FAUNAL AND FLORAL ECOLOGICAL ASSESSMENT AS PART OF THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS OF THE MINING RIGHT APPLICATION FOR THE PROPOSED MINING OF GYPSUM ON PORTION 0 OF THE FARM KANAKIES 332, NEAR LOERIESFONTEIN, NORTHERN CAPE

Prepared for

Cabanga Environmental

July 2018

Section A: Background

Prepared by: **Scientific Terrestrial Services**
Report author **M. Meintjies**
Report reviewer **N. Cloete (Pr.Sci.Nat)**
Report Reference: **STS 170078**
Date: **July 2018**

Scientific Terrestrial Services CC
CC Reg No 2005/122329/23
29 Arterial Road West
Oriel
2007
Tel: 011 616 7893
Fax: 086 724 3132
E-mail: admin@sasenvgroup.co.za

DOCUMENT GUIDE

The table below provides the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) Regulations 2017 (as amended in 2014) for Specialist Reports and also the relevant sections in the reports where these requirements are addressed.

NEMA Regulations (2017) - Appendix 6	Relevant section in this report
(1) A specialist report prepared in terms of these Regulations must contain -	
(a) details of -	
(i) the specialist who prepared the report; and	Appendix D
(ii) the expertise of that specialist to compile a specialist report, including a curriculum vitae;	Appendix D
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Appendix D
(c) an indication of the scope of, and the purpose for which, the report was prepared;	Introduction & Section 1.2
(cA) an indication of the quality and age of base data used for the specialist report;	Section 1.2
(cB) a description of existing impacts on site, cumulative impacts of the proposed development and levels of acceptable change;	N/A[1]
(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	N/A
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 2
(f) details of an assessment of the specific identified sensitivity[2] of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying alternatives;	Section 3
(g) an identification of any areas to be avoided, including buffers;	N/A
(h) a map superimposing the activity, including the associated structures and infrastructure on the environmental sensitivities of the site, including areas to be avoided, including buffers;	N/A
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section A: Section 1.2
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment or activities;	N/A
(k) any mitigation measures for inclusion in the EMPr;	N/A
(l) any conditions for inclusion in the environmental authorisation;	N/A
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	N/A
(n) a reasoned opinion -	
(i) as to whether the proposed activity, activities or portions thereof should be authorised;	N/A
(iA) regarding the acceptability of the proposed activity or activities; and	N/A
(ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	N/A
(o) a description of any consultation process that was undertaken during the course of preparing the specialist report	N/A
(p) a summary and copies, if any, comments received during any consultation process and, where applicable all responses thereto; and	N/A
(q) any other information requested by the competent authority.	N/A

[1] N/A = Not applicable to this report (Section A). These requirements will be addressed in the specific specialist report finding under Section B and C.

[2] Illustration of possible sensitive areas / habitats based on desktop data.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACRONYMS

BGIS	Biodiversity Geographic Information Systems
CARA	Conservation of Agricultural Resources Act
CBA	Critical Biodiversity Area
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
ESA	Ecological Support Area
GIS	Geographic Information System
Gy	Gypsum
Ha	Hectare
IBA	Important Bird Area
IUCN	International Union for Conservation of Nature
m	Metre
MAP	Mean Annual Precipitation
MAPE	Mean Annual Potential Evaporation
MASMS	Mean Annual Soil Moisture Stress
MAT	Mean Annual Temperature
MFD	Mean Frost Days
MPRDA	Mineral and Petroleum Resources Development Act
MRA	Mining Right Area
NBA	National Biodiversity Assessment
NCNCA	Northern Cape Nature Conservation Act
NEMA	National Environmental Management Act
NEMBA	National Environmental Management Biodiversity Act
NFA	National Forest Act
NPAES	National Protected Areas Expansion Strategy
ONA	Other Natural Area
PES	Present Ecological State
PRECIS	Pretoria Computer Information System
RDL	Red Data Listed
SANBI	South African National Biodiversity Institute
SABAP	South African Bird Atlas Project
SACAD	South African Conservation Areas Database
SAPAD	South African Protected Area Database
SCC	Species of Conservation Concern
STS	Scientific Terrestrial Services
TSP	Threatened Species Programme

1 INTRODUCTION

Scientific Terrestrial Services (STS) was appointed to conduct a terrestrial ecological assessment as part of the environmental assessment and authorisation process for the proposed mining of natural Gypsum (Gy) on the remaining extent of the farm Kanakies 332, near Loeriesfontein, Northern Cape, henceforth referred to as the Mining Right Area (MRA) (Figure 1 & 2). The MRA is situated within the Hantam Local Municipality and within the Calvinia Magisterial District.

The MRA is situated approximately 45 km west to southwest of the town of Loeriesfontein, and 40 km north to north-west of Niewhoudtville within the North Cape Province. The extent of the MRA is approximately 7457 ha, while the concentrated gypsum deposit is situated on approximately 689 ha. The area where the gypsum deposit is concentrated will henceforth be referred to as the "focus area". Although the proposed Mining Right Application will include the remaining extent of the farm Kanakies 332, the specialist assessment was confined to the focus area.

Furthermore, the approximate area required for infrastructure is 9 hectares (ha), and will comprise the following infrastructure (Witkop Fluorspar Mine, 2018[3]):

- Mobile crushing and high frequency screening plant (<0.6 ha);
- Shipping container type office block and ablution facility (0.2 ha), with a high roof shed (0.3 ha);
- Vehicle parking area and fuel storage area (0.3 ha);
- Product stockpile area (2.1 ha);
- Run of Mine stockpile (0.5 ha); and
- Access Road (5 ha).

The purpose of this report is to define the terrestrial ecology of the focus area including both floral and faunal aspects as well as mapping and defining areas of increased Ecological Importance and Sensitivity (EIS) and to define the Present Ecological State (PES) of the focus area. It is the objective of this study to provide detailed information to guide the activities associated with the proposed mining activities associated with the focus area to ensure the ongoing functioning of the ecosystem in such a way as to support local and regional conservation requirements and the provision of ecological services in the local area.

[3] Witkop Fluorspar Mine (Pty) Ltd Mining Work Programme submitted in support of a Mining Right Application. March 2018.

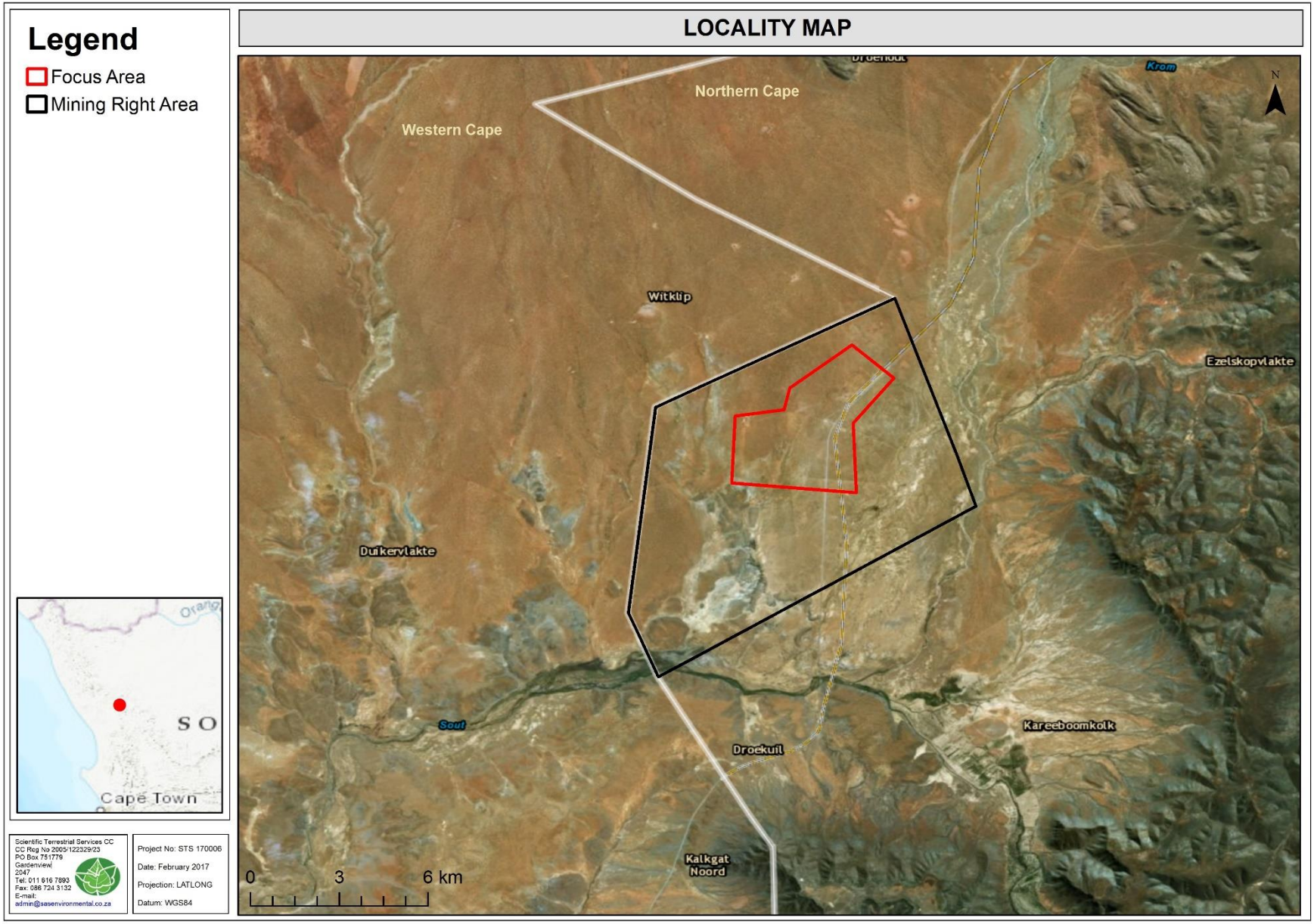

Figure 1: Digital satellite image depicting the MRA and focus area in relation to surrounding areas.

