

Council for Geoscience

NORTH WEST PROVINCIAL MINING AND ENERGY INVESTMENT CONFERENCE

25-26 January 2022

Bon Hotel - Rustenburg



**mineral resources
& energy**

Department:
Minerals Resources and Energy
REPUBLIC OF SOUTH AFRICA

A proud entity of the Department of Mineral Resources and Energy



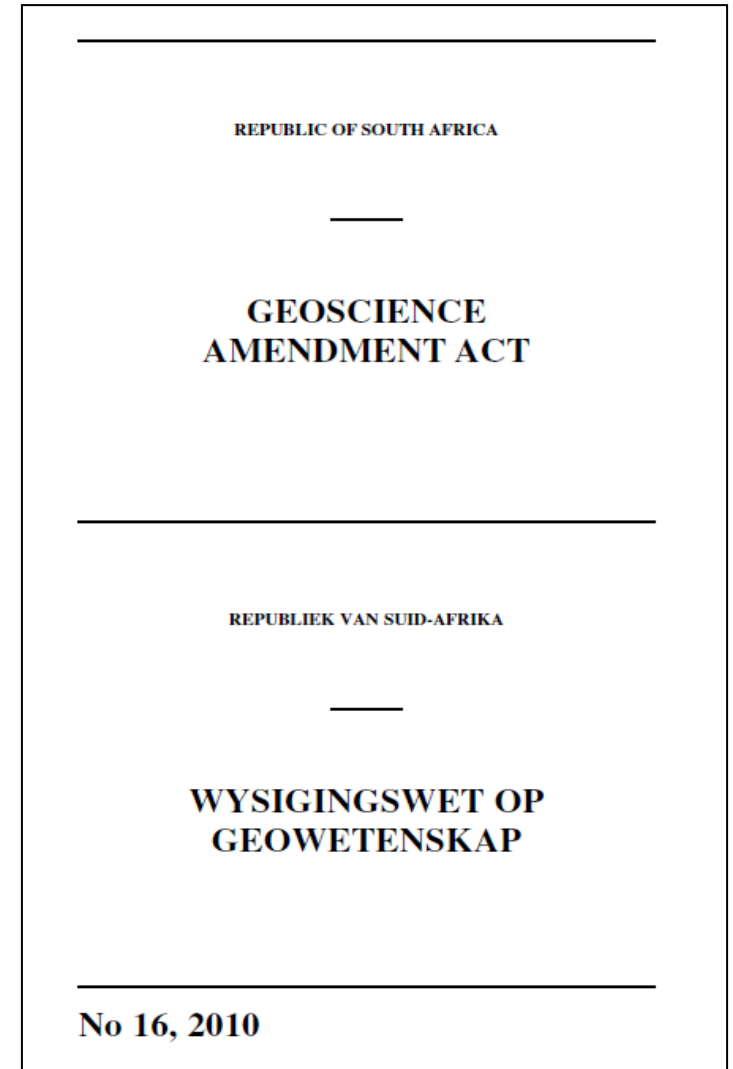
Council for Geoscience

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ABOUT THE COUNCIL FOR GEOSCIENCE

- The Council for Geoscience (CGS) is one of the National Science Councils of South Africa.
- The CGS is the legal successor of the Geological Survey of South Africa, which was formed in 1912 by the amalgamation of 3 former Surveys, the oldest of which - the Geological Commission of the Cape of Good Hope - was founded in 1895.
- The **Geoscience Act, Act 100 of 1993**, as amended, established the CGS in its present form.
- The CGS is listed as a **Schedule 3A Public Entity** in terms of the Public Finance Management Act (**PFMA**) (Act No. 1 of 1999).



CGS VISION, MISSION AND VALUES



Vision

- A prosperous and transformed society enabled by geoscience solutions



Mission

- Providing integrated, systematic and thematic maps and conducting research on the onshore and offshore geology of South Africa, as mandated, to:
- Facilitate mineral, energy and agricultural development;
- Contribute to the assessment and sustainable management of mineral, geohydrological and geoenvironmental resources;
- Support infrastructure development.
- Discharging the mandate in a manner that supports transformation and national developmental imperatives.



Values

- Innovation
- Diversity
- Excellence
- Accountability
- Learning
- Safety, Health, and Environment
- Transparency

GOVERNANCE STRUCTURE OF THE CGS



Minister of Mineral Resources and Energy:
Mr Samson Gwede Mantashe

Executive Authority



Chairperson of the Board: **Dr Humphrey Mathe**

Accounting Authority



Chief Executive Officer: **Mr Mosa Mabuza**



Ms Refilwe Shelembe



Dr David Khoza



Mr Leonard Matsepe



Dr Jonty Tshipa

CGS Executive Team

CGS MANDATE

INTEGRATED AND MULTIDISCIPLINARY GEOSCIENCE MAPPING PROGRAMME: 2018–2021 MATRIX				
ND imperative: Economic growth	ND imperative: Environment and health	ND imperative: Innovation	ND imperative: International relations	
1. Geoscience for mineral and energy resources	2. Geoscience for infrastructure and land use	3. Geoscience for health, groundwater and the environment	4. Geoscience innovation	5. Geoscience diplomacy
CUSTODIANSHIP OF ALL GEOSCIENTIFIC INFORMATION IN SOUTH AFRICA				
Onshore and offshore geoscience research and mapping for current and future generations Modelling geological environments and mineralising systems for mineral and energy resources	Geotechnical mapping and vulnerability investigations (sinkholes, mine subsidence, coastal erosion and landslides) Seismic susceptibility investigations (mine seismic hazard assessment) Optimisation of land use (food security, geoheritage and geotourism, physical infrastructure)	Environmental geoscience research (monitoring and mitigating the impact of geology and mining activities on health and the environment) Hydrogeological research and modelling	Application of artificial intelligence in geoscience Cultivating geoscientific innovation and novelty	Geoscience collaboration and global standards International geoscience policy and governance OAGS Secretariat

Drivers for economic growth

- Mineral resources pipeline
- Energy security
- Water security
- Marine mapping
- Environmental mapping and geohazards
- Infrastructure and land-use
- Innovation
- Geoscience diplomacy

CGS' CONTRIBUTION TO THE ECONOMIC RECONSTRUCTION AND RECOVERY PLAN

The South African Economic Reconstruction and Recovery Plan has three phases:

1. **Engage and Preserve** - which includes a comprehensive health response to save lives and curb the spread of the pandemic
2. **Recovery and Reform** - which includes interventions to restore the economy while controlling the health risks;
3. **Reconstruct and Transform** - which entails building a sustainable, resilient and inclusive economy

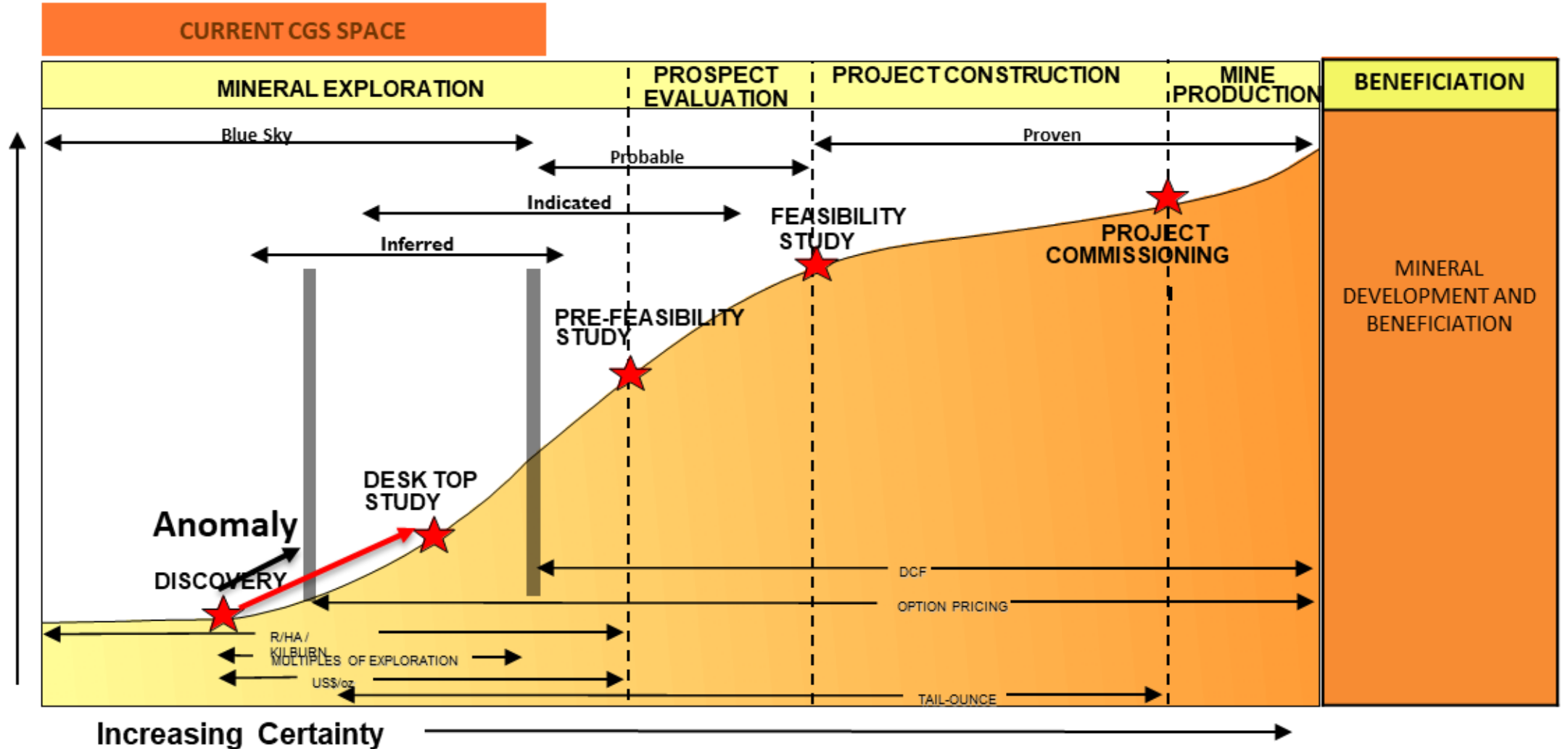


CGS directly contributes to **FIVE (5) of the Priority interventions**

Priority interventions:

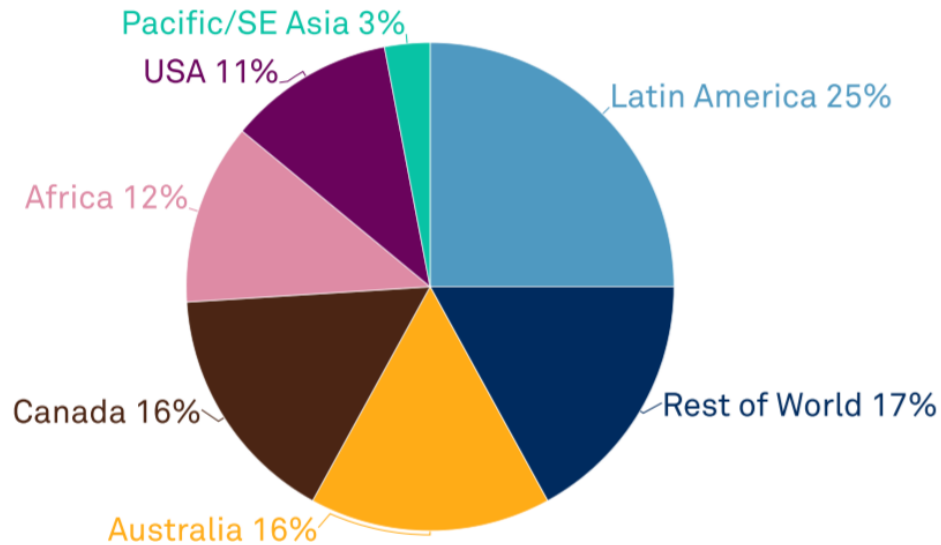
1. **Aggressive infrastructure investment**
2. Employment orientated strategic localization, reindustrialization and export promotion
3. **Energy security**
4. Support for tourism recovery and growth
5. Gender equality and economic inclusion of women and youth;
6. **Green economy interventions**
7. Mass public employment interventions
8. **Strengthening food security**
9. **Macro-economic interventions**

