



DIGITAL TRANSFORMATION ENABLING SUSTAINABLE DEVELOPMENT MANDATES

Digital Transformation of Mining Industry - Driving Energy Transition and Sustainable Resource Development (Adoption of Geospatial Technology and Earth Observation)

DIRECTOR INFORMATION DELIVERY (Botswana) – Lesego P. Peter



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BGI Background

Where is Botswana?

Institutional Background

BGI – In the Structure of Government Ministry

BGI Mandate

BGI Strategic Focus

BGI Areas of Impact

How BGI Enhances Prospectivity

**Data Coverage Showing Improvements of Prospectivity in Botswana
Technology Towards Advancing Prospectivity**

Pre-competitive Data on Mineral Prospects

**Latest updates (2022) of National Geological Interpretations and Updates
Industrial Minerals**

Data Access Platforms

**Digital Transformation Using Geospatial Technology and Earth
Observation**

Conclusions

Where is Botswana?

AFRICA



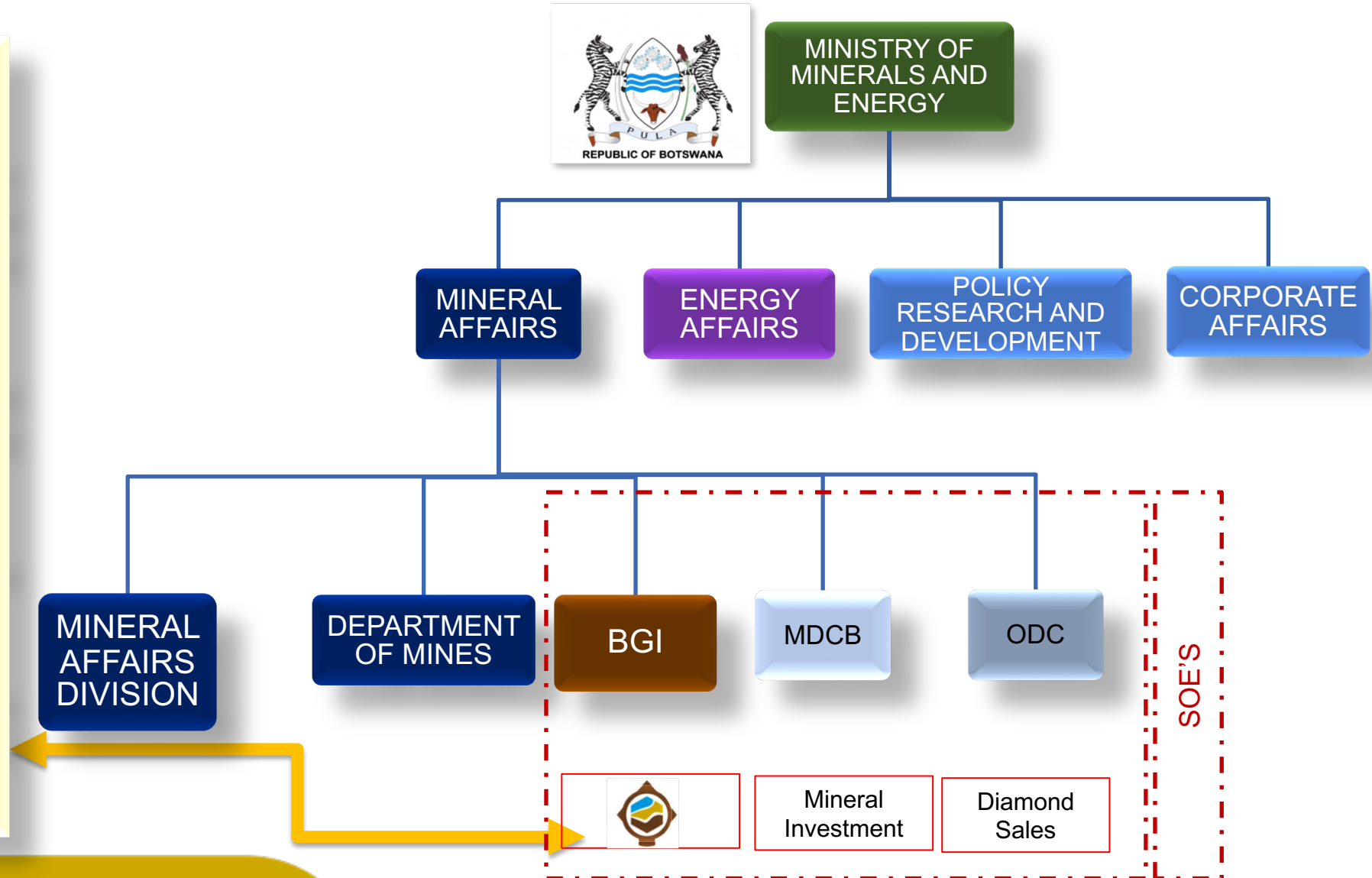
- Botswana is located in the Southern part of Africa.
- Is part of SADC (Southern African Development Community).



- Botswana Geoscience Institute (BGI) is a public corporation constituted under the Botswana Geoscience Institute Act , 2014
- Wholly owned by the Government of Botswana. (Parastatal.)
- Resulted from GoB decision to restructure Department of Geological Survey (DGS).
- GoB realised the need to improve efficiencies in carrying out geoscience research.
- Ensure best practices in geoscience research.
- Geological Survey was formed in 1948 while survey practice in Botswana began in 1943.
- It later focused on exploration for various minerals in Botswana.

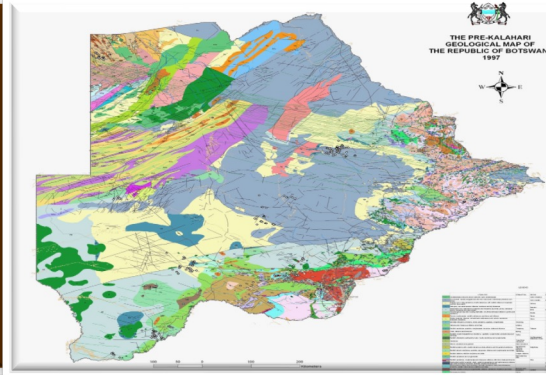
MAIN ROLE OF BGI

- Undertake research in field of geosciences and provide specialized geoscientific services
- Promote search for and exploration of any mineral in Botswana
- Custodian of geoscience information
- Advisory body in and geosciences geohazards





- Geoscience Research
- Geological Mapping



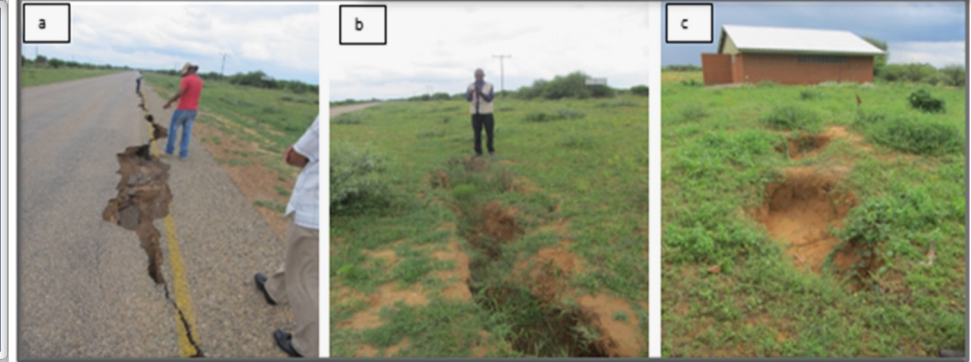
- Key Operational Services - Laboratory Services



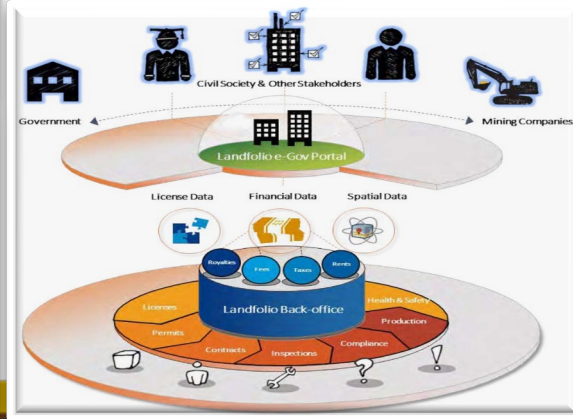
- Mineral Resource Assessments / Exploration



- Geohazards monitoring
- Seismicity monitoring & Assessment
- Geotechnical assessments



- Geoscience policy advice



- Geoscience data and information management (Critical geoscience datasets)

- Key Operational Services - Drilling Services





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.

Values

- We are **reliable** custodians of Geoscience information.
- We are innovative in creating and promoting **market-oriented products and services**.
- We are **professional** in all our interactions.
- We act with **integrity**, transparency and accountability.
- *Kgetsi ya tsie e kgonwa ke go tshwaraganelwa. We stand together.*

Botswana Geoscience Institute

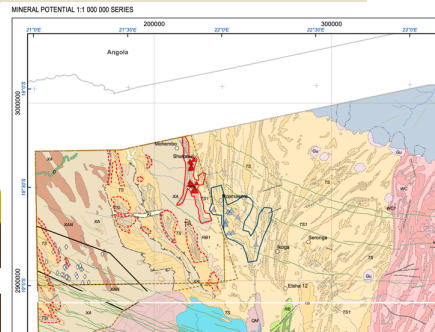
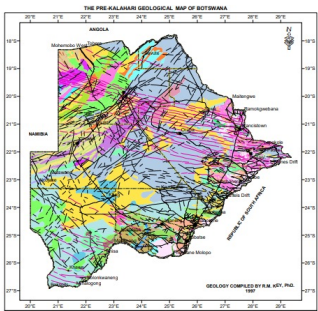
Making Botswana a preferred destination for mineral exploration

Geological and mineral occurrence grassroots investigations

Geological mapping

Data Analysis based on availability and accessibility of geoscience information

Advise prospects/investors and Government on mineral potential or even up to bankable feasibility if possible



