisation method for intangible assets are reviewed every period-end. Changes in the expected useful life or the expected pattern of consumption of future economic benefits embodied in the asset are considered to modify the amortisation period or method, as appropriate and are treated as changes in accounting estimates. The amortisation expense on intangible assets with finite lives is recognized in the statement of profit or loss in the expense.

An intangible assets is derecognized upon disposal (i.e., at the date the recipient obtains control) or when no future economic benefits are expected from its use or disposal. Any gain or loss arising upon derecognition of the asset (calculated as the difference between the net disposal proceeds and the carrying amount of the asset) is included in the statement of profit or loss.

Amortisation is provided to write down the intangible assets, on a straight line basis, to their residual values as follows:

<b>Item</b>	<b>Depreciation method</b>	<b>Average useful life</b>
Computer software	Straight line	10 years

#### **1.6 Financial instruments**

Financial instruments held by the institute are classified in accordance with the provisions of IFRS 9 Financial Instruments.

Broadly, the classification possibilities, which are adopted by the institute, as applicable, are as follows:

Financial assets which are equity instruments:

- Mandatorily at fair value through profit or loss; or

Financial assets which are debt instruments:

- Amortised cost. (This category applies only when the contractual terms of the instrument give rise, on specified dates, to cash flows that are solely payments of principal and interest on principal, and where the instrument is held under a business model whose objective is met by holding the instrument to collect contractual cash flows); or
- Mandatorily at fair value through profit or loss.

Financial liabilities:

- Amortised cost; or

Note 21 Financial instruments and risk management presents the financial instruments held by the institute based

## **BOTSWANA GEOSCIENCE INSTITUTE**

### **Annual Financial Statements for the year ended 31 March 2023**

#### **Accounting Policies**

---

#### **1.6 Financial instruments (continued)**

All regular way purchases or sales of financial assets are recognized and derecognized on a trade date basis. Regular way purchases or sales are purchases or sales of financial assets that require delivery of assets within the time frame established by regulation or convention in the marketplace.

The specific accounting policies for the classification, recognition and measurement of each type of financial instrument held by the institute are presented below:

##### **Trade and other receivables**

###### **Classification**

Trade and other receivables, excluding, when applicable, VAT and prepayments, are classified as financial assets subsequently measured at amortised cost (Note 6).

They have been classified in this manner because their contractual terms give rise, on specified dates to cash flows that are solely payments of principal and interest on the principal outstanding, and the institute's business model is to collect the contractual cash flows on trade and other receivables.

###### **Recognition and measurement**

Trade and other receivables are recognized when the institute becomes a party to the contractual provisions of the receivables. They are measured, at initial recognition, at fair value plus transaction costs, if any.

They are subsequently measured at amortised cost.

The amortised cost is the amount recognized on the receivable initially, minus principal repayments, plus cumulative amortisation (interest) using the effective interest method of any difference between the initial amount and the maturity amount, adjusted for any loss allowance.

###### **Impairment**

The institute does not recognize a loss allowance for expected credit losses on trade and other receivables, as receivables are insignificant compared to income.

###### **Write off policy**

The Institute writes off a receivable when there is information indicating that the counterparty is in severe financial difficulty and there is no realistic prospect of recovery, e.g. when the counterparty has been placed under liquidation or has entered into bankruptcy proceedings. Receivables written off may still be subject to enforcement activities under the institute recovery procedures, taking into account legal advice where appropriate. Any recoveries made are recognized in profit or loss.

###### **Derecognition**

Refer to the derecognition section of the accounting policy for the policies and processes related to derecognition.



## **BOTSWANA GEOSCIENCE INSTITUTE**

### **Annual Financial Statements for the year ended 31 March 2023**

#### **Accounting Policies**

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#### **1.6 Financial instruments (continued)**

##### **Trade and other payables**

##### **Classification**

Trade and other payables (Note 10), excluding VAT and amounts received in advance, are classified as financial liabilities subsequently measured at amortised cost.

