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**BIODIVERSITY ASSESSMENT AS PART OF THE
ENVIRONMENTAL IMPACT ASSESSMENT AND
AUTHORISATION PROCESS FOR THE PROPOSED
EXPANSION ACTIVITIES AT THE MAMATWAN MINE, NEAR
HOTAZEL, NORTHERN CAPE PROVINCE**

Prepared for

SLR Consulting (South Africa) (Pty) Ltd

May 2020

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SAS Environmental Group of Companies

EXECUTIVE SUMMARY

Scientific Terrestrial Services (STS) was appointed to conduct a Biodiversity Assessment for the proposed expansion activities at the Mamatwan Mine. The biodiversity assessment revealed that the study area comprises of three habitat units, namely the Kathu Bushveld, Degraded Bushveld and Transformed Habitat, ranging in sensitivity from intermediate (Kathu Bushveld), moderately low (Degraded Bushveld) to low (Transformed habitat). The Kathu Bushveld was degraded as a result of edge effects related to mining activities which have resulted in bush encroachment and Alien Invasive Plant (AIP) establishment in areas. This habitat unit did however provide habitat for a number of protected floral species and can be considered representative of the Kathu Bushveld vegetation type, a Least Threatened Vegetation type as per the National Biodiversity Assessment (2018). The Degraded Bushveld was severely altered from the reference Kathu Bushveld as a result of historic and ongoing mining activities and cannot be considered representative of the Kathu Bushveld. The transformed habitat has been completely transformed comprising of no vegetation, or where vegetation was observed was limited to AIPs.

A number of protected floral species was observed and include the National Forest Act, 1998, (Act 84 of 1998, amended in September 2011) (NFA) protected trees *Vachellia erioloba* and *V. haematoxylon*. Also observed were a number of Northern Cape Nature Conservation Act, 2009 (Act 9 of 2009) (NCNCA) protected species, namely *Boophone disticha* (Poison Bulb), *Harpagophytum procumbens* (Devil's Claw), and *Tridentea sp. H. procumbens* is also considered a protected species in terms of the National Environmental Management Biodiversity Act, 2004 (Act 10 of 2004) Threatened or Protected Species (TOPS).

It is recommended that a walkdown of the final development footprint be undertaken during the flowering season (preferably between January and May), and after sufficient rainfall events whereby all floral SCC are marked by means of GPS. Permits will have to be obtained from the Department of Environment, Forestry and Fisheries (DEFF) and Northern Cape Department Environment and Nature Conservation (NCDENC) for all protected species individuals to be disturbed prior to commencement of expansion activities. All herbaceous protected floral individuals should be rescued and relocated by a suitably qualified contractor.

A single Species of Conservation Concern (SCC) was directly observed within the study area, *Orycteropus afer* (Aardvark) and likely utilises much of the Kathu Bushveld for foraging while breeding is likely to occur off-site. There is a high likelihood for a further five SCC to occur on the site. *Opisthophthalmus ater* (Steinkopf Burrowing Scorpion) which is Critically Endangered is considered a protected species within the National Environmental Management Biodiversity Act, 2004 (Act 10 of 2004) Threatened or Protected Species (TOPS), a further two burrowing scorpions *Opisthophthalmus wahlbergii* and *Opisthophthalmus carinatus* all protected by the Northern Cape Nature Conservation Act, 2009 (Act 9 of 2009) (NCNCA) are likely to occur in the Kathu and Degraded Bushveld. Two avian species: *Aquila verreauxii* (Verreaux's Eagle) and *Anthus crenatus* (African Rock Pipit) have been observed in the vicinity and although they were not observed during the field assessment the habitat created by the mine provides habitat which is suitable for their presence. Verreaux's eagle only utilises the site for foraging while the African Rock Pipit potentially breeds within the larger mining right area on the hillslopes within Degraded bushveld and Transformed areas.

Following the biodiversity assessment within the study area, the impacts associated with the proposed development activities were determined. The impacts arising from the proposed development will range from very low to high for floral and faunal habitat, diversity and SCC for the various expansion related activities. The most significant impacts are expected to arise from the development of the top-cut stockpile and Manganese Railway Line due to the extent of vegetation clearance, loss of protected floral species and faunal SCC habitat that will result from the development of these infrastructure. With mitigation measures fully implemented, it is the opinion of the specialist that all impacts can be effectively reduced to acceptable levels.

It is the opinion of the ecologists that this study provides the relevant information required in order to implement Integrated Environmental Management (IEM) and to ensure that the best long-term use of the ecological resources in the study area will be made in support of the principles of sustainable development.



MANAGEMENT SUMMARY

Scientific Terrestrial Services (STS) was appointed to conduct a Biodiversity Assessment as part of the environmental impact assessment and authorisation process for the proposed expansion activities at the Mamatwan Mine, near Hotazel in the Northern Cape Province.

The proposed expansion activities associated with the study area and assessed during the current assessment include the following:

- Development of a top-cut stockpile, and crushing and screening plant;
- Construction and operation of a railway loop and associated infrastructure; and
- Installation of a pipeline: Three alternatives are proposed, with alternative 1 considered as the preferred alternative by the proponent.

Specific outcomes required from this report include the following:

- To define the Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS) of the biodiversity associated with the study area;
- To conduct a Species of Conservation Concern (SCC) assessment, including potential for such species to occur within the study area;
- To provide faunal and floral inventories of species as encountered on site;
- To determine and describe habitats, communities and ecological state of the study area;
- To describe the spatial significance of the study area with regards to surrounding natural areas;
- To identify and consider all sensitive landscapes, including rocky ridges, wetlands and any other ecologically important features, if present; and
- To determine direct and indirect environmental impacts that the project activities might have on the biodiversity of the study area and to develop mitigation and management measures for all phases of the development.

BIODIVERSITY ASSESSMENT RESULTS:

1) Desktop Assessment

- According to the National Biodiversity Assessment (2018), the majority of the study area is classified as falling within the remaining extent of the Kathu Bushveld (LC), except where expansion activities are situated within existing mining areas. Based on the field assessment results, areas classified as the Kathu Bushveld although degraded was still associated with a number of Kathu Bushveld endemics, and can subsequently be considered as the Kathu Bushveld habitat;
- In terms of the mining and biodiversity guidelines (2013) the study area does not fall into any biodiversity priority areas and is therefore no mining constraints placed on this area according to this dataset; and
- As per the Northern Cape Critical Biodiversity Areas (2016) database, the study area is not associated with any CBAs, but where vegetation remains the study area is classified as “other natural areas”. This indicates that although portions within the study area is considered as natural vegetation, these areas are not considered important for preserving a specific ecosystem, species, nor is it considered important for maintaining long-term ecological functioning in the landscape as a whole.

2) Floral Assessment Results:

- Three habitat units were identified, i.e. Kathu Bushveld, Degraded Bushveld and Transformed Habitat;
- Two vegetation communities could be distinguished within the Kathu Bushveld Habitat unit, in line with the Natural Scientific Services CC (NSS, 2018) assessment, namely:
 - *Senegalia (Acacia) mellifera* - *Vachellia (Acacia) haematoxylon* – *Grewia flava* Kathu Bushveld, and;
 - *Senegalia (Acacia) mellifera* – *Stipagrostis* Open Kathu Bushveld;
- Although individual species abundance differed for the vegetation communities, the species composition was similar, and both vegetation communities can be considered representative of the Kathu Bushveld vegetation type. Subsequently, these vegetation communities are considered as a single habitat unit, namely the Kathu Bushveld;
- The Kathu Bushveld Habitat unit was associated with habitat degradation as a result of edge effects arising from ongoing mining activities which have led to the establishment of Alien



Invasive Plant (AIP) species as well as bush encroachment by indigenous species such as *Senegalia mellifera* in areas. This habitat unit did however provide suitable habitat for a number of National Forest Act, 1998, (Act 84 of 1998, amended in September 2011) (NFA) and Northern Cape Nature Conservation Act, 2009 (Act 9 of 2009) (NCNCA) protected floral species and is of intermediate ecological importance and sensitivity;

- The Degraded Bushveld includes the NSS (2018) vegetation type *Acacia* dominated vegetation in recovery, as well as the rehabilitated mine dumps, and the outer slopes of the currently utilised mine dumps, where vegetation has managed to re-establish. This habitat unit has been severely degraded, comprising largely of grasses and a few scattered trees. This habitat unit still provided habitat for NFA protected trees, although a lower abundance of individuals was recorded as opposed to the Kathu Bushveld. This habitat unit is therefore of moderately low ecological importance and sensitivity;
- Areas falling within the study area that was utilised on a regular basis for mining, or where ground clearing activities have resulted in no vegetation remaining or where vegetation was limited to Alien Invasive Plant (AIP) species was classified as transformed. Due to the lack of natural vegetation within these areas, the floral ecological importance and sensitivity is considered low; and
- A number of protected floral species were observed at the time of the assessment and include the NFA protected trees *Vachellia erioloba* and *V. haematoxylon*. Also observed was a number of NCNCA protected species, namely *Boophone disticha*, *Harpagophytum procumbens*, and *Tridentea* sp. It is recommended that a summer season walkdown be undertaken and all protected floral species within the final development footprint be marked by means of GPS. It is highly likely that a higher abundance of floral SCC individuals will be recorded during the summer season, when individuals are flowering. Permits will have to be obtained from the Department of Agriculture, Forestry and Fisheries (DAFF) and the Northern Cape Department Environment and Nature Conservation (NCDENC) for all protected species to be disturbed as a result of the proposed expansion activities prior to commencement. All herbaceous protected floral individuals should be rescued and relocated by a suitably qualified contractor.

3) **Faunal Assessment Results**

- Historical and current mining activities, in much of the study area and its immediate vicinity, have led to edge effects and a decrease in available natural faunal habitat. Furthermore, these activities continue to cause disturbances which likely repel some fauna;
- No sensitive faunal corridors will be disturbed that may limit habitat connectivity;
- Mostly commonly occurring faunal species who are known to occur throughout the region and are not considered threatened, who have broad habitat requirements enabling them to utilise various area both within and without the mine were observed within the study area;
- A single SCC was directly observed within the study area, *Orycteropus afer* (Aardvark). There is a high likelihood for a further five SCC to occur on the site: *Opisthophthalmus ater* (Steinkopf Burrowing Scorpion) and two further burrowing scorpions *Opisthophthalmus wahlbergii* and *Opisthophthalmus carinatus* as well as *Aquila verreauxii* (Verreaux's Eagle) and *Anthus crenatus* (African Rock Pipit);
- The footprint of the proposed activities will occur directly adjacent to the current mining activities which will ensure the cumulative footprint of the entire development are compact rather than dispersed within the study area; and
- The proposed development is deemed unlikely to pose a long-term conservation threat to the faunal species diversity and assemblage in the region.

BIODIVERSITY IMPACT ASSESSMENT:

1) **Floral Impact Assessment**

Following the floral assessment, the impacts associated with the proposed development activities were determined. A summary of the outcome of the impact assessment is provided below.

The pre-construction phase, especially from a floral resource management perspective, is essential in ensuring that activities associated with all phases of the project have the lowest possible impact on the receiving environment. In this regard, scoring of the pre-planning phase is considered important, since although it is unlikely to result in an immediate impact, failure to effectively plan, and implement an AIP control plan, a rehabilitation plan, obtain the necessary floral permits as well as design and implement a rescue and relocation plan prior to the onset of ground clearing activities, the impact is likely to be higher during the construction and operational phase., as well as the decommissioning and closure phase.



The increased impact significance prior to mitigation is largely attributed to the loss of floral habitat and diversity not of the direct footprint but also the surrounding ecology due to AIP proliferation. The proposed development will result in a change from a largely natural landscape to hardened infrastructure, and the intensity of the impact is therefore considered to result in a moderate to permanent change in the landscape. The impact is further considered to be long-term to permanent as post development rehabilitation is unlikely to restore the floral ecology to predevelopment conditions. The impact is lastly considered definite, as floral habitat will have to be removed for the construction of the proposed infrastructure.

Table A: A summary of the impact significance on floral resources.