Safer communities and livelihoods

Geotechnical investigations

Seismological monitoring

Assessment of geohazards on critical infrastructure

Natural hazards mapping and modelling

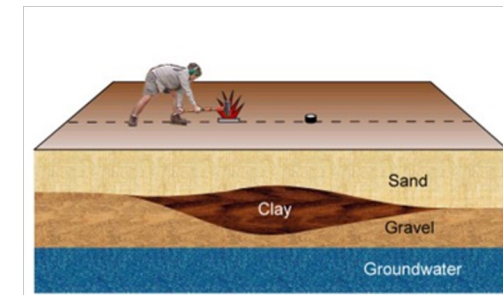


To Have an informed Nation

Promote public understanding of geoscience

Demonstrate the importance of geoscience to resource and environmental issues

Provision of information on natural capital accounting: for development



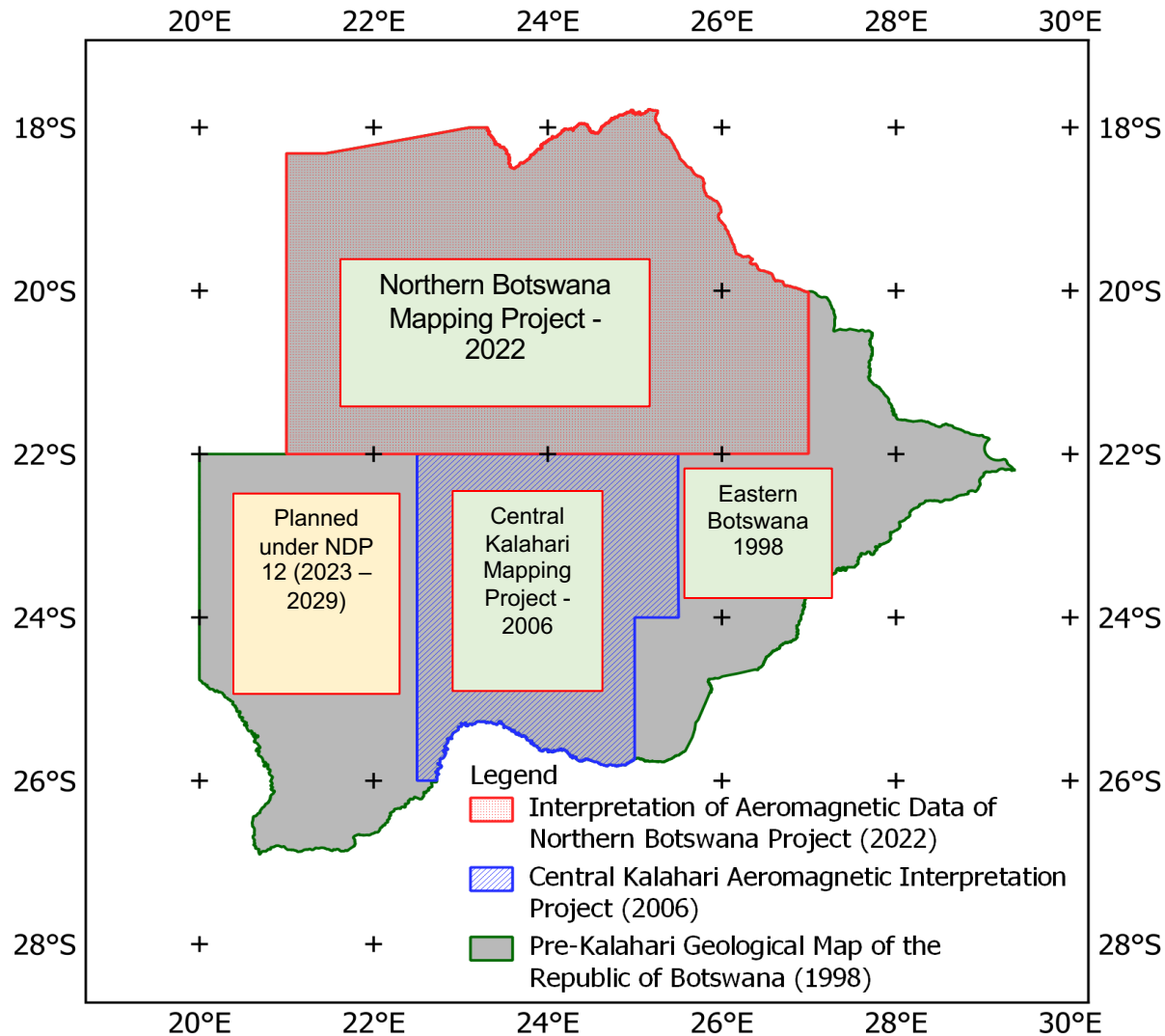
Enhancing Prospectivity in Botswana

- Technology
- Innovation
- Improving Pre-competition Data
 - Geophysics
 - Geochemistry
 - Geology
 - Mineral Occurrences
 - Reports and Maps
 - Core Sheds
 - Exploration Reports
- Governance and Policies





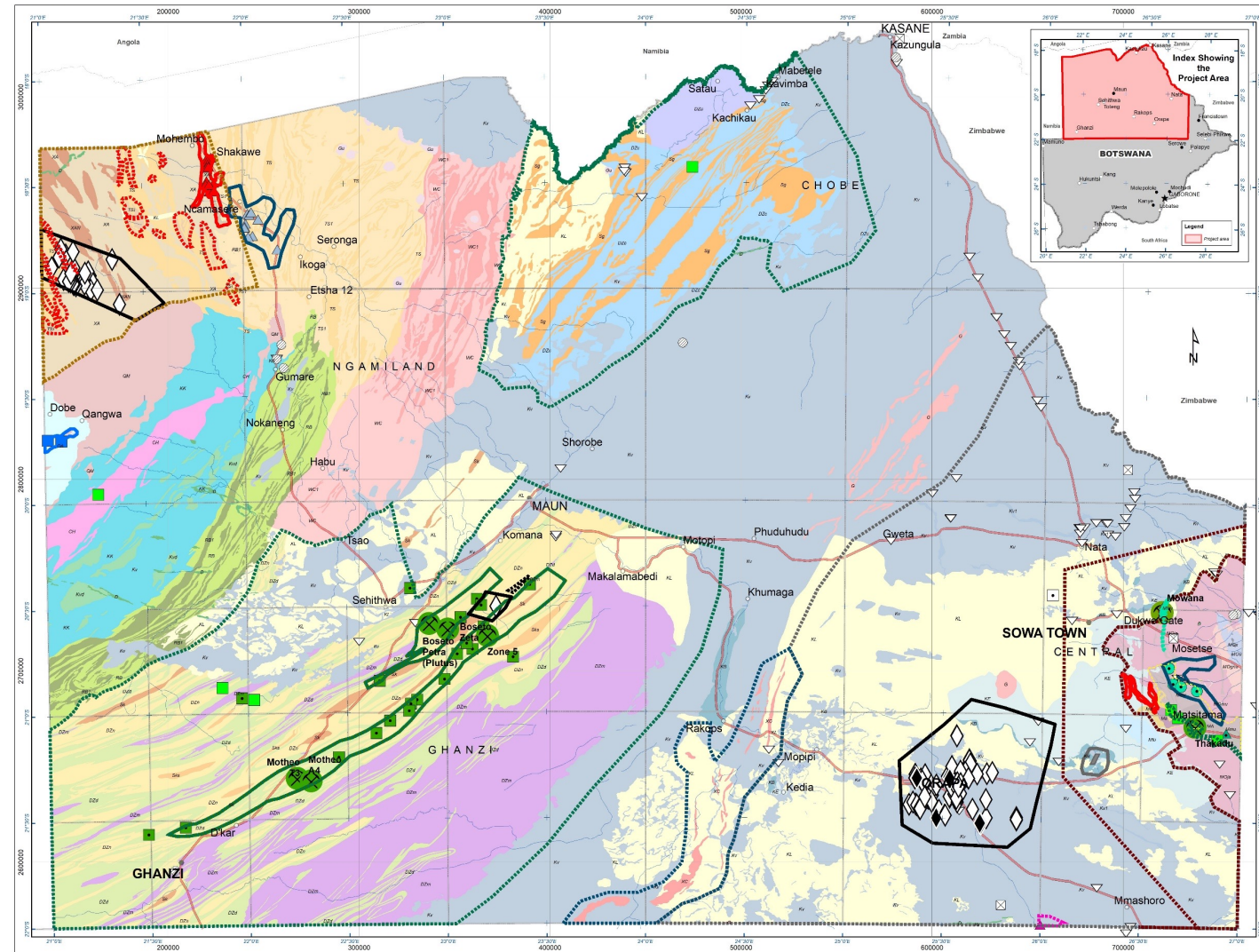
Data Coverage Showing Improvement of Prospectivity in Botswana



- The government of Botswana's continue to invest in mineral exploration in country,
- Provision for enabling policies and the environment
- Enhanced prospectivity through technology advancement, availing baseline data online
- Streamlined processes (prospecting application, baseline data, instruments)
- By 2022, Botswana has invested in production of:-
 - ✓ 1: 500 000 geological and mineral potential maps
 - ✓ 1: 1 000 000 Geological Map 1997
 - ✓ 1: 1 000 000 Geological Map 2022

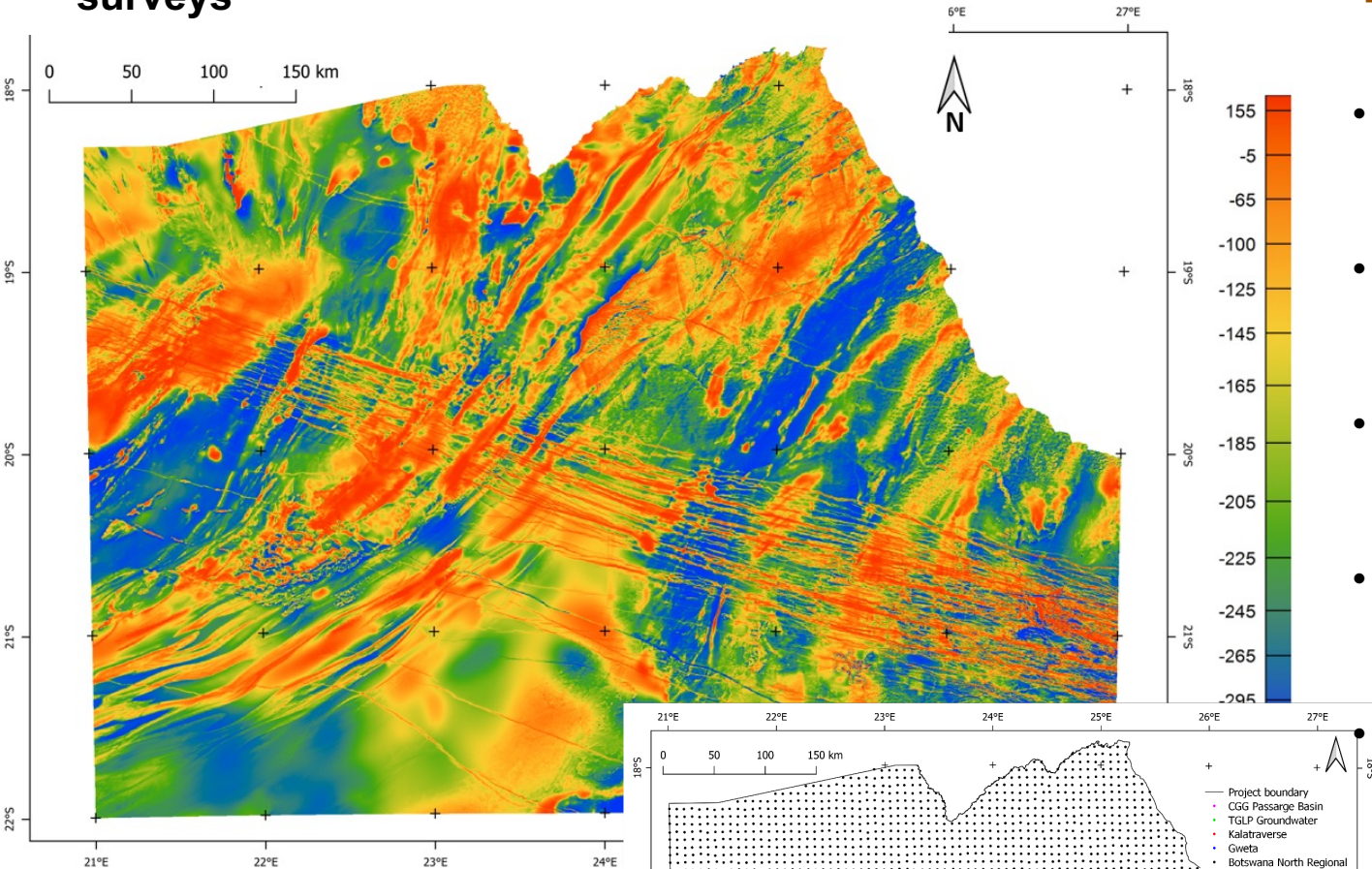
Notes:

- Thirty-five (35) priority areas for mineral prospecting - total surface area approx. **40,622 km²**
- Twelve (12) high potential - known mines and deposits, and extensions that are highly prospective, - total surface area of **10,817 km²**
- Twenty-three (23) medium potential occurrences and metal based deposits - total surface area of **29,805 km²**
- Tabulation of resource estimates, where available, to provide the framework/basis for determining the mineral prospects
- **Improved understanding of Geology and Hydrogeology**



Geophysical Data – Magnetics:

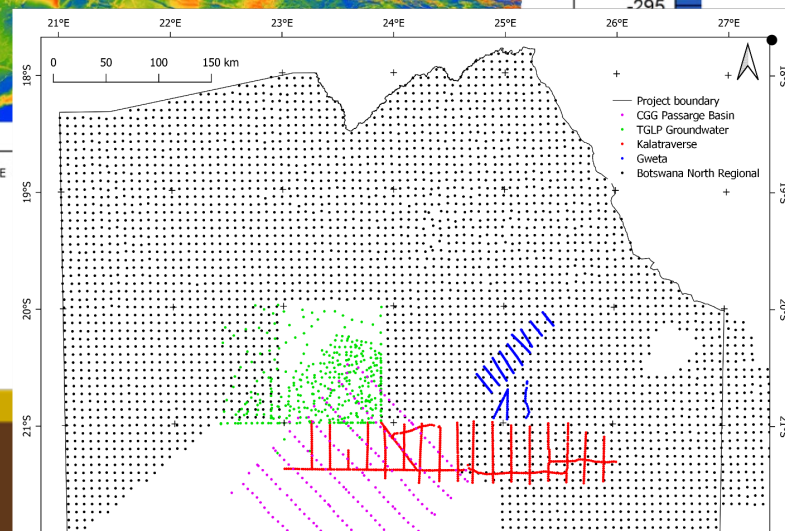
- **Compilation of 35 airborne magnetic surveys**



Technology (Example):

- **Using geoscientific data such (Gravity and Magnetic data) to conduct statistical methods.**
- **The use 3D Magnetic inversion to show the geological interpretation underground.**
- **The use Geosoft to show magnetic vector distribution.**
- **Through Cluster analysis zones the area to indicate geology and possible prospectivity within the zones**

The data can still be used for further analysis, project still ongoing.



