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Proposed Sand Mining Project in the Free State Province

Ecological Impact Assessment

Prepared for:

Copper Sunset Sand (Pty) Ltd

Project Number:

COP6147

July 2020



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This document has been prepared by Digby Wells Environmental.

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EXECUTIVE SUMMARY

Biodiversity is defined, according to the National Environmental Management: Biodiversity Act, Act 10 of 2004 (NEM:BA), as “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”. The NEMBA legislation upholds the country’s commitment to the protection of South Africa’s biological resources and it is imperative that development takes place in a sustainable way to achieve this.

Digby Wells was commissioned by Copper Sunset to complete an Ecological Impact Assessment as part of the authorisation process for the proposed sand mining activities associated with Copper Sunset, within the New Vaal Colliery Mining Right area which is owned by Seriti Resources. This study addresses and adheres to the regulations and regulatory procedures of the Department of Mineral Resources. As part of the assessment sensitive features such as wetlands were investigated, and the findings presented within this report.

The site visit and infield ecological assessment took place on the 8th January 2020.

Copper Sunset Operation falls within the Grassland Biome with the regional vegetation characterised by the Central Free State Grassland.

This vegetation type is characterised by undulating plains supporting short grassland naturally dominated by *Themda triandra*, *Eragrostis curvula* and *E. chloromelas* when degraded. Dwarf karoo bushes establish in severely degraded clayey bottomlands while overgrazed and trampled low-lying areas with heavy clayey soils are prone to *Acacia* karoo encroachment.

Most of the site is dominated by an old oak plantation, that will need to be removed prior to sand mining being undertaken. In terms of grass species, it was observed that *Panicum maximum* (White Buffalo Grass) is growing underneath the canopy of the oak plantation. There are several other exotic and alien invasive species that were also identified and noted within the site footprint, such as oak trees, Apple Thorn and Tree of Heaven. Majority of the site has been impacted upon as a result of the old oak plantation, mining activities and tracks running through the site, resulting in no natural areas remaining. Based on the site assessment undertaken, the overall sensitivity was considered low.

Tracks associated with the Cape Clawless Otter were identified during the site assessment undertaken. It must be noted the Otters are considered to be near threatened according to the IUCN Red Data List. Only tracks were found and no direct burrows or nests were observed indicating that the otter is not residing within the area to be impacted upon, however this cannot be assumed to be the case and it is recommended that prior to clearing activities an inspection is undertaken to ensure that SCC, like this are not impacted upon and mitigation measures are undertaken to minimise the impact to such species.

The National Freshwater Ecosystem Priority Areas (NFEPA) strategic spatial priorities for conserving the country’s freshwater ecosystems and supporting sustainable use of water

resources were considered to evaluate the importance of the wetland areas that could occur within the project area. Spatial layers (FEPA's) used by the NFEPA project for this study includes the wetland classification and ranking. An onsite assessment was undertaken to identify if there are any potential wetlands within the area that could be impacted upon. The assessment was done in accordance with the Department of Water Affairs (DWS) that will be guidelines for wetland delineation (DWA, 2005).

Based on the site assessment conducted and auger points done, there were no wetlands identified within the proposed sand mining project area.

The main activities that will result in impacts to the environment with respect to ecology are identified below:

- Site/vegetation clearance
- Access and haul road construction
- Topsoil stockpiling
- Active Sand Mining
- Rehabilitation – rehabilitation mainly consists of spreading of the preserved subsoil and topsoil, profiling of the land and re-vegetation
- Post-closure monitoring and rehabilitation.

The major impact would be a result of clearing activities and active sand mining which will result in habitat loss within the project area. In saying this, the impact was still considered low as a result of the low sensitivity identified within the site.

Based on the impact assessment, including mitigation measures adopted, the overall impact to ecology is expected to be low, also taking into consideration that Seriti plans to mine this area once sand mining activities have been completed.

The following recommendations are provided:

- The footprint area should be kept as small as possible and only existing access roads should be used to reach the site for clearing and vehicles should not be allowed to traverse natural areas or leave the demarcated road;
- Walk through of the area to ensure that no SCC are impacted upon as a result of sand mining activities;
- An AIP management plan must be implemented, whereby existing AIP's within the project area are eradicated as well as the disturbed site is monitored quarterly for at least two years after rehabilitation to ensure that alien invasion does not take place;
- Erect signage with respect to speed limits;
- Restrict vehicle movement to daylight hours;
- Concurrent rehabilitation should take place; and
- Monitoring of the rehabilitated area once completed for vegetation establishment.

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1 Introduction

Biodiversity is defined, according to the National Environmental Management: Biodiversity Act, Act 10 of 2004 (NEMBA), as “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”. The NEMBA legislation upholds the country’s commitment to the protection of South Africa’s biological resources and it is imperative that development takes place in a sustainable way to achieve this.

The Copper Sunset mining area falls within the Grassland Biome, one of nine biomes in South Africa (Mucina and Rutherford, 2012). This is the second largest of the South African biomes, covering approximately 30% of the country (SANBI, 2013). A common misconception is that grasslands are comprised primarily of grass species of the Poaceae family. However, grassland diversity is actually made up primarily of forbs such as gladioli, orchids and bulbs, although grasses are more abundant in area according to the World Wildlife Foundation (WWF), making it an exceptionally diverse ecosystem from a botanical perspective, supporting 3500 plant species (SANBI, 2013).

2 Terms of Refence

Digby Wells was commissioned by Copper Sunset to complete an Ecological Impact Assessment as part of the authorisation process for the proposed sand mining activities associated with Copper Sunset, within the New Vaal Colliery Mining Right area which is owned by Seriti Resources. This study addresses and adheres to the regulations and regulatory procedures of the Department of Mineral Resources. As part of the assessment sensitive features such as wetlands were investigated, and the findings presented within this report.

3 Brief Project Description

Copper Sunset Sand (Pty) Ltd (Copper Sunset) seeks to undertake a sand mining project in the Free State Province. The proposed project falls within an existing Mining Right Area (MRA) of the New Vaal Colliery which is owned by Seriti Resources. Therefore, Copper Sunset intends to obtain a Mining Permit through completing a Mining Permit Application (MPA) in terms of Section 27 of the Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA). The proposed project triggers Listed Activities of the Environmental Impact Assessment (EIA) Regulations, 2014 (GN R 982 of 4 December 2014 as amended by GN R 326 of 7 April 2017) promulgated under the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The project triggered activities in Listing Notice 1 (GN R 983 of 4 December 2014 amended by GNR 327 of 7 April 2017)) which thus requires a Basic Assessment (BA) process to be undertaken. This process requires a comprehensive public consultation process.

This document serves as the Ecological Assessment that was undertaken for the proposed project.

4 Regulatory and Institutional Framework

In terms of the NEMA and other applicable laws as listed in Table 4-1 below, it is required that the environmental and social impacts associated with mining activities be assessed to identify any potential negative and/or positive consequences as a result thereof. Following which, measures must be proposed to avoid or minimise these impacts.

The following legislative requirements were considered during this assessment:

- Section 24 of the Constitution of the Republic of South Africa, 1996 (Act No.108 of 1996);
- The Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA) and its Regulations;
- National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2014) (NEM: BA);
- Section 5 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA);
- National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) (NEM: PAA) as amended;
- National Forest Act, 1998, (Act No. 84 of 1998) (NFA); and
- Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA).

Table 4-1: Policy and Legislative Context Applicable to the Application

Legislation	Applicable Legislation Requirements	Relevance to the Applicant
The Constitution	Section 24: Environmental Rights for All	Everyone has the right: <ul style="list-style-type: none"> • To an environment that is not harmful to their health or well-being; and • To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that – • Prevent pollution and ecological degradation; • Promote conservation; and • Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development. Section 24 of the constitution enshrines environmental rights in South Africa as a whole and the protection of the environment in the Bill of Rights, especially in relation to justifiable economic and social development.
	Section 32: Access to information	Everyone has the right of access to: <ul style="list-style-type: none"> • Any information held by the state (unless it is information that is explicitly excluded by the Promotion of Access to Information Act, 2000 (Act No. 2 of 2000); • Any information held by another person and that is required for the exercise or protection of any rights. This is further extended by NEMA, Section 2(4)(k) of the NEMA specifically provides that “decisions must be taken in an open and transparent manner, and access to information must be provided in accordance with the law”.

