Environmental Impact Assessment
And
Environmental Management Programme

for Listed Activities Associated with the Proposed Copper Sunset Mining Right Extension Project, situated near Vereeniging, Free State Province

DMRE Reference Number: FS30/5/1/1/2/164 MR

Environmental Authorisation in Support of the Copper Sunset Mining Right Extension Project

DRAFT REPORT FOR PUBLIC REVIEW

SUBMITTED FOR ENVIRONMENTAL AUTHORISATIONS IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998) (NEMA) AND THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT, 2014 (ACT NO. 26 OF 2014) (NEM:WA) IN RESPECT OF LISTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY APPLICATIONS IN TERMS OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (ACT NO. 28 OF 2002) (MPRDA) (AS AMENDED).

Name of Applicant:	Copper Sunset Sand (Pty) Ltd
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File Reference Number SAMRAD:	FS30/5/1/1/2/164 MR

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Report Type:	**Environmental Impact Assessment and Environmental Management Plan Report**
Project Name:	**Integrated Environmental Impact Assessment for the Proposed Copper Sunset Mining Right Extension Project, situated near Vereeniging, Free State Province**
Project Code:	**COP6679**

Name	Responsibility	Signature	Date
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Claire Wannenburgh	1st Reviewer		June 2021
Barbara Wessels	2nd Reviewer		June 2021

IMPORTANT NOTICE

In terms of the Mineral and Petroleum Resources Development Act (Act 28 of 2002 as amended), the Minister must grant a prospecting or mining right if among others the mining "will not result in unacceptable pollution, ecological degradation or damage to the environment".

Unless an Environmental Authorisation can be granted following the evaluation of an Environmental Impact Assessment and an Environmental Management Programme report in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA), it cannot be concluded that the said activities will not result in unacceptable pollution, ecological degradation or damage to the environment.

In terms of section 16(3)(b) of the EIA Regulations, 2014, any report submitted as part of an application must be prepared in a format that may be determined by the Competent Authority and in terms of section 17 (1) (c) the competent Authority must check whether the application has taken into account any minimum requirements applicable or instructions or guidance provided by the competent authority to the submission of applications.

It is therefore an instruction that the prescribed reports required in respect of applications for an environmental authorisation for listed activities triggered by an application for a right or a permit are submitted in the exact format of, and provide all the information required in terms of, this template. Furthermore, please be advised that failure to submit the information required in the format provided in this template will be regarded as a failure to meet the requirements of the Regulation and will lead to the Environmental Authorisation being refused.

It is furthermore an instruction that the Environmental Assessment Practitioner must process and interpret his/her research and analysis and use the findings thereof to compile the information required herein. (Unprocessed supporting information may be attached as appendices). The EAP must ensure that the information required is placed correctly in the relevant sections of the Report, in the order, and under the provided headings as set out below, and ensure that the report is not cluttered with un-interpreted information and that it unambiguously represents the interpretation of the applicant.

OBJECTIVE OF THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

The objective of the environmental impact assessment process is to, through a consultative process: -

- determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;
- describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
- identify the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;
- determine the: -
    - nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
    - degree to which these impacts: -
    - can be reversed;
    - may cause irreplaceable loss of resources, and
    - can be avoided, managed or mitigated.
- identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment;
- identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;
- identify suitable measures to manage, avoid or mitigate identified impacts; and
    - identify residual risks that need to be managed and monitored.

EXECUTIVE SUMMARY

Introduction

Copper Sunset (Pty) Ltd (Copper Sunset) has an approved Mining Right (MR) (DMRE Ref. No. FS30/5/1/1/2/164 MR) and Environmental Management Programme (EMPr), in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA), for the mining of sand on the Farm Bankfontein No. 1849. The MR was approved in 2009 and amended in 2011, 2016 and 2017 to incorporate additional areas into the Mining Right Area (MRA).

The Applicant now wishes to extend the MRA to incorporate adjacent properties to extend the Life of Mine (LoM) by approximately 20 years. The intent is to expand the current mining operations to include additional portions of the Remaining Extent (RE) of the Farm Bankfontein No. 9 and a portion of the RE of the Farm Zandfontein No. 259. The proposed extension of the MRA amounts to approximately 1642 ha (Bankfontein) and 1179 ha (Zandfontein), for the mining of sand.

Copper Sunset is applying for the following authorisations and licences, which are required prior to the commencement of mining operations:

- An Environmental Authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA);
- Regulation 31 Amendment Process in terms of the Environmental Impact Assessment Regulations, 2014 (GN R982 of 04 December 2014, as amended) (the “EIA Regulations, 2014”) promulgated under the NEMA; and
- An Integrated Water Use Licence (IWUL) in terms of the National Water Act, 1998 (Act No. 38 of 1998) (NWA).

Digby Wells Environmental (hereinafter Digby Wells) has been appointed by Copper Sunset as the independent Environmental Assessment Practitioner (EAP) to facilitate the application for Environmental Authorisation through a Scoping and EIA process.

Project Applicant

The details of the Project Applicant are included in the table below.

Company name:	Copper Sunset Sand (Pty) Ltd
Contact person:	Trudie Vosloo
Physical address:	67 Van Buuren Road, Bedfordview, Germiston, 2008
Telephone:	011 622 1785
Email:	trudie@tvosloo.com

Project Overview

The proposed Copper Sunset Mining Right Extension Area (MREA) falls within an existing MRA of the New Vaal Colliery. Seriti Resources (Seriti) is the holder of the New Vaal Colliery MR. The MR permits the mining and extraction of coal. Copper Sunset entered into an agreement with Seriti to mine sand within the proposed MREA. The sand deposit lies between 0.4 – 5 m below the surface. Strip mining will be utilised to recover the resource, with the sand mined in strips of 30 – 35 m in width and 0.4 - 5 m in depth. The length of the strips is dependent on the area to be mined but approximate lengths are in the region of 180 – 600 m. The type of sand present at the mining area includes building sand and plaster sand. In addition, Copper Sunset will add clay to the material to be mined. The mining method to be applied includes:

- Stripping and stockpiling of topsoil;
- Construction of temporary haul roads (20 m wide and the length will be approximately 10 km) (It is important to note that the haul road will move as mining progresses through the life of mine);
- Mining of the sand resource including screening of sand;
- Backfilling of the mined excavations with stockpiled topsoil and unwanted material from the screening process; and
- Concurrent rehabilitation.

No permanent infrastructure will be constructed on site for the sand mining operation. All machinery will be mobile and brought in by Copper Sunset. The existing infrastructure area at the Bankfontein Farm will continue to be utilised. This includes offices and associated infrastructure, like toilets, a weigh bridge, and washing plant (which is currently not constructed), oil separator, workshop, parking area for machines and a bulk hydrocarbon storage tank. Mobile offices will be placed at the entrance to the new mining areas and space will be available to park mining equipment not in use. Portable toilets, a hydrocarbon storage tank and water bowser will also be utilised.

A screening process will be utilised, where required, should sand become contaminated with unusable particles. The screening process will include the use of a Screening Machine. The screening machines will be moved from one area to the next within the MRA, as required. The use of the machine will not disturb any additional areas and will be placed on top of areas which will or have already been disturbed by the sand mining operations.

The extension of the existing MRA triggers activities incorporated in Listing Notice 1 and Listing Notice 2 of the Environmental Impact Assessment (EIA) Regulations, 2014 (GN R982 of 04 December 2014 as amended), promulgated under the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The Listed Activities requires a Scoping and Environmental Impact Reporting (S&EIR) process to be carried out as part of the authorisation process.

Additionally, Copper Sunset have four separate EAs and EMPrs utilised to manage the existing and approved MRA. It is recommended that as part of this application all Environmental Authorisations (EAs) and EMPrs are consolidated into one EMPr that is applicable to the approved MR and the new areas being applied for. This report constitutes the draft integrated EIA/EMPr and Regulation 31 Amendment Report which is submitted to Interested and Affected Parties (I&APs) and relevant authorities for review and comment in terms of the EA application as per the NEMA EIA Regulations, 2014 (as amended).

Purpose of this Report

The purpose of an EIA process is to ensure that the potential environmental and social impacts associated with the establishment, operation and closure and rehabilitation phases of a project are identified, assessed and appropriately managed. There are two primary phases of an EIA process, namely the Scoping Phase and the Impact Assessment Phase. Identification of potential impacts occurs during the Scoping Phase, whilst the assessment and mitigation of those impacts occurs during the Impact Assessment Phase. The impact assessment and mitigation management are presented in this EIA/EMPr Report. Various specialist studies were undertaken during the Project evaluation to inform the EIA/EMP; these included:

- Air Quality Impact Assessment;
- Noise Impact Assessment;
- Fauna and Flora Impact Assessment;
- Heritage and Palaeontology Impact Assessment;
- Surface Water Impact Assessment;
- Soil, Land Use and Land Capability Impact Assessment including an Agricultural Component;
- Wetlands Impact Assessment;
- Hydropedological Assessment;
- Traffic Impact Assessment;
- Social Impact Assessment; and
- Rehabilitation and Closure Assessment.

A summary of the baseline environment is presented in Section 11 (Part A). Environmental monitoring plans suggested by various specialists are included in Section 8 (Part B) of this report and should be implemented to measure compliance, determine whether mitigation measures are effective and determine trends over the life of the Project.

Environmental Consultants

The contact details for the independent EAP are provided in the table below.

Company name:	Digby Wells Environmental
Contact person:	Claire Wannenburgh
Professional affiliation/registration:	EAPASA Registration No. 2019/1013
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Approach and Methodology for the Public Participation Process

A Public Participation Process (PPP) was initiated during the Scoping Phase, which is central to the investigation of environmental and social impacts. It is important that stakeholders who are affected by the project are given an opportunity to identify concerns and to ensure that local knowledge, needs and values are understood and taken into consideration as part of the impact assessment process. The Draft Scoping Report was submitted to the public for input and comments for a period of 30 days. The commenting period was from 11 January 2021 to 10 February 2021. The comments from the stakeholders are included in the Comment and Response Report. The Final Scoping Report was submitted to the Department of Mineral Resources and Energy (DMRE) on 18 February 2021 and approved on 17 May 2021, thereby allowing Copper Sunset to continue into the EIA Phase.

The Draft EIA/EMP has been submitted to the public for input and comments for a period of 30 days. The commenting period is from **08 July 2021** and ends on **10 August 2021**. The electronic Draft EIA/EMP can be accessed and downloaded from the Digby Wells website www.digbywells.com (Public Documents) and the data-free service portal http://view.datafree.co/PublicDocuments/.

Due to COVID-19 Regulations, no hard copies have been made available. Focus Group meetings are planned to be held during this commenting period to present the Draft EIA/EMP and obtain comments from the Interested and Affected Parties (I&APs). The Draft EIA/EMP will be updated with the comments received from the I&APs prior to submission of the Final EIA/EMP to the DMRE for consideration. Once the DMRE has made a decision, it will be communicated to all the registered I&APs.

Project Alternatives

A Project alternative is defined as a possible course of action, in place of another, that would meet the same purpose and need (DEAT, 2004). Section 9.1, Part A, provides the details of the development footprint alternatives considered for this Project. The following alternatives were considered in this EIA/EMP:

- Location;

- Design and layout;
- Mining method; and
- The 'No-Go" alternative.

Environmental Baseline

The proposed Copper Sunset MREA is characterized by warm-hot summers and cool-cold winters. The geology falls within the Vryheid Formation that forms part of the Ecca Group, which is part of the Karoo Supergroup. The dominant soil forms include Clovelly, Avalon, Katspruit, Mispah, Witbank, Arcadia, Glencoe, Pinedene, Dresden and Hutton.

The proposed Copper Sunset MREA falls dominantly within the Central Free State Grassland vegetation type, with a small section on the western side within the Andesite Mountain Bushveld vegetation type. This Grassland Biome is rich in flora and fauna diversity but is under threat due to rapid urbanisation and expansion of mining and industrial activities. The Central Free State Grassland is considered a 'Vulnerable' vegetation type with a conservation target of 24%, whereas the Andesite Mountain Bushveld is listed as 'Least Threatened' on the National List of Threatened Terrestrial Ecosystems. The present land use within the Project area mainly includes cultivated land and grasslands (for grazing). The MREA has been disturbed through anthropogenic activity, including farming. A large section of the eastern MREA has historically been impacted by agropastoral activities.

The western section of the proposed Copper Sunset MREA is predominantly classified as Degraded Land, with the remaining area classified as Ecological Support Areas (ESAs). The eastern section of the MREA is predominantly classified as ESAs. The catchment area is drained by the Vaal River. The Project area comprises National Freshwater Ecosystem Priority Areas (NFEPA) wetlands. The eastern side of the MREA is close to the Vaal River, while the western portion traverses the Taaibosspruit River. The entire MREA was defined as a Sub-Quaternary Catchment and did not contain any FEPA river systems.

Environmental Impact Summary

The EIA Report, the associated specialist studies and the PPP were undertaken and completed in line with the legislative requirements discussed in Section 10 (Part A) of this report. A quantitative impact rating methodology was applied to determine the significance of the expected impacts pre-mitigation and post-mitigation. Table A provides a summary of the key impacts (i.e. of moderate and major significance only) expected during the various phases of the Project. This report lists and assesses all the potential impacts, together with the associated mitigation measures.

Table A: Summary of the Most Impacts Associated with the Proposed Activities

Activity	Aspect	Impacts	Rating (Pre-Mitigation)	Rating (Post-Mitigation)
Establishment Phase				
Site Clearance: Vegetation and topsoil will be removed with a bulldozer and stockpiled along the mined-out strip	Wetlands	• Direct loss of wetland areas; • Habitat loss; • Loss of biodiversity; and • Erosion and sedimentation of wetland areas.	Major (negative)	Moderate (negative)
Site Clearance: Vegetation and topsoil will be removed with a bulldozer and stockpiled along the mined-out strip	Soil, land use and land capability	• Compaction of soil and therefore increased surface runoff; • Increased wind, and water erosion on unprotected soils and consequently sedimentation as these soils are highly erodible; • Removal of vegetation and basal cover, increasing the potential loss of topsoil, organic material and decreased soil fertility; • Compaction, ponding, and changes to the natural hydrological functioning of the landscape; • Loss of usable soil as a resource for agriculture – disturbance, low fertility, erosion and compaction; and • Loss of Land Capability and agricultural land due to complete restrictions to cattle grazing (current land use). Reduced area for cattle grazing.	Major (negative)	Minor (negative)
Site Clearance	Heritage	• Direct impact to Heritage Resource BGG-001 and BGG-002.	Major (negative)	Moderate (positive)
Construction of a temporary haul road (20 m width) to gain access to the sand mining area. (It is important to note that the haul road will move as mining progresses through life of mine)	Soil, land use and land capability	• Compaction of soil and increased runoff potential; • Reduced infiltration rate, reduced rooting depth (vegetation cover) and increased surface runoff; • Increased erosion, and consequently sedimentation of wetlands and freshwater bodies; • Impacting agricultural activities in short, medium and long term due to changes in the soil agricultural potential and complete restriction to cattle grazing (current land use); and • Soil contamination from spills and leakages.	Moderate (negative)	Minor (negative)
Site Clearance: Vegetation and topsoil removal to a depth of about 0.4 – 5 m with a bulldozer and stockpiled along the mined-out strip; Construction of 20 m wide haul/access road to the sand mining area	Hydropedology	• Sedimentation and siltation of nearby watercourses due to erosion of disturbed soils.	Moderate (negative)	Negligible (negative)
Construction of 20 m wide haul/access road to the sand mining area	Hydropedology	• Alteration of watercourse geometry and fluvial patterns of disturbed river channels.	Moderate (negative)	Negligible (negative)
Site/vegetation clearance	Fauna and Flora	• Loss of plant communities including floral SCC; • Loss of biodiversity; • Increased erosion; • Potential for AIP proliferation; • Loss of faunal habitat including faunal SCC; and • Loss of vegetation types.	Moderate (negative)	Minor (negative)
Stockpiling of topsoil	Fauna and Flora	• Heavy machinery utilised increasing vehicle movement in the area, increasing soil compaction, habitat disturbances and vegetation removal; • Natural vegetation will be removed, damaged and fragmented promoting edge effects and AIP proliferation; and • Increased soil compaction and erosion.	Moderate (negative)	Minor (negative)

Activity	Aspect	Impacts	Rating (Pre-Mitigation)	Rating (Post-Mitigation)
Construction of a temporary haul roads (20 m width) to gain access to the sand mining area. It is important to note that the haul road will move as mining progresses through life of mine	Wetlands	• Fragmentation of wetland areas; • Habitat loss; • Loss of biodiversity; and • Erosion and sedimentation of wetland areas.	Moderate (negative)	Minor (negative)
All project related activities associated with establishment and operation	Socio-economic	• Impacts associated with potential Population Influx.	Moderate (negative)	Minor (negative)
• Site clearance and vegetation removal; • Placement of the Offices and associated mining equipment; • Construction of the hydrocarbon storage tank and refuelling area; • Establishment of a haul road / tracks; and • Stockpiling of topsoil		• Community Health, Safety and Security - Increase in nonsense factors.	Moderate (negative)	Minor (negative)
Operational Phase				
Mining of sand resources to approximately 0.4 – 5 m. This include screening (if required) and stockpiling in a separate area	Soil, land use and land capability	• Loss of usable soil as a resource – Mining of sand, erosion and compaction; • Soil contamination; and • Loss of usable soil for agriculture – changing the land capability.	Major (negative)	Moderate (negative)
Mining of sand resources including screening (if required) to approximately 0.4 – 5 m and stockpiled in a separate area	Hydropedology	• Disruption of water flow paths and subsequent alteration of streamflow regime and deterioration of wetlands functioning.	Major (negative)	Minor (negative)
Mining of sand resources including screening (if required) to approximately 0.4 – 5 m and stockpiling	Wetlands	• Direct loss of wetlands; • Water quality contamination and deterioration; • Habitat loss as a result of poor water quality; • Loss of biodiversity; and • Erosion and sedimentation within the wetlands	Major (negative)	Moderate (negative)
All project related activities associated with establishment and operation	Socio-economic	• Impacts associated with Decreased Community Health, Safety, and Security.	Moderate (negative)	Moderate (negative)
Transportation of material on haul roads	Soil, land use and land capability	• Compaction of soil and increased runoff potential; • Reduced infiltration rate, reduced rooting depth (vegetation cover) and increased surface runoff; • Increased erosion, and consequently sedimentation; and • Soil contamination from spills and leakages.	Moderate (negative)	Minor (negative)
Transportation of the sand	Fauna and Flora	• Increased potential of faunal casualties through road kill and destruction and removal of vegetation (floral SCC); • AIP sprawl; and • Increased dust pollution due to erosion and vehicular activity.	Moderate (negative)	Minor (negative)

Activity	Aspect	Impacts	Rating (Pre-Mitigation)	Rating (Post-Mitigation)
Refuelling of diesel on site	Fauna and Flora	• Contamination of soil, water and surrounding areas / habitats (pan vegetation) from Hydrocarbon waste/spills (lubricants, oil, explosives, and fuels).	Moderate (negative)	Negligible (negative)
Concurrent rehabilitation (backfilling, reprofiling and revegetation) of mined-out strips as sand mining progresses	Hydropedology	• Restoration of close to natural hydrological responses through concurrent rehabilitation (backfilling, reprofiling & re-vegetation) of mined-out landscapes.	Moderate (positive)	Moderate (positive)
Decommissioning Phase				
Soil stabilisation and revegetation with natural or indigenous seed mix; Erosion monitoring at rehabilitated, reprofiled and re-vegetated surfaces; and Water quality monitoring upstream and downstream of the decommissioning Project site	Hydropedology	• Restoration of free drainage to rehabilitated landscapes that suits desired post-closure land use.	Major (positive)	Major (positive)
Demolition and removal of infrastructure; and Rehabilitation and closure.	Surface Water	• Restoration of pre-mining streamflow regime in nearby watercourses.	Major (positive)	Major (positive)
Decommissioning activities	Socio-economic	• Economic boom-bust after the establishment and operation phases.	Moderate (negative)	Minor (negative)

Conclusions and Recommendations

The specialist studies that were undertaken during the EIA Phase aimed to identify and weigh anticipated impacts and risks associated with the proposed Copper Sunset Project. The findings of the impact assessments have shown that the activities will have impacts on the receiving environment. The most significant negative impacts identified are associated with site clearing during the establishment phase and general operational and maintenance activities (i.e. Mining of sand resources, transportation of the sand, Refuelling of diesel on site, etc.) during the operational phase. These activities may result in soil erosion, soil compaction, topsoil loss and subsequent sedimentation of watercourses leading to water quality deterioration. The proposed mining activities will have direct negative ecological impacts, most notably habitat loss and fragmentation as well as AIP proliferation.

A key finding is that the proposed mining activities will have a major impact on wetlands. The wetlands cover an area of approximately 1638.733 ha, and the overall impacts of the project were determined to be significant and may potentially lead to an irreversible damage to the remaining wetlands in the MREA. An Offset Assessment is recommended to compensate for wetland impacts associated with the Project. In addition, heritage resources were identified within the MREA, and it is recommended that these should be avoided through amending the project design to avoid the heritage resources and implement a 100 m no-go buffer zone around each of the identified graves. However, if amending the project design is not feasible, the Applicant will need to embark on a consultation process to assess whether a grave relocation process is feasible.

In terms of fauna and flora, Species of Conservation Concern (SCC) (i.e. *Boophone disticha* (Sore-eye Flower)*, Eucomis autumnalis* (Pineapple Flower) and *Silene burchellii* var. *burchellii* (Gunpowder Plant)) were identified within the development footprint. It is recommended that areas to be mined should be screened for the identified floral SCC and any other Red Data/protected species prior to establishment. If found, these species should be relocated to a nearby site of similar habitat.

Adequate mitigation measures have been included into the EMP to reduce the significance of all the identified negative impacts. Most negative impacts can be reduced through the implementation of mitigation measures. Nevertheless, the wetlands impact assessment, for example, revealed major impacts which cannot be mitigated.