##### **Recognition and measurement**

They are recognized when the institute becomes a party to the contractual provisions, and are measured, at initial recognition, at fair value plus transaction costs, if any.

They are subsequently measured at amortised cost using the effective interest method.

The effective interest method is a method of calculating the amortised cost of a financial liability and of allocating interest expense over the relevant period. The effective interest rate is the rate that exactly discounts estimated future cash payments (including all fees and points paid or received that form an integral part of the effective interest rate, transaction costs and other premiums or discounts) through the expected life of the financial liability, or (where appropriate) a shorter period, to the amortised cost of a financial liability.

If trade and other payables contain a significant financing component, and the effective interest method results in the recognition of interest expense, then it is included in profit or loss in finance costs.

Trade and other payables expose the institute to liquidity risk and possibly to interest rate risk. Refer to Note 21 for details of risk exposure and management thereof.

##### **Derecognition**

Refer to the "derecognition" section of the accounting policy for the policies and processes related to derecognition.

##### **Cash and cash equivalents**

Cash and cash equivalents are stated at carrying amount which is deemed to be fair value.

##### **Derecognition**

##### **Financial assets**

The institute derecognizes a financial asset only when the contractual rights to the cash flows from the asset expire, or when it transfers the financial asset and substantially all the risks and rewards of ownership of the asset to another party. If the institute neither transfers nor retains substantially all the risks and rewards of ownership and continues to control the transferred asset, the institute recognizes its retained interest in the asset and an associated liability for amounts it may have to pay. If the institute retains substantially all the risks and rewards of ownership of a transferred financial asset, the institute continues to recognize the financial asset and also recognizes a collateralized borrowing for the proceeds received.

##### **Financial liabilities**

The institute derecognizes financial liabilities when, and only when, the institute obligations are discharged, cancelled or they expire. The difference between the carrying amount of the financial liability derecognized and the consideration paid and payable, including any non-cash assets transferred or liabilities assumed, is recognized in profit or loss.

## **BOTSWANA GEOSCIENCE INSTITUTE**

### **Annual Financial Statements for the year ended 31 March 2023**

#### **Accounting Policies**

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#### **1.7 Inventories**

Inventories are measured at the lower of cost and net realisable value.

The cost of inventories is assigned using the first-in, first-out (FIFO) formula.

#### **1.8 Impairment of assets**

The institute assesses at each end of the reporting period whether there is any indication that an asset may be impaired. If any such indication exists, the institute estimates the recoverable amount of the asset.

If there is any indication that an asset may be impaired, the recoverable amount is estimated for the individual asset. If it is not possible to estimate the recoverable amount of the individual asset, the recoverable amount of the cash-generating unit to which the asset belongs is determined.

The recoverable amount of an asset or a cash-generating unit is the higher of its fair value less costs to sell and its value in use.

If the recoverable amount of an asset is less than its carrying amount, the carrying amount of the asset is reduced to its recoverable amount. That reduction is an impairment loss.

An impairment loss of assets carried at cost less any accumulated depreciation or amortisation is recognized immediately in profit or loss. Any impairment loss of a revalued asset is treated as a revaluation decrease.

A reversal of an impairment loss of assets carried at cost less accumulated depreciation or amortisation other than goodwill is recognized immediately in profit or loss.

#### **1.9 Employee benefits**

##### **Severance and gratuity benefits**

Contract employees are entitled to severance pay in accordance with the terms specified in the Botswana Employment Act, and gratuity in terms of their employment contracts. Severance and gratuity benefits are recognized at the end of each financial period as they are accrued and a provision made equal to the liability estimated as the employees renders service to the institute up to the period end.

#### **1.10 Government grants**

Government grants are recognized when there is reasonable assurance that:

- the institute will comply with the conditions attaching to them; and
- the grants will be received.

Government grants are recognized as income over the periods necessary to match them with the related costs that they are intended to compensate.

A government grant that becomes receivable as compensation for expenses or losses already incurred or for the purpose of giving immediate financial support to the entity with no future related costs is recognized as income of the period in which it becomes receivable.

