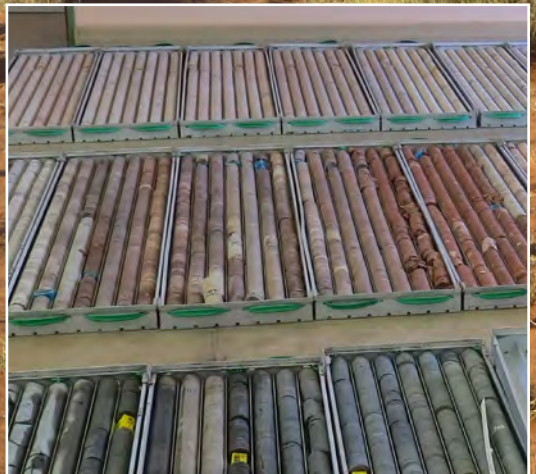


# Annual Report

2019/2020

'Geoscience is the fulcrum of human development'



mineral resources  
& energy

Department:  
Minerals Resources and Energy  
REPUBLIC OF SOUTH AFRICA



Council for Geoscience





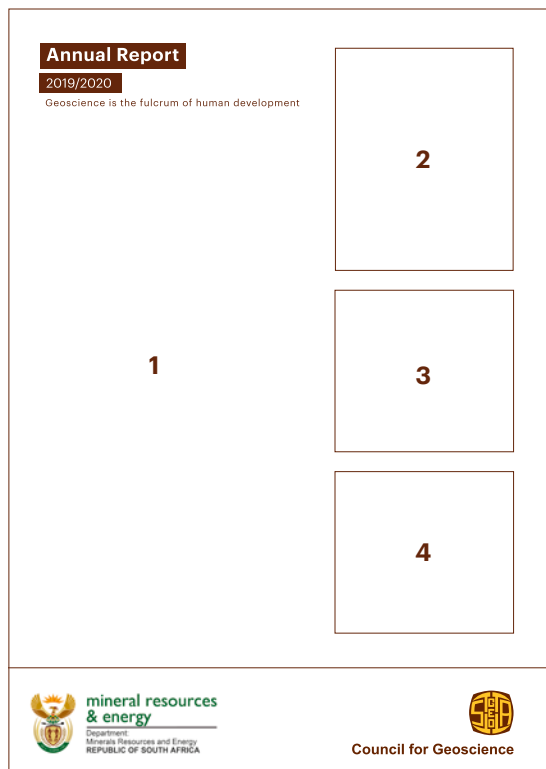
## Council for Geoscience

The Council for Geoscience (CGS) is one of the National Science Councils of South Africa and is the legal successor of the Geological Survey of South Africa, which was formed in 1912 by the amalgamation of three former surveys, the oldest of which - the Geological Commission of the Cape of Good Hope - was founded in 1895.

The Geoscience Act, Act No. 100 of 1993 established the CGS in its present form.

The CGS strives for a diverse workplace by incorporating the contributions of people from a wide variety of backgrounds, promoting an inclusive culture and demonstrating respect for the individual.

Consistently providing prompt and courteous service to both our external and internal stakeholders.



Geoscience is the fulcrum of human development - a quote by Mosa Mabuza, 2019

### Cover:

1. Klinghardt Mountains – Namibia  
(Photographer: Dr Paul Macey)
2. Ammonites from the upper Cretaceous St Lucia Formation, Nibela Peninsula, Lake St Lucia (Photographer: Dr Greg Botha)
3. Ms Mukosi mapping the alkaline ring complexes in Southern Namibia, looking at the typical alkali syenite outcrop  
(Photographer: Mr Jabulani Mathebula)
4. Borehole cores of the Karoo Supergroup from the Springbok Flats Coalfield  
(Photographer: Dr Valerie Nxumalo)

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Ammonites from the upper Cretaceous St Lucia Formation, Nibela Peninsula, Lake St Lucia



# Part A: General Information



Nama Group over the Namaqua Basement in Namibia

## 1. GENERAL INFORMATION ON THE COUNCIL FOR GEOSCIENCE

<b>REGISTERED NAME:</b>	Council for Geoscience
<b>PFMA NATIONAL PUBLIC ENTITY:</b>	Schedule 3A
<b>PHYSICAL ADDRESS:</b>	280 Pretoria Street Silverton, Pretoria South Africa
<b>POSTAL ADDRESS:</b>	Private Bag X112 Pretoria, South Africa 0001
<b>TELEPHONE NUMBER:</b>	+27 (0)12 841 1911
<b>FAX NUMBER:</b>	+27 (0)12 841 1203
<b>E-MAIL ADDRESS:</b>	info@geoscience.org.za
<b>WEBSITE ADDRESS:</b>	www.geoscience.org.za
<b>EXTERNAL AUDITORS:</b>	Auditor-General of South Africa
<b>BANKERS:</b>	Nedbank and ABSA in Silverton, Pretoria
<b>BOARD SECRETARY:</b>	Ms Nomkhosi Cele

## Council for Geoscience

The Geoscience Act, Act No 100 of 1993 as amended, established the Council for Geoscience (CGS) to assume, inter alia, the role of a national custodianship of geoscientific information and knowledge.

The CGS has evolved to a modern institution with specialised facilities, assets and expertise. The scientific focus areas of the organisation include geoscience mapping, economic geology, geophysics, marine geoscience, as well as environmental, groundwater and engineering geosciences. The CGS has six regional offices in South Africa, with a head office in Silverton, Pretoria (Figure 1).

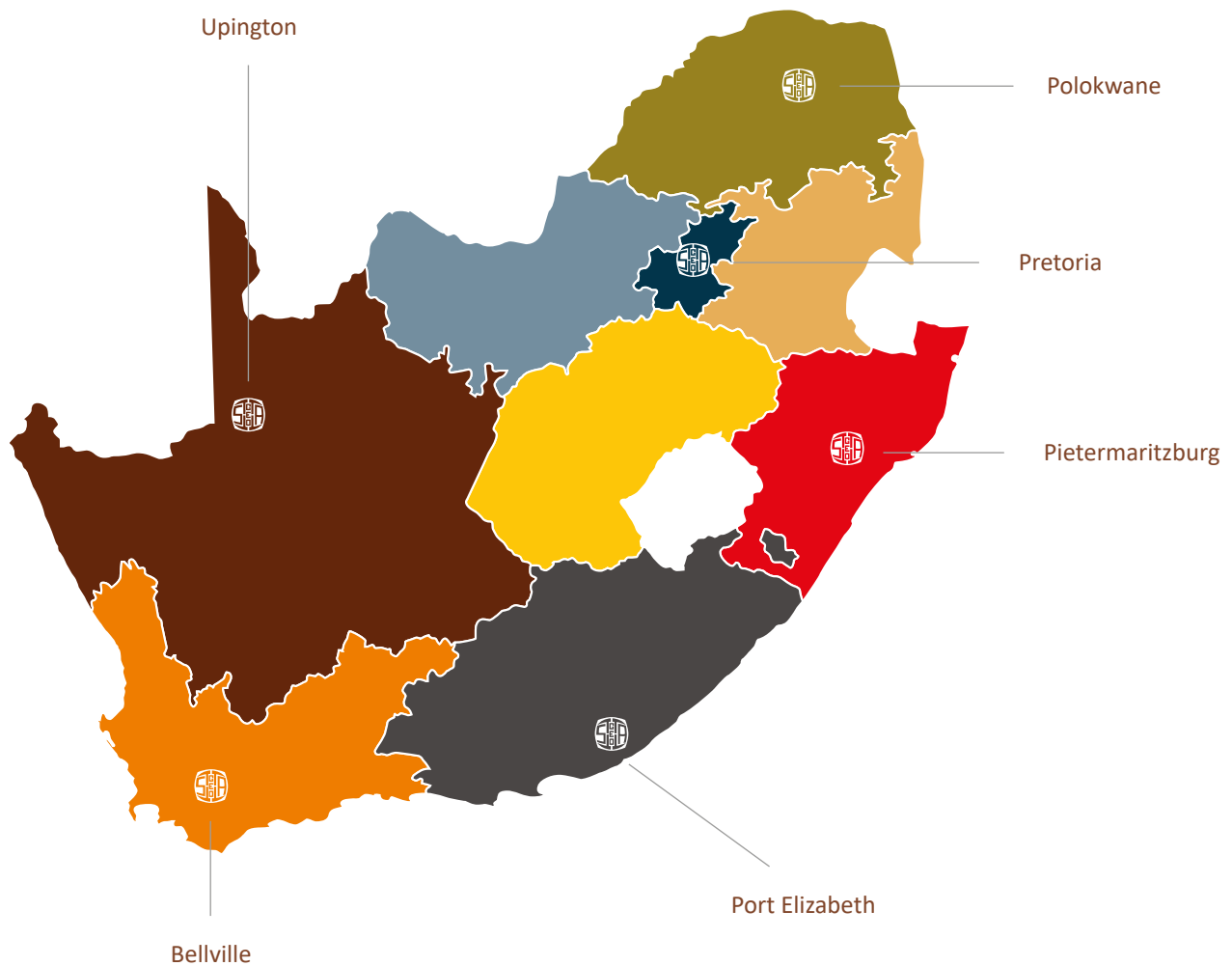


Figure 1: The six regional offices of the CGS in South Africa.

# Abbreviations and Acronyms

4IR	FOURTH INDUSTRIAL REVOLUTION
AMD	ACID MINE DRAINAGE
ASTER	ADVANCED SPACEBORNE THERMAL EMISSION AND REFLECTION RADIOMETER
BBBEE	BROAD-BASED BLACK ECONOMIC EMPOWERMENT
BSC	BALANCED SCORECARD
CCMA	COMMISSION FOR CONCILIATION, MEDIATION AND ARBITRATION
CCS	CARBON CAPTURE AND STORAGE
CCUS	CARBON CAPTURE UTILISATION AND STORAGE
CEO	CHIEF EXECUTIVE OFFICER
CGS	COUNCIL FOR GEOSCIENCE
CIO	CHIEF INFORMATION OFFICER
COVID-19	CORONAVIRUS DISEASE 2019
CSIR	COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH
CTBT (O)	COMPREHENSIVE NUCLEAR-TEST-BAN TREATY (ORGANISATION)
DMRE	DEPARTMENT OF MINERAL RESOURCES AND ENERGY
DSI	DEPARTMENT OF SCIENCE AND INNOVATION
EE	EMPLOYMENT EQUITY
EGS	EUROPEAN GEOLOGICAL SURVEYS
EU	EUROPEAN UNION
GDIP	GEOSCIENCE DATA AND INFORMATION POLICY
GEMMAP	GEOLOGICAL MAPPING AND MINERAL ASSESSMENT PROJECT
GRAP	GENERALLY RECOGNISED ACCOUNTING PRACTICE
GTP	GEOSCIENCE TECHNICAL PROGRAMME
ICT	INFORMATION COMMUNICATION TECHNOLOGY
IEA	INTERNATIONAL ENERGY AGENCY
IESBA	INTERNATIONAL ETHICS STANDARDS BOARD FOR ACCOUNTANTS' CODE OF ETHICS FOR PROFESSIONAL ACCOUNTANTS
IMMP	INTEGRATED AND MULTIDISCIPLINARY GEOSCIENCE MAPPING PROGRAMME
IOC	INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION
IRP	INTEGRATED RESOURCE PLAN
ISA	INTERNATIONAL STANDARDS ON AUDITING



ISO	INTERNATIONAL ORGANISATION FOR STANDARDISATION
KDD	KAROO DEEP DRILLING
LA-ICPMS	LASER ABLATION INDUCTIVELY COUPLED PLASMA MASS SPECTROMETRY
LIDAR	LIGHT DETECTION AND RANGING
MGB	MURCHISON GREENSTONE BELT
MP	MEMBER OF PARLIAMENT
MPRDA	MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT
MTEF	MEDIUM TERM EXPENDITURE FRAMEWORK
MTSF	MEDIUM-TERM STRATEGIC FRAMEWORK
NDP	NATIONAL DEVELOPMENT PLAN
NIMPO	NATIONAL INTELLECTUAL PROPERTY MANAGEMENT OFFICE
NRF	NATIONAL RESEARCH FOUNDATION
OAGS	ORGANISATION OF AFRICAN GEOLOGICAL SURVEYS
PAA	PUBLIC AUDIT ACT OF SOUTH AFRICA
PFMA	PUBLIC FINANCE MANAGEMENT ACT
PGM	PLATINUM GROUP METAL
PYGMI	PYTHON GEOPHYSICAL MODELLING AND INTERPRETATION
REE	RARE-EARTH ELEMENTS
RPL	RECOGNITION FOR PRIOR LEARNING
SAA	SOUTH AFRICAN AIRWAYS
SABC	SOUTH AFRICAN BROADCASTING CORPORATION
SAMREC	SOUTH AFRICAN CODE FOR THE REPORTING OF EXPLORATION RESULTS, MINERAL RESOURCES AND MINERAL RESERVES
SHEQ	SAFETY, HEALTH, ENVIRONMENT AND QUALITY
SMART	SPECIFIC, MEASURABLE, ACHIEVABLE, REALISTIC AND TIMELY
SNMP	SOUTHERN NAMIBIA MAPPING PROGRAMME
UNESCO	UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANISATION
UNFC	UNITED NATIONS FRAMEWORK CLASSIFICATION
UNISA	UNIVERSITY OF SOUTH AFRICA
XRF	X-RAY FLUORESCENCE

# 1. Foreword by the Chairperson of the Board



‘The CGS increased the onshore geoscience mapping coverage of the country at a detailed scale of 1:50 000 from a mere 4% to an impressive 8.8% in the reporting year. This is in line with our endeavours to increase exploration activities in the country, catalyse investment and increase the country’s share of the global exploration expenditure from the current lowest ebb of below 1% to 5% in the next five years’

## CHAIRPERSON OF THE BOARD Dr Humphrey Mathe

It is my humble honour and pleasure to present the Council for Geoscience (CGS) annual report covering the financial year 2019/2020, the final year of the tenure of the current board. I would like to thank the outgoing Board that has served its fiduciary responsibilities with distinction and guided the delivery of several important projects of the CGS.

I write this report at a time when South Africa and, indeed, the whole world is facing a serious and dangerous health and economic challenge of unprecedented magnitude due to the novel coronavirus disease, December 2019 (in short, COVID-19) that the World Health Organisation (WHO) declared a pandemic. In response, the South African government declared a national state of emergency, bringing to an abrupt halt all economic activities in the country to curb the spread of the virus. The CGS responded with admirable agility to secure business continuity and to fully maintain our National Key Point status amid the national lockdown. This was achieved through the establishment of the CGS COVID-19 Committee that oversaw all interventions to secure business exigency at CGS while adhering to all prescripts inscribed in the National Disaster Management Act (NDMA) Regulations. The Board derived immense pride when the CGS was bequeathed with the responsibility to support government’s decision to partially reopen the mining industry in accordance with the amended NDMA Regulations, Chapter 4, S11 (K)(3), which stipulates that “The monitoring and impact assessment of seismicity through the Council for Geoscience must be intensified with immediate effect”.

The COVID-19 pandemic has also brought with it significant strain to the ailing South African economy, prompting a call from government for an expeditious implementation of the Economy Recovery Plan. To heed this call, the CGS moved swiftly to streamline the Geoscience Technical Programme to focus on highest prospects of mineral deposit investigations that can be a magnet for investment, inclusive development and job creation in the short term. Progress on these initiatives will be accounted for in the current financial year.

During the year under review, the CGS achieved great strides in its strategy and operational programmes. I am pleased to report that the CGS and, indeed, the whole of South Africa, has benefited from the continued implementation and application of the Integrated Multi-Disciplinary Mapping Programme (IMMP), which is in its third year of operation and implementation. Through this programme, the CGS has increased the mapping coverage of the country at a detailed scale of 1:50 000 from a mere 4% to an impressive 8.8% in the reporting year. This is in line with our endeavours to increase exploration activities in the country, catalyse investment and increase the country’s share of the global exploration expenditure from the current lowest ebb of below 1% to 5% in the next five years. Indeed, the IMMP has started yielding results, with four target anomalies having been discovered in the reporting year and few of these earmarked for drilling in the early part of the next financial year.

The organisation continues to improve on its performance and the quality of outputs, which are primarily focused on high impact to society. This year under review, the organisational performance improved from 69% from FY2018/19 to 82%. I am delighted that the organisation has obtained an unqualified audit.

The CGS is part of South Africa's efforts to ensure energy security as outlined in the Integrated Resource Plan 2019 (IRP 2019) and facilitating a just transition to a low carbon economy. To this end, we have intensified our research on clean coal technologies and alternative sources of energy as exemplified by the projects such as Molteno-Indwe Coalfields, Geothermal Energy, Battery Minerals as well as Carbon Capture, Utilisation and Storage (CCUS). The CGS is providing technical support to ESKOM for the extension of the Koeberg nuclear power station operating license by executing the Probabilistic Seismic Hazard Analysis (PSHA). To strengthen the CGS's position in fulfilling its mandate to collect, compile, interpret and disseminate high-quality geoscience data, information and knowledge for South Africa, the development of the Geoscience Act Regulations that are intended to bring the Act into full effect is at an advanced stage. Being mindful of the importance of geoscience data and information as a critical driver for exploration broadly and transformation, (in particular), the CGS Board has approved the Data and Information Policy to facilitate the responsible dissemination of geoscience data and information to all its stakeholders.

I'm proud to report that one of our chief scientists, Dr Hayley Cawthra, was awarded a National Research Fund (NRF) scientific grading as being amongst the best scientists in the land. The CGS Board is proud of this inspirational and exemplary achievement by Dr Cawthra and has urged all eminent CGS scientists to emulate the achievements of Dr Cawthra.

The Board conveys its sincere and heart-felt condolences to the families of our fallen colleagues, namely, Ms Lilian Mathonsi, Mr Mbube Elijah Nkosi, Mr Muhumbulo Ayanda Tshikovhi and Mr Hlengani Edward Maswanganyi and all members of the CGS team who lost their loved ones.

In conclusion, I thank the Honourable Minister of Mineral Resources and Energy, Mr S.G. Mantashe (MP) for his enduring support to the CGS and his appointment of the new Board that took office on the 1st May 2020. I congratulate and welcome the newly appointed Board members and I look forward to their fruitful tenure. My sincere gratitude and appreciation goes to the Honourable Chairperson of the Parliamentary Portfolio Committee on Mineral Resources and Energy (PPC MRE), Mr S. Luzipho (MP) and the entire PPC MRE Committee for the critical review of our work and the continuous support. Finally, I want to commend the CGS executive management, scientists and support staff for their commitment and outstanding performance in the execution of the CGS mandate. Led by Mr Mosa Mabuza in his "quiet leadership" style, the CGS family has exalted the adage of the Chinese Zen masters that: "without calm, there is no way to persevere; without magnanimity, there is no way to embrace everyone; without kindness, there is no way to care for all the people; and without fairness, there is no way to make sound judgements".

I'm confident that the coming financial year will be a successful one despite the challenges posed by COVID-19.

Thank you.



**Dr H Mathe**  
Chairperson  
Board of the Council for Geoscience  
30 September 2020



# 1. Amazwi Okwendulela kaSihlalo weBhodi



‘I-CGS yengeze ukudwetshwa kwebalazwe lolwazi olujulile ngokwakheka komhlaba endaweni esemhlabeni owomile engekho olwandle ezweni ngesikali esiningiliziwe sika-1:50 000 ukusuka endaweni encane engama-4% kuya kwenkulu engama-8.8% onyakeni wombiko. Lokhu kuhambisana nemizamo yethu yokwengeza imisebenzi yokuhlola isimo somhlaba ezweni, sikhuthaze ukutshala izimali nokwengeza isabelo sezwe sochithomali lokuhlolwa kwesimo somhlaba emhlabeni wonke ukusukela kwesikhona njengamanje esehle kakhulu saze safinyelela ngaphansi kwe-1% ukuya kuma-5% eminyakeni eyisihlanu ezayo.’

## USIHLALO WEBHODI UDkt. Humphrey Mathe

Ngokuzithoba kwami okunenhlonipho nentokozo nginethulela umbiko wonyaka we-Council for Geoscience (i-CGS) ohlanganisa unyakamali wezi-2019/2020, unyaka wokugcina wesikhathi sokusebenza kwebhodi elikhona njengamanje. Ngithanda ukubonga iBhodi elizophuma elenze imisebenzi yalo yokuphathwa kwezimali ngokuncomekayo kakhulu futhi lanika umhlahlandlela wokwenziwa kwemisebenzi eminingana ebalulekile ye-CGS.

Ngibhala lo mbiko ngesikhathi lapho iNingizimu Afrika kanye, okusempeleni, nomhlaba wonke ubhekene nesimo sezempilo nezomnotho esibucayi futhi ngokusezingeni elingakaze libonwe ngenxa yesifo segciwane elisha iKhorona, eliqubuke ngoDisemba wezi-2019 (kafushane, i-COVID-19) Inhlangothi Yezempilo Yomhlaba (i-WHO) eyasimemezela njengobhubhane. Ukuze kubhekane nalesi simo, uhulumeni waseNingizimu Afrika wamemezela isimo esibucayi, kwamiswa ngokushesha nangokungalingelele yonke imisebenzi yezomnotho ezweni ukuze kugwenywe ukusabalala kwegciwane. I-CGS yabhekana nesimo ngendlela encomekayo ukuze iqinisekise ukuqhubeka nomsebenzi futhi igcine esimweni ngokugcwele isimo Sezindawo zethu Zikahulumeni Ezibalulekile ngesikhathi Sokuvalwa Thaqi Kokusebenza Kwezinto Ezweni Lonke. Lokhu kwafezekela ngokusungulwa kweKomidi le-COVID-19 le-CGS elaphatha umsebenzi wokungenelela ukuze kuqinisekise ukuhlangabezana nezimfuno zomsebenzi e-CGS ngesikhathi kuhlonishwa imiyalelo ebhalwe Kwimithetho-nqubo Yomthetho Kazwelonke Wokuhlangabezana Nezimo Ezibucayi (i-NMDA). IBhodi lazizwa lineqholo kakhulu ngesikhathi i-CGS inikwa umsebenzi wokweseka isinqumo sikahulumeni sokuvula ngokungaphelele imboni yezimayini kuhambisana nokuthobela Imithetho-nqubo ye-NMDA echitshiyelwe, Isahluko 4, S11 (K)(3), eyalela ukuthi “Ukuqapha nokuhlolwa komthelela wokwenzeka nokuvama kokuzamazama komhlaba okwenziwa i-Council for Geoscience kufanele kuqiniseke ngokushesha”.

Ubhubhane lwe-COVID-19 lufike futhi nobunzima emnothweni waseNingizimu Afrika ontengantengayo, lokhu kwakhuthaza umyalelo ophuma kuhulumeni wokuqalisa ngokushesha Uhlelo Lokusimamisa Umnotho. Ukuze kulandelwe lo myalelo, i-CGS yathatha izinyathelo ngokushesha zokwenza ukusebenza kangcono Kohlelo Lobuchwepheshe Bolwazi Olujulile Ngokwakheka Komhlaba ukuze lugxile ekuphenyeni ezindaweni okunethemba elikhulu lokuthi zingaba nezimbiwa okungahamba ukutshalwa kwezimali, intuthuko efaka bonke abantu nokudalwa kwamathuba emisebenzi esikhathi esifushane. Inqubekela-phambili kulezi zinhlelo kuzoxoxwa ngayo kunyakamali ophuzulu.

Onyakeni obuyekwezwayo, i-CGS ifeze amagxathu amakhulu ezinhlelweni zayo zamasu nezomsebenzi. Kuyintokozo kimi ukubika ukuthi i-CGS kanye, okusempeleni, neNingizimu Afrika yonkana izuzile ekuqalisweni nasekuqhutshweni okuqhubekayo Kohlelo Oluhlanganisiwe Lwemikhakha Ehlukene Lokudwetshwa Kwebalazwe (i-MMP), olusonyakeni walo wesithathu wokusebenza nokuqaliswa. Ngokusebenzisa lolu hlelo, i-CGS seyengeze ukudwetshwa kwebalazwe ezweni ngesikali esiningiliziwe sika-1:50 000 ukusuka endaweni encane engama-4% kuya kwenkulu engama-8.8% onyakeni wombiko. Lokhu kuhambisana nemizamo

yethu yokwengeza imisebenzi yokuhlola isimo somhlaba ezweni, sikhuthaze ukutshala izimali nokwengeza isabelo sezwe sochithomali lokuhlolwa kwesimo somhlaba emhlabeni wonke ukusukela kwesikhona njengamanje esehle kakhulu saze safinyelela ngaphansi kwe-1% ukuya kuma-5% eminyakeni eyisihlanu ezayo.”

Okusempeleni, i-IMMP seyiqaqale ukukhipha imiphumela lapho sekutholwe okune okungajwayelekile okuphokophelwe onyakeni wombiko futhi okumbalwa kwalokhu kubekelwe ukuhlolwa ngasekuqaleni konyakamali olandelayo. Isikhungo siyaqhubeka nokwenza ngcono indlela esenza ngayo umsebenzi nezinga lokukhishwayo, okugxile kakhulukazi ekubeni nomthelela omkhulu emphakathini. Kulo nyaka obuyekizwayo, ukwenziwa komsebenzi esikhungweni kwathuthuka ukusukela kuma-69% kunyakamali wezi-2018/2019 (ku-FY2018/19) ukuya kuma-82%. Nginentokozo ngokuthi isikhungo sithole imiphumela yokucwaningwa kwamabhuku okungenasici.

I-CGS iyingxenywe yemizamo yeNingizimu Afrika yokuqinisekisa ukuba khona kwamandla anele njengoba kubhalwe Ohlwelweni Oluhlanganisiwe Lwezinsiza Lwezi-2019 (i-IRP 2019) nokusiza ukuguqulwa emnothweni onekhabhoni ephansi okufanele. Ukuze kwenzeke lokhu, siqinise ucwaningo lwethu ngobuchwepheshe bamalahle obuhlanzekile kanye neminye imithombo engasetshenziswa yamandla njengoba kubonakaliswe imisebenzi efana Namasimu Amalahle eMolteno-Indwe, Amandla Atholakala Ekushiseni Okungaphansi Komhlaba, Izimbiwa Zokwakha Amabhetthri, Nezindlela Zokuqoqa, Ukusebenzisa Nokugcina Ikhabhoni (i-CCUS). I-CGS ihlinzeka ngokwesekwa kwezobuchwepheshe kuka-ESKOM ukuze kunwetshwe isikhathi sokusebenza kwemvume yesiteshi sikagesi esisebenza ngamandla enuzi sase-Koeberg ngokusebenzisa Ukuhlaziywa Kwengozi Yokwenzeka Nokuvama Kokuzamazama Komhlaba Okungenzeka (i-PSHA). Ukuze kuqinisekwe isimo se-CGS sokufeza umsebenzi wayo wokuqoqa, ukuhlanganisa, ukutolika, nokusatshalaliswa kolwazi olujulile ngokwakheka komhlaba, imininingwane nolwazi lweNingizimu Afrika, ukubunjwa Kwemithetho-nqubo Yomthetho Wolwazi Olujulile Ngokwakheka Komhlaba inhloso yayo okungukwenza Umthetho usebenze ngokugcwele sekusezingeni eliphezulu. Ngokwazi ukubaluleka kolwazi olujulile ngokwakheka komhlaba nemininingwane njengengxenywe ebaluleke kakhulu yokuhlolwa kwesimo somhlaba ngokubanzi nezinguquko, (ngokukhethekile), Ibhodi le-CGS ligunyaze Inqubomgomo Yolwazi Neminingwane ukuze isize ngokusatshalaliswa kolwazi olujulile lokwakheka komhlaba ngendlela eqotho kubabambiqhaza bayo.

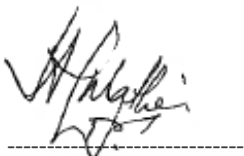
Ngineqholo lokubika ukuthi omunye wososayensi bethu abayizinhloko, uDkt Hayley Cawthra, wahlonishwa ngokubekwa ngokwezosayensi ezingeni le-National Research Fund (i-NRF) lokuba phakathi kososayensi abaphambili kunabo bonke ezweni. Ibhodi le-CGS lineqholo ngempumelelo ekhuthazayo neyisibonelo kaDkt. Cawthra futhi likhuthaze bonke ososayensi abavelele base-CGS ukuthi babuke isibonelo esihle kuDkt Cawthra.

Ibhodi lizwakalisa ukuzwelana kweqiniso nokusuka ekujuleni kwenhliziyo emindenini yozakwethu asebesishiyile emhlabeni, okuyilaba, Nks. Lilian Mathonsi, Mnu. Mbube Elijah Nkosi, Mnu. Muhumbulo Ayanda Tshikovihi noMnu. Hlangani Edward Maswanganyi nawo wonke amalungu ethimba le-CGS alahlekelwa abathandileyo babo.

Uma sengiphetha, ngibonga uNgqongqoshe Ohloniphekile Wezimbiwa Namandla, uMnu. S. G. Mantashe (i-MP) ngokweseka kwakhe i-CGS okuqhubekayo nokubeka kwakhe esikhundleni Ibhodi Elisha eliqale ukusebenza mhla lu-1 kuMeyi wezi-2020. Ngihalalisela futhi ngamukele amalungu Ebhodi asanda kubekwa esikhundleni futhi sengimagange ukubona ukusebenza kwabo okunempumelelo. Ngibonga futhi ngincoma ngokweqiniso uSihlalo Ohloniphekile Wekomidi lasePhalamende Lomsebenzi Wemithombo Yezimbiwa Namandla (i-PPC MRE), uMnu. S. Luzipho (i-MP) kanye Nekomidi lonke le-PPC MRE ngokuhlola umsebenzi wethu ngeso elibukhali kanye nokwesekwa okuqhubekayo. Okokugcina, ngifuna ukuncoma abaphathi abakhulu, ososayensi nabasebenzi bokusekela ngokuzinikela kwabo nokusebenza okuncomekayo ekulandelweni komyalelo wokwenza umsebenzi we-CGS. Ngokuholwa uMnu. Mosa Mabuza ngohlobo lwakhe “lobuhlo obunokuthula”, umndeni wase-CGS uphakamise isisho sabaphathi Bokuzindla bama-Shayina esithi: “ngaphandle kokuthula, ayikho indlela yokuphikelela; ngaphandle kobubele, ayikho indlela yokwamukela bonke abantu; ngaphandle komusa, ayikho indlela yokunakekela bonke abantu; futhi ngaphandle kokungachemi, ayikho indlela yokuthatha izinqumo ezilungile.”

Ngiyakholwa ukuthi unyakamali ozayo uzoba onempumelelo yize kunezinselelo ezilethwe yi-COVID-19.

Ngiyabonga.



**UDkt. H Mathe**

USihlalo

Ibhodi le-Council for Geoscience

30 September 2020

## 2. Chief Executive Officer's Overview



'The CGS has accelerated the implementation of the Integrated and Multi-Disciplinary Geoscience Mapping Programme and re-prioritised areas of greatest potential of discovery of the world-class deposits. To this end, five areas of highest potential constitutes the CGS's contribution to the economic recovery programme of government. These include critical minerals such as lithium, manganese, vanadium, fluorspar, phosphates and base metals, all of which are envisioned to contribute towards growing exploration expenditure in South Africa to 5% share of the global exploration budget'

### CHIEF EXECUTIVE OFFICER Mr Mosa Mabuza

This year marks the end of the Medium-term Strategic Framework (MTSF) cycle spanning 2014 to 2019 and the beginning of the 2019 to 2024 MTSF. The CGS, in this period, underwent drastic strategy and structural changes that resulted in an organisation more aligned to its founding legislation. The CGS mandate was strengthened during this period, as we sought better ways to demonstrate the societal impact arising from the effective implementation geoscientific programmes. In the legislative mandate aligned strategy that is a subject of implementation, we introduced an integrated approach to delineate the thematic areas of focus that streamline the contribution of geosciences towards attainment of the goals of the National Development Plan (NDP). I am pleased to report that our scientists have published more than 200 peer-reviewed articles during this five-year cycle, which have received approximately 1 440 citations. The CGS regularly takes in students from universities of technology (formerly known as technikons) for experiential learning. This programme assists students to complete the practical aspect of their qualifications, which constitutes a critical pre-requirement for them to finalise their studies. In the last five years, we contributed to the graduations of 17 students, more than 66% of whom are females. Within this period, 27 Master's and 10 Doctoral degrees have been awarded to CGS staff. Other notable achievements of the past five years include, albeit not limited to:

- Enhanced the coverage of national mapping at a scale of 1:50 000 from below 5% to 8.8% at the end of the MTSF cycle.
- Set a bold target of using geoscience data and information to significantly grow inclusive exploration of mineral resources from below 1% to 5% share of the global exploration budget
- The published 1:1 000 000-scale geology map of South Africa.
- The first global geological map of the seafloor and coastal plain of the Last Glacial Maximum.
- Implementation of geoscience mapping projects in Griqualand West, the Northern Cape, Giyani and the seafloor.
- Discovery of groundwater resources in the Beaufort West region during the draught period.
- Seismic microzonation of the City of Johannesburg.
- Continued successful monitoring of seismic activity throughout South Africa.
- Development of remote sensing techniques to predict geohazards.
- Multi-disciplinary geoscience definition of mineral targets generated and prioritised for drilling.
- Artificial intelligence application in geoscience established as a core competency of the organisation.

South Africa's decision to invest in the geosciences is intended to drive inclusive economic growth, enhance environmental stewardship and contribute to, among others, food and energy security (including instruments for transition to a low carbon economy), optimal spatial planning and land use, and support for the national water programme.

The CGS is in its third year of the implementation of the Integrated and Multidisciplinary Geoscience Mapping Programme (IMMP), which aims to generate high-resolution integrated geoscience maps across the country at different scales, with basic geology maps at a 1:50 000 scale as well as geophysics and geochemistry maps at variable scales. The geoscience information collected will be used to delineate geological formations and features that may enhance understanding of a number of earth processes, mineral and energy resources distribution, groundwater, land use, infrastructure, geohazards and geo-environmental pollution-related matters. In addition, the geoscience information generated can be used for social and economic activities such as geotourism.

After three years, the IMMP has shifted the onshore geoscience data coverage from 5% to 8.8%. In doing so, it has uncovered new groundwater resources and potential targets within the Karoo and Cape supergroups as well as significant structures that may have a bearing on geohazards. This information is currently assisting in addressing localised water crises and improving geohazard mitigation. Furthermore, the programme has defined new potential hydrothermal and magmatic mineral targets in the Northern Cape, Western Cape, North West and Limpopo Provinces, respectively. These include critical minerals such as lithium, manganese, vanadium, fluorspar, phosphates and base metals, all of which are envisioned to contribute towards growing exploration expenditure in South Africa to 5% share of the global exploration budget.

An intermediate outcome of the IMMP is to grow the exploration expenditure to 5%, discovering new mineral and energy deposits to contribute to economic growth, employment and job creation. For the CGS to discover and quantify the mineral potential of South Africa's territory and quantify the impact of the IMMP, several initiatives have been proposed, such as the development and promotion of the Geoscience Act and its Regulations. In the year under review, the CGS started developing regulations that will give effect to the full implementation of the Geoscience Act, as amended. This process is aligned with the approved Geoscience Data and Information Policy (GDIP) and its Guidelines, which will be published in the coming year. The availability of geoscience data and information to society in a transparent and orderly manner will catalyse mining and exploration activities in the country.

Parallel to these processes is the programme to digitally migrate all historical data and information to a modern infrastructure base that will enable faster access to data and information. I am proud to announce that approximately 120 000 unpublished maps and reports dating back as far as the late 1800s are archived at the CGS. The vast majority of these remain potentially useful and would be costly to replace — many cannot be replaced. Records scanning has been identified as an integral part of the organisation's digital transformation strategy. Modalities were implemented to deal with the diversity of the collections, as both the quality and quantity of the records have a direct bearing on how well the information can be documented and maintained in the long term. Keeping with the original intent of the strategy, external access to the map collections will be the second step in achieving full implementation. Once scanned, all records will be assigned a geographical position to facilitate spatial recovery and will be made available in accordance with the GDIP and its Guidelines.

Palaeontological collections at the CGS are among the largest of their kind in South Africa and are of strategic importance given that they record a unique South African perspective on the evolution of life and environmental change over three billion years. The palaeontological heritage of South Africa is important in that fossils form part of the National Estate of the country and define its identity. Two large collections housing several hundred thousand specimens are housed at the Silverton and



Bellville offices of the CGS. Although palaeontology is part of the mandate of the CGS, this discipline has remained dormant for the past few decades and the collections neglected. Now, the CGS is recognising the importance of South Africa's fossil heritage as symbols for the nation to rally behind, hence the rehabilitation of its collections as a first step to resuscitate the discipline.

During the 2019/2020 financial year, the CGS started creating an organisation-wide awareness of ISO 9001, specifically with the core business units. The business units are establishing policies, procedures, processes, forms and templates as a basis for implementation of ISO 9001 in the next financial year. The CGS aims to be fully certified by 31 March 2023.

Progress on ISO 17025 was disrupted with the closure of the CGS laboratory services until August 2019, when major equipment services were completed, including calibration of mass and temperature metrology, to ensure measurement accuracy of test results. ISO 17025 accreditation plans were reviewed, focusing on document reviews, customer satisfaction, internal audit planning, and implementation and monitoring of quality control programmes across all laboratory sections. The accommodation and environmental conditions of the facilities remain a major non-conformance and a key dependency for the validation of analytical methods. The heating, ventilation and air-conditioning upgrade project is currently underway to address these conditions.

Sustainability is an integral part of the CGS mandate and business at the financial/economic, social, stakeholder and environmental levels. Sustainability is embedded in scientific focus and innovation within the organisation and we are privileged to have a harmonious and diversified workforce that views the CGS as its employer of choice. I extend a warm welcome to the new members of the CGS team. To those who left us, thank you for your services and may you be successful in your new endeavours.

Every year has its highlights and low moments. During the year under review, the CGS lost some of its talent, including some true stalwarts of the geosciences, through retirement. We celebrate the sterling contribution of these colleagues who served the organisation well. The following men and women are among those who have dedicated their lives to the organisation:

- Mr CH de Beer - 40 years as a Specialist Scientist in the Geoscience Mapping Business Unit.
- Mr RH Sello - 38 years as a Technical Officer in the Laboratory Services Business Unit.
- Dr M Cloete - 35 years as a Senior Specialist Scientist in the Strategic Management Office.
- Dr DI Cole - 34 years as a Specialist Scientist in the Mapping Geoscience Business Unit.
- Ms EE van Tonder - 33 years as a Librarian: Bookshop and Unpublished Reports in the Facilities Management Business Unit.
- Ms S Mahwayi - 32 years as an Administrative Officer in the Facilities Management Business Unit.
- Dr MT Atanasova – 28 years as a Section Head: Mineralogy in the Laboratory Services Business Unit.
- Dr LP Chevallier – 28 years as a Senior Specialist Scientist in the Geoscience Mapping Business Unit.
- Ms JD Grobler – 24 years as a Databank Administrator in the GIS and Scientific Databases Business Unit.
- Ms KIG Burger – 21 years as a Technical Officer in the Laboratory Services Business Unit.
- Ms MD Paweska – 21 years as a Project Administrator in the Applied Geoscience Division.
- Mr SW Strauss – 21 years as a Chief Scientist in the Economic Geology and Geochemistry Business Unit.
- Ms CJ Skeffers - 17 years as an Office Administrator in the Geoscience Mapping Business Unit.
- Dr B Yibas-Babso – 14 years as a Specialist Scientist in the Economic Geology and Geochemistry Business Unit.

My deepest condolences go to colleagues who lost family members and friends during the year. The sadness of loss hit the CGS family particularly strongly with the untimely deaths of Mr HE Maswanganyi, a Security Officer in the Protection Services Business Unit, Mr ME Nkosi, a Technical Officer in the Laboratory Services Business Unit, and Mr MA Tshikovhi, an Intern in the Economic Geology and Geochemistry Business Unit.

To all those colleagues who are recovering from ailments at present, we look forward to welcoming you back.

My special thanks go to the Board members, under the judicious leadership of the chairperson, Dr Humphrey Mathe, for their patience, meticulous evaluation of our work, support and guidance throughout the year. Gratitude goes, too, to the Parliament Portfolio Committee on Mineral Resources and Energy for its support, commitment, oversight and guidance, the Minister as well as the officials of the Department of Mineral Resources and Energy.

I sign off this overview confident that we have built a solid foundation for a CGS that is stronger, more delivery-focused and exemplary of a capable state institution of government. This have achieved only because we are standing on the proverbial shoulders of giants in the form of all our forebears. Let us seize this moment and continue crafting a formidable legacy for generations ahead of us.

A handwritten signature in black ink, consisting of stylized, overlapping loops and a long horizontal stroke extending to the right.

**Mr M Mabuzza**

Chief Executive Officer

Council for Geoscience

30 September 2020

## 2. Isifinyezo SikaMphathi Omkhulu



‘I-CGS iqhubekisele phambili ngokushesha ukuqaliswa Kohlelo Oluhlanganisiwe Lwemikhakha Ehlukeni Lokudwetshwa Kwebalazwe Lolwazi Olujulile Ngokwakheka Komhlaba futhi yaphinda yabeka phambili izindawo okunamathuba amakhulu kakhulu okuthi kutholakale kuzona izinsalela zezingqumbi zezimbiwa ezisezingeni lomhlaba. Ukuze kufezwe le nhloso, izindawo ezinhlanu okunamathuba amakhulu kakhulu okuthi kutholakale izimbiwa kuzona zingukufaka isandla kwe-CGS ohlelweni lokusimamisa umnotho lukahulumeni. Lezi zimbiwa zihlanganisa izimbiwa ezibalulekile ezifana ne-lithium, i-manganese, i-vanadium, i-fluospa, ama-phosphate, nezinsimbi ezijwayelekile ezingesilona igugu, zonke okubhekwe ukuthi zifake isandla ekukhuliseni uchithomali lokuhlola isimo somhlaba eNingizimu Afrika ukuze ifinyelele engxenyeni engama-5% yesabiwomali somhlaba sokuhlola isimo somhlaba’

### UMPHATHI OMKHULU UMnu Mosa Mabuza

Lo nyaka uyisikhumbuzo sokuphela komzungezo Wohlaka Lwamasu Esikhathi Esimaphakathi (i-MTSF) owaqala ngowezi-2014 kuya kowezi-2019 nokuqala kwe-MTSF yowezi-2019 kuya kowezi-2024. I-CGS ngalesi sikhathi, yabhekana noguquko olukhulu kumasu nasesakhiweni sayo okwaholela esikhungweni esihambisana kakhudlwana nemithetho yokusungulwa kwaso. Umyalelo wokwenza umsebenzi we-CGS waqiniswa ngalesi sikhathi, njengoba sasifuna izindlela ezingcono zokukhombisa umthelela emphakathini owenziwa ukusebenzisa ngempumelelo izinhlelo zolwazi olujulile lokwakheka komhlaba. Eswini elihambisana nomyalelo okhishwe umthetho wokwenza umsebenzi okuyiwona odingidwayo, sethula indlela ehlanganisiwe ukuze sichaze ngokuqondile izingxenye eziyindikimba okufanelwe kugxilwe kuzo ezenza ngcono ukufaka isandla kolwazi olujulile lokwakheka komhlaba ekufezweni kwemigomo Yohlelo Lwentuthuko Kazwelonke (i-NDP). Kuyintokozo kimi ukubika ukuthi ososayensi bethu bashicilele ama-athikili angaphezu kwezi-200 abuyekwezwe ozakwabo ngalesi sikhathi somzungezo weminyaka emihlanu, futhi athole ukucaphunwa izikhathi ezicishe zibe yi-1 440. I-CGS njalo nje ithatha abafundi basemanyuvesi ezobuchwepheshe (ayekade aziwa kuqala ngokuthi ama-technikon) ukuze bafunde ngomsebenzi. Lolu hlelo lusiza abafundi ukuthi baqedele ingxenye yokwenza ngqo umsebenzi ukuze bathole iziqu zabo, eyingxenye eyisidingo esibalulekile okufanele bahlangabezane naso kuqala ukuze baqedele izifundo zabo. Eminyakeni emihlanu edlule, sifake isandla ekuphuthuleni izifundo kwabafundi abayi-17, abangaphezu kwama-66% babo abangabesifazane. Kulesi sikhathi, abasebenzi be-CGS bethweswa iziqu ze-Master’s Nezobudokotela ezingama-27. Enye impumelelo ephawulekayo yeminyaka emihlanu edlule ifaka, kodwa noma kungaphelele lapho:

- Sengeza ukudwetshwa kwebalazwe likazwelonke ngesikali sika-1:50 000 ukusuka ngaphansi kwendawo engama-4% kuya kwengama-8.8% ekupheleni komzungezo we-MTSF.
- Sazibekela umgomo okhombisa ukuzethemba wokusebenzisa ulwazi olujulile lokuhlolwa kwesimo somhlaba ukuze sengeze kakhulu ukuhlolwa kwesimo semithombo yezimbiwa ukusukela ngaphansi kwe-1% ukuya kuma-5% wesabelo sochithomali lokuhlolwa kwesimo somhlaba emhlabeni wonke.
- Ibalazwe elishicilelwe elinesikali sika-1:1 000 000 lokwakheka komhlaba laseNingizimu Afrika.
- Ibalazwe lokuqala emhlabeni lokwakheka komhlaba wephansi lolwandle nengxenye esogwini eyithafa Yesikhathi Sokwembozwa Komhlaba Ngeqhwa Okukhulu Kokugcina.
- Ukuqaliswa kwemisebenzi yokudwetshwa kwamabalazwe olwazi olujulile ngokwakheka komhlaba e-Grqigqualand West, eNyakatho Kapa eGiyani nakwiphansi lolwandle.
- Ukutholakala kwemithombo yamanzi engaphansi komhlaba esifundeni sase-Beaufort West ngesikhathi sesomiso.



- Ukwehlukaniswa kwezindawo Zedolobhakazi laseGoli ngokwezindawo okungenzeka kuzona ukuzamazama komhlaba.
- Ukuqapha ngempumelelo okuqhubekayo kwamathuba nokwenzeka kokuzamazama komhlaba eNingizimu Afrika yonke.
- Ukusungulwa kwezindlela zokuzwa ukude ukuze kubikezelwe izingozi ezingadalwa isimo sokwakheka komhlaba.
- Ukuchazwa ngokwemikhakha ehlukeni kolwazi olujulile ngokwakheka komhlaba kwezimbiwa okwenziwe futhi kwaphokophelwa ukuthi zimbiwe kuqala.
- Ukusetshenziswa kokuhlakanipha okwenziwe ngobuchwepheshe olwazini olujulile lokwakheka komhlaba okusungulwe njengekhono elingumnyombo lesikhungo.

Isinqumo seNingizimu Afrika sokutshala imali olwazini olujulile lokwakheka komhlaba kuhloswe ngaso ukuqhubekisela phambili ukukhula komnotho okufaka bonke abantu, ukukhulisa ukulondolozwa kwemvelo nokufaka isandla, phakathi kokunye, ekutholakaleni kokudla namandla anele (okufaka izinto zokusebenza ukuze siguqukele emnothweni osebenzisa ikhabhoni ephansi), ukuhlelwa kwendawo okulungile nokusetshenziswa komhlaba, nokwesekwa kwezinhlelo zamanzi kuzwelonke.

I-CGS isonyakeni wayo wesithathu wokusebenza Kohlelo Oluhlanganisiwe Lwemikhakha Ehlukene Lokudwetshwa Kwebalazwe (i-MMP), okuhloswe ngalo ukukhiqiza amabalazwe acacile ahlanganisiwe olwazi olujulile lokwakheka komhlaba ezweni lonke ngokwezikali ezahlukeni, lapho amabalazwe ayisisekelo okufunda ngokwakheka komhlaba eyisikali sika-1:50 000 kanye namabalazwe okufunda ngokwakheka kwesimo somhlaba ngokuma kwawo nawesimo somhlaba ngokwamakhemikhali akhona emhlabeni ngezikali ezahlukeni. Ulwazi olujulile lwesimo sokwakheka komhlaba oluqoqiwe luzosetshenziselwa ukuchaza ngokwakheka komhlaba nomumo wawo okungasiza ekukhuliseni ukuqonda izinqubo eziningana ngokwenzeka emhlabathini, ukusabalala kwemithombo yezimbiwa namandla, amanzi angaphansi komhlaba, ukusetshenziswa komhlaba, ingqalasizinda, izingozi ezidalwa isimo sokwakheka komhlaba kanye nezindaba eziphathelene nokungcola kwezindawo ezisizungezile ngokwemvelo. Phezu kwalokho, ulwazi olujulile lwesimo sokwakheka komhlaba oluveziwe lungasetshenziselwa izinto ezenziwa kwezenhlalo nasemnothweni ezifana nezokuvakasha ezigxile ekufundeni ngokwakheka kwesimo somhlaba nemvelo.

Ngemuva kweminyaka emithathu, i-IMMP isuse ukudwetshwa kwebalazwe lolwazi olujulile ngokwakheka komhlaba endaweni esemhlabeni owomile engekho olwandle ukusuka endaweni engama-4% kuya kwengama-8.8. Ngokwenze njalo, ithole imithombo emisha yamanzi engaphansi komhlaba kanye naleyo okungenzeka kube yiyona emaqenjini amadwala aqavile e-Karoo naseKapa kanye nezinye izakhiwo ezibalulekile okungenzeka zibe nomthelela ezingozini ezidalwa isimo sokwakheka komhlaba. Lolu lwazi njengamanje lusiza ekubhekaneni nezinkinga zokuswela amanzi ezindaweni ezithile kanye nokwenza ngcono ukuvimba izingozi ezidalwa isimo sokwakheka komhlaba. Ngaphezu kwalokho, uhlelo lukhombela lapho kungenzeka kutholakale izimbiwa ezintsha ezindaweni ezinamanzi ashisayo ne-magma ezifundazweni zaseNyakatho Kapa, eNtshonalanga Kapa, eNyakatho Ntshonalanga naseLimpopo ngokwehlukana kwazo. Lezi zimbiwa zihlanganisa izimbiwa ezibalulekile ezifana ne-lithium, i-manganese, i-vanadium, i-fluospar, ama-phosphate, nezinsimbi ezijwayelekile ezingesilona igugu, zonke okubhekwe ukuthi zifake isandla ekukhuliseni uchithomali lokuhlola isimo somhlaba eNingizimu Afrika kuze kufinyelele engxenyeni engama-5% yesabiwomali somhlaba sokuhlola isimo somhlaba."