Ground gravity data coverage



MINERAL POTENTIAL

Priority 1	Priority 2	Priority 1	Priority 2
		Precious Metals	Energy Minerals
		Gold	Uranium
		Major Metals	Coal
		Copper - Silver	Petroleum
		Copper - Lead - Zinc	Precious Stones
		Copper - Lead - Zinc - Silver	Diamonds
		Steel Metals	
		Iron	
		Manganese	
		Nickel - Copper - Cobalt - Chromium - Platinum Group Elements (PGE)	

MINES AND MINERAL OCCURRENCES

Metallic Minerals

Mines

- Copper Silver (Cu-Ag)
- Copper Lead Zinc (Cu-Pb-Zn+/-Ag)

Mineral Occurrences

Major Metals

- Copper (Cu)
- Copper Silver (Cu-Ag)
- Copper Gold Silver (Cu-Au-Ag)
- Copper Lead Zinc (Cu-Pb-Zn-Ag)
- Copper Nickel (Cu-Ni-Cr-V)
- Lead Zinc (Zn-Pb-Cu-Ag-V-Ge)

Steel Metals

- Iron (Fe)
- Manganese (Mn)
- Nickel Copper (Ni-Cu-Co-Cr)
- Nickel PGE (Ni-PGE)

Energy Minerals

- Coal (C)

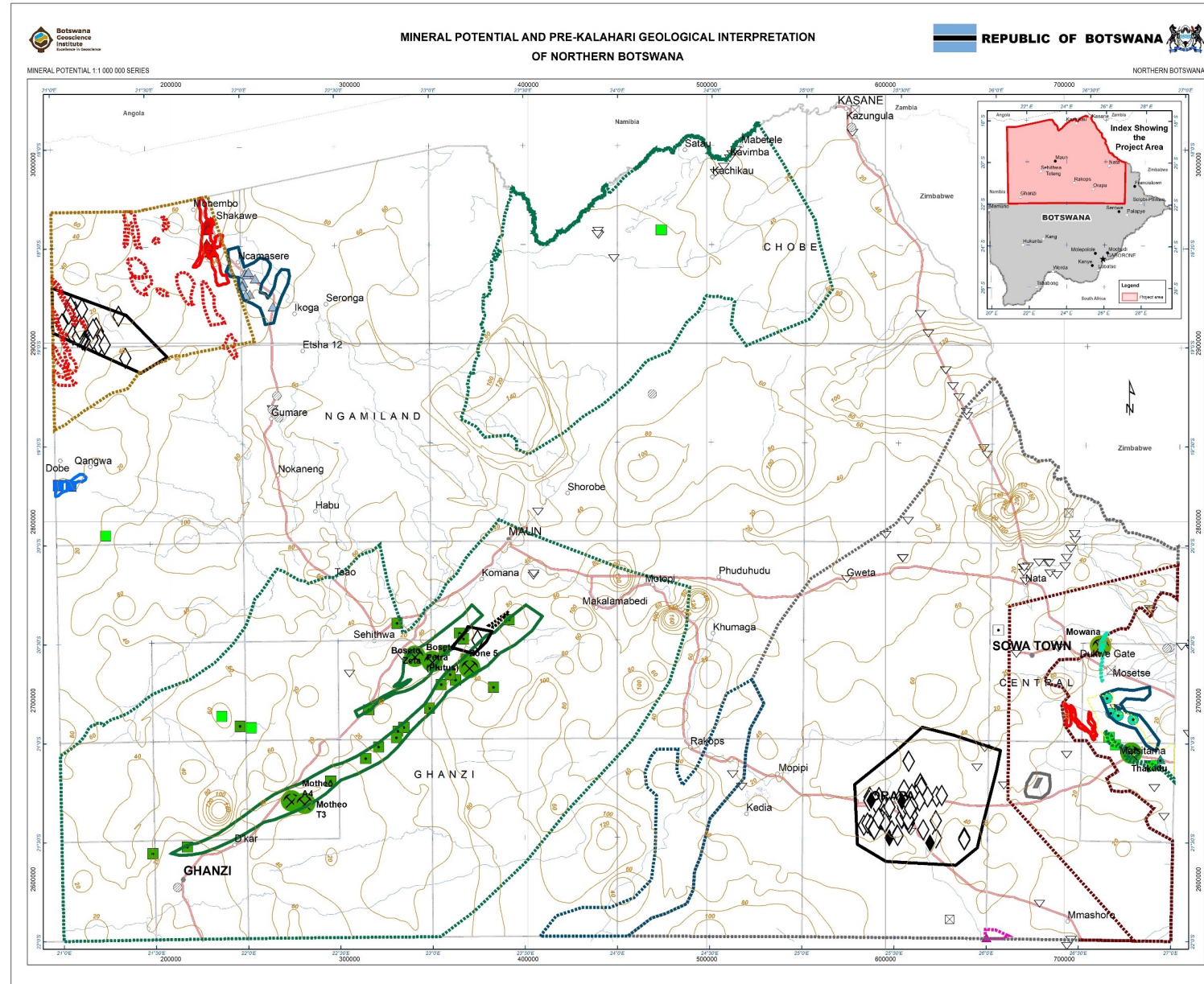
Industrial Minerals

Mines

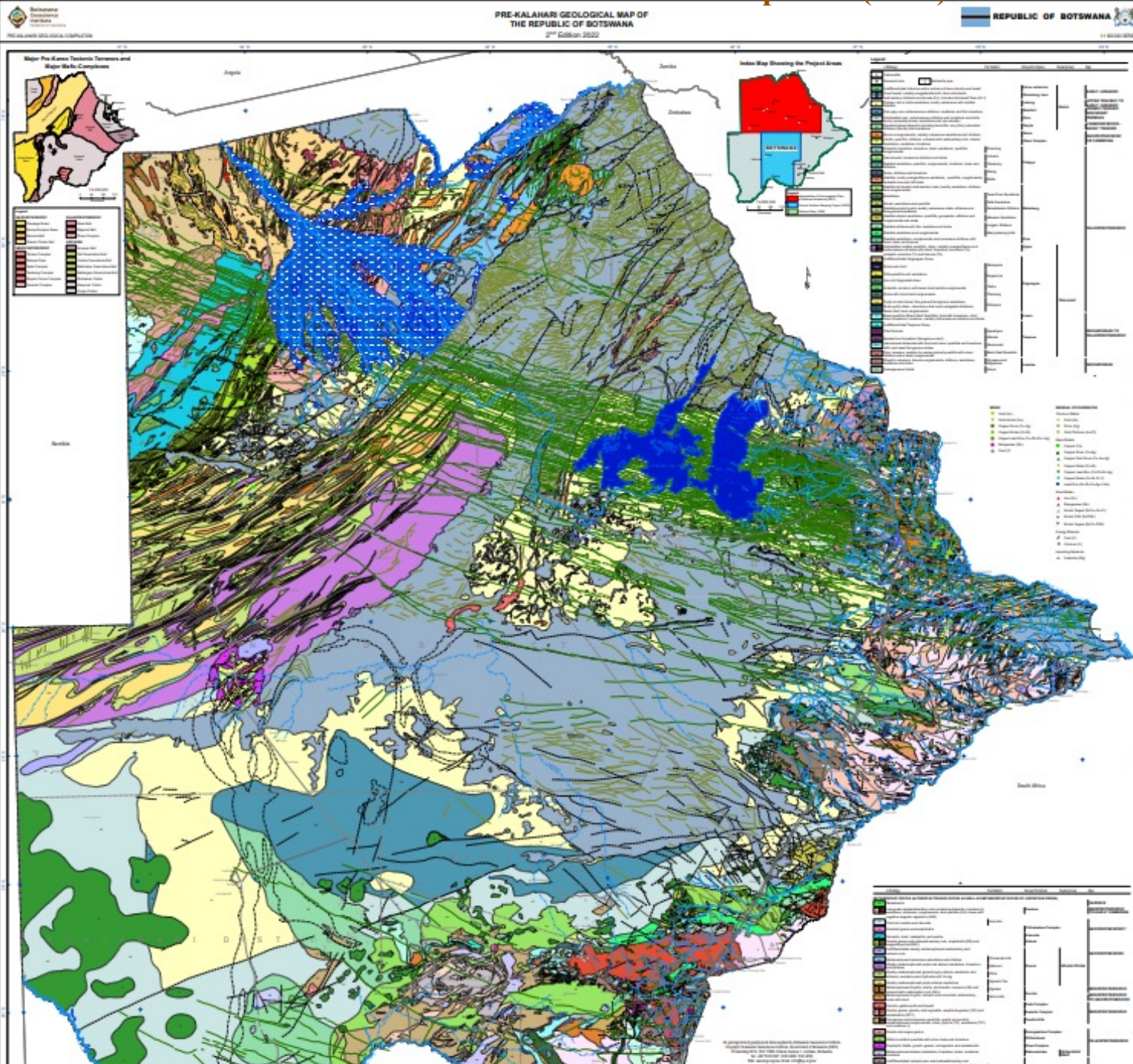
- Salt and Soda Ash
- Stone (Aggregate, Crushed stone, Gravel, Stone)
- Sand (Ground sand, Pit sand, River Sand)
- Other (Including: Granite, Clay, Dolerite, Basalt, Silcrete, Silica and Siltstone)

Prospect

- Granites/ornamental stones
- Clay



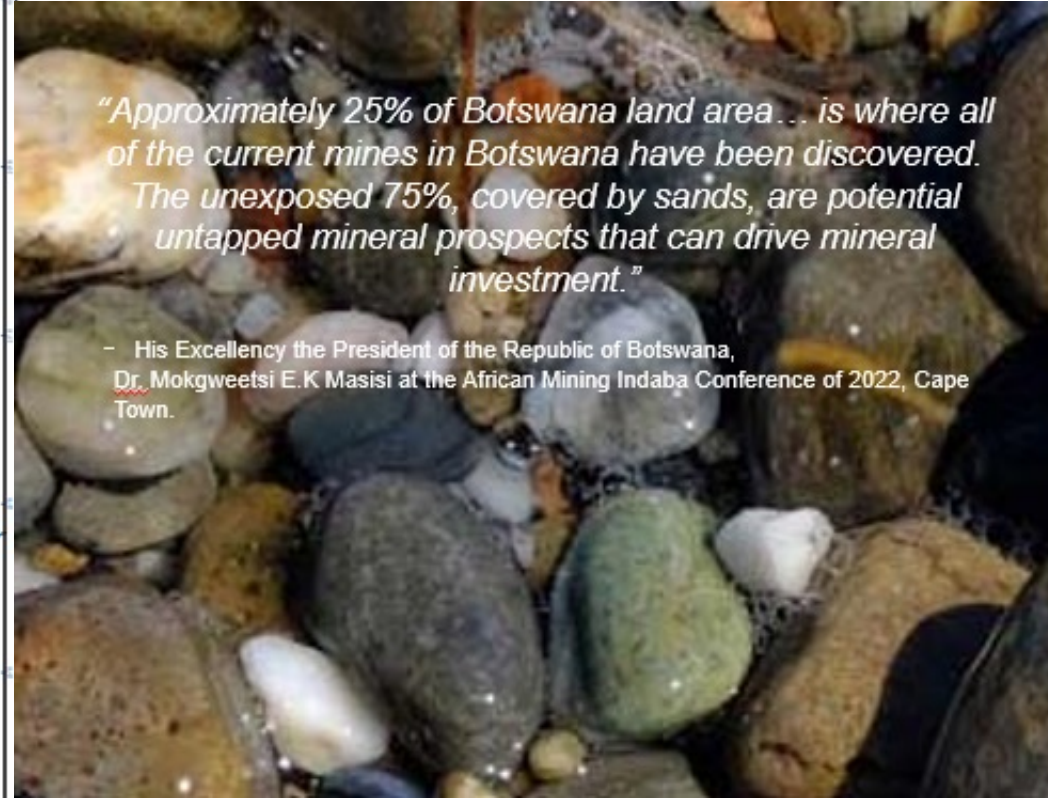
Latest updates (2022) of National Geological Interpretations and Updates



1 : 1 000 000
Geological Map (2022)