ROLE OF CGS IN THE MINING VALUE CHAIN

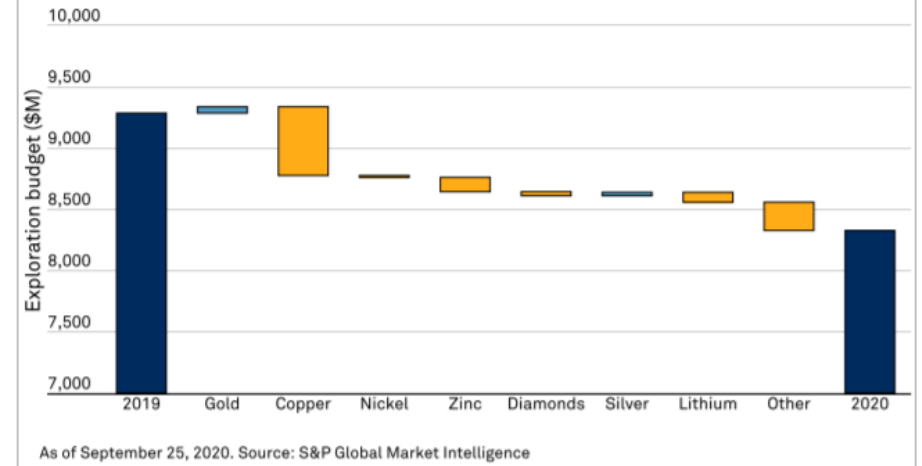


GLOBAL EXPLORATION BUDGET

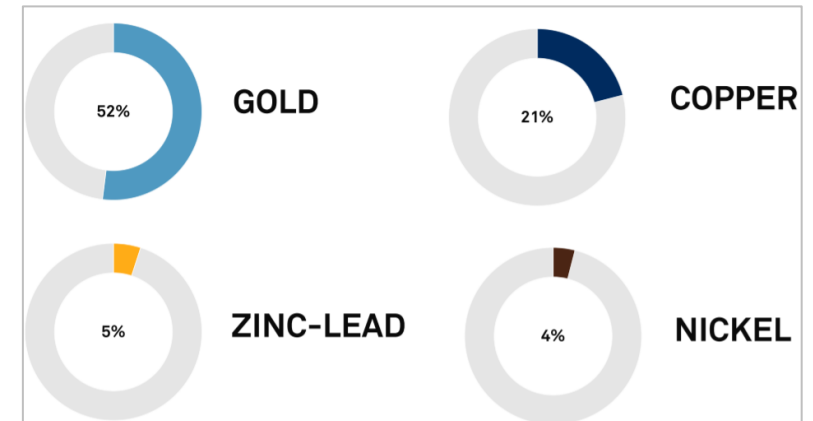
Share of 2020 exploration budget by location



Change in exploration budget by commodity (2019-2020)

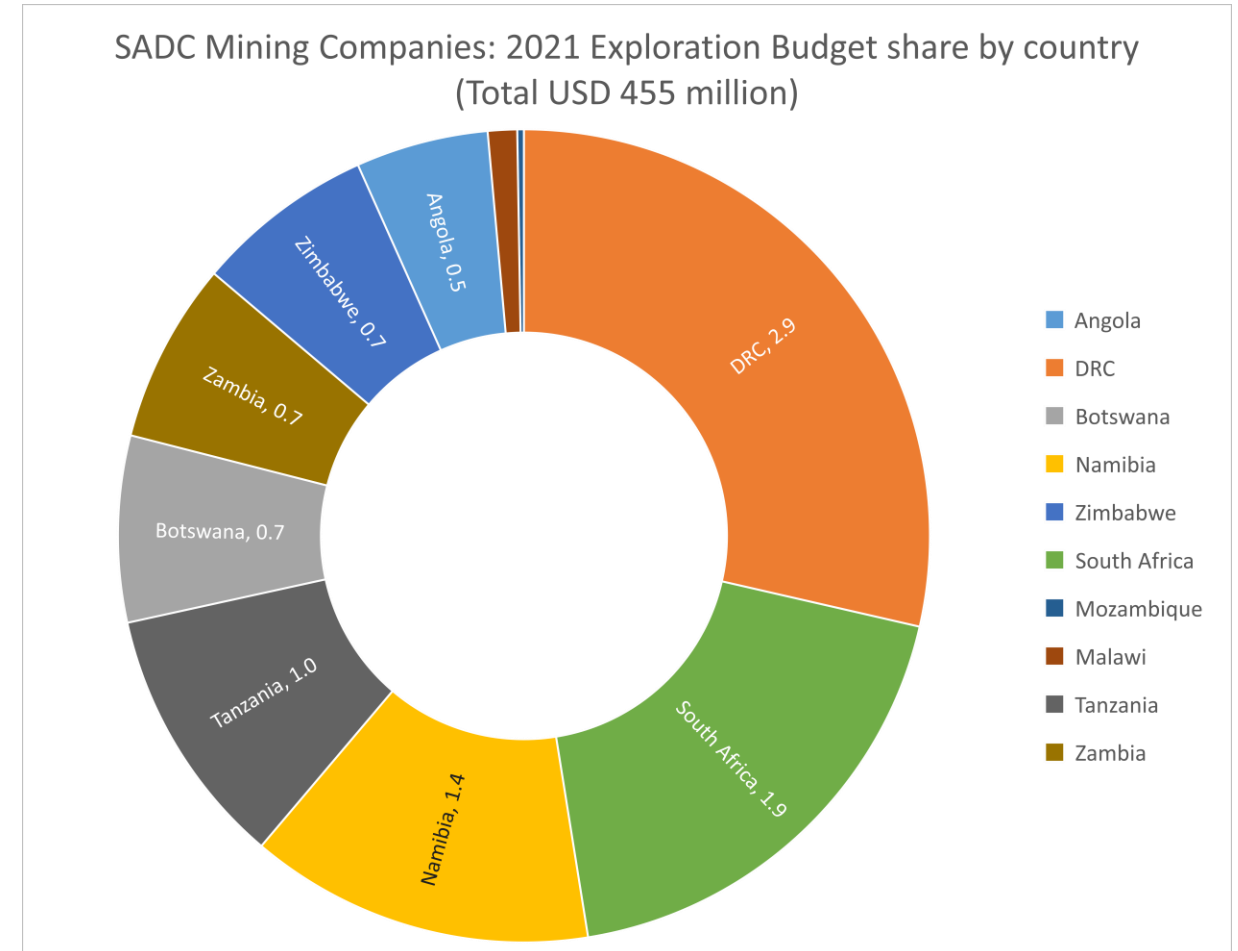


- Africa's share of the global exploration at 12% is \$1.1 billion.
- The expected share of the junior exploration companies has increased by 62% year on year to a total of \$4.1 billion.
- The majors account for marginally over half of global exploration budget at a total of \$5.6 billion.



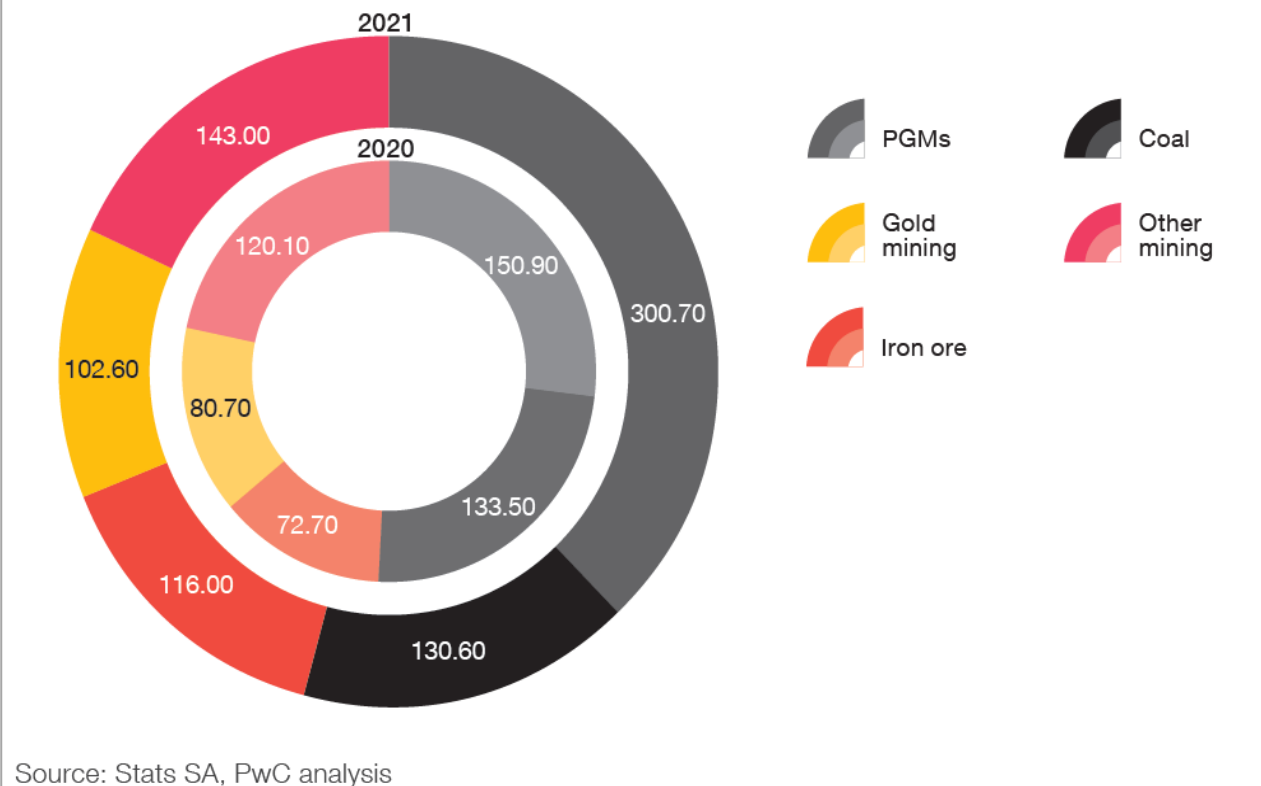
THE ROAD TO RECOVERY

- The mineral exploration sector is well in recovery mode from the downturn caused by COVID-19.
- In 2021, the annual global exploration budget increased by 35% year over year to \$11.2 billion.
- A global increase ranging between 5% and 15% is anticipated for the 2022.
 - easing of lockdown restrictions allowed explorers to reactivate programs by mid-2020
 - higher metals prices
 - increased financing activities



CONTRIBUTION OF MINING TO SA ECONOMY

Figure 1: Mining sales per commodity, FY2020 v FY2021

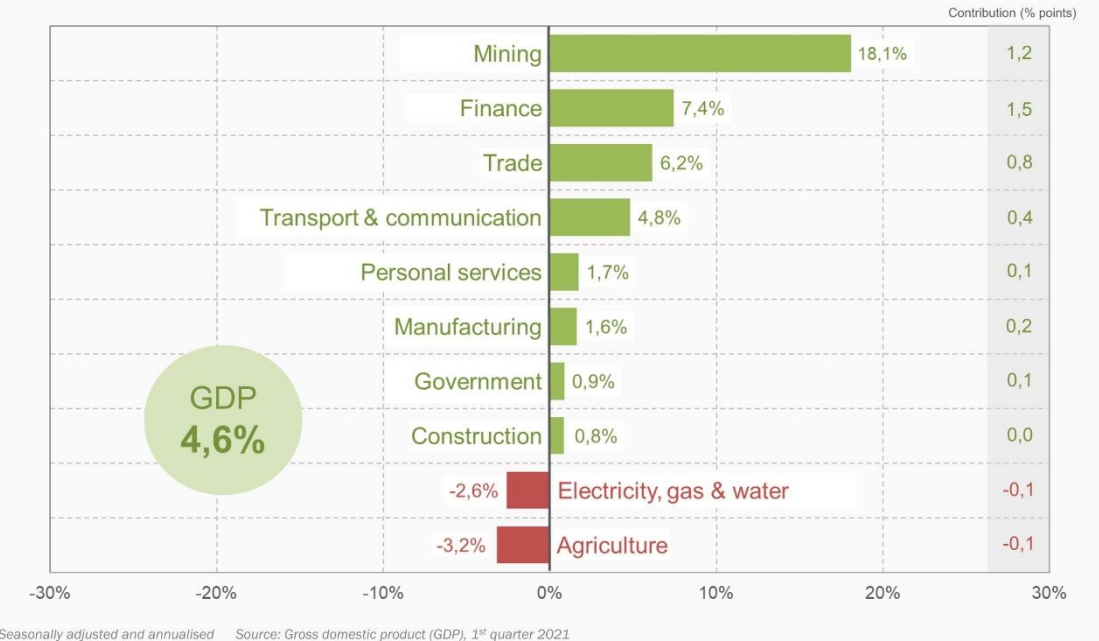


- South Africa's largest mining sectors: PGMs, Coal and Gold.
- Total mining revenue generated was R792.9 billion (July 2020 to June 2021).