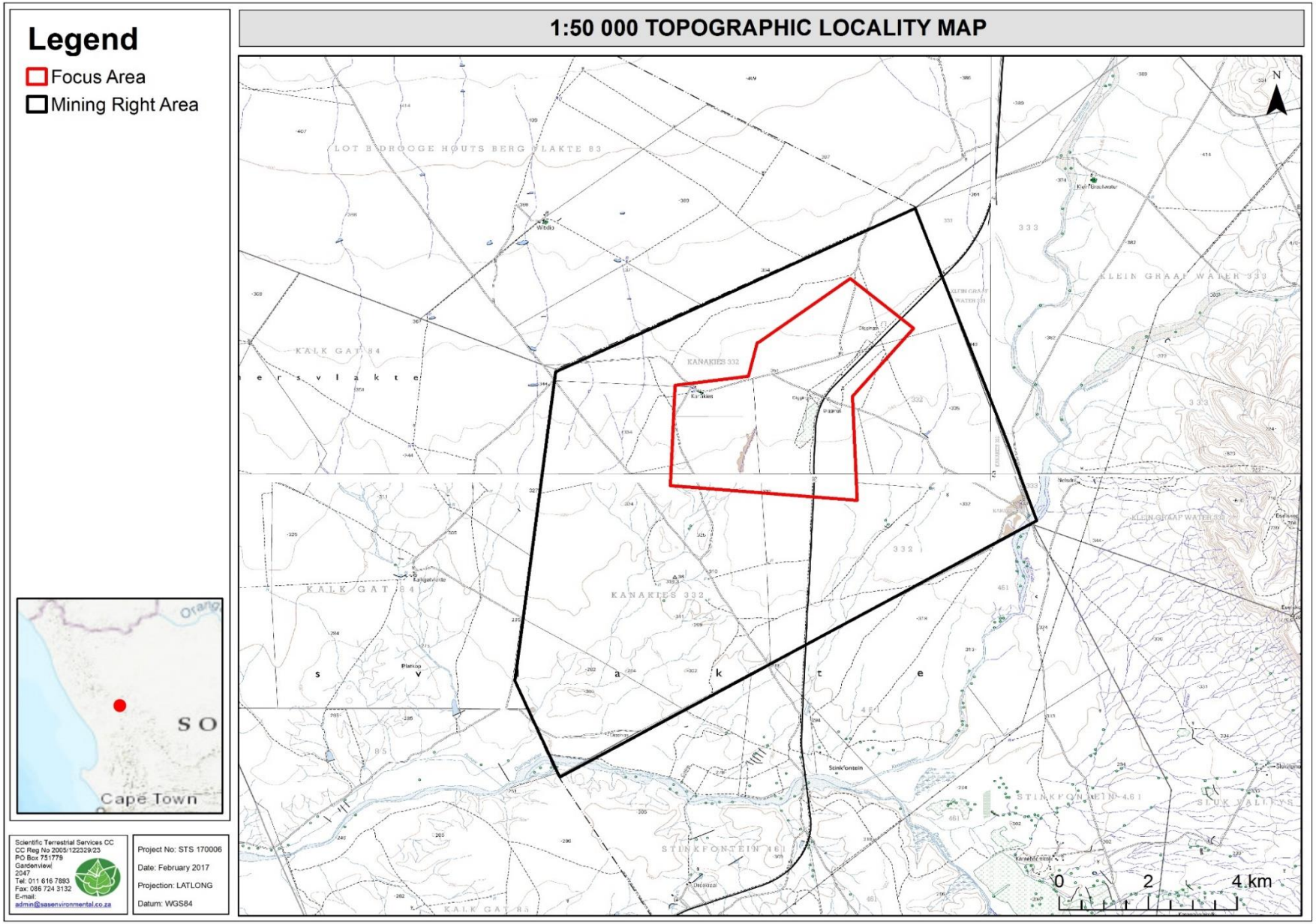

Figure 2: Location of the MRA and focus area depicted on a 1:50 000 topographical map in relation to surrounding area.

1.1 Resource Particulars

The Gypsum deposit consists of 2 layers i.e. a powder layer of an approximate thickness of 0.4 m, approximately 0.2 to 0.7 m under the surface, followed by a nodular crystalline layer with an approximate thickness of 0.9 to 1.3 m (Figure 3).

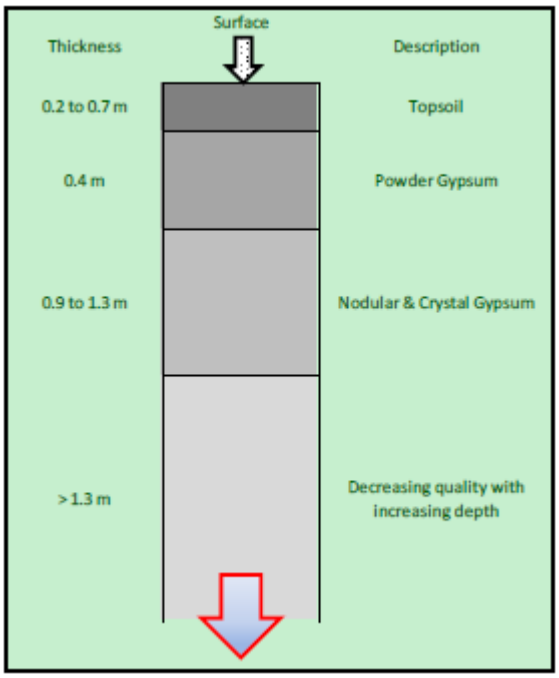

Figure 3: Stratigraphic Column (Witkop Fluorspar Mine, 2018).

The gypsum deposit will be harvested by roll-over trench mining with the depth of trenching varying between 1.4 and 2.5 m. The overburden layer will first be removed (0.2 to 0.7 m), followed by the selective removal of the powder layer (0.4 m) and subsequently the removal of the crystal containing clay layer (between 0.9 and 1.3 m). The powder will be screened to remove foreign materials and is expected to be recovered by a margin of at least 40% by volume harvested, inclusive of waste generated during screening, which should be less than 2% combined from dust generated and foreign objects removed during screening. The clay layer will be roll-crushed and screened by means of high frequency technology alongside the trench to increase the average gypsum composition from between 40% and 50% to between 80% and 90%. The harvesting recovery margin is estimated at 65% by volume extracted whilst the efficiency of the high frequency screening process is expected to be no less than 37%, calculating to an overall 76% mean loss by volume of material harvested. For more information regarding the mining activities refer to the Witkop Fluorspar Mine (Pty) Ltd Mining Work Programme.

1.2 Scope

Specific outcomes in terms of the report are as follows:

- Compile a desktop study with all relevant information as presented by SANBI's Biodiversity Geographic Information Systems (BGIS) website (http://bgis.sanbi.org), including the Northern Cape Critical Biodiversity Areas (2016), to gain background information on the physical habitat and potential floral and faunal biodiversity associated with the MRA;
- To conduct a Red Data Listed (RDL) species desktop assessment as well as a desktop assessment of other Species of Conservation Concern (SCC), including potential for such species to occur within the focus area;
- To describe the spatial significance of the focus area with regards to surrounding natural areas; and
- To identify and consider all sensitive landscapes including rocky ridges, wetlands and/ or any other special features.

1.3 Assumptions and Limitations

The following assumptions and limitations are applicable to this report:

- The terrestrial ecological desktop assessment is confined to the MRA and does not include the adjacent properties; these were however illustrated as part of the desktop assessment; and
- It is important to note that although all data sources used provide useful and often verifiable, high quality data, the various databases used do not always provide an entirely accurate indication of the MRA's actual site characteristics at the scale required to inform the Environmental Impact Assessment (EIA) process. However, this information is considered to be useful as background information to the study and sufficient decision making can take place with regards to the mining activities based on the desktop results.