The social study has identified key positive impacts which will result from the Project. If the proposed Project is authorised some positive social and economic impacts will be realised at local and regional level. The Project will contribute to the increased market demand on the requirements for building sand in the vicinity of the proposed Project area and has the potential to improve local socio-economic profiles through job creation.

Monitoring plans, which should be implemented throughout the life of the mine, have also been provided to ensure that adverse impacts are recognised, and continuous improvements are developed and monitored throughout the lifespan of the Project. Based on the assessment of the impacts associated with the Project, it is recommended that the proposed Copper Sunset

Project should be authorised, provided that the mitigation measures proposed herein are applied diligently.

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LIST OF ACRONYMS AND ABBREVIATIONS

ADU	Animal Demography Unit
AIPs	Alien Invasive Plant Species
AMG	At Main Gate
AQIA	Air Quality Impact Assessment
BGGC	Burial Grounds and Graves Consultation
BID	Background Information Document
BPEP	Best Possible Environmental Practices
BRAHMS	Botanical Research and Herbarium Management Software
BWP	Behind Washing Plant
BW	Behind Workshop
CARA	Conservation of Agricultural Resources
CBA	Critical Biodiversity Area
CEC	Cation Exchange Capacity
CFP	Chance Finds Procedure
Copper Sunset	Copper Sunset (Pty) Ltd
CR	Critically Endangered
CRR	Comments and Response Report
CS	Cultural Significance
dBA	Decibels
DBE	Department of Basic Education
DFFE	Department of Forestry, Fisheries, and the Environment
Digby Wells	Digby Wells Environmental
DMRE	Department of Mineral Resources and Energy
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECA	Environmental Conservation Act, 1989 (Act No. 73 Of 1989)
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment

EIS	Ecological Importance and Sensitivity
EMP	Environmental Management Plan
EMPr	Environmental Management Programme
EN	Endangered
EP	Environmental Practitioner
ESA	Early Stone Age
ESAs	Ecological Support Areas
FDDM	Fezile Dabi District Municipality
FEPA	Freshwater Ecosystem Priority Areas
FRAI	Fish Response Assessment Index
FSNCO	Free State Nature Conservation Ordinance (Ordinance 8 of 1969)
FWS	Facultative Wetland Species
GRP	Grave Relocation Process
Ha	Hectares
HGM	Hydro-geomorphic
HIA	Heritage Impact Assessment
HRQ	Haul Road from Quarry
HSMP	Heritage Site Management Plan
I&APS	Interested and Affected Parties
IBA	Important Bird Areas
IDP	Integrated Development Plan
IHAS	Integrated Habitat Assessment System
IUCN	International Union for the Conservation of Nature
IWUL	Integrated Water Use License
IWULA	Integrated Water Use Licence Application
LC	Least Concern
LED	Local Economic Development
LoM	Life of Mine
LSA	Later Stone Age
LUP	Land Use Plan
m	Metres
m/s	Metres per Second

MAE	Mean Annual Evaporation
mamsl	Metres Above Mean Sea Level
MAP	Mean Annual Precipitation
MAR	Mean Annual Runoff
MLM	Metsimaholo Local Municipality
MIRAI	Macroinvertebrate Response Assessment Index
MPRDA	Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 Of 2002)
MR	Mining Right
MRA	Mining Right Application
MREA	Mining Right Extension Area
MSA	Middle Stone Age
MWS	Mostly Wetland Dependant Species
mya	million years ago
NCRs	National Noise-Control Regulations
NEMA	National Environmental Management Act, 1998 (Act No. 107 Of 1998)
NEM:AQA	National Environmental Management: Air Quality Act, 2004 (Act No. 39 Of 2004)
NEM:BA	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 Of 2004)
NEM:WA	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
NEM: PAA	National Environmental Management Protected Areas Act, 2003 (Act No. 57 of 2003)
NEWPOSA	New Plants of southern Africa website
NFA	National Forests Act, 1998 (Act No. 84 of 1998)
NFEPA	National Freshwater Ecosystem Priority Areas
NGOs	Non-Governmental Organisations
NHRA	National Heritage Resources Act, 1999 (Act No. 25 Of 1999)
NID	Notice of Intent to Develop
NT	Near Threatened
NWA	National Water Act, 1998 (Act No. 36 of 1998)
OHS	Occupational Health and Safety
OWS	Obligate Wetland Species

PA	Protected Area
PES	Present Ecological Status
PHRA	Provincial Heritage Resources Authority
PHRA-G	Provincial Heritage Resources Authority of Gauteng
PM	Particulate Matter
PPP	Public Participation Process
QDS	Quarter Degree Squares
RCP	Rehabilitation and Closure Plan
RE	Remaining Extent
S&EIR	Scoping and Environmental Impact Reporting
SABAP2	South African Bird Atlas Project
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Index
SANS	South African National Standards
SASS	South African Scoring System
SCC	Species of Conservation Concern
SDF	Standard Design Flood
SDF	Spatial Development Framework
SEP	Stakeholder Engagement Plan
SIA	Social Impact Assessment
SLP	Social and Labour Plan
SME	Short Medium Enterprises
SANBI	South African National Biodiversity Institute
SS	Suspended Solids
SSV	Soil Screening Values
SWS	Seasonal Wetland Species
TIA	Traffic Impact Assessment
TMP	Topsoil Management Plan
TSP	Total Suspended Particulate
TDS	Total Dissolved Solids
TWS	Temporary Wetland Species
Vu	Vulnerable

WMA	Water Management Area
WML	Waste Management Licence
WULA	Water Use Licence Application
WUL	Water Use Licence

Part A: Scope of Assessment and Environmental Impact Assessment Report

1 Introduction

Copper Sunset (Pty) Ltd (Copper Sunset) has an approved Mining Right (MR) (DMRE Ref. No. FS30/5/1/1/2/164 MR) and Environmental Management Programme (EMPr), in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA), for the mining of sand on the Farm Bankfontein No. 1849. The MR was approved in 2009 and amended in 2011, 2016 and 2017 to incorporate additional areas into the Mining Right Area (MRA).

The existing operations are situated in the Free State Province on the following farms:

- Farm Bankfontein No. 1849;
- A portion of the Remaining Extent (RE) of the Farm Zandfontein No. 259;
- A portion of the RE of the Farm Bankfontein No. 9; and
- A portion of the RE of the Farm Rietfontein No. 152.

The Applicant now wishes to extend the MRA to incorporate adjacent properties to extend the Life of Mine (LoM) by approximately 20 years. The intent is to expand the current mining operations to include additional portions of the Remaining Extent (RE) of the Farm Bankfontein No. 9 and a portion of the RE of the Farm Zandfontein No. 259. The proposed extension of the MRA amounts to approximately 1642 ha (Bankfontein) and 1179 ha (Zandfontein), for the mining of sand.

The extension of the existing MRA triggers activities incorporated in Listing Notice 1 and Listing Notice 2 of the Environmental Impact Assessment (EIA) Regulations, 2014 (GN R982 of 04 December 2014 as amended), promulgated under the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The Listed Activities requires a Scoping and Environmental Impact Reporting (S&EIR) process to be carried out as part of the authorisation process.

Digby Wells Environmental (Digby Wells) has been appointed by Copper Sunset as the independent Environmental Assessment Practitioner (EAP) to conduct the required environmental authorisation process to expand their existing and approved MR for the mining of sand over the proposed areas. A Water Use Licence Application (WULA) will be submitted to the Department of Water and Sanitation (DWS) to obtain the required permissions to mine the wetland areas which have been identified within the MRA.

Additionally, Copper Sunset have four separate EAs and EMPrs utilised to manage the existing and approved MRA. It is recommended that as part of this application all Environmental Authorisations (EAs) and EMPrs are consolidated into one EMPr that is applicable to the approved MR and the new areas being applied for. Therefore, the following processes will be undertaken:

- A Section 102 amendment application process as per the MPRDA to amend the MR;
- A S&EIR process to authorise the new Listed Activities as per the NEMA;

- An IWULA process in terms of the National Water Act, 1998 (Act No. 36 of 1998) (NWA) to mine the wetland areas found within the expansion area; and
- A Regulation 31 amendment process to consolidate the EAs and EMPrs into one consolidated report as per the NEMA.

This EIA/EMPr is for the proposed Mining Right Extension Area (MREA) and the existing and approved MRA in the Free State Province of South Africa.

The Final Scoping Report was submitted to the DMRE on 18 February 2021 and approved on 17 May 2021, thereby allowing Copper Sunset to continue into the EIA Phase. This report constitutes the draft integrated EIA/EMPr and Regulation 31 Amendment Report which is submitted to Interested and Affected Parties (I&APs) and relevant authorities for review and comment in terms of the EA application as per the NEMA EIA Regulations, 2014 (as amended).

2 Item 3: Project Applicant

Copper Sunset is the proponent in this application. The details of the applicant are presented in Table 2-1.

Table 2-1: Contact Details of the Applicant

Name of Applicant:	Copper Sunset Sand (Pty) Ltd		
Registration number (if any):	2006/036057/07		
Trading name (if any):	Copper Sunset		
Responsible person: ***(E.g. CEO, Director, etc.)***	Trudie Vosloo		
Contact person:	Trudie Vosloo		
Physical address:	67 Van Buuren Road, Bedfordview, Germiston, 2008		
Postal address:	P.O. Box 914, Bedfordview		
Postal code:	2008		
Telephone:	011 622 1785	**Fax:**	011 615 2226
Email:	trudie@tvosloo.com		

2.1 Item 3(a)(i): Details of EAP

Digby Wells has been appointed by Copper Sunset to conduct the Environmental Authorisation Application and the IWULA processes, as well as the associated specialist studies and the required Public Participation Process for the proposed Project. The details of the EAP are contained in Table 2-2 below.

Table 2-2: Contact Details of the EAP

Name of EAP:	Claire Wannenburgh		
Professional affiliation/registration:	EAPASA Registration No. 2019/1013		
Contact person: ***(if different from EAP)***	Claire Wannenburgh		
Company:	Digby Wells and Associates (South Africa) (Pty) Ltd		
Physical address:	Digby Wells House, 48 Grosvenor Road, Bryanston, Johannesburg, 2191		
Postal address:	Private Bag X10046, Randburg, South Africa		
Postal code:	2125	**Cell phone:**	082 852 8482
Telephone:	011 789 9495	**Fax:**	011 789 9498
Email:	claire.wannenburgh@digbywells.com		

2.2 Item 3(a)(ii): Expertise of the EAP

This section provides details regarding the EAP's qualifications and experience. The EAP's Curriculum Vitae (CV) and certificates of qualification are attached as Appendix A of this report.

2.2.1 The Qualifications of the EAP

Claire Wannenburgh holds the following qualifications:

- Bachelor of Science (BSc) Honours (Environmental Analysis and Management) – University of Pretoria (2013); and
- BSc (Environmental Science) – University of Pretoria (2012).

2.2.2 Summary of the EAP's Experience

Claire Wannenburgh is an Environmental Consultant at Digby Wells. She holds a BSc in Environmental Science (2010-2012) and has completed her BSc (Honours) in Environmental Management and Analysis (2013-2013) from the University of Pretoria where she majored in Environmental Impact Assessment, Auditing and Environmental Law. Claire is a hard-working individual, a good team player and always strives to perform to the best of her abilities. She has seven years' experience and has managed various Performance Assessments and Water Use License Audits and has worked as an Environmental Control Officer. She has also managed high profile Environmental Impact Assessments; Basic Assessments; Water Use License and Permitting Applications; Environmental Management Programme Amendments; Green Star Environmental Management Programmes and Auditing. She was awarded Golden Key International Membership which recognises the top 15% of students per field of study in any undergraduate and post-graduate degree. Claire is also ISO14001 certified as an internal

lead auditor and is registered as an Environmental Assessment Practitioner (EAPASA Ref No. 2019/1013).

3 Item 3(b): The Location of the Development Footprint of the Activity on the Approved Site as Contemplated in the Accepted Scoping Report

The approved Copper Sunset MR and proposed Mining Right Extension Area (MREA) is located within Viljoensdrif, near the Vaal River and Lethabo Power Station. Copper Sunset is situated approximately 8 kilometres (km) south of the town of Vereeniging, 10 km south-east of Vanderbijlpark, and 13 km north-east of Sasolburg in the Free State Province of South Africa. Table 3-1 provides a summary of the proposed MREA to be incorporated into the approved Copper Sunset MRA as well as the properties which have already been approved as part of the Copper Sunset MR. The proposed MREA falls within an existing MRA of the New Vaal Colliery. Seriti Resources (Seriti) is the holder of the MR. The MR permits the mining and extraction of coal. Copper Sunset entered into an agreement with Seriti to mine sand within the MRA.

No permanent infrastructure will be constructed on the proposed expansion areas for the sand mining operation. All machinery will be mobile and brought in by Copper Sunset. The existing infrastructure area at the Bankfontein Farm will continue to be utilised.

Refer to Figure 3-1 for the Land Tenure Map (also attached in Appendix B as Plan 1).

Table 3-1: Property Description

<table>
<tr><td>Farm Name:</td><td>
<table>
<tr><th>Farm Name</th><th>Farm Portion</th></tr>
<tr><td colspan="2">New Proposed Expansion Areas</td></tr>
<tr><td>Bankfontein No. 9</td><td>RE</td></tr>
<tr><td>Zandfontein No. 259</td><td>A portion of the RE</td></tr>
<tr><td colspan="2">Approved Copper Sunset MR Properties</td></tr>
<tr><td>Rietfontein No. 152</td><td>A portion of the RE</td></tr>
<tr><td>Zandfontein No. 259</td><td>A portion of the RE</td></tr>
<tr><td>Bankfontein No. 9</td><td>A portion of the RE</td></tr>
<tr><td>Bankfontein No. 1849</td><td>Entire Property</td></tr>
</table>
</td></tr>
<tr><td>Application Area (Ha):</td><td>The proposed Bankfontein expansion area = 1642.1 ha
The proposed Zandfontein expansion area = 1179.4 ha
The approved Copper Sunset MRA = 759.13 ha
Total area = 3580.63 ha</td></tr>
</table>

<table>
<tr><td>Magisterial District:</td><td>The MREA is located in the northern part of the Free State Province and falls under the Sasolburg Magisterial District.</td></tr>
<tr><td>Distance and direction from nearest town:</td><td>The approved MRA and proposed MREA is located approximately 8 km south of the town of Vereeniging.</td></tr>
<tr><td>21-digit Surveyor General Code for each farm portion:</td><td>
<table>
<tr><th>Farm</th><th>Portion</th><th>21 Digit Code</th></tr>
<tr><td colspan="3">New Proposed Expansion Areas</td></tr>
<tr><td>Bankfontein No. 9</td><td>RE</td><td>F01600000000000900000</td></tr>
<tr><td>Zandfontein No. 259</td><td>A portion of the RE</td><td>F01600000000025900000</td></tr>
<tr><td colspan="3">Approved Copper Sunset MR Properties</td></tr>
<tr><td>Rietfontein No. 152</td><td>A portion of the RE</td><td>F01600000000015200000</td></tr>
<tr><td>Zandfontein No. 259</td><td>A portion of the RE</td><td>F01600000000025900000</td></tr>
<tr><td>Bankfontein No. 9</td><td>A portion of the RE</td><td>F01600000000000900000</td></tr>
<tr><td colspan="2">Bankfontein No. 1849</td><td>F01600000000184900000</td></tr>
</table>
</td></tr>
</table>

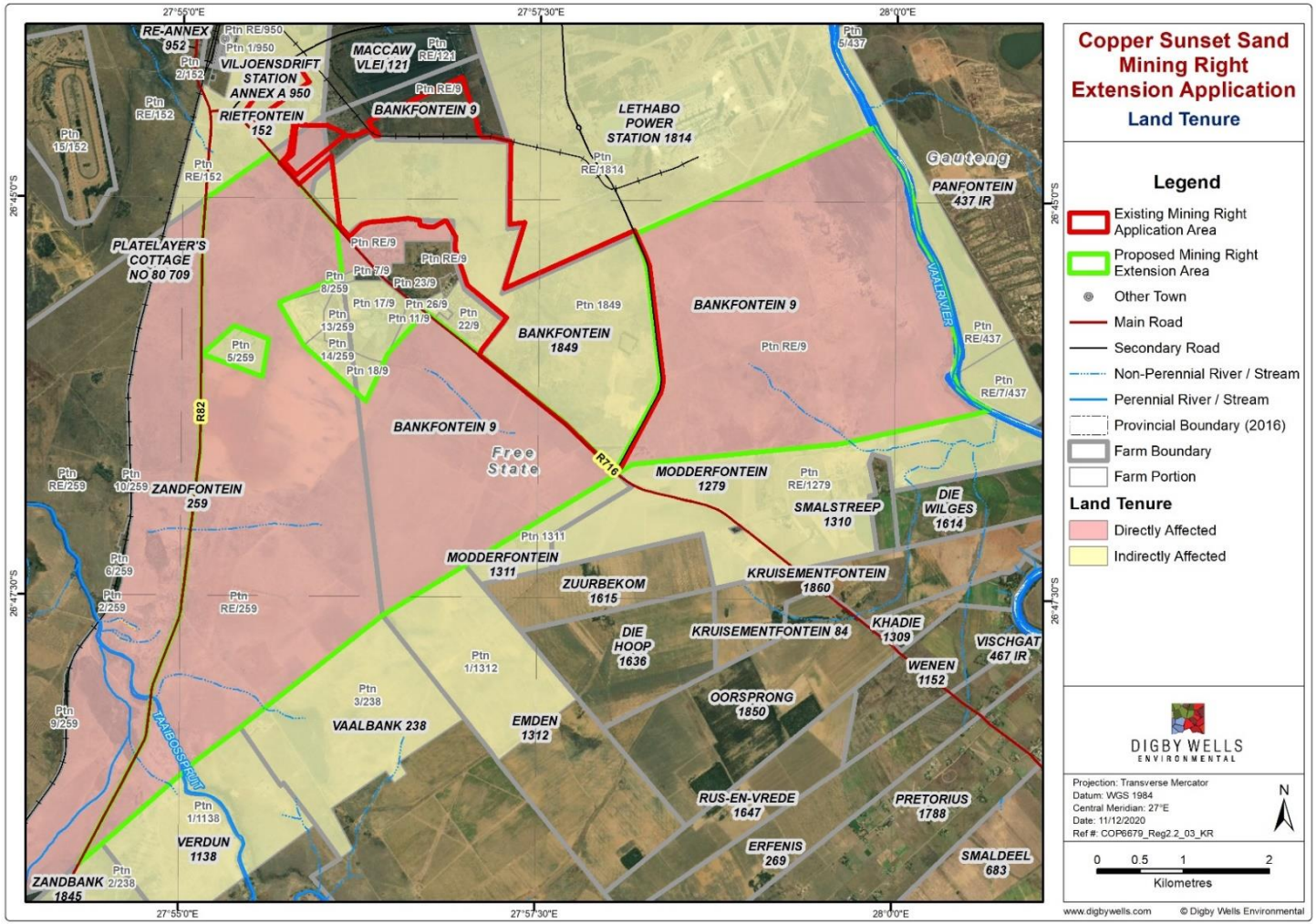

Figure 3-1: Land Tenure Map

4 Item 3(c): Locality Map

Figure 4-1 illustrates the regional setting of the Copper Sunset Project area. The plan is also attached as Plan 2 in Appendix B.

The approved MRA and proposed MREA is situated near the town of Vereeniging within the Sasolburg Magisterial District. The area falls within the jurisdiction of the Metsimaholo Local Municipality (MLM), which is located in the Fezile Dabi District Municipality (FDDM), Free State Province. The locality map is depicted in Figure 4-2 (also attached in Appendix B, Plan 3).

