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BIODIVERSITY ASSESSMENT AS PART OF THE ENVIRONMENTAL IMPACT ASSESSMENT (EIA) AND AUTHORISATION PROCESS FOR THE PROPOSED EXPANSION AND UPGRADE FOR ACTIVITIES ASSOCIATED WITH THE BEESHOEK MINE, NEAR POSTMASBURG, NORTHERN CAPE PROVINCE

Prepared for

Envirogistics (Pty) Ltd

July 2021

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Report Reference: STS 190023

EXECUTIVE SUMMARY

Scientific Terrestrial Services CC (STS) was appointed to conduct a Biodiversity and Impact Assessments as part of the Environmental Impact Assessment (EIA) and Authorisation process for the Consolidation, Upgrade and Expansion Activities at the Assmang (Pty) Ltd Beeshoek Iron Ore Mine, near Postmasburg, Northern Cape Province; henceforth referred to as the "Beeshoek Mine". The proposed Consolidation, Upgrade, and Expansion Activities will take place within the Beeshoek Mine's Surface Rights Area (SRA) and entails five (5) projects (or listing activities) that will collectively be referred to as the "focus area".

The purpose of the Beeshoek Mine project is to give effect to the Regulation 23 Mineral and Petroleum Resources Development Act, 2002, (Act No. 28 of 2002) (MPRDA) requirements for the optimisation of the Mining Right, as well as the implementation of the best practical environmental management measures for the operation and management of the Waste Rock Dumps (WRDs). Further to this, the proposed Beeshoek Low-Grade Beneficiation Optimisation Project is to allow Beeshoek Mine to optimise the mining process and reduce mineral waste on site (in line with the National Waste Management Hierarchy) by implementing two additional Beneficiation Projects, namely a new WHIMS Plant to rework the existing slimes from the Slimes Dam and a new Jig Plant to rework the existing low-grade stockpile (Discard Dump). The five projects include the below:

- **Project 1**: Consolidation of Run of Mine (ROM) Stockpiles on South Mine.
- **Project 2**: Amendments to the design of existing Waste Rock Dumps (WRDs) in terms of the increase in heights, and allowance for final slope, which will result in extension of footprints.
- **Project 3**: Increase of Opencast footprint areas, as well as the undertaking of detrital mining for shallow iron ore reserves, including transportation routes (Haul roads).
- **Project 4**: Development of the Beneficiation Project which will comprise of a WHIMS Plant and Jig Plant at Beeshoek.
- **Project 5**: Water Management.

Conservation Summary (Desktop database research)

The Beeshoek Mine is situated within the Savanna Biome and within the Eastern Kalahari Bushveld Bioregion. The mine occurs in three vegetation types, namely the Postmasburg Thornveld (western Portion), Kuruman Thornveld (Eastern Portion) and the Kuruman Mountain Bushveld (Eastern Boundary) – all three vegetation types are Least Concern ecosystems and currently Poorly Protected.

For the Terrestrial Biodiversity Theme (Online Web Based National Environmental Screening Tool), the Beeshoek Mine is considered to have a very high sensitivity. The triggered sensitivity features include an Ecological Support Areas (ESA), and a Freshwater ecosystem priority area. The Beeshoek Mine is further located in the Griqualand West Centre (GWC) of plant endemism and the Gamagara Corridor.

Habitat Summary (ground-truthed results)

Based on the results of the field investigation that was undertaken across various seasons, namely 10-13 June 2019 (winter assessment), 22–24 January 2020 (summer assessment), and 1-5 March 2021 (early autumn), five broad habitat units were distinguished for the Beeshoek Mine:

- **Calcrete Shrubland**: This habitat unit is located on shallow calcrete soils derived from the Coega/Knersvlakte soil forms. The vegetation mainly comprised shrubland with sparse grass cover. Species diversities were intermediate and trees generally of low diversity and abundance. Habitat integrity varied throughout this habitat unit, with some areas more encroached by indigenous woody species, and other areas characterised by largely intact vegetation;

- **Modified Habitat Unit**: This habitat unit includes areas where vegetation is significantly degraded or entirely absent as a result of mining-related activities. Two sub-units can be distinguished for this habitat unit, namely Transformed Habitat and Degraded Thornveld;

- **Moisture-driven Habitat**: This habitat unit is associated with cryptic wetlands, seasonal depressions, preferential flow paths and a recharge area. The Moisture-driven Habitat includes watercourses as delineated within the Freshwater Ecological Assessment (SAS 219099, 2021), but also includes non-watercourse habitat which is not considered true watercourse as defined in the National Water Act, 1998 (Act No. 36 of 1998) (NWA). Instead, these are low-lying areas where water will preferentially move during rain events, but the floral communities lack wetland indicator vegetation (e.g., vegetation within the centre of the Seasonal Depressions especially differed from that of the Cryptic Wetlands). There is also an occurrence of different soil forms between the Watercourse and Non-watercourse habitat;

- **Open Thornveld Habitat Unit**: Habitat restricted to the deeper red soils of the Vaalbos and Plooysburg soil forms. Vegetation included an almost continuous grass layer with large tree species such as Vachellia erioloba scattered throughout. Habitat integrity also varied throughout the site; and

- **Rupicolous Habitat Unit**: This habitat unit includes areas with shallow red soils of the Mispah/Glenrosa soil forms, comprising darker iron-rich stones that either present as lower-lying areas with small pebbles or as prominent rock outcrops on hills. The vegetation communities were generally dominated by encroaching *Senegalia melifera* subsp. *detinens* but also included a higher species diversity when compared to the other habitat units within the Beeshoek Mine SRA.

Based on conservation significance, presence of SCC and the level of habitat degradation, the floral sensitivity of the habitat units indicate that the Modified Habitat Unit is of **Low and Moderately Low Sensitivity**, the Calcrete Shrubland is of **Intermediate Sensitivity**, the Watercourses (Cryptic Wetlands and Episodic Drainage lines) of **Moderately High Sensitivity**, the Non-watercourses (Preferential Flow Paths, Seasonal Depressions and Recharge zone) of **Moderately Low and Intermediate Sensitivity**, the Open Thornveld varied between **Intermediate and Moderately Low Sensitivities**, and the Rupicolous Habitat varied between **Moderately Low and Moderately High Sensitivities**. The proposed Beeshoek Mine activities will impact on these habitat units to varying degrees.

When considering the conservation significance, presence of SCC and the level of habitat degradation, the faunal sensitivity of the habitat units indicate that the Modified Habitat Unit is of **Low and Moderately Low Sensitivity**, the Natural Habitats are of **Intermediate Sensitivity** and the Watercourses and Non-watercourses of **Moderately High Sensitivity**.

Floral SCC recorded within the focus area included species protected under the National Forest Act, 1998 (Act No. 84 of 1998, as amended in September 2011) (NFA), National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004) (NEMBA) Threatened or Protected Species lists (TOPS) regulations, and Schedule 2 protected species of the Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009) (NCNCA). Mining activities associated with Project 2 and especially Project 3 are anticipated to have an unfavourable impact on floral SCC. Projects 1, 4 and 5 will minimally impact on floral SCC. Faunal SCC observed and expected to occur on site include species protected under TOPS as well as being listed either as protected or specially protected in Schedules 1 and 2 of the NCNCA. Project 3 will have the greatest impact on potential faunal SCC as a result of the increased areas where vegetation clearance will take place.

Impact Statement

Separately, the five projects will vary considerably in the significance of the impact ratings on floral and faunal ecology associated with the Beeshoek Mine. Collectively, the impacts are anticipated to be significant on both floral and faunal habitat and diversity, as well as on SCC.

Most significant impacts to affect the floral and faunal habitat integrity and species diversity within the Beeshoek Mine include, but are not limited to, the following:

- Mining activities within sensitive habitat such as Cryptic Wetlands (though limited to only two pans), species-rich Rupicolous Habitat (floral) and large stretches of untransformed Calcrete Shrubland. Considering that the Postmasburg Thornveld, Kuruman Thornveld and Kuruman Mountain Bushveld are endemic vegetation types (Skowno et al, 2019) and the fact that there

are several additional mining expansions planned in the region, further impact on the remaining extent of the currently least concern, but poorly protected, vegetation types could increase their threat status;
- Continued expansion resulting in fragmented habitat, the loss of movement corridors and breeding habitat for faunal species;
- Increase risk of erosion and poor stormwater management - resulting in loss of soils, the down-slope sedimentation of habitat and the consequent loss of habitat beyond the planned footprint;
- AIP proliferation and woody encroachment into natural vegetation, displacing indigenous flora, altering favourable habitat conditions for the establishment of indigenous species and limiting faunal species utilisation of these area;
- Rehabilitation efforts are likely to result in sub-optimal recovery of the landscape to pre-mining conditions, resulting in residual impacts to floral and faunal communities;
- Placement of mining infrastructure within floral and faunal SCC habitat;
- Destruction, removal or harvesting of floral SCC during construction and operational activities; and
- Potentially poorly implemented and monitored rescue and relocation of SCC that will be affected by the proposed project, leading to unsuccessful rescue efforts and loss of SCC individuals.

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

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Section A: Background Information

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Theme-Specific Requirements as per Government Notice No. 320 Terrestrial Biodiversity Theme – Very High Sensitivity Rating as per Screening Tool Output		
No.	**SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS**	**Section in report/Notes**
2	**Terrestrial Biodiversity Specialist Assessment**	
2.1	The assessment must be prepared by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP) with expertise in the field of terrestrial biodiversity.	**Part A – C:** Cover Pages **Part A:** Appendix E
2.2	The assessment must be undertaken on the preferred site and within the proposed development footprint.	**Part A**: Section 1
2.3	**The assessment must provide a baseline description of the site which includes, as a minimum, the following aspects:**	
2.3.1	A description of the ecological drivers or processes of the system and how the proposed development will impact these;	**Part B**: Section 3 (flora) **Part C:** Section 3 (vertebrates)
2.3.2	Ecological functioning and ecological processes (e.g., fire, migration, pollination, etc.) that operate within the preferred site;	**Part B**: Section 3 (flora) **Part C:** Section 3 (vertebrates)
2.3.3	The ecological corridors that the proposed development would impede including migration and movement of flora and fauna;	**Part A:** Section 3 (desktop analysis) **Part B**: Section 3 (flora) **Part C:** Section 3 (vertebrates)
2.3.4	The description of any significant terrestrial landscape features (including rare or important flora-faunal associations, presence of Strategic Water Source Areas (SWSAs) or Freshwater Ecosystem Priority Area (FEPA) sub catchments;	**Part A:** Section 3 (desktop analysis) **Part B:** Section 3 (flora) **Part C:** Section 3 (vertebrates) **For descriptions on the presence of FEPAs, please refer to the Freshwater Biodiversity Assessment (SAS 219099, 2021)*
2.3.5	A description of terrestrial biodiversity and ecosystems on the preferred site, including: a) main vegetation types; b) threatened ecosystems, including listed ecosystems as well as locally important habitat types identified; c) ecological connectivity, habitat fragmentation, ecological processes and fine scale habitats; and d) species, distribution, important habitats (e.g. feeding grounds, nesting sites, etc.) and movement patterns identified;	**Part A**: Section 3 (desktop analysis) **Part B:** Section 3 (flora) **Part C:** Section 3 (vertebrates)
2.3.6	The assessment must identify any alternative development footprints within the preferred site which would be of a "low" sensitivity as identified by the screening tool and verified through the site sensitivity verification; and	Not Applicable.
2.3.7	**The assessment must be based on the results of a site inspection undertaken on the preferred site and must identify:**	
2.3.7.1	Terrestrial Critical Biodiversity Areas (CBAs), including: *a) the reasons why an area has been identified as a CBA;* *b) an indication of whether or not the proposed development is consistent with maintaining the CBA in a natural or near natural state or in achieving the goal of rehabilitation;*	**Part A**: Section 3 (desktop analysis) **Part B**: Section 3 and 5.3.3

Theme-Specific Requirements as per Government Notice No. 320 Terrestrial Biodiversity Theme – Very High Sensitivity Rating as per Screening Tool Output		
	c) *the impact on species composition and structure of vegetation with an indication of the extent of clearing activities in proportion to the remaining extent of the ecosystem type(s);* d) *the impact on ecosystem threat status;* e) *the impact on explicit subtypes in the vegetation;* f) *the impact on overall species and ecosystem diversity of the site; and* g) *the impact on any changes to threat status of populations of species of conservation concern in the CBA;*	
2.3.7.2	Terrestrial Ecological Support Areas (ESAs), including: *a) the impact on the ecological processes that operate within or across the site;* *b) the extent the proposed development will impact on the functionality of the ESA; and* c) *loss of ecological connectivity (on site, and in relation to the broader landscape) due to the degradation and severing of ecological corridors or introducing barriers that impede migration and movement of flora and fauna;*	
2.3.7.3	Protected areas as defined by the National Environmental Management: Protected Areas Act, 2004 including- *a) an opinion on whether the proposed development aligns with the objectives or purpose of the protected area and the zoning as per the protected area management plan;*	**Part A**: Section 3 (desktop analysis) However, not applicable as there are no protected areas within 10 km of the site.
2.3.7.4	Priority areas for protected area expansion, including- *a) the way in which in which the proposed development will compromise or contribute to the expansion of the protected area network;*	**Part A**: Section 3 (desktop analysis)
2.3.7.5	SWSAs including: *a) the impact(s) on the terrestrial habitat of a SWSA; and* b) *the impacts of the proposed development on the SWSA water quality and quantity (e.g. describing potential increased runoff leading to increased sediment load in water courses);*	Not Applicable
2.3.7.6	FEPA sub catchments, including- *a) the impacts of the proposed development on habitat condition and species in the FEPA sub catchment;*	**For descriptions on the presence of FEPAs, please refer to the Freshwater Biodiversity Assessment (SAS 219099, 2021)*
2.3.7.7	Indigenous forests, including: *a) impact on the ecological integrity of the forest; and* b) *percentage of natural or near natural indigenous forest area lost and a statement on the implications in relation to the remaining areas.*	Not Applicable
2.4	**The findings of the assessment must be written up in a Terrestrial Biodiversity Specialist Assessment Report.**	
	Part B: Results of the **Floral Assessment** as well as conclusions on Terrestrial Biodiversity as it relates to vegetation communities. **Part C:** Results of the **Vertebrate Assessment** as well as conclusions on Terrestrial Biodiversity as it relates to faunal communities. **Part D:** Results of the **Invertebrate Assessment** as well as conclusions on Terrestrial Biodiversity as it relates to faunal communities.	
3	**Terrestrial Biodiversity Specialist Assessment Report**	
3.1	**The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information:**	
3.1.1	Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	**Part A:** Appendix E
3.1.2	A signed statement of independence by the specialist;	**Part A:** Appendix E
3.1.3	A statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	**Part B:** Section 1.3 (flora) **Part C:** Section 1.3 (vertebrates)

Theme-Specific Requirements as per Government Notice No. 320 Terrestrial Biodiversity Theme – Very High Sensitivity Rating as per Screening Tool Output		
3.1.4	A description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant;	**Part A**: Appendix C **Part B:** Section 2 (flora) **Part B:** Appendix A (flora) **Part C:** Section 2 (fauna) **Part C**: Appendix A (fauna)
3.1.5	A description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;	**Part B:** Section 1.3 (flora) **Part C:** Section 1.3 (vertebrates)
3.1.6	A location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);	**Part B:** Section 4 (flora) **Part C:** Section 4 (vertebrates)
	Impact Assessment Requirements 3.1.7 Additional environmental impacts expected from the proposed development; 3.1.8 Any direct, indirect and cumulative impacts of the proposed development; 3.1.9 The degree to which impacts and risks can be mitigated; 3.1.10 The degree to which the impacts and risks can be reversed; 3.1.11 The degree to which the impacts and risks can cause loss of irreplaceable resources; 3.1.12 Proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	**Part B:** Section 5 (flora) **Part C:** Section 5 (vertebrates)
3.1.13	A motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a "low" terrestrial biodiversity sensitivity and that were not considered appropriate;	**Not Applicable to this report**
3.1.14	A substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not; and	Executive summary **Part B:** Section 6 (flora) **Part C:** Section 6 (vertebrates)
3.1.15	Any conditions to which this statement is subjected.	**Part B:** Section 5.4 (flora) **Part C:** Section 5.4 (vertebrates)
3.2	The findings of the Terrestrial Biodiversity Specialist Assessment must be incorporated into the Basic Assessment Report or the Environmental Impact Assessment Report, including the mitigation and monitoring measures as identified, which must be incorporated into the EMPr where relevant.	**Not Applicable to this report. Responsibility of the EAP.**
3.3	A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	This report is submitted to the EAP and applicant and will be appended to the EIA / EMP by the EAP in due course as part of the application process.