1.4 Legislative Requirements

The following legislative requirements were considered during the assessment:

- National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA);
- National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA);

  - NEMBA: National Threatened or Protected Species Regulations, 2015 (Notice 255 of 31 March 2015 in Government Gazette 38600);
  - NEMBA: Publication of List of Species that are Threatened and Protected, Activities that are Prohibited and Exemption from Restriction, 2015 (Notice 256 of 31 March 2015 in Government Gazette 38600); and
  - NEMBA: Alien and Invasive Species Regulations, 2016 (Notice 864 of 29 July 2016 in Government Gazette 40166).
- Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) (CARA);
- The Northern Cape Nature Conservation Act, 2009 (Act 9 of 2009) (NCNCA);
- The National Forest Act, 1998 (Act 84 of 1998) (NFA)
  - NFA: Notice of List of Protected Tree Species, 2014 (Notice 908 of 21 November 2014 in Government Gazette 38215); and
- Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002) (MPRDA).

The details of each of the above, as they pertain to this study, are provided in **Appendix B** of this report.

2 ASSESSMENT APPROACH

2.1 General Approach

In order to accurately determine the PES of the focus area and capture comprehensive data with respect to faunal and floral taxa, the following methodology was used:

- Maps and digital satellite images were consulted prior to the field assessment in order to determine broad habitats, vegetation types and potentially sensitive sites. An initial visual on-site assessment of the focus area was made in order to confirm the assumptions made during consultation of the maps; and
- Relevant databases considered during the assessment of the study area included the South African National Biodiversity Institute (SANBI) Threatened Species Programme (TSP), the Northern Cape Critical Biodiversity Areas (2016), Mucina and Rutherford (2012), National Biodiversity Assessment (2011), Important Bird Areas in conjunction with the South African Bird Atlas Project (SABAP 2) (2015), International Union for Conservation of Nature (IUCN), and Pretoria National Herbarium Computer Information Systems (PRECIS).

3 RESULTS OF THE DESKTOP ANALYSIS

3.1 Conservation Characteristics of the MRA based on National and Provincial Datasets

The following section contains data accessed as part of the desktop assessment and are presented as a “dashboard” report below (Table 1). The dashboard report aims to present concise summaries of the data on as few pages as possible in order to allow for improved assimilation of results by the reader to take place. Where required, further discussion and interpretation is provided, and information that was considered to be of particular importance was emboldened.

It is important to note that although all data sources used provide useful and often verifiable, high quality data, the various databases used do not always provide an entirely accurate indication of the MRA’s actual site characteristics at the scale required to inform the EIA process. However, this information is considered to be useful as background information to the study and sufficient decision making can take place with regards to the mining activities based on the desktop results.

Table 1: Summary of the conservation characteristics associated with the MRA.

Details of the MRA in terms of Mucina & Rutherford (2012)	
Biome (Figure 4)	The MRA is situated within the **Succulent Karoo and Azonal Vegetation Biome.**
Bioregion (Figure 4)	The MRA is situated within the **Knersvlakte and Inland Saline Vegetation Bioregion.**
Vegetation Type (Figure 4)	The majority of the MRA is situated within the, **Northern Knersvlakte Vygieveld,** with the south western portion falling within the **Knersvlakte Shale Vygieveld,** and the south eastern portion within the **Namaqualand Riviere vegetation type.**
Conservation details pertaining to the MRA (Various databases)	
NBA (2011)	The portion off the MRA falling within the Northern Knersveld Vygieveld falls within an area that in currently not protected while the remaining portion is considered to be poorly protected.
National Threatened Ecosystems (2011)	The MRA is situated within an area that is currently considered to be least threatened.
Protected Areas (Figure 5)	According to the SAPAD (2017) database, the MRA is situated immediately east of the Kalk Gat Private Nature Reserve (PNR), while the Knersvlakte Nature Reserve is situated ± 10km to the west. The SACAD (2017) and NPAES (2009) datasets does not indicate any protected or conservation areas within 10 km of the MRA.
IBA (2015)	The MRA is not located within or near an IBA (within 10 km).
Northern Cape Provincial Spatial Development Framework (NPSDF, 2012)	
The MRA is situated within the Knersvlakte Centre (KVC) of Endemism (Figure 8). The KVC is bounded by the Olifants River to the south, the Bokkeveld Escarpment in the east, the Sandveld Granite hills of the Spektakel and Little Namaqualand Suite to the west, and Namaqualand Rocky Hills to the north. The KVC is generally more or less level plains and rolling, generally low-relief hills. The vegetation of the KVC is broadly classified as Succulent Karoo, typically low in stature and dominated by succulents, with grasses more prominent in sandy areas (van Wyk and Smith, 2001).	

Mining & Biodiversity guidelines (2013) (Figure 6)	
Highest Biodiversity Importance	The southwestern corner of the MRA falls within an area considered to be of **Highest Biodiversity Importance.** Highest Biodiversity Importance areas include areas where mining is not legally prohibited, but where there is a very high risk that due to their potential biodiversity significance and importance to ecosystem services (e.g. water flow regulation and water provisioning) that mining projects will be significantly constrained or may not receive necessary authorisations**. No proposed mining activities are planned within this area.**
Moderate Biodiversity Importance	The majority of the MRA is considered to be of **Moderate Biodiversity Importance.** Moderate Biodiversity Importance areas include Ecological Support Areas (ESAs), vulnerable ecosystems and focus areas for protected area expansion. Areas of Moderate Biodiversity Importance are considered of moderate risk for mining. EIA's and their associated specialist studies should focus on confirming the presence and significance of these biodiversity features, identifying features (e.g. threatened species) not included in the existing datasets and on providing site-specific information to guide the application of the mitigation hierarchy. Authorisations may set limits and specify biodiversity offsets that would be written into licence agreements and/or authorisations.
Northern Cape Critical Biodiversity Areas (2016) (Figure 7)	
Critical Biodiversity Area (CBA) 2	The south western corner of the MRA (approximately 28% of the MRA) falls within a CBA 2. According to the Technical Guidelines for CBA Maps document (SANBI, 2017) CBAs are areas that must remain in good ecological condition for meeting biodiversity targets for ecosystem types, species of special concern or ecological processes. CBA 2 are areas that have been selected as the best option for meeting biodiversity targets, based on complementary, efficiency, connectivity and / or avoidance of conflict with other land or resource users. **No proposed mining activities are planned within this area.**
Ecological Support Area (ESA)	The majority of the eastern half of the MRA (approximately 29% of the MRA) falls within an ESA. According to the Technical Guidelines for CBA Maps document (June 2017) ESAs are areas which must retain their ecological processes in order to meet biodiversity targets for ecological processes that have not been met in CBAs or protected areas; meet biodiversity targets for representation of ecosystem types or species of special concern when it's not possible to meet them in CBAs; support ecological functioning of protected areas or CBAs or a combination of these (SANBI, 2017**). Proposed mining activities are planned within the ESA associated with the focus area.**
Other Natural Area (ONA)	The remaining extent (approximately 43%) of the MRA falls within the ONA category. According to the Technical Guidelines for CBA Maps document (June, 2017) ONA consist of all those areas in good or fair ecological condition that fall outside the protected area network and have not been identified as CBAs or ESAs (SANBI, 2017). **Proposed mining activities are planned within the ONA associated with the focus area.**

Description of the vegetation type(s) relevant to the MRA (Mucina & Rutherford 2006) (Figure 4)			
Vegetation Type	Northern Knersvlakte Vygieveld **(entire focus area)**	Knersvlakte Shale Vygieveld	Namaqualand Riviere
Climate	Winter-rainfall climate with dry, hot summers and mild, rainy winters	Winter-rainfall climate with dry, hot summers and mild, rainy winters	Arid, seasonal climate
Altitude (m)	200–800	160–540	0–800
MAP* (mm)	127	126	147
MAT* (°C)	17.9	18.6	18.1
MFD* (Days)	5	3	6
MAPE* (mm)	2641	2668	2647
MASMS* (%)	81	81	NA
Distribution	Western and Northern Cape Provinces	Western Cape Province	Northern and Western Cape Provinces
Geology & Soils	Mostly Cenozoic alluvium and calcrete that overlies the mudstone, siltstone and sandstone of the Knersvlakte Subgroup (Vanrhynsdorp Group, Namibian Erathem) as well as gneiss of the Stalhoek Complex (Mokolian). Low stone content, soils acid to neutral, shallow to deep, where shallow bedrock or duripan crusts underly. Heuweltjies occur in places	Shale bands of the Knersvlakte Subgroup (Vanrhynsdorp Group, Namibian Erathem), on level plains or hilltops and moderate to steep slopes covered by shallow soils, moderately acid to slightly alkaline, high stone content.	Alluvial sandy soils on Quaternary fluviatile sediments that overlie Namibian-age sediments and Mokolian gneisses. Seasonally wet (late winter). The riverbed sometimes carries torrential flood waters. In summer, patches of crystallised salt film may cover the soil surface in slight, clayey depressions
Conservation	Least threatened. Target 28%. None conserved in statutory conservation areas	Target 28%. None of the unit is conserved in statutory conservation areas	Least threatened. Target 24%. Only very small portion statutorily protected in nature reserves
Vegetation & landscape features (Dominant Floral Taxa listed in Appendix C)	Slightly undulating landscape covered with open-canopy (10–30%) succulent shrubland. Heuweltjies occur in places and these are dominated by *Stoeberia frutescens* or *Lampranthus uniflorus*. Annuals and geophytes can determine the appearance of the vegetation in spring after good winter rains	Low (10–20% of canopy cover) shrubland formed by mat-forming and cushion-forming shrubs, mainly with succulent leaves and high incidence of *spinescence. Ruschia* and *Salsola* are the major dominants	Complex of alluvial shrubland (*Suaeda fruticosa, Zygophyllum morgsana, Ballota africana* and *Didelta spinosa*) and patches of tussock graminoids occupying riverbeds and banks of intermittent rivers. In places low thickets of *Vachellia karroo* and *Tamarix usneoides* can be encountered

