



Council for Geoscience

ANNUAL REPORT

of the Council for Geoscience

2017/2018



*Overlooking the Numees Group and Hilda Subgroup rocks of the Gariep Supergroup,
in the Richtersveld National Park, Northern Cape. Photograph by: Mr Nick Baglow*

Table of Contents

PART A: GENERAL INFORMATION	6
1. GENERAL INFORMATION ON THE COUNCIL FOR GEOSCIENCE	7
2. ABBREVIATIONS AND ACRONYMS	9
3. FOREWORD BY THE CHAIRPERSON OF THE BOARD	10
4. OVERVIEW BY THE CHIEF EXECUTIVE OFFICER	12
5. STATEMENT OF RESPONSIBILITY FOR PERFORMANCE INFORMATION	16
6. STRATEGIC OVERVIEW	17
6.1 Vision	17
6.2 Mission	17
6.3 Core Values	17
6.4 Strategic outcome-oriented goals	17
7. LEGISLATIVE AND OTHER GUIDING POLICIES	18
7.1 Other Relevant Guiding Policies	19
8. ORGANISATIONAL STRUCTURE	20
8.1 Reporting structure	21
PART B: PERFORMANCE INFORMATION	22
1. AUDITOR-GENERAL'S REPORT: PREDETERMINED OBJECTIVES	23
2. OVERVIEW OF THE PERFORMANCE OF THE COUNCIL FOR GEOSCIENCE	23
2.1 Service delivery environment	23
2.2 Organisational environment	24
2.3 Key policy developments and legislative changes	24
3. PERFORMANCE INFORMATION OF THE CGS BY STRATEGIC PERSPECTIVES AND OBJECTIVES	25
3.1 Corporate scorecard for 2017/2018	26
4. OPERATIONAL HIGHLIGHTS	31
4.1 Introduction to the Geoscience Technical Programme of the CGS	31
4.1.1 Karoo deep drilling and geo-environmental baseline programme (ST-2016-1250)	32
4.1.2 Management of State contingent liabilities with respect to D&O mines in South Africa (ST-2013-1165)	33
4.1.3 Mine water management programme (ST-2016-1251)	34
4.1.4 Stimulation of investment in the mining and mineral exploration sectors (ST-2013-1163)	35
4.1.5 Geoscience mapping Delivery of a 1:50 000-scale geological map database for the whole of South Africa (georeferenced field sheets, published maps and vector data) (ST-2018-1312)	37
4.1.6 Interpretation of existing high-resolution airborne geophysical data (ST-2017-1270)	38
4.1.7 Cenozoic rationalisation of 1:250 000-scale geological maps (ST-2018-1269)	38
4.1.8 Ground geophysical target definition of targets generated based on previous airborne geophysical surveys (ST-2018-1315)	39
4.1.9 Geothermal Energy Potential of South Africa	40
4.1.10 Hydrocarbon potential of the Prince Albert Formation, Ecca Group in the main Karoo basin, South Africa (ST 2018-1273)	41
4.1.11 Marine geological mapping (ST-2016-1264)	41
4.1.12 Medical Geology Programme (ST-2018-1297)	42
4.1.13 Feasibility-level dolomite stability investigations at Promised Land and Annexure (667 ha), Churchill (337 ha) and Danielskuil 1, 2 and 3 (101 ha, 144 ha and 296 ha) (CO-2017-5810)	42
4.1.14 South African National Seismograph Network (SANSN): mapping of surface deformation and displacement due to earthquakes using radar interferometry (ST-2002-0184)	42
4.1.15 Regional geotechnical mapping for sustainable human settlement and infrastructure and development (1:50 000) (ST-2018-1290)	43
4.1.16 Environmentally friendly and efficient methods for the extraction of rare earth elements from secondary sources (CO-2016-5790)	43
4.1.17 Assessment of the CO ₂ storage capacity of the Mesozoic succession, Orange basin, West Coast, South Africa (ST-2018-1272)	44

4.1.18	Geological mapping and integrated training and capacity building in modern geological mapping and research for Directorate Geological Survey: South Africa and Namibia (FR-2016-5788 and FR 2017-5805)	44
4.1.19	Geological mapping and mineral assessment of Malawi (FR-2017-5811)	46
4.1.20	Hydrogeological and water quality mapping consultancy in the Shire River basin in Malawi	46
5.	DISSEMINATION OF INFORMATION	46
5.1	Publications	46
5.2	Peer-reviewed articles	48
5.3	Conference proceedings	51
	PART C: GOVERNANCE	56
1.	EXECUTIVE AUTHORITY	57
2.	BOARD OF THE COUNCIL FOR GEOSCIENCE	57
2.1	Board composition and duties	57
2.2	Board Charter and Board responsibilities	59
2.3	Board induction and orientation	59
2.4	Training of new Board members	59
2.5	Board meetings	59
2.6	Board remuneration	60
2.7	Committees of the Board	60
2.7.1	Audit and Risk Committee	60
2.7.2	Finance Committee Responsibilities and Composition	63
2.7.3	Technical Committee	63
2.7.4	Personnel, Remuneration and Transformation Committee	64
3.	RISK MANAGEMENT	64
4.	INTERNAL CONTROL	65
5.	INTERNAL AUDIT	65
6.	COMPLIANCE WITH LAWS AND REGULATIONS	65
7.	FRAUD AND CORRUPTION	65
8.	MINIMISING CONFLICT OF INTEREST	65
9.	CODE OF CONDUCT	65
10.	COMPANY SECRETARY	66
11.	QUALITY ASSURANCE	66
12.	HEALTH, SAFETY AND ENVIRONMENTAL ISSUES	66
13.	PUBLIC AWARENESS	67
	PART D: HUMAN RESOURCES MANAGEMENT	70
1.	OVERVIEW OF HUMAN RESOURCES MATTERS	71
2.	HUMAN RESOURCES PRIORITIES FOR THE YEAR UNDER REVIEW	71
3.	PERFORMANCE MANAGEMENT	72
4.	EMPLOYEE WELLNESS PROGRAMMES	72
5.	HIGHLIGHTS OF ACHIEVEMENTS	72
6.	CHALLENGES FACED BY THE ORGANISATION	72
7.	FUTURE HUMAN RESOURCES GOALS	73
8.	HUMAN RESOURCES OVERSIGHT STATISTICS	73
	PART E: FINANCIAL INFORMATION	76
1.	STATEMENT OF RESPONSIBILITY	78
2.	REPORT OF THE CHIEF EXECUTIVE OFFICER	79
3.	REPORT OF THE AUDITOR-GENERAL TO PARLIAMENT ON THE COUNCIL FOR GEOSCIENCE	80
4.	ANNEXURE – AUDITOR-GENERAL’S RESPONSIBILITY FOR THE AUDIT	84
5.	ANNUAL FINANCIAL STATEMENTS FOR THE YEAR ENDED 31 MARCH 2018	85

List of Tables

Table A1: Strategic objectives and related initiatives of the five-year strategy	18
Table B1: Corporate scorecard for 2017/2018	26
Table B2: Status of some national projects for 2017/2018	31
Table C1: Board composition.....	58
Table C2: Board meetings — 1 April 2017 – 31 March 2018.....	60
Table C3: Audit and Risk Committee meetings.....	61
Table C4: Finance Committee meetings	63
Table C5: Technical Committee meetings.....	63
Table C6: Personnel, Remuneration and Transformation Committee meetings	64
Table C7: Public awareness	67
Table D1: Racial and gender profile of students in the bursary programme	72
Table D2: Gender and racial profile of interns in the internship programme.....	72
Table D3: Age profile	73
Table D4: Training costs	73
Table D5: Employment changes	73
Table D6: Reasons for staff leaving	73
Table D7: Labour relations: misconduct and disciplinary action	74
Table D8: Equity targets and EE status.....	74
Table D9: EE Targets - Males	74
Table D10: EE Targets - Females	75
Table D11: Disabled Staff	75

List of Figures

Figure 1: The locations of six regional offices of the CGS in South Africa.	8
Figure 2: The organisational structure of the CGS.....	20
Figure 3: Council for Geoscience staff and dignitaries at the handover ceremony of one of the boreholes in Beaufort West.....	32
Figure 4: Council for Geoscience scientists investigating AMD in the Ermelo Coal Field.	35
Figure 5: Mineral prospectivity map for Bushveld granite-related Sn-Mo-W-Cu-Pb-Zn-Ag-F-REE polymetallic mineralisation showing prospective areas (in red) and the localities of follow-up targets. 1) Roossenekal target, 2) Groblersdal target, 3) Dennilton target, 4) Loskop target, 5) Moloto target, 6) Ruigtesloot target, 7) Bela Bela target, and the 8) Thabazimbi target.	36
Figure 6: Published map coverage (5 %) of 1:50 000-scale geological map in South Africa.....	37
Figure 7: Areas that were identified for interpretation during 2016/2017: (a) 2329 AC, (b) 3221 AA, (c) Kuruman military base area, (d) remainder of the North West survey and the (e) MTEF diamond fields survey.....	38
Figure 8: Calcretised lake sediments bury red aeolian sand within the Wedge Hill Formation palaeo-lacustrine deposits. Beds of bleached aeolian sand occur at different levels within the ~20m sedimentary succession suggesting that arid periods of dune activity alternated with more humid periods during which catchment discharge resulted in the formation of a shallow lake within the Soutloop River Valley.	39
Figure 9: Geothermal energy potential map produced in this study. The map highlights zones with highest inferred geothermal gradients, underlying tectonic and structural features and locations of regional seismicity.	40
Figure 10: Multibeam echosounder (bathymetric) data for Table Bay	41
Figure 11: Interpreted structural features in Table Bay, from multibeam bathymetry and side-scan sonar.	42
Figure 12: Vertical displacement (in mm) displayed in Google Earth Pro software.	43
Figure 13: Geology of the Fish River Canyon hiking trail (Map produced by the CGS and GSN).	45
Figure 14: The organisational governance risk management structure of the CGS.	64
Figure 15: Parliamentary Portfolio Committee (PPC) on Mineral Resources visit to the CGS National Core Library in Donkerhoek	69

PART A: GENERAL INFORMATION

1. GENERAL INFORMATION ON THE COUNCIL FOR GEOSCIENCE	7
2. ABBREVIATIONS AND ACRONYMS	9
3. FOREWORD BY THE CHAIRPERSON OF THE BOARD	10
4. OVERVIEW BY THE CHIEF EXECUTIVE OFFICER	12
5. STATEMENT OF RESPONSIBILITY FOR PERFORMANCE INFORMATION	16
6. STRATEGIC OVERVIEW	17
6.1 Vision	17
6.2 Mission.....	17
6.3 Core Values	17
6.4 Strategic outcome-oriented goals.....	17
7. LEGISLATIVE AND OTHER GUIDING POLICIES	18
7.1 Other Relevant Guiding Policies.....	19
8. ORGANISATIONAL STRUCTURE	20
8.1 Reporting structure.....	21



Overlooking the Numees Group and Hilda Subgroup rocks of the Gariep Supergroup, in the Richtersveld National Park, Northern Cape. Photograph by: Mr Nick Baglow

PART A: GENERAL INFORMATION

1. GENERAL INFORMATION ON THE COUNCIL FOR GEOSCIENCE

REGISTERED NAME:	Council for Geoscience
PHYSICAL ADDRESS:	280 Pretoria Street Silverton, Pretoria South Africa
POSTAL ADDRESS:	Private Bag X112 Pretoria, South Africa 0001
TELEPHONE NUMBER:	+27 (0)12 841 1911
FAX NUMBER:	+27 (0)12 841 1203
E-MAIL ADDRESS:	info@geoscience.org.za
WEBSITE ADDRESS:	www.geoscience.org.za
EXTERNAL AUDITORS:	Auditor-General of South Africa
BANKERS:	Nedbank and ABSA in Silverton, Pretoria
COMPANY SECRETARY:	Ms Thulisile Nxumalo

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 its head office located in Silverton, Pretoria (Figure 1).



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

2. ABBREVIATIONS AND ACRONYMS

AIDS	Acquired Immunodeficiency Syndrome		
AMD	Acid Mine Drainage	MQA	Mining Qualifications Authority
AMT	Audio-magnetotelluric	MTEF	Medium Term Expenditure Framework
ATP	Annual Technical Programme	MTSF	Medium Term Strategic Framework
BBMT	Broadband magnetotelluric	NDP	National Development Plan
BIC	Bushveld Igneous Complex	NEHAWU	National Education, Health and Allied Workers' Union
BRGM	Bureau de Recherches Géologiques et Minières	NEMA	National Environmental Management Act
BSC	Balanced Scorecard	NIPMO	National Intellectual Property Management Office
CCS	Carbon Capture and Storage	OAGS	Organisation of African Geological Surveys
CEO	Chief Executive Officer	PDAC	Prospectors and Developers Association of Canada
CGS	Council for Geoscience	PGM	Platinum Group Metal
CoGTA	Cooperative Governance and Traditional Affairs	PFMA	Public Finance Management Act
CSR	Corporate Social Responsibility	PPC	Parliamentary Portfolio Committee
CTBT(O)	Comprehensive Nuclear-Test-Ban Treaty (Organisation)	PSA	Public Servants Association
D&O	Derelict and Ownerless	REEs	Rare Earth Elements
DMR	Department of Mineral Resources	SAGA	South African Geophysical Association
DST	Department of Science and Technology	SAIMM	The Southern African Institute of Mining and Metallurgy
EE	Employment Equity	SAMSS	Southern African Marine Science Symposium
FY	Financial Year	SANAS	South African National Accreditation System
ERT	Electrical Resistivity Tomography	SANMAP	South African Nearshore Mapping Programme
GIS	Geographic Information System	SANSN	South African National Seismograph Network
GRAP	Generally Recognised Accounting Practice	SAR	Synthetic Aperture Radar
GSD	Geological Survey Department	SASQUA	Southern African Society for Quarternary Research
GSN	Geological Survey of Namibia	SHEQ	Safety, Health, Environment and Quality
GTK	Geological Survey of Finland	SMART	Specific, Measurable, Aligned, Realistic/ Relevant and Time-bound
HIV	Human Immunodeficiency Virus	SPLUMA	Spatial Planning and Land Use Management Act
IMWA	International Mine Water Association	STI	Science, Technology and Innovation
ISO	International Organisation for Standardisation	W:B	White:Black
KOSH	Klerksdorp–Orkney–Stilfontein–Hartebeesfontein	XRD	X-Ray Diffraction
LIMS	Laboratory Information Management System	XRF	X-Ray Fluorescence
LUT	Lappeenranta University of Technology		
MAIWD	Ministry of Agriculture, Irrigation and Water Development		
M:F	Male:Female		
MPRDA	Mineral and Petroleum Resources Development Act		

3. FOREWORD BY THE CHAIRPERSON OF THE BOARD



Dr H. Mathe, Chairperson of the Board

I am pleased to report that the Council for Geoscience (CGS) has significantly improved and stabilised following the appointment of the new Board of Directors with effect from March 2017, as well as the appointment of Mr Mosa Mabuza as the Chief Executive Officer (CEO) with effect from July 2017. In as much as 2017, just like 2016, was a challenging year, the board together with executive management worked tirelessly on strengthening internal governance structures, motivating the CGS associates to focus on building the organisation by adhering to the CGS mandate and finalising the appointment of key and critical executive managers who will vigorously drive the mandate of the organisation.

Furthermore, there has been a significant improvement in the organisational performance from the lowest ebb of 48% in the FY 2015/16 to sustaining performance above 88% for the FY 2016/17 as well as the FY under review.

The President's State of the Nation address earlier this year affirmed mining as a sunrise industry, given the exceptional geological potential for discovery of world-class mineral deposit/reserves. The bulk of South

Africa's mines were discovered using conventional exploration techniques and technologies. As such, the exploration real estate in South Africa remains in the top quartile in terms of geological potential, which shall be unleashed with the integrated and multidisciplinary geoscience mapping programme.

During the financial year under review, the CGS management, supported by the board, prioritised the placement of personnel in terms of the approved organisational structural redesign. The afore placement is in accordance with the approved integrated and multidisciplinary geoscience mapping programme to deliver on the major projects that will be of benefit to the country and will enhance the overall performance of the organisation. In driving and delivering on its mandate, the organisation has performed very well in implementing several projects of strategic significance to the South African society. The key benefit of undertaking the integrated and multidisciplinary approach in conducting research at the CGS was evident during the environmental baseline investigations conducted in the southern Karoo near the town of Beaufort West. During this study, the CGS made a groundbreaking impact on the South African society by discovering water in Beaufort West during the research studies on the Shale Gas Project. Two boreholes, BW-02 and BW-04, returned high water yields of 8 litres/second and 5 litres/second respectively. The water was intersected at depths greater than 165m, and the combined yield of the two boreholes is about 33 million litres per month of potable water supplied to over 45 000 people in Beaufort West. The discovered water was estimated to translate to a monthly value of R984 500.00 (about R11.81 million per year based on a rate of 29.8c/KL for level 6 water restrictions). On the 13th February 2018, the CGS together with the Department of Mineral Resources (DMR), handed over the two water boreholes to the Beaufort West Municipality.

A plaque to this effect was unveiled by the Director-General of the DMR, Advocate T Mokoena and the then Mayor of Beaufort West, Councillor van der Linde.

The integrated and multi-disciplinary geoscience mapping programme will also seek to develop novel solutions to address national developmental imperatives such as finding new mineralisation

systems and contributing towards diversification of the energy mix as well as the low-carbon economic growth trajectory contemplated by the South African government. The latter includes, albeit not limited to (i) leading research on geothermal energy in South Africa; (ii) investigating the shale gas potential of lower Karoo strata; and (iii) reducing the carbon footprint of South Africa by researching mechanisms of sequestering carbon dioxide.

Some of the technologies and applications in the geoscience mapping programme will include: applying principles of artificial intelligence for the identification and characterisation of natural systems such as complicated mineralisation, groundwater controls and natural hazards; and gathering and using high-resolution surveying techniques such as hyperspectral satellite imagery, Lidar, drones as well as subsurface surveying techniques that span magnetotelluric and high density seismic array modelling. The CGS is also assessing prospects of augmenting the capacity of the laboratory facilities to strengthen the geoscience mapping value chain.

The CGS has also made significant progress in the following technical projects, inter alia: the rehabilitation of Derelict and Ownerless (D&O) Mines, assessment of Uranium and Thorium resources, strategic mine water management, off-shore mapping that is supportive of the Ocean's Phakisa and the Blue Economy Development programme, to mention a few.

Sustainability is an integral part of the CGS's mandate and business at the financial/economic, social, stakeholder and environmental levels. The scientific focus and innovation within the organisation has the sustainability thrust embedded in it. The board ensures that all CGS divisions implement sustainable safety, health and environmental management systems. To this effect, the board approved the CGS Risk Management Framework as well as strategic risk register.

The CGS will continue to pursue collaborative partnerships with local and international research institutes. These partnerships are important for exchanges in knowledge and effective execution of the mandate. One such partnership seeks to monitor shallow and deep mine seismicity and involves the Mine Health and Safety Council, the Council for

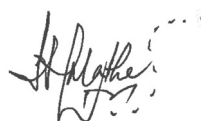
Scientific and Industrial Research and Mintek. This is an imperative, as continued and deepening mining significantly increases the risks to human life and surrounding infrastructure.

In terms of human resources, the CGS maintains a harmonious and diversified workforce that has embraced it as an employer of choice. Of particular interest, the CGS board prides itself on the training and development opportunities provided to the CGS associates. During the year under review, eight associates were awarded MSc degrees, and four associates were awarded PhD degrees.

I am delighted that the management of CGS is constantly driving towards excellence and aptly recognising the same. In December last year, the CGS acknowledged the excellence of associates across the spectrum of levels as individuals or teams. This event was intended to cultivate and nurture a culture of performance and must be sustained.

We will continue to build a strong foundation that will ensure the prosperity of the organisation in the years ahead. I am pleased that, for the past 15 consecutive years, the CGS has obtained unqualified Audit opinions from the Auditor-General of South Africa.

In conclusion, I would like to thank the Ministry of Mineral Resources and the Ministry of Science and Technology for their dedicated support and guidance as well as the Parliamentary Portfolio Committee (PPC) on Mineral Resources for the support, oversight role and guidance provided to the CGS. Furthermore, my gratitude is extended to the board, the management team and the entire CGS associates for their continued commitment to the organisation. In as much as there might still be challenges at the CGS, I am confident that the organisation is steadily heading towards a stable environment and will continue to deliver on its mandate.



Dr H. Mathe
Chairperson
Board of the Council for Geoscience

4. OVERVIEW BY THE CHIEF EXECUTIVE OFFICER



Mr M. Mabuza, Chief Executive Officer

It is that time of the year when we retrospectively review our performance while we are synchronously evaluating the impact of our delivery to the national transformative disposition. The past year was an important and exciting time for the CGS as it began firming up the framework for undertaking an ambitious and highly integrated programme to collect multidisciplinary geoscience information across the length and breadth of South Africa. The mandate of the CGS is well inscribed in our founding legislation, as amended. Key among the aspects of our mandate is the critical integrated and multidisciplinary geoscience mapping approach and its application toward finding applied geological solutions to challenges confronting the people of South Africa. Notwithstanding the fact that the formalised mining industry is more than one hundred and thirty years old, the prospects for delineating new mineralisation systems are significant in which our geological and prospecting real estate remains in the top quartile of the peer jurisdictions. It is noteworthy to emphasise the importance of geology to human development broadly, spanning not only minerals development but a contribution towards, inter alia, infrastructure development, agriculture and food security, medical geology, energy security,

groundwater, engineering geology and geohazards identification for pre-emptive disaster management.

The application of an integrated and multidisciplinary geoscience approach to conducting our research was evident during the CGS's environmental baseline investigations conducted in the southern Karoo, near the town of Beaufort West. This project was undertaken while the Western Cape faced the worst drought in recorded history. Two boreholes, BW-02 and BW-04, were drilled and returned conservative water yields of 8 litres/second and 5 litres/second respectively. The combined yield of the two boreholes is about 33 million litres per month of potable water. Due to the water crisis in the Western Cape and particularly at Beaufort West, the DMR and CGS donated these boreholes to the Beaufort West Municipality on the 13th February 2018 to provide access to a community of about 45 000 people.

The integrated and multidisciplinary geoscience programme seeks to evaluate new and more innovative ways to resolve societal problems and to develop novel solutions to address national imperatives. The CGS is exploring innovative ways to contribute

Training and development remain one of our critical investments that seek to bequeath the geoscience expertise to posterity.

towards diversifying the energy mix of South Africa and adding a further impetus to the attainment of the “low carbon economic growth trajectory”. These include, albeit not limited to, leading research on geothermal energy potential in South Africa; characterising the lower Karoo strata to, among other things, undertake a geo-environmental baseline study for the prospective exploitation of shale gas as well as researching mechanisms of sequestering carbon dioxide to moderate the carbon footprint of South Africa. We are resolute in exploring new technologies and applications in geosciences to enhance the efficacy of our work. Some of these technologies and applications include: applying principles of artificial intelligence for the identification and characterisation of natural systems such as groundwater controls and natural hazards; and gathering and using high-resolution surveying techniques such as hyperspectral satellite imagery, Lidar, drones and subsurface surveying techniques such as magnetotelluric and high-density seismic array modelling. We are also excited about prospects of upgrading the laboratory facilities and acquiring new analytical equipment that will not only further assist in the effective and efficient processing of the multidisciplinary geoscience programme samples of the CGS, but also enhance the quality and turnaround times for the samples we analyse for our vast customer base.

Our collaborative partnerships with local and international research institutes give effect to our geoscience diplomacy programme. These kinds of partnerships are important for skills development and better execution of the mandate. One such partnership seeks to monitor shallow and deep mine seismicity and involves the CGS, the Council for Scientific and Industrial Research, Mintek and the Mine Health and Safety Council. This is an imperative requirement, as continued and deep mining significantly increases the risks to human life and the surrounding infrastructure. We are participating in several bi-national and multi-national collaborative efforts in the development of geosciences expertise and its response to societal challenges. We use these platforms to exchange ideas on modes of continuous improvement in the respective fields of collaboration.

It is fitting that the CGS family commits a further comprehensive programme during the year that our fellow compatriots have declared a centenary

commemoration of our founding father of democracy, Dr Nelson Mandela. Our programme is designed to resonate with the values of, among other things, building a non-racial, non-sexist and prosperous nation – we accordingly emphasise the criticality of geoscience’s response to societal challenges.

The environmental legacy emanating from protracted mining in South Africa without stringent environmental legislation presents a threat to our constitutional responsibility to protect the environment for generations. We are accordingly seized with the management of the so-called “derelict and ownerless mines and sites” that are posing a threat to proximate societies. A comprehensive database and a ranking mechanism for the risks associated with these mines and sites have been established. We prioritise such mines and sites that are located on state lands, while we are planning to embark on a programme of assessing the reclamation potential in some of the old dumps.

The strategies for the mine water and environmental management programme is well developed and ready for implementation. Key amongst these are mechanisms to ensure that clean surficial water is protected from the risk of ingress into old mine workings, which result in acid mine drainage. We consequently design and construct canals to divert the water from prospects of ingress, saving millions of litres of water a day from such risk.

South Africa’s geological heritage and prowess can never be over-stated. In this regard, our contribution to geotourism is amongst key contributions of the CGS to nurturing a basic appreciation of geology by society and tourists. We will be ramping up our contribution and collaboration with relevant authorities and stakeholders.

We registered a geoscience patent for the first time in the history of CGS in the current financial year – this marks one of the critical parts of our delivery orientation, which is advancing not only science and technology but embraces aspects of innovation in what is popularly known as Science, Technology and Innovation (STI). We also collaborated with the Department of Science and Technology to establish a National Intellectual Property Management Office (NIPMO) in the CGS, which gave effect to the

Intellectual Property Rights Act, 2008. This office is focussed on monitoring, managing and nurturing the development of intellectual property at the CGS.

The CGS is embracing current ways of doing business smarter. We introduced a web-based performance management system in 2017 and have moved to paperless monitoring and evaluation of our performance. This constitutes part of a basket of interpositions that seek to meaningfully enhance our business models and the efficacy with which we measure our implementation progress, utilisation of resources, as well as the impact of our delivery. We convened a review of our technical programme in January to evaluate the extent of implementation of our planned programme in January 2018. This allowed us to use the afore-based system to seamlessly assess and account on our progress in order to plan on optimisation of delivery before the end of the financial year. We will be ramping up on more regular reviews henceforth.

We have re-ignited a new spirit of the CGS family that nurtures excellence in geosciences. In December 2017, we hosted a special awards session to acknowledge colleagues who attained excellence in pursuit of their respective areas of geoscience work. We congratulate all nominees and winners of the 2017 Excellence Awards and are certain that this intervention has inspired all of us to attain geoscience excellence at all material times. I introduced a special category of the CEO's award for excellence, which is named after Mr Elijah Nkosi in recognition of his impeccable track record of excellence in the field of mineral separation at the CGS. Mr Nkosi was requested to re-join the CGS after his retirement to re-introduce his vast and exclusive expertise to the organisation and to train several young technicians.