Government grants related to assets, including non-monetary grants at fair value, are presented in the statement of financial position by setting up the grant as deferred income or by deducting the grant in arriving at the carrying amount of the asset.

Grants related to income are presented as a credit in the profit or loss in the statement of comprehensive income presented as a credit in the profit or loss (separately).



## **BOTSWANA GEOSCIENCE INSTITUTE**

### **Annual Financial Statements for the year ended 31 March 2023**

#### **Accounting Policies**

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#### **1.11 Income Tax**

The institute is a not for profit organisation and its income is exempt from income tax.

#### **1.12 Related parties**

Parties are considered to be related if one party has the ability to control or jointly control the other party or exercise significant influence over the other party in making financial and operating decisions. Key management personnel are also regarded as related parties. Key management personnel are those persons having authority and responsibility for planning, directing and controlling the activities of the entity, directly or indirectly, including all board members.

Related party transactions are those where a transfer of resources or obligations between related parties occur, regardless of whether or not a price is charged.

**BOTSWANA GEOSCIENCE INSTITUTE**  
**Annual Financial Statements for the year ended 31 March 2023**  
**Notes to the Annual Financial Statements**

Figures in Pula	2023	2022
-----------------	------	------

**2. New Standards and Interpretations**

**2.1 Standards and interpretations effective and adopted in the current year**

In the current year, the company has adopted the following standards and interpretations that are effective for the current financial year and that are relevant to its operations:

Standard/ Interpretation:	Effective date: Years beginning on or after	Expected impact:
• Annual Improvement to IFRS Standards 2018-2020: Amendments to IFRS 1	01 January 2022	The impact of the amendments is not material.
• Reference to the Conceptual Framework: Amendments to IFRS 3	01 January 2022	The impact of the amendments is not material.
• Annual Improvement to IFRS Standards 2018-2020: Amendments to IFRS 9	01 January 2022	The impact of the amendments is not material.
• Property, Plant and Equipment: Proceeds before Intended Use: Amendments to IAS 16	01 January 2022	The impact of the amendments is not material.
• Onerous Contracts - Cost of Fulfilling a Contract: Amendments to IAS 37	01 January 2022	The impact of the amendments is not material.
• Annual Improvement to IFRS Standards 2018-2020: Amendments to IAS 41	01 January 2022	The impact of the amendments is not material.

**2.2 Standards and interpretations not yet effective**

The company has chosen not to early adopt the following standards and interpretations, which have been published and are mandatory for the company's accounting periods beginning on or after 01 April 2023 or later periods:

Standard/ Interpretation:	Effective date: Years beginning on or after	Expected impact:
• Lease liability in a sale and leaseback	01 January 2024	Unlikely there will be a material impact
• Initial application of IFRS 17 and IFRS 9 - Comparative information	01 January 2023	Unlikely there will be a material impact
• Deferred tax related to assets and liabilities arising from a single transaction - Amendments to IAS 12	01 January 2023	Unlikely there will be a material impact
• Disclosure of accounting policies: Amendments to IAS 1 and IFRS Practice Statement 2.	01 January 2023	Unlikely there will be a material impact
• Definition of accounting estimates: Amendments to IAS 8	01 January 2023	Unlikely there will be a material impact
• Classification of Liabilities as Current or Non-Current - Amendment to IAS 1	01 January 2023	Unlikely there will be a material impact
• IFRS 17 Insurance Contracts	01 January 2023	Unlikely there will be a material impact



**BOTSWANA GEOSCIENCE INSTITUTE**  
**Annual Financial Statements for the year ended 31 March 2023**  
**Notes to the Annual Financial Statements**