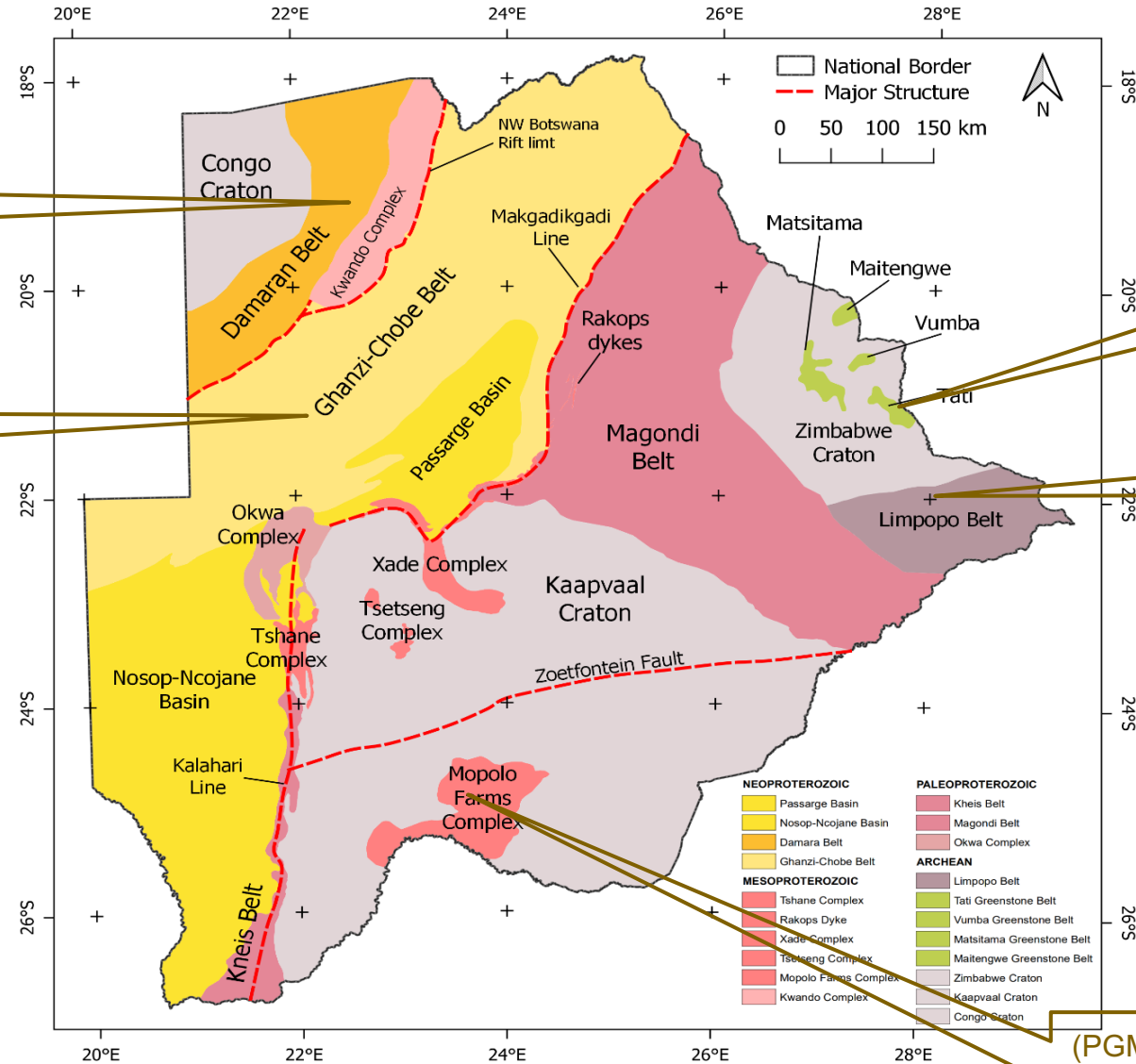
"Approximately 25% of Botswana land area ... is where all of the current mines in Botswana have been discovered. The unexposed 75%, covered by sands, are potential untapped mineral prospects that can drive mineral investment."

- His Excellency the President of the Republic of Botswana, Dr. Mokgweetsi E.K Masisi at the African Mining Indaba Conference of 2022, Cape Town.





GEOLOGICAL SETTINGS DEPICTING DIFFERENT MINERAL POTENTIAL DEPOSITS (Pre-Karoo Tectonic Terrans, Mafic Complexes)



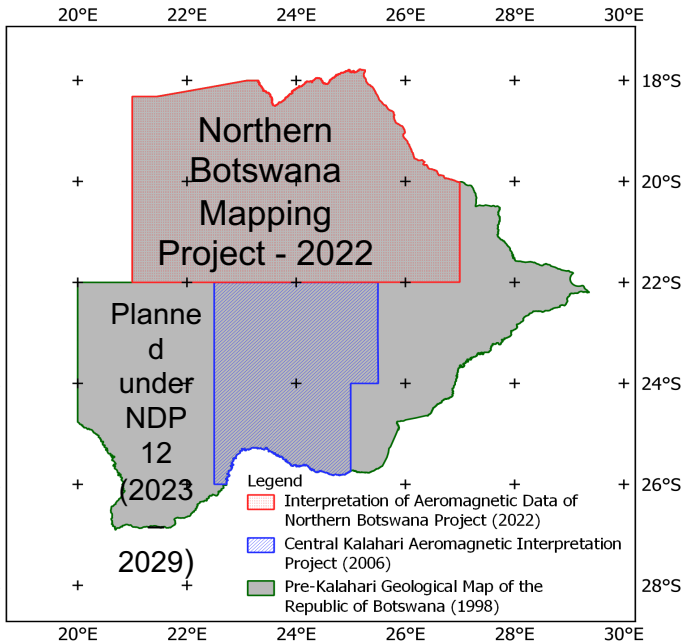
1.3% CU
3% Pb – Zn
3.5 g/t Ag

Stratabound Cu – Ag
Koemacau,

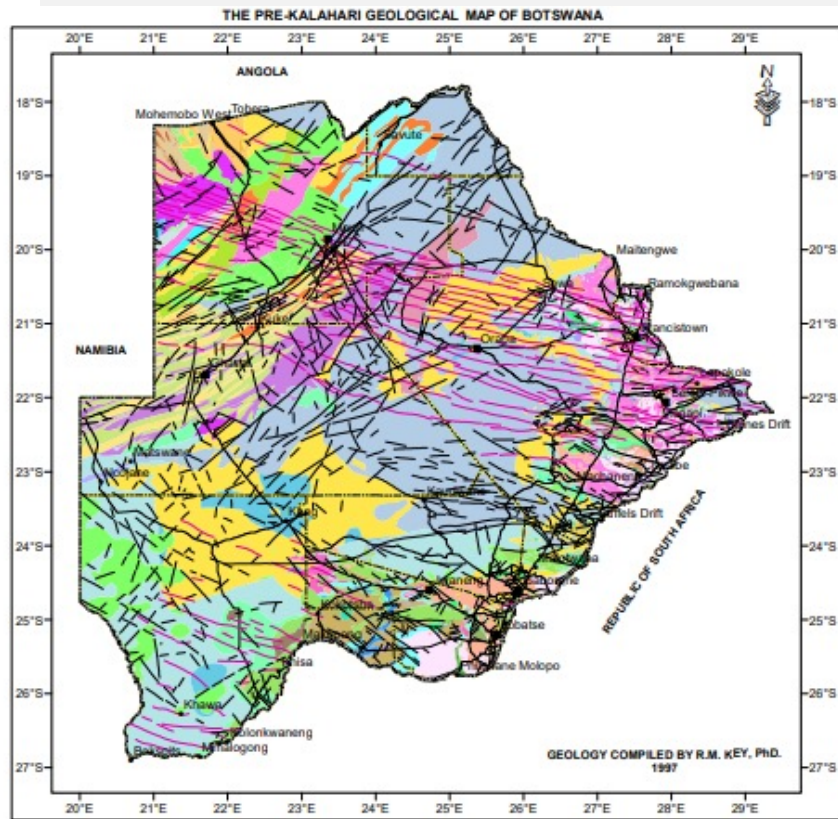
Cu, Ni and A
(Phoenix/Selkirk and Mupane Mines)u

Ni/Cu
(BCL)

(PGM) Mopolo Farms Complex (Bushveld Igneous Complex Analogue)



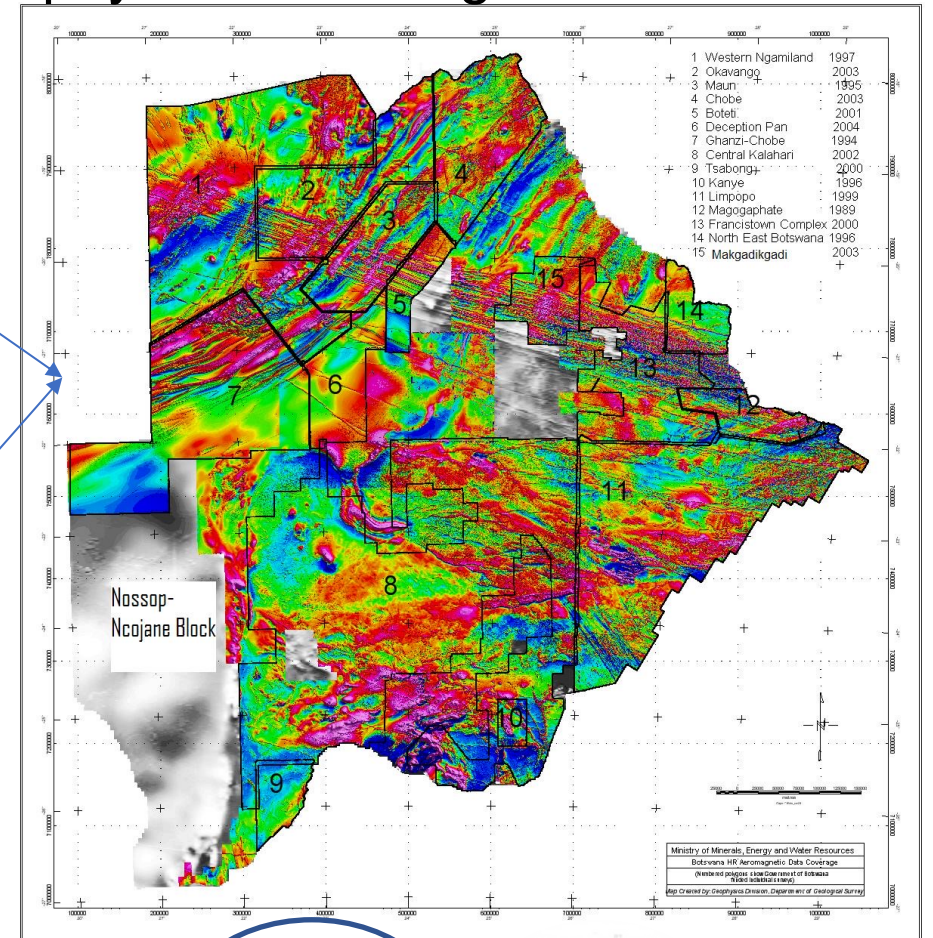
Pre-competition Data – Geological Mapping Coverage



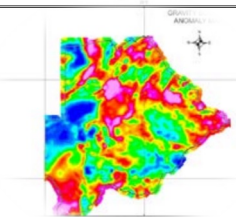
106 760km²
Airborne
Electromagnetics
(20% of Botswana
Covered with
Airborne
Electromagnetic
Surveys

25% High
Resolution
(250 line
spacing)
Coverage of
Radiometric –
Eastern
Botswana