- Increased contribution of 7.6% to South Africa's GDP in 2021 (R985,3 bn)

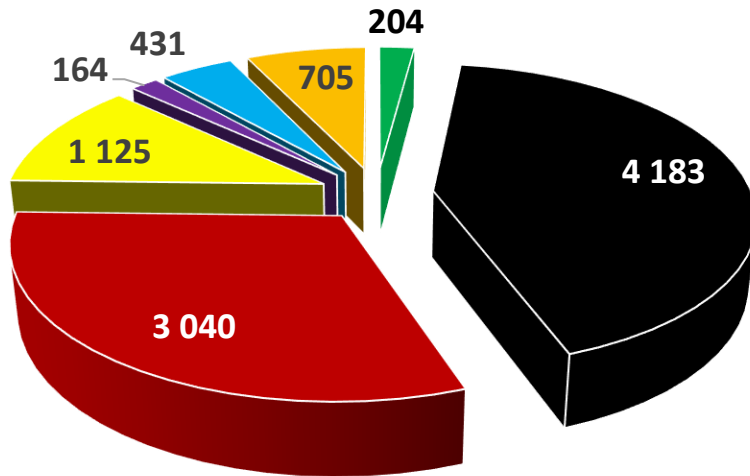
Finance, mining and trade were the most significant contributors to GDP growth

Industry growth in the first quarter of 2021 compared with the fourth quarter of 2020

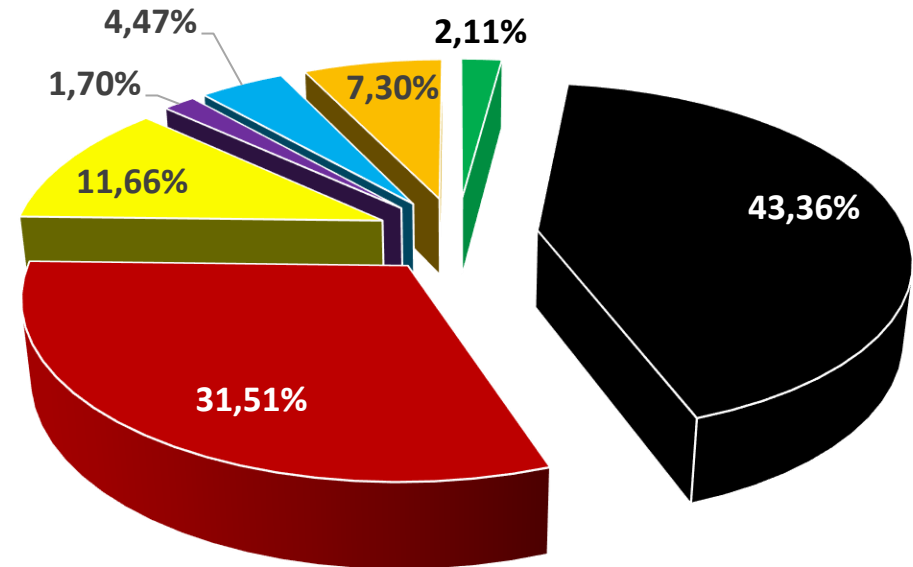


PRELIMINARY GROSS IN-SITU MINERAL VALUE OF SOUTH AFRICA

Gross In-Situ Value of Minerals in SA in Billion USD



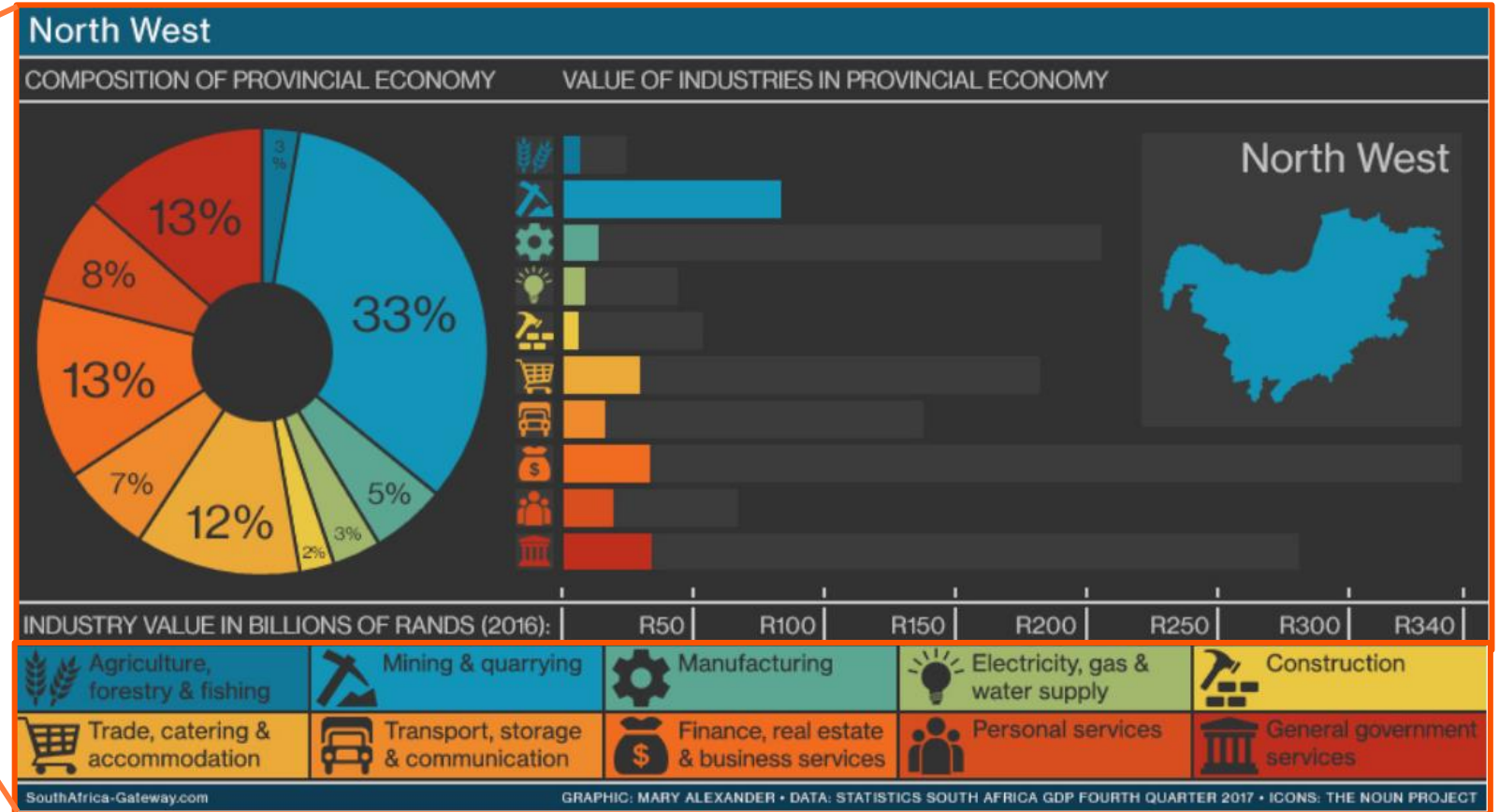
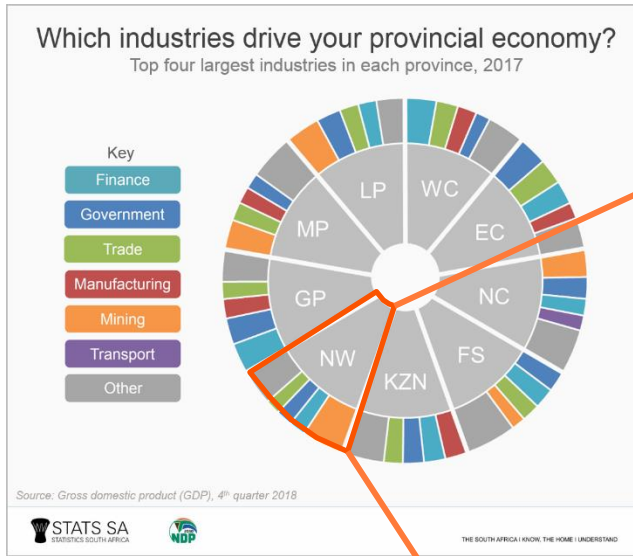
Proportions of Gross In-Situ Value of Minerals in SA



■ Nickel ■ Coal ■ PGE ■ Gold ■ Chromium ■ Iron Ore ■ Others

The gross in-situ value of ~9.6 trillion USD

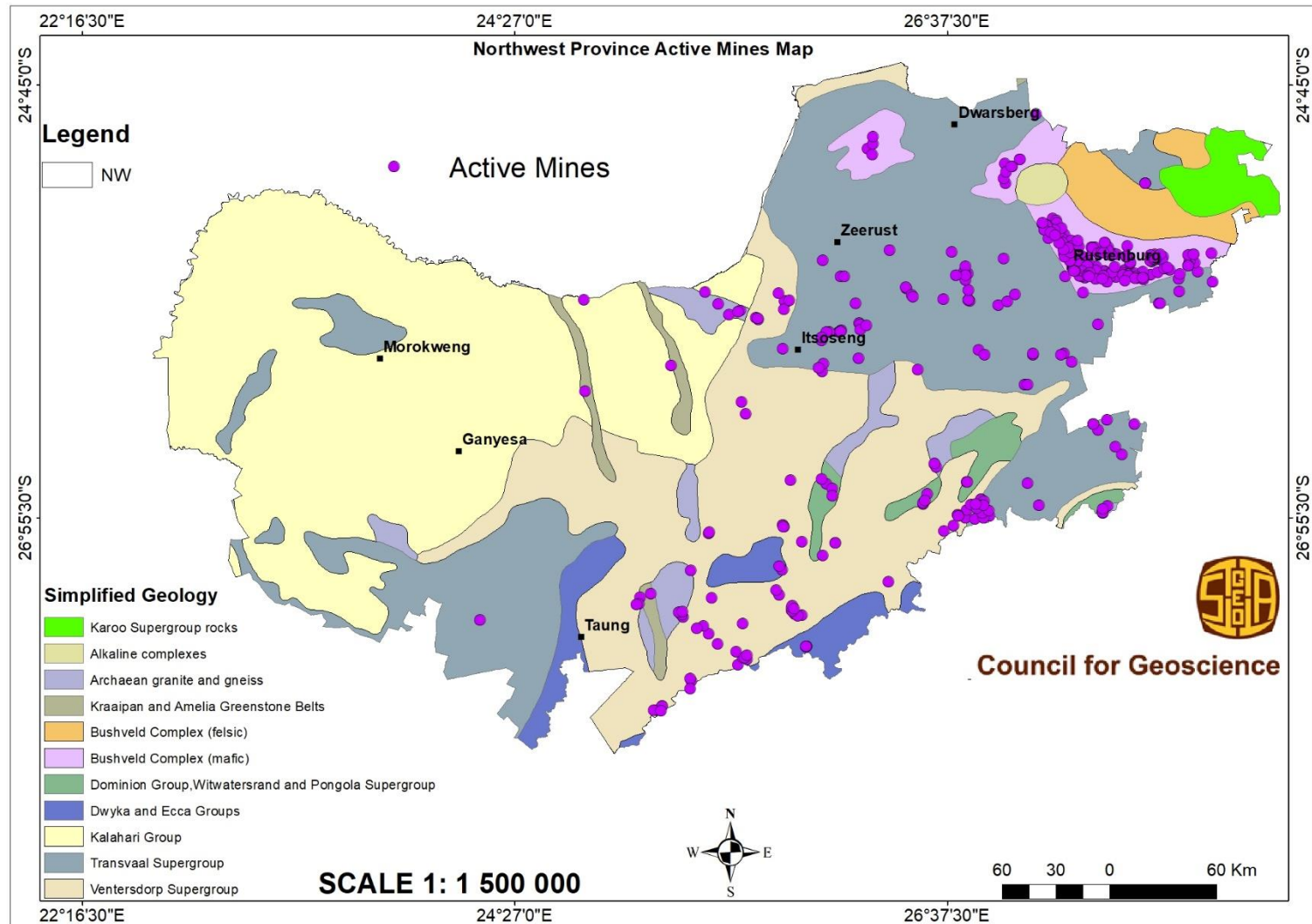
CONTRIBUTION OF MINING IN THE NORTH WEST PROVINCE