Inhloso ephakathi nendawo ye-IMMP ukukhulisa isabelomali sokuhlola isimo somhlaba size sifike kuma-5%, ukuthola izinsalela zezingqumbi zezimbiwa namandla amasha ukuze ifake isandla ekukhulisweni komnotho, imisebenzi nokudalwa kwamathuba omsebenzi. Ukuze i-CGS ithole futhi ilinganise ukuthi indawo yaseNingizimu Afrika inezimbiwa ezingakanani futhi ilinganise umthelela we-IMMP, kuphakanyiswe izinhlelo eziningana, ezifana nokusungulwa nokukhuthazwa Komthetho Wolwazi Olujulile Ngokwakheka Komhlaba Nemithethonqubo yawo. Onyakeni obuyekwezwayo, i-CGS yaqala ukusungula

imithetho-nqubo ezokwenza ukuthi Umthetho Wolwazi Olujulile Ngokwakheka Komhlaba usebenze ngokugcwele, njengoba uchtshiyelwe. Le nqubo ihambisana Nenqubomgomo egunyaziwe Yolwazi Neminingwane Yolwazi Olujulile Ngokwakheka Komhlaba (i-GDIP) Nemihlahlandlela yayo ezoshicilelwa onyakeni ozayo. Ukutholakala kolwazi neminingwane yolwazi olujulile ngokwakheka komhlaba ngendlela ecacile nehlekile emphakathini izokhuthaza imisebenzi yokumba ezimayini nokuhlola isimo somhlaba ezweni.

Okuhambisana nezinqubo zohlelo uhlelo lokususa ngobuchwepheshe lonke ulwazi neminingwane ewumlando lusiwe esizindeneni esiyinqalazizinda yesimanje okuzokwenza ukuthi ulwazi neminingwane kufinyeleleke ngokushesha. Ngineqholo ukunazisa ukuthi amabalazwe cishe ayizi-120 000 angazange ashicilelwe nemibiko okusukela emuva esikhathini seminyaka ye-1800 yokugcina akungobo yomlando e-CGS. Okuningi kwalokhu kusengenzeka ukuthi kube usizo namanje futhi kungabiza ukukubuyisela —okuningi ngeke kukwazi ukubuyiselwa. Ukuskena amarekhodi kuhlonzwe njengengxenywe ebalulekile yesu lenhlangano lokuguqukela ekusebenziseni ubuchwepheshe besimanje. Kwasetshenziswa izimo ukuze kubhekanwe nokuhlukahlukana kwamaqoqo, ngoba kokubili izinga nobuningi bamarekhodi kunomthelela oqondile ekutheni iminingwane ingarekhodwa futhi ilondolozwe isikhathi eside. Ukuze kuhanjiswa nenhloso yokuqala yesu, ukufinyeleleka kwamaqoqo amabalazwe abantu bangaphandle kuzoba isinyathelo sesibili sokuqala ukusebenza kwalo ngokugcwele. Uma eseskeniwe, wonke amarekhodi azobekwa ngokwezindawo ukuze kwenziwe lula ukubuyiselwa kwendawo futhi azokwenziwa abe khona ngokuhambisana ne-GDIP Nemihlahlandlela yayo.

Amaqoqo ezinsalela zokwakuphila osekwaquka kwaba izimo eziqopheke ematsheni ase-CGS aphakathi kwamanye amaningi kunawo wonke ohlobo lwawo eNingizimu Afrika futhi abalulekile ngokwesu lenhlangano ngoba arekhoda umbono ohlukile waseNingizimu Afrika ekuguqukeni kwempilo nesimo semvelo eminyakeni eyizigidigidi ezintathu. Ifa laseNingizimu Afrika lezinsalela zokwakuphila osekwaquka kwaba izimo eziqopheke ematsheni libalulekile ngoba ezinsalela zokwakuphila osekwaquka kwaba izimo eziqopheke ematsheni kwenza ingxenywe Yefa Lezwe futhi kuchaza ubulona. Amaqoqo amabili amakhulu aphelele izifanekiso ezingamakhulu ezinkulungwane amaningana abekwe emahhovisi e-CGS ase-Silverton nase-Bellville. Yize ukufunda ngezinsalela zokwakuphila osekwaquka kwaba izimo eziqopheke ematsheni kuyingxenywe yomsebenzi we-CGS, lo mkhakha uhlale ungasebenzi esikhathini esingamashumi eminyaka ambalwa adlule futhi namaqoqo enganakiwe. Manje, i-CGS isiyakubona ukubaluleka kwefa laseNingizimu Afrika lokuyizinsalela zokwakuphila osekwaquka kwaba izimo eziqopheke ematsheni njengezipawu zesizwe okufanele zeseke, yingakho kubuyiselwa esimweni amaqoqo ayo njengesinyathelo sokuqala sokuqala umkhakha.

Ngonyakamali wezi-2019/2020, i-CGS yaqala ukwazisa inhlangano yonke nge-ISO 9001, ngokukhethekile amayunithi enza umsebenzi wenhlangano ongumnyombo. Amayunithi omsebenzi asungula izinqubomgomo, izindlela zokwenza izinto, izinqubo, amafomu nezifanekiso njengesisekelo sokuqalisa ukusebenza kwe-ISO 9001 kunyakamali ozayo. Umndeni wase-CGS uhlose ukuthi ube sowugunyazwe ngokugcwele mhla zingama-31 kuMashi wezi-2023.

Ukuqhubekela phambili kwe-ISO 17025 kwathikamezeka ngokuvalwa komsebenzi welabhorethri ye-CGS kwaze kwaba u-Agasti 2019, ngesikhathi kuqedwa imisebenzi yempahla enkulu, okufaka kuyo ukufakwa kwamayunithi okukala isisindo nezinga lokushisa ezintweni zokusebenza, ukuze kuqinisekise ukunemba kokukalwa kwemiphumela yokuhlola. Izinhlelo zokugunyazwa kwe-ISO 17025 zahlolwa, kugxilwe ekuhlolweni kwemibhalo, ukwaneliseka kwamakhasimende, ukuhlala ukucwaningwa kwamabhuku kwangaphakathi, nokuqala ukusebenzisa nokuqapha izinhlelo zokulawula amazinga omsebenzi kuzo zonke izingxenywe zama-labhorethri. Ukubekwa kwempahla yokusebenza nezimo zemvelo zezindawo akukabi sezingeni elidingekayo futhi kusayisihibe esikhulu sokuqinisekisa izindlela zokuhlaziya. Umsebenzi wokwenziwa kangcono kokushisa, ukufaka umoya nokupholisa nokomisa umoya uyaqhubeka njengamanje ukuze kubhekwe nalezi zimo.

Ukusimama kuyingxenywe ebalulekile yomsebenzi nebhizinisi le-CGS ngokwezimali/ezomnotho, ezenhlalo, ababambiqhaza nemvelo. Ukusimama kusekelwe ekugxilweni kwezesayensi nokuqamba amasu amasha okusebenza esikhungweni futhi sinenhlanhla yokuba nabasebenzi abavumelanayo nabemikhakha eyahlukene ababona i-CGS njengomqashi ongcono abamsebenzelayo. Ngithanda ukwamukela ngemfudumalo amalungu amasha ethimba lase-CGS. Kulabo abasisiyya, siyabonga ngomsebenzi wenu futhi sinifisela impumelelo emisebenzini yenu emisha.

Unyaka ngamunye unokuvelele kwawo nezikhathi ezingemnandi. Kulo nyaka obuyekwezwayo, i-CGS ilahlekelwe abanye babasebenzi bayo abanekhono, kuhlenganisa nezingqalabutho zangempela zolwazi olujulile lokwakheka komhlaba, ngenxa yokuthatha umhlalaphansi. Sincoma ukufaka isandla okuvelele kwalabozakwethu abasisenze kahle isikhungo. Laba besilisa nabesifazane baphakathi kwalabo abanikele impilo yabo esikhungweni:

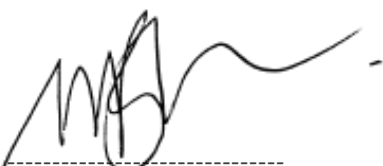
- uMnu. CH de Beer – iminyaka engama-40 Njengososayensi Onguchwepheshe Kuyunithi Yebhizinisi Yokudwetshwa Kwamabalazwe Olwazi Olujulile Ngokwakheka Komhlaba.
- uMnu. RH Sello – iminyaka engama-38 years Njengomsebenzi Wobuchwepheshe Eyunithini Yebhizinisi Yemisebenzi YaseLabhorethri.
- uDkt. M Cloete – iminyaka engama- 35 Njengososayensi Onguchwepheshe Omkhulu Ehhovisi Lamasu Okuphatha.
- uDkt DI Cole – iminyaka engama-34 Njengososayensi Onguchwepheshe Kuyunithi Yebhizinisi Yokudwetshwa Kwamabalazwe Olwazi Olujulile Ngokwakheka Komhlaba.
- uNks EE van Tonder – iminyaka engama-33 Engumsebenzi Wasemtapweni Wolwazi: Isitolo Sezincwadi Nemibiko Engashicilelwe Eyunithini Yebhizinisi Yokuphatha Izindawo Nempahla Yokusebenza.
- uNks S Mahwayi – iminyaka engama-32 Njengonobhala Eyunithini Yebhizinisi Yokuphatha Izindawo Nempahla Yokusebenza.
- uDkt MT Atanasova – iminyaka engama-28 Njengenhloko Yomnyango: Ukufunda Ngezimbiwa Eyunithini Yebhizinisi Yemisebenzi YaseLabhorethri.
- Dr LP Chevallier – iminyaka engama-28 Njengososayensi Onguchwepheshe Kuyunithi Yebhizinisi Yokudwetshwa Kwamabalazwe Olwazi Olujulile Ngokwakheka Komhlaba.
- uNks JD Grobler – iminyaka engama-24 Njengonobhala Wesizindalwazi Eyunithini Yebhizinisi ye-GIS Nezizindalwazi Zesayensi.
- uNks KIG Burger – iminyaka engama-21 Njengomsebenzi Wobuchwepheshe Eyunithini Yebhizinisi Yemisebenzi YaseLabhorethri.
- uNks MD Paweska – iminyaka engama-21 Njengonobhala Wemisebenzi Esigabeni Solwazi Olujulile Olusetshenziswayo Ngokwakheka Komhlaba.
- uMnu. SW Strauss – iminyaka engama-21 Njengososayensi Oyinhloko Eyunithini Yebhizinisi Yokufunda Ngokwakheka Komhlaba Kwezomnotho Nangokwesimo Sokwakheka Komhlaba Ngokwamakhemikhali.
- Nks CJ Skeffers – iminyaka eyi-17 Njengonobhala Eyunithini Yebhizinisi
- Yokudwetshwa Kwamabalazwe Olwazi Olujulile Ngokwakheka Komhlaba.
- uDkt. B Yibas-Babso – iminyaka eyi-14 Njengososayensi Onguchwepheshe Eyunithini Yebhizinisi Yokufunda Ngokwakheka Komhlaba Ngokwezomnotho Nangokwesimo Sokwakheka Komhlaba Ngokwamakhemikhali.

Ngizwakalisa ukuzwelana kakhulu nozakwethu abalahlekelwe amalungu emindeni nabangani onyakeni. Ukudabuka ngokulahlekelwa kwaba kukhulu kakhulu emndenini wase-CGS ngokushona ngokuzuma kukaMnu HE Maswanganyi, Unogada Eyunithini Yebhizinisi Yemisebenzi Yokuveleleka, noMnu MA Tshikovi, Umfundi Owayesathola Uqeqesho Eyunithini Yebhizinisi Yokufunda Ngokwakheka Komhlaba Ngokwezomnotho Nangokwesimo Sokwakheka Komhlaba Ngokwamakhemikhali.

Kubo bonke ozakwethu abasalulama ekuguleni njengamanje, sibheke ukuthi sinamukele futhi uma senibuyile.

Ngibonga ngokukhethekile amalungu eBhodi, ngaphansi kobuholi obunobuhlakani bukaDkt Humphrey Mathe, ngesineke sabo, ukuhlola umsebenzi wethu ngokucophelela, ukwesekwa nokuholwa onyakeni wonke. Sibonga futhi, Ikomidi lasePhalamende Lomsebenzi Wemithombo Yezimbiwa Namandla ngokweseka kwalo, ukuzinikela, ukuqapha nobuholi, uNgqongqoshe kanye nabasebenzi Bomnyango Wezimbiwa Namandla.

Ngiphetha lesi sifinyezo nginethemba lokuthi sakhe isisekelo esiqinile se-CGS enamandla, egxile ekufezeni umsebenzi wayo futhi eyisibonelo njengesikhungo sikahulumeni esinekhono. Lokhu sikwaze ukukufeza kuphela ngoba sime ngokwesisho emahlombe alabo abanamandla kakhulu okuyilabo abangokhokho bethu. Asithatheni leli thuba siqhubeke nokwakha ifa elikhulu silakhela izizukulwane ezizayo.



**uMnu M Mabuzza**  
Umphathi Omkhulu  
i-Council for Geoscience  
30 September 2020



### 3. STATEMENT OF RESPONSIBILITY FOR PERFORMANCE INFORMATION

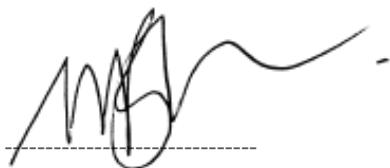
#### Statement of responsibility for performance information for the year ended 31 March 2020

The Chief Executive Officer (CEO) is responsible for the preparation of the performance information of the CGS and the judgments made in this information.

Moreover, it is the responsibility of the CEO to establish and implement a system of internal controls designed to provide reasonable assurance of the integrity and reliability of performance information.

In our opinion, the performance information fairly reflects the actual achievements against planned objectives, indicators and targets of the strategic and annual performance plan of the CGS for the financial year ended 31 March 2020.

The performance information of the CGS for the year ended 31 March 2020 has been examined by the external auditors and their report is presented on pages 116 to 120. The performance information was also approved by the Board of the CGS.



**Mr M Mabuza**  
Chief Executive Officer  
Council for Geoscience  
30 September 2020



**Dr H Mathe**  
Chairperson  
Board of the Council for Geoscience  
30 September 2020

## 4. STRATEGIC OVERVIEW

The core mandate of the CGS is inscribed in its founding prescripts. The vision, mission and core values of the organisation aptly find their expression, as outlined in Geoscience Act No 100 of 1993, as amended, as follows:

### Vision

A prosperous and transformed society enabled by geoscience solutions.

### Mission

- The mission of the CGS is to contribute to a prosperous South Africa by:
- Providing integrated, systematic and thematic geoscience 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 geo-environmental resources;
- Contribute to the mapping and characterisation of geo-engineering and geohazards; and
- Support infrastructure development planning.
- Acting as a national advisory authority on geo-environmental pollution and geohazards.
- Providing an information repository and delivery platform that facilitates actionable decisions and the accessibility of pertinent information by relevant stakeholders.
- Discharging the mandate in a manner that supports transformation and national developmental imperatives.

### Core Values

- Innovation: Solving problems through novel ideas that create value for the stakeholders of the CGS;
- Diversity: Promoting an inclusive culture that respects the contributions of the diverse people of the CGS;
- Excellence: Striving for exceptional quality in all that the CGS does;
- Accountability: Setting SMART targets with personal ownership and commitment to the achievement of the desired outcomes;
- Learning: Creating a learning organisation through continuous personnel development; and
- Service: Providing efficient and effective services to all, consistently.

### Strategic outcome-oriented goals

The CGS has adopted a strategy to encourage sustainability of the organisation in a changing state of polity, the economy, society, as well as the scientific and technological landscape. The strategic objectives and their related initiatives, which are illustrated below (Figure 2), are intended to shift the strategic orientation of the CGS to maintain an impactful delivery of the core mandate.

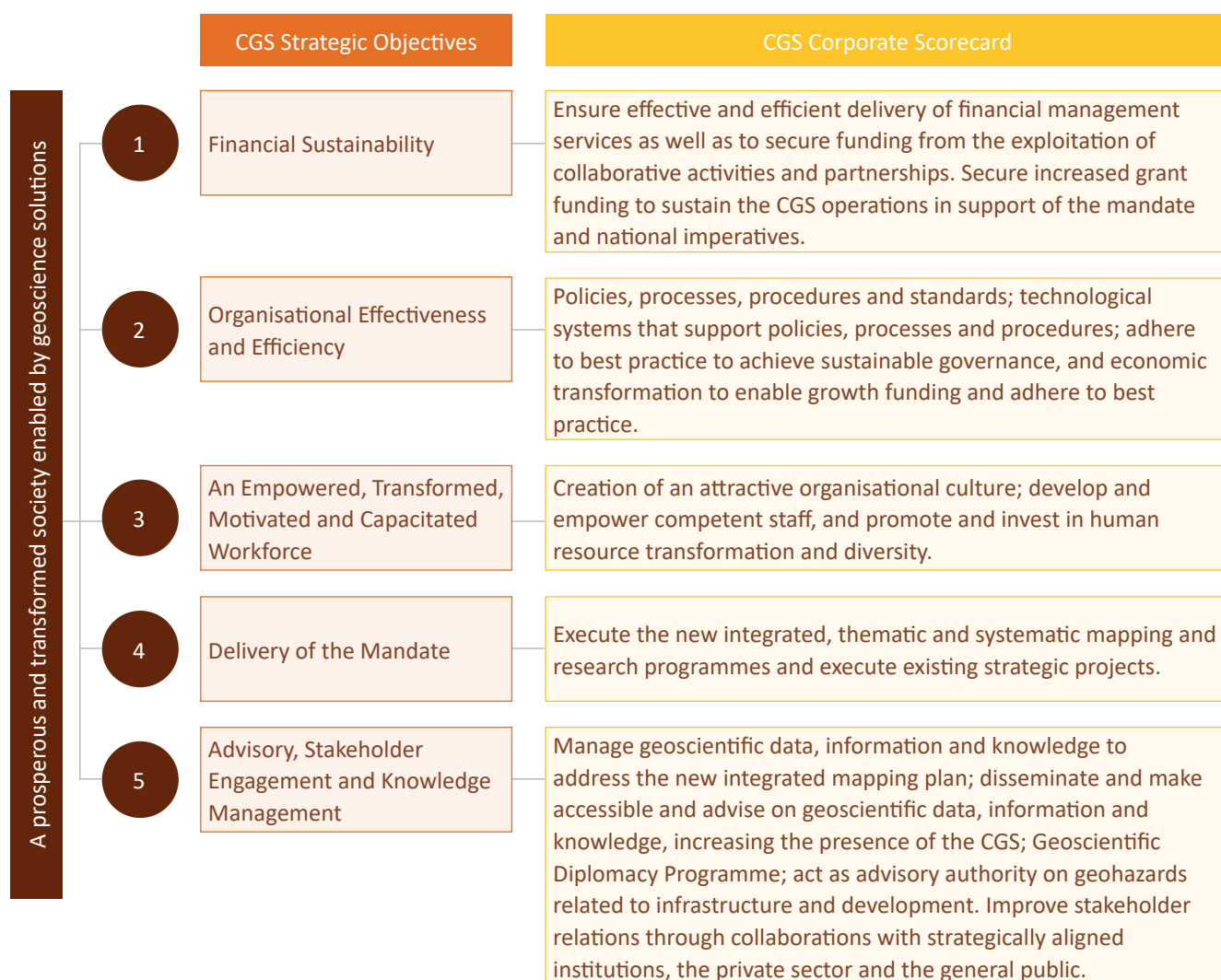


Figure 2: CGS strategic outcomes linked to strategic objectives and initiatives.

## 5. LEGISLATIVE AND OTHER GUIDING POLICIES

The Public Finance Management Act (PFMA) (Act No 1 of 1999) lists the CGS as a Schedule 3A Public Entity.

Geoscience Amendment Act No 16 of 2010 markedly stretched the mandate of the CGS with the respective sections 4(c), 4(eA), 4(f), 5(b) and 8 introducing the new role of the CGS to receive geoscience information from prospecting and mining rightholders and in the review and evaluation of geotechnical reports, the maintenance of certain national geoscientific facilities and the appointment of a Geotechnical Appeal Committee. These provisions were omitted in the proclamation that pronounced the promulgation of the Amendment Act effective from 1 July 2012 due to the paucity of resources to implement the expanded mandate. The CGS has since re-orientated to ready itself for the staggered implementation of these provisions. This constitutes organic growth in pursuit of maximum execution of its mandate by the end of the current Medium-term Expenditure Framework (MTEF) cycle.



The mandate of the CGS, as defined in the Geoscience Act as amended, is summarised as follows:

**Geological research and knowledge management:** The CGS investigates a wide range of surface and subsurface, onshore and offshore geosciences. These include geology, geochemistry, geophysics, engineering geology, economic geology, geohazards and geohydrology. The CGS is also mandated to promote the development of mineral and upstream energy resources in the country. The organisation performs these duties mainly through government funds and, to a lesser extent, through collaborations with private and public institutions, including institutions of higher education. The CGS is responsible for the following, among others:

- The national custodianship of all geoscientific information and its dissemination to stakeholders, and
- The review of all geotechnical reports and counsel on infrastructure development in the country.

**Management of several national geoscience facilities:** These include the National Borehole-Core Repository, the National Geoscience Heritage Collections (Geoscience Museum), the National Geoscience Library and the National Seismograph Network.

**Advisory service:** Based on research findings obtained through its various functions, the CGS is mandated to advise its primary stakeholder, the Minister of Mineral Resources, as stated in Geoscience Act No 100, on issues relating to mineral resources. The CGS also renders national advisory services for local, provincial, national and international authorities on geohazards and geo-environment-related issues.

**Training and development:** The CGS invests substantively in the training, development and competency of its staff through training and bursaries. It also cooperates with institutions of higher learning to promote research, training and the development of scientists in geoscience.

#### Other guiding policies

Given the urgent need to address national imperatives, the CGS ensures that its business model and all its activities address the following strategic national outcomes in alignment with the National Development Plan (NDP) Vision 2030:

- **Decent employment through inclusive economic growth:** Increase the benefits of mineral resources to the country by delivering geoscience information and services to increase the rail, water and energy infrastructure;
- **A skilled and capable workforce to support an inclusive growth path:** Build capacity in scientific, administrative and managerial/leadership skills, and in the development of products, systems and services;
- **An efficient, competitive and responsive economic infrastructure network:** Geoscience information and services input into infrastructure development contribute to South Africa's economic development of coal, gas, electricity and water resources;
- **Vibrant, equitable and sustainable rural communities with food security for all:** Assistance by the CGS in the development of South Africa and its people through improved infrastructure development, mining and geotourism;
- **Environmental assets and natural resources that are well protected and continually enhanced:** Conducting research regarding acid mine drainage (AMD), climate change and carbon capture and storage technologies, and
- **An efficient, effective and development-oriented public service and an empowered fair and inclusive citizenship:** Development of the regulatory systems of the CGS in line with legislative requirements and the national mandates that address gender equity and employment equity (EE).

Further to the NDP and MTSF, the objectives of the CGS have been formulated to support the objectives of the Department of Mineral Resources and Energy (DMRE), whose core focus is promoting sustainable development of the mining, minerals and upstream petroleum sectors. Other objectives of the DMRE supported by the CGS and to which it aligns include contributing to skills development, facilitating transformation in the mining, minerals and energy sectors, as well as effecting the necessary research and development underpinning sustainable exploration activities. The CGS derives its strategic underpinning from the government's MTSF for 2014 to 2019 and the MTSF 2019 to 2024, the Stakeholders' Declaration on Strategy for the Sustainable Growth and Meaningful Transformation of South Africa's Mining Industry of the DMRE, and the 2019 White Paper on Science, Technology and Innovation of the Department of Science and Innovation(DSI).

## 6. ORGANISATIONAL STRUCTURE

The organogram describes the reporting structure of the CGS (Figure 3) that was developed to support its efficient, effective and robust functioning and the composition of its Board of Directors and executive management. The executive management team of the CGS consists of the Chief Executive Officer for the CGS and reports to the accounting authority (the CGS Board, see Part C section 2.1 and 2.2). The CEO is supported by an executive team that oversees four portfolios: Geological Resources, Applied Geosciences, Finance and Corporate Services. Information on each member of the executive management team is provided on page 27.

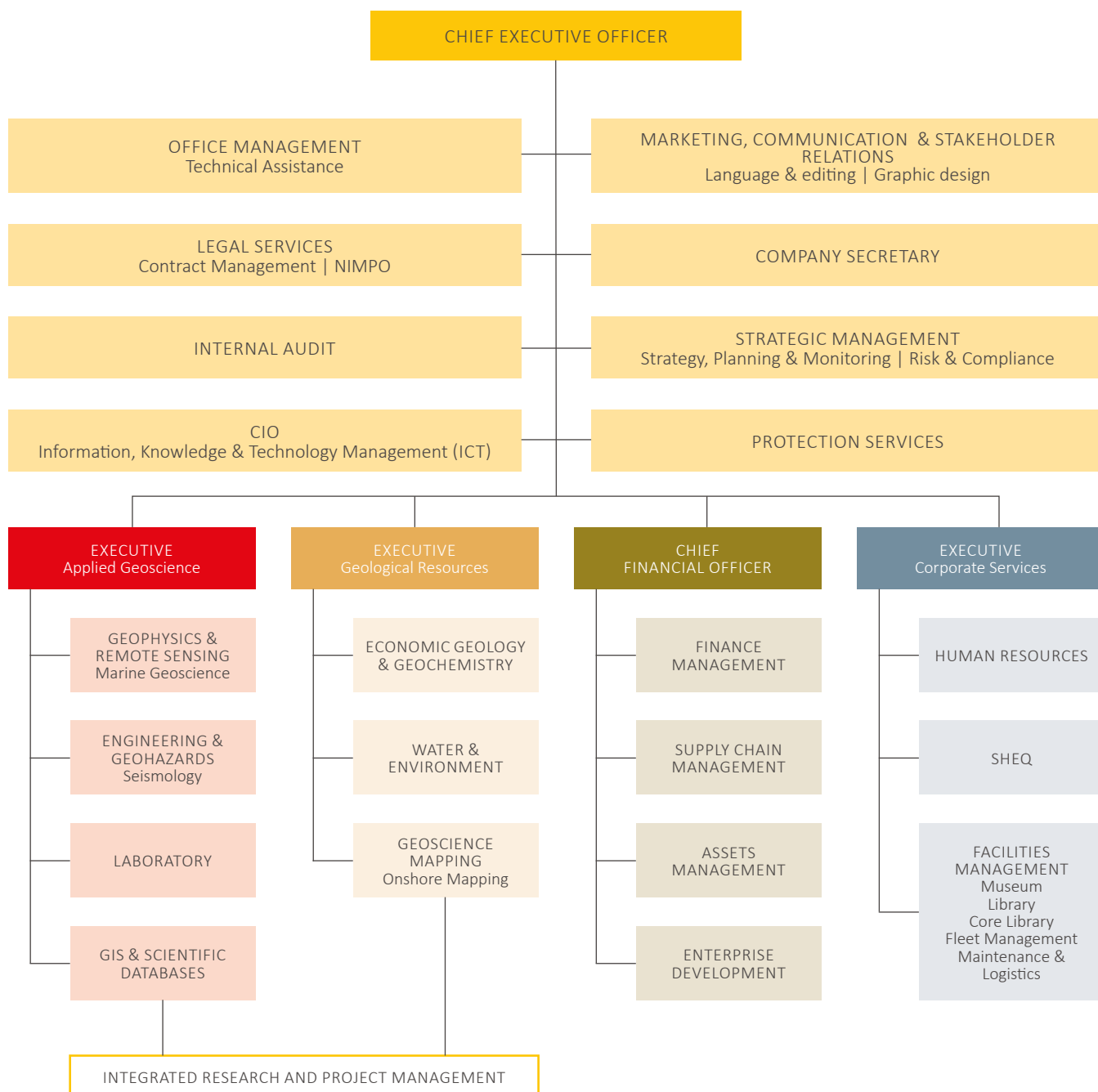


Figure 3: The organisational structure of the CGS.

## 7. EXECUTIVE MANAGEMENT TEAM OF THE CGS



**CHIEF EXECUTIVE OFFICER:**  
Mr Mosa Mabuza



**EXECUTIVE MANAGER GEOLOGICAL  
RESOURCES:** Ms Refilwe Shelembe



**EXECUTIVE MANAGER APPLIED GEOSCIENCE:**  
Dr David Khoza



**CHIEF FINANCIAL OFFICER:** Mr Leonard  
Matsepe



**EXECUTIVE MANAGER CORPORATE SERVICES:**  
Dr Jonty Tshipa



# Part B: Performance Information



Geoscientists conducting field work in the Eastern Cape Province

## 1. AUDITOR-GENERAL'S REPORT: PREDETERMINED OBJECTIVES

The Auditor-General performed the necessary audit procedures on the performance information to provide reasonable assurance in the form of an audit conclusion. The audit conclusion on the performance against predetermined objectives is included in the report to management, with material findings being reported under the Predetermined Objectives heading in the Report on Other Legal and Regulatory Requirements section of the Auditor-General's report.

The Report of the Auditor-General, published as Part E: Financial Information, is contained from pages 112 to 154.

## 2. OVERVIEW OF THE PERFORMANCE OF THE COUNCIL FOR GEOSCIENCE

### Service delivery environment

The IMMP of the CGS is in its third year. Through this detailed mapping programme, the CGS is realising its mandate to collect, compile, interpret and disseminate high-quality geoscience data, information and knowledge for South Africa in accordance with the Geoscience Act No 100 of 1993, as amended in 2010. The CGS business has delivered various geoscience products to advise various stakeholders through the provision of geoscience information to address the country's societal challenges and developmental imperatives. In the year under review, the CGS implemented its strategic objectives through the five core themes (listed below and in operational highlights) and these guided its activities in statutory, commercial and collaborative projects.



This section of the report provides key performance information that demonstrates the CGS's service delivery achievements. The information corroborates the organisation's effective management, planning, budgeting, implementation, monitoring and evaluation, as well as reporting. It also reinforces the symbiosis of planning and managing inputs and activities to achieve desired results.

The performance information affirms alignment with strategic outcomes/objectives and demonstrates achievements against performance indicators and targets identified in the strategic plans, annual performance plans and the budget.



- **Geoscience for mineral and energy resources:**

The programmes of the CGS are positioning the organisation to respond to the call of the Minister of Mineral Resources and Energy, Mr Gwede Mantashe (MP), for South Africa to capture a minimum of 5% of the global exploration budget of approximately \$10 billion in the next three to five years. The provision of critical pre-competitive geoscience information is one of the key factors in increase mineral exploration activities, many of which could lead to exploitation projects, thereby boosting investment attractiveness of South Africa. As a whole, the globe faces a projected exponential increase in the demand for mineral and energy resources due to the potential doubling of the world population in the next 20 years. The development and sustainable use of mineral and energy resources, which requires a multiple layer model that includes fundamental and applied research, has thus become urgent.

To contribute to the mineral and energy resources theme, the CGS continues to generate information in projects such as the Molteno-Indwe coalfield, characterisation of the lithosphere of South Africa, Griqualand West, Limpopo and Bushveld, and geothermal energy potential of South Africa projects.

- **Geoscience for health, groundwater and environment:**

Through the management of state contingent liabilities for derelict and ownerless mines in South Africa (or derelict and ownerless mines) and mine environment and water management (or mine water) projects, the CGS advises the DMRE, particularly on environmental contamination and preservation, thereby promoting environmental stewardship. The two projects were characterised by two main pillars: research (e.g. air quality monitoring, mineral assessments for future mining, passive treatment, coexistence of mining and biodiversity) and construction (construction of canals and closure of shafts). In the year under review, the Mine Water Project implemented ingress control and passive treatment measures. The Derelict and Ownerless Mines Project sealed 21 high-risk unsafe mine openings in various parts of the country.

For the first time in its history, the CGS produced four 1:100 000 scale hydrogeological maps (together with their explanations) in selected areas in the Northern Cape Province. Through integrated and multidisciplinary geoscience datasets using machine learning techniques in the Maluti Mapping Project in the Free State Province, the CGS also produced a groundwater potential 3D model. The CGS is also conducting groundwater mapping in the Eastern Cape Province (Makana). Here, hydrogeological modelling has been completed, potential groundwater resources have been identified and several

areas selected for targeted drilling in the next financial year. Additionally, the CGS has developed an innovative groundwater mapping tool that adopts integrated and multidisciplinary geoscience datasets using machine learning techniques.

- **Geoscience for infrastructure and land use:**

South Africa's investment in the infrastructure programme is significant. The CGS has responded to this programme by mapping the extent of dolomitic rock nationally to use it as proxy for characterising areas of possible subsidence. To this end, the extent of dolomitic layers nationally has been delineated using known boreholes. Additionally, artificial intelligence tools have been developed to predict the development of subsidence in dolomitic areas. The national seismic network continues to detect natural and mining-induced earthquakes in South Africa on a continuous 24-hour basis.

- **Geoscience innovation:**

As a science council, the CGS fosters scientific innovation in all areas of geoscience, particularly in application. To this end, the CGS has embraced the world trajectory towards the fourth industrial revolution (4IR) by applying machine learning algorithms to develop predictive capabilities in areas such as geohazards (subsidence and seismicity) mapping and water mapping. The software tool for water mapping was published in the current reporting period.

- **Geoscience diplomacy:**

As the permanent secretariat of the Organisation of African Geological Surveys (OAGS), the CGS promotes the development of close relations between African member states in geoscience research. The OAGS conducts annual multinational training programme under the European Union (EU)-funded PanAfGeo project. This project, in which the CGS plays a key role, has produced 1 074 trainees in 16 African countries. The CGS was also involved in publishing in the year under review several newsletters that highlighted key activities of the OAGS and its member states.

Additionally, the CGS is collaborating with the Namibian and Malawian geological surveys in high-resolution geological mapping projects that have strong elements of training and skills transfer for human capital development.

## Business of the CGS

Geoscience mapping at various scales is a core discipline of the CGS. In the year under review, the CGS continued its detailed mapping programme at a scale of 1:50 000, and has increased coverage to 8.8%. This is based on geological maps produced. In the 2019/20 financial year, the CGS produced 32 geological maps, two geotechnical maps at a scale of 1:50 000 and four hydrogeological maps at a scale of 1:100 000, and three 1:50 000 scale ingress risk maps for the Witwatersrand Basin.

The CGS also engages in collaborative projects typically characterised as follows:

- **Agency projects:** Sourced essentially from other government departments/institutions and public entities;
- **Private sector:** Collaboration with private sector establishments.

The CGS successfully manages a number of national geoscience facilities, including:

- The national seismograph network, which monitors seismic activity locally and globally; monitors global infrasound activity as part of its collaboration with the Comprehensive Nuclear-Test-Ban Treaty Organisation (CTBTO);
- The national borehole core repository, which provides a comprehensive collection of valuable geological materials;
- The national geoscience museum, which provides information and preserves rare, scientifically valuable and geological heritage samples;
- The national geoscience library and bookshop, which provide geological publications and maps to the public, and
- The national geoscience analytical facility, which is available for the analysis of geological samples and industrial raw materials.

## Organisational environment

During the past year, the CGS focused on the modalities for the implementation of the GDIP and subsequently appointed a Public Information Officer to streamline the function of data and information management between the organisation and its key stakeholders. To this end, the statistics in Figure 4 represent the number of stakeholders/clients the CGS has served with geological data and information in the last quarter of the financial year in review. These stakeholders include private citizens, emerging explorers with a bias towards the transformative programme that remains a central policy tenet of government, industry protagonists, state-owned enterprises, higher education institutions and international companies.

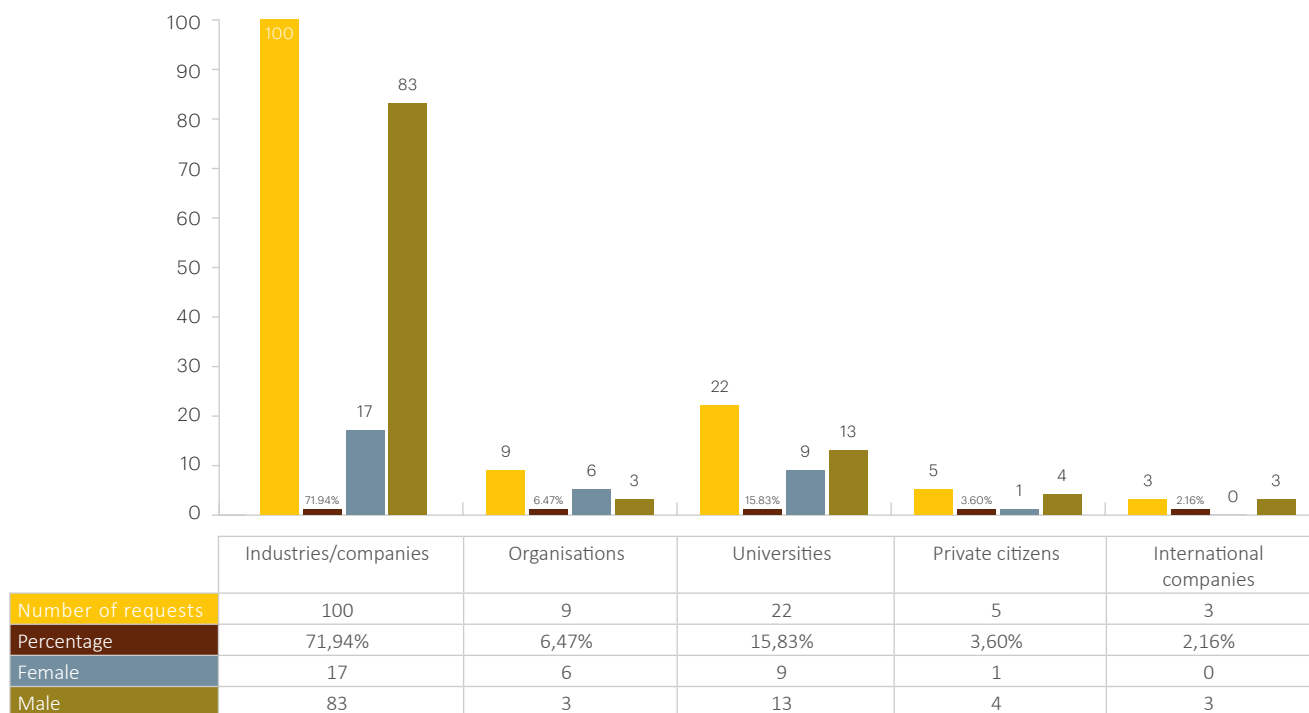


Figure 4: Statistics for geoscience data and information request at the CGS covering the last quarter of 2019/2020.

## Key policy developments and legislative changes

No key policy developments have occurred to the Geoscience Amendment Act 16 of 2010 since it took effect on 1 July 2012. The Amendment Act includes a more comprehensive description of the services rendered by the CGS.

The Minerals and Petroleum Resources Development Amendment Act (MPRDA) of 2008 explicitly outlines the role of the CGS in geological information generated through exploration activities in South Africa. With the new strategic approach, the CGS is aligning its activities with the latest developments in the MPRDA amendments, National Environmental Management Act and the Spatial Planning and Land Use Management Act.

### 3. CGS PERFORMANCE INFORMATION

In accordance with CGS strategy, the balanced scorecard (BSC) methodology has been adopted to provide an account of the overall performance of the organisation. The BSC essentially measures the performance of the organisation at corporate business unit and individual level. There are five strategic objectives that cover the customer, internal business process, learning and growth and financial perspectives (Figure 5).

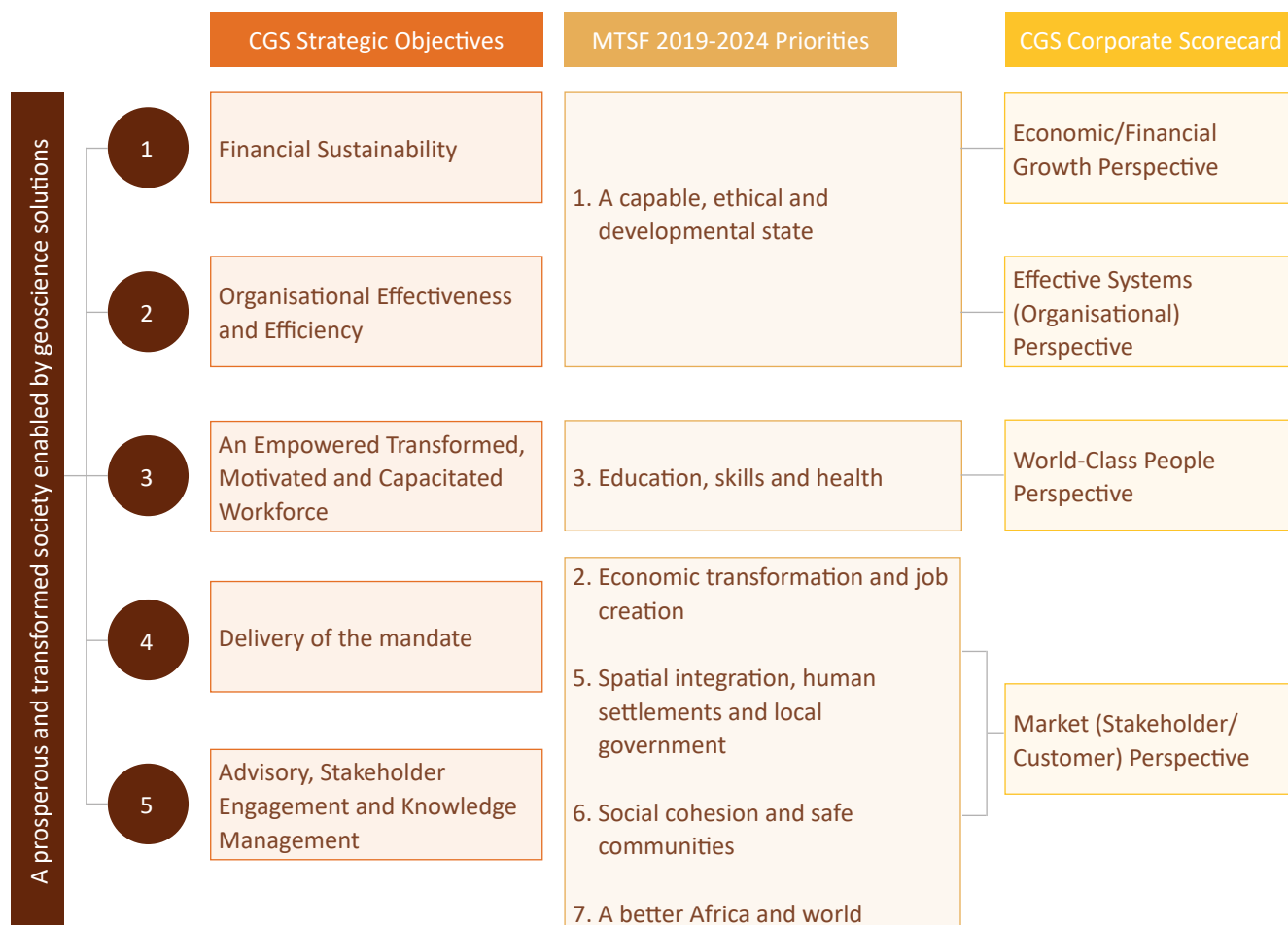


Figure 5: Summarised strategic objectives of the CGS and their link to the MTSF 2019-2024 priorities and the corporate scorecard.

This performance account details the service delivery environment of the organisation, the broad disciplines in which service delivery is provided, and the range of clients and stakeholders served. The objectives, activities and progress of programmes and projects of the organisation are outlined.

To evaluate the corporate performance of the CGS, the organisation has developed performance indicators, which, together with the performance targets for 2019/2020, are summarised in the accompanying table on pages 33 to 35 (Table 1).



### 3.1. Corporate scorecard for 2019/2020

Table 1: Corporate scorecard for 2019/2020

Financial Perspective	FINANCIAL SUSTAINABILITY				
Strategic objective 1	Financial Sustainability				
Performance Indicators	Actual Achievement 2018/2019	Planned Target 2019/2020	Actual Achievement 2019/2020	Deviation from planned target to Actual Achievement for 2019/2020	Comment on deviations
Percentage of overhead costs to total costs	Not applicable	≤55%	61.04%	+6.04%	Target not achieved. The denominator of the ratio was substantially reduced as a result of focused processing and interpretation of data already collected in the preceding year.
Percentage of personnel costs to total costs	Not applicable	≤60%	65.86%	+5.86%	Target not achieved. The denominator of the ratio was substantially reduced as a result of focused processing and interpretation of data already collected in the preceding year.
Revenue from collaborative activities/ partnerships	R30m	R26.6m	R29m	+R2.4m	Target achieved. Additional commercial work was implemented during the final year under review.
Grant revenue	R426.6m	R414.1m	R422.4m	+R8.3m	Target achieved. Accelerated implementation of the IMMP resulted in the over achievement and also the reduction of deferred income.

Systems Perspective	POLICIES, PROCESSES, PROCEDURES AND STANDARDS, TECHNOLOGICAL SYSTEMS THAT SUPPORT POLICIES, PROCESSES AND PROCEDURES, ADHERE TO BEST PRACTICE TO ACHIEVE SUSTAINABLE GOVERNANCE, ECONOMIC TRANSFORMATION TO ENABLE GROWTH FUNDING AND ADHERE TO BEST PRACTICE				
Strategic objective 2	Organisational Effectiveness and Efficiency				
Performance Indicators	Actual Achievement 2018/2019	Planned Target 2019/2020	Actual Achievement 2019/2020	Deviation from planned target to Actual Achievement for 2019/2020	Comment on deviations
Percentage of total Procurement spend on goods and services from Small Micro and Medium Enterprises	New measure	≥30%	48.25%	Not applicable*	Target achieved. This is due to a concerted effort to advance transformation.
Number of audit qualifications	0	0	0	0	Target achieved.

Not applicable\*: the planned target was not an absolute figure but a range.

Learning and Growth Perspective	CREATION OF AN ATTRACTIVE ORGANISATIONAL CULTURE, DEVELOP AND EMPOWER COMPETENT STAFF AND PROMOTE AND INVEST IN HUMAN RESOURCE TRANSFORMATION AND DIVERSITY				
Strategic objective 3	An Empowered, Transformed, Motivated and Capacitated Workforce				
Performance Indicators	Actual Achievement 2018/2019	Planned Target 2019/2020	Actual Achievement 2019/2020	Deviation from planned target to Actual Achievement for 2019/2020	Comment on deviations
Percentage of scientific staff with Masters or Doctoral degrees	Not applicable	≥35%	41.56%	Not applicable*	Target achieved. There was a focused recruitment drive to attract scientific staff with Masters and Doctorates as well as a deliberate investment in the talent pipeline.
Staff turnover rate	1.37%	≤5%	7.99%	+2.99%	Target not achieved. This is due to a deliberate management decision to re-evaluate filling of some of the vacant positions in line with the directive of Government to significantly improve cost efficiencies, including reduction of the wage bill.
Percentage of training expenditure to leviable amount of payroll	2.46%	≥2%	3.52%	Not applicable*	Target achieved due to accelerated organisational focus on employee training in line with the business exigencies.
Percentage of satisfied staff	65%	≥75%	69.3%	-5.7%	Target not achieved. The organisation achieved a score of 69.3% satisfaction level, which is 4% higher than the satisfaction level attained in 2018/19. This survey is based on an unprecedented return rate of 79% of the staff.
Percentage of staff living with disability	1.59%	≥1.5%	1.66%	Not applicable*	Target achieved. There was an awareness intervention to encourage employees to disclose.
EE statistics, Male–Female ratio	49:51	≤50:≥50	49:51	Not applicable*	Target achieved due increased focus on gender parity interventions both in recruitment and talent pipeline (bursars).

Not applicable\*: the planned target was not an absolute figure but a range.

Stakeholder/Market Perspective	EXECUTE THE NEW INTEGRATED, THEMATIC AND SYSTEMATIC MAPPING AND RESEARCH PROGRAMME AND EXECUTE EXISTING STRATEGIC PROJECTS				
Strategic objective 4	Delivery of the Mandate				
Performance Indicators	Actual Achievement 2018/2019	Planned Target 2019/2020	Actual Achievement 2019/2020	Deviation from planned target to Actual Achievement for 2019/2020	Comment on deviations
Geoscience for mineral and energy resources: Number of geoscience products	New measure	50	54	+4	Target achieved. The additional products are a function of multivariate factors such as leveraging derivatives from existing research work.
Geoscience for infrastructure and land use: Number of geoscience products	New measure	5	5	0	Target achieved.

Geoscience for health, groundwater and the environment: Number of geoscience products	New measure	6	15	+9	Target achieved. The additional products are a function of multivariate factors such as leveraging derivatives from existing research work and requests from the shareholder.
Geoscience innovation: Number of geoscience products	New measure	3	8	+5	Target achieved. The additional research products were developed to demonstrate CGS technical prowess.
Geoscience diplomacy: Number of geoscience products	New measure	3	3	0	Target achieved.

Strategic objective 5 Advisory, Stakeholder Engagement and Knowledge Management					
Performance Indicators	Actual Achievement 2018/2019	Planned Target 2019/2020	Actual Achievement 2019/2020	Deviation from planned target to Actual Achievement for 2019/2020	Comment on deviations
Number of articles published on media platforms	13	16	17	+1	Target achieved. The deviation is due to the interest from media on the progress and positive reporting of the CGS work.
Stakeholder satisfaction level	64.9%	≥70%	76%	Not applicable*	Target achieved. The deviation is a result of the extensive stakeholder engagement programme that the CGS has undertaken in the year under review.
Number of peer-reviewed articles published	26	22	41	+19	Target achieved. Leveraged collaboration opportunities between CGS and strategic partners in pursuit of advancing the geoscience body of knowledge.
Number of CGS publications	6	10	12	+2	Target achieved. Increased focus on processing and interpretation of data yielded more publications.
Number of conference proceedings published	136	41	47	+6	Target achieved. Increased focus on processing and interpretation of data yielded more publications.

Not applicable\*: the planned target was not an absolute figure but a range.

## 4. OPERATIONAL HIGHLIGHTS

### 4.1. INTRODUCTION TO THE GEOSCIENCE TECHNICAL PROGRAMME

The CGS effects the national IMMP through the Geoscience Technical Programme (GTP) as its implementation tool. The GTP is composed of statutory, mandatory, commercial and national strategic projects that aim to address the societal challenges and contribute to the realisation of NDP Vision 2030 through the application of geoscience knowledge. The GTP includes projects that are conceptualised and implemented across the thematic areas (minerals, energy, water, infrastructure development, environment and innovation). Further to this, the CGS continues to implement mandatory projects to actualise the specific provisions of the Geoscience Amendment Act, Act No 16 of 2010 (e.g. development and maintenance of the national core library, or geophysical reference sites). The CGS uses selected projects to advise the DMRE on matters of national strategic importance. To develop and encourage collaboration, particularly among state geological surveys and the private sector, the CGS undertakes projects under commercial agreements.

To facilitate the exploration of minerals and energy resources, the IMMP improved the mapping coverage at a detailed scale from 5% to 8.8% in the year under review – providing pre-competitive information. The CGS has focused on the Northern Cape Province, given its enigmatic geology under cover, significant minerals and energy potential. In addition, the province is one of the most water scarce in the country, and requires identification and mapping of new aquifers. The dolomite layer, which is extensive in the province, requires proper delineation. This has significant implications for the infrastructure build programme (see Figure 6). Progress and highlights of the GTP during 2019/2020 are discussed in the sections to follow.