**3. Property, plant and equipment**

	2023			2022		
	Cost or revaluation	Accumulated depreciation	Carrying value	Cost or revaluation	Accumulated depreciation	Carrying value
Land	9,831,985	-	9,831,985	9,831,985	-	9,831,985
Buildings	165,528,015	(19,863,364)	145,664,651	165,528,015	(16,552,803)	148,975,212
Plant and machinery	10,299,250	(2,779,644)	7,519,606	12,787,250	(2,307,656)	10,479,594
Motor vehicles	4,341,364	(2,490,587)	1,850,777	6,111,164	(3,290,099)	2,821,065
Office equipment	11,810,290	(6,026,698)	5,783,592	11,170,197	(4,604,445)	6,565,752
Laboratory equipment and instruments	16,294,671	(4,014,878)	12,279,793	15,847,140	(3,106,279)	12,740,861
<b>Total</b>	<b>218,105,575</b>	<b>(35,175,171)</b>	<b>182,930,404</b>	<b>221,275,751</b>	<b>(29,861,282)</b>	<b>191,414,469</b>

**Reconciliation of property, plant and equipment - 2023**

	Opening balance	Additions	Classified as held for sale	Depreciation	Impairment loss related to NCA held for sale	Total
Land	9,831,985	-	-	-	-	9,831,985
Buildings	148,975,212	-	-	(3,310,561)	-	145,664,651
Plant and machinery	10,479,594	-	(1,615,887)	(612,050)	(732,051)	7,519,606
Motor vehicles	2,821,065	-	(528,814)	(441,474)	-	1,850,777
Office equipment	6,565,752	640,094	-	(1,422,254)	-	5,783,592
Laboratory equipment and instruments	12,740,861	447,531	-	(908,599)	-	12,279,793
	<b>191,414,469</b>	<b>1,087,625</b>	<b>(2,144,701)</b>	<b>(6,694,938)</b>	<b>(732,051)</b>	<b>182,930,404</b>

**Reconciliation of property, plant and equipment - 2022**

	Opening balance	Additions	Disposals	Transfers	Depreciation	Total
Land	9,831,985	-	-	-	-	9,831,985
Buildings	152,285,774	-	-	-	(3,310,562)	148,975,212
Plant and machinery	5,433,278	-	-	5,188,270	(141,954)	10,479,594
Motor vehicles	3,023,930	850,000	(232,268)	-	(820,597)	2,821,065
Office equipment	7,753,289	395,296	(38,876)	(440)	(1,543,517)	6,565,752
Laboratory equipments and instruments	18,400,350	686,945	(35,066)	(5,187,830)	(1,123,538)	12,740,861
	<b>196,728,606</b>	<b>1,932,241</b>	<b>(306,210)</b>	<b>-</b>	<b>(6,940,168)</b>	<b>191,414,469</b>

**4. Intangible assets**

	2023			2022		
	Cost / Valuation	Accumulated amortisation	Carrying value	Cost / Valuation	Accumulated amortisation	Carrying value
Computer software	2,616,681	(2,059,811)	556,870	2,616,681	(1,187,695)	1,428,986

**Reconciliation of intangible assets - 2023**

	Opening balance	Amortisation	Total
Computer software	1,428,986	(872,116)	556,870

**BOTSWANA GEOSCIENCE INSTITUTE**  
**Annual Financial Statements for the year ended 31 March 2023**  
**Notes to the Annual Financial Statements**

**4. Intangible assets (continued)**

**Reconciliation of intangible assets - 2022**

	Opening balance	Additions	Amortisation	Total
Computer software	2,262,972	30,567	(864,553)	1,428,986

**5. Inventories**

Consumables	241,658	306,964
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**6. Trade and other receivables**

**Financial instruments:**

Trade receivables	23,502	75,792
Other receivables	6,020	100,611
Board and manager recoveries	-	3,255
Imprest	46,824	93,842

**Non-financial instruments:**

WHT Receivables	44,830	31,917
Prepayments	122,038	67,105

<b>Total trade and other receivables</b>	<b>243,214</b>	<b>372,522</b>
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**Split between non-current and current portions**

Current assets	243,214	372,522
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**Financial instrument and non-financial instrument components of trade and other receivables**

At amortised cost	76,346	273,499
Non-financial instruments	166,868	99,022
	<b>243,214</b>	<b>372,521</b>

**Exposure to credit risk**

Trade receivables inherently expose the institute to credit risk, being the risk that the institute will incur financial loss if customers fail to make payments as they fall due.