NBA= National Biodiversity Assessment; NPAES= National Protected Areas Expansion Strategy; SAPAD= South African Protected Area Database; IBA= Important Bird Area; MAP= Mean Annual Precipitation; MAT= Mean Annual Temperature; MFD= Mean Frost Days; MAPE= Mean Annual Potential Evaporation; MASMS= Mean Annual Soil Moisture Stress

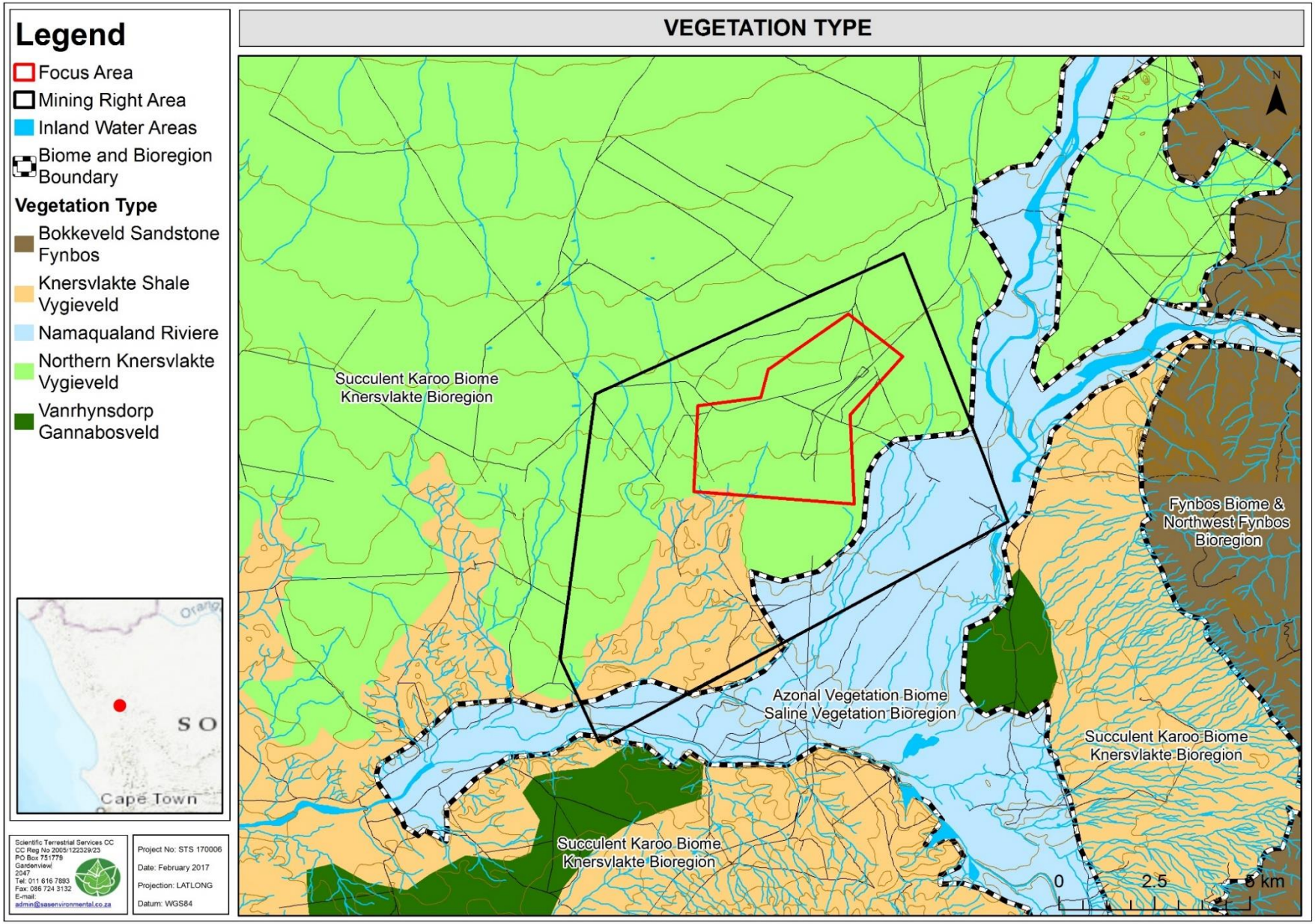

Figure 4: Vegetation types, Biomes and Bioregions associated with the MRA (Mucina and Rutherford, 2012).

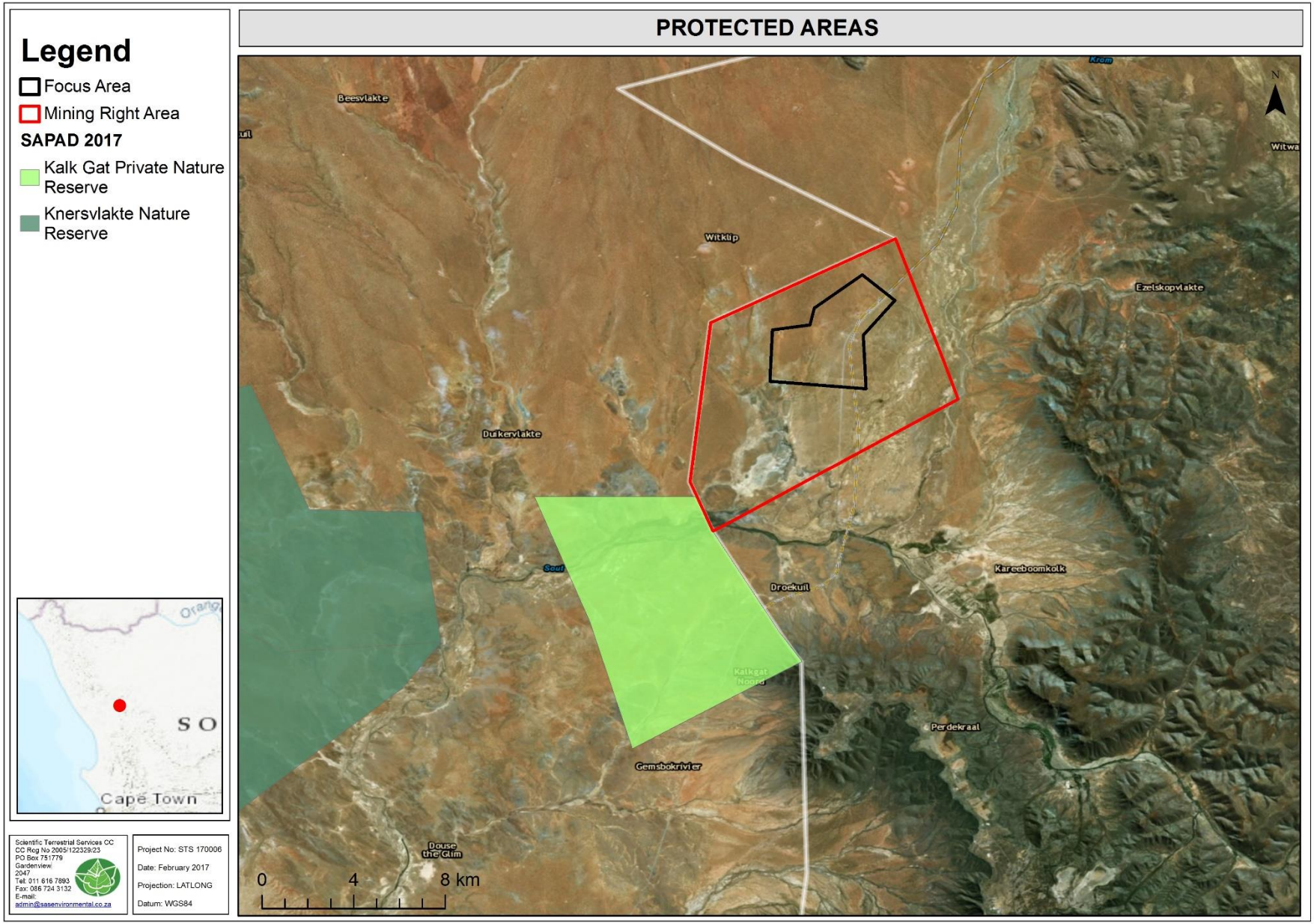

Figure 5: The Kalk Gat Private Nature Reserve situated immediately southwest of the MRA (SAPAD, 2017)