Legislation	Applicable Legislation Requirements	Relevance to the Applicant
	<p>Section 33: Administrative Justice</p>	<p>Everyone has the right to administrative action that is lawful, reasonable and procedurally fair. Everyone whose rights have been adversely affected by administrative action has the right to be given written reasons. National legislation must be enacted to give effect to these rights, and must - (a) provide for the review of administrative action by a court or, where appropriate, an independent and impartial tribunal; (b) impose a duty on the state to give effect to the rights in subsections (1) and (2); and (c) promote an efficient administration This section of the Constitution guarantees that administrative action will be reasonable, lawful and procedurally fair, and it makes sure that people have the right to ask for written reasons if and when administrative action has a negative impact on them thus the Applicant. The provisions of NEMA and its Regulations dictate the manner in which environmental authorization processes are undertaken, decisions made, and the appeal process; all of which are applicable to the current application.</p>
	<p>Section 38 Enforcement of Rights and Administrative Review</p>	<p>Section 38 of the Constitution promotes the possibility to enforce all constitutional rights, including the Section 24 environmental right In the context of this report the section 38 provisions on <i>locus standi</i> have been extended by section 32 of NEMA which states that :“Any person or group of persons may seek appropriate relief in respect of any breach or threatened breach of any provision of this Act, including a principle contained in Chapter 1, or any other statutory provision concerned with the protection of the environment or the use of natural resources”</p>

Legislation	Applicable Legislation Requirements	Relevance to the Applicant
MPRDA	(GNR527, 23 April 2004 as amended by GNR R1288 dated 29 October 2004; GNR1203 dated 30 November 2006; and GNR349 dated 18 April 2011).	<p>The purpose of the MPRDA is to provide for equitable access to and sustainable development of the mineral and petroleum resources of South Africa.</p> <p>As per section 22(4)(a) of the MPRDA, an applicant is required to complete the required environmental authorization to obtain regulatory approval prior to the commencement of any mining activities.</p>
NEMA	Environmental Impact Assessment (EIA) Regulations of 2014: GNR 324 to 326 of 7 April 2017	<p>The EIA Regulations, The EIA Regulations, GNR 327 of 4 December 2017, Regulation 19-20, and Regulation 39-44 set out the process required to undertake the Basic Assessment (BA) process including the public participation process to be undertaken as part of the BA. This Act prohibits mining of minerals without a permit issued.</p> <p>When submitting an application for a right or permit in terms of the MPRDA an applicant must obtain regulatory approval or the required environmental authorization as part of the application for a mining permit in terms of the MPDRA and required to submit an environmental management program (Section 24(1a) of NEMA), also referred to as an EMP, within 180 days once an application has been accepted.</p> <p>As part of this project, a BA Process in terms of the EIA Regulations is being followed. This report forms part of the BA being undertaken. This document serves as the Specialist Report for the BA process</p>

Legislation	Applicable Legislation Requirements	Relevance to the Applicant
NEMA	Section 2: Chapter 1 & Chapter 5	<p>Chapter 1 contains a set of principles that guide development and state that environmental management must place people and their needs at the forefront of its concern and serve their physical, psychological, developmental, cultural and social interests equitably</p> <p>Sustainable development must consider relevant factors such as the following:</p> <ul style="list-style-type: none"> • That the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied; • That the development, use, and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardized; • That a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions; and • That negative impacts on the environment and on people's environmental rights are anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied. <p>Chapter 5 specifically deals with integrated Environmental Management and addresses the authorisation of activities that are likely to be detrimental to the environment (activities listed in the EIA Regulations, 2014 (as amended)). These authorisations are considered on the basis of EIA procedures.</p> <p>Ecological Impact Assessment is a sub-discipline of the EIA that is utilized to identify, quantify and evaluate the impacts of a project on biodiversity.</p> <p>The principles of NEMA have been considered. This report aims to identify the potential environmental impacts that need to be investigated as part of the BA Process and is prepared in compliance with NEMA.</p>

Legislation	Applicable Legislation Requirements	Relevance to the Applicant
NEM:BA		<p>Although NEM: BA makes no express reference to the CBD, this Act's objectives mirror those of the Convention on Biological Diversity and its provisions seek to implement CBD objectives at a national level by providing for the following:</p> <ul style="list-style-type: none"> • Management and conservation of South Africa's biodiversity within NEMA's framework • Usage of indigenous biological resources in a sustainable manner • Fair and equitable sharing among stakeholders of the benefits arising from bioprospecting involving indigenous biodiversity • Protection of species and ecosystems that warrant national protection; and • Establishment and functions of the South African National Biodiversity Institute (SANBI) <p>NEM: BA restricts activities on protected species via its associated Threatened or Protected Species Regulations (TOPS) and also provides for any activity (which must be identified in terms of this Act) which may impact on these species.</p> <p>In addition to this the Alien and Invasive Species Regulations (GNR 506 of 2013), promulgated in terms of Section 97(1) of NEM: BA apply as well as Alien Invasive Regulations (2014) and the Invasive Species List (2018) are also listed.</p> <p>A Ecological Survey was undertaken for the receiving environment; it also survived for protected species and determined the impact of the project on ecology. If any protected species are identified within the proposed project area, a license to disturb protected flora will be required.</p>

Legislation	Applicable Legislation Requirements	Relevance to the Applicant
NFA		<p>The NFA provides for the protection of particular trees, a particular group of trees, particular woodland or trees belonging to a particular species by way of a declaration by Minister of the Department of Agriculture, Forestry and Fisheries (“DAFF”) – which is the custodian of all natural forest resources within the borders of the Republic of South Africa. According to section 15 of the NFA, the effect of this declaration means that no individual or persons may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport purchase, sell, donate any protected tree, unless under a license or in terms of an exemption.</p>
NEM: PAA	Section 50(5)	<p>Section 50(5) of NEM: PAA states that no development may be permitted in a nature reserve or world heritage site without the prior written consent and approval of the management authority.</p> <p>The project area traverses no protected areas.</p>

5 Expertise of the Specialist

Brett Coutts is a Principal Consultant at Digby Wells. He received a Bachelor of Science and Honours degree in Zoology and Environmental Science from the University of Witwatersrand. Brett assists with the management and co-ordination of all relevant studies related to rehabilitation and certain ecological project. This includes the compilation of rehabilitation plans and undertaking of rehabilitation assessments.

In addition to this, Brett assists within the Biophysical Department with the management of specialist studies that are undertaken by the department and is also responsible for the compilation of the Geographic Information System (GIS) component of Biodiversity Land Management Plans (BLMP) and undertaking ecological assessments.

6 Methodology

Baseline and background information was researched and used to understand the area prior to fieldwork and to complete the screening (desktop) assessment. A regional understanding of the project area is gained through this process which enables a more accurate ecological assessment to be done. During the undertaking of the desktop study relevant information was collected from the following sources:

- Mucina and Rutherford (2012), expected vegetation type and community structure:
- South African National Botanical Institute (SANBI), Pretoria Computerised Information System) PRECIS List's, potential species in the proposed development area/site area according to the;
- South African Bird Atlasing Project (SABAP2);
- Provincial legislation, potential Red Data Listed species and their current status; and
- Current biodiversity and ecosystem status.

6.1 Mucina and Rutherford Vegetation Map of South Africa, Swaziland and Lesotho

The vegetation of South Africa was extensively mapped in the 2006 publication by Mucina and Rutherford. This publication provides relatively detailed descriptions of the various vegetation habitats that are found in South Africa detailing expected species, conservation importance and more. The expected species lists supplied by Mucina and Rutherford (2012) for each vegetation type found in the study area were used to add to the list of expected species for the study area.

6.2 National Protected Area Expansion Strategy

The National Protected Area Expansion Strategy (NPAES) has designated areas for future incorporation into existing protected areas (both National and Informal protected areas). These areas are large, mostly intact areas required to meet biodiversity targets, and suitable for

protection. They may not necessarily be proclaimed as protected areas in the future and are a broad scale planning tool allowing for better development and conservation planning.

6.3 South African Biodiversity Information Facility

The SIBIS South African Biodiversity Information Facility (SABIF) online interactive species distribution lists were obtained from the SANBI which includes all the plants, mammals, reptiles, amphibians and terrestrial invertebrate species officially recorded by SANBI and associates for Quarter Degree Squares (QDS) which the study site is located in. This list is therefore not a comprehensive list representing only those species that may occur in these grids, but rather a guideline as to what is likely to occur here. The sites sampled are also only a very small portion of the whole grid and habitats suitable for certain species in these lists may not be present at the sites sampled. It is therefore not unusual for species in the list to be absent from the sampling sites.

6.4 Field Investigations and Seasonal Influence

The site visit and infield ecological assessment took place on the 8th January 2020.

6.4.1 Flora

Aerial imagery was utilized to identify and stratify homogenous vegetation units. Sampling transects then were selected within representative areas of this homogenous vegetation units and then groundtruth by means of a site visit. All findings based on the site visit are presented within this report. Refer to Figure 6-1 for the transects walked during the site assessment.

6.4.1.1 Species of Special Concern (SSC)

From the overall species list, a list of SSC was compiled. A comprehensive SSC species list was compiled taking the following Red Data Lists into consideration:

- International Union for the Conservation of Nature (IUCN) Red Data List (2019);
- The SANBI Red Data list version 2019.1;
- The South African Red Data lists for mammals (2004), birds (2016), butterflies and Herpetofauna;
- NEM:BA Threatened or Protected Species Regulations, and
- The Convention on International Trade in Endangered Species of Flora and Fauna (CITES) list (2019).

The South African Red Data List uses the same criteria as that defined by the IUCN. According to the IUCN all species are classified in nine groups, set through criteria such as rate of decline, population size, area of geographic distribution, and degree of population and distribution fragmentation (IUCN, 2019). The categories are described in Table 6-1 below.