GLOSSARY OF TERMS

Most definitions are based on terms and concepts elaborated by Richardson *et al*. (2011), Hui and Richardson (2017) and Wilson *et al*. (2017), with consideration to their applicability in the South African context, especially South African legislation [notably the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), and the associated Alien and Invasive Plant (AIP) Species Regulations, 2020].

Alien species (syn. exotic species; non-native species)	A species that is present in a region outside its natural range due to human actions (intentional or accidental) that have enabled it to overcome biogeographic barriers.
Biological diversity or Biodiversity (as per the definition in NEMBA)	The variability among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part and also includes diversity within species, between species, and of ecosystems.
Biome - as per Mucina and Rutherford (2006); after Low and Rebelo (1998).	A broad ecological spatial unit representing major life zones of large natural areas – defined mainly by vegetation structure, climate and major large-scale disturbance factors (such as fires).
Bioregion (as per the definition in NEMBA)	A geographic region which has in terms of section 40(1) been determined as a bioregion for the purposes of this Act;
Critical Biodiversity Area (CBA)	A CBA is an area considered important for the survival of threatened species and includes valuable ecosystems such as wetlands, untransformed vegetation and ridges.
Corridor	A dispersal route or a physical connection of suitable habitats linking previously unconnected regions.
Disturbance	A temporal change, either regular or irregular (uncertain), in the environmental conditions that can trigger population fluctuations and secondary succession. Disturbance is an important driver of biological invasions.
Ecoregion	An ecoregion is a "recurring pattern of ecosystems associated with characteristic combinations of soil and landform that characterise that region".
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.
Ecological Support Area (ESA)	An ESA provides connectivity and important ecological processes between CBAs and is therefore important in terms of habitat conservation.
Ground·Truth	To check the accuracy of (remotely sensed data) by means of in-situ observations.
Habitat (as per the definition in NEMBA)	A place where a species or ecological community naturally occurs.
Important Bird and Biodiversity Area (IBA)	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.
Integrity (ecological)	The integrity of an ecosystem refers to its functional completeness, including its components (species) its patterns (distribution) and its processes.
Invasive species	Alien species that sustain self-replacing populations over several life cycles, produce reproductive offspring, often in very large numbers at considerable distances from the parent and/or site of introduction, and have the potential to spread over long distances.

Listed alien species	All alien species that are regulated in South Africa under the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004), Alien and Invasive Species Regulations, 2020.
Least Threatened	Least threatened ecosystems are still largely intact.
Native species (syn. indigenous species)	Species that are found within their natural range where they have evolved without human intervention (intentional or accidental). Also includes species that have expanded their range as a result of human modification of the environment that does not directly impact dispersal (e.g. species are still native if they increase their range as a result of watered gardens, but are alien if they increase their range as a result of spread along human-created corridors linking previously separate biogeographic regions).
RDL (Red Data listed) species	According to the Red List of South African plants (http://redlist.sanbi.org/) and the International Union for Conservation of Nature (IUCN), organisms that fall into the Extinct in the Wild (EW), critically endangered (CR), Endangered (EN), Vulnerable (VU) categories of ecological status.
Species of Conservation Concern (SCC)	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

BGIS	Biodiversity Geographic Information Systems
CARA	Conservation of Agricultural Resources Act, 1983 [Act No. 43 of 1983]
CBA	Critical Biodiversity Area
CR	Critically Endangered
DFFE	Department of Forestry, Fisheries and the Environment
DMRE	Department of Mineral Resources and Energy
EA	Environmental Authorisation
E-GIS	Environmental Geographical Information Systems
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMPr	Environmental Management Programs
EN	Endangered
ESA	Ecological Support Area
EW	Extinct in the Wild
GN	Government Notice
GWC	Griqualand West Centre
Ha	Hectares
IBA	Important Bird and Biodiversity Area
IUCN	International Union for Conservation of Nature
IWWMP	Integrated Water and Waste Management Plan
MAP	Mean annual precipitation
MAPE	Mean Annual Potential Evaporation
MASMS	Mean Annual Soil Moisture Stress
MAT	Mean Annual Temperature
MFD	Mean Frost Days
MPRDA	Mineral and Petroleum Resources Development Act, 2002 [Act No. 28 of 2002]
NBA	National Biodiversity Assessment
NCDENC	Northern Cape Department of Environment and Nature Conservation
NCNCA	Northern Cape Nature Conservation Act, 2009 [Act No. 9 of 2009]
NCPSDF	Northern Cape Provincial Spatial Development Framework
NEMA	National Environmental Management Act, 1998 [Act No. 107 of 1998]
NEMBA	National Environmental Management: Biodiversity Act, 2004 [Act No. 10 of 2004]
NEMPAA	National Environmental Management: Protected Areas Act, 2003 [Act No. 57 of 2003]
NPAES	National Protected Area Expansion Strategy
OREX	Ore Export
QDS	Quarter Degree Squares
RDL	Red Data listed
ROD	Record of Decision
ROM	Run of Mine
SABAP 2	South African Bird Atlas Project 2
SACAD	South African Conservation Areas Database
SACNASP	Professional member of the South African Council for Natural Scientific Professions
SANBI	South African National Biodiversity Institute
SanParks	South African National Parks
SAPAD	South African Protected Areas Database
SCC	Species of Conservation Concern
STS	Scientific Terrestrial Services
SRA	Surface Rights Area
SWD	Storm Water Dam
SWSA	Strategic Water Source Area
VEGMAP	National Vegetation Map Project
VU	Vulnerable
WRD	Waste Rock Dumps

1 INTRODUCTION

Scientific Terrestrial Services CC (STS) was appointed to conduct a Biodiversity and Impact Assessments as part of the Environmental Impact Assessment (EIA) and Authorisation process for the Consolidation, Upgrade and Expansion Activities at the Assmang (Pty) Ltd Beeshoek Iron Ore Mine, near Postmasburg, Northern Cape Province; henceforth referred to as the "Beeshoek Mine". The proposed Consolidation, Upgrade, and Expansion Activities will take place within the Beeshoek Mine's Surface Rights Area (SRA) and entails five (5) projects (or listing activities) that will collectively be referred to as the "**focus area**" (refer to Section 1.1 below).

The Beeshoek Mine holds an existing Mining Right on the farms Beeshoek 448 and Olynfontein 475 and is situated within the Tsantsabane Local Municipality and the ZF Mgcawu District Municipality. The Beeshoek Mine is further situated approximately 7 km west of Postmasburg and 70 km south of Kathu. The Beeshoek Mine is traversed by the R385 regional road, with the Ore Export (OREX) Railway Line traversing the Beeshoek Mine. Refer to Figures 1 and 2 for a depiction of the Beeshoek Mine.

The purpose of this report (Part A) is to define the biodiversity associated with the SRA 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 (floral assessment in Part B and the faunal assessment in Part C).

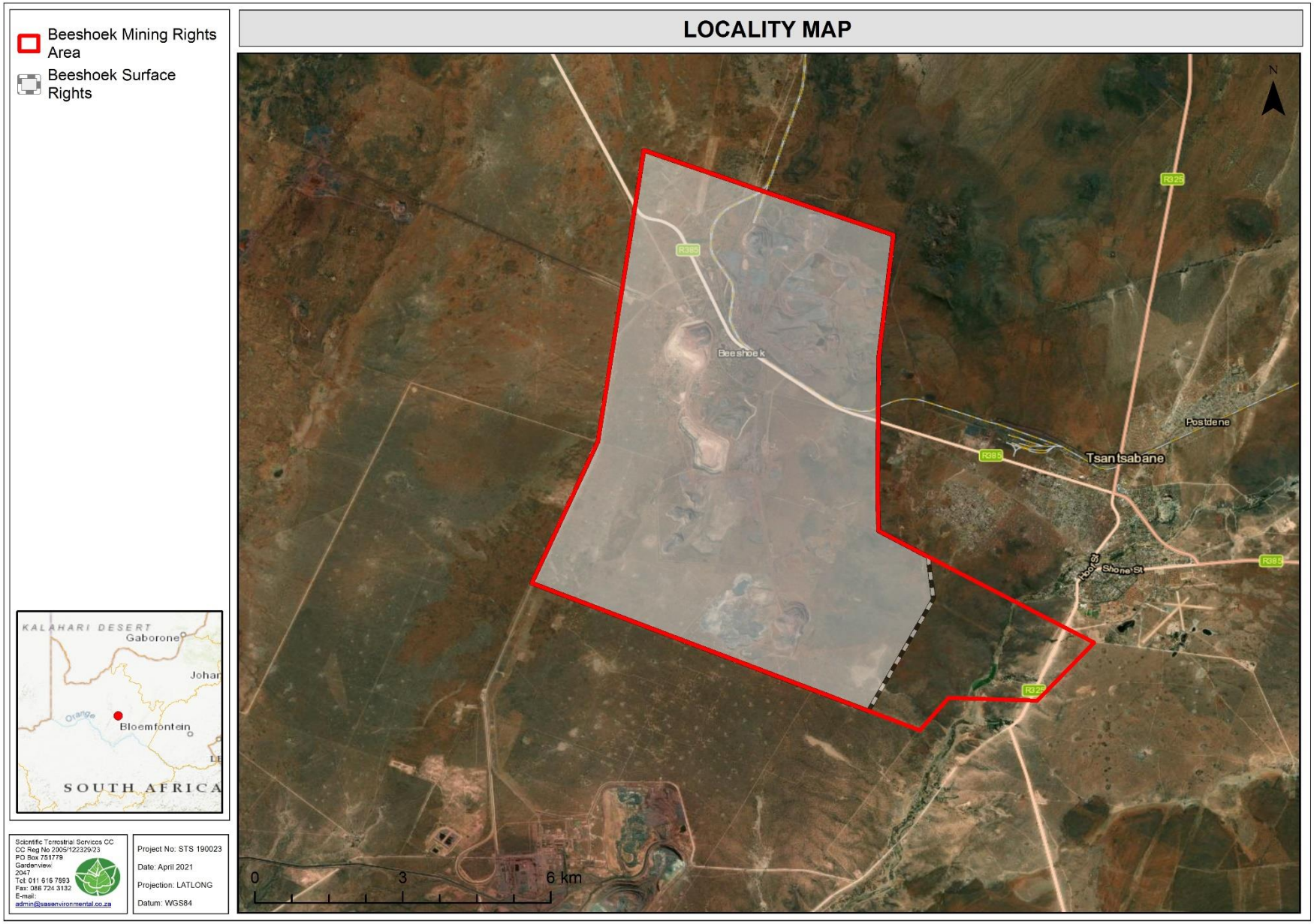

Figure 1: Digital satellite image depicting the Beeshoek Mine in relation to surrounding areas.

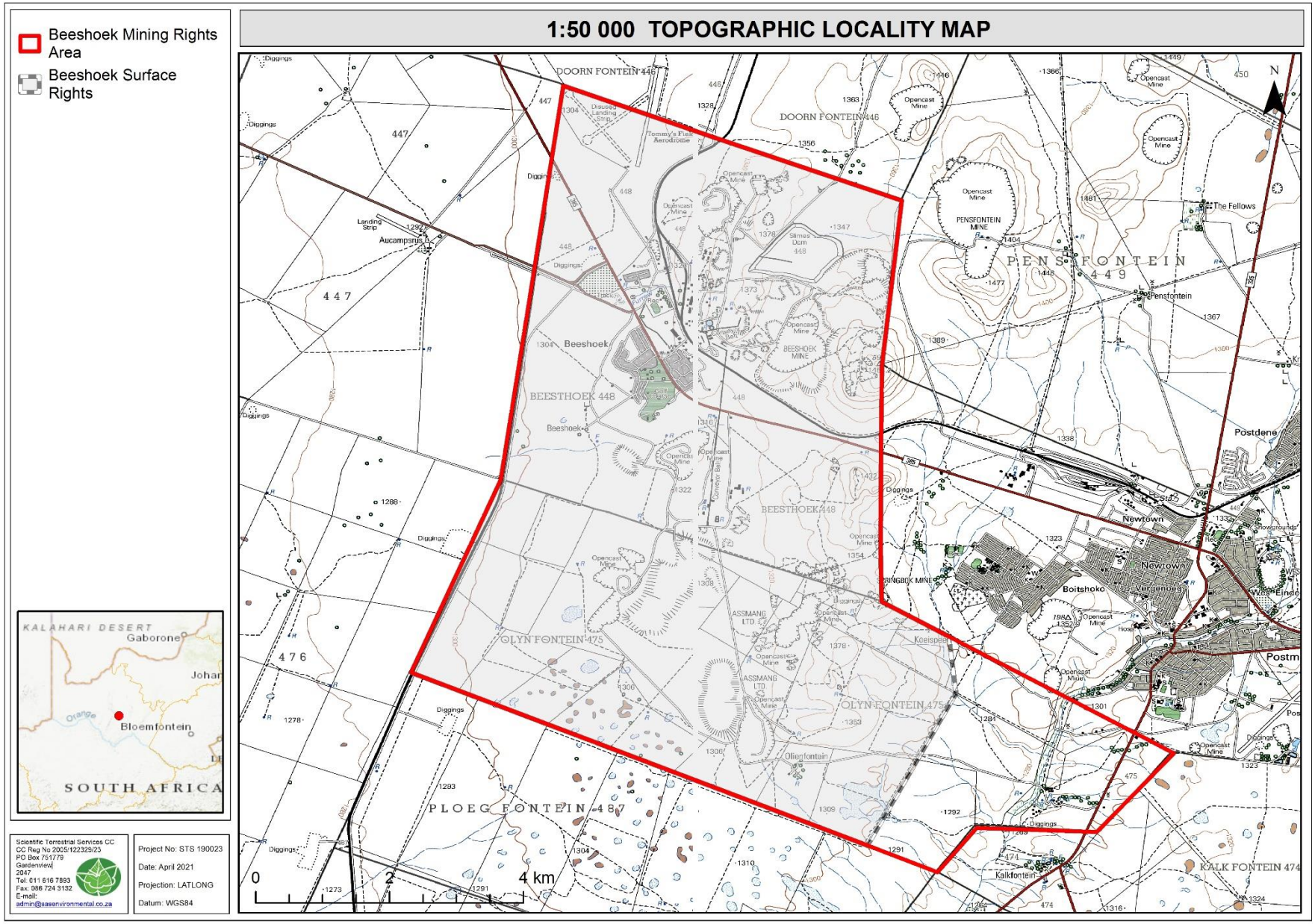

Figure 2: The Beeshoek Mine depicted on a 1:50 000 topographical map in relation to the surrounding area.

1.1 Project Description[1]

Assmang (Pty) Ltd is the holder of the new order rights in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA) in respect of high-grade hematite iron ore deposits at Beeshoek on the farms Beesthoek and Olynfontein. The mining method currently entails an opencast mining operation, which consists of five (5) active opencast pits (Village Opencast Pit, HF Opencast Pit, BF Opencast Pit, East Opencast Pit, and BN Opencast Pit). Although other opencast pits are dormant at this time, these are continuously assessed in terms of their economic value. The current resources of the Mine are approximately 87 million tonnes with a reserve of about 26 million tonnes.

Beeshoek Mine can broadly be categorised as follows:

- Northern Mining Area ("North Mine"): This area comprises active as well as historical mining areas. Several small quarries and mine residue dumps of various categories are located within this area. The area also includes the existing iron ore beneficiation plant, tailings storage facility (slimes dam), as well as the North Opencast Pit (BN Opencast Pit);
- Main Offices, village (since demolished) and recreational area; and
- Southern Mining Area ("South Mine"): This area comprises large opencast pits and associated Waste Rock Dumps (WRDs). The Village Opencast Pit and associated WRD are the main activities in this area. This area also includes a crushing and screening area as pre-preparation of the Run of Mine (ROM) iron ore before being routed by overland conveyor to the Iron Ore Beneficiation Plant located at North Mine.