As part of our broader programme to secure a seamless transfer of skills and sustainability of the business of CGS, we also invited Mr Masibi Matji to continue with his specialised skills and to train young technicians. We have extended several contracts of highly experienced geoscientists in the CGS beyond their retirement ages so as to secure appropriate continuity and ensure necessary skills transfer to a younger generation of geoscientists. These include, albeit not limited to, Dr M Cloete, Dr D Cole, Dr L Chevallier, Dr C Hatton, Dr N Baglow, Dr G De Kock, Dr S Strauss and Mr C De Beer. These colleagues have dedicated their entire professional lives to the profession of geosciences and continue to serve their nation with distinction.

Training and development remain one of our critical investments that seek to bequeath the geoscience expertise to posterity. In this regard, we invest an average of 2% of our liveable payroll on training and development. At the end of the financial year under review, we invested in a total of 49 fulltime bursars, six of which were at PhD level, 29 MSc, 13 BSc Honours and one BSc. We also invest in part-time bursaries for our colleagues at the CGS – we have achieved a total complement of 45 part-time bursars, of which 15 are PhDs, and the remaining 30 are MSc level. We also provide opportunities for employment training through our internship programme. In the financial year 2017/18, we served a total of 34 interns with varying levels of qualifications.

Every year has its high and low moments. In the year under review, we bid farewell to true stalwarts of geosciences to retirement. We celebrate the sterling contribution of these colleagues in summary here below:

- **Dr Jurie Viljoen:** Employment period 15 February 1982 to 31 January 2018.

Dr Viljoen's career in geoscience started when he graduated from the University of Stellenbosch in 1982. He has worked for the CGS for 36 years, and his specialisation is sedimentology and geological mapping. For the first eight years of his career, Dr Viljoen was employed as a junior, then senior geologist. From 1990 – 2002 he was the manager of the Western Cape regional office. From 2002 until his retirement, Dr Viljoen worked at the CGS as a chief geologist. Over the years, Dr Viljoen worked on a broad range of topics including Karoo sedimentary rocks, Mesozoic basins, industrial minerals such as building sand and brick clay, occurrence, source and deposition of alluvial diamonds, and he introduced the CGS to this idea of CO₂ storage in sedimentary basins – and in particular, the Algoa and Zululand Basins. He has worked outside of our borders in Madagascar, Tanzania and Ghana. Dr Viljoen has published numerous scientific papers, reports and maps on 1:50,000 and also 1:250,000 scales from the areas around Clanwilliam, Mossel Bay, George, Stellenbosch, Priseka and Carnarvon. He has been instrumental in applied geoscience in informing the Square Kilometre Array construction in the Northern Cape with his deep geological knowledge. Dr Viljoen has truly added value to the institutional knowledge of the CGS and also the geological knowledge of South Africa as a whole.

In conclusion, let me express our deepest condolences to the colleagues who lost family members and friends in the financial year under review. In particular, the CGS family was deeply saddened by an untimely passing of Mr Elvis Raphadu, who was a contract employee at the CGS – we convey sincere condolences to the Raphadu family. We also wish all the colleagues who are traversing their convalescence journey a fast recovery and look forward to meeting back at the ranch.

I am particularly proud of the CGS family for having in-sourced all the ancillary staff in the various functions of cleaning, landscaping, protection services and the canteen. The CGS family restored the dignity of their own colleagues.

We have built a solid foundation on which to build a stronger and delivery-focussed CGS. This we could only achieve because we recognise that we are proverbially standing on the shoulders of giants in the form of all our fore-bearers. Let us seize this moment and work on building a standing legacy for generations ahead of us.

A special thanks to the Board of the CGS, under the judicious leadership of the chairperson, Dr Humphrey Mathe, for their patience, meticulous evaluation of our work, support and guidance in the execution of their fiduciary responsibilities.



Mr M. Mabuza
Chief Executive Officer
Council for Geoscience

5. STATEMENT OF RESPONSIBILITY FOR PERFORMANCE INFORMATION

Statement of responsibility for performance information for the year ended 31 March 2018

The Chief Executive Officer is responsible for the preparation of the performance information of the CGS and the judgements 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 regarding the integrity and reliability of performance information.

In our opinion, the performance information fairly reflects the actual achievements against planned objectives, indicators and targets as per the strategic and annual performance plan of the CGS for the financial year ended 31 March 2018.

The performance information of the CGS for the year ended 31 March 2018 has been examined by the external auditors and their report is presented on pages 80 to 84. The performance information was also approved by the Board of the CGS.



Mr M. Mabuza
Chief Executive Officer
Council for Geoscience
31 July 2018



Dr H. Mathe
Chairperson
Board of the Council for Geoscience
31 July 2018

6. 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 the Geoscience Act No. 100 of 1993, as amended, as follows:

6.1 Vision

A prosperous and transformed society enabled by geoscience solutions.

6.2 Mission

The mission of the CGS is to contribute to a prosperous South Africa by:

6.2.1 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;
- Mapping and characterisation of geo-engineering and geohazards; and
- Support infrastructure development planning.

6.2.2 Acting as a national advisory authority on geo-environmental pollution and geohazards.

6.2.3 Providing an information repository and delivery platform that facilitates actionable decisions and the accessibility of pertinent information by relevant stakeholders.

6.2.4 Discharging the mandate in a manner that supports transformation and national developmental imperatives.

6.3 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.

6.4 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 tabled below (Table A1), are intended to shift the strategic orientation of the CGS to deliver an impactful delivery of the core mandate.

Table A1: Strategic objectives and related initiatives of the five-year strategy

Strategic objectives	Strategic initiatives	Main outcome
Delivery of the mandate	Successfully execute the multidisciplinary geoscience mapping programme and all other CGS projects through integrated, thematic and systematic mapping and research.	GEOSCIENCE INFORMATION AND SOLUTIONS ENABLING PROSPERITY FOR ALL
Advisory function, stakeholder engagement and knowledge management	Manage, disseminate, make accessible and advise strategic local and international stakeholders regarding geoscientific matters, including geohazard data and information.	
An empowered, transformed, motivated and capacitated workforce	Create an attractive organisational culture through the development of an investment in an empowered, diverse, competent and transformed staff.	
Organisational effectiveness and efficiency	Implement sound policies, processes and best practices in view of adopting and promoting international standards, sustainable governance and economic growth.	
Financial sustainability	Drive sustainable governance and the management of funding to enable the economic growth of the organisation.	

7. 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.

The 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 right holders, 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 the 1st July 2012 on account of paucity of resources to implement the expanded mandate. The CGS has since reorganised its orientation to ready itself for the staggered implementation of these provisions and accordingly intends to approach relevant authorities to facilitate the upliftment of the aforementioned sections during the financial year 2018/19. This constitutes organic growth of the CGS 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, but are not limited to, 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, amongst others:

- The national custodianship of all geoscientific information and dissemination thereof to the relevant stakeholders; and
- The review of all geotechnical reports and counsel in respect of infrastructure development within the country.

The 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 the 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-environmental-related issues.

Training and Development: The CGS invests substantively in training, development and competency of its staff through various training efforts and bursary offers. Moreover, the CGS also cooperates with institutions of higher learning in the promotion of research, training and development of scientists in the field of geoscience.

7.1 Other Relevant Guiding Policies

In realising the urgent need to address the national imperatives, the CGS ensures that its business model and all its activities address the following strategic national outcomes in alignment with the NDP Vision 2030:

- **Decent employment through inclusive economic growth:** Increase the benefits of the 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 respect of scientific, administrative and managerial/ leadership skills as well as 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 (CCS); 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 and employment equity (EE).

Along with the NDP, the strategy of the CGS aligns with the outcome-oriented goals of the DMR as listed below:

- Increased investment in the minerals, mining and upstream petroleum sectors;
- Efficient, effective and development-oriented state institutions;
- Transformed minerals sector;
- Equitable and sustainable benefits from mineral resources; and
- Improved health and safety conditions.

The CGS derives its strategic underpinning from the Government's Medium Term Strategic Framework (MTSF) for 2014–2019, the Stakeholders' Declaration on Strategy for the Sustainable Growth and Meaningful Transformation of South Africa's Mining Industry of the DMR, and the Ten-Year Innovation Plan of the Department of Science and Technology (DST).

8. ORGANISATIONAL STRUCTURE

The organogram describes the reporting structure of the CGS (Figure 2) that was developed to support the efficient, effective and robust functioning of the CGS and the composition of its Board of Directors and Executive Management.

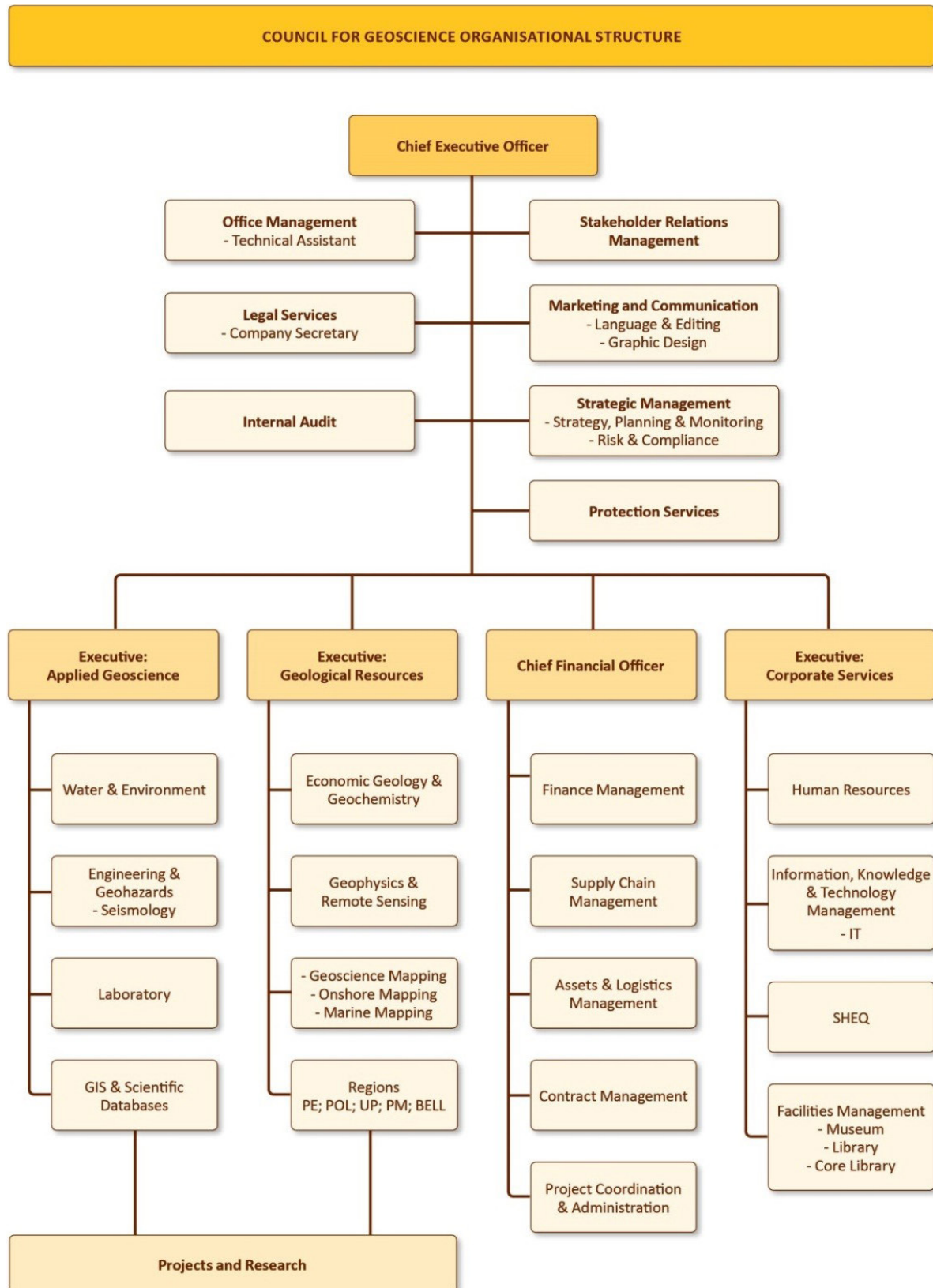


Figure 2: The organisational structure of the CGS.

8.1 Reporting structure

The primary shareholder of the CGS is the Minister of Mineral Resources, with a secondary accounting responsibility to the Minister of Science and Technology.



*Resigned on 24 August 2017

PART B: PERFORMANCE INFORMATION

1. AUDITOR-GENERAL'S REPORT: PREDETERMINED OBJECTIVES	23
2. OVERVIEW OF THE PERFORMANCE OF THE COUNCIL FOR GEOSCIENCE	23
2.1 Service delivery environment	23
2.2 Organisational environment	24
2.3 Key policy developments and legislative changes	24
3. PERFORMANCE INFORMATION OF THE CGS BY STRATEGIC PERSPECTIVES AND OBJECTIVES..	25
3.1 Corporate scorecard for 2017/2018	26
4. OPERATIONAL HIGHLIGHTS	31
4.1 Introduction to the Geoscience Technical Programme of the CGS	31
5. DISSEMINATION OF INFORMATION	46
5.1 Publications.....	46
5.2 Peer-reviewed articles.....	48
5.3 Conference proceedings	51



Heavy minerals sand at Illovo Beach, KwaZulu Natal

PART B: PERFORMANCE INFORMATION

This section of the report provides key performance information that demonstrates the CGS's achievements with regard to service delivery. The information corroborates the extent to which the organisation affects aspects of effective management, planning, budgeting, implementation, monitoring and evaluation as well as reporting. Accordingly, the performance information reported illuminates the symbiotic inclusivity of planning and managing the inputs and activities to achieve desired results.

The CGS presents the performance information that affirms alignment in terms of the strategic outcomes/objectives and demonstrates the organisational achievements against performance indicators and targets as identified in the Strategic Plans, Annual Performance Plans and the budget.

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 80 to 84.

2. OVERVIEW OF THE PERFORMANCE OF THE COUNCIL FOR GEOSCIENCE

2.1 Service delivery environment

The CGS is mandated to collect, compile, interpret and disseminate geoscience knowledge for South Africa in terms of the Geoscience Act No. 100 of 1993, as amended. The business model of the CGS allows for both statutory and collaborative activities. The statutory integrated and multidisciplinary geoscience mapping programme seeks to address developmental imperatives of South Africa, as articulated in the NDP Vision 2030.

The CGS applies the following scientific disciplines:

- **Geoscience mapping:** The CGS conducted geoscience mapping as a core of the disciplines at various scales. In the reported year, the CGS commenced the detailed mapping programme at a scale of 1:50 000 to improve the coverage published geoscientific map. An audit of the geological maps in the CGS's repositories was conducted to establish the level of completeness and quality;
- **Minerals and energy development:** The research conducted in the minerals and energy resources development at the CGS contributes to stimulation of investment in the exploration and mining. In 2017/2018, processing and interpretation for 66 element-analyses were conducted on samples collected from the Pofadder-Uppington, Prieska, Aggeneys, Naip, Vaal, Gariep and Tugela areas, to name a few. Geophysical surveys were also undertaken in these areas. These surveys led to the production of mineral prospectivity maps;
- **Environment and water:** The CGS advises the government through DMR on the contingent environmental liabilities of the State concerning D&O mines in the country. It also advises the DMR on the management of mine water emanating from defunct Witwatersrand goldfields and coal mines of the eastern Highveld with regard to, inter alia, water ingress and mine residue control and provides proactive solutions for mining of the Karoo Uranium Province, should this occur; and
- **Engineering geoscience and physical geohazards:** The CGS provides advice and also reviews and evaluates geotechnical reports in respect of geohazards (e.g. sinkholes in dolomitic areas, seismicity and landslides) that may affect all infrastructure development on dolomite lands to various entities in order to reduce the risk to lives and property from the potential effects of the aforementioned geohazards.

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

- **Agency projects:** These projects are essentially sourced from other government departments/institutions and public entities;
- **International projects:** These projects are mainly sourced through international tenders and have essentially advanced the country's regional integration policy to give effect to the Geoscience Diplomacy programme of the CGS; and
- **Private sector:** These projects constitute collaboration with private sector establishments.

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

- The national seismograph network and infrasound observatory, which monitor earthquakes and other sonic disturbances crossing over the country;
- The national borehole core repository, which provides a comprehensive national 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.

2.2 Organisational environment

During the past year, the CGS appointed a CEO and the new organisational structure was approved and duly implemented. A number of CGS colleagues assumed acting roles at Executive Management positions as well as management levels across the organisation, contributing their vast knowledge of the business to bring about the necessary premise for sufficient organisational stability. In addition, the Strategy Unit was established in the Office of the CEO and has introduced an unprecedented web-based performance management system to enhance the ease of strategy development and performance monitoring within the organisation.

The adoption of the CGS strategy focuses on an integrated and multidisciplinary geoscience mapping programme that is streamlined with all other activities

coordinated around this programme. The strategy aims to enhance the map coverage of South Africa's land surface at a greater level of detail, not only geologically, but also geophysically, geochemically and geotechnically to produce a new generation of more detailed maps to serve as a base to advise the State and various stakeholders, including the public. Marine geoscience mapping also features prominently in line with the objectives of marine Operation Phakisa.

This strategy substituted an interim intervention known as the "*Business Unusual strategy*", following the unsuccessful implementation of the preceding Repositioning strategy that was introduced at the beginning of the current MTSF cycle. The Business Unusual strategy, however, yielded some positive results, for example, revenue generation and the reduction of the financial rollover of funds allocated to MTEF projects.

The Annual Technical Programme (ATP) audit was conducted by independent evaluation constituted by members of the academic community and industry experts. This exercise yielded performance of an average project completion rate at 86.8% and a quality score of 4.03 out of 5, resulting in an aggregated performance of 70%.

The prevailing organisational environment has appositely cultivated for the CGS to deliver its mandate in a manner that impacts positively to societal developmental needs.

2.3 Key policy developments and legislative changes

No key policy developments have occurred in relation to the Geoscience Amendment Act (Act No. 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. It expands the mandate of the organisation and reflects its interaction with the Minerals and Petroleum Resources Development Act (Act No. 28 of 2002), the amendment of which is still pending. With the new strategic approach, the CGS is gearing itself towards aligning its activities with the latest developments in the Mineral and Petroleum Resources Development Act (MPRDA) amendments, National Environmental Management Act (NEMA) and the Spatial Planning and Land Use Management Act (SPLUMA).

3. PERFORMANCE INFORMATION OF THE CGS BY STRATEGIC PERSPECTIVES AND OBJECTIVES

In accordance with the strategy of the CGS, the Balanced Scorecard (BSC) approach has been adopted to provide an account of the overall performance of the organisation. The BSC essentially measures the performance of the organisation at the corporate business unit and individual level. There are nine strategic objectives identified in resonance with the BSC framework, and, as such, cover the customer, internal business process, the financial, learning, and growth perspectives. The objectives are aligned with the targeted strategic outcomes of the organisation and include:

- i. Market (stakeholder/customer) perspective:
 - To serve our stakeholders and customers; and
 - To effectively promote the CGS.
- ii. Economic (Financial) growth perspective:
 - To generate revenue; and
 - To manage overhead efficiency.
- iii. Effective systems (organisational) perspective:
 - To develop and implement effective procedures; and
 - To drive preferential procurement.
- iv. World-class people perspective:
 - To attract and retain the workforce;
 - To build a positive organisational culture and reflect and embrace diversity in South Africa; and
 - To reflect and embrace Republic of South Africa diversity.

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

To evaluate the corporate performance of the CGS, the organisation has developed a range of performance indicators, which cover the entire spectrum of activities within the organisation. The performance indicators, together with the performance targets for the period 2017/2018, are summarised in the accompanying table on pages 26 to 30 (Table B1).

3.1 Corporate scorecard for 2017/2018

Table B1: Corporate scorecard for 2017/2018

Market (stakeholder / customer) perspective	TO DRIVE STAKEHOLDER AND CUSTOMER SATISFACTION BY THE DEVELOPMENT OF WORLD CLASS PRODUCTS AND SERVICES				
Strategic objective 1	To serve our stakeholders and customers				
Programme performance indicator	Actual achievement 2016/2017	Planned target 2017/2018	Actual achievement 2017/2018	Deviation from planned target to actual achievement for 2017/2018	Comment on deviations
Number of geoscience maps and publications published	17	5	9	+4	Target exceeded due to finalisation of multi-year publications in the form of two books, a Memoir and a Metallogenic Map Explanation.
Client satisfaction survey score	84.3%	60%	69.6%	+9.6%	Target exceeded as a result of better organisational response to service delivery following the downward adjustment of the target coinciding with the introduction of a new strategy for the year under review.
Number of rural development project reports completed	22	5	8	+3	Target exceeded due to additional requirements of the ground stability and landslide susceptibility studies by the local municipalities in the Northern Cape Province for human settlement development purposes.
Number of regional and African development project reports completed	7	2	7	+5	Target exceeded due to the Malawian clientele extending the scope of work based on the positive outcomes of previously concluded tasks.
Number of innovation project reports completed	3	2	2	0	
ATP performance index	76.9%	80%	70%	-10%	Target not met due to delayed finalisation of the ATP, which impeded qualitative finalisation of some projects.

Market (stakeholder / customer) perspective	TO DRIVE STAKEHOLDER AND CUSTOMER SATISFACTION BY THE DEVELOPMENT OF WORLD CLASS PRODUCTS AND SERVICES				
Strategic objective 2	To effectively promote the Council for Geoscience and disseminate strategic information to the public				
Programme performance indicator	Actual achievement 2016/2017	Planned target 2017/2018	Actual achievement 2017/2018	Deviation from planned target to actual achievement for 2017/2018	Comment on deviations
Number of peer-reviewed articles published	34	5	47	+42	Target exceeded because of CGS's refocus on its mandate and continued acquisition of new multi-disciplinary data. This allowed for new external collaborations and partnerships and additional articles published.
Number of conference proceedings	168	20	42	+22	Target exceeded due to leveraging opportunities for greater exposure of young scientists, particularly those studying towards their MSc and PhD qualification to present their abstracts. This was augmented by the advancement of our geoscience diplomacy programme, such as the CTBTO, OAGS, SAGA, Canada bilateral, etc., all of which hosted a number of conference proceedings in which the CGS participated
Number of projects with external collaborators	20	5	5	0	
Number of strategic science partnerships	10	5	5	0	
Number of media articles published	54	4	10	+6	Target exceeded due to a streamlined and incremental effort to illuminate the brand of the CGS. This was stretched beyond a downward adjusted target.

Market (stakeholder / customer) perspective	TO DRIVE STAKEHOLDER AND CUSTOMER SATISFACTION BY THE DEVELOPMENT OF WORLD CLASS PRODUCTS AND SERVICES				
Strategic objective 2	To effectively promote the Council for Geoscience and disseminate strategic information to the public				
Programme performance indicator	Actual achievement 2016/2017	Planned target 2017/2018	Actual achievement 2017/2018	Deviation from planned target to actual achievement for 2017/2018	Comment on deviations
Articles published in industry publications	30	6	9	+3	Target exceeded due to renewed interest in the implementation of the CGS strategy against a lowered target.

Economic (Financial) growth perspective	TO ACHIEVE SUSTAINABLE REVENUE AND PROFIT GROWTH				
Strategic objective 3	To generate revenue				
Programme performance indicator	Actual achievement 2016/2017	Planned target 2017/2018	Actual achievement 2017/2018	Deviation from planned target to actual achievement for 2017/2018	Comment on deviations
Number of audit qualifications	0	0	0	0	
Commercial revenue and sales (Rand)	R38.2m	R22m	R52.6m	+R30.6m	Target exceeded due to more commercial work done than anticipated.
Grant revenue (Rand)	R390.2m	R366m	R359.5m	-R6.5m	Target not met because of unexpected delays in the implementation of projects (e.g. prolonged stakeholder engagements in the Karoo Deep Drilling Project).
Strategic objective 4	To manage overhead efficiency				
Programme performance indicator	Actual achievement 2016/2017	Planned target 2017/2018	Actual achievement 2017/2018	Deviation from planned target to actual achievement for 2017/2018	Comment on deviations
Ratio of overhead costs to the total cost	56.72%	≤55%	54.33%	0.67%	Target achieved. Overheads have been contained in relation to the total cost.
Ratio of personnel cost to the total cost	55.58%	≤60%	54.73%	5.27%	Target achieved due to more expenditure on projects rather than on personnel.

Effective systems (organisational) perspective	TO DEVELOP AND MAINTAIN EFFECTIVE AND STREAMLINED PROCESSES, USING APPROPRIATE TOOLS AND METHODOLOGIES				
Strategic objective 5	To develop and implement effective procedures				
Programme performance indicator	Actual achievement 2016/2017	Planned target 2017/2018	Actual achievement 2017/2018	Deviation from planned target to actual achievement for 2017/2018	Comment on deviations
Number of policies written and/or reviewed	15	8	8	0	
Strategic objective 6	To drive preferential procurement				
Programme performance indicator	Actual achievement 2016/2017	Planned target 2017/2018	Actual achievement 2017/2018	Deviation from planned target to actual achievement for 2017/2018	Comment on deviations
Preferential procurement as a percentage of total procurement	73.9%	≥60%	72.25%	+12.25%	Target exceeded due to a concerted effort to drive transformation.

World-class people perspective	TO DEVELOP A WORLD-CLASS GEOSCIENCE ORGANISATION WHERE OUR PEOPLE CAN GROW AND PERFORM OPTIMALLY				
Strategic objective 7	To attract and retain the workforce				
Programme performance indicator	Actual achievement 2016/2017	Planned target 2017/2018	Actual achievement 2017/2018	Deviation from planned target to actual achievement for 2017/2018	Comment on deviations
Staff turnover	0.86%	<10%	0.24%	9.76%	Target achieved due to extra effort to cultivate an environment towards being an employer of choice.
Number of staff enrolled for MSc and PhD degrees	42	40	45	+5	Target exceeded due to an additional effort to invest in a solid base for requisite skills base.
Ratio of scientific staff to total staff	69.41%	≥60%	60.99%	0.99%	Target achieved due to an extra effort being put to recruit scientific staff for projects
Percentage of scientific staff with MSc and PhD degrees	28.57%	≥52%	33.72%	-18.28%	Target not achieved due to the redefinition of a scientist that inflated the reference pool and subsequently reducing the ratio.
Strategic objective 8	To build a positive organisational culture and reflect and embrace diversity in South Africa				
Programme performance indicator	Actual achievement 2016/2017	Planned target 2017/2018	Actual achievement 2017/2018	Deviation from planned target to actual achievement for 2017/2018	Comment on deviations
Staff satisfaction level	60%	60%	69%	+9%	Target exceeded due to steady stabilisation of the organisation's environment.
Strategic objective 9	To reflect and embrace Republic of South Africa diversity				
Programme performance indicator	Actual achievement 2016/2017	Planned target 2017/2018	Actual achievement 2017/2018	Deviation from planned target to actual achievement for 2017/2018	Comment on deviations
EE statistics (consolidated): WB ratio	24:76	<32:>68	19:81	+13%	Target exceeded due to increased focus on transformation.
EE statistics (gender): M:F ratio	54:46	<55:>45	50:50	+5%	Target exceeded due to increased focus on gender parity interventions.