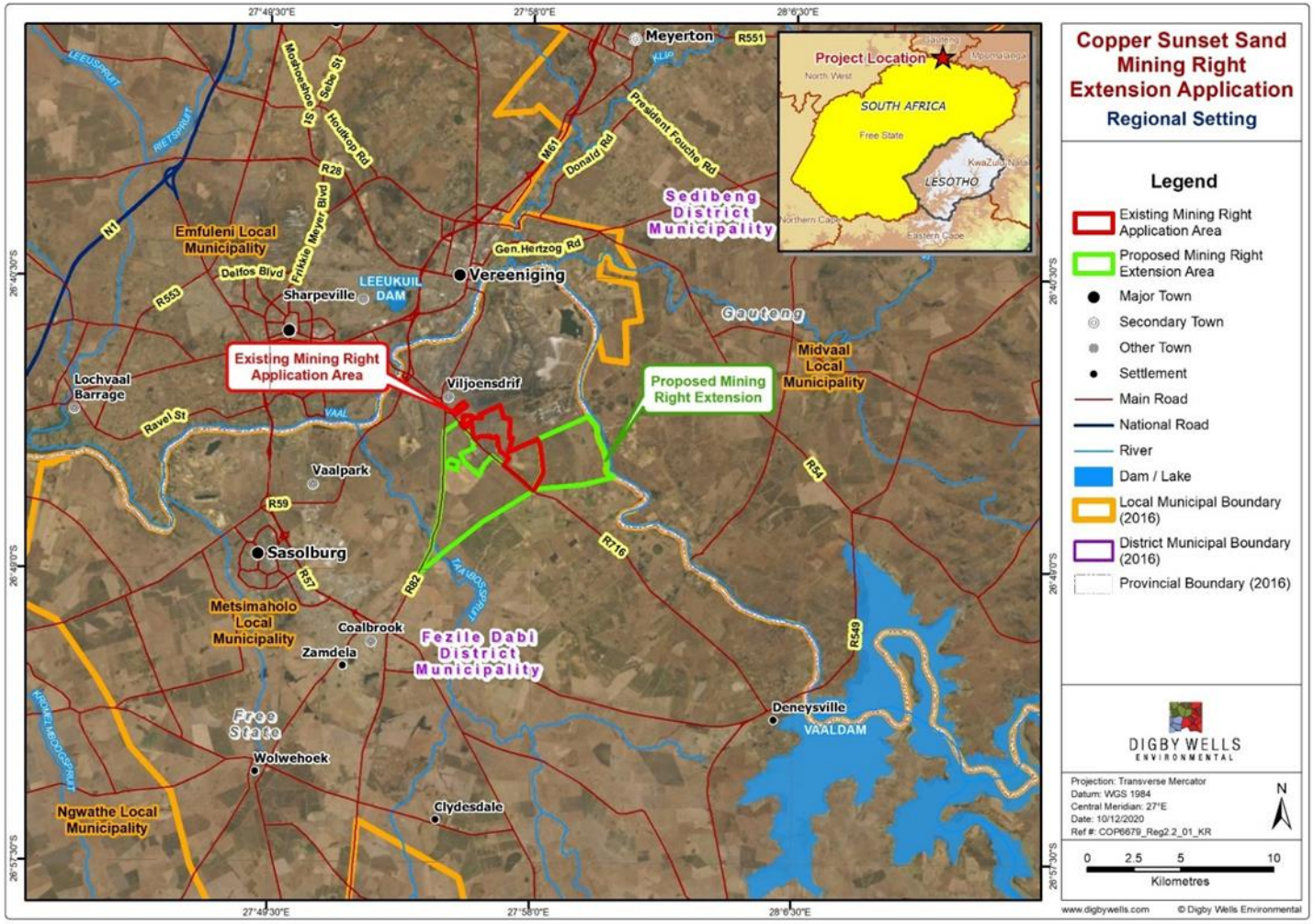

Figure 4-1: Regional Setting and Full Extent of Mining Right Boundary

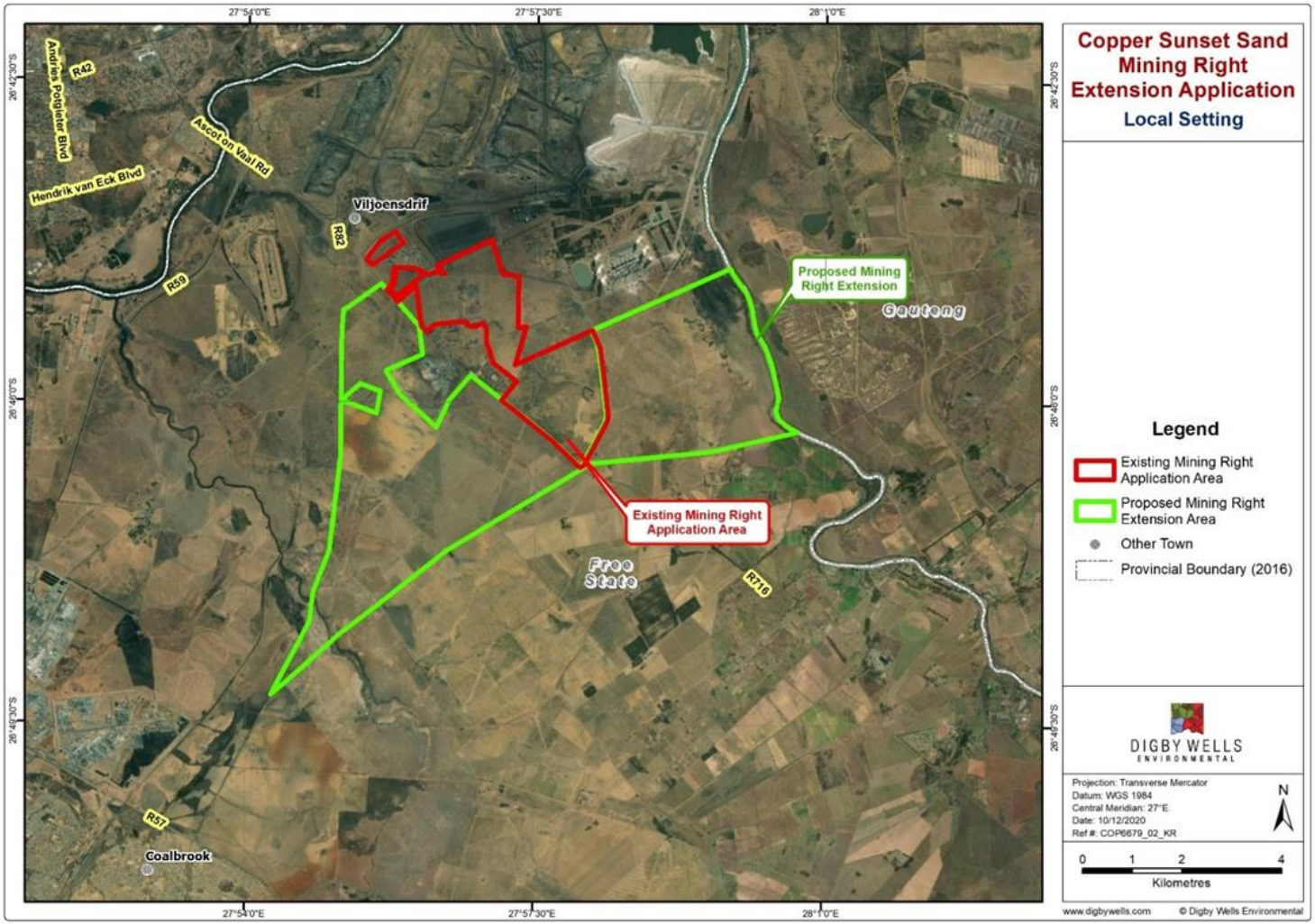

Figure 4-2: Locality Map

5 Item 3(d): Description of the Scope of the Proposed Overall Activity

The proposed infrastructure layout plan, as shown in Figure 5-1 below, is included in Appendix B as Plan 4. Figure 5-2 shows the existing infrastructure at the Bankfontein Farm, which will continue to be utilised.

For the purpose of the report, the following terms apply:

- Approved Mining Right Area defines the farms included in the Mining Right boundary (approved Copper Sunset Mining Right properties) as indicated in Section 3 above;
- The proposed MREA defines farm portions directly affected by the proposed mining and mining-related infrastructure (i.e. new proposed expansion areas); and
- Study Area will be determined by each specialist and the zone of influence in terms of potential impacts the Project area will have, relevant to the individual specialist fields.

5.1 Item 3(d)(i): Listed and Specified Activities

Together with the EIA Regulations, 2014 (as amended), the Minister published Regulations in terms of Sections 24 and 24D of the NEMA for Activities that require Environmental Authorisation prior to their commencement.

Activities identified in Listing Notice 1 (GN R 983) require that a Basic Assessment Process be followed when applying for an EA. Activities identified in Listing Notice 2 (GN R 984)) require a S&EIR Process to be undertaken.

Copper Sunset currently holds the following EAs and EMPrs, which are applicable to the Mining Right boundary:

- The original EMPr associated with the application for a MR on the Farm Bankfontein No. 1849, approved in 2008 (DMRE Ref. No. FS30/5/1/1/2/164 MR dated 28/04/2009);
- The 2011 EA and EMPr associated with the construction of a washing plant, a Return Water Dam (RWD), a settling dam and brick building (DMRE Ref. No. FS30/5/1/2/3/2/1 (164) EM dated 19/09/2011);
- The 2015 and 2016 EA and EMPr associated with the incorporation of additional areas into the MRA (DMRE Ref. No. FS30/5/1/2/3/2/1 (164) EM dated 08/03/2016 and 20/12/2016); and
- The 2017 EMPr associated with incorporation of additional areas into the MR (DMRE Ref. No. FS30/5/1/2/2 (164) MR dated 30/05/2018).

Table 5-1 details all the Activities in terms of the EIA Regulations, 2014 (as amended) in accordance with the NEMA that forms part of the Copper Sunset mining operation and have already been approved.

The proposed activities at the additional areas to be mined trigger Regulations GN R.983 and GN R.984, and therefore a S&EIR process must be undertaken, and approval received prior to the activities being commended with. Table 5-2 provides the identified Listed Activities as provided by the EIA Regulation, 2014 (as amended).

Table 5-1: Approved Listed Activities

Name of Activity	Aerial extent of the activity (Ha or m^2)	Listed Activity Mark with an X where applicable or affected.	Corresponding Listed Activities in terms of EIA Regulations, 2014 (as amended)	Waste Management Authorisation (Indicate whether an authorisation is required in terms of the Waste Management Act). (Mark with an X)
The clearing of indigenous vegetation prior to the mining of sand	759.13 ha	X	Listing Notice 2 (GN R 984) Activity 15	N/A
Removal of protected species should these species be encountered	759.13 ha	X	Listing Notice 1 (GN R 983 Activity 30	N/A
Mining and screening (where required) of sand within the approved MR area	759.13 ha	X	Listing Notice 2 (GN R 984) Activity 17	N/A
The change in land use from agriculture to mining	759.13 ha	X	Listing Notice 1 (GN R 983) Activity 28	N/A
Construction of mine related infrastructure include hydrocarbon storage tank, oil separator, workshop and hard standing area for the storage of machinery.	1 ha	X	Listing Notice 2 (GN R 984) Activity 17	N/A

Name of Activity	Aerial extent of the activity (Ha or m^2)	Listed Activity Mark with an X where applicable or affected.	Corresponding Listed Activities in terms of EIA Regulations, 2014 (as amended)	Waste Management Authorisation (Indicate whether an authorisation is required in terms of the Waste Management Act). (Mark with an X)
Construction and operation of the hydrocarbon storage tank (14,000 L)	10 m^3 14,000 L	N/A	N/A	N/A
Concurrent Rehabilitation	759.13 ha	N/A	N/A	N/A
Washing Plant	2 Ha	N/A	N/A	N/A
Construction of the haul roads	759.13 ha	X	Listing Notice 1 (GN R 983) Activity 24	N/A

Table 5-2: New Listed Activities to be Undertaken for the Proposed Expansion Project

Name of Activity Mining (E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads pipelines, power lines, conveyors, etc.)	**Aerial extent of the activity** (Ha or m^2)	**Listed Activity** Mark with an X where applicable or affected.	**Applicable Listing Notice** **Listing Notice 1(GN R983); Listing Notice 2 (GN R984) and Listing Notice 3 (GN R985)**	**Waste Management Authorisation** **(Indicate whether an authorisation is required in terms of the Waste Management Act).** **(Mark with an X)**
The clearance of indigenous vegetation of more than 20 ha. The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	2821.5 ha	X	Listing Notice 2 (GN R 984) Activity 15	N/A

Name of Activity Mining (E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads pipelines, power lines, conveyors, etc.)	**Aerial extent of the activity** (Ha or m^2)	**Listed Activity** Mark with an X where applicable or affected.	**Applicable Listing Notice** **Listing Notice 1(GN R983); Listing Notice 2 (GN R984) and Listing Notice 3 (GN R985)**	**Waste Management Authorisation** **(Indicate whether an authorisation is required in terms of the Waste Management Act).** **(Mark with an X)**
Clearance of protected species Any process or activity identified in terms of section 53(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).	2821.5 ha	X	Listing Notice 1 (GN R 983) Activity 30	N/A

Name of Activity Mining (E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads pipelines, power lines, conveyors, etc.)	**Aerial extent of the activity** (Ha or m^2)	**Listed Activity** Mark with an X where applicable or affected.	**Applicable Listing Notice** **Listing Notice 1(GN R983); Listing Notice 2 (GN R984) and Listing Notice 3 (GN R985)**	**Waste Management Authorisation** **(Indicate whether an authorisation is required in terms of the Waste Management Act).** **(Mark with an X)**
Mining and screening (where required) of sand within the proposed expansion area Any activity including the operation of that activity which requires a mining right as contemplated in section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including— (a) associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource; or (b) the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing.	2821.5 ha	X	Listing Notice 2 (GN R 984) Activity 17	N/A
Construction of haul roads and access roads The development of a road— (ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres	10 km in length 20 m in width	X	Listing Notice 1 (GN R 983) Activity 24	N/A

Name of Activity Mining (E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads pipelines, power lines, conveyors, etc.)	**Aerial extent of the activity** (Ha or m^2)	**Listed Activity** Mark with an X where applicable or affected.	**Applicable Listing Notice** **Listing Notice 1(GN R983); Listing Notice 2 (GN R984) and Listing Notice 3 (GN R985)**	**Waste Management Authorisation** **(Indicate whether an authorisation is required in terms of the Waste Management Act).** **(Mark with an X)**
Fuel handling and storage facilities. Two new fuel storage tanks will be installed each equating to 14,000 L. The combined capacity including the already approved storage tank at the Copper Sunset workshops amount to 42,000 L. The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.	20 m^3	N/A	N/A	N/A

Name of Activity Mining (E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads pipelines, power lines, conveyors, etc.)	**Aerial extent of the activity** (Ha or m^2)	**Listed Activity** Mark with an X where applicable or affected.	**Applicable Listing Notice** **Listing Notice 1(GN R983); Listing Notice 2 (GN R984) and Listing Notice 3 (GN R985)**	**Waste Management Authorisation** **(Indicate whether an authorisation is required in terms of the Waste Management Act).** **(Mark with an X)**
The change in land use from agricultural to mining Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: (i) will occur inside an urban area, where the total land to be developed is bigger than 5 hectares; or (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare.	2821.5 ha	X	Listing Notice 1 (GN R 983) Activity 28	N/A
Concurrent Rehabilitation	2821.5 ha	N/A	N/A	N/A

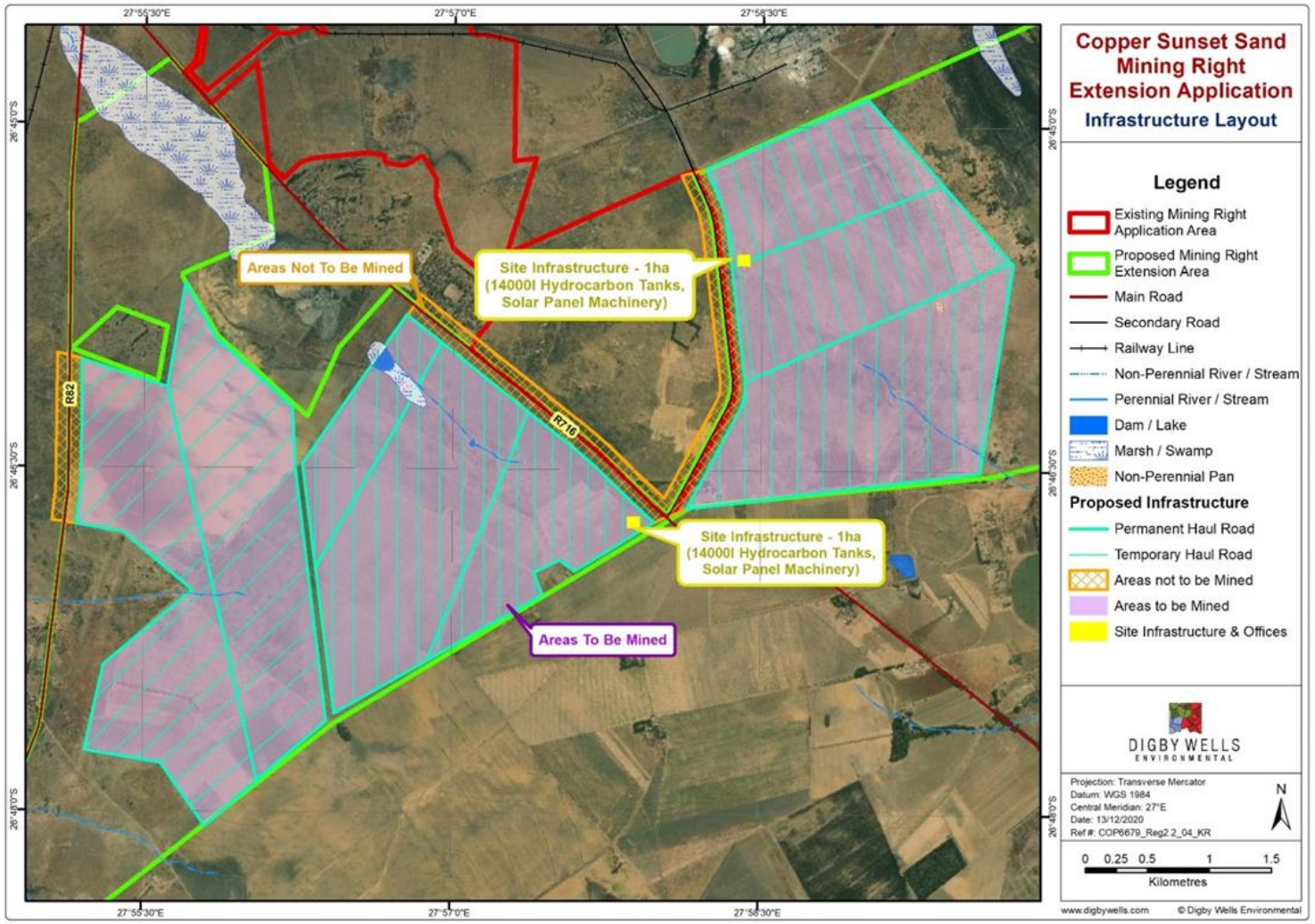

Figure 5-1: Proposed Infrastructure Layout Plan

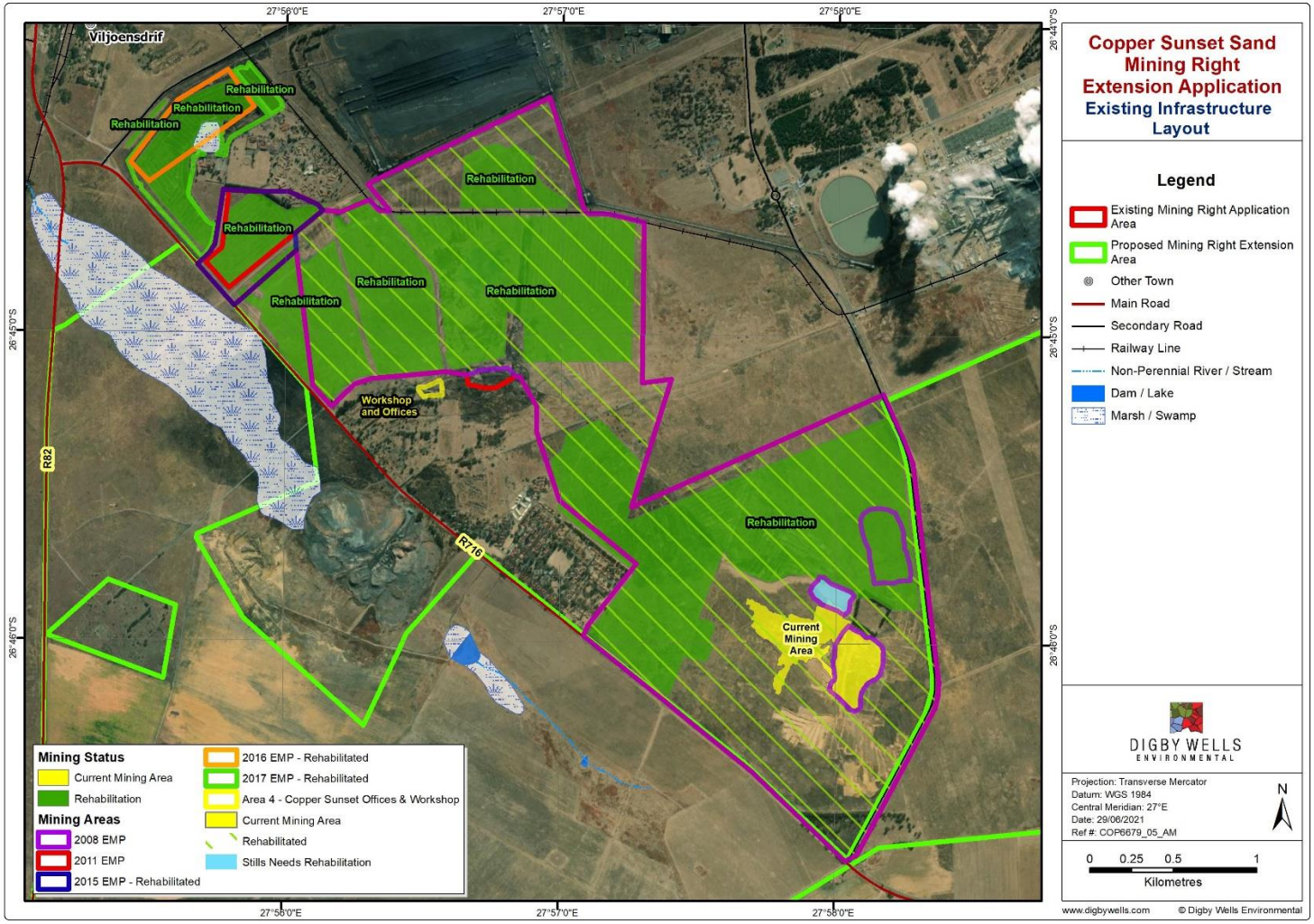

Figure 5-2: Existing Infrastructure at the Copper Sunset MRA

5.2 Item 3(d)(ii): Description of the Activities to be Undertaken

Copper Sunset began sand mining in 2009. There is currently about nine months left of the LoM. Therefore, Copper Sunset wishes to expand the MRA to include additional portions of the RE of the Farm Bankfontein No. 9 and a portion of the RE of the Farm Zandfontein No. 259. The properties are located within Seriti's MRA. The intention of the Applicant is to maximise the mineral resource and to further extend the LoM.

The sand deposit lies between 0.4 – 5 m below the surface. Strip mining will be utilised to recover the resource, with the sand mined in strips of 30 – 35 m in width and 0.4 - 5 m in depth. The length of the strips is dependent on the area to be mined but approximate lengths are in the region of 180 – 600 m. The type of sand present at the mining area includes building sand and plaster sand. In addition, Copper Sunset wish to add clay to the material they wish to mine. The mining method to be applied includes:

- Stripping and stockpiling of topsoil;
- Construction of temporary haul roads (20 m wide and the length will be approximately 10 km) (It is important to note that the haul road will move as mining progresses through the life of mine);
- Mining of the sand resource including screening of sand;
- Backfilling of the mined excavations with stockpiled topsoil and unwanted material from the screening process; and
- Concurrent rehabilitation.