Pre Competition Data - National Geophysical Coverage



25 000
Gravity
Stations

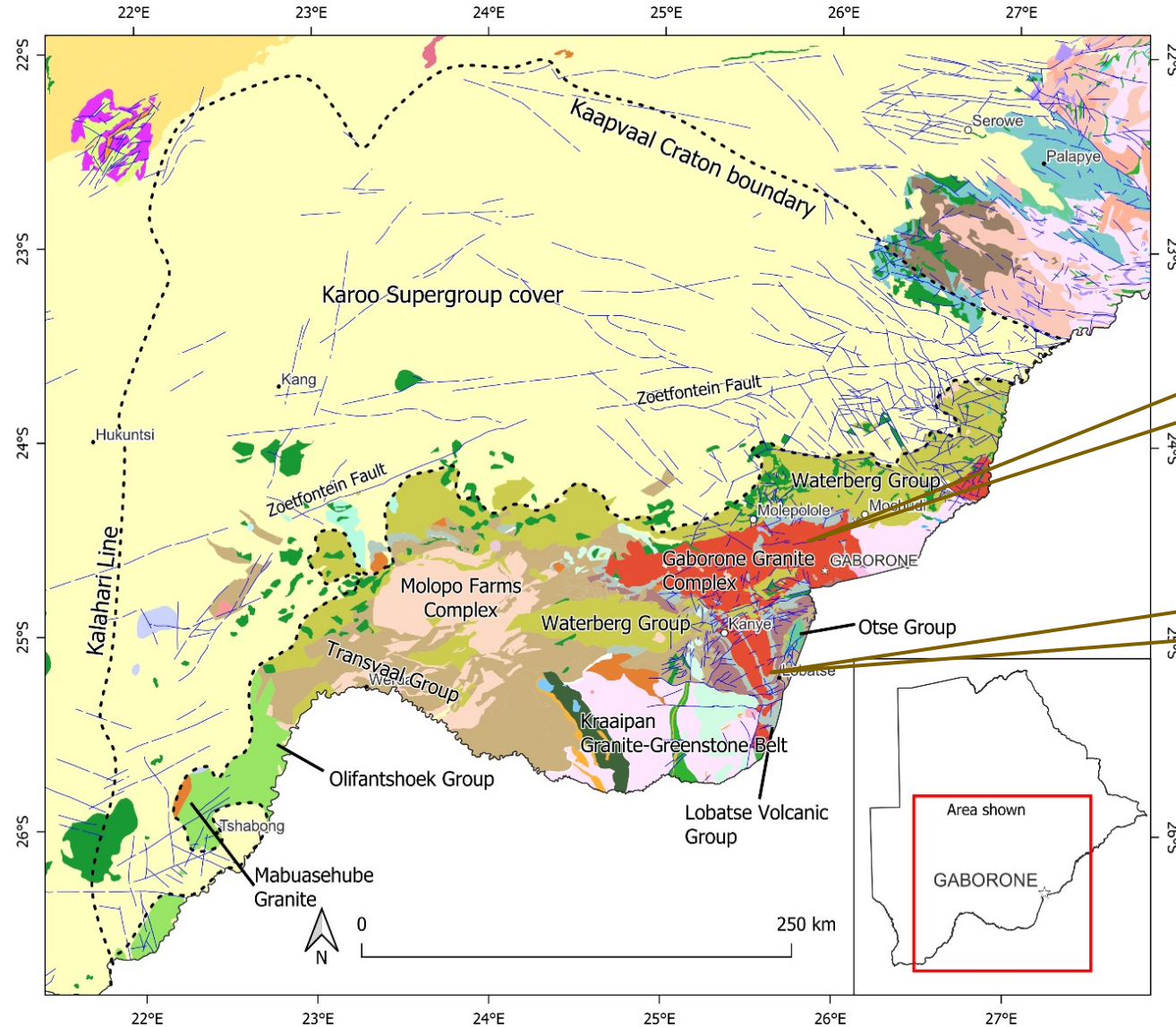


Notes;

- Botswana widely covered in geological mapping
- Data as far back as 1950s during Departmental of Geological Survey establishment

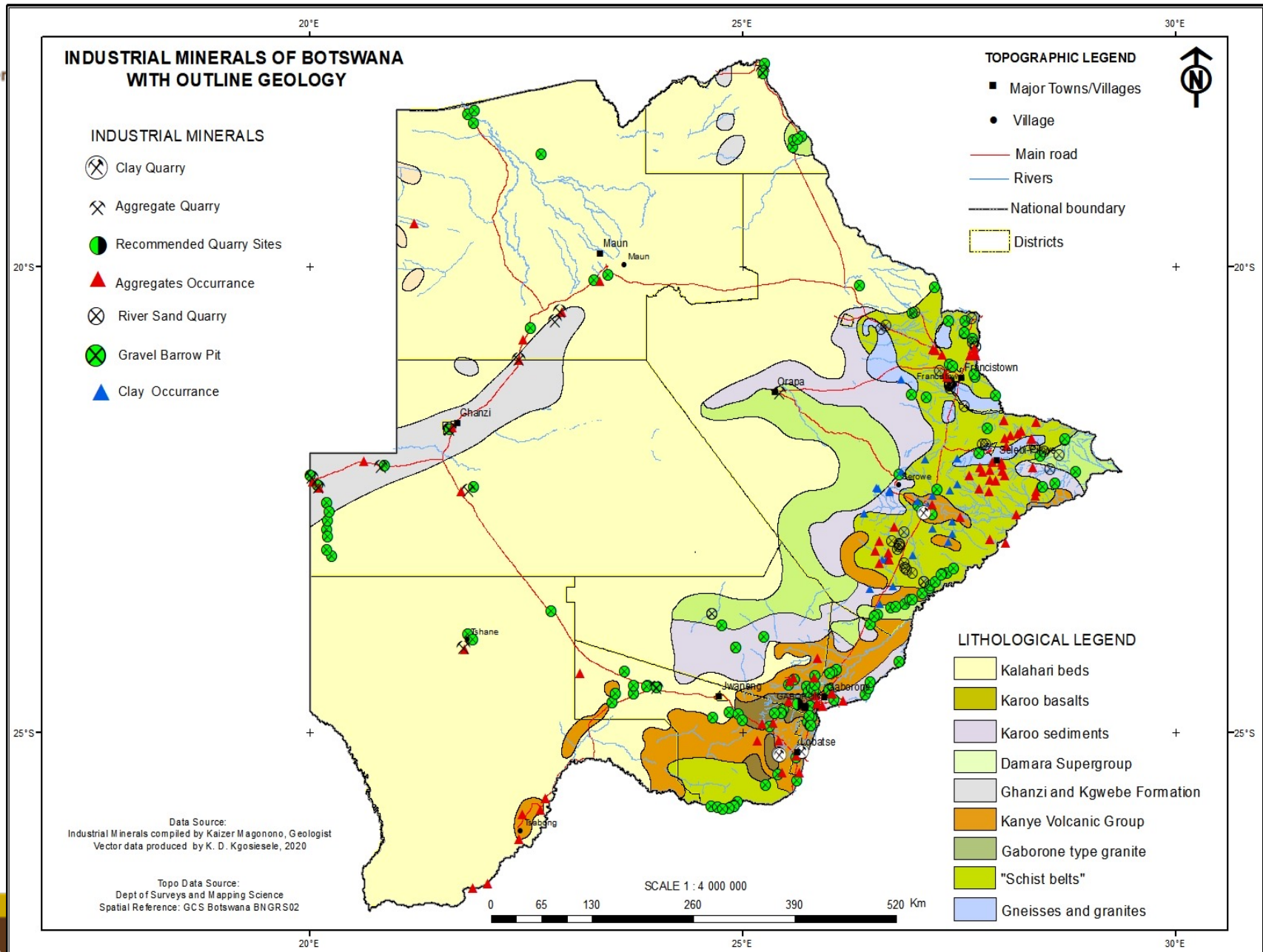


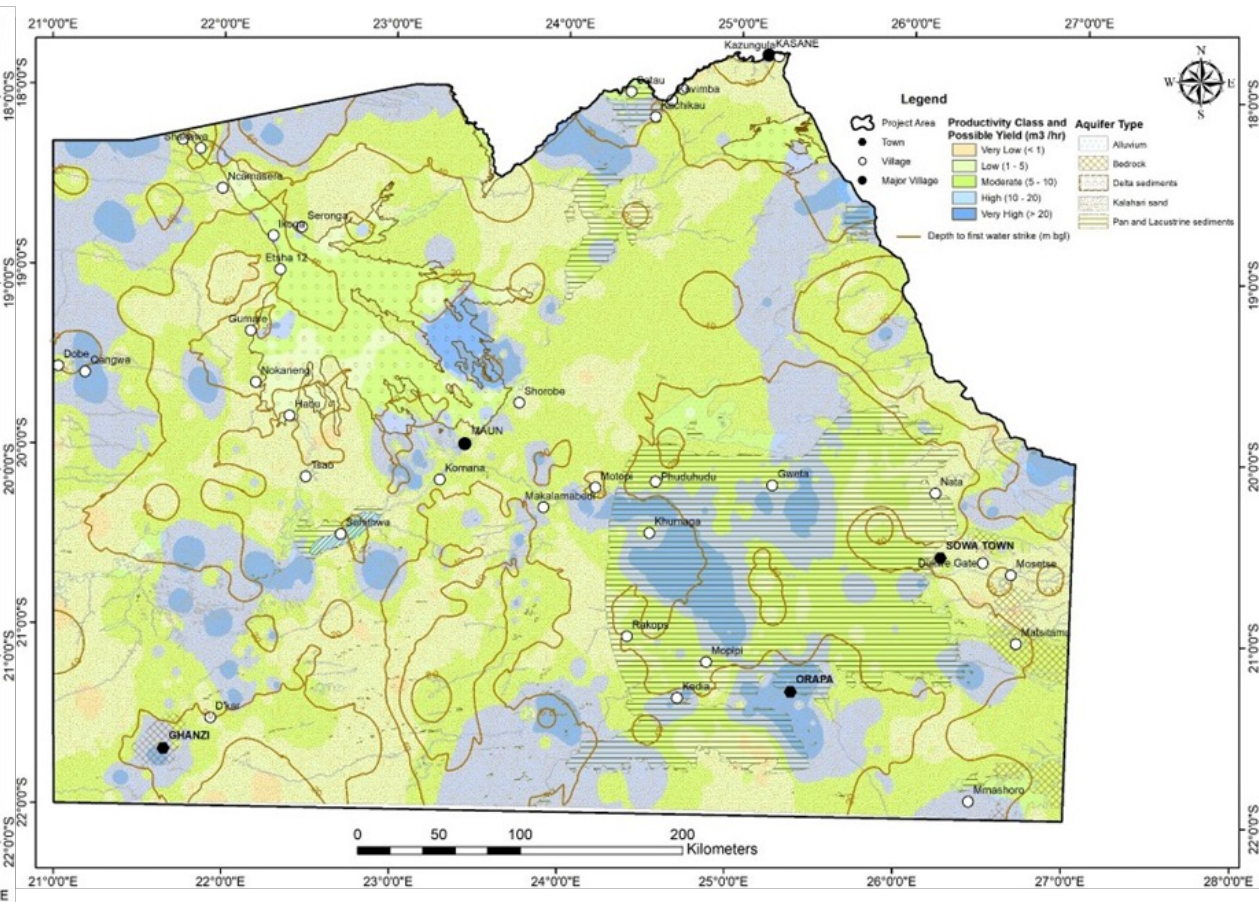
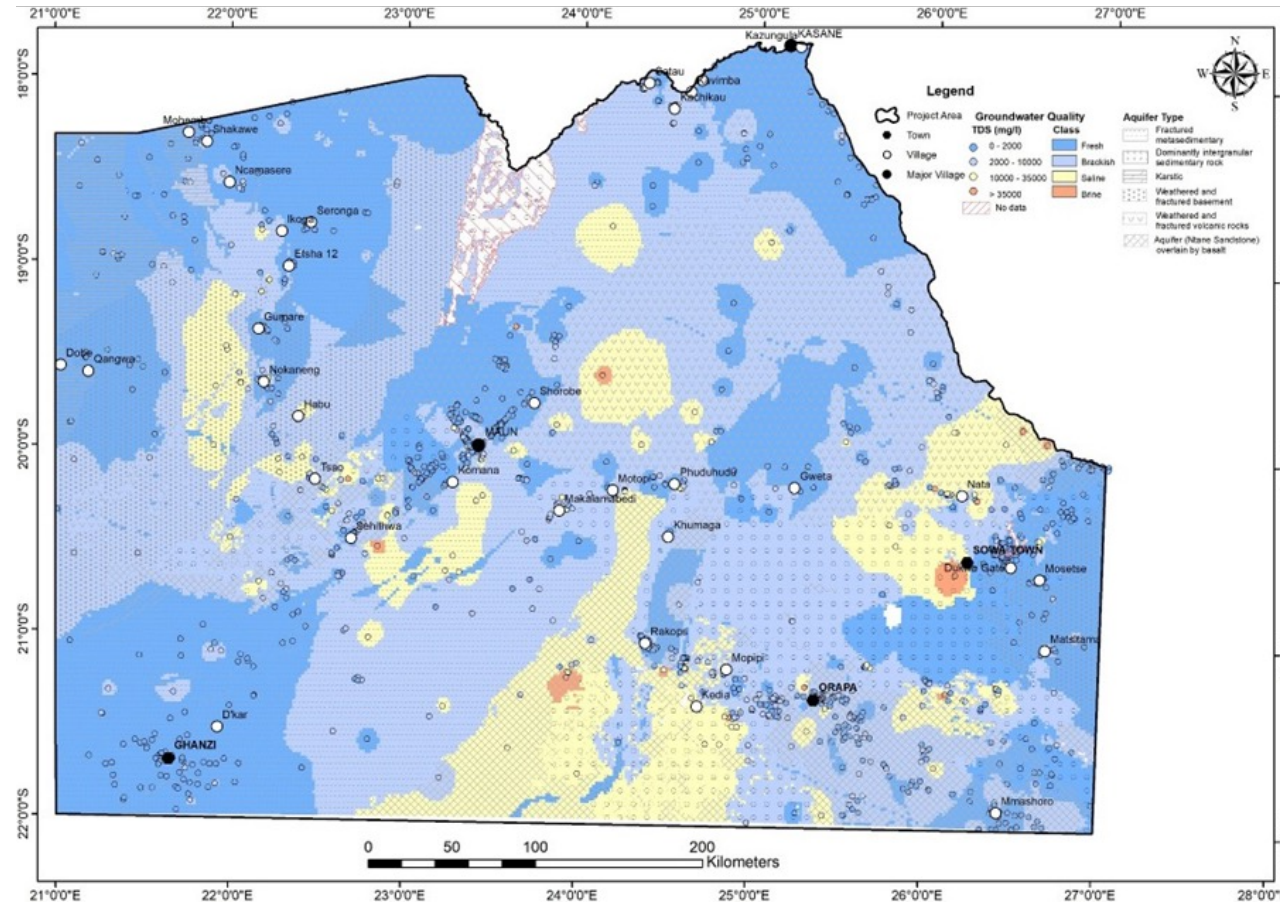
Major Pre-Karoo tectonic terranes and mafic complexes of Southern and Eastern Botswana