	Planning Phase		Construction and Operational Phase		Rehabilitation Phase	
Infrastructure Component	Unmanaged	Mitigated	Unmanaged	Mitigated	Unmanaged	Mitigated
Impact of floral Habitat and Diversity						
Top-cut stockpile	Medium	Low	High	Medium	High	Medium
Crushing and Screening Plant	Low	Very Low	Medium	Low	Medium	Very Low
Borehole Drilling	Very Low	Insignificant	Very Low	Insignificant	Very Low	Insignificant
Dewatering Pipeline Alternative 1	Low	Very Low	Medium	Low	Medium	Low
Dewatering Pipelines Alternative 2 and 3	Medium	Very Low	Medium	Low	Medium	Low
New offices, future stockpile area and contractor laydown	Low	Very Low	Low	Very Low	Low	Very Low
Manganese Rail line and road and security checkpoint	Medium	Low	High	Medium	High	Medium
Impact on Floral SCC						
Top-cut stockpile	High	Medium	High	High	Medium	Low
Crushing and Screening Plant	Low	Very Low	Medium	Low	Low	Very Low
Borehole Drilling	Very Low	Insignificant	Very Low	Insignificant	Very Low	Insignificant
Dewatering Pipeline Alternative 1	Medium	Low	Medium	Low	Medium	Low
Dewatering Pipelines Alternative 2 and 3	Medium	Low	Medium	Low	Medium	Low
New offices, future stockpile area and contractor laydown	Low	Very Low	Low	Very Low	Low	Very Low
Manganese Rail line and road and security checkpoint	High	Medium	High	High	Medium	Low

2) Faunal Impact Assessment

Based on the impact assessment of potential impacts on faunal habitat, diversity and SCC associated with the study areas, it is evident that the impacts arising from the proposed development will range from very low to medium for faunal habitat and diversity, and very low to medium for faunal SCC prior to the implementation of mitigation measures. With mitigation implemented, all impacts can be reduced in duration, extent and intensity. Pre-construction planning is an important step in ensuring that sensitive environments be considered during planning to ensure the lowest possible impacts are incurred to the local environment. Unabated development without proper consideration for faunal habitat will lead to higher impacts through the construction and rehabilitation phases.

Table B: Faunal impact assessment for the proposed mining activities

	Planning Phase		Construction and Operational Phase		Rehabilitation Phase	
Habitat Unit	Unmanaged	Mitigated	Unmanaged	Mitigated	Unmanaged	Mitigated
Impact of Faunal Habitat and Diversity						
Top-cut stockpile	Medium	Medium	Medium	Medium	Medium	Medium



	Planning Phase		Construction and Operational Phase		Rehabilitation Phase	
Habitat Unit	Unmanaged	Mitigated	Unmanaged	Mitigated	Unmanaged	Mitigated
Crushing and Screening Plant	Medium	Very Low	Medium	Very Low	Low	Very Low
Borehole Drilling	Very Low	Insignificant	Very Low	Insignificant	Very Low	Very Low
Dewatering Pipeline Alternative 1	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Dewatering Pipelines Alternative 2 and 3	Low	Very Low	Low	Very Low	Low	Low
New offices, road, security checkpoint and contractor laydown	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Manganese Rail line and additional infrastructure	Medium	Low	Medium	Low	Low	Low
Impact on Faunal SCC						
Top-cut stockpile	Medium	Medium	Medium	Medium	Medium	Medium
Crushing and Screening Plant	Low	Very Low	Low	Very Low	Low	Low
Borehole Drilling	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Dewatering Pipeline Alternative 1	Low	Low	Low	Low	Low	Low
Dewatering Pipelines Alternative 2 and 3	Low	Low	Low	Low	Very Low	Very Low
New offices, road, security checkpoint and contractor laydown	Very Low	Very Low	Very Low	Very Low	Very Low	Insignificant
Manganese Rail line and additional infrastructure	Medium	Low	Medium	Low	Medium	Medium

Sensitivity

The section below summarise the findings of the biodiversity sensitivity assessment based on:

- the presence or potential occurrence for floral and faunal SCC,
- habitat integrity and levels of disturbance,
- threat status of the habitat type,
- the presence of unique landscapes, and
- overall levels of diversity.

Table C: A summary of the sensitivity of each habitat unit and implications for development.

Habitat Unit	Sensitivity	Development Implications
Kathu Bushveld	<p>INTERMEDIATE</p> <p><u>Conservation Objective</u></p> <p>Preserve and enhance the biodiversity of the habitat unit and surrounds while optimising development potential.</p>	<p>This habitat unit is of intermediate ecological sensitivity. Based on the desktop assessment, this habitat unit is not of conservation importance. However, a number of protected floral species and a single faunal species were observed and is likely inhabited by several more faunal species due to the suitably available habitat and movement patterns of potential faunal SCC, contributing to the sensitivity of this habitat unit. Permits will have to be obtained from DAFF and NCDENC prior to removal/destruction of any protected faunal and floral specimens. All herbaceous protected floral and faunal species should be rescued and relocated by a suitably qualified contractor prior to any ground disturbance activities. Development within this habitat unit is not prohibited from a floral and faunal resource management perspective, although the development footprint should be minimised, and care should be taken not to disturb the surrounding natural habitat. A rehabilitation and AIP control and Management Plan should also be implemented at the onset of the commencement of the expansion activities, to limit spread of AIPs and further degradation of the surrounding floral habitat.</p>
Degraded Bushveld	<p>MODERATELY LOW</p> <p><u>Conservation Objective</u></p>	<p>This habitat unit is not considered ecologically important from a floristic perspective. The Degraded Bushveld habitat unit is no longer considered representative of the reference vegetation type, i.e. the Kathu Bushveld, and provides limited suitable habitat for floral SCC and native floral species, although a number of protected floral species were observed</p>



Habitat Unit	Sensitivity	Development Implications
	Optimise development potential while improving biodiversity intactness of surrounding natural habitat and managing edge effects.	<p>during the field assessment. The necessary permits will have to be obtained for the removal of all protected species prior to ground disturbance activities taking place. The habitat unit is of moderately low conservation significance. Two avian SCC may utilise this habitat, one for foraging only (Verreaux's Eagle) and the other likely breeds within this unit (African Rock Pipit). If breeding sites are recorded a suitably qualified specialist should be contacted to recommend mitigation measures.</p> <p>To reduce opportunities for AIPs to be exchanged between the Degraded Bushveld habitat and surrounding natural areas i.e Kathu Bushveld habitat unit during all phases of the development, an AIP management plan should be implemented for the clearance of listed alien species before expansion activities commence.</p>
Transformed	<p>LOW</p> <p><u>Conservation Objective</u></p> <p>Optimise development potential.</p>	<p>The Transformed Habitat is of low ecological importance and sensitivity due to the modified floral species composition of these areas comprising predominantly of bare soils or AIP species. Ecological functioning and habitat integrity are significantly compromised, and these areas should be optimised for development. Edge effect impacts on the surrounding natural vegetation should be well managed to limit the spread of AIP species to the surrounding areas. These disturbances have reduced the suitability of the habitat for faunal species who will largely avoid these locations due to the lack of resources and continuous disturbances from mine personnel and activities.</p>





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Part A: Background Information

Prepared by:	Scientific Terrestrial Services
Report author	M. Meintjies
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DOCUMENT GUIDE

The following table indicates the requirements for Specialist Studies as per Appendix 6 of Government Notice 326 as published in Government Notice 40772 of 2017, amendments to the Environmental Impact Assessment (EIA) Regulations, 2014 as it relates to the National Environmental Management Act, 1998 (Act No. 107 of 1998).

No.	Requirement	Section in report
a)	Details of -	
(i)	The specialist who prepared the report	Part A: Appendix E
(ii)	The expertise of that specialist to compile a specialist report including a curriculum vitae	Part A: Appendix E
b)	A declaration that the specialist is independent	Part A: Appendix E
c)	An indication of the scope of, and the purpose for which, the report was prepared	Part A: Section 1.2 Part B: Section 1.1 Part C: Section 1.1
cA)	An indication of the quality and age of base data used for the specialist report	Part A: Section 2.1 and 3.1 Part B: Section 2 Part C: Section 2
cB)	A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change	Part B and C
d)	The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment	Part A: Section 1.3 and 2 Part B: Section 2 Part C: Section 2
e)	A description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Part B and C
f)	Details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives	Part B and C
g)	An identification of any areas to be avoided, including buffers	Part B and C
h)	A map superimposing the activity including the associated structure and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers	Part B and C
i)	A description of any assumptions made and any uncertainties or gaps in knowledge	Part A: Section 1.3 Part B: Section 1.3 Part C: Section 1.3
j)	A description the findings and potential implication's of such findings on the impact of the proposed activity, including identified alternatives on the environment or activities	Part B and C
k)	Any mitigation measures for inclusion in the EMPr	Part B and C
l)	Any conditions for inclusion in the environmental authorisation	Part B and C
m)	Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Part B and C
n)	A reasoned opinion -	
(i)	As to whether the proposed activity, activities or portions thereof should be authorised	Part B and C
(iA)	Regarding the acceptability of the proposed activity or activities	Part B and C
(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	Part B and C
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 of 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



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GLOSSARY OF TERMS

Alien and Invasive species	A species that is not an indigenous species; or an indigenous species translocated or intended to be translocated to a place outside its natural distribution range in nature, but not an indigenous species that has extended its natural distribution range by natural means of migration or dispersal without human intervention.
Biome	A broad ecological unit representing major life zones of large natural areas – defined mainly by vegetation structure and climate.
CBA (Critical Biodiversity Area)	A CBA is an area considered important for the survival of threatened species and includes valuable ecosystems such as wetlands, untransformed vegetation and ridges.
Endangered	Organisms in danger of extinction if causal factors continue to operate.
Endemic species	Species that are only found within a pre-defined area. There can therefore be sub-continental (e.g. southern Africa), national (South Africa), provincial, regional or even within a particular mountain range.
ESA (Ecological Support Area)	An ESA provides connectivity and important ecological processes between CBAs and is therefore important in terms of habitat conservation.
IBA (Important Bird and Biodiversity Area)	The IBA Programme identifies and works to conserve a network of sites critical for the long-term survival of bird species that: are globally threatened, have a restricted range, are restricted to specific biomes/vegetation types or sites that have significant populations.
Indigenous vegetation (as per the definition in NEMA)	Vegetation occurring naturally within a defined area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.
Invasive species	Means any species whose establishment and spread outside of its natural distribution range; they threaten ecosystems, habitats or other species or have demonstrable potential to threaten ecosystems, habitats or other species; and may result in economic or environmental harm or harm to human health
Least Threatened	Least threatened ecosystems are still largely intact.
Phyto Centres and Regions of Endemism	Most of southern Africa's endemic plants are concentrated in only a few, relatively small areas, known as regions or centres of endemism. Not only do these centres hold clues to the origin and evolution of the botanical diversity within a particular area, but these are also areas that, if conserved, would safeguard the greatest number of plant species (Van Wyk & Smith 2001).
RDL (Red Data listed) species	Organisms that fall into the Extinct in the Wild (EW), critically endangered (CR), Endangered (EN), Vulnerable (VU) categories of ecological status.
SCC (Species of Conservation Concern)	The term SCC in the context of this report refers to all RDL (Red Data) and IUCN (International Union for the Conservation of Nature) listed threatened species as well as protected species of relevance to the project.



LIST OF ACRONYMS

AIP	Alien Invasive Plant
BGIS	Biodiversity Geographic Information Systems
CARA	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983)
CBA	Critical Biodiversity Area
CR	Critically Endangered
EIA	Environmental Impact Assessment
EN	Endangered
ESA	Ecological Support Area
GIS	Geographic Information System
GPS	Global Positioning System
IBA	Important Bird Area
IUCN	International Union for the Conservation of Nature
LoM	Life of Mine
MAP	Mean Annual Precipitation
MAPE	Mean Annual Potential for Evaporation
MASMS	Mean Annual Soil Moisture Stress
MAT	Mean Annual Temperature
MFD	Mean Frost Days
MPRDA	Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002)
NBA	National Biodiversity Assessment (2011)
NEMA	National Environmental Management Act, 1998 (Act 107 of 1998)
NEMBA	National Environmental Management Biodiversity Act, 2004 (Act 10 of 2004)
NPAES	National Protected Areas Expansion Strategy
NT	Near Threatened
PES	Present Ecological State
PRECIS	Pretoria Computer Information Systems
QDS	Quarter Degree Square (1:50,000 topographical mapping references)
RDL	Red Data List
SABAP 2	Southern African Bird Atlas 2
SANBI	South African National Biodiversity Institute
SAPAD	South Africa Protected Area Database
SCC	Species of Conservation Concern
STS	Scientific Terrestrial Services CC
TSP	Threatened Species Programme
VU	Vulnerable



1 INTRODUCTION

Scientific Terrestrial Services (STS) was appointed to conduct a Biodiversity Assessment as part of the environmental impact assessment and authorisation process for the proposed Mamatwan Mine Project, near Hotazel, Northern Cape Province. The Mamatwan Mine (MMT) is located within the John Taolo Gaetsewe District Municipality and the Joe Morolong Local Municipality.