The purpose of the Beeshoek Mine project is to give effect to the Regulation 23 MPRDA requirements for the optimisation of the Mining Right, as well as the implementation of the best practical environmental management measures for the operation and management of the WRDs. Further to this, the proposed Beeshoek Low-Grade Beneficiation Optimisation Project is to allow Beeshoek Mine to optimise the mining process and reduce mineral waste on site (in line with the National Waste Management Hierarchy) by implementing two additional Beneficiation Projects, namely a new WHIMS Plant to rework the existing slimes from the Slimes Dam and a new Jig Plant to rework the existing low-grade stockpile (Discard Dump).

[1] Assmang (Pty) Ltd: Beeshoek Iron Ore Mine. FINAL Environmental Scoping Report in terms of National Environmental Management Act, 1998 and the National Environmental Management: Waste Act, 2008 for: Beeshoek Mine Optimisation Project. April 2021.
Report Reference - EnviroGistics Ref.: 21910. Departmental Ref.: 223MRC. Mining Right Ref: 223MRC
Report Author - Tanja Bekker. MSc. Environmental Management; Pr.Sci.Nat. EAPASA Reg No: 2019/306; SACNASP Reg No: 400198/09

The above-mentioned purpose of the Beeshoek Mine is split into five (5) projects (or listing activities) and was assessed by the biodiversity team to determine the floral and faunal associations and occurrence within the five (5) proposed projects, as further described below, including determining the impact that the five (5) proposed projects will have on the terrestrial biodiversity.

The five (5) projects will collectively be referred to as the "**focus area**". See also Figures 3 - 6 for a depiction of the proposed five projects, with detailed descriptions of each provided below.

1.1.1 Project 1: Consolidation of Run of Mine (ROM) Stockpiles on South Mine (Figure 3).

In areas where individual ROM stockpiles are located (OM Stockpile, South Contaminated ROM 1 and Contaminated Dump 2), these will be consolidated to allow for further capacity and operational management – referred to as the "**Consolidated ROM Footprint**". The ROM stockpile area on South Mine will thus be demarcated as a combined ROM stockpile area for both on-grade, off-grade and BIS.

Specific details include:

- Overall Area: 35 ha.
- No clearance of vegetation is required; this area is located on the north-eastern perimeter of the West Pit Waste Rock Dump (WRD) in a legally disturbed area.
- Heights will not exceed 10 m.

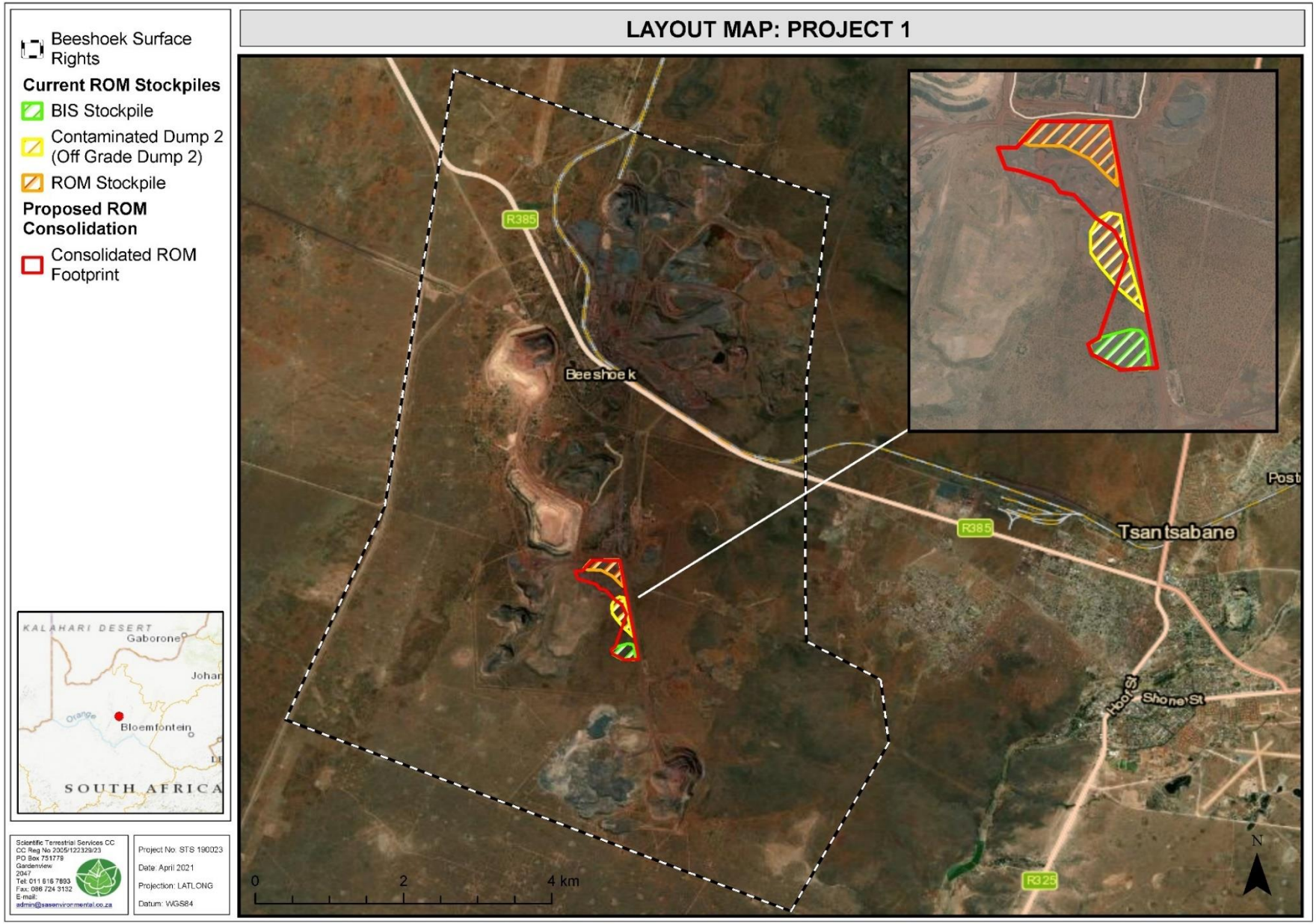

Figure 3: Layout map of Project 1 - Consolidation of Run of Mine (ROM) Stockpiles on South Mine.

1.1.2 Project 2: Amendments to the design of existing Waste Rock Dumps (WRDs) in terms of the increase in heights and allowance for final slope, which will result in an extension of footprints (Figure 4).

The Beeshoek Mine proposes to increase the heights of several existing WRD's. The increase in the height will also require an increase in the footprint areas to allow for the correct slope at closure. The below list of WRDs is targeted for height and footprint increase:

- Village Pit Waste Rock Dump (VP1): Current area approximate 70 ha, to be increased with approximately 26 ha (final area 96 ha) to allow for final slope and footprint upon rehabilitation (area pending designs but will involve clearance of about 25 ha). Dimensions are as follows:
  - Footprint: 96 m
  - Height: 120 m, upon rehabilitation 70 ha.
- GF Waste Rock Dump: Current area approximately 48 ha, to be increased by about 6 ha (final area about 54 ha) to allow for final slope and footprint upon rehabilitation (area pending designs). Dimensions are as follows:
  - Footprint: 54 ha.
  - Height: 120 m, upon rehabilitation 97 ha.
- East Pit Waste Rock Dump: Current area approximately 144 ha, to be increased by about 26 ha (final area about 170 ha) to allow for final slope and footprint upon rehabilitation (area pending designs but will involve clearance more than 25 ha). Dimensions are as follows:
  - Footprint: 170 ha.
  - Height: 120 m, upon rehabilitation 114 ha.
- West Pit Waste Rock Dump (VP2): Current area approximately 80 ha, to be increased with about 55 ha (final area 135 ha) to allow for final slope and footprint upon rehabilitation (area pending designs but will likely involve clearance of about 35 ha). Dimensions are as follows:
  - Footprint: 135 ha.
  - Height: 110 m, upon rehabilitation 707 ha.
- HF Waste Rock Dump (new dump on historic dump footprint): Current area approximately 20 ha and used for BIS stockpiling, to be reused to allow for HF Pit waste rock disposal and final slope and footprint upon rehabilitation (area pending designs). This area is located on an existing WRD footprint (no additional clearance therefore required). Dimensions are as follows:
  - Footprint: 20 ha.

  - Height: 50 ha, upon rehabilitation 50 ha.

- Discard Dump: Current area approximately 28 ha, to be increased to about 60 ha. This area is located within the mining area, between WRDs, Slimes Dam and Opencast Pits; no clearance will be required. Dimensions are as follows:
  - Footprint: 60 ha.
  - Height: 50 m.

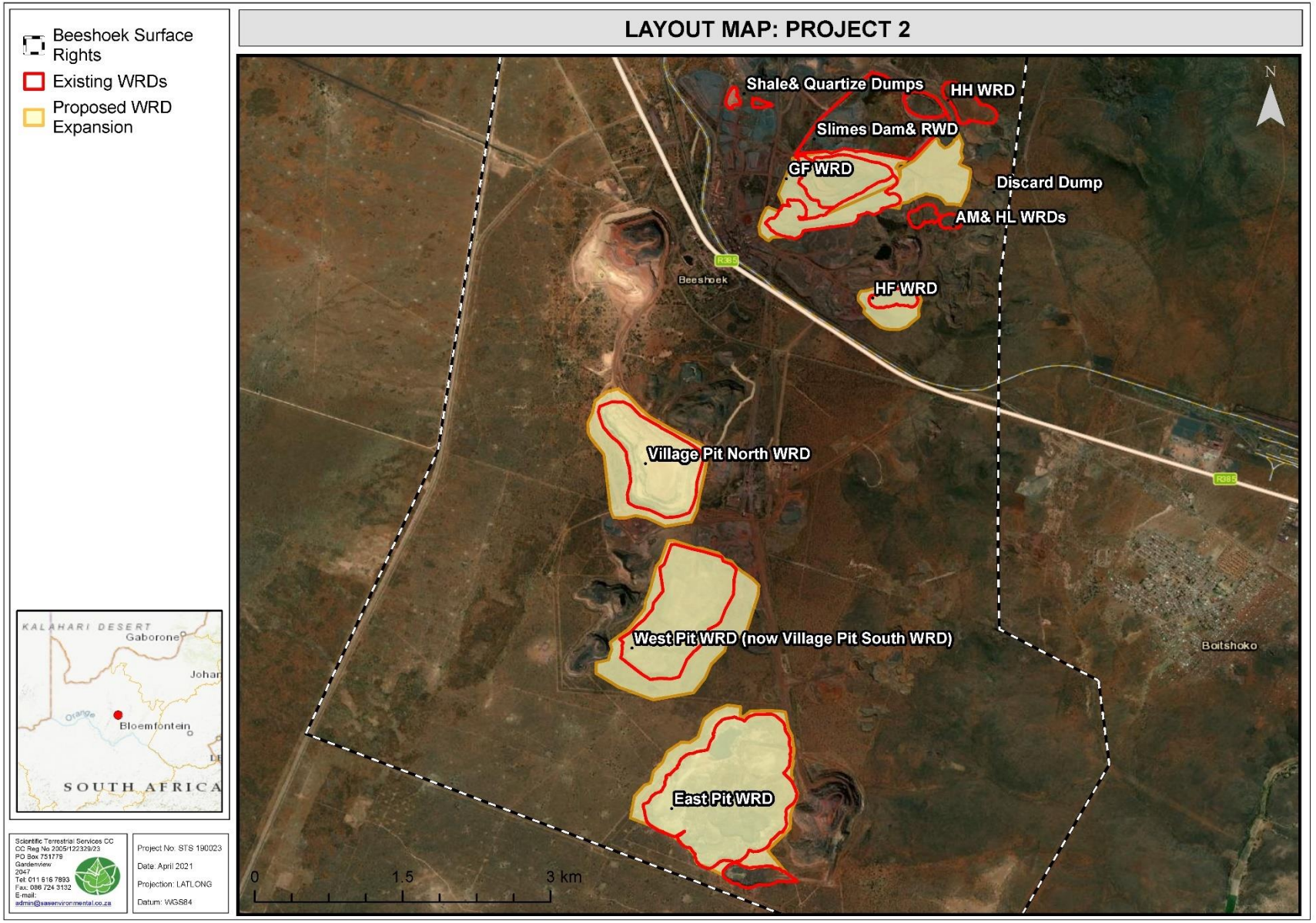

Figure 4: Layout map of Project 2 - Amendments to the design of existing Waste Rock Dumps in terms of the increase in heights and allowance for final slope, which will result in the extension of footprints.

1.1.3 Project 3: Increase of Opencast footprint areas, as well as the undertaking of detrital mining for shallow iron ore reserves, including transportation routes (Haul roads) (Figure 5).

The mine would like to make use of the opportunity to increase the approved footprints of active pits, which will include:

- **BN Pit**
  - Depth: 162 m.
  - Area – 137 ha.
  - Planned to be expanded by 66 ha to approximately 137 ha.
  - Approximately 25 ha will require vegetation clearance.
- **Village Pit (VP North)** will be expanded by 203 ha in the future to 269 ha and will further include two satellite pits: **Pit East** and **Pit South**, each with and area of about 37 ha and 22 ha respectively. Clearance of vegetation will be required. Overall dimensions are as follows:
  - VP North Depth: 180 m.
  - VP East Depth: 160 m.
  - VP South Depth: 60 m.
  - Area: 436 ha.
- **Village Exploration Block Area**: To the west of the proposed Village Pit expansion area, an area for specific target exploration drilling has been demarcated. This area is about 170 ha in extent.
- **BF Pit Expansion** will be expanded from about 30 ha (comprising of 3 pits) to about 86 ha. Approximately 25 ha may require clearance.
  - Depth: 180 m.
  - Area: 86 ha.
- **East Pit**: will not result in an increase in the footprint but rather in the depth of mining within the mining shell. The depth of East Pit is planned at approximately 220 m.
  - Depth: 200 – 220 m.
  - Area: 50 ha.
- **Future Strategic Exploration Block Area[2]:** Around the East Pit potential strategic iron ore resources have been identified. The area in question is about 976 ha. Various

[2] **Note in terms of the Future pit**: For this activity it is important to note that the future pit is in its planning phase, further exploration will be required in this area. Once the final designs for the mining schedule is available this will be submitted to the DMRE for approval. It will also be at this time that a detailed waste management strategy will be developed for the management of waste rock and overburden in this area. Once this information is available the necessary Waste Management License and Water Use License will be applied for from the DMRE and DWS respectively.

wetland systems are present within this area, as well as a potential recharge zone. Due to the presence of these sensitive ecosystems, strategic exploration drilling will be undertaken to determine the potential resources within this area. The drilling will be undertaken in terms of a management plan to ensure the least amount of disturbance to these systems.

- The **Detrital Mining area** of about 238 ha will be established – it should be noted that entire area will not be utilised, only where minerals are found economically viable. Clearance of vegetation will be required. Dimensions are as follows:
  - Depth: 20 - 40 m.
  - Area: 238 ha.

One additional haul road will be required:

- **Village Haul Road**: 1100 m (about 3.3 ha) with a width of 30 m. The road will be located in areas mostly disturbed with exiting mining activities or along exiting roads.

Backfilling of Opencast Pits

The 2004 Environmental Management Plan (EMP) clearly states that mine waste produced in the northern mining area will be used for the in-filling of available opencast pits areas. The Mine will backfill as far as practically possible as part of the ongoing development of the annual and long-term rehabilitation plans, but voids may remain where enviroberms will be established for safety.