OVERVIEW OF NORTH WEST MINERALS AND ENERGY

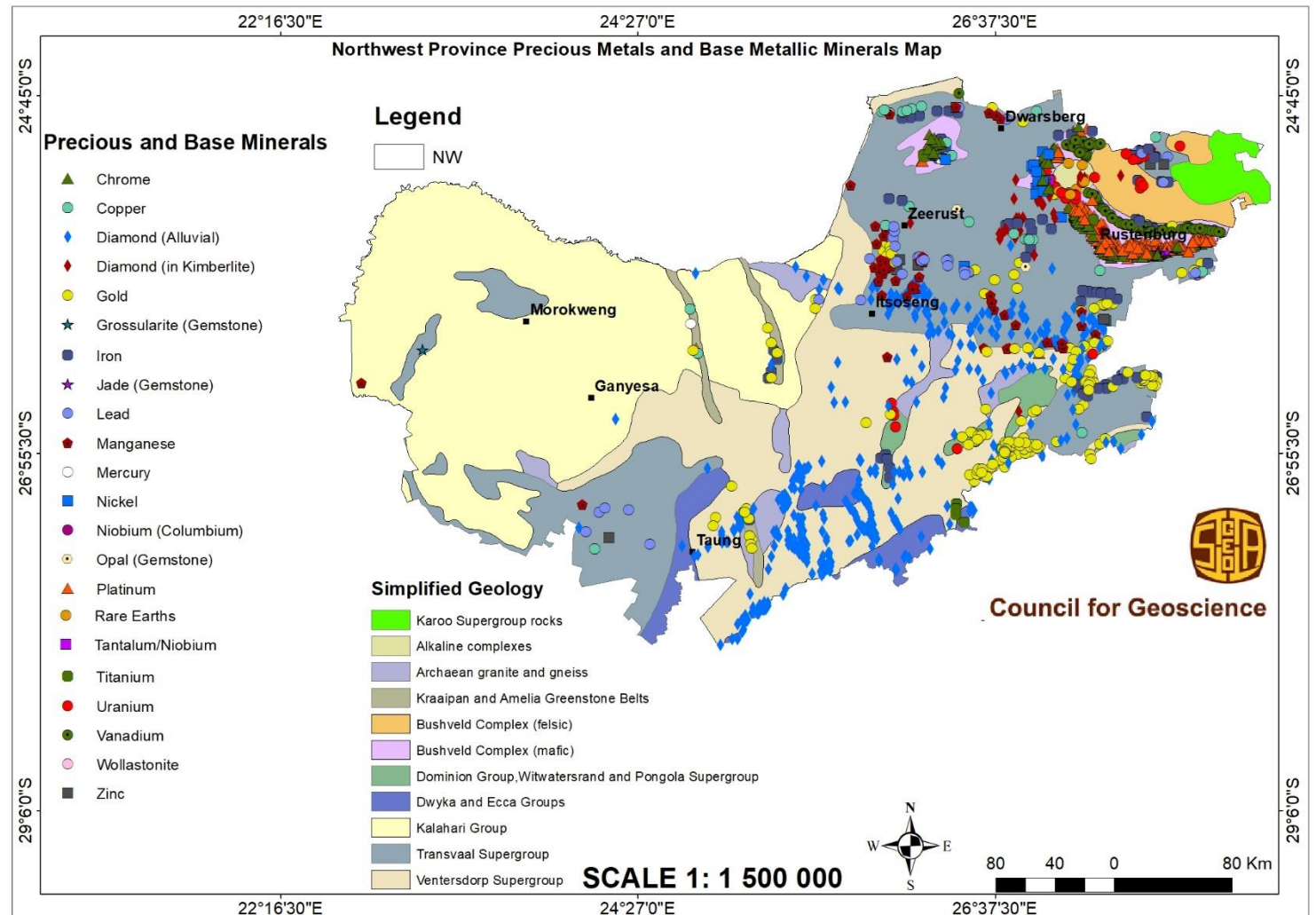
GEOLOGICAL OVERVIEW AND ACTIVE MINES IN THE NW

- The NW province is covered largely by rocks from the Archaean basement to the recent sediments of the Cenozoic era.
- Granites and gneisses of the Swazian era together with the Amalia Greenstone Belt of the Kraaipan Group make up the basement rocks of the study area. The Amalia Greenstone Belt rocks that hosts minor Gold and Silver mineralisation.
- In other parts, the basement is overlain by the Dominion Group of the Witwatersrand Supergroup which is also well known for its Gold and Uranium deposits.



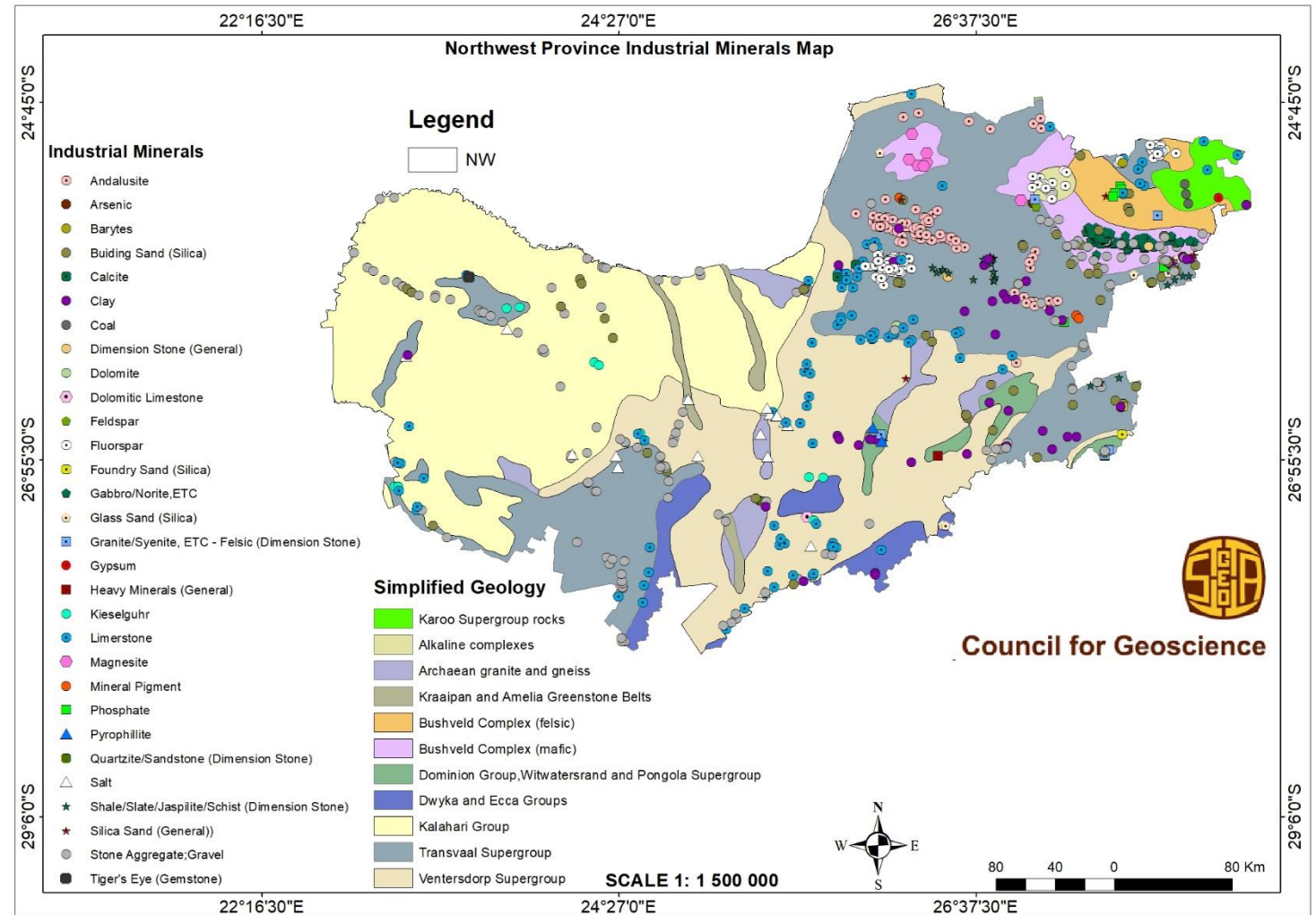
KNOWN PRECIOUS METALS AND BASE MINERALS OF THE NW

- The main commodities in NW are diamonds, PGEs, gold, uranium and Iron.
- PGEs are associated with the chromitites of the Western Bushveld Complex.
- Gold mineralisation is hosted in the Amalia Greenstone Belt is associated with quartz-carbonate veins that crosscut the BIF layering.
- Gold, together with Uranium also hosted by rocks of the Witwatersrand Basin and Transvaal dolomites.
- Numerous Kimberlitic and alluvial diamond occurrences are found in North West Province.

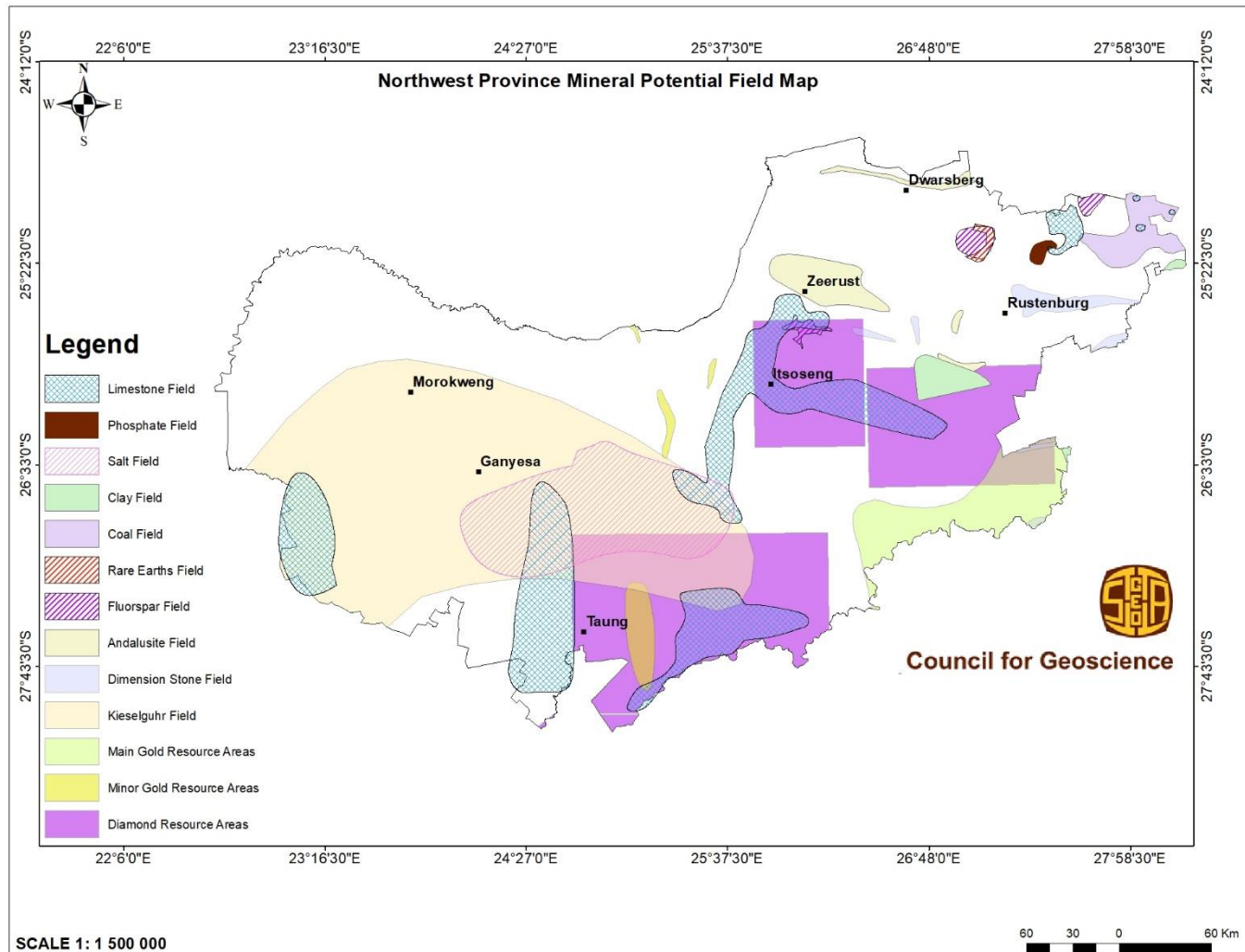


KNOWN INDUSTRIAL MINERAL-SYSTEM OCCURRENCES

- Several industrial mineral occurrences are found in the NW province which can be classified into multiple groups based on lithologies as well as deposit types.