5.2.1 Resource Deposit

Copper Sunset is applying for an extension to their MRA to include adjacent farms to continue mining general sand (90% plaster and 10% building sand) and clay.

The deposit extends over an area of 2821.5 ha. The deposit is known to have an average thickness of 1.2 m – 5 m. Copper Sunset intends to supply several clients with building and plaster sand as well as clay for use mainly in the construction industry. The proposed Copper Sunset MREA is expected to produce sand at a rate of 53,000 m^3 per month. The proposed extension area will extend the LoM for Copper Sunset by approximately 20 years (Figure 5-3,

also attached in in as Plan 5.

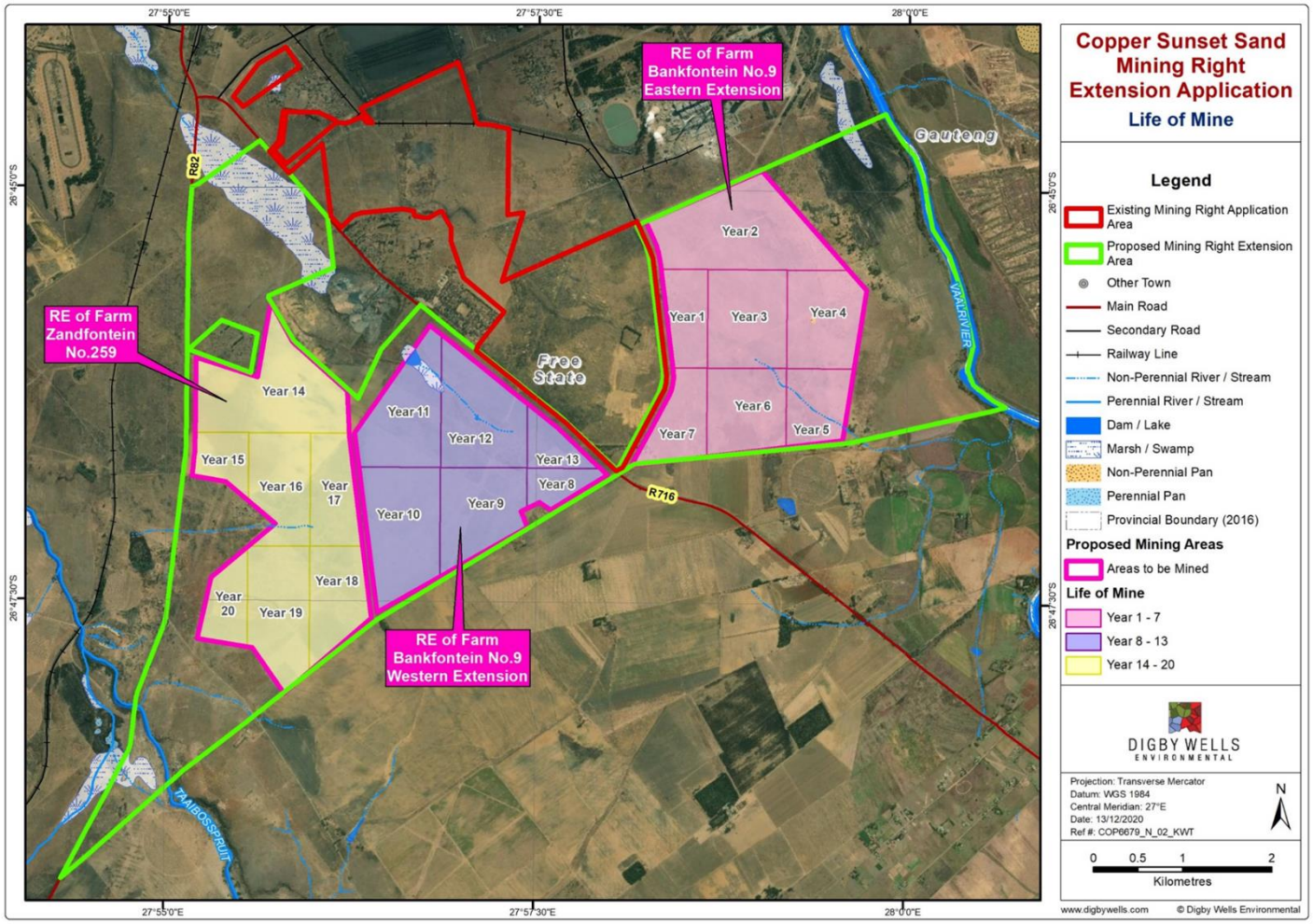

Figure 5-3: LoM Plan

5.2.2 Establishment Phase

A haul road will be constructed to gain access to the sand mining area. No permanent infrastructure will be constructed on site and all machinery will be mobile and brought in by Copper Sunset. The mining infrastructure already established will be used for the expanded areas, however; mobile offices will be established at the entrance to the new mining areas (Figure 5-1 above). A total of two new mobile offices each (approximately 1 ha) will be established at each mining area, which will be erected when mining commences in these areas. Portable toilets, a hydrocarbon storage tank and water bowser will also be utilised. The mobile office areas will include the following:

- Mobile offices;
- Hydrocarbon storage tank (14,000 L) with associated bund. Machinery will bec refuelled in the area;
- Waste storage area;
- Parking area for the storage of mobile infrastructure; and
- A generator and solar panels to provide electricity to the offices.

5.2.3 Operational Phase

The mine will make use of a fleet of tipper trucks, front-end loaders, excavators, water trucks, tractor and bulldozers. Mining will commence with the removal of vegetation by means of a bulldozer. The topsoil will be removed by a bulldozer to a depth of about 0.3 – 0.4 m and stockpiled in a separate area for use during rehabilitation. Strip mining will take place in sequences of 30 – 50 m wide to extract the sand by means of light weight excavators. The commencement of mining in the extension areas will initially be on the sand deposit on the eastern portion of the RE of Bankfontein No. 9 RE (Eastern Block), thereafter on the western portion of the RE of Bankfontein No. 9 RE (Western Block) and lastly on a portion of the RE of Zandfontein No. 259.

A screening process will be utilised where required should sand become contaminated with unusable particles. The screening process will include the use of Mobile Screening Machines. The mixed sand will be loaded onto the top of the machine and separated out into separate stockpiles, depending on the sand particle sizes. It is proposed that two Mobile Screening Machines or similar equipment will be utilised in the sand mining process, however; this could change depending on how the mine develops. The screening machines will be moved from one area to the next within the MRA, as required. The use of the machine will not disturb any additional areas and will be placed on areas which will or have already been disturbed by the sand mining operations.

The customer's trucks (100-200 trucks per day) will enter via the haul road into the mining area. The haul road will be constructed as a loop to allow continuous flow of traffic. The mined-out sand / screened sand will be placed directly onto the customers trucks and taken to market. The haul road will move as the mining area changes.

5.2.4 Rehabilitation Phase

Sand mining will cease once the resource has been extracted. Concurrent rehabilitation will be implemented during the sand mining process. The areas which have been mined of sand will be backfilled with the waste material (pebbles and stones) from the screening plant which will be covered with topsoil stockpiled during the operational phase. The area will be levelled and then contoured to avoid ponding of water. The topography is anticipated to be slightly lower as a result of the removal of sand. The area will then be allowed to naturally re-vegetate. Where vegetation is not being well established, an indigenous seed mix will be utilised to improve vegetation establishment where required.

5.2.5 Mining Associated Infrastructure

The existing infrastructure area at the Bankfontein Farm will continue to be utilised. This includes offices and associated infrastructure, toilets, a weigh bridge, washing plant (which is currently not constructed), oil separator, workshop, parking area for machines and a bulk hydrocarbon storage tank. Copper Sunset sought authorisation to construct a wash plant that would be utilised to wash and screen sand prior to the product being sold. This authorisation was granted in 2011, and the wash plant was constructed but decommissioned in January 2016. The affected area was fully rehabilitated. The Applicant intends to re-construct the wash plant at the existing offices. The current operation and Copper Sunset is operating successfully, however, the inclusion of the washing plant and associated infrastructure will contribute to broadening the client base and product for the operation. The new infrastructure is proposed to be constructed within the authorised mining area and is expected to have limited impact on the receiving environment. The construction and use of the washing plant will enable Copper Sunset to provide an additional product, a finer sand, which can be sold to industrial clients.

The refuelling of equipment will take place at the mobile office areas within the expanded mining area.

5.2.5.1 Electricity

The existing office receives electricity from a solar power system. Electricity for the mining operation will also be received from a solar power system which will be installed at the proposed temporary mine offices. A diesel generator will also be installed as a back up to the solar panels. All mining machinery and plant will be diesel powered. Copper Sunset have further applied for an electricity connection at Eskom and are awaiting installations.

5.2.5.2 Water Management

Water will be abstracted from an authorised borehole, located at the existing Copper Sunset offices. This borehole is authorised by the Department of Water and Sanitation (DWS) under Water Use Licence (WUL) No. 08/C22F/AG/2315, granted on 18 September 2013. It is anticipated that water will only be required for potable water and dust suppression on the expansion area. The water will be sourced from the borehole and pumped into a water cart for transport to the new proposed sand mining area. A water cart works by providing water cartage

services, water storage or water spraying for dust suppression and landscaping purposes. The water carts feature a water tank that is mounted to the body of a truck. The amount of water used will remain within the limits of the existing license. No mining will take place within a 100 m buffer from the edge of the Vaal River.

5.2.5.3 *Waste Management*

General and hazardous waste will be generated as a result of the Copper Sunset Project. The waste will be handled, separated, stored and disposed of accordingly. The following waste types are anticipated to be generated at the operation:

- General waste:
  - Domestic Waste;
  - Paper;
  - Plastic;
  - Cardboard;
  - Tins; and
  - Glass.
- Hazardous Waste:
  - Hydrocarbon waste such as oily rags as a result from the hydrocarbon stored onsite; and
  - Chemical waste from the chemicals that may be utilised for cleaning purposes.

It is anticipated that all general waste will either be recycled or disposed of at the local municipality landfill site. Hazardous waste will be removed offsite by a hazardous waste contractor. A safe disposal certificate for the removal of hazardous waste will be retained as proof of safe disposal. Mobile toilets will be serviced by an authorised contractor.

5.2.6 Project Activities

Table 5-3 provides a summary of activities associated with the proposed Project that were assessed as part of the EIA process.

Table 5-3: Project Activities

Activity No.	Activity
Establishment Phase	• Site clearance and vegetation removal; • Removal and stockpiling of topsoil; • Placement of the offices and associated mining equipment; • Construction of the hydrocarbon storage tank and refuelling area; and

Activity No.	Activity
	• Establishment of a haul road / tracks (this will move during the operational phase as mining progresses).
Operational Phase	• Mining of sand resources including screening (if required); • Transportation of sand; • Refuelling of machinery within the mining area (for machinery that cannot be moved easily) or at the mobile offices; • Handling of general and hazardous waste; and • Concurrent rehabilitation (topsoil cover, ripping and vegetation establishment) and monitoring of vegetation establishment.
Closure and Rehabilitation Phase	• Backfilling of the mined excavations with topsoil and waste from the screening plants; • Dismantling and removal of infrastructure; • Rehabilitation (topsoil cover, ripping and vegetation establishment); and • Post-closure monitoring.

6 Item 3(e): Policy and Legislative Context

This section aims to provide a description of the policy and legislative context within which the Project is being proposed. Table 6-1 provides a description of the national legislation and guidelines that are considered applicable to the Project and its activities.

Table 6-1: Policy and Legislative Context

Applicable legislation and guidelines used to compile the report	Reference where applied
The Constitution of the Republic of South Africa, 1996 Under Section 24 of the Constitution of the Republic of South Africa, 1996 (the Constitution) it is clearly stated that: *Everyone has the right to* *(a) an environment that is not harmful to their health or well-being; and* *(b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that -* *(i) Prevent pollution and ecological degradation;* *(ii) Promote conservation; and* *(iii) Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.*	Digby Wells is undertaking an S&EIR process to identify and determine the potential impacts associated with the proposed Project. Mitigation measures recommended will aim to ensure that the potential impacts are managed to acceptable levels to support the rights as enshrined in the Constitution.
National Environmental Management Act, 1998 (Act No 107 of 1998) and EIA Regulations (as amended in 2017) The Environmental Management Act, 1998 (Act No 107 of 1998) (NEMA), as amended was set in place in accordance with Section 24 of the Constitution. Certain environmental principles under NEMA have to be adhered to, to inform decision making for issues affecting the environment. Section 24 (1)(a) and (b) of NEMA state that: *The potential impact on the environment and socio-economic conditions of activities that require authorisation or permission by law and which may significantly affect the environment, must be considered, investigated and assessed prior to their implementation and reported to the organ of state charged by law with authorizing, permitting, or otherwise allowing the implementation of an activity.* The EIA Regulation, 2014 was published under GN R 982 on 4 December 2014 (EIA Regulations) and came into operation on 08 December 2014. Together with the EIA Regulations, the Minister also published GN R 983 (Listing Notice No. 1), GN 984 (Listing Notice No. 2) and GN R 985 (Listing Notice No. 3) in terms of Sections 24(2) and 24D of the NEMA, as amended. The EIA Regulations have been made applicable to prospecting and mining activities.	The sand mining Project proposed by Copper Sunset triggers Listed Activities in accordance with the EIA regulations, 2014 (as amended) and therefore requires environmental authorisation prior to being undertaken. The Listed Activities have been included in Table 5-2 above. The EA application was submitted on 14 December 2020. The Scoping Report was submitted on 18 February 2021 and approved on 17 May 2021**.** This EIA/EMPr is informed by the requirements of the NEMA and Regulations thereunder.
Mineral and Petroleum Resource Development Act. 2002 (Act No. 28 of 2002) The MPRDA sets out the requirements relating to the development of the nation's mineral and petroleum resources. It also aims to ensure the promotion of economic and social development through exploration and mining related activities. The MPRDA requires that mining companies assess the socio-economic impacts of their activities from start to closure and beyond. Companies must develop and implement a comprehensive Social and Labour Plan (SLP) to promote socio-economic development in their host communities and to prevent or lessen negative social impacts.	Copper Sunset wish to expand their MRA to incorporate adjacent properties to extend the LoM and are thus applying for EA to authorise new Listed Activities as per NEMA. The NEMA EA application and Section 102 application were submitted to the DMRE on 14 December 2020. The EIA process is undertaken to meet the requirements of the MPRDA read with the EIA Regulations, 2014 (as amended). Financial Provisioning and Closure Costs are included herein, and the report is appended hereto as Appendix O.
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) On 29 November 2013, the list of waste management activities published under GN R718 of 3 July 2009 (GN R718) was repealed and replaced with a new list of waste management activities under GN R921 of 29 November 2013. Included in the new list are activities listed under Category A, B and C. These activities include inter alia the following: Category A describes waste management activities requiring a Basic Assessment process to be carried out in accordance with the EIA Regulations supporting an application for a waste management licence; Category B describes waste management activities requiring an Environmental Impact Assessment process to be conducted in accordance with the EIA Regulations supporting a waste management licence application; and	The proposed Project does not warrant the need to apply for a Waste Management Licence (WML), however; the norms and standards for waste management under the Act will be duly taken into consideration.

Applicable legislation and guidelines used to compile the report	Reference where applied
Category C describes waste management activities that do not require a WML but these activities will have to comply with the prescribed requirements and standards as prescribed by the Minister, which includes the Norms and Standards for Storage of Waste, 2013. These activities include the storage of general waste at a facility with a capacity to store in excess of 100 m^3 and storage of hazardous waste in excess of 80 m^3. The Waste Classification and Management Regulations published under GN R 634 of November 2013 require that all wastes be classified according to SANS10234 and managed according to its classification.	
National Water Act, 1998 (Act No. 36 of 1998) (NWA) The NWA provides for the sustainable and equitable use and protection of water resources. It is founded on the principle that the National Government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest, and that a person can only be entitled to use water if the use is permissible under the NWA. GN R 704 was published in June 1999 and aims to regulate the use of water for mining and related activities for the protection of water resources and states the following: • Regulation 4: No residue deposit, reservoir or dam may be located within the 1:100 year flood line, or less than a horizontal distance of 100 m from the nearest watercourse. Furthermore, person(s) may not dispose of any substance that may cause water pollution; • Regulation 5: No person(s) may use substances for the construction of a dam or impoundment if that substance will cause water pollution; • Regulation 6 is concerned with the capacity requirements of clean and dirty water systems, and • Regulation 7 details the requirements necessary for the protection of water resources.	The Eastern portion of proposed expansion area is located near the Vaal River. A 100 m buffer zone will be established to prevent mining activities being undertaken in close proximity to the river. Wetlands have been identified within the expansion area. A WULA will be submitted to the DWS to obtain the required permissions to mine the areas.
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEM:BA) The NEM:BA regulates the management and conservation of the biodiversity of South Africa within the framework provided under NEMA. This Act also regulates the protection of species and ecosystems that require national protection and also takes into account the management of alien and invasive species. The following regulations which have been promulgated in terms of the NEM:BA are also of relevance: • Alien and Invasive Species Lists, 2014 published (GN R.599 in GG 37886 of 1 August 2014); • National Environmental Management: Biodiversity Act, 2004: Threatened and Protected Species Regulations; and • National list of Ecosystems Threatened and in need of Protection under Section 52(1) (a) of the Biodiversity Act (GG 34809, GN R.1002, 9 December 2011).	A Fauna and Flora Impact Assessment, Wetland Impact Assessment and Aquatics Impact Assessment were conducted as part of the EIA Phase, and appended hereto as Appendix G, Appendix H and Appendix I, respectively.
National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) The prevailing legislation in the Republic of South Africa with regards to the Air Quality field is the National Environment Management: Air Quality Act, 2004 (Act No. 39 of 2004) (NEM: AQA). According to the Act, the Department of Forestry, Fisheries and the Environment, the provincial environmental departments and local authorities (district and local municipalities) are separately and jointly responsible for the implementation and enforcement of various aspects of NEM: AQA. A fundamental aspect of the new approach to the air quality regulation, as reflected in the NEM: AQA is the establishment of National Ambient Air Quality Standards (NAAQS). These standards provide the goals for air quality management plans and also provide the benchmark by which the effectiveness of these management plans is measured. The NEM: AQA provides for the identification of priority pollutants and the setting of ambient standards with respect to these pollutants.	An Air Quality Impact Assessment has been summarised in this EIA/EMPr and is appended hereto as Appendix J. The Project's activities will set out to abide by the NEM: AQA and standards set out in the NAAQS. The Project does not trigger an Atmospheric Emission License.
National Dust Control Regulation 2013 The Minister of Water and Environmental Affairs, released on the 01 November 2013 the National Dust Control Regulation, in terms of Section 53, read with Section 32 of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) (NEM: AQA). In the published National Dust Control Regulations, terms like target, action and alert thresholds were omitted. Another notable observation was the reduction of the permissible frequency of exceedance from three to two incidences within a year. The standard actually adopted a more stringent approach than previously and would require dedicated mitigation plans now that it is in force.	An Air Quality Impact Assessment has been summarised in this EIA/EMPr and is appended hereto as Appendix J. The Project's activities will set out to abide by the NEM: AQA and standards set out in the NAAQS.
National Noise Control Regulations, R.154 of 1992 (the Noise Regulations) promulgated in terms of Section 25 of the Environmental Conservation Act, 1989 (Act 73 of 1989)	A Noise Impact Assessment has been summarised in this EIA/EMPr and the report is appended hereto as Appendix K.

Applicable legislation and guidelines used to compile the report	Reference where applied
The National Noise-Control Regulations (GN R154 in Government Gazette No. 13717 dated 10 January 1992) (NCRs) form part of the Environmental Conservation Act and these Regulations apply to external noise. The NCRs differentiates between Disturbing Noise levels (which is objective and scientifically measurable which are generally compared to existing ambient noise level) and Noise Nuisance (which is a subjective measure and is defined as noise that "*disturbs or impairs or may disturb or impair the convenience or peace of any person*"). Local Authorities use Controlled Areas to identify areas with high noise levels. Restrictions have been set out for development that occurs in these Controlled Areas. These regulations make provision for guidelines pertaining to noise control and measurements. The regulations make reference to the use of the South African National Standards 10103:2008 (SANS) guidelines for the Measurement and Rating of Environmental Noise with Respect to Land Use, Health, and Annoyance and to Speech Communication. As such, a Noise Impact Assessment in accordance with the NCRs must be undertaken for submission to determine the potential disturbing and nuisance noise levels associated with a particular development.	
The National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) The National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) is the overarching legislation that protects and regulates the management of heritage resources in South Africa. The Act requires that Heritage Resources Agency's in this case the South African Heritage Resources Agency (SAHRA) and Provincial Heritage Resources Authority of Gauteng (PHRA-G), be notified as early as possible of any developments that may exceed certain minimum thresholds. This act is enforced through the National Heritage Regulations GN R 548 (2000).	For the Scoping Phase, a Notice of Intent to Develop (NID) was submitted to SAHRA. A Heritage Impact Assessment has been undertaken and included as Appendix L. The Heritage report will be submitted to SAHRA for comment.
Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA) CARA aims to provide for the conservation of the natural agricultural resources of the country through the maintenance of the production potential of land, by combatting and preventing erosion and the weakening of water sources. In addition, this Act aims to protect vegetation, while combatting weeds and invader plants	As part of this sand mining Project, flora, fauna, wetlands and soils were investigated to determine the current status of the environment and to determine any potential ecological sensitivity to be avoided and/or mitigated. A Fauna and Flora Impact Assessment and Wetland Impact Assessment are appended hereto as Appendix G and Appendix H, respectively.
Environmental Conservation Act, 1989 (Act No. 73 of 1989) (ECA) ECA makes provision for guidelines pertaining to noise control and measurements. The regulations make reference to the use of the South African National Standards 10103:2008 (SANS) guidelines for the Measurement and Rating of Environmental Noise with Respect to Land Use, Health, and Annoyance and to Speech Communication.	Mitigation measures have been included for the potential impacts due to the generation of noise. The mitigation measures are in compliance with the ECA.
GN R 1147 (Financial Provisioning Regulations), 2015 The Financial Provisioning Regulations prescribe methods for determining the quantum of financial provision for rehabilitation and mechanisms for providing for it. Section 41 (1) of the MPRDA has been repealed and Section 24P of the NEMA, as amended, which provides that the holder of a mining right must make financial provision for rehabilitation of negative environmental impacts. The financial provision must guarantee the availability of sufficient funds.	The Financial Provisioning Regulations are applicable to rehabilitation and closure plans as they prescribe the minimum content of an annual rehabilitation plan and the minimum content of a final rehabilitation, decommissioning and mine closure plan. The Closure and Rehabilitation Report is attached as Appendix O and summarised in this EIA/EMPr.