4. OPERATIONAL HIGHLIGHTS

4.1 Introduction to the Geoscience Technical Programme of the CGS

The CGS has undertaken various integrated and multidisciplinary geoscience projects, which aim to develop detailed geoscientific information and knowledge, and these form part of the Geoscience Technical Programme. The integration of various fields of geoscience, include geological, structural, geotechnical, geophysical and geochemical mapping; water and environmental geosciences; and seismology to address societal challenges as defined by several key national objectives, including the NDP Vision 2030; the goals of the DMR; the 10-year innovation plan of the DST, and the strategic objectives of the CGS. Some of the projects are presented in Table B2 and include:

- The Karoo deep drilling baseline project, which seeks to establish geo-environmental baseline criteria in the southern Karoo and to use this information to support policy and legislation governing any potential shale gas development;
- The D&O in South Africa project, which aims to delineate the extent of negative environmental effects resulting from abandoned mines and ultimately aims to quantify mine liability;
- The mine water management project, which seeks to address the challenges of acid mine water drainage, with a particular focus on water ingress control into the gold and coal mines of South Africa; and
- The promotion of exploration and investment in the minerals industry, which is a large multidisciplinary project covering a countrywide range of prospective areas, particularly within the Northern Cape, North West Kwa-Zulu Natal and Mpumalanga provinces.

Table B2: Status of some national projects for 2017/2018

Project no.	Project name	Start–end dates of MTEF cycle	Funding Received in 2017/2018 (including opening balance from 2016/2017)	Total expenditure and balance as at the end of 2017/2018	Overall status (%) of technical completion of projects as at the end of 2017/2018	Comments
ST-2016-1250	Karoo deep drilling and geo-environmental baseline	Aug 2015 – Mar 2020 Year 3	R44 765 721.81	R17 276 263.35 Balance = R27 489 458.47	39%	Funds committed: R18.6 million for Geophysical survey R6.3 million for monitoring boreholes Remaining Funds: R2.8 million
ST-2013-1165	Management of State contingent liabilities with respect to D&O in South Africa	Apr 2015 – Mar 2018 Year 3	R55 990 481.37	R39 457 570.07 Balance = R16 532 911.30	70 %	Funds committed: R7.5 million (Invoicing in progress) Remaining Funds: R10.2 million
ST-2016-1251	Mine water management programme	Apr 2015 – Mar 2018 Year 3	R29 760 964.99	R 20,614,241.41 Balance = R9 146 723.58	69 %	Remaining Funds: R9.2 million for canal construction
ST-2013-1163	Stimulation of investment in the mining and mineral exploration sectors	Apr 2015 – Mar 2018 Year 3	R91 011 031.23	R88 723 852.35 Balance = R2 287 178.88	97%	Remaining Funds: R 2.5 million for geochemical analysis

4.1.1 Karoo deep drilling and geo-environmental baseline programme (ST-2016-1250)

The CGS is conducting a five-year multidisciplinary and integrated geoscience programme in the southern Karoo to enable informed decision-making and strengthen the regulatory framework for natural resource exploration and extraction in the southern Karoo, specifically with regard to any shale gas development. The main aim of the programme is to develop an environmental baseline from geoscientific investigation including sub-surface drilling and monitoring. The benefits of multidisciplinary research were realised when the CGS integrated structural geological mapping and geophysical surveys to uncover significant and previously undefined groundwater aquifers. This groundwater aquifer was drilled, and subsequent tests indicated a sustainable water supply of approximately 33 million litres of water per month. This translates to an estimated monetary value

ranging from R984 500 to a maximum of a possible R13 000 000 per month, as per the level 6B water restriction tariffs in the Western Cape Province. This discovery was especially significant when considering that the water resources were discovered at a time when the Western Cape Province faces the worst drought in recorded history, and the town of Beaufort West relied almost entirely on stressed groundwater resources. The water resources discovered by the CGS will serve approximately 45 000 persons and be an indispensable contributor toward alleviating the current water crisis in Beaufort West. On the 13th February 2018, the CGS handed over two boreholes that yielded a significant amount of good drinking groundwater, as confirmed by pump tests and laboratory results to the Beaufort West Municipality (Figure 3).



Figure 3: Council for Geoscience staff and dignitaries at the handover ceremony of one of the boreholes in Beaufort West.

4.1.2 Management of State contingent liabilities with respect to D&O mines in South Africa (ST-2013-1165)

D&O mines are a legacy of mining in South Africa and represent a significant hazard toward the environment and human health, while still offering mineral resource potential to some extent. The CGS has committed to assisting the state by evaluating, quantifying and closing D&O mines in South Africa. The CGS committed to undertake five tasks during FY 2017/18 as part of the management of the D&O mines in South Africa project including:

1. The management and maintenance of a national D&O mine database.
Outcome: This task includes the verification of mineral rights and determining land ownership rights, quantifying, classifying and prioritising mine openings and supporting future planning.
2. Performing an integrated asbestos rehabilitation monitoring programme. This task aims to develop and quantify baseline asbestos load data as an indicator of airborne dust pollution in different environmental samples around the vulnerable areas near the asbestos mine dumps.
Outcome: During this task, asbestos fibre contamination was calculated at six different sites within the Limpopo and Mpumalanga provinces.

3. Closure and site closure of abandoned mines. During this task, a generic concrete plug was designed and used to seal vertical and inclined mine openings.

Outcome: A total of 43 out of 45 mine openings were successfully sealed with this design.

Several mines were assessed for potential opportunities with regard to future mining and other development options at D&O mine sites, particularly concerning coal, iron, clay, dimension stone and building sand; results from three provinces on different commodities not allowing implementation of future mining or other development options yielded the following: resource estimation to be completed, financial assistance required and technology limitations. Promising results were obtained at sand and clay deposits.

4. The development of a national mine closure strategy.

Outcome: The development of a scoping report, establishing national and international perspectives, legal aspects and a strategic approach.

This project is due for an additional three-year renewed cycle.

4.1.3 Mine water management programme (ST-2016-1251)

The mine water management programme of the CGS aims to investigate the impacts and potential mitigation scenarios related to mine water drainage. Mine water drainage and ingress into shallow groundwater aquifers represent one of the largest contributors toward the pollution in the natural environment. During FY 2017/18 several tasks were undertaken:

1. The primary task involves providing support to the DMR. This task ensures that the mining industry and its stakeholders have access to any relevant information, e.g. on climate change.
Outcome: Information established to support informed decisions on management, mitigation and adaption.
2. Investigating the coexistence of mining and biodiversity and conservation.
Outcome: This task focussed on the Mpumalanga grasslands and developed a risk-based analytical approach. This included a combination of conceptual geo-environmental models, assessments of groundwater vulnerability and field verifications. This demonstrated that the generation of AMD and its migration to the surface water environment is a near-inevitable consequence of coal mining in Mpumalanga (Figure 4).
3. Managing water ingress in the Witwatersrand Goldfields.
Outcome: Ingress point was closed at Gravelotte Gold Mine, and an ingress zone at Van Rhyn Gold Mines was converted into a canal. An airborne electromagnetic survey was done by mapping the occurrence of groundwater and identifying pathways linking surface water bodies to the underground mines. Preliminary interpretation identified a possible important source of water ingress. This preliminary study, using high-resolution remote sensing data for the monitoring of water ingress areas on a daily basis proved successful, using simple statistical measures producing up-to-date data products and managing the extremely large volumes. The tracer study, using emerging organic pollutants

such as herbicides, prescription medication and caffeine, demonstrated the suitability of these chemicals as tracers for water ingress.

4. Investigating mine residues and specifically the leachate seepage, e.g. from AMD from mine residue dumps.
Outcome: Evaluating innovative and new geo-materials that can be used as effective mine dump linings, such as material produced from coal-combustion fly ash. Researching the development of geopolymers toward the effective stabilisation and solidification of hazardous and toxic materials. A review on geopolymers was completed, and valuable practical experience was gained in producing geopolymer specimens of varying shapes from a South African fly ash. A theoretical design was established for a cost-effective, geopolymer-based double composite lining system was proposed while four types of pre-prototype geopolymers were identified.
5. Searching for proactive solutions in emerging mining areas.
Outcome: Investigation and development of a groundwater vulnerability model for water management solutions for coal mines in the Thukela and Olifants water management areas. Groundwater risk maps were also developed for the Upper Vaal, KwaZulu-Natal coal fields and the Sabie-Pilgrim's Rest Goldfield.
6. Passive treatment of polluted coalfield mine water.
Outcome: Investigated long-term remediation techniques for polluted mine water. An integrated passive treatment approach is envisaged requiring the subsequent construction of a pilot treatment plan allowing for continuous monitoring.
7. The impacts associated with marine and coastal mining on marine biota and marine heritage resources.
Outcome: Impacts were assessed, and an extensive review of the legislation governing the impacts was completed.



Figure 4: Council for Geoscience scientists investigating AMD in the Ermelo Coal Field.

4.1.4 Stimulation of investment in the mining and mineral exploration sectors (ST-2013-1163)

The programme on the stimulation of investment in the mining and mineral exploration sectors aims to use regional geochemical data integrated with an understanding of ore-forming processes and mineralising systems to generate mineral potential target regions. This programme integrates this information to develop and provide high-resolution geoscience data and knowledge as well as mineral prospectivity maps to assist in stimulating investment in exploration and mining in South Africa. Several tasks were undertaken during FY 2017/18:

1. A regional geochemistry survey was undertaken in the Pofadder-Upington area of the Northern Cape. Geochemical fieldwork for this survey was completed in FY 2016/17 and the data processing, data interpretation and report were completed in FY 2017/2018. Deliverables for FY 2017/18 include a comprehensive geochemical report, geochemical atlas and 264 digital geochemical maps at a scale of 1:100 000. Several geochemical anomalies are discussed in particular sedimentary exhalative base metals, granite-related mineralisation, mafic and ultramafic indicator minerals and uranium mineralisation. A geochemical atlas of the Pofadder area has been completed and geochemical maps for the Aggeneys and Naip areas. Two types of geochemical maps were compiled for each chemical element, namely a geochemical contour map and a geochemical bubble plot;
2. Mapping and regional geophysical surveys of the alluvial diamond fields were conducted around Prieska in the Northern Cape. These focussed on the Vaal and Gariep River terraces and included high-resolution airborne geophysical surveys, detailed ground geophysical surveys and detailed geological mapping of the alluvial diamond fields;
3. A regional geochemical survey of the Sabie-Barberton area in Mpumalanga was completed. The sampling was carried out using a sample density of one soil sample per km². The project is expected to collect 13 104 samples over 21 1:50 000-scale map sheet areas with 11 426 samples having been collected thus far. The number of samples is the equivalent of more than 15 map sheets at a scale of 1:50 000;
4. An aggregate quality assessment was conducted in the Eastern Cape. Field sampling was concluded, and currently the regional remote

- sensing data, petrographic and petrophysical analyses, and geotechnical are ongoing;
5. High-resolution airborne geophysical surveys were completed in the southern part of the Kheis area in the Northern Cape and the Karoo uranium field in the Free State and KwaZulu-Natal provinces. The purpose of this task was to gather high-resolution magnetic and radiometric data to assess the mineral potential of the uranium fields of the Karoo Supergroup and to map the bedrock geology of the Kheis Terrane, which is covered by Kalahari sand. A basic interpretation of existing regional aeromagnetic data for both blocks has been carried out;
 6. A follow-up soil sampling programme was conducted to verify regional prospective anomalies and to validate the targeting model proposed to delineate Bushveld granite-related Sn-F-(REE)-Zn-Pb-Cu polymetallic mineralisation in the Bushveld Igneous Complex (BIC) through high-density (100m x 250m grid) soil geochemical surveys. Approximately 8 000 soil samples, elemental analysis, data processing and interpretation, and report writing have been completed. The results demonstrate that the proposed model is effective in delineating potential targets, and regional targets are indicative of mineralisation. The study has also uncovered new prospective areas with some meriting further exploration programmes (Figure 5); and
 7. A follow-up soil sampling programme was also conducted in the Tugela Terrane in KwaZulu-Natal. The objective of this task was to verify and delineate the anomalous gold and chrome targets that were generated from the airborne regional geochemical survey. The results suggest that chromium forms within the Sithilo Serpentine Complex and the amphibolite Wosi Formation. The gold is structurally controlled and located within the chlorite schist of the Mfongosi Group. The geochemical results supported the view that the anomalous target areas are regarded as hydrothermal gold and podiform chrome deposits. It is recommended that trenching and detailed geological mapping should be carried out to understand the geological and structural complexity of the area in view of potential gold deposits. In addition, a mineralogical investigation should be carried out to explore potential chromium deposits.

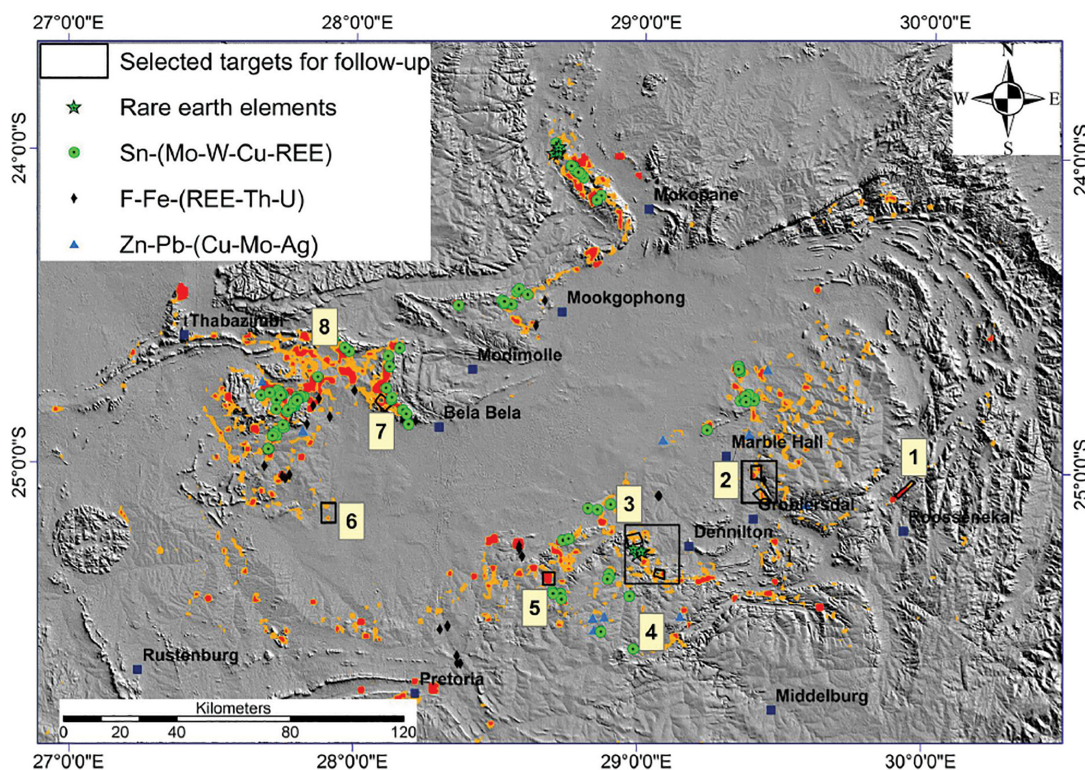


Figure 5: Mineral prospectivity map for Bushveld granite-related Sn-Mo-W-Cu-Pb-Zn-Ag-F-REE polymetallic mineralisation showing prospective areas (in red) and the localities of follow-up targets. 1) Roossenekal target, 2) Groblersdal target, 3) Dennilton target, 4) Loskop target, 5) Moloto target, 6) Ruigtesloot target, 7) Bela Bela target, and the 8) Thabazimbi target.

4.1.5 Geoscience mapping Delivery of a 1:50 000-scale geological map database for the whole of South Africa (georeferenced field sheets, published maps and vector data) (ST-2018-1312)

A priority in the initial stages of the 1:50 000 scale integrated and multidisciplinary geoscience mapping programme was to carry out a technical audit of the available 1:50 000-scale geological field sheets. The results of the audit, together with input from the CGS scientific community and external government, academic and industry stakeholders, form a good base in developing a detailed scientific plan and selecting the areas to be mapped in the context of the geoscience mapping programme. In addition to the scientific and strategic goals, the 1:50 000-scale mapping programme and its allied research output will provide the vehicle to rebuild, transform and integrate the various mapping competencies in the CGS. The geological map audit, which has for the first time in the history of the CGS, allowed the digital capturing of metadata, is linked

to a concurrent project, which envisages the delivery of a 1:50 000-scale geological map database for the whole of South Africa. A database was developed and subsequently audited where metadata and other information were captured. The results of the audit will be continually updated as new areas are mapped. These data will be interrogated to extract information to assist in the overall planning of future mapping under the integrated and multidisciplinary geoscience mapping programme. A total of 2 400 1:50 000-scale geological maps and field sheets were scanned and georeferenced with metadata compiled for each map. The audit illuminated that South Africa has a published 1:50 000-scale geological map coverage of about 5% (Figure 6). A significant amount of mapping has to be conducted in order to attain a national coverage.

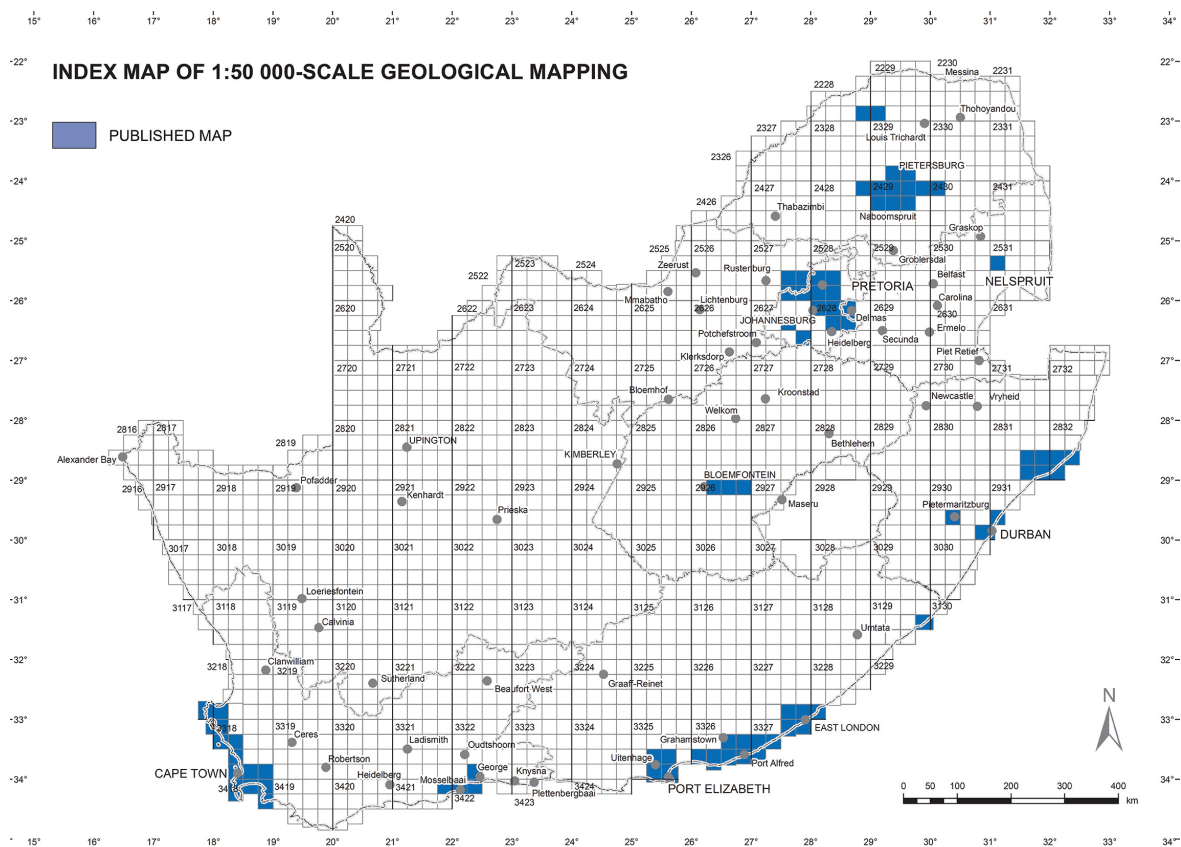


Figure 6: Published map coverage (5 %) of 1:50 000-scale geological map in South Africa.

4.1.6 Interpretation of existing high-resolution airborne geophysical data (ST-2017-1270)

The CGS has a large amount of airborne geophysical data in the geophysical data repository, including magnetic and radiometric data. Currently, there are records of approximately 121 surveys at various scales. Of these records, only 40 surveys have been interpreted. This project aims to systematically interpret the remaining

81 surveys. Four areas were interpreted in FY 2017/18 (Figure 7). This project is imperative in supporting the integrated and multidisciplinary geoscience mapping programme of the CGS and assisting in various tasks such as the locating of natural resources, land development and spatial planning.

Legend

- Planned for 2017/2018
- Not yet interpreted
- Interpreted

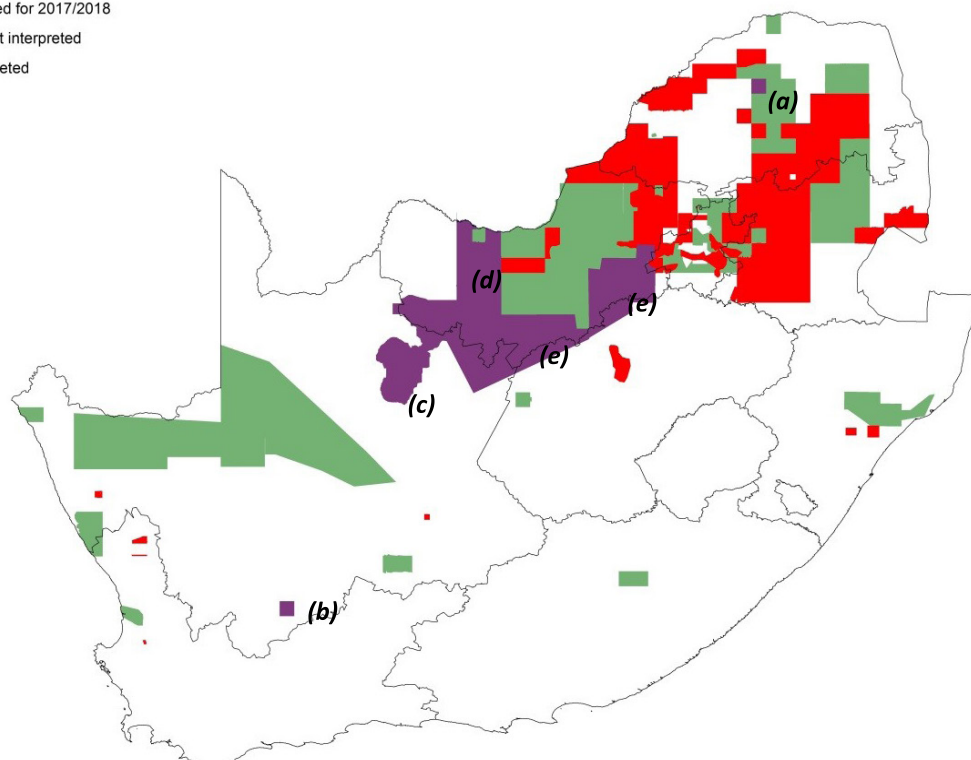


Figure 7: Areas that were identified for interpretation during 2016/2017: (a) 2329 AC, (b) 3221 AA, (c) Kuruman military base area, (d) remainder of the North West survey and the (e) MTEF diamond fields survey.

4.1.7 Cenozoic rationalisation of 1:250 000-scale geological maps (ST-2018-1269)

The Cenozoic Rationalisation programme focused on the compilation of seven, 1:50 000-scale maps covering the Maputaland coastal zone within the iSimangaliso Wetland Park, World Heritage Site, between Kosi Bay and St Lucia. The coastline maps form part of a set of twenty sheets covering the region. The maps reflect the revised Cenozoic lithostratigraphy of the region that is represented by the Maputaland Group. Various reports which detail lithostratigraphic descriptions, and the role played by raised beach ridge formation in the evolution of the St Lucia estuarine lake during the Holocene were compiled. Luminescence dating

of the beach ridges established the chronology of pulsed shrinking of the lake shoreline during the late Holocene in response to a sea-level regression. Indicators of raised intertidal zone deposits were dated at points along the coastline to corroborate the estuarine record of elevated sea-level. In the Northern Cape Province to the south of Witsand, the Volop sheet was mapped to elucidate the relationship between Kalahari Group dunefields and the underlying palaeo-lacustrine deposits. Field evidence showed the Quaternary palaeo-lake bed deposits in the Soutloop River valley, named the Wedge Hill Formation (Figure 8), that underlie the regional hardpan calcrete

duricrust profile are probably older than predicted. Initial analytical results have been received showing that no fossil pollen is preserved within the highly alkaline, dolomitic lacustrine sediments. The results

of the initial geochronological analysis will reveal whether the age of the deposits can be estimated using luminescence or U/Th dating techniques.



Figure 8: Calcretised lake sediments bury red aeolian sand within the Wedge Hill Formation palaeo-lacustrine deposits. Beds of bleached aeolian sand occur at different levels within the ~20m sedimentary succession suggesting that arid periods of dune activity alternated with more humid periods during which catchment discharge resulted in the formation of a shallow lake within the Soutloop River Valley.

4.1.8 Ground geophysical target definition of targets generated based on previous airborne geophysical surveys (ST-2018-1315)

This project runs over two to three years and has the sole focus of conducting various surveys around the country while training and transferring the requisite skills to CGS staff members. A survey was carried out in the Vredefort Dome with the main aim of collecting magnetotelluric data and focused substantially on the training of staff members in data acquisition, pre-processing and analysis. The geophysical methods used in this survey were audio-magnetotelluric (AMT),

broadband magnetotelluric (BBMT) and vertical electrical sounding methods. The vertical electrical sounding and AMT results show an increasing resistivity with depth, and BBMT results show that at lower frequencies the resistivity decreases noticeably. The magnetotelluric method was used for mapping to at least 40km below the subsurface and can be further applied toward the better delineation of the subsurface.