The MMT is situated approximately 17km south of the town of Hotazel, 32,6km north of the town of Kathu and 43km west of the town of Kuruman. The R380 runs directly adjacent to the MMT in a north-south direction from Hotazel to Kathu, the M31 roadway is located approximately 14km east of MMT and the N14 highway is located approximately 24km southeast of the MMT. The MMT Mine is situated south of the UMK Mining Right Area (MRA), and east of the Tsipi MRA. The location and extent is indicated in Figures 1 & 2.

The proposed MMT expansion activities include the following, and will henceforth collectively be referred to as the “study area” (Figure 3):

- Development of a top-cut stockpile; and crushing and screening plant;
- Construction and operation of a railway loop and associated infrastructure; and
- Installation of a pipeline: Three alternatives are proposed, with alternative 1 considered as the preferred alternative by the proponent.

The purpose of this report (Part A) is to define the biodiversity of the study area from a desktop conservation database perspective. It is the objective of this desktop assessment to provide detailed information to guide the fieldwork components (discussed in Parts B and C) to ensure that all relevant ecological aspects are considered prior to performing the field assessments. This report is not a standalone report and should be considered together with the outcome of the biodiversity assessments (Part B and C).

1.1 Project Description

South32 operates the opencast manganese Mamatwan Mine, part of the legal entity of Hotazel Manganese Mines (Pty) Ltd, which started operations in 1963. MMT holds the following environmental permits and authorisations:

- A Mining right (Reference number: NC 256 MR) issued and approved by the former Department of Minerals and Energy (DME) (currently the Department of Mineral Resources (DMR)) in May 2006;
- An Environmental Management Programme (EMP reference number NC 6/2/2/118) that was approved in November 2005;



- An Air Emissions Licence (AEL) (Licence number: NC/AEL/NDM/ZRH01/2014) issued by the Northern Cape Department of Environment and Nature Conservation (DENC) in March 2015;
- An amended Integrated Water Use Licence (IWUL) License number: 10/D41K/AGJ/1537) issued by the Department of Water and Sanitation (DWS) in January 2012 as amended in October 2017; and
- An Environmental Authorisation (Reference number: NC/KGA/HOT3/07) for bulk fuel storage issued by former Department of Tourism, Environment and Conservation (currently DENC) in July 2007.

MMT proposes to undertake an integrated regulatory process to cater for layout/activity changes that have already taken place as well as proposed layout/activity changes to be undertaken in future. The table below provides further information.

Table 1: Summary of the changes that have already taken place as well as proposed changes at the MMT.

1. Layout changes and activities that have already taken place	
Layout changes that have already taken place	Activities that have already taken place
➤ Expansion of the north eastern and south eastern waste rock dump;	➤ The use of Adam's pit for the disposal of mine wastewater, tailings and storage of product
➤ Establishment and changes to the rehabilitation criteria of waste rock dumps	➤ The abstraction of mine water from Adam's pit for dust suppression
➤ Expansion of the stockyard	➤ Irrigation of gardens and veld using treated sewage effluent
➤ Potable and process water storage facilities	
2. Proposed layout changes and activities	
Proposed layout changes	Proposed activity changes
➤ Establishment of a top-cut stockpile and associated crushing and screening plant	➤ Sale of waste rock as aggregate
➤ Establishment of stormwater management infrastructure	➤ Re-processing of the Dense Medium Separation (DMS) and Sinter Fines
➤ Changes to waste rock dump height	
➤ Establishment of a pipeline to transport abstracted water from Middelplaats to MMT	
➤ Upgrading the railway and railway loadout station	

All activities already in progress or layout changes already implemented (Section 1 of Table 1) for which environmental authorisation have not been obtained have been assessed by STS as part of the S24G rectification assessment (STS, 2019). The current study focused on all proposed layout/activity changes as highlighted in Section 2 of Table 1 above and are discussed in greater detail below. Refer to Figure 3 below for all proposed layout/activity changes assessed during the current field assessment.



1.1.1 Proposed layout changes and activities

Top-cut stockpile and crushing and screening plant

Additional storage space is required to stockpile top-cut material prior to processing at the sinter plant. The top-cut material will need to be subjected to crushing and screening via a mobile crushing and screening plant, prior to the material being sent to the sinter plant. The estimated height for the proposed top-cut stockpile is between 50 m and 80 m at a maximum, which corresponds with the adjacent waste rock dumps.

Abstraction boreholes and water pipeline alternatives

MMT further proposes to abstract water from the Middelplaats Mine as and when water is not available from the open pit (dewatering) or from the Vaal Gamagara Water Pipeline. Water will be abstracted via two proposed boreholes. A pipeline to transfer the water from the Middelplaats Mine to MMT will need to be established. Three alternative routes are being considered with Alternative 1 the preferred route option.

Increased capacity of the Manganese rail line

Transnet Freight Rail (TFR) plans to increase the capacity of the Manganese rail line. In order to meet the TFR expansion requirements the loading rate of trains at the MMT needs to be increased. The plan to achieve this will be through the establishment of a new railway loop, new loadout station, product stockpile areas, stacker and reclaimers (Figure 3).

New offices and parking areas

Part of the expansion will include the construction of new site offices for contractors laydown areas as well as additional parking for contractors and staff (Figure 3).



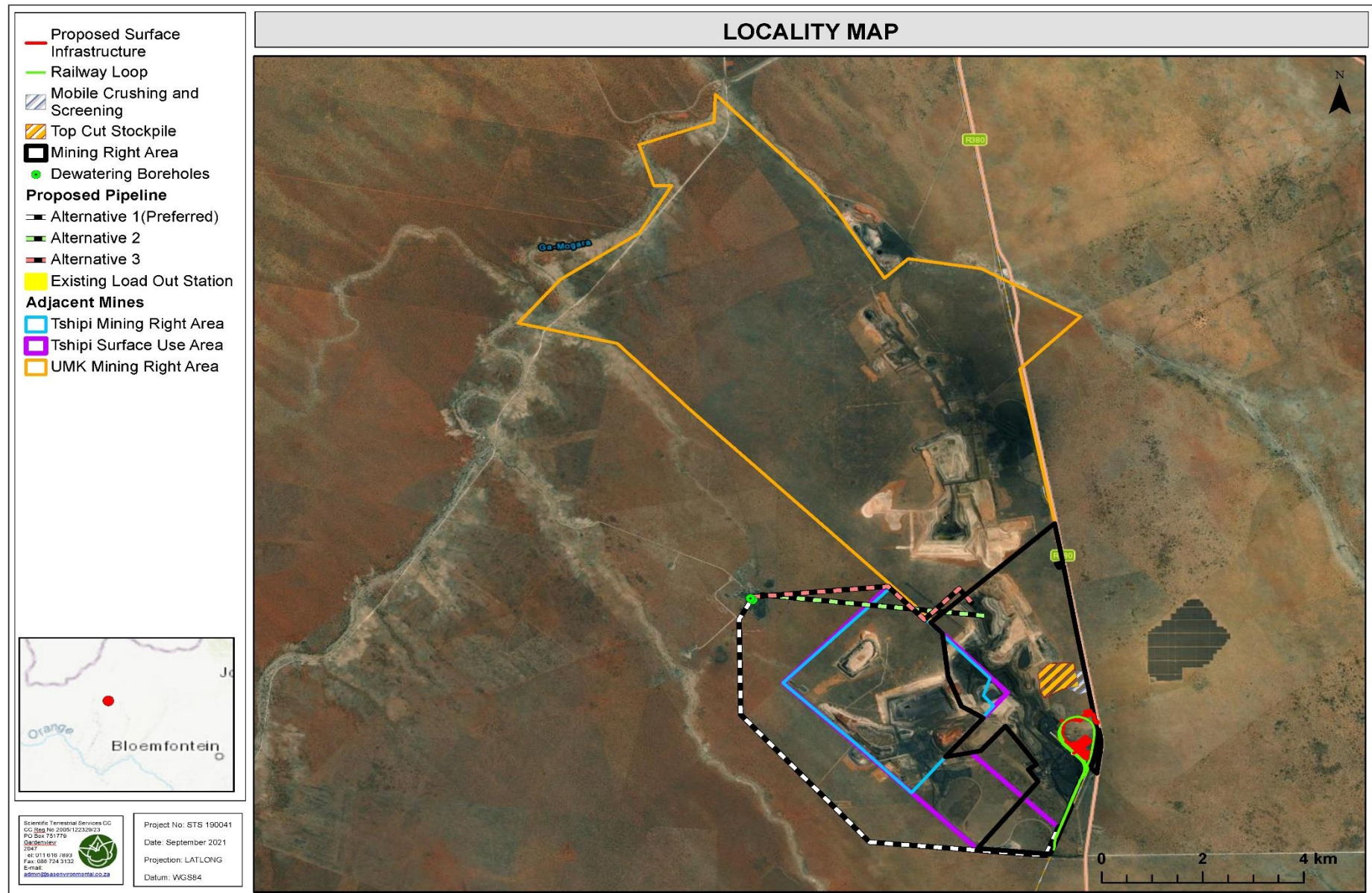


Figure 1: The Mamatwan Mining Right Area, proposed infrastructure expansion areas as well as surrounding mine boundaries indicated on digital satellite imagery.



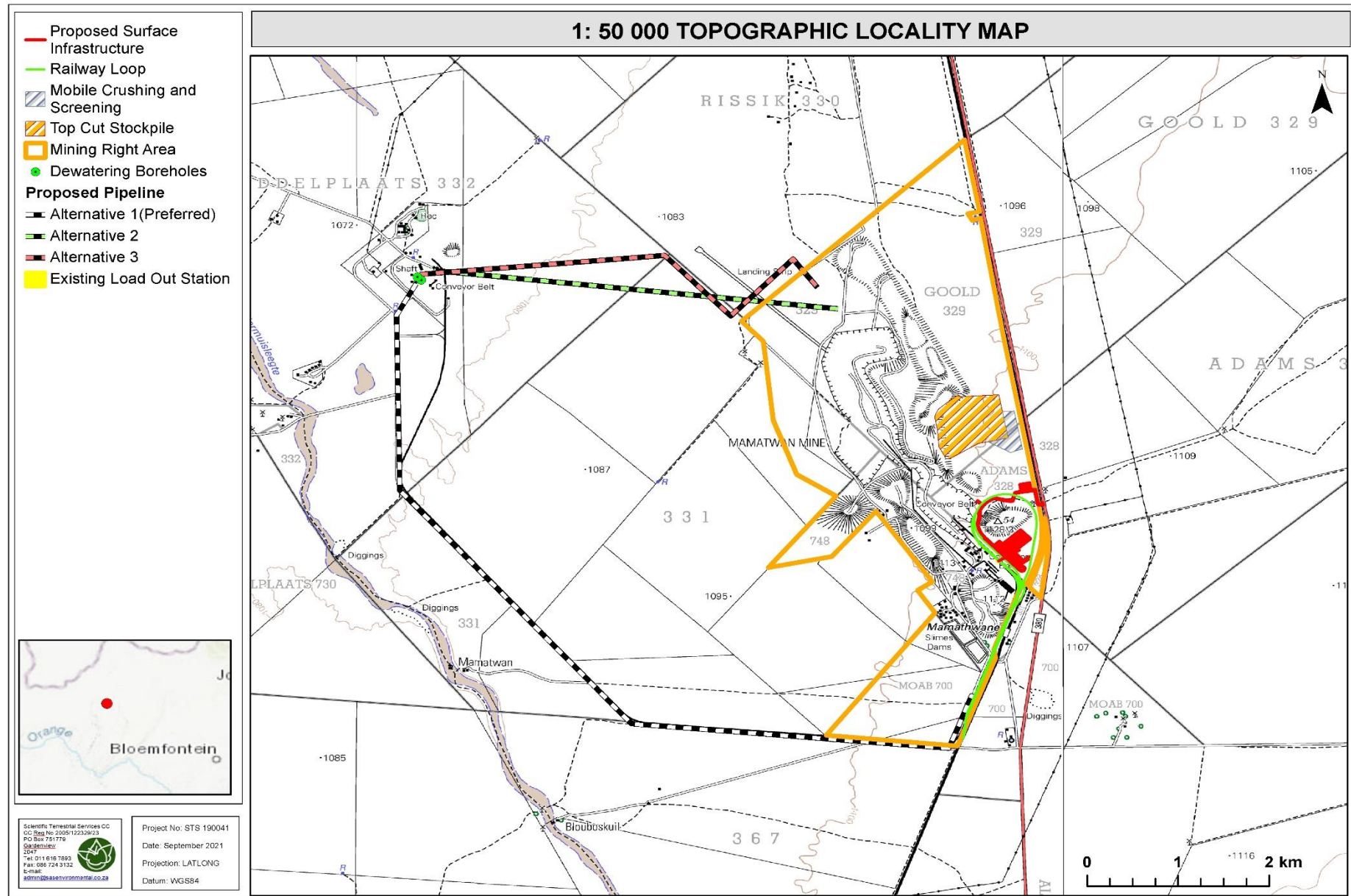


Figure 2: The study area depicted on a 1:50 000 topographical map in relation to the surrounding area.