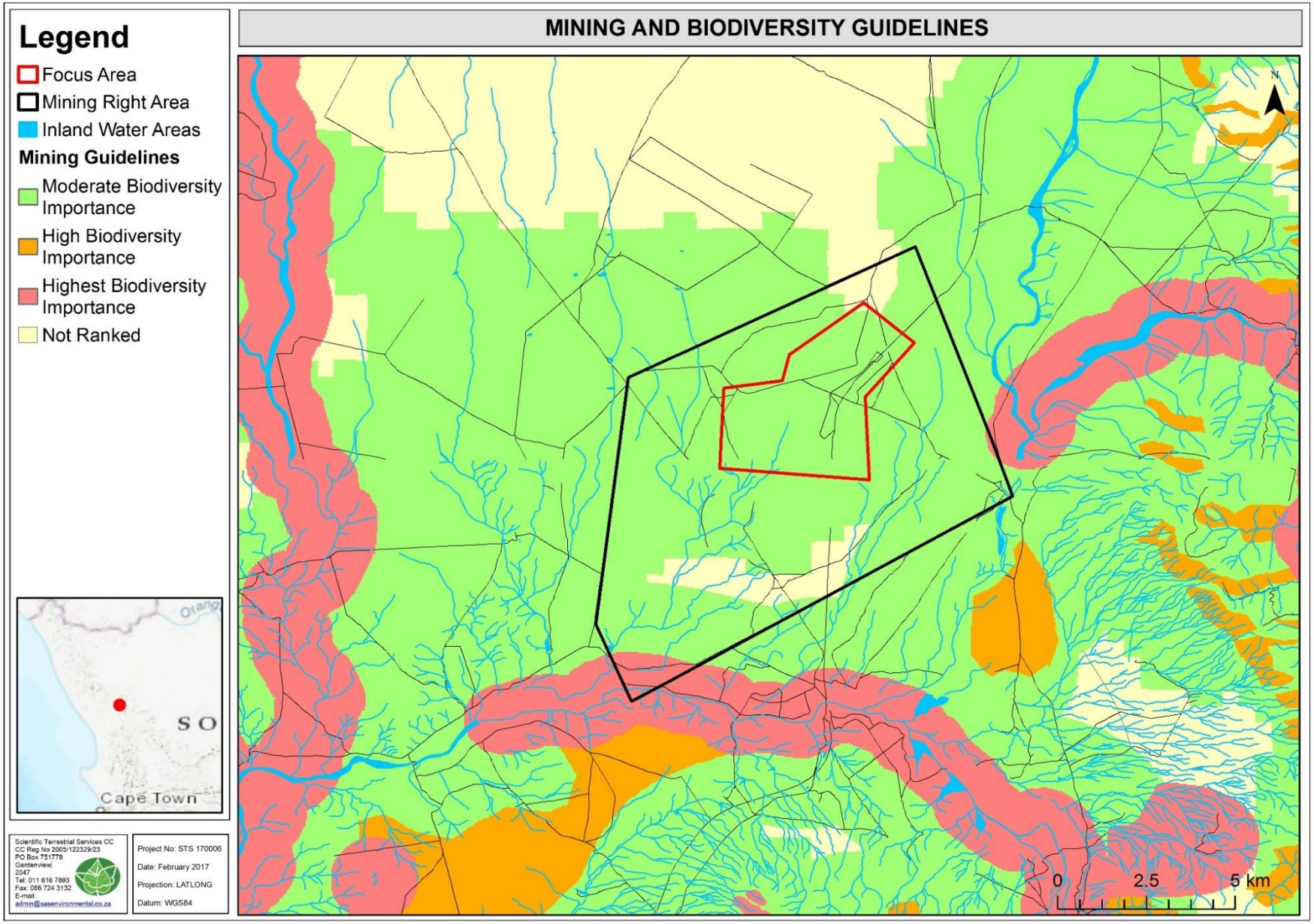

Figure 6: Importance of the study area according to the Mining and Biodiversity Guidelines (2013).

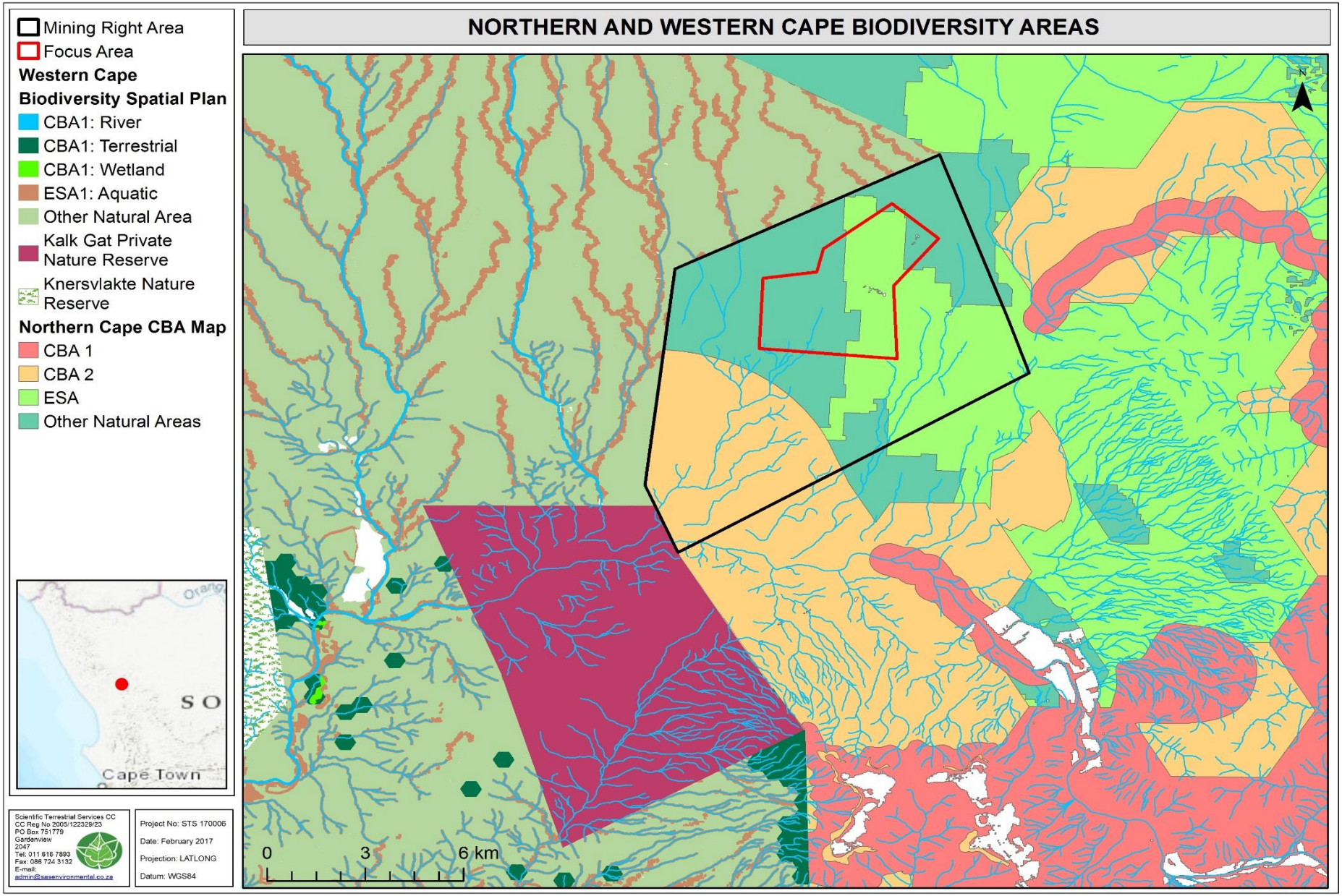

Figure 7: Conservation importance of the MRA according to the Northern Cape Critical Biodiversity Areas Map (2016).