Table 6-1: Red Data Categories (taken from SANBI 2018)

Category		Description
Extinct	(EX)	No known individuals remaining.
Extinct in the Wild	(EW)	Known only to survive in captivity.
Critically Endangered	(CR)	Extremely high risk of extinction in the wild.
Endangered	(EN)	High risk of extinction in the wild..
Vulnerable	(VU)	High risk of endangerment in the wild.
Near Threatened	(NT)	Likely to become endangered in the near future.
Least Concern	(LC)	Lowest risk. Does not qualify for a more at-risk category. Widespread and abundant taxa are included in this category.
Data Deficient	(DD)	Not enough data to make an assessment of its risk of extinction.
Not Evaluated	(NE)	Has not yet been evaluated against the criteria.
	Extinct	Threatened species are species that are facing a high risk of extinction. Any species classified in the IUCN categories CR, EN or VU is a threatened species. Species of conservation concern are species that have a high conservation importance in terms of preserving South Africa's high floristic diversity and include not only threatened species, but also those classified in the categories, NT, LC and DD
	Threatened	
	Other categories of conservation concern	
	Other categories	

The online IUCN, Plants of Southern Africa (POSA) and the SANBI species status data bases were referenced in order to identify Red Data Listed species and their various threat status categorisations.

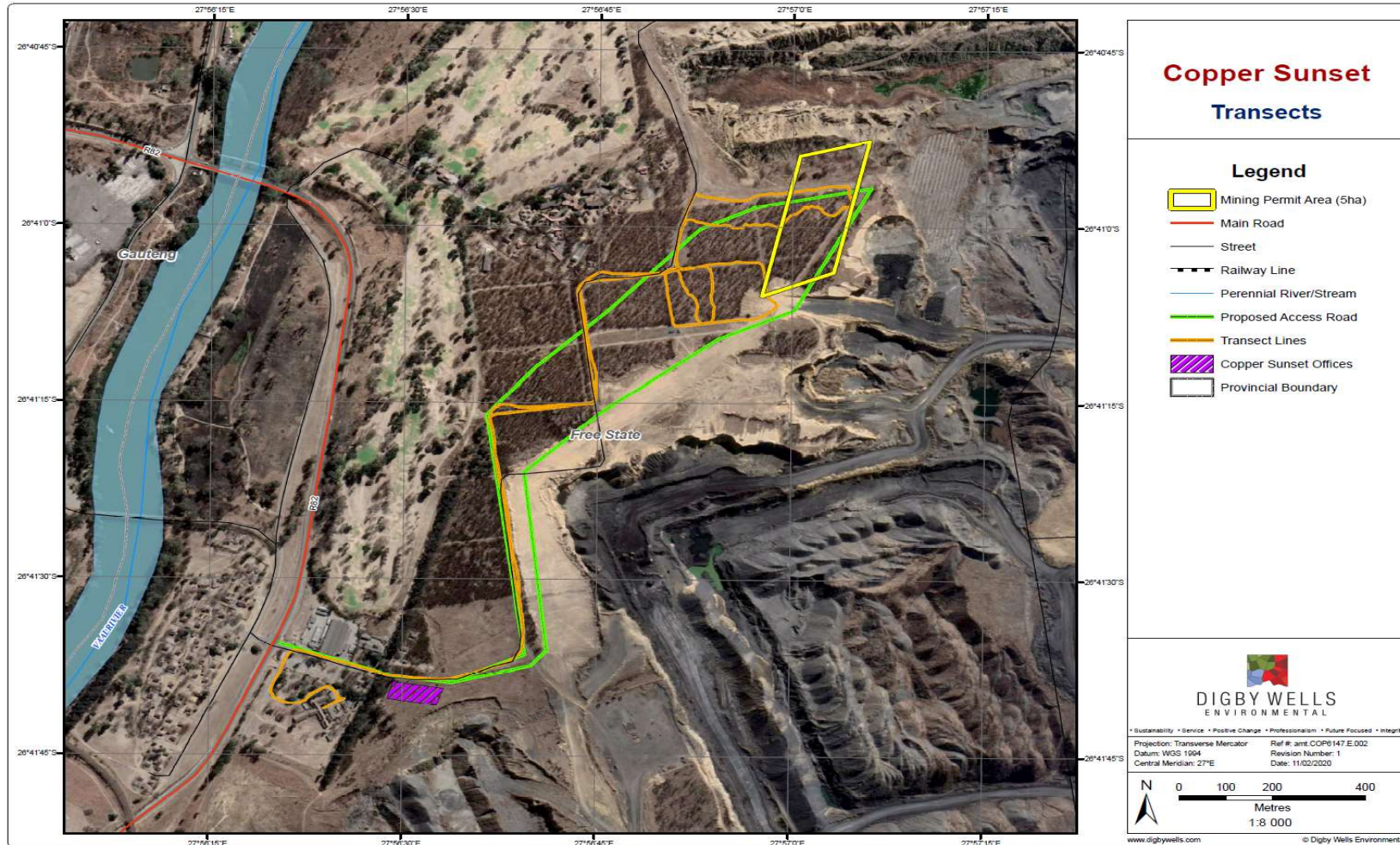


Figure 6-1: Transects

6.4.2 Alien Invasive Species

Alien plant species in South Africa are categorised according to the Alien and Invasive Species Lists, 2014 (GN R864 in GG 40166 of 29 July 2016) of the NEM:BA. The national list of invasive plant species listed in NEMBA represents the following categories:

- Category 1a: Species requiring compulsory control;
- Category 1b: Invasive species controlled by an invasive species management programme;
- Category 2: Invasive species controlled by area, and
- Category 3: Invasive species controlled by activity.

The species recorded on site are categorised according to NEMBA, and management measures designed according to requirements of the act.

6.4.3 Fauna

A desktop analysis combined with a wet-season survey was undertaken to determine the species that occur in the study area, compared against historical records and survey results. Fauna occurring on site include assemblages within terrestrial and riparian ecosystems: mammals, birds, reptiles, amphibians and invertebrates. Each of these assemblages occurs within unique habitats, the ecological state of these habitats directly relates to the number of species found within them. The main habitats occurring in the project area are montane grassland, highveld grassland and wetland and riparian areas.

6.4.3.1 Red Data Faunal Assessment

The IUCN Red Data categories are defined as follow and it is used for the status identification of mammals, birds, reptiles and amphibians globally:

- Critically Endangered (CR): A taxon is Critically Endangered when it is considered to be facing an extremely high risk of extinction in the wild (IUCN, 2019).
- Endangered (EN): A taxon is Endangered when it is considered to be facing a very high risk of extinction in the wild (IUCN, 2019).
- Vulnerable (VU): A taxon is Vulnerable when the best available evidence indicates it to be facing a high risk of extinction in the wild (IUCN, 2019).
- Near Threatened (NT): A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future (IUCN, 2010).

6.5 Impact Assessment

Details of the impact assessment methodology used to determine the significance of impacts to wetland ecosystems is provided below.

The significance rating process follows the established impact/risk assessment formula:

$$\text{Significance} = \text{Consequence} \times \text{Probability} \times \text{Nature}$$

Where

$$\text{Consequence} = \text{Intensity} + \text{Extent} + \text{Duration}$$

And

$$\text{Probability} = \text{Likelihood of an impact occurring}$$

And

$$\text{Nature} = \text{Positive (+1) or negative (-1) impact}$$

Note: In the formula for calculating consequence, the type of impact is multiplied by +1 for positive impacts and -1 for negative impacts.

The matrix calculates the rating out of 147, whereby Intensity, Extent, Duration and Probability are each rated out of seven as indicated in Table 6-4. The weight assigned to the various parameters is then multiplied by +1 for positive and -1 for negative impacts. Impacts are rated prior to mitigation and again after consideration of the mitigation measure proposed in this Impact Assessment Report. The significance of an impact is then determined and categorised into one of eight categories, as indicated in Table 6-3, which is extracted from Table 6-2. The description of the significance ratings is discussed in Table 6-4. It is important to note that the pre-mitigation rating takes into consideration the activity as proposed, i.e. there may already be certain types of mitigation measures included in the design (for example due to legal requirements). If the potential impact is still considered too high, additional mitigation measures are proposed.

Table 6-2: Impact Assessment Parameter Ratings

Rating	Intensity/ Replicability		Extent	Duration/Reversibility	Probability
	Negative Impacts (Nature = -1)	Positive Impacts (Nature = +1)			
7	Irreplaceable loss or damage to biological or physical resources or highly sensitive environments. Irreplaceable damage to highly sensitive cultural/social resources.	Noticeable, on-going natural and / or social benefits which have improved the overall conditions of the baseline.	<u>International</u> The effect will occur across international borders.	Permanent: The impact is irreversible, even with management, and will remain after the life of the project.	Definite: There are sound scientific reasons to expect that the impact will definitely occur. >80% probability.
6	Irreplaceable loss or damage to biological or physical resources or moderate to highly sensitive environments. Irreplaceable damage to cultural/social resources of moderate to highly sensitivity.	Great improvement to the overall conditions of a large percentage of the baseline.	<u>National</u> Will affect the entire country.	Beyond project life: The impact will remain for some time after the life of the project and is potentially irreversible even with management.	Almost certain / Highly probable: It is most likely that the impact will occur. <80% probability.