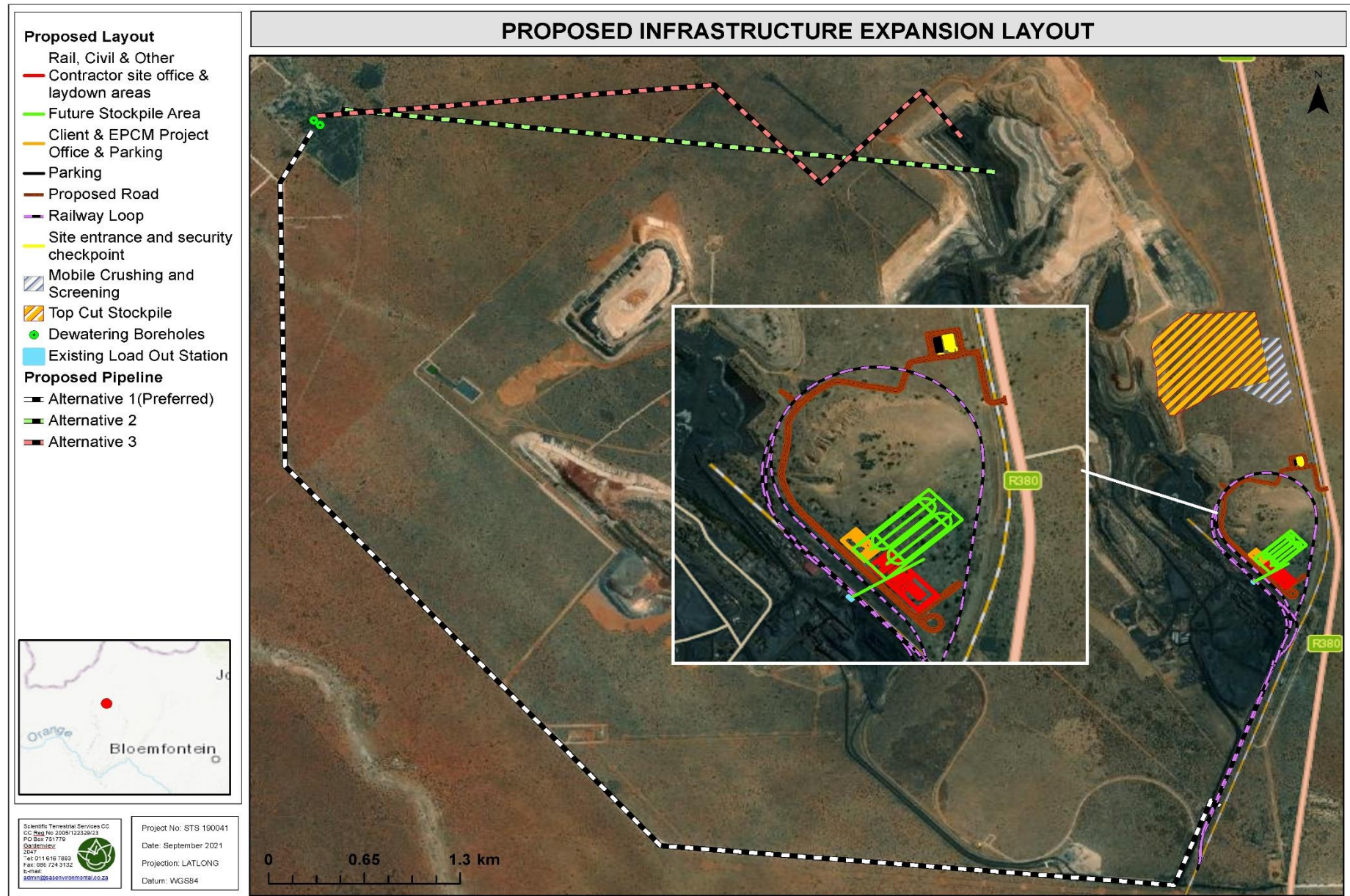


Figure 3: Proposed expansion activities of the Mamatwan Mine.



1.2 Scope of Work

Specific outcomes in terms of the report (Part A) are as follows:

- Compile a desktop assessment with all relevant information as presented by the South African National Biodiversity Institute (SANBI)'s Biodiversity Geographic Information Systems (BGIS) website (<http://bgis.sanbi.org>), including the National Biodiversity Assessment (2018), Mining and Biodiversity Guidelines (2013) and the Northern Cape Critical Biodiversity Areas database (2016);
- To outline the legislative requirements that were considered for the assessment (Appendix B); and
- To provide the methodologies followed relating to the impact assessment and development of the mitigation measures (Appendix C) that was applied in the biodiversity assessments.

1.3 Assumptions and Limitations

The following assumptions and limitations are applicable to this report:

- The biodiversity desktop assessment is confined to the study area and does not include detailed results of the neighbouring and adjacent properties; although the sensitivity of surrounding areas is included on the respective maps; 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 actual site characteristics within the study area at the scale required to inform the EIA process. However, this information is considered useful as background information to the study and, based on the desktop results, sufficient decision making can take place with regards to the development activities.



1.4 Legislative Requirements

The following legislative requirements were considered during the assessment:

- The Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996);
- The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA);
- The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA);
- The Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA)
- Government Notice R598 Alien and Invasive Species Regulations as published in the Government Gazette 37885 dated 1 August 2014 as it relates to the National Environmental Management Biodiversity Act, 1998 (Act 107 of 1998);
- The Conservation of Agricultural Resource Act, 1983 (Act No. 43 of 1983) (CARA);
- The National Forest Act, 1998 (Act No. 84 of 1998, amended 2001) (NFA);
- Government Notice 536 List of Protected Tree Species as published in the Government Gazette 41887 dated 7 September 2018 as it relates to the National Forest Act, 1998 (Act No. 84 of 1998); and
- The Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009) (NCNCA).

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

Maps and digital satellite images were generated prior to the field assessment in order to determine broad habitats, vegetation types and potentially sensitive sites. Relevant databases and documentation that were considered during the assessment of the study area included:

- National Protected Areas Expansion Strategy (NPAES) Focus Areas for Protected Area Expansion, 2009 (Formally and Informally Protected Areas);
- South Africa Conservation Area Database, Quarter 3, 2019;
- South Africa Protected Area Database, Quarter 3, 2019;
- South African National Biodiversity Institute (SANBI) Threatened Species Programme (TSP);
- Northern Cape Critical Biodiversity Areas (2016);
- Mucina and Rutherford, 2018:
 - Biomes, Bioregions and Vegetation Type(s);



- National Biodiversity Assessment, 2018;
- Mining and Biodiversity Guidelines, 2013;
- Important Bird and Biodiversity Areas (IBAs), 2015, in conjunction with the South African Bird Atlas Project (SABAP2); and
- 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 Study Area 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 2). 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 are provided.



Table 2: Summary of the conservation characteristics for the study area – falling within the Quarter Degree Square (QDS) 2722BD.

CONSERVATION DETAILS PERTAINING TO THE STUDY AREA (VARIOUS DATABASES)		DESCRIPTION OF THE VEGETATION TYPE(S) RELEVANT TO THE STUDY AREA (MUCINA & RUTHERFORD 2006; 2018)						
NBA (2018) (Figure 4)	According to the National Biodiversity Assessment (2018), the majority of the study area is classified as falling within the remaining extent of the Kathu Bushveld (Least Concern (LC)), except where expansion activities are situated within existing mining areas. According to the NBA (2018), the vegetation type is poorly protected (PP). Ecosystem types are categorised as “not protected”, “poorly protected”, “moderately protected” and “well-protected” based on the proportion of each ecosystem type that occurs within a protected area recognised in the Protected Areas Act, 2003 (Act No. 57 of 2003), and compared with the biodiversity target for that ecosystem type. Ecosystems not occurring within any protected area, or where less than 50% of the biodiversity target has been met, are considered “poorly protected”.	Biome	According to Mucina and Rutherford (2012), the study area is located within the Savanna Biome .					
		Bioregion	The proposed study area is situated within the Eastern Kalahari Bushveld Bioregion .					
		Vegetation Type	The proposed study area falls within the Kathu Bushveld (SVk 12) vegetation type.					
		Climate	Summer and autumn rainfall with very dry winters.					
		Altitude (m)	MAP* (mm)	MAT* (°C)	MFD* (Days)	MAPE* (mm)	MASMS* (%)	
		960–1300	300	18.5	27	2883	85	
SAPAD (2019); SACAD (2019) and NPAES (2009)	According to the National Protected Areas Expansion Strategy (NPAES, 2009) database, the South African Protected Area Database (SAPAD, 2019) and the South African Conservation Areas Database (SACAD, 2019) the study area does not fall within a protected or conservation area or nature reserve, nor is it situated within 10 km of a formal protected area.	Distribution	Northern Cape Province: Plains from Kathu and Dibeng in the south, through Hotazel, vicinity of Frylinckspan to the Botswana border roughly between Van Zylsrus and McCarthysrus.					
		Geology & Soils	Aeolian red sand and surface calcrete, deep (>1.2 m) sandy soils of Hutton and Clovelly soil forms. Land types mainly Ah and Ae, with some Ag (Mucina & Rutherford, 2012). This soil data is for the vegetation type as identified by Mucina & Rutherford as a whole, and not specific to the study area.					
		Conservation	Least threatened. Target 16%. None conserved in statutory conservation areas. More than 1% already transformed, including the iron ore mining locality at Sishen, one of the biggest open-cast mines in the world. Erosion is very low.					
Northern Cape CBAs (Figure 5)	According to the Northern Cape Critical Biodiversity Areas (2016) database, the study area is not associated with any CBAs, but where vegetation remains is classified as other natural areas. An Ecological Support Area (ESA) is however situated 320 m southwest of the Proposed Pipeline Alternative 1. This indicates that although portions within the study area is considered as natural vegetation, these areas are not considered important for preserving a specific ecosystem, species, nor is it considered important for maintaining long-term ecological functioning in the landscape as a whole	Vegetation & landscape features	Medium-tall tree layer with <i>Vachellia erioloba</i> in places, but mostly open and including <i>Boscia albitrunca</i> as the prominent trees. Shrub layer generally most important with, for example, <i>Senegalia mellifera</i> , <i>Diospyros lycioides</i> and <i>Lycium hirsutum</i> . The grass layer is variable in cover.					
IBA (2015)	The study area does not fall within an Important Bird and Biodiversity Area (IBA, 2015), nor is it located within 10 km of an IBA.	Biogeographically Important Taxa (Kalahari endemics) <u>Small Tree</u> : <i>Vachellia luederitzii</i> var. <i>luederitzii</i> . <u>Graminoids</u> : <i>Anthephora argentea</i> , <i>Megaloprotachne albescens</i> , <i>Panicum kalaharensense</i> . <u>Herb</u> : <i>Neuradopsis bechuanensis</i> .						
IMPORTANCE OF THE STUDY AREA ACCORDING TO THE MINING AND BIODIVERSITY GUIDELINES (2013)								
In terms of the mining and biodiversity guidelines (2013) the study area does not fall into any biodiversity priority areas and there is therefore no mining development constraints placed on the study area.								



NORTHERN CAPE PROVINCIAL SPATIAL DEVELOPMENT FRAMEWORK (NCPSDF, 2019)

The NCPSDF is to function as an innovative strategy that will apply sustainability principles to all forms of land use management throughout the Northern Cape as well as to facilitate practical results, as it relates to the eradication of poverty and inequality and the protection of the integrity of the environment.

The study area also falls within the Gamagara corridor. The Gamagara Corridor comprises the mining belt of the John Taolo Gaetsewe and Siyanda districts and runs from Lime Acres and Danielskuil to Hotazel in the north. The corridor focuses on the mining of iron and manganese.