REE in Gaborone Granite Complex (Semarle synite)

(Strata Bound Manganese Deposits in Transvaal Group)





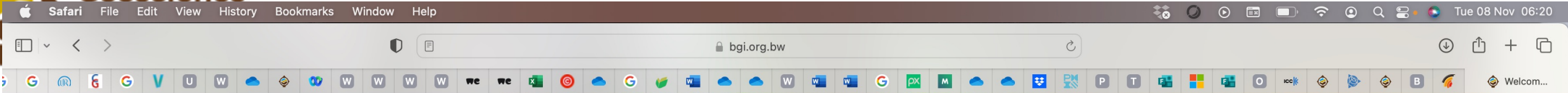
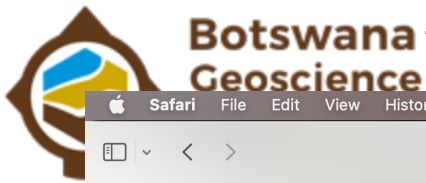
Pre-Kalahari water quality

Kalahari aquifer productivity



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DATA ACCESS PLATFORMS



- HOME
- ABOUT BGI
- OPERATIONS & SERVICES
- PROJECTS
- DOWNLOADS
- MEDIA CENTRE
- CONTACT US

GEOSCIENCE DATA AND INFORMATION PORTALS



Geoscience Publications and Reports Portal

Geoscience Information and Collection Management
 he Botswana Geoscience Institute (BGI) Library holds collections of geoscience data that is accessible to staff and the public...



Botswana Geological Portal

Multidisciplinary Geoscience data and Information
 A platform that provides an intuitive web map interface for multidisciplinary geoscience data search, discovery, and access for internal and external stakeholders...



Exploration and Water Boreholes Portal (BOREHIVE)

Borehole Portal - BoreHive
 As mandated by the Botswana Geoscience Institute Act, BGI exists to undertake research in the field of geosciences and provide specialised geoscientific services...



Mining Cadastre System (MCS)

Your gateway to all mineral tenure services in Botswana
 Botswana's Mining Cadastre Portal provides an electronic platform for all stakeholders in the mineral sector to engage directly with the Botswana Ministry of Minerals and Energy (MME)...

DIGITAL TRANSFORMATION USING GEOSPATIAL TECHNOLOGY AND EARTH OBSERVATIONS

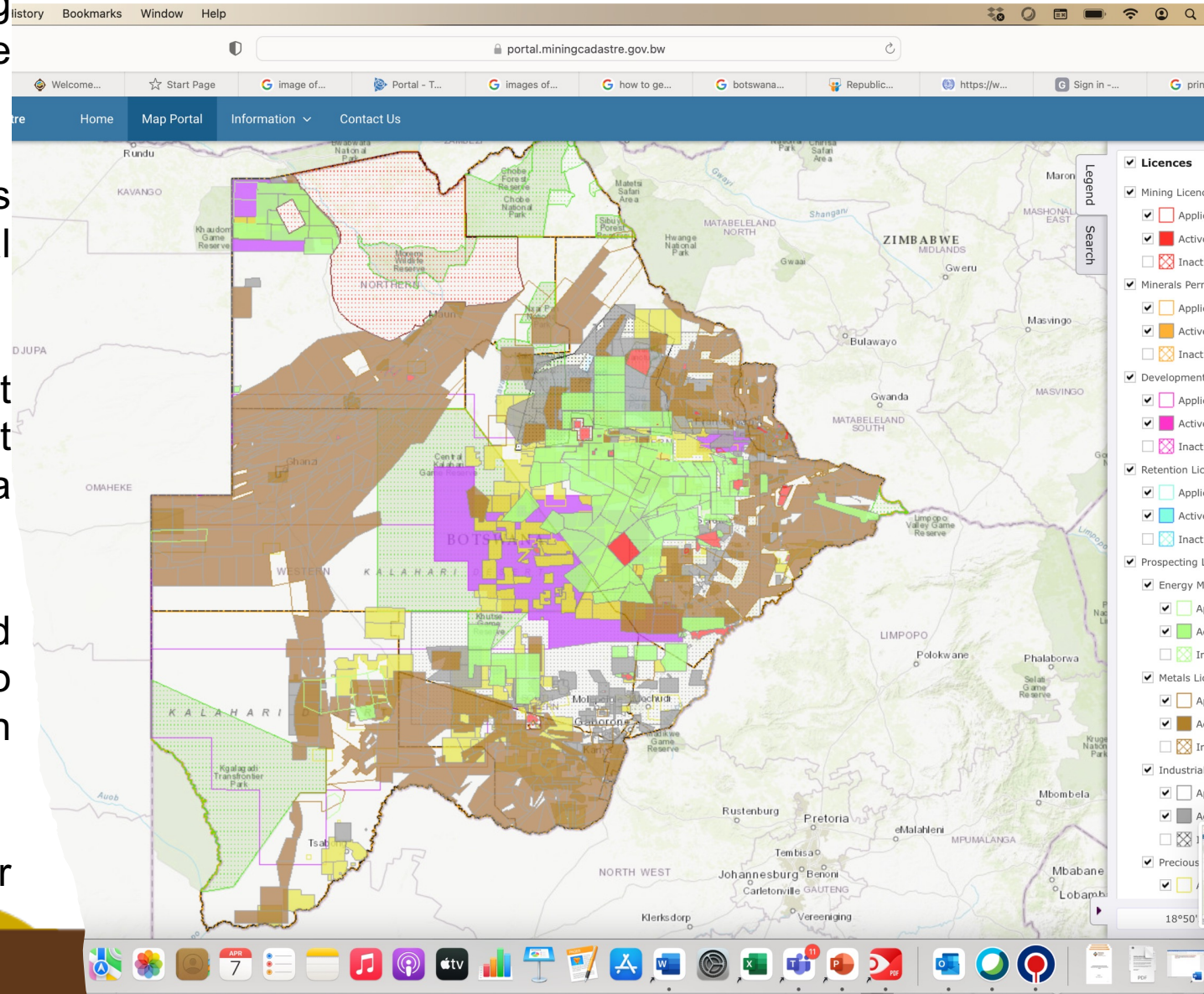
- This project was initiated as part of the Government Reset-agenda under Priority 3 which is Digitalization, focusing on combining the delivery of government priorities to place the country to compete at a global scale.

- The goal was to improve development of Mines in the Country through provision of mineral occurrence data

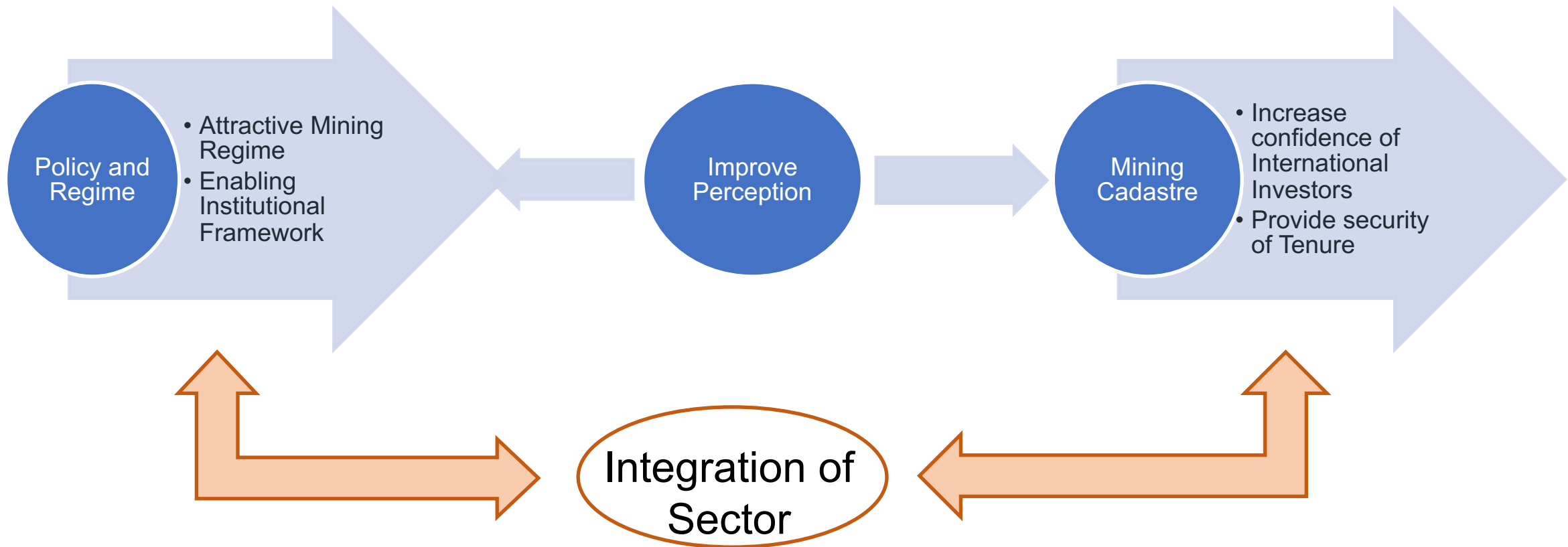
- The mining sector is one of Botswana's biggest export earners and a key focus for government production, while simultaneously delivering a positive economic impact for its citizens.

- The government of Botswana committed National Development Plan (NDP 11) to facilitate digitalization in the country through implementation of the Mining Cadastre System.

- Mining Cadastre was launched in October 2022.



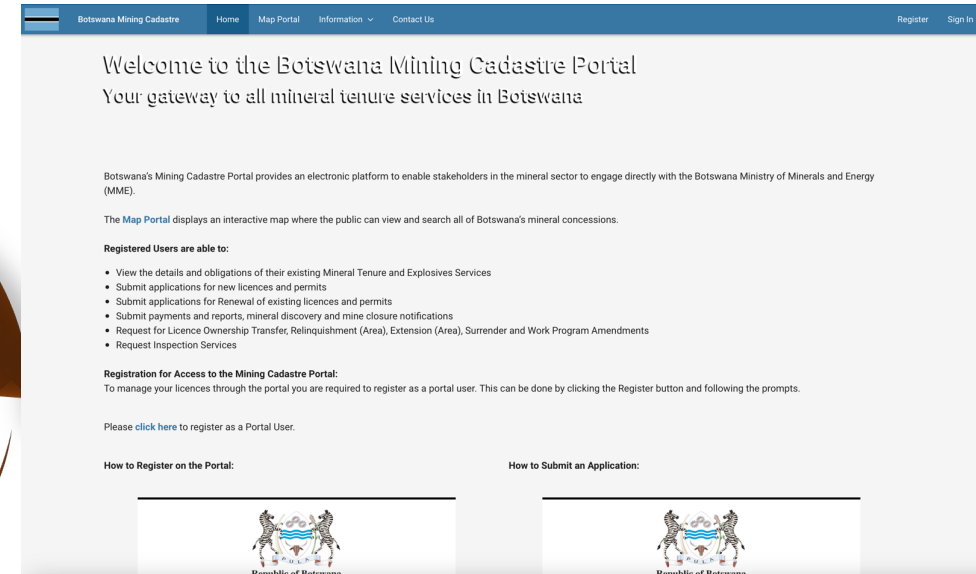
Mineral Development for Growth



APPLYING PROSPECTING AND OR MINING LICENSE/PERMITS PROCESS

How to apply for prospecting and mining licenses?