Rating	Intensity/ Replicability		Extent	Duration/Reversibility	Probability
	Negative Impacts (Nature = -1)	Positive Impacts (Nature = +1)			
5	<p>Serious loss and/or damage to physical or biological resources or highly sensitive environments, limiting ecosystem function.</p> <p>Very serious widespread social impacts.</p> <p>Irreparable damage to highly valued items.</p>	<p>On-going and widespread benefits to local communities and natural features of the landscape.</p>	<p><u>Province/ Region</u></p> <p>Will affect the entire province or region.</p>	<p>Project Life (>15 years): The impact will cease after the operational life span of the project and can be reversed with sufficient management.</p>	<p>Likely: The impact may occur. <65% probability.</p>
4	<p>Serious loss and/or damage to physical or biological resources or moderately sensitive environments, limiting ecosystem function.</p> <p>On-going serious social issues. Significant damage to structures / items of cultural significance.</p>	<p>Average to intense natural and / or social benefits to some elements of the baseline.</p>	<p><u>Municipal Area</u></p> <p>Will affect the whole municipal area.</p>	<p>Long term: 6-15 years and impact can be reversed with management.</p>	<p>Probable: Has occurred here or elsewhere and could therefore occur. <50% probability.</p>

Rating	Intensity/ Replicability		Extent	Duration/Reversibility	Probability
	Negative Impacts (Nature = -1)	Positive Impacts (Nature = +1)			
3	Moderate loss and/or damage to biological or physical resources of low to moderately sensitive environments and, limiting ecosystem function. On-going social issues. Damage to items of cultural significance.	Average, on-going positive benefits, not widespread but felt by some elements of the baseline.	<u>Local</u> Local extending only as far as the development site area.	Medium term: 1-5 years and impact can be reversed with minimal management.	Unlikely: Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur. <25% probability.
2	Minor loss and/or effects to biological or physical resources or low sensitive environments, not affecting ecosystem functioning. Minor medium-term social impacts on local population. Mostly repairable. Cultural functions and processes not affected.	Low positive impacts experience by a small percentage of the baseline.	<u>Limited</u> Limited to the site and its immediate surroundings.	Short term: Less than 1 year and is reversible.	Rare / improbable: Conceivable, but only in extreme circumstances. The possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures. <10% probability.

Rating	Intensity/ Replicability		Extent	Duration/Reversibility	Probability
	Negative Impacts (Nature = -1)	Positive Impacts (Nature = +1)			
1	Minimal to no loss and/or effect to biological or physical resources, not affecting ecosystem functioning. Minimal social impacts, low-level repairable damage to commonplace structures.	Some low-level natural and / or social benefits felt by a very small percentage of the baseline.	<u>Very limited/Isolated</u> Limited to specific isolated parts of the site.	Immediate: Less than 1 month and is completely reversible without management.	Highly unlikely / None: Expected never to happen. <1% probability.

Table 6-3: Probability/Consequence Matrix

		Significance																																					
Probability	7	-147	-140	-133	-126	-119	-112	-105	-98	-91	-84	-77	-70	-63	-56	-49	-42	-35	-28	-21	21	28	35	42	49	56	63	70	77	84	91	98	105	112	119	126	133	140	147
	6	-126	-120	-114	-108	-102	-96	-90	-84	-78	-72	-66	-60	-54	-48	-42	-36	-30	-24	-18	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126
	5	-105	-100	-95	-90	-85	-80	-75	-70	-65	-60	-55	-50	-45	-40	-35	-30	-25	-20	-15	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105
	4	-84	-80	-76	-72	-68	-64	-60	-56	-52	-48	-44	-40	-36	-32	-28	-24	-20	-16	-12	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84
	3	-63	-60	-57	-54	-51	-48	-45	-42	-39	-36	-33	-30	-27	-24	-21	-18	-15	-12	-9	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	63
	2	-42	-40	-38	-36	-34	-32	-30	-28	-26	-24	-22	-20	-18	-16	-14	-12	-10	-8	-6	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42
	1	-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
		-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
		Consequence																																					

Table 6-4: Significance Rating Description

Score	Description	Rating
109 to 147	A very beneficial impact that may be sufficient by itself to justify implementation of the project. The impact may result in permanent positive change	Major (positive) (+)
73 to 108	A beneficial impact which may help to justify the implementation of the project. These impacts would be considered by society as constituting a major and usually a long-term positive change to the (natural and / or social) environment	Moderate (positive) (+)
36 to 72	A positive impact. These impacts will usually result in positive medium to long-term effect on the natural and / or social environment	Minor (positive) (+)
3 to 35	A small positive impact. The impact will result in medium to short term effects on the natural and / or social environment	Negligible (positive) (+)
-3 to -35	An acceptable negative impact for which mitigation is desirable. The impact by itself is insufficient even in combination with other low impacts to prevent the development being approved. These impacts will result in negative medium to short term effects on the natural and / or social environment	Negligible (negative) (-)
-36 to -72	A minor negative impact requires mitigation. The impact is insufficient by itself to prevent the implementation of the project but which in conjunction with other impacts may prevent its implementation. These impacts will usually result in negative medium to long-term effect on the natural and / or social environment	Minor (negative) (-)
-73 to -108	A moderate negative impact may prevent the implementation of the project. These impacts would be considered as constituting a significant and usually a long-term change to the (natural and / or social) environment and result in major changes.	Moderate (negative) (-)
-109 to -147	A major negative impact may be sufficient by itself to prevent implementation of the project. The impact may result in permanent change. Very often these impacts are immitigable and usually result in very severe effects. The impacts are likely to be irreversible and/or irreplaceable.	Major (negative) (-)

6.5.1 Assumptions and Limitations

Findings, recommendations and conclusions provided in this report are based on the authors' best scientific and professional knowledge as well as information available at the time of compilation. The author, however, accept no liability for any actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with services rendered, and by the use of the information contained in this document.

No form of this report may be amended or extended *without the prior written consent of the author*. Any recommendations, statements or conclusions drawn from or based on this report must be clearly cite or make reference to this report. Whenever such recommendations, statements or conclusions form part of a main report relating to the current investigation, this report must be included in its entirety.

7 Description of the Study Area

7.1 Locality

The proposed project, which involves sand mining is located on the following properties:

- Maccaw Vlei No. 121, RE/121

The Copper Sunset Project is located in the northern part of the Free State Province and falls under the Sasolburg Magisterial District. The Copper Sunset Project is located approximately 2 km southeast of the town of Vereeniging. Refer to Figure 7-1, for the Project Locality.