7 Item 3(f): Need and Desirability of the Proposed Activities

South Africa is rich in a variety of mineral resources and has thus become a world leader in mining. For years, mining has been the driving force behind South Africa's economy and continues to make a valuable contribution to the country's economy and people's livelihoods.

Copper Sunset began sand mining in 2009. There is currently about nine months left of the LoM. The Applicant has identified the need to expand the approved MRA to exploit identified sand resources found on the adjacent properties to ascertain and prolong the lifespan of the sand mine. Sand is one of the key materials used in the construction of roads, buildings, and other infrastructure. There is an increased market demand on the requirements for building sand in the vicinity of the proposed Project area, which has motivated the continued operation of the mine. The total market in the geographical area in which the mine is situated is estimated to be between 200,000 and 220,000 tonnes per month. Thus, providing general sand (90% plaster and 10% building sand) and clay to the local markets will support numerous building activities, and support the growing demand of sand in the market.

Additionally, the extension is necessary to ensure adequate supply of sand to Copper Sunset's customers. Overall, if approved, this proposed extension to the existing MR will extend the life of sand mining at the existing mine by at least 20 years.

Apart from economic benefits, the proposed Project would ultimately contribute towards the wider socioeconomic development of the area in the form of continued employment opportunities and service delivery through promoting infrastructural development.

7.1 Questions to be Engaged with when Considering Need and Desirability

The Guideline on the assessment of Need and Desirability (DEA, 2017) includes a number of questions, the answers to which should be considered in the EIA Process. Table 7-1 present the needs and desirability analysis undertaken for the Copper Sunset Project.

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Table 7-1: Need and Desirability

Theme	No.	Question	Response
Securing ecological sustainable development and use of natural resources"	1	How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?	The entire area covered by the extension application (2821.5 ha) will be completely transformed by the proposed mining activities. During the EIA Phase, the impacts to each environmental aspect were assessed according to the Digby Wells impact assessment methodology. Section 12.1 provides details on the impacts and risks identified for the Project. The vegetation and topsoil will be stripped and the sand resource under the topsoil will be removed through mining activities. It should be noted that the MREA has been disturbed through anthropogenic activity, including farming. A large section of the eastern MREA (Figure 5-3) has historically been impacted by agropastoral activities. Also, the area is located within Seriti's MRA and will possibly be open cast mined by the New Vaal Colliery. While the ecological integrity of the entire application area will be destroyed through mining, with appropriate management measures, impacts on surrounding intact sensitive habitats (except for wetlands proposed to be mined) can be prevented.
	1.1	How were the following ecological integrity considerations taken into account?	
	1.1.1	Threatened Ecosystems	A Fauna and Flora Assessment was conducted and is included in Appendix G. The Project area is situated within two vulnerable ecosystems, the Central Free State Grassland, which constitutes the majority of the Project area, and the Andesite Mountain. Based on the Red Data plant species search for the 2627 DD QDS, a total of five Red Data listed species may potentially occur within the Project area. The Digby Wells Scoping Report (Digby Wells Environmental, 2020) listed a potential 21 floral Species of Conservation Concern (SCC) that may occur within and in close proximity to the Project area. During the recent surveys in 2020 and 2021, only three floral SCC (*Boophone disticha, Silene burchellii var. burchellii and Eucomis autumnalis*) were encountered.

Theme	No.	Question	Response
			A total of four mammal SCC, three bird SCC, the SCC Giant African Bullfrog and the Highveld Giant Cupid are likely to occur within Project area. These have been listed in Sections **Error! Reference source not found.**. The proposed extension area does not fall within any original or remaining extents of a threatened ecosystem.
	1.1.2	Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure.	The Eastern portion of proposed expansion area is located near the Vaal River. It is anticipated that a 100 m (or more) buffer zone will be established to prevent mining activities being undertaken in close proximity to the river. Wetlands have been identified within the MREA (see Section 11.6). The findings in the Wetlands Assessment (Appendix H) show that the wetlands cover an area of approximately 1638.733 ha which amounts to 56.62 % of the total 2821.5 ha MREA. A Wetland Offset Strategy has been recommended for the loss of wetlands in the proposed excavation areas that cannot be mitigated or reduced. A WULA will be submitted to the DWS to obtain the required permissions to mine the areas. A 500 m buffer zone is recommended for the rehabilitated wetlands and mined out areas to aid in the re-establishment of wetland functions and vegetation as well as to make provision for rehabilitation results.
	1.1.3	Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs)	The Project area traverses no protected areas. The western section of the proposed Copper Sunset MRA is predominantly classified as Degraded Land, with the remaining area classified as ESA1 (sites with minimal degradation) and ESA2 (sites with degradation, i.e., they can be totally degraded, but not totally transformed) (Figure 11-21). The eastern section of the MRA is predominantly classified as ESA2, with smaller areas classified as ESA1.

Theme	No.	Question	Response
	1.1.4	Conservation targets	The Project is located within two vegetation types, namely the Central Free State Grassland and Andesite Mountain Bushveld. The conservation status of the Central Free State Grassland is considered 'Vulnerable' with only small portions legally conserved. Almost a quarter of the area has been transformed, either for cultivation or building of dams such as Allemanskraal, Erfenis, Groothoek, Koppies and Kroonstad. Parts of the areas have been subjected to overgrazing with subsequent Vachellia karoo encroachment. The conservation status of the Andesite Mountain Bushveld is also considered 'Vulnerable' with roughly 7% statutorily conserved, predominantly in the Suikerbosrand Nature Reserve and Magaliesberg area. The vegetation type has succumbed to a staggering transformation of 60% and a conservation target of 24%.
	1.1.5	Ecological drivers of the ecosystem	For the most part, mitigation measures have been suggested which will reduce the adverse effects identified during this EIA Phase. However, the Project will have adverse effects on the wetlands in the area. The extent of potential impacts and potential mitigation is outlined in Section 12.1.
	1.1.6	Environmental Management Framework	Multiple environmental management frameworks were taken into consideration while compiling the specialist reports. These frameworks were instrumental as guidelines to assess the necessary environmental capacities and ensure compliance to the country's laws. Frameworks employed include the Constitution of the Republic of South Africa (Act No.108 of 1996), NEM: BA, MPRDA, NEMA, National Forests Act (NFA) (Act No. 84 of 1998), National Environmental Management Protected Areas Act, 2003 (Act No. 57 of 2003) (NEM: PAA), to name a few.
	1.1.7	Spatial Development Framework (SDF)	The FDDM Integrated Development Plan (IDP), containing the SDF, was referenced for the compilation of this EIA Report.

Theme	No.	Question	Response
	1.1.8	Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.)	The following National Freshwater Ecological Priority Area (NFEPA) wetlands were identified within the MREA: • Valley floor, Channelled Valley Bottom (CVB), Rank 5 – Downstream of the MREA; • Bench, Depression, Rank 6 – Within the western MREA; • Slope, Seep, Rank 6 – Associated with both the Vaal River and Taaibosspruit; • Valley floor, CVB, Rank 4 – Associated with the CVB within the western MREA; • Valley floor, CVB, Rank 6 – Associated with the Vaal River; and • Valley floor, Floodplain, Rank 6 - Associated with both the Vaal River and Taaibosspruit The entire MREA was defined as a Sub-Quaternary Catchment and did not contain any river Freshwater Ecosystem Priority Areas (FEPA). No Ramsar (Convention on Wetlands of International Importance) sites are present in the vicinity of the Project area.
	1.2	How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	The proposed Project will completely disturb the grassland currently existing within the extension area resulting in the destruction of the current biological diversity over the area. It should be noted that a large section of the eastern MREA (Figure 5-3) has historically been impacted by agropastoral activities. The concurrent rehabilitation method ensures continued reinstatement of mined-out areas, thereby keeping the impact on the receiving environment as low as possible. No consideration was given to alternative mining sites mainly due to the availability of sand within the expansion area and that the area is directly adjacent to Copper Sunset's existing mining operation. The Project will also

Theme	No.	Question	Response
	1.3	How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	ensure job opportunities. These have been investigated and included in Section 12 and are more detailed in the social study (Appendix M). The Eastern portion of proposed expansion area is located near the Vaal River. It is anticipated that more than a 100 m buffer zone will be established to prevent mining activities being undertaken in close proximity to the river. Wetlands have been identified within the expansion area and the Applicant would like to mine these areas. A Wetland Offset strategy has been recommended for the loss of wetlands in the proposed excavation areas that cannot be mitigated or reduced. A 500 m buffer zone is recommended for the rehabilitated wetlands and mined out areas to aid in the re-establishment of wetland functions and vegetation and also to make provision for rehabilitation results. The heritage study found that by implementing the recommended mitigation measures effectively, identified heritage resources (BGG-001 and BGG-002) will be preserved (see Appendix L).
	1.4	What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided altogether, what measures were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?	General and hazardous waste will be generated as a result of the proposed Project. The waste will be handled, separated, stored and disposed of accordingly. It is anticipated that all general waste will either be recycled or disposed of at the local municipality landfill site. Hazardous waste will be removed offsite by a hazardous waste contractor. A safe disposal certificate for the removal of hazardous waste will be retained as proof of safe disposal.
	1.5	How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what	The Cultural Heritage sites in the Project area were investigated during this EIA Phase and are presented in Appendix L. During the pre-disturbance survey undertaken for the current Heritage Resources Management process, three heritage resources (BGG-001 - Burial ground of 65 identified

Theme	No.	Question	Response
		measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	graves, BGG -002 - Burial ground of approximately 52 visible graves and H-ft-001 - an old round of artillery) were identified. The avoidance of impacts to BGG-001 and BGG-002 through amending the Project design to avoid the heritage resources and implementing a 100 m no-go buffer zone around each of the identified graves is recommended. By implementing the recommended mitigation measures effectively, identified heritage resources (BGG-001 and BGG-002) will be preserved (see Appendix L). There is a better chance of preserving these heritage resources while Copper Sunset is responsible for the area. Where Project design amendments are not feasible, Copper Sunset will need to embark on a consultation process to assess whether a Grave Relocation Process is feasible.
	1.6	How will this development use and/or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	The proposed sand mining activities will essentially deplete a non-renewable natural resource within the expansion area (sand). Once the sand is removed, it will be gone from this area forever. The sand will be sold to the building and construction industry and will form an integral part to future construction projects in the area. Sand is an integral ingredient for residential and other developments. Mitigation measures aimed at avoiding, reducing and / or managing the negative impacts are found in this report. Concurrent rehabilitation will be implemented during the sand mining process. The concurrent rehabilitation method ensures continued reinstatement of mined-out areas, thereby keeping the impact on the receiving environment as low as possible. The extent of positive impacts associated with this Project are conveyed in Section 12 and associated specialist studies which have been appended.
	1.7	How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part? Will	The EIA Phase has confirmed the presence of wetlands. The extent of potential impacts and potential mitigation is outlined in Section 12.

Theme	No.	Question	Response
		the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts?	The wetlands cover an area of approximately 1638.733 ha which amounts to 58.62 % of the total 2821.5 ha MREA. The overall impacts of the project were determined to be significant and may potentially lead to irreversible damage to wetland areas. The loss of wetland areas leads to altered ecosystem functioning and the loss of biodiversity. A Wetland Offset Strategy has been proposed as a mitigation measure for the loss of wetlands in the proposed excavation areas that cannot be mitigated or reduced. A 500 m buffer zone is recommended for the rehabilitated wetlands and mined out areas to aid in the re-establishment of wetland functions. The recommended mitigation measures will not restore wetland areas that are lost as a result of the Project; however, these will be to rehabilitate and preserve un-impacted wetlands and improve their functioning as well as to compensate for significant residual adverse impacts.
	1.7.1	Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)? (note sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life)	Sand is a critical component for any development activity. The sand will be sold into the local building and construction market and will form an integral part to future construction projects in the area. The total market in the geographical area in which the mine is situated is estimated to be between 200 000 and 220 000 tonnes per month. The mine is also using solar panels and generators for electricity instead of putting pressure on the grid. The social impacts as a result of sand mining proceeding were assessed during the EIA Phase (Appendix M). The socio-economic impacts of sand mining include employment and increasing the country's economic value through the support of various industries.
	1.7.2	Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more	

Theme	No.	Question	Response
		important priorities for which the resources should be used (i.e. what are the opportunity costs of using these resources this the proposed development alternative?)	
	1.7.3	Do the proposed location, type and scale of development promote a reduced dependency on resources?	The proposed sand mining activities will essentially deplete a non-renewable natural resource within the expansion area. Once the sand is removed, it will be gone from this area forever. The sand will be sold into the local building and construction market and will form an integral part to future construction projects in the area. Also, the mine is using solar panels and generators for electricity instead of putting pressure on the grid.
	1.8	How were a risk-averse and cautious approach applied in terms of ecological impacts?	Sufficient information was gathered prior to the onset of this process to indicate that the potential mining of sand is feasible. The main sensitive landscapes in and around the Project area are wetlands and the Vaal River. To minimise the impact on these sensitive landscapes, a wetland, hydropedology and surface water specialist studies were undertaken prior to submitting the Final EIA/EMPr to the DMRE. Mitigation measures contained in this report reduce environmental risks. However, it should be noted that mining has irreversible environmental impacts that cannot be avoided. Environmental legislation and frameworks were applied while compiling reports for the EIA Phase. These were important as they helped consider the limits of the ecosystems and contained current knowledge about the consequences of decisions and actions.
	1.8.1	What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	Part A, Section 21 outlines the gaps, uncertainties and assumptions which were presented in each of the specialist studies undertaken.

Theme	No.	Question	Response
	1.8.2	What is the level of risk associated with the limits of current knowledge?	
	1.8.3	Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	
	1.9	How will the ecological impacts, resulting from this development impact on people's environmental right in terms of the following:	
	1.9.1	Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	As with all mining, there will be a general deterioration of the environment. The following specialist studies were undertaken to assess the potential impacts and ensure that all aspects were considered: • Soil, Land Use and Land Capability Assessment • Hydropedological Assessment • Surface Water Assessment • Fauna and Flora Assessment • Wetland Assessment • Aquatics Impact Assessment • Air Quality Assessment • Noise Assessment • Heritage Assessment • Social Assessment • Traffic and Transport Assessment

Theme	No.	Question	Response
			Specifications on the negative impacts and their mitigation measures are found in Section 12 below. For the detailed methodology used to determine the significance of the identified impacts, refer to Part A, Section 12.
	1.9.2	Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?	As part of the specialist studies conducted for the Project, Impact Assessments were undertaken. The most positive impacts were noted in the Social Impact Assessment. For the significance assigned to the positive and negative impacts, refer to Part A, Section 12.1. For the detailed methodology used to determine the significance of the identified impacts, refer to Part A, Section 13.
	1.10	Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?	Appendix M provides the Social Impact Assessment Report. Several socio-economic impacts (both positive and negative) were identified for the proposed Project. The Company's commitment to local employment is essential to ensuring that members of local communities' benefit from the Project. While none of the negative impacts can be avoided if the Project is approved, their intensity, duration and significance can be reduced if the mitigation measures are implemented effectively.
	1.11	Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives/targets/considerations of the area?	There are no direct positive impacts on the ecological integrity of an area as a result of the sand mine. The main negative ecological impacts associated with the proposed expansion Project include the following: • Cumulative dust and noise impacts on surrounding areas; • Potential impact on faunal and floral species of conservation concern; • Loss of wetlands; and • Destruction of vegetation.

Theme	No.	Question	Response
	1.12	Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?	Refer to Section 9.1 for details of the alternatives which were investigated during the EIA Phase.
	1.13	Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?	Cumulative impacts were investigated and presented under Section 12.2.
Promoting justifiable economic and social development"	2.1	What is the socio-economic context of the area, based on, amongst other considerations, the following considerations?	
	2.1.1	The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks of policies applicable to the area,	The social baseline took the FDDM IDP for the period 2020-2021 and the MLM IDP (2018-2019) into consideration. The IDP presents issues and requests raised by residents in each local municipal district of the FDDM. The proposed extension to the existing MR will extend the life of sand mining at the existing mine by at least 20 years, thus allowing Copper Sunset to continue supplying jobs at that the mine for a longer time period.
	2.1.2	Spatial priorities and desired spatial patterns (e.g. need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.),	Copper Sunset has been operational since 2009. The mine contributes directly to society through the employment of local residents and Local Economic Development (LED) commitments of the mine. The mine also contributes to infrastructure development in the surrounding area.

Theme	No.	Question	Response
	2.1.3	Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.), and	
	2.1.4	Municipal Economic Development Strategy ("LED Strategy").	
	2.2	Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area?	The extension area will contribute to a change of sense of place within the local area as a result of cumulative dust and noise which would be created as a result of the proposed mine. The main benefit associated with the Project is the ability to provide sand for developments taking place within the MLM. Sand is a critical component of any development activity. The proposed Project will result in continued employment opportunities. The positive impact from the Project will be recognised through implementing the Community Development Projects.
	2.2.1	Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?	Yes, LED initiatives and skills development form part of the identified Community Development Projects as included in the SLP.
	2.3	How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?	The mine supplies sand to the building industry in the local and regional area. In addition, the mine has to meet the commitments of the SLP regarding Human Resources Development, LED, and the process pertaining to management of downscaling and retrenchment. The proposed extension of the mining footprint will not impact negatively on the social status of the area.

Theme	No.	Question	Response
	2.4	Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long-term? Will the impact be socially and economically sustainable in the short- and long-term?	The mine will offer portable skills to employees throughout the LoM, to ensure that they have skills other than those required by the mine, to lessen the negative impact and foster continued livelihood.
	2.5	In terms of location, describe how the placement of the proposed development will	
	2.5.1	result in the creation of residential and employment opportunities in close proximity to or integrated with each other,	The number of staff at the existing Copper Sunset mine has been reduced via retrenchment due to the downscaling of the mine. Should the project be approved there will be additional employment opportunities directly created at the existing mine. The extension will also result in the prolonging of the existing jobs at the existing mine. The sand mined from the extension area is a critical component for development within the area. The construction/ development industry will also provide employment opportunities.
	2.5.2	reduce the need for transport of people and goods	The sand product will be loaded onto customer trucks and trucked to various markets.
	2.5.3	result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport),	
	2.5.4	compliment other uses in the area,	A Traffic Impact Assessment was undertaken to assess the impact of the additional traffic expected to be generated by the proposed mine extension for all phases of the project. This is appended as Appendix N. The findings of the study showed that the proposed development is expected to have a negligible impact on the existing operational conditions of the road network and no road

Theme	No.	Question	Response
			capacity improvements have been recommended on the wider road network. Nonetheless, it has been recommended that the Dihlabekela Road should be rehabilitated and widened as well as for the Gravel Road (farm access road and the fourth leg at the intersection of R716 and Dihlabakela Road) to be paved.
	2.5.5	be in line with the planning for the area,	Copper Sunset currently has about nine months left of the LoM. The LoM is proposed to be extend by at least 20 years and the Closure and Rehabilitation Report considered end-land use in line with the LED Strategy.
	2.5.6	for urban related development, make use of underutilised land available with the urban edge,	Not applicable. The proposed Copper Sunset Project area is outside an urban area.
	2.5.7	optimise the use of existing resources and infrastructure,	The mining infrastructure already established will be used for the expanded areas, however; mobile offices will be established at the entrance to the new mining areas. No permanent infrastructure will be constructed on site for the sand mining operation. All machinery will be mobile and brought in by Copper Sunset.
	2.5.8	opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement),	No bulk infrastructure will form part of this development.
	2.5.9	discourage "urban sprawl" and contribute to compaction/densification,	The Project area and surrounds are fairly rural and cannot therefore influence urban sprawl.
	2.5.10	contribute to the correction of the historically distorted spatial patterns of settlements and	The Community Development projects associated with the SLP prioritises Historically Disadvantaged South Africans as beneficiaries.

Theme	No.	Question	Response
		to the optimum use of existing infrastructure in excess of current needs,	
	2.5.11	encourage environmentally sustainable land development practices and processes,	Mining is inherently unsustainable and a destructive activity involving the taking of a non-renewable resource. The successful rehabilitation of the area will contribute to mitigating the impacts caused by mining.
	2.5.12	take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.),	The proposed expansion area is dependent on the location of the identified sand resource.
	2.5.13	the investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential),	The proposed Project will allow the mine to continue contributing to the local, regional and national Gross Domestic Product (GDPs), and also to the local communities through job security, as well as other influences and community upliftment programmes that are undertaken by the mine through their SLP.
	2.5.14	impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area, and	Three heritage resources (BGG-001 - Burial ground of 65 identified graves, BGG -002 - Burial ground of approximately 52 visible graves and H-ft-001 - an old round of artillery) were identified within the Project area. Mitigation measures, where possible, is presented in Appendix L.
	2.5.15	in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?	The proposed Project will ensure job security, as well as programmes implemented from the mine's SLP.
	2.6	How were a risk-averse and cautious approach applied in terms of socio-economic impacts?	Social impacts have been investigated and presented as Appendix M.