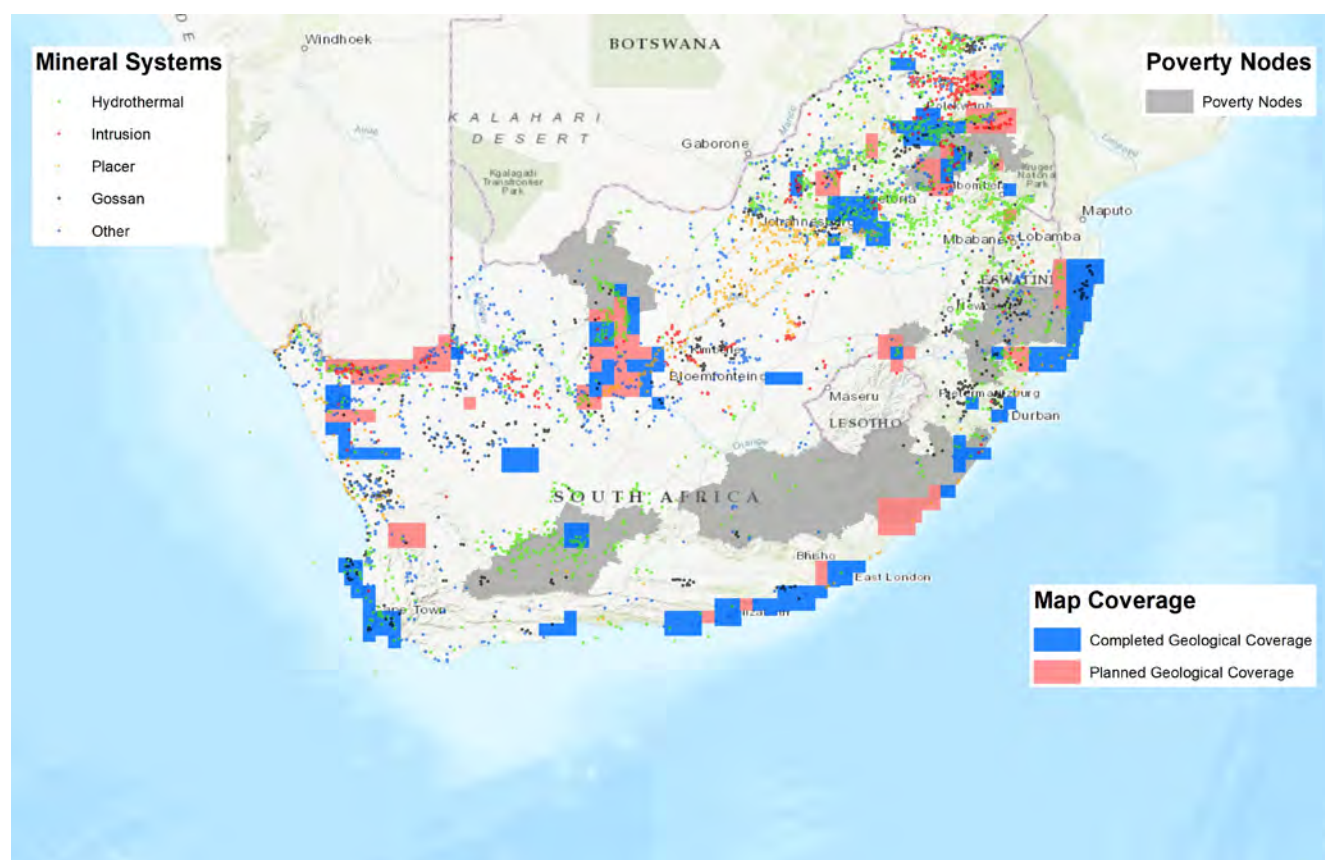
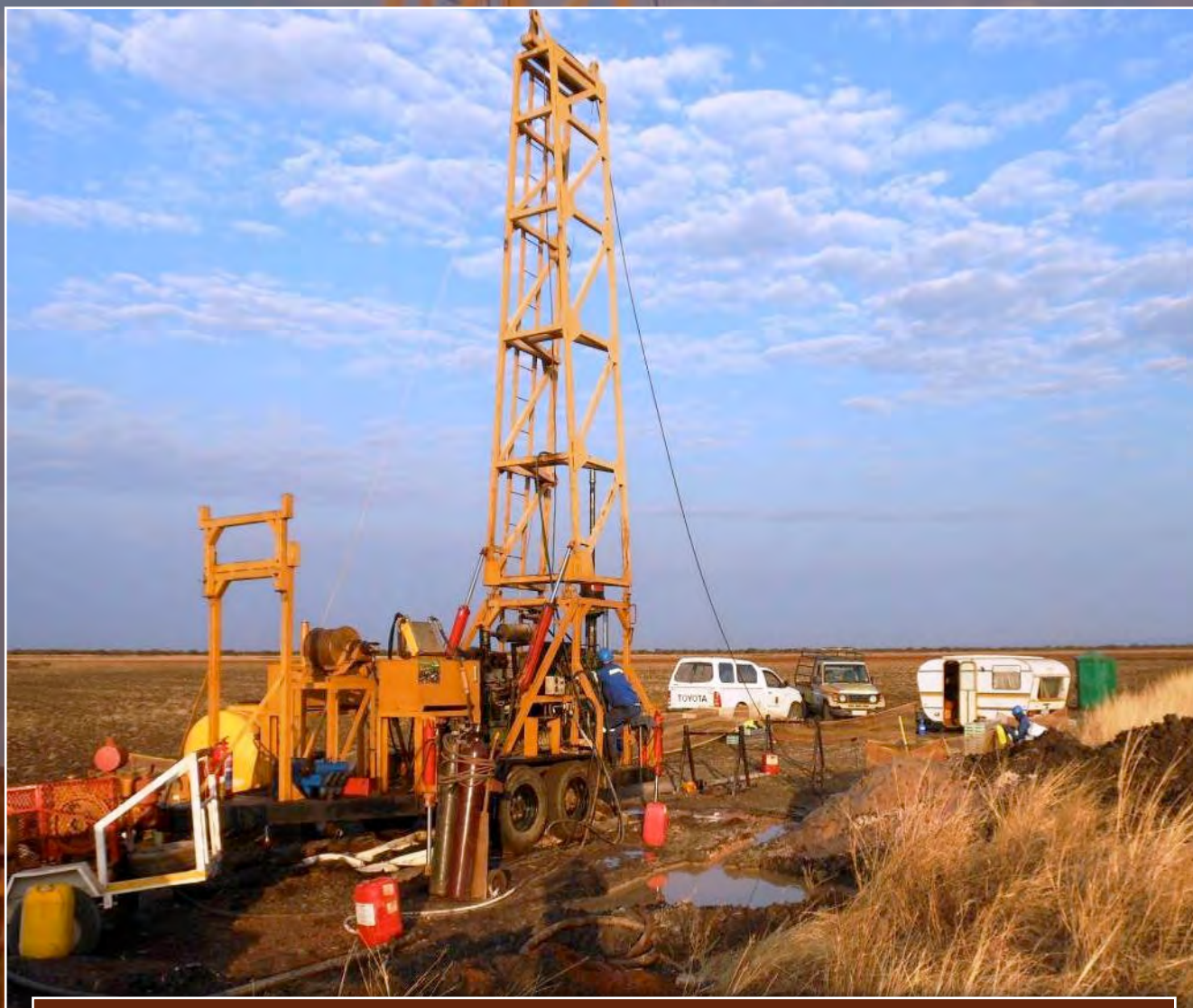


Figure 6: Focus areas for the GTP (2018/2019 to 2019/2020).



# GEOSCIENCE FOR MINERAL AND ENERGY RESOURCES



## Drilling for coal and uranium in the Springbok Flats Coalfield in Limpopo

The minerals and energy sectors are major contributors to South Africa's growth and development plan. The 'Geoscience for mineral and energy resources' theme facilitates an enabling environment that supports national imperatives, including the delivery of spatial and geoscience information and services. This information attracts local and international investment to develop mineral and upstream petroleum resources. The theme also aims to achieve outcomes including an increase in the uptake of exploration licences and expenditure, and foreign direct investment. It also fuels growth of private sector investment and opens up new economic growth. This latter outcome encompasses the Operation Phakisa – oceans economy and green economy. Finally, the function aims to increase support for the exploration, development and production of both shale gas and mining.

Similar to the other themes this theme is enabled by Section 5.1(c) of the Geosciences Amendment Act, to 'serve as the national custodian of geotechnical information, prospecting information and all other geoscientific information relating to the earth, the marine environment and geomagnetic space'. Under the 'Geoscience for mineral and energy resources' theme, the CGS collects, analyses and processes high-quality onshore and offshore geoscience (e.g. geological, geochemical, geophysical and mineral data), which will lower the risks of and increase confidence in exploration and mining, particularly in areas that remain underexplored. Naturally, these data are also used to identify potential economic natural energy resources such as coal, petroleum, natural gas, shale gas and geothermal energy.

## 4.2. PROJECTS RELATED TO ENERGY RESOURCES

The Integrated Resource Plan (IRP), which was gazetted in October 2019, is an electricity infrastructure development plan based on least-cost electricity supply and demand balance, taking into account security of supply and the environment (minimise negative emissions and water usage). South Africa continues to pursue a healthy, diversified energy mix that reduces reliance on a single or a few primary energy sources and promotes a just transition to a low carbon economy to reduce the carbon footprint of South Africa.

### 4.2.1. PROJECTS RELATED TO ENERGY RESOURCES

#### 4.2.1.1. Karoo Deep Drilling (KDD) and Geoenvironmental Baseline Programme

**Background and purpose:** The KDD programme aims to develop a geo-environmental baseline in the southern Karoo for informed decision-making and strengthening of the regulatory framework for possible shale gas development in the area. Key parts of the baseline are understanding the current status of seismicity in the area and flagging areas at which seismicity could be triggered by shale gas exploration and exploitation activities.

**Achievements and highlights:** The KDD programme successfully completed four 1:50 000 scale geological maps and their explanation sheets in the Beaufort West area in the Western Cape Province. The groundwater and seismic monitoring programmes (see Figure 7 for seismic patterns) continued to collect good data. The data from the six seismograph stations was critical in investigating existing lineaments and their links with the seismicity patterns in the Beaufort West area. This active fault-mapping exercise has identified areas with clusters of small seismic events that could be triggered by the possible shale gas exploration and exploitation activities. One of these is the Leeu-Gamka cluster, suspected to be associated with the Leeu-Gamka fault. Areas such as these should be flagged in the process of granting exploration permits for shale gas exploration.

The project has also had two papers published in the reporting year, entitled; “The Shale Gas Potential of the Prince Albert Formation: A preliminary Study” and “Lithostratigraphy of the Prince Albert Formation (Ecca Group, Karoo Supergroup). The project supported three MSc one of which was completed by Mr Matome Sekiba; and one PhD projects as part of its capacity building endeavours.



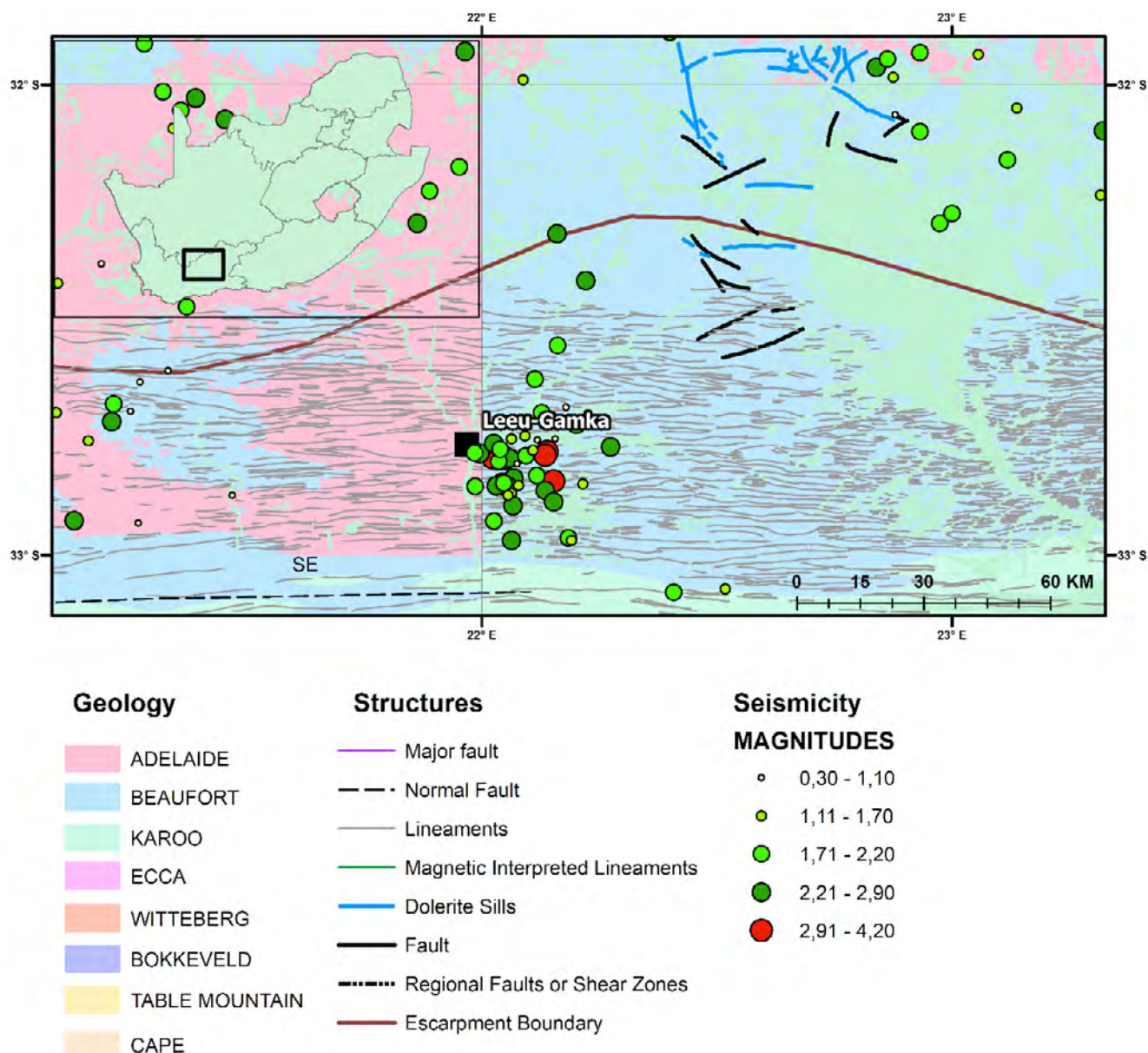


Figure 7: Map showing seismicity events in the Karoo Basin of South Africa.

#### 4.2.1.2. Geothermal energy potential of South Africa

**Background and purpose:** The CGS aims to contribute to the implementation of the IRP by investigating geothermal energy potential as a source of renewable energy. Geothermal energy that is harnessed for both direct use and electricity generation comes from the heat that flows continuously from the earth's interior to the surface. Geothermal energy has provided affordable, reliable and renewable energy since the 1890s for direct heating of commercial and residential buildings. Since then, its use has expanded to include utility-scale electricity production, distributed heating and cooling applications, and the augmentation of various industrial processes. Geothermal heat flow is expressed visibly at the surface as volcanoes, fumaroles, hot springs and geysers. Geothermal resource temperatures at a depth of 7km are accessible with existing drilling technology.

**Achievements and highlights:** Preliminary investigations have indicated that South Africa has low-enthalpy geothermal energy potential. For the first time, the CGS has mapped these high geothermal potential areas using magnetotelluric (MT) data (Figure 8), and identified structural controls and potential reservoirs of hot groundwater near known hot springs. The

MT data in the figure below indicates that geothermal systems in the area exhibit, in general, higher conductivity values than the host rock.

For the year under review, this project produced results from geophysical and data from hot springs and geysers. These will be integrated with other geoscience data to determine the geothermal energy economic potential. These results will also be used to find a location for developing an exploratory low-enthalpy geothermal pilot plant.

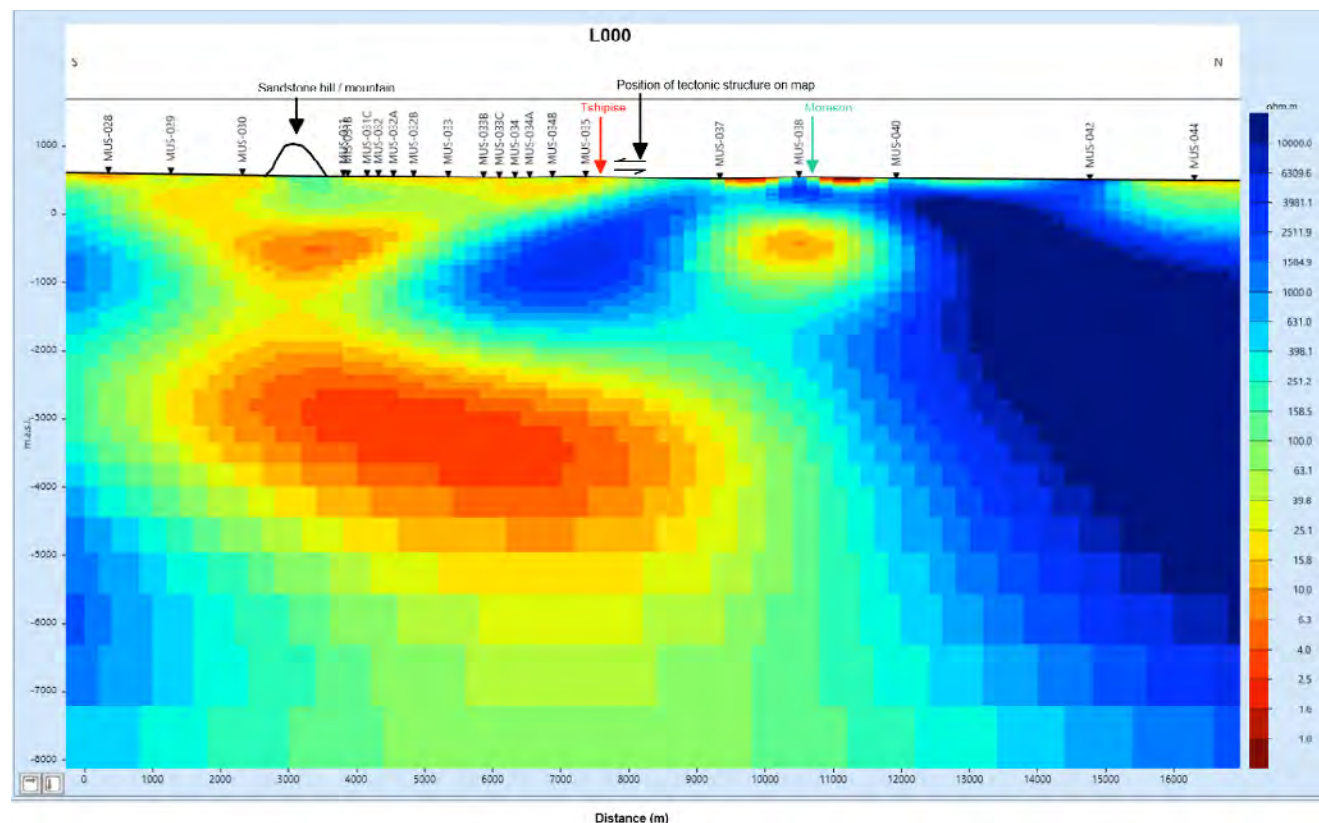


Figure 8: Electrical conductivity structure showing the possible presence of 'hot' source rocks at depth.

#### 4.2.1.3. Molteno-Indwe Coalfield Project

**Background and purpose:** The Molteno-Indwe Coalfield, in the Eastern Cape Province, was the major coal-producing area in South Africa from 1864 to 1904, with the majority of the mining activities concentrated near the town of Indwe. However, the discovery of high-quality coals in the Witbank (Emalahleni) and other areas resulted in the decline of coal production in the Molteno-Indwe Coalfield and eventually production ceased in 1947. The rapid development of the Witbank Coalfield resulted in the establishment of power stations in Mpumalanga, which by and large supplies energy in South Africa. Between 30% and 70% energy is lost during electricity transmission from Mpumalanga to the Eastern Cape Province. It is for this reason that the CGS, as mandated by the DMRE, launched a coal resource assessment of the Molteno-Indwe Coalfield. The aim of this project is mainly to understand the quality, quantity and distribution of coal in the coalfield, which will inform possible coal use.

**Achievements and highlights:** In the year under review, preliminary results show an estimated total coal tonnage of 530 million tons, at zero cut-off coal thickness, and 470 million tons at a minimum of 0.8 m coal thickness. The coal tonnage estimate decreases to about 320 million tons accounting for geological and mining losses. The potential coal revenue may be between R26 billion (R80 per ton) and R122 billion (at R350 per ton) in the Molteno-Indwe Coalfield, before coal processing. The calorific values range from 2.7MJ/kg to 27MJ/kg, ash contents from 17% to 89% and volatiles from 4% to 18%. In addition, sulphur contents are mainly below 1%. The coal rank increases from west to east, probably because of



the density of the dolerite intrusions eastwards. Petrographic observations of polished thin sections (microscopy study) revealed the presence of inertinite, vitrinite and liptinite, with inertinite constituting the majority of the macerals and liptinite constituting the least amount of macerals in the Molteno-Indwe Coalfield. The vitrinite reflectance values range from 1% to 3.1% (bituminous to anthracite coals respectively). The minerals identified include quartz, clay, calcite and pyrite. The rare-earth elements (REE) contents in the coals show the potential for further research in this area, with very few samples showing REE concentrations of up to 454 ppm with the pattern of relative enrichments of the heavy REE. The rest of the samples show low concentrations. The main REE minerals are monazite, xenotime and REE carbonate.

Preliminary results further indicate that the establishment of a modular power plant, such as for small modular fluidised bed combustion, modular decentralised fixed bed or moving bed gasifiers, and modular fluidised bed gasifiers, can be explored. However, it is suggested that comprehensive coal advance testing is conducted in the coalfield to ascertain the potential for these modular plants. In addition, the potential for REE should be further investigated, as preliminary results are encouraging. The investigations in the year under review indicate that more studies, such as a comprehensive Karoo Basin analysis study, will have to be implemented in the coming year. Figure 9 shows the three-dimensional view of the Molteno area within the Molteno-Indwe Coalfield.

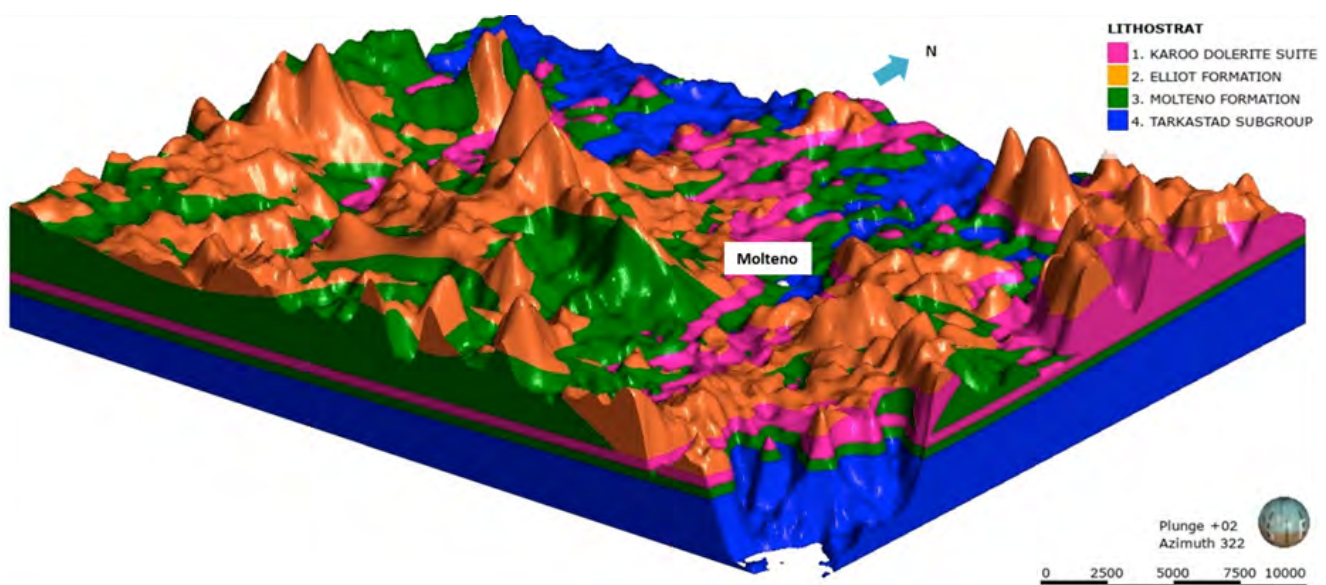


Figure 9: A three-dimensional map showing the Molteno area coalfield.

## 4.3. PROJECTS RELATED TO MINERAL RESOURCE ASSESSMENT

### 4.3.1. ONSHORE GEOSCIENCE PROJECTS

#### 4.3.1.1. Griqualand West Project

**Background and purpose:** The Griqualand West Geoscience Mapping Project characterises geological evolution in the Griqualand West region in the Northern Cape Province to enhance understanding of hydrothermal mineralising systems, geohazards and groundwater-dependent controls. This region has had a longstanding mineral exploration and extraction industry and its future longevity will require fundamental information on sustainable development. Geologically, the area is complex and is characteristic of structural deformation of the chemical sediments, including dolomite and banded-iron formation. Some of the world's largest economically important deposits of iron and manganese are concentrated in the area.

The main aim of this project is to characterise the mineral deposits such as diamond, Fe, Mn and tiger's eye and their mineralising systems, and support land use, agricultural and groundwater as well as environmental studies through geoscientific characterisation; for purposes of infrastructure development and economic growth.

**Achievements and highlights:** During the 2019/2020 financial year, the Griqualand West project focused on extensive data mining and the generation of large pre-existing datasets. Available data considered existing geology, minerals and mining and borehole information, which was appended by available satellite data and remote sensing. These datasets were used to identify gaps in the current knowledge base throughout the Griqualand West region. Considering these datasets, 1:50 000-scale geological mapping was undertaken to fill in the highlighted data gaps. This particularly included improved understanding of the structural controls on iron, manganese and base metal mineralising systems, particularly at depth, the development and control of sinkholes, and the distribution of groundwater resources. Highlights for 2019/2020 financial year include an improved understanding of the geochemical source signatures of the iron and manganese source material, improved and high-resolution Cenozoic geological subdivisions and the addition of greater structural detail. The latter has begun to delineate potential regional base metal sulphide distribution. This project has this year produced eleven 1: 50 000 scale geological maps; 2 geotechnical maps, four 1:100 000 scale hydrogeological maps as well as eight geochemical synthesis reports.

#### 4.3.1.2. Limpopo Greenstone Belt Project

**Background and purpose:** This project uses high-resolution geological mapping integrated with aspects of regional geochemistry and geophysics to answer the fundamental questions associated with greenstone belts, and their evolution. High-resolution geological mapping delineates geological contacts and relationships that previously have been undefined. The geophysics component of the project entails the interpretation of existing data and production of the interpreted layers using remote sensing to support the geological mapping task. Additional geochemistry and geochronology have enabled the delineation of various rock types and their age relationships (Figure 10). Further geochemical analyses are planned for the next financial year. This will assist in constraining the ages and metamorphism across the region. The overall aim of this project is to characterise the gold and base metal deposits in the Murchison–Giyani greenstone belts for supporting economic growth through geological mapping, geochemical and water quality mapping and environmental investigations of the area.

The MGB is of vital economic importance as it is well mineralised and contains a large variety of valuable precious and base metal deposits, as well as non-metal mineral deposits. There are approximately 250 mineral occurrences in the area, with gold occurrences the most abundant, sometimes associated with arsenic, tungsten and mercury. The MGB has a mining history of more than 100 years and currently abandoned deposits are marked by tailing dumps and abandoned shafts. Illegal mining of gold is prevalent in some of the abandoned and closed mines, which contributes to the environmental impacts associated with mining in the area.

**Achievements and highlights:** In the year under review, the project focused on the Murchison Greenstone Belt (MGB) and completed two geological maps (1:50 000 scale) covering the Giyani Greenstone Belt. The project has also produced five preliminary geological maps (1:50 000 scale) and one preliminary geochemical synthesis report was completed.

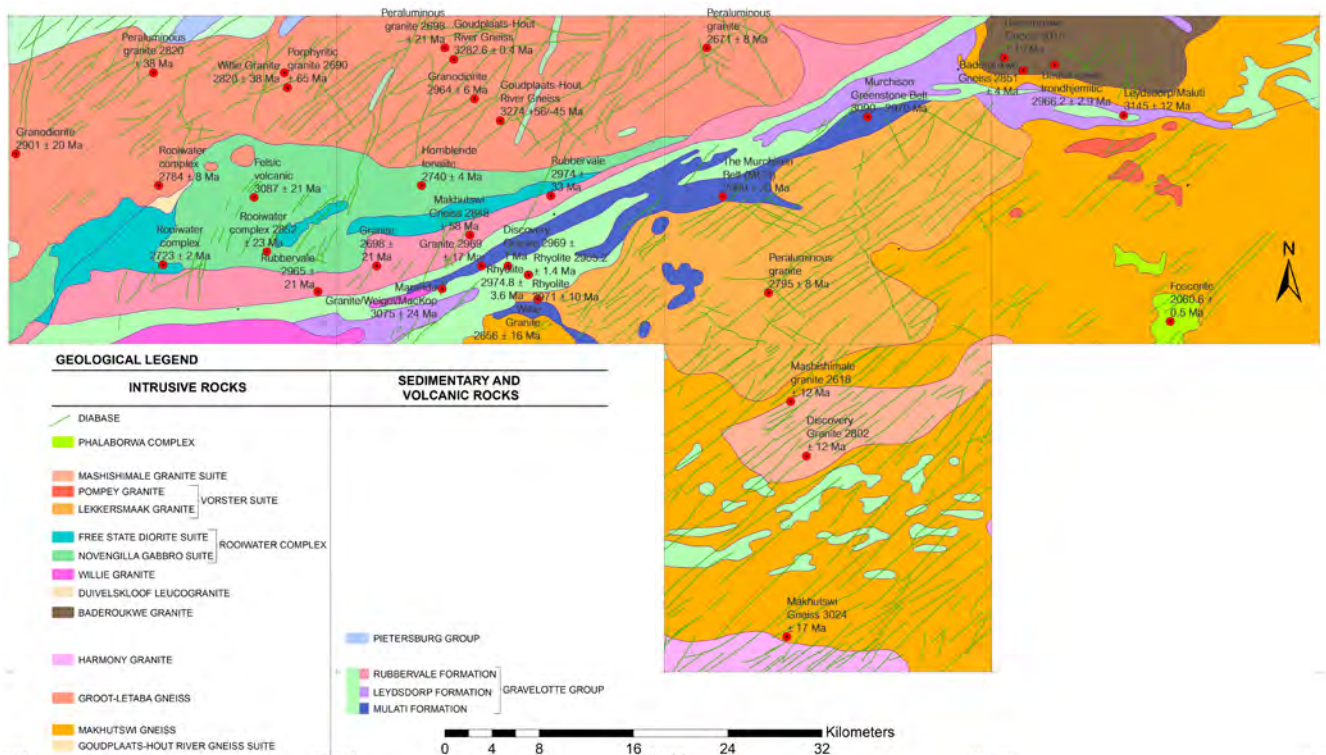


Figure 10: Simplified geological map of the study area displaying the geochronology data of some of the lithologies in the area.

#### 4.3.1.3. Central KwaZulu-Natal Geoscience Mapping Project

**Background and purpose:** The Central KwaZulu-Natal Geoscience Mapping Project constrains the structural and stratigraphic controls and the evolution of mineral-bearing sequences in the central KwaZulu-Natal region. These include shear-zone hosted, hydrothermal and placer gold deposits across the southern boundary of the Kaapvaal Craton. The main of this project is the assessment of the nature of current mineral deposits by monitoring industry activities and investigating future mineral potential and ore genesis; as well as the development of stratigraphic and tectonic geological information in the Central Kwa-Zulu Natal region that can support the characterisation and understanding of hydrothermal gold deposits.

**Achievements and highlights:** A detailed data review of all available work undertaken in the region since as early as 1910 indicated key zones within the Nkandla and Melmoth map sheets that needed revision and review. Then, detailed traverse mapping was undertaken of the southwestern region of the Nkandla map sheet to aid correlation of units across the boundary between the mapped sheets. The region being investigated forms the so-called 'Southern' or 'Mome' syncline in which the Hlathini, Mabaleneni, Mome, Dlabe and Msukane formations are developed. These formations bear no resemblance to lithologies of the Pongola Supergroup identified in the neighbouring Qudeni map sheet, or within the Mhlathuze inlier in the north of the Nkandla map sheet. Detailed mapping and associated laser ablation inductively coupled plasma mass spectrometry (LA-ICPMS) dating of numerous samples will hopefully aid further interpretations of this region. Additional mapping focused on the northwestern region of the study area. This included mostly Natal Group and Karoo siliciclastic units. Furthermore, the southern extent of the region included the Ilangwe Greenstone Belt, which forms an east-west-trending zone of elevated topography dominated by amphibolite-schist and chert-banded iron formation successions (Figure 11). These rocks are highly deformed, with upright isoclinal folding dominant. Greenstone lithologies are host to numerous small-scale prospects for gold, iron, copper and kyanite mineralisation. Of these prospects, kyanite-bearing schists and quartzites of the Ilangwe Greenstone Belt to the south of Nkandla appear to host the most appreciable quantities of ore, although still at a small scale. Potential iron ore deposits are known from both greenstone successions, but grades appear to be low. The financial year focuses included compiling and editing the final map sheets and the completion of a stratigraphic description of the Sinqeni Formation. The project complete one 1:50 000 scale of Qudeni. The remaining preliminary maps undergo cartography in the coming financial year.



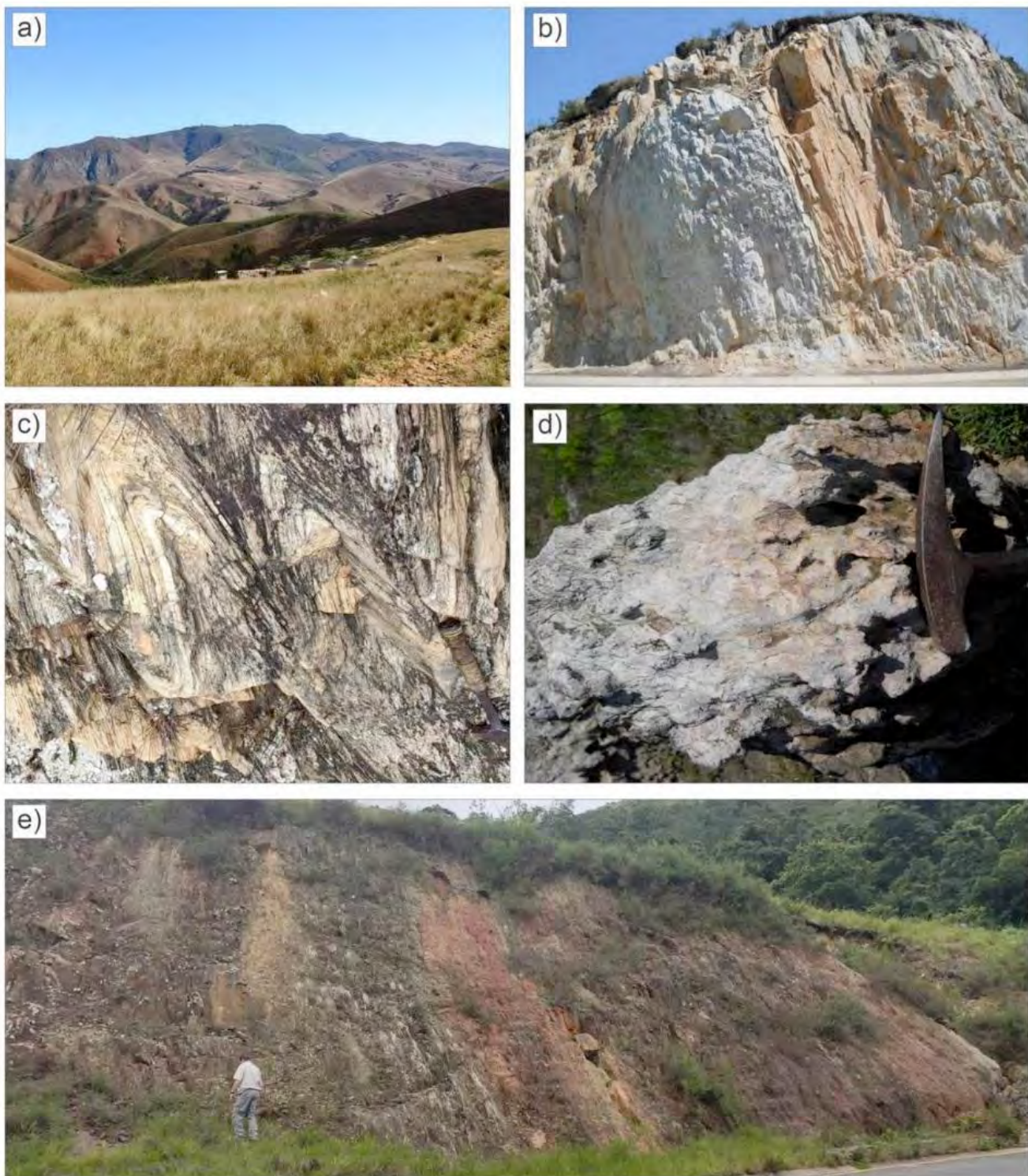


Figure 11: (a) Northwest-oriented view of the Nomanci ridge, capped by weathered quartz schists;  
 (b) quartz-kyanite schists exposed on the Nkandla forest road (note the light blue-coloured kyanite schist band intercalated with quartz schists).  
 (c) Intensely folded Nomangci Formation quartz-sericite schist at the Ntumbeni Sericite Mine. Axial planes parallel the main N-S shear orientation.  
 (d) Knobbly kyanite schist exposed on the Nomangci Ridge.  
 (e) Quartz-(kyanite-sericite) schists intercalated with maroon coloured volcanic schists of the Simbagwezi Formation in the Nkandla Forest Road south of the Nomangci Ridge.



#### 4.3.1.4. Characterisation of the continental lithosphere

**Background and purpose:** The geological mapping component of the project aims to fill the relevant geoscience knowledge gaps with fundamental geological data that can assist in characterising the tectonostratigraphic controls and evolution of hydrothermal mineral systems (e.g. orthomagmatic Cu-Ni, VMS-type Cu-Pb-Zn, superficial U and pegmatite-hosted REEs) and establishing the geological controls on the flow and chemistry of groundwater resources. The study area chosen for the current financial year is located along the Namaqua-Natal Orange River Pegmatite Belt, which is highly prospective for lithium and REE mineralisation.

**Achievements and highlights:** The pegmatites of this region are now mapped in high detail and are shown for the first time on the 1:50 000-scale map sheets (Figure 12). Included are previously unidentified large pegmatitic bodies containing indicator minerals for lithium-mineralisation. A wealth of new field data has been collected and, together with catalogued historical data, resulted in a large digital database aiding in the cross-border correlation of the recently remapped Namibia geology. This led to major changes in the tectonostratigraphy, which will advance the understanding of tectonostratigraphic controls on the mineralising systems in the Richtersveld magmatic arc, for example the identification and delineation of structurally controlled metasomatic events. The current mapping was, furthermore, assisted by newly processed hyperspectral imagery that enabled very accurate discrimination of lithological units and, more importantly, strongly highlights fluid-altered rocks. These fluid-induced processes present an opportunity for further investigation into mineralisation.

This project achieved the publication of four 1:50 000 scale geological maps.

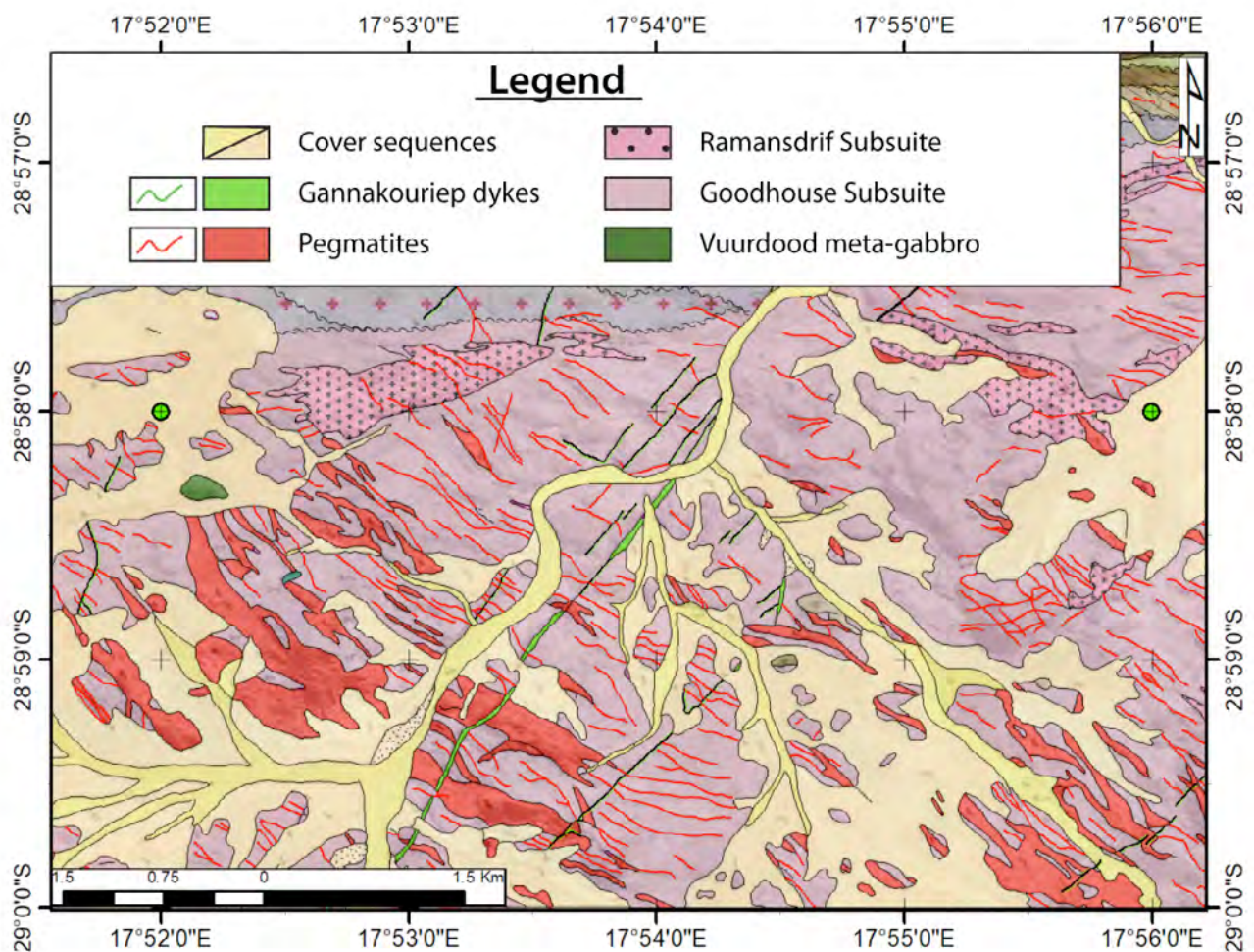


Figure 12: An excerpt from the 1:50 000 2817DD (Nous) geological map, indicating the occurrence of pegmatites in high detail.

#### 4.3.1.5. Maluti a Phofong Geoscience Mapping Project

**Background and purpose:** The Maluti a Phofong Mapping Project uses high-resolution geological mapping, together with geophysics and hydrogeological characterisation, to determine the fundamental controls of water and mineral distribution in this region. The areas mapped to date cover the Phuthaditjhaba poverty node and comprise sheets 2828BD Tshame, 2828DB Phuthaditjhaba, 2828DA Monantsa and 2828DD Mont-Aux-Sources, which were mapped in the 1980s but are currently under revision as part of ongoing value addition, not only to cover the country at a scale of 1:50 000, but to revise any existing geological models and explore new contexts in which they might be applicable. The purposes of this mapping are primarily to renew interest in mineral deposits, to increase investment in the mining and beneficiation sector, and to understand geo-environmental challenges, to address and mitigate how these factors might affect rural-urban dynamics and nearby populous.

**Achievements and highlights:** The Maluti projects produced cross sections showing the area which is underlain by rocks of the upper part of the Karoo Supergroup, which were deposited in the main Karoo Basin from the Triassic to the Jurassic. These rocks were since subjected to Cenozoic and Quaternary processes and weathering, forming the present-day landscape (Figure 13). Deposition of the upper stratigraphic units from the Triassic through to the Jurassic comprises the Katberg and Burgersdorp formations of the Beaufort Group, and the Molteno, Elliot and Clarens formations of the Stormberg Group. Quaternary to recent fluvial deposits of scree and talus, landslides and slumps in addition to alluvium and weathering of the Masotcheni Formation complete the geology currently visible. All sheets are being reproduced in digital format or have already been converted digitally. The current focus adds value to key applied geological components, namely an investigation into the effect of uranium on groundwater in the greater Phuthaditjhaba area, the exploration of basalt fibre in the greater Free State, the exploration of the Masotcheni Formation as a viable source of brickmaking material and the exploration of alluvial diamonds in old fluvial channel pathways emanating from the Drakensberg highlands.

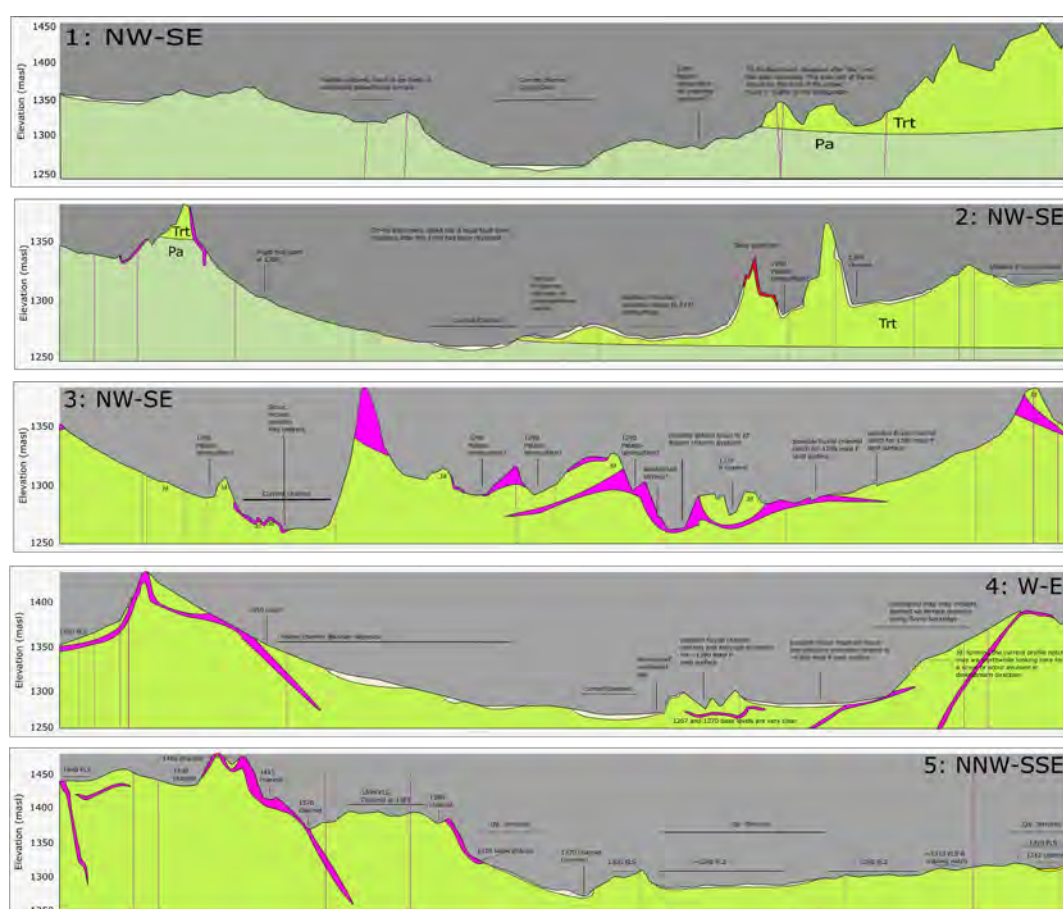


Figure 13: Profiles 1 to 5 showing the geology and expected location of alluvial deposits based on the similarity of palaeoland surfaces along the current Orange River.

The CGS has employed innovative machine learning techniques to integrate multidisciplinary geoscience data to map areas with the biggest water potential. A detailed groundwater potential map was completed for the year under review (Figure 14). This study has been done in the Maluti area and several areas of high water potential are being investigated further, with drilling planned in the next financial year. For this task, the project completed a 3D model using artificial intelligence methods.

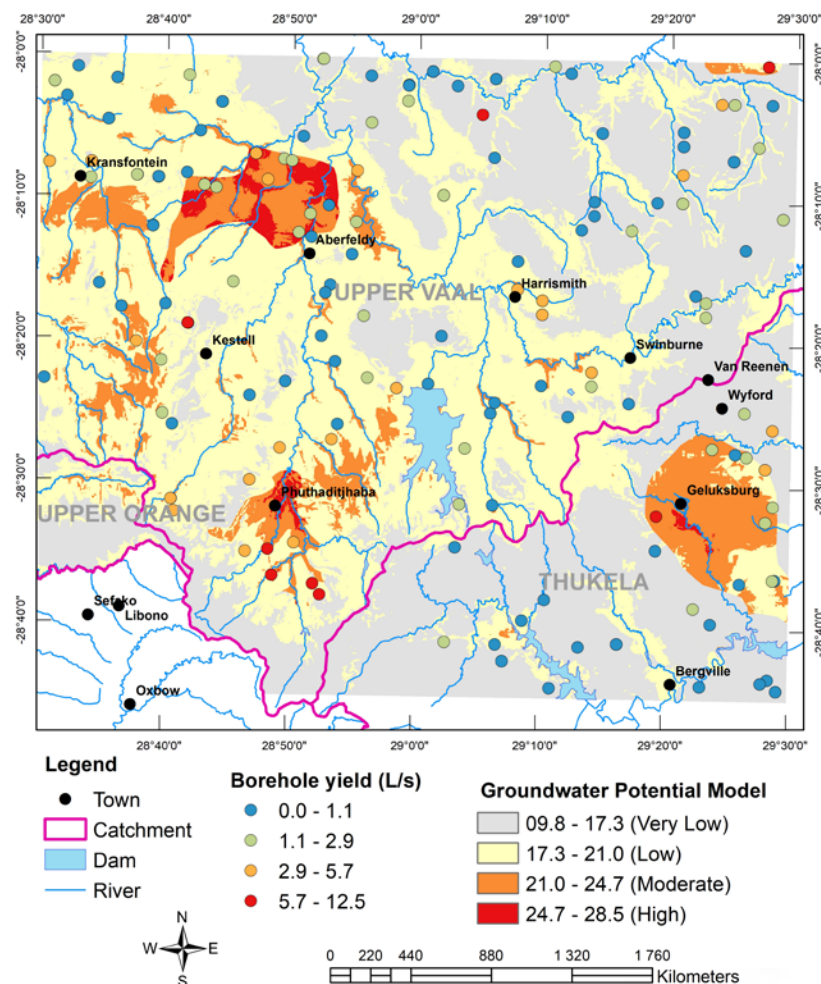


Figure 14: Groundwater potential map in the Maluti area.