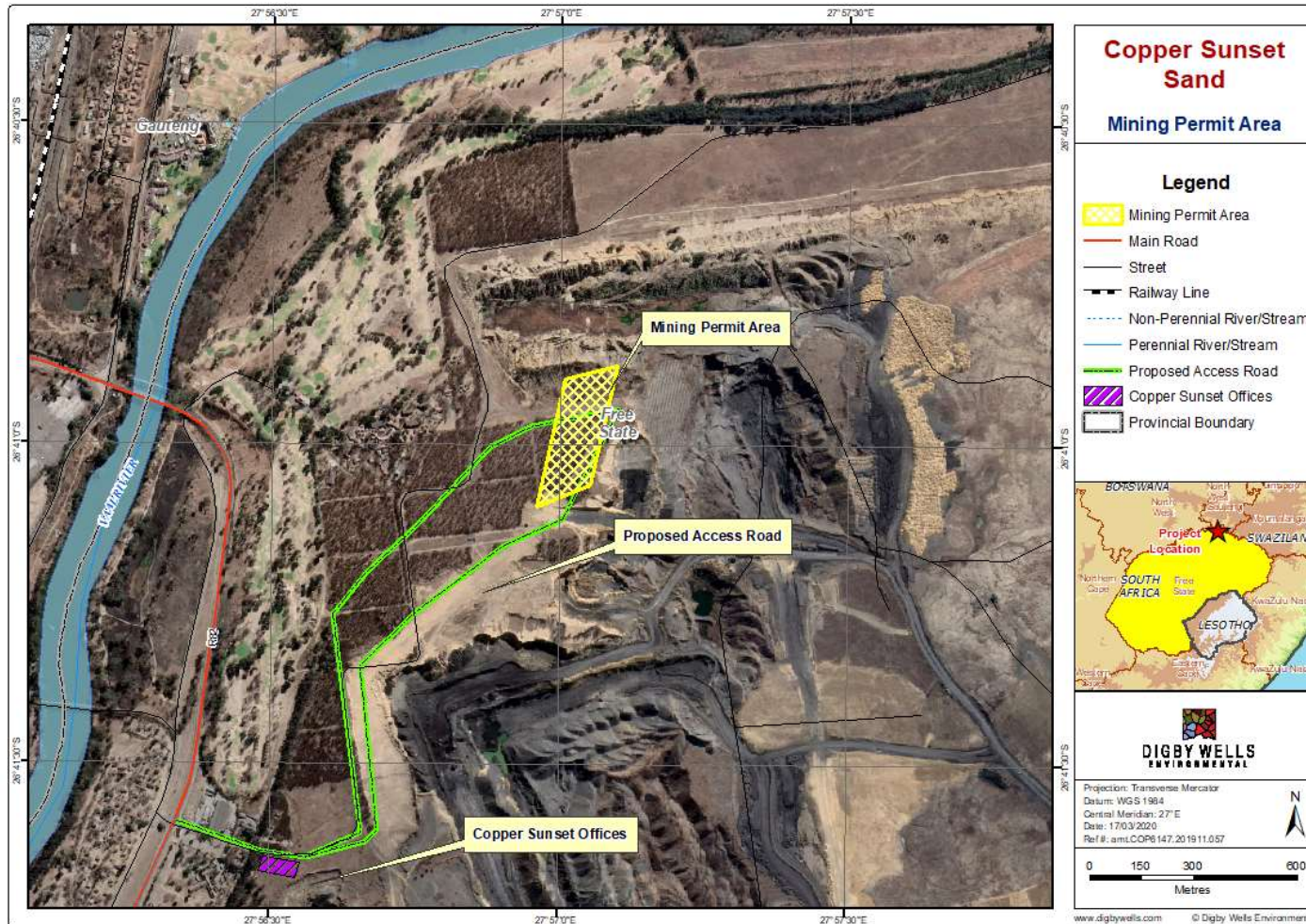


Figure 7-1: Locality Setting and Permit Area

7.2 Climate

The area experiences a typical Highveld climate with marked seasonality in the distribution of rainfall. The mean average rainfall is 641.7mm, which mostly occurs in the summer months of October to March. Thunderstorms are frequent during the rainy season and are usually characterised by lightning, heavy rain, strong winds and sometimes hail. Drought conditions can occur during winter. The maximum temperatures range from 27.8°C in January to 17.7°C in July, with minimum temperatures ranging from 15.5°C in January to near 0°C in June and July. Frost is common and occurs on average between the middle of May and the beginning of September. The most prevalent strong wind direction is from the north and east during the year and particularly during the summer months.

7.3 Quaternary Catchments

The proposed sand mining operations is located within the quaternary catchment C22F (drains directly into the Vaal River).

7.4 Regional Vegetation

Copper Sunset Operation falls within the Grassland Biome with the regional vegetation characterised by the Central Free State Grassland (Gh 6) (Mucina and Rutherford, 2006).

7.4.1 Central Free State Grassland (Gh6)

This vegetation type is characterised by undulating plains supporting short grassland naturally dominated by *Themeda triandra*, and by *Eragrostis curvula* and *E. chloromelas* when degraded. Dwarf karoo bushes establish in severely degraded clayey bottomlands. Overgrazed and trampled low-lying areas with heavy clayey soils are prone to Acacia karoo encroachment.

This vegetation is classified as Vulnerable. Only small portions enjoy statutory conservation such as Willem Pretorius, Rustenfontein and Koppies Dam Nature Reserves. Almost a quarter of the area has been transformed either for cultivation or by dams. Refer to Table 7-1, for dominant grass species that occur within this vegetation type.

Table 7-1: Naturally Occurring Grasses in the Local Vegetation Types

Central Free State Grassland	<i>Aristida adscensionis</i> ; <i>Aristida congesta</i> ; <i>Cynodon dactylon</i> ; <i>Digitaria argyrograpta</i> ; <i>Elionurus muticus</i> ; <i>Eragrostis chloromelas</i> ; <i>Eragrostis lehmanniana</i> ; <i>Eragrostis obtusa</i> ; <i>Eragrostis plana</i> ; <i>Eragrostis curvula</i> ; <i>Eragrostis trichophora</i> ; <i>Heteropogon contortus</i> ; <i>Panicum stapfianum</i> ; <i>Setaria sphacelata</i> ; <i>Themeda triandra</i> ; <i>Tragus keolerioides</i> ; <i>Cymbopogon pospischilii</i> .
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7.5 National Spatial Biodiversity Assessment

The Copper Sunset site occurs in a Vulnerable ecosystem (grassland) with a small amount of Least Threatened (savanna) occurring on site. As most of the area is transformed, the

implications of this are that ideally, any remaining natural grasslands should be conserved and managed for biodiversity gain.

7.6 National List of Ecosystems that are Threatened and in need of Protection

The National threatened ecosystems list (National Environmental Management: Biodiversity Act, Act 10 of 2004) NEM:BA was referenced in order to ascertain the level of ecosystem threat of the ecosystems present within the project site.

According to the National List of Threatened Ecosystems NEM:BA no Threatened Ecosystems occur on site.

7.7 National Protected Areas Expansion Strategy (NPAES)

The NPAES are areas designated for future incorporation into existing protected areas (both National and Informal protected areas). These areas are large, mostly intact areas required to meet biodiversity targets, and suitable for protection. They may not necessarily be proclaimed as protected areas in the future and are a broad scale planning tool allowing for better development and conservation planning. No expansion focus areas exist within a 30km radius of the site.

8 Findings

The following sections details the findings from the infield assessment of the general biodiversity present and the general environmental observations completed during field work procedures.

8.1 Flora

Most of the site is dominated by an old oak plantation, that will need to be removed prior to sand mining being undertaken. In terms of grass species *Panicum maximum* (White Buffalo Grass) was observed to be growing underneath the canopy of the oak plantation. There are several other exotic and alien invasive species that were also identified and noted within the site footprint (Refer to Table 8-1). Majority of the site has been impacted upon as a result of the old oak plantation, mining activities and tracks running through the site, resulting in no natural areas remaining. Based on the site assessment undertaken, the overall sensitivity was considered to be low as a result of the level of disturbance noted. Refer to Figure 8-2 for the vegetation delineation and Figure 8-1 for site photography.

It must be noted that once the sand mining activities have been completed, Serti plan to mine the area utilising open cast mining methods to extract coal and that the approvals for such are already in place.



Figure 8-1: Site Photos

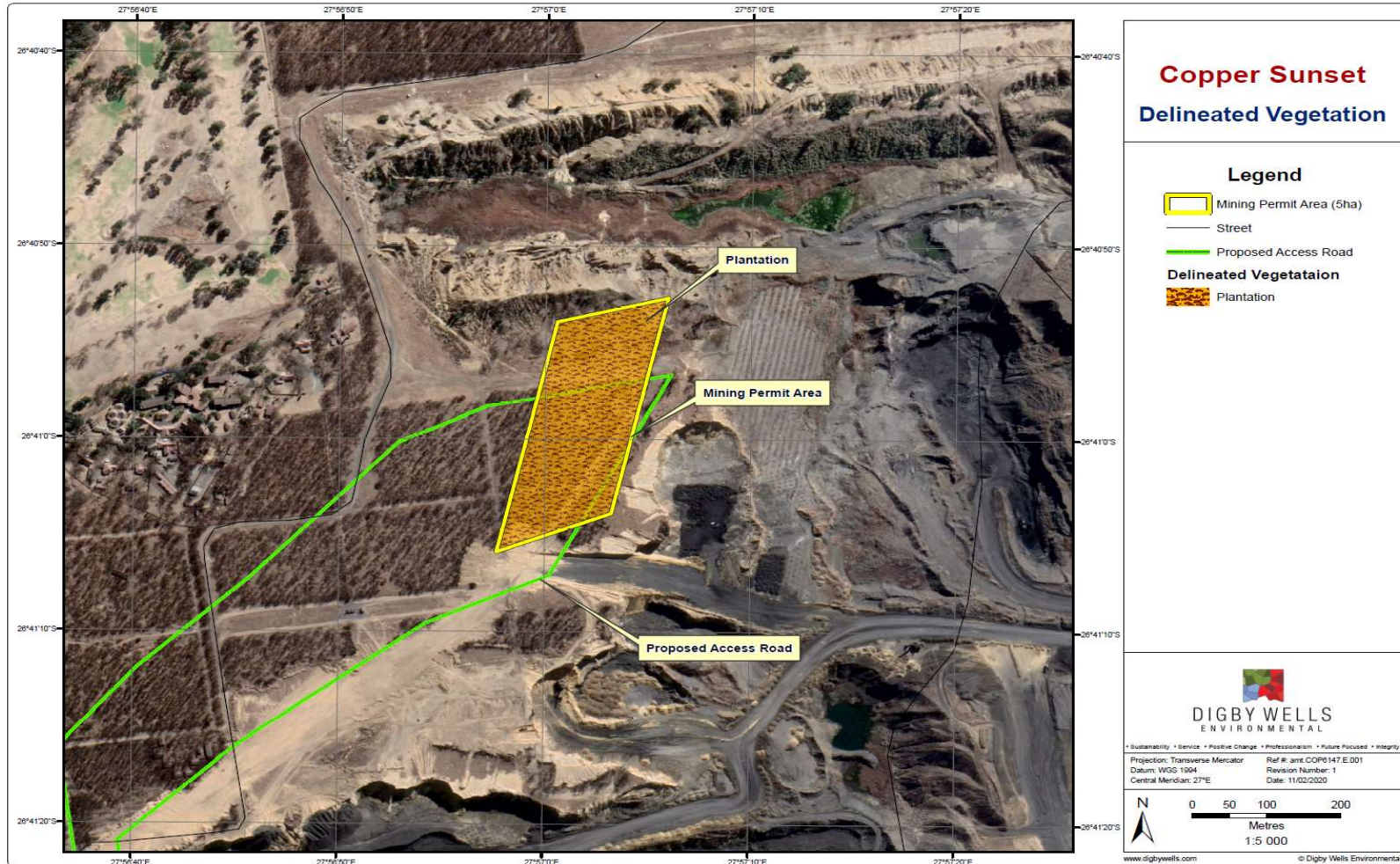


Figure 8-2: Vegetation Delineation

8.1.1 Alien Plant Invasion

Alien plant species invasion is significant on site with most of the area being made up of an old oak plantation within the proposed project site.