4.1.9 Geothermal Energy Potential of South Africa

Geothermal energy is one of the fastest growing renewable energy sources in the world. Much of this acceleration is due to technological advances that have allowed low-enthalpy geothermal energy to be harnessed from moderate heat flow regions. These regions are often not only restricted to locations that occur near active plate tectonic boundaries and/or volcanic activity but also occur in most global settings, including South Africa. Despite this, geothermal energy has not yet formed part of South Africa's future renewable energy mix. This is largely due to a common misconception that South Africa does not have any viable geothermal potential regions. The CGS undertook a geothermal energy research and development initiative to investigate and highlight the country's potential regions. The results of this study are shown in the map below (Figure 9). Regions

showing the highest inferred geothermal gradients correlate well with zones with underlying tectonic structures and anomalous seismicity. This suggests a heat contribution linked to underlying geological controls related to areas of orogenesis. Moreover, five zones with the highest inferred geothermal potential have been defined from the results of this study. The CGS will now undertake a follow-up study to further investigate these regions and identify the most promising geothermal exploration target locations. This work will include geophysical and hydro-geothermal modelling. It is envisioned that the results of this research will ultimately be used toward the development of South Africa's first low-enthalpy geothermal energy pilot plant and the realisation of geothermal as part of South African renewable energy development.

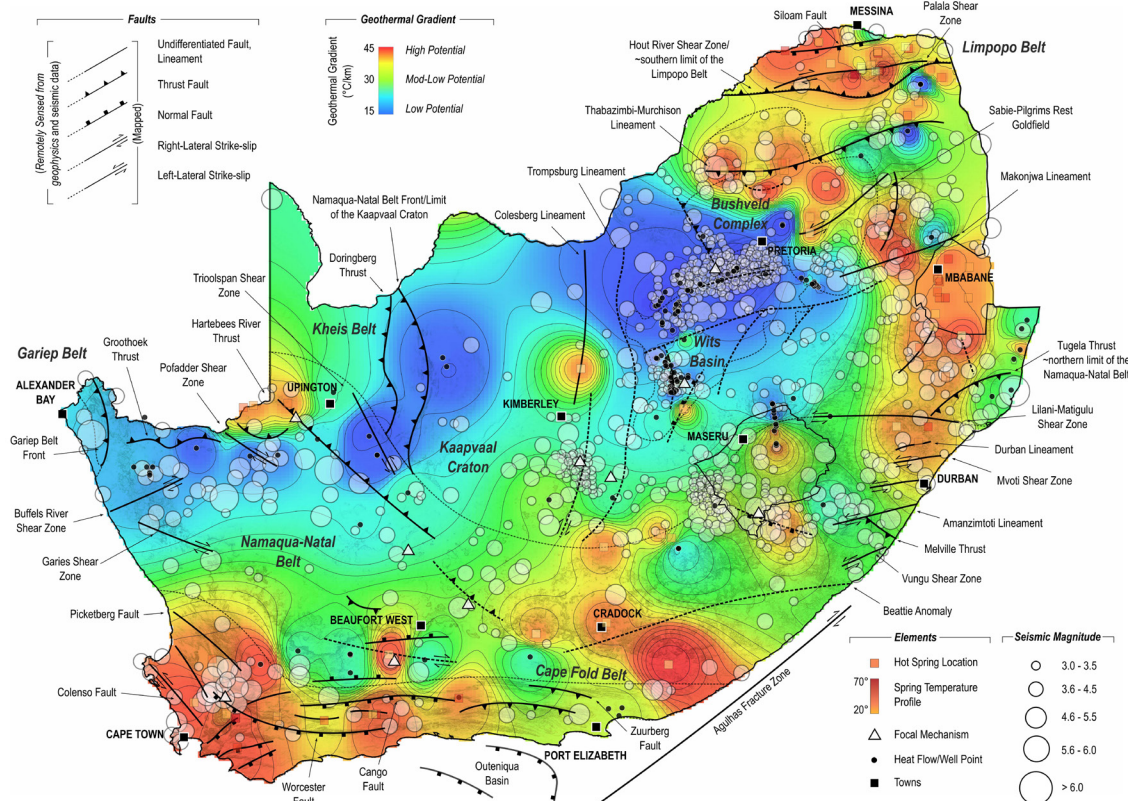


Figure 9: Geothermal energy potential map produced in this study. The map highlights zones with highest inferred geothermal gradients, underlying tectonic and structural features and locations of regional seismicity.

4.1.10 Hydrocarbon potential of the Prince Albert Formation, Ecca Group in the main Karoo basin, South Africa (ST 2018-1273)

This project aims to investigate the shale gas potential of the Prince Albert Formation of the main Karoo Basin through field sampling and samples obtained from a deep drilling programme. Chemostratigraphy will be applied to study the lithology and depositional environment of the lower Ecca Group while the petrophysics and shale gas potential of the Prince Albert Formation will be ascertained through analysing the gas content, total organic carbon and thermal maturity. These objectives will be realised through fieldwork, sampling, core logging and various chemical analysis, e.g. X-Ray Fluorescence (XRF), X-Ray Diffraction (XRD), rock-eval, vitrinite reflectance, porosity and residual gas measurements.

4.1.11 Marine geological mapping (ST-2016-1264)

The South African Nearshore Mapping Programme (SANMAP) aims to map the continental shelf with the objective of boosting South Africa's blue economy in line with the NDP and Operation Phakisa. SANMAP also seeks to produce seamless onshore-offshore geological maps of the seafloor as the marine component of the integrated multidisciplinary geoscience mapping programme of the CGS. The acquisition of high-resolution, high-quality marine geophysical and hydrographic data can also be used in the delineation and designation of marine protected areas and mineral resource mapping, where exploration is currently focussed on diamonds and titanium sand. Future possibilities include polymetallic manganese nodules and crusts, glauconite, phosphates and building aggregates. The risk in future exploration and eventual exploitation, however, lies in the current relative lack of detailed knowledge of the seafloor. Geohazard assessments, quantifying sediment migration, infrastructural planning on coasts, and providing baselines for monitoring global change, hydrographic mapping and charting, effects and deposits of past sea-level fluctuations, benthic habitat mapping and interpreting submerged environments and underwater landscapes, highlight some research areas which use marine geophysical data. New mapping is being carried out in tandem with analytical work on existing datasets, and the development of a robust data management strategy. To adhere to international

standards, careful environmental planning needs to be carried out in conjunction with the mapping of mineral deposits. A thematic approach is being adopted and carried out systematically. New datasets have not yet been fully acquired to fill the first sheet, although work has commenced in Table Bay (Figures 10 and 11). Side-scan sonar lines were run at 130m with a 20% overlap of adjacent lines, ensuring 100% coverage of the seafloor. Multibeam bathymetry and pinger sub-bottom profiling data were acquired concurrently with side-scan (after the side-scan had been completed) as infill lines between the side-scan sonar lines. A boomer sub-bottom profiling survey and a marine magnetic survey were conducted. The SANMAP team conducted a bathymetric survey of Rietvlei. The area is located on the coastal plain adjacent to Table Bay. The team continued with research projects and analysed sediment samples from the seafloor for sedimentary characteristics and marine microfossils. Interpretive desktop work and database management run in parallel with the offshore mapping programme. The CGS plans to further intensify the marine geoscience programme as a response to the National developmental imperatives.

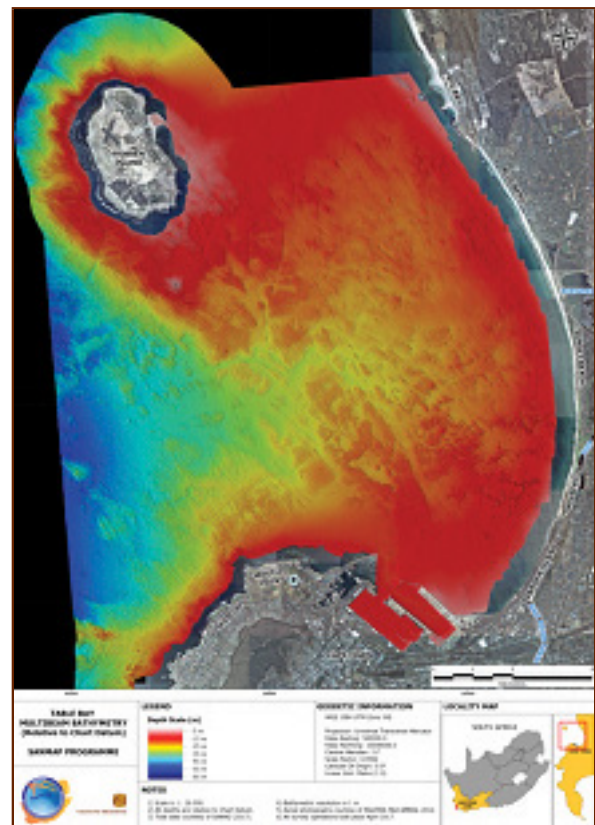


Figure 10: Multibeam echosounder (bathymetric) data for Table Bay.

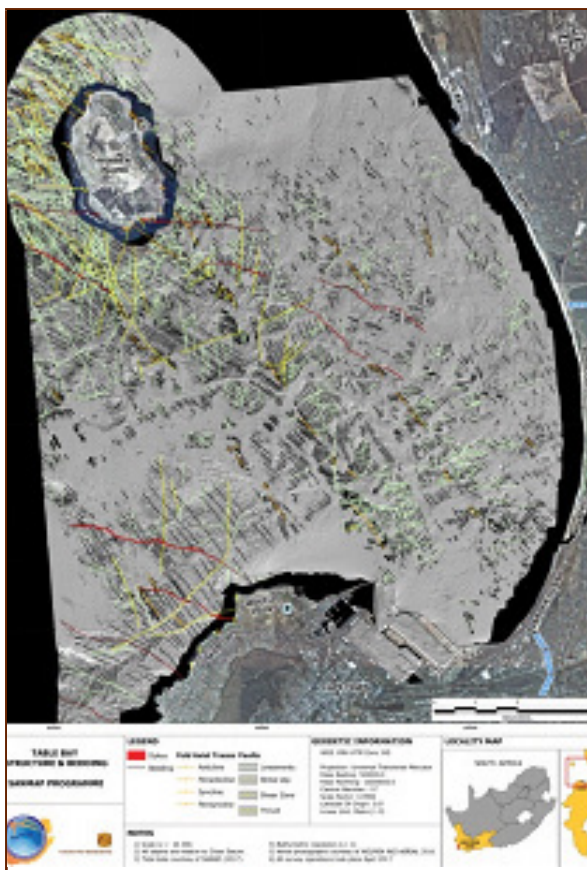


Figure 11: Interpreted structural features in Table Bay, from multibeam bathymetry and side-scan sonar.

4.1.12 Medical Geology Programme (ST-2018-1297)

The geological environment, in its natural or modified state, affects the surrounding habitat of humans, animals and plants. Medical geology studies how the health of human and animal communities have been affected by the natural or modified geological environment, creating environmental problems relating to asbestos, fluoride, uranium, lead, coal pollution and acid mine water drainage. Not only does medical geology programmes seek to link and integrate several projects investigating the effects and impact of harmful elements and nanoparticles found in geological, hydrological and atmospheric environments on the health of surrounding communities, but its execution will also broaden the research base in South Africa. This programme endeavours to assist municipalities and affected communities by proposing cost-effective, holistic solutions and mitigating measures. Preliminary investigations undertaken in Mpumalanga and North West provinces show a probable correlation between certain diseases and geological and natural environmental factors, such as dust fall particulate matter.

4.1.13 Feasibility-level dolomite stability investigations at Promised Land and Annexure (667 ha), Churchill (337 ha) and Danielskuil 1, 2 and 3 (101 ha, 144 ha and 296 ha) (CO-2017-5810)

This project was initiated by the Northern Cape Department of Cooperative Governance and Traditional Affairs (CoGTA) and involved a feasibility-level dolomite stability study investigation and subsequent shallow geotechnical investigation within the jurisdictions of Kgatelopele, Joe Morolong and Ga-Segonyana Local Municipalities. Geotechnical assessments of areas that are underlain by dolomite are imperative to ensure safe and effective land development and spatial planning. During FY 2017/18 a total area of 1545 ha was assessed, and reports were handed over to assist with planning for future development.

4.1.14 South African National Seismograph Network (SANSN): mapping of surface deformation and displacement due to earthquakes using radar interferometry (ST-2002-0184)

Mapping surface deformation associated with seismic events is imperative to better understand geohazard effects and to assist in the design of geohazard mitigation measures. Radar interferometry using synthetic aperture radar (SAR) satellite imagery has widely been applied to study the surface deformation and displacements taking place as a result of geohazards (Figure 12). This project used Sentinel-1 SAR data and mapped surface deformation and vertical displacement associated with past earthquakes in South Africa. Surface deformation associated with the Stilfontein earthquake of 3 April 2017 (magnitude 5.2) was attempted using Sentinel 1 SAR data (four scenes) acquired on 24 March 2017, 5 April 2017, 31 March and 12 April 2017. The differential interferometric analysis yielded a vertical displacement ranging from -18mm (subsidence) to 45mm (uplift). A displacement map for areas having high coherence (coherence >0.6) was also prepared by masking out areas of low coherence (coherence <0.6). Major uplifts of 32mm to 45mm were observed in the Klerksdorp-Orkney-Stilfontein-Hartebeesfontein (KOSH) region whereas negative displacements of -15mm to -28mm are observed in the northern (east of Lichtenburg), north-eastern (north-east of Ventersdorp), north-western (north-west of Coligny) and south-western part of the image (south-east of Leeudoringstad). Surface

deformation is also observed around Stilfontein-Klerksdorp-Hartbeesfontein region while mine dumps of the KOSH region have undergone significant upward

movements (shown in pink and dark blue colours) due to the earthquake.

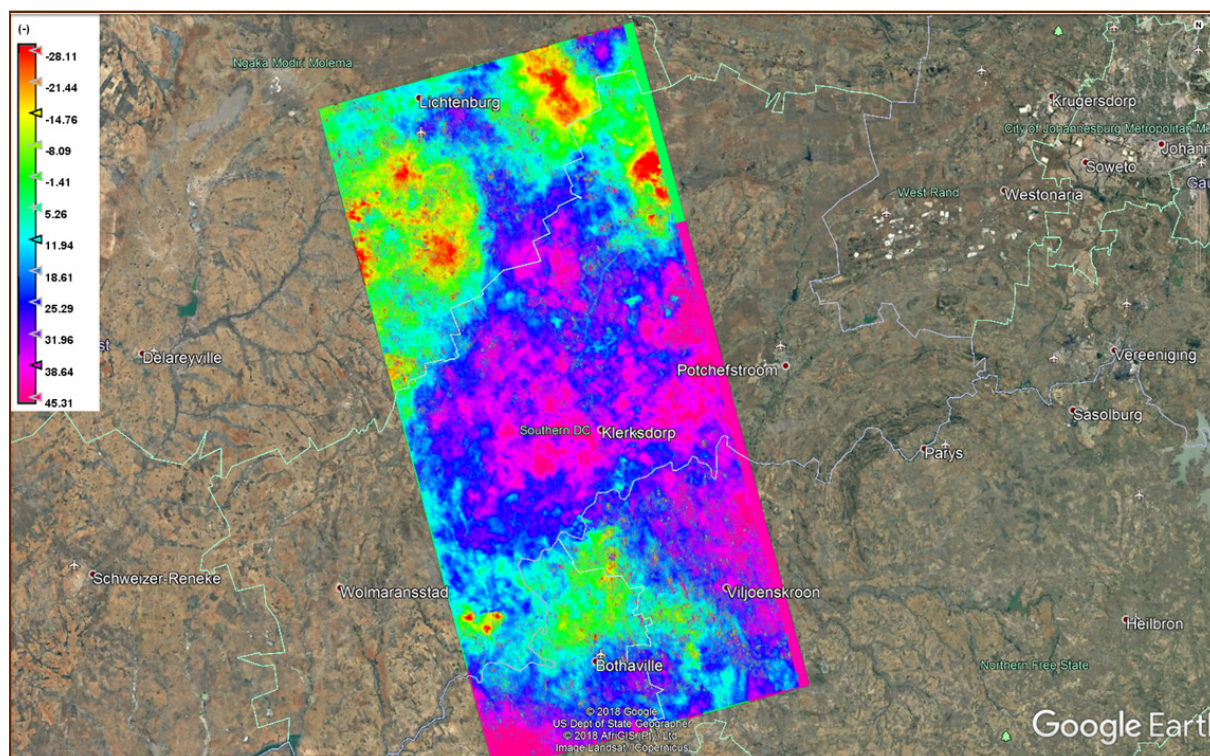


Figure 12: Vertical displacement (in mm) displayed in Google Earth Pro software.

4.1.15 Regional geotechnical mapping for sustainable human settlement and infrastructure and development (1:50 000) (ST-2018-1290)

The assessment of the geological environment is a prerequisite to formulating effective recommendations regarding the suitability of a site for sustainable human settlement and infrastructure development. This project aims to gather accurate information on various geological elements and use this information to define safe, cost-effective and non-detrimental infrastructural parameters. This is particularly important for sites that are located on or near geological environments that are prone to instabilities, such as those underlain by dolomite.

4.1.16 Environmentally friendly and efficient methods for the extraction of rare earth elements from secondary sources (CO-2016-5790)

Rare earth elements (REEs) have a wide variety of applications particularly with regard to the development of hybrid electric motors, catalytic applications and toward the development of various electronics. The CGS is a partner in the European Environmentally friendly and efficient methods for the extraction of rare earth elements from secondary sources (ENVIREE) project. This investigates possible environmentally friendly and efficient methods for the extraction of REEs from secondary sources. The CGS has focused on the identification of secondary REE sources, on abandoned mines where REEs were historically produced as a primary or by-product, and on mines where REEs are present at economically interesting concentrations in the residues. During FY 2017/18 the CGS focussed on several key themes:

1. Collecting additional samples and information regarding REE-bearing mine residues, focussing on deposits in North West and Limpopo Provinces, including planning for drilling to assess the REE content of deposits in three dimensions;
2. Testing a new leaching approach and using conventional leaching processes, including thermal treatments with the aim of comparing the life-cycle impacts of conventional and new methods; and
3. Hosting the ENVIREE consortium meeting in October 2017. This meeting, attended by CGS staff, included a project meeting, a workshop on the technical content of the project and a field visit to the Rooiberg Mine, one of the sites identified as having REE potential in the mine wastes.

4.1.17 Assessment of the CO₂ storage capacity of the Mesozoic succession, Orange basin, West Coast, South Africa (ST-2018-1272)

This project will serve to advance current knowledge of the offshore sedimentary basins of South Africa with respect to carbon capture and sequestration (CCS) and, through the mapping and definition of geological aspects of the Orange basin, further the SACCCS roadmap for CCS by identifying possible offshore reservoirs. In light of recent developments towards a test injection in 2018, an assessment of the offshore storage potential of the Orange basin will be required sooner rather than later for the purpose of demonstration or commercial-scale storage. From the currently available data, four seismic units are delineated based upon seismic bounding features, acoustic impedance, and internal-reflection characteristics. Each unit is separated into facies and associated systems tracts as previously defined in literature. Systems tracts are defined by seismic architecture as well as geophysical log signatures to interpret a depositional environment for each facies. Several seismic units have been resolved and characterised. Logistically, the offshore Orange basin presents a very good storage option since it hosts untapped, mineralised oil and gas reservoirs as well as potential thick saline aquifers. The Orange basin represents the largest potential CO₂ repository in South Africa.

4.1.18 Geological mapping and integrated training and capacity building in modern geological mapping and research for Directorate Geological Survey: South Africa and Namibia (FR-2016-5788 and FR 2017-5805)

The Geological Survey of Namibia (GSN) has contracted the CGS to map and research the complex Precambrian basement rocks of southern Namibia over the past four years in the context of two projects, FR-2016-5788 and FR-2017-5805. The main aim of these projects has been to develop a unified lithostratigraphy and tectonostratigraphy across the South Africa–Namibia border to better understand the rock units and structures controlling mineralisation in the region, specifically deposits of Cu, Pb, Zn, U, Ta, Nb, REE, Li and W.

The main application of the maps and reports is for economic geology, groundwater search and infrastructure development, e.g. solar powered farms, pipelines, roads and bridges. The geological mapping is supported by geochronology and isotope geochemistry, whole-rock major, trace and REE geochemistry and structural investigations.

Based on the mapping and research datasets, the CGS has proposed a modified geodynamic model for the central/western Namaqua Metamorphic Province. In addition to the scientific work, the project has allocated significant resources to transfer mapping and research skills to the GSN and CGS geologists. The project has also involved several collaborators from the Universities of Stellenbosch, Cape Town, McGill (Canada) and Curtin (Australia). Through the research and postgraduate training, the project has produced one PhD, four MSc and eight Honours graduates over the past four years and four articles have recently been published in international journals. The mapping for project FR-2016-5788, started in 2013, has now been completed, having delivered all the nine 1:50 000-scale geological maps, the Warmbad 1:250 000-scale geological map, databases and reports to the GSN (Figure 13). The final geological report for the Namaqua-Natal Province will only be completed in FY 2018/19. The project has also published the first hiking and geological map of the Fish River Canyon in collaboration with Slingsby's Maps.

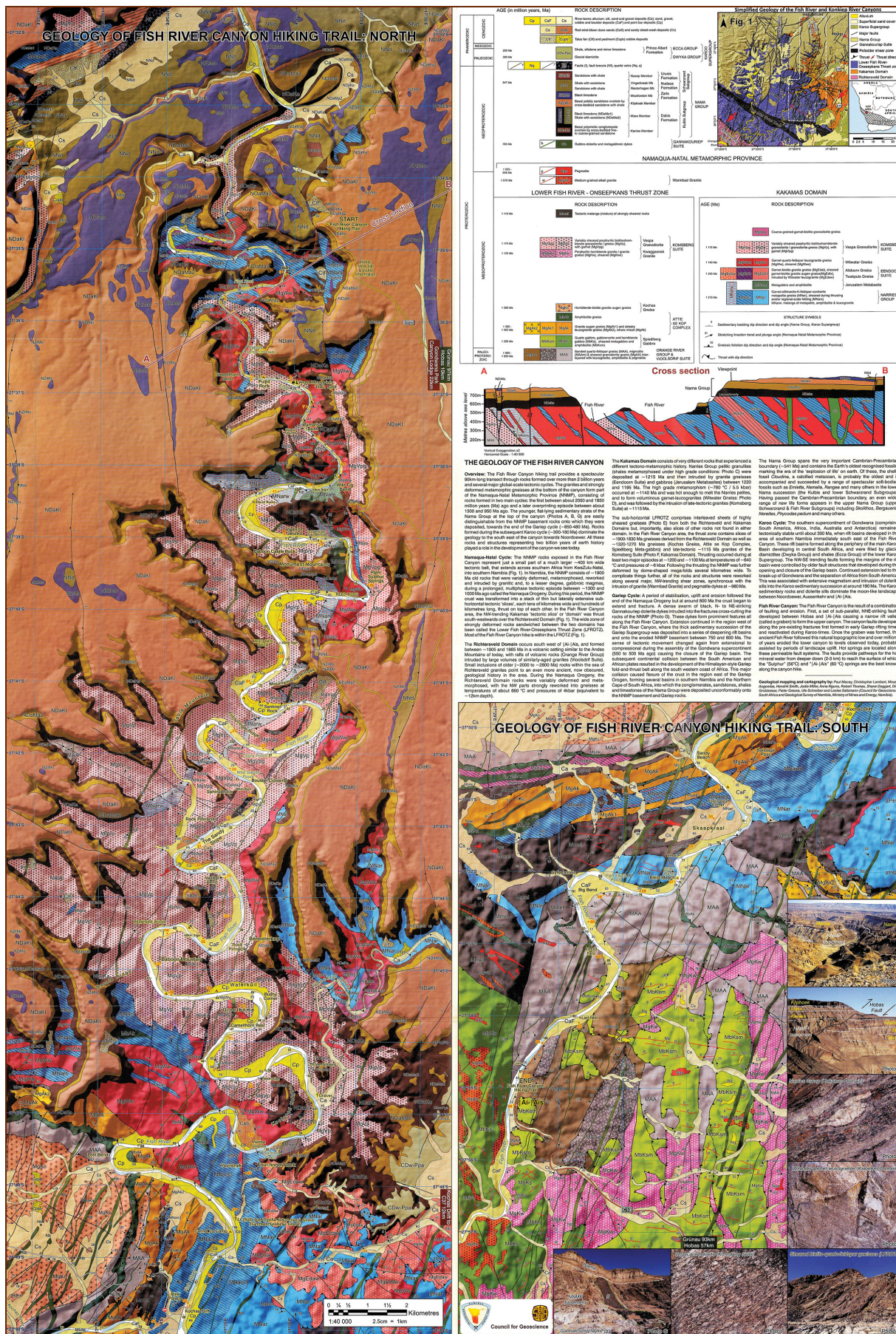


Figure 13: Geology of the Fish River Canyon hiking trail (Map produced by the CGS and GSN).

4.1.19 Geological mapping and mineral assessment of Malawi (FR-2017-5811)

This consortium led by the Bureau de Recherches Géologiques et Minières (BRGM) of France with the Geological Survey of Finland (GTK) and the CGS, funded by the French, is a 4.5-year project (2016-2020). The client is the Geological Survey Department (GSD) of Malawi. The project involves the geological mapping of the whole of Malawi, i.e. 40 maps at 1:100 000, ten maps at 1:250 000 and a 1:1 000 000 compilation, each with explanations. Most of these activities include a comprehensive compilation phase to integrate archival data from engineering studies, field surveys and laboratory analyses into the current project. Subsequent fieldwork and laboratory analyses will involve a large number of specialists from the BRGM and its partners, in various disciplines. GSD geologists will take part in all aspects of the project and, it is anticipated, will take increasing responsibility as the project progresses. The financial year of 2018/19 will see two more field seasons where there should be two CGS-led geological mapping teams. Map compilation and report writing of the CGS involvement in the mineral assessment module in the first season will take place in 2018 or, more likely, 2019. The CGS contribution to the geophysics module will also take place in 2019.