CBA = Critical Biodiversity Areas; ESA = Ecological Support Area; IBA = Important Bird and Biodiversity Areas; MAP – Mean annual precipitation; MAT – Mean annual temperature; MAPE – Mean annual potential evaporation; MFD = Mean Frost Days; MASMS – Mean annual soil moisture stress (% of days when evaporative demand was more than double the soil moisture supply); NBA = National Biodiversity Assessment; NPAES = National Protected Areas Expansion Strategy; SACAD = South African Conservation Areas Database, SAPAD = South African Protected Areas Database.



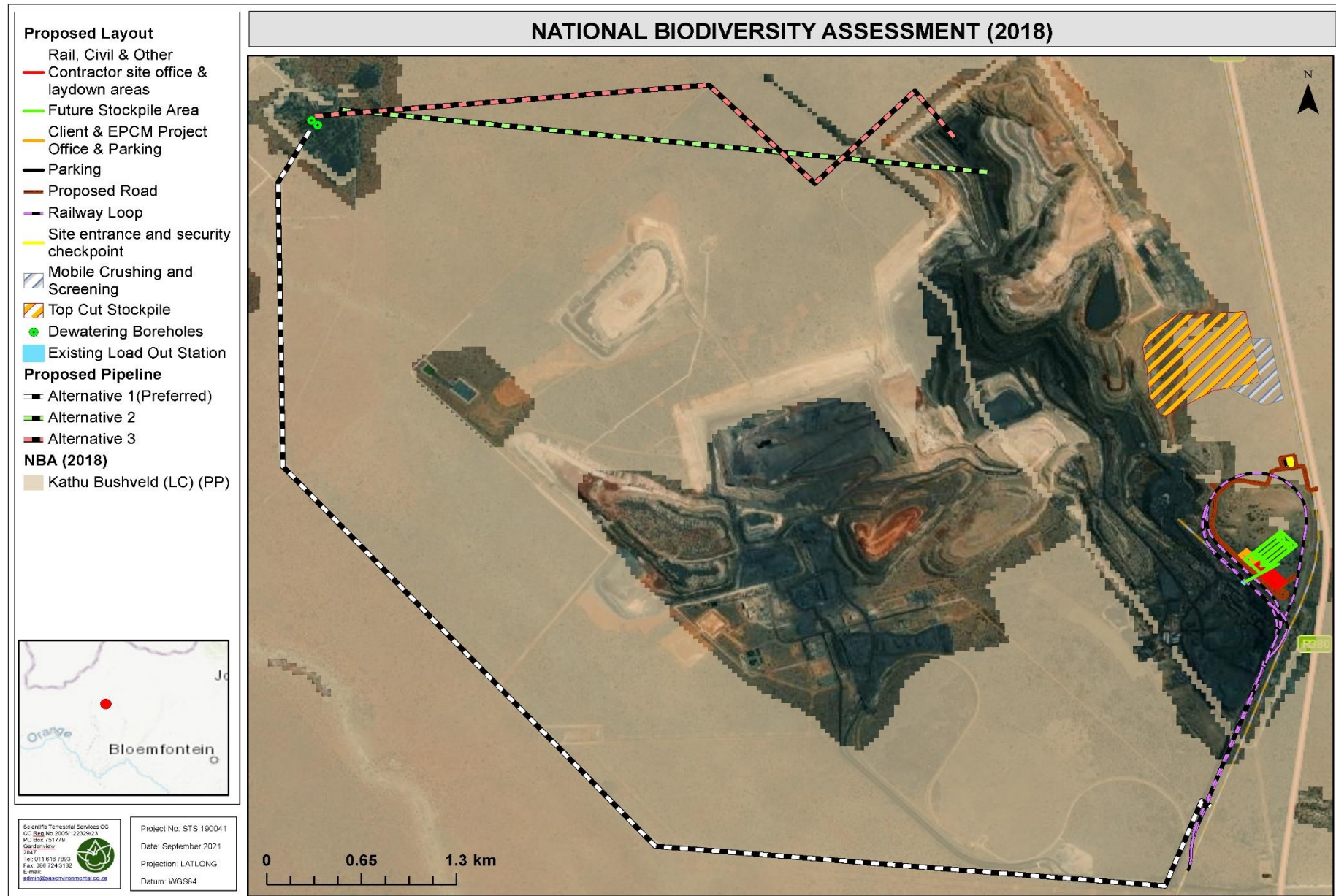


Figure 4: Remaining extent of the Kathu Bushveld (LC) (PP) vegetation type according to the National Biodiversity Assessment (2018).



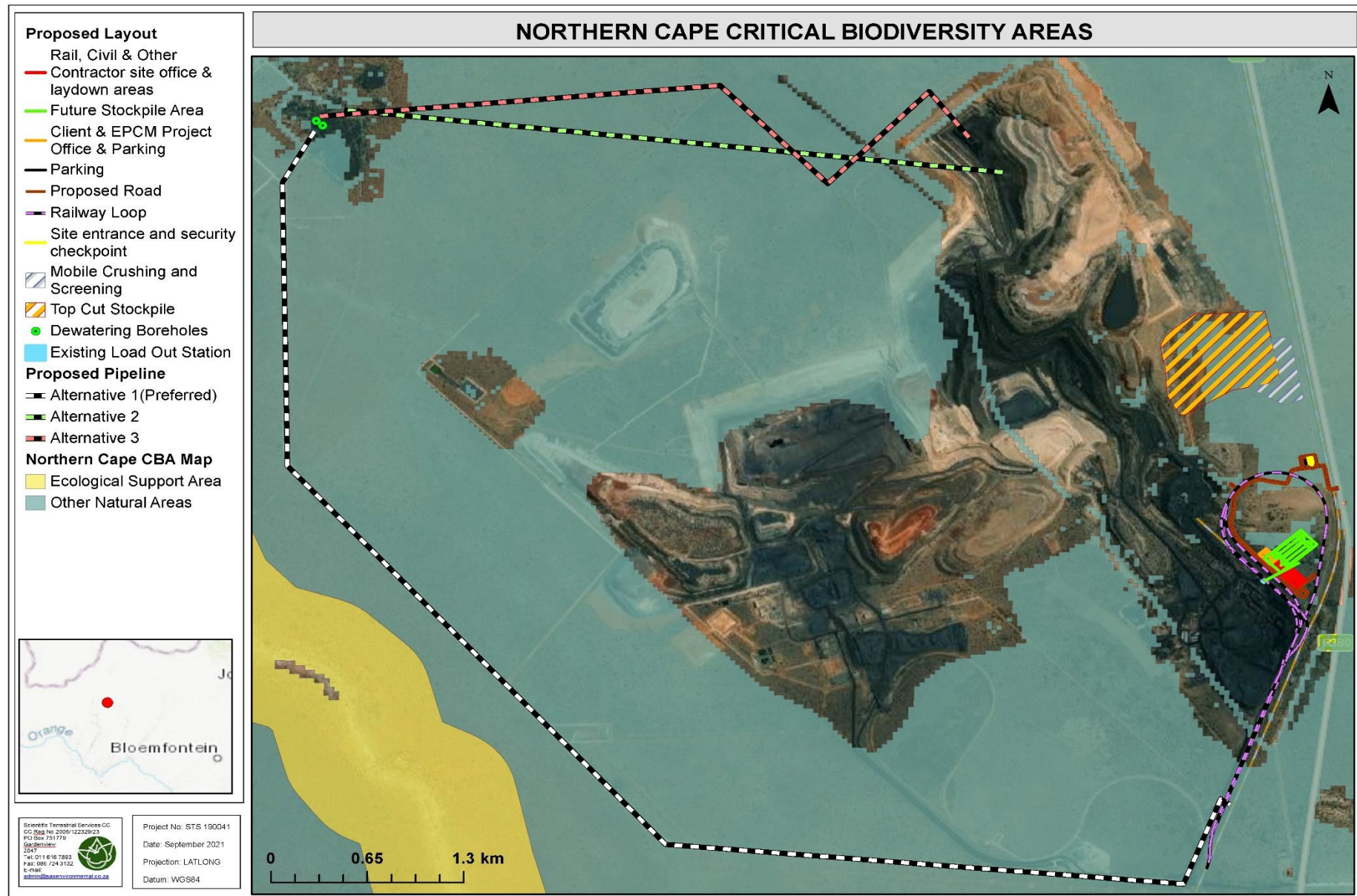


Figure 5: Ecological Support Areas (ESA) in close proximity to the study area according to the Northern Cape CBA Map (2016).



4 STRUCTURE OF THE REPORT

Part A of this report served to provide an introduction to the study area, as well as the general approach to the study. Part 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.

Part B presents the results of the floral field assessment, data analyses and discussion of the results. The section then presents the results of the impact assessment where the impacts on floral ecology and biodiversity are discussed.

Part C presents the results of the faunal field assessment, data analyses and discussion of the results. The section then presents the results of the impact assessment where the impacts on faunal ecology and biodiversity are discussed.



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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 seasonality, time and budgetary constraints relevant to the type and level of investigation undertaken as well as the project program and STS CC and its staff, at their sole discretion, 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.

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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

The Constitution of the Republic of South Africa, 1996 (Act 108 of 1996)

The environment and the health and well-being of people are safeguarded under the Constitution of the Republic of South Africa, 1996 by way of section 24. Section 24(a) guarantees a right to an environment that is not harmful to human health or well-being and to environmental protection for the benefit of present and future generations. Section 24(b) directs the state to take reasonable legislative and other measures to prevent pollution, promote conservation, and secure the ecologically sustainable development and use of natural resources (including water and mineral resources) while promoting justifiable economic and social development. Section 27 guarantees every person the right of access to sufficient water, and the state is obliged to take reasonable legislative and other measures within its available resources to achieve the progressive realisation of this right. Section 27 is defined as a socio-economic right and not an environmental right. However, read with section 24 it requires of the state to ensure that water is conserved and protected and that sufficient access to the resource is provided. Water regulation in South Africa places a great emphasis on protecting the resource and on providing access to water for everyone.

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

The National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) and the associated Environmental Impact Assessment (EIA) Regulations (GN R326 as amended in 2017 and well as listing notices 1, 2 and 3 (GN R327, R325 and R324 of 2017), state that prior to any development taking place which triggers any activity as listed within the abovementioned regulations, an environmental authorisation process needs to be followed. This could follow either the Basic Assessment process or the Environmental Impact Assessment process depending on the nature of the activity and scale of the impact.

The Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002) (MPRDA)

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).

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

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 bioprospecting 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.

Government Notice 598 Alien and Invasive Species Regulations (2014), including the Government Notice 864 Alien Invasive Species List as published in the Government Gazette 40166 of 2016, as it relates to the National Environmental Management Biodiversity Act, 2004 (Act No 10 of 2004);

NEMBA is administered by the Department of Environmental Affairs and aims to provide for the management and conservation of South Africa's biodiversity within the framework of the NEMA. In terms of alien and invasive species. This act in terms of alien and invasive species aims to:

- Prevent the unauthorized 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 minimize harm to the environment and biodiversity; and
- Eradicate alien species and invasive species from ecosystems and habitats where they may harm such ecosystems or habitats.

Alien species are defined, in terms of the National Environmental Management: Biodiversity Act, 2004 (Act no 10 of 2004) as:

- (a) A species that is not an indigenous species; or
- (b) An indigenous species translocated or intended to be translocated to a place outside its natural distribution range in nature, but not an indigenous species that has extended its natural distribution range by natural means of migration or dispersal without human intervention.

Categories according to NEMBA (Alien and Invasive Species Regulations, 2017):

- **Category 1a:** Invasive species that require compulsory control;
- **Category 1b:** Invasive species that require control by means of an invasive species management programme;
- **Category 2:** Commercially used plants that may be grown in demarcated areas, provided that there is a permit and that steps are taken to prevent their spread; and
- **Category 3:** Ornamentally used plants that may no longer be planted.

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

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.

September 2011)

According to the department of Agriculture, Land Reform and Rural Development (previously the Department of Agriculture, Forestry and Fisheries (DAFF)) ©2019 website (<https://www.daff.gov.za/daffweb3/>): "In terms of the National Forests Act of 1998 certain tree species (types of trees) can be identified and declared as protected. The Department of Water Affairs and Forestry followed an objective, scientific and participative process to arrive at the new list of protected tree species, enacted in 2004. All trees occurring in natural forests are also protected in terms of the Act. Protective actions take place within the framework of the Act as well as national policy and guidelines. Trees are protected for a variety of reasons, and some species require strict protection while others require control over harvesting and utilization."

Applicable sections of the NFA pertaining to the proposed project include the below:

Section 12:

Declaration of trees as protected

- (1) The Minister may declare-



- a) particular tree,
 - b) a particular group of trees,
 - c) a particular woodland; or
 - d) trees belonging to a particular species,
- to be a protected tree, group of trees, woodland or species.