#### 4.3.1.6. Bushveld Mapping Project

**Background and purpose:** The Bushveld Mapping Project studies the evolution of and controls on magmatic and hydrothermal mineralising systems, in particular those linked to future energy technologies. An additional theme of this project is the characterisation of previously undefined surficial deposits. The prime consideration of studies on Fe-Ti-V mineralisation has been on the spatial distribution, nature and origin of the understudied vanadiferous magnetite pipes. A mineralogical assessment of some of these pipes suggests a potentially significant economic potential to recover  $V_2O_5$ , Fe and  $TiO_2$  (Figure 15).

**Achievements and highlights:** Petrographic studied done in the year under review show that grain size distribution, texture and lack of silicate gangue in associated with titanomagnetite in the rocks suggest that the ore in the Bushveld area will be easily liberated upon grinding. Major element XRF and in situ LA-ICP-MS trace elemental analyses of magnetite and ilmenite in the magnetite pipes of the Upper Main Zone, Bushveld Complex, suggest that pipes form by the sinking of magnetite layers deep into the cumulate pile. Current knowledge and priority areas for research on the Tinderbox PGM prospect previously suggesting a possible extension of the Merensky reef further south of the eastern limb of the Bushveld Complex



are noted and briefly described. This extension of the Merensky reef in the southern portions of the eastern limb has been investigated using regional soil geochemical datasets. Studies on the structural controls of base metal mineralisation have been conducted and preliminary analyses and interpretation of structural data suggest the Wonderkop fault controlled the local structures that bear polymetallic mineralisation in Mutue Fides and Boschhoek. Work in the financial year also focused on the vanadium and REE mineralisation in the project area, which are critical to a wide range of modern high technology applications. This project completed two 1:50 000 scale geological maps.

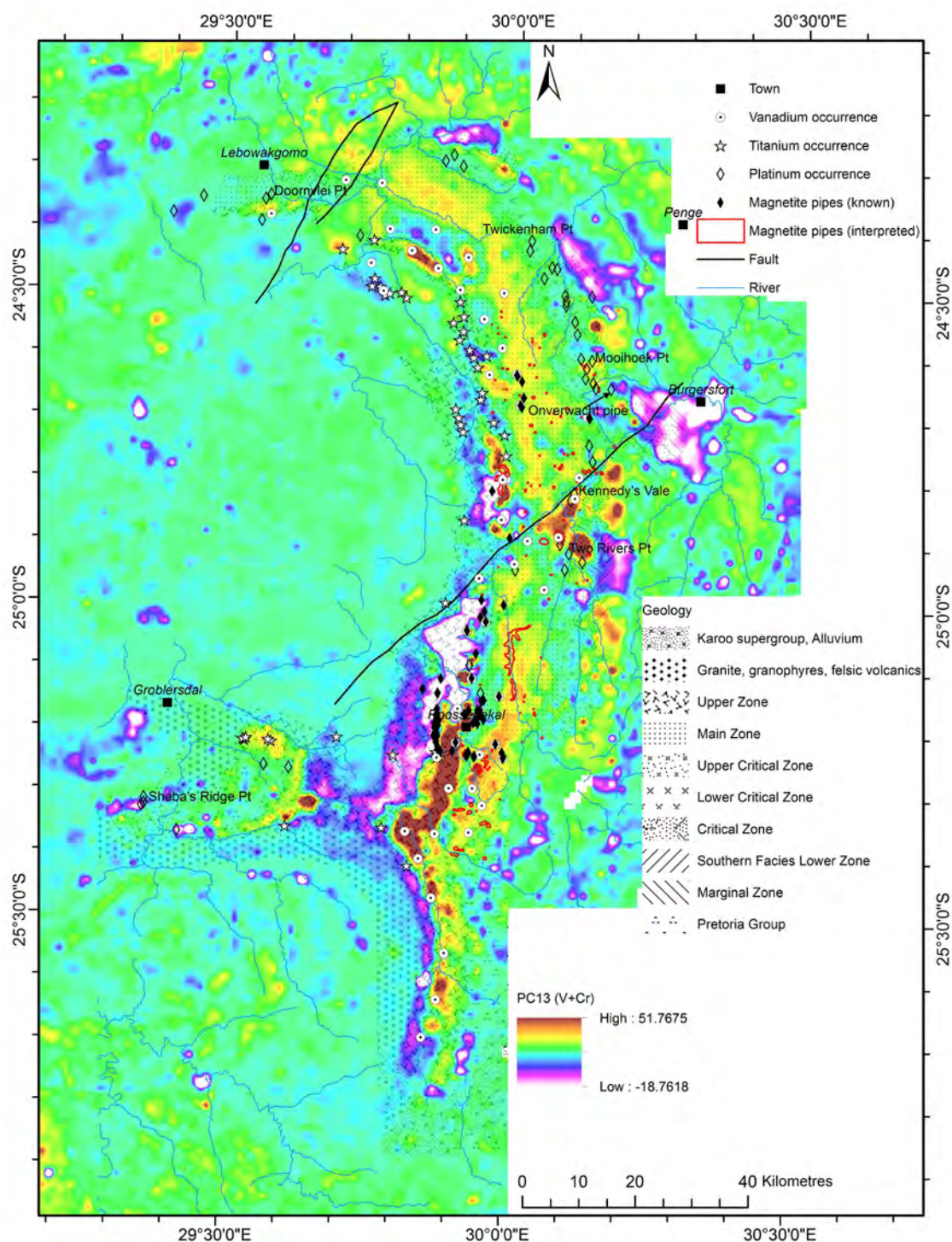


Figure 15: Distribution of factor scores of PC13 map produced from rescaled point data outlining magnetite layers and some pipes (brown colour) and a belt of pipes within the Main Zone of the Bushveld Complex.



#### 4.3.1.7. Cape Basin Mapping Project

**Background and purpose:** The main objective of the Cape Basin Mapping Project is geological mapping to support the identification of potentially undiscovered hydrogeological resources and geoheritage sites.

The project is centred on four major themes: geological mapping and characterisation, hydrogeology, economic geology and geo/palaeoheritage. This project was focused on the surrounds of the town of Clanwilliam, starting with an investigation of two areas represented by 1:50 000-scale geological map sheets in this region. The area is located within the highly fractured 'western arm' of the Cape Fold Belt and is typified by rocks of the Cape Supergroup, with minor outcrops of Cretaceous-aged dolerite intrusive rocks of the False Bay Suite and local Cenozoic-aged deposits. Preliminary datasets that have been acquired include structural and bedding data, as well as an update of most known water points and economic geology points.

**Achievements and highlights:** In the year under review, the Cape Basin Mapping Project made two new exciting discoveries, bringing to light the possible first (and oldest) evidence from Africa of life moving onto land and the discovery of an important glaciogene Ordovician-aged site associated with trace fossils. Both discoveries are important contributions to the body of geoscience knowledge.

Two large northwest-trending normal faults have been identified in the study area. These are: the Olifants River and Wupperthal grabens and the north Cederberg horst, which form a prominent topographic high separating both low-lying grabens. These faults appear bounded to a topographic high horst feature in the northern Cederberg. This horst is also associated with a series of concentric radial fracture sets. These features have not been indicated on previous geological maps. It is suggested that a possible pre-Cape topographic high, or subcropping indenter, may be responsible for these structural features. A remote sensing exercise using newly acquired ASTER and Sentinel-2 data is underway in the search for any potential hydrogeological and mineral resources, as these resources are known to be structurally and lithologically controlled in the study area. A sound understanding of the structural geology of this water-stressed area and surrounds is vital to understanding its hydrogeology and the migration of aquifer waters through time. This may lead to future groundwater discoveries in the area, and the development of better groundwater management plans and policies. The results from this preliminary study support the fractured aquifer model for the Table Mountain Group aquifer and show the efficacy of this tool in identifying lineaments that accommodate water, leading to a better characterisation of the Table Mountain Group aquifer in this area.

## 4.4. OFFSHORE GEOSCIENCE PROGRAMMES

### 4.4.1. Marine Geoscience Programme

**Background and purpose:** The great importance of the marine environment is that it is recognised as part of the Operation Phakisa – oceans economy. South Africa's offshore marine territories encompass 1.54 million km<sup>2</sup> to the outer limit of the 200 nautical miles (370 km) exclusive economic zone. An additional 1.87 million km<sup>2</sup> will be added if South Africa's claim to an extended continental shelf is endorsed by the United Nations. In comparison, the country's mainland area totals only 1.22 million km<sup>2</sup>. The South African offshore territory is, therefore, the next frontier for exploration, as this area is too vast to ignore. Internationally, there has been an increasing realisation that the state's offshore territory is an important strategic resource. The aims of this project are to enhance economic growth through research on the coast and continental shelf of South Africa and, in turn, to boost the Blue Economy as well as to effectively plan adaptive strategies to address threats to infrastructure and the coastal community; tighter constraints on the rates of sea level rise are vital.

**Achievements and highlights:** The CGS uses sonar systems mounted on marine vessels to map the seafloor, which aims is to achieve 100% coverage and acquisition of high-resolution data. With sensors mounted on both small and large marine vessels, the CGS uses a full suite of the best current instrumentation technology, which includes multibeam echosounders, side-scan sonar, a marine magnetometer, boomer sub-bottom profiler, pinger sub-bottom profiler and a sound-velocity profiler. The Marine Geoscience Programme aims to create the 'real map' of South Africa, which encompasses the onshore and the offshore areas.

To this end, the CGS continued to maintain and test equipment, participated in field surveys along coasts, participated in and contributed to matters related to ocean governance (specifically the National Working Group on Marine Spatial Planning and intersessional work on the International Seabed Authority) and continued with knowledge generation through research investigations. Several peer-reviewed articles were published that focus on the following themes: the submerged palaeolandscape of the Palaeo-Agulhas Plain (Figure 16), the marine geology and structural evolution of Table Bay, trace fossils of animal footprints preserved in cemented dunes of the Cape south coast, a correlation of high-resolution shellfish sequences from archaeological sites to palaeocoastlines as a prediction tool of beach type and intertidal assemblages, and a seismic stratigraphy for the Agulhas Bank. Highlights of this work are the discovery that drawings people made on sandy beaches in the Late Pleistocene are preserved in the Quaternary rock record (Figure 17), and a line of evidence to explain why the Cape Fynbos Strandveld vegetation contains such diverse species richness, related to an expansive now-drowned ecosystem, only a tiny fraction of which is currently exposed.

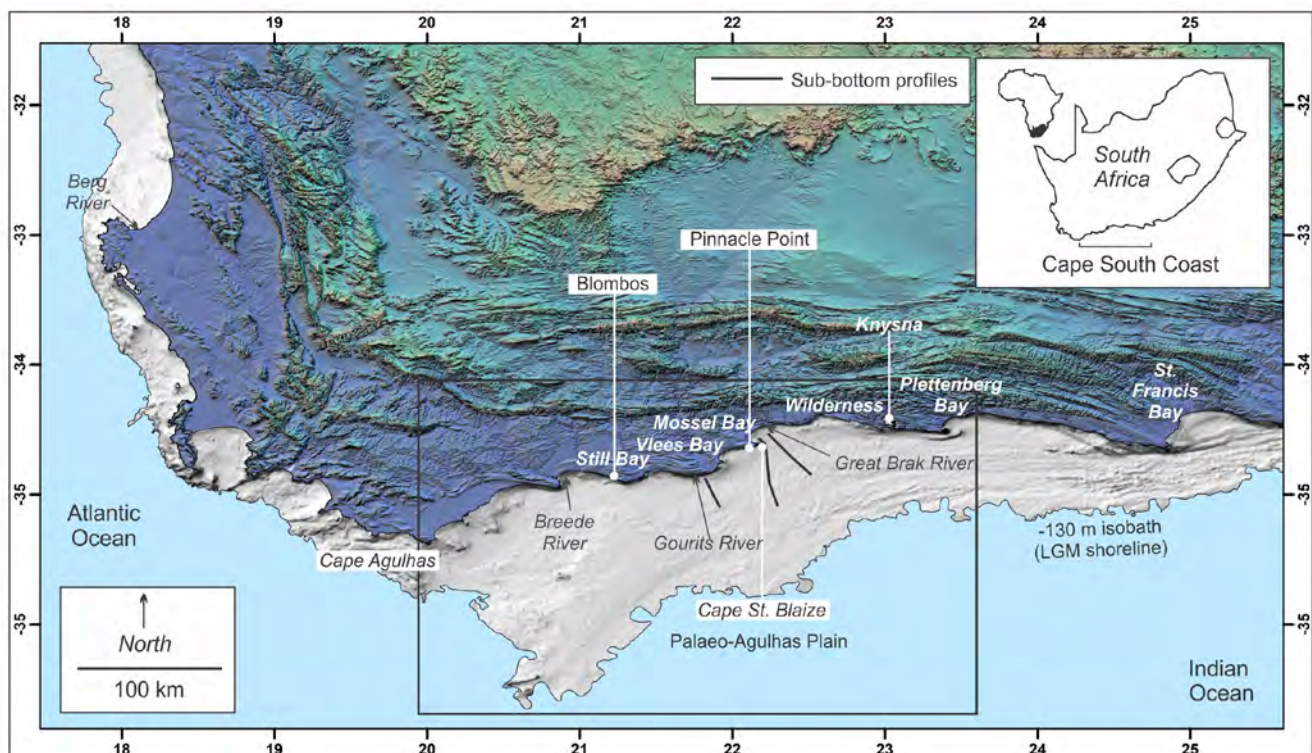


Figure 16: Last Glacial Maximum exposure of the Palaeo-Agulhas Plain (the submerged landscape on the Cape south coast), with terrestrial background data from the SRTM 90m grid and continental shelf bathymetry from de Wet (2013).



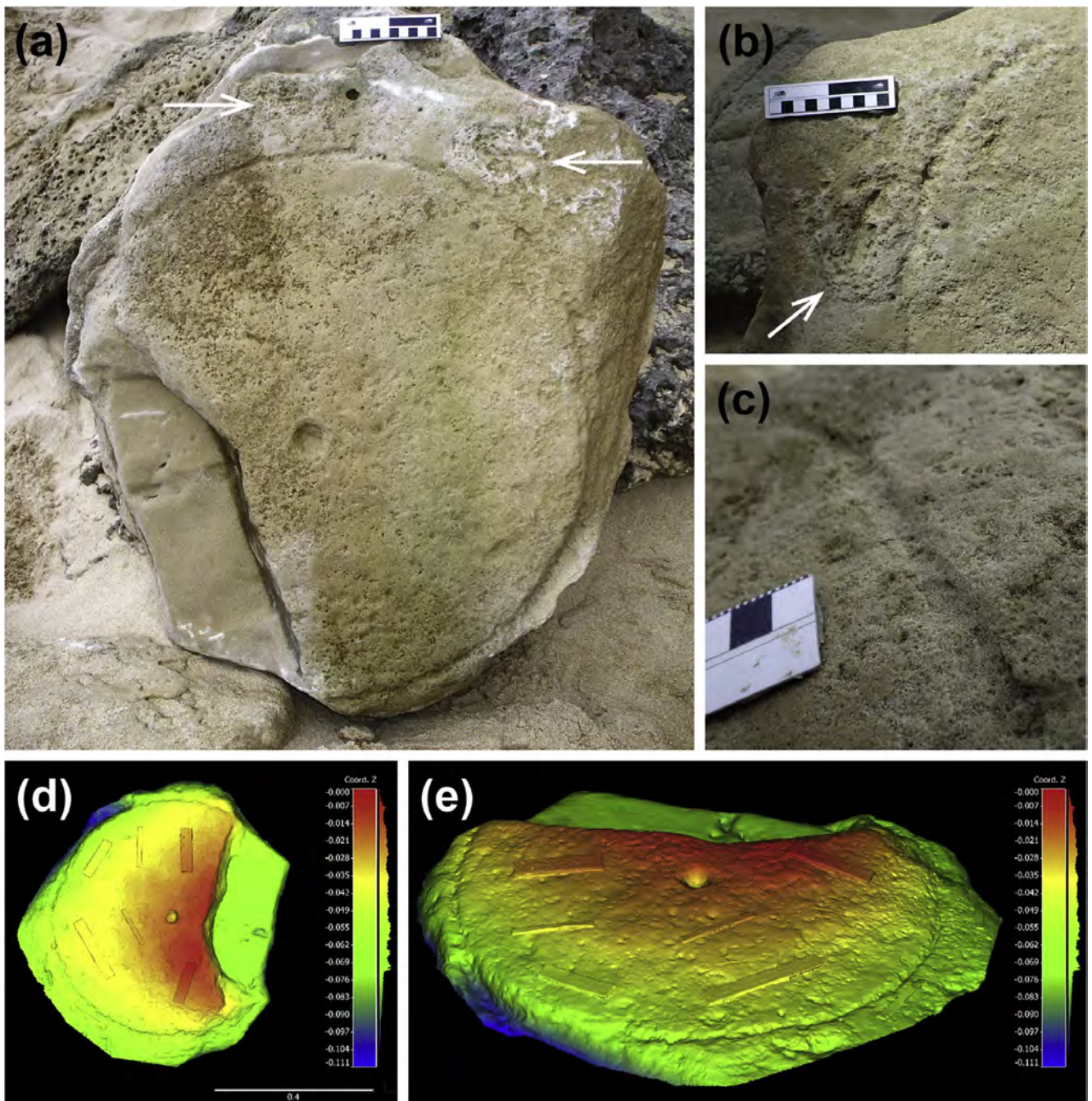


Figure 17: A circular groove feature with a central depression, which was discovered near Wilderness: (a–c) Arrows indicating possible knee impressions; scale bar = 10cm; (d, e) photogrammetry colour mesh of A1, using 70 images. Photos were taken an average 0.465m from the surface.



# GEOSCIENCE FOR INFRASTRUCTURE AND LAND USE



**Landslides triggered by flash flooding in lower-lying areas in the eThekweni Metropolitan area (Durban and surroundings)**

The 'Geoscience for infrastructure and land use' theme provides a systematic geoscience reconnaissance mapping. The geoscience information is analysed to identify safe and sustainable human settlement, sustainable land-use and infrastructure development. The Constitution of South Africa and the Geoscience Amendment Act, stating in Section 5.1(eA), holds that the CGS must 'review and evaluate all geotechnical reports in respect of geohazards that may affect all infrastructure development at prescribed tariffs'.

In line with NDP Vision 2030, the primary objectives of the 'Geoscience for infrastructure and land use' theme are effective infrastructure and land development. A number of developmental acts and agencies, such as the Municipal Infrastructure Support Agent, Disaster Management Act, Spatial Planning and Land Use Management Act and Critical Infrastructure Bill, also create an enabling environment for the theme to support the national imperatives noted above. This theme not only provides geoscience information and input for infrastructure development, but it supports South Africa's economic development of mineral, upstream petroleum (i.e. oil and gas) and water resources. South Africa's natural hazards include high risk of subsidence in dolomitic terrains, and earthquakes and floods, all of which may have a significant impact on the economy, property and key infrastructure developments. The CGS strengthens the nation's ability to manage the impact of natural hazards by collecting geoscience information and building early warning systems that can reduce hazard impact.



## 4.5. NATIONAL DOLOMITIC LAND LAYER

**Background and purpose:** According to the Geoscience Amendment Act No 16 of 2010, the CGS serves as the national custodian of all geotechnical information with a view to compiling a comprehensive, integrated collection of dolomite and geotechnical data which is easily accessible to the general public and government institutions. In addition to that, this Act requires that an opinion, from a geo-hazard (dolomite) perspective, be obtained from CGS on the suitability of the site for a specific development. The role of the CGS is to provide informed science-based policy in the field of geohazards and geotechnical assessment. This advisory role is critical to the state authorities and general public to ensure safe development on dolomitic land. The key objectives of this mandatory project are to guide local authorities (municipalities) and the National Home Builders Regulatory Council (NHBR) on the safe, sustainable and judicious development of dolomitic land as well as assist the general public on risk management, vigilance and pro-active measures required in terms of the Code of Practice to limit the effect of geohazards related to dolomitic land.

The dolomitic land layer was updated across the Transvaal and Griqualand West basins using available published geological maps (at 1:50 000 and 1:250 000 scales) to determine the inferred (but probable) dolomitic land layer and areas anticipated to be underlain by dolomitic bedrock at relatively shallow depths (i.e. up to 100m), albeit covered with surficial deposits. During the 2019/2020 financial year, information from 11 735 boreholes across 35 demarcated areas were used in refining the extent of dolomitic land. The boreholes were classified in terms of inherent hazard classes using borehole information such as depth to dolomite bedrock, end of hole material, occurrence, dolomite residuum and wad, cavities, depth to groundwater and preliminary inherent hazard classes. Some 1 714 boreholes have been classified and the dolomitic land layer adjusted accordingly. An extract of the areas updated during the current financial year is indicated in Figure 18.

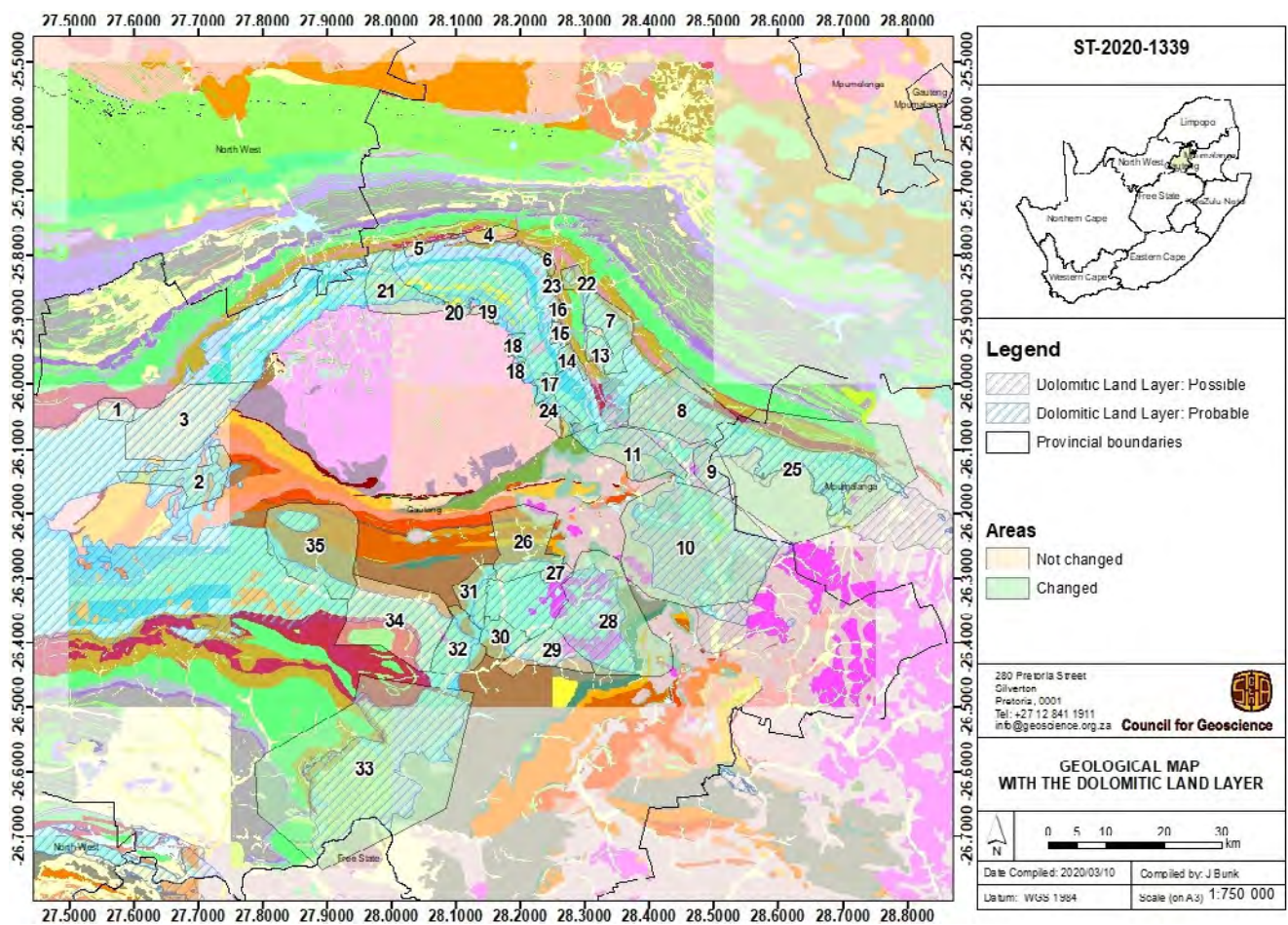


Figure 18: Dolomitic land layer areas updated across Gauteng in 2019/2020.

Three case study areas were selected across the country to compile preliminary 3D geological models of the extent of dolomitic land using available drill-hole and regional geophysical information. These areas cover the West Rand, East Rand in Gauteng and Northern Cape Provinces (Danielskuil and Kuruman), and studies will continue into the following financial year.

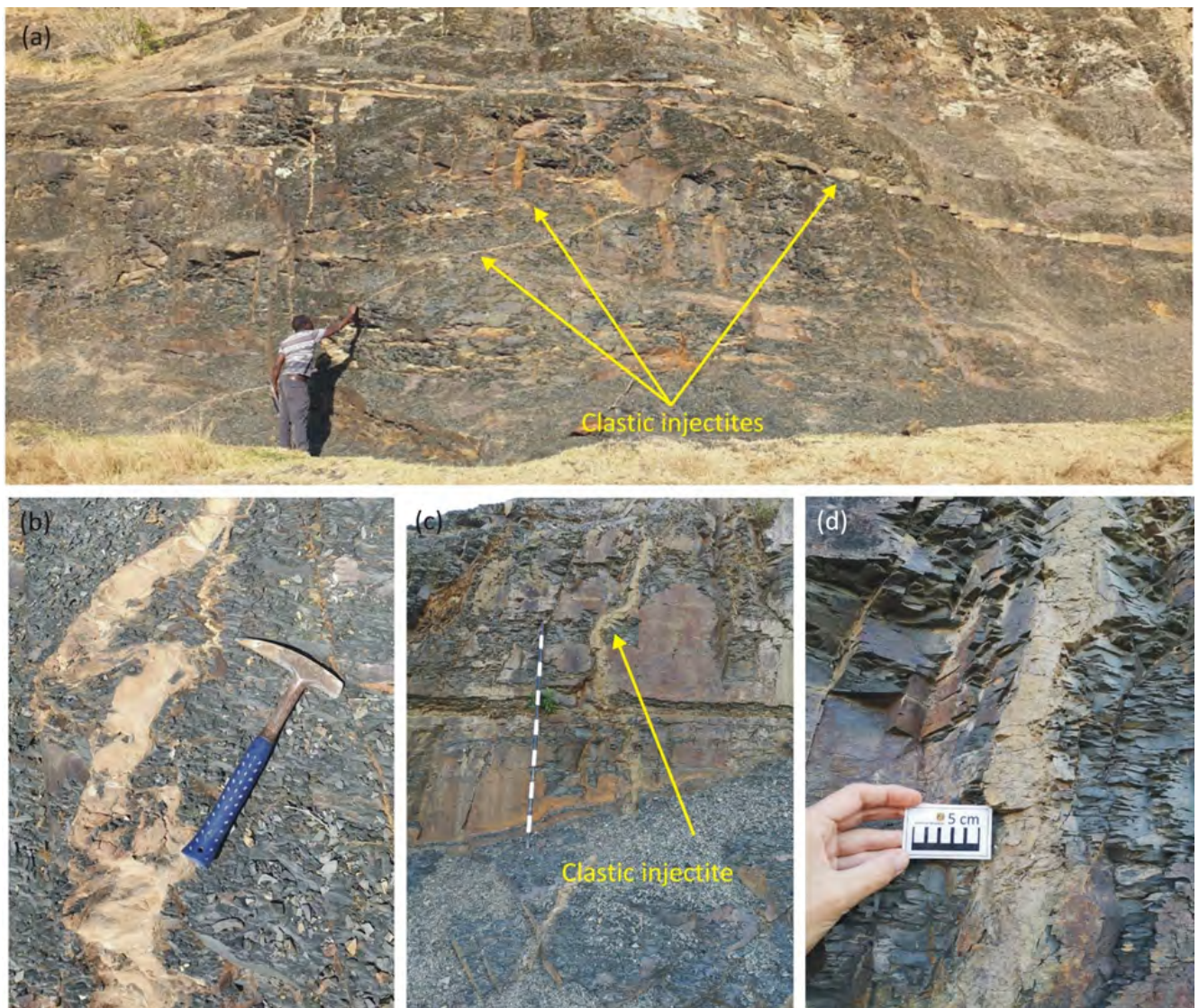
## 4.6. EASTERN CAPE MAPPING PROJECT

**Background and purpose:** The Eastern Cape Mapping Project captures, analyses and develops fundamental geoscience data within the Mthatha area and surroundings. The study area is situated in a historically underdeveloped province within the bounds of the OR Tambo District Municipality, one of South Africa's rural poverty nodes. Research undertaken in the area supports sustainable economic development and assists decision-makers and stakeholders to make informed choices when undertaking land use planning, monitoring, conservation and environmental management of areas on which the livelihoods of local communities depend. To resolve some of the more pressing geoscientific challenges in the area, the project focuses on three specific research goals: land degradation and erosion rates of hazardous, easily erodible soils; geological and geographical characteristics that influence the groundwater potential, and an assessment and review of the area's mineral potential.

**Achievements and highlights:** In 2019/2020 financial year, this project addressed the region's extreme state of land degradation. Specifically, 4780 erosional features were identified and mapped, a detailed calculation of land currently under erosive gullying was undertaken, rills and sheet erosion (average of 1.63% or 6 009ha) were described, detailed lithostratigraphic profiling of erosive sediments (nine discrete palaeosols) was done, a local and regional investigation into anthropogenic and natural drivers contributing to the development of erosional features was undertaken, and initial rates of erosion were calculated (0.46m/y in the last 81 years). Optically stimulated luminescence sampling of sediments will assist in establishing a record of landscape evolution and determining the timing of erosional gullies and rates of erosion. These results are crucial to understanding the relative roles that natural, climatic and/or human activities play in the development of erosional features.

Assessment of existing data was instrumental in partially reclassifying various parameters (aquifer classification, spring localities/association, groundwater yield, land use, slope aspect, slope angles, dyke density and Quaternary catchment areas) considered to govern groundwater occurrences locally for use in a geographic information system-based analytical hierarchy process. In the coming financial year, the findings will be integrated into a weighted overlay modelling system to produce a groundwater potential map of the area. Initial analysis of the data shows good groundwater potential in areas exhibiting a high frequency of dyke intersections. Field mapping and a desktop review of the economic geology of the area have identified several new mineral occurrences, including clays and aggregate material. Newly observed geological features include an array of clastic dykes denoting the occurrence of fluidisation, as shown in Figure 19. This project produced eight 1:50 000 scale geological maps.





*Figure 19: Clastic injectites in shale of the Eccra Group: (a) Numerous injectite sills and dykes intruded into shales of possible Collingham Formation; (b) a thin 10cm thick contorted clastic dyke; (c and d) subvertical 5–10cm thick clastic dyke intruded into Eccra Group shales.*

The results from machine learning and fuzzy logic technics in the Makana block produced an output with values ranging from 0.024 to 0.168 (Figure 20). The results were categorised into four groups (high, moderate, low and very low), indicating the groundwater potential zones of the study area. The high fuzzy output values indicate a high potential for groundwater, based on the datasets used, and the lowest values indicate the least prospective areas in terms of groundwater potential. The most prospective groundwater areas are located close to major rivers. These areas are characterised by structural density, favourable geological conditions, predominantly arenaceous material and an aquifer yield within or above a range of 0.5L/s to 2L/s. Both the groundwater potential map and the hydrogeological model will be used to generate the drilling zones.

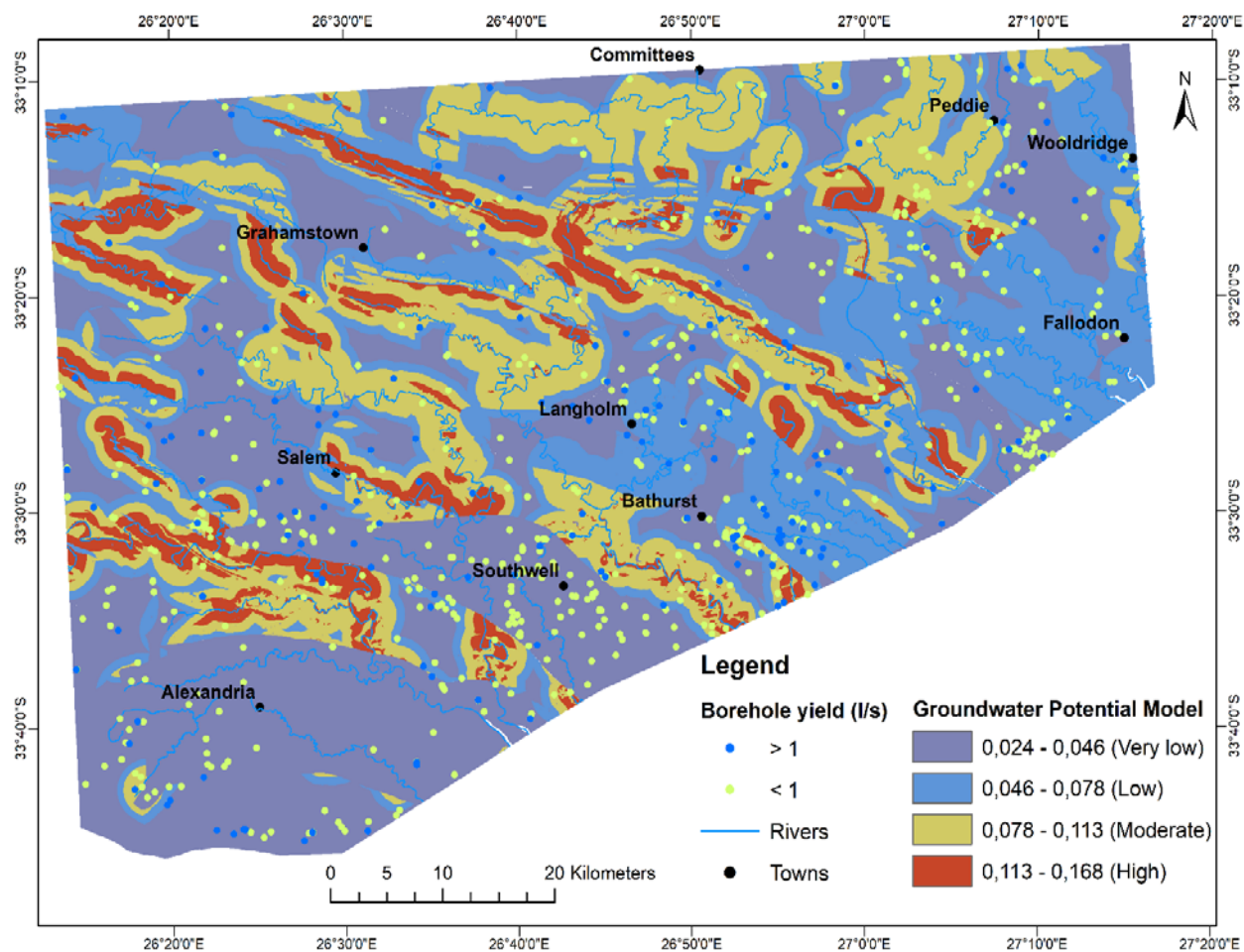


Figure 20: Groundwater potential map of the Makana block in the Eastern Cape, highlighting areas of high and low potential for groundwater.



# GEOSCIENCE FOR HEALTH, GROUNDWATER AND THE ENVIRONMENT



**Air percussion drilling for water supply in Randjiesfontein, Johannesburg**

The South African mining industry is a relatively mature sector that has boosted the economy, but that, to some degree, has left environmental legacy challenges in need of urgent attention. The social and economic wellbeing of communities is related directly to the health of the environment in which they live, produce their food and work. The focus of mining worldwide is shifting towards exploration and exploitation, with great emphasis on environmental stewardship. As a water-scarce country, South Africa faces significant challenges in availability and provision of water and a limited understanding of water resources. The development of communities, agriculture, and mineral and energy resources depends on availability and knowledge of water resources.

The 'Geoscience for health, groundwater and environment' theme is designed to promote environmental stewardship particularly in areas prone to contamination because of activities including mineral exploration and exploitation. Under this theme, sources of groundwater are identified and delineated for communities, industries and agriculture. Interventions such as artificial recharge will also be considered.

## 4.7. MANAGEMENT OF STATE CONTINGENT LIABILITIES FOR DERELICT AND OWNERLESS MINES IN SOUTH AFRICA

**Background and purpose:** The primary aim of this project is to develop measures to minimise the impacts of derelict and ownerless mines with the outcome of identifying, classifying, closing and rehabilitating such mines. This can be translated to, inter alia, the reduction of the contingent liability of the state by sustainable sealing and rehabilitation of mine openings that pose a threat to environmental safety, and ground stability assessments in shallow undermined areas.

**Achievements and highlights:** In the year under review, closure of 21 mine openings was completed. Sixteen mine openings were finalised in the Tugela area, while five of the nine mine openings for the Penge area were completed. Construction work started for the closure of the remaining four mine openings, located in the Ekurhuleni municipal area – these will be closed in the coming year. Furthermore, ground stability assessments on shallow undermined locations in the Gopane area in the North West Province, were completed. Geotechnical investigations in the area were supported by applying ground geophysical surveys, remote sensing, geohydrology and percussion, and rotary core drilling. Activities including ground geophysics, LiDAR and a geohydrological survey were previously completed. The survey results are being integrated for the creation of a ground stability assessment map of the area.

The CGS drilled eight percussion boreholes as part of its investigation across the Gopane area. Water quality results from all boreholes show the domination of calcium, magnesium and bicarbonate as indicated in the piper diagram depicted in Figure 21.

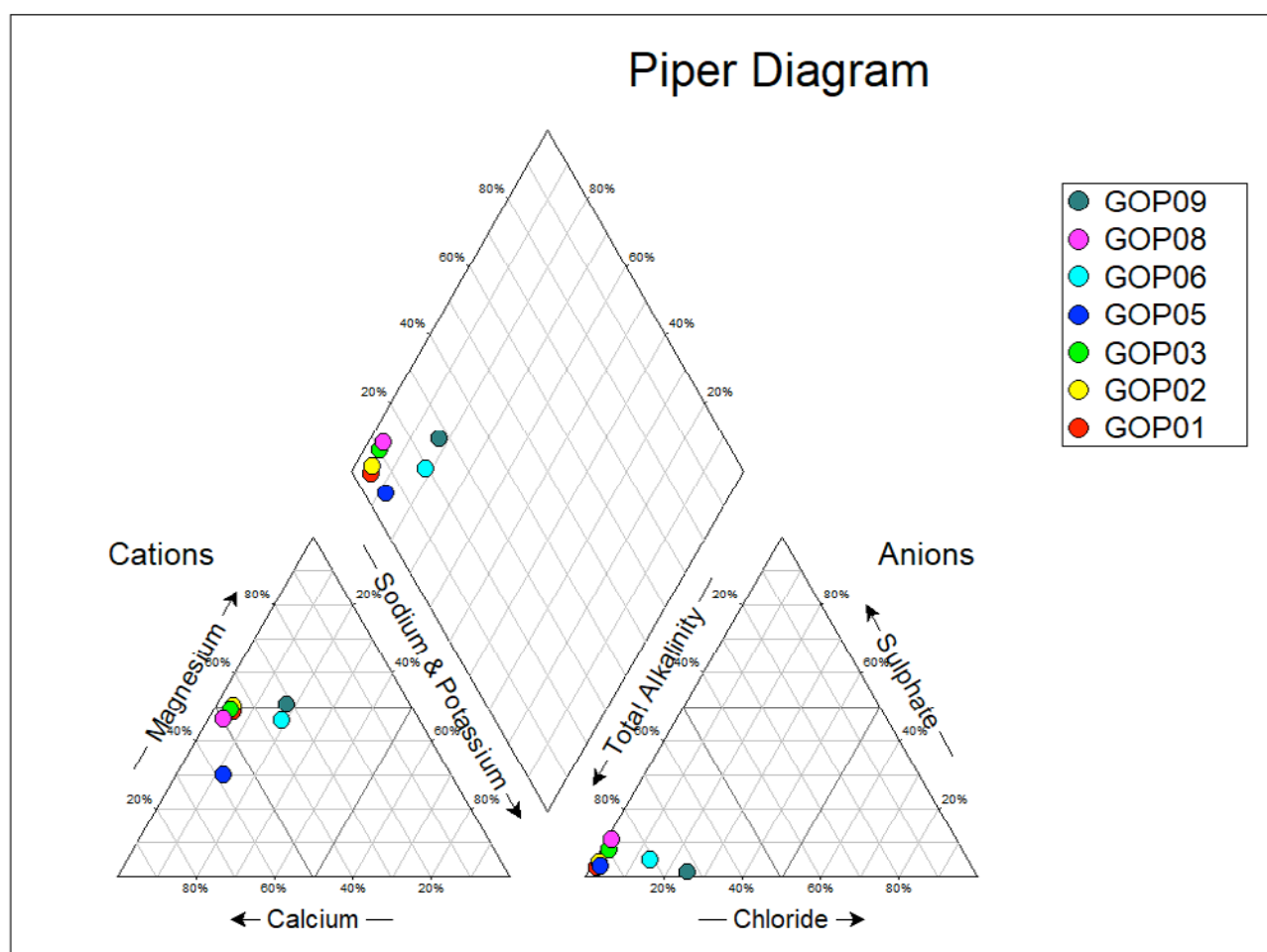


Figure 21: Piper diagram showing the water quality in the boreholes drilled in Gopane.



## 4.8. MINE ENVIRONMENT AND WATER MANAGEMENT PROGRAMME

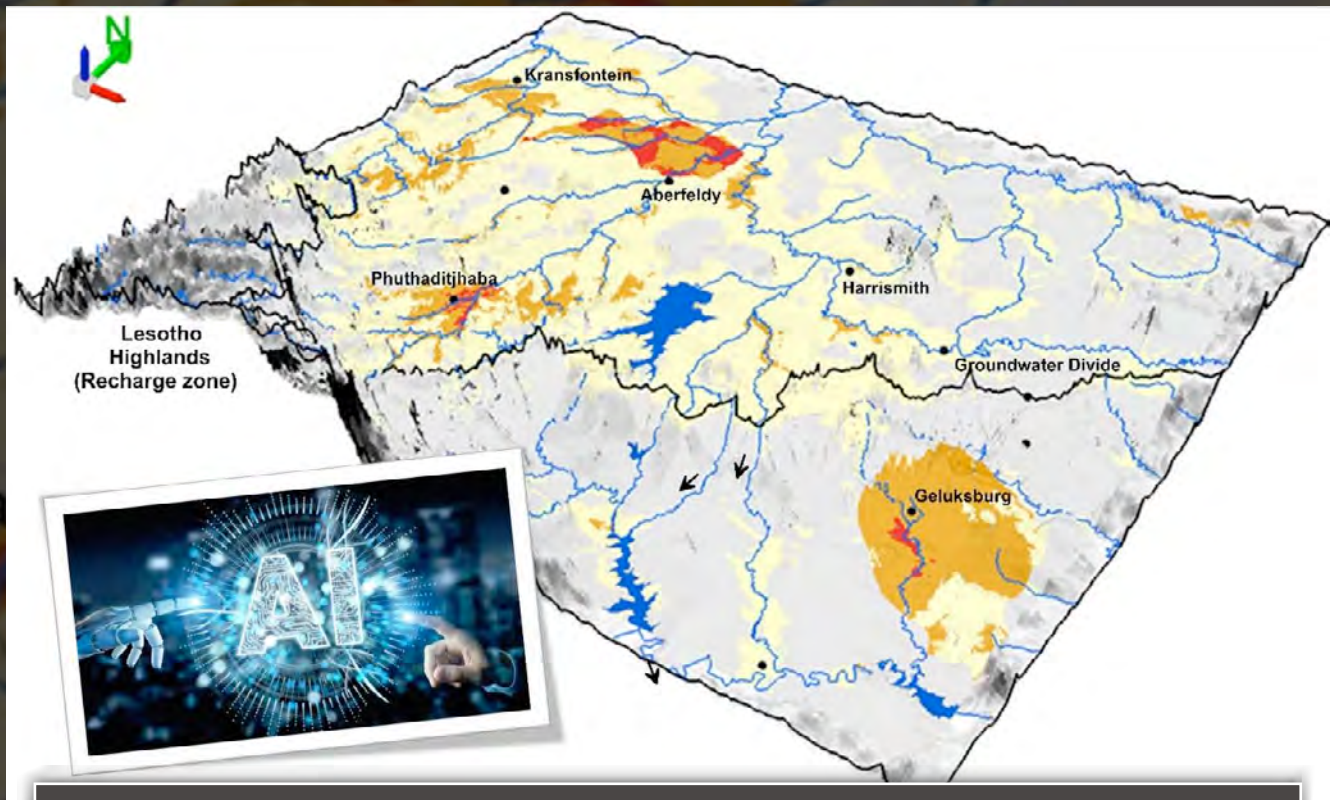
**Background and purpose:** The focus of the Mine Environment and Water Management Programme (MEWMP) is the identification and reduction of ingress of water into the underground workings of the gold mines of the Witwatersrand, the development and pilot implementation of passive mine water treatment technologies in the gold and coal mining sites in Mpumalanga and Gauteng Provinces to treat environmental challenges. The project also investigates the possibility of the coexistence of mining with biodiversity conservation and the maintenance of water security via a decision support tool and supports the environmental regulations of coastal and marine mining. This project will also assist in promoting sustainability in future mining activities.

**Achievements and highlights:** This 2019/2020 financial year, this project reviewed environmental critical levels applied at mine water pumping stations. The review results showed potential to relax the levels, which will reduce pumping rates and costs. The construction of the long-awaited Van Ryn Canal, which aims to reduce the ingress of water into the Witwatersrand started in the year under review. Canalisation activities are ongoing - the water has already been diverted away from the previously identified ingress point and no longer feeds into the underground voids. The consolidation and production of ingress risk points into three regional risk maps have been completed. The augmentation of the decision-making tool for coexistence of mining and the environment has highlighted discrepancies in the classification of some protected areas. More importantly, a case study was done as proof of concept and has demonstrated the validity of the tool. Technical knowledge from this task contributed to the development of the 'Environmental proactive solutions and coexistence of mining and environment guideline' of the DMRE. Finally, the technical contribution to the review paper on acid mine water through the team of experts demonstrated the continued relevance and impact of the project to the greater pursuit of mine water solutions.



Figure 22: Construction activities at the Van Ryn Canal.

## GEOSCIENCE INNOVATION



**Groundwater potential map of Maluti-a-Phofung area in the Free State. Map produced using an integration of multi-geoscience datasets and artificial intelligence algorithms.**

The CGS's investment in innovation will drive and enable high-impact science, leading to more accurate and robust insights, and better decisions to support the CGS mission.

The 'Geoscience innovation' theme fosters the conversion of ideas into actionable solutions meant to solve some of the country's societal challenges, such as water scarcity, poverty, geohazards and others. Across a wide variety of geoscience fields datasets (geology, geophysics, geochemistry etc.), data are being collected and accumulated at a dramatic pace, creating an urgent need for a new generation of computational theories and tools to assist humans in extracting useful information (knowledge) from the rapidly growing volumes of digital data. The 'Geoscience innovation' theme is also looking at the application of modern technologies such as artificial intelligence in knowledge extraction. This would improve speed, efficiency and accuracy in the knowledge extraction process.



## 4.9. USE OF BUSHVELD MINE TAILINGS FOR THE SYNTHESIS OF NANOSIZED MATERIALS

**Background and purpose:** The purpose of this project is to investigate the suitability of plagioclase-rich Bushveld slimes for the synthesis of calcium aluminate ( $\text{CaAl}_2\text{O}_4$ ) nanomaterials.  $\text{CaAl}_2\text{O}_4$  could be used to accelerate the strength development of geopolymers, a building material that represents a potential alternative to traditional liner systems for the cost-effective prevention of the uncontrolled release of toxic leachates from mine stockpiles into the environment, including the local surface and groundwater.

**Achievements and highlights:** The year under review, the efficiency with which calcium and aluminium can be extracted from slimes was investigated using four different extraction methods: Direct acid leaching, thermochemical treatment, low temperature sulphation, and microwave-assisted leaching. Direct acid leaching was found to be the most efficient process, with up to 88% of plagioclase having been dissolved to solution during acid leaching. However, iron and magnesium were also coextracted to solution, which inhibited the formation of pure  $\text{CaAl}_2\text{O}_4$  mineral phases. This year, the new formulated extraction methodology was successfully complemented. However, in order to fully synthesise the nanomaterials, a purification process for the leachates, which will help to improve the purity levels of synthesised nanoparticles will be investigated and implemented in the coming financial year.

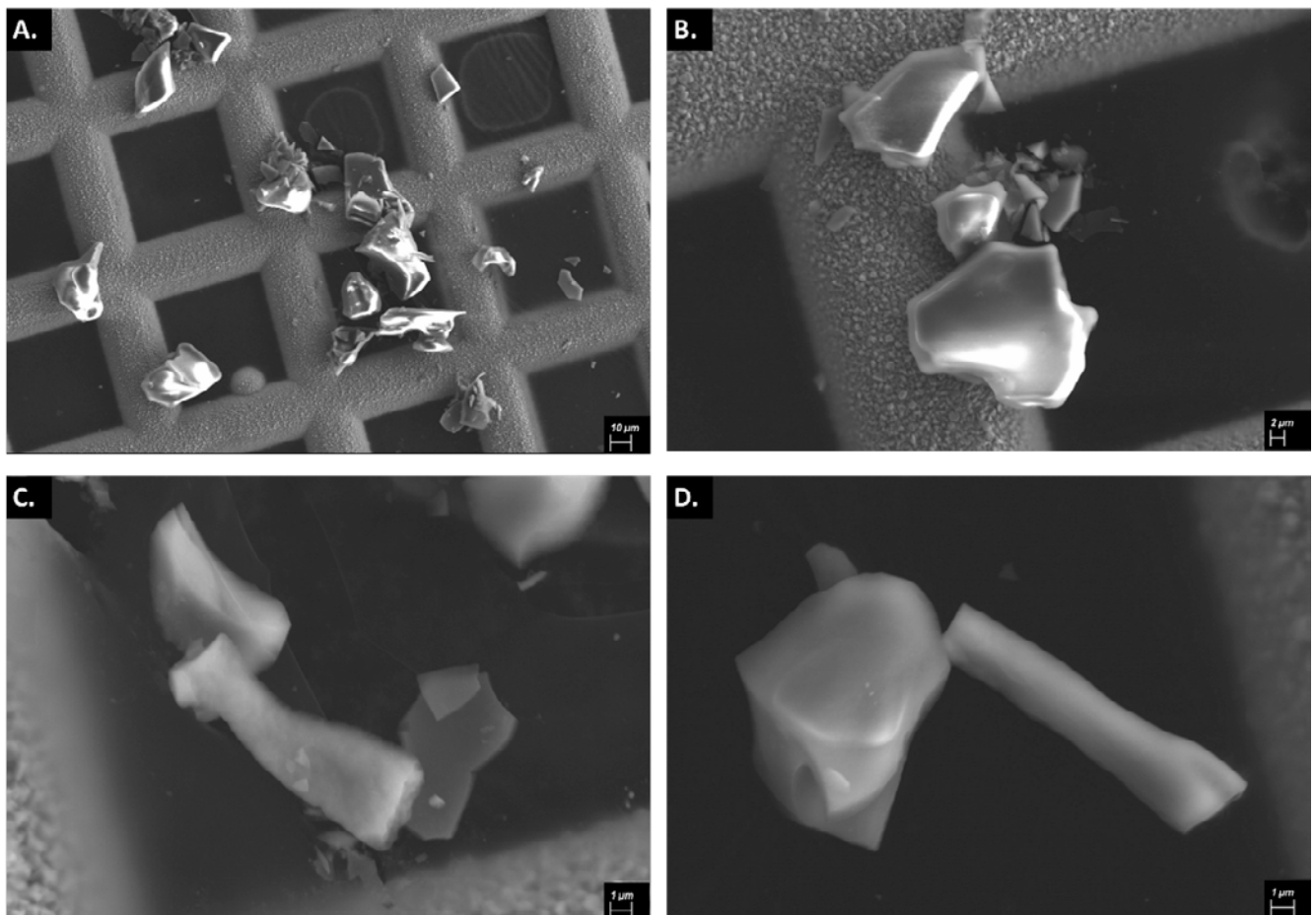


Figure 23: Agglomerated nanoparticles synthesised via the combustion method using commercial reagents.