4.1.20 Hydrogeological and water quality mapping consultancy in the Shire River basin in Malawi

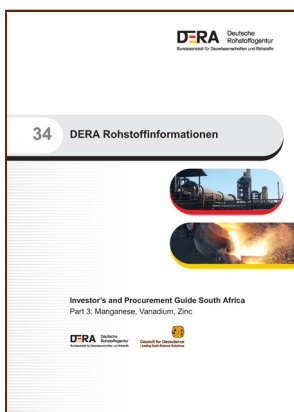
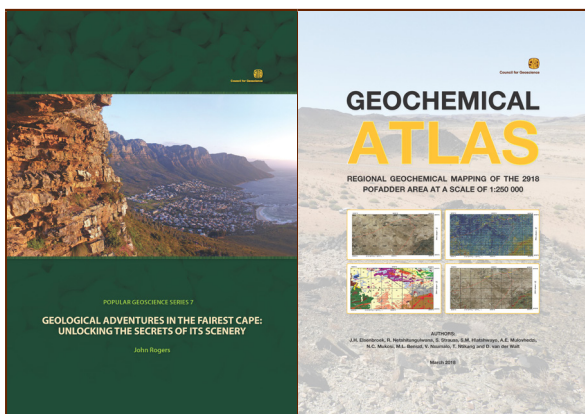
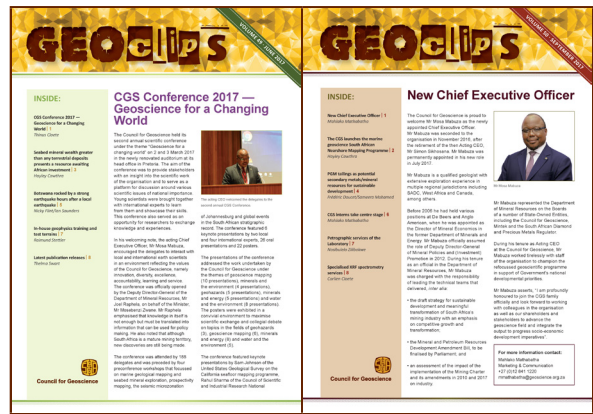
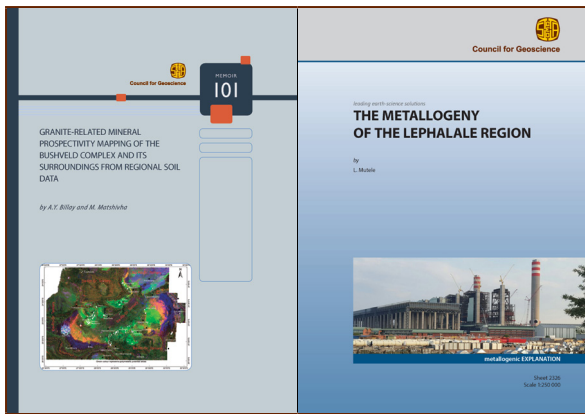
The Ministry of Agriculture, Irrigation and Water Development (MAIWD) of Malawi, through the Shire River basin management programme, undertook hydrogeological and water quality mapping of the Shire River basin. A consortium consisting of the CGS and PBM consultants (Malawi) executed the project. The technical objectives were to map groundwater aquifers, including yields, and water quality parameters to improve the understanding of groundwater occurrences and quality in the Shire River basin in view of informed water resource modelling, planning, management, development and monitoring. Other objects included database development, map production and capacity building.

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 and conferences as well as maps and these are presented in section 5.1 to 5.3. The organisation continues to refocus on its mandate and continues to acquire new-multidisciplinary data, and this has resulted in new external collaborations and partnerships and development of additional publications.

5.1 Publications

1. Memoir 101: Granite-related mineral prospectivity mapping of the Bushveld Complex and its surroundings from regional soil data by A.Y. Billay and M. Matshivha
2. Metallogenic Explanation: Sheet 2326 (Scale: 1:250 000): The metallogeny of the Lephalale region by L. Mutele (map on CD)
3. Popular Geoscience Series 7: Geological adventures in the Fairest Cape: Unlocking the secrets of its scenery by John Rogers
4. Geochemical Atlas: Regional geochemical mapping of the 2918 Pofadder area at a scale of 1:250 000 by J.H. Elsenbroek, R. Netshitungulwana, S. Strauss, S.M. Hlatshwayo, A.E. Mulovhedzi, N.C. Mukosi, M.L. Bensid, V. Nxumalo, T. Ntikang and D. van der Walt
5. Buchholz, P. and Foya, S., 2017. Investor's and Procurement Guide South Africa. Part 3: Manganese, Vanadium, Zinc. DERA Rohstoffinformation, Deutsche Rohstoffagentur, Bundesanstalt für Geowissenschaften und Rohstoffe, Berlin, ISBN: 978-3-943566-83-3
6. GEOclips Newsletter, Volume 49, June 2017, 8 pp.
7. GEOclips Newsletter, Volume 50, September 2017, 8 pp.
8. GEOclips Newsletter, Volume 51, December 2017, 8 pp.
9. GEOclips Newsletter, Volume 52, March 2018, 16 pp.



5.2 Peer-reviewed articles

(CGS staff are indicated in bold letters)

1. Abiye, T., Bybee, G. and **Leshomo, J.**, 2018. Fluoride concentrations in the arid Namaqualand and the Waterberg groundwater, South Africa: Understanding the controls of mobilization through hydrogeochemical and environmental isotopic approaches. *Groundwater for Sustainable Development*, 6, pp. 112–120. <https://doi.org/10.1016/j.gsd.2017.12.004>
2. Archibald, D.B., Collins, A.S., Foden, J.D., Payne, J.L., **Macey, P.H.**, Holden, P. and Razakamanana, T., 2017. Stenian–Tonian arc magmatism in west-central Madagascar: the genesis of the Dabolava Suite. *Journal of the Geological Society*, 175, pp. 111–129. <https://doi.org/10.1144/jgs2017-028>
3. Bailie, R., **Macey, P.H.**, Nethenzheni, S., Frei, D. and Le Roux, P., 2017. The Keimoes Suite redefined: The geochronological and geochemical characteristics of the ferroan granites of the eastern Namaqua Sector, Mesoproterozoic Namaqua-Natal Metamorphic Province, southern Africa. *Journal of African Earth Sciences*, 134, pp. 737–765. <http://dx.doi.org/10.1016/j.jafrearsci.2017.07.017>
4. Bamisaiye, O.A., Eriksson, P.G., Van Rooy, J.L., Brynard, H.M., Foya, S., **Billay, A.Y.** and **Nxumalo, V.**, 2017. Subsurface mapping of Rustenburg Layered Suite (RLS), Bushveld Complex, South Africa: Inferred structural features using borehole data and spatial analysis. *Journal of African Earth Sciences*, 132, pp. 139–167. <http://dx.doi.org/10.1016/j.jafrearsci.2017.05.003>
5. Baratoux, D., Chennaoui-Aoudjehane, H., Gibson, R., Lamali, A., Reimold, W.U., Sapah, M.S., Chabou, M.C., Habarulema, J.B., Jessell, M.W., Mogessi, A., Benkhaldoun, Z., Nkhonjera, E., **Mukosi, N.C.**, Kaire, M., Rochette, P., Sickafoose, A., Martínez-Frías, J., Hofmann, A., Folco, L., Rossi, A.P., Faye, G., Kolenberg, K., Tekle, K., Belhai, D., Elyajouri, M., Koerber, C. and Abdeen, M.M., 2017. The state of planetary and space sciences in Africa. *EOS, Earth and Space Science News, American Geophysical Union*, 98(11), pp. 16–20. <https://doi.org/10.1029/2017EO075833>
6. Bond, C.E., Kremer, Y., Johnson, G., **Hicks, N.**, Lister, R., Jones, D.G., Haszeldine, R.S., **Saunders, I.**, Gilfillan, S.M.V., Shipton, Z.K. and Pearce, J., 2017. The physical characteristics of a CO₂ seeping fault: The implications of fracture permeability for carbon capture and storage integrity. *International Journal of Greenhouse Gas Control*, 61, pp. 49–60. <http://dx.doi.org/10.1016/j.ijggc.2017.01.015>
7. Bordy, E.M., Spelman, S., **Cole, D.I.** and **Mthembu, P.**, 2017. Lithostratigraphy of the Pietermaritzburg Formation (Ecca Group, Karoo Supergroup), South Africa. *South African Journal of Geology*, 120(2), pp. 293–302. DOI: 10.2113/gssajg.120.2.293
8. **Brandt, M.B.C.**, 2017. Near-surface wave attenuation (kappa) of an earthquake near Durban, South Africa. *Journal of the Southern African Institute of Mining and Metallurgy*, 117(12). <http://dx.doi.org/10.17159/2411-9717/2017/v117n12a10>
9. **Brandt, M.B.C.**, 2017. Near-surface wave attenuation (kappa) of Far West Rand micro-events. *Journal of the Southern African Institute of Mining and Metallurgy*, 117(6). <http://dx.doi.org/10.17159/2411-9717/2017/v117n6a1>
10. **Cawthra, H.C.**, Jacobs, Z., Compton, J.S., Fisher, E.C., Karkanas, P. and Marean, C.W., 2018. Depositional and sea-level history from MIS 6 (Termination II) to MIS 3 on the southern continental shelf of South Africa. *Quaternary Science Reviews*, 181, pp. 156–172. <https://doi.org/10.1016/j.quascirev.2017.12.002>
11. **Claassen, D.** and De Wit, M., 2017. Site-specific geoscientific characterization of Thyspunt, South Africa — an area identified for the proposed construction of a nuclear power plant. *South African Journal of Geology*, 120(4), pp. 459–476. <https://doi.org/10.25131/gssajg.120.4.459>
12. **Cole, P.** and Cooper, G.R.J., 2018. Determination of the distance to magnetic sources using tensor data. *Pure and Applied Geophysics*. <https://doi.org/10.1007/s00024-018-1803-3>

13. Colliston, W.P., Schoch, A.E. and **Cole, J.**, 2017. The Grenvillian Namaqua fold belt adjacent to the western Kaapvaal Craton: 2. Archaean Craton and supercontinent connections. *Precambrian Research*, 300, pp. 289–314.
<http://dx.doi.org/10.1016/j.precamres.2017.07.032>
14. De Kock, M.O., Beukes, N.J., Adeniyi, E.O., **Cole, D.**, Götz, A.E., Geel, C. and Ossa, F-G., 2017. Deflating the shale gas potential of South Africa's Main Karoo Basin. *South African Journal of Science*, 113(9/10), pp. 87–98. DOI: 10.17159/sajs.2017/20160331
15. De V. Wickens, H. and **Cole, D.I.**, 2017. Lithostratigraphy of the Skoorsteenberg Formation (Ecca Group, Karoo Supergroup), South Africa. *South African Journal of Geology*, 120(3), pp. 433–446.
<https://doi.org/10.25131/gssajg.120.3.433>
16. De V. Wickens, H. and **Cole, D.I.**, 2017. Lithostratigraphy of the Kookfontein Formation (Ecca Group, Karoo Supergroup), South Africa. *South African Journal of Geology*, 120(3), pp. 447–458.
<https://doi.org/10.25131/gssajg.120.3.447>
17. **Dhansay, T.**, Musekiwa, C., Ntholi, T., **Chevallier, L.**, **Cole, D.** and De Wit, M.J., 2017. South Africa's geothermal energy hotspots inferred from subsurface temperature and geology. *South African Journal of Science*, 113(11/12), pp. 80–86.
<https://doi.org/10.17159/sajs.2017/20170092>
18. **Dhansay, T.**, Navabpour, P., De Wit, M. and Ustaszewski, K., 2017. Assessing the reactivation potential of pre-existing fractures in the southern Karoo, South Africa: Evaluating the potential for sustainable exploration across its Critical Zone. *Journal of African Earth Sciences*, 134, pp. 504–515.
<http://dx.doi.org/10.1016/j.jafrearsci.2017.07.020>
19. Dorrington, R.A., Lombard, A.T., Bornman, T.G., Adams, J.B., **Cawthra, H.C.**, Deyzel, S.H.P., Goschen, W.S., Liu, K., Mahler-Coetzee, J., Matcher, G.F., McQuaid, C., Parker-Nance, S., Patterson, A., Perissinotto, R., Porri, F., Roberts, M., Snow, B. and Vrancken, P., 2018. Working together for our oceans: A marine spatial plan for Algoa Bay, South Africa. *South African Journal of Science*, 114(3/4), pp. 18–23.
<https://doi.org/10.17159/sajs.2018/a0247>
20. Fitchett, J.M., Knight, J., Bamford, M.K., **Cawthra, H.C.**, Esterhuysen, A., Quick, L.J. and Thackeray, J.F., 2017. Discussion on the Last Glacial Maximum in southern Africa. *Palaeontologia Africana*, 52, pp. 1–45. ISSN 2410-4418
21. Gastaldo, R.A., **Neveling, J.**, Geissman, J.W. and Li, J., 2017. A multidisciplinary approach to review the vertical and lateral facies relationships of the purported vertebrate-defined terrestrial Permian–Triassic boundary interval at Bethulie, Karoo Basin, South Africa. *Earth-Science Reviews*.
<http://dx.doi.org/10.1016/j.earscirev.2017.08.002>
22. Gastaldo, R.A., **Neveling, J.**, Looy, C.V., Bamford, M.K., Kamo, S.L. and Geissman, J.W., 2017. Paleontology of the Blaauwater 67 and 65 farms, South Africa: Testing the *Daptocephalus/Lystrosaurus* biozone boundary in a stratigraphic framework. *PALAIOS*, 32, pp. 349–366.
<http://dx.doi.org/10.2110/palo.2016.106>
23. Hahn, A., Schefuß, E., Andò, S., **Cawthra, H.C.**, Frenzel, P., Kugel, M., Meschner, S., Mollenhauer, G. and Zabel, M., 2017. Southern Hemisphere anticyclonic circulation drives oceanic and climatic conditions in late Holocene southernmost Africa. *Climate of the Past*, 13, pp. 649–665,
<https://doi.org/10.5194/cp-13-649-2017>
24. Helm, C.W., Anderson, R.J., Buckley, L.G., **Cawthra, H.C.** and De Vynck, J.C., 2017. Biofilm assists recognition of avian trackways in Late Pleistocene coastal aeolianites, South Africa. *Palaeontologia Africana*, 52, pp. 78–84.
<http://wiredspace.wits.ac.za/handle/10539/23462>
25. Helm, C.W., **Cawthra, H.C.**, Cowling, R.M., De Vynck, J.C., Marean, C.W., McCrea, R.T. and Rust, R., 2018. Palaeoecology of giraffe tracks in Late Pleistocene aeolianites on the Cape south coast. *South African Journal of Science*, 114(1/2), 8 pp.
<http://dx.doi.org/10.17159/sajs.2018/20170266>
26. Helm, C.W., McCrea, R.T., Lockley, M.G., **Cawthra, H.C.**, Thesen, G.H.H. and Mwankunda, J.M., 2018. Late Pleistocene vertebrate trace fossils in the Goukamma Nature Reserve, Cape South

- Coast, South Africa. *Palaeontologia Africana*, 52, pp. 89–101.
<https://hdl.handle.net/10539/23736>
27. **Hicks, N.** and Green, A., 2017. A first assessment of potential stratigraphic traps for geological storage of CO₂ in the Durban Basin, South Africa. *International Journal of Greenhouse Gas Control*, 64, pp. 73–86.
<http://dx.doi.org/10.1016/j.ijggc.2017.06.015>
 28. **Hicks, N.** and Green, A., 2017. A Mid-Miocene erosional unconformity from the Durban Basin, SE African margin: A combination of global eustatic sea level change, epeirogenic uplift, and ocean current initiation. *Marine and Petroleum Geology*, 86, pp. 798–811.
<https://doi.org/10.1016/j.marpetgeo.2017.06.037>
 29. Johnson, G., **Hicks, N.**, Bond, C.E., Gilfillan, S.M.V., Jones, D., Kremer, Y., Lister, R., Nkwane, M., Maupa, T., **Munyangane, P.**, **Robey, K.**, **Saunders, I.**, Pearce, J., Shipton, Z.K. and Haszeldine, R.S., 2017. Detection and understanding of natural CO₂ releases in KwaZulu-Natal, South Africa. *Energy Procedia*, 114, pp. 3757–3763.
<https://doi.org/10.1016/j.egypro.2017.03.1505>
 30. **Kwata, M.G.** and **Moja, S.J.**, 2017. Characterization of settleable dust and surface dust samples from the old and abandoned asbestos mine dumps in the Limpopo Province, South Africa. *Journal of Pollution Effects & Control*, 5(4). DOI: 10.4176/2375-4397.1000206
 31. **Kwata, M.G.**, **Moja, S.J.** and Chadi, G.M., 2018. A geochemical and morphological study from dust samples collected near former asbestos mining in Limpopo Province, South Africa. *International Journal of Environmental Sciences & Natural Resources*, 8(5), pp. 1–3. DOI: 10.19080/IJESNR.2018.08.555749
 32. **Kwata, M.G.**, **Moja, S.J.**, Masindi, K., Mashalane, T., Mtyelwa, O. and Malatji, M.R., 2017. A mineralogy study from settleable dust samples in Mpumalanga Province, South Africa. *Journal of Earth Science & Climatic Change*, 8(12). DOI: 10.4172/2157-7617.1000436
 33. Li, J., Gastaldo, R.A., **Neveling, J.** and Geissman, J.W., 2017. Siltstones across the *Daptocephalus* (*Dicynodon*) and *Lystrosaurus* Assemblage Zones, Karoo Basin, South Africa, show no evidence for aridification. *Journal of Sedimentary Research*, 87, pp. 653–671.
<http://dx.doi.org/10.2110/jsr.2017.35>
 34. **Macey, P.H.**, Bailie, R., Miller, J.A., Thomas, R.J., De Beer, C., Frei and le Roux, P. 2018. Accepted. Implications of the distribution, age and origins of the granites of the Mesoproterozoic Spektakel Suite for the timing of the Namaqua Orogeny in the Bushmanland Subprovince of the Namaqua-Natal Metamorphic Province, South Africa. *Precambrian Research*
 35. **Madzivire, G.**, Maleka, R.M., Tekere, M. and Petrik, L.F., 2017. Cradle to cradle solution to problematic waste materials from mine and coal power station: Acid mine drainage, coal fly ash and carbon dioxide. *Journal of Water Process Engineering*.
<http://dx.doi.org/10.1016/j.jwpe.2017.08.012>
 36. **Madzivire, G.**, Ramasenya, K., **Tlowana, S.**, **Coetzee, H.** and **Vadapalli, V.R.K.**, 2017. Application of mine water leaching protocol on coal fly ash to assess leaching characteristics for suitability as a mine backfill material. *Journal of Environmental Science and Health, Part A*.
<https://doi.org/10.1080/10934529.2017.1410420>
 37. **Mangongolo, A.**, Strasser, F.O., **Saunders, I.** and **Rathod, G.W.**, 2017. Depths of earthquakes in South Africa. *Seismological Research Letters*, 88(4), pp. 1078–1088. DOI: 10.1785/0220170046
 38. **Manzunzu, B.**, **Midzi, V.**, **Mangongolo, A.** and Essrich, F., 2017. The aftershock sequence of the 5 August 2014 Orkney earthquake (M_L 5.5), South Africa. *Journal of Seismology*, 21(6), pp. 1323–1334.
<https://doi.org/10.1007/s10950-017-9667-z>
 39. **Midzi, V.**, **Saunders, I.**, **Manzunzu, B.**, **Kwadiba, M.T.**, **Jele, V.**, **Mantsha, R.**, Marimira, K.T., **Mulabisana, T.F.**, Ntibinyane, O., **Pule, T.**, **Rathod, G.W.**, **Sitali, M.**, **Tabane, L.**, **Van Aswegen, G.** and **Zulu, B.S.**, 2018. The 03 April 2017 Botswana M6.5 earthquake: Preliminary results. *Journal of African Earth Sciences*, 143, pp. 187–194.
<https://doi.org/10.1016/j.jafrearsci.2018.03.027>

40. **Moabi, N.G.**, Grantham, G.H., Roberts, R.J. and Le Roux, P., 2017. The geology and geochemistry of the Straumnsnutane Formation, Straumnsnutane, western Dronning Maud Land, Antarctica and its tectonic setting on the western margin of the Kalahari Craton: additional evidence linking it to the Umkondo Large Igneous Province. In: Pant, N.C. and Dasgupta, S. (eds), *Crustal Evolution of India and Antarctica: The Supercontinent Connection*. Special Publications, Geological Society, London, 457.
<http://sp.lyellcollection.org/content/early/2017/04/12/SP457.4.abstract>
41. **Mohamed, S.**, Van der Merwe, E.M., Altermann, W. and **Doucet, F.J.**, 2017. Addendum to "Process development for elemental recovery from PGM tailings by thermochemical treatment: Preliminary major element extraction studies using ammonium sulphate as extracting agent" [Waste Manage. 50 (2016) 334–345]. *Waste Management*, 66, pp. 222–224.
<http://dx.doi.org/10.1016/j.wasman.2017.04.009>
42. Muir, R.A., Bordy, E.M., Reddering, J.S.V. and **Viljoen, J.H.A.**, 2017. Lithostratigraphy of the Enon Formation (Uitenhage Group), South Africa. *South African Journal of Geology*, 120(2), pp. 273–280.
<https://doi.org/10.25131/gssajg.120.2.273>
43. Muir, R.A., Bordy, E.M., Reddering, J.S.V. and **Viljoen, J.H.A.**, 2017. Lithostratigraphy of the Kirkwood Formation (Uitenhage Group), including the Bethelsdorp, Colchester and Swartkops Members, South Africa. *South African Journal of Geology*, 120(2), pp. 281–293.
<https://doi.org/10.25131/gssajg.120.2.281>
44. Ntlhabane, S., Becker, M., Charikinya, E., **Voigt, M.**, Schouwstra, R. and Bradshaw, D., 2017. Towards the development of an integrated modelling framework underpinned by mineralogy. *Minerals Engineering*.
<http://dx.doi.org/10.1016/j.mineng.2017.09.013>
45. **Sakala, E.**, Fourie, F., Gomo, M. and **Coetzee, H.**, 2017. GIS-based groundwater vulnerability modelling: A case study of the Witbank, Ermelo and Highveld Coalfields in South Africa. *Journal of African Earth Sciences*, 137, pp. 46–60.
<https://doi.org/10.1016/j.jafrearsci.2017.09.012>
46. Van der Merwe, E.M., Gray, C.L., Castleman, B.A., **Mohamed, S.**, Kruger, R.A. and **Doucet, F.J.**, 2017. Ammonium sulphate and/or ammonium bisulphate as extracting agents for the recovery of aluminium from ultrafine coal fly ash. *Hydrometallurgy*, 171, pp. 185–190.
<http://dx.doi.org/10.1016/j.hydromet.2017.05.015>
47. Wündsche, M., Haberzettl, T., **Cawthra, H.C.**, Kirsten, K.L., Quick, L.J., Zabel, M., Frenzel, P., Baade, J., Daut, G., Kasper, T., Meadows, M.E. and Mäusbacher, R., 2018. Holocene environmental change along the southern Cape coast of South Africa - Insights from the Eilandvlei sediment record spanning the last 8.9 kyr. *Global and Planetary Change*, 163, pp. 51–66.
<https://doi.org/10.1016/j.gloplacha.2018.02.002>

5.3 Conference proceedings

(CGS staff are indicated in bold letters)

1. **Bensid, M.**, 2017. Geochemical mapping of the Tugela Terrane, KwaZulu-Natal, South Africa: Semi-regional soil survey. World Congress on Geochemistry and Marine Science, Atlanta, USA, 16–17 November 2017.
2. **Botha, G.A.** and **Musekiwa, C.**, 2017. Rationalization of the Quaternary regolith depicted on the published 1:250 000 geological series maps covering South Africa. 21st Conference of the Southern African Society for Quaternary Research (SASQUA), Johannesburg, 3–7 April 2017.
3. **Buthelezi, M.** and **Weckmann, U.**, 2017. Geophysical mineral characterisation on the Wortel farm, Namaqua Sector, Northern Cape, South Africa. 15th SAGA Biennial Conference and Exhibition, Cape Town, 10–13 September 2017.
4. **Cawthra, H.C.**, 2017. The 'South African Nearshore Mapping Programme' sheds light on the wealth of the seafloor. 15th SAGA Biennial Conference and Exhibition, Cape Town, 10–13 September 2017.
5. **Cawthra, H.C.**, Cowling, R.M., Hahn, A., Jacobs, Z., Marean, C.W. and Zabel, M., 2017. Reconstructing the palaeo-Agulhas Plain: clues from the continental shelf. 21st Conference of the SASQUA, Johannesburg, 3–7 April 2017.

6. **Cawthra, H.C.**, Cowling, R.M., Hahn, A., Jacobs, Z., Marean, C.W. and Zabel, M., 2017. Clues from the continental shelf in reconstructing the palaeo-Agulhas Plain. Southern African Marine Science Symposium (SAMSS), Port Elizabeth, 3–7 July 2017.
7. **Cawthra, H.C.**, Jacobs, Z., Compton, J.S., Fisher, E.C., Karkanas, P. and Marean, C.W., 2017. Palaeoshoreline depositional history from MIS 6 (Termination II) to MIS 3 on the southern margin of South Africa. 21st Conference of the SASQUA, Johannesburg, 3–7 April 2017.
8. **Cawthra, H.C.**, Jacobs, Z., Compton, J.S., Fisher, E.C., Karkanas, P. and Marean, C.W., 2017. Palaeoshoreline depositional history from MIS 6 (Termination II) to MIS 3 on the southern margin of South Africa. SAMSS, Port Elizabeth, 3–7 July 2017.
9. **Chevallier, L., Cole, D., Mosavel, H., Brandt, M., Muvhuso, M., Ngobeni, D., Nxokwana, N., Black, D., Hanise, B., Ledwaba, L. and Craill, C.**, 2017. Karoo Deep Drilling and Geo-Environmental Baseline Programme. 2017 AAPG Africa Region, Geoscience Technology Workshop, Exploration and Development of Unconventional Hydrocarbons, American Association of Petroleum Geologists, Cape Town, 20–23 June 2017.
10. **Chirenje, E., Hicks, N.**, Davids, S. and **Nxantsiya, Z.**, 2017. Geophysical appraisal of the Zululand Basin as a test site for the geological storage of carbon dioxide in South Africa. 15th SAGA Biennial Conference and Exhibition, Cape Town, 10–13 September 2017.
11. **Cole, J. and Craill, C.**, 2017. Data contribution of the CGS to the proposed Vredefort Impact Structure geophysical test site. 15th SAGA Biennial Conference and Exhibition, Cape Town, 10–13 September 2017.
12. **Cole, J.**, Webb, S.J. and Finn, C.A., 2017. A 3D potential field model of the Bushveld. 15th SAGA Biennial Conference and Exhibition, Cape Town, 10–13 September 2017.
13. **Cole, P.** and Cooper, G.R.J., 2017. Tensor based modelling of magnetic data. 15th SAGA Biennial Conference and Exhibition, Cape Town, 10–13 September 2017.
14. **Combrink, M., Bamford, M.K., Fitchett, J.M. and Botha, G.**, 2017. Late-Quaternary pollen inferred environments of Ntsikeni Wetland, KwaZulu-Natal, South Africa. 21st Conference of SASQUA, Johannesburg, 3–7 April 2017.
15. **Dube, M.G. and Sakala, E.**, 2017. Mapping of dolomite hosted alluvial diamonds trapping zones using high resolution airborne magnetic data in the North West Province, South Africa. 15th SAGA Biennial Conference and Exhibition, Cape Town, 10–13 September 2017.
16. **Dube, M.G., Novhe, O., Ramasenya, K. and Van Zweel, N.**, 2017. Passive treatment technologies for the treatment of AMD from abandoned coal mines, eMalahleni, South Africa — Column experiments. 6th International Conference on Earth Science and Climate Change, Hong Kong, 18–19 September 2017.
17. Fitchett, J.M., Knight, J., Bamford, M.K., **Cawthra, H.C.**, Esterhuysen, A., Quick, L.J. and Thackeray, J.F., 2017. Discussion on the Last Glacial Maximum in southern Africa. 21st Conference of the SASQUA, Johannesburg, 3–7 April 2017.
18. Haberzettl, T., Wündsche, M., Kasper, T., Mäusbacher, R., **Cawthra, H.C.**, Daut, G., Frenzel, P., Kirsten, K.L., Quick, L.J., Zabel, M. and Meadows, M.E., 2017. RAIN-Science team. Holocene paleoenvironmental change and sea level variations in South Africa. 5th PAGES Open Science Meeting, Zaragoza, Spain, 9–13 May 2017.
19. Hahn, A., Miller, C., Andò, S., Bouimetarhan, I., **Cawthra H.C.**, Schefuß, E. and Zabel, M., 2017. Eastern South African provenance study: a toolbox for interpreting inorganic and organic marine versus terrestrial signals. 21st Conference of the SASQUA, Johannesburg, 3–7 April 2017.
20. **Havenga, M.**, 2017. The ‘Footprint’ method to interpret radiometric data using cluster analyses: Results from four large areas. 15th SAGA Biennial Conference and Exhibition, Cape Town, 10–13 September 2017.
21. **Ledwaba, L.**, 2017. Ground geophysical surveys at known alluvial and kimberlite pipe occurrences. 15th SAGA Biennial Conference and Exhibition, Cape Town, 10–13 September 2017.