- Have Company name in place to start the application process.
- Click on the link below:
- Access application process online”
<https://portal.miningcadastre.gov.bw/page/landing>



Why invest in mining?

- Mining time period can be from 25 years to 100 years operation of operation.
- Return on Investment (RoI) is highly possible.
- Minerals are in high demand



Minerals in Botswana

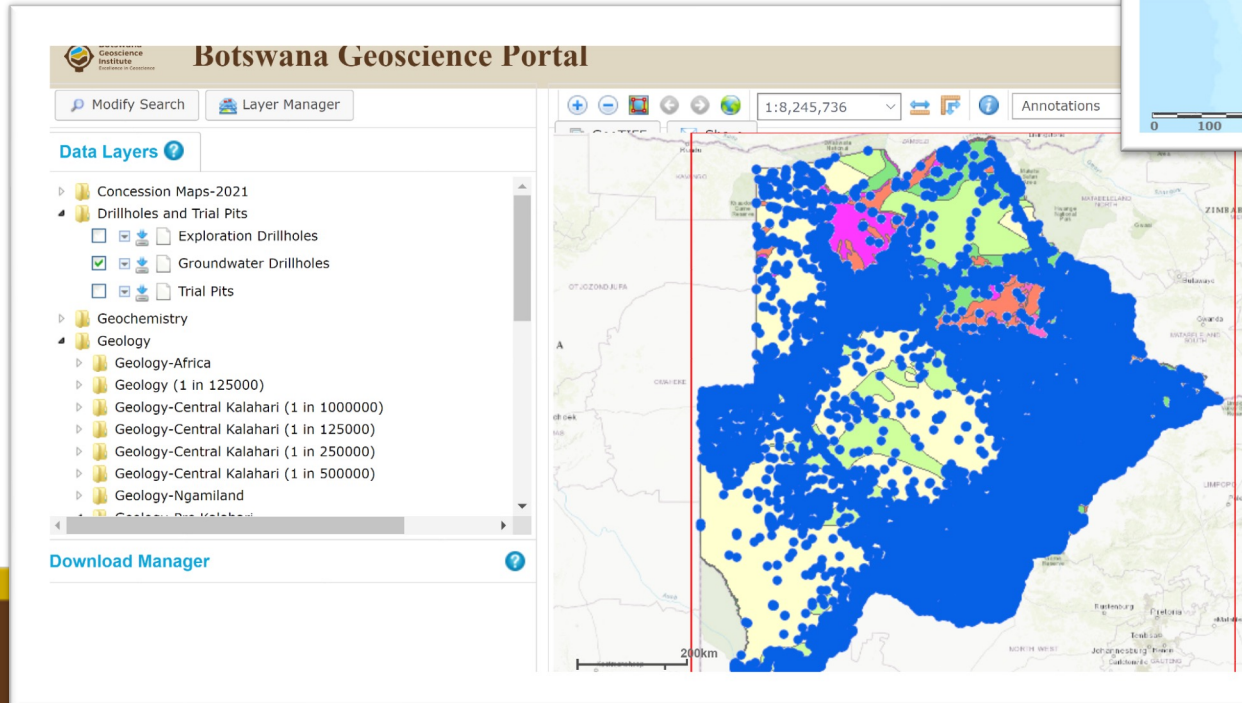
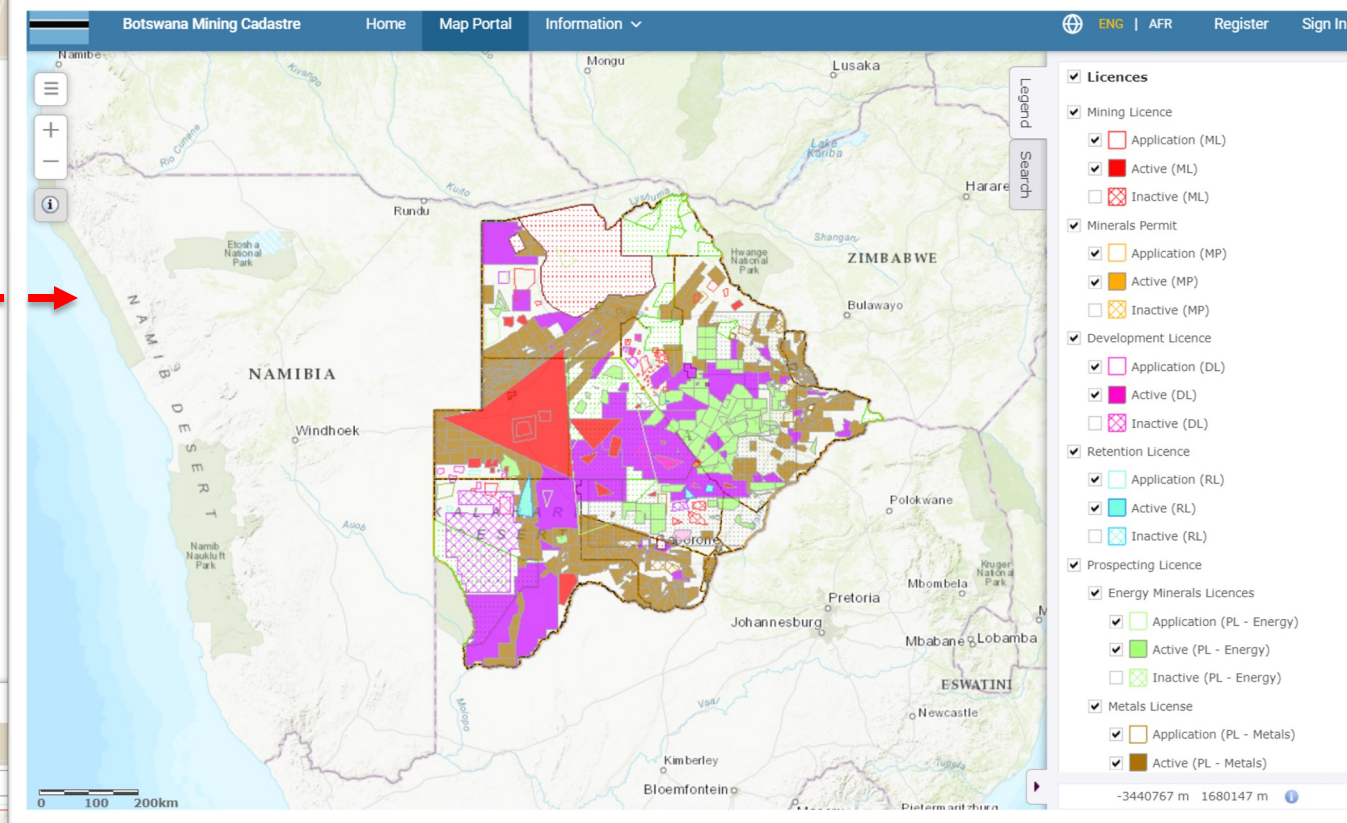
(especially those in demand):

- REE (rare earth minerals i.e lithium)
- Metals: Copper, silver, nickel, graphite
- Coal
- Manganese
- Gold etc



MINING CADASTER

- Mining Cadastre is accessible at: <https://portal.miningcadastre.gov.bw/page/landing>



NIGIS

- BGI Data within NIGIS is accessed from **Geoscience Portal**, (Geology, Geophysics, etc). Accessible at www.geos.bgi.org.bw
- Reports, publications at www.library.org.bw
- Borehole reports at www.borehive.org.bw

BGI OTHER WEBSITES

Botswana Geoscience Institute Online Library


Home Contact Us

BGI Mandate

Botswana Geoscience Institute (BGI), was established to undertake research in the field of geosciences and provide specialised geoscientific services, be a custodian of geoscience information, promote the search for and exploration of any mineral in Botswana and to act as an advisory body in respect to of geosciences and geohazards....[Read More.](#)

Geoscience Information and Collection Management

The Botswana Geoscience Institute (BGI) Library holds collections of geoscience data that is accessible to staff and the public. The collections predate the independence era as the Botswana Geological Survey, as it was known before 2015, was established in 1948.



Collections

- 1. Maps**
The collection includes various geological maps of Botswana of scale 1:125 000 to 1: 1000 000.
- 2. Books and Journals**
The library has a collection of geoscience journals and books.
- 3. Publications**
This is a collection of the former Geological Survey and BGI publications including district memoirs, bulletins, mineral resources and the annual reports of the Institute.
- 4. Reports**
Documents in this collection include consultants and internal reports on various geoscience projects.
- 5. Open Prospecting License Reports**
Accessible to the public are open prospecting license reports that include geological logs and assays and historical concession maps.

Frequently Accessed

Title	Author
Review of Industrial Minerals in the Serowe-Palapye-Mahalapye Area, Central District, A	Kreimeyer, R; Ramonyane, P
Prospecting licence 380/2008-Shoshong/Kalamare	Ashante coal
Prospecting licence 380/2008-Shoshong/Kalamare	Ashante coal
Prospecting licence 380/2008-Shoshong/Kalamare	Ashante Coal PTY LTD
Prospecting licence 370/2010- Central district	Ashante coal
Prospecting licence 380/2008-Shoshong/Kalamare	Ashante coal
Prospecting licence 370/2008-Central district	Ashante coal
Prospecting licence 370/2008-Central District	Ashante coal
Geotechnics of soft soils	Karstunen, M [Ed.]
Introduction to Mining Seismology, An	Gibowicz, Sławomir Jerzy ; Gibowicz, Sławomir Jerzy ; Orłowski, Renata; Kijko, Andrzej

I. **LIBWIN portal:** provides **geological collections and publications** among others and aggregate data for research or business intelligence purposes repository for consultants, geoscientific, prospecting licenses and mineral resources reports, annotated bibliographies, bulletins, district memoirs, records of the geological survey, seismological series, multimedia, books, journals. Accessible at www.library.bgi.org.bw