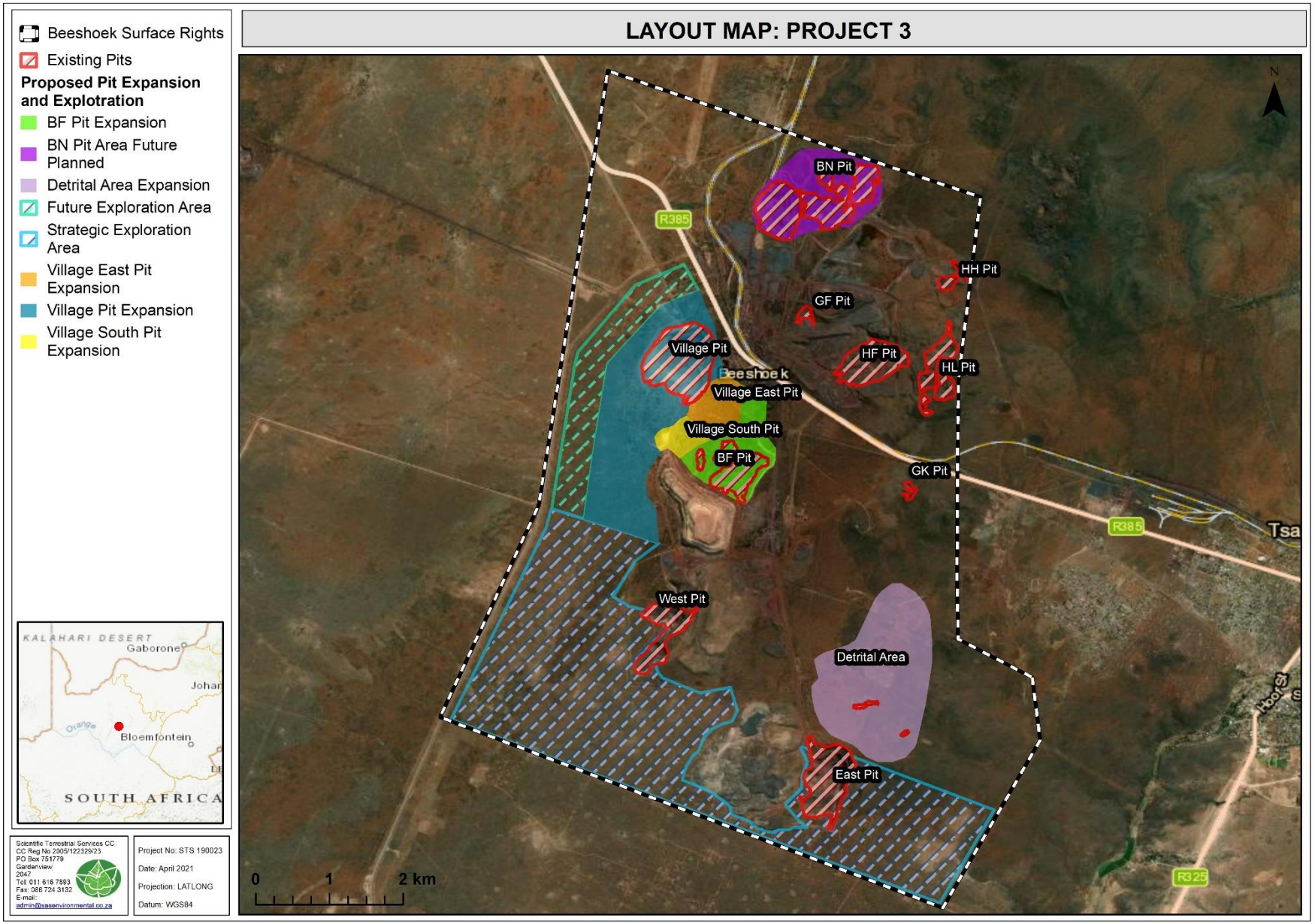

Figure 5: Layout map of Project 3 - Increase of Opencast footprint areas, as well as the undertaking of detrital mining.

1.1.4 Project 4: Development of the Beneficiation Project which will comprise of a WHIMS Plant and Jig Plant at Beeshoek (Figure 6).

Beeshoek Mine has identified the opportunity to recover and economically beneficiate existing and arising low-grade resources. The intent being the construction, commissioning and bringing into production two additional beneficiation sections capable of processing ≈ 520 tph of material to produce ≈ 1 Mtpa of export quality sinter fines product.

The project includes the following footprints:

- WHIMS Plant: 13.2 ha;
- JIG Plant: Footprint: approximately 2.6 ha on already disturbed areas. Jig Plant Laydown Area: 2 ha on existing Discard Dump footprint;
- Staging Stockpile (WHIMS);
- Tailings Pipeline HDPE: 315 mm diameter at 750 m^3/hr (208.3l/s):
  - 1.1 km northern perimeter to Slimes Dam;
  - 1.4 km southern perimeter to Slimes Dam; and
  - Existing pipeline of 1.3 km to be rerouted directly to the WHIMS Plant.
- Jig Plant Road System:
  - Road 1: 240 m with a width of approx. 16 m.
  - Road 2: 700 m with a width of approx. 16 m.
  - Road 3: 280 m with a width of 16 m.
  - Road 4: 135 m with a width of about 30 m.
  - Decommissioning of existing haul road: about 800-1000 m length of about 30 m width.
- Overhead Powerline: 22 kV powerline of approx. 620 m;
- Underground electrical cable: 22 kV of approx. 380 m;
- Clearance (potentially 5.6 ha), note that the clearance associated with the road does not contribute to the listing activity for clearance.:
  - Road 1 – potential clearance of 0.1 ha (considered disturbed area).
  - WHIMS Laydown Area: approximately 1.5 ha.
  - WHIMS Plant footprint, including access road of 160 m: approximately 4 ha.
  - WHIMS Plant Central Process Water Dam: 0.4 ha, capacity less than 50 000 m^3.

1.1.5 Project 5: Water Management (Figure 6).

The Beeshoek Mine will also establish additional water storage tanks on site which will include:

- An additional storage tank for clean water at the current D300 tank on South Mine. The current intended capacity is about 250 m^3.
- A new additional storage tank near the existing BN Tank of 500 m^3. The purpose is to provide sufficient storage space for water from the approved in-pit dewatering activities;
- Four 10 m^3 plastic tanks at the existing clarifier, thickener area. To allow for the storage of water in the water balance system of the mine to capacitate the plant process to start up without delay;
- One 2000 m^3 process water tank adjacent to the existing Clarifier connected with a "balancing pipe". To allow for the storage of water in the water balance system of the mine to capacitate the plant process to start up without delay;
- Existing Dam: Steel Dam 250 m^3 with capacity to store process water and allow for the storage of top-up water; and
- Existing Dam: Zinc Dam: 90 m^3 with capacity to store input water where required.

Ancillary infrastructure: Topsoil stockpiles

With the expansion of area, soil layers will be stripped and place on the existing topsoil stockpiles near the detrital area, this will be dependent on the outcomes of the specialist studies.

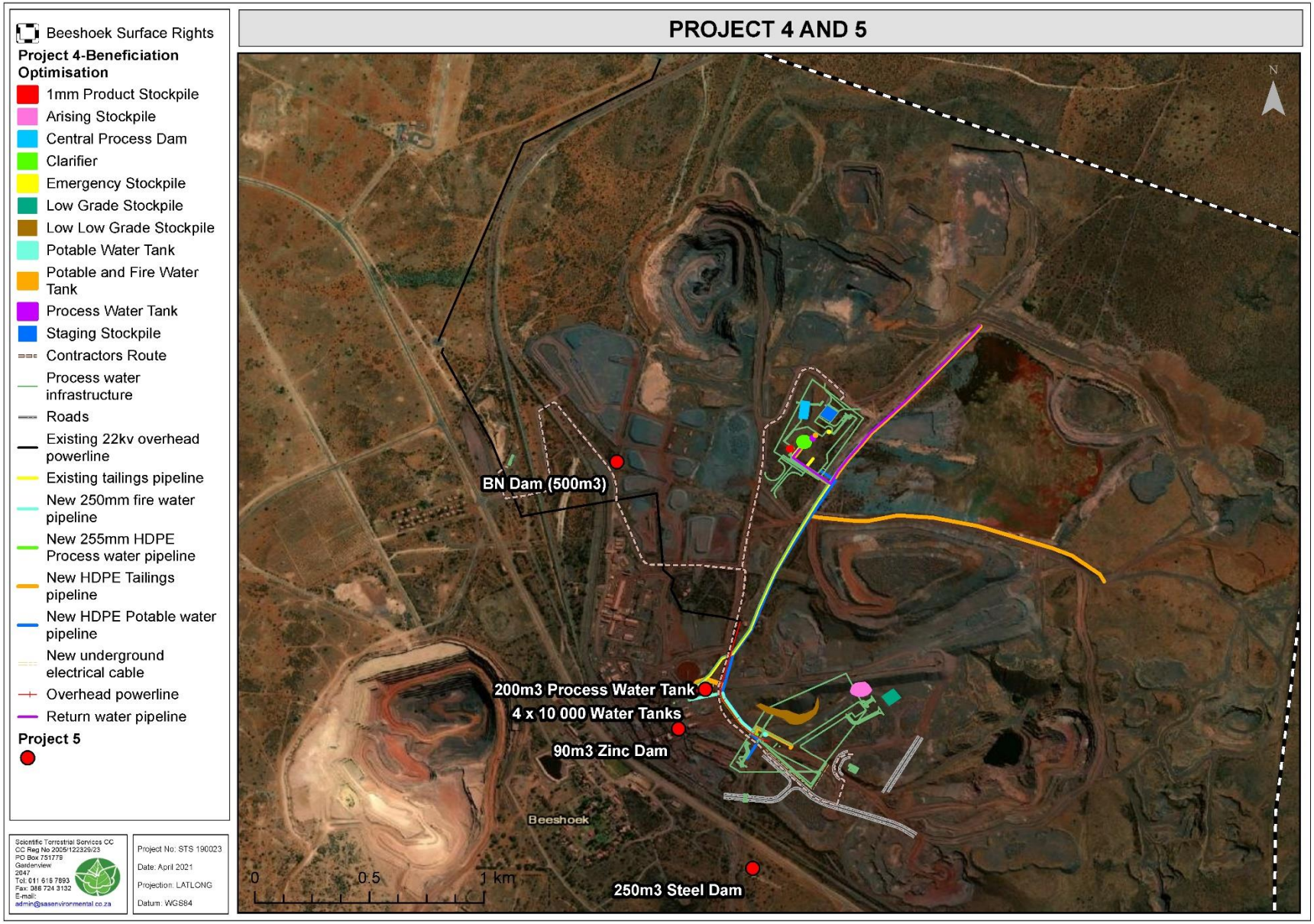

Figure 6: Layout map of Project 4 - Optimisation of Beneficiation and implementation of the Waste Management Hierarchy, as well as Project 5 - Water Management.

1.2 Scope of Work

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

- To compile a desktop assessment with all relevant information as presented by South African National Biodiversity Institute's (SANBI's) Biodiversity Geographic Information Systems (BGIS) website (http://bgis.sanbi.org) and the Environmental Geographical Information Systems (E-GIS) website (https://egis.environment.gov.za/). The desktop assessment aims to gain background information on the physical habitat and potential floral and faunal ecology associated with the focus area;
- To state the indemnity and terms of use of this report (Appendix A) as well as to provide the details of the specialists who prepared the reports (Appendix E);
- To outline the legislative requirements that were considered for the assessment (Appendix B of this report); and
- To provide the methodologies followed relating to the impact assessment and development of the mitigation measures (Appendix C) that were applied in the floral and faunal assessments (Part B and Part C).

1.3 Assumptions and Limitations

The following assumptions and limitations are applicable to this report:

- The biodiversity desktop assessment is confined to the focus area and does not include detailed results of the surrounding areas or adjacent properties, although ecologically important or sensitive areas according to the desktop databases of the surrounding areas have been included on the relevant maps;
- It is important to note that although all of the data sources used do provide useful and often verifiable, high-quality data, the various databases do not always provide an entirely accurate indication of the actual site characteristics at the scale required to inform an environmental process and must be 'ground-truthed'. However, this information is useful as background information to the study and, based on the desktop results, sufficient decision making can take place with regards to the proposed infrastructure development if considered together with the ground-truthed results of the biodiversity assessments (Part B and C); and
- Three field assessments were undertaken across various seasons, namely 10-13 June 2019 (winter assessment), 22–24 January 2020 (summer assessment), and 1-5 March 2021 (early autumn) – although each seasonal assessment focused on different areas and did not necessarily incur a full assessment of the previous areas. Each assessment did, however, aim to look at a portion of all the representative habitat units.

The field assessment aimed to determine the ecological status of the habitat associated with the focus area, and to "ground-truth" the results of the desktop assessment.

1.4 Legislative Requirements

The following legislative requirements were considered during the assessment:

- The Constitution of the Republic of South Africa, 1996[3];
- The Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA);
- 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);
    - Government Notice (GN) number R.1020: Alien and Invasive Species Regulations, 2020, in Government Gazette 43735 dated 25 September 2020 as it relates to the NEMBA; and
    - GN number 1003: Alien and Invasive Species Lists, 2020, in Government Gazette 43726 dated 18 September 2020, as it relates to the NEMBA.
- The National Forest Act, 1998 (Act No. 84 of 1998, amended) (NFA);
    - GN 536: List of Protected Tree Species as published in the Government Gazette 41887 dated 7 September 2018, as it relates to the NFA;
- Government Gazette 45421 dated 10 May 2019 as it relates to the Department of Forestry, Fisheries and the Environment (DFFE)'s national environmental screening report required with an application for environmental authorisation as identified in regulation 16(1)(v) of EIA Regulations:
    - For the Terrestrial Biodiversity Theme: GN 320 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity as published in Government Gazette 43110 dated 20 March 2020; and
    - For Animal and Plant Species Themes**:** GN 1150 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Plant and Animal Species as published in Government Gazette 43855 dated 30 October 2020;
- The Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009) (NCNCA); and

[3] Since 1996, the Constitution has been amended by seventeen amendments acts. The Constitution is formally entitled the 'Constitution of the Republic of South Africa, 1996". It was previously also numbered as if it were an Act of Parliament – Act No. 108 of 1996 – but since the passage of the Citation of Constitutional Laws Act, neither it not the acts amending it are allocated act numbers.

- The Northern Cape Provincial Spatial Development Framework (NCPSDF) as developed in 2011 to meet the requirements of the Northern Cape Planning and Development Act, 1998 (Act 7 of 1998) and the Municipal Systems Act, 2000 (Act 32 of 2000).

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

2 ASSESSMENT APPROACH

Maps and digital satellite images were generated prior to the field assessment to determine broad habitats, vegetation types and potentially sensitive sites. The biodiversity desktop assessment is confined to the Borrow Pits and does not include the neighbouring and adjacent properties, although the sensitivity of surrounding areas is included on the respective maps. Relevant databases and documentation that were considered during the assessment of the Borrow Pits include [4]:

- 2010 National Protected Area Expansion Strategy (NPAES) (Government of South Africa. 2010; DEA & SANBI, 2009), including the below listed vector datasets:
    - NPAES Focus Areas 2010: National Protected Areas Expansion Strategy: Focus areas for protected area expansion (South African National Parks (SanParks), 2010);
    - NPAES Formal: Polygons of formal protected national parks areas in South Africa (SANParks/SANBI, 2013); and
    - NPAES Protected Areas – Informal: Informal conservation areas in South Africa (SANParks/SANBI, 2012).
- The South African Conservation Areas Database, Quarter 2 (SACAD, 2020);
- The South African Protected Areas Database, Quarter 2 (SAPAD, 2020);
- The Northern Cape CBA Map, including the following datasets and research documents:
    - 2016 Northern Cape Critical Biodiversity Areas (NCDENC, 2016a);
    - 2016 Northern Cape Critical Biodiversity Areas Reason (NCDENC, 2016b); and.

[4] Datasets obtained from:

- SANBI BGIS (2019). The South African National Biodiversity Institute - Biodiversity GIS (BGIS) [online]. URL: http://bgis.sanbi.org as retrieved in 2019; and
- Department of Environmental Affairs (DEA) Environmental Geographical Information Systems (E-GIS) website. URL: https://egis.environment.gov.za/

- Critical Biodiversity Areas of the Northern Cape: Technical Report (Holness et al. 2016).

- The National Vegetation Map Project (VEGMAP), with the below vector dataset used for information on Biomes, Bioregions and Vegetation Type(s):
  - 2018 Final Vegetation Map of South Africa, Lesotho and Swaziland (SANBI, 2018a)
- The National List of Threatened Ecosystems 2011 (SANBI 2011; South Africa, 2011);
- From the National Biodiversity Assessment (NBA, 2018) Terrestrial Assessment project (Skowno et al., 2019):
  - 2018 Terrestrial ecosystem threat status and protection level - remaining extent (SANBI, 2018b); and
  - 2018 Terrestrial ecosystem threat status and protection level layer (SANBI, 2018c).
- The Mining and Biodiversity Guidelines (Department of Environmental Affairs et al., 2012);
- The Important Bird and Biodiversity Areas (IBA) Programme and vector dataset (BirdLife South Africa, 2015; Marnewick et al., 2015a and 2015b), in conjunction with the South African Bird Atlas Project 2 (SABAP 2); and
- The International Union for Conservation of Nature (IUCN).