In order to mitigate the risk of financial loss from defaults, the institute only deals with reputable customers with consistent payment histories.

There have been no significant changes in the credit risk management policies and processes since the prior reporting period.

The average credit period on trade receivables is 30 days (2022: 30 days). No interest is charged on outstanding trade receivables.

A loss allowance has not been recognized for all trade receivables, in accordance with IFRS 9 Financial Instruments, as it is not material at the end of each reporting period.

There has been no change in the estimation techniques or significant assumptions made during the current reporting period.



**BOTSWANA GEOSCIENCE INSTITUTE**  
**Annual Financial Statements for the year ended 31 March 2023**  
**Notes to the Annual Financial Statements**

Figures in Pula	2023	2022
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**6. Trade and other receivables (continued)**

**Fair value of trade and other receivables**

The fair value of trade and other receivables approximates their carrying amounts.

**7. Cash and cash equivalents**

Cash and cash equivalents consist of:

Cash on hand	3,595	4,063
Bank balances	12,239,871	18,797,620
	<b>12,243,466</b>	<b>18,801,683</b>

**Credit quality of cash at bank and short-term deposits, excluding cash on hand**

The credit quality of cash at bank and short-term deposits, excluding cash on hand that are neither past due nor impaired can be assessed by reference to external credit ratings (if available) or historical information about counterparty default rates. Commercial banks in Botswana are not rated, however they are subsidiaries of rated banks.

**8. Non-Current Asset held for sale**

Non-current assets are classified as held for sale if their carrying amount will be recovered through a sale transaction rather than through continuing use. This condition is regarded as met only when the sale is highly probable and the asset (or disposal group) is available for immediate sale in its present condition.

Accumulated depreciation for NCA held for sale relate to the accumulated depreciation charged before the asset has been transferred to NCA held for sale.

	Cost or Valuation	Accumulated Depreciation	Impairment Loss	Carrying Value
Mobile Plant	2,488,000	(140,062)	(732,051)	1,615,887
Motor Vehicle	1,769,800	(1,240,986)	-	528,814
	<b>4,257,800</b>	<b>(1,381,048)</b>	<b>(732,051)</b>	<b>2,144,701</b>

**9. Deferred - Capital Grants**

Capital grant relates to grant for the purpose of capital expenditure. The grant is amortised on an annual basis. The annual amortisation is equivalent to the depreciation and any impairments or write downs on the assets that were financed from the grants.

Opening Balance	192,843,453	198,991,576
Capital asset purchased	1,087,624	1,962,808
Amortisation and impairments	(8,299,105)	(7,804,722)
Capital asset disposed	-	(306,209)
	<b>185,631,972</b>	<b>192,843,453</b>

**BOTSWANA GEOSCIENCE INSTITUTE**  
**Annual Financial Statements for the year ended 31 March 2023**  
**Notes to the Annual Financial Statements**

Figures in Pula	2023	2022
-----------------	------	------

**10. Trade and other payables**

**Financial instruments:**

Payables	1,611,967	697,710
Payroll liabilities	7,555,561	12,535,353
PAYE	535,786	509,783
	<b>9,703,314</b>	<b>13,742,846</b>

**Financial instrument and non-financial instrument components of trade and other payables**

At amortised cost	9,703,314	13,742,845
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**Exposure to currency risk**

The institute is exposed to currency risk related to trade payables because certain wholesale transactions are denominated in foreign currencies. Exchange rate exposures are managed within approved policy parameters utilising foreign forward exchange contracts where necessary.

There have been no significant changes in the foreign currency risk management policies and processes since the prior reporting period.

The net carrying amounts, in Pula, of trade and other payables, excluding non-financial instruments, are denominated in the following currencies. The amounts have been presented in Pula by converting the foreign currency amount at the closing rate at the reporting date.

**Pula Amount**

Pula	9,703,314	13,742,848
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**Fair value of trade and other payables**

The fair value of trade and other payables approximates their carrying amounts.