22. **Leshomo, J.T.** and **Abiye, T.A.**, 2017. Determination of uranium mobility through geochemical modelling in the Karoo Uranium Province. 15th Biennial Ground Water Division Conference 2017, Promoting the efficient use and protection of groundwater, Stellenbosch, 14–18 October 2017.
23. **Mahlatji, M.** and **Maré, L.**, 2017. A comparison between downhole geophysical logging data and laboratory acquired petrophysical data measured along a core drilled in the Lanseria granite, Johannesburg dome. 15th SAGA Biennial Conference and Exhibition, Cape Town, 10–13 September 2017.
24. **Manzunzu, B., Midzi, V.** and **Durrheim, R.J.**, 2017. Uncertainty associated with the earthquake catalogue: Impacts on seismic hazard assessment for Johannesburg. AfricaArray 2017 Scientific Workshop, University of the Witwatersrand, Johannesburg, 27 June–1 July 2017.
25. **Midzi, V., Jele, V., Kwadiba, T., Mantsha, R., Manzunzu, B., Mulabisana, T., Pule, T., Tabane, L., Van Aswegen, G. and Zulu, B.S.**, 2017. The 2017 Botswana M6.5 earthquake: Scientific rapid response. AfricaArray 2017 Scientific Workshop, University of the Witwatersrand, Johannesburg, 27 June–1 July 2017.
26. **Mukosi, N., Bensid, M.L. and Netshitungulwana, R.**, 2017. Regional airborne soil geochemical survey of the Namaqualand region, Northern Cape, South Africa. World Congress on Geochemistry and Marine Science, Atlanta, USA, 16–17 November 2017.
27. **Mwenze, T., Okujeni, C., Siad, A., Bailie, R., Voigt, M.** and **Le Roux, P.**, 2017. Geochemistry and Sr-Nd isotope systematics of the Platreef feldspathic pyroxenite, northern Bushveld Igneous Complex: Implications for stratigraphy and PGE-Cu-Ni exploration. Minerals Research Showcase 2017, The Southern African Institute of Mining and Metallurgy (SAIMM), Cape Town, 3–4 August 2017.
28. **Nemaxwi, P., Odiyo, J.O. and Makungo, R.**, 2017. Estimation of groundwater recharge response from rainfall events in a semi-arid fractured aquifer: case study of Quaternary catchment A91H, Limpopo Province, South Africa. 15th Biennial Ground Water Division Conference 2017, Promoting the efficient use and protection of groundwater, Stellenbosch, 14–18 October 2017.
29. **Neumann, F.H., Grímsson, F., Zetter, R., Cowling, R., Scott, L., Bamford, M. and Cawthra, H.C.**, 2017. Tracing the origin of Southern African biomes — the Miombo woodland from the early Miocene until modern times. 21st Conference of the Southern African Society for Quaternary Research (SASQUA), Johannesburg, 3–7 April 2017.
30. **Ngobeni, D.**, 2017. Exploration of kimberlites in a resistive half-space using a single loop time-domain system — A case study from dolomitic terrain. 15th SAGA Biennial Conference and Exhibition, Cape Town, 10–13 September 2017.
31. **Nhleko, L., Novhe, O.** and **Tredoux, G.**, 2017. In-situ iron removal treatment in a primary aquifer, the Atlantis example. 15th Biennial Ground Water Division Conference 2017, Promoting the efficient use and protection of groundwater, Stellenbosch, 14–18 October 2017.
32. **Ntlhabane, S., Becker, M., Charikinya, E., Voigt, M., Schouwstra, R. and Bradshaw, D.**, 2017. Towards the development of an integrated modelling framework underpinned by mineralogy. Minerals Research Showcase 2017, SAIMM, Cape Town, 3–4 August 2017.
33. **Ogasawara, H., Durrheim, R.J., Yabe, Y., Ito, T., Van Aswegen, G., Grobbelaar, M., Funato, A., Ishida, A., Ogasawara, H., Mngadi, S., Manzi, M., Ziegler, M., Ward, A., Hofmann, G., Moyer, P., Boettcher, M., Dight, P., Ellsworth, W., Liebenberg, B., Wechsler, N., Onstott, T., Berset, N. and the DSeis Team**, 2017. Drilling into seismogenic zones of M2.0–M5.5 earthquakes from deep South African gold mines (DSeis): Establishment of research sites. AfricaArray 2017 Scientific Workshop, University of the Witwatersrand, Johannesburg, 27 June–1 July 2017.
34. **Pule, T., Midzi, V., Manzunzu, B., Zulu, B., Mulabisana, T., Rathod, G. and Maphahlele, K.**, 2017. Macro seismic survey of the M4.6, 2017 Stilfontein earthquake. AfricaArray 2017 Scientific Workshop, University of the Witwatersrand, Johannesburg, 27 June–1 July 2017.

35. Rudzani, L., Gumbo, J.R., **Yibas, B.** and **Novhe, O.**, 2017. Geochemical and mineralogical characterization of gold mine tailings for the potential of acid mine drainage in the Sabie–Pilgrim’s Rest goldfields, South Africa. 9th International Conference on Research in Chemical, Agricultural, Biological and Environmental Sciences (RCABES-2017), Parys, 25–29 June 2017.
36. **Sakala, E.**, Fourie, F., **Chirenje, E.**, **Saeze, H.** and **Sekiba, M.**, 2017. Towards automation of modelling of geophysical data using artificial intelligence. 15th SAGA Biennial Conference and Exhibition, Cape Town, 10–13 September 2017.
37. **Sakala, E.**, Fourie, F., Gomo, M. and **Coetzee, H.**, 2017. Hydrogeological investigation of the Witbank, Ermelo and Highveld coalfields: Implications for the subsurface transport and attenuation of acid mine drainage. In: Wolkersdorfer, C., Sartz, L., Sillanpää, M. and Häkkinen, A. (eds), *Mine Water and Circular Economy (Vol. I)*, pp. 564–572. 13th International Mine Water Association (IMWA) Congress, Mine Water & Circular Economy — A Green Congress, Lappeenranta University of Technology (LUT), Lappeenranta, Finland, 25–30 June 2017.
38. **Sakala, E.**, Fourie, F., Gomo, M. and **Coetzee, H.**, 2017. Mapping surface sources of acid mine drainage using remote sensing: Case study of the Witbank, Ermelo and Highveld coalfields. In: Wolkersdorfer, C., Sartz, L., Sillanpää, M. and Häkkinen, A. (eds), *Mine Water and Circular Economy (Vol. II)*, pp. 1246–1254. 13th IMWA Congress, Mine Water & Circular Economy — A Green Congress, LUT, Lappeenranta, Finland, 25–30 June 2017.
39. **Sebothoma, S.T.** and **Chirenje, E.**, 2017. Applications of geophysical techniques for alluvial diamond exploration at Itsoseng, North West Province. 15th SAGA Biennial Conference and Exhibition, Cape Town, 10–13 September 2017.
40. **Sekiba, M.**, **Chirenje, E.**, **Ngobeni, D.** and **Sethobya, M.**, 2017. Assessment of geophysical techniques as an exploration tool for alluvial deposits in the southern fields, Schweizer-Reneke, North West Province. 15th SAGA Biennial Conference and Exhibition, Cape Town, 10–13 September 2017.
41. **Sethobya, M.**, **Sebothoma, S.T.** and **Ngobeni, D.**, 2017. Electrical Resistivity Tomography (ERT) applications for alluvial diamonds exploration in different geological terraces — successes and shortcomings. 15th SAGA Biennial Conference and Exhibition, Cape Town, 10–13 September 2017.
42. Wiles, E.A., Loureiro, C. and **Cawthra, H.C.**, 2017. Analysis of shoreline change and coastal hazards: implications for a medium-scale embayment, Mossel Bay, Western Cape. SAMSS, Port Elizabeth, 3–7 July 2017.



Outcrops of the Pongola Supergroup by White Umfolozi River (KwaZulu Natal)

PART C: GOVERNANCE

1.	EXECUTIVE AUTHORITY	57
2.	BOARD OF THE COUNCIL FOR GEOSCIENCE	57
2.1	Board composition and duties.....	57
2.2	Board Charter and Board responsibilities.....	59
2.3	Board induction and orientation	59
2.4	Training of new Board members	59
2.5	Board meetings	59
2.6	Board remuneration	60
2.7	Committees of the Board	60
3.	RISK MANAGEMENT	64
4.	INTERNAL CONTROL	65
5.	INTERNAL AUDIT	65
6.	COMPLIANCE WITH LAWS AND REGULATIONS	65
7.	FRAUD AND CORRUPTION.....	65
8.	MINIMISING CONFLICT OF INTEREST	65
9.	CODE OF CONDUCT	65
10.	COMPANY SECRETARY	66
11.	QUALITY ASSURANCE	66
12.	HEALTH, SAFETY AND ENVIRONMENTAL ISSUES	66
13.	PUBLIC AWARENESS	67



Merensky reef - platinum bearing unit, Limpopo

PART C: GOVERNANCE

The Corporate Governance of the CGS embodies systems, structures and processes by which the entity is directed, controlled and held to account. The CGS applies corporate governance through the precepts of its enabling act, the Geoscience Act, Act 100 of 1993, as amended, the PFMA, the National Treasury Regulations, the Protocol on Corporate Governance in the Public Sector, the King Code IV, and policies of the organisation. This part of the report details governance systems, structures and processes within the organisation which comprise, but is not limited to:

- **The Board and its committees** — which covers the composition of the Board and committees, Board induction, Board remuneration and conduct, role and responsibilities of the Board;
- **Compliance with laws and regulations** — which reports on the status of the CGS compliance with the relevant and applicable legislative prescripts;
- **Internal control and risk management** — which covers reporting on the risk management framework implemented as well as the effectiveness of the internal controls in the organisation;
- **Fraud and corruption** — covers measures put in place to detect and combat fraudulent activities;
- **Internal audit** — outlines the activities of the internal audit function;
- **Quality assurance** — status with regard to quality assurance within the CGS; and
- **Health, safety and environment issues** — CGS level of compliance with Safety, Health, Environment and Quality (SHEQ) standards.

The CGS is committed to the fundamental principles of good corporate governance, transparency, integrity, accountability and responsibility as set out in the PFMA (Act No. 1 of 1999, as amended); Council for Geoscience Act No 100 of 1993, as amended; National Treasury Regulations; the Protocol on Corporate Governance in the Public Sector; and the King Code IV as well as the policies of the organisation.

1. EXECUTIVE AUTHORITY

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

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). The Board comprised of 12 non-executive members, four alternate members and one executive member, the CEO. The Chairperson of the Board is an independent non-executive member; as such the roles of the Chairperson and CEO and their duties are clearly separated.

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

- 2.1.1 To exercise the duty of utmost care to ensure reasonable protection of the assets and records of the organisation;
- 2.1.2 To 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 to act in a way that is inconsistent with responsibilities assigned to Board members;
- 2.1.4 Not to 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 To 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 a process of annual declarations of interest as well as a declaration of interest at committees of the Board and Board meetings to ensure that Board members disclose real or perceived conflicts in any matter before the Accounting Authority. Board members are required to withdraw from the 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, it monitors compliance with the policies and performance with respect to 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; fair, equitable, competitive and cost-effective procurement.

The Board has the authority to lead, control and manage the business of the CGS. The Board has adopted a comprehensive Delegation of Authority framework in accordance with section 56 of the PFMA (Act No. 1 of 1999, as amended). As a result, the Board has delegated 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 responsibilities and accountability towards the organisation.

Table C1: Board composition

Name	Designation	Employer	Date appointed	Qualifications	Area of expertise
Dr H. Mathe*	Chairperson	Tranter Resources (Pty) Limited	1 March 2017	PhD (Geology)	Geology
Mr M. Mabuza*	Chief Executive Officer (CEO)	Council for Geoscience	1 March 2017	BSc Hons (Geology), Postgraduate Diploma in Business Administration	Geology, Mineral Policy and Promotion
Mr B.A. Gerrys	Board member	Department of Science and Technology	1 March 2017	MSc (Engineering Management)	Technology and Innovation Systems
Mr K. Koloi	Board member	Infracon	1 March 2017	BTech (Chemical Engineering)	Electrical Engineering
Dr J. Mahachi	Board member	University of Johannesburg	1 March 2017	PhD (Structural Engineering)	Structural Engineering
Dr M. Mayekiso*	Board member	Department of Environmental Affairs	1 March 2017	PhD (Marine and Environmental Science)	Conservation of Ocean and Coast
Ms R. Mdubeki*	Board member	Department of Rural Development and Land Reform	1 March 2017	BSc (Land Surveying)	Land Surveying
Mr K. Menoe	Board Member	Department of Mineral Resources	1 March 2017	BSc (Chemical Engineering)	Mineral Beneficiation
Ms D. Mochotlhi*	Board member	Department of Water and Sanitation	1 March 2017	MSc (Environment and Society)	Environmental Sciences
Mr T. Motaung (Resigned on 24 August 2014)	Board member	Bethlehem Magistrate Court	1 March 2017 – 24 Aug 2017	BA (Law)	Law
Mr X. Mvinjelwa	Board member	Imerys South Africa	1 March 2017	BSc (Chemistry, Production Management), MBA	Strategy and Corporate Services

Name	Designation	Employer	Date appointed	Qualifications	Area of expertise
Mr K. Ramokgopa	Board member	KS Innovations	1 March 2017	BSc (Civil Engineering), Masters in Business Leadership (MBL), Masters in Public Administration (MPA)	Civil Engineering, Business Management and Public Administration
Mr O. Willcox	Board member	National Treasury	1 March 2017	MA (Economics)	Economics
Mr I. Abader (Alternate to Dr M. Mayekiso)	Alternate Board member	Department of Environmental Affairs	1 March 2017	BA, BProc, MBA	Environmental Sciences
Mr P. Nel* (Alternate to D. Mochotlhi)	Alternate Board member	Department of Water and Sanitation	1 March 2017	BCompt Hons (Accounting) CA (SA)	Accounting and Financial Management
Ms P. Tsotetsi (Alternate to Ms R. Mdubeki)	Alternate Board member	Department of Rural Development and Land Reform	1 March 2017	BSc (Land Surveying)	Quantity Surveying
Mr A. Moatshe (Alternate to Mr K. Menoe)	Alternate Board member	Department of Mineral Resources	03 July 2017		Awaiting Information from Board member

*Re-appointment

2.2 Board Charter and Board responsibilities

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

- Leadership role of the Board, judgement and strategic direction;
- Board composition;
- Accountability, fiduciary duties and responsibilities;
- Code of conduct for the Board;
- Constitution and appointment of committees;
- Governance and meeting procedures;
- Management of conflict of interest;
- Responsibility for the adoption of strategic plans and the monitoring of operational performance and management;
- Determination and approval of policies;
- Risk management; and
- Board selection, orientation and evaluation.

2.3 Board induction and orientation

The CGS has a programme which ensures that newly appointed Board members are inducted.

2.4 Training of new Board members

The CGS has implemented a director development programme to ensure that the Board members are adequately and continuously 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 the CGS governance structures, strategic projects and organisational performance to enable them to fulfil their duties and responsibilities.

2.5 Board meetings

The Board had six meetings in the 2017/2018 financial year. The accompanying tables depict the attendance of meetings by each Board member in the financial year under review.

Table C2: Board meetings — 1 April 2017 – 31 March 2018

Board Members	2017/2018						Number of meetings attended
	25 April	30 May	27 July	26 October	25 January	23 March	
Dr H. Mathe (Chairperson)	Present	Present	Present	Present	Present	Present	6
Mr M. Mabuza (CEO)	Present	Present	Present	Present	Present	Present	6
Dr M. Mayekiso	Apology	Apology	Apology	Apology	Present	Present	2
Mr I. Abader*	Present	Apology	Present	Apology	Apology	Apology	2
Ms D. Mochothli	Apology	Present	Apology	Present	Apology	Apology	2
Mr Paul Nel*	Apology	Apology	Apology	Apology	Present	Present	2
Ms R. Mdubeki	Present	Apology	Present	Apology	Apology	Present	3
Ms P. Tsotetsi*	Apology	Apology	Apology	Apology	Present	Apology	1
Dr J. Mahachi	Present	Present	Present	Present	Present	Present	6
Mr X. Mvinjelwa	Present	Present	Present	Present	Present	Apology	5
Mr K. Koloï	Apology	Present	Present	Apology	Apology	Apology	2
Mr O. Willcox	Apology	Present	Present	Present	Apology	Apology	3
Mr K. Ramokgopa	Present	Present	Present	Apology	Present	Present	5
Mr B. Gerryts	Present	Present	Present	Present	Present	Present	6
Mr A. Moatshe*	Not yet appointed	Not yet appointed	Present	Apology	Present	Apology	2
Mr K. Menoe	Apology	Present	Apology	Apology	Apology	Apology	1
Mr T. Motaung**	Present	Apology	Apology	-	-	-	1

* Alternate members

** Resigned on 24 August 2017

2.6 Board remuneration

The remuneration of Board members is determined by the Minister of Mineral Resources, as disclosed in note 12 of the notes to the financial statements.

2.7 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 which shall, subject to the direction of the Board, perform such functions of the Board that may be determined from time to time. Furthermore, section 56 of the PFMA (Act No. 1 of 1999, as amended) provides that the Board may delegate some of its responsibilities to its committees and the management of the CGS without divesting the Board of its roles and responsibilities in their capacity as the Board. The Board committees are therefore required to make recommendations to the entire Board before any strategic decisions may be implemented by Management.

Mandated by section 15 of the Geoscience Act (Act No. 100 of 1993 as amended), section 56 of the PFMA (Act No. 1 of 1999, as amended) and the recommendations of the King Code, the Board has constituted and delegated some of its functions to the following four Board committees:

2.7.1 Audit and Risk Committee

The Audit and Risk Committee was established in terms of section 77 of the PFMA (Act No. 1 of 1999, as amended) and the National Treasury Regulation 27. The Audit and Risk Committee discharges its responsibilities in terms of the Audit & Risk Committee Charter, which sets out its committee composition, roles and responsibilities. The Audit and Risk Committee continually monitors the quality and reliability of financial information of the CGS used by the Board, financial statements issued by the CGS and various functions in the organisation. The Audit & 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 as from 1 April 2017 to 31 March 2018 is reflected in the table below.

Table C3: Audit and Risk Committee meetings

Committee Members	2017/2018										Meetings attended
	20 April	18 May	21 July	25 July	22 August	13 October	18 January	07 February	13 March	19 March	
Mr S. M Xulu	Present	Present	Apology	Present	Present	Present	Present	Present	Present	Apology	8
Mr P. Nel	Present	Apology	Apology	Apology	Present	Present	Apology	Present	Present	Apology	5
Ms I. Singo	Present	Apology	Apology	Apology	Present	Present	Apology	Present	Present	Present	6
Mr O. Willcox	Present	Apology	Present	Present	Apology	Present	Present	Present	Present	Present	8
Ms KR Mthimunye	Present	Present	Present	Present	Present	Present	Present	Present	Present	Present	10
Mr K. Ramokgopa	Present	Present	Present	Present	Apology	Present	Present	Present	Present	Present	9

2.7.1.1 Audit and Risk Committee Report

The Audit & Risk Committee (the 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 as contained therein.

In executing its duties, the Committee have inter-alia, performed the following functions:

1. 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 effectively and efficiently fulfilled its roles. During the financial year 2017/18, 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 relation to:

- a) Procurement;
- b) Financial management;
- c) Human resources management;
- d) Performance management;

- e) IT infrastructure related control measures; and
- f) Fraud Prevention & Corruption related control measures.

The Committee is confident to report that corrective measures were implemented towards resolving all findings relating to internal controls weaknesses. The Committee further reports that during the year under review a number of weaknesses around performance management and Information Technology were identified, and management has assured the Committee that appropriate corrective measures would be implemented in the 2018/2019 financial year.

2. 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 reliability 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;

- f) And 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 requirements as well as South African Standards of Generally Recognised Accounting Practices (SA Standards of GRAP).

3. Risk Management

The Committee reports that during the year under review it approved the Risk Management Framework; Strategic Risk Register; and Fraud Prevention Plan, which was subsequently communicated to employees and incorporated in the culture of CGS. The Committee reviewed:

- a) The organisation's risk appetite and tolerance levels;
- b) The significant financial risk exposures and directed management to monitor, and develop mitigation strategies for such exposures including, but not limited to reputational, operational, fraud, strategic, information technology, and communications systems as well as disaster recovery and business-continuity risk;
- c) And requested management to prioritise the development of the annual risk management plan with regard to the annual risk management scope of work and compliance activities.

4. Evaluation of financial statements

The Committee reviewed and discussed the financial statements of the CGS for the year ended 31 March 2018 with the Auditor-General. The Committee also reviewed the management letter of the Auditor-General and reviewed 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 (Act No. 1 of 1999, as amended) and the SA Standards of GRAP.

5. 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 also ensure that management resolves all the audit findings that are still work 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.



Mr S.M. Xulu

Chairperson: Audit and Risk Committee

Council for Geoscience

31 July 2018

2.7.2 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, but not limited to:

- Review and make recommendations to the Board in respect of any significant financial activities;
- Monitor the liquidity and financial condition of the CGS;
- Recommend and approve bad debts and write-offs;
- Address material variances in the approved annual and/or revised budgets in accordance with the Materiality and Significance Framework Plan;
- Review the proposed capital as well as operating budget for capital expenditures;
- Review financial statements for the annual report;
- Annually review all policies that have financial implications; and
- Consider and reconcile corporate performance information management against the approved budget.

The Finance Committee comprised of five non-executive members as detailed on table C6. Furthermore, meeting attendance of the Finance Committee as from 1 April 2017 to 31 March 2018 is reflected in the table below:

Table C4: Finance Committee meetings

Committee Members	2017/2018						Meetings attended
	20 April	13 October	18 January	07 February	13 March	19 March	
Ms KR. Mthimunya	Present	Present	Present	Present	Present	Present	6
Mr P. Nel	Present	Present	Present	Present	Present	Apology	5
Ms I. Singo	Apology	Present	Apology	Present	Present	Present	4
Dr J. Mahachi	Present	Present	Present	Present	Apology	Present	5
Mr K. Koloi	Present	Present	Present	Present	Apology	Present	5

2.7.3 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, and evaluate the scientific and technical output, and oversee the annual technical audit.

The composition and meeting attendance of the Technical Committee as from 1 April 2017 to 31 March 2018 is reflected in the table below.

Table C5: Technical Committee meetings

Members	2017/2018				Meetings attended
	19 April	20 July	12 October	17 January	
Mr B. Gerryts	Present	Present	Present	Present	4
Mr X. Mvinjelwa	Present	Present	Present	Present	4
Mr A. Moatshe	Not yet appointed	Present	Present	Apology	2
Dr M. Mayekiso	Present	Present	Apology	Present	3
Dr J. Mahachi	Present	Present	Present	Present	4
Ms P. Tsotetsi	Present	Present	Present	Apology	3
Mr D. Sibiya	Present	Apology	Present	Apology	2

2.7.4 Personnel, Remuneration and Transformation Committee

The Personnel, Remuneration and Transformation Committee is mandated to consider and recommend for Board's approval, the human resources strategies and policies of the CGS. Furthermore, the committee considers and recommends for Board's approval, the organisational remuneration model; remuneration for executive management; and annual salary increases, as well as evaluates and makes recommendations on the payment of performance bonuses. The committee

also considers organisational performance reports on labour related matters; EE, as well employee training and development matters.

The composition and meeting attendance of the Personnel, Remuneration and Transformation Committee as from 1 April 2017 to 31 March 2018 is reflected in the table below:

Table C6: Personnel, Remuneration and Transformation Committee meetings

Members	2017/2018					Meetings attended
	19 April	20 July	12 October	31 October	17 January	
Ms R. Mdubeki	Present	Present	Present	Present	Present	5
Mr K. Ramokgopa	Present	Present	Present	Present	Present	5
Mr A. Moatshe	Not yet appointed	Apology	Present	Present	Present	3
Mr I. Abader	Present	Present	Apology	Apology	Present	3
Mr X. Mvinjelwa	Present	Present	Present	Present	Present	5
Mr D. Sibiyi	Present	Apology	Apology	Present	Present	3

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 the 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. CGS

develops the strategic risk register annually based on the organisational strategy, which is monitored on a quarterly basis, and which provides assurance to the Board that CGS is adequately managing the identified risks.

The organisational governance risk management structure of the CGS is presented below:



Figure 14: The organisational governance risk management structure of the CGS.

4. INTERNAL CONTROL

Management has the responsibility to design, implement and continually review internal controls to provide assurance on the effectiveness and efficiency of operations and on the reliability of financial reporting, as well as on 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 (Act No. 1 of 1999, as amended) 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 the internal audit reports were presented to the Audit and Risk Committee on a quarterly basis. Follow-up audits were conducted on prior year findings. The internal audit also performed ad-hoc tasks that were requested by Management.

6. COMPLIANCE WITH LAWS AND REGULATIONS

The CGS complies with National Treasury Regulations through the PFMA compliance calendar. The PFMA compliance calendar is 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 (Act No. 1 of 1999, as amended) to take appropriate steps to prevent unauthorised, irregular, fruitless and wasteful expenditure and losses resulting from criminal conduct. An Anti-Fraud Prevention Policy is in place, as well as a “whistleblowing facility” that is administered by Deloitte. Reports are issued on a monthly basis, 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 which has been adopted. The CGS is committed to ethical and fair business dealings and promotes a corporate culture which 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. In furthering this, all staff, contractors, consultants and others acting on behalf of the organisation are required to accurately and honestly represent the organisation and will refrain from engaging in any activity or scheme intended to defraud anyone of money, property or services. The reputation and integrity of the CGS is 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 any relevant regulatory changes and new developments in corporate governance. Furthermore, the Company Secretary provides the Board and the Board committees with guidance in respect of 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 within the context of a quality management system which ensures that the creation, delivery and monitoring of services occur in line with national and international quality standards. The purpose of quality management in the CGS is to ensure that stakeholders receive excellent services at all times. A quality gap assessment has been initiated which is being used as a tool to drive the implementation of the ISO 9001 quality management system within the CGS. An organisation-wide quality awareness programme was initiated during the financial year with 248 staff members having been trained.