The field assessments took place over 10-13 June 2019 (winter assessment), 22–24 January 2020 (summer assessment), and 1-5 March 2021 (early autumn) to “ground-truth” the results of the desktop assessment. Results of the field assessment are presented in Parts B and C.

3 RESULTS OF THE DESKTOP ANALYSIS

3.1 Conservation Characteristics of the Beeshoek Mine Boundary 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 1). The dashboard report aims to present concise summaries of the data on as few pages as possible in order to allow for improved assimilation of results by the reader to take place. Where required, further discussion and interpretation are provided.

Table 1: Summary of the terrestrial conservation characteristics for the Beeshoek Mine.

DESCRIPTION OF THE VEGETATION TYPE(S) RELEVANT TO THE BEESHOEK MINE ACCORDING TO MUCINA & RUTHERFORD (2012; 2018 (BETA-VERSION) (FIGURE 3)				
Biome	The Beeshoek Mine is situated within the Savanna Biome.			
Bioregion	The Beeshoek Mine occurs within the Eastern Kalahari Bushveld Bioregion.			
Vegetation type		**Postmasburg Thornveld (Svk 14) (western Portion)**	**Kuruman Thornveld (Svk 9) (Eastern Portion)**	**Kuruman Mountain Bushveld (Svk 10) (Eastern Boundary)**
Altitude (m)		1 180 –1 440 m	1 100 –1 500	1 100 –1 800
Climate		Summer and autumn rainfall with very dry winters.	Summer and autumn rainfall with very dry winters.	Summer and autumn rainfall with very dry winters.
Climate	**MAP (mm)**	306	369	371
	MAT (°C)	17.0	17.5	16.8
	MFD (Days)	38	36	40
	MAPE (mm)	2752	2786	2728
	MASMS (%)	84	84	83
Distribution		Northern Cape Province	North-West and Northern Cape Provinces	Northern Cape and North-West Provinces
Geology & soils		Red aeolian sand of the Kalahari Group overlying the volcanics and sediments of the Griqualand West Supergroup that outcrop in places. Deep soils are of the Hutton form	Some Campbell Group dolomite and chert and mostly younger, superficial Kalahari Group sediments, with red wind-blown (0.3–1.2 m deep) sand. Locally, rocky pavements are formed in places	The Kuruman and Asbestos Hills consist banded iron formation, with jaspilite, chert and riebeckite-asbestos of the Asbestos Hills Subgroup of the Griqualand West Supergroup (Vaalian).
Conservation		Least threatened. Target 16%. None of the unit is conserved in statutory conservation areas, but very little has been transformed	Least threatened. Target 16%. None conserved in statutory conservation areas. Only 2% already transformed.	Least threatened. Target 16%. None conserved in statutory conservation areas. Very little transformed.
Vegetation & landscape features (dominant floral taxa in appendix D)		Flats surrounded by mountains supporting open, shrubby thornveld characterised by a dense shrub layer, often lacking a tree layer. The grass layer is very sparse. Shrubs generally low with a karroid affinity	Flat rocky plains and some sloping hills with very well-developed, closed shrub layer and well-developed open tree stratum consisting of *Vachellia erioloba* (formerly *Acacia erioloba*)	Rolling hills with generally gentle to moderate slopes and hill pediment areas with an open shrubveld with *Calobota cuspidosa* formerly (*Lebeckia macrantha*) prominent in places. Grass layer is well developed

CONSERVATION DETAILS PERTAINING TO THE AREA OF INTEREST (VARIOUS DATABASES)		NATIONAL WEB BASED ENVIRONMENTAL SCREENING TOOL (2020)	
NBA (2018): **1) Ecosystem Threat Status** **2) Ecosystem Protection Level**	The Beeshoek Mine is located within the Postmasburg Thornveld, Kuruman Thornveld and the Kuruman Mountain Bushveld, all of which are considered **Least Concern** ecosystems and are currently **Poorly Protected (Figure 7)**. Most of Projects 2 and 3 footprints occur in the Postmasburg Thornveld that stretches across the western and southern extents of the Beeshoek Mine. The Detrital area is located in both the Kuruman Thornveld and the Kuruman Mountain Bushveld, with the proposed Beneficiation Optimisation project	The screening tool is intended to allow for pre-screening of sensitivities in the landscape to be assessed within the EA process. This assists with implementing the mitigation hierarchy by allowing developers to adjust their proposed development footprint to avoid sensitive areas	
		Animal species theme (Figure 8)	For the animal species theme, the Beeshoek Mine is considered to largely have a **low sensitivity**, with several sections scattered throughout the Beeshoek Mine considered to be of **medium sensitivity**. One small area in the southern section of the Beeshoek Mine is a **high sensitivity area**.

	partially located in the Kuruman Thornveld. The remaining footprint areas largely occur in already mined or transformed sites. 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 National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) (NEMPAA) and compared with the biodiversity target for that ecosystem type. The ecosystem protection level status is assigned using the following criteria: i. If an ecosystem type has more than 100% of its biodiversity target protected in a formal protected area either a or b, it is classified as well protected, ii. When less than 100% of the biodiversity target is met in formal a or b protected areas it is classified it as moderately protected, iii. If less than 50% of the biodiversity target is met, it is classified it as poorly protected, and iv. If less than 5% it is hardly protected.		The sensitivities were triggered by the potential occurrence of the following species: • High: the avifauna *Neotis ludwigii* (Ludwig's bustard) (Endangered); and • Medium: the avifauna species *Sagittarius serpentarius* (Secretary bird) (Endangered).
		Plant species theme (Figure 9)	For the plant species theme, the Beeshoek Mine is considered to largely have a **low sensitivity**, with several sections scattered throughout the Beeshoek Mine considered to be of **medium sensitivity**. The sensitivity was triggered by the potential occurrence of a vulnerable plant species.
		Terrestrial biodiversity theme	For the Terrestrial Biodiversity Theme, the Beeshoek Mine is considered to have a **very high sensitivity**. The triggered sensitivity features include an Ecological Support Areas (ESA), and a Freshwater ecosystem priority area.
National Threatened Ecosystems[5] (2011) **Figure 4**	The Beeshoek Mine is located within an ecosystem that is currently considered to be **Least Concern**. Least Concern ecosystems have not experienced a significant loss of natural habitat or deterioration in condition.	**STRATEGIC WATER SOURCE AREAS FOR SURFACE WATER (2017)**	
IBA (2015)	The Beeshoek Mine is not located within or near an IBA (within 10 km).	Surface Water Strategic Water Source Area (SWSAs) are defined as areas of land that supply a disproportionate (i.e., relatively large) quantity of mean annual surface water runoff in relation to their size. they include transboundary areas that extend into Lesotho and Swaziland. The Sub-National Water Source Areas (WSAs) are not nationally strategic as defined in the report but were included to provide a complete coverage.	
SAPAD (2020, Q3); **SACAD (2020, Q3);** **NPAES (2009).** **Figure 4**	According to the South African Protected Areas Database (SAPAD, 2020)[6], the South African Conservation Areas Database (SACAD, 2020)[7] and the National Protected Areas Expansion Strategy (NPAES, 2009), no protected areas or conservation areas are indicated within 10 km of the Beeshoek Mine.	**Name & Criteria**	The Beeshoek Mine is not within 10 km of a Strategic Water Source Area.

[5] For Environmental Impact Assessments (EIAs), the 2011 National list of Threatened Ecosystems remains the trigger for a Basic Assessment in terms of Listing Notice 3 of the EIA Regulations 2014, as amended published under the National Environmental Management Act, 1998 (Act No. 107 of 1998). However, the updated 2018 ecosystem threat status have been considered in the assessment of impact significance in EIAs.

[6] **SAPAD (2020):** The definition of protected areas follows the definition of a protected area as defined in the National Environmental Management: Protected Areas Act, (Act 57 of 2003). Chapter 2 of the National Environmental Management: Protected Areas Act, 2003 sets out the "System of Protected Areas", which consists of the following kinds of protected areas - 1. Special nature reserves; 2. National parks; 3. Nature reserves; 4. Protected environments (1-4 declared in terms of the National Environmental Management: Protected Areas Act, 2003); 5. World heritage sites declared in terms of the World Heritage Convention Act; 6. Marine protected areas declared in terms of the Marine Living Resources Act; 7. Specially protected forest areas, forest nature reserves, and forest wilderness areas declared in terms of the National Forests Act, 1998 (Act No. 84 of 1998); and 8. Mountain catchment areas declared in terms of the Mountain Catchment Areas Act, 1970 (Act No. 63 of 1970).

[7] **SACAD (2020):** The types of conservation areas that are currently included in the database are the following: 1. Biosphere reserves, 2. Ramsar sites, 3. Stewardship agreements (other than nature reserves and protected environments), 4. Botanical gardens, 5. Transfrontier conservation areas, 6. Transfrontier parks, 7. Military conservation areas and 8. Conservancies.

<table>
<tr><th colspan="2">NORTHERN CAPE CRITICAL BIODIVERSITY AREAS (2016) (FIGURE 10)</th><th>NORTHERN CAPE PROVINCIAL SPATIAL DEVELOPMENT FRAMEWORK (NCPSDF, 2019)</th></tr>
<tr><td>ECOLOGICAL SUPPORT AREA (ESA)</td><td>The Detrital Area, and sections of the Opencast Pit Expansions are located within the ESA.

According to the Technical Guidelines for CBA Maps document ESAs are areas that must retain their ecological processes in order to meet biodiversity targets for ecological processes that have not been met in CBAs or protected areas; meet biodiversity targets for the representation of ecosystem types or Species of special concern when it's not possible to meet them in CBAs; support ecological functioning of protected areas or CBAs or a combination of these (SANBI, 2017).</td><td rowspan="2">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 Beeshoek Mine is located within the Griqualand West Centre (GWC) of plant endemism (Figure 12). This semi-arid region is broadly described as savanna, forming part of the eastern Kalahari Bushveld Bioregion. Studies investigating the endemism of the centre report at least 23 plant species that have restricted distributions (Frisby et al. 2019). The Beeshoek Mine also falls within the Gamagara Corridor (Figure 13). 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.</td></tr>
<tr><td>OTHER NATURAL AREAS (ONA)</td><td>The western portion, except where active mining is taking place is classified as other natural areas. Most of Projects 2 and 3 occur within these areas.

According to the Technical Guidelines for CBA Maps document, ONA consist of all those areas in good or fair ecological condition that fall outside the protected area network and have not been identified as CBAs or ESAs (SANBI, 2017).</td></tr>
<tr><td colspan="2"></td><td>MINING AND BIODIVERSITY GUIDELINES (2012)
The Beeshoek Mine Boundary is situated within an area currently not ranked under the mining and biodiversity guidelines. (2013).</td></tr>
<tr><td>CBA REASONS</td><td colspan="2">The Northern Cape Critical Biodiversity Areas (2016) database also includes the "reasons" layer, which is based on the planning units used in the spatial analysis and provides a list of biodiversity and ecological features found in each planning unit, which contribute to the biodiversity target (CBA Map Reason Metadata).

According to this Northern Cape Critical Biodiversity Areas Reasons layer, the triggering biodiversity and ecological features for the ESAs within the Beeshoek Mine include the below:
- All natural wetlands; FEPA catchment; Conservation Areas; Kuruman Thornveld; Landscape structural elements; Postmasburg Thornveld; Kuruman Mountain Bushveld; Kuruman Thornveld; and Postmasburg Thornveld.</td></tr>
</table>

NBA = National Biodiversity Assessment; NPAES = National Protected Areas Expansion Strategy; SAPAD = South African Protected Areas Database; IBA = Important Bird and Biodiversity Area; 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).

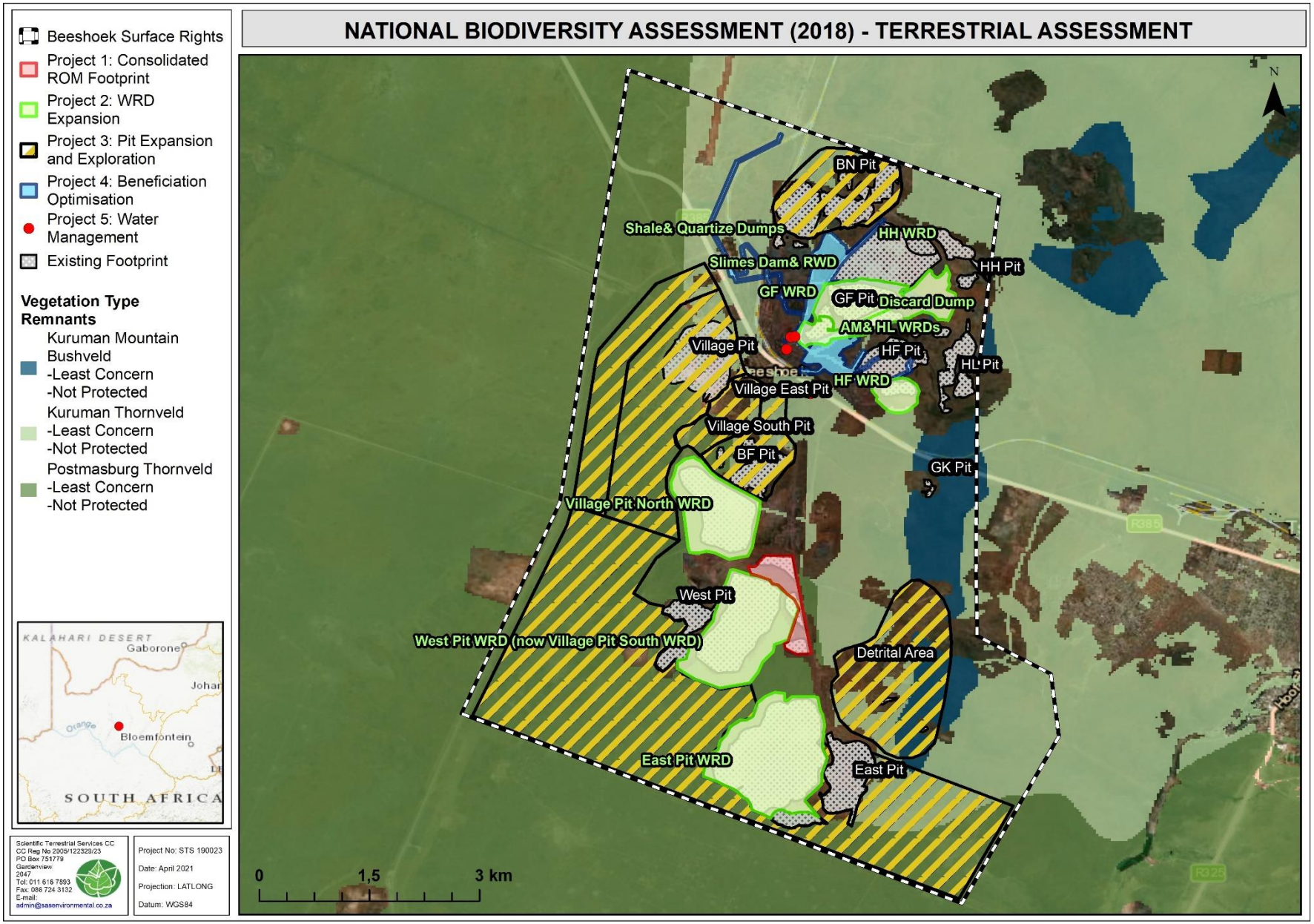

Figure 7: Vegetation types associated with the Beeshoek Mine (Mucina & Rutherford, 2018 (beta-version))