Invasion by destructive alien plant species erodes the natural capital of ecosystems, compromises their stability and is a growing problem in South Africa (Richardson and Van Wilgen, 2004). Species such as *Acacia mearnsii* (Black Wattle) and *Eucalyptus* spp. out-compete native species, forming dense mono-specific stands. This reduces the area available for potential plant SSC, as well as land for grazing by domestic and wild animals.

Certain species have different alien invasive categories for different provinces in South Africa. Table 8-1 lists the alien plant species that were recorded on within and surrounding the project area, including invasive categories for those species that have been recognised as invasive.

Table 8-1: Alien Plant Species Recorded on Site

Family	Species Name	Common Name	NEMBA
Simaroubaceae	<i>Ailanthus altissima</i>	Tree of Heaven	1b
Solanaceae	<i>Datura Ferox</i>	Apple Thorn	1b
Asteraceae	<i>Mikania sp</i>	Mile a Minute	Prohibited
Asteraceae	<i>Senecio sp</i>	Ragot	Prohibited
Amaranthaceae	<i>Alternanthera pungens</i>	Paper Thorn	Weed
Fagaceae	<i>Quercus Robustus</i>	English Oak	Not listed (Alien Tree)
Salicaceae	<i>Populus deltoides</i>	Poplar	No listed (Alien Tree)
Pinaceae	<i>Pinus sp</i>	Pine sp	Certain species are listed
Ulmaceae	<i>Ulmus sp</i>	Elm sp	Not listed
Solanaceae	<i>Solanum sp</i>	Tree tomato/giant devil fig/sliver-leaf bitter apple/bugweed/Jerusalem cherry/potato creeper/wild tomato	All species listed as 1b

8.2 Fauna

Based on data available there is a chance that certain sensitive species may occur within the region, however no evidence of such species was evident at the time of the site assessment. Refer to Table 8-2.

Table 8-2: Threatened Fauna Likely to Occur in the Region

Scientific Name	Common Name
<i>Chrysospalax villosus</i>	Rough-haired Golden Mole
<i>Orycteropus afer</i>	Aardvark
<i>Proteles cristatus</i>	Aardwolf
<i>Poecilogale albinucha</i>	African Striped Weasel
<i>Atelerix frontalis</i>	Southern African Hedgehog
<i>Felis serval</i>	Serval
<i>Mystromys albicaudatus</i>	Whitetailed Mouse
<i>Aonyx capensis</i>	Cape Clawless Otter

Based on the site assessment undertaken there was evidence of certain faunal activities on site. The following species were identified on site:

- Cape Porcupine (*Hystrix africaeaustralis*);
- Black Backed Jackal (*Canis mesomelas*);
- Cape Clawless Otter (*Aonyx capensis*);
- Fallow Deer (*Dama Dama*); and
- Sprigkbok (*Antidorcas marsupialis*).

Tracks associated with the Cape Clawless Otter were identified during the site visit undertaken. It must be noted the Otter is considered near threatened according to the IUCN Red Data List. Only tracks were found and no direct burrows or nests were observed indicating that the otter is not residing within the area to be impacted upon, however this cannot be assumed to be the case and it is recommended that prior to clearing activities an inspection is undertaken to ensure that SCC, like this are not impacted upon and mitigation measures are undertaken to minimise the impact to such species.

A bird count for the New Vaal Colliery which the proposed sand mine is located in was carried out on the 2nd February 2019 and the following birds were identified during the count:

- European Honey Buzzard;
- European Bee-eater;
- Reed Cormorant;
- Western Cattle Egret;
- Red-knobbed Coot;
- Levaillant's Cisticola;
- Long-tailed Widowbird;
- Southern Red Bishop;
- Cape Longclaw;
- White-winged Widowbird;
- African Stonechat;
- Zitting Cisticola;
- Helmeted Guineafowl;
- Common Shelduck;
- White-faced Whistling Duck;
- Little Swift;
- Grey-headed Gull;
- Egyptian Goose;
- Blacksmith Lapwing;
- Pin-tailed Whydah;
- Crowned Lapwing;
- Whiskered Tern;
- African Spoonbill;
- Hadedda Ibis;
- Common Myna;
- African Darter;
- Cape Turtle Dove;
- Squacco Heron;
- African Sacred Ibis;
- Long-crested Eagle;
- White-faced Whistling Duck;
- Speckled Pigeon;
- Black-winged Stilt;
- White-rumped Swift;
- Barn Swallow;
- Cloud Cisticola;
- Southern Fiscal;
- Swainson's Spurfowl;
- Crested Barbet; and
- Pied Starling.

None of the species listed above are considered of ecological concern based on the bird count undertaken, however this does not eliminate the fact that there could be SSC within and surrounding area.

8.3 Wetlands

The NFEPA strategic spatial priorities for conserving the country's freshwater ecosystems and supporting sustainable use of water resources were considered to evaluate the importance of the wetland areas that could occur within the project area. Spatial layers (FEPA's) used by the NFEPA project for this study include the wetland classification and ranking. An onsite assessment was undertaken to identify any potential wetlands within the area that will be impacted upon delineation in accordance with the DWA guidelines for wetland delineation (DWA, 2005).

Based on the site assessment conducted and auger points done, there were no wetlands identified within the proposed sand mining project area. Refer to Figure 8-3 for the location of the auger points and Figure 8-4 indicating the soils identified on site.

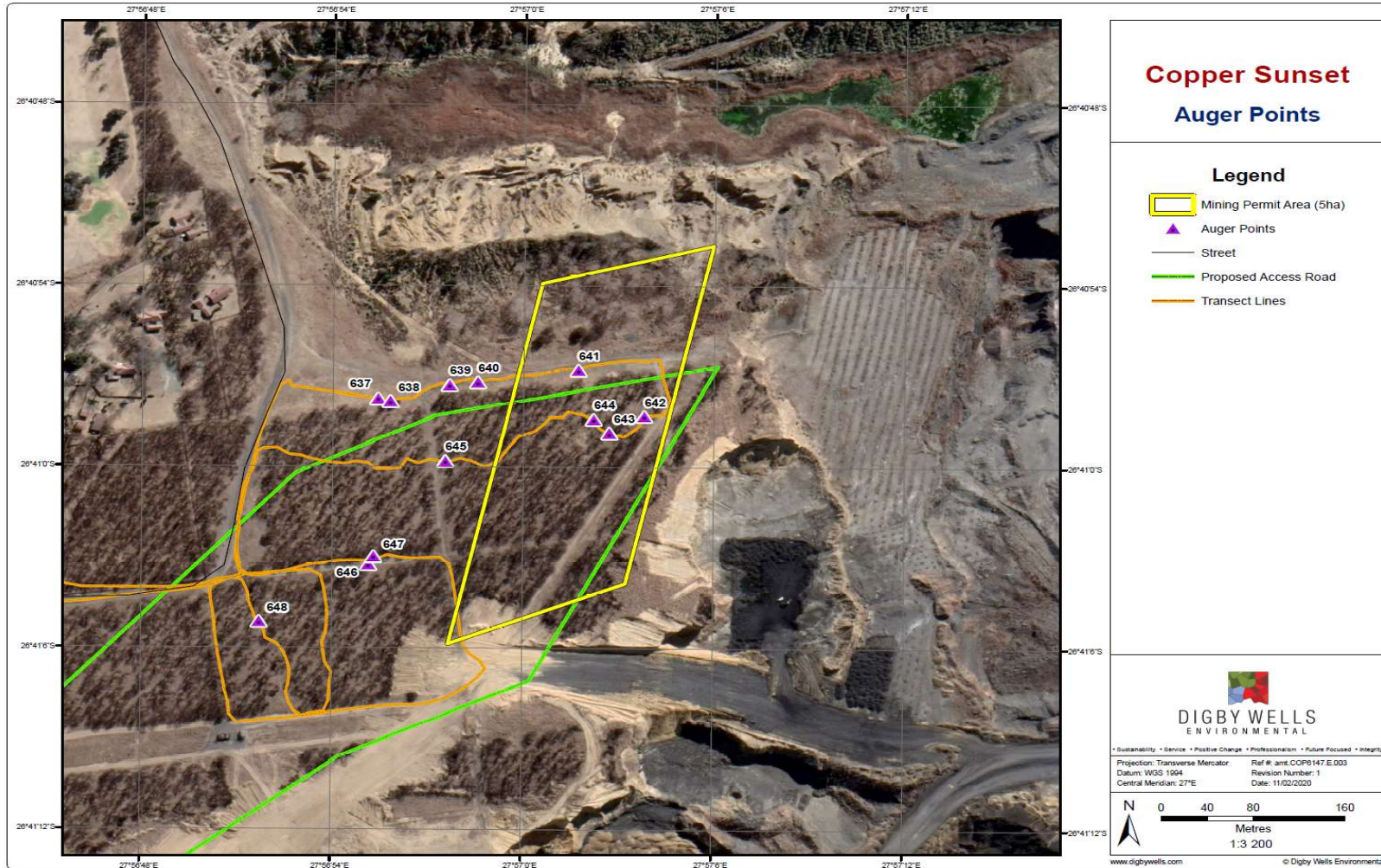


Figure 8-3: Auger Points



Figure 8-4: Augered Soils on Site

9 Impact Assessment

The activities associated with the project are listed in Table 9-1. Figure 8-2 represents the vegetation habitats delineation map with the proposed mine plan and infrastructure layout. It should be noted that no impact to wetlands are anticipated as no wetlands are located onsite. The impact assessment has therefore only considered impacts to fauna and flora.