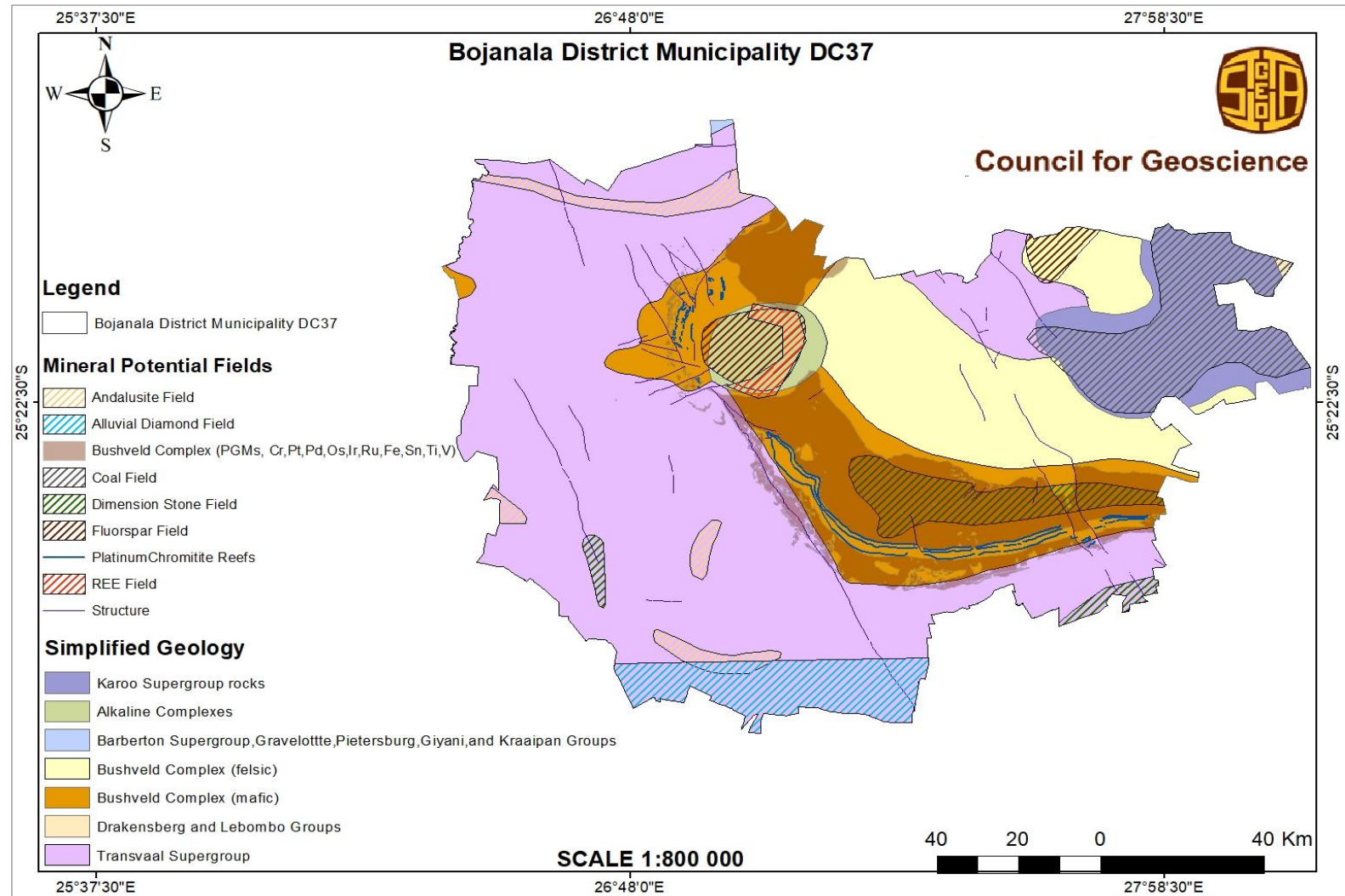
MINERAL POTENTIAL FIELDS OF THE NW PROVINCE



- The NW province has proven to be enriched in several economic mineral deposits.
- Thirteen(13) mineral potential Fields are identified

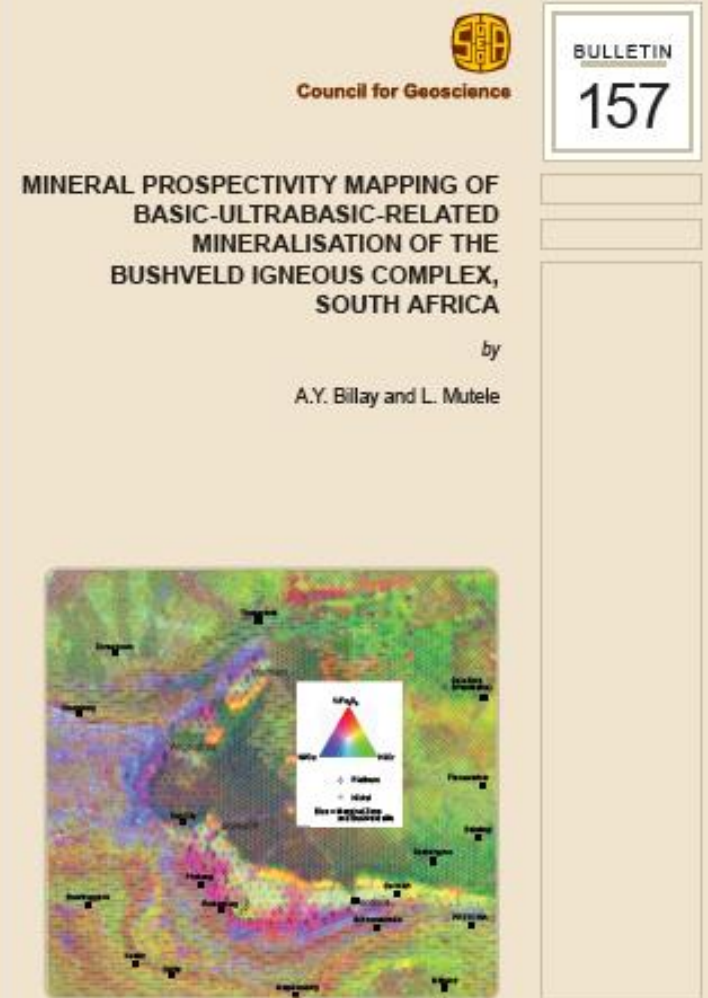
THE GEOLOGY AND MINERAL POTENTIAL OF THE BOJANALA DISTRICT MUNICIPALITY

- Several potential mineral commodities are found in the Bojanala District Municipality.
- They range from energy commodities such as coal, to industrial and Precious commodities such as Fluorspar and diamonds.