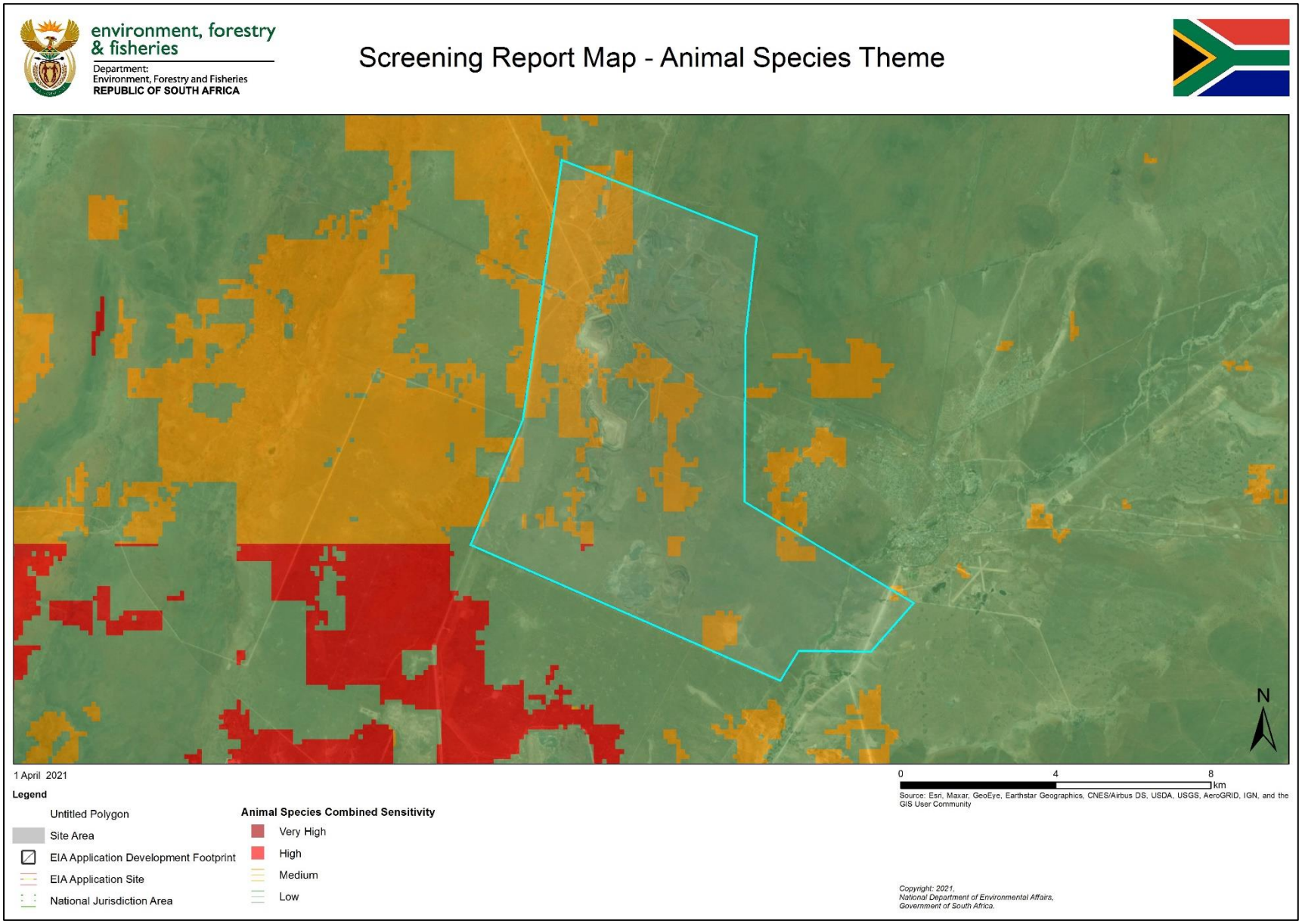

Figure 8: Screening Tool outcome for the Animal Species Theme.

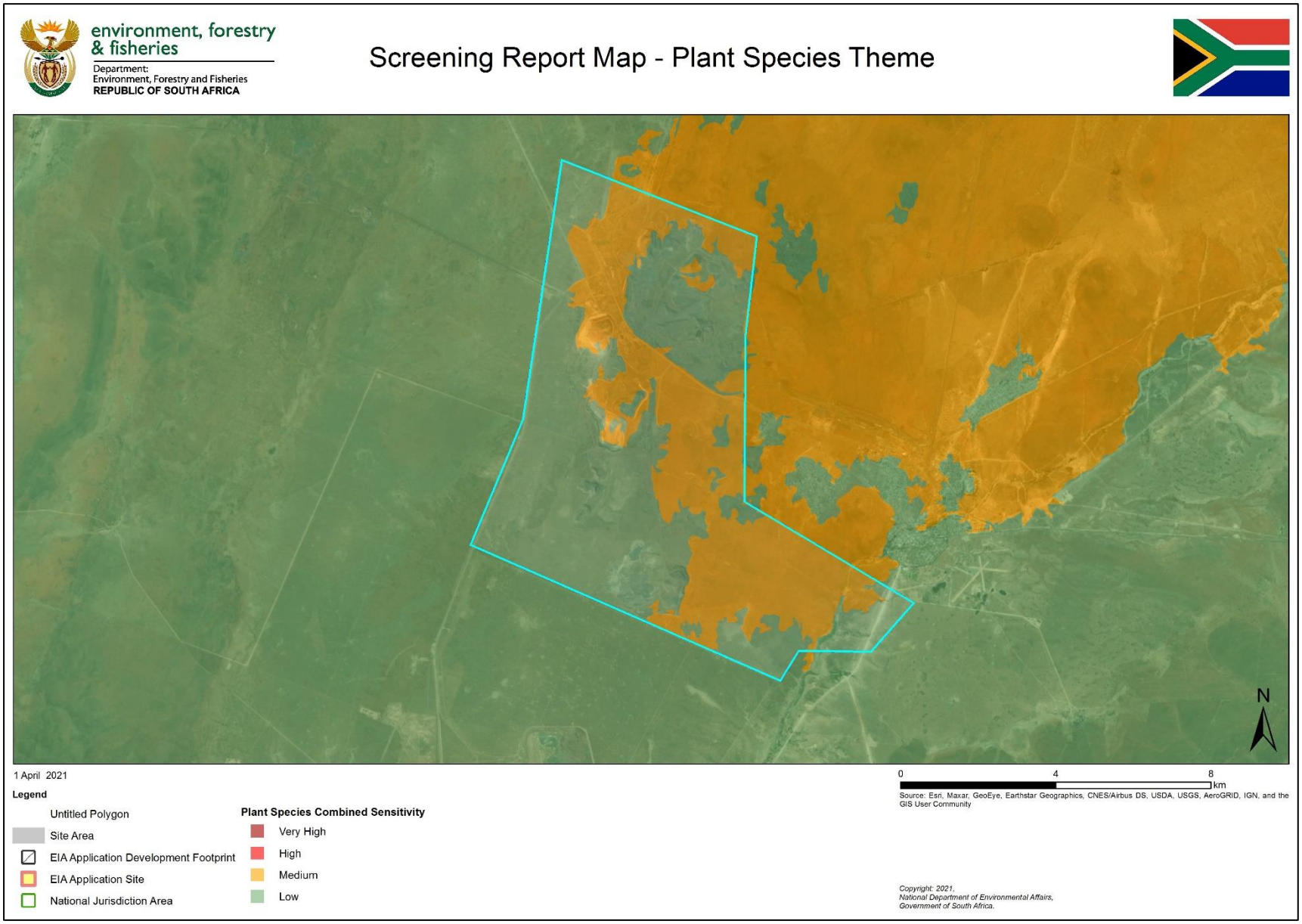

Figure 9: Screening Tool Outcome for the Plant Species Theme.

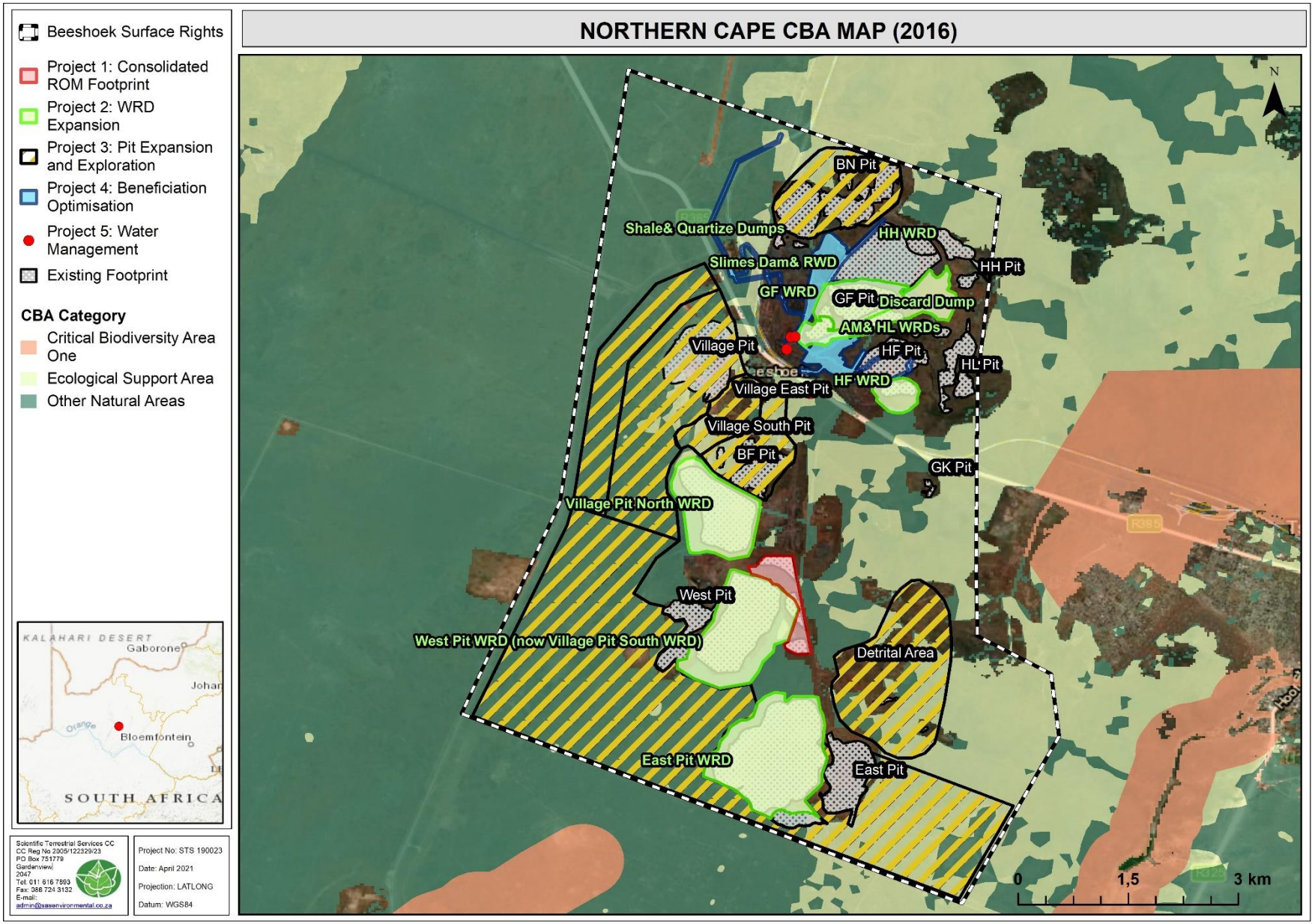

Figure 10: Ecological Support Areas (ESA) associated with the Beeshoek Mine according to the Northern Cape CBA Map (2016).

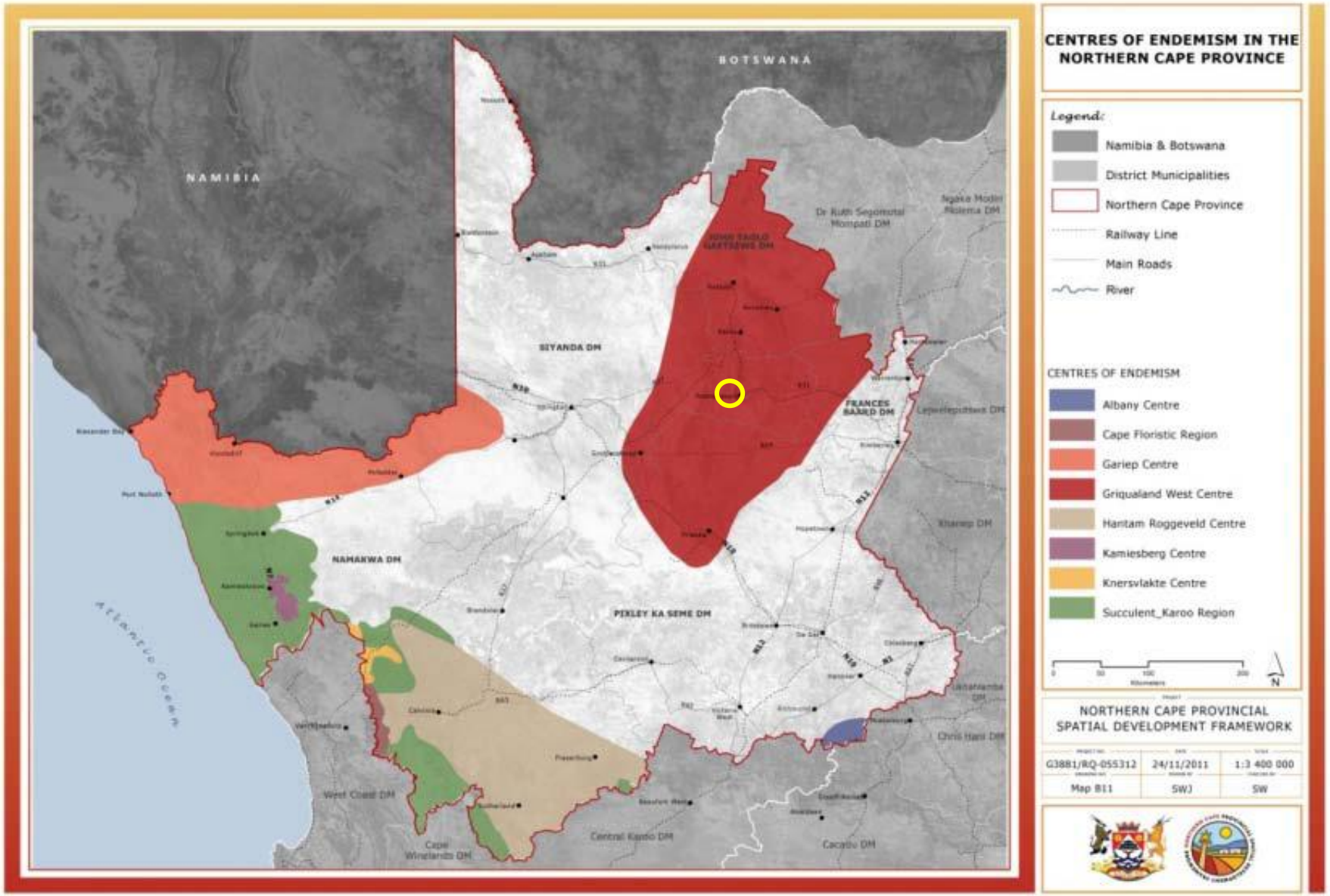

Figure 11: Centers of endemism of the Northern Cape Province: the Beeshoek Mine indicated by a yellow circle (Northern Cape Provincial Spatial Development Framework, 2012).