(2) The Minister may make such a declaration only if he or she is of the opinion that the tree, group of trees, woodland or species is not already adequately protected in terms of other legislation.

(3) In exercising a discretion in terms of this section, the Minister must consider the principles set out in section 3(3) of the NFA.

Section 15(1):

No person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a licence granted by the Minister or in terms of an exemption from the provisions of this subsection published by the Minister in the Gazette.

Contravention of this declaration is regarded as a first category offence that may result in a person who is found guilty of being.

For the latest list of protected trees refer to: Government Notice 536 List of Protected Tree Species as published in the Government Gazette 41887 dated 7 September 2018.

The Northern Cape Nature Conservation Act (NCNCA, Act No 9 of 2009)

The purpose of this Act is to provide for the sustainable utilisation of wild animals, aquatic biota and plants; to provide for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora; to provide for offences and penalties for contravention of the Act; to provide for the appointment of nature conservators to implement the provisions of the Act; to provide for the issuing of permits and other authorisations; and to provide for matters connected therewith.

Restricted activities involving specially protected plants:

49(1) No person may, without a permit –

- (a) Pick;
- (b) Import;
- (c) Export;
- (d) Transport;
- (e) Possess;
- (f) Cultivate; or
- (g) 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 –

- (a) Pick;
- (b) Import;
- (c) Export;
- (d) Transport;
- (e) Cultivate; or
- (f) Trade in,

A specimen of a protected plant.



APPENDIX C: Impact Assessment Methodology

Ecological Impact Assessment Method

The method to be used for assessing risks/impacts is outlined in the sections below.

PART A: DEFINITIONS AND CRITERIA*		
Definition of SIGNIFICANCE	Significance = consequence x probability	
Definition of CONSEQUENCE	Consequence is a function of intensity, spatial extent and duration	
Criteria for ranking of the INTENSITY of environmental impacts	VH	Severe change, disturbance or degradation. Associated with severe consequences. May result in severe illness, injury or death. Targets, limits and thresholds of concern continually exceeded. Substantial intervention will be required. Vigorous/widespread community mobilisation against the project can be expected. May result in legal action if impact occurs.
	H	Prominent change, disturbance or degradation. Associated with real and substantial consequences. May result in illness or injury. Targets, limits and thresholds of concern regularly exceeded. Will definitely require intervention. Threats of community action. Regular complaints can be expected when the impact takes place.
	M	Moderate change, disturbance or discomfort. Associated with real but not substantial consequences. Targets, limits and thresholds of concern may occasionally be exceeded. Likely to require some intervention. Occasional complaints can be expected.
	L	Minor (Slight) change, disturbance or nuisance. Associated with minor consequences or deterioration. Targets, limits and thresholds of concern rarely exceeded. Require only minor interventions or clean-up actions. Sporadic complaints could be expected.
	VL	Negligible change, disturbance or nuisance. Associated with very minor consequences or deterioration. Targets, limits and thresholds of concern never exceeded. No interventions or clean-up actions required. No complaints anticipated.
	VL+	Negligible change or improvement. Almost no benefits. Change not measurable/will remain in the current range.
	L+	Minor change or improvement. Minor benefits. Change not measurable/will remain in the current range. Few people will experience benefits.
	M+	Moderate change or improvement. Real but not substantial benefits. Will be within or marginally better than the current conditions. A small number of people will experience benefits.
	H+	Prominent change or improvement. Real and substantial benefits. Will be better than current conditions. Many people will experience benefits. General community support.
	VH+	Substantial, large-scale change or improvement. Considerable and widespread benefit. Will be much better than the current conditions. Favourable publicity and/or widespread support expected.
Criteria for ranking the DURATION of impacts	VL	Very short, always less than a year. Quickly reversible
	L	Short-term, occurs for more than 1 but less than 5 years. Reversible over time.
	M	Medium-term, 5 to 10 years.
	H	Long term, between 10 and 20 years. (Likely to cease at the end of the operational life of the activity)
	VH	Very long, permanent, +20 years (Irreversible. Beyond closure)
Criteria for ranking the EXTENT of impacts	VL	A part of the site/property.
	L	Whole site.
	M	Beyond the site boundary, affecting immediate neighbours
	H	Local area, extending far beyond site boundary.
	VH	Regional/National



PART B: DETERMINING CONSEQUENCE							
INTENSITY = VL							
DURATION	Very long	VH	Low	Low	Medium	Medium	High
	Long term	H	Low	Low	Low	Medium	Medium
	Medium term	M	Very Low	Low	Low	Low	Medium
	Short term	L	Very low	Very Low	Low	Low	Low
	Very short	VL	Very low	Very Low	Very Low	Low	Low
INTENSITY = L							
DURATION	Very long	VH	Medium	Medium	Medium	High	High
	Long term	H	Low	Medium	Medium	Medium	High
	Medium term	M	Low	Low	Medium	Medium	Medium
	Short term	L	Low	Low	Low	Medium	Medium
	Very short	VL	Very low	Low	Low	Low	Medium
INTENSITY = M							
DURATION	Very long	VH	Medium	High	High	High	Very High
	Long term	H	Medium	Medium	Medium	High	High
	Medium term	M	Medium	Medium	Medium	High	High
	Short term	L	Low	Medium	Medium	Medium	High
	Very short	VL	Low	Low	Low	Medium	Medium
INTENSITY = H							
DURATION	Very long	VH	High	High	High	Very High	Very High
	Long term	H	Medium	High	High	High	Very High
	Medium term	M	Medium	Medium	High	High	High
	Short term	L	Medium	Medium	Medium	High	High
	Very short	VL	Low	Medium	Medium	Medium	High
INTENSITY = VH							
DURATION	Very long	VH	High	High	Very High	Very High	Very High
	Long term	H	High	High	High	Very High	Very High
	Medium term	M	Medium	High	High	High	Very High
	Short term	L	Medium	Medium	High	High	High
	Very short	VL	Low	Medium	Medium	High	High
			VL	L	M	H	VH
			A part of the site/ property	Whole site	Beyond the site, affecting neighbours	Extending far beyond site but localised	Regional/ National
			EXTENT				

PART C: DETERMINING SIGNIFICANCE							
PROBABILITY (of exposure to impacts)	Definite/ Continuous	VH	Very Low	Low	Medium	High	Very High
	Probable	H	Very Low	Low	Medium	High	Very High
	Possible/ frequent	M	Very Low	Very Low	Low	Medium	High
	Conceivable	L	Insignificant	Very Low	Low	Medium	High
	Unlikely/ improbable	VL	Insignificant	Insignificant	Very Low	Low	Medium
			VL	L	M	H	VVH
			CONSEQUENCE				



PART D: INTERPRETATION OF SIGNIFICANCE	
Significance	Decision guideline
Very High	Potential fatal flaw unless mitigated to lower significance.
High	It must have an influence on the decision. Substantial mitigation will be required.
Medium	It should have an influence on the decision. Mitigation will be required.
Low	Unlikely that it will have a real influence on the decision. Limited mitigation is likely required.
Very Low	It will not have an influence on the decision. Does not require any mitigation
Insignificant	Inconsequential, not requiring any consideration.

*VH = very high, H = high, M= medium, L= low and VL= very low and + denotes a positive impact.

Mitigation measure development

According to the DEA *et al.*, (2013) “Rich biodiversity underpins the diverse ecosystems that deliver ecosystem services that are of benefit to people, including the provision of basic services and goods such as clean air, water, food, medicine and fibre; as well as more complex services that regulate and mitigate our climate, protect people and other life forms from natural disaster and provide people with a rich heritage of nature-based cultural traditions. Intact ecological infrastructure contributes significant savings through, for example, the regulation of natural hazards such as storm surges and flooding by which is attenuated by wetlands”.

According to the DEA *et al.*, (2013) Ecosystem services can be divided into 4 main categories:

- Provisioning services are the harvestable goods or products obtained from ecosystems such as food, timber, fibre, medicine, and fresh water;
- Cultural services are the non-material benefits such as heritage landscapes and seascapes, recreation, ecotourism, spiritual values and aesthetic enjoyment;
- Regulating services are the benefits obtained from an ecosystem’s control of natural processes, such as climate, disease, erosion, water flows, and pollination, as well as protection from natural hazards; and
- Supporting services are the natural processes such as nutrient cycling, soil formation and primary production that maintain the other services.

Loss of biodiversity puts aspects of the economy, wellbeing and quality of life at risk, and reduces socio-economic options for future generations. This is of particular concern for the poor in rural areas who have limited assets and are more dependent on common property resources for their livelihoods. The importance of maintaining biodiversity and intact ecosystems for ensuring on-going provision of ecosystem services, and the consequences of ecosystem change for human well-being, were detailed in a global assessment entitled the Millennium Ecosystem Assessment (MEA, 2005), which established a scientific basis for the need for action to enhance management and conservation of biodiversity.

Sustainable development is enshrined in South Africa’s Constitution and laws. The need to sustain biodiversity is directly or indirectly referred to in a number of Acts, not least the National Environmental Management: Biodiversity Act (No. 10 of 2004) (hereafter referred to as the Biodiversity Act), and is fundamental to the notion of sustainable development. In addition, International guidelines and commitments as well as national policies and strategies are important in creating a shared vision for sustainable development in South Africa (DEA *et al.*, 2013).

The primary environmental objective of the Mineral and Petroleum Resources Development Act (MPRDA) is to give effect to the environmental right contained in the South African Constitution. Furthermore, Section 37(2) of the MPRDA states that “any prospecting or mining operation must be conducted in accordance with generally accepted principles of sustainable development by integrating social, economic and environmental factors into the planning and implementation of prospecting and mining projects in order to ensure that exploitation of mineral resources serves present and future generations”.

Pressures on biodiversity are numerous and increasing. According to the DEA *et al.*, (2013) Loss of natural habitat is the single biggest cause of biodiversity loss in South Africa and much of the world.



The most severe transformation of habitat arises from the direct conversion of natural habitat for human requirements, including¹:

- Cultivation and grazing activities;
- Rural and urban development;
- Industrial and mining activities, and
- Infrastructure development.

Impacts on biodiversity can largely take place in four ways (DEA *et al.*, 2013):

- **Direct impacts:** are impacts directly related to the project including project aspects such as site clearing, water abstraction and discharge of water from riverine resources;
- **Indirect impacts:** are impacts associated with a project that may occur within the zone of influence in a project such as surrounding terrestrial areas and downstream areas on water courses;
- **Induced impacts:** are impacts directly attributable to the project but are expected to occur due to the activities of the project. Factors included here are urban sprawl and the development of associated industries; and
- **Cumulative impacts:** can be defined as the sum of the impact of a project as well as the impacts from past, existing and reasonably foreseeable future projects that would affect the same biodiversity resources. Examples include numerous mining operations within the same drainage catchment or numerous residential developments within the same habitat for faunal or floral species.

Given the limited resources available for biodiversity management and conservation, as well as the need for development, efforts to conserve biodiversity need to be strategic, focused and supportive of sustainable development. This is a fundamental principle underpinning South Africa's approach to the management and conservation of its biodiversity and has resulted the definition of a clear mitigation strategy for biodiversity impacts.

'Mitigation' is a broad term that covers all components of the 'mitigation hierarchy' defined hereunder. It involves selecting and implementing measures – amongst others – to conserve biodiversity and to protect, the users of biodiversity and other affected stakeholders from potentially adverse impacts as a result of mining or any other land use. The aim is to prevent adverse impacts from occurring or, where this is unavoidable, to limit their significance to an acceptable level. Offsetting of impacts is considered to be the last option in the mitigation hierarchy for any project.

The mitigation hierarchy in general consists of the following in order of which impacts should be mitigated (DEA *et al.*, 2013):

- **Avoid/prevent impact:** can be done through utilising alternative sites, technology and scale of projects to prevent impacts. In some cases, if impacts are expected to be too high the "no project" option should also be considered, especially where it is expected that the lower levels of mitigation will not be adequate to limit environmental damage and eco-service provision to suitable levels;
- **Minimise impact:** can be done through utilisation of alternatives that will ensure that impacts on biodiversity and ecoservices provision are reduced. Impact minimisation is considered an essential part of any development project;
- **Rehabilitate impact:** is applicable to areas where impact avoidance and minimisation are unavoidable where an attempt to re-instate impacted areas and return them to conditions which are ecologically similar to the pre-project condition or an agreed post project land use, for example arable land. Rehabilitation can however not be considered as the primary mitigation tool as even with significant resources and effort rehabilitation that usually does not lead to adequate replication of the diversity and complexity of the natural system. Rehabilitation often only restores ecological function to some degree to avoid ongoing negative impacts and to minimise aesthetic damage to the setting of a project. Practical rehabilitation should consist of the following phases in best practice:
 - **Structural rehabilitation** which includes physical rehabilitation of areas by means of earthworks, potential stabilisation of areas as well as any other activities required to develop a long terms sustainable ecological structure;

¹ Limpopo Province Environment Outlook. A Report on the State of the Environment, 2002. Chapter 4.