Laboratory testing facilities remain a high priority area within the quality management system of the CGS. The Laboratory Services have commissioned and continue to expand the Laboratory Information Management System (LIMS), which is a database that is used primarily to process, store and access customer, quality control and sample information. LIMS is also used for various laboratory support processes, namely equipment calibration and maintenance records. Specialised ISO 17025 quality management training has been undertaken by selected laboratory staff which took place at the facilities of the South African National Accreditation System (SANAS). This training has contributed positively to the process of validating laboratory test methods fit for purpose in view of ensuring the quality of the CGS's analytical test results.

12. HEALTH, SAFETY AND ENVIRONMENTAL ISSUES

The CGS strives to conduct all its activities in a safe and environmentally sensitive manner at all times. The organisation has created, and sustains, the necessary organisational competency to enable the development and rollout of health, safety and environmental management plans for its major projects.

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. The CGS Safety, Health and Environment Policies enable the organisation to drive compliance with occupational health, safety and environmental legislation.

The CGS conducts health and safety risk assessments to routinely identify hazards and assess risks in order to prevent workplace injuries and diseases. Project hazard assessments are conducted on all key projects. Significant hazards and risks in affected areas are communicated to all staff members. Identified countermeasures are implemented according to the health and safety programme rollout. Occupational health and safety performance is monitored through various indicators aimed at ensuring continual compliance with applicable legislation. Committees such as the Operational Risk Management Committee, Business Continuity Committee, Audit and Risk Committee and the CGS Board quarterly monitor the occupational health and safety performance of the organisation.

Environmental management is pivotal to the operations of the CGS. In addition to the scientific work that the organisation undertakes to address the environmental challenges of the country, it has also developed a corporate environmental management programme aimed at addressing its own environmental impacts. The approach that has been adopted by the organisation is to proactively prevent pollution and reduce resource wastage in its processes by conducting an environmental risk assessment as well as developing and implementing an environmental management plan to manage identified environmental risks.

13. PUBLIC AWARENESS

Table C7: Public awareness

The CGS participated in the following public awareness initiatives:

EXHIBITIONS		
Event	Date	Outcome
Shale gas stakeholder engagement in Beaufort West	25 April 2017	The CGS was invited to support the DMR at the shale gas stakeholder engagement in Beaufort West. The CGS exhibited at the event to enlighten the community about the CGS services.
Budget vote speech, Cape Town	16 May 2017	The CGS exhibited at the budget vote speech of the DMR to promote the CGS services to members of Parliament and other stakeholders who visited the exhibition stand of the organisation.
Sustainability Week, Pretoria	13-15 June 2017	The CGS participated at the Sustainability Week Conference to exhibit and present at the mining seminar. The presentations by the CGS were based on mine water contamination and environmental health.
Africa Down Under, Perth, Australia	6-8 September 2017	The CGS supported and co-exhibited with the DMR and its entities at the Africa Down Under conference, which was largely about mining and exploration in Africa.
China Mining Conference, Tianjin, China	23–25 September 2017	The CGS supported and co-exhibited with the DMR and its entities at the China Mining Conference in Tianjin, which was largely about mining and exploration in China.
South African Geophysics Association (SAGA) Conference, Cape Town	10-13 September 2017	The CGS participated at the SAGA conference in the form of an exhibition, presentations and workshops. This platform allowed the CGS geoscientists to share knowledge amongst its peers and to gain extensive exposure to methods and applications of geophysics.
Mining Indaba Conference, Cape Town	5–8 February 2018	The CGS supported and co-exhibited with the DMR and its entities at the Mining Indaba, which was largely about mining and exploration in Africa.
Prospectors and Developers Association of Canada (PDAC) Conference, Toronto, Canada	4–7 March 2018	The PDAC is an annual trade conference that takes place in Toronto, Canada. The CGS supported and co-exhibited with the DMR at the PDAC.

CAREER EXPOSURE EVENTS

Event	Date	Outcome
International Museums Day	18 May 2017	The CGS National Geoscience Museum participated in the International Museum Day to highlight the importance of the museum in society as well as to promote its services to learners and the public.
Annual Unlimited Science Expo in Kwalata, Hammanskraal	23-25 May 2017	The CGS participated at the annual Unlimited Science Expo in Kwalata, Hammanskraal. The CGS exhibited at the event and enlightened the learners about CGS and its services.
Learners Focus Week, Polokwane	4-7 July 2017	The CGS participated in the annual Learners Focus Week through exhibitions and presentations to learners on the various career paths in the organisation. The presentations targeted Mathematics and Science learners from all nine provinces of South Africa.
National Science Week Launch, Port Elizabeth, Nelson Mandela University	5 August 2017	The CGS participated in the National Science Week launch held by the DST at the Nelson Mandela University in Port Elizabeth. Through the exhibition, learners were exposed to the CGS services and were encouraged to pursue science-related career paths.

CORPORATE SOCIAL RESPONSIBILITY (CSR) INITIATIVES**EMPLOYEE-FOCUSED INITIATIVES**

Event	Date	Outcome
Women's Day Workshop	11 August 2017	The CGS commemorated Women's month through a workshop which was hosted on the 11th of August 2017. The workshop's aim was to recognise the commitment of the CGS women in a work environment and to empower them through motivational speakers that gave talks around general health and wellbeing, mental health and work-life balance.
National Heritage Day	24 September 2017	The CGS employees celebrated Heritage Day by wearing their traditional outfits to work in celebration of their diverse cultures and traditions.
National Breast Cancer Month	1-31 October 2017	The CGS created a leaflet and posters about breast cancer to encourage employees to have regular check-ups.
World AIDS Day	1 December 2017	The CGS created awareness posters about HIV/AIDS amongst employees by encouraging them to ascertain their HIV/AIDS status.

COMMUNITY-FOCUSED INITIATIVES

Event	Date	Outcome
Nelson Mandela Day	18 July 2017	The CGS took action and inspired change in favour of those who are less fortunate at the following homes during the commemoration of Mandela Day 2017: <ul style="list-style-type: none"> Leamogetswe Home of Safety situated in Saulsville, Pretoria. The safe home accommodates 104 abandoned, abused and HIV/AIDS infected children; Durbanville Children's Home and Iris Children's Hospice; Jogébed Child and Youth Care Centre; and Ramongwana Primary School situated in a village just outside Polokwane.
Donation of furniture to the Gaerobe Adult Centre in Soshanguve	21 November 2017	The CGS donated tables, cabinets and chairs to assist the Gaerobe Adult Centre in carrying out their daily educational activities.
Beaufort west borehole handover ceremony	13 February 2018	The CGS handed over two boreholes of clean water to the Beaufort West Municipality in Western Cape.

COUNCIL FOR GEOSCIENCE EXCELLENCY AWARDS

Event	Date	Outcome
Council for Geoscience Excellency Awards	07 December 2017	The CGS held a prestigious awards of excellence evening ceremony on the 7 December 2017 at Monte de Dios, Pretoria. This event was used to recognise and show appreciation to scientists and staff whose hard work helped the CGS achieve its mandate, and help it contribute toward the growth and development of South Africa.

OVERSIGHT VISIT OF THE PPC ON MINERAL RESOURCES

Event	Date	Outcome
Oversight visit of the PPC on Mineral Resources to the CGS National Core Library in Donkerhoek	30 January 2018	The PPC on Mineral Resources oversight visited the CGS National Core Library in Donkerhoek (Figure 15) for purposes of assessing how these resources may be used to benefit emergent black miners.



Figure 15: Parliamentary Portfolio Committee (PPC) on Mineral Resources visit to the CGS National Core Library in Donkerhoek.

PART D: HUMAN RESOURCES MANAGEMENT

1.	OVERVIEW OF HUMAN RESOURCES MATTERS.....	71
2.	HUMAN RESOURCES PRIORITIES FOR THE YEAR UNDER REVIEW	71
3.	PERFORMANCE MANAGEMENT	72
4.	EMPLOYEE WELLNESS PROGRAMMES	72
5.	HIGHLIGHTS OF ACHIEVEMENTS.....	72
6.	CHALLENGES FACED BY THE ORGANISATION	72
7.	FUTURE HUMAN RESOURCES GOALS.....	73
8.	HUMAN RESOURCES OVERSIGHT STATISTICS	73



Borehole core logging, National Core Library at Donkerhoek, Pretoria

PART D: HUMAN RESOURCES MANAGEMENT

The report under Human Resources Management introduces key focus areas of the Human Resources department for the year under review. An overview of key priority focus areas is discussed, including training and transformation initiatives of the CGS.

The section further details the following:

- Performance measurement systems that are used to assess performance;
- Management of employee wellness to ensure the health and wellbeing of staff;
- Key highlights in respect of human resources activities for the year under review;
- Challenges faced by the organisation pertaining to human capital issues;
- Future human resources goals for the management of human resources; and
- Report on human resources statistics.

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

1. OVERVIEW OF HUMAN RESOURCES MATTERS

The following is an overview of some of the key focus areas of the Human Resources department for the year under review:

- Capacitating the CGS with the required resources;
- Review of remuneration levels for staff;
- Review of some of the key policies;
- Training of staff in various disciplines aligned with CGS strategic objectives;
- Facilitation of MSc and PhD studies for staff through the CGS bursary programme;
- Facilitation of training for full-time students through the CGS bursary programme in the various scientific disciplines in line with the CGS mandate; and
- Ensuring employee wellness.

2. HUMAN RESOURCES PRIORITIES FOR THE YEAR UNDER REVIEW

Resourcing the CGS with the required skills and expertise continues to be a key component of the core deliverables in the Human Resources department. The appropriate skills are pivotal to the delivery of the CGS on its strategy, projects and mandate.

Organisational structure review

The roll-out of the new organisational structure commenced in earnest in July 2017. The recruitment of vacant executive positions is being finalised and will be followed by management positions.

Diversity and transformation

The CGS, as a designated employer, is required to develop and submit an EE plan to monitor progress in achieving its EE targets. The CGS has reviewed and submitted its new EE plan in January 2018.

CGS's overall staff profile in terms of gender includes 50% male and 50% female staff members while the profile regarding race comprises 81% Blacks and 19% Whites.

The percentage representation of people with disabilities is 0.71% against the national target of 2%. The CGS still has to focus its efforts to attract Coloureds, Indians, women and people with disabilities.

Employee benefits and compensation

The CGS reviews staff salaries on an annual basis in line with inflation indices. This is a negotiated process with three recognised unions, i.e. Solidarity, PSA and NEHAWU. The organisation further conducts benchmarking of salaries against the national all incumbents market, as part of its strategy to align its salaries with national all incumbents' market data to the 50th percentile.

The following are benefits offered to staff:

- Life cover in the event of death during employment; and
- Income care scheme in the event of temporary and permanent incapacitation.

Training and professional development

Full-time study bursaries

The CGS offers full-time bursaries to students in the various fields of geoscience. For the year under

review, the CGS awarded a total of 49 bursaries for full-time studies in respect of PhD, MSc, BSc Honours and BSc qualifications.

Table D1: Racial and gender profile of students in the bursary programme

Study Level	Actuals Males				Actuals Females				Total
	W	A	I	C	W	A	I	C	
PhD	0	3	0	0	0	2	1	0	6
MSc	5	11	1	0	2	5	0	5	29
BSc Hons	0	3	0	0	0	9	1	0	13
BSc	0	1	0	0	0	0	0	0	1
Total	5	18	1	0	2	16	2	5	49

Internships

The CGS continues to partner with the Mining Qualifications Authority (MQA) to support skills development, growth and career opportunities for

aspiring young graduates. To this end, a total of 34 interns were trained at the organisation during the year under review.

Table D2: Gender and racial profile of interns in the internship programme

Study Level	Race				Total
	W	A	I	C	
PhD	0	0	0	0	0
MSc	1	6	1	0	8
BSc Hons	1	12	1	1	15
BSc/ BTech	4	0	0	1	5
N Diploma (Attained)	3	0	0	0	3
N Diploma (in Progress)	3	0	0	0	3
Total	12	18	2	2	34

3. PERFORMANCE MANAGEMENT

The CGS continues to use the balanced scorecard as a performance measurement tool to measure performance at a corporate level and individual level.

4. EMPLOYEE WELLNESS PROGRAMMES

The CGS strives to ensure the wellness of its staff through the contracted service provider Careways. Services under this programme include, among others, support with emotional and personal difficulties, alcohol, drug and gambling abuse, management of stress, HIV/AIDS and financial wellness.

5. HIGHLIGHTS OF ACHIEVEMENTS

The CGS has achieved a turnover rate of 0.24% for the year under review. The investment in training and development amounted to 2.55% of the personnel expenditure. This percentage is significantly higher than the 1% prescribed by the Skills Development Act.

6. CHALLENGES FACED BY THE ORGANISATION

The CGS is faced with a loss of a critical mass of unique and specialised expertise in scientific skills owing to staff members reaching retirement age. Although

the number only represents 11% of our scientific staff, there are no obvious successors with similar skills to continue within the specialised fields. Thus, our mentoring and succession plans for skills transfer are being implemented.

7. FUTURE HUMAN RESOURCES GOALS

The organisation is looking into capacitating its scientific skills in line with the integrated multidisciplinary geoscience mapping programme.

8. HUMAN RESOURCES OVERSIGHT STATISTICS

Table D3: Age profile

	Age Group	<24	25 - 34	35 - 44	45 - 54	55 - 64	>65	Total
2017/18	Number of Staff	1	136	128	94	60	4	423
	Percentage (%) of Staff	0,24	32,15	30,26	22,22	14,18	0,95	100,00

Table D4: Training costs

Personnel Expenditure	Training expenditure (R'000)*	Training expenditure as a percentage of personnel cost	Number of employees trained	Average training cost per employee
179 326 564.39	4 574.8	2.55	413	11 077.13

Table D5: Employment changes

Programme	Employment as at 31 March 2017	Appointments	Terminations	Employment at the end of the period
Top Management	3	1	1	3
Senior Management	8	1	1	8
Professional qualified	171	15	7	179
Skilled	104	3	4	103
Semiskilled	58	5	2	61
Unskilled	9	60	0	69
Total	353	85	15	423

Table D6: Reasons for staff leaving

Reasons for staff leaving		
Reason	Number	Percentage of total number of staff leaving
Death	0	0,00
Resignation	11	73,33
Dismissal	2	13,33
Retirement	1	6,67
Ill health	0	0,00
Expiry of contract (Non-Renewal)	1	6,67
Other	0	0,00
Total	15	100

Table D7: Labour relations: misconduct and disciplinary action

Nature of Disciplinary Action	Number
Verbal Warning	0
Written Warning	7
Final Written Warning	0
Dismissal	2

Table D8: Equity targets and EE status

Occ Levels	Actuals Males				Actuals Females				Foreign Nationals		Total
	W	A	I	C	W	A	I	C	Male	Female	
Top Management	0	3	0	0	0	0	0	0	0	0	3
Senior Managers	1	4	0	0	1	2	0	0	0	0-	8
Professional qualified	32	48	3	1	16	54	6	2	15	2	179
Skilled	6	65	0	2	9	20	1	0	0	0	103
Semiskilled	2	9	0	2	10	33	0	4	0	0	60
Unskilled	0	24	0	0	0	45	0	1	0	0	70
Total	41	153	3	5	36	154	7	7	15	2	423

Table D9: EE Targets - Males

Occ Levels	Actuals Males							
	W	Target	A	Target	I	Target	C	Target
Top Management	0	0	3	3	0	0	0	1
Senior Managers	1	1	4	6	0	0	0	1
Professional qualified	32	33	48	47	3	4	1	4
Skilled	6	6	65	69	0	0	2	3
Semiskilled	2	2	9	13	0	0	2	4
Unskilled	0	0	24	7	0	0	0	0
Total	41	42	153	145	3	4	5	13

Table D10: EE Targets - Females

Occ Levels	Actuals Females							
	W	Target	A	Target	I	Target	C	Target
Top Management	0	0	0	2	0	0	0	0
Senior Managers	1	2	2	5	0	1	0	1
Professional qualified	16	17	54	55	6	7	2	5
Skilled	9	9	20	22	1	3	0	0
Semiskilled	10	11	33	35	0	0	4	9
Unskilled	0	0	45	4	0	0	1	0
Total	36	39	154	123	7	11	7	15

Table D11: Disabled Staff

Disabled Staff				
Occ Levels	Male		Female	
	Current	Target	Current	Target
Top Management	0	0	0	0
Senior Managers	0	1	0	0
Professional qualified	0	0	1	2
Skilled	0	0	0	1
Semiskilled	2	2	0	0
Unskilled	0	0	0	0
Total	2	3	1	3

PART E: FINANCIAL INFORMATION

1.	STATEMENT OF RESPONSIBILITY.....	78
2.	REPORT OF THE CHIEF EXECUTIVE OFFICER	79
3.	REPORT OF THE AUDITOR-GENERAL TO PARLIAMENT ON THE COUNCIL FOR GEOSCIENCE	80
4.	ANNEXURE – AUDITOR-GENERAL’S RESPONSIBILITY FOR THE AUDIT	84
5.	ANNUAL FINANCIAL STATEMENTS FOR THE YEAR ENDED 31 MARCH 2018.....	85



Vryheid Formation exposures by Zungwini tunnel, KwaZulu Natal

PART E: FINANCIAL INFORMATION

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

- The statement of responsibility for the Annual Financial Statements of the year ended 31 March 2018 as 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 matters related thereto; and
- The Annual Financial Statements comprise: the Statement of Financial Position; Statement of Financial Performance; Statement of Changes in Net Assets; Cash Flow Statement and Notes to the Financial Statements.

1. STATEMENT OF RESPONSIBILITY

Statement of responsibility for the Annual Financial Statements for the year ended 31 March 2018

The Board is responsible for the preparation of the Annual Financial Statements of the CGS and the judgements 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 in respect 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 2018.


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 2018 have been audited by the external auditors, and their report is presented on pages 80 to 84.

The Annual Financial Statements of the CGS set out on pages 85 to 113 have been approved.



Mr M. Mabuza
CHIEF EXECUTIVE OFFICER
Council for Geoscience
31 July 2018



Dr H. Mathe
CHAIRPERSON OF THE BOARD
Council for Geoscience
31 July 2018

2. REPORT OF THE CHIEF EXECUTIVE OFFICER

General financial review of the Council for Geoscience

The statement of the financial position shows total assets of R565.6m. Current assets amount to R286m and current liabilities to R173.2m for the reporting period, meaning that the CGS will be able to meet its current financial obligations. An amount of R29.7m was spent on CGS infrastructure such as scientific and office equipment, machinery, buildings and computer equipment. Plans are in place to increase this investment to build a sustainable organisation. For the year under review, the financial performance of the CGS incurred a loss to the amount of R27.2m. This loss relates to the 2016/17 incentive bonus cost of R25m not provided for, and increased expenditure on projects.

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 in respect of 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.

Request for the retention of surplus

In terms of Section 53(3) of the Public Finance Management Act (Act No. 1 of 1999), the Council CGS has to obtain approval from the 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

A Supply Chain Management section 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 Act of 1999 (as amended by Act No. 29 of 1999).

Audit report matters

The CGS obtained an unqualified audit opinion from the Auditor-General for the year ended 31 March 2018. A number of issues were raised but were resolved during the current financial year.

Plans for future additional financial challenges

The CGS has reviewed its strategy and structure to optimise the delivery of its mandate. The new strategy includes an integrated and multidisciplinary geoscience mapping programme, which aims to refocus the organisation on its statutory mandate as well as to rejuvenate investment in the mining sector.

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 85 to 113, which comprise the statement of financial position as at 31 March 2018, the statement of financial performance, statement of changes in net assets, and statement of cash flows 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 2018, and its financial performance and cash flows for the year then ended in accordance with Standard 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 the International Ethics Standards Board for Accountants' *Code of ethics for professional accountants* (IESBA code) and 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 code.
5. I believe that the audit evidence I have obtained is sufficient and appropriate to provide a basis for my opinion.

Emphasis of matter

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

Restatement of corresponding figures

7. As disclosed in note 25 to the financial statements, the corresponding figures for 31 March 2017 were restated as a result of an error in the financial statements of the public entity at, and for the year ended, 31 March 2018.

Responsibilities of accounting authority for the financial statements

8. 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.
9. In preparing the financial statements, the accounting authority is responsible for assessing the Council for Geoscience'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 accounting authority 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

10. 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.
11. 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

12. 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 material findings on the reported performance information against predetermined objectives for selected programme presented in the annual performance report. I performed procedures to identify findings but not to gather evidence to express assurance.
13. My procedures address 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 indicators included in the planning documents. My procedures also did 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.
14. 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 programme presented in the annual performance report of the public entity for the year ended 31 March 2018:

Programme	Pages in the annual performance report
Programme 1 – Market (stakeholder/customer) perspective	26 - 28

15. 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.
16. I did not raise any material findings on the usefulness and reliability of the reported performance information for the following programme:
- Programme 1 - Market (stakeholder/customer) perspective

Other matter

17. I draw attention to the matter below.

Achievement of planned targets

18. Refer to the annual performance report on pages 26 to 30 for information on the achievement of planned targets for the year and explanations provided for the under/ over achievement of a number of targets.

Report on the audit of compliance with legislation

Introduction and scope

19. In accordance with the PAA and the general notice issued in terms thereof, I have a responsibility to report material findings on the compliance of the public entity with specific matters in key legislation. I performed procedures to identify findings but not to gather evidence to express assurance.

20. The material findings on compliance with specific matters in key legislations are as follows:

Procurement and contract management

21. Some of the bid documentation for procurement of commodities designated for local content and production, did not meet the stipulated minimum threshold for local production and content as required by the 2017 preferential procurement regulation 8(2).

22. Some of the commodities designated for local content and production, were procured from suppliers who did not meet the prescribed minimum threshold for local production and content, as required by the 2017 preferential procurement regulation 8(5).

Other information

23. The accounting authority is responsible for the other information. The other information comprises the information included in the annual report. The other information does not include the financial statements, the auditor's report and those selected programme presented in the annual performance report that have been specifically reported in this auditor's report.

24. 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.

25. 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 programme presented in the annual performance report, or my knowledge obtained in the audit, or otherwise appears to be materially misstated.

26. 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

27. 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 matter reported below is limited to the significant internal control deficiencies that resulted in the findings on compliance with legislation included in this report.

Financial and performance management

Compliance monitoring

28. Non-compliance with laws and regulations relating to local content and production could have been avoided had management consistently applied the requirements of the applicable legislations.

Auditor-General

Pretoria
31 July 2018



AUDITOR - GENERAL
SOUTH AFRICA

Auditing to build public confidence

4. 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 programme 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 related to events or conditions that may cast significant doubt on the Council for Geoscience’s ability 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 the 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 continuing as a going concern.
 - evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and 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, related safeguards.

5. ANNUAL FINANCIAL STATEMENTS FOR THE YEAR ENDED 31 MARCH 2018

STATEMENT OF FINANCIAL POSITION AT 31 MARCH 2018

	Notes	2018 R'000	2017 (Restated) R'000
Assets			
Non-current assets			
		279 588	276 637
Property and equipment	3	259 700	255 542
Intangible assets	4	2 326	3 533
Heritage assets	26	17 562	17 562
Current assets		286 067	336 760
Inventories	5	5	5
Trade and other receivables	7	21 456	19 391
Cash and cash equivalents	8	264 606	317 364
Total assets		565 655	613 397
Net assets and liabilities			
Net assets			
Accumulated surplus		384 417	447 657
Non-current liabilities			
Post-employment benefit liabilities	6	8 035	8 050
Current liabilities		173 203	157 690
Trade and other payables	9	29 955	26 452
Deferred income	10	121 984	113 072
Accruals	11	21 263	18 166
Total net assets and liabilities		565 655	613 397

STATEMENT OF FINANCIAL PERFORMANCE FOR THE PERIOD ENDED 31 MARCH 2018

	Notes	2018 R'000	2017 (Restated) R'000
Revenue	12	411 533	428 437
Cost of commercial projects	12	(25 265)	(14 615)
Cost of statutory projects	12	(188 364)	(159 243)
Gross surplus		197 904	254 579
Other operating income	12	4 458	7 198
Administrative expenses		(252 415)	(220 235)
Other operating expenses	12	(1 581)	(6 948)
Interest received	13	24 425	25 572
(Loss) / surplus from operations		(27 209)	60 166
Finance cost	14	(31)	(55)
Net (loss) / surplus for the year		(27 240)	60 111

STATEMENT OF CHANGES IN NET ASSETS FOR THE PERIOD ENDED 31 MARCH 2018

	Notes	Accumulated surplus R'000	Total R'000
Balance at 31 March 2016		387 546	387 546
Net surplus for the period restated		60 111	60 111
Net surplus for the period 2017		60 575	60 575
Correction of prior period error	25.1	(464)	(464)
Balance at 31 March 2017		447 657	447 657
Retrieval of surplus by National Treasury through DMR		(36 000)	(36 000)
Net (loss) for the period		(27 240)	(27 240)
Balance at 31 March 2018		384 417	384 417

CASH FLOW STATEMENT FOR THE PERIOD ENDED 31 MARCH 2018

	Notes	2018 R'000	2017 (Restated) R'000
Cash inflow from operating activities		(23 531)	77 608
Cash receipts from customers		410 106	439 301
Cash paid to suppliers and employees		(458 031)	(387 210)
Cash generated from operations	15	(47 925)	52 091
Interest received	13	24 425	25 572
Finance cost	14	(31)	(55)
Cash outflow from investing activities		(29 227)	(72 763)
Acquisition of:			
Property and equipment	16.1	(29 374)	(73 127)
Intangible assets	16.2	(279)	(1 633)
Proceeds from sale of asset	12	296	-
Insurance proceeds for property and equipment	3.1	130	1 997
Net (decrease) / increase in cash and cash equivalents		(52 758)	4 845
Cash and cash equivalents at beginning of period	8	317 364	312 519
Cash and cash equivalents at end of period	8	264 606	317 364

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 has been presented separately on the statement of financial position such as:

- receivables from non-exchange transactions, including taxes and transfers;
- taxes and transfers payable; and
- 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 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.

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:

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 maintenance 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, by equal instalments over their average useful lives, as follows:

Land	Not depreciable
Buildings	30 years
Motor vehicles	5 to 8 years
Equipment	5 to 7 years
Aircraft & Helicopter - Body	15 years
Aircraft & Helicopter - Components	Useful hours per Civil Aviation Authority
Boat	10 years
Office furniture	20 years
Computer equipment	6 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 five 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; and
- 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.

1.6 Heritage assets

Heritage assets are assets held for their cultural, environmental or historical significance. Heritage assets are initially recognised at deemed cost (fair value) which has been determined, due to the nature of heritage assets, by specialised valuers. Heritage assets are reflected at fair value and are not depreciated.