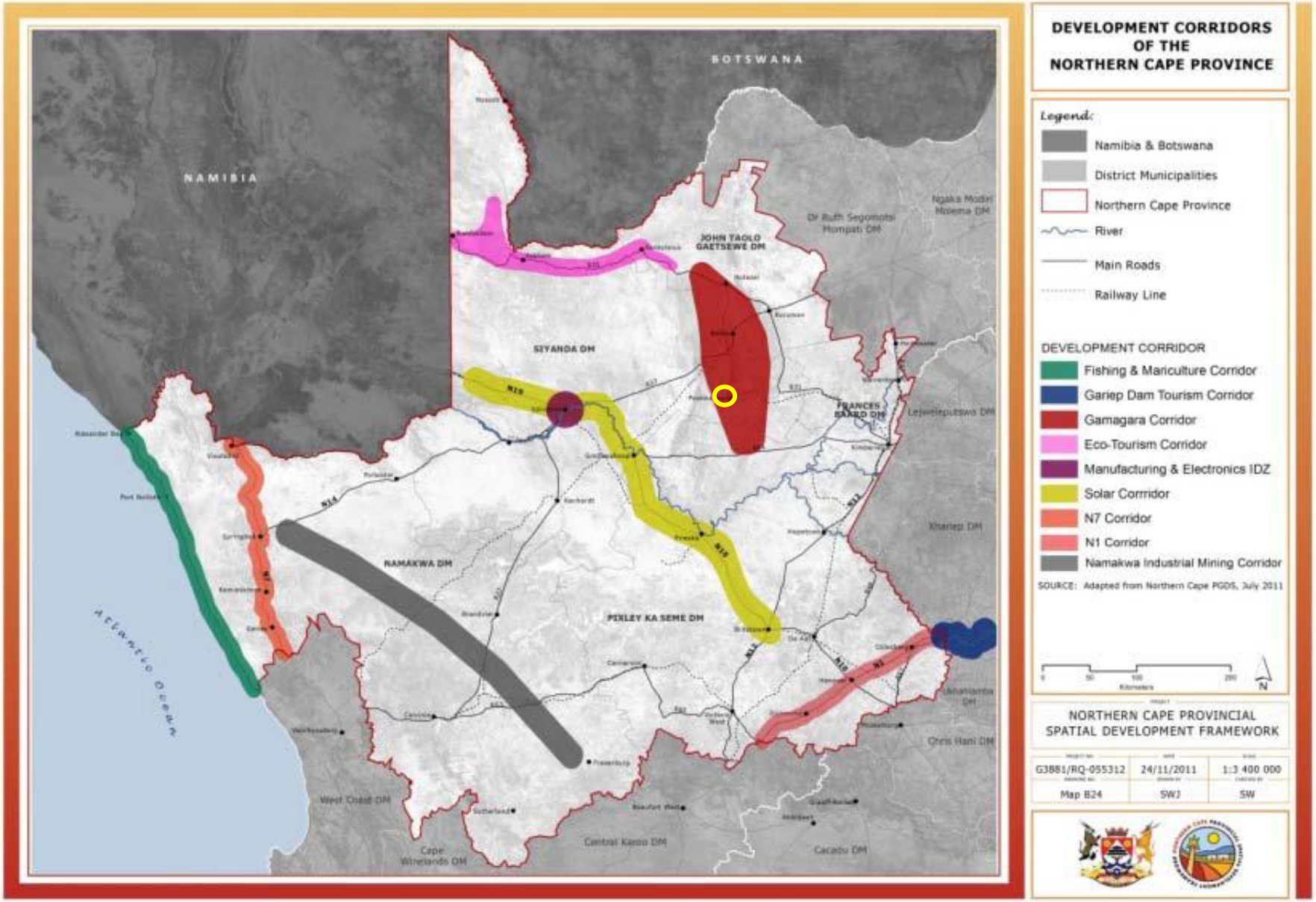

Figure 12: Development regions and corridors of the Northern Cape: the Beeshoek Mine indicated by the yellow circle (NPSDF, 2012).

4 STRUCTURE OF THE REPORT

Part A of this report served to introduce the Beeshoek Surface Rights and focus 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. Part B 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 fauna field assessment. This section presents data analyses and a discussion of the results. Finally, this section then presents the results of the impact assessment where the impacts on vertebrate 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 refer 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

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 CONSERVATION OF AGRICULTURAL RESOURCES ACT, 1983 (ACT NO. 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.

THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998) (NEMA)

The National Environmental Management Act, 1998 (Act No. 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 NATIONAL ENVIRONMENTAL MANAGEMENT BIODIVERSITY ACT, 2004 (ACT NO. 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 bio prospecting involving indigenous biological resources;
- To give effect to ratify international agreements relating to biodiversity which are binding to the Republic;
- To provide for cooperative governance in biodiversity management and conservation; and
- To provide for a South African National Biodiversity Institute to assist in achieving the objectives of this Act.

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

Furthermore, a person may not carry out a restricted activity involving either:

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

GOVERNMENT NOTICE NUMBER R.1020: ALIEN AND INVASIVE SPECIES REGULATIONS, 2020 (IN GOVERNMENT GAZETTE 43735), INCLUDING GOVERNMENT NOTICE NUMBER 1003: ALIEN AND INVASIVE SPECIES LISTS, 2020 (IN GOVERNMENT GAZETTE 43726) AS IT RELATES TO THE NEMBA

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 unauthorised introduction and spread of alien and invasive species to ecosystems and habitats where they do not naturally occur,
- Manage and control alien and invasive species, to prevent or minimise harm to the environment and biodiversity; and
- Eradicate alien 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, 2020):

- **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 NATIONAL FOREST ACT, 1998 (ACT NO. 10 OF 1998), AS AMENDED IN SEPTEMBER 2011 (NFA)

According to the department of Department of Forestry, Fisheries and the Environment (DFFE) (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 utilisation."

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 sentenced to a fine or imprisonment for a period up to three years, or both a fine and imprisonment.

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 NORTHERN CAPE NATURE CONSERVATION ACT, 2009 (ACT NO 9 OF 2009) (NCNCA)

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.

APPENDIX C: Impact Assessment Methodology

Ecological Impact Assessment Method

In order for the Environmental Assessment Practitioner (EAP) to allow for sufficient consideration of all environmental impacts, impacts were assessed using a common, defensible method of assessing significance that will enable comparisons to be made between risks/impacts and will enable authorities, stakeholders and the applicant to understand the process and rationale upon which risks/impacts have been assessed. The method used for assessing risks/impacts is outlined in the sections below.
The first stage of risk/impact assessment is the identification of environmental activities, aspects and impacts. This is supported by the identification of receptors and resources, which allows for an understanding of the impact pathway and an assessment of the sensitivity to change. The definitions used in the impact assessment are presented below.

- An **activity** is a distinct process or task undertaken by an organisation for which a responsibility can be assigned. Activities also include facilities or infrastructure that is possessed by an organisation.
- An **environmental aspect** is an 'element of an organizations activities, products and services which can interact with the environment'[8]. The interaction of an aspect with the environment may result in an impact.
- **Environmental risks/impacts** are the consequences of these aspects on environmental resources or receptors of particular value or sensitivity, for example, disturbance due to noise and health effects due to poorer air quality. In the case where the impact is on human health or wellbeing, this should be stated. Similarly, where the receptor is not anthropogenic, then it should be stipulated what the receptor is.
- **Receptors** can comprise, but are not limited to, people or human-made systems, such as local residents, communities and social infrastructure, as well as components of the biophysical environment such as wetlands, flora and riverine systems.
- **Resources** include components of the biophysical environment.
- **Frequency of activity** refers to how often the proposed activity will take place.
- **Frequency of impact** refers to the frequency with which a stressor (aspect) will impact on the receptor.
- **Severity** refers to the degree of change to the receptor status in terms of the reversibility of the impact; sensitivity of receptor to stressor; duration of impact (increasing or decreasing with time); controversy potential and precedent setting; threat to environmental and health standards.
- **Spatial extent** refers to the geographical scale of the impact.
- **Duration** refers to the length of time over which the stressor will cause a change in the resource or receptor.

The significance of the impact is then assessed by rating each variable numerically according to the defined criteria. Refer to the Table B1. The purpose of the rating is to develop a clear understanding of influences and processes associated with each impact. The severity, spatial scope and duration of the impact together comprise the consequence of the impact and when summed can obtain a maximum value of 15. The frequency of the activity and the frequency of the impact together comprise the likelihood of the impact occurring and can obtain a maximum value of 10. The values for likelihood and consequence of the impact are then read off a significance-rating matrix and are used to determine the level of mitigation that may be necessary[9].

The assessment of significance is undertaken twice. Initial significance is based on only natural and existing mitigation measures (including built-in engineering designs). The subsequent assessment takes into account the recommended management measures required to mitigate the impacts. Measures such as demolishing infrastructure, and reinstatement and rehabilitation of land, are considered post-mitigation.

[8] The definition has been aligned with that used in the ISO 14001 Standard.

[9] Some risks/impacts that have low significance will however still require mitigation.

The model outcome of the impacts was then assessed in terms of impact certainty and consideration of available information. The Precautionary Principle is applied in line with South Africa's National Environmental Management Act, 1998 (Act No. 107 of 1998) in instances of uncertainty or lack of information, by increasing assigned ratings or adjusting final model outcomes. In certain instances, where a variable or outcome requires rational adjustment due to model limitations, the model outcomes have been adjusted.

Table C1: Criteria for assessing significance of impacts.

LIKELIHOOD DESCRIPTORS

Probability of impact	**RATING**
Highly unlikely	1
Possible	2
Likely	3
Highly likely	4
Definite	5
Sensitivity of receiving environment	**RATING**
Ecology not sensitive/important	1
Ecology with limited sensitivity/importance	2
Ecology moderately sensitive/ /important	3
Ecology highly sensitive /important	4
Ecology critically sensitive /important	5

CONSEQUENCE DESCRIPTORS

Severity of impact	**RATING**
Insignificant / ecosystem structure and function unchanged	1
Small / ecosystem structure and function largely unchanged	2
Significant / ecosystem structure and function moderately altered	3
Great / harmful/ ecosystem structure and function largely altered	4
Disastrous / ecosystem structure and function seriously to critically altered	5
Spatial scope of impact	**RATING**
Activity specific/ < 5 ha impacted / Linear developments affected < 100m	1
Development specific/ within the site boundary / < 100ha impacted / Linear developments affected < 100m	2
Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear developments affected < 1000m	3
Regional within 5 km of the site boundary / < 2000ha impacted / Linear developments affected < 3000m	4
Entire habitat unit / Entire system/ > 2000ha impacted / Linear developments affected > 3000m	5
Duration of impact	**RATING**
One day to one month	1
One month to one year	2
One year to five years	3
Life of operation or less than 20 years	4
Permanent	5

Table C2: Significance Rating Matrix.

LIKELIHOOD (Frequency of activity + Frequency of impact)	CONSEQUENCE (Severity + Spatial Scope + Duration)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45
	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90
	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105
	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120
	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150

Table C3: Positive/Negative Mitigation Ratings.

Significance Rating	Value	Negative Impact Management Recommendation	Positive Impact Management Recommendation
Very high	126-150	Critically consider the viability of proposed projects Improve current management of existing projects significantly and immediately	Maintain current management
High	101-125	Comprehensively consider the viability of proposed projects Improve current management of existing projects significantly	Maintain current management
Medium-high	76-100	Consider the viability of proposed projects Improve current management of existing projects	Maintain current management
Medium-low	51-75	Actively seek mechanisms to minimise impacts in line with the mitigation hierarchy	Maintain current management and/or proposed project criteria and strive for continuous improvement
Low	26-50	Where deemed necessary seek mechanisms to minimise impacts in line with the mitigation hierarchy	Maintain current management and/or proposed project criteria and strive for continuous improvement
Very low	1-25	Maintain current management and/or proposed project criteria and strive for continuous improvement	Maintain current management and/or proposed project criteria and strive for continuous improvement

The following points were considered when undertaking the assessment:

- Risks and impacts were analysed in the context of the *project's area of influence* encompassing:
  - Primary project site and related facilities that the proponent and their contractors develops or controls;
  - Areas potentially impacted by cumulative impacts for any existing project or condition and other project-related developments; and
  - Areas potentially affected by impacts from unplanned but predictable developments caused by the project that may occur later or at a different location.
- Risks/Impacts were assessed for all stages of the project cycle including:
  - Pre-construction;
  - Construction;
  - Operation;
  - Closure and decommissioning.
- If applicable, transboundary or global effects were assessed.
- Individuals or groups who may be differentially or disproportionately affected by the project because of their *disadvantaged* or *vulnerable* status were assessed.

- Particular attention was paid to describing any residual impacts that will occur after rehabilitation.

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 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 freshwater;
- 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, 2004 (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 Minerals and Petroleum Resources Development Act, 2002 (Act No 28 of 2002) (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, including[10]:

- 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):

[10] Limpopo Province Environment Outlook. A Report on the State of the Environment, 2002. Chapter 4.

- **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 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;
  - **Functional rehabilitation** which focuses on ensuring that the ecological functionality of the ecological resources on the Beeshoek Mine 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 or 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.[11]

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

➢ Mitigation and performance improvement measures and actions that address the risks and impacts[12] 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 where possible.
➢ 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 projects. These recommendations also include general management measures which apply to the proposed projects as a whole. Mitigation measures have been developed to address issues in all phases throughout the life of the projects from planning, through to construction and operation.

[11] Provincial Guideline on Biodiversity Offsets, Western Cape, 2007.

[12] Mitigation measures should address both positive and negative impacts

APPENDIX D: Vegetation Types

SVk 9 Kuruman Thornveld

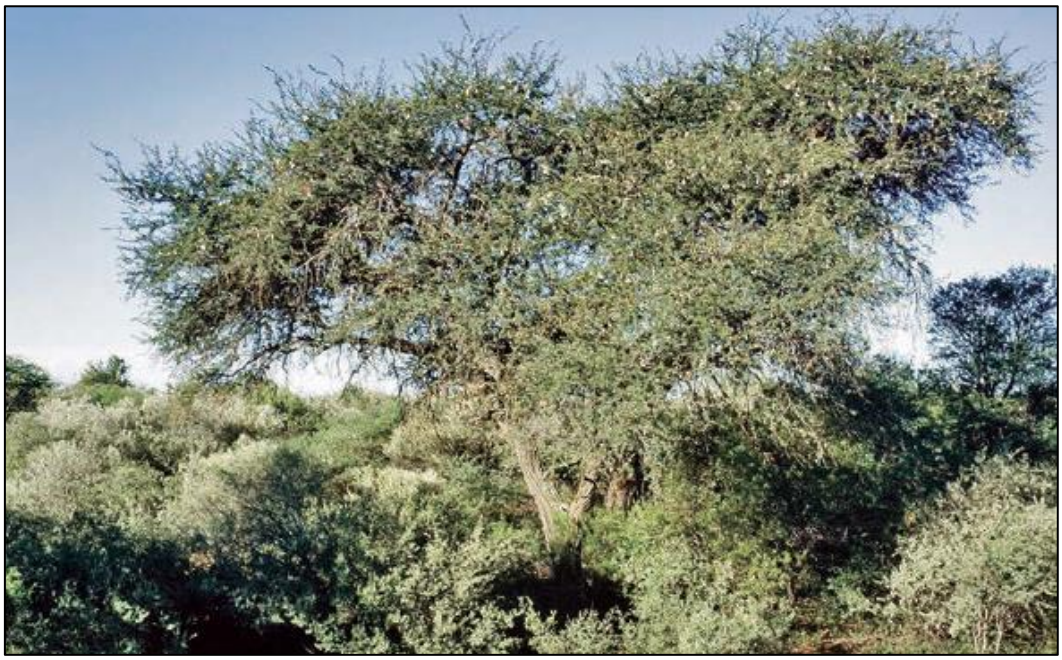


Figure D1: Kuruman Thornveld: *Vachellia* (*Acaia) erioloba* trees and the overwhelmingly dominant shrub *Tarchonanthus tcamphoratus* immediately south of Kuruman at an altitude of 1415 m. Image source: Mucina and Rutherford (2006) Figure 9.79, page 520.

Dominant and typical floristic species of Kuruman Thornveld (Mucina & Rutherford, 2012). The table contains the important taxa associated with the vegetation type.

Woody Layer	
Tall Tree	*Vachellia erioloba* (d).
Small Trees	*Senegalia mellifera* subsp. *detinens* (d), *Boscia albitrunca*,
Tall Shrubs	*Grewia flava* (d), *Lycium hirsutum* (d), *Tarchonanthus camphoratus* (d), *Gymnosporia buxifolia*
Low Shrubs	*Vachellia hebeclada* subsp. *hebeclada* (d), *Justicia divaricatum* (d) (formerly *Monechma divaricatum*), *Lasiosiphon polycephalus*, *Helichrysum zeyheri*, *Hermannia comosa*, *Pentzia calcarea*, *Plinthus sericeus,*
Geoxylic Suffrutex	*Elephantorrhiza elephantina*
Forb layer	
Herbs	*Dicoma schinzii*, *Gisekia africana*, *Harpagophytum procumbens* subsp. *procumbens*, *Indigofera daleoides*, *Limeum fenestratum*, *Nolletia ciliaris*, *Seddera capensis*, *Osteospermum scariosum* (formerly *Tripteris aghillana*), *Vahlia capensis* subsp. *vulgaris,*
Grass layer	
Graminoids	*Aristida meridionalis* (d), *Aristida stipitata* subsp. *stipitata* (d), *Eragrostis lehmanniana* (d), *Eragrostis echinochloidea*, *Melinis repens.*
Endemic Taxa	
Herb	*Gnaphalium englerianum*
Biogeographically Important Taxon [GW]Griqualand West endemic, [K]Kalahari endemic, [S]Southernmost distribution in interior of southern Africa	
Small Trees	*Vachellia luederitzii* var. *luederitzii*[K], *Terminalia sericea*[S].
Tall Shrub	*Vachellia haematoxylon*[K].
Low Shrub	*Blepharis marginata*[GW]
Herb	*Corchorus pinnatipartitus*[GW]
Graminoid	*Digitaria polyphylla*[GW]

(d) = dominant species

(The genus for all *Senegalia* and *Vachellia* spp. were formerly *Acacia*)

Additional Remarks: Disturbed areas north of Kuruman are characterised by *Aristida adscensionis*, *Aristida congesta*, *Enneapogon scoparius*, *Geigeria ornativa*, *Melhania rehmanii*, *Rhigozum trichotomum* and *Sericorema remotiflora* and the absence of *Vachellia erioloba*, *V. haematoxylon* and *Grewia flava*.