## 4.10. PYTHON GEOPHYSICAL MODELLING AND INTERPRETATION PROJECT

**Background and purpose:** The Python Geophysical Modelling and Interpretation (PyGMI) Project provides innovative geoscience data modelling and interpretation solutions. The solutions are made available at no cost to the wider geoscience community for self-use locally and internationally. PyGMI incorporates various interpretation tools, including processing capability for seismic, magnetotelluric, gravity and magnetic data, and has been designed for ease of use, with minimum training required.

**Achievements and highlights:** This year, the PyGMI improved the ability to run machine learning algorithms, including supervised and unsupervised classification of features. This is an additional feature of PyGMI (Figure 24). Additionally, PyGMI has modules specifically for developing 3D geological and geophysical models, including borehole data processing.

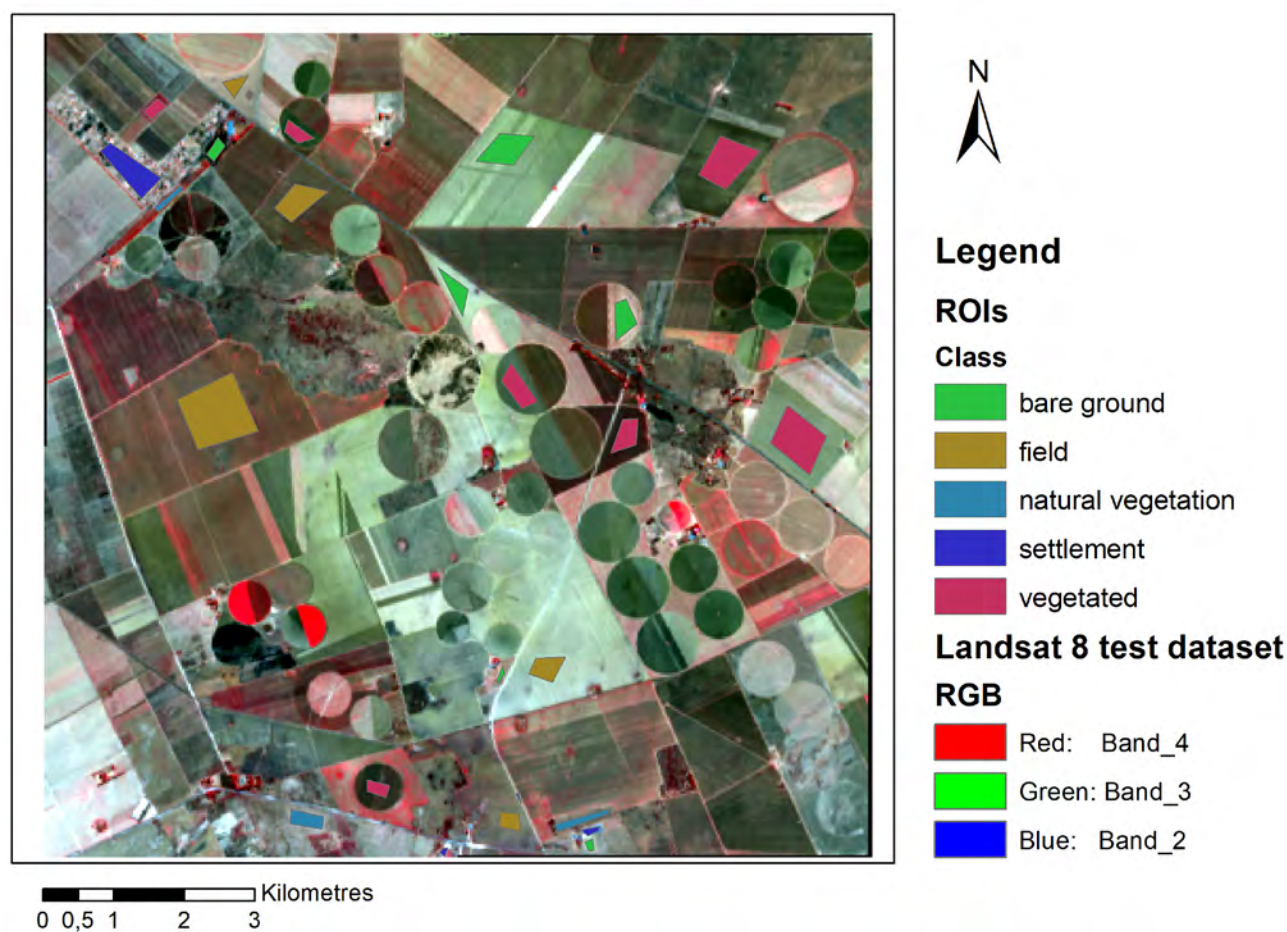


Figure 24: An example of a test dataset and the regions of interest that contain the training classes for the classification analysis.

#### 4.11. LONGER-TERM FEASIBILITY STUDY OF IN-SITU IRON AND MANGANESE REMOVAL BY OZONATION: A NOVEL APPROACH TO PROTECTING GROUNDWATER SUPPLY SCHEMES

**Background and purpose:** This project aims to permanently and cost-effectively prevent Fe- and Mn-related clogging in water supply infrastructure experienced in South Africa by means of in-situ Fe and Mn removal through ozonation treatment. The CGS is collaborating with the Water Research Commission on a study to resolve borehole clogging due to Fe and Mn biofouling.

**Achievements and highlights:** The CGS formulated and patented a methodology to resolve borehole clogging due to Fe and Mn biofouling. This is a common and significant challenge in primary and secondary aquifers in South Africa. This project is a continuation of previous work conducted by CGS at the same location in Atlantis's Witzand wellfield, which yielded promising results in applicability of the technology (patented by CGS) in South Africa. This year, the CGS piloted this novel approach of longer-term removal of in-situ Fe and Mn by ozonation to protecting groundwater supply schemes. To achieve the main objective, full production scale that Fe- and Mn-related clogging problems experienced in South Africa can be prevented permanently and cost-effectively by in-situ ozonation treatment. To date, the treatment plant has been assembled and injection is underway. A telemetry system designed for the project to collect, store and view data offsite has been developed (Figure 25).

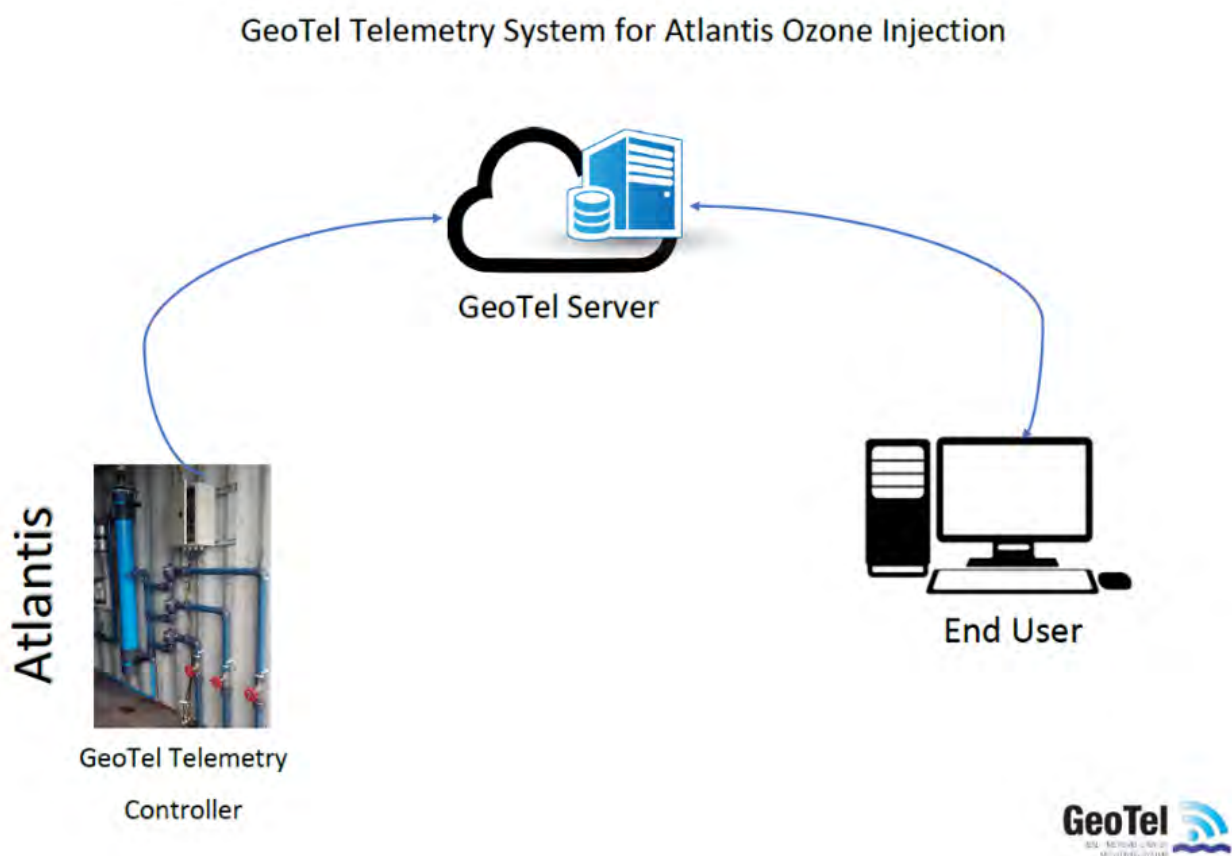


Figure 25: Remote monitoring of injection data is stored using a telemetry system designed for the project.

## 4.12. APPLICATION OF ARTIFICIAL INTELLIGENCE IN GEOSCIENCE

### (a) Development of an automation system for hazard classification of boreholes drilled in dolomitic land

**Background and purpose:** This project assesses sinkhole-prone areas for judicious land use through the application of artificial intelligence. This predictive ability is critical for the management and development of key infrastructure in the nation.

Centuries of urbanisation and urban expansion imply that communities have already settled in areas that may be deemed unsuitable for development due to the presence of sinkhole hazards. Sinkholes are a geological hazard that manifest as depressions on the ground surface, often due to the dissolution or collapse of surface sediments into bedrock cavities. Sinkholes are common in karst and evaporite terrains (a geological environment where bedrock can be dissolved by slightly acidic groundwater such as limestone, dolomite and gypsum). Sinkholes occur in various sizes, shapes (bowl shaped or vertical wall) and depths.

The development of a sinkhole can be very gradual, with continuous and gradual depression of the surface, which can develop into a catastrophic event. Sinkholes and associated subsidence can cause damage to infrastructure and/or loss of life in areas prone to sinkhole formation. Sinkhole events are very difficult to predict, but there is often precursory ground deformation months or even years before ultimate collapse.

Space-borne radar interferometry, together with knowledge gained from thousands of boreholes drilled in dolomitic terrain, can be used in the design of an effective early warning sinkhole system. Predictions derived from the borehole information will assume that the sinkhole phenomena in the future will form in similar conditions as sinkholes in the past. Datasets for the development of a pre-warning system are too big to be efficiently analysed, but other approaches can be used. Artificial intelligence, in particular the fuzzy expert and machine learning systems, will be used for the development of a pre-warning system using geotechnical information and space-borne radar interferometry data. All these datasets will be used in the development of a hybrid system, which will be combined with automated results from the radar interferometry data analysis.

**Achievements and highlights:** Machine learning algorithms were used to characterize and classify areas of possible dolomite-linked subsidence in the West Rand. The results of this work will be used to advise municipalities on their infrastructure development plans in the long term.

### (b) Regional groundwater potential mapping using a fuzzy inference system

**Background and purpose:** This project maps areas of high potential of groundwater, using artificial intelligence. The resultant models assist in delineating areas to be drilled to supply water-scarce communities with much-needed water.

Machine learning techniques are increasingly becoming widely applied in the search for water resources. The CGS adopts an integrated approach to developing groundwater potential maps (Figure 26). The CGS methodology incorporated nine different data sources (aquifer types, topographic slope, lineament density, drainage density, land use/land cover, distance to lineaments, distance to streams, potential recharge and soil clay content) in a fuzzy inference system that used in-house-developed software to create a regional groundwater potential map for the northern Free State. The method proved very effective, minimising time, labour and costs required to identify areas with high groundwater potential, and should aid local authorities in land-use planning and groundwater resources management.

**Achievements and highlights:** This part of the project completed the development of artificial intelligence methodologies on groundwater mapping. This methodology was later used for the development of the groundwater potential map in the Maluti Project.



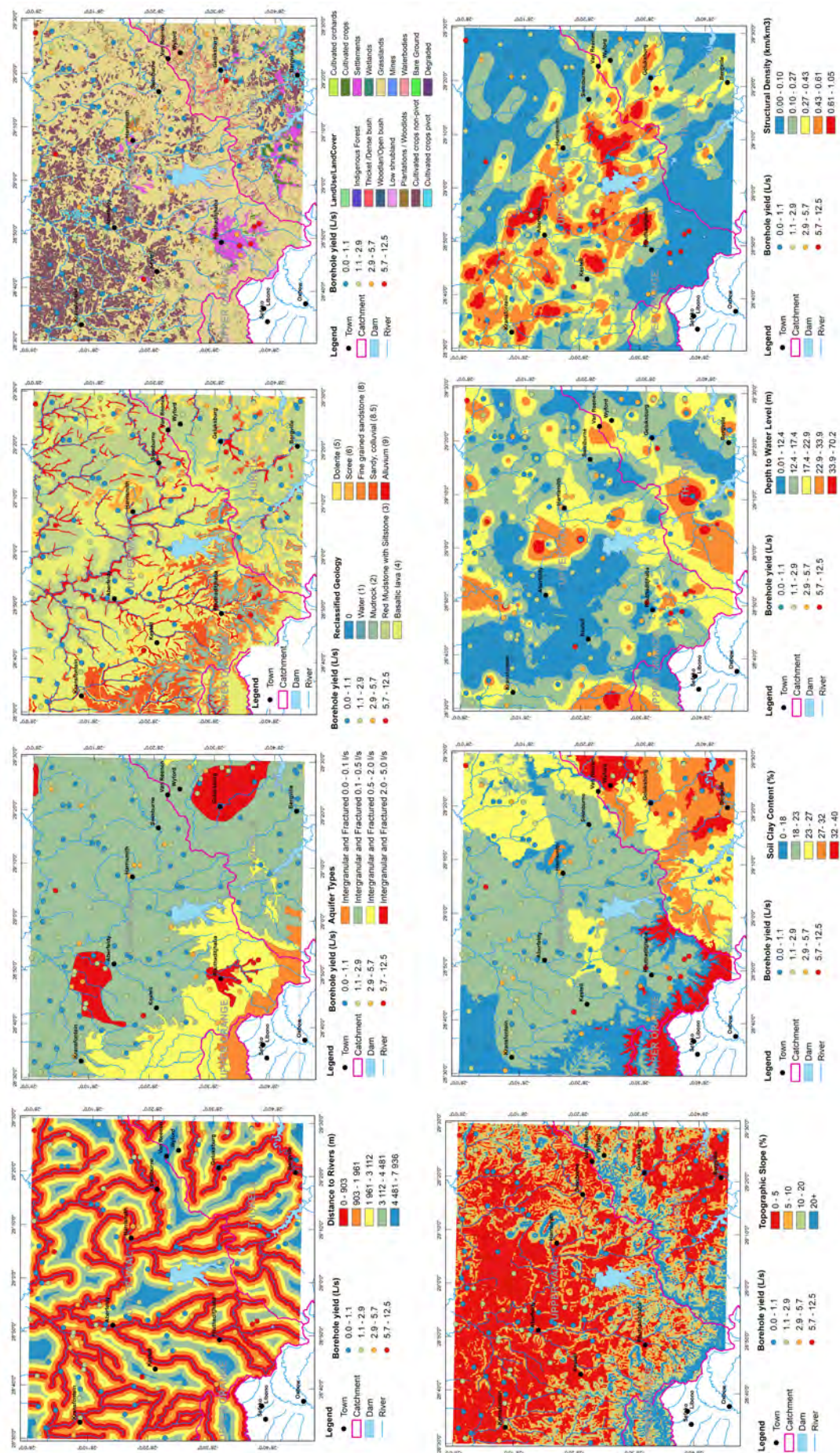


Figure 26: Input parameters used to generate a groundwater potential map.



# GEOSCIENCE DIPLOMACY



**Biotite-Cordierite-K-Fspar-Sillimanite-Garnet Metapelite.**

The nature and vagaries of the planet's surface extend it beyond the borders of any single state or entity. As a permanent secretariat of OAGS, the CGS primarily used the 'Geoscience diplomacy' theme as a pillar in fulfilling and executing several of South Africa's international relations, particularly in geoscience. In line with one of the bold priorities of the sixth administration of contributing to 'A better Africa', the CGS has a history of collaboration with various African countries through geoscience mapping, institutional reform, map compilation and other services. Recently, the CGS has been working with the minerals and mines ministries in Malawi and Namibia.

The 'Geoscience diplomacy' theme's helps to create an enabling environment to support national imperatives. A crucial aspect of this theme is human capital building around geoscientific, administrative and managerial/leadership skills, and development of innovative products, systems and services. The agreement on the establishment of an African continental free-trade area offers great opportunities to place South Africa on a path of investment-led trade, and to work with other African countries to develop their own industrial capacity.



The CGS continues to develop its GDP as part of thematic approach to its GTP. This theme supports broader international geoscientific developmental goals and requirements, particularly of African communities. Detailed fundamental geological mapping has been undertaken in Namibia and Malawi to support economic development, and to train and develop local geologists and students. The CGS was also appointed as a supervisor in the Cameroon and Burkina Faso geological and geochemical projects. As secretariat of the OAGS, the CGS continues to play a leadership role in improving African partnerships and collaboration. The South African seismic network, administered by the CGS, makes an important contribution to the preparatory commission for the CTBTO, which facilitates global cooperation in monitoring nuclear weapon testing.

### 4.13. CTBTO PROJECT

**Background and purpose:** The CTBTO bans all nuclear explosions on earth, whether for military or for peaceful purposes. South Africa has ratified the CTBT treaty and participates in several initiatives to curb the testing of nuclear weapons. To this end, the CGS monitors nuclear activity using the seismic and infrasound stations (Figure 27) installed near Boshof in the Free State. Data collected are continuously analysed to inform and augment global monitoring activities.

Infrasound monitoring is one of four technologies used by the International Monitoring System to verify compliance with the CTBT. Atmospheric and shallow underground nuclear explosions can generate infrasound waves that may be detected by the infrasound network (Figure 27).



Figure 27: Infrasound stations installed around the world to monitor possible nuclear activity.



Acoustic waves with very low frequencies are called infrasound. In fact, these waves are below the frequency band audible to the human ear, which typically ranges from 20 to 20 000 Hertz. Infrasound is produced by a variety of natural and man-made sources: exploding volcanoes, earthquakes, meteors, storms and auroras in the natural world; nuclear, mining and large chemical explosions, as well as aircraft and rocket launches in the man-made arena (Figure 28).

The sound waves can no longer propagate in regions where the sound speed is higher than it was where the wave started (no added energy). They are then reflected back. This happens either when the temperature rises dramatically (thermosphere ~100 km), when the ambient wind speed rises dramatically (upper stratosphere ~30–50 km) or both (sudden stratospheric warming). This means that there is almost always a direction of preferred propagation, less attenuation when the distance travelled is smaller.

**Achievements and highlights:** In the year under review, the project produced a synthesis report and held several training workshops.

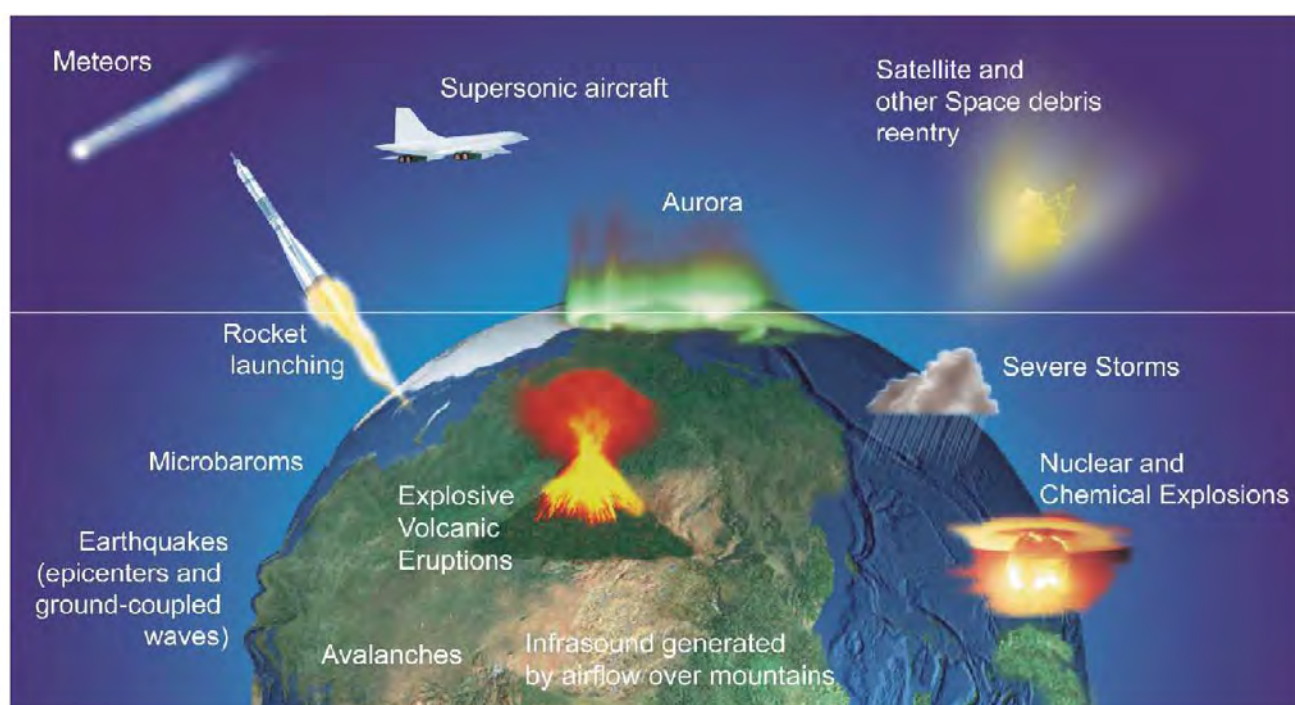


Figure 28: Sources of infrasound signals.

#### 4.14. GEOLOGICAL MAPPING AND MINERAL ASSESSMENT PROJECT OF MALAWI

**Background and purpose:** The Geological Mapping and Mineral Assessment Project (GEMMAP) contributes to the economic development of Malawi by diversifying the mineral sector and advancing geological knowledge and human capacity building, especially in the geosciences. The project has three main objectives: Constitute a fundamental knowledge base for future mineral resources management of Malawi by providing a set of modern multiscale geological and thematic (mineral resources and geohazards) maps of the whole country; develop strategies for responsible artisanal and small-scale mining, and implement a capacity-building programme for sustainable human resources development in the earth sciences in Malawi.

**Achievements and highlights:** In the year under review, GEMMAP completed the first field season and submitted the first set of 1:100 000-scale geological maps to the client for review. Progress was made on soil geochemical sampling activities. Updated geohazard maps have been produced across Malawi and geochemical analyses have been completed, for example of the organic shale within the Karoo strata (Figure 29).

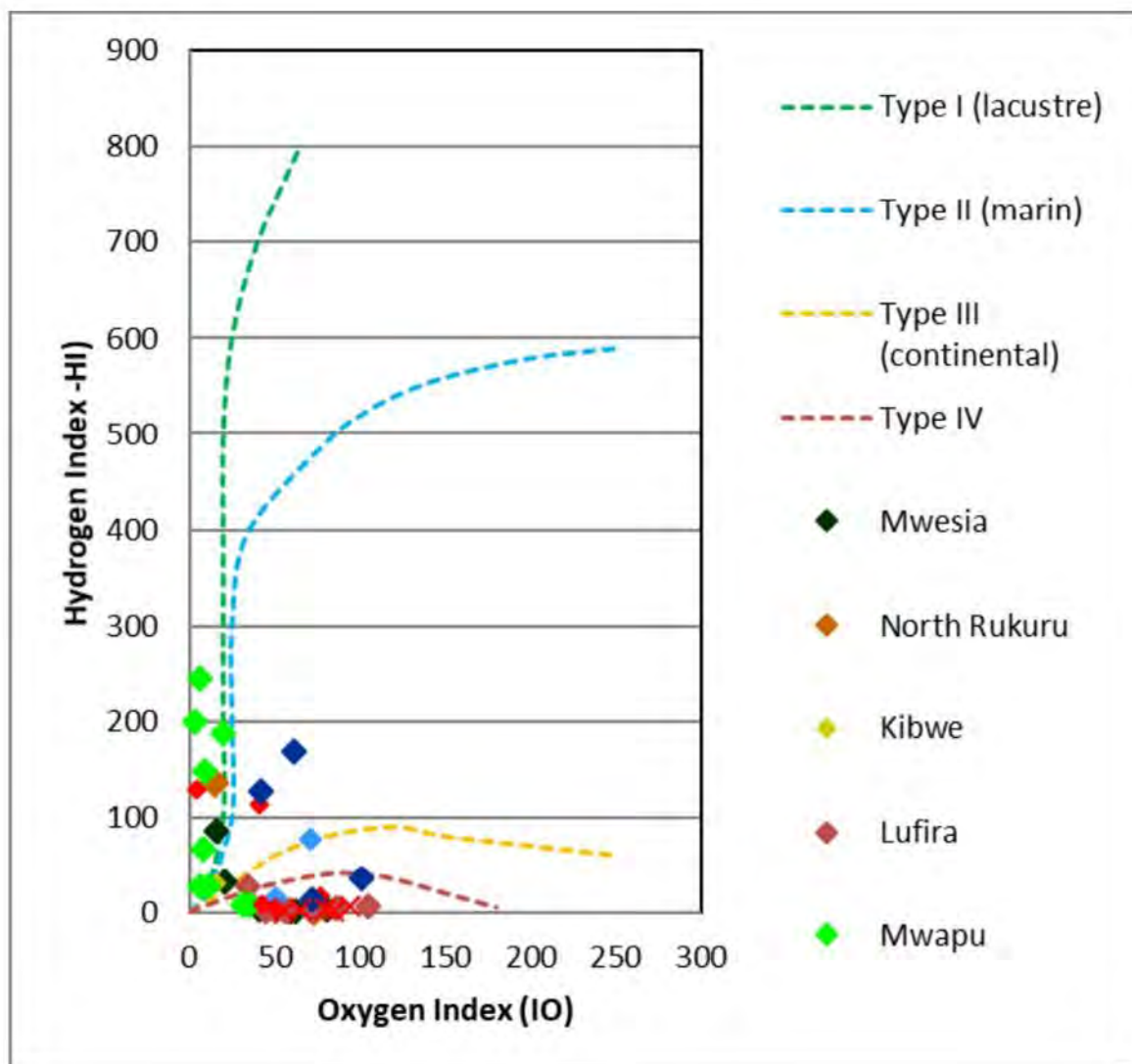


Figure 29: Van Krevelen diagram showing a mixed composition of organic matter with lacustrine Organic Matter (type 1) and minor land plants Organic Matter (type 3) for Karoo units of the northern Karoo basins. Most of the samples contain carbonised material (type 4).

## 4.15. GEOLOGICAL MAPPING AND RESEARCH FOR THE DIRECTORATE OF THE GEOLOGICAL SURVEY OF NAMIBIA

**Background and purpose:** Since 2013, the CGS has been leading a regional-scale mapping and capacity building project in southern Namibia under contract for, and in collaboration with, the Geological Survey of Namibia. Between 2013 and March 2019, the Southern Namibia Mapping Programme (SNMP) produced 59 new, fully digital 1:50 000-scale geological maps covering almost 28 000 km<sup>2</sup> in the rugged and remote mountain desert along the lower Orange River border with South Africa. These still need to be reviewed by the client.

**Achievements and highlights:** In the year under review, the current Namibia mapping project represents a 13-month long extension (March 2019 to March 2020) to the SNMP to produce 27 new 1:50 000-scale maps of the Precambrian basement geology of the Sperrgebiet (the restricted diamond mining area spanning Lüderitz, Aus, Witputs and Bogenfels) and Aussenkehr areas. These still need to be accepted by the client. The new tectonostratigraphic map for the Namaqua Metamorphic Province in the lower Orange River region in Figure 30 is an example of the project products. An additional objective is the reconnaissance mapping of the Cenozoic geology of the 1:250 000-scale Oranjemund sheet. The SNMP contributes to the larger national geoscience objective of having detailed geological map coverage (1:50 000 scale) for the entire country by 2030, in accordance with the stated aims of Vision 2030, Millennium Development Goals, NDP 4-5 and the Harambe Prosperity Plan of the government of Namibia. Furthermore, the programme enhances research skills and capacity levels in geological mapping within the Geological Survey of Namibia.

The project made good progress during 2019/2020 but challenges in obtaining the geochronology data delayed final report writing and map legends. Capacity-building continues to be an important component of the work, with the completion of four honours projects by students from the University of Namibia. The project deadline has been extended to 31 September 2020.

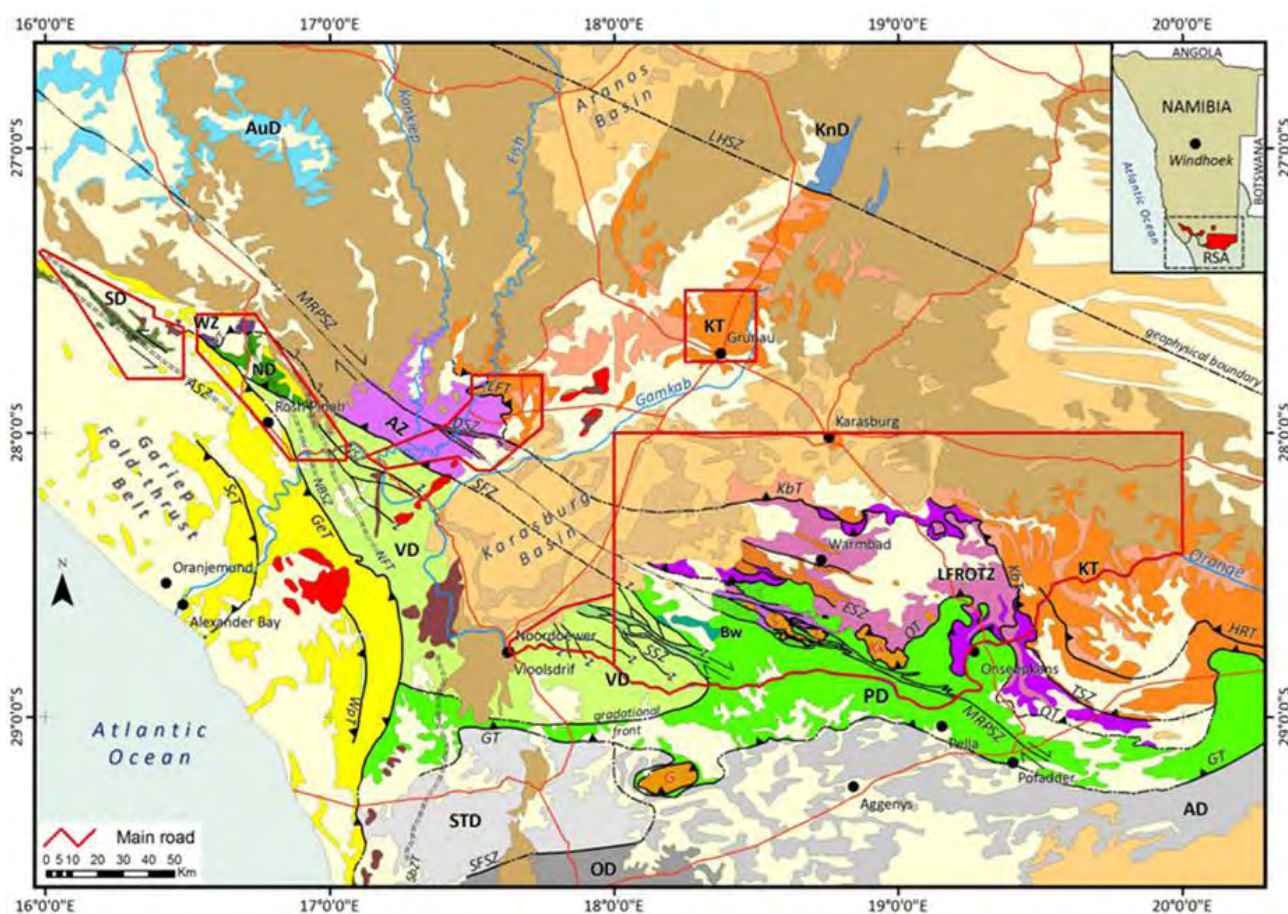


Figure 30: The new tectonostratigraphic map for the Namaqua Metamorphic Province in the lower Orange River region.



## 4.16. ORGANISATION OF AFRICAN GEOLOGICAL SURVEYS

**Background and purpose:** The OAGS was established on 2 February 2007 to promote African geoscience, provide technical advice to the continent's decision-makers and establish a platform for member interaction. The OAGS and European Geological Surveys (EGS) have been in partnership since 2016, implementing the PanAfGeo project. Pan-African support to the EGS-OAGS partnership is a training programme implementing the transfer of knowledge between European and African geological surveys and institutional strengthening of African national administrations in charge of geology and mining.

Through the programme, the EU encourages environmental protection, economic development and social inclusion across the African continent, while helping to secure a sustainable raw materials supply, facilitating transparent and more consistent minerals trade between the EU and Africa. PanAfGeo is an example of a continental-scale international cooperation and development project in geosciences, providing first-class training to public sector officers from African Geological Surveys.

**Achievements and highlights:** This three-year programme (2016 to 2019), against an investment of around 10 million euros, has provided 42 training sessions for more than 1 000 officers from 49 African countries, generating impressive at institutional and technical capacity impacts in Africa leading, for instance, to the setup of a national geological agency (geological survey) in the Democratic Republic of the Congo, which is not just the first world producer of cobalt, a critical raw material for the EU hi-tech industry, but holds estimated mineral reserves worth more than 20 trillion euros. The main mandate of a geological survey is to discover, map and assess a country's mineral reserves, and support the government to enforce environmental monitoring and legal controls.

PanAfGeo has given trainees a state-of-the-art toolkit, best practice methods and opportunities to take part in field trips in seven geoscientific domains: geoscientific mapping, mineral resources assessment (e.g. assessing the value of the country's mineral resource endowment), artisanal and small-scale mining (a primary source of income for hundreds of thousands in Africa), environmental management of mines, geohazards (e.g. natural risks, such as landslides), geoheritage (e.g. sustainable tourism) and geoscience information management (e.g. information technology skills). PanAfGeo is co-funded by the EU through its Directorate-General for International Cooperation and Development and a consortium of 12 European geological surveys led by the Bureau de Recherches Géologiques et Minières, the French geological survey. The OAGS produced two quarterly newsletters this financial year in review. These are available at the <https://www.oagsafrica.org/>.

## 4.17. INFORMATION COMMUNICATION TECHNOLOGY

The CGS is undergoing a substantial digital transformation process to improve and optimise the efficiency and effectiveness of its business while simultaneously laying the foundation for 4IR technologies. This section presents key focus areas of the GGS Information Communication Technology (ICT) for the year under review, including digital transformation and information security initiatives, these initiatives include:

- Implementation of agile, cost-effective and efficient server, storage and backup infrastructure to enable digital transformation
- Implementation of integrated enterprise systems to enable effective management of data and information across the organisation and the stakeholder eco-system
- Strengthening security and governance of functions related to CGS and stakeholder information

Implementation of high-performance ICT infrastructure and the strengthening of governance processes for effective management of the ICT function is aimed at optimising the management of information and data across the organisations, ensuring transparency of ICT cost and optimising the management of investments in information technology, service level management and risk management to assist the organisation to achieve its mandate.

#### 4.17.1. OVERVIEW OF INFORMATION COMMUNICATION TECHNOLOGY

The ICT strategic plan for the period 2018 – 2023 proposes the organisation and execution of ICT capabilities to support CGS strategic objectives and align the technology capabilities in line with business initiatives. The year under review saw the commencement of ICT initiatives that are intended to:

- Support delivery of the CGS mandate by providing ICT infrastructure that is sufficiently flexible, expandable and secure to support and sustain an excellent geoscience data management and dissemination program.
- Provide the technology to facilitate and support advisory, stakeholder engagement and knowledge management functions through provision of a complete digital experience to CGS stakeholders.
- Modern architecture to facilitate communication, collaboration and an enhanced personal experience by making delivering data and information in a connected and accessible manner.
- Improve governance and formalize operational processes of the ICT function by creating an optimal environment for the management, governance and monitoring of ICT compliance, operations and projects
- Develop and implement robust cyber security strategy to mitigate cyber security risk and build the required resilience
- Position the CGS as a leading digital enterprise through optimized digital product and service innovation.

The organization has made significant progress through the execution of key transformation projects including: upgrade and modernization of network, server, storage and backup infrastructure, implementation of an Enterprise Resource Planning (ERP) solution and the implementation of an integrated geoscience management system to make data available and accessible to authorized stakeholders.

## 5. DISSEMINATION OF INFORMATION

The CGS disseminates the results of its research to its stakeholders in publication series including memoirs, bulletins, explanations, annual reports, newsletters, conference proceedings and maps, and these are presented in sections 5.1 to 5.3. The organisation's refocus on its mandate and its focus on acquiring new-multidisciplinary data has resulted in new external collaborations and partnerships and development of additional publications.

### 5.1. CGS Publications

1. Billay, A.Y. and Mutele, L. 2020. Mineral prospectivity mapping of basic-ultrabasic-related mineralisation of the Bushveld Igneous Complex, South Africa. Bulletin, Council for Geoscience, 157, 113 pp.
2. Hicks, N. 2020. The seismic stratigraphy, geological evolution and CO<sub>2</sub> storage potential of the offshore Durban Basin, South Africa, Memoir, Council for Geoscience, 102, 103 pp.
3. Lin, L., Makonto, O., Saeze, H., Lin, H., Nemaxwi, P., Lewele, L. and Ramugondo, S. 2020. The hydrogeology of the Kathu area. Hydrogeological explanation, sheet 2723C, scale: 1:100 000, Council for Geoscience, 22 pp.
4. Lin, L., Nemaxwi, P., Lin, H., Saeze, H., Makonto, O. and Lewele, L. 2020. The hydrogeology of the Ditshilabeleng area. Hydrogeological explanation, sheet 2723B, scale: 1:100 000, Council for Geoscience, 28 pp.
5. Lin, L., Saeze, H., Makonto, O., Lewele, L., Lin, H. and Nemaxwi, P. 2020. The hydrogeology of the Boesmansgat area. Hydrogeological explanation, sheet 2723D, scale: 1:100 000, Council for Geoscience, 23 pp.
6. Lin, L., Saeze, H., Makonto, O., Nemaxwi, P., Lin, H., Lewele, L. and Ramugondo, S. 2020. The hydrogeology of the Kuruman area. Hydrogeological explanation, sheet 2723A, scale: 1:100 000, Council for Geoscience, 30 pp.
7. Nel, Z.E. 2019. From building legitimacy to building networks: Reconceptualising the social licence to operate in the context of deep offshore mining. Bulletin, Council for Geoscience, 156, 30 pp.
8. Van Zyl, W.F. 2019. Geological mapping of the inner shelf off Cape Town's Atlantic Seaboard, South Africa. Bulletin, Council for Geoscience, 155, 190 pp.
9. Geoclips, Volume 57, June 2019, 12 pp.
10. Geoclips, Volume 58, September 2019, 12 pp.
11. Geoclips, Volume 59, December 2019, 12 pp.
12. Geoclips, Volume 60, March 2020, 12 pp.

### 5.2. Peer-reviewed articles

(CGS staff are indicated in bold)

1. Aphane, M.E., **Doucet, F.J.**, Kruger, R.A., Petrik, L., van der Merwe, E.M. 2019. Preparation of sodium silicate solutions and silica nanoparticles from South African coal fly ash. Waste and Biomass Valorization. <https://doi.org/10.1007/s12649-019-00726-6>.
2. Ballouard, C., Elburg, M.A., Tappe, S., Reinke, C., Ueckermann, H., **Doggart, S.** 2019. Magmatic-hydrothermal evolution of rare metal pegmatites from the Mesoproterozoic Orange River pegmatite belt (Namaqualand, South Africa). Ore Geology Reviews, 116. <https://doi.org/10.1016/j.oregeorev.2019.103252>.
3. Bumby, A., Grantham, G.H., **Moabi, N.G.** 2020. The structural evolution of the Straumnsnutane and western Sverdrupfjella areas, western Dronning Maud Land, Antarctica: implications for the amalgamation of Gondwana. Geological Magazine, 1–23. <https://doi.org/10.1017/S0016756819001523>.
4. **Cawthra, H.C.**, 2019. Emergence of the African savannah. Nature Geoscience, News and Views, 12, 588–589. <https://doi.org/10.1038/s41561-019-0412-9>.
5. **Cawthra, H.C.**, Anderson, R.J., de Vynck, J.C., Jacobs, Z., Jerardino, A., Kyriacou, K., Marean, C.W. 2019. Migration of Pleistocene shorelines across the Palaeo-Agulhas Plain: evidence from dated sub-bottom profiles and archaeological shellfish assemblages. Quaternary Science Reviews Special Publication on the PalaeoAgulhas-Plain. <https://doi.org/10.1016/j.quascirev.2019.106107>.



6. **Cawthra, H.C.**, Cowling, R.M., Andò, S., Marean, C.W. 2019. Geological and soil maps of the Palaeo-Agulhas Plain for the Last Glacial Maximum. *Quaternary Science Reviews Special Publication on the Palaeo-Agulhas Plain*. <https://doi.org/10.1016/j.quascirev.2019.07.040>.
7. **Cawthra, H.C.**, Frenzel, P., Hahn, A., Compton, J.S., Gander, L., Zabel, M. 2019. Seismic stratigraphy of the inner to mid Agulhas Bank, South Africa. *Quaternary Science Reviews Special Publication on the Palaeo-Agulhas-Plain*. <https://doi.org/10.1016/j.quascirev.2019.105979>.
8. Coetzee, A., Kisters, A.F.M., **Chevallier, L.** 2019. Sill complexes in the Karoo LIP: Emplacement controls and regional implications. *Journal of African Earth Sciences*, 158. <https://doi.org/10.1016/j.jafrearsci.2019.103517>.
9. **De Beer, C.H.** 2019. Update to the South African Stratigraphic Code and Guidelines for Standardised Lithostratigraphic/Lithodemic Descriptions. *South African Journal of Geology*, 122(2), 257–266. doi: 10.25131/sajg.122.0018.
10. **De Beer, C.H.**, Macey, P.H. 2019. Lithostratigraphy of the Mesoproterozoic Windpoort Granite (Spektakel Suite), western Namaqualand, South Africa. *South African Journal of Geology*, 122(2), 249–256. doi: 10.25131/sajg.122.0017.
11. Fitchett, J.M., Combrink, M., Bamford, M.K., **Botha, G.A.** 2020. A late quaternary palaeoenvironmental record from Ntsikeni Wetland, KwaZulu-Natal Maloti-Drakensberg, South Africa. *Quaternary International*. <https://doi.org/10.1016/j.quaint.2020.02.027>.
12. Gastaldo, R.A., Kamo, S.L., **Neveling, J.**, Geissman, J.W., Looy, C.V., Martini, A.M. 2020. The base of the Lystrosaurus Assemblage Zone, Karoo Basin, predates the end-Permian marine extinction. *Nature Communications*, 11, 1428. <https://doi.org/10.1038/s41467-020-15243-7>.
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15. **Gcasamba, S.P.**, Ramasanya, K., Eklou, S., **Vadapalli, V.R.K.** 2019. A laboratory investigation on the performance of South African acid producing gold mine tailings and its possible use in mine reclamation. *Journal of Environmental Science & Health, Part A*, 54(13), 1293–1301. <https://doi.org/10.1080/10934529.2019.1642694>.
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### 5.3. Scientific abstracts (CGS staff are indicated in bold)

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2. **Botha, G.**, **Havenga, M.** 2019. Re-interpretation of the Cenozoic lithostratigraphy of the Maputaland coastal plain: integration of field mapping and high resolution airborne radiometrics. 16th SAGA Biennial Conference and Exhibition, Durban, South Africa, 6–9 October 2019.
3. **Cawthra, H.C.**, Cowling, R.M., Marean, C.W., Ando, S. 2019. A submerged terrestrial landscape in southern South Africa: Geological and soil maps for the Last Glacial Maximum. GeoHab 2019, St Petersburg, Russia, 13–17 May 2019.
4. **Cawthra, H.C.**, **MacHutchon, M.R.**, **van Zyl, F.W.**, **Pillay, T.**, **Shange, H.** 2019. Updates and highlights from the South African offshore mapping programme. GeoHab 2019, St Petersburg, Russia, 13–17 May 2019.
5. Colarossi, D., Duller, G., Roberts, H., Tooth, S., **Botha, G.** 2019. A new single grain luminescence chronology for a key late Quaternary terrestrial archive: Voordrag, KwaZulu-Natal, eastern South Africa. 20th Congress of the International Union for Quaternary Research, Dublin, Ireland, 25–31 July 2019.
6. Davies, N., Shillito, A., **Penn-Clarke, C.**, 2019. Frozen footprints: trace fossils from late Ordovician low-latitude glacial deposits (Pakhuis Formation, Table Mountain Group, South Africa). 63rd Annual Meeting of the Palaeontological Association, Valencia, Spain, 15–21 December 2019.
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8. **Doggart, S.**, Buick, I., **Macey, P.** et al. 2019. A new perspective on the origins of the Orange River Pegmatite Belt. 50th Anniversary Conference of the Geological Society of Namibia, Windhoek, Namibia, 1–4 September 2019.
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21. **MacHutchon, M.R., de Beer, C.H., van Zyl, F.W., Salzmann, L., Cawthra, H.C.** 2019. Structural insights into the western branch of the Saldania Belt through the marine geology of Table Bay, South Africa. GeoHab 2019, St Petersburg, Russia, 13–17 May 2019.
22. **Makonto, O.** 2019. Hydrogeological mapping in the Kuruman River Catchment of the Northern Cape Province, South Africa. Proceedings of the 16th Ground Water Division Conference: Conservation, Demand & Surety (GWD), Port Elizabeth, 20–23 October 2019.
23. **Makubalo S., Kenan A., Diamond R.** 2019. Hydrogeochemistry of groundwater in the Namaqualand region, South Africa: Implications for surficial uranium potential. 46th IAH Congress, Malaga, Spain, 22–27 September 2019.
24. **Maluleke, M.K., Modise, D.M., Nyati, M.N. and Moja, S.J.** 2020. The effect of site Bloemfontein, irrigation and soil on the fruits yield of African horned (Cucumis metuliferus L.). Combined Congress Conferences, University of the Free State, 20–23 January 2020.
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26. **Meghraoui, M., Amponsah, P., El Gabry, M., Grobbelaar, M., Tuluka Mavonga, G., Atalay, A. and Midzi, A.** 2019. The challenges of seismological centres in Africa: Virtual or intercontinental scientific infrastructure. 27th IUGG General Assembly, National and Regional Earthquakes Centres: Highlights and Challenges, 8–18 July 2019, Montreal, Canada.
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29. **Midzi, V., Manzunzu, T., Pule T., Mulabisana, T.** 2019. Relocation of seismic events in South Africa for ground truth identification and classification. Science and Technology Conference, CTBTO Preparatory Commission, Hofburg Palace, Vienna, Austria, 24–28 June 2019.
30. **Midzi, V., Pule, T., Manzunzu, B., Mulabisana, T., Zulu, B.S.** 2019. Improved monitoring of seismicity in the gold mining regions of South Africa: New Velocity Models Keynote Presentation. 16th SAGA Biennial Conference and Exhibition, Durban, South Africa, 6–9 October 2019.
31. **Muedi, T., de Wit, M.J., Linol, B., Nengovhela, V., Dhansay, T.** 2019. Surface and subsurface description of the early Jurassic Karoo Dolerites: Toward a comprehensive understanding of the emplacement mechanism and possible gas migration. 7th International Science Conference on Large Igneous Provinces, Tomsk, Russia, 28 August–8 September 2019.
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35. Pargeter, J., Blackwood, A., **Cawthra, H.C.,** Esteban, I., Jacobs, Z., McNeil, J., Saktura, R. 2019. The Msikaba Red Sand Dunes: Technological variability at the Early to Middle Stone Age transition in Pondoland, South Africa. Society for American Anthropologists/SAAs, Albuquerque, New Mexico, USA, 10–14 April 2019.
36. Petitta, M., Absametov, M., **Coetzee, H.** et al. 2019. Launch of the new Groundwater Working Group for implementation of the United Nations Framework Classification (UNFC). 46th IAH Congress, Malaga, Spain, 22–27 September 2019.
37. **Pillay, T., Cawthra, H.C., Lombard, M.** 2019. Characterising marine benthic habitats on the South African continental shelf using geophysical tools. GeoHab 2019, St Petersburg, Russia, 13–17 May 2019.
38. **Saeze, H.** 2019. Hydrochemical characterisation of groundwater in the Evander Goldfields, Mpumalanga, South Africa. Proceedings of the 16th Ground Water Division Conference: Conservation, Demand & Surety (GWD), Port Elizabeth, 20–23 October 2019.
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41. **Sakala, E., Novhe, O.†, Vadapalli, V.R.K.** 2019. Application of artificial intelligence (AI) to predict mine water quality, a case study in South Africa. In: E. Khayrulina, Ch. Wolkersdorfer, S. Polyakova and A. Bogush. Mine Water — Technological and Ecological Challenges, pp. 140–146. Perm State University, Perm, Russia.
42. Sakala, E., Saeze, H. 2019. Application of data mining and knowledge discovery process to extract valuable knowledge from geoscience datasets. 16th SAGA Biennial Conference and Exhibition, Durban, South Africa, 6–9 October 2019.
43. **Sekiba, F.M.,** Fourie, F., **Sakala, E.** 2019. Airborne and ground geophysical surveys to investigate the deep geology and geohydrology in the Beaufort West area, western Karoo, South Africa. Proceedings of the 16th Ground Water Division Conference: Conservation, Demand & Surety ( ), Port Elizabeth, 20–23 October 2019.
44. Shilito, A., Davies, N., **Penn-Clarke, C.** 2019. Africa's earliest pioneers? Subaerial footprints from the Ordovician Graafwater Formation of South Africa. 63rd Annual Meeting of the Palaeontological Association, Valencia, Spain, 15–21 December 2019.
45. **Smith, H., Macey, P.,** Miller, J. et al. 2019. Timing and characterisation of 1200–1100 Ma tectonism in the Namaqua Metamorphic Complex, Southern Namibia. 50th Anniversary Conference of the Geological Society of Namibia, Windhoek, Namibia, 1–4 September 2019.
46. **Van Zyl, W.** 2019. The geological mapping of the inner shelf off Cape Town's Atlantic Seaboard. GeoHab 2019, St Petersburg, Russia, 13–17 May 2019.
47. Zipkin, A., Fisher, E.C., **Cawthra, H.C.,** Gordon, G., Knudson, K. 2019. Beyond the Swartberg: Preliminary findings from an extended strontium isoscape in the South African Karoo. Paleoanthropology Society Annual Meeting, Albuquerque, New Mexico, USA, 9–10 April 2019.