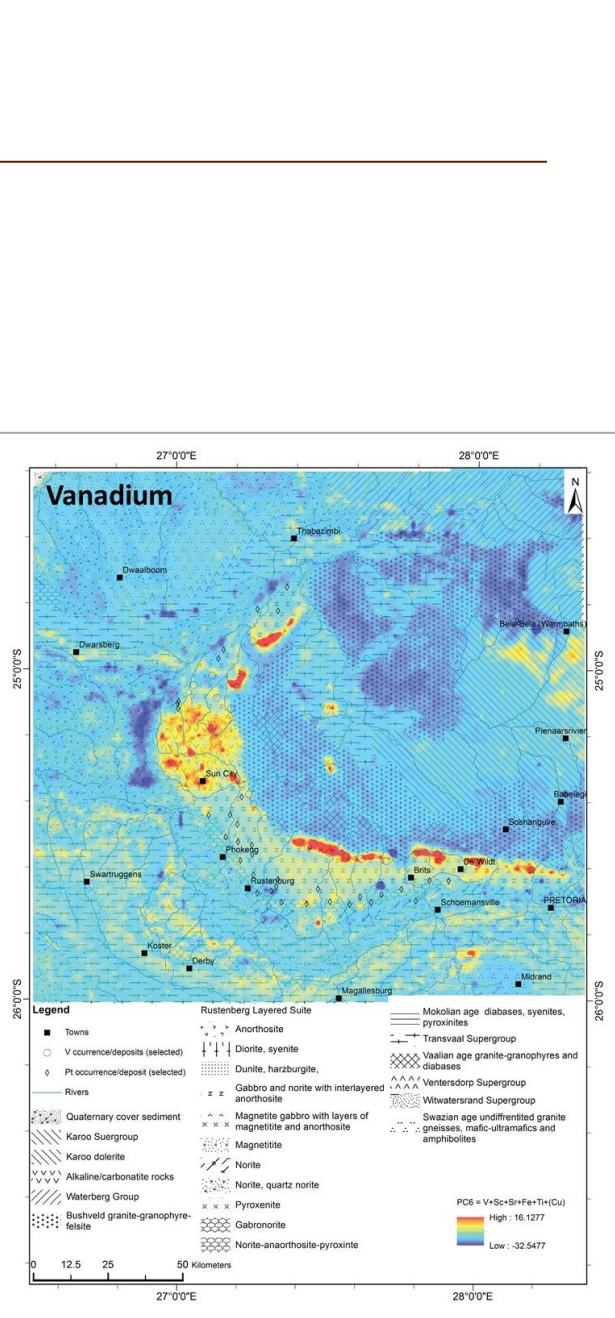
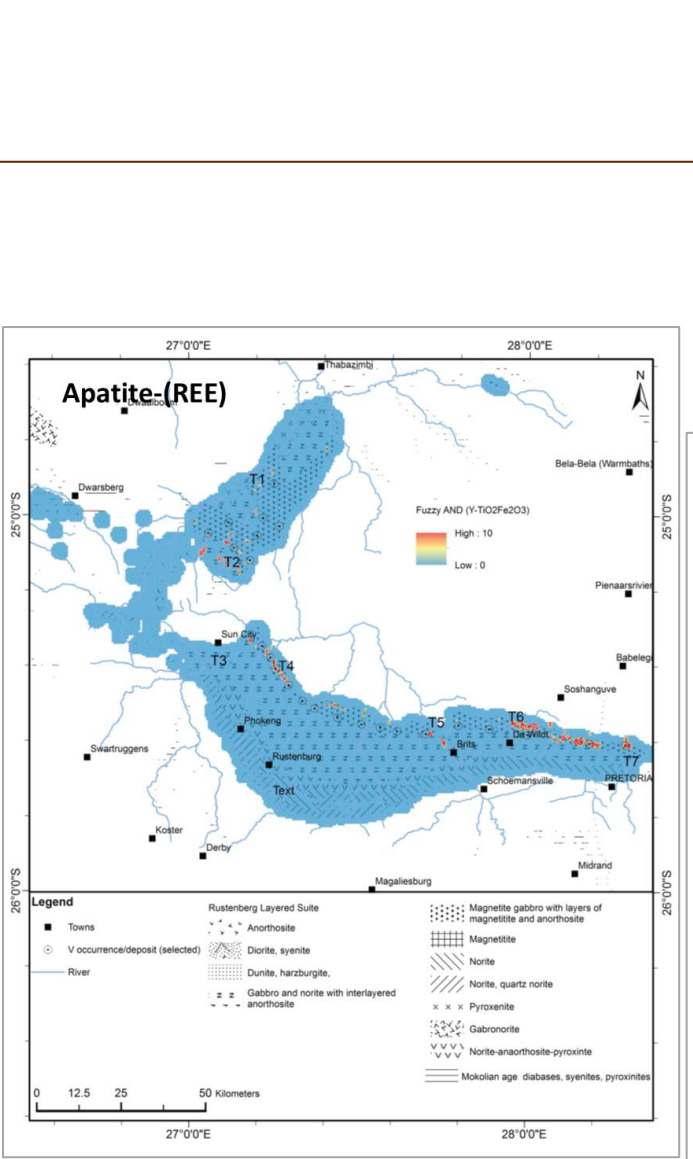
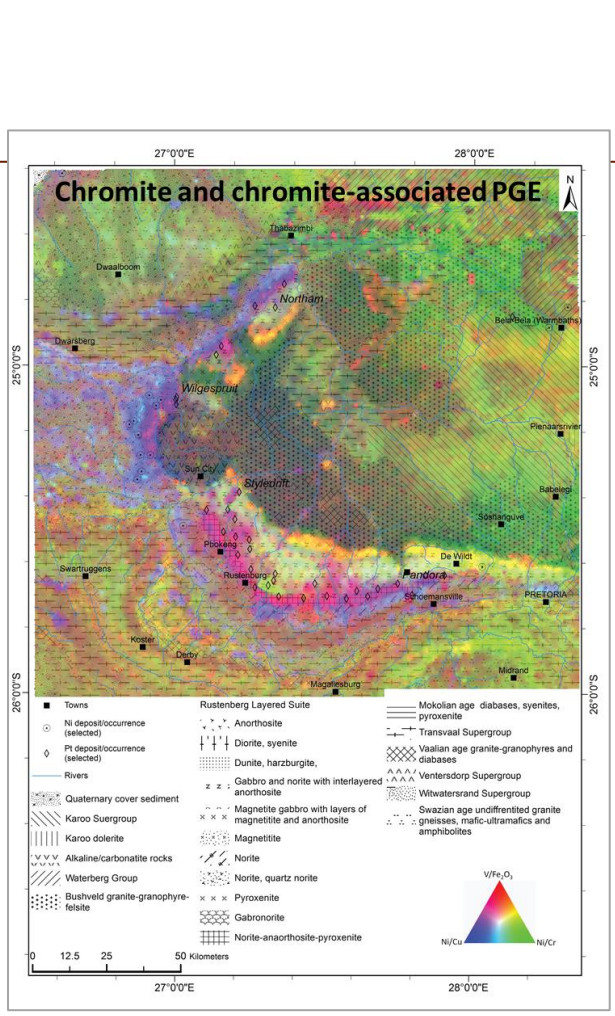
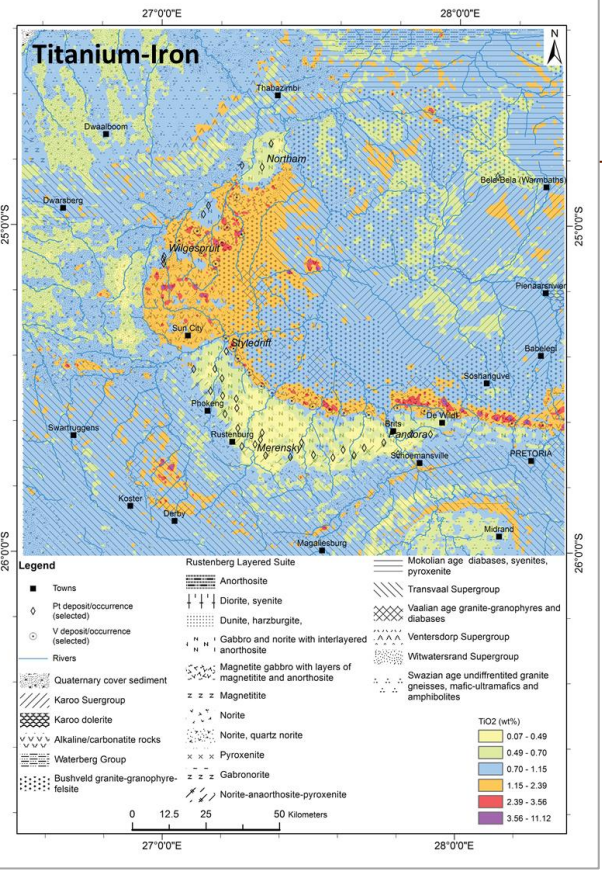


MINERAL PROSPECTIVITY MAPPING OF BASIC-ULTRABASIC- RELATED MINERALISATION OF THE BUSHVELD IGNEOUS COMPLEX, SOUTH AFRICA

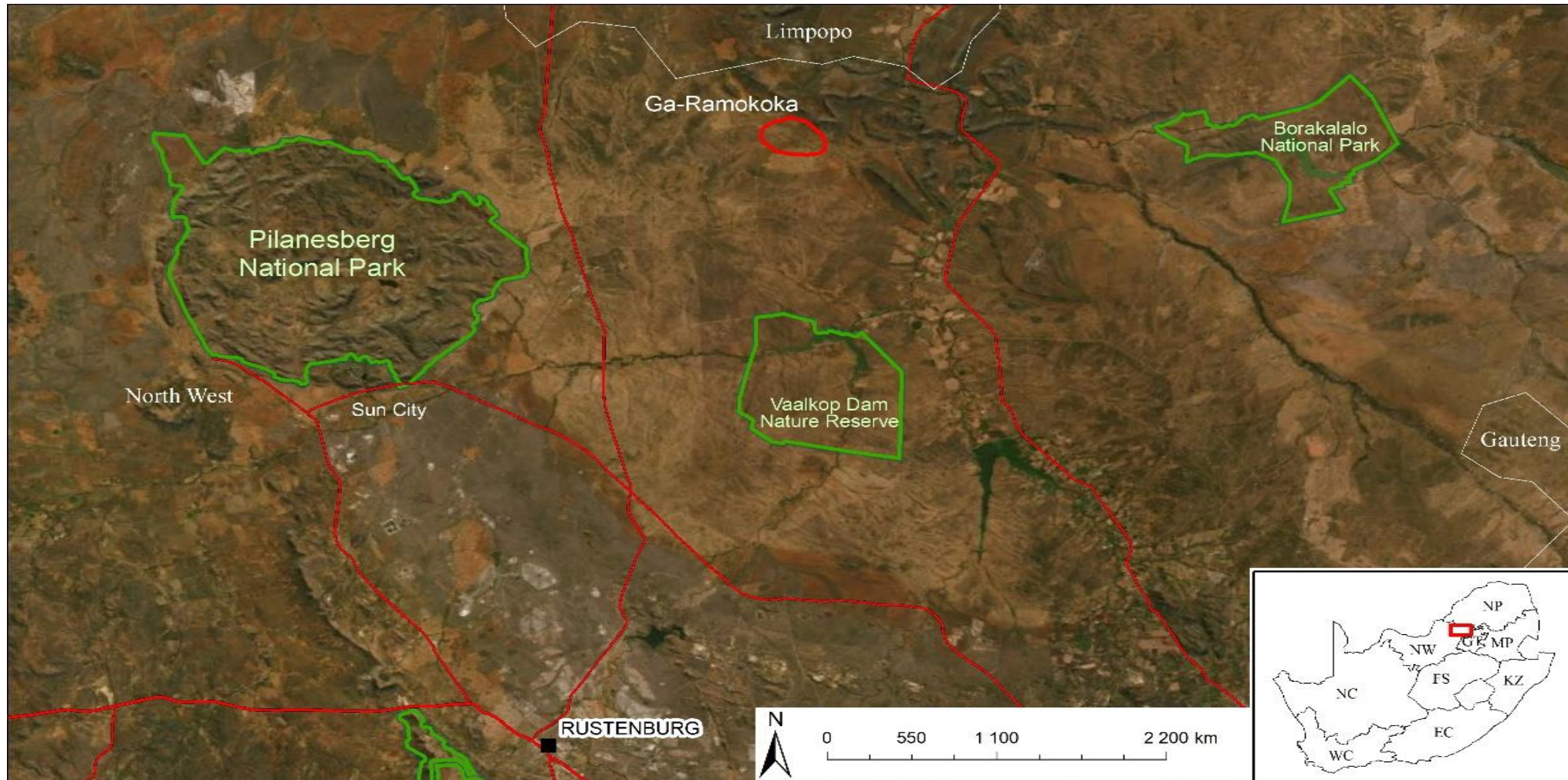
by A.Y Billay and L. Mutele



Direct all publications or any data-related enquiries to data@geoscience.org.za



GA-RAMOKOKA CARBONATITE COMPLEX



PROJECT OBJECTIVES

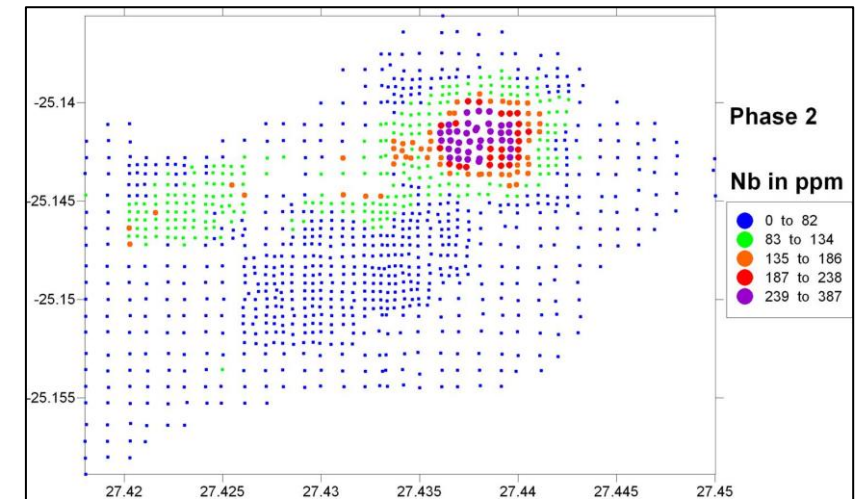
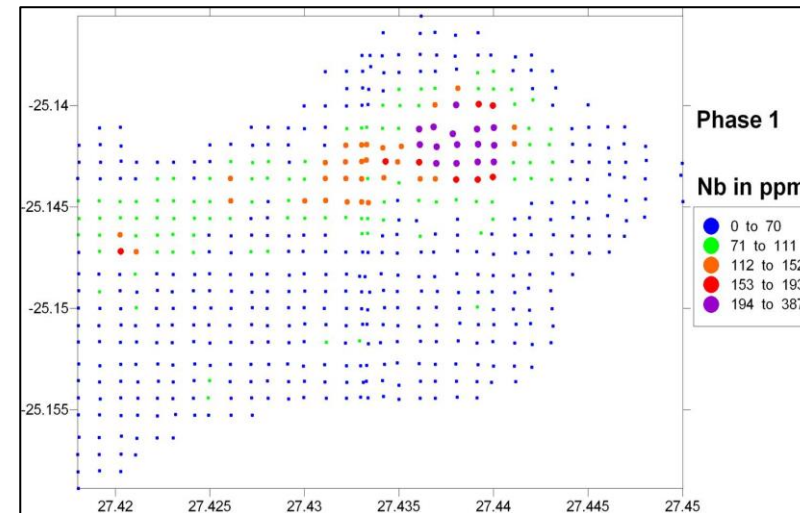
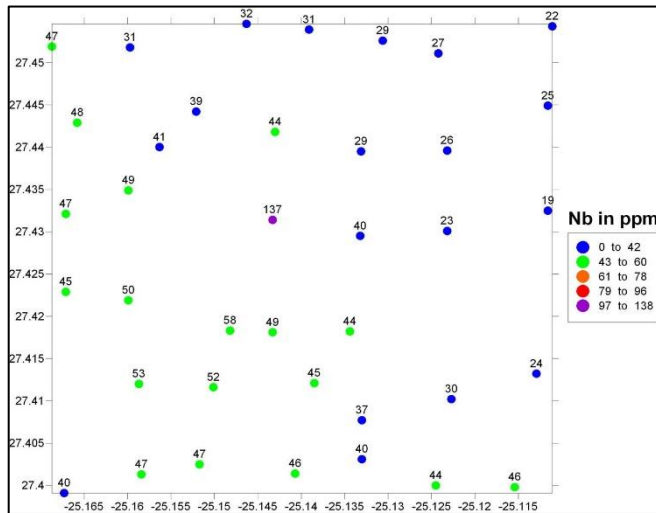
- Undertake the Geoscientific Research of the Ga-Ramokoka Carbonatite Complex (G-RCC) to understand emplacement and mineralization style.
- Evaluate mineral potential and determine economic value of the REE, Copper and Phosphate by Geoscientific Core Drilling.
- Undertake geoenvironmental baseline studies that will guide further prospecting which also involves drilling.