**11. Deferred income - Other Grants**

Deferred income represents grants received that have not been utilised yet. These amounts will be recognized when they are applied for the purposes as defined under the grant convention.

Opening Balance	2,198,038	4,001,144
Grant Income	69,823,367	73,141,394
Revenue Expenditure	(72,684,717)	(78,039,280)
Capital Expenditure	(1,087,624)	(1,962,808)
Reserves utilised & Reinstatement of project funds	8,383,510	5,057,587
	<b>6,632,574</b>	<b>2,198,037</b>



**BOTSWANA GEOSCIENCE INSTITUTE**  
**Annual Financial Statements for the year ended 31 March 2023**  
**Notes to the Annual Financial Statements**

Figures in Pula	2023	2022
-----------------	------	------

**12. Grant Income**

Government Grant - Subvention	54,168,089	60,725,080
Other Project Grants	10,133,118	12,336,412
	<b>64,301,207</b>	<b>73,061,492</b>

The Institute received grant from the sponsor which is predominantly from Government relating to the funding of operations and projects. Other grants received related to National Development Plan (NDP) 11 projects. Within NDP11 projects, there was a project funded by the Japanese namely Japan Oil, Gas and Metals National Corporation (JOGMEC) which received BWP 948,978 in the current year.

**13. Other operating income**

Commissions received	105,667	125,335
Rental Income	252,572	510,531
Other income	832,288	1,015,195
Amortisation and Impairment of Capital Grant	8,299,105	7,804,721
	<b>9,489,632</b>	<b>9,455,782</b>

**14. Other operating gains (losses)**

<b>Gains (losses) on disposals, scrapings and settlements</b>		
Property, plant and equipment	3	24,470
		(86,522)

**15. Operating surplus(deficit)**

Operating deficit for the year is stated after charging (crediting) the following, amongst others:

<b>Auditor's remuneration - external</b>		
Audit Fee	193,971	132,924

<b>Remuneration, other than to employees</b>		
Consulting and professional services	1,200,915	175,150

**Employee costs**

Salaries, wages, bonuses and other benefits	39,331,189	42,785,512
Gratuity expenses	2,588,151	3,093,560
Retirement benefit plans: defined contribution expense	3,045,943	3,259,907
<b>Total employee costs</b>	<b>44,965,283</b>	<b>49,138,979</b>

**Depreciation and amortisation**

Depreciation of property, plant and equipment	6,694,938	6,940,169
Amortisation of intangible assets	872,116	864,553
<b>Total depreciation and amortisation</b>	<b>7,567,054</b>	<b>7,804,722</b>

**16. Investment income**

<b>Interest income</b>		
<b>Investments in financial assets:</b>		
Bank	107,165	162,615

**BOTSWANA GEOSCIENCE INSTITUTE**  
**Annual Financial Statements for the year ended 31 March 2023**  
**Notes to the Annual Financial Statements**

Figures in Pula	2023	2022
-----------------	------	------

**17. Taxation**

No provision has been made for tax as the Institute is exempt from tax.

**18. Going concern**

We draw attention to the annual financial statements, which indicates that the institute incurred a net deficit of P7,147,834 during the year ended 31 March 2023 (P3,250,634 in the previous year). As of that date the entity's current liabilities exceeded its current assets by P3,607,550 (current assets exceeded current liabilities in the previous year by P3,540,285).

The annual financial statements have been prepared on the basis of accounting policies applicable to a going concern. This basis presumes that funds will be available to finance future operations and that the realisation of assets and settlement of liabilities, contingent obligations and commitments will occur in the ordinary course of business.

The ability of the institute to continue as a going concern is dependent on a number of factors. The most significant of these is that the directors continue to procure funding for the ongoing operations for the institute from the bank or key stakeholders such as Government and other sponsors.

In response to the strained financial position, the Institute has developed a revenue generation plan to support the government of Botswana grant thereon. The Board and Management of BGI have assessed the BGI Business Model and confirm the Institute's viability as a body corporate constituted by the BGI Act no 29 of 2014.