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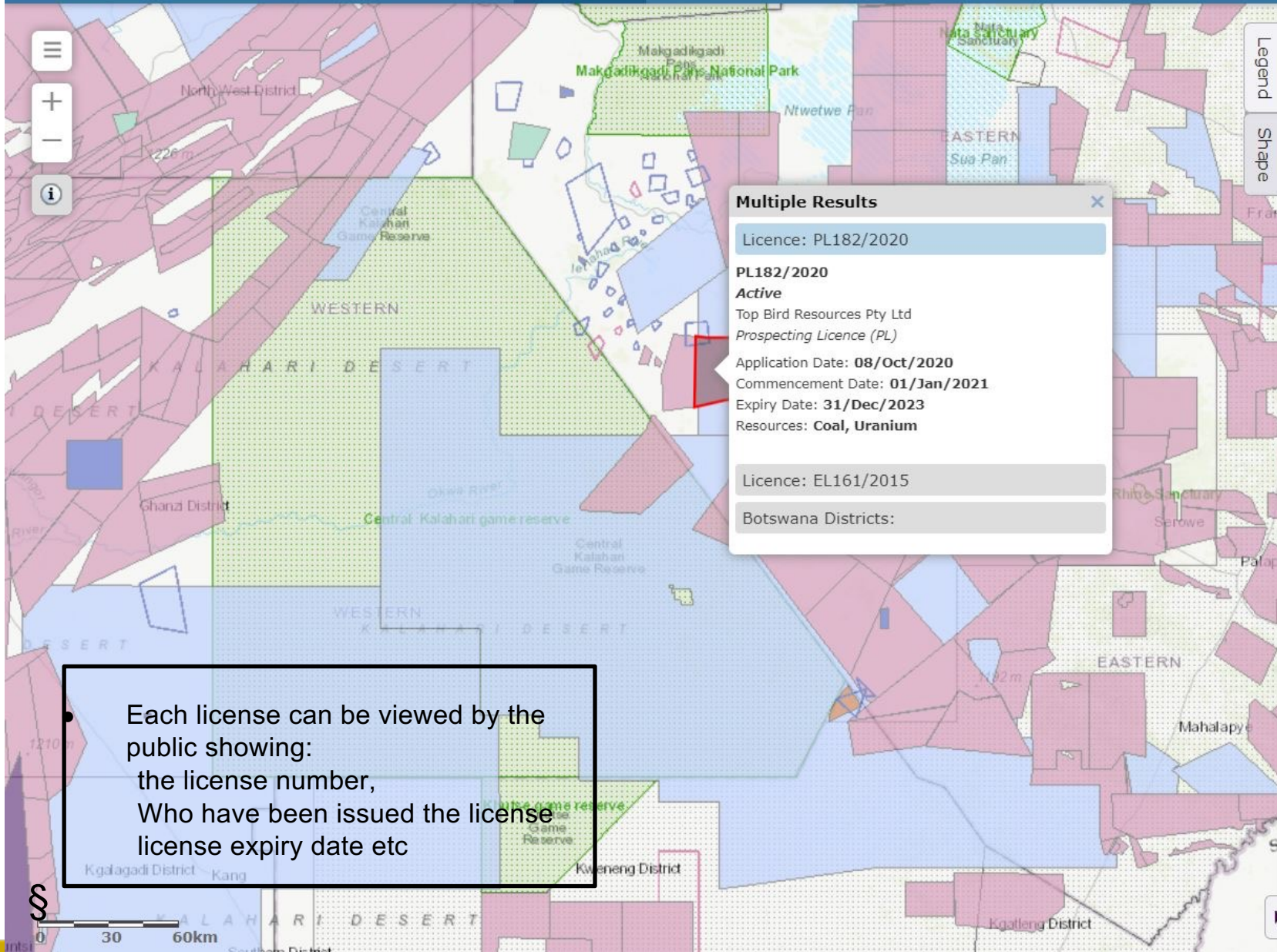
Welcome | Search Borehole

Search Borehole

Search by Borehole Number, Village/Town/City, District, Year, Sample Type, Longitude, Latitude

No	Borehole No.	Borehole Type	Sample Type	Location
1.	BH1	Groundwater	Water	Khudumelapye
2.	BH10	Groundwater	Water	Khekhenye
3.	BH100	Groundwater	Water	Nakalakukama
4.	BH1000	Groundwater	Water	Morwa
5.	BH10000	Groundwater	Water	Kunyere
6.	BH10001	Groundwater	Water	Kunyere
7.	BH10002	Groundwater	Water	Kunyere
8.	BH10003	Groundwater	Water	Kunyere
9.	BH10004	Groundwater	Water	Kunyere

II. The **BoreHive** portal provides for search, discovery, and an interactive dynamic map display pinpointing location on data and information. The information covers water and exploration boreholes, critical information like borehole location, coordinates, depth, water strike, yield and relative borehole logs. Accessible at www.bh.bgi.org.bw

Legend
Shape

- Licences
 - Mining Licence
 - Application (ML)
 - Active (ML)
 - Inactive (ML)
 - Minerals Permit
 - Application (MP)
 - Active (MP)
 - Inactive (MP)
 - Development Licence
 - Application (DL)
 - Active (DL)
 - Inactive (DL)
 - Retention Licence
 - Application (RL)
 - Active (RL)
 - Inactive (RL)
 - Prospecting Licence
 - Energy Minerals
 - Application (PL - Energy)
 - Active (PL - Energy)
 - Inactive (PL - Energy)
 - Metals
 - Application (PL - Metals)
 - Active (PL - Metals)

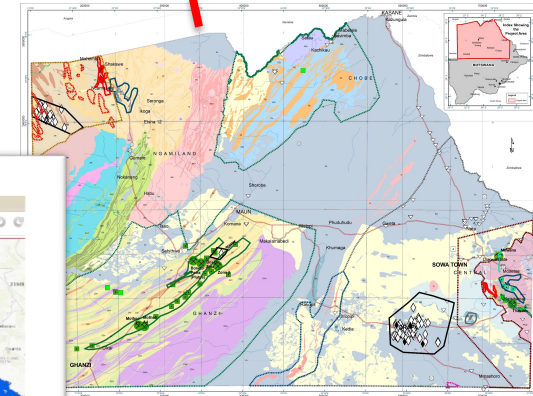
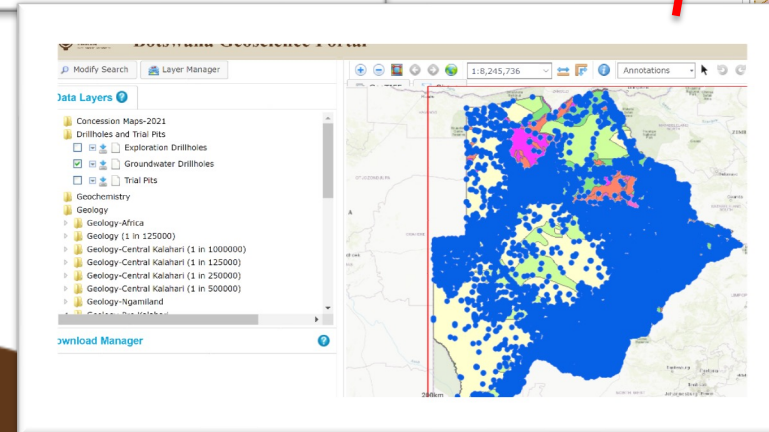
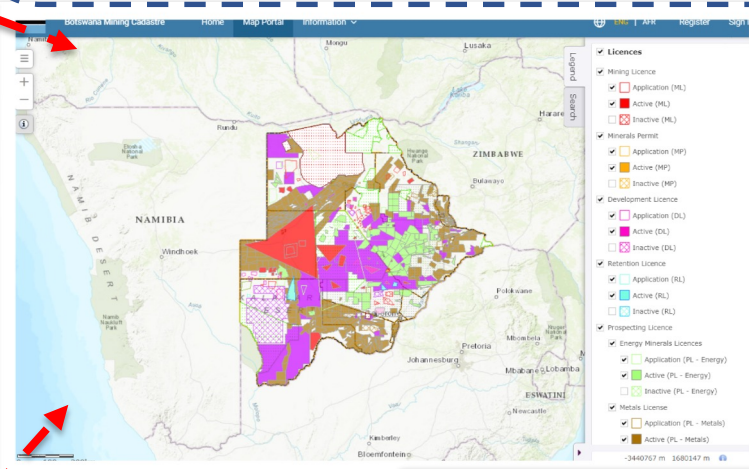
Each license can be viewed by the public showing:
the license number,
Who have been issued the license
license expiry date etc

- The system secures mineral rights, recording the geographical location, ownership and time validity of mining rights, assuring compliance with the payment of fees and/or other requirements to keep a concession valid.
- Handles all the processes related to exploration and mining activities thereby enhancing efficiency and improve turnaround times.

BGI have provided platforms to store and allow data extraction Geoscience portal, Landfolio are build on GIS platform to allow data mining of both vector and raster data

- Improves retrieval of reports, maps etc
- Allows quality checks and approval of data and information

- Provides Mineral Rights Security
- Mining Cadaster allows Data Mining of relinquished PL reports
- Improves geoscience research

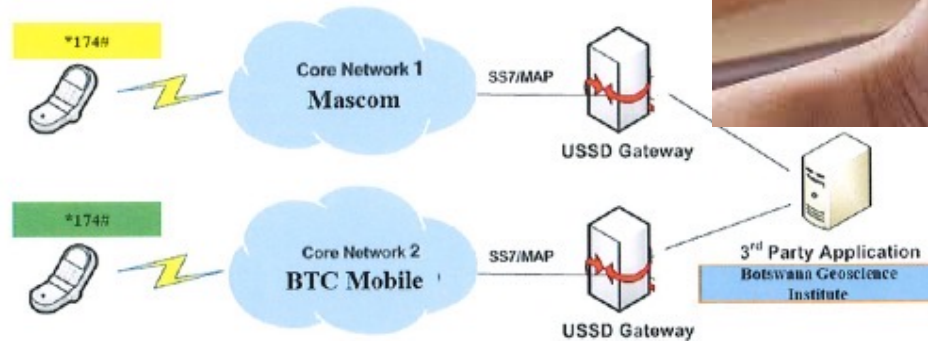


Mobile Payment

- BGI will use USSD provision in creating e-Commerce platform.
- USSD allows users to use a smartphone or data/internet connection to use mobile banking through i.e *754# code

Customer dials *174#, and selects the menu to pay.

Online Payment Processing



Online Payment

- Online Gateway will provide a shopping cart for purchases of BGI products and services, placed on BGI websites.



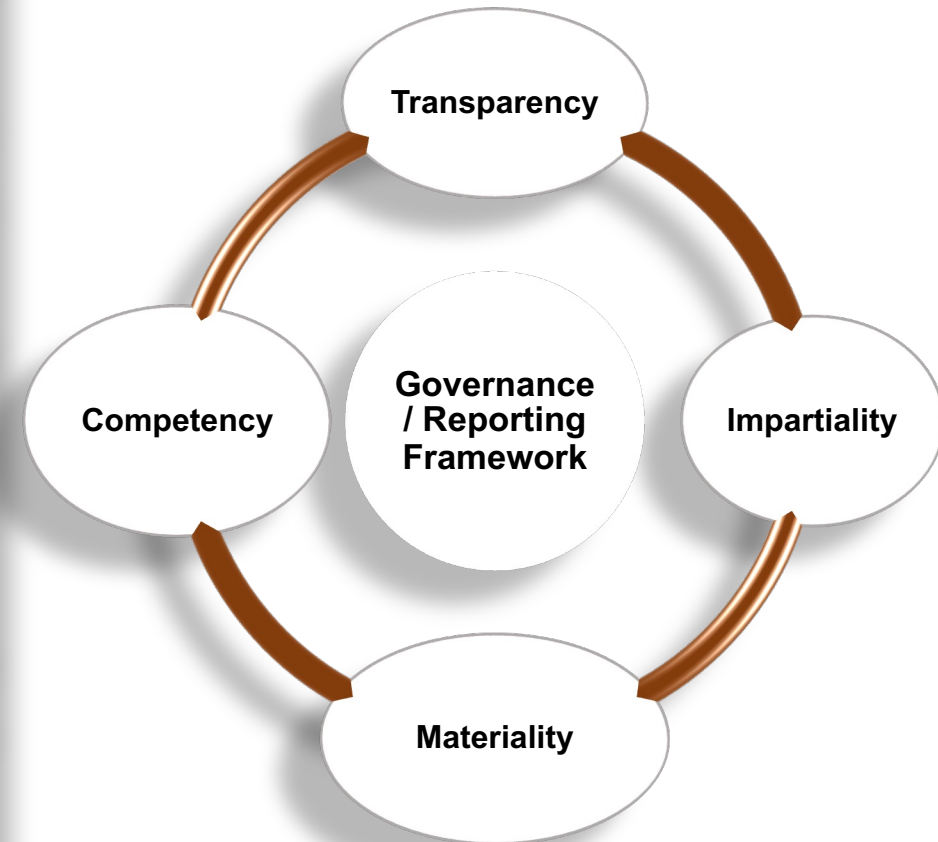
Customer selects the report and add items on the shopping cart and pays online.



Botswana

- Botswana richly endowed in economic minerals and an inherent value exists in the strategic mineral commodities;
- Opportunity to attract technological excellence in mineral-related industries including mines, to support side-stream and downstream value addition.
- Geoscience Data and Information Databases available: <https://portal.miningcadastre.gov.bw/page/landing>; www.libwin.bgi.org.bw; www.bh.bgi.org.bw & www.geos.bgi.org.bw)
- Botswana as the destination for mining – **Investment Attractiveness Index** and **Policy Perception Index** rated approximately 70% (Fraser Ranking, 2021);
- BGI is focusing on enhancing, promoting, diversifying to improve Botswana's **Mineral prospectivity and beneficiation drive**;
- Inherent exhaustibility of mineral resources makes their benefit timeline finite and requires planning in advance for resource decline and exhaustion = **Integrated Mineral Resource Development Plan**; and

We are using Geospatial technology and Earth Observations to enable a shared approach on how Mineral Resource Development can contribute to broad-based development.





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Physical Address: Plot 11566, Khama 1 Avenue, Lobatse, Botswana
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Fax: +267 533 4295
Email: info@bgi.org.bw

CONTRACT DETAILS:

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