PROJECT PHASES

- Phase i, ii, iii – Soil geochemistry.
- Phase IV: Geochemical trenching was carried out in order to obtain more information of the target zones in 2008.
- Phase V: Ground geophysics.
- Phase VI: Geological investigation, geophysical investigation, mineral tonnage estimation and geo-environmental baseline data was consolidated in year 2020.

BACKGROUND: REGIONAL GEOCHEMICAL MAPPING

- Regional soil sampling on the 1:250 000 2526 Rustenburg sheet was carried out between 1991 and 1992.
- Phase I, II and III: Geochemical soil sampling high-density grids of 100 m, 50 m and 25 m respectively were carried out between 2006 and 2007 respectively;

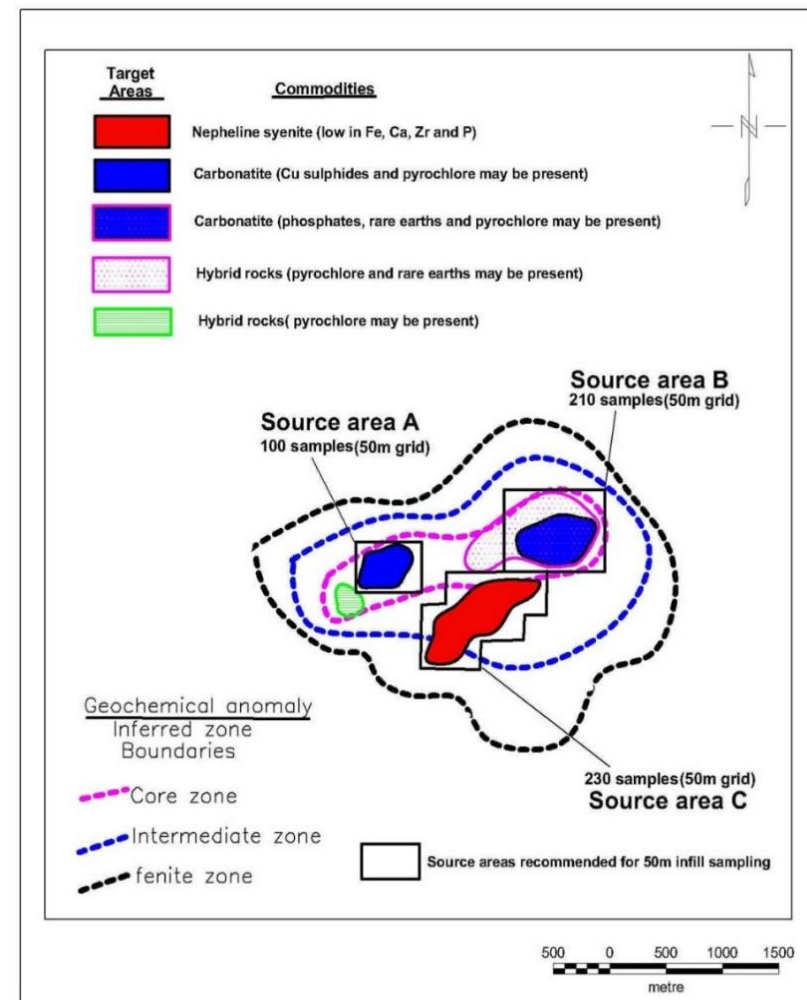
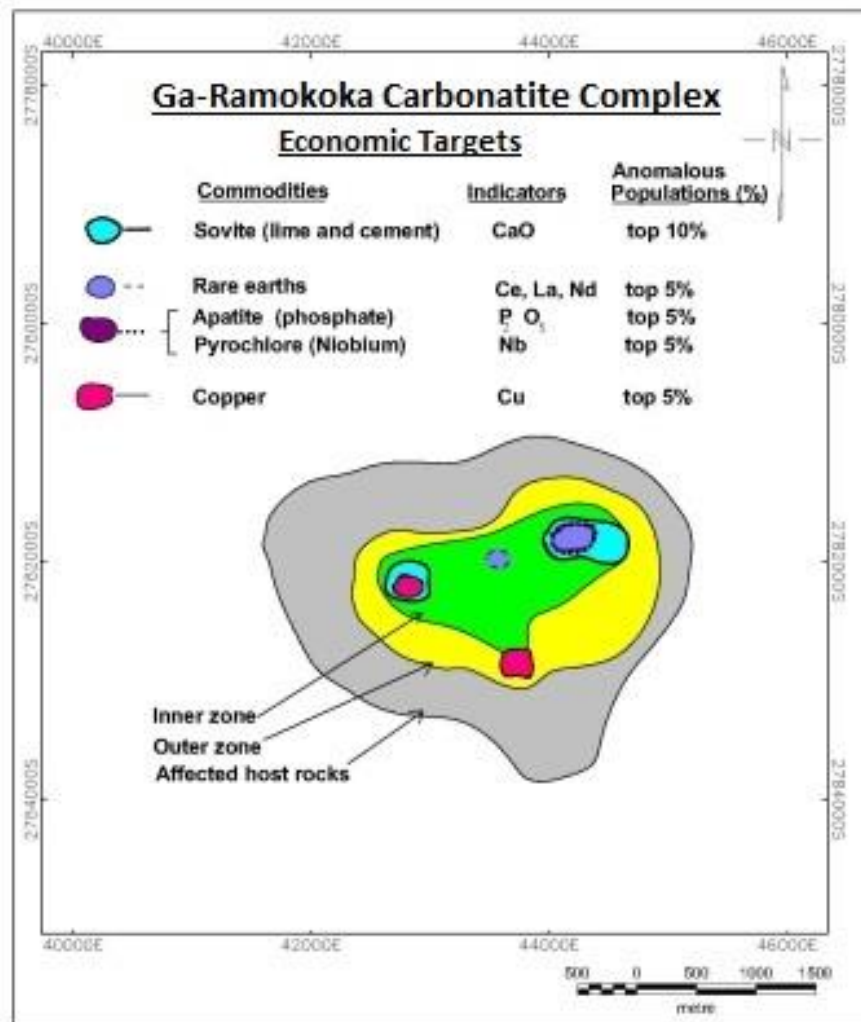


Regional Geochemical Mapping
(1 sample /km²)

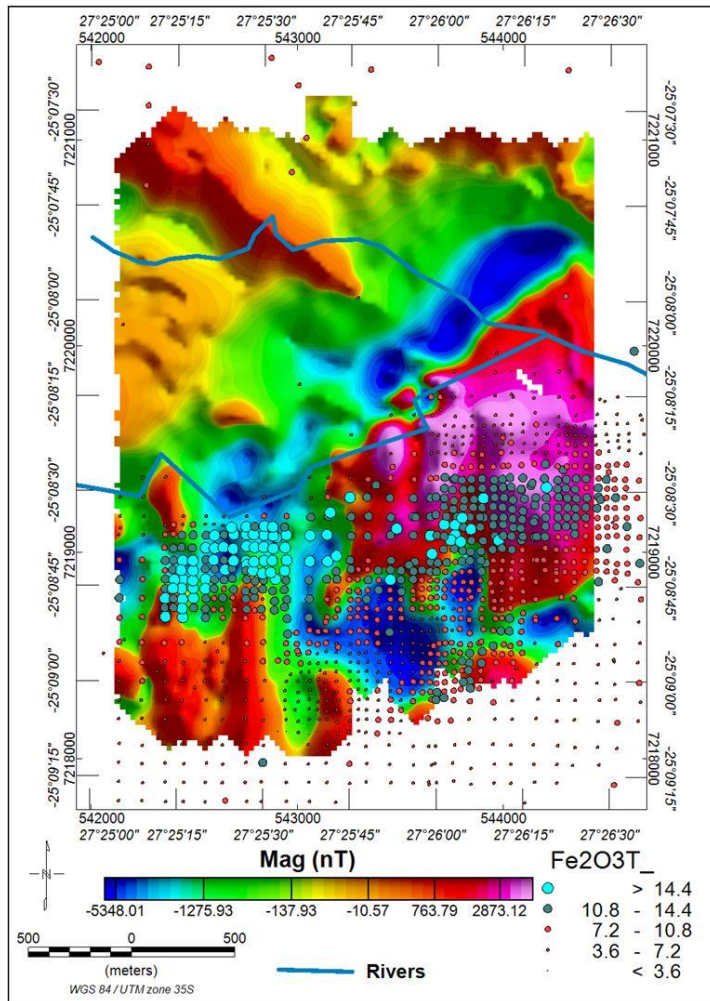
Phase 1: Geochem follow up: 100 * 100 m

Phase 2: Geochem follow up: 50 * 50 m

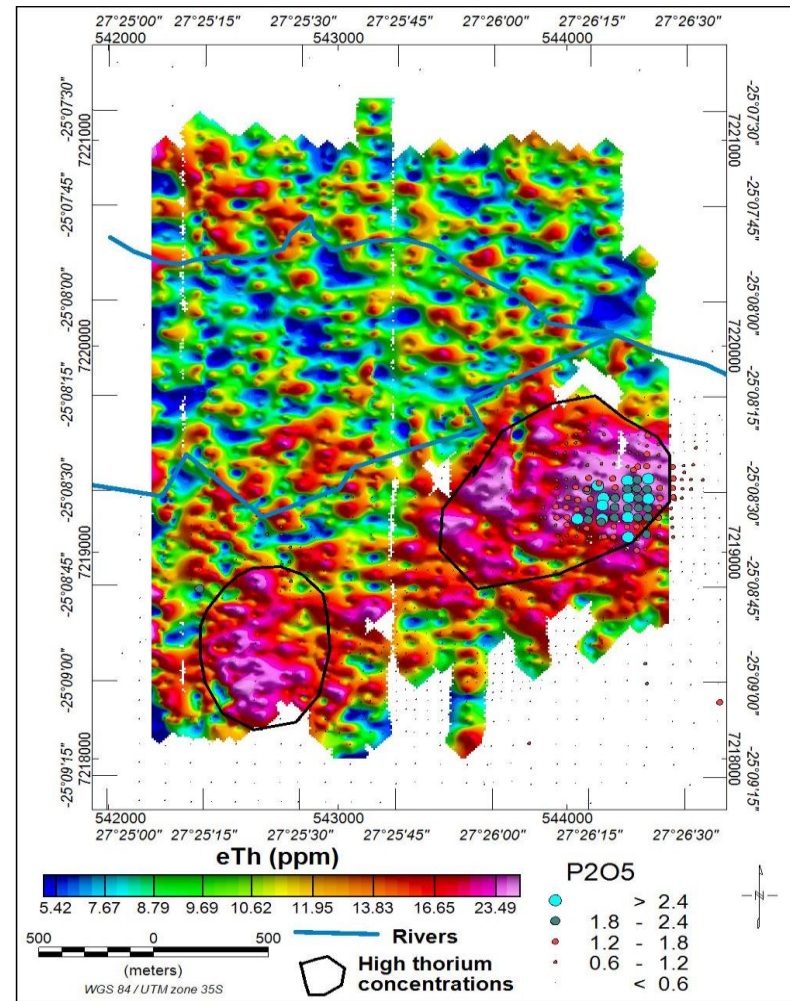
G-RCC PHASE I, II, III – SOIL GEOCHEMISTRY