**19. Related parties**

Relationships	Refer to Page 1 (General Information)
Members of Board	
Members of Key Management	
Stakeholders	
	Senior Management
	Government of Botswana
	Other Government entities

**Related party transactions**

**Income**

Government of Botswana-Grant received	54,168,089	60,725,080
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**Employee Cost**

Senior Management Salaries	7,237,559	7,889,634
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**Board Expenses**

Board Fee Allowances	297,802	248,535
Board Meetings	213,976	230,433
	<b>511,778</b>	<b>478,968</b>

**Amount included in trade receivables related parties**

Board and Manager Recoveries	-	3,255
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**BOTSWANA GEOSCIENCE INSTITUTE**  
**Annual Financial Statements for the year ended 31 March 2023**  
**Notes to the Annual Financial Statements**

**Figures in Pula**

**20. Members of the Board Fees**

	<b>2023</b>	<b>2022</b>
Prof. Motsoptse Modisi	32,475	20,475
Ms.Tebogo Mmoshe	20,380	20,160
Ms.Ontlametse Mokopakgosi	22,900	34,020
Dr.Sebusi Odisitse	33,664	36,540
Ms.Bogadi Mathangwane	22,900	26,460
Mr.Ogone M.Gaboutloeloe	30,460	36,540
Mr.Harold Van Zyl	46,025	21,420
Mr.Othusitse Lebuletswe	16,458	7,560
Ms.Portia Nuku-Basaakane	19,560	10,080
Mr.Sipho Mbebe	22,080	11,340
Mr.Thabo Balopi	30,900	23,940
	<b>297,802</b>	<b>248,535</b>

**21. Financial instruments and risk management**

**Categories of financial instruments**

**Categories of financial assets**

**2023**

	<b>Note</b>	<b>Amortised cost</b>	<b>Prepayments</b>	<b>Total</b>	<b>Fair value</b>
Trade and other receivables	6	76,346	122,038	198,384	76,346
Cash and cash equivalents	7	12,243,467	-	12,243,467	12,243,467
		<b>12,319,813</b>	<b>122,038</b>	<b>12,441,851</b>	<b>12,319,813</b>

**2022**

	<b>Note</b>	<b>Amortised cost</b>	<b>Prepayments</b>	<b>Total</b>	<b>Fair value</b>
Trade and other receivables	6	273,500	67,105	340,605	273,500
Cash and cash equivalents	7	18,973,465	-	18,973,465	18,973,465
		<b>19,246,965</b>	<b>67,105</b>	<b>19,314,070</b>	<b>19,246,965</b>

**Categories of financial liabilities**

**2023**

	<b>Note(s)</b>	<b>Amortised cost</b>	<b>Total</b>	<b>Fair value</b>
Trade and other payables	10	9,703,314	9,703,314	-

**2022**

	<b>Note(s)</b>	<b>Amortised cost</b>	<b>Total</b>	<b>Fair value</b>
Trade and other payables	10	13,742,848	13,742,848	-

**BOTSWANA GEOSCIENCE INSTITUTE**  
**Annual Financial Statements for the year ended 31 March 2023**  
**Notes to the Annual Financial Statements**

Figures in Pula	2023	2022
-----------------	------	------

**21. Financial instruments and risk management (continued)**

**Capital risk management**

The institute's objectives when managing capital are to safeguard the institute's ability to continue as a going concern in order to provide returns for stakeholders and benefits for other stakeholders and to maintain an optimal capital structure to reduce the cost of capital.

The institute is funded by the government. Consistent with this objective, the Institute does not monitor capital on the basis of the gearing ratio.

Trade and other payables	10	9,703,314	13,742,848
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**Financial risk management**

**Overview**

The Institute is exposed to the following risks from its use of financial instruments:

- Credit risk;
- Liquidity risk; and

The board has overall responsibility for the establishment and oversight of the company's risk management framework. The board has established the risk committee, which is responsible for developing and monitoring the institute's risk management policies. The committee reports quarterly to the board on its activities.