Theme	No.	Question	Response
	2.6.1	What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	Part A, Section 21 outlines the gaps, uncertainties and assumptions which were presented in each of the special studies undertaken.
	2.6.2	What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?	
	2.6.3	Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	
	2.7	How will the socio-economic impacts, resulting from this development impact on people's environmental right in terms of the following:	
	2.7.1	Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	Based on the outcome of the various specialist studies and the impact assessment completed, the main potential negative impacts on people's environmental right will be cumulative noise and dust. All impacts considered cumulatively will contribute to a change in the sense of place. Mitigation measures have been proposed to minimise, manage, and remedy negative impacts (see Section 12).
	2.7.2	Positive impacts. What measures were taken to enhance positive impacts?	Positive impact will result from employment creation, community development, and growth of local economy. Each of these impacts are provided with mitigation measures to enhance the positive impact. For the detailed methodology used to determine the significance of the identified impacts, refer to Part A, Section 13.

Theme	No.	Question	Response
	2.8	Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socio-economic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?	No serious socio-economic or environmental impacts were identified to motivate the closure of the Copper Sunset operation. The mine contributes to the community as part of its SLP obligations. Dust from the proposed Project activities may adversely impact human and animal health. Mitigation measures have been included in Section 12 below.
	2.9	What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?	Should the proposed mitigations and required off-sets (wetlands) be implemented as suggested by the specialists, this will result in the best practicable environmental option.
	2.10	What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)?Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?	The aim of the SLP is to initiate projects which develop the surrounding communities which may be impacted by a proposed mining project. Copper Sunset currently has about nine months left of the LoM. This proposed extension to the existing MR will extend the life of sand mining at the existing mine by at least 20 years. The Community Development projects associated with the SLP prioritise Historically Disadvantaged South Africans as beneficiaries.

Theme	No.	Question	Response
	2.11	What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?	
	2.12	What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?	Monitoring suggestions have been provided for the construction, operational and closure phases of the Project. These will help assess the effective assessment of specific environmental aspects and the degree to which they are affected by the mining operation. This includes traffic, soils, surface water, fauna and flora, wetlands, aquatics, air quality, noise, etc. Refer to Part B, Section 8 for the monitoring programme.
	2.13	What measures were taken to:	
	2.13.1	ensure the participation of all interested and affected parties,	During the pre-application and Scoping Phase, an I&AP database was developed to identify and verify the directly and indirectly affected landowners or land occupiers as well as the potentially affected surrounding communities. This was updated and used throughout the EIA Process as well.
	2.13.2	provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation,	Digby Wells will maintain and update the I&AP database to ensure communication with all registered I&APs. Site notices have been erected in various locations around the site and in the nearest communities to announce the Project, SMS notifications will be utilised to keep I&APs informed about the Project. Due to COVID-19 Regulations, Focus Group meetings will be held during the EIA Phases to engage with any I&AP who wishes to attend, and the Project will be presented at these meetings as well as the findings of the impact assessments. A stakeholder engagement plan was developed and will be followed throughout the EIA Phase.

Theme	No.	Question	Response
			COVID-19 measures during face-to-face meetings will be taken into consideration.
	2.13.3	ensure participation by vulnerable and disadvantaged persons,	Site notices and a newspaper advert have been placed, and a meeting held in areas easily accessible to the most disadvantaged affected community.
	2.13.4	promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means,	The consultation process seeks to inform affected communities of the positive and negative impacts associated with the proposed Project and provide opportunity for any stakeholder to raise concerns which will be responded to both on record in the reports and through direct written response (where possible).
	2.13.5	ensure openness and transparency, and access to information in terms of the process,	Digby Wells is bound by legislation and regulations to share information pertaining to the Project, to be transparent and impartial.
	2.13.6	ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge, and	All stakeholders have been and will continue to be accommodated as far as is reasonably possible.
	2.13.7	ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein was be promoted?	The EAP cannot force participation from specific demographics. Cultural norms will be respected and adhered to; however, no demographic can be excluded from public consultation and therefore all registered stakeholders and meeting attendees will be considered intrinsic to the public consultation process and outcomes. *COVID-19 measures during face-to-face meetings will be taken into consideration.*
	2.14	Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the	

Theme	No.	Question	Response
		community (e.g. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?	
	2.15	What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected	The Applicant must produce a Health and Safety policy in compliance with the Mine Health and Safety Act, 1996 (Act No. 29 of 1996). Workers must be educated on a regular basis as to the environmental and safety risks that may occur within their work environment. Also, adequate measures need to be taken to ensure that the appropriate personal protective equipment is issued to workers based on the areas that they work and the requirements of their job.
	2.16	Describe how the development will impact on job creation in terms of, amongst other aspects:	
	2.16.1	the number of temporary versus permanent jobs that will be created,	There will be additional employment opportunities directly created at the existing mine should the extension application be granted. The extension will also result in the prolonging of the existing jobs at the existing mine. Copper Sunset have eleven permanent mine employees who are currently residing at New Vaal Eskom Housing. The proposed Project is anticipated to increase the employment opportunities to 31 positions.
	2.16.2	whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area),	Yes, the labour available in the area will be able to take up the job opportunities. There will be additional employment directly created at the existing mine should the extension application be granted. The extension will also result in the prolonging of the existing jobs at the existing mine.
	2.16.3	the distance from where labourers will have to travel,	

Theme	No.	Question	Response
	2.16.4	the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits), and	There will be additional employment directly created at the existing mine should the extension application be granted. The extension will also result in the prolonging of the existing jobs at the existing mine. However, it is too early in the process to confirm from what distance labourers will be required to travel, as the labour force has not yet been appointed. Copper Sunset is committed to source labour from the nearest affected community.
	2.16.5	the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).	There will be additional employment directly created at the existing mine should the extension application be granted. There are no host communities living in the areas planned to be mined. The Farms are owned by Seriti and are leased to the farmers. No farmers or farm workers will be displaced as a result of the proposed extension Project.
	2.17	What measures were taken to ensure:	
	2.17.1	that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment, and	Digby Wells has identified the relevant government organisations which must be consulted throughout the EIA Process. Furthermore, this application is in terms of the One Environmental System and Digby Wells shall endeavour to align the various procedures to reduce stakeholder fatigue.
	2.17.2	that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?	Not Applicable.
	2.18	What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?	As part of the EIA Process, Financial Liability for the Applicant was calculated to determine the cost of decommissioning and rehabilitating the mine site to an end-land use which is sustainable and in the best interest of both the surrounding communities and the environment. The purpose of the EIA is to propose mitigation measures to reduce or avoid the impacts as a result of the mine proceeding.

Theme	No.	Question	Response
	2.19	Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?	
	2.20	What measures were taken to ensure that he costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?	
	2.21	Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?	The preferred site has been selected based on the availability of sand and its proximity to the existing mining operation. This application relates to the extension of the existing MRA to now include the additional portions of the RE of the Farm Bankfontein No. 9 and a portion of the RE of the Farm Zandfontein No. 259. Viable sand reserves have been identified over the extension areas, through extrapolation of the existing disturbance within the existing MRA.
	2.22	Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?	Cumulative impacts were investigated and presented under Section 12.2.

8 Item 3(g): Motivation for the Preferred Development Footprint within the Approved Site as Contemplated in the Accepted Scoping Report

The preferred development footprint is primarily influenced by the established Copper Sunset mining operation taking place on the adjacent portion of land. The MREA has been selected based on the availability of sand and its proximity to the existing mining operation. No other site alternatives were identified. Wetlands have been identified within the proposed extension areas and cover 1638.733 ha of the area. A large section of the MREA has historically been impacted by anthropogenic activities. The Applicant intends to mine severely disturbed wetland areas (leaving sensitive wetlands unmined) in order to fully maximise the mineral resource available on the properties. A wetland offset assessment will be undertaken to determine the extent of wetlands to be offset and to compensate for significant residual adverse impacts.

9 Item 3(h): Full Description of the Process Followed to Reach the Proposed Preferred Alternatives within the Site

9.1 Item 3(h)(i): Details of the Development Footprint Alternatives Considered

A project alternative is defined as a possible course of action, in place of another, that would meet the same purpose and need (DEAT, 2004).

In an EIA process, project alternatives serve to determine the most effective way of meeting the objectives of that project. This is generally done through either enhancing the benefits of an activity and/or mitigating the negative impacts and risks of an activity.

According to the Department of Forestry, Fisheries, and the Environment (DFFE) (previously known as Department of Environmental Affairs) Criteria for Determining Alternatives in EIA Guideline (2004), there are various types or categories of alternatives, including:

- Location alternative – alternative project sites in the same geographic area;
- Process/design alternative – alternative process/design/equipment;
- Activity alternative – consideration of different means to achieve the same project objective;
- Routing alternative – consideration of different routes for linear infrastructure;
- Site layout alternative – consideration of the different options to place project infrastructure; and
- No-go alternative – the proposed project/activity does not proceed, implying that the current situation or status quo remains.

Four alternative types were considered for the Project. These are discussed in the sections below.

9.1.1 Location Alternatives

The location of the mining activity is determined by the location of the resource. This application relates to the extension of the existing MR to now include the additional portions of the RE of the Farm Bankfontein No. 9 and a portion of the RE of the Farm Zandfontein No. 259 (**preferred alternatives**). The initial plan was to mine the entire Zandfontein Farm, however, due to other land uses the MRA was reduced in size to only consider a portion of the farms (Figure 9-1).

Locational alternatives have not been considered as the proposed area has been selected based on the availability of the sand resource and the established mining operation taking place on the adjacent portion of land. Three heritage resources were identified within the Project area. It has been recommended that the Project design should be amended to avoid the heritage resources and a 100 m no-go buffer zone implemented around each of the identified graves. Where Project design amendments are not feasible, Copper Sunset will need to embark on a consultation process to assess whether a Grave Relocation Process is feasible. No mining will take place within a 100 m buffer from the edge of the Vaal River.

9.1.2 Design and Layout of the Project

The design and layout options associated with this proposed extension area are primarily influenced by the occurrence of the sand resource. The mining layout is designed to consider the following:

- Any infrastructure in the area;
- Exclusion of environmentally sensitive areas;
- Servitudes;
- Thickness and quality considerations; and
- The intention to mine in strips approximately 500 m long by 30 m wide.

The infrastructure to be utilised by the mine will not be permanent. Wetlands have been identified within the proposed MREA (Figure 11-26), especially near the Vaal River and Taaibosspruit.

9.1.2.1 Wetlands Located within the Extension Area

Option 1 – Implement a buffer around the wetlands and not mine them (Figure 11-26);

Option 2 – Apply to the DWS to mine the whole area (including wetland areas); or

Option 3 – Mine severely disturbed wetlands and conserve those with high ecological importance and sensitivity (**preferred option**).

9.1.2.1.1 Avoid Wetlands

Channelled valley bottoms, seeps, floodplains, floodplain and associated valley bottoms and valley head seep cover 1638.733 ha of the extension area. The appropriate buffer requirements would have to be implemented in order to avoid the wetlands. This would result in only a small portion of the area available to be mined which would make the expansion project uneconomical as limited sand will be able to be sold. This is therefore not considered to be the preferred option.

9.1.2.1.2 Mine Wetlands

Wetlands (including the required buffer zones) are located throughout the MREA and therefore this option will involve the mining of all the wetlands located within the MREA. This may result in the complete loss of wetlands and could be considered to have a significant negative impact on the environment. This is therefore not considered to be the preferred option.

9.1.2.1.3 Mine Severely Disturbed Wetlands Only (Preferred Option)

The third option involves the mining of some significantly disturbed wetlands while other wetlands will remain preserved and possibly aim to improve the overall Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS) of the wetlands. The PES and EIS of the wetlands identified within the proposed extension area were investigated during the EIA Phase. The wetlands were considered to have an ecological state ranging between 'Moderately Modified' (PES Category C) and 'Highly Modified' (PES Category E). A 'no-go' zone is recommended for the rehabilitated wetlands and mined out areas to aid in the re-establishment of wetland functions and vegetation and also to make provision for rehabilitation results. For wetlands in the proposed excavation areas that cannot be mitigated or avoided, a Wetland Offset Assessment is recommended to calculate the total wetland loss and determine the exent of wetlands to be offset. This is the preferred option. The reason for this is because the option permits the mining of sand while taking the environment into consideration (i.e. preserving some of the wetlands). This option will be in line with the wetland offsets strategy.

9.1.3 Mining Methods Alternative

Due to the shallow location of the sand, strip mining is the only possible mining process to remove the sand material. The use of any other alternative mining method such as underground mining will not target the resource being mined and will possibly cause more damage to the environment than the strip-mining method.

9.1.4 The No-Go Alternative

The no-go option would result in the sand resource not being mined and would therefore not be available for the construction industry within the Gauteng and Free State Provinces. If the proposed Project is not approved, the opportunity to utilize this mineral as well as valuable socio-economic opportunities will be lost. The no-go option would, however, mean that all the negative impacts associated with mining will still be realised as the area could still be open cast mined by the New Vaal Colliery (i.e. vegetation removal, dust creation and noise

generation) as the area has an approved MR for the mining of coal. Therefore, the no-go option would just mean that the sand resource will not be realised but the area may still be mind for coal.

Additionally, if the EA is not granted, the jobs that would have been created by the proposed mining Project as well as the jobs that would have been retained from the old Copper Sunset mine would be lost.

Through a Regulation 31 Amendment Process, Copper Sunset wishes to amend and consolidate all EAs and EMPrs into one consolidated EMPr that is applicable to the approved MR and the new areas being incorporated. The consolidation has been deemed a more effective management tool; therefore, the no-go option would result in Copper Sunset maintaining its current separate authorisations at the operation, which will hinder effective environmental management.

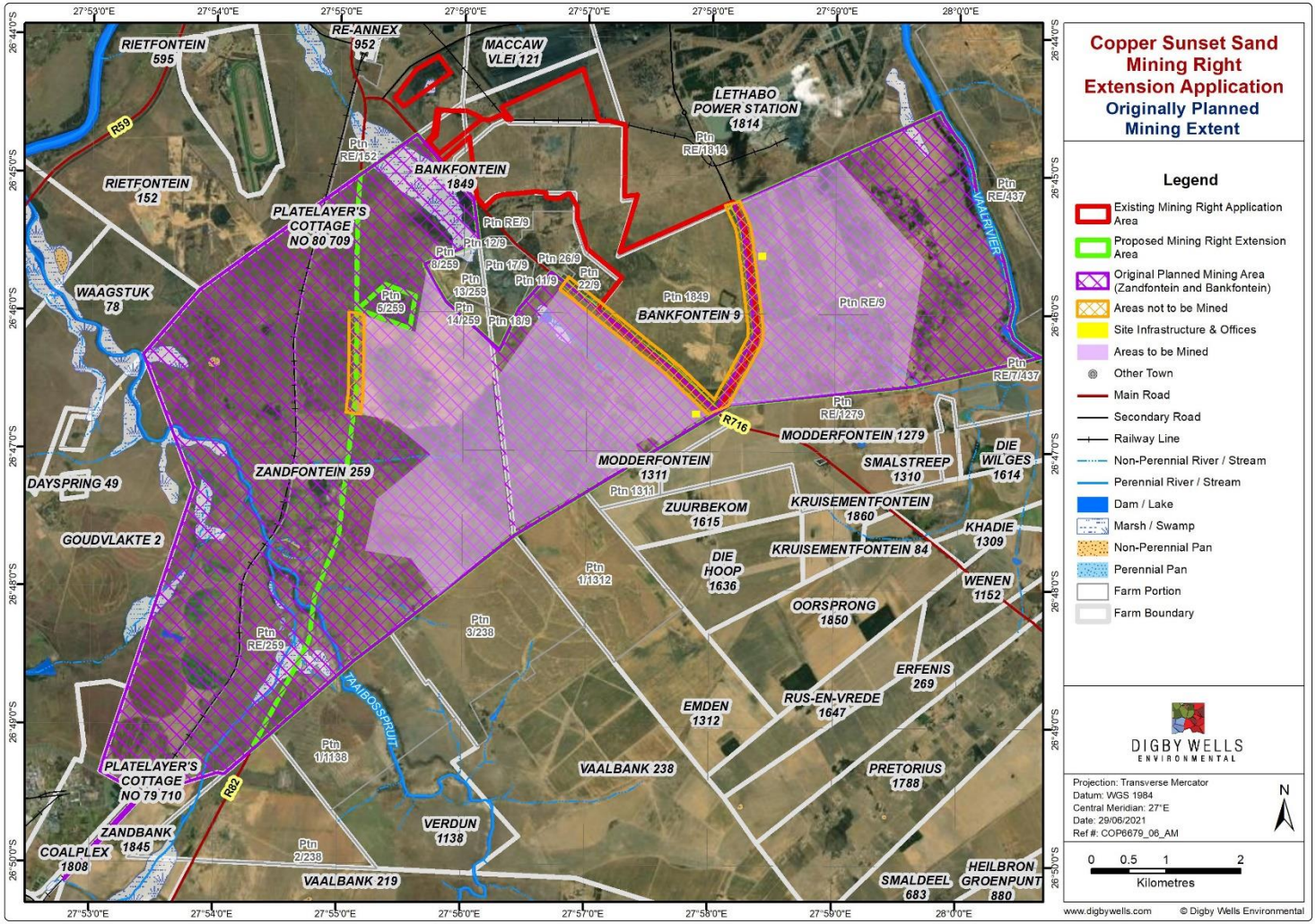


Figure 9-1: Originally Planned Mining Extent

10 Item 3(h)(ii): Details of the Public Participation Process Followed

The Public Participation Process (PPP) was developed to ensure compliance with environmental regulatory requirements and to provide I&APs with an opportunity to evaluate the proposed Project. During this process stakeholders are able to provide inputs and to receive feedback from the environmental specialists and/or proponent.

During the PPP, the following core activities were undertaken:

- Identification of the stakeholders and creation of a database;
- Development and distribution of PPP material;
- Stakeholder communication and consultation; and
- Recording and responding to suggestions and concerns raised during the public meetings and during the comment period.

10.1.1 Stakeholder Identification

Windeed and desktop searches were conducted in and around the Project area to verify land ownership and obtain contact details. This information is used to create a stakeholder database which will be continually updated throughout the PPP with new stakeholders (refer to , the PP Report).

Stakeholders for the proposed Project were grouped into the following categories:

- **Government:** National, Provincial, District and Local authorities;
- **Landowners:** Directly affected and surrounding landowners;
- **Land occupiers:** Directly affected and surrounding land occupiers;
- **Communities:** Surrounding communities;
- **Non-Governmental Organisations (NGOs):** Environmental and social organisations;
- **Agriculture:** associations or organisations focussed on agricultural activities; and
- **Business:** small and medium enterprises and formal organisations.

The directly affected farms (proposed extension areas) are owned by Seriti.

10.1.2 Consultation with Stakeholders during the Scoping Phase

The PPP is undertaken in terms of the regulatory requirements set out in Regulation 44 and 45 of the EIA Regulations, 2014 (as amended). The PPP enables stakeholders to partake and submit comments, suggestions or issues of concern. As part of planning for the face-to-face stakeholder consultations, Digby Wells submitted a Stakeholder Engagement Plan (SEP) as per the Covid-19 Regulations (GN R 650 of 5 June 2020) of the Department of Environment, Forestry and Fisheries. The purpose of the stakeholder meetings was to disseminate detailed

Project information to the I&APs. During the engagement the various stages of the Scoping process, and the PPP were explained, as well as the related legislated timeframes. Having Focus Group Meetings was important in order to address the differing needs and concerns of the I&APs. A translator was available at the stakeholder meetings to assist with conveying the information presented in the appropriate language(s).

10.1.2.1 Public Participation Media

Considering the legislative requirements and good practice the following methods have been implemented to make project information available to stakeholders:

- **Background Information Document (BID):** BIDs were emailed to various stakeholders. The BID included a project description, information about the required legislation, the competent authorities and details of the appointed EAP. The BID was also accompanied by a registration and comment form for stakeholders to register as I&APs or to submit comments. Information regarding the availability of the Scoping Report was also provided;
- **Newspaper advertisement:** A newspaper advertisement was placed in the Vaalweekblad Newspaper in English on 8 January 2021. The advertisement included a brief project description, information about the required legislation, the competent authorities, details of the appointed EAP and registration process for I&APs;
- **Notification Letter:** A letter with information regarding the availability of the Scoping Report for public comment was emailed to stakeholders;
- **Site notices:** Site notices were put up at various places (which contained a brief project description, information about the required legislation, the competent authorities and details of the EAP as well as registration process for I&APs);
- **SMS:** A SMS was sent to registered I&APs in support of the announcement of availability of the Scoping Report for public comment; and
- The environmental Scoping Report and associated documentation was available for public comment for a period of 30 days (from 11 January to 10 February 2021).

10.1.2.2 Stakeholder Meetings

Focus Group Meetings with the directly affected landowner, farm leases and immediately adjacent landowners were held on 19, 20, 26 January 2021 and 02 February 2021. The purpose of these meetings was to disseminate detailed information about the proposed Project, address comments already raised by the community representatives where possible, and to obtain further comments. A formal presentation was conducted by the EAP, during which maps showing the Project area and extent were made available.

Comments raised by the stakeholders were captured in the Comments and Response Report (CRR). The comments received during the Scoping phase were addressed by the Project team. Responses have been included in the CRR and were incorporated into the PP Chapter

Report (see).

10.1.3 Public Participation Activities During the Scoping Phase

Table 10-1 provides a summary of the PP activities undertaken during the Scoping Phase (please see Appendix C).