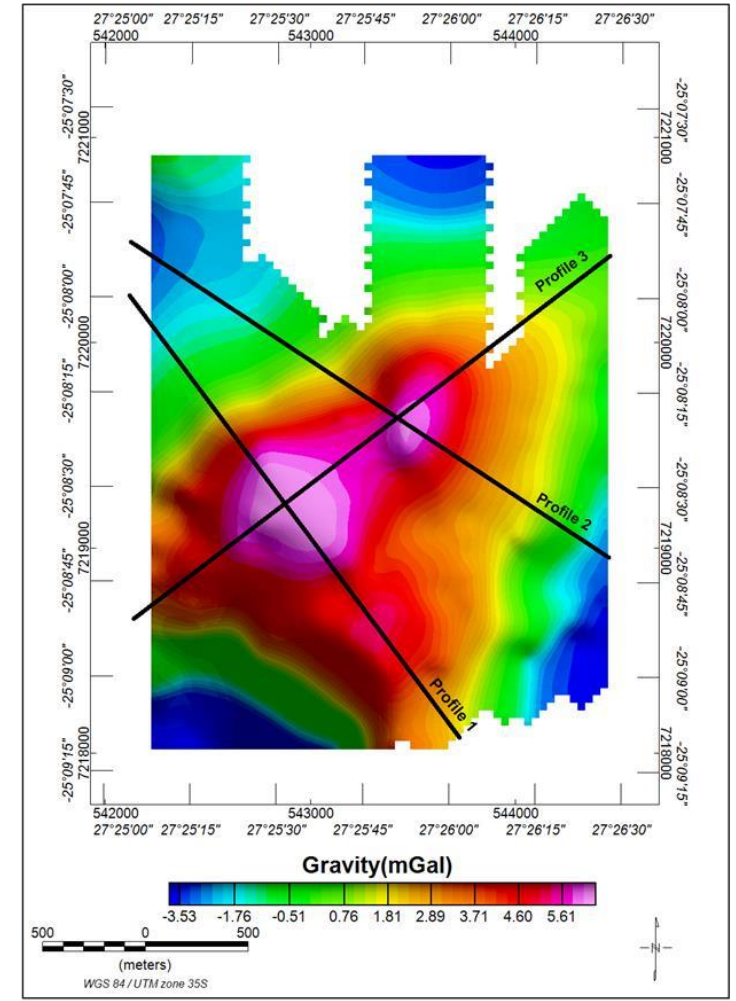
G-RCC PHASE IV – GROUND GEOPHYSICS



Magnetics



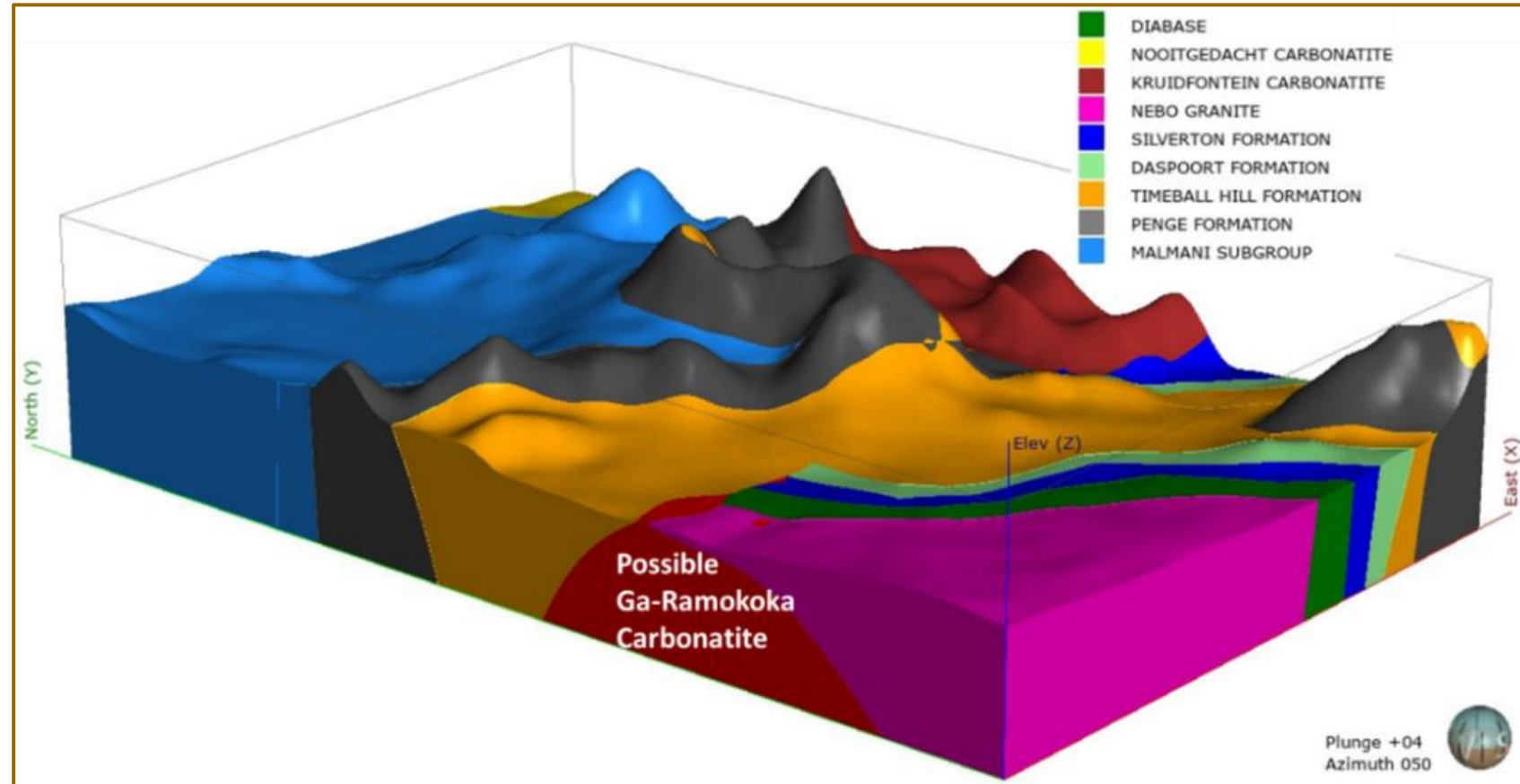
Radiometric



Gravity

G-RCC PHASE V – 3D GEOLOGICAL MODELLING

- The 3D geological model shows that the G-RCC is probably exposed to the surface in some areas, albeit a small exposure.
- The Transvaal Supergroup rocks are steeply dipping towards the Nebo Granite in the west, and dipping to the east in the eastern side of the study area, forming an anticline with the Penge Formation at its core.
- A syncline is observed in the northwestern part of the study area, which agrees to the observed geological map. The inferred fault shown on the map may have provided pathways for intrusion of the silica under saturated magma, which eventually formed the G-RCC.



3D geological model showing the possible location of the G-RCC.

G-RCC PHASE V -TONNAGE ESTIMATES (REEs, Phosphate and Copper)

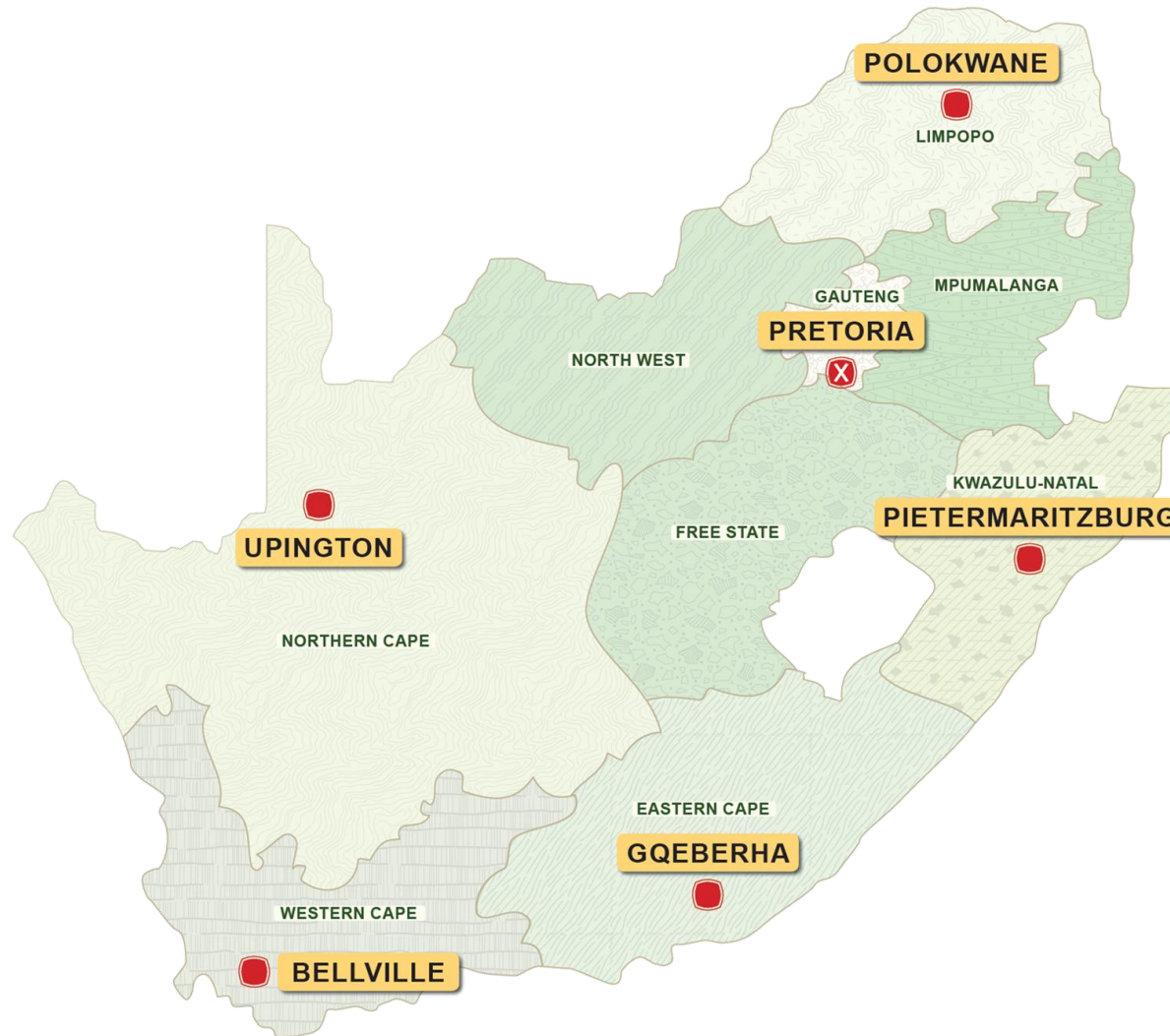
Source body	Commodities	Gross tonnage, million t	Grade (REE ppm; phosphate and Cu %)	Contained tonnage, t	Tonnage discounting potential geological losses	Tonnage discounting potential mining losses	Tonnage discounting potential process losses	Potential Revenues, million Rands
Carbonatite	Cerium	46.46	434.48	20187.50	10093.75	5046.88	2523.44	74.19
	Lanthanum		280.71	13043.11	6521.55	3260.78	1630.39	47.93
	Neodymium		180.10	8367.95	4183.97	2091.99	1045.99	790.77
	Yttrium		109.67	5095.77	2547.89	1273.94	636.97	28.76
	Total REEs			46694.33				941.65
	Phosphate	46.46	0.22	102220.8	51110.4	25555.2	12777.6	57.4992
	Total for Carbonatites							999.15
Syenite	Copper	56.63	527	29842.96	14921.48	7460.74	3730.37	293.21
	Phosphate		0.35	198198	99099	49549.5	24774.75	111.49
	Total Syenite							404.69
Grand total								1403.85

Geological, mining and process losses of 50% each were used for estimation of potential revenues
 *The prices for commodities were obtained from <https://www.imf.org/en/Research/commodity-prices> and <https://www.statista.com/statistics/280038/chinese-domestic-and-export-prices-for-rare-earth-oxides/> based on the spot prices reported on the 2nd July 2020.
 *The exchange rates were obtained from <https://www1.oanda.com/currency/converter/> based on the exchange rate reported on the 2nd July 2020.

Source body	Area (10 x 10 ⁶ m ²)	Thickness, m	Density, t/m ³	Gross tonnage, million t
Carbonatite	0.38	38.50	3.20	46.46
Syenite	0.57	38.50	2.60	56.63



Re a leboga; Thank you



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