SVk 14 Postmasburg Thornveld

Dominant and typical floristic species of Postmasburg Thornveld (Mucina & Rutherford, 2012). The table contains the important taxa associated with the vegetation type.

Woody Layer	
Tall Tree	*Vachellia erioloba* (d).
Small Trees	*Vachellia karroo* (d), *Vachellia tortilis* subsp. *heteracantha* (d), *Searsia lancea* (d), *Ziziphus mucronata* (d).
Tall Shrubs	*Searsia tridactyla* (d), *Diospyros lycioides* subsp. *lycioides*, *Ehretia rigida* subsp. *rigida*, *Grewia flava*, *Tarchonanthus camphoratus*.
Low Shrubs	*Vachellia hebeclada* subsp. *hebeclada* (d), *Felicia muricata*, *Gomphocarpus fruticosus* subsp. *fruticosus*, *Lantana rugosa*, *Melolobium microphyllum*, *Chaenostoma halimifolia* (formerly *Sutera halimifolia*).
Succulent Shrubs	*Kalanchoe rotundifolia*, *Lycium cinereum*
Forb layer	
Herbs	*Dicoma anomala*, *Geigeria filifolia*, *Geigeria ornativa*, *Hibiscus pusillus*, *Jamesbrittenia aurantiaca*, *Selago densiflora*, *Osteospermum scariosum* (formerly *Tripteris aghillana*)
Geophytic Herb	*Boophone disticha*
Grass layer	
Graminoids	*Digitaria eriantha* subsp. *eriantha* (d), *Enneapogon scoparius* (d), *Eragrostis lehmanniana* (d), *Aristida adscensionis*, *Aristida congesta*, *Aristida diffusa*, *Eragrostis superba*, *Heteropogon contortus*, *Melinis repens*, *Schmidtia pappophoroides*, *Stipagrostis uniplumis*
Biogeographically Important Taxon (Griqualand West endemics)	
Succulent Shrub	*Euphorbia bergii*.
Graminoid	*Digitaria polyphylla*

(d) = dominant species
(The genus for all *Senegalia* and *Vachellia* spp. were formerly *Acacia,* and the genus for all *Searsia spp* was formerly *Rhus*)

Additional Remarks: In contrast to eastern parts of the unit, *Tarchonanthus camphoratus* is conspicuously absent in the western parts.

SVk 10 Kuruman Mountain Bushveld

Figure D2: Kuruman Mountain Bushveld: Open low bushveld with teh usually leafless *Lebeckia macrantha* clearly visible at an altitude of approximately 1680 m near Bretby between Danielskuil and Kuruman. Image source: Mucina and Rutherford (2006) Figure 9.80, page 521.

Dominant and typical floristic species of Kuruman Mountain Bushveld (Mucina & Rutherford, 2012). The table contains the important taxa associated with the vegetation type.

Woody Layer	
Small Trees	*Searsia lancea*
Tall Shrubs	*Diospyros austro-africana*, *Euclea crispa* subsp. *crispa*, *Euclea undulata*, *Olea europaea* subsp. *africana*, *Searsia pyroides* var. *pyroides*, *Searsia tridactyla*, *Tarchonanthus camphoratus*, *Tephrosia longipes*
Low Shrubs	*Searsia ciliata* (d), *Amphiglossa triflora*, *Anthospermum rigidum* subsp. *pumilum*, *Gomphocarpus fruticosus* subsp. *fruticosus*, *Helichrysum zeyheri*, *Lantana rugosa*, *Wahlenbergia nodosa*
Succulent Shrubs	*Ebracteola wilmaniae*, *Hertia pallens*
Herbaceous Climber	*Rhynchosia totta*
Forb layer	
Herbs	*Dicoma anomala*, *Dicoma schinzii*, *Geigeria ornativa*, *Helichrysum cerastioides*, *Heliotropium strigosum*, *Hibiscus marlothianus*, *Kohautia cynanchica*, *Kyphocarpa angustifolia*.
Geophytic Herb	*Boophone disticha*, *Pellaea calomelanos*.
Grass layer	
Graminoids	*Andropogon chinensis* (d), *Andropogon schirensis* (d), *Anthephora pubescens* (d), *Aristida congesta* (d), *Digitaria eriantha* subsp. *eriantha* (d), *Themeda triandra* (d), *Triraphis andropogonoides* (d), *Aristida diffusa*, *Brachiaria nigropedata*, *Bulbostylis burchellii*, *Cymbopogon caesius*, *Diheteropogon amplectens*, *Elionurus muticus*, *Eragrostis chloromelas*, *Eragrostis nindensis*, *Eustachys paspaloides*, *Heteropogon contortus*, *Melinis repens*, *Schizachyrium sanguineum*, *Trichoneura grandiglumis*.
Biogeographically Important Taxon (Griqualand West endemics)	
Tall Shrub	*Calobota cuspidosa* (formerly *Lebeckia macrantha*) (d).
Low Shrubs	*Justicia puberula*, *Tarchonanthus obovatus*
Succulent Shrub	*Euphorbia wilmaniae*
Graminoid	*Digitaria polyphylla*
Herb	*Sutera griquensis*
Endemic Taxa	
Succulent Shrub	*Euphorbia planiceps*

(d) = dominant species
(The genus for all *Searsia spp* was formerly *Rhus*)

Additional Remarks: Many species in this unit are widely distributed to the northeast of the subcontinent and reach their southwestern limit in this unit (e.g. *Andropogon schirensis*). There are distinct floristic differences with the relatively nearby and parallel mountains of the SVk 15 Koranna-Langeberg Mountain Bushveld. For example, *Croton gratissimus* is common in the last mentioned unit but rare in Kuruman Mountain Bushveld. *Calobota cuspidosa* (formerly *Lebeckia macrantha*) shows just the reverse distributional pattern between these units. A very low form (<0.5 m) of *Vachellia hebeclada* is common in the north on Makhubung hill, north of Heuningvlei.

APPENDIX E: Declaration and Specialists CV's

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

M. Meintjies	MSc (Medicinal Plant Science) (University of Pretoria)
C. Hooton	BTech Nature Conservation (Tshwane University of Technology)
C. Steyn	MSc Plant Science (University of Pretoria)
N. Cloete	MSc (Environmental Management) (University of Johannesburg)
Kim Marais	BSc (Hons) Zoology (Herpetology) (University of the Witwatersrand)
S. 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:	Kim Marais		
Postal address:	PO. Box 751779, Gardenview		
Postal code:	2047	Fax:	086 724 3132
Telephone:	011 616 7893		
E-mail:	kim@sasenvgroup.co.za		
Qualifications	BSc (Hons) Zoology (University of the Witwatersrand) BSc (Zoology and Conservation) (University of the Witwatersrand)		
Registration / Associations	Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP) Member of South African Wetland Forum		

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

Company of Specialist:	Scientific Terrestrial Services		
Name / Contact person:	Christien Steyn		
Postal address:	PO. Box 751779, Gardenview		
Postal code:	2047	Fax:	086 724 3132
Telephone:	011 616 7893		
E-mail:	christien@sasenvgroup.co.za		
Qualifications	MSc (Plant Science) (University of Pretoria) BSc (Hons) Plant Science (Invasion Biology) (University of Pretoria) BSc Environmental Science (University of Pretoria)		
Registration / Associations	Member of the South African Council for Natural Scientific Professions (SACNASP) Member of the South African Association of Botanists (SAAB) Member of the Botanical Society of South Africa (BotSoc)		

Company of Specialist:	Scientific Terrestrial Services		
Name / Contact person:	Stephen van Staden		
Postal address:	29 Arterial Road West, Oriel, Bedfordview		
Postal code:	1401	Fax:	011 615 6240/ 086 724 3132
Telephone:	011 616 7893		
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 Natural 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		

I, Christopher Hooton, 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.

Specialist Signature

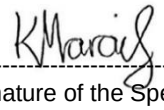
I, Christien Steyn, declare that -

- 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, 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



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, 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

SAS ENVIRONMENTAL GROUP OF COMPANIES –
SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF CHRISTOPHER HOOTON

PERSONAL DETAILS

Position in Company	Senior Scientist, Member Biodiversity Specialist
Joined SAS Environmental Group of Companies	2013

EDUCATION

Qualifications

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

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

AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga, North West, Limpopo, KwaZulu-Natal, Eastern Cape, Western Cape, Northern Cape, Free State
Africa - Zimbabwe, Sierra Leone

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

- Floral Assessments
- Faunal Assessments
- Biodiversity Actions Plan (BAP)
- Biodiversity Management Plan (BMP)
- Alien and Invasive Control Plan (AICP)
- Ecological Scan
- Protected Tree and Floral Marking and Reporting
- Biodiversity Offset Plan

Freshwater Assessments

- Freshwater Verification Assessment
- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning

SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF CHRISTIEN STEYN

PERSONAL DETAILS

Position in Company	Floral Ecologist
Joined SAS Environmental Group of Companies	2018

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Member of the South African Council for Natural Scientific Professions (SACNASP)
Member of the South African Association of Botanists (SAAB)
Member of the Botanical Society of South Africa (BotSoc)

EDUCATION

Qualifications

MSc (Plant Science) (University of Pretoria)	2017
BSc (Hons) Plant Science (Invasion Biology) (University of Pretoria)	2014
BSc Environmental Science (University of Pretoria)	2013

AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga, North West, Limpopo, KwaZulu-Natal, Northern Cape, Free State

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

- Terrestrial Ecological and Biodiversity Scoping Assessments
- Terrestrial Ecological and Biodiversity Screening Assessments
- Floral Assessments
- Input into Terrestrial Rehabilitation Plan design with the focus on the re-establishment of vegetation
- Floral Rescue and Relocation Plans
- Alien and Invasive Control Plan (AICP)
- Alien and Invasive Plant Identification and awareness training
- Terrestrial Monitoring
- Protected Tree and Floral Marking and Reporting
- Desktop Studies, Mapping and Background Information Research

Training

- Advanced Grass Identification Course
- Practical Plant Identification, including Herbarium Usage and Protocols
- Vegetation Classification and Mapping: Use of Geographic Information System for understanding vegetation pattern and biodiversity conservation.
- Introduction to Statistics for Biologists: Applications of plant ecology principles in plant conservation, i.e., species distribution modelling, alien plant invasions, conservation planning
- Plant Functional Trait Course: Hands-on, field-based exploration of plant functional traits, along with experience in the usage of plant traits data in climate-change research and ecosystem ecology

SAS ENVIRONMENTAL GROUP OF COMPANIES –
SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF KIM MARAIS

PERSONAL DETAILS

Position in Company	Senior Scientist Water Resource Manager
Joined SAS Environmental Group of Companies	2015

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Professional member of the South African Council for Natural Scientific Professions (SACNASP – Reg No. 117137/17)
Member of the Western Cape Wetland Forum (WCWF)

EDUCATION

Qualifications

BSc (Hons) Zoology (University of the Witwatersrand)	2012
BSc (Zoology and Conservation) (University of the Witwatersrand)	2011

Short Courses

Aquatic and Wetland Plant Identification (Cripsis Environment)	2019
Tools for Wetland Assessment (Rhodes University)	2018
Certificate in Environmental Law for Environmental Managers (CEM)	2014
Certificate for Introduction to Environmental Management (CEM)	2013

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

- Biodiversity Action Plans (BAP)
- Alien and Invasive Control Plans (AICP)
- Faunal Eco Scans
- Faunal Impact Assessments

Freshwater Assessments

- Desktop Freshwater Delineation
- Freshwater Verification Assessment
- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning
- Watercourse Maintenance and Management Plans
- Freshwater Offset Plan

Aquatic Ecological Assessment and Water Quality Studies

- Riparian Vegetation Integrity (VEGRAI)
- Water quality Monitoring
- Riverine Rehabilitation Plans

Legislative Requirements, Processes and Assessments

- Water Use Applications (Water Use Licence Applications / General Authorisations)
- Water Use Audits
- Freshwater Resource Management and Monitoring as part of EMPR and WUL conditions
- Public Participation processes

SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF NELANIE CLOETE

PERSONAL DETAILS

Position in Company	Senior Scientist, Member Botanical Science and Terrestrial Ecology
Joined SAS Environmental Group of Companies	2011

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Professional member of the South African Council for Natural Scientific Professions (SACNASP – Reg No. 400503/14)
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)
Member of the Gauteng Wetland Forum (GWF)

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

AREAS 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)

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

- Floral Assessments
- Biodiversity Actions Plan (BAP)
- Biodiversity Management Plan (BMP)
- Alien and Invasive Control Plan (AICP)
- Ecological Scan
- Terrestrial Monitoring
- Protected Tree and Floral Marking and Reporting
- Biodiversity Offset Plan

Freshwater Assessments

- Desktop Freshwater Delineation
- Freshwater Verification Assessment
- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning
- Plant species and Landscape Plan

Legislative Requirements, Processes and Assessments

- Water Use Applications (Water Use Licence Applications / General Authorisations)
- Environmental and Water Use Audits
- Freshwater Resource Management and Monitoring as part of EMPR and WUL conditions

SAS ENVIRONMENTAL GROUP OF COMPANIES –
SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF STEPHEN VAN STADEN

PERSONAL DETAILS

Position in Company	Group CEO, Water Resource Discipline Lead, Managing Member, Ecologist, Aquatic Ecologist
Joined SAS Environmental Group of Companies	2003 (year of establishment)

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 the Gauteng Wetland Forum
Member of International Association of Impact Assessors (IAIA) South Africa;
Member of the Land Rehabilitation Society of South Africa (LaRSSA)

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

Short Courses

Integrated Water Resource Management, the National Water Act, and Water Use Authorisations, focusing on WULAs and IWWMPs	2017
Tools for Wetland Assessment (Rhodes University)	2017
Legal liability training course (Legricon Pty Ltd)	2018
Hazard identification and risk assessment training course (Legricon Pty Ltd)	2018
Wetland Management: Introduction and Delineation (WLID1502S) (University of the Free State)	2018
Hydropedology and Wetland Functioning (TerraSoil Science and Water Business Academy)	2018

AREAS 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

DEVELOPMENT SECTORS OF EXPERIENCE

1. Mining: Coal, chrome, Platinum Group Metals (PGMs), mineral sands, gold, phosphate, river sand, clay, fluorspar
2. Linear developments (energy transmission, telecommunication, pipelines, roads)
3. Minerals beneficiation
4. Renewable energy (Hydro, wind and solar)
5. Commercial development
6. Residential development
7. Agriculture
8. Industrial/chemical

KEY SPECIALIST DISCIPLINES

Legislative Requirements, Processes and Assessments

- Water Use Applications (Water Use Licence Applications / General Authorisations)
- Environmental and Water Use Audits
- Freshwater Resource Management and Monitoring as part of EMPR and WUL conditions

Freshwater Assessments
- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning
- Maintenance and Management Plans
- Plant Species and Landscape Plans
- Freshwater Offset Plans
- Hydropedological Assessment
- Pit Closure Analysis

Aquatic Ecological Assessment and Water Quality Studies
- Habitat Assessment Indices (IHAS, HRC, IHIA & RHAM)
- Aquatic Macro-Invertebrates (SASS5 & MIRAI)
- Fish Assemblage Integrity Index (FRAI)
- Fish Health Assessments
- Riparian Vegetation Integrity (VEGRAI)
- Toxicological Analysis
- Water quality Monitoring
- Screening Test
- Riverine Rehabilitation Plans

Biodiversity Assessments
- Floral Assessments
- Biodiversity Actions Plan (BAP)
- Biodiversity Management Plan (BMP)
- Alien and Invasive Control Plan (AICP)
- Ecological Scan
- Terrestrial Monitoring
- Biodiversity Offset Plan

Soil and Land Capability Assessment
- Soil and Land Capability Assessment
- Hydropedological Assessment

Visual Impact Assessment
- Visual Baseline and Impact Assessments
- Visual Impact Peer Review Assessments