## 5.4. Media articles

1. Media advertorial – Geobulletin: Geotechnical and geohazards investigation in municipalities
2. Media advertorial – Leadership magazine: How the Council for Geoscience is working to boost the blue economy
3. Media advertorial – Mining Elites: Access to Information – Key to sustainable geoscientific contributions
4. Media advertorial – Mining Review Africa: Council for Geoscience at the forefront of environmental sustainability
5. Media advertorial – Mining Review Africa: Council for Geoscience: World-class laboratory services
6. Media advertorial – Mining Review Africa: Transforming South African mining for the future
7. Media advertorial – Mining Review Africa: Water in mining: Activities at the Council for Geoscience
8. Media advertorial – Mining Weekly: Council for Geoscience at the forefront of environmental sustainability
9. Media advertorial – Pan African Parliament: Mapping the way
10. Media advertorial – Sawubona: The Council for Geoscience supporting renewable energy technologies
11. Media advertorial – South African Business: Mapping the future
12. Media advertorial – Sustainability Week Publication: Council for Geoscience at the forefront of environmental sustainability
13. Media article – GSSA Geobulletin: Ceres–Tulbagh earthquake
14. Media article – Mining Weekly: CGS to present findings on Harding gold claims
15. Media article – Mining Weekly: Harding has no economically viable gold, Council for Geoscience confirms
16. Media article – Post-matric: Council for Geoscience profile and bursary and internship information
17. Media article – Science Careers SA: How the Council for Geoscience is working to boost the blue economy; plus Marine Geoscientist interview



# Part C: Governance



Geoscience engagements with the CGS Board and the Auditor General in Makhonjwa Mountains in the Mpumalanga Province

## 1. EXECUTIVE AUTHORITY

The Minister of Mineral Resources and Energy (The Minister), through the CGS Board, is accountable for the control, management and performance management of the CGS. Accordingly, the organisation submits reports quarterly and annually in terms of National Treasury Regulations (26.1) to the DMRE, on 30 April, 31 July, 31 October and 31 January.

## 2. BOARD OF THE COUNCIL FOR GEOSCIENCE

### 2.1. Board composition and duties

The Minister appointed the CGS Board with effect from 1 March 2017, in terms of Section 4 of the Geoscience Act (Act No 100 of 1993, as amended) and ended on 28 February 2020. The Board was composed of ten non-executive members, four alternate members and one executive member, the CEO. The Chairperson of the Board is an independent non-executive member and the roles and duties of the Chairperson and the CEO are clearly outlined. Mr O Wilcox, formerly deployed by the Minister of Finance to the Board, terminated his services on 31 January 2019 and Mr K Ramokgopa, who was serving as a non-executive, independent member, resigned on 20 June 2019.

Corporate governance at the CGS embodies systems, structures and processes by which the entity is directed, controlled and held to account. It is applied through the precepts of its enabling act, Geoscience Act, Act No 100 of 1993, as amended, the Public Finance Management Act (PFMA) (Act No 1 of 1999, as amended), National Treasury Regulations, the Protocol on Corporate Governance in the Public Sector, and policies of the organisation. This part of the report details the organisation's governance systems, structures and processes.

- **The Board and its committees** — the composition of the Board and committees, Board induction, Board remuneration and conduct, role and responsibilities of the Board;
- **Compliance with laws and regulations** — the status of CGS compliance with legislative prescripts;
- **Internal control and risk management** — the risk management framework implemented, and the effectiveness of the internal controls in the organisation;
- **Fraud and corruption** — measures to detect and combat fraudulent activities;
- **Internal audit** — activities of the internal audit function;
- **Quality assurance** — status of quality assurance, and
- **Health, safety and environment issues** — compliance with safety, health, environment and quality (SHEQ) standards.



The composition of the Board from 1 March 2017 to 28 February 2020 was as follows:

Board members	Skills and experience
Dr Humphrey Mathe – Chairperson of the Board	Dr Mathe was appointed Board Chairperson on 1 March 2017. He is an Exploration Geologist with a BSc in Geology and Chemistry, BSc Honours in Geology and an MSc and a PhD in Exploration Geology. He has vast experience and knowledge acquired over many years and has held CEO positions in both the private and public sectors.
Mr Mosa Mabuza	Mr Mabuza is a Geologist with a BSc Honours in Geology and a Postgraduate Diploma in Business Administration. He was appointed a Board member on 1 March 2017 and the CEO of the CGS on 1 July 2017. Mr Mabuza served, inter alia, at De Beers as an Explorationist, Laboratory Geologist and Senior Business Analyst, at DMRE as Chief Director of Mineral Promotion, at Anglo American Platinum as Head of Government Relations and at DMRE as Deputy Director-General for Mineral Policy and Promotion.
Mr Beeuwen Gerryts	Mr Gerryts is a Mechanical Engineer with an MSc Engineering Management degree (technology and innovation management) from the University of Pretoria. He was appointed a Board member on 1 March 2017. He is serving at DSI as a Chief Director for Technology Localisation, Beneficiation and Advanced Manufacturing. He has extensive experience in research and innovation management, ICT and product system specifications, policy development, and some publications in R&D and industrial development.
Mr Kabelo Koloi	Mr Koloi was appointed a Board member on 1 March 2017. He is a member of the Institute of Professional Engineering Technologists. He has a B-Tech in Electrical Engineering and a Diploma in Business Management. He is a Chemical Engineer at Infracon.
Dr Jeffrey Mahachi	Dr Mahachi was appointed a Board member on 1 March 2017. He is a registered professional Structural Engineer with a PhD, MSc and Master's in Information Technology and BSc in Civil Engineering. He has worked as a technical executive with the National Home Builders Registration Council and as a Research Engineer with the CSIR. He is currently Head of the Civil Engineering and Built Environment School at the University of Johannesburg.

Board members	Skills and experience
Dr Monde Mayekiso	Dr Mayekiso is a Board member with a PhD in Marine Estuarine Environmental Science, an MSc in Ichthyology and Fisheries Science, a BSc Honours in Zoology, and a Certificate in Financial Management. He has worked as Deputy Director General of Ocean and Coast Branch of the Department of Forestry, Fisheries and Environment. He has also served as Programme Manager for Coast at the CSIR and on the advisory panels for the NRF Institutional Research Development Programme and as a Board member of the South African Biodiversity Institute. He currently represents South Africa on international bodies such as the Intergovernmental Oceanographic Commission (IOC) and the Convention on the Conservation of Antarctic Marine Living Resources (CCALMR). He has served as Chair of both IOC Sub-commission for Africa and CCALMR. He has been published in local and international journals.
Ms Rosalind Mdubeki	Ms Mdubeki was appointed a Board member on 1 March 2017. She has a BSc in Surveying, a National Diploma in Surveying and a Certificate in Project Management. She has worked for Eskom as a Survey Technician and Engineer in training and currently serves as a Surveyor General: Bloemfontein (responsible for Free State and the Northern Cape) in the Department of Rural Development and Land Reform.
Mr Kagiso Menoe	Mr Menoe holds a BSc in Chemical Engineering and several management qualifications. He was appointed a Board member on 1 March 2017. He has worked for the DMRE as a Director for Beneficiation Economics, for the State Diamond Trader as a Quality Assurance Inspector, and for De Beers as an Optimisation Engineer, Ore Processing Engineer and Senior Plant Metallurgist.
Ms Deborah Mochothli	Ms Mochothli was appointed a Board member on 1 March 2019 and has a Master's in Environment and Society, a B-Tech in Environmental Health, a BA Honours in Public Administration and a BA in Social Science. She has worked with the Department of Water and Sanitation as Chief Director for Regulations and Water Use, for South African National Parks as Manager: Environmental Audits and for Mafikeng District as Chief Environmental Health Officer.
Mr Xolisa Mvinjelwa	Mr Mvinjelwa has a BSc in Chemistry, Master's in Business Administration and Diploma in Production Management. He was appointed a Board member on 1 March 2017. He has worked as a Technical Assistant at Vereeniging Refractories, for Rhino Minerals as an Assistant Marketing Manager and later, Marketing Analyst and Director for Special Projects at SAMREC.
Dr Kgositso Ramokgopa	Dr Ramokgopa was appointed a Board member on 1 March 2017. He holds a PhD in Public Affairs, a Master's in Public Administration, Master's of Business Leadership and BSc in Civil Engineering. He has served as a Mayor for City of Tshwane and as CEO for Metropolitan Trading Company and for Johannesburg Market.
Mr Owen Willcox	Mr Willcox was appointed a Board member on 1 March 2017 and resigned on 29 January 2019. He has a Master's of Commerce in Economics and BA Honours in Economics and Industrial Psychology. He has served at National Treasury as a Senior Economist, Director for International Finance and Regional Economic Policy, Chief Director of Economics, Director for Forecasting and Trade Programme Manager for TIPS, among others.
<b>Alternate Board members</b>	<b>Skills and experience:</b>
Ms Pontso Tsotetsi	Ms Tsotetsi was appointed an alternate Board member to Ms R Mdubeki on 1 March 2017. She has a BSc in Land Surveying, a Diploma in Land Surveying and a Certificate in Advanced Management Development Programme.
Mr Paul Nel	Mr Nel was appointed an alternate member to Ms D Mochothli on 1 March 2017. He has a BCompt Honours and is a Chartered Accountant and Information Systems Auditor.  He has served as Chief Director at the Department of Water and Sanitation, Managing Director for Integrated Business Control South Africa, Chief Financial Officer for several banking institutions and an Audit Manager for Deloitte & Touche.
Mr Ishaam Abader	Mr Abader was appointed an alternate Board member to Dr Mayekiso on 1 March 2017. He has a Master's Degree in Business Administration, a law degree (BProc) and a BA with law as a major.  Mr Abader was a senior State Attorney and later a Legal Director in the Gauteng Department of Agriculture, Land Reform and Rural Development, and has also served as the Chief Director: Legal Services in the Department of Forestry, Fisheries and Environment. He has held various portfolios as a Deputy Director General (DDG) in the Department of Environmental Affairs: DDG: Corporate Affairs; DDG: Environmental Quality and Protection and, currently, DDG: Legal, Authorisations, Compliance and Enforcement. Mr Abader has also served on the Weather Services Board, the Geoscience Board as well as on the Board of the National Nuclear Regulator.



## 2.2. The current Board – 1 May 2020 to 30 April 2023

The current Board was appointed by the Minister effective 1 May 2020. The Board includes the Chairperson (independent), and 11 other non-executive members, four alternate members and the CEO (executive member).



**Dr Humphrey Mathe**  
Chairperson of the Board

### Skills and experience:

Dr Mathe was re-appointed Board Chairperson on 1 May 2020. He is an Exploration Geologist with a BSc in Geology and Chemistry, BSc Honours in Geology and an MSc and a PhD in Exploration Geology. He has vast experience and knowledge acquired over many years and has held CEO positions in both the private and public sectors.

### Current external appointments:

He serves as Chief Executive Officer for Tranter Holdings, member of the Board and director for a number of organisations, including Howden Africa Holdings and Westcoal Holdings Limited. He is Chairperson of Scinta South Africa.



**Mr Mosa Mabuza**  
Chief executive officer

### Skills and experience:

Mr Mabuza is a geologist with a BSc Honours in Geology and a Postgraduate Diploma in Business Administration. He was re-appointed Board member on 1 May 2020 and the CEO of the CGS on 1 July 2017. Mr Mabuza served, inter alia, at De Beers as an Explorationist, Laboratory Geologist and Senior Business Analyst, at DMRE as Chief Director of Mineral Promotion, at Anglo American Platinum as Head of Government Relations and at DMRE as Deputy Director-General for Mineral Policy and Promotion.

### Current external appointments:

He serves as a member of the Wits University Council and has vast experience in strategic leadership, exploration, policy formulation and human resources.



**Dr Jennifer Mirembé**  
Board member

### Skills and experience:

Dr Mirembé has a Doctorate in Town Planning, a Master's in City Planning and a number of management qualifications. She has served in a number of senior positions, including her current role as a Director for Delivery Channel Management and Chief Town Planning in the National Department of Human Settlements.

### Current external appointments:

She was appointed a member of the CGS Board on 1 June 2020.



**Ms Adila Chowan**  
Board member

### Skills and experience:

Ms Chowan was appointed an independent Board member on 1 May 2020. She is a Chartered Accountant and holds an LLB qualification. She has served on both public and private company boards as a director.

### Current external appointments:

She is currently serving on the Board of Directors for Legal Aid South Africa and the Nuclear Energy Corporation of South Africa and Action Aid South Africa.



**Mr Beuwen Gerryts:**  
Board member

**Skills and experience:**

Mr Gerryts is a Mechanical Engineer and has also completed an MSc Engineering Management degree (technology and innovation management) at the University of Pretoria. He was reappointed Board member on 1 May 2020. He is serving at DSI as a Chief Director for Technology Localisation, Beneficiation and Advanced Manufacturing. He has extensive experience in research and innovation management, ICT and product system specifications, policy development, and some publications in R&D and industrial development.

**Current external appointments:**

He is currently serving on the CGS Board and is Chairperson of the Technical Committee. He also serves as a member of the Advisory Board for the Graduate School of Technology Management (GSTM) at the University of Pretoria.



**Mr Xolisa Mvinjelwa:**  
Board member

**Skills and experience:**

Mr Mvinjelwa has a BSc in Chemistry, Master's in Business Administration and Diploma in Production Management. He was re-appointed Board member on 1 May 2020. He has worked as a Technical Assistant at Vereeniging Refractories, for Rhino Minerals as an Assistant Marketing Manager and later, Marketing Analyst and Director for Special Projects at SAMREC.

**Current external appointments:**

He is a Board member of the CGS and serves as Chairman of the SAMREC Provident Fund and Chairman of the ECCA Mineral Pension Fund. He was the Head of Human Resources, Strategy and Corporate Services at Imerys South Africa. He is currently the Executive Director of Ethics and Transformation at Imerys South Africa. He is also the Chairman of Coastal Fuels, a junior coal mining company and is Chairperson of the Port St Johns Development Agency, an Executive Director and Board member, and Chairperson of the Stakeholder Relations Management Steering Committee of Imerys South Africa.



**Dr Thuli Khumalo:**  
Board member

**Skills and experience:**

Dr Khumalo has a PhD in Environmental Science, a management development programme with Gibbs and Master of Philosophy in Corporate Strategy. She has served in a number of executive positions, including her current role as a Director for Air Quality Management in the Department of Forestry, Fisheries and Environment.

**Current external appointments:**

She was appointed a Board member of the CGS on 1 May 2020.



**Mr Smunda Mokoena:**  
Board member

**Skills and experience:**

Mr Mokoena was appointed an independent member of the CGS Board on 1 May 2020. He has a B Sc in Engineering, an MBA and holds a Government Certificate of Competence (GCC) for Mines and Works. He has vast experience having served as a director on a number of boards. He is currently serving an Executive Director at Best Infrastructure and Investments, and at Service Delivery Solutions (Pty) Ltd. He has many years of experience in the mining and energy industries in both public and private sector sectors

**Current external appointments:**

He currently serves as a Part-time Member and Chairperson of the National Public Transport Regulator (NPTR) and as a Part-time Regulator Member of the National Energy Regulator (NERSA).



**Ms Rosalind Mdubeki:**  
Board member

**Skills and experience:**

Ms Mdubeki was re-appointed Board member on 1 May 2020. She has a BSc in Surveying, a National Diploma in Surveying and a Certificate in Project Management. She has worked for Eskom as a Survey Technician and Engineer in training and currently serves as a Surveyor General: Bloemfontein (responsible for Free State and Northern Cape) in the Department of Rural Development and Land Reform.

**Current external appointments:**

She is a member of the Board and Chairperson of the Personnel, Remuneration and Transformation Committee of the CGS. She is a member of the Free State Townships Board and a council member of SAGC.



**Adv Ntika Maake:**  
Board member

**Skills and experience:**

Adv Maake has a Master of Laws in Extractive Industries in Africa, a Diploma in Project Management and a post graduate qualification in climate change and energy law, among others. He has served at a number of public entities, including Eskom holdings, City of Tshwane and the Department of Justice and Constitutional Development.

**Current external appointments:**

He is a shareholder in a number of companies, a CGS Board member and a director in a number of other companies.



**Ms Sibongile Malie:**  
Board member

**Skills and experience:**

Ms Malie has an Baccalaureus Legum (LLB) qualification and has an extensive experience in the mining and minerals sector, gained through my 14 years of employment with the DMRE. She gained a strong understanding of the legislative and regulatory framework relating to the mining and minerals sector. Ms Malie is currently holding a position of a Director in Mineral Policy Development at the DMRE.

**Current external appointments:**

She was appointed a member of the CGS Board on 1 June 2020.



**Ms Deborah Mochothli:**  
Board member

**Skills and experience:**

Ms Mochothli was reappointed Board member on 1 May 2020 and has a Master's in Environment and Society, a B-Tech in Environmental Health, a BA Honours in Public Administration and a BA in Social Science. She has worked with the Department of Water and Sanitation as Chief Director for Regulations and Water Use, for South African National Parks as Manager: Environmental Audits and for Mafikeng District as Chief Environmental Health Officer.

**Current external appointments:**

She is a Board member of the CGS, and a member of Women for the Environment and of the North West Interdepartmental Committee.





**Ms Lebogang Madiba:**  
Board member

**Skills and experience:**

Ms Madiba was appointed a Board member on 5 August 2019. She has a BCom Hons in Economics, Master of Finance in Economic Policy and Executive Leadership Programme. She currently serve as Chief Director: Economic Services, Public Finance at the National Treasury. Previous occupations includes Deputy Treasurer for Transnet SOC Limited, Director: Country Risk, Senior Financial Analyst: Country Risk and Senior Economist: Municipal Finance Recovery Services at the National Treasury, as well as Specialist: Price Risk and Escalation Management for Gauteng Provincial Government.

**Current external appointments:**

She is a member of the CGS Board and serves on the audit and risk and finance committees.



**Mr Paul Nel:**  
Alternate Board member

**Skills and experience:**

Mr Nel was reappointed an alternate member to Ms D Mochotlhi on 1 May 2020. He has a BCompt Honours and is a Chartered Accountant and Information Systems Auditor.

He has served as Chief Director at the Department of Water and Sanitation, Managing Director for Integrated Business Control South Africa, Chief Financial Officer for several banking institutions and as an Audit Manager for Deloitte & Touche.

**Current external appointments:**

Mr Nel is an alternate Board member of the CGS.



**Ms Pontso Tsotetsi:**  
Alternate Board member

**Skills and experience:**

Ms Tsotetsi was reappointed an alternate Board member to Ms R Mdubeki on 1 May 2020. She has a BSc in Land Surveying, a Diploma in Land Surveying and a Certificate in Advanced Management Development Programme.

**Current external appointments:**

She has served as a Survey Technician at the Surveyor-General in Pietermaritzburg, Professional Land Surveyor at the Surveyor-General in Bloemfontein and a Deputy Surveyor-General at the Surveyor-General in Pretoria.



**Mr Andries Moatshe:**  
Alternate Board member

**Skills and Experience:**

Mr Moatshe was reappointed an alternate member to Ms Malie on 1 May 2020. He has a Master's in Environmental Management and a Higher Diploma in Public Health. He is currently working for the DMRE as a Chief Director for Mine Environmental Management and has contributed to the department's policy development.

**Current external appointments:**

Mr Moatshe is an alternate member on the CGS Board.



**Dr Sabelo Malaza:**  
Alternate Board member

**Skills and Experience:**

Mr Malaza has a B Phil and a Doctorate in Business Administration. He is an Environmental Management Practitioner with more than 16 years' experience in the public sector. He has served at the Department of Water and Sanitation and Department of Forestry, Fisheries and Environment in diverse capacities.

**Current external appointments:**

He was appointed an alternate member of the CGS Board on 1 May 2020.

The Board upholds and embraces the fiduciary duties of the Board outlined in Section 50 of the PFMA (Act No 1 of 1999, as amended), which requires, among others, that Board members:

- 2.1.1. Exercise the duty of utmost care to ensure reasonable protection of the assets and records of the organisation;
- 2.1.2. Act with fidelity, honesty, integrity and in the best interest of the CGS in managing the financial affairs of the CGS;
- 2.1.3. Not act in a way that is inconsistent with responsibilities assigned to Board members;
- 2.1.4. Not use their position and/or privileges or confidential information they obtained as members of the Board for personal gain or to improperly benefit another person, and
- 2.1.5. Disclose and declare any direct or indirect interests that the member or spouse or close family may have that would be a potential conflict of interest.

The Board has implemented annual declarations of interest and a declaration of interest at every committee and Board meeting to ensure that members disclose real or perceived conflicts in any matter before the Accounting Authority. Board members must withdraw from proceedings when the matter is considered unless the Board decides otherwise.

Subject to the provisions of the Geoscience Act, read together with the PFMA, the Board is accountable for the performance of the CGS. The Board shall exercise control and manage the affairs of the CGS, set the strategic direction of the organisation, and approve the vision, mission, strategic objectives and policies of the organisation.

In addition, the Board monitors compliance with policies and performance with scientific, administrative and financial objectives. The Board is solely responsible for ensuring that the CGS has and maintains effective, efficient and transparent systems of financial management, risk management, internal audit, and fair, equitable, competitive and cost-effective procurement.

The Board has the authority to lead, control and manage the business of the CGS, and has adopted a comprehensive delegation of authority framework in accordance with Section 56 of the PFMA, which delegates the day-to-day management of the affairs of the CGS to the CEO. The delegation of authority policy does not in any way divest the Board of its responsibility and accountability for the organisation.

## 2.3. Board Charter and Board responsibilities

The Board Charter, which is reviewed annually, provides for the following:

- a) Leadership role of the Board, judgment and strategic direction;
- b) Board composition;
- c) Accountability, fiduciary duties and responsibilities;
- d) Code of conduct for the Board;
- e) Constitution and appointment of committees;
- f) Governance and meeting procedures;
- g) Management of conflict of interest;
- h) Responsibility for the adoption of strategic plans and the monitoring of operational performance and management;
- i) Determination and approval of policies;
- j) Risk management, and
- k) Board selection, orientation and evaluation.

## 2.4. Board induction and orientation

The CGS has a Board induction programme.

## 2.5. Training of new Board members

A director development programme ensures that Board members are adequately and continually trained and have the necessary knowledge of and development on best practices and principles of corporate governance. Through quarterly reports and policies, Board members are kept abreast of CGS governance structures, strategic projects and organisational performance to enable them to fulfil their duties and responsibilities.

## 2.6. Board meetings

The Board had five meetings in 2019/2020. The accompanying tables detail the attendance of meetings by each Board member during the year.

*Table 2: Board meetings*

Board members	25 April 2019	29 May 2019	25 July 2019	29 October 2019	29 January 2020	Meetings attended
Dr H Mathe (Chairperson)	Present	Present	Present	Present	Present	5
Mr M Mabuza (CEO)	Present	Present	Apology	Present	Present	4
Dr M Mayekiso	Present	Apology	Apology	Apology	Apology	1
Mr I Abader*	Apology	Present	Apology	Apology	Present	2
Ms D Mochotlhi	Apology	Apology	Apology	Present	Present	2
Mr P Nel*	Present	Apology	Apology	Apology	Apology	1
Ms R Mdubeki	Apology	Apology	Apology	Present	Present	2
Ms P Tsotetsi*	Present	Present	Apology	Apology	Apology	2
Dr J Mahachi	Present	Present	Present	Present	Present	5
Mr X Mvinjelwa	Present	Present	Present	Present	Apology	4
Mr K Koloi	Apology	Apology	Apology	Apology	Present	1
Dr K Ramokgopa	Present	Apology	-	-	-	1/2
Mr B Gerrits	Present	Apology	Present	Present	Present	4
Mr A Moatshe*	Apology	Apology	Apology	Apology	Apology	-
Mr K Menoe	Apology	Present	Present	Present	Present	4
Ms L Madiba	-	-	-	Apology	Present	1

\* Alternate members – Not yet a member \*\*Resigned



## 2.7. Board remuneration

The remuneration of Board members is determined by the Minister of the DMRE in consultation with the Minister of Finance, as disclosed in note 12 of the notes to the financial statements.

## 2.8. Committees of the Board

In terms of Section 15 of the Geoscience Act (Act No 100 of 1993, as amended), the Board may establish a committee that shall, subject to the direction of the Board, perform such functions of the Board as determined from time to time. Furthermore, Section 56 of the PFMA (Act No 1 of 1999, as amended) provides that some Board responsibilities may be delegated to Board committees and the management of the CGS without divesting the Board of its roles and responsibilities. The Board committees are, therefore, required to make recommendations to the entire Board before strategic decisions are implemented by management.

Mandated by Section 15 of the Geoscience Act, Section 56 of the PFMA and the recommendations of the King Code, the Board has constituted and delegated some of its functions to the following four Board committees:

### 2.8.1. Audit and Risk Committee

The Audit and Risk Committee was established in terms of Section 77 of the PFMA and National Treasury Regulation 27. The Audit and Risk Committee discharges its responsibilities in terms of the Audit and Risk Committee Charter, which sets out its committee composition, roles and responsibilities. The Audit and Risk Committee continually monitors the quality and reliability of CGS financial information used by the Board, financial statements issued by the CGS and various functions in the organisation. The Audit and Risk Committee ensures that emerging risks are timeously identified and that appropriate and effective control measures are put in place to mitigate these risks.

The composition and meeting attendance of the Audit and Risk Committee from 1 April 2019 to 31 March 2020 are reflected in the table below.

*Table 3: Audit and Risk Committee meetings*

Committee members	2019/2020					Meetings attended
	17 April	15 May	16 July	11 October	17 January	
Mr SM Xulu (Chairperson)	Present	Present	Present	Present	Present	5
Mr P Nel	present	Present	Present	Apology	Present	4
Ms D Morabe	Present	Present	Apology	Apology	Present	3
Mr O Willcox	-	-	-	Present	Present	2/2
Ms KR Mthimunya	Apology	Apology	Present	Present	Present	3
Dr K Ramokgopa	Present	Present	-	-	-	2/2

*\*\*Resigned, - Before appointment, #Joint meeting of the Finance Committee and Audit and Risk Committee*

#### 2.8.1.1. Audit and Risk Committee report

The Audit and Risk Committee reports that it has complied with its responsibilities arising from Section 77 of the PFMA and National Treasury Regulation 27.1. The committee also reports that it has adopted the Audit and Risk Committee Charter as its appropriate terms of reference, has regulated its affairs in compliance with this charter and has discharged all its responsibilities contained therein.

In executing its duties, the committee has performed, inter alia, the following functions:

## 2.9. Evaluation of internal controls

The committee has directed, monitored and evaluated the activities of the Internal Audit function. Through the Internal Audit function, the committee constantly monitored the effectiveness of the internal controls and assessed whether the Internal Audit function fulfilled its roles. During 2019/2020, the internal controls were reported to have significantly improved, and compliance with prescribed policies as well as procedures was reported to be satisfactory. However, there is a room for improvement in:

- a) Procurement;
- b) Financial management;
- c) Human resources management;
- d) Performance management;
- e) Information technology infrastructure-related control measures, and
- f) Fraud prevention and corruption-related control measures.

The committee is confident to report that corrective measures were implemented towards resolving all findings relating to internal controls weaknesses.

## 2.10. Evaluation of the annual report

The committee has:

- a) Reviewed the CGS's report on corporate performance information;
- b) Reviewed the CGS accounting policies and practices;
- c) Reviewed the adequacy and usefulness of the financial information provided to the Auditor-General;
- d) Evaluated, reviewed and discussed with the Auditor-General the audited Annual Financial Statements included in the annual report;
- e) Reviewed the Auditor-General's management report and the Auditor's report, and
- f) Based on the information provided to the committee, considered and concluded that the Annual Financial Statements comply with the requirements of the PFMA, National Treasury Regulations and South African Standards of Generally Recognised Accounting Practices (SA Standards of GRAP).

## 2.11. Risk management

The committee reports that during the year under review it approved the Strategic Risk Register and Anti-Fraud and Corruption Policy, which was subsequently communicated to employees and incorporated in the culture of the CGS. The committee reviewed:

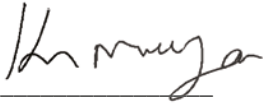
- a) The organisation's risk appetite and tolerance levels, and
- b) The significant financial risk exposures, and directed management to monitor and develop mitigation strategies for such exposures, including reputational, operational, fraud, strategic, information technology and communications systems, as well as disaster recovery and business continuity risk.

## 2.12. Evaluation of financial statements

The committee reviewed and discussed with the Auditor-General the financial statements of the CGS for the year ended 31 March 2020. The committee also reviewed the management letter of the Auditor-General and management responses thereto. The committee is of the opinion that the financial statements are compliant, in all material respects, with the requirements of the PFMA and the SA Standards of GRAP.

## 2.13. Auditor's report

The committee has reviewed the prior year audit findings implementation plan and hereby reports that a significant number of findings have been resolved. The committee will ensure that management resolves all audit findings that are still in progress. The committee concurs and accepts the conclusions of the Auditor-General on the financial statements and is of the opinion that the audited Annual Financial Statements should be accepted and read together with the report of the Auditor-General.



**Ms KM Maroga**

Chairperson

Audit and Risk Committee

30 September 2020

## 2.14. Finance Committee responsibilities and composition

The Finance Committee of the CGS is mandated to consider and recommend for the Board's approval the following matters:

- Significant financial activities;
- Liquidity and financial condition of the CGS;
- Write-off of bad debts;
- Material variances in the approved annual and/or revised budgets in accordance with the Materiality and Significance Framework Plan;
- Proposed capital and operating budget for capital expenditures;
- Financial statements for the annual report;
- All policies that have financial implications, and
- Corporate performance information management against the approved budget.

The Finance Committee consists of six non-executive members as detailed in the table below, together with the meeting attendance from 1 April 2019 to 31 March 2020.

*Table 4: Finance Committee meetings*

Committee members	2019/2020					Meetings attended
	17 April	15 May	16 July	11 October	17 January	
Ms KR Mthimunya (Chairperson)	Apology	Apology	Present	Present	Present	3
Mr P Nel	Apology	Present	Present	Apology	Present	3
Ms L Madiba	-	-	-	Apology	Apology	-
Ms D Morabe	Present	Present	Apology	Apology	Apology	2
Dr J Mahachi	Present	Present	Present	Present	Present	5
Mr K Kolo	Present	Apology	Apology	Present	Present	3
Mr M Mabuza	Present	Present	Present	Present	Present	5
Mr O Willcox	-	-	-	Present	Present	2/2

\*Resigned, - Before appointment, #Joint meeting of the Finance Committee and Audit and Risk Committee



## 2.15. Technical Committee

The Technical Committee of the CGS is mandated to consider and recommend for the Board's approval the annual scientific and strategic technical programme of the organisation, evaluate the scientific and technical output and oversee the implementation of the ICT strategy as well as the End-term evaluations.

The composition and meeting attendance of the Technical Committee from 1 April 2019 to 31 March 2020 is reflected in the table below.

*Table 5: Technical Committee meetings*

Committee members	2019/2020					Meetings attended
	16 April	17 May	12 July	10 October	17 January	
Mr B Gerrits (Chairperson)	Present	Present	Present	Apology	Present	4
Mr X Mvinjelwa	Apology	Present	Apology	Apology	Apology	1
Dr M Mayekiso	Apology	Apology	Present	Apology	Present	2
Dr J Mahachi	Present	Present	Apology	Present	Present	4
Mr K Menoe	Present	Apology	Present	Present	Present	4
Ms P Tsotetsi	Present	Apology	Apology	Present	Apology	2
Mr D Sibiya	Present	Present	Apology	Present	Present	3
Mr M Mabuza	Present	Present	Present	Present	Present	5

- Before appointment

## 2.16. Personnel, Remuneration and Transformation Committee

The Personnel, Remuneration and Transformation Committee is mandated to consider and recommend for the Board's approval the human resources strategies and policies of the CGS. It also considers and recommends for the Board's approval the organisational remuneration model, remuneration for executive management and annual salary increases, and evaluates and makes recommendations on the payment of performance bonuses. The committee also considers organisational performance reports on labour-related matters, employment equity, and employee training and development matters.

The composition and meeting attendance of the Personnel, Remuneration and Transformation Committee from 1 April 2019 to 31 March 2020 is reflected in the table below.

*Table 6: Personnel, Remuneration and Transformation Committee meetings*

Committee members	2019/2020				Meetings attended
	15 April	16 May	15 October	16 January	
Ms R Mdubeki (Chairperson)	Present	Present	Present	Present	4*
Dr K Ramokgopa	Present	Apology	-	-	1/2
Mr K Menoe	Present	Apology	Present	Present	3
Mr I Abader	Apology	Apology	Apology	Apology	0
Mr X Mvinjelwa	Apology	Present	Present	Apology	2
Mr D Sibiya	Present	Present	Present	Present	4
Mr M Mabuza	Present	Present	Present	Present	4

\* Alternate member, - Before appointment

### 3. RISK MANAGEMENT

The CGS Board is responsible for entrenching risk management governance through effective leadership. Management accounts to the Board for the integration of risk management into CGS daily operations and for the implementation and monitoring of the risk management process. The Audit and Risk Committee is an independent committee responsible for overseeing risk exposure related to governance and risk management within the CGS. The CGS develops the strategic risk register annually based on the organisational strategy, which is monitored quarterly and which provides assurance to the Board that the CGS is adequately managing identified risks.

The organisational governance risk management structure of the CGS is presented in the figure below.



*Figure 31: Organisational governance risk management structure of the CGS.*

### 4. INTERNAL CONTROL

Management is responsible for designing, implementing and continually reviewing internal controls to provide assurance on the effectiveness and efficiency of operations and on the reliability of financial reporting, and for safeguarding and maintaining accountability for the assets of the organisation. These controls are monitored throughout the CGS by management and employees, with the necessary segregation of duties. The internal audit performs independent reviews on the effectiveness of these controls as part of its annual internal audit plan, and the audit reports are presented to the Audit and Risk Committee.

## 5. INTERNAL AUDIT

The internal audit function was established in terms of the PFMA and conducts risk-based audits aligned to the Standards for the Professional Practice of Internal Auditing. A formal internal audit charter was reviewed and approved by the Audit and Risk Committee.

An annual internal audit plan was approved by the Audit and Risk Committee, and internal audit reports were presented to the Audit and Risk Committee quarterly. Follow-up audits were conducted on prior-year findings. The internal audit also performed ad-hoc tasks requested by management.

## 6. COMPLIANCE WITH LAWS AND REGULATIONS

The CGS complies with National Treasury Regulations through the PFMA compliance checklist and calendar, which are continually monitored and updated. Compliance with laws and regulations is monitored through the activities of the Audit and Risk Committee.

## 7. FRAUD AND CORRUPTION

The CGS has a legal responsibility in terms of the PFMA to take appropriate steps to prevent unauthorised, irregular, fruitless and wasteful expenditure and losses resulting from criminal conduct. An anti-fraud and corruption policy was reviewed in January 2020, as well as a whistleblowing facility that is administered by Deloitte. Reports are issued monthly, and fraudulent conduct is investigated by the internal auditors and reported to the Audit and Risk Committee.

## 8. MINIMISING CONFLICT OF INTEREST

All suppliers of goods and services to the CGS are required to complete standardised National Treasury documentation (SBD4 Declaration of Interest). In view of possible allegations of favouritism, should the resulting bid, or part thereof, be awarded to persons employed by the CGS, or to persons connected with or related to them, it is required that the bidder or his or her authorised representative declare his or her position to the evaluation/adjudication authority.

In addition, staff members of the CGS involved in the Bid Evaluation and Adjudication Committee are required to complete declaration and non-disclosure forms at each meeting.



## 9. CODE OF CONDUCT

All staff members of the CGS abide by the Code of Ethics and Conduct. The CGS is committed to ethical and fair business dealings and promotes a corporate culture that is non-sectarian, and is socially and environmentally responsible. It does so by subscribing to the following values and principles:

- Fairness and integrity in all business dealings, including the ethical handling of actual or apparent conflicts of interest between personal and professional relationships;
- Respect for the human rights and dignity of all employees;
- Acceptance of diverse cultural, religious, race, gender and sexual orientations;
- Honesty, transparency and accountability, and
- Adherence to sound standards of corporate governance and applicable laws.

In terms of the Code of Ethics and Conduct, all persons serving on behalf of the CGS are required to uphold the highest standard of business ethics and integrity. Furthermore, all staff, contractors, consultants and others acting on behalf of the organisation are required to accurately and honestly represent the organisation and to refrain from engaging in any activity or scheme intended to defraud anyone of money, property or services. The reputation and integrity of the CGS are central to its ability to operate as an effective state-owned organisation.

## 10. COMPANY SECRETARY

The Company Secretary provides advisory services to the Board and notifies Board members of regulatory changes and new developments in corporate governance. Furthermore, the Company Secretary provides the Board and the Board committees with guidance on how their responsibilities should be discharged in the best interests of the organisation. The Company Secretary facilitates and attends Board and Board committee meetings, and takes custody of the related policy documents.

## 11. QUALITY ASSURANCE

Services delivered by the CGS are rendered in the context of a quality management system which ensures that creation, delivery and monitoring of services are in line with national and international quality standards. Quality management in the CGS ensures that stakeholders receive excellent services at all times.

Following the previous financial year's organisation-wide ISO 9001:2015 quality awareness training, the development of quality documents has begun. This includes the review of the SHEQ policy statement, the writing of procedures (including scientific procedures) and the initiation of schedules for monitoring and measuring resources. Plans are afoot to attain ISO 9001 certification by the end of 2022/2023.

The CGS laboratory remains a high-priority facility in testing a variety of samples to ensure excellent and accurate service to clients and stakeholders. Activities undertaken during the year towards ISO 17025 accreditation include test method plans, validation and reporting (pH, electrical conductivity, alkalinity, major and minor oxides, trace elements, carbon, nitrogen, hydrogen and calorific values), ISO 17025:2017 transition training for 19 key laboratory personnel, review of quality management system documents and the rollout of a quality control programme. The organisation is on track to attain full accreditation by the end of 2020/2021.

## 12. HEALTH, SAFETY AND ENVIRONMENT

The executive management of the CGS is obliged, in terms of the Occupational Health and Safety Act, to provide a safe workplace without risk to human life, while staff members have a duty to work and behave in compliance with the safety directives of the organisation. CGS safety, health and environment policies enable the organisation to drive compliance with occupational health, safety and environmental legislation.

Occupational health and safety performance is monitored through various indicators (indoor air quality and ventilation, hazardous biological agents, water quality monitoring, hazardous chemical substances) to ensure continual compliance with applicable legislation. Employee medical surveillance was conducted for CGS employees followed by an extensive medical assessment for CGS laboratory personnel.

The Audit and Risk Committee and the CGS Board monitor the occupational health and safety performance of the organisation quarterly.

Fifty-four CGS employees received firefighting training during this financial year.

Project safety activities conducted on CGS scientific projects during the financial year included occupational health and safety risk identification workshops with CGS employees, health, safety and environmental inspections on the Karoo Deep Drilling Project in Beaufort West and risk assessment on CGS employees exposed to asbestos workings in the Griqualand West area.

## 13. MARKETING, COMMUNICATION AND STAKEHOLDER ENGAGEMENT PROGRAMME

### Building the CGS brand

During 2019/2020, the CGS coordinated brand awareness activities to illuminate the work of the organisation among all stakeholders. This involved events, campaigns, participation in conferences, media relations, and establishing and maintaining strategic collaborations and partnerships.

Brand-building highlights included:

- A Mining Weekly article on a CGS report on the purported gold found in the Harding area, KwaZulu-Natal.
- A media advertorial in Pan-African Parliament, titled 'Mapping the Way'.
- A media advertorial in Mining Elites in Africa profiling access to information key to sustainable geoscientific contributions.
- A media advertorial in SAA's flagship publication Sawubona profiling the CGS's support for renewable energy technologies.
- Thirteen media advertorials in various trade and mainstream media.
- Regular real-time newsfeeds about the organisation that have contributed to the steady growth of followers on the CGS social media platforms Facebook, Twitter and LinkedIn.

## Media interviews

- The CGS received the following media coverage: eNCA Night News interview by Faith Mangope on township landscape and ground stability of Durban (CEO).
- Interview by SABC News on report for purported gold in Harding, KwaZulu-Natal (CEO).
- Interview by Newzroom Afrika on 20.08 carat diamond discovered by Petra Diamond in Cullinan (CEO).
- Interview by Newzroom Afrika on International Energy Agency (IEA) coal report in Johannesburg (CEO).
- Interview at the Mining Indaba 2020 by Newzroom Afrika highlighting the vastness of untapped exploration value that is being de-risked by the mapping programme in South Africa (CEO).
- Interview by Radio 702's Bongani Bingwa on private companies and banks not investing in coal projects in South Africa (CEO).
- Interview by Power FM's Tumisoang Ndlovu on an IEA coal report in Johannesburg (CEO).
- Interview on eNCA on an earthquake that occurred in the KwaZulu-Natal area (Dr Eldridge Kgaswane).
- Interview by Radio 2000's Ntombi Phiri alongside the Free State Investment Conference on the role of the CGS in the mining industry and South Africa as a whole (CEO).
- Interview on Radio Sonder Grense on the 10-year mapping programme (Dr Johann Neveling).
- Interview on Chai FM about the geoscience field at a show targeted at youngsters aged between nine and 11 years old. (Ms Portia Munyangane and Ms Zama Sibewu).
- Interview on Jacaranda FM on the earthquake in the KwaZulu-Natal area (Dr Eldridge Kgaswane)
- Interview on SAFM on the earthquake in KwaZulu-Natal. (Mr Ian Saunders)
- Interview on Kaya FM and Thobela FM on the earthquake in KwaZulu-Natal (Ms Mahlatse Mononela).

In addition, the CGS responded to many ad-hoc print and online media enquiries about earthquakes.

## Campaigns and events

Key campaigns and events for the year included:

- Billboard advertising in the Silverton area, Pretoria from August to October 2019. The billboards were profiling the mandate and services of the CGS.
- Corporate and social media marketing videos produced and flighted on different platforms, encapsulating the work of the organisation.
- Social media campaign throughout August profiling women in different roles at the CGS, and another campaign showcasing various cultures in South Africa during Heritage Month.
- A celebration of Heritage Day, with CGS staff wearing traditional clothing and sharing traditional dishes.

Delegates of the CGS attended the DMRE women's awards ceremony on 23 August 2019 at the CSIR in Pretoria to recognise and show appreciation to women in the department and its entities. Ms Refilwe Shelembe won the Top Women Achiever Award, while Dr Hayley Cawthra and Dr Valerie Nxumalo won the Women Special Awards in their respective professions.

## Career and educational expos

The CGS participated in the following career expos:

- Hosted learners from various grades to expose them to the different career opportunities in geoscience on 4 July 2019.
- National Science Week at the Mittah Seperepere Convention Centre in Kimberley on 27 July 2019, which exposed more than 2 000 learners to careers in science, engineering and technology.
- Wits Geoscience career day on 20 July 2019.

## Corporate social responsibility

- Donation of 1 000 sanitary towels to Botlokwa Special School.





Figure 32: The CGS representatives led by the Board chairperson, Dr Humphrey Mathe, at the Mining Indaba Conference.



Figure 33: CGS CEO, Mr Mosa Mabuza, interacting with stakeholders at the exhibition booth.





Figure 34: Ms Sisanda Makubalo interacting with learners at the National Science Week launch.



Figure 35: The CGS delegation at the SAGA Conference held in Durban.





Figure 36: Ms Ponani Mthembi with learners who attended the career outreach programme at Thomo Village.



Figure 37: Teachers at Botlokwa Special School accepted the sanitary towels on behalf of the learners.



## 14. B-BBEE COMPLIANCE PERFORMANCE INFORMATION

The following table (Table 7) has been completed in accordance with the compliance to the broad-based black economic empowerment (BBBEE) requirements of the BBBEE Act of 2013 and as determined by the Department of Trade and Industry.

Table 7: BBBEE compliance performance information

Has the department/public entity applied any relevant code of good practice (BBBEE certificate levels 1 to 8) to the following:		
Criteria	Response Yes/No	Discussion <i>(include a discussion on your response and indicate what measures have been taken to comply)</i>
Determining qualification criteria for the issuing of licences, concessions or other authorisations foreconomic activity in terms of any law?	No	Only the DMRE can make such concessions. The CGS does not issue licences.
Developing and implementing a preferential procurement policy?	Yes	Supply chain management of the CGS encapsulates the provisions of preferential procurement contained in Preferential Procurement Policy Framework Act
Determining qualification criteria for the sale of state-owned enterprises?	Yes	Certain tenders contain prequalification criteria to advance exempt micro enterprises and qualifying special enterprises
Developing criteria for entering into partnerships with the private sector?	Yes	Depending on the needs assessment and procurement requirement, the CGS can explore such partnerships
Determining criteria for the awarding of incentives, grants and investment schemes in support of broad-based black economic empowerment?	No	The CGS does not have a policy that gives grants to suppliers

# Part D: Human Resources Management



The National Core Library at Donkerhoek in Pretoria

## 1. OVERVIEW OF HUMAN RESOURCES MATTERS

### 1.1. SYNOPSIS

The year under review was a challenging year for the fiscus. The Minister of Finance introduced measures to trim the public sector wage bill by R27 billion over three years, starting in the 2019/2020 financial year, and challenged all government entities to play their part in reducing the remuneration bill by, among others, freezing recruitment to reduce the salary bill and encouraging early retirement for staff 55 years and above as well as terminating the payout of performance bonuses. The CGS heeded this call by not replacing some of the scientific positions vacated through the retirement and early retirement of senior personnel. The freezing of salary increases and performance bonuses for an indefinite period also contributed, in part, to some resignations, as reflected in the exit interview reports conducted by the organisation. The net effect of the curbing of staff recruitment resulted in the CGS not attaining the 5% target of staff turnover rate.

The organisation has made significant strides in representation of females and people living with disabilities. Notably, female staff represent 44% of the scientific cohort, with African females making up 30%. The representation of people living with disabilities is at an all-time high due to the in-house disability awareness campaign, which encouraged employees to disclose their disabilities.

Thirty-five percent of the scientific staff have Master's and PhD degrees, which meets the set target. Management will continue to invest in the scientific cohort to ensure that the organisation and the country have high-calibre scientists.

#### **Creating an enabling culture and environment for employees**

The focus of the CGS is to create a culture of high performance, which is necessary to drive and embed the GTP to contribute to societal needs. To this end, management has approved and commissioned a performance management intervention that recognises core management competencies such as risk management and quality management for the managerial cohort, as well as behavioural aspects for the rest of the staff.

This section presents key focus areas of the Human Resources department for the year under review, including training and transformation initiatives.

It also includes:

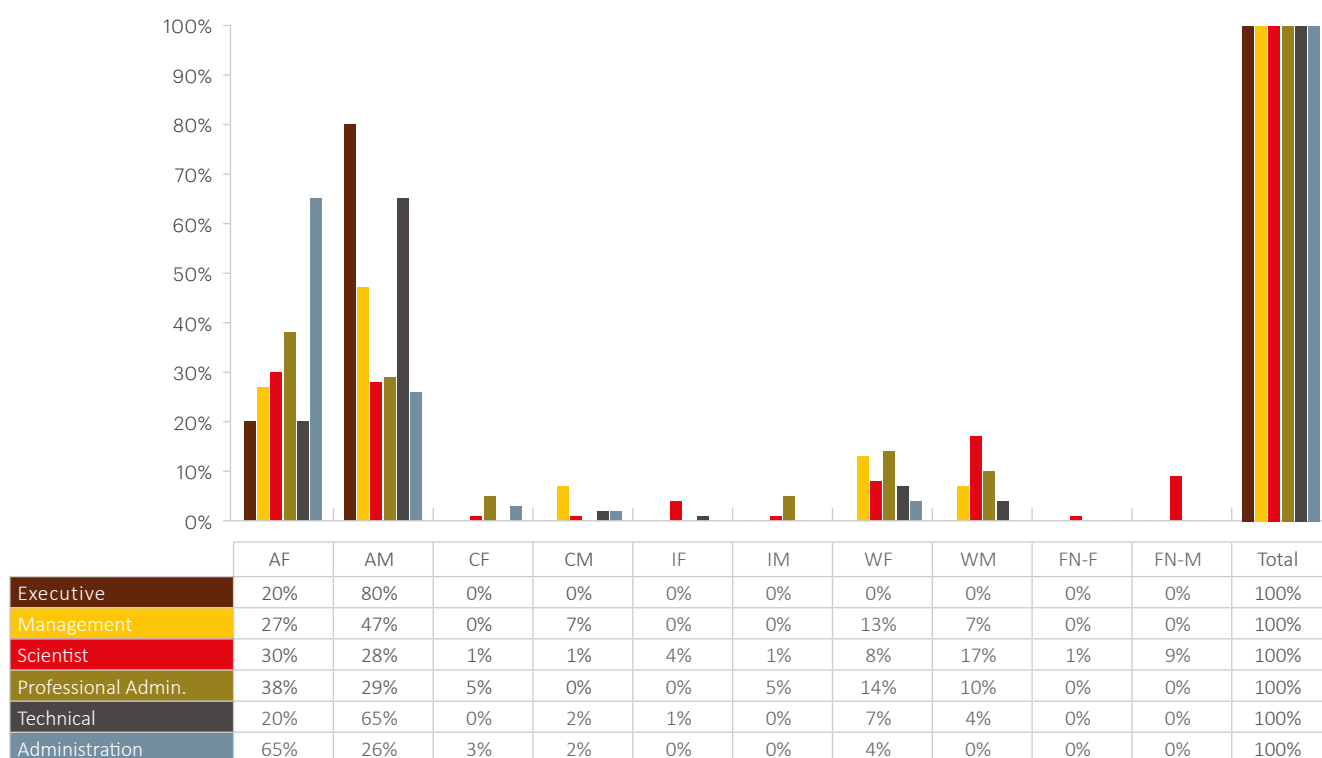
- Performance measurement systems to assess performance;
- Management of employee wellness to ensure the health and wellbeing of staff;
- Key human resources activities for the year;
- Human capital challenges;
- Human resources goals, and
- Human resources statistics.