Table 10-1: Public Participation Scoping Phase Activities

Activity	Details
Identification of stakeholders	Stakeholder database which represents various sectors of society, including directly affected and adjacent landowners, in and around the proposed Project area.
Distribution of BID announcement letter	A BID with registration and comment form was emailed to stakeholders on 08 January 2021. An SMS was also sent to stakeholders on 08 January 2021 announcing the availability of the Draft scoping report.
Placing of newspaper advertisement	A newspaper advertisement was placed in English in the Vaalweekblad on 08 January 2021.
Putting up of site notices	Site notices were put up at the proposed Project site on 08 January 2021. A site notice placement report and map were developed to indicate the locations of site notices in and around the Project area.
Announcement of Draft Scoping Report	Announcement of availability of the Draft Scoping Report was emailed to stakeholders on 08 January 2021. The Draft Scoping Report was released electronically, and copies were available to stakeholders on the Digby Wells website (www.digbywells.com under Public Documents) and could be accessed via our data-free service. The Scoping Report was made available for public comment for a period of 30 days (from 11 January to 10 February 2021). Note: ***Due to COVID-19 Regulations, no documents were placed at public areas.*** Stakeholders were sent a data-free link where they could access the reports. http://view.datafree.co/PublicDocuments/.
Consultation with Stakeholders	Focus Group meetings were held with the directly affected landowner, farm leases and immediately adjacent landowners during the public review period.
Obtaining comments from stakeholders	Comments, issues of concern and suggestions received from stakeholders were captured in the Comment and Response Report (CRR). The CRR is appended to this report (refer to Appendix C).
Announcement of Final Scoping Report	The final report has been made available on www.digbywells.com (under Public Documents). A notification letter was sent to all I&APs informing them about the availability and submission of the Final Scoping Report to the DMRE. The report was submitted to the DMRE on 18 February 2021.

10.1.4 Consultation with Stakeholders during the EIA Phase

During the Impact Assessment Phase, the following main Public Participation activities were undertaken:

- Feedback was provided on the findings of the specialist studies conducted and mitigation measures proposed by means of consultation with I&APs;
- Environmental reports were made available for public comment;
- Consultation with I&APs was conducted; and
- I&APs were again provided an opportunity to comment on specialist findings, impacts assessments and recommendations.

Table 10-2 provides more detail regarding the Stakeholder Engagement activities to be undertaken during the EIA Phase.

Table 10-2: EIA Phase Public Participation Process Activities

Activity	Details
Update of stakeholder database	The stakeholder database was updated and will continue to be updated until final submission of the EIA report to the DMRE.
Announcement of EIA	Stakeholders were contacted through SMS and email on **08 July 2021,** announcing the availability of the Draft EIA Report. The Draft EIA Report was released electronically and made available to stakeholders on the Digby Wells website (www.digbywells.com under Public Documents) and could be accessed via our data-free service portal. ***Note:*** *Due to COVID-19 Regulations, no documents were placed at public areas. Stakeholders were sent a data-free link where they could access the reports. http://view.datafree.co/PublicDocuments/* ***(30-day comment period for the Draft EIA Report: 08 July 2021 to 10 August 2021)***
Stakeholder Meeting	Focus Group Meetings are planned to be held between **16 – 22 July** 2021. This will, however, be confirmed with stakeholders.
Obtained comments from stakeholders	The stakeholders were provided with an opportunity to comment on the Draft EIA Report. Comments, issues of concern and suggestions received from stakeholders will be captured in the final CRR.

10.2 Item 3(h)(iii): Summary of Issues Raised by I&APs

The CRR has been compiled capturing all stakeholder comments obtained during the Scoping Phase public comment period. The CRR will be updated to include stakeholder comments provided during the EIA Phase. Comments received to date are presented in Table 10-2 below.

Table 10-3: Comments and Responses Received During Scoping Phase

ISSUE OR CONCERN	CONTRIBUTOR			DATE OF CONTRIBUTION	MEANS OF CONTRIBUTION	RESPONSE
Land Ownership and Lease Agreements						
I am currently leasing a portion of the farm Zandfontein 259 from Seriti for grazing livestock including cattle, sheep and goats as well as maize harvesting.	Mr	Marius Fourie	Landowner and Leasee on Farm Zandfontein 259	20 January 2021	Focus Group Meeting	Thank you for sharing the information and the information has been noted.
I am currently leasing a portion of the farm Bankfontein 9 from Seriti for grazing livestock including cattle, sheep and goats as well as maize harvesting.	Mr	James Reynders	Landowner and Leasee on Farm Bankfontein 9	20 January 2021	Focus Group Meeting	Thank you for sharing the information and the information has been noted.
Eskom Lethabo Power Station is located on the north-eastern boundary of the proposed project area.	Mr	Pieter Müller	Eskom Lethabo Power Station 1814	26 January 2021	Focus Group Meeting	Thank you for sharing the information and the information has been noted.
I am the owner of the Farm Emden 1312 which is registered under the Cairo Trust. I am leasing approximately 280 hectares of land from Seriti on the farm Zandfontein 259 for maize and wheat harvesting. I appreciated the presentation and information shared about the project. I will engage with Seriti to discuss compensation and other issues within the duration of my lease agreement.	Mr	Jaap van der Westhuizen Landowner and Leasee on Farm Zandfontein 259	Cairo Group	02 February 2021	Focus Group Meeting	Thank you for the comment. Seriti will remain the surface right owners should the mining right be granted. A contract will be in place between Seriti and Copper Sunset which will permit Copper Sunset to mine the sand from the properties. The company intends to have a collaborative working relationship with all landowners and will ensure open and transparent communication is maintained.
Our family has a portion of the Farm Bankfontein 9 leased from Seriti for grazing of livestock.	Mr	Selwyn Lloyd	S & B Engineers	02 February 2021	Focus Group Meeting	Thank you for sharing the information and noted. The company intends to have a collaborative working relationship with all landowners and will ensure open and transparent communication is maintained.
Furthermore, We also have property alongside the R82 adjacent to the existing railwaylink.	Mr	Reinard Lloyd	Su-Rei Boerdery			
We have no specific comments on the project and are willing to have a working relationship and open communication with Copper Sunset should they commence mining activities.	Mr	Clinton Lloyd	Su-Rei Boerdery			
Project Specific Issues						
Confirmation is required to understand what other applications have been submitted for sand mining as there may be some sand mining rights already authorised for land	Ms	Kim McCann	Seriti Coal (Pty) Ltd: New Vaal Colliery	19 January 2021	Comment and Response Form	Thank you for the comment. Digby Wells has been made aware of an environmental authorisation application by Jongilizwe Sand Mining company and Afrimat who are currently operating in the area. Additionally, we are aware of the sand mining application which has been made by Mabefu Engagement Minerals. The Department of Mineral

ISSUE OR CONCERN	CONTRIBUTOR			DATE OF CONTRIBUTION	MEANS OF CONTRIBUTION	RESPONSE
portions which are located within the area Copper Sunset is currently applying for.						Resources and Energy (DMRE) will be the lead-authority and will be the decision-maker for approving or declining any proposed applications.
What are the timelines on the project should the authorisation be granted by the DMRE	Mr	Fanie Kitching	Seriti Coal (Pty) Ltd: New Vaal Colliery	20 January 2021	Focus Group Meeting	Digby Wells submitted the Final Scoping Report on 18 February 2021 and the Final Environmental Impact Assessment (EIA) and Environmental Management Programme (EMPr) is planned for submission on 02 September 2021. The Department of Mineral Resources and Energy (DMRE) will have 107 days to approve or decline the Report. Should the Environmental Authorisation (EA) be approved, and the Mining be granted; Copper Sunset will commence with Mining activities.
When is the Mining approval expected?	Ms	Kim McCann	Seriti Coal (Pty) Ltd: New Vaal Colliery	20 January 2021	Focus Group Meeting	
What is the expected Life of Mine (LoM)?	Ms	Kim McCann	Seriti Coal (Pty) Ltd: New Vaal Colliery	20 January 2021	Focus Group Meeting	The Life of Mine (LoM) is expected to be approximately 30 years.
When updating the lease agreement that Copper Sunset has with Seriti, the servitudes for the conveyor belt that will be running through the project area must be taken into consideration. Seriti has a mining right for their underground operations that comprises of a conveyor belt that will be running to the current plant at New Vaal Colliery. The EIA and Integrated Water Use License Application (IWUL) is currently with DMRE for approval.	Ms	Kim McCann	Seriti Coal (Pty) Ltd:	20 January 2021	Focus Group Meeting	Thank you for the information and noted. This will be taken into consideration in the mine plans and lease agreements.
There are other sand mining operations around the area, one of them being Jongilizwe Sand Mine located on the farm Zandfontein. They have a mining permit for sand mining.	Ms	Kim McCann	New Vaal Colliery	20 January 2021	Focus Group Meeting	Copper Sunset is aware of the current sand mining activities by Jongilizwe. This area has been excluded from the proposed Mining Right Extension Project footprint.
Where exactly is the proposed extension project?	Mr	Alex Mabe Ward Councillor	Metsimaholo Local Municipality	20 January 2021	Focus Group Meeting	The Locality Plan was presented depicting the proposed project area. It should be noted that the proposed project falls within the Metsimaholo Local Municipality under Ward 19.
There is an existing servitude line that is currently supplying water to New Vaal Lethabo Properties. This must be considered as well.	Mr	Pieter Müller	Eskom Lethabo Power Station 1814	26 January 2021	Focus Group Meeting	Thank you and noted. This information will be considered as part of the Environmental Impact Assessment (EIA) phase.
What is the depth level of sand mining proposed within the proposed project area? And will it be mined all at once?	Mr	Marius Fourie	Landowner and Leasee on Farm Zandfontein	20 January 2021	Focus Group Meeting	Copper Sunset will be mining the sand using the “strip mining method” with concurrent rehabilitation. The mine will mine one area first then rehabilitate it and move to the next area. The entire mining area will not be mined at once. The plan is to firstly mine on the Farm Bankfontein 9 as outlined in the infrastructure plan. Topsoil will firstly be removed at a depth of approximately 1.5 metres and stockpiled. Thereafter, the sand resource will be extracted from a depth of 2-3 metres. Rehabilitation will be done immediately after each section of mining has taken place to
	Mr	Jaap van der Westhuizen	Cairo Group	02 February 2021	Focus Group Meeting	

ISSUE OR CONCERN	CONTRIBUTOR			DATE OF CONTRIBUTION	MEANS OF CONTRIBUTION	RESPONSE
		Landowner and Leasee on Farm Zandfontein 259				ensure that the area is rehabilitated to an environment as close as possible to the pre-mining activity.
Will the area be mined all at once or phased out?	Mr	Selwyn Lloyd	S & B Engineers	02 February 2021	Focus Group Meeting	Mining activities will be phased and will first mine on Farm Bankfontein and thereafter move to Farm Zandfontein. Refer to Figure 5-3 for the Life of Mine (LoM) plan.
	Mr	Reinard Lloyd	Su-Rei Boerdery			
	Mr	Clinton Lloyd	Su-Rei Boerdery			
Water (wetlands, ground- and surface water)						
Surface and shallow aquifer water flow will be impacted due to mining and rehabilitation. This could reduce the water flow into an already impacted wetland.	Ms	Kim McCann	Seriti Coal (Pty) Ltd: New Vaal Colliery	19 January 2021	Comment & Registration Form	Noted. Digby Wells undertook various specialist studies including hydropedological studies (Appendix E), surface water studies (Appendix F), and wetland assessments (Appendix H) in order to assess the current status quo of the environment and to develop mitigation and management measures to reduce negative impacts on already impacted areas. These will need to be implemented prior to commencement of the project.
Afrimat is currently using underground mine water as a source of water supply for their sand operations.	Mr	Andrew Crausaz	Afrimat Clinker Suppliers	26 January 2021	Focus Group Meeting	Thank you for the comment. Copper Sunset will consider this water source as an option for their water supply should sand mining be commenced with. This option will only be considered depending on the water qualities of the underground workings.
There are existing wetlands in the area, will these be mined as well? Where will the Company source their water?	Mr	Selwyn Lloyd	S & B Engineers	02 February 2021	Focus Group Meeting	Thank you for the comment. Digby Wells undertook a wetland assessment study (Appendix H) as part of the Mining Right Extension Application. Various specialists undertook their investigations and detailed findings are presented in this Environmental Impact Assessment/ Environmental Management Programme (EIA/EMPr), including mitigation and management measures to limit or avoid negative impacts on sensitive areas including existing wetlands. An Integrated Water Use License (IWUL) will be applied for to mine severely disturbed wetlands. At present, water will be sourced from a borehole located at the approved Copper Sunset Mining Right Area which has an approved IWUL. A total amount of water permitted to be abstracted in accordance with the IWUL is 140 650 m^3 per annum. Water will only be used for dust suppression.
	Mr	Reinard Lloyd	Su-Rei Boerdery			
	Mr	Clinton Lloyd	Su-Rei Boerdery			
Copper Sunset must take into consideration specifically the portions of the Farm Bankfontein (outside the proposing Expansion Area) where a protected species namely *Boophone Disticha* was identified. The plant is known to be highly toxic and used	Mr	Pieter Müller	Eskom Lethabo Power Station 1814	26 January 2021	Focus Group Meeting	Thank you for sharing the information. A Fauna and Flora Study (Appendix G) was undertaken and includes all species identified within the MREA. The results of the fauna and flora species have also been included in this report. Digby Wells will contact Eskom should additional information be required.

ISSUE OR CONCERN	CONTRIBUTOR			DATE OF CONTRIBUTION	MEANS OF CONTRIBUTION	RESPONSE
for hunting historically. An EIA application for the power plant was applied for in this area which was submitted by Eskom in 2018. The project was rejected due to the discovery of these protected species. The area was deemed as a “no-go” area and thus the project was not commenced with.						
Employment						
How many people who are staying around the area are currently employed by Copper Sunset?	Mr	Alex Mabe Ward Councillor	Metsimaholo Local Municipality	20 January 2021	Focus Group Meeting	Copper Sunset have 11 permanent mine employees who are currently residing at New Vaal Eskom Housing. The proposed project is anticipated to increase the employment opportunities to 31 positions.
Employment for poor people living around the area must be prioritised. The Ward Councillor must be kept informed of employment opportunities, otherwise there will be problems if the Municipality is not involved.	Mr	Alex Mabe Ward Councillor	Metsimaholo Local Municipality	20 January 2021	Focus Group Meeting	Your comment is noted. Copper Sunset will ensure that all recruitment processes are communicated with the Municipality and ensure continuous involvement of the Ward Councillor.
Safety and Security Measures						
Will the mine be fenced off, that the livestock may not pass over the mining operation areas?	Mr	Marius Fourie	Landowner and Leasee on Farm Zandfontein	20 January 2021	Focus Group Meeting	Your comment has been considered. Copper Sunset will fence-off all mine operational areas and will ensure that there is security around the area to prevent any illegal activities.
I am concerned about the safety and security in the area. Theft of livestock is on the rise. In addition, there is an annual dog racing event hosted by local people who hunt wildlife in the area. They make fires and on certain occasions leave the area exposed. This has the potential to cause wild fires. The issue was reported to the local police at Viljoensdrift however nothing was done.	Mr	James Reynders	Landowner and Leasee on Farm Bankfontein 9	20 January 2021	Focus Group Meeting	Noted. Copper Sunset’s Mine Manager has approached these people in the past and when asked they just ignore the mine. They indicate that it’s a government property. This is a big concern for the mine and aims to work with all surrounding landowners to prohibit such activities from taking place. The issue has also been raised with Eskom as it is their land which is being utilised for the illegal activity.
It should be noted that the Lethabo Power Station is built between two existing earth-faults. This will affect the sand mining activities as the earth fault is running along the current mining operations and extending to the proposed extension area. There is currently a sink-hole within the wetland area on Eskom land. The wetland poses a safety risk as it is prone to veld fires. In 2020, there was a massive	Mr	Pieter Müller	Eskom Lethabo Power Station 1814	26 January 2021	Focus Group Meeting	Thank you for your comment which has been noted. Copper Sunset will implement all required health and safety measures to manage veld fires in their mining area by ensure fire breaks are correctly implemented and maintained. Collaboration with all landowners to mitigate such issues from occurring in the area will be undertaken.

ISSUE OR CONCERN	CONTRIBUTOR			DATE OF CONTRIBUTION	MEANS OF CONTRIBUTION	RESPONSE
veld fire in the area that occurred and the case was taken to court and both Eskom and the landowner were found to be at fault as the fire-breaks were not properly implemented. The veld fires burnt the entire wetland area and resulted in an impact on the biodiversity. As such, Eskom has implemented a Disaster Management Plan and Emergency Response Plan as per the Western Cape guidelines which must include all landowners in order to respond promptly to veld fires should they occur.						
Hunting of animals is an issued for the Eskom Lethabo Power Station. People are putting snare-traps in the wetland area and around the dumps. The Free State Conservation Agency has been contacted regarding the hunting issue. Security needs to be improved and Eskom will take this issue further with the Free State Conservation Agency.	Mr	Pieter Müller	Eskom Lethabo Power Station 1814	26 January 2021	Focus Group Meeting	Copper Sunset appreciates the effort to engage with the Free State Conservation Agency and will be available to participate in Future Forums to be established by Eskom to prevent hunting in the mining areas.
Public Participation						
I assume if COVID-19 lockdown national regulations continue, FGMs [Focus Group Meetings] will be conducted as part of the Public Participation Process?	Ms	Kim McCann	New Vaal Colliery	20 January 2021	Focus Group Meeting	Agreed. Focus Group Meetings (FGMs) will be held in compliance to all COVID-19 national regulations and associated restrictions as part of the Health and Safety Measures to mitigate risks associated with public meetings.
Heritage Impact Assessment						
The SAHRA Archaeology, Palaeontology, Meteorite (APM) Unit notes that the HIA [Heritage Impact Assessment] will be undertaken as part of the EIA phase. Further comments will be issued upon receipt of the draft EIA with all associated appendices and the HIA inclusive of a Archaeological Impact Assessment (AIA) and field-based Palaeontological Impact Assessment (PIA).	Mr	Sityhilelo Ngcatsha	South African Heritage Resources Agency	16 March 2021	Email	Thank you for your email. The HIA and PIA has been appended to this report as Appendix L and will be submitted to the South African Heritage Resource Authorities (SAHRA).
EIA and Specialist Report						
Availing of the draft report, as well as all specialist studies in electronic format as well as any GIS related data (shapefiles) based on modelled predictions and layout plans.	Mr	Jan Venter	Department of Agriculture, Rural Development, Land and Environmental Affairs (DARDLEA)	26 March 2021	Email	The draft Environmental Impact Assessment (EIA) and associated appendices will be made available for public comment for a period of 30 days (08 July to 10 August 2021).

ISSUE OR CONCERN	CONTRIBUTOR			DATE OF CONTRIBUTION	MEANS OF CONTRIBUTION	RESPONSE
Water Resources, Contamination and Shortages						
It must also be considered that the restrictive layers, which prevented the water from leeching out of the profile does not exist anymore. No sub-surface layers that prevent the water from leeching out of the profile. The water is now outside the reach of the plant and the possibility of the profile obtaining field capacity regarding water availability is very limited. On the other hand, the water will leech through the profile reaching the overburden and decanting upwards to the plant with unwanted toxic chemicals.	Mr	Jan Venter	Department of Agriculture, Rural Development, Land and Environmental Affairs (DARDLEA)	26 March 2021	Email	The proposed project is for a sand mine and therefore the depth of mining will not exceed 5 m. The proposed project activities will not have an impact on groundwater.
Containment of grey surface water and sub-surface water.						All water that will be discharged from the mine will be contained via stormwater management structures and then allowed to discharge to the stream. Silt traps will be installed to prevent siltation of the nearby streams.
Impact on water sources in view of possible spillage.						Mitigation measures have been included for the containment of any hydrocarbon spillage that may occur as a result of the operation of the mine. Spillages will be cleaned up as soon as possible and spill kits will be placed around the areas where machines are working, or hydrocarbons are being stored.
Cut-off drains, which prohibits surface water as well as sub-surface water from flowing outside the relevant site. Each site / company must cater for his or her own grey water. If a cut-off drain is not installed the surface water and especially the sub surface water can move laterally underground to other waterways, streams, wetlands and settlements						A surface water specialist study was undertaken to assess the impacts the sand mine will have on the environment. All potential impacts to the surface water resources have been assessed and mitigation measures proposed to reduce these impacts. The following mitigation measures have been proposed for the management of surface water: • Runoff from dirty areas should not be allowed to flow into the stream, unless the Department of Water and Sanitation discharge authorisation and compliance with relevant discharge standards as stipulated in the National Water Act (NWA) is obtained; • The water quality monitoring program provided in this report should be adhered to for monitoring water resources within and in close proximity to the study area to allow detection of any contamination arising from operational activities; • The management of general and other forms of waste must ensure collection and disposal into clearly marked skip bins that can be collected by approved contractors for disposal to appropriate disposal sites;

ISSUE OR CONCERN	CONTRIBUTOR			DATE OF CONTRIBUTION	MEANS OF CONTRIBUTION	RESPONSE
						• The overall housekeeping and storm water system management (including the maintenance of berms, conveyance channels and clean-up of leaks) must be maintained throughout the life of mine; • The hydrocarbon and chemical storage areas and facilities must be located on hard-standing area (paved or concrete surface that is impermeable), roofed and bunded in accordance with SANS1200 specifications. This will prevent mobilisation of leaked hazardous substances; • Training of mine personnel and contractors in proper hydrocarbon and chemical waste handling procedures is recommended; and • Vehicles must only be serviced within designated service bays.
Impact on Agricultural Activities						
Possible impact on agriculture activities or nearby agricultural livelihoods. Impact on existing or future agriculture projects, source information from relevant Government Sector Departments.	Mr	Jan Venter	Department of Agriculture, Rural Development, Land and Environmental Affairs (DARDLEA)	26 March 2021	Email	The land capability is dominated by Class III and Class IV. Where Class III has a potential for intensive cultivation and Class IV is generally not suitable for agriculture but has a high use potential for pastures, rangeland, forest land or wildlife for food, and cover. The current dominant land use is intensive cultivation and cattle grazing. The effect of mining in the region will result in a loss of cultivated farmland as well as cattle farming land which will result in economical agricultural income losses. The potential impact due to the sand mining activities on the soil, land use, and land capability is major to moderate if mismanaged. It should, however, be noted that the area proposed for sand mining is located within the Seriti's Mining Right Area and therefore this area may potentially be mined by Seriti for coal in the future.
Soil Impact Assessment						
The primary and secondary impact in our natural resources especially soils.	Mr	Jan Venter	Department of Agriculture, Rural Development, Land and Environmental Affairs (DARDLEA)	26 March 2021	Email	Thank you for the comment it is noted.
From an agriculture point of view our interest is in the topsoil's ranging from the surface up to 1.2 meters deep or up to the restrictive layer, for example at least horizons A, B and C (subsoils). This is where all the interaction microorganisms, chemical interaction and water movement takes place ensuring that the plant receive the nutrients and available water through chemical interaction. If there is water in the soil profile, not all the water is available to the plant. The profile must at least reach						During the operational phase, various activities may impact the soil, land use and land capability other than removing the sub-soil (sandmining). The soil depth will decrease, therefore soil water holding capacity, fertility, vegetation, crop potential and land capability will also reduce. This includes changes to the natural soil physical, chemical and biological activities which therefore changes the land use and capability. When the areas are not well maintained, erosion may occur and result in sedimentation and changes to the land uses, such as wetlands. The impacts are anticipated to be major, however; with the implementation of recommended mitigation measures, the impact will be reduced to moderate.