Table 9-1: Activities Associated with the Mining Project

Project Phase	Project Activity
Construction Phase	Site/vegetation clearance
	Access and haul road construction
	Topsoil stockpiling
Operational Phase	Active Sand Mining
Closure Phase	Rehabilitation – rehabilitation mainly consists of spreading of the preserved subsoil and topsoil, profiling of the land and re-vegetation
	Post-closure monitoring and rehabilitation.

9.1 Construction Phase

The construction phase activities that will have an impact on the fauna and flora are summarised below.

Table 9-2: Construction Phase Interaction with Flora and Fauna Associated with the Site

Interaction		Impact
1	Site Clearance within vegetated areas	Loss of habitat of low ecological sensitivity and disturbance to soil resources

9.1.1 Impact Description

Clearing activities will lead to the direct loss of the vegetation on site and disturbance of soil resources. Majority of the area is made up of an old oak plantation, thus the sensitivity within the area is considered low, however this habitat does still provide refuge for certain faunal species. In addition to this there is a potential loss of topsoil resources that could occur during mining related activities through wind and water erosion, which will need to be managed.

If rehabilitation activities are undertaken properly, there is the potential to restore the area back to grassland once mining has been undertaken. It must be noted that Seriti plan to mine the area utilising open cast methods to extract coal and that existing authorisation are in place to conduct such mining.

9.1.2 Management Objectives

The objectives of management actions and mitigation measures are to avoid and reduce impacts to flora and fauna habitat on site and to mitigate any impacts that cannot be avoided. In addition to this management of topsoil resources is critical for the successful rehabilitation of the site. Management objectives rooted in the mitigation hierarchy, will ensure that impacts from clearing are limited and sensitive vegetation, plants and habitats are avoided during this process (biodiversity process and pattern). To this end, no fauna or fauna SSC may be disturbed without the correct permitting procedure in place. No sensitive landscapes may be disturbed. It must be noted that one SCC (Cape Clawless Otter) was identified on site, through tracks, but no evidence of active burrows was found. The overall sensitivity of the area in questions is considered to be low based on the level of disturbance that has occurred historically. Soil management is critical to rehabilitation efforts and every effort must be taken to protect these resources and utilised them for the intended purpose.

9.1.3 Management Actions and Targets

If possible, clearing activities should be kept to a minimum and only areas where mining of sand is going to be undertaken should be cleared.

Areas that are not directly affected by development should be conserved. This entails restricting access and controlling any alien invasive species as well as keep vegetation clearance to a minimum. Rehabilitation of small areas disturbed during construction, and not needed for operation, should occur concurrent to mining activity. Soil stockpiles to be utilised for rehabilitation only and should compaction of these stockpiles should be avoided.

The Ecological Management Plan detailed in Section 10 must be developed and used as a guide to inform management actions. However, specific important management actions pertinent to this phase and activity are briefly discussed below.

9.1.4 Impact Ratings

Table 9-3: Impacts of the Construction Phase – Loss of Habitat

Dimension	Rating	Motivation	Significance
Activity and interaction: Site Clearance within vegetated areas			
Impact Description: Loss of habitat (AIP vegetation types)			
<i>Prior to Mitigation/Management</i>			
Duration	Medium Term (3)	Vegetation will be removed, and the impact will be during the project life and should recover overtime. Fauna species will move away with no permanent impact on them.	- 42 Minor

Dimension	Rating	Motivation	Significance
Extent	Limited (2)	The area to be cleared will be limited to the sand mining activities	
Intensity x type of impact	Minimal (1)	Owing to the sensitivity rating, the impact will be minimal.	
Probability	Certain (7)	Clearing of vegetation will definitely take place for the establishment of sand mining related activities.	
Nature	Negative	The impact will be negative.	
Mitigation/Management Actions			
<ul style="list-style-type: none"> The footprint area to be cleared should be kept as small as possible and only existing access roads should be used to reach the site for clearing and vehicles should not be allowed to leave the demarcated road. Walk through of the area to ensure that no SCC are impacted upon as a result of sand mining activities. An AIP management plan must be implemented, whereby existing AIP's within the project area are eradicated as well as the disturbed site is monitored quarterly for at least two years to ensure that alien invasion does not take place. 			
Post-Mitigation			
Duration	Medium (3)	The area can be reinstated to grazing land use after decommissioning.	- 35 Negligible
Extent	Very limited (1)	The area to be cleared is minor in extent.	
Intensity x type of impact	Minimal (1)	The impact intensity can be reduced through mitigation.	
Probability	Likely (7)	Edge effects will still impact on the grassland area if mining is to take place immediately adjacent to it.	
Nature	Negative	The impact will be negative.	

9.2 Operational Phase

The operational phase activities that will have an impact on the flora and fauna are summarised below.

Table 9-4: Operational Phase Interaction with Flora and Fauna Associated with the Site

Interaction		Impact
1	Sand Mining Activities	This will involve stripping of topsoil and limited stockpiling, mining of sand, profiling of the area and placement of topsoil and vegetation of impacted areas.

9.2.1 Impact Description

Concurrent rehabilitation will be undertaken on the mined-out strips. The rehabilitation process involves the removal and stockpiling of topsoil. Typically, the topsoil is not stockpiled for longer than five days. Subsequent to mining, the mined-out strips are then contoured, and the stockpiled topsoil is applied and levelled to resemble the pre-mining landscape. Although this contouring and levelling occurs, there is an overall lowering of the topography; however, rehabilitation is aiming to ensure the site is free draining.

It must be noted that there is overlap between the construction and operational phases on the mine. The largest impact is associated with the initial clearing activities, which will be associated with the removal of the oak plantation within the active mining areas.

9.2.2 Management Objectives

The objectives of the management measures are to ensure that operational areas do not expand into natural vegetation or habitat and that concurrent rehabilitation is undertaken.

9.2.3 Management Actions and Targets

Signage should be erected to indicate a minimum a speed limit of 30 km/hr on access roads on site. Signage should also warn drivers of the risk of animal on the road. Further to this, driving of vehicles should be restricted to daylight hours.

Concurrent rehabilitation should take place to ensure that habitat is restored to a certain extent as soon as possible. An AIP management plan must be implemented.

9.2.4 Impact Ratings

The impact is rated in Table 9-5 below.

Table 9-5: Potential Impacts of Operational Phase on Flora and Fauna Habitat on Site

Dimension	Rating	Motivation	Significance
Activity and Interaction 1: Mining of sand			
Impact Description: Potential disturbance and movement of mining machinery			
<i>Prior to Mitigation/Management</i>			
Duration	Project Life (5)	The impact will only persist as long as vehicles are on site during the operational phase.	-40 Minor
Extent	Limited (2)	The impact is restricted to the areas where vehicular activity and machinery are active.	
Intensity	Moderate (3)	The impact is moderate; since the impact of construction would have been more pronounced.	
Probability	Probable (4)	Faunal disturbance is commonly observed in mining operations without appropriate mitigation.	
Nature	Negative		
<i>Mitigation/Management Actions</i>			
<ul style="list-style-type: none"> • Erect signage with speed limits. • Restrict vehicle movement to daylight hours. • Walk through of the area to ensure that no SCC are impacted upon as a result of sand mining activities • Concurrent rehabilitation should take place. 			
<i>Post-Mitigation</i>			
Duration	Project Life (5)	The impact will only persist as long as vehicles are on site during the operational phase.	-30 Negligible
Extent	Limited (2)	The impact is restricted to the areas where vehicular activity and machinery are active.	
Intensity	Moderate (3)	The impact is moderate; since the site is largely disturbed prior to the development.	
Probability	Unlikely (3)	If the speed limits are adhered to and noise is restricted, then the impact is reduced.	
Nature	Negative		

9.3 Decommissioning Phase

The decommissioning activities have been rated together and rated below (Table 9-6).

Table 9-6: Closure and Rehabilitation Phase Interaction Associated with the Site

Interaction	Impact
Rehabilitation of impacted areas to grazing	Improvements from rehabilitation will be recognisable over time as area is returned to grassland.