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 recognised using the accrual basis and accounted for in the statement of financial position 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.

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.

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.

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.

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, a judgement has been made that it would not be meaningful to classify the lease into components and to classify them all as operating leases.

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.

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 2017/2018:

GRAP statement	Description	Impact	Effective date
GRAP 20	Related Party Disclosure	None	01 April 2019
GRAP 32	Service Concession Arrangements: Grantor	None	No effective date
GRAP 34	Separate Financial Statements	None	No effective date
GRAP 35	Consolidated Financial Statements	None	No effective date
GRAP 36	Investments in Associates and Joint Ventures	None	No effective date
GRAP 37	Joint Arrangements	None	No effective date
GRAP 38	Disclosure of Interests in Other Entities	None	No effective date
GRAP 108	Statutory Receivables	None	01 April 2019
GRAP 109	Accounting by Principals and Agents	None	01 April 2019
GRAP 110	Living and Non-living Resources	None	01 April 2019

3. PROPERTY AND EQUIPMENT

	Land R'000	Buildings and Fixtures R'000	*Equipment R'000	Office furniture R'000	Aircraft and Boat R'000	Motor vehicles R'000	Computer equipment R'000	Total R'000
2018								
Gross carrying amount	18 231	184 274	138 955	13 519	24 425	30 652	20 364	430 420
Accumulated depreciation at the beginning of the period	(1 960)	(54 726)	(75 316)	(8 156)	(11 035)	(11 014)	(12 671)	(174 878)
Opening net carrying amount at 31 March 2017	16 271	129 548	63 639	5 363	13 390	19 638	7 693	255 542
Movements during the period:								
Work in progress (refer to note 3.3)	-	4 652	(2 600)	-	-	-	-	2 052
Acquisitions	-	-	20 982	993	-	3 865	1 483	27 323
Disposals	-	-	(393)	(96)	(104)	(312)	(298)	(1 203)
Disposals - Cost	-	-	(4 464)	(350)	(2 077)	(754)	(1 194)	(8 839)
Disposals - Depreciation	-	-	4 071	254	1 973	442	896	7 636
Depreciation	-	(5 061)	(12 117)	(662)	(1 122)	(2 912)	(2 140)	(24 014)
Closing net carrying amount at 31 March 2018	16 271	129 139	69 511	5 598	12 164	20 279	6 738	259 700
Gross carrying amount	18 231	188 926	152 873	14 162	22 348	33 763	20 653	450 956
Accumulated depreciation/impairment	(1 960)	(59 787)	(83 362)	(8 564)	(10 184)	(13 484)	(13 915)	(191 256)

Property and equipment (continued)

	Land R'000	Buildings and Fixtures R'000	*Equipment R'000	Office furniture R'000	Aircraft and Boat R'000	Motor vehicles R'000	Computer equipment R'000	Total R'000
2017								
Gross carrying amount	18 231	161 454	120 375	14 002	23 382	16 496	21 407	375 347
Accumulated depreciation at the beginning of the period	(1 600)	(49 785)	(76 522)	(8 214)	(8 732)	(9 854)	(13 656)	(168 363)
Opening net carrying amount at 31 March 2016	16 631	111 669	43 853	5 788	14 650	6 642	7 751	206 984
Movements during the period:								
Work in progress (refer to note 3.3)	-	19 360	2 230	-	983	-	-	22 573
Impairment	(360)	-	-	-	-	-	-	(360)
Acquisitions	-	3 459	29 724	664	-	14 275	2 432	50 554
Disposals	-	-	(2 116)	(404)	-	(11)	(486)	(3 017)
Disposals - Cost	-	-	(13 341)	(1 147)	-	(117)	(3 449)	(18 054)
Disposals - Depreciation	-	-	11 225	743	-	106	2 963	15 037
Depreciation	-	(4 941)	(10 020)	(685)	(1 750)	(1 821)	(1 978)	(21 195)
Closing net carrying amount at 31 March 2017	16 271	129 547	63 674	5 363	13 883	19 085	7 719	255 542
Gross carrying amount	18 231	184 273	138 988	13 519	24 365	30 654	20 390	430 420
Accumulated depreciation/impairment	(1 960)	(54 726)	(75 314)	(8 156)	(10 482)	(11 569)	(12 671)	(174 878)

* Equipment in the tables above include the following categories of equipment: Specialised Equipment, Audio & Visual and Technical 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	R 2 800
280 Pretoria Street, Silverton, Pretoria	R 94 000

The value of these properties has been included in the carrying amount of land and buildings as at 31 March 2018 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.

Property and equipment (continued)**3.1 Compensation from third parties for property and equipment lost**

	2018 R'000	2017 R'000
Proceeds from insurance	130	1 997

3.2 Impairment of property**Description**

Land: 474 Carl Street, Town Lands 351JR, Pretoria West	-	360
	-	360

The events and circumstances that led to the recognition of an impairment loss was as a result of a devaluation on Land and Buildings. The recoverable service amount used is the higher of the fair value less cost to sell and value in use. A certified property valuator was contracted and based on their findings the appropriate recoverable service amount is its value in use.

3.3 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	19 360	2 230	983	22 573
Opening net carrying amount at 31 March 2017	19 360	2 230	983	22 573
Movement	4 652	(2 600)	-	2 052
Closing net carrying amount at 31 March 2018	24 012	(370)	983	24 625

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 R24,724m in respect of a ventilation system in the Silverton building that has been delayed.

	Buildings and Fixtures R'000
Gross carrying amount	20 845
Opening net carrying amount at 31 March 2017	20 845
Movement	3 879
Closing net carrying amount at 31 March 2018	24 724

3.4 Property and equipment continued

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

	2018 R'000	2017 R'000
Repairs and Maintenance		
Land and Buildings	5 100	4 064
Office Equipment and Furniture	690	92
Technical and Scientific Equipment	2 781	3 272
Specialised Equipment	51	-
Computer Equipment	80	375
Aircraft	1 208	1 229
	9 910	9 032

4. INTANGIBLE ASSETS

Computer software

	2018 R'000	2017 R'000
Gross carrying amount	9 971	8 639
Accumulated amortisation	(6 438)	(4 827)
Opening net carrying amount at 31 March 2017	3 533	3 812
Movements during the period:		
Acquisitions	279	1 633
Disposals	(108)	(90)
Disposals - Cost	(517)	(301)
Disposals - Amortisation	409	211
Amortisation	(1 378)	(1 822)
Closing net carrying amount at 31 March 2018	2 326	3 533
Gross carrying amount	9 733	9 971
Accumulated amortisation	(7 407)	(6 438)

5. INVENTORIES

Publication inventories	5	5
-------------------------	---	---

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	95	118
Interest charge	1 899	1 995
Expected return on planned assets	(1 285)	(1 355)
Actuarial (gain)/loss recognised	(724)	(580)
	(15)	178

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

	2018	2017	2016	2015	2014
Present value of fund obligations	25 565	23 084	22 931	21 863	19 504
Fair value of planned assets	(17 530)	(15 034)	(15 059)	(14 851)	(14 147)
Liability recognised in statement of financial position	8 035	8 050	7 872	7 012	5 357

Retirement benefit (continued)

Movement in net liability during the period is as follows:	2018			2017		
	Liability	Planned asset	Net	Liability	Planned asset	Net
Liability at beginning of period	23 084	-	23 084	22 931	-	22 931
Value of planned assets at beginning of period	-	(15 034)	(15 034)	-	(15 059)	(15 059)
	23 084	(15 034)	8 050	22 931	(15 059)	7 872
Interest charge/expected return of planned asset	1 899	(1 285)	614	1 995	(1 355)	640
Current service costs	95	-	95	118	-	118
Benefits paid	(1 701)	1 701	-	(1 670)	1 670	-
Actuarial (gain)/loss	2 188	(2 912)	(724)	(290)	(290)	(580)
Closing balance	25 565	(17 530)	8 035	23 084	(15 034)	8 050

Contributions expected to be paid

Top up payments are expected to be made during the 2019 financial year

Expected rate of return on assets 8,22%

Assumptions

Discount rates 8,22%

Basis of discount rates: JSE zero coupon bond yield after the market closed on 31 March 2018

Return on assets 8,22%

Expected salary increases 7,00%

Health care cost inflation rate 6,84%

Sensitivity analysis-on accrued liability (R Millions) for the year ending 31 March 2018

Assumption	Change	In service	Continuation	Total	Change
Central assumptions	-	3 428	22 138	25 566	-
Health care inflation	1%	3 970	23 982	27 952	9%
	-1%	2 985	20 505	23 490	-8%
Discount rate	1%	2 987	20 491	23 478	-8%
	-1%	4 294	24 031	28 325	10%
Post retirement mortality	-1 year	3 538	23 116	26 654	4%
Average retirement date	-1 year	3 546	22 138	25 684	0%
Continuation of membership at retirement	-10%	3 091	22 138	25 229	-1%

The table above indicates, for example that if medical inflation is 1% greater than the long-term assumptions made, the liability will be 9% higher than that shown.

Retirement benefit (continued)

Sensitivity analysis for current service and interest cost (R Millions) for the year ending 31 March 2018

Assumption	Change	Current service	Interest cost	Total	Change
Central assumptions	-	95 300	1 898 900	1 994 200	-
Health care inflation	1%	112 900	2 081 900	2 194 800	10%
	-1%	81 100	1 739 700	1 820 800	-9%
Discount rate	1%	82 000	1 942 100	2 024 100	1%
	-1%	112 000	1 842 200	1 954 200	-2%
Post retirement mortality	-1 year	98 200	1 981 200	2 079 400	4%
Average retirement date	-1 year	66 500	1 906 400	1 972 900	-1%
Continuation of membership at retirement	-10%	86 800	1 867 500	1 954 300	-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 R11,580m (2017: R10,521m) represents equal contributions of 7.5% by the employer and employee.

7. TRADE AND OTHER RECEIVABLES FOR EXCHANGE REVENUE

	2018 R'000	2017 R'000
Trade receivables	3 492	9 037
Contract customers	12 651	6 747
Other receivables	5 331	4 269
	21 474	20 053
Less - Provision for bad debts	(18)	(662)
	21 456	19 391
Provision for bad debts		
Opening balance	662	1 672
Movement	(644)	(1 010)
Closing balance	18	662
Analysis of Impairment		
Long overdue debtors considered impaired	18	662
	18	662

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:

	2018 R'000	2017 R'000
Cash at bank	19 944	16 497
Call accounts	244 662	300 867
Cash and cash equivalents at the end of the period are represented by the following balances:	264 606	317 364

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

9. TRADE AND OTHER PAYABLES

Trade payables	15 544	10 408
Other payables	14 411	16 044
	29 955	26 452

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

10. DEFERRED INCOME

Exchange revenue

10.1 Deferred income arising as a result of an agreement entered into with the Department of Science and Technology to look into rock innovation.

Carrying amount at the beginning of period	-	192
Amounts used during the period	-	(192)
Carrying amount at the end of period	-	-

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

Carrying amount at the beginning of period	1 421	-
Amounts received	3 103	1 421
Amounts used during the period	(645)	-
Carrying amount at the end of period	3 879	1 421

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

Amounts received	48	-
Carrying amount at the end of period	48	-

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

Carrying amount at the beginning of period	1 004	1 502
Amounts used during the period	(822)	(498)
Carrying amount at the end of period	182	1 004

Deferred income (continued)	2018 R'000	2017 R'000
10.5 Deferred income arising as a result of an agreement with the Department of Science and Technology in terms of the Earth Observation and Geohazards Assessment.		
Carrying amount at the beginning of period	2 922	2 922
Carrying amount at the end of period	2 922	2 922
10.6 Deferred income arising as a result of an agreement with the Department of Science and Technology to study the Witwatersrand Central Basin mine water apportionment.		
Carrying amount at the beginning of period	35	35
Carrying amount at the end of period	35	35
10.7 Deferred income arising as a result of an agreement entered into with the National Research Foundation.		
Carrying amount at the beginning of period	321	110
Amounts received	-	211
Amounts used during the period	(211)	-
Carrying amount at the end of period	110	321
10.8 Deferred income arising as a result of pre-funding for the Microzonation Project.		
Amounts received	-	11 493
Amounts used during the period	-	(11 493)
Carrying amount at the end of period	-	-
10.9 Deferred income arising as a result of an agreement entered into with the Department of Mineral Resources to develop and implement various measures to mitigate the effect of mining-induced contamination.		
Carrying amount at the beginning of period	107 369	119 006
Amounts received	189 788	194 006
Amounts used during the period	(182 349)	(205 643)
Carrying amount at the end of period	114 808	107 369
Total deferred income	121 984	113 072

11. ACCRUALS

Accruals for leave pay

Carrying amount at the beginning of period	13 584	10 927
Provision current period	3 379	3 683
Amounts used during the current period	(904)	(1 026)
Carrying amount at the end of period	16 059	13 584

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

Accruals (continued)**Accruals for 13th cheque**

Carrying amount at the beginning of period
Provision current period
Carrying amount at the end of period

2018 R'000	2017 R'000
4 582	4 147
622	435
5 204	4 582

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

Total accruals

21 263	18 166
--------	--------

12. SURPLUS/DEFICIT FROM OPERATIONS

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

Revenue**Non-exchange revenue**

Total grant received
Project related revenue

366 988	378 598
(189 788)	(194 006)
177 200	184 592

Exchange revenue

Department of Mineral Resources project related revenue
Contracting revenue
Publication revenue

182 349	205 643
47 423	32 833
4 561	5 369
234 333	243 845
411 533	428 437

Cost of contracts

Direct cost
Personnel expenditure

11 865	7 222
13 400	7 393
25 265	14 615

Cost of statutory projects

Direct cost
Personnel expenditure

101 522	79 373
86 842	79 870
188 364	159 243

Other operating income

Foreign currency gains
Proceeds from sale of asset
Recovery of asset losses
Sundry income

119	183
296	-
130	1 997
3 913	5 018
4 458	7 198

Surplus/deficit from operations (continued)**Administrative expenses include -**

	2018	2017
	R'000	R'000
Audit fees	5 898	3 025
- Current period	2 235	2 318
- Internal audit	3 597	195
- Fee for other services	66	512
Bad debts written off	7	1 090
Provision for bad debts	(18)	(1 010)
Depreciation - on owned assets	24 014	21 195
- Buildings	5 061	4 941
- Equipment	12 117	10 020
- Office furniture	662	685
- Motor vehicles	2 912	1 821
- Aircraft	1 122	1 750
- Computer equipment	2 140	1 978
Amortisation - intangible assets		
- Computer software	1 378	1 516
Rentals in respect of operating leases		
- Land and Buildings	1 098	651
- Multifunctional printers	883	438
Other operating expenses		
Net loss on disposal of equipment	393	2 116
Net loss on disposal of vehicles	415	11
Net loss on disposal of intangible assets	108	90
Net loss on disposal of computer equipment	298	486
Net loss on disposal of office furniture	96	404
Impairment of assets	-	360
Write-off of bad debts	7	1 090
Foreign currency losses	264	2 391
	1 581	6 948
Staff costs	255 942	222 281
Included in staff costs are:		
Defined benefit plan expense for the post-retirement medical-aid fund	(15)	178
- Current service cost	95	118
- Interest cost	1 899	1 995
- Expected return on plan assets	(1 285)	(1 355)
- Recognised actuarial (gain)/loss	(724)	(580)
Defined contribution plan expenses for the pension and provident fund	11 580	10 521

Surplus/deficit from operations (continued)

Emoluments

Senior management	2017/2018				
	Pensionable salary R'000	Performance bonus	Provident/ Pension fund contributions R'000	*Other contributions R'000	Total R'000
Mr Mabuza M	2 074	194	111	73	2 452
Mr Matsepe L D	2 305	388	140	115	2 948
Mr Ramagwede L F	1 762	221	115	96	2 194
Mr Tlowana S I	566	-	27	27	620
Mrs Grobbelaar M	749	-	28	33	810
Mr Craill C	786	-	28	34	848
Ms Shelembe P R	749	-	21	19	789
Dr De Kock G S	620	-	22	18	660
Mrs Kola M E M	1 174	175	61	54	1 464

2016/2017					
		Pensionable salary R'000	Provident/ Pension fund contributions R'000	Other contributions R'000	Total R'000
Mr Sikhosana M S (Acting CEO)	End date Nov 2016	1 973	-	21	1 994
Mr Matsepe L D		2 041	107	90	2 238
Mr Ramagwede L F		1 909	108	88	2 105
Dr Makgae M E		1 645	100	84	1 829
Mr Mabuza M (Acting CEO)	Start date Nov 2016	438	-	6	444

		2017 R'000	2016 R'000
Board emoluments			
Non-executive Board Members			
Dr Mathe H		274	203
Dr Mahachi J		103	-
Mr Koloi K		78	-
Mr Ramokgopa K		229	-
Mr Mvinjelwa X		116	-
Prof Ngoepe P E	(Term ended - 28 Feb 2017)	-	394
Ms Mthimunya K R	(Term ended - 28 Feb 2017)	-	171
Mr Sibiyi D	(Term ended - 28 Feb 2017)	-	28
Prof Hermanus M A	(Term ended - 28 Feb 2017)	-	69
Dr McGill J E	(Term ended - 28 Feb 2017)	-	101
		800	966

* 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. INTEREST RECEIVED

	2018 R'000	2017 R'000
Interest received		
- Interest income on call accounts	23 147	22 081
- Interest income on current accounts	1 278	3 491
	24 425	25 572

14. FINANCE COST

Finance cost on motor vehicle fleet cards.	31	55
--	----	----

15. RECONCILIATION OF NET (LOSS)/SURPLUS FOR THE PERIOD TO CASH GENERATED FROM OPERATIONS

Net surplus for the period	(27 240)	60 111
Interest	31	55
Depreciation on property and equipment	24 014	21 195
Amortisation - intangible assets	1 378	1 822
Impairment of assets	-	360
Proceeds from sale of an asset	(296)	-
Compensation from third parties for property and equipment lost	(130)	(1 997)
Net loss on disposal of fixed assets	1 311	3 107
Interest earned	(24 425)	(25 572)
Provision for post-retirement medical-aid benefits	(15)	178
Operating cash flows before working capital changes	(25 373)	59 259
Working capital changes:		
Increase/(Decrease) in retained surplus	(36 158)	-
Increase in provision for accumulated leave pay and 13 th cheque	3 098	3 073
(Increase)/Decrease in trade and other receivables	(2 249)	10 860
Increase/(Decrease) in trade and other payables	3 845	(8 982)
Increase/(Decrease) in deferred income	8 911	(12 119)
Cash generated from operations (including finance costs)	(47 925)	52 091

16. ACQUISITION OF:

16.1 Property and equipment

Land and buildings	-	3 459
Equipment	20 981	29 724
Office furniture	993	664
Motor vehicles	3 865	14 275
Computer equipment	1 483	2 432
	27 322	50 554
Work in progress - Acquisitions		
Land and buildings	4 652	19 360
Equipment	(2 600)	2 230
Aircraft	-	983
	2 052	22 573
Total acquisitions	29 374	73 127

Acquisition of: (continued)**16.2 Intangible assets**

Computer software

2018 R'000	2017 R'000
279	1 633
279	1 633

17. CONTINGENT LIABILITY**17.1 Bank guarantees**

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

1 431	1 400
1 431	1 400

17.2 Pending legal action

The Council for Geoscience has an estimated legal liability due to a pending labour case

6 455	3 000
6 455	3 000

18. 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.

19. OPERATING LEASE COMMITMENTS**19.1 Lease of office space**

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

Up to 1 year	415	-
2 to 5 years	1 192	-
Total lease commitments	1 607	-

19.2 Lease of office printing equipment

The operating lease between a supplier and the Council for Geoscience entered into from 01 October 2015 to 30 September 2018.

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

Up to 1 year	2 347	1 689
2 to 5 years	-	2 214
Total lease commitments	2 347	3 903

19.3 Commitments

Operating expenditure

Approved and contracted

Approved but not yet contracted*

47 494	85 337
33 434	-

Operating lease commitments (continued)

	2018 R'000	2017 R'000
Capital expenditure		
Approved and contracted: Property and equipment	24 966	38 308
Approved but not yet contracted: Property and Equipment*	6 199	9 984
Total commitments	112 093	133 629
Commitments		
Up to 1 year	56 334	99 554
2 to 5 years	55 759	34 075
Total commitments	112 093	133 629

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

- Sampling Services Geophysics
- Accommodation and travel
- Courier services

***Change in accounting policy**

A decision was made to change the method of disclosure of its commitments during the period to now disclose the approved but not yet contracted for, commitments. The latter method provides more reliable information when evaluating the Council for Geoscience's ability to meet its liabilities and commitments. The change in accounting policy was applied retrospectively and the corresponding comparative figures were restated.

20. FINANCIAL INSTRUMENTS

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

20.1 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.

Financial instruments (continued)

20.2 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 2018

	Weighted average effective interest rate %	Weighted average effective interest rate %
Assets		
Cash	3,95%	3,95%
Call accounts	7,22%	7,04%

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.

20.3 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 2018 is disclosed in note 21.

20.4 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.

21. FOREIGN CURRENCY EXPOSURE

	2018 R'000	2018 R'000		2017 R'000	2018 R'000
Exchange rate	Foreign amount	R-value	Exchange rate	Foreign amount	R-value
21.1 Trade receivables					
Foreign currency					
British pound	R 0,00000	-	-	R 16,39520	£15 238
Euro	R 14,34280	€ 0,33	5	R 0,00000	£0 -
US\$	R 11,64500	\$34	396	R 13,19130	\$166 2 195
21.2 Banks					
Foreign funds					
Moroccan Dirham	R 0,00000	د.م. 0	-	R 1,32690	د.م. 7 774 10 316
Euro	R 14,34280	€ 240	3 442	R 14,05630	€ 240 3 374

22. RELATED-PARTY TRANSACTIONS

2018	2017
R'000	R'000

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

Total grant received	366 988	378 598
----------------------	---------	---------

Refer to note 10 for further details regarding transactions with the Department of Mineral Resources.

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

Relationships:

Parent National Department: Department of Mineral Resources

23. IRREGULAR EXPENDITURE

Opening balance	-	217
Irregular expenses identified in the current year	74	393
Expenditure condoned	-	(610)
	74	-

Analysis of expenditure condoned per age classification

Opening balance - Condoned by the accounting authority of the Council for Geoscience

- 217

Irregular expenses identified in the current year

Current year - Condoned by the accounting authority of the Council for Geoscience

- 64

Prior year - Condoned by the accounting authority of the Council for Geoscience

- 329

- 610

Details of irregular expenditure identified in the current year

Non-compliance with National Treasury's instruction on local content when purchasing field clothing.

74

Two board members were remunerated in direct contravention of the CGS policy and Treasury regulation. An investigation confirmed that the irregular expenditure was not a result of fraudulent, corrupt and criminal activities or actions that deprived the State of value for money.

393

74 393

24. FRUITLESS AND WASTEFUL EXPENDITURE

Opening balance	-	-
Fruitless and wasteful expenditure identified in the current year	-	33
Written off as irrecoverable	-	(33)
Interest for late payment to supplier	-	-

25. CORRECTION OF PRIOR YEAR ERROR

25.1 Correction of prior year unrecorded revenue and accruals

Nature

Statement of financial performance as at 31 March 2017

Depreciation/amortisation recorded in the incorrect period	306	600
Refund of overpaid expenditure - retirement benefit expenses	-	(297)
Insurance claim receipt incorrectly recorded as a payable	(685)	-
Expenditure captured in the incorrect period	843	2 573

Effect

Statement of financial position as at 31 March 2017

Depreciation/amortisation recorded in the incorrect period	(306)	(600)
Refund of overpaid expenditure of retirement benefit expenses - Sundry debtor	-	297
Insurance claim receipt incorrectly recorded as a payable	685	-
Expenditure captured in the incorrect period	(843)	(2 573)

Statement of net assets for the period ended 31 March 2017

Accumulated surpluses	(464)	(2 876)
-----------------------	-------	---------

Correction of prior year disclosure

Nature

Disclosure as at 31 March 2017

Restatement of closing balances of assets

Cost:	Aircraft and boat	60	-
	Computer equipment	(26)	-
	Equipment	(33)	-
	Vehicles	(2)	-
	Buildings	1	-
	Property and equipment in the process of being constructed with delays	2 097	-
Accumulated Depreciation:	Aircraft and boat	(553)	-
	Vehicles	555	-
	Equipment	(2)	-
Commitments	Hvac project	10 419	-

Effect

None (only disclosure item)

26. HERITAGE ASSETS DISCLOSURE

2018	2017
R'000	R'000

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
Take on value	13 313	13 313
	17 562	17 562

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

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.

Contact information

Pretoria

280 Pretoria Street,
Silverton, Pretoria

Private Bag X112,
Pretoria, 0001,
South Africa

Tel: +27 (0)12 841 1911
Fax: +27 (0)12 841 1221
e-mail: info@geoscience.org.za
website: www.geoscience.org.za

Bellville

3 Oos Street, Bellville,
South Africa

P.O. Box 572,
Bellville, 7535,
South Africa

Tel: +27 (0)21 943 6700
Fax: +27 (0)21 946 4190
e-mail: info@geoscience.org.za
website: www.geoscience.org.za

Pietermaritzburg

139 Jabu Ndlovu Street,
Pietermaritzburg, South Africa

P.O. Box 900,
Pietermaritzburg, 3200,
South Africa

Tel: +27 (0)33 345 6265/6
Fax: +27 (0)86 675 6880
e-mail: info@geoscience.org.za
website: www.geoscience.org.za

Polokwane

30A Schoeman Street,
Polokwane, South Africa

P.O. Box 620,
Polokwane, 0700,
South Africa

Tel: +27 (0)15 295 3471
Fax: +27 (0)15 295 2826
E-mail: info@geoscience.org.za
website: www.geoscience.org.za

Port Elizabeth

16 2nd Avenue,
Walmer, Port Elizabeth

P.O. Box 5347,
Walmer, 6065,
South Africa

Tel: +27 (0)41 581 1164/1128
Fax: +27 (0)41 581 1165
e-mail: info@geoscience.org.za
website: www.geoscience.org.za

Upington

24 Josling Street,
Upington, South Africa

P.O. Box 775,
Upington, 8800,
South Africa

Tel: +27 (0)54 332 1403
Fax: +27 (0)54 332 3961
e-mail: info@geoscience.org.za
website: www.geoscience.org.za

The Council for Geoscience cares about the future
of our planet.

This 2017/2018 Annual Report is printed on Cocoon 60 Silk,
a FSC® Mix certified paper.

By using Cocoon 60 Silk rather than a non-recycled paper, the
environmental impact was reduced by :



114 kg of landfill



13 kg CO₂ and
greenhouse gases



132 km travel in the
average European car



4,801 litres of
water



267 kWh of energy



185 kg of wood

Sources : Carbon Footprint data evaluated by Labelia Conseil, Virgin fibres
from non-integrated mill latest European BREF data.



Council for Geoscience

www.geoscience.org.za

RP335/2018

ISBN: 978-1-920226-87-9