ISSUE OR CONCERN	CONTRIBUTOR			DATE OF CONTRIBUTION	MEANS OF CONTRIBUTION	RESPONSE
field capacity before water becomes available.						To reduce the impact, it is proposed that topsoil will be stripped and stockpiled prior to the sand being abstracted. Concurrent rehabilitation will also be undertaken to minimise the impact on the soil environment.
Various homogeneous soil type must preferably be stockpile together.						All topsoil will be stockpiled prior to the mine abstracting the soil.
The method of stripping the soils is very important, less rehabilitation cost when reseeding thus reaching the necessary vegetation cover that is required, it is also important to rehabilitate the stockpiles as soon as possible therefore preventing unnecessary erosion on the stockpiles.						Sand mining will cease once the resource has been extracted. Concurrent rehabilitation will be implemented during the sand mining process. The areas which have been mined of sand will be backfilled with the waste material (pebbles and stones) from the screening plant which will be covered with topsoil stockpiled during the operational phase. The stockpiles will not be vegetated due to the short turnaround of sand mining. The area will be levelled and then contoured to avoid ponding of water. The topography is anticipated to be slightly lower as a result of the removal of sand. The area will then be allowed to naturally re-vegetate. Where vegetation is not being well established, an indigenous seed mix will be utilised to improve vegetation establishment where required.
Current Land Use						

Current land use zonings and alignment thereof with regards to the relevant legislations such ACT 70-1970, CARA Act 43 of 1983, Spatial Planning and Land Use Management Act, 2013, historical land uses are not always up to date or compliant with current land uses.	Mr	Jan Venter	Department of Agriculture, Rural Development, Land and Environmental Affairs (DARDLEA)	26 March 2021	Email	The current land use of the proposed Copper Sunset Mining Right Extension Area (MREA) was identified by aerial imagery during the desktop assessment and verified during the field assessment. The land uses were described as:
						• Predominantly:
						  ○ Cultivated land; and
						  ○ Grassland.
						• Minor Areas:
						  ○ Forested land;
						  ○ Waterbodies;
						  ○ Wetlands;
						  ○ Mines and quarries;
						  ○ Built-up area; and
						  ○ Shrubland.
						A site visit was conducted to verify the land use of the area proposed to be mined.
						The Free State Biodiversity Plan (Collins, 2016) is a spatial tool that forms part of the national biodiversity planning tools and initiatives that are provided for in national legislation and policy. The Free State Biodiversity Plan was published in 2016, and like those of the other provinces, identifies and maps terrestrial categories with associated land-use and management guidelines. The categories are divided into Protected Areas (PACBA, Ecological Support Areas, Other Area and Degraded Area).

ISSUE OR CONCERN	CONTRIBUTOR			DATE OF CONTRIBUTION	MEANS OF CONTRIBUTION	RESPONSE
						The western section of the proposed Copper Sunset MREA is predominantly classified as Degraded Land, with the remaining area classified as ESA1 (sites with minimal degradation) and ESA2 (sites with degradation, i.e., they can be totally degraded, but not totally transformed). The eastern section of the MREA is predominantly classified as ESA2, with smaller areas classified as ESA1.
Geo- Tech Studies						
The geo-tech studies focus only on the geological aspects etc.	Mr	Jan Venter	Department of Agriculture, Rural Development, Land and Environmental Affairs (DARDLEA)	26 March 2021	Email	No impact to the groundwater or geotechnical environment is anticipated to occur as a result of the sand mine.
Chemicals						
Chemical fallout with regards to surrounding areas.	Mr	Jan Venter	Department of Agriculture, Rural Development, Land and Environmental Affairs (DARDLEA)	26 March 2021	Email	No chemical fall out is anticipated to occur as a result of the sand mine.

11 Item 3(i): The Environmental Attributes associated with the Development Footprint Alternatives

This section provides a description of the baseline environment associated with the Project area and region (where relevant). The purpose of understanding the environmental baseline conditions relates to the potential of the project to impact on the existing environment, and the potential for existing environmental aspects to influence a proposed development in terms of design, location, technology, and layout.

Several specialist studies were undertaken as part of the environmental regulatory process during the EIA phase for the proposed Project, as shown in Table 11-1 below.

Table 11-1: Specialist reports and associated appendices

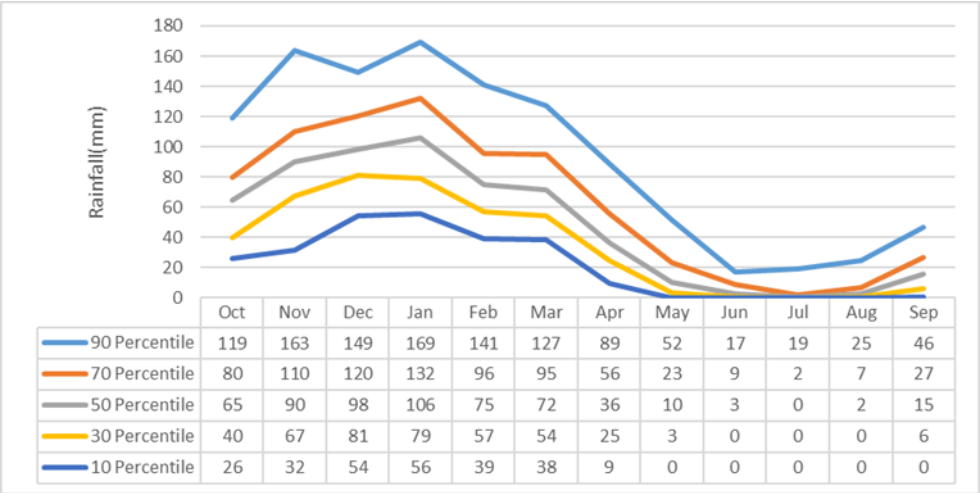
Specialist Study	Appendix
Soil, Land Use and Land Capability Assessment	Appendix D
Hydropedological Assessment	Appendix E
Surface Water Assessment	Appendix F
Fauna and Flora Assessment	Appendix G
Wetland Assessment	Appendix H
Aquatics Impact Assessment	Appendix I
Air Quality Assessment	Appendix J
Noise Assessment	Appendix K
Heritage Assessment	Appendix L
Social Assessment	Appendix M
Traffic and Transport Assessment	Appendix N
Rehabilitation and Closure Assessment	Appendix O

The subsection below provides the baseline bio-physical and socio-economic environmental conditions currently present on the Project site. The information provided in this section has been obtained from the abovementioned specialist reports.

11.1 Climate

The MREA is characterised by a typical continental climate of warm-hot summers and cool-cold winters (South African Weather Bureau, 1986). The climate is classified as Cwb (Oceanic Subtropical Highland Climate) by the Köppen-Geiger system (Köppen & Geiger, 1936). The Mean Annual Precipitation (MAP) for quaternary catchments C22F, C22G and C22K is 655 mm, 613 mm and 644 mm, respectively (WRC, 2015). The combined average MAP for the three quaternary catchments is likely to be distributed as indicated in Figure 11-1. The wettest

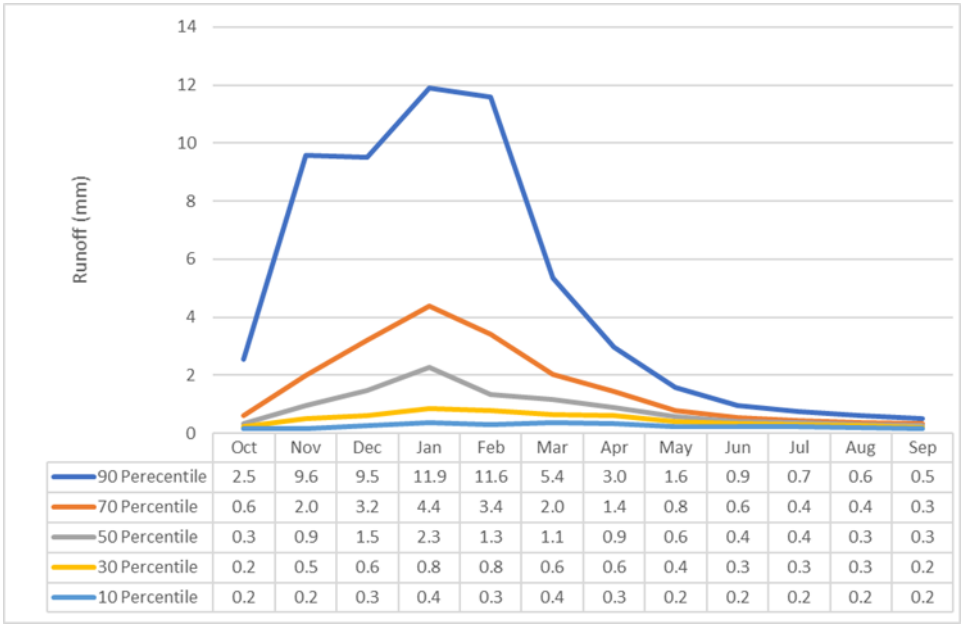
month is January with a 90th percentile of 169 mm and a 10th percentile of 56 mm. This implies that the region experiences moderate to high rainfall.



	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
90 Percentile	119	163	149	169	141	127	89	52	17	19	25	46
70 Percentile	80	110	120	132	96	95	56	23	9	2	7	27
50 Percentile	65	90	98	106	75	72	36	10	3	0	2	15
30 Percentile	40	67	81	79	57	54	25	3	0	0	0	6
10 Percentile	26	32	54	56	39	38	9	0	0	0	0	0

Figure 11-1: Average Monthly Rainfall Distribution

The Mean Annual Runoff (MAR) depth for the area was calculated to be 27.72 mm. This runoff accounts for approximately 4% of the MAP for the area. The 90th (extreme flow) and 70th (normal flow) percentiles of runoff during the month of January are 11.9 mm and 4.4 mm, respectively. The MAR for quaternary catchments C22F, C22G and C22K is likely to be distributed as indicated in Figure 11-2.



	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
90 Perecentile	2.5	9.6	9.5	11.9	11.6	5.4	3.0	1.6	0.9	0.7	0.6	0.5
70 Percentile	0.6	2.0	3.2	4.4	3.4	2.0	1.4	0.8	0.6	0.4	0.4	0.3
50 Percentile	0.3	0.9	1.5	2.3	1.3	1.1	0.9	0.6	0.4	0.4	0.3	0.3
30 Percentile	0.2	0.5	0.6	0.8	0.8	0.6	0.6	0.4	0.3	0.3	0.3	0.2
10 Percentile	0.2	0.2	0.3	0.4	0.3	0.4	0.3	0.2	0.2	0.2	0.2	0.2

Figure 11-2: Monthly Percentile Distribution of Runoff

The Mean Annual Evaporation (MAE) for quaternary catchments C22F, C22G and C22K is 1 650 mm, 1 600 mm, and 1 625 mm, respectively (WRC, 2015). The region experiences higher evaporation than precipitation, giving rise to dry winters and wet summers with a negative

natural water balance. The average monthly distribution of potential evaporation and rainfall for the quaternary catchments can be seen in Figure 11-3

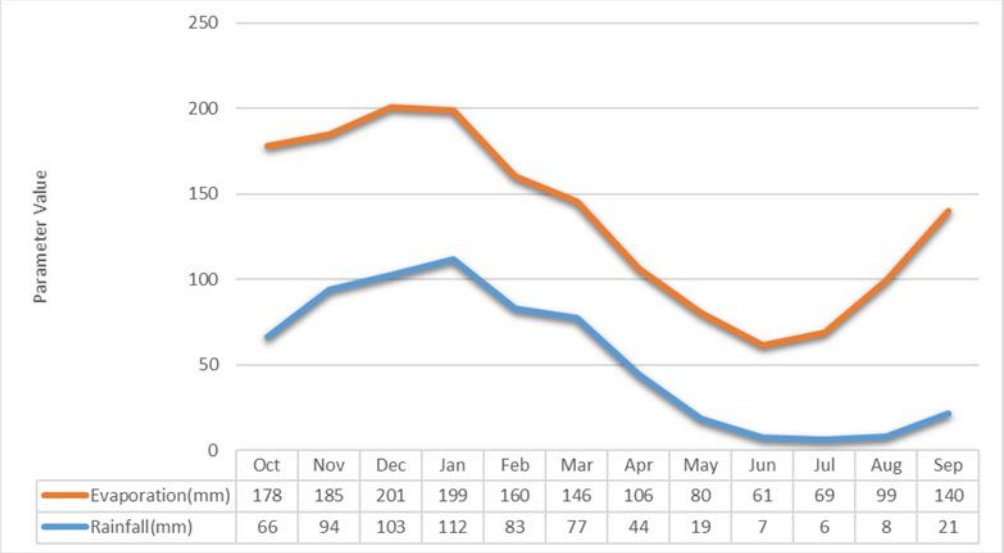


Figure 11-3: Monthly Distribution of Potential Evaporation and Rainfall

11.1.1 Temperature and Humidity

The monthly temperature and humidity records (three-year average) for the Project area are presented in Table 11-2 and Figure 11-4 below. The data indicates that the monthly temperature average varied between 10°C - 22°C. Ambient temperatures were observed to be higher during the summer months. The relative humidity records ranged between 41% and 58% with June as the highest humidity month and December presenting the lowest level at 41%.

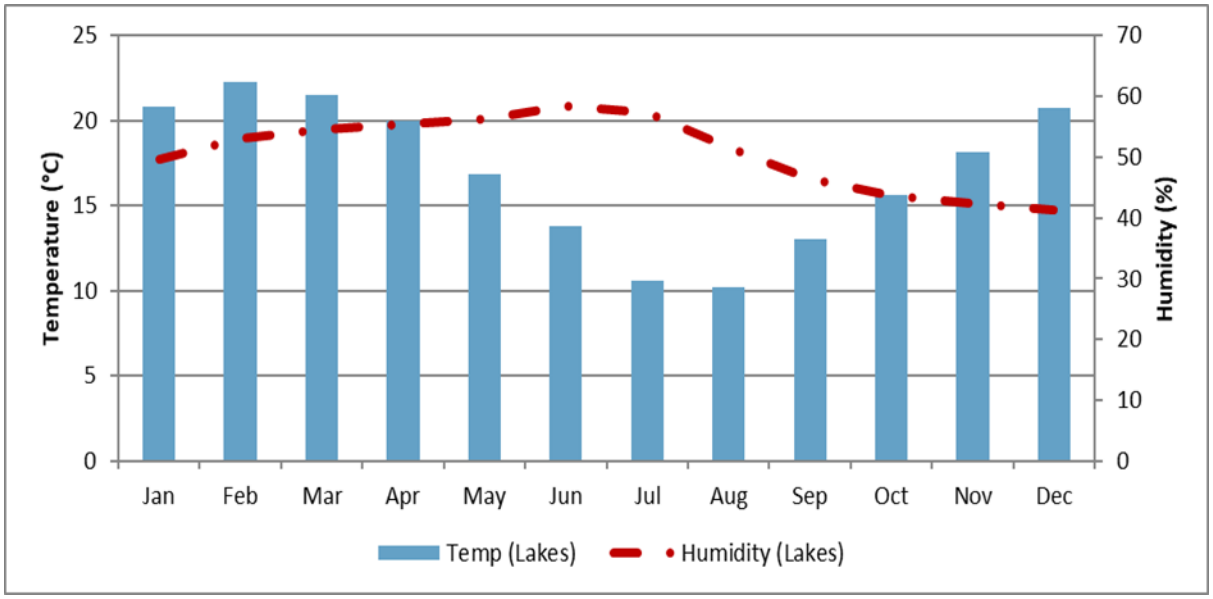


Figure 11-4: Monthly Temperature and Humidity (2017 – 2019)

11.1.2 Rainfall

The total monthly rainfall records (three-years average) are provided in **Error! Reference source not found.** and **Error! Reference source not found.**. Based on the rainfall data, the summer months (December – February) received most of the rainfall (i.e. >62%) with December and February being the peak rainfall months (**Error! Reference source not found.**), followed by Spring with 22% and Autumn with 15%. While winter (June – August), received the least rainfall.

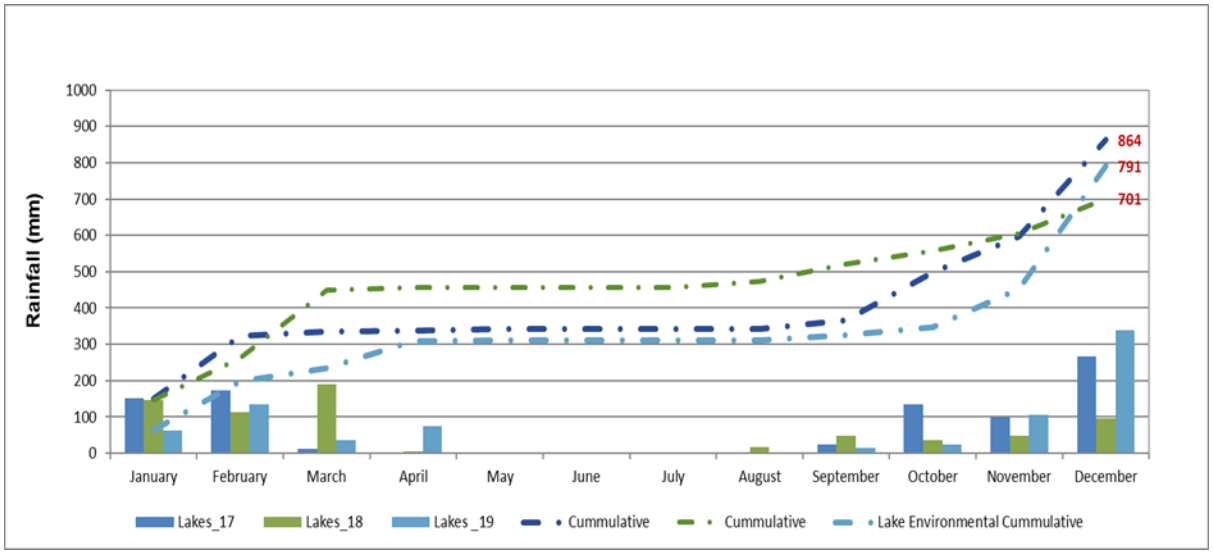


Figure 11-5: Rainfall (2017 – 2019)

Table 11-2: Climate Statistics

Parameters	Three-year average (2017 – 2019)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Temp. (◦C)	21	22	22	20	17	14	11	10	13	16	18	21	17
Total Mon. Rain (mm)	121	140	79	28	1	0	0	6	28	65	83	234	785
Rel. Hum. (%)	50	53	55	55	56	58	57	52	46	44	42	41	51

(Source: Lakes Environmental Data)

11.2 Topography and Slope

The topography of the proposed MREA ranges from higher elevations in the center of the extension area to lower-lying areas in the east and west. The MREA can be described as uneven slopes with moderate undulating plains running towards the low-lying valleys, the Vaal River on the eastern side and the Taaibosspruit on the western side of the MREA. The overall elevation of the MREA is approximately 1 425 -1 504 meters above mean sea level (mamsl)

(Figure 11-6). The elevation difference gives rise to a slope of between 0 and 2 degrees (°), with a ridge near the Vaal River floodplain and towards the Taaibosspruit having a slope of 3 - 4° (Figure 11-7).

11.3 Geology

The geology and soils are typically of the Plinthic Catena. The western section of the proposed MREA falls predominantly on fine- to coarse-grained sandstone, shale, and coal seams, with a minor area in the northern corner consisting of soil cover, alluvium and a network of dolerite sills, sheets and dykes, mainly intrusive into the Karoo Supergroup within the southern corner.

The eastern section of the MREA consists predominantly of soil cover, with minor areas consisting of fine- to coarse-grained sandstone, shale and coal seams and alluvium, quartzite and conglomerates along the Vaal River. Within the eastern section, a small area consists of a network of dolerite sills, sheets and dykes, mainly intrusive into the Karoo Supergroup (Figure 11-8). The dominant sandstone and shale geology of the MREA attribute to the sandy-loam apedal nature of the soils found during the site assessment. Whereas, the quarts, conglomerates and network of dolerite sills, dykes and sheets contribute to the heavy clayey, vertic soils along the rivers and wetland systems.

The geology of the MREA include:

- Aeolian sand adjacent of the Vaal River;
- Alluvium associated with the Vaal River and Taaibosspruit;
- Fine to coarse grained sandstone, shale and coal seams dominating the western portion;
- Network of dolerite sills, sheets and dykes, mainly intrusive into the Karoo Supergroup within the western corner of the MREA; and
- Soil cover dominating the eastern section of the MREA (Figure 11-8).