- **Functional rehabilitation** which focuses on ensuring that the ecological functionality of the ecological resources on the focus area supports the intended post closure land use. In this regard special mention is made of the need to ensure the continued functioning and integrity of wetland and riverine areas throughout and after the rehabilitation phase;
 - **Biodiversity reinstatement** which focuses on ensuring that a reasonable level of biodiversity is re-instated to a level that supports the local post closure land uses. In this regard special mention is made of re-instating vegetation to levels which will allow the natural climax vegetation community of community suitable for supporting the intended post closure land use; and
 - **Species reinstatement** which focuses on the re-introduction of any ecologically important species which may be important for socio-cultural reasons, ecosystem functioning reasons and for conservation reasons. Species re-instatement need only occur if deemed necessary.
- **Offset impact:** refers to compensating for latent or unavoidable negative impacts on biodiversity. Offsetting should take place to address any impacts deemed to be unacceptable which cannot be mitigated through the other mechanisms in the mitigation hierarchy. The objective of biodiversity offsets should be to ensure no net loss of biodiversity. Biodiversity offsets can be considered to be a last resort to compensate for residual negative impacts on biodiversity.

The significance of residual impacts should be identified on a regional as well as national scale when considering biodiversity conservation initiatives. If the residual impacts lead to irreversible loss or irreplaceable biodiversity the residual impacts should be considered to be of *very high significance* and when residual impacts are considered to be of *very high significance*, offset initiatives are not considered an appropriate way to deal with the magnitude and/or significance of the biodiversity loss. In the case of residual impacts determined to have *medium to high significance*, an offset initiative may be investigated. If the residual biodiversity impacts are considered of low significance no biodiversity offset is required.²

In light of the above discussion the following points present the key concepts considered in the development of mitigation measures for the proposed development.

- Mitigation and performance improvement measures and actions that address the risks and impacts³ are identified and described in as much detail as possible.
- Measures and actions to address negative impacts will favour avoidance and prevention over minimisation, mitigation or compensation.
- Desired outcomes are defined and have been developed in such a way as to be measurable events with performance indicators, targets and acceptable criteria that can be tracked over defined periods, with estimates of the resources (including human resource and training requirements) and responsibilities for implementation wherever possible.

Recommendations

Recommendations were developed to address and mitigate impacts associated with the proposed development. These recommendations also include general management measures which apply to the proposed development as a whole. Mitigation measures have been developed to address issues in all phases throughout the life of the operation from planning, through to construction and operation.

² Provincial Guideline on Biodiversity Offsets, Western Cape, 2007.

³ Mitigation measures should address both positive and negative impacts



APPENDIX D: Vegetation Types

Kathu Bushveld (SVk 12)



Figure D1: Open savanna dominated by *Vachellia erioloba*, *Senegalia mellifera* and *Grewia flava* with low cover of *Stipagrostis ciliate* against the red sand east of Oupos, in the Kuruman District north of Kathu. Photo reference: Mucina and Rutherford (2012) p. 522.

Remark One of the most strikingly dominant areas of fairly tall *Vachellia erioloba* is centred on the town of Kathu, which was built around many of these trees.

Table D1: Dominant & typical floristic species of Kathu Bushveld (Mucina & Rutherford, 2012)

Group	Species
Woody Species	
Tall tree	<i>Vachellia erioloba</i> (d)
Small trees	<i>Boscia albitrunca</i> (d), <i>Senegalia mellifera</i> subsp. <i>detinens</i> (d), <i>Terminalia sericea</i> .
Tall shrubs	<i>Diospyros lycioides</i> subsp. <i>lycioides</i> (d), <i>Dichrostachys cinerea</i> , <i>Grewia flava</i> , <i>Gymnosporia buxifolia</i> , <i>Rhigozum brevispinosum</i>
Low shrubs	<i>Aptosimum decumbens</i> , <i>Grewia retinervis</i> , <i>Nolletia arenosa</i> , <i>Sida cordifolia</i> , <i>Tragia dioica</i>
Herbaceous species	
Herbs	<i>Acrotome inflata</i> , <i>Erlangea misera</i> , <i>Gisekia africana</i> , <i>Heliotropium ciliatum</i> , <i>Hermbstaedtia fleckii</i> , <i>Hermbstaedtia odorata</i> , <i>Limeum fenestratum</i> , <i>Limeum viscosum</i> , <i>Lotononis platycarpa</i> , <i>Senna italica</i> subsp. <i>arachoides</i> , <i>Tribulus terrestris</i>
Graminoids	
Grasses	<i>Aristida meridionalis</i> (d), <i>Brachiaria nigropedata</i> (d), <i>Centropodia glauca</i> (d), <i>Eragrostis lehmanniana</i> (d), <i>Schmidtia pappophoroides</i> (d), <i>Stipagrostis ciliata</i> (d), <i>Aristida congesta</i> , <i>Eragrostis biflora</i> , <i>Eragrostis chloromelas</i> , <i>Eragrostis heteromera</i> , <i>Eragrostis pallens</i> , <i>Melinis repens</i> , <i>Schmidtia kalahariensis</i> , <i>Stipagrostis uniplumis</i> , <i>Tragus berteronianus</i> .

*(d) – Dominant species for the vegetation type



APPENDIX E: Declaration and Specialists CV's

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

Marelle Meintjies	BSc Plant Science (University of Pretoria)
Daryl van der Merwe	MSc. Cand. (Conservation Biology) (University of Cape Town)
Nelanie Cloete	MSc Botany and Environmental Management (University of Johannesburg)
Christopher Hooton	BTech Nature Conservation (Tshwane University of Technology)
Kim Marais	BSc (Hons) Zoology (Herpetology) (University of the Witwatersrand)
Stephen van Staden	MSc Environmental Management (University of Johannesburg)

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:	011 615 6240/ 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 (IAIA) South Africa group Member of the Grassland Society of South Africa (GSSA)		

Company of Specialist:	Scientific Terrestrial Services		
Name / Contact person:	Stephen van Staden		
Postal address:	29 Arterial Road West, Oriel, Bedfordview		
Postal code:	2007	Cell:	082 442 7637
Telephone:	011 616 7893	Fax:	011 615 6240/ 086 724 3132
E-mail:	stephen@sasenvgroup.co.za		
Qualifications	MSc (Environmental Management) (University of Johannesburg) BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg) BSc (Zoology, Geography and Environmental Management) (University of Johannesburg)		
Registration / Associations	Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP) Accredited River Health practitioner by the South African River Health Program (RHP) Member of the South African Soil Surveyors Association (SASSO) Member of the Gauteng Wetland Forum		



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

I, Marelie Meintjies, 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

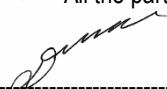


Signature of the Specialist

Signature of the Specialist

I, Daryl van der Merwe, 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



Signature of the Specialist



I, Stephen van Staden, declare that -

- I act as the **independent specialist (reviewer)** 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



Signature of the Specialist

I, Nelanie Cloete, declare that -

- I act as the **independent specialist (reviewer)** 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



Signature of the Specialist

I, Christopher Hooton, declare that -

- I act as the **independent specialist (reviewer)** 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



Signature of the Specialist



I, Kim Marais, declare that -

- I act as the **independent specialist (reviewer)** 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

Kim Marais





SCIENTIFIC TERRESTRIAL SERVICES (STS) – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF MARELIE MEINTJES

PERSONAL DETAILS

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

Terrestrial Assessments

- Floral Ecological Assessment as part of the Environmental Assessment and Authorisation Process for the proposed Leslie 2 underground coal mining operation, Gauteng Province.
- Floral Ecological Assessment as part of the Environmental Assessment and Authorisation Process for the proposed development of Zwavelpoort 373-JR Portions 116 and 130, Pretoria, Gauteng Province
- Floral Ecological assessment for the Jeannette Expansion Project at the Taung Gold International Mine near Welkom, Free State Province.
- Terrestrial Sensitivity Scan as part of the Environmental Authorisation Process for the proposed Sagewood Ext 17 development within the Summerset Area, Gauteng
- Terrestrial Sensitivity Scan as part of the Environmental Authorisation Process for the proposed Kyalami X4 development, Midrand, Gauteng Province
- Terrestrial Ecological Sensitivity Scan as part of the Environmental Assessment and Authorisation Process for the proposed development on erf 199, Witfield, Boksburg, Gauteng Province
- Terrestrial Ecological Scan as part of the Environmental Authorisation Process for the proposed development of Witfontein Ext 87, Gauteng province
- Terrestrial Sensitivity Scan as part of the environmental impact assessment and authorisation process for the proposed development of a pipeline in Kriel, Mpumalanga Province.

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.



Screening Assessment

- Desktop Ecological Assessment and Field Verification Report as part of the Screening Assessment for the Proposed Soweto Power Park Ext 3, Gauteng Province

Miscellaneous Projects

- Desktop Ecological Assessment and Site Sensitivity Report as part of the Elikhulu TSF Facility site selection process, Evander, Mpumalanga Province
- Ecological Screening Assessment, Ground Truthing and Site Sensitivity Report for the Proposed Tubatse SEZ. Steelpoort, Limpopo Province
- Identification of Important Medicinal Plant Species to be rescued and relocated as part of the Rescue and Relocation Plan for the area earmarked for surface infrastructure at the Yzermyn Colliery near Dirkiesdorp, Mpumalanga
- Biodiversity Survey for the BMW Group South Africa at the Rosslyn Manufacturing Plant, Rosslyn, Gauteng Province
- Biodiversity and Ecosystem Health for Limpopo Province, South Africa Thematic Chapter as part of Limpopo Environmental Outlook Report
- Literature Review and Initial Assessment on the control of Alien and Invasive Plants associated with aquatic environments within the City of Johannesburg





SCIENTIFIC TERRESTRIAL SERVICES (STS) – SPECIALIST CONSULTANT INFORMATION – **DARYL VAN DER MERWE**

PERSONAL DETAILS

Position in Company	Ecologist
Date of Birth	28 May 1990
Nationality	South African
Languages	English, Afrikaans
Joined SAS Group of Companies	2019

EDUCATION

Qualifications

BSc Environmental Sciences (University of Pretoria)	2014
BSc (Honours) Plant Science (University of Pretoria)	2015
MSc Conservation Biology Candidate (University of Cape Town)	2019

COUNTRIES OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga and Limpopo

SELECTED PROJECT EXAMPLES

Faunal Assessments

- Terrestrial report as part of environmental assessment and authorisation process for the proposed sewer pipeline from the Dal Fouche Mine to Impala Mine between Springs and Brakpan, Gauteng Province
- Faunal and floral ecological assessment as part of the environmental assessment and authorisation process for the proposed Khwezela Dragline route from the Kromdraai section to Navigation section of the Anglo American LANDAU Colliery near Emalahleni in the Mpumalanga Province

Previous Work Experience

- Two years of environmental consulting at Polygon Environmental Planning, Tzaneen, Limpopo.