9.3.1 Impact Description

During the decommissioning phase, remaining areas to be rehabilitated will be profiled and topsoil replaced, lastly vegetation will be re-established. Potential impacts associated with this phase could be the colonization of alien invasive plant species.

The impacts associated with flora and fauna during the Closure and Rehabilitation Phase, as well as the significance ratings and potential mitigation measures are discussed further below.

9.3.2 Management Objectives

The primary objectives of mitigation measures for the rehabilitation and closure phase is to ensure that the project site is rehabilitated to a reasonable ecological state, representing species diversity and suitable habitat for indigenous fauna species. The disturbed areas should be rehabilitated to grazing land use at least taking into consideration legal requirements. Further to this, it is important that alien plant species do not colonise and spread throughout the site.

9.3.3 Management Actions and Targets

An AIP management plan should be implemented, and all alien plant species should be removed as emergent or juveniles.

9.3.4 Impact Ratings

The impacts of the rehabilitation and closure phase are represented in Table 9-7.

Table 9-7: Potential Impacts of the Rehabilitation and Closure Phase – Establishment of Alien Plant Species

Dimension	Rating	Motivation	Significance
Dismantling and removal of infrastructure			
Impact Description: Profiling of the area and rehabilitation (topsoil cover, ripping and vegetation establishment)			
Prior to Mitigation/Management			
Duration	Medium-term (3)	This activity will only take place for a limited time only. Alien plant invasion may occur for a short period of time.	Minor (negative) 36

Dimension	Rating	Motivation	Significance
Extent	Limited (2)	Rehabilitation will be undertaken for disturbed areas that have not been rehabilitated. Alien plants will establish around disturbed areas associated with the decommissioning phase.	
Intensity x type of impact	Serious (4)	Alien plant invasion is a serious problem with significant ecological consequences; hence its reference in the NEMBA and CARA legislation.	
Probability	Probable (4)	This activity will occur. Since alien plants have already been recorded on site, the spread of these species due to disturbance will invariably take place. The seedbank in the soil will contain alien species.	
Nature	negative	The impact will be negative	
Mitigation/Management Actions			
<ul style="list-style-type: none"> • An alien plant species management plan should be implemented for two years after rehabilitation is completed. • All emergent alien plant species should be removed before they reach a seed-bearing or flowering maturity. • Monitoring of the rehabilitated area and removal of alien invasive plant species. 			
Post-Mitigation			
Duration	Short term (2)	Rehabilitation activities will be restricted to a short period of time.	21 Small positive
Extent	Limited (2)	Only certain parts of the site will have revegetated cover, this will include all open areas left behind by infrastructure removal.	
Intensity	Moderate (3)	The effectiveness of the rehab will determine the intensity.	
Probability	Unlikely (3)	It's unlikely that the rehabilitation will be for restoration of former habitat.	
Nature	Positive	Overall potential small positive impact as the area has the potential to be rehabilitated to a better state than it currently is.	

9.4 Cumulative Impacts

New Vaal are planning on mining within the area once sand mining activities have been completed and it is expected that there may be additional impacts that may occur as a result of mining within the area.

9.5 Unplanned Events and Low Risks

The planned activities will have known impacts as discussed above; however, unplanned events may happen on any project that may have potential impacts which will need mitigation and management. Table 9-8 is a summary of the findings from a flora and fauna perspective.

Table 9-8: Unplanned Events, Low Risks and their Management Measures

Unplanned Event	Potential Impact	Mitigation / Management / Monitoring
Hydrocarbon spillages	Contamination	Vehicles must only be serviced within designated service bays. Drip trays should be placed beneath vehicles not in use Procedures should be put in place to clean-up spillages in the event that they should occur. Spill kits need to be obtained and should be available on site to clean up any leaks or spills. Spillages of magnitude should also be reported to the authorities within 24 hours and an internal incident reporting system implemented.
Poaching of animal species on site due to increase activity on site.	Small mammals and reptiles may be at risk due to increased human activity on site.	Ensure continuous environmental awareness training takes place.
Occurrences of unplanned fires	Primary and Secondary grasslands vegetation and habitat types will be destroyed	Ensure a fire management plan is in place and that appropriate and dedicated equipment is available for firefighting.

10 Environmental Management Plan

The objective of an EMP is to present (a) mitigation measures to manage undue or reasonably avoidable adverse impacts associated with the development of a project and (b) to enhance potential positives.

10.1 Summary of Mitigation and Management

Table 10-1 provides a summary of the proposed project activities, environmental aspects and impacts on the receiving environment. Information on the frequency of mitigation, relevant legal requirements, recommended management plans, timing of implementation, and roles/responsibilities of persons implementing the EMP. All of the mitigation measures have been previously listed in the impact assessment tables as well.

Table 10-1: Mitigation and Management Plan

Activities	Potential Impact	Size and scale of disturbance	Aspects Affected	Phase	Mitigation Type/Measures	Compliance with standards/Standard to be achieved	Time period for Implementation
Site clearance including vegetation removal	Loss of low sensitivity habitat	Limited	Flora and Fauna	Construction	<ul style="list-style-type: none"> The footprint area should be kept as small as possible and only existing access roads should be used. An alien invader management plan should be implemented. Walk through of the area to ensure that no SCC are impacted upon as a result of sand mining activities. 	NEMA, 1998 (Act 107 of 1998) NEM:BA, 2004 (Act 10 of 2004)	Design and construction phases.
Sand Mining Activities	Increased vehicular movement and associated human activities on the site.	Limited	Flora and Fauna	Operational	<ul style="list-style-type: none"> Erect signage with speed limits. Restrict non-essential vehicle movement to daylight hours. Walk through of the area to ensure that no SCC are impacted upon as a result of sand mining activities Concurrent rehabilitation should take place. 	NEMA, 1998 (Act 107 of 1998) NEM:BA, 2004 (Act 10 of 2004)	Construction and operational phases
Transportation of material to relevant stockpiles.	Potential for road kills and faunal disturbance	Limited			<ul style="list-style-type: none"> Erect signage with speed limits. Restrict non-essential vehicle movement to daylight hours. Concurrent rehabilitation should take place. 	NEMA, 1998 (Act 107 of 1998) NEM:BA, 2004 (Act 10 of 2004) CARA, 1983 (Act No. 43 of 1983)	Signage should be erected before the operational phase.
Rehabilitation (topsoil cover, ripping and vegetation establishment)	When the soil is disturbed, alien plants in the seedbank will establish and spread. Rehabilitation must take by using local indigenous grass species that are sown in the correct depth and method, and type of topsoil, which is layered on the correct slope.	Limited	Flora and Fauna	Decommissioning Phase	<ul style="list-style-type: none"> Remove alien invasive species as and when they occur; An alien invasive management plan must be established; and All compacted areas will be ripped to loosen the soils during rehabilitation and seeded with an appropriate seed mixture. Ensure routine inspections of vehicles utilised on site. Have drip trays and spill kits available. Ensure hydrocarbons are not stored on the ground (bare soil) 	NEMA, 1998 (Act 107 of 1998) NEM:BA, 2004 (Act 10 of 2004) CARA, 1983 (Act No. 43 of 1983)	Alien management plan to be implemented after construction quarterly for 2 years and after decommissioning quarterly for two years.

10.2 Monitoring Plan

The aspects requiring monitoring, based on the flora and fauna assessment, are described below.

Table 10-2: Monitoring Plan

Activities	Impacts requiring monitoring programmes	Functional requirements for monitoring	Roles and responsibilities (For the execution of the monitoring programmes)	Monitoring and reporting frequency and time periods for implementing impact management actions
Fauna and Flora Monitoring	Impacts on vegetation structure and health. Impacts on faunal populations and numbers	Ensuring sustainable populations of both fauna and flora persist until closure	Terrestrial Ecologist	Every year, during the wet season
Rehabilitation	Success of rehabilitation	Rehabilitation success	Rehabilitation Specialist	Quarterly for 2 years after closure
Soil disturbance	Establishment of alien plant species	Alien plant monitoring	Qualified Botanist	Quarterly monitoring for two years

11 Consultation Undertaken

No comments directly related to flora and fauna have been received.

12 Comments and Responses

No Comments have been received thus far.

13 Discussion and Conclusion

The Copper Sunset Sand Mining project area is situated in Central Free State Grassland vegetation type. The site has been classified into one primary vegetation unit, namely disturbed vegetation as a result of the historical oak plantations located within the project area.

Floral diversity within the project area was considered low with a low diversity of indigenous species. No wetlands were identified within the area that is going to be impacted upon. In terms of faunal diversity, the section currently forms part of the overall New Vaal game park, thus several different species are expected to occur within the area and surroundings. One SSC was identified from tracks, which was the Cape Clawless Otter (*Aonyx capensis*). This species may utilise the areas and surroundings for habitat and foraging activities. Fallow Deer (Dama Dama), which have been released into the area were also encountered. This species is not local to South Africa. Other SSC could utilise the area and it is suggested that a walkthrough be conducted prior to clearing activities being undertaken. As a result of the level of transformation, faunal diversity was lower than expected.

Based on the impact assessment, including mitigation measures adopted, the overall impact to ecology is expected to be low, also taking into consideration that Seriti plan to mine this area once sand mining activities have been completed.

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