The CGS regards its staff members as a crucial resource pivotal to the delivery of its strategic objectives. To this end, the Human Resources department is a strategic partner in the organisation whose role is to ensure that the CGS attracts and retains the required resources and expertise to carry out its legislative mandate and strategic objectives.

## 1.2. DIVERSITY AND TRANSFORMATION

The CGS has a diversified workforce. The staff profile by race, gender and job category for the year ending 31 March 2020 is summarised in Figure 38 below:

**Workforce profile: Demographics by Race, Gender and Job Category**



*Figure 38: Workforce profile by race, gender and level.*





## JOHANN NEVELING

### Motto

Prioritise excellence and don't ask of others what I don't do myself.

### Qualifications:

BSc (Hons), MBA, PhD

### Experience:

25 years' research experience in sedimentology and stratigraphy

16 years' project management experience

**Forte:** Ability to recognise and focus on the big picture

### How did you find the programme?

It was an interesting experience

### Key learnings

It was interesting to be exposed to an external view (especially that of the Board) of the CGS's work.

---



## LEBOGANG LEDWABA

### Motto

To be aware requires focus, and to be focused requires awareness

### Qualifications:

2013-2015, MSc (Exploration Geology), Rhodes University Grahamstown

2007-2008, BSc Honours (Geophysics), University of the Witwatersrand Johannesburg

2001-2006, BSc (Mathematics and Physics), University of the Witwatersrand, Johannesburg

**Experience:** More than 12 years' experience in geoscience. I am a versatile scientist with an affinity for numeracy

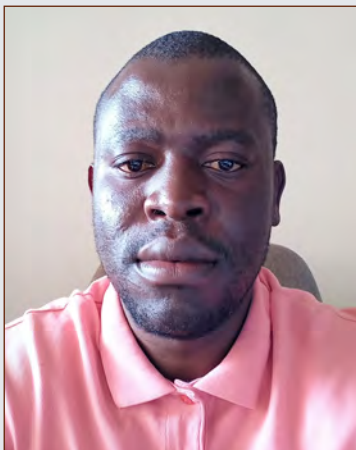
**Forte:** Knowledge in geophysics and exploration geology, given my various roles in the remote sensing and geophysics unit and in other units

### How did you find the programme?

Eye-opening, especially on how large organisations are managed and transformed. It was easy to engage with the executive management team and I found that everyone's point of view is taken into consideration. The way meetings are handled gave me confidence to always raise my point and the experience taught me that hard work always ends with rewards.

### Key learnings

The programme is a force multiplier that has built my critical skills, such as natural leadership, communication, critical and analytical thinking, which are all indispensable in dealing with various stakeholders within and outside the organisation. It has directly influenced how I approach a leadership model and fiscal understanding of the business I am in. I have learnt about executive management strategic plans and business reviews. Having actively contributed to the formulation and implementation of the current CGS Strategic Plan, I am now able to understand change management, strategic development, monitoring and evaluation. Continued exposure to this role has expedited my natural skills and new skills and I am able to appreciate the business's contribution to addressing some of the socio-economic challenges faced by our country. I have also learnt that a shift from pure science to executive management requires a different mindset, and that I have the aptitude for such a shift.



## LITSHEDZANI MUTELE

### Motto

Wisdom and knowledge are essential tools for any form of success

### Qualifications:

BSc majoring in Geology, Applied Mathematics and Chemistry from Rhodes University (2011)

BSc (Hons) in Geology from Rhodes University (2012).

MSc in Geology from the University of KwaZulu Natal (in progress)

### Experience:

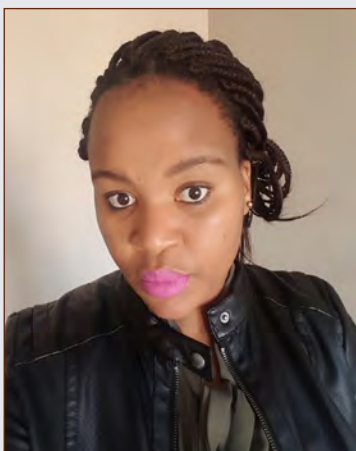
In 2012, I received an internship at the CGS and in the Mineral Resources Development Unit, currently known as the Economic Geology and Geochemistry

Unit. I acquired geoscientific skills and knowledge such as geological and metallogenic mapping and technical writing, and published a metallogenic map with an explanation bulletin of the Lephalale area. In 2014, I was appointed a junior scientist. I have compiled several CGS internal technical reports, bulletins and peer-reviewed papers.

I received CGS excellence awards for junior scientist (2017) and intermediate scientist (2018).

My current position is technical assistant in the office of the Executive for Geological Resources, responsible for compiling GTP documents and quarterly technical reports.

This is a good platform to teach and train, particularly junior staff about the mandate and strategy of the CGS.



## THATO KGARI

### Motto

Success awaits to enrich your life, so strive to do your best

### Qualifications:

MSc (cand) Hydrogeology

### How did you find the programme?

It was a great learning experience for me.

### Key learnings

Corporate governance and its functions (stakeholder, strategy, Exco, committees/ Board etc); governing legislation, policies and applications; strategy management

and link to organisation and government - tracking strategic plan deliverables, creating mechanisms for monitoring progress and performance towards those goals; project management - coordination of the complex activities and driving actions and initiatives within the Geological Resources division and across business units; internal and external audit procedures and application; performance management - manage and track performance for business units and corporate scorecard, planning, budgeting, implementation and monitoring of geoscience programmes as well and national projects within the organisation; and technical advisory role and administration in the executive office.



### Rising through the ranks

The CGS invests in employee development by increasing the required operational, technical, functional and behavioural competencies of its staff as well as by building knowledge management capability that supports retention and transfer. Matome Sekiba is on the way up.

Matome is ready to take a leaf from Warren Buffet's book, judging by his favourite quote -

*'Someone's sitting in the shade today because someone planted a tree a long time ago.'*

Matome joined the CGS in 2005 on a 12-month contract as a technical assistant mostly conducting gravity surveys. In 2008, he earned a six-month experiential learning contract, which exposed him to geophysical techniques such as survey planning and processing of data. In 2009, then a proud CGS bursar holding a National Diploma in Geology, Matome was appointed a technical officer in the Geophysics unit. In that year, he completed a six-month course in basic project management through the University of South Africa, going on to obtain a BTech degree in Geology from Tshwane University of Technology in 2010. Out in the field, he correlated the southeastern limb with other limbs of the Bushveld Igneous Complex to determine whether similar physical properties could be delineated. The results of the study were of the subject of his BTech dissertation entitled 'Magnetostratigraphy of

the southeastern limb of the Bushveld Complex. After nine years of geophysical projects, Matome took a bold decision to complete his BSc Honours degree in 2014. He was then afforded an opportunity to study for an MSc degree funded by the Karoo Deep Drilling Project.

This geophysics go-getter has amassed vast experience in the application of geophysical techniques in geotechnical, mineral and groundwater exploration studies and has carried out geophysical investigations to solve various earth science-related problems. He has been involved in various projects where geophysical techniques have been used to delineate groundwater-bearing structures, including the delineation of pathways that may lead to the contamination of groundwater or surface water. 'I have a keen interest in geohydrological studies, particularly as these relate to groundwater exploration,' he comments.

Striving for great career heights by excelling in his work keeps Matome motivated, and his perseverance and outstanding work were rewarded with a CGS scientific technical excellence award in 2018, which, he says, 'was a magnificent achievement, which contributed immensely to my career growth'. 'I thank the CGS for allowing me to apply my geoscientific knowledge to serve my fellow South Africans,' he concludes.



## Full-time Bursary Programme

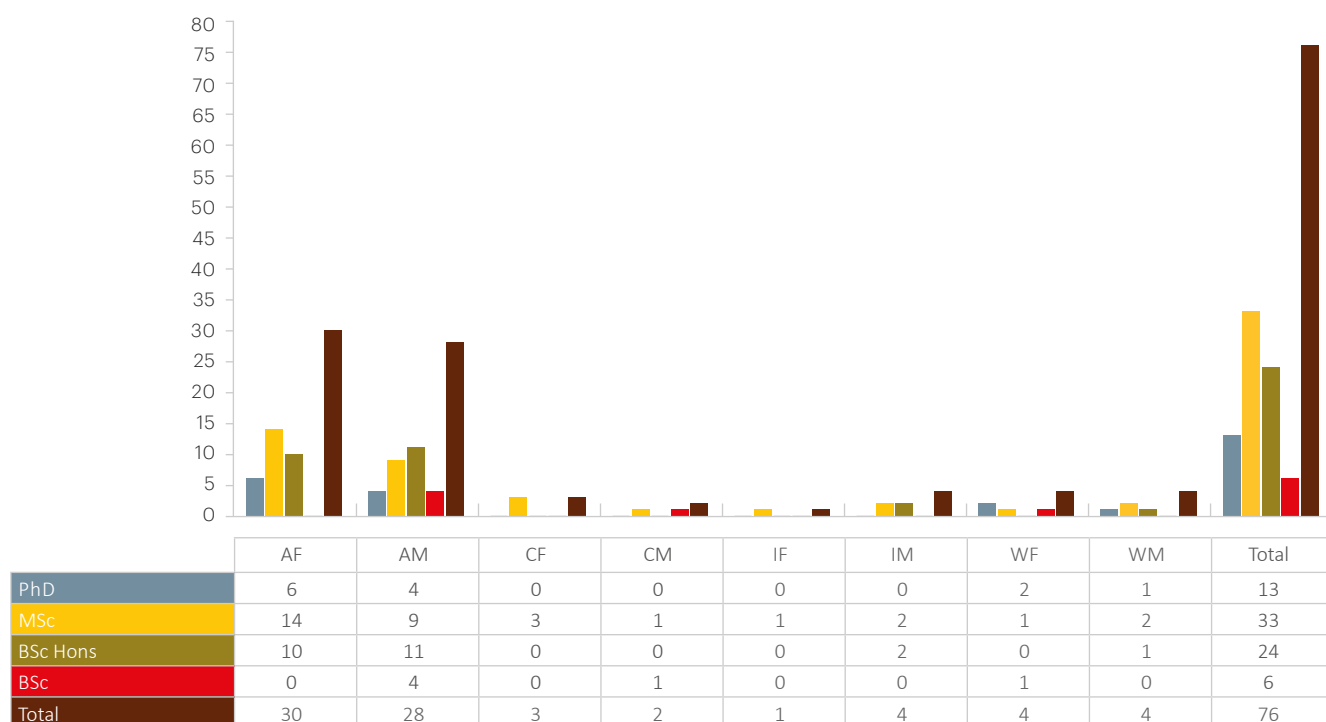


Figure 39: Full Time Bursary Programme.

The CGS is committed to producing high-calibre PhDs to generate knowledge and drive innovation. As seen in Figure 39, there are 76 students in the CGS full-time bursary programme, 17% of whom are registered for PhD degrees and 43% for MSc degrees.

The Figure 40 below indicates the number of bursars scheduled to complete their studies in the 2019/2020 to 2026/2027 fiscal period. Where vacancies exist, these bursars will be absorbed into the CGS.

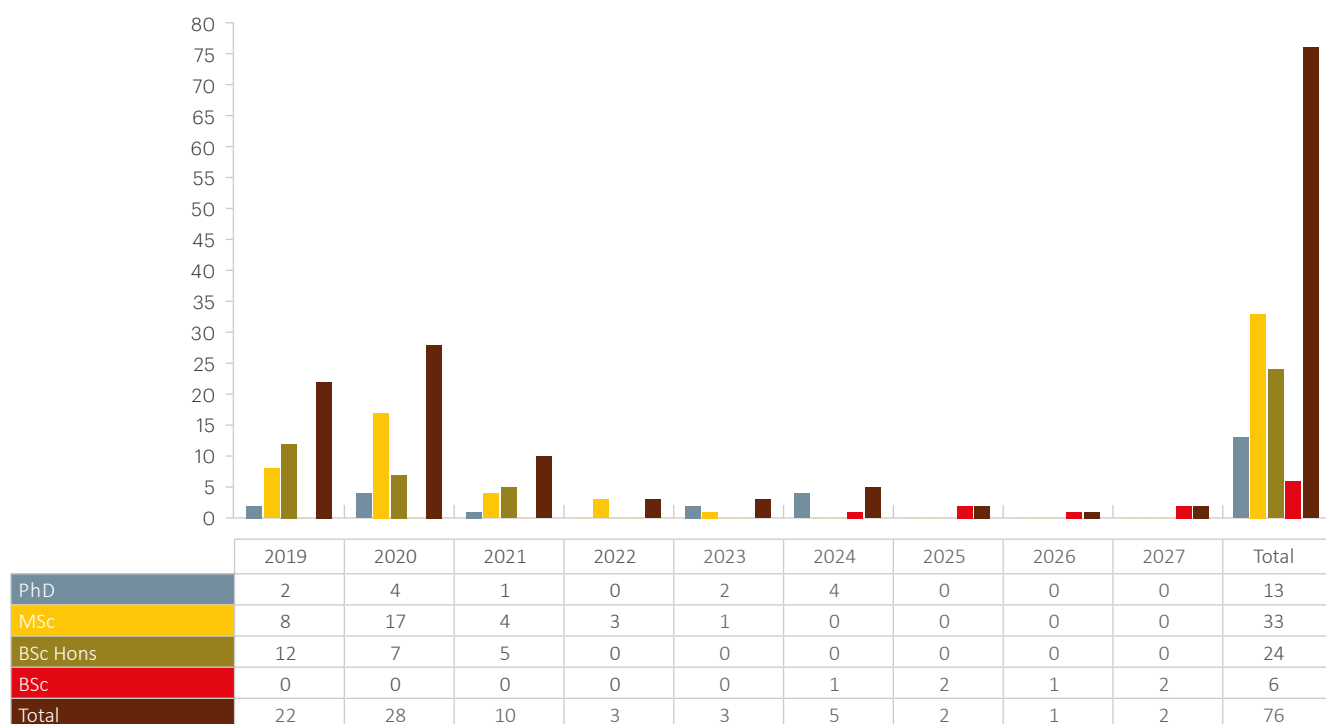


Figure 40: Full-time bursars by anticipated completion date

### 1.3. PART-TIME BURSARS

The part-time bursary programme forms an integral part of the organisation's career development and retention strategies. Currently, 91 employees across the various business units or divisions are beneficiaries of this intervention.

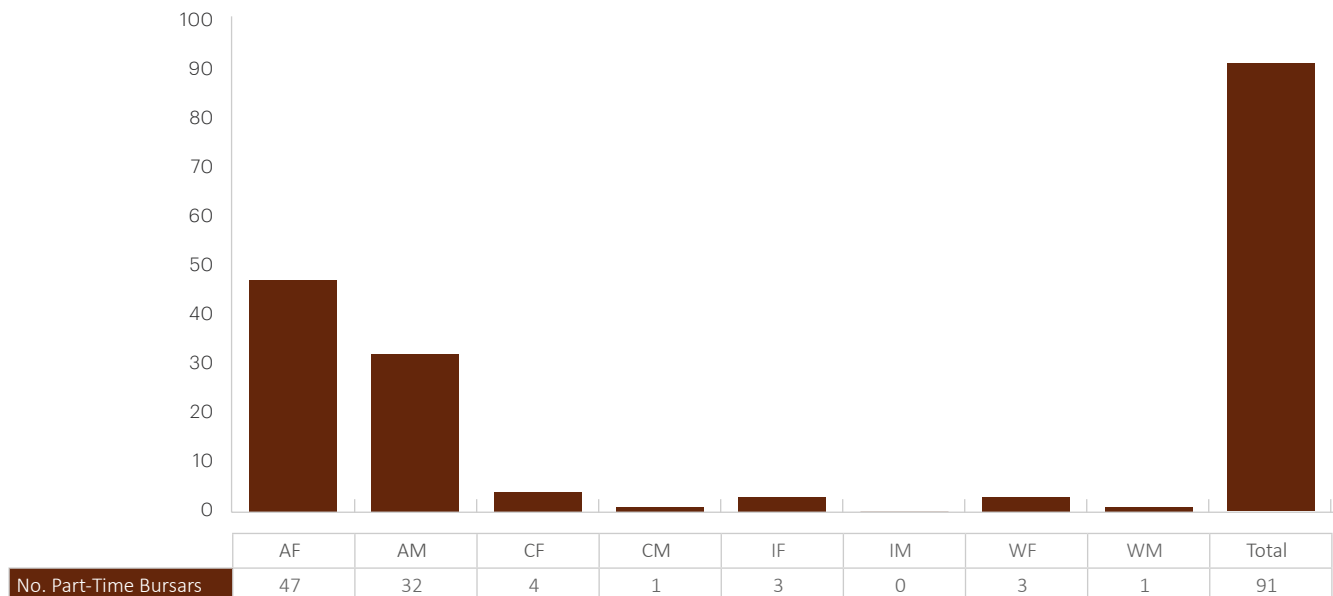


Figure 41: Part-time bursars by race and gender

### 1.4. INTERNSHIP PROGRAMME

Annually, interested and suitably qualified graduates are invited to apply for the CGS two-year internship programme. The internship supports and equips graduates with practical work experience and provides them with exposure to work areas in their career fields. Currently, 28 interns are participating in the programme, 90% of whom are placed in the core functions.

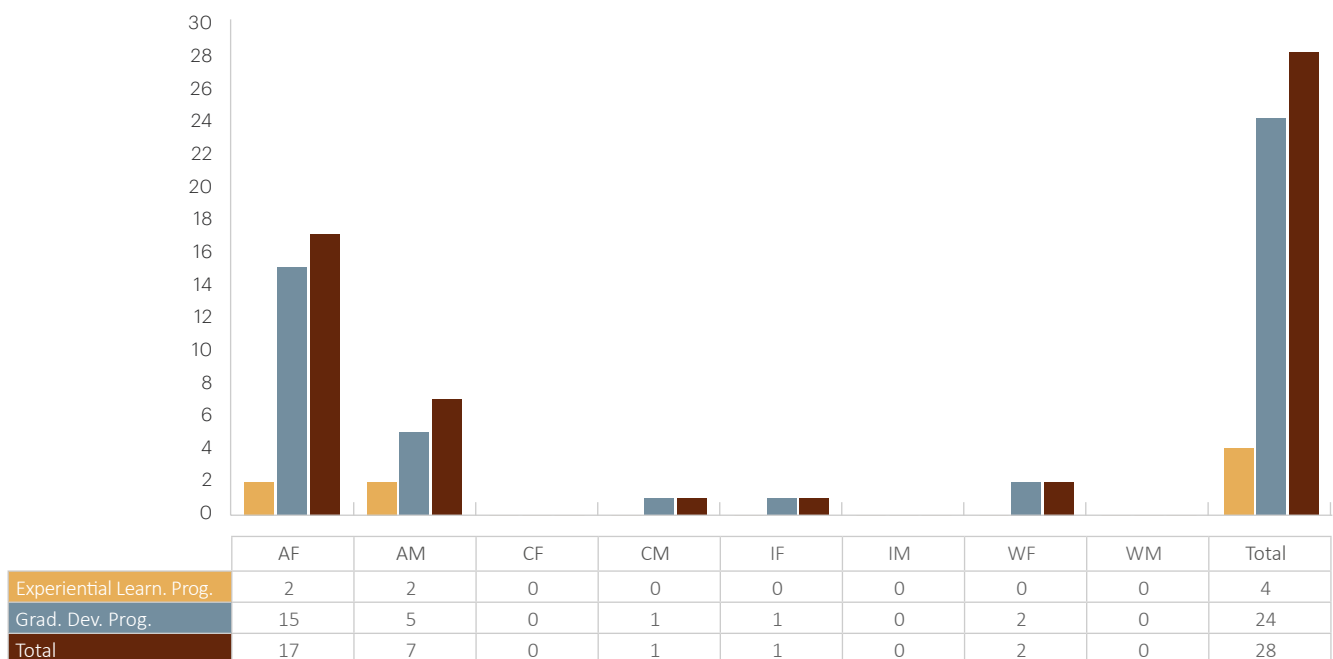


Figure 42: Internship programme

## 1.5. STAFF TURNOVER ANALYSIS

Figure 43 shows that, of exits in the year under review, 39% were voluntary separation (resignations) – 50% in the core functions - and 61%) involuntary separations.

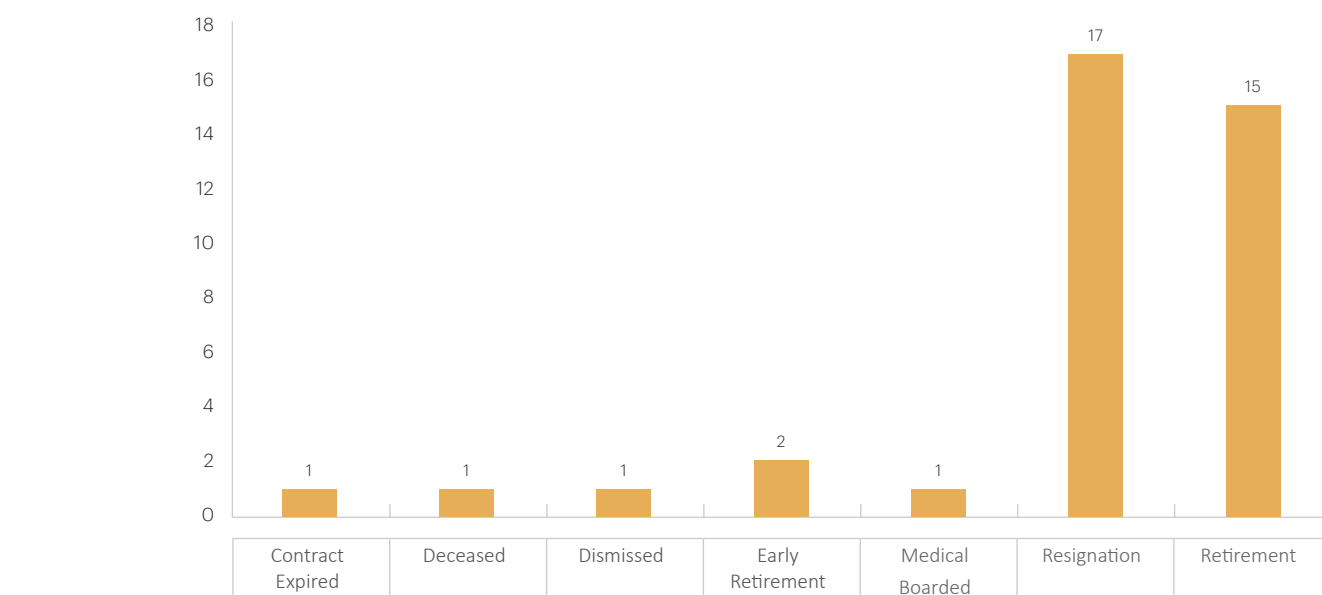


Figure 43: Staff Turnover

## 1.6. STAFFING AND RECRUITMENT

During the year under review, 25 positions were filled, as depicted in Figure 43 above. As CGS is a government entity, positions are advertised, competed for and the best talent appointed based on assessment. Of the 25 positions filled, four were filled by internal candidates, reflecting the worth of CGS training and development initiatives, which provide competitive advantage to internal candidates to compete with external candidates. Further, from time to time, management invites junior employees and labour representatives to strategic retreats, another form of developing the workforce.

Figure 44 reflects the appointment analysis by job category for the year under review:

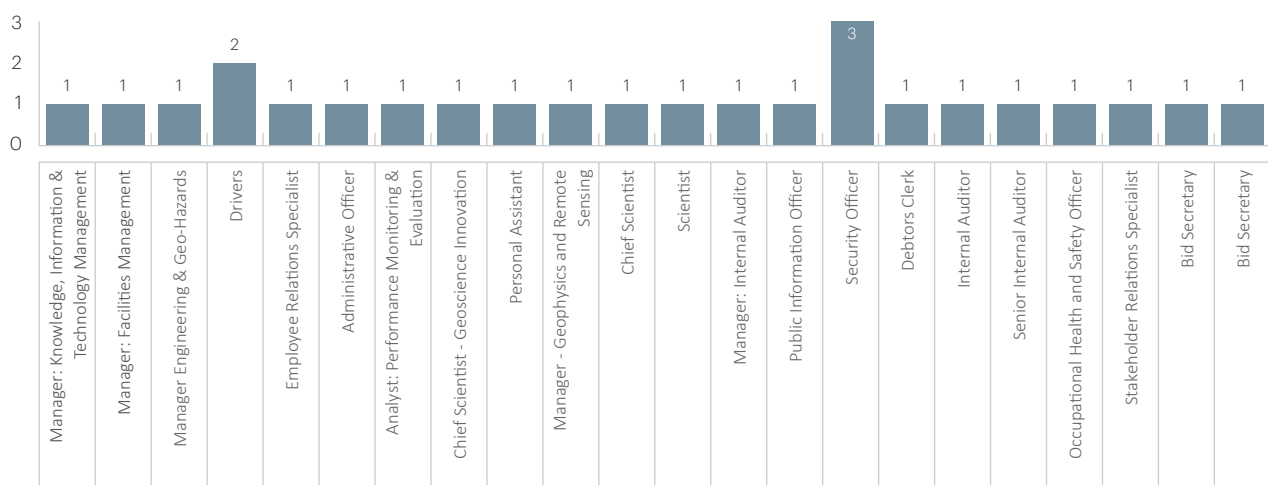


Figure 44: Staff appointments



## 1.7. TRAINING AND PROFESSIONAL DEVELOPMENT

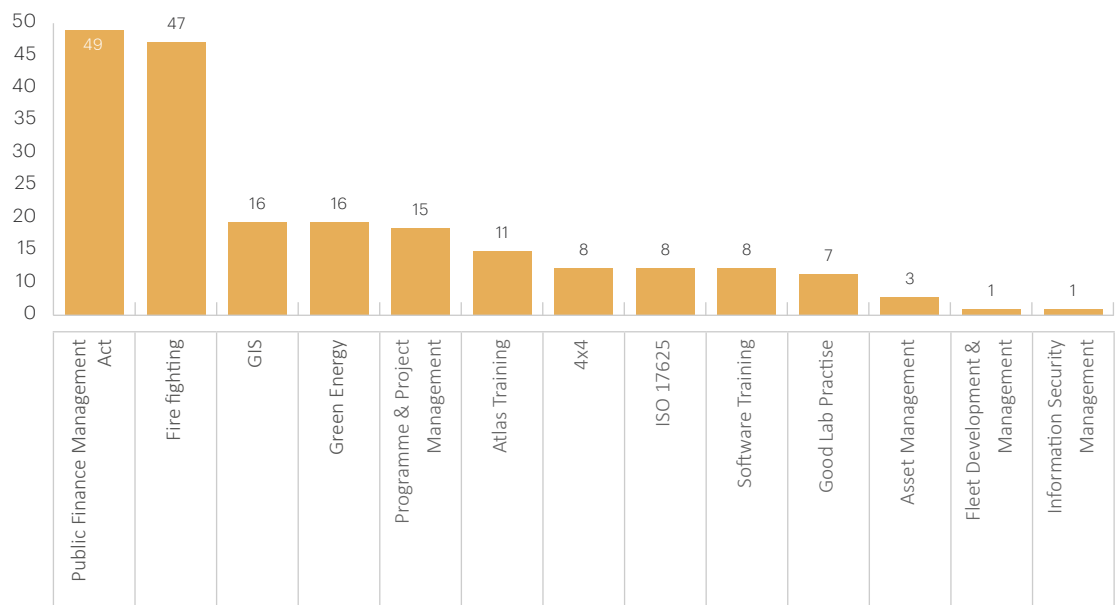


Figure 45: Training and development

## 1.8. EMPLOYEE/INDUSTRIAL RELATIONS

Except for the isolated incident of harassment, all grievances were related to unfairness in grading and job functions, as depicted in Figure 46 below. Given the similarity of incidents, the organisation undertook a job evaluation exercise to correct the disparities and to ensure equality and fairness in job grading and job functions. Job evaluation and grading will provide the foundation for basic needs.

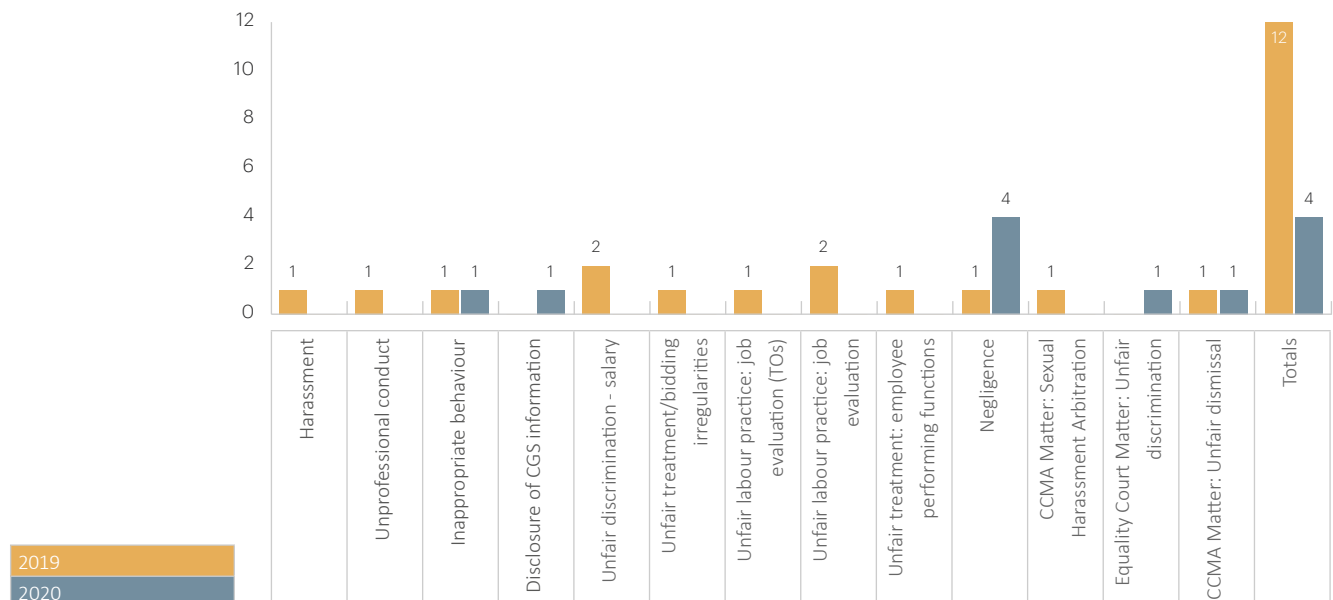


Figure 46: Employee relations

## 1.9. SAFETY AND LOST TIME INJURY

No injuries on duty were reported for the year under review.

## 1.10. EMPLOYEE WELLNESS PROGRAMME

The CGS subscribes to Careways to promote employee wellness in the workplace. The wellness report for the quarter under review indicates a utilisation rate of 10% by CGS staff against the industry benchmark of 9.5% and the government benchmark of 8.43%. The key work-related problems highlighted in the report are as follows:


- a) Workplace trauma
- b) Problems with management
- c) Sexual harassment

Management has put measures in place to address the above. These include a review of the workplace harassment policy, which the Board has already approved, and a planned rollout of workshops in 2020/2021 to raise awareness and encourage reporting by staff. A senior commissioner from the CCMA will facilitate the workshops.

## 1.11. PLANNED ACTIVITIES FOR THE NEXT YEAR

- a) Recognition of Prior Learning (RPL)
- b) Ongoing review of policies
- c) Probation management process mapped and to be rolled out
- d) Compiling an organisation-wide skills matrix.

# Part E: Financial Information



Borehole cores of the Karoo Supergroup from the Springbok Flats Coalfield

## 1. STATEMENT OF RESPONSIBILITY

### Statement of responsibility for the Annual Financial Statements for the year ended 31 March 2020

The Board is responsible for the preparation of the Annual Financial Statements of the CGS and the judgments made in this information.

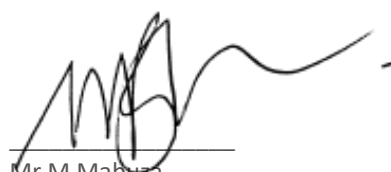
It is the responsibility of the Accounting Authority to establish and implement a system of internal controls designed to provide reasonable assurance of the integrity and reliability of the Annual Financial Statements.

In our opinion, the financial statements fairly reflect the operations of the CGS for the financial year ended 31 March 2020.

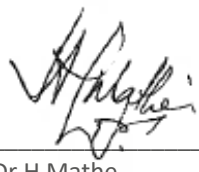
The external auditors are engaged to express an independent opinion on the Annual Financial Statements of the CGS.

The Annual Financial Statements of the CGS for the year ended 31 March 2020 have been audited by the external auditors, and their report is presented on pages 116 to 120.

The Annual Financial Statements of the CGS set out on pages 121 to 154 have been approved.



Mr M Mabuza  
Chief Executive Officer  
Council for Geoscience  
30 September 2020



Dr H Mathe  
Chairperson of the Board  
Council for Geoscience  
30 September 2020



This part of the report provides insight into the financial wellness of the organisation and covers the following aspects:

- The statement of responsibility for the Annual Financial Statements of the year ended 31 March 2020, signed by the CEO, Mr M Mabuza, and the Chairperson of the Board, Dr H Mathe;
- The report of the CEO, which includes the general financial review and matters related to the proposed activities, retention of surplus, supply chain management, audit report and plans for the future;
- Report of the Auditor-General to Parliament on the CGS. This report gives an opinion regarding the fairness of the Annual Financial Statements in presenting the organisation's financial position, financial performance, cash flow in accordance with SA Standards of GRAP and requirements of the PFMA in all material aspects. It reports on performance on legal and regulatory compliance, internal control and related matters, and
- The Annual Financial Statements, comprising the Statement of Financial Position, Statement of Financial Performance, Statement of Changes in Net Assets, Cash Flow Statement and Notes to the Financial Statements.

## 2. Chief Financial Officer's Report



'Sustainable investment in Geosciences will accelerate the recovery of the South African economy. The CGS continues to exploit its vast geoscience information, knowledge and scientific prowess to secure sustainable funding'

**CHIEF FINANCIAL OFFICER**  
**Mr Leonard Matsepe**

### Background

The CGS is listed as a Schedule 3A Public Entity in terms of the PFMA. The objectives of the CGS are to develop and publish world-class geoscience knowledge products and to render geoscience-related services to the South African public and industry.

## Financial position

A steady balance sheet position has been maintained over the last 11 years and total assets have increased by an average rate of 7% over the last decade. The CGS boasts total assets of R614.3 million in 2020 financial year with a liquidity ratio of 1.7.

## Capital expenditure

During the year, the CGS invested R92.7 million (2018/19: R28.7 million) in property, equipment and intangible assets. Continued investment in scientific infrastructure and equipment remains a priority to ensure that world-class facilities and equipment are acquired and maintained.

## Cash flow management

Accelerated financial support of our Integrated and Multidisciplinary Geoscience Mapping Programme has seen the cash and cash equivalents decrease from R253.6 million in 2019 to R232 million in 2020, resulting in a net cash outflow of R21.6 million.

## Going concern

The CGS's Annual Financial Statements have been prepared on the going-concern basis. Executive management has performed a formal review of the CGS's ability to continue as a going concern in the foreseeable future and based on this review, considers that the presentation of the financial statements on this basis is appropriate.

## Events after the 31 March 2020

### Non-Adjusting events

#### COVID-19 Pandemic

The Novel Corona Virus pandemic and subsequent supplementary budget speech has not materially impacted the CGS, however the programme of the CGS has been streamlined to maximise on delivery and impact. No facts nor circumstances of a material nature arose between the financial year-end and the date of this report which needs to be reported as part of these annual financial statements apart from the items mentioned above.

#### Deep drilling programme in Beaufort-West

The Council for Geoscience awarded a contract to a service provider for a Deep Vertical Stratigraphic research core borehole for the Karoo Deep drilling programme in Beaufort-West with an estimated value of R35 million.

#### Probalistic seismic hazard analysis

The Council for Geoscience awarded a contract to a service provider to oversee the planning, development and technical execution of a probalistic seismic hazard analysis for a nuclear site with an estimated value of R34 million.

#### CGS appointed as implementing agent for the Carbon Capture, Storage and Utilisation project (CCSU)

The Council for Geoscience has been appointed as the implementing agency of the CCSU project. The Director General of Minerals and Energy requested South African Nation Energy Development Institute (SANEDI) to transfer the MTEF funding allocations that were made available for the Carbon Capture, Storage and Utilisation project to the CGS. The total value of project is still being evaluated.

### New proposed activities

The Geoscience Amendment Act (Act No 16 of 2010) mandates the CGS to, among others, be the custodian and curator of all geotechnical information in South Africa. The CGS is also the national mandatory authority for geohazards related to infrastructure development. Thus, the Act empowers the CGS to be the custodian of all geotechnical data with the purpose of advising government, state institutions, private organisations and the public on the complete geotechnical risk profile of the country.

In addition, the CGS has been specifically entrusted with the responsibility of monitoring seismicity related to the resumption of mining activity during the national lockdown.

### Request for the retention of surplus

In terms of Section 53(3) of the PFMA of 1999, the CGS has to obtain approval from National Treasury to retain surpluses. Approval was obtained for the use of accumulated surpluses for the maintenance of and investment in scientific equipment and infrastructure, and the implementation of the repositioning strategy. A new request will be made for the year under review.

### Supply chain management

The Supply Chain Management Unit is operational under the division of the Chief Financial Officer. This business unit provides an appropriate procurement and provisioning system, which is fair, equitable, transparent, competitive and cost-effective, and is established in accordance with Section 54 of the PFMA of 1999 (as amended by Act No 29 of 1999). In terms of the BBBEE, Section 13G (1) of the B-BBEE Act, the CGS complied with Management control and Enterprise Supplier Development.

### Audit report matters

The CGS obtained an unqualified audit opinion from the Auditor-General for the year ended 31 March 2020 and will continue to enhance internal control environment.

### Financial Sustainability

The CGS continues to exploit its vast geoscience information, knowledge and scientific prowess to secure sustainable funding. To this end, the CGS develops purposeful value propositions worthy of both fiscal and commercial investment. The CGS remains committed and primarily focuses on supporting the national imperatives through the delivery of its mandate.



### 3. REPORT OF THE AUDITOR-GENERAL TO PARLIAMENT ON THE COUNCIL FOR GEOSCIENCE

#### Report on the audit of the financial statements

##### Opinion

1. I have audited the financial statements of the Council for Geoscience set out on pages 121 to 154 which comprise the statement of financial position as at 31 March 2020, statement of financial performance, statement of changes in net assets and cash flow statement for the year then ended, as well as the notes to the financial statements, including a summary of significant accounting policies.
2. In my opinion, the financial statements present fairly, in all material respects, the financial position of the Council for Geoscience as at 31 March 2020, and its financial performance and cash flows for the year then ended in accordance with the Standards of Generally Recognised Accounting Practice (Standards of GRAP) and the requirements of the Public Finance Management Act of South Africa, 1999 (Act No. 1 of 1999) (PFMA).

##### Basis for opinion

3. I conducted my audit in accordance with the International Standards on Auditing (ISAs). My responsibilities under those standards are further described in the auditor-general's responsibilities for the audit of the financial statements section of this auditor's report.
4. I am independent of the public entity in accordance with sections 290 and 291 of the *Code of ethics for professional accountants* and parts 1 and 3 of the *International Code of Ethics for Professional Accountants (including International Independence Standards)* of the International Ethics Standards Board for Accountants (IESBA codes) as well as the ethical requirements that are relevant to my audit in South Africa. I have fulfilled my other ethical responsibilities in accordance with these requirements and the IESBA codes.
5. I believe that the audit evidence I have obtained is sufficient and appropriate to provide a basis for my opinion.

##### Emphasis of matters

6. I draw attention to the matters below. My opinion is not modified in respect of these matters.

##### Restatement of corresponding figures

7. As disclosed in note 24 to the financial statements, the corresponding figures for 31 March 2019 were restated as a result of an error in the financial statements of the public entity at, and for the year ended, 31 March 2020.

##### Events after reporting date

8. I draw attention to note 23 to the financial statements, which deals with subsequent events, and specifically the possible effects of the future implications of COVID-19 on the public entity's future prospects, performance and cash flows.

##### Responsibilities of the accounting authority for the financial statements

9. The accounting authority is responsible for the preparation and fair presentation of the financial statements in accordance with the Standards of GRAP and the requirements of the PFMA, and for such internal control as the

accounting authority determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

10. In preparing the financial statements, the accounting authority is responsible for assessing the public entity's ability to continue as a going concern, disclosing, as applicable, matters relating to going concern and using the going concern basis of accounting unless the appropriate governance structure either intends to liquidate the public entity or to cease operations, or has no realistic alternative but to do so.

#### Auditor-general's responsibilities for the audit of the financial statements

11. My objectives are to obtain reasonable assurance about whether the 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 my opinion. Reasonable assurance is a high level of assurance but is not a guarantee that an audit conducted in accordance with the ISAs will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.
12. A further description of my responsibilities for the audit of the financial statements is included in the annexure to this auditor's report.

## Report on the audit of the annual performance report

#### Introduction and scope

13. In accordance with the Public Audit Act of South Africa, 2004 (Act No. 25 of 2004) (PAA) and the general notice issued in terms thereof, I have a responsibility to report on the usefulness and reliability of the reported performance information against predetermined objectives for selected objectives presented in the annual performance report. I performed procedures to identify material findings but not to gather evidence to express assurance.
14. My procedures address the usefulness and reliability of the reported performance information, which must be based on the approved performance planning documents of the public entity. I have not evaluated the completeness and appropriateness of the performance measures included in the planning documents. My procedures do not examine whether the actions taken by the public entity enabled service delivery. My procedures also do not extend to any disclosures or assertions relating to planned performance strategies and information in respect of future periods that may be included as part of the reported performance information. Accordingly, my findings do not extend to these matters.
15. I evaluated the usefulness and reliability of the reported performance information in accordance with the criteria developed from the performance management and reporting framework, as defined in the general notice, for the following selected objective presented in the annual performance report of the public entity for the year ended 31 March 2020:

Objectives/	Pages in the annual performance report
Objective 4 – Delivery of the mandate	34 - 35

16. I performed procedures to determine whether the reported performance information was properly presented and whether performance was consistent with the approved performance planning documents. I performed further procedures to determine whether the indicators and related targets were measurable and relevant, and assessed the reliability of the reported performance information to determine whether it was valid, accurate and complete.

17. I did not identify any material findings on the usefulness and reliability of the reported performance information for this objective:
- Objective 4 – Delivery of the mandate

#### Other matters

18. I draw attention to the matters below.

#### Achievement of planned targets

19. Refer to the annual performance report on pages 34 to 35 for information on the achievement of planned targets for the year and explanations provided for the under/over achievement of a number of targets.

#### Adjustment of material misstatements

20. I identified material misstatements in the annual performance report submitted for auditing. These material misstatements were in the reported performance information of objective 4: delivery of the mandate. As management subsequently corrected the misstatements, I did not raise any material findings on the usefulness and reliability of the reported performance information.

## Report on the audit of compliance with legislation

#### Introduction and scope

21. In accordance with the PAA and the general notice issued in terms thereof, I have a responsibility to report material findings on the public entity's compliance with specific matters in key legislation. I performed procedures to identify findings but not to gather evidence to express assurance.
22. The material findings on compliance with specific matters in key legislation are as follows:

#### Annual financial statements

23. The financial statements submitted for auditing were not prepared in accordance with the prescribed financial reporting framework, as required by section 55(1) (b) of the PFMA.
24. Material misstatements of non-current assets, current liabilities, revenue, expenditure, disclosure items and statement of changes in net assets identified by the auditors in the submitted financial statement were corrected, resulting in the financial statements receiving an unqualified audit opinion.

## Other information

25. The accounting authority is responsible for the other information. The other information comprises the information included in the annual. The other information does not include the financial statements, the auditor's report and those selected objectives presented in the annual performance report that have been specifically reported in this auditor's report.
26. My opinion on the financial statements and findings on the reported performance information and compliance with legislation do not cover the other information and I do not express an audit opinion or any form of assurance conclusion thereon.



27. In connection with my audit, my responsibility is to read the other information and, in doing so, consider whether the other information is materially inconsistent with the financial statements and the selected objectives presented in the annual performance report, or my knowledge obtained in the audit, or otherwise appears to be materially misstated.
28. If based on the work I have performed, I conclude that there is a material misstatement in this other information, I am required to report that fact. I have nothing to report in this regard.

## Internal control deficiencies

29. I considered internal control relevant to my audit of the financial statements, reported performance information and compliance with applicable legislation; however, my objective was not to express any form of assurance on it. The matters reported below are limited to the significant internal control deficiencies that resulted in the findings on compliance with legislation included in this report.
30. Management did not adequately prepare accurate and complete financial statements that are supported and evidenced by reliable information; as a result, there were material adjustments to the financial statements.

## Other reports

31. I draw attention to the following engagements conducted by various parties which had, or could have, an impact on the matters reported in the public entity's financial statements, reported performance information, compliance with applicable legislation and other related matters. These reports did not form part of my opinion on the financial statements or my findings on the reported performance information or compliance with legislation.
32. An independent consultant investigated an allegation of possible misappropriation of the public entity's assets, at the request of the public entity, which covered the period 1 April 2017 to 30 April 2018. The investigation was concluded in October 2018 and resulted in further inquiries into the implicated employees. These proceedings were concluded and the implicated employees resigned on 16 May 2019 and 31 July 2019.
33. An independent consultant investigated an allegation of irregular procurement of assets, at the request of the public entity, which covered purchases made in 2016. The investigation was concluded in May 2019 and resulted in further inquiries into the implicated employees. These proceedings were concluded and the implicated employees resigned on 31 July 2019.

*Auditor-General*

Pretoria  
30 September 2020



## Annexure – Auditor-general’s responsibility for the audit

1. As part of an audit in accordance with the ISAs, I exercise professional judgement and maintain professional scepticism throughout my audit of the financial statements and the procedures performed on reported performance information for selected objective and on the public entity’s compliance with respect to the selected subject matters.

### Financial statements

2. In addition to my responsibility for the audit of the financial statements as described in this auditor’s report, I also:
  - identify and assess the risks of material misstatement of the 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 my 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 public entity’s internal control
  - evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by the accounting authority
  - conclude on the appropriateness of the accounting authority’s use of the going concern basis of accounting in the preparation of the financial statements. I also conclude, based on the audit evidence obtained, whether a material uncertainty exists relating to events or conditions that may cast significant doubt on the ability of the Council for Geoscience to continue as a going concern. If I conclude that a material uncertainty exists, I am required to draw attention in my auditor’s report to the related disclosures in the financial statements about the material uncertainty or, if such disclosures are inadequate, to modify my opinion on the financial statements. My conclusions are based on the information available to me at the date of this auditor’s report. However, future events or conditions may cause a public entity to cease operating as a going concern
  - evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and determine whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation

### Communication with those charged with governance

3. I communicate with the accounting authority regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that I identify during my audit.
4. I also confirm to the accounting authority that I have complied with relevant ethical requirements regarding independence, and communicate all relationships and other matters that may reasonably be thought to have a bearing on my independence and, where applicable, actions taken to eliminate threats or safeguards applied.

## 4. ANNUAL FINANCIAL STATEMENTS FOR THE YEAR ENDED 31 MARCH 2020

# Statement of Financial Position

as at 31 March 2020

	Note(s)	2020 R'000	2019 (Restated) R'000
<b>Assets</b>			
<b>Non-current assets</b>			
		345 147	279 168
Property and equipment	3	326 633	260 051
Intangible assets	4	952	1 555
Heritage assets	25	17 562	17 562
<b>Current assets</b>		<b>269 202</b>	<b>388 562</b>
Inventories	5	5	5
Trade and other receivables from exchange transactions	7	37 184	134 975
Cash and cash equivalents	8	232 013	253 582
<b>Total assets</b>		<b>614 349</b>	<b>667 730</b>
<b>Net assets and liabilities</b>			
Accumulated surplus		445 081	384 135
<b>Non-current liabilities</b>			
Post-employment benefit liabilities	6	9 254	7 661
<b>Current liabilities</b>		<b>160 014</b>	<b>275 934</b>
Trade and other payables	9	25 688	29 461
Deferred income	10	109 127	221 360
Accruals	11	25 199	25 113
<b>Total net assets and liabilities</b>		<b>614 349</b>	<b>667 730</b>



# Statement of Financial Performance

for the Period Ended 31 March 2020

	Note(s)	2020 R'000	2019 (Restated) R'000
<b>Total Revenue</b>		<b>486 198</b>	<b>484 085</b>
Revenue from exchange transactions	12	287 659	284 750
Revenue from non - exchange transactions	12	198 539	199 335
<b>Total cost of projects</b>		<b>(165 673)</b>	<b>(178 817)</b>
Cost of commercial projects	12	(22 698)	(20 775)
Cost of statutory projects	12	(142 975)	(158 042)
<b>Gross surplus</b>		<b>320 525</b>	<b>305 268</b>
Administrative expenses		(255 959)	(304 394)
Other operating expenses	12	(3 600)	(6 457)
<b>Surplus from operations</b>		<b>60 966</b>	<b>(5 583)</b>
Finance cost	13	(20)	(28)
<b>Net surplus for the year</b>		<b>60 946</b>	<b>(5 611)</b>

# Statement of Changes in Net Assets

for the Period Ended 31 March 2020

	Note(s)	Accumulated surplus R'000	Total R'000
<b>Opening balance at 31 March 2018</b>		<b>384 417</b>	<b>389 746</b>
Correction of prior period error	24	5 329	5 329
<b>Restated balance at 31 March 2018</b>		<b>389 746</b>	<b>389 746</b>
Net (loss) for the period		(1 086)	(1 086)
Correction of prior period error	24	(4 525)	(4 525)
		(5 611)	(5 611)
<b>Restated balance at 31 March 2019</b>		<b>384 135</b>	<b>384 135</b>
Net surplus for the period		60 946	60 946
<b>Balance at 31 March 2020</b>		<b>445 081</b>	<b>445 081</b>

# Cash Flow Statement

for the Period Ended 31 March 2020

	Note(s)	2020 R'000	2019 (Restated) R'000
<b>Cash inflow from operating activities</b>		<b>67 891</b>	<b>16 989</b>
Cash receipts from customers		549 165	342 754
Cash paid to suppliers and employees		(504 583)	(346 869)
Cash generated from operations	15	44 582	(4 115)
Interest received	12	23 329	21 132
Finance cost	13	(20)	(28)
<b>Cash outflow from investing activities</b>		<b>(89 460)</b>	<b>(28 013)</b>
Acquisition of:			
Property and equipment	15,1	(92 543)	(28 542)
Intangible assets	15,2	(207)	(132)
Proceeds from sale of asset	12	874	339
Insurance proceeds for property and equipment	3,1	2 416	322
<b>Net (decrease) in cash and cash equivalents</b>		<b>(21 569)</b>	<b>(11 024)</b>
<b>Cash and cash equivalents at beginning of period</b>	8	<b>253 582</b>	<b>264 606</b>
<b>Cash and cash equivalents at end of period</b>	8	<b>232 013</b>	<b>253 582</b>

# Accounting Policies

for the Annual Financial Statements for the Year Ended 31 March 2020

## 1 Accounting policies

### 1.1 Basis of preparation

Statement of compliance

1. The financial statements have been prepared in accordance with the Standards of Generally Recognised Accounting Practices (GRAP) including any interpretations, guidelines and directives issued by the Accounting Standards Board.