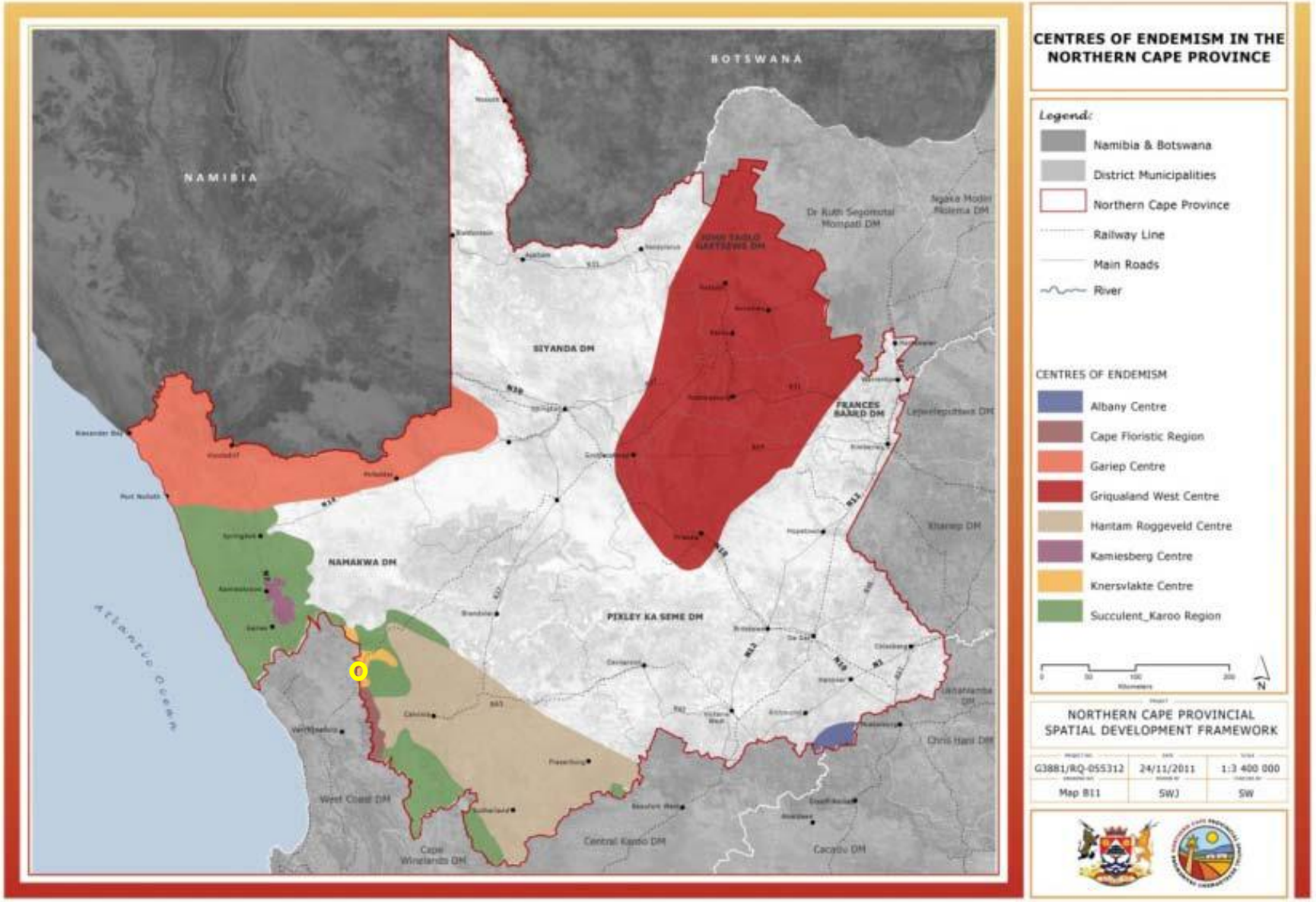

Figure 8: Centers of endemism of the Northern Cape Province: The MRA indicated by a yellow circle indicating that the MRA falls within the Knersvlakte Centre of Endemism (Northern Cape Provincial Spatial Development Framework, 2012).

4 STRUCTURE OF THE REPORT

Section A of this report served to provide an introduction to the MRA and focus area, as well as the general approach to the study. Section A also presents the results of general desktop information reviewed as part of the study including the information generated by the relevant authorities as well as the context of the site in relation to the surrounding anthropogenic activities and ecological character.

Section B addresses all the issues pertaining to the assessment of the floral ecology of the focus area.

Section C addresses all the issues pertaining to the assessment of the faunal ecology of the focus area.

5 REFERENCES

Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983).

IBA: Marnewick MD, Retief EF, Theron NT, Wright DR, Anderson TA. 2015. Important Bird and Biodiversity Areas of South Africa. Johannesburg: BirdLife South Africa. Online available: http://bgis.sanbi.org/IBA/project.asp.

Mineral Resource and Development Act, 2002 (Act 28 of 2002).

Mining Guidelines: Department of Environmental Affairs, Department of Mineral Resources, Chamber of Mines, South African Mining and Biodiversity Forum, and South African National Biodiversity Institute. 2013. Mining and Biodiversity Guideline: Mainstreaming biodiversity into the mining sector. Pretoria. 100 pages. Online available: http://bgis.sanbi.org/Mining/project.asp.

Mucina, L. & Rutherford, M.C. (Eds). (2012). *The Vegetation of South Africa, Lesotho and Swaziland*. Strelitzia 19. South African National Biodiversity Institute, Pretoria, RSA.

National Environmental Management Act, 1998 (Act 107 of 1998).

National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).

National Forest Act, 1998 (Act 84 of 1998).

NBA: Driver A., Sink, K.J., Nel, J.N., Holness, S., Van Niekerk, L., Daniels, F., Jonas, Z., Majiedt, P.A., Harris, L. & Maze, K. 2012. National Biodiversity Assessment 2011: An assessment of South Africa's biodiversity and ecosystems. Synthesis Report. South African National Biodiversity Institute and Department of Environmental Affairs, Pretoria. Online available: http://bgis.sanbi.org/NBA/project.asp.

Northern Cape Department of Environment and Nature Conservation. 2016 Northern Cape Critical Biodiversity Areas [Vector] 0. Available from the Biodiversity GIS website, downloaded on November 2017.

Northern Cape Nature Conservation Act, 2009 (Act 9 of 2009).

Northern Cape Provincial Development and Resources Management Plan / Provincial Spatial Development Framework (PSDF) (2012). Department of Co-operative Governance, Human Settlements, and Traditional Affairs.

NPAES: DEA and SANBI. 2009. *National Protected Areas Expansion Strategy Resource Document*. Online available: http://bgis.sanbi.org/protectedareas/NPAESinfo.asp.

SABAP2, 2014. *The South Africa Bird Atlas Project 2 database.*

SACAD: Department of Environmental Affairs. (2017). *South Africa Conservation Areas Database* (SACAD_OR_2017_Q3). Online available: [http://egis.environment.gov.za]

SANBI (2009). PRECIS Information Database. The South African National Biodiversity Institute is thanked for the use of data from the National Herbarium, Pretoria (PRE) Computerised Information System (PRECIS). Online available: http://posa.sanbi.org/intro_precis.php.

SANBI, 2017. Technical Guidelines for CBA Map: Guidelines for developing a map of Critical Biodiversity Areas & ecological Support Areas using systematic biodiversity planning. Fist Edition (Beta Version), June 2017. Compiled by Driver, A., Holness, S & Daniels, F. South African National Biodiversity Institute, Pretoria

SAPAD: Department of Environmental Affairs. (2017). *South Africa Protected Areas Database* (SAPAD_OR_2017_Q3). Online available: [http://egis.environment.gov.za]

The South African National Biodiversity Institute - Biodiversity GIS (BGIS) [online]. URL: http://bgis.sanbi.org as retrieved in 2018

Threatened Ecosystems: National Environmental Management Biodiversity Act: National list of ecosystems that are threatened and in need of protection (G 34809, GoN 1002). 2011. Department of Environmental Affairs. Online available: http://bgis.sanbi.org/ecosystems/project.asp.

Van Wyk, A.E., and Smith, G.F. Regions of Floristic Endemism in Southern Africa. A review with emphasis on Succulents. Umdaus Press, Hatfield, Pretoria, South Africa.

Witkop Fluorspar Mine (Pty) Ltd Mining Work Programme submitted in support of a Mining Right Application. March 2018.

APPENDIX A: INDEMNITY AND TERMS OF USE OF THIS REPORT

The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information. The report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken and STS CC and its staff reserve the right to modify aspects of the report including the recommendations if and when new information may become available from ongoing research or further work in this field or pertaining to this investigation.

Although STS CC exercises due care and diligence in rendering services and preparing documents, STS CC accepts no liability and the client, by receiving this document, indemnifies STS CC and its directors, managers, agents and employees against all actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with services rendered, directly or indirectly by STS CC and by the use of the information contained in this document.

This report must not be altered or added to without the prior written consent of the author. This also refers to electronic copies of this report which are supplied for the purposes of inclusion as part of other reports, including main reports. Similarly, any recommendations, statements or conclusions drawn from or based on this report must make reference to this report. If these form part of a main report relating to this investigation or report, this report must be included in its entirety as an appendix or separate section to the main report.

APPENDIX B: LEGISLATIVE REQUIREMENTS

National Environmental Management Act, 1998 (Act 107 of 1998)

The National Environmental Management Act (NEMA; Act 107 of 1998) and the associated Environmental Impact Assessment (EIA) Regulations (GNR 326 of 2017, as amended from the EIA Regulations of 2014) and well as Listing Notices 1, 2 and 3 (GNR 327, GNR 325 and GNR 324 of 2017), state that prior to any development taking place which triggers any activity as listed within the abovementioned regulations, an environmental authorisation (EA) process needs to be followed. This could follow either the Basic Assessment process or the EIA process depending on the nature of the activity and scale of the impact.

National Environmental Management Biodiversity Act, 2004 (Act 10 of 2004)

The objectives of this act are (within the framework of NEMA) to provide for:

- The management and conservation of biological diversity within the Republic of South Africa and of the components of such diversity;
- The use of indigenous biological resources in a sustainable manner;
- The fair and equitable sharing among stakeholders of the benefits arising from bio prospecting involving indigenous biological resources;
- To give effect to ratify international agreements relating to biodiversity which are binding to the Republic;
- To provide for cooperative governance in biodiversity management and conservation; and
- To provide for a South African National Biodiversity Institute to assist in achieving the objectives of this Act.

This act alludes to the fact that management of biodiversity must take place to ensure that the biodiversity of the surrounding areas are not negatively impacted upon, by any activity being undertaken, in order to ensure the fair and equitable sharing among stakeholders of the benefits arising from indigenous biological resources.
Furthermore, a person may not carry out a restricted activity involving either:

a) A specimen of a listed threatened or protected species;
b) Specimens of an alien species; or
c) A specimen of a listed invasive species without a permit.

NEMBA: National Threatened or Protected Species Regulations, 2015

Chapter 4, Part 2 of the National Environmental Management: Biodiversity Act (NEMBA; Act 10 of 2004) provides for listing of Threatened or Protected Species (TOPS). If a species is listed as threatened, it must be further classified as critically endangered, endangered or vulnerable. The Act defines these classes as follows:

- Critically Endangered species: any indigenous species facing an extremely high risk of extinction in the wild in the immediate future;
- Endangered species: any indigenous species facing a high risk of extinction in the wild in the near future, although it is not a critically endangered species;
- Vulnerable species: any indigenous species facing an extremely high risk of extinction in the wild in the medium-term future; although it is not a critically endangered species or an endangered species.
- Protected species: “any species which is of such high conservation value or national importance that it requires national protection”. Species listed in this category will include, among others, species listed in terms of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Certain activities, known as Restricted Activities, are regulated on listed species using permits by a special set of regulations published under the Act. Restricted activities regulated under the act are keeping, moving, having in possession, importing and exporting, and selling.

NEMBA: Alien and Invasive Species Regulations (Notice 864 of 29 July 2016 in Government Gazette 40166)

The NEMBA Alien and Invasive Species Regulations aim to:

- Prevent the unauthorised introduction and spread of alien and invasive species to ecosystems and habitats where they do not naturally occur,
- Manage and control alien and invasive species, to prevent or minimise harm to the environment and biodiversity; and
- Eradicate alien and invasive species from ecosystems and habitats where they may harm such ecosystems or habitats.

The NEMBA Alien and Invasive Species Regulations further categorise the various invasive species, as listed in the National List of Invasive Species, as falling within Category 1a, 1b, 2 and 3 as listed below.

Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983)

Removal of the alien and weed species encountered in the application area must take place in order to comply with existing legislation (amendments to the regulations under the CARA, 1983 and Section 28 of the NEMA, 1998). Removal of species should take place throughout the construction and operation, phases.

Northern Cape Nature Conservation Act, 2009 (Act 9 of 2009)

According to the NCNCA (2009) the following are applicable in terms of protected floral species, as listed in Schedules, 1- 3 and 6 of the Act.

Restricted activities involving specially protected plants:
49 (1) No person may, without a permit-

- Pick;
- Import;
- Export;
- Transport;
- Possess;
- Cultivate; or
- Trade in, a specimen of a specially protected plant

Restricted activities involving protected plants
50 (1) Subject to the provision of section 52, no person may, without a permit-

- Pick;
- Import;
- Export;
- Transport;
- Cultivate; or
- Trade in, a specimen of a protected plant.

National Forests Act (Act 84 of 1998) Protected Tree Species

In terms of Section 15(1) the National Forests Act (Act 84 of 1998) an amended list of protected tree species has been published November 2014. According to this Act protected tree species may not be cut, disturbed, damaged or destroyed and their products may not be possessed, collected, removed, transported, exported, donated, purchased or sold - except under licence granted by the Department of Water and Sanitation (DWS) or a delegated authority. Applications for such activities should be made to the responsible official in each province. Each application is evaluated on merit (including site visits) before a decision is taken whether or not to issue a licence (with or without conditions). Such decisions must be in line with national policy and guidelines.

Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002)

The obtaining of a New Order Mining Right (NOMR) is governed by the MPRDA. The MPRDA requires the applicant to apply to the DMR for a NOMR which triggers a process of compliance with the various applicable sections of the MPRDA. The NOMR process requires environmental authorisation in terms of the MPRDA Regulations and specifically requires the preparation of a Scoping Report, an Environmental Impact Assessment (EIA) and Environmental Management Programme (EMP), and a Public Participation Process (PPP).

APPENDIX C: VEGETATION TYPES

Northern Knersvlakte Vygieveld

Dominant Floral Taxa

Table E1: Dominant & typical floristic species of Northern Knersvlakte Vygieveld (Mucina & Rutherford, 2012)

Group	Species
Low shrubs	*Asparagus capensis* var. *capensis*, *Galenia fruticosa*, *G. secunda*, *Lessertia depressa*, *Melolobium adenodes*, *Pteronia glabrata*, *P. intermedia*, *P. villosa*
Woody climber	*Asparagus kraussianus*
Succulent Shrubs	*Cephalophyllum framesii*, *C. parvibracteatum* (d), *Drosanthemum curtophyllum* (d), *D. pulverulentum* (d), *Leipoldtia calandra* (d), *Ruschia subsphaerica* (d), *Salsola zeyheri* (d), *Antimima watermeyeri*, *Augea capensis*, *Didelta carnosa* var. *carnosa*, *Galenia sarcophylla*, *Lampranthus uniflorus*, *Phyllobolus trichotomus*, *Ruschia lisabeliae*, *R. robusta*, *Salsola namibica*, *S. tuberculata*, *Tetragonia fruticosa*, *T. robusta* var. *psiloptera*, *Zygophyllum cordifolium, Drosanthemum schoenlandianum*[K], *Hallianthus planus*[NQ], *Malephora purpureo-crocea*[NQ], *Stoeberia frutescens*[NQ]
Graminoids	*Loudetia simplex (d), Panicum natalense (d), Schizachyrium sanguineum (d), Trachypogon spicatus (d), Alloteropsis semialata subsp. eckloniana, Bewsia biflora, Digitaria tricholaenoides, Diheteropogon amplectens, Sporobolus pectinatus, Tristachya biseriata, T. leucothrix*
Herb	*Gazania lichtensteinii* (d), *Adenogramma glomerata*, *Amellus microglossus*, *Cotula microglossa*, *Diascia pachyceras*, *Felicia bergeriana*, *Heliophila variabilis*, *Lotononis parviflora*, *Lyperia tristis*, *Manulea cheiranthus*, *M. gariepina*, *Oncosiphon suffruticosum*, *Pelargonium minimum*, *Pharnaceum croceum*, *Rhynchopsidium pumilum*, *Tripteris breviradiata*, *Ursinia nana*, *Zaluzianskya benthamiana*, *Z. villosa*
Geophytic herbs	*Cyanella hyacinthoides*, *Drimia intricata*, *Eriospermum paradoxum*, *Freesia viridis*, *Moraea ciliata*, *M. pallida*, *Ornithoglossum viride*, *Oxalis annae*, *O. obtusa*, *O. purpurea*, *Trachyandra jacquiniana, Lachenalia framesii* (e)
Succulent Herbs	*Brownanthus vaginatus*, *Notechidnopsis tessellata, Phyllobolus nitidus*, *P. spinuliferus*, *Psilocaulon junceum, Quaqua acutiloba, Tromotriche revoluta*[K]

***(d) – Dominant species for the vegetation type; (e) – Emdemic Taxa, [NQ]Namaqualand endemic, [K]Knersvlakte endemic**

Knersvlakte Shale Vygieveld

Dominant Floral Taxa

Table E1: Dominant & typical floristic species of Knersvlakte Shale Vygieveld (Mucina & Rutherford, 2012)

Group	Species
Low shrubs	*Asparagus capensis* var. *capensis*, *Atriplex vestita* var. *appendiculata*, *Eriocephalus ericoides*, *Galenia fruticosa*, *Hirpicium alienatum*, *Pteronia ciliata*, *Tripteris sinuata*
Woody climber	*Asparagus kraussianus*
Succulent Shrubs	*Arenifera stylosa* (d), *Caulopsilon rapaceum* (d), *Ruschia spinosa* (d), *Salsola zeyheri* (d), *Augea capensis*, *Cheiridopsis namaquensis*, *Lampranthus uniflorus*, *Salsola aphylla*, *S. namibica*, *Tetragonia fruticosa*, *Tylecodon wallichii* subsp. *wallichii*, *Zygophyllum foetidum, Malephora purpureo-crocea*[NQ], *Tylecodon suffultus*
Graminoids	*Ehrharta delicatula*, *E. longiflora*, *Karroochloa tenella*
Herb	*Dimorphotheca sinuata* (d), *Gorteria diffusa* subsp. *diffusa* (d), *Oncosiphon suffruticosum* (d), *Osteospermum pinnatum* (d), *Amellus microglossus*, *Emex australis*, *Jamesbrittenia glutinosa*, *Lasiopogon glomerulatus*, *Lepidium africanum*, *Sisymbrium capense, Lasiopogon debilis*[K]
Geophytic herbs	*Drimia intricata*, *Gethyllis lata* subsp. *lata*, *G. linearis*, *Oxalis pes-caprae*
Succulent Herbs	*Brownanthus vaginatus* (d), *Phyllobolus nitidus*, *Psilocaulon dinteri*, *P. junceum*, *Tetragonia microptera, Tromotriche revoluta*[K]

***(d) – Dominant species for the vegetation type; (e) – Emdemic Taxa, [NQ]Namaqualand endemic, [K]Knersvlakte endemic**

Namaqualand Riviere

Dominant Floral Taxa

Table E1: Dominant & typical floristic species of Namaqualand Riviere (Mucina & Rutherford, 2012)

Group	Species
Riparian Thicket	
Small Tree	*Vachellia karroo* (d)
Tall Shrub	*Melianthus pectinatus*, *Rhus burchellii*, *Tamarix usneoides*.
Low shrub	*Ballota africana* (d). Semiparasitic Epiphytic Shrub: *Viscum capense*
Dry River Bottom	
Tall Shrub	*Lebeckia sericea*
Low Shrubs	*Galenia africana* (d), *Gomphocarpus fruticosus* (d), *Hermannia disermifolia*, *Jamesbrittenia fruticosa*, *Salvia dentata*
Succulent Shrubs	*Suaeda fruticosa* (d), *Zygophyllum morgsana* (d), *Atriplex cinerea* subsp. *bolusii*, *Didelta carnosa* var. *carnosa*, *Lycium horridum*, *Salsola tuberculata*, *Tetragonia fruticosa*, *T. pillansii*, *Zygophyllum retrofractum, Sarcocornia terminalis* (d)(e)
Herbaceous Climber	*Didymodoxa capensis*
Graminoids	*Cynodon dactylon* (d), *Odyssea paucinervis* (d), *Cyperus marginatus*, *Diplachne fusca*, *Ehrharta longiflora*, *Isolepis antarctica*, *Scirpus nodosus*
Herb	*Limonium dregeanum* (d), *Arctotheca calendula*, *Cotula coronopifolia*, *Galium tomentosum*
Geophytic herbs	*Crinum variabile*
Succulent Herbs	*Conicosia elongata*, *Mesembryanthemum guerichianum*.

***(d) – Dominant species for the vegetation type; (e) – Emdemic Taxa,**

APPENDIX D: DETAILS, EXPERTISE AND CURRICULUM VITAE OF SPECIALISTS

1. (a) (i) Details of the specialist who prepared the report

Nelanie Cloete	MSc Environmental Management (University of Johannesburg)
Christopher Hooton	BTech Nature Conservation (Tshwane University of Technology)

1. (A). (ii) The expertise of that specialist to compile a specialist report including a curriculum vitae

Company of Specialist:	Scientific Terrestrial Services		
Name / Contact person:	Nelanie Cloete		
Postal address:	PO. Box 751779, Gardenview		
Postal code:	2047	Cell:	084 311 4878
Telephone:	011 616 7893	Fax:	086 724 3132
E-mail:	Nelanie@sasenvgroup.co.za		
Qualifications	MSc Environmental Management (University of Johannesburg) MSc Botany (University of Johannesburg) BSc (Hons) Botany (University of Johannesburg) BSc (Botany and Zoology) (Rand Afrikaans University)		
Registration / Associations	Professional member of the South African Council for Natural Scientific Professions (SACNASP) Member of the South African Association of Botanists (SAAB) Member of the International Affiliation for Impact Assessments (IAIAsa) South Africa group Member of the Grassland Society of South Africa (GSSA) Member of the Botanical Society of South Africa (BotSoc)		

1. (b) a declaration that the specialist is independent in a form as may be specified by the competent authority

I, Nelanie Cloete, declare that -

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct

N Cloete

SCIENTIFIC TERRESTRIAL SERVICES (STS) – SPECIALIST CONSULTANT INFORMATION

INFORMATION – NELANIE CLOETE

PERSONAL DETAILS

Position in Company	Senior Scientist Botanical Science and Terrestrial Ecology
Date of Birth	6 October 1983
Nationality	South African
Languages	English, Afrikaans
Joined SAS Group of Companies	2011

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Professional member of the South African Council for Natural Scientific Professions (SACNASP)
Member of the South African Association of Botanists (SAAB)
Member of the International Affiliation for Impact Assessments (IAIAsa) South Africa group
Member of the Grassland Society of South Africa (GSSA)
Member of the Botanical Society of South Africa (BotSoc)

EDUCATION

Qualifications

MSc Environmental Management (University of Johannesburg)	2013
MSc Botany (University of Johannesburg)	2007
BSc (Hons) Botany (University of Johannesburg)	2005
BSc (Botany and Zoology) (Rand Afrikaans University)	2004

Short Courses

Certificate – Department of Environmental Science in Legal context of Environmental Management, Compliance and Enforcement (UNISA)	2009
Introduction to Project Management - Online course by the University of Adelaide	2016

COUNTRIES OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga, North West, Limpopo, KwaZulu-Natal, Northern Cape, Eastern Cape, Free State
Africa - Democratic Republic of the Congo (DRC)

SCIENTIFIC TERRESTRIAL SERVICES (STS) – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF CHRISTOPHER HOOTON

PERSONAL DETAILS

Position in Company	Senior Scientist Zoological Science and Terrestrial Ecology
Date of Birth	24 June 1986
Nationality	South African
Languages	English, Afrikaans
Joined STS	2013

EDUCATION

Qualifications

BTech Nature Conservation (Tshwane University of Technology)	2013
National Diploma Nature Conservation (Tshwane University of Technology)	2008

COUNTRIES OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga, North West, Limpopo, KwaZulu-Natal, Eastern Cape, Western Cape, Northern Cape, Freestate
Zimbabwe

Previous Work Experience

- Spotted Hyaena Research Project, Phinda Private Game Reserve, KwaZulu Natal.
- Camera Trap Survey as part of the Munyawana Leopard Project, Mkuze Game Reserve, KwaZulu Natal.
- Lowveld Wild Dog Project, Savé Valley Conservancy, Zimbabwe.
- Lion collaring and Tracking as part lion management program, Savé Valley Conservancy, Zimbabwe.
- Junior Nature Conservator, Gauteng Department of Rural Development and Land Reform.

SCIENTIFIC TERRESTRIAL SERVICES (STS) – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF MARELIE MEINTJIES

PERSONAL DETAILS

Position in Company	Junior Field Biologist
Date of Birth	8 July 1986
Nationality	South African
Languages	English, Afrikaans
Joined SAS	April 2015

EDUCATION

Qualifications

MSc Medicinal Plant Science (University of Pretoria)	2014
BSc (Hons) Medicinal Plant Science (University of Pretoria)	2012
BSc Biotechnology (University of Pretoria)	2011

COUNTRIES OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga, Free State, Northern Cape, Western Cape

SELECTED PROJECT EXAMPLES

Desktop Ecological Assessments

- Aquatic and Wetland Scoping Assessment as part of the Environmental Assessment and Authorisation Process for the Proposed Witfontein Mining Project, near Bethal, Mpumalanga Province
- Freshwater Resource Scoping Assessment as part of the Environmental Assessment and Authorisation Process for the Proposed Photovoltaic Solar Energy Facility on the Heuningklip Farm near Vredenburg, Western Cape Province
- Desktop Ecological Assessment and Site Sensitivity Report as part of the Environmental Assessment and Authorisation Process prior to Prospecting Activities on the Farm Zeekoebaart 306 Rd, Postmasburg, Northern Cape Province
- Desktop Ecological Assessment as part of the environmental assessment and authorisation process for the Genet Manganese (Pty) Ltd prospecting area on the farm Lemoenkloof No 456, Northern Cape Province.