SCIENTIFIC TERRESTRIAL SERVICES (STS) – SPECIALIST CONSULTANT INFORMATION CURRICULUM VITAE OF **STEPHEN VAN STADEN**

PERSONAL DETAILS

Position in Company	Managing member, Ecologist, Aquatic Ecologist
Date of Birth	13 July 1979
Nationality	South African
Languages	English, Afrikaans
Joined SAS	2003 (year of establishment)
Other Business	Trustee of the Serenity Property Trust

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP)
Accredited River Health practitioner by the South African River Health Program (RHP)
Member of the South African Soil Surveyors Association (SASSO) Member of the Gauteng Wetland Forum
Member of IAIA South Africa

EDUCATION

Qualifications

MSc (Environmental Management) (University of Johannesburg)	2003
BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg)	2001
BSc (Zoology, Geography and Environmental Management) (University of Johannesburg)	2000
Tools for wetland Assessment short course Rhodes University	2016

COUNTRIES OF WORK EXPERIENCE

South Africa – All Provinces
Southern Africa – Lesotho, Botswana, Mozambique, Zimbabwe Zambia
Eastern Africa – Tanzania Mauritius
West Africa – Ghana, Liberia, Angola, Guinea Bissau, Nigeria, Sierra Leona
Central Africa – Democratic Republic of the Congo

PROJECT EXPERIENCE (Over 2500 projects executed with varying degrees of involvement)

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- 1 Mining: Coal, Chrome, PGM's, Mineral Sands, Gold, Phosphate, river sand, clay, fluorspar
 - 2 Linear developments
 - 3 Energy Transmission, telecommunication, pipelines, roads
 - 4 Minerals beneficiation
 - 5 Renewable energy (wind and solar)
 - 6 Commercial development
 - 7 Residential development
 - 8 Agriculture
 - 9 Industrial/chemical

REFERENCES

-
- Terry Calmeyer (Former Chairperson of IAIA SA)
Director: ILISO Consulting Environmental Management (Pty) Ltd
Tel: +27 (0) 11 465 2163
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 - Alex Pheiffer
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 - Marietjie Eksteen
Managing Director: Jacana Environmental
Tel: 015 291 4015





SCIENTIFIC TERRESTRIAL SERVICES (STS) – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF **NELANIE CLOETE**

PERSONAL DETAILS

Position in Company	Senior Scientist Botanical Science and Terrestrial Ecology
Date of Birth	6 June 1983
Nationality	South African
Languages	English, Afrikaans

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
Integrated Water Resource Management, the National Water Act, and Water Use Authorisations, focusing on WULAs and IWWMPs	2017

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)

SELECTED PROJECT EXAMPLES

Floral Assessments

- Floral assessment as part of the environmental assessment and authorisation process for the proposed Mzimvubu water project at Maclear, Eastern Cape.
- Floral assessment as part of the environmental authorisation process for the proposed Assmang Iron Ore Black Rock, Northern Cape Province.
- Floral assessment as part of the environmental authorisation process for the proposed Bloemwater Knellpoort water project pipeline assessment, Free State Province.
- Terrestrial ecological scan as part of the environmental authorisation process for the proposed Sappi Pipeline, Gauteng.
- Floral assessment as part of the proposed Setlagole Mall development, North West Province.
- Floral assessment as part of the coastal habitat changes in the Brand-se Baai area, Western Cape.

Environmental and Ecological Management Plans

- Biodiversity Action plans for African Exploration, Mining and Finance Corporation in line with the NEMBA requirements.
- Biodiversity Action plans for Twickenham Platinum mining operations in line with the NEMBA requirements, Limpopo Province.
- Biodiversity Action plans for Bokoni Platinum mining operations in line with the NEMBA requirements, Limpopo Province.
- Maintenance and Management Plan for the Gamagara River, Northern Cape.



- Development of the Limpopo Province Environmental Outlook Report.

Permit applications for protected tree and floral species

- Permit application for the removal and propagation of protected tree species for the Open Cast Operations within Bokoni Platinum Mine in the Limpopo Province.
- Permit application for the removal of protected tree species for Modikwa Mine within the Limpopo Province.
- Permit application for the removal of protected tree species for the Umfolozi Power line within the Kwa-Zulu Natal Province.
- Permit application for the removal of protected tree species for the expansion activities at Black Rock Mining Operations, Northern Cape Province.
- Permit application for the removal of protected tree species for the expansion activities at Assmang Dwars Rivier Mine, Limpopo Province.





SCIENTIFIC TERRESTRIAL SERVICES (STS) – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF **CHRISTOPHER HOOTON**

PERSONAL DETAILS

Position in Company	Ecologist
Date of Birth	24 June 1986
Nationality	South African
Languages	English, Afrikaans
Joined SAS	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

SELECTED PROJECT EXAMPLES

Faunal Assessments

- Faunal assessment as part of the environmental assessment and authorisation process for the proposed Mzimvubu Water Project, Eastern Cape.
- Faunal assessment as part of the environmental assessment and authorisation process for the proposed Setlagole Mall Development, North West.
- Faunal assessment as part of the environmental assessment and authorisation process for the proposed Expansion and Upgrade of the Springlake Railway Siding, Hattingspruit, Kwa-Zulu Natal.
- Faunal assessment as part of the environmental assessment and authorisation process for the proposed Styldrift tailings storage facility, return water dams, topsoil stockpile and other associated infrastructure, North West.
- Faunal assessment as part of the environmental assessment and authorisation process for the development of a proposed abalone farm, Brand se Baai, Western Cape.
- Faunal assessment as part of the environmental assessment and authorisation process for the development of a proposed abalone farm, Doringbaai, Western Cape.
- Vegetation composition and subsequent loss of carrying capacity for the Rand Water B19 and VG Residue Pipeline Project, Freestate.
- Faunal assessment as part of the environmental assessment and authorisation process for the Evander Shaft 6 Plant Upgrade, New Tailings Dam Area and Associated Tailings Delivery and Return Water Pipeline, Evander, Mpumalanga.

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 **KIM MARAIS**

PERSONAL DETAILS

Position in Company	Consultant
Date of Birth	28 February 1989
Nationality	The Netherlands
Languages	English, Afrikaans
Joined SAS	2015 – Present

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Registered member of the South African Council for Natural Scientific Professions (SACNASP 117137/17)

EDUCATION

Qualifications

Short course in the identification of Aquatic and wetland plants	2019
Short course in Tools for Wetland Assessment (Rhodes University)	2018
Certificate in Environmental Law for Environmental Managers (CEM)	2014
Certificate for Introduction to Environmental Management (CEM)	2013
BSc (Hons) Zoology (Herpetology) (University of the Witwatersrand)	2012
BSc (Zoology and Environment, Ecology and Conservation) (University of Witwatersrand)	2011

COUNTRIES OF WORK EXPERIENCE

South Africa – All Provinces

West Africa – Uganda

SELECTED PROJECT EXAMPLES

Faunal Screening Assessments

- Faunal Screening as part of the Brand se Baai Mining expansion, West Coast, Western Cape.
- Faunal Screening for the proposed Vergenoegd residential estate, Cryodon, Western Cape.
- Faunal Screening as part of the baseline investigation of the Swartklip Site for the proposed Cape Town international Airport Wetland Offset, Khayalitscha, Western Cape.
- Faunal screening for the proposed Glengary development, Durbanville, Western Cape.

Wetland Delineation and Wetland Function Assessment

Various **Freshwater Assessments**, including:

- Wetland Offset Plan for the Cape Town International Airport, Cape Town.
- Wetland offset investigation for the proposed Idas Valley residential development, Stellenbosch, Western Cape.
- Freshwater Assessment for the Swartklip Site as part of the Cape Town International Airport Wetland Offset requirements, Cape Town.
- Freshwater Assessment for the proposed road upgrades to Protea and Waarburgh Roads, Joostenbergvlakte, Western Cape.
- Freshwater Verification and Risk Assessment for the proposed upgrading of road culverts associated with the Main Road 287, 288 and trunk road 32/1, Bonnievale, Western Cape.
- Freshwater Assessment for the installation of a side cut drain north of the existing Kleinmond cemetery, Kleinmond, Western Cape.



- Freshwater Assessment for the proposed Melkhoutfontein residential development and associated services, Stillbaai, Western Cape.
- Freshwater Assessment associated with the Section 24G rectification process for the unauthorised dams within Tierhoek, Citrusdal, Western Cape.
- Freshwater Assessment associated with the Section 24G rectification process for the unauthorised Kleinberg dams, Citrusdal, Western Cape.
- Freshwater Assessment for the proposed sediment removal from an existing irrigation dam and installation of a sediment containment system at the Boschenmeer Golf Estate, Paarl, Western Cape.
- Freshwater Assessment for the proposed Heuningklip Solar Farm, Vredenburg, Western Cape.
- Freshwater screening for the proposed Doornfontein Solar Farm, Velddrift, Western Cape.
- Freshwater Screening for the proposed Valentia underground shooting range, Paarl, Western Cape.
- Freshwater Assessment for the proposed Baden Powell Industrial development, Western Cape.
- Freshwater Assessment for the decommissioning of five landfill sites within the Drakenstein Municipality, Western Cape.
- Freshwater Assessment for the proposed De Hoop Residential Development, southern Paarl, Western Cape.
- Freshwater assessment for the proposed Vredenburg Wind Energy Facility, Vredenburg, Western Cape.
- Wetland Assessment for the proposed Excelsior Wind Energy Farm and associated powerline infrastructure, Swellendam, Western Cape.
- Wetland Assessment for the sewage Bulk Service System for the Drakenstein Municipality, Paarl, Western Cape.
- Freshwater screening for the proposed Vendome residential Development, Paarl, Western Cape.
- Wetland Assessment for the Riverclub Development for the Val de Vie development, Paarl, Western Cape.
- Wetland Assessment for the Riverfarm Development for the Val de Vie development, Paarl, Western Cape.
- Wetland Assessment for the development of three agricultural dams for irrigation of crops, Cape Farms, Western Cape.
- Wetland Assessment for the Willow Wood Estate Sewage pipeline upgrade, D'Urbanvale, Western Cape.
- Wetland Assessment for the rectification of infilling of a freshwater feature, D'Urbanvale, Western Cape.
- Freshwater Assessment for the stabilisation of the Franschoek River embankment, Leeu Estates, Franschoek, Western Cape.
- Freshwater Assessment for the proposed Helderburg Hospital, Somerset West, Western Cape.
- Freshwater Assessment for the Vergenoegd Wine Estate, Crydon, Western Cape.
- Freshwater assessment for the proposed upgrade of the community school, Elandsdift farm, Sir Lowry's Pass, Western Cape.

Various **Freshwater Rehabilitation and Management Plans**, including:

- Detailed Method Statement for the rehabilitation and Maintenance of the wetland associated with the Gentleman's Estate Plots, Val de Vie, Paarl, Western Cape.
- Detailed method statement for the rectification and rehabilitation of a storm water system, D'Urbanvale, Western Cape.
- Rehabilitation Plan for the proposed de Hoop Residential Development, Paarl, Western Cape.
- Rehabilitation Plan for the proposed abstraction and storage of water from the Diep River in a 500,000m³ dam, Durbanville, Western Cape.
- Rehabilitation Plan for the proposed bulk water pipeline over the Kuils River, Belhar, Western Cape.
- Rehabilitation and implementation plan for the proposed IDas Valley residential development offset requirements, Stellenbosch, Western Cape.

Water Use Authorisations and ECO input

- WUA for the SANRAL N3 De Beers Pass Section within the Free State and KwaZulu-Natal.
- Assistance with the WULA for the Mzimvubu Water Project, Eastern Cape.
- WUA for the Excelsior Wind Energy Farm and associated powerline infrastructure, Swellendam, Western Cape.
- WUA for the Golden Valley Phase II Wind Energy Facility, Eastern Cape.
- WUA for the Sewage Bulk Service system for the Val de Vie Polo and Lifestyle Estate, Paarl, Western Cape.
- WUA for the Riverfarm Development for the Val de Vie Polo and Lifestyle Estate, Paarl, Western Cape.
- WUA for the Pearl Valley II Development for the Val de Vie Polo and Lifestyle Estate, Paarl, Western Cape.
- WUA for the Levendal Village for the Val de Vie Polo and Lifestyle Estate, Paarl, Western Cape.
- WUA for a residential Development, Klipmuts, Western Cape.
- WUA for the Riverclub Development for the Val de Vie Polo and Lifestyle Estate, Paarl, Western Cape.
- WUA for the proposed Copperton Wind Energy Facility, Northern Cape.
- WUA for the proposed bulk water pipeline crossing over the Kuils River, Bellville, Western Cape.
- WUA for the proposed Vergenoegd Village residential development near Crydon, Western Cape.
- Validation and Verification process of three farms in Franschoek, Western Cape.
- Validation and Verification process for Farm 1165 in Durbanville, Western Cape.
- WUA for the De Hoop Lifestyle Estate, Paarl, Western Cape.
- WUA for the proposed Platrug Dam with storage capacity of 500,000m³, Western Cape.



- WUA for the proposed Boland Park residential development, Western Cape.
- WUA for the proposed Symphony Way residential development, Delft, Western Cape.
- WUA for the proposed abstraction and storage of groundwater on erf 3239 and Farm Watervliet 1224, Paarl, Western Cape.
- WUA for the proposed abstraction of groundwater as part of the Belhar development, Belhar, Western Cape.

Specialist **Environmental Control Work**

- ECO of WUL conditions for the proposed bridge and access road over the Berg River, Val de Vie Estate, Paarl.
- ECO of WUL conditions for the proposed bulk water pipeline over the Kuils River, City of Cape Town, Belhar, Western Cape.
- ECO of WUL conditions for the proposed Riverclub residential development, Paarl, Western Cape.
- Various specialist freshwater input into EMP's and landscape plans, Western Cape.