The financial statements have been prepared on a historic cost basis and accounting policies are consistent with prior years.

These annual financial statements have been prepared on a going concern basis, i.e. the assumption that the Council for Geoscience will continue to operate as a going concern for at least the next twelve months.

2. The cash flow statement has been prepared in accordance with the direct method.
3. Specific information is presented separately on the statement of financial position such as:
  - (a) receivables from non-exchange transactions, including taxes and transfers;
  - (b) taxes and transfers payable;
  - (c) trade and other payables from non-exchange transactions.

The budget reporting standard does not apply to the Council for Geoscience as our budget is tabled as part of the Department of Mineral Resources & Energy budget.

### 1.2 Revenue recognition

Revenue comprises the revenue from non-exchange transactions recognised as income in the current year, contract income and sales of publications.

The Council for Geoscience measures revenue at the fair value of the consideration received or receivable. Revenue is recognised only when it is probable that the economic benefits associated with a transaction will flow to the Council for Geoscience, and the amount of revenue and associated costs incurred or to be incurred, can be measured reliably.

#### 1.2.1 Revenue from non-exchange transactions

The Council for Geoscience receives grants in the form of a baseline allocation from the Department of Mineral Resources & Energy.

Revenue from non-exchange transactions is recorded as deferred income when it is received. It is then recognised as income proportionate to the costs incurred.

#### 1.2.2 Revenue from exchange transactions

Revenue from exchange transactions comprises sales and contract revenue as follows:



# Accounting Policies

for the Annual Financial Statements for the Year Ended 31 March 2020

## **Sales revenue**

Sales revenue represents the invoiced value of goods and services supplied by the Council for Geoscience. This revenue is recognised when the revenue recognition criteria are met.

## **Contract revenue**

Revenue from contracts is recognised by means of progress payments over the duration of the contracts. Revenue from contracts in progress is recognised when the revenue criteria are met. When the outcome of a contract can be estimated reliably, revenue is recognised by referring to the stage of completion of the contract outcome.

## **1.3 Interest received**

Interest is recognised on a time proportionate basis with reference to the principal amount receivable and the effective interest rate applicable.

## **1.4 Property and equipment**

Property and equipment are tangible non-current assets that are held for use in the production or supply of goods or services, or for administrative purposes, and are expected to be used during more than one period.

The cost of an item of property and equipment is recognised as an asset when:

- it is probable that future economic benefits associated with the item will flow to the Council for Geoscience; and
- the cost of the item can be measured reliably.

Land and buildings were valued at initial recognition and subsequently only the building is depreciated on a straight-line method.

Costs include costs incurred initially to acquire or construct an item of property and equipment and costs incurred subsequently to add to, replace part of, or service it. If the cost of a replacement part is recognised in the carrying amount of an item of property and equipment, the carrying amount of the replaced part is derecognised.

Property and equipment are carried at cost less accumulated depreciation and any impairment losses.

Day to day expenses incurred on property and equipment are expensed directly to surplus or deficit for the period.

Where an asset is acquired at no cost, or at a nominal cost, its cost is its fair value as at date of acquisition.

Major refurbishment that meets the recognition criteria of an asset is capitalised.

Depreciation is provided on all property and equipment other than freehold land, to write down the cost, less residual value, on a straight line basis over their average useful lives, as follows:

# Accounting Policies

for the Annual Financial Statements for the Year Ended 31 March 2020

<b>Land</b>	<b>Not depreciable</b>
Buildings	30 years
Motor vehicles	5 to 10 years
Equipment	5 to 10 years
Aircraft & Helicopter - Body	15 years
Aircraft & Helicopter - Components	Useful hours per Civil Aviation Authority
Boat	10 years
Office furniture	20 to 23 years
Computer equipment	6 to 11 years
Specialised equipment	15 years

The depreciation charges for each period are recognised in the statement of financial performance, unless it is included in the carrying amount of another asset.

The average useful lives and residual values are reviewed on an annual basis and changes are reflected as change in accounting estimates on a prospective basis.

## 1.5 Intangible assets

An intangible asset is recognised 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.

Capitalised computer software is carried at cost less accumulated amortisation and less accumulated impairment losses. Computer software is tested annually for impairment or changes in estimated future benefits. Amortisation is provided to write down the intangible assets to their residual value, on a straight-line basis, being two to eight years.

### Research and development

Expenditure on research activities is recognised as an expense in the period in which it is incurred.

An internally generated intangible asset arising from research and development is recognised as part of intangible assets only if all of the following conditions are met:

- an asset is created that can be identified;
- it is probable that the asset created will generate future economic benefits;
- the development cost of the asset can be measured reliably.

Where no internally generated intangible asset can be recognised, development expenditure is recognised as an expense in the period in which it is incurred. Internally generated assets are amortised on a straight-line basis over their useful lives.

# Accounting Policies

for the Annual Financial Statements for the Year Ended 31 March 2020

## 1.6 Heritage assets

Heritage assets are assets held for their cultural, environmental or historical significance. Heritage assets are initially recognised at deemed cost which has been determined, due to the nature of heritage assets, by specialist valuers. Heritage assets are reflected at deemed cost and are not depreciated. At each reporting date Heritage assets are assessed for indications of impairment. If any such indication exists, an estimate of the recoverable amount or the recoverable service amount of the heritage assets will be determined and tested against the carrying amount.

## 1.7 Inventories

The Council for Geoscience is a custodian of scientific information that produces publications in the form of books, maps and map explanations etc. These publications are distributed to the public for free or at a nominal charge.

Inventories are initially measured at deemed costs (fair value).

## 1.8 Translation of foreign currencies

### Foreign currency transactions

A foreign currency transaction is recorded, on initial recognition in Rands, by applying to the foreign currency amount the spot exchange rate between the Rand and the foreign currency at the date of the transaction.

At each balance sheet date:

- foreign currency monetary items are translated using the closing rate.

Exchange differences arising on the settlement of monetary items or on translating monetary items at rates different from those at which they were translated on initial recognition during the period or in previous annual financial statements are recognised in the statement of financial performance in the period in which they arise.

Cash flows arising from transactions in a foreign currency are recorded in Rands by applying to the foreign currency amount the exchange rate between the Rand and the foreign currency at the date of the cash flow.

## 1.9 Deferred income

Deferred Income is accounted for in the statement of financial position. The related revenue is recognised on an accrual basis in the statement of financial performance in the period in which it satisfies the revenue recognition criteria.

## 1.10 Retirement benefit costs

### Short-term employee benefits

The cost of short-term employee benefits (those payable within twelve months after the service is rendered, such as bonuses, paid vacation leave and sick leave) is recognised in the period in which the service is rendered and is not discounted.

# Accounting Policies

for the Annual Financial Statements for the Year Ended 31 March 2020

The expected cost of compensated absences is recognised as an expense as the employees render services that increase their entitlement or, in the case of non-accumulating absences, when the absence occurs.

## **Defined contribution and defined benefit plans**

The Council for Geoscience operates both a defined contribution pension and provident fund and a defined benefit plan in respect of post-retirement medical-aid contributions. For the defined benefit plan, the defined benefit obligation and the related current service cost, is determined by using the projected unit credit method. The defined benefit plan is subject to an annual actuarial valuation. The qualifying plan asset of this scheme is held and administered by Momentum Group Limited.

The actuarial gains or losses are further limited to the extent that the net cumulative unrecognised actuarial gains or losses (before recognition of that actuarial gain or loss) exceed the unrecognised part of the transactional liability. Payments to defined contribution retirement benefit plans are charged to the statement of financial performance in the year to which they relate.

## **1.11 Provisions and contingent liabilities**

### **Provisions are recognised when:**

- the entity has a present obligation as a result of a past event;
- it is probable that an outflow of resources embodying economic benefits will be required to settle the obligation; and
- a reliable estimate can be made of the obligation.

The amount of a provision is the present value of the expenditure expected to be required to settle the obligation.

### **Commitments**

The Council for Geoscience classifies commitments as contracted future transactions that are non-cancellable or only cancellable at significant cost, and that will normally result in the outflow of cash.

This excludes steady routine transactions such as salary commitments relating to employment contracts or social security benefits.

A distinction is made between operational and capital commitments.

Disclosure is made of the aggregate amount of operational and capital expenditure contracted for at the reporting date, to the extent that the amount has not been recorded in the financial statements.

If a commitment is for a period longer than a year, it is stated in the note to the commitments.

Disclosure of expenditure that has been approved, but that has not yet been contracted for, is made.



# Accounting Policies

for the Annual Financial Statements for the Year Ended 31 March 2020

## **1.12 Financial instruments**

### **Initial recognition**

The entity classifies financial instruments, or their component parts, on initial recognition as a financial asset, a financial liability or an equity instrument in accordance with the substance of the contractual arrangement.

Financial assets and liabilities are recognised on the entity's statement of financial position when the Council for Geoscience becomes party to the contractual provisions of the instrument.

Financial assets and liabilities are recognised initially at fair value.

### **Derecognition of financial instruments**

The entity derecognises a financial asset only when the contractual rights to the cash flows from the asset expire, or it transfers the financial asset and substantially all the risks and rewards of ownership of the asset to another entity.

The entity derecognises financial liabilities when the entity's obligations are discharged, cancelled or they expire.

### **Impairment of loans and receivables**

Financial assets are assessed for indicators of impairment at each balance sheet date. Financial assets are impaired where there is objective evidence that, as a result of one or more events that occurred after the initial recognition of the financial asset, the estimated future cash flows of the investment have been impacted.

The carrying amount of trade receivables is reduced through the use of an allowance account (bad debt provision). When a trade receivable is considered uncollectible, it is written off against the allowance account. Subsequent recoveries of amounts previously written off are credited against the allowance account. Changes in the carrying amount of the allowance account are recognised in surplus or deficit.

Fair values of trade and other payables are determined at a price charged at transaction date and impaired when indicators of impairment are present. At period end there were no differences between the book value and the fair values of trade and other payables.

### **Fair value of trade and other receivables**

Fair values of trade and other receivables are determined at a price charged at transaction date and impaired when indicators of impairment are present. At period end there were no differences between the book value and the fair values of trade and other receivables because of the short-term maturity.

### **Financial assets carried at amortised cost**

Loans and receivables are measured at amortised cost less any impairment losses recognised to reflect irrecoverable amounts. Impairment is determined on a specific basis, whereby each asset is individually evaluated for impairment indicators. Write-offs of these assets are expensed in surplus or deficit.

# Accounting Policies

for the Annual Financial Statements for the Year Ended 31 March 2020

## **Cash and cash equivalents**

Cash and cash equivalents are short-term, highly liquid investments that are readily convertible to known amounts of cash. Cash and cash equivalents are measured at fair value.

## **Financial liabilities carried at amortised cost**

Trade and other payables are initially measured at fair value and are subsequently measured at amortised cost.

### **1.13 Operating leases**

Leases of assets under which all the risks and rewards of ownership are effectively retained by the lessor are classified as operating leases. Lease payments under an operating lease are recognised as an expense on a straight-line basis over the lease term.

Any contingent rents are expensed in the period they are incurred.

### **1.14 Impairment**

The Council for Geoscience identifies cash generating assets as assets that are managed with the objective of generating a commercial return, and non-cash generating assets as assets that do not generate market related cash flows from that asset.

The entity assesses at each balance sheet date whether there is any indication that an asset may be impaired. If there is any indication that an asset may be impaired, the recoverable amount is estimated for the individual asset. The recoverable amount of an asset is the higher of fair value less assumed 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 recognised immediately in surplus or deficit.

At each reporting date the entity assesses impairment losses recognised in prior years for continued existence or decreases. If such indication exists, the recoverable amounts of those assets are estimated. The increase in the carrying amount of an asset attributable to a reversal of an impairment loss does not exceed the carrying amount that would have been determined had no impairment loss been recognised for the asset in prior periods. A reversal of an impairment loss of assets carried at cost less accumulated depreciation or amortisation is recognised immediately in surplus or deficit.

### **1.15 Critical accounting estimates and judgements**

#### **Provision for bad debts**

Past experience indicates a reduced prospect of collecting debtors over the age of four months. Debtor balances are regularly assessed by management and provided for in line with the policy.

#### **Provisions**

Provisions were raised and management determined an estimate based on the information available and in line with the policy.

# Accounting Policies

for the Annual Financial Statements for the Year Ended 31 March 2020

## Property and equipment

Management has made certain estimations with regard to the determination of estimated useful lives and residual values of items of property and equipment.

## Leases

Management has applied its judgement to classify all lease agreements that the entity is party to as operating leases, as they do not transfer substantially all risks and ownership to the entity. Furthermore, as the operating lease in respect of premises is only for a relatively short period of time, management has made a judgement that it would not be meaningful to classify the lease into separate components for the land and for the buildings for the Polokwane office current lease, and the agreement will be classified in its entirety as an operating lease.

### 1.16 Sources of estimation uncertainty

There are no key assumptions concerning the future and other key sources of estimation uncertainty at the balance sheet date that could have a significant risk of causing material adjustment to the carrying amounts of assets and liabilities within the next financial year.

### 1.17 Irregular expenditure

Irregular expenditure is recorded in the notes to the financial statements when confirmed. The amount recorded is equal to the value of the irregular expenditure incurred, unless it is impractical to determine, in which case reasons therefore must be provided in the notes. Irregular expenditure receivables are measured at the amount that is expected to be recovered and are de-recognised when settled or written-off as irrecoverable.

### 1.18 Post-reporting date events

Events after the reporting date are those events, both favourable and unfavourable, that occur between the reporting date and the date when the financial statements are authorised for issue. Two types of events can be identified:

- Those that provide evidence of conditions that existed at the reporting date (adjusting events after the reporting date)
- Those that are indicative of conditions that arose after the reporting date (non-adjusting events after the reporting date).

The CGS will adjust the amounts recognised in the financial statements to reflect adjusting events after the reporting date once the event occurred.

The CGS will disclose the nature of the event and estimate its financial effect or a statement that such estimate cannot be made in respect of all material non-adjusting events, where nondisclosure could influence the economic decisions of users taken on the basis of the financial statements.

# Notes

to the Annual Financial Statements for the Year Ended 31 March 2020

## 2 New standards and interpretations

### 2.1 Standards and interpretations issued, but not yet effective

The Council for Geoscience has not applied the following standards and interpretations, which have been approved but are not yet effective for accounting periods 2019/2020:

GRAP statement	Description	Impact	Effective date
GRAP 32	Service Concession Arrangements: Grantor	None	01 April 2020
GRAP 34	Separate Financial Statements	None	01 April 2020
GRAP 35	Consolidated Financial Statements	None	01 April 2020
GRAP 36	Investments in Associates and Joint Ventures	None	01 April 2020
GRAP 37	Joint Arrangements	None	01 April 2020
GRAP 38	Disclosure of Interests in Other Entities	None	01 April 2020
GRAP 110	Living and Non Living Resources	None	01 April 2020
IGRAP 1	Applying the probability test on initial recognition revenue (amendments)	None	01 April 2020
IGRAP 20	Adjustments to revenue	None	01 April 2020

## 3 Property and equipment

2020	Land	Buildings and Fixtures	*Equipment	Office furniture	Aircraft and Boat	Motor vehicles	Computer equipment	Total
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Gross carrying amount	18 231	195 082	166 001	13 315	22 348	29 264	20 552	464 793
Accumulated depreciation at the beginning of the period	(1 960)	(65 334)	(90 541)	(8 382)	(10 286)	(13 695)	(14 543)	(204 741)
<b>Opening net carrying amount at 31 March 2019</b>	<b>16 271</b>	<b>129 748</b>	<b>75 460</b>	<b>4 932</b>	<b>12 062</b>	<b>15 569</b>	<b>6 009</b>	<b>260 051</b>
Movements during the period:								
Work in progress (refer to note 3.2)	-	14 854	25 825	-	1 282	-	29 810	71 771
Acquisitions	-	485	10 653	356	-	872	8 406	20 772
Reversal of impairment	360	2 881	-	-	-	-	-	3 241
Disposals	-	-	(2 221)	(83)	(7)	(524)	(348)	(3 182)
Disposals - Cost	-	-	(7 306)	(346)	(75)	(3 236)	(4 592)	(15 555)
Disposals - Depreciation	-	-	5 085	264	68	2 712	4 244	12 373
Depreciation	-	(6 165)	(14 362)	(628)	(102)	(2 466)	(2 297)	(26 020)
<b>Closing net carrying amount at 31 March 2020</b>	<b>16 631</b>	<b>141 803</b>	<b>95 355</b>	<b>4 579</b>	<b>13 234</b>	<b>13 450</b>	<b>41 580</b>	<b>326 633</b>
Gross carrying amount	18 231	210 421	195 173	13 325	23 555	26 899	54 176	541 781
Accumulated depreciation/impairment	(1 600)	(68 618)	(99 819)	(8 746)	(10 321)	(13 449)	(12 596)	(215 148)



# Notes

to the Annual Financial Statements for the Year Ended 31 March 2020

## Property and equipment (continued)

2019	Land	Buildings and Fixtures	*Equipment	Office furniture	Aircraft and Boat	Motor vehicles	Computer equipment	Total
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Gross carrying amount	18 231	189 610	154 354	14 162	22 348	33 763	20 653	453 121
Accumulated depreciation at the beginning of the period	(1 960)	(59 933)	(81 838)	(8 557)	(10 184)	(12 937)	(13 422)	(188 831)
<b>Opening net carrying amount at 31 March 2018</b>	<b>16 271</b>	<b>129 677</b>	<b>72 516</b>	<b>5 605</b>	<b>12 164</b>	<b>20 826</b>	<b>7 231</b>	<b>264 290</b>
Movements during the period:								-
Work in progress (refer to note 3.2)	-	2 131	4	-	-	-	-	2 135
Reversal of impairment	-	631	-	-	-	-	-	631
Acquisitions	-	3 341	19 245	234	-	1 956	1 633	26 409
Disposals	-	-	(475)	(233)	-	(4 077)	(638)	(5 422)
Disposals - Cost	-	-	(7 602)	(1 081)	-	(6 456)	(1 735)	(16 874)
Disposals - Depreciation	-	-	7 127	849	-	2 379	1 097	11 452
Depreciation	-	(6 032)	(15 830)	(674)	(102)	(3 137)	(2 218)	(27 993)
<b>Closing net carrying amount at 31 March 2019</b>	<b>16 271</b>	<b>129 748</b>	<b>75 460</b>	<b>4 932</b>	<b>12 062</b>	<b>15 569</b>	<b>6 009</b>	<b>260 051</b>
Gross carrying amount	18 231	195 082	166 001	13 315	22 348	29 264	20 552	464 793
Accumulated depreciation/impairment	(1 960)	(65 334)	(90 541)	(8 382)	(10 286)	(13 695)	(14 543)	(204 741)

\* Equipment in the tables above include the following categories of equipment: Specialised Equipment, Audio & Visual, Technical Equipment, Office Equipment and Scientific Equipment

The transfer of the following land and buildings as stipulated under section 26 of the Geoscience Act (Act No. 100 of 1993) has not yet been completed.

### Location

Fair value  
at date of  
transfer  
R'000

474 Carl Street, Town Lands 351JR, Pretoria West

R2 800

280 Pretoria Street, Silverton, Pretoria

R94 000

The value of these properties has been included in the carrying amount of land and buildings as at 31 March 2020 and was determined by an independent valuator.

Details regarding land and buildings are kept at the Council for Geoscience head office and will be supplied upon written request.

# Notes

to the Annual Financial Statements for the Year Ended 31 March 2020

## Property and equipment (continued)

2020	2019
R'000	R'000

### 3.1 Compensation from third parties for property and equipment lost

Proceeds from insurance

2 416	322
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### 3.2 Property and equipment in the process of being constructed

Cumulative expenditure recognised in the carrying value of property and equipment being developed/constructed

	Buildings and Fixtures R'000	*Equipment R'000	Aircraft and Boat R'000	Total R'000
Gross carrying amount	32 062	1 497	1 040	34 599
<b>Opening net carrying amount at 31 March 2019</b>	<b>32 062</b>	<b>1 497</b>	<b>1 040</b>	<b>34 599</b>
Movement	14 854	55 635	1 282	71 771
<b>Closing net carrying amount at 31 March 2020</b>	<b>46 916</b>	<b>57 132</b>	<b>2 322</b>	<b>106 370</b>

#### Property and equipment in the process of being constructed with delays

Included in the work in progress for buildings and fixtures is a carrying amount of R36,649m in respect of a ventilation system in the Silverton building that has been delayed.

Gross carrying amount

**Opening net carrying amount at 31 March 2019**

Movement

**Closing net carrying amount at 31 March 2020**

Buildings and Fixtures R'000
24 724
<b>24 724</b>
11 925
<b>36 649</b>

### 3.3 Property and equipment continued

Repairs and maintenance expenditure incurred for the year to repair and maintain property and equipment

#### Repairs and Maintenance

Land and Buildings	2 931	4 933
Office Equipment and Furniture	27	5
Technical and Scientific Equipment	1 947	1 224
Specialised Equipment	-	58
Computer Equipment	99	150
Aircraft	777	366
	<b>5 781</b>	<b>6 736</b>

# Notes

to the Annual Financial Statements for the Year Ended 31 March 2020

## 4 Intangible assets

### Computer software

Gross carrying amount

Accumulated amortisation

**Opening net carrying amount at 31 March 2019**

Movements during the period:

Acquisitions

Disposals

Disposals - Cost

Disposals - Amortisation

Amortisation

**Closing net carrying amount at 31 March 2020**

Gross carrying amount

Accumulated amortisation

	2020 R'000	2019 R'000
	9 865	9 733
	(8 310)	(6 990)
	1 555	2 743
	207	132
	(2)	-
	(671)	-
	669	-
	(810)	(1 320)
	952	1 555
	9 402	9 865
	(8 450)	(8 310)

## 5 Inventories

Publication inventories

	5	5
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## 6 Retirement benefit

### 6.1 Post-retirement medical-aid fund (PRM)

The Council for Geoscience has made provision for the medical-aid fund covering all its qualifying employees. All eligible employees are members of the defined benefit scheme. To improve management of this defined benefit scheme the Council for Geoscience established a qualifying plan asset in October 2010 which is held and administered by Momentum Group Limited and evaluated annually as at 31 March.

**The amount recognised in the statement of financial performance is determined as follows:**

Current service costs	48	73
Interest charge	2 074	2 020
Expected return on planned assets	(1 517)	(1 441)
Actuarial (gain)/loss recognised	3 947	(1 026)
Recognition of loss on asset realisation	(2 959)	-
	<b>1 593</b>	<b>(374)</b>

# Notes

to the Annual Financial Statements for the Year Ended 31 March 2020

## 6 Retirement benefit (continued)

The amount included in the statement of financial position arising from Council for Geoscience obligation in respect of PRM is as follows:

	2020	2019	2018	2017	2016
Present value of fund obligations	24 348	24 214	25 565	23 084	22 931
Fair value of planned assets	(15 094)	(16 553)	(17 530)	(15 034)	(15 059)
Liability recognised in statement of financial position	9 254	7 661	8 035	8 050	7 872

**Movement in net liability during the period is as follows:**

	2020			2019		
	Liability	Planned asset	Net	Liability	Planned asset	Net
Liability at beginning of period	24 214	-	24 214	25 565	-	25 565
Value of planned assets at beginning of period	-	(16 553)	(16 553)	-	(17 530)	(17 530)
	24 214	(16 553)	7 661	25 565	(17 530)	8 035
Interest charge/expected return of planned asset	2 074	(1 517)	557	2 020	(1 441)	579
Contributions received	-	(2 959)	(2 959)	-	-	-
Current service costs	48	-	48	73	-	73
Benefits paid	(2 179)	2 179	-	(1 742)	1 742	-
Actuarial (gain)/loss	191	3 756	3 947	(1 702)	676	(1 026)
Closing balance	24 348	(15 094)	9 254	24 214	(16 553)	7 661

### Contributions expected to be paid

Top up payments are expected to be made during the 2021 financial year

Expected rate of return on assets 11,03%

### Assumptions

Discount rates 11,03%

Basis of discount rates: JSE zero coupon bond yield after the market closed on 31 March 2020

Return on assets 11,03%

Expected salary increases 5,00%

Health care cost inflation rate 7,47%



# Notes

to the Annual Financial Statements for the Year Ended 31 March 2020

## 6 Retirement benefit (continued)

### Sensitivity analysis-on accrued liability (R Millions) for the year ending 31 March 2020

Assumption	Change	In service	Continuation	Total	Change
Central assumptions	-	1.825	22,523	24.348	-
Health care inflation	1%	2.101	24,184	26.285	8%
	-1%	1.596	21,034	22.630	-7%
Discount rate	1%	1.605	21,092	22.697	-7%
	-1%	2.094	24,143	26.237	8%
Post retirement mortality	-1 year	1.875	23,416	25.291	4%
Average retirement date	-1 year	1.935	22,523	24.458	0%
Continuation of membership at retirement	-10%	1.643	22,523	24.166	-1%

The table above indicates, for example that if medical inflation is 1% greater than the long-term assumptions made, the liability will be 8% higher than that shown.

### Sensitivity analysis for current service and interest cost (R Millions) for the year ending 31 March 2020

Assumption	Change	Current service	Interest cost	Total	Change
Central assumptions	-	47 800	2 074 100	2 121 900	-
Health care inflation	1%	58 800	2 264 700	2 323 500	10%
	-1%	39 100	1 907 600	1 946 700	-8%
Discount rate	1%	39 600	2 121 100	2 160 700	2%
	-1%	58 300	2 014 100	2 072 400	-2%
Post retirement mortality	-1 year	49 100	2 160 700	2 209 800	4%
Average retirement date	-1 year	51 800	2 083 100	2 134 900	-1%
Continuation of membership at retirement	-10%	43 300	2 039 400	2 082 700	-2%

The table above indicates, for example, that if medical inflation is 1% greater than the long-term assumptions made, the liability will be 10% higher than that shown.

## 6.2 Pension and provident fund benefits

The Council for Geoscience and its employees contribute to a defined contribution plan. The assets of the scheme are held separately from the Council for Geoscience in funds under the control of trustees. The total cost charged to income of R13,994m (2019: R13,755m) represents equal contributions of 7.5% by the employer and employee.

# Notes

to the Annual Financial Statements for the Year Ended 31 March 2020

## 7 Trade and other receivables from exchange revenue

	2020 R'000	2019 R'000
Trade receivables	1 024	1 977
Contract customers	30 677	127 574
Other receivables	7 530	7 599
	39 231	137 150
Less - Provision for bad debts	(2 047)	(2 175)
	37 184	134 975
Provision for bad debts		
Opening balance	2 175	18
Movement	(128)	2 157
Closing balance	2 047	2 175
<b>Analysis of Impairment</b>		
Long overdue debtors considered impaired	2 047	2 175
	<b>2 047</b>	<b>2 175</b>

There is no difference between the fair value of trade and other receivables and their book value.

## 8 Cash and cash equivalents

Cash and cash equivalents at the end of the period are represented by the following balances:

Cash at bank	24 197	17 333
Call accounts	207 816	236 249
Cash and cash equivalents at the end of the period are represented by the following balances:	232 013	253 582

There is no difference between the fair value of cash and cash equivalents and their book value.

## 9 Trade and other payables

Trade payables	8 323	9 621
Other payables	17 365	19 840
	<b>25 688</b>	<b>29 461</b>

There is no difference between the fair value of trade payables and their book value.

# Notes

to the Annual Financial Statements for the Year Ended 31 March 2020

2020	2019
R'000	R'000

## 10 Deferred income

### Exchange revenue

#### 10.1 Deferred income arising as a result of an agreement entered into with the Department of Science and Innovation to develop an intellectual property management office. (Geoscience Act par 5(1)(g))

Carrying amount at the beginning of period	3 264	3 879
Amounts used during the period	(655)	(615)
Carrying amount at the end of period	2 609	3 264

#### 10.2 Deferred income arising as a result of an agreement with the Organisation of African Geological Surveys.

Carrying amount at the beginning of period	48	48
Amounts received	200	-
Carrying amount at the end of period	248	48

#### 10.3 Deferred income arising as a result of an agreement with the Department of Science and Innovation for the environmentally friendly and efficient methods for the extraction of Rare Earth Elements.

Carrying amount at the beginning of period	182	182
Carrying amount at the end of period	182	182

#### 10.4 Deferred income arising as a result of an agreement with the Department of Science and Innovation in terms of the Earth Observation and Geohazards Assessment.

Carrying amount at the beginning of period	-	2 922
Amounts used during the period	-	(2 922)
Carrying amount at the end of period	-	-

#### 10.5 Deferred income arising as a result of an agreement entered into with the National Research Foundation.

Carrying amount at the beginning of period	110	110
Carrying amount at the end of period	110	110

#### 10.6 Deferred income arising as a result of an agreement entered into with the Department of Mineral Resources & Energy to develop and implement various measures to mitigate the effect of mining-induced contamination.

Carrying amount at the beginning of period	217 756	112 264
Amounts received	215 523	206 648
Amounts used during the period	(327 301)	(101 156)
Carrying amount at the end of period	105 978	217 756
<b>Total deferred income</b>	<b>109 127</b>	<b>221 360</b>

# Notes

to the Annual Financial Statements for the Year Ended 31 March 2020

## 11 Accruals

### Accruals for leave pay

	2020 R'000	2019 R'000
Carrying amount at the beginning of period	18 983	16 060
Provision current period	2 839	4 061
Amounts used during the current period	(2 018)	(1 138)
Carrying amount at the end of period	19 804	18 983

The leave pay provision relates to the estimated liabilities as a result of leave days due to employees.

### Accruals for 13th cheque

Carrying amount at the beginning of period	6 130	5 204
Provision current period	(735)	926
Carrying amount at the end of period	5 395	6 130

The 13th cheque accrual relates to the structuring of the employee costs to company and is paid out on employees' birthdays.

<b>Total accruals</b>	<b>25 199</b>	<b>25 113</b>
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## 12 Surplus/Deficit from operations

Operating surplus/deficit is arrived at after taking the following items into account:

<b>Revenue</b>	<b>486 198</b>	<b>484 085</b>
<b>Non-exchange revenue</b>		
Total grant received	414 062	405 983
Project related revenue	(215 523)	(206 648)
<b>Total non-exchange revenue</b>	<b>198 539</b>	<b>199 335</b>
<b>Exchange revenue</b>		
Department of Mineral Resources & Energy project related revenue	223 839	227 288
Contracting revenue	25 822	25 812
Publication revenue	3 276	3 601
	<b>252 937</b>	<b>256 701</b>
<b>Other exchange revenue</b>		
Foreign currency gains	835	1 744
Proceeds from sale of asset	874	339
Recovery of asset losses	2 416	322
Sundry income	6 863	4 512
	<b>10 988</b>	<b>6 917</b>



# Notes

to the Annual Financial Statements for the Year Ended 31 March 2020

## 12 Surplus/Deficit from operations (continued)

	2020 R'000	2019 R'000
Interest received		
- Interest income on call accounts	17 100	17 698
- *Interest income on current accounts	6 634	3 434
(* includes interest accrued to the amount of R404,835)	23 734	21 132
<b>Total exchange revenue</b>	<b>287 659</b>	<b>284 750</b>
<b>Total cost of contracts</b>	<b>165 673</b>	<b>178 817</b>
<b>Cost of contracts</b>		
Direct cost	10 613	10 755
Personnel expenditure	12 085	10 020
	<b>22 698</b>	<b>20 775</b>
<b>Cost of statutory projects</b>		
Direct cost	35 302	59 825
Personnel expenditure	107 673	98 217
	<b>142 975</b>	<b>158 042</b>
<b>Administrative expenses include :</b>		
Audit fees	3 820	5 586
- Current period	2 084	2 756
- Internal audit	1 736	2 830
- Fee for other services	-	-
Bad debts written off	-	-
Provision for bad debts	( 2 047)	( 2 157)
Depreciation - on owned assets	26 020	27 993
- Buildings	6 165	6 032
- Equipment	14 362	15 830
- Office furniture	628	674
- Motor vehicles	2 466	3 137
- Aircraft	102	102
- Computer equipment	2 297	2 218
Reversal of impairment	3 241	631
Amortisation - intangible assets		
- Computer software	810	1 320
Rentals in respect of operating leases		
- Land and buildings	1 044	1 045
- Multifunctional printers	1 400	519

# Notes

to the Annual Financial Statements for the Year Ended 31 March 2020

## 12 Surplus/Deficit from operations (continued)

	2020 R'000	2019 R'000
<b>Other operating expenses</b>		
Net loss on disposal of equipment	2 221	475
Net loss on disposal of vehicles	524	4 077
Net loss on disposal of intangible assets	2	-
Net loss on disposal of computer equipment	348	639
Net loss on disposal of office furniture	83	233
Net loss on disposal of aircraft	7	-
Write-off of bad debts	-	-
Foreign currency losses	415	1 034
	<b>3 600</b>	<b>6 457</b>
 Staff costs	 280 074	 294 552
 Included in staff costs are:		
Defined benefit plan expense for the post-retirement medical-aid fund	4 552	( 374)
- Current service cost	48	73
- Interest cost	2 074	2 020
- Expected return on plan assets	(1 517)	(1 441)
- Recognised actuarial (gain)/loss	3 947	(1 026)
 Defined contribution plan expenses for the pension and provident fund	 13 994	 13 755

## Emoluments

Senior management	2019/2020				
	Pensionable salary	Performance bonus	Provident/ Pension fund contributions	*Other contributions	Total
	R'000	R'000	R'000	R'000	R'000
Mr Mabuza M	2 736	-	167	97	<b>3 000</b>
Mr Matsepe L D	2 455	-	150	133	<b>2 738</b>
Ms Shelembe P R	1 849	-	121	108	<b>2 078</b>
Dr Tshipa J	1 959	-	118	110	<b>2 187</b>
Dr Khoza T D	1 857	-	113	96	<b>2 066</b>

# Notes

to the Annual Financial Statements for the Year Ended 31 March 2020

## 12 Emoluments (continued)

Senior management	2018/2019				
	Pensionable salary	Performance bonus	Provident/ Pension fund contributions	*Other contributions	Total
	R'000	R'000	R'000	R'000	R'000
Mr Mabuza M	2 736	244	166	103	3 249
Mr Matsepe L D	2 455	318	149	120	3 042
Mr Ramagwede L F	1 877	283	122	101	2 383
Ms Shelembe P R	1 850	274	111	99	2 334
Dr Tshipa J	1 633	-	98	91	1 822
Dr Khoza T D	1 351	-	85	72	1 508

### Board emoluments

Non-executive Board Members

	2020 R'000	2019 R'000
Dr Mathe H	120	170
Dr Mahachi J	139	110
Mr Kolozi K	55	67
Mr Ramokgopa K	23	172
Mr Mvinjelwa X	68	101
Dr Mayekiso M	-	-
Mr Abader I	-	-
Mr Nel P	-	-
Ms Mdubeki R	-	-
Mr Menoe K	-	-
Ms Mochothli D	-	-
Ms Tsotetsi P	-	-
Ms Madiba L	-	-
Mr Wilcox O	-	-
Mr Moatshe A	-	-
Mr Gerrys B	-	-
	<b>405</b>	<b>620</b>

\* Other contributions relate to employer contributions towards statutory deductions.

Details regarding Board Members' service contracts:

Board Members representing government departments are not included above as they received no emoluments.

## 13 Finance cost

Finance cost on motor vehicle fleet cards.

20 28

# Notes

to the Annual Financial Statements for the Year Ended 31 March 2020

2020	2019
R'000	R'000

## 14 Reconciliation of net surplus/(loss) for the period to cash generated from operations

Net surplus for the period	60 946	( 5 611)
Interest	20	28
Depreciation on property and equipment	26 020	27 993
Amortisation - intangible assets	810	1 320
Reversal of impairment of assets	( 3 241)	( 631)
Proceeds from sale of an asset	( 874)	( 339)
Compensation from third parties for property and equipment lost	( 2 417)	( 322)
Net loss on disposal of fixed assets	3 182	5 423
Interest earned	( 23 329)	( 21 133)
Provision for post-retirement medical-aid benefits	1 592	( 374)
Operating cash flows before working capital changes	62 711	6 354
Working capital changes:		
Increase in provision for accumulated leave pay and 13th cheque	87	3 848
(Increase)/Decrease in trade and other receivables	97 792	( 113 519)
Increase/(Decrease) in trade and other payables	( 3 774)	( 2 752)
Increase/(Decrease) in deferred income	( 112 233)	101 954
Cash generated from operations (including finance costs)	44 582	( 4 115)

## 15 Acquisition of:

### 15.1 Property and equipment

Land and buildings	485	3 341
Equipment	10 653	19 245
Office furniture	356	234
Motor vehicles	872	1 956
Computer equipment	8 406	1 633
	<b>20 772</b>	<b>26 409</b>

### Work in progress - Acquisitions

Land and buildings	14 854	2 131
Computer equipment	29 810	-
Equipment	25 825	2
Aircraft and boat	1 282	-
	<b>71 771</b>	<b>2 133</b>

### Total acquisitions

<b>92 543</b>	<b>28 542</b>
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### 15.2 Intangible assets

Computer software	207	132
	<b>207</b>	<b>132</b>



# Notes

to the Annual Financial Statements for the Year Ended 31 March 2020

2020 R'000	2019 R'000
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## 16 Contingent liability

### 16.1 Bank guarantees

Performance bonds and bid bonds issued for contract work to various financial institutions.

1 927	1 431
<b>1 927</b>	<b>1 431</b>

### 16.2 Pending legal action

The Council for Geoscience has an estimated legal liability due to pending labour cases.

-	1 078
<b>-</b>	<b>1 078</b>

## 17 Taxation

No provision for income tax was made as the Council for Geoscience is exempted in terms of section 10(1)(Ca)(i) of the Income Tax Act.

## 18 Operating lease commitments

### 18.1 Lease of office space

The operating lease between a supplier and the Council for Geoscience entered into from 01 December 2017 to 30 November 2020.

At reporting date, the outstanding commitments under non-cancellable operating leases, which fall due are as follows:

Up to 1 year	385	621
2 to 5 years	-	705
<b>Total lease commitments</b>	<b>385</b>	<b>1 326</b>

### 18.2 Lease of office printing equipment

The operating lease between a supplier and the Council for Geoscience entered into from 01 October 2015 to 31 July 2020.

At the reporting date, the outstanding commitments under non-cancellable operating leases, which fall due are as follows:

Up to 1 year	1 121	1 140
<b>Total lease commitments</b>	<b>1 121</b>	<b>1 140</b>

### 18.3 Commitments

Operating expenditure

Approved and contracted

Approved but not yet contracted

29 274	25 289
-	-

# Notes

to the Annual Financial Statements for the Year Ended 31 March 2020

## 18 Operating lease commitments (continued)

	2020 R'000	2019 R'000
Capital expenditure		
Approved and contracted: Property and equipment	69 701	5 101
Approved but not yet contracted: Property and equipment	1 548	889
<b>Total commitments</b>	<b>100 523</b>	<b>31 279</b>
Commitments		
Up to 1 year	52 950	25 623
2 to 5 years	47 573	5 656
<b>Total commitments</b>	<b>100 523</b>	<b>31 279</b>

The Council for Geoscience has usage based contracts for the provision of the following services

- Sampling Services Geophysics
- Accommodation and travel
- Courier services

## 19 Financial instruments

Financial instruments consist of cash and cash equivalents, investments with financial institutions, trade and other receivables and trade and other payables.

### 19.1 Credit risk

Financial assets, which potentially subject the Council for Geoscience to concentrations of credit risk, consist principally of cash, short-term deposits and trade receivables. The Council for Geoscience's cash equivalents and short-term deposits are placed with high credit quality financial institutions. Trade receivables are presented net of the allowance for doubtful debts. Credit risk with respect to trade receivables is limited due to the large number of customers being dispersed across different industries and geographical areas. Accordingly the Council for Geoscience has no significant concentration of credit risk.

The carrying amounts of financial assets included in the statement of financial position represent the Council for Geoscience's exposure to credit risk in relation to those assets.

Trade and other receivables are controlled by well-established policies and procedures which are reviewed and updated on an on-going basis. The Council for Geoscience does not have any significant exposure to any individual customer or counterparty.

Trade receivables and other payables are carried at amortised costs. Refer to notes 7 and 9.

### 19.2 Interest rate risk

The organisation's exposure to interest rate risk and the effective interest rates on the financial instruments at reporting date are: 31 March 2020

# Notes

to the Annual Financial Statements for the Year Ended 31 March 2020

## 19 Financial instruments (continued)

	2020 Weighted average effective interest rate %	2019 Weighted average effective interest rate %
<b>Assets</b>		
Cash	3.90%	3.94%
Call accounts	6.87%	7.22%

### Short-term deposits

The risk is perceived to be low due to the following factors:

- Funds are only invested with approved financial institutions according to the policy of the Council for Geoscience.
- Short-term deposits are only reinvested or invested with Management approval.

### 19.3 Foreign currency risk

The Council for Geoscience undertakes certain transactions denominated in foreign currencies, hence exposures to exchange rate fluctuations arise. It is not policy for the Council for Geoscience to take out cover on these outstanding foreign currency transactions due to the fact that these transactions take place on an ad-hoc basis. The Council for Geoscience exposure at 31 March 2020 is disclosed in note 20.

### 19.4 Airborne operations risk

It is the policy of the Council for Geoscience to transfer risk in respect of airborne operations to third parties, namely insurance and an external operator.

## 20 Foreign currency exposure

		2020 R'000			2019 R'000		
		Exchange rate	Foreign amount	R-value	Exchange rate	Foreign amount	R-value
<b>20.1 Trade receivables</b>							
Foreign currency							
Euro	R 19.27180	€ 0,00	0	R 14.34280	€ 0,00	0	
US\$	R 17.62600	\$34	596	R 14.28750	\$72	1 032	
<b>20.2 Banks</b>							
Foreign funds							
Euro	R 19.27180	€ 240	4 625	R 16.02640	€ 240	3 846	

# Notes

to the Annual Financial Statements for the Year Ended 31 March 2020

2020 R'000	2019 R'000
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## 21 Related-party transactions

During the period, the following related-party transactions took place between the Council for Geoscience and the Department of Mineral Resources & Energy:

Total grant received	414 062	405 983
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Refer to note 10 for further details regarding transactions with the Department of Mineral Resources & Energy.

All other related-party transactions were concluded at arm's length.

Relationships:

Parent National Department: Department of Mineral Resources & Energy

## 22 Irregular expenditure

Opening balance	-	74
Irregular expenses identified in the current year	-	-
Expenditure condoned	-	( 74 )
	-	-
Details of irregular expenditure identified in the prior year		
Non-compliance with National Treasury's instruction on local content when purchasing field clothing.	-	-
	-	-

## 23 Events after reporting date

Non-Adjusting events

### Deep drilling programme in Beaufort-West

The Council for Geoscience awarded a contract to a service provider for a Deep Vertical Stratigraphic research core borehole for the Karoo Deep drilling programme in Beaufort-West with an estimated value of R35 million.

### Probalistic seismic hazard analysis

The Council for Geoscience awarded a contract to a service provider to oversee the planning, development and technical execution of a probalistic seismic hazard analysis for a nuclear site with an estimated value of R34 million.



# Notes

to the Annual Financial Statements for the Year Ended 31 March 2020

## 23 Events after reporting date (continued)

### CGS appointed as implementing agent for the Carbon Capture, Storage and Utilisation project (CCSU)

The Council for Geoscience has been appointed as the implementing agency of the CCSU project. The Director General of Minerals and Energy requested South African Nation Energy Development Institute (SANEDI) to transfer the MTEF funding allocations that were made available for the Carbon Capture, Storage and Utilisation project to the CGS. The total value of project is still being evaluated.

### COVID-19 Pandemic

The Novel Corona Virus pandemic and subsequent supplementary budget speech has not materially impacted the CGS, however the programme of the CGS has been streamlined to maximise on delivery and impact.

No facts nor circumstances of a material nature arose between the financial year-end and the date of this report which needs to be reported as part of these annual financial statements apart from the items mentioned above.

2020	2019
R'000	R'000

## 24 Correction of prior year error

Nature	Period		
A correction was made to the financial statements on revenue that was not recognised in the period to which it relates.	31-Mar-18	-	(2 544)
A correction was made to the financial statements on revenue that was not recognised in the period to which it relates.	31-Mar-15	-	(35)
A correction was made to the financial statements on other income that was not recognised in the period to which it relates.	31-Mar-19	(279)	-
A correction was made to the financial statements to depreciation/amortisation for prior period.	31-Mar-18	-	514
A correction was made to the financial statement to prepaid expenses for the prior period.	31-Mar-19	(397)	-
A allocation correction was made from expenditure and capitalised.	31-Mar-19	(2)	(286)
A correction was made to expenditure that was not recognised in the correct period. .	31-Mar-19	5 203	378
An adjustment was made to payables in the prior period relating to a construction project retention.	31-Mar-18	-	(2 257)
An adjustment was made to fixed asset in the prior period for the capitalisation of the construction project retention.	31-Mar-18	-	2 257
Adjustment was made to estimated useful life of property and equipment. Correction could only be made in 2018/2019 financial year due to impracticability of calculation for prior years. This is due to the unavailability of information from inception of the affected property and equipment.	31-Mar-19	-	(3 356)
		<b>4 525</b>	<b>(5 329)</b>

# Notes

to the Annual Financial Statements for the Year Ended 31 March 2020

## 24 Correction of prior year error (continued)

### Effect

#### Statement of financial performance as at 31 March 2019

	2020 R'000	2019 R'000
Revenue recorded in the incorrect period - MTEF	-	(2 544)
Revenue recorded in the incorrect period - Commercial Revenue	-	(35)
Other income recorded in the incorrect period - Recovery of study debt/Insurance claims	(279)	-
Expenditure recorded in the incorrect period	5 203	-
Prepaid expenses not accounted for correctly	(397)	-
Depreciation/amortisation recorded in the incorrect period	-	514
Work in progress captured as an expense	(2)	(286)
Adjustment to depreciation/amortisation as a result of change in estimated useful life of property and equipment	-	(3 356)
Reallocation of expenditure erroneously capitalised	-	378
	<b>4 525</b>	<b>(5 329)</b>

### Effect

#### Statement of financial position as at 31 March 2019

Government Grant Project Related Revenue Recognised - Deferred income	-	2 544
Commercial Revenue - Deferred income	-	35
Study debt recovered and insurance claim accounted for correctly	279	-
Work in progress not provided for - Payables	-	(2 257)
Work in progress not provided for - Property & Equipment	-	776
Capitalisation of technical asset	-	1 481
Expenditure recorded in the incorrect period not provided for	(5 203)	-
Prepaid expenses not accounted for correctly	397	-
Accumulated depreciation/amortisation recorded in the incorrect period	-	(514)
Work in progress captured as an expense	2	286
Adjustment to accumulated depreciation/amortisation as a result of change in estimated useful life of property and equipment	-	3 356
Adjustment for asset capitalisation error	-	(378)

#### Statement of net assets for the period ended 31 March 2019

Accumulated surpluses	(4 525)	5 329
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# Notes

to the Annual Financial Statements for the Year Ended 31 March 2020

## 24 Correction of prior year error (continued)

### Correction of Prior year disclosure

#### Nature

#### Disclosure as at 31 March 2019

Restatement of closing balances of cumulative expenditure recognised in the carrying value of property and equipment being developed/constructed:

Buildings and Fixtures	31-Mar-19	-	5 919
Equipment	31-Mar-19	-	1 865
Aircraft and Boat	31-Mar-19	-	57

### Restatement of closing balances of commitments

Approved and contracted	31-Mar-19	-	(25 370)
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#### Effect

None (only disclosure item)

## 25 Change in accounting estimate

The useful lives and residual values of property and equipment was reassessed. This resulted in change of estimated remaining lives of certain assets in categories listed below:

	Old	New
Equipment	5 - 7 years	5 - 10 years
Office furniture	20 years	20 - 23 years
Motor vehicles	5 - 8 years	5 - 10 years
Computer equipment	6 years	6 - 11 years
Computer software	2 - 5 years	2 - 8 years

The effect of the change in accounting estimate has resulted in depreciation amounting to R 3,117,150 in 2019/2020.

The change of R4,675,726 will be reflected in future periods.

Due to the change in accounting estimate regarding the useful life of assets, the depreciation expense is reported at:

	20 563	23 178
Equipment	14 362	15 830
Office furniture	628	674
Motor vehicles	2 466	3 136
Computer equipment	2 297	2 218
Computer software	810	1 320

# Notes

to the Annual Financial Statements for the Year Ended 31 March 2020

## 25 Change in accounting estimate (continued)

	2020 R'000	2019 R'000
Depreciation expense using the previous rates would have been reported at:	23 679	21 082
Equipment	16 756	14 617
Office furniture	635	671
Motor vehicles	2 670	2 863
Computer equipment	2 719	1 889
Computer software	899	1 042
Difference	(3 117)	2 096
Equipment	(2 394)	1 213
Office furniture	(8)	3
Motor vehicles	(204)	274
Computer equipment	(422)	329
Computer software	(89)	278

## 26 Heritage assets disclosure

GRAP 103 defines heritage assets as assets which have a cultural, environmental, historical, natural, scientific technological or artistic significance and are held indefinitely for the benefit of present and future generations.

Certain heritage assets are described as inalienable items thus assets which are retained indefinitely and cannot be disposed of without consent as required by law or otherwise.

### Nature

The Council for Geoscience has the following different classes of heritage:

- Gemstone collections	1 445	1 445
- Meteorite collections	2 804	2 804
- Mineral collections	13 313	13 313
	<b>17 562</b>	<b>17 562</b>

The heritage assets were at initial recognition valued at fair value using evaluators with the following credentials :

Fossils -	Professor for Paleontological Research, University of the Witwatersrand
Mineral collections -	M.Sc. Geology and Professor and Chairman of the Department of Geology, University of the Witwatersrand
Meteorite collections -	Author of "Meteorites", Private collector of meteorites
Gemstones -	M.Sc. Geology



# Notes

to the Annual Financial Statements for the Year Ended 31 March 2020

## 26 Heritage assets disclosure (continued)

Various valuation methods were used taking into account the different types of heritage assets held by the Council for Geoscience.

The valuations reports are held at the Council for Geoscience offices and are available for inspection.

The Palaeontological (fossil) assets have no monetary value as legislation does not permit the purchase or sale of fossils.

(National Heritage Resources Act 1999 par 35(4)(c).

The Council for Geoscience is in possession of old scientific equipment only for display purposes. This equipment does not carry any value.

## Notes

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[illegible]







**Council for Geoscience**

[www.geoscience.org.za](http://www.geoscience.org.za)

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