**Liquidity risk**

Prudent liquidity risk management implies maintaining sufficient cash, the availability of funding through an adequate amount of committed credit facilities.

**2023**

		Carrying amount
<b>Current liabilities</b>		
Trade and other payables		9,703,314

**2022**

		Carrying amount
<b>Current liabilities</b>		
Trade and other payables	10	13,742,848

The maturity profile of contractual cash flows of derivative financial liabilities are as follows:

**Interest rate risk**

As the institute has no significant interest-bearing assets, the institute's income and operating cash flows are substantially independent of changes in market interest rates.



**BOTSWANA GEOSCIENCE INSTITUTE**  
**Annual Financial Statements for the year ended 31 March 2023**  
**Notes to the Annual Financial Statements**

Figures in Pula	2023	2022
-----------------	------	------

**22. Contingencies**

There are no known contingent liabilities for the institute as at year end.

**23. Events after the reporting period**

The members of board are not aware of any material events occurring between the year-end date and the date of approval of the financial statements, which require disclosure.

**BOTSWANA GEOSCIENCE INSTITUTE**  
**Annual Financial Statements for the year ended 31 March 2023**  
**Detailed Income Statement**

Figures in Pula	Note(s)	2023	2022
<b>Revenue</b>			
Government grants		54,168,089	60,725,080
Other project grants		10,133,118	12,336,412
	12	<b>64,301,207</b>	<b>73,061,492</b>
<b>Other operating income</b>			
Amortisation of capital grant		8,299,105	7,804,721
Commissions received		105,667	125,335
Other income		832,288	1,015,195
Rental Income		252,572	510,531
	13	<b>9,489,632</b>	<b>9,455,782</b>
<b>Other operating gains (losses)</b>			
Gains (losses) on disposal of assets or settlement of liabilities		24,470	(86,522)
<b>Expenses (Refer to page 29)</b>		<b>(81,070,308)</b>	<b>(85,844,001)</b>
<b>Operating deficit</b>	15	<b>(7,254,999)</b>	<b>(3,413,249)</b>
Investment income	16	107,165	162,615
<b>Deficit for the year</b>		<b>(7,147,834)</b>	<b>(3,250,634)</b>



**BOTSWANA GEOSCIENCE INSTITUTE**  
**Annual Financial Statements for the year ended 31 March 2023**  
**Detailed Income Statement**

Figures in Pula	Note(s)	2023	2022
<b>Other operating expenses</b>			
Advertising and marketing		314,553	503,065
Amortisation	4	872,116	864,553
Annual Report Expenses		287,372	320,368
Auditor's remuneration - external audit	15	193,971	132,924
BITRI Collab Expenses		250,792	414,949
Bad debts		4,230	3,905
Bank charges		36,723	42,826
Board Expenses		408,331	478,968
Cleaning		567,823	679,114
Co-operate& Strategy		952,971	73,829
Computer expenses		62,400	47,750
Consulting and professional fees		1,200,915	175,150
Consumables Lab service		219,789	137,226
Consumables- Others		141,423	204,890
Data Management expenses		2,031,904	2,808,971
Depreciation	3	6,694,938	6,940,169
Employee costs		44,965,283	49,138,979
General Expenses		292,493	316,478
Health & Safety		262,786	204,767
Impairment loss	8	732,051	-
Insurance		1,020,956	975,926
Lab Expenses		212,469	42,057
Motor vehicle expenses		714,206	568,906
NDP Projects		10,492,853	12,965,802
Postage and Telephone		766,366	951,211
Printing and stationery		201,972	223,783
Protective clothing		95	89,009
Recruitment Expenses		167,958	95,818
Recurring Projects		631,782	356,269
Repairs and maintenance		2,347,957	2,311,063
Security		736,358	946,195
Staff development and training expenses		433,005	394,311
Staff welfare		116,116	1,247
Subscriptions		53,955	69,894
Travel - local		284,727	222,017
Travel - overseas		127,497	18,166
Utilities		2,269,172	2,123,446
		<b>81,070,308</b>	<b>85,844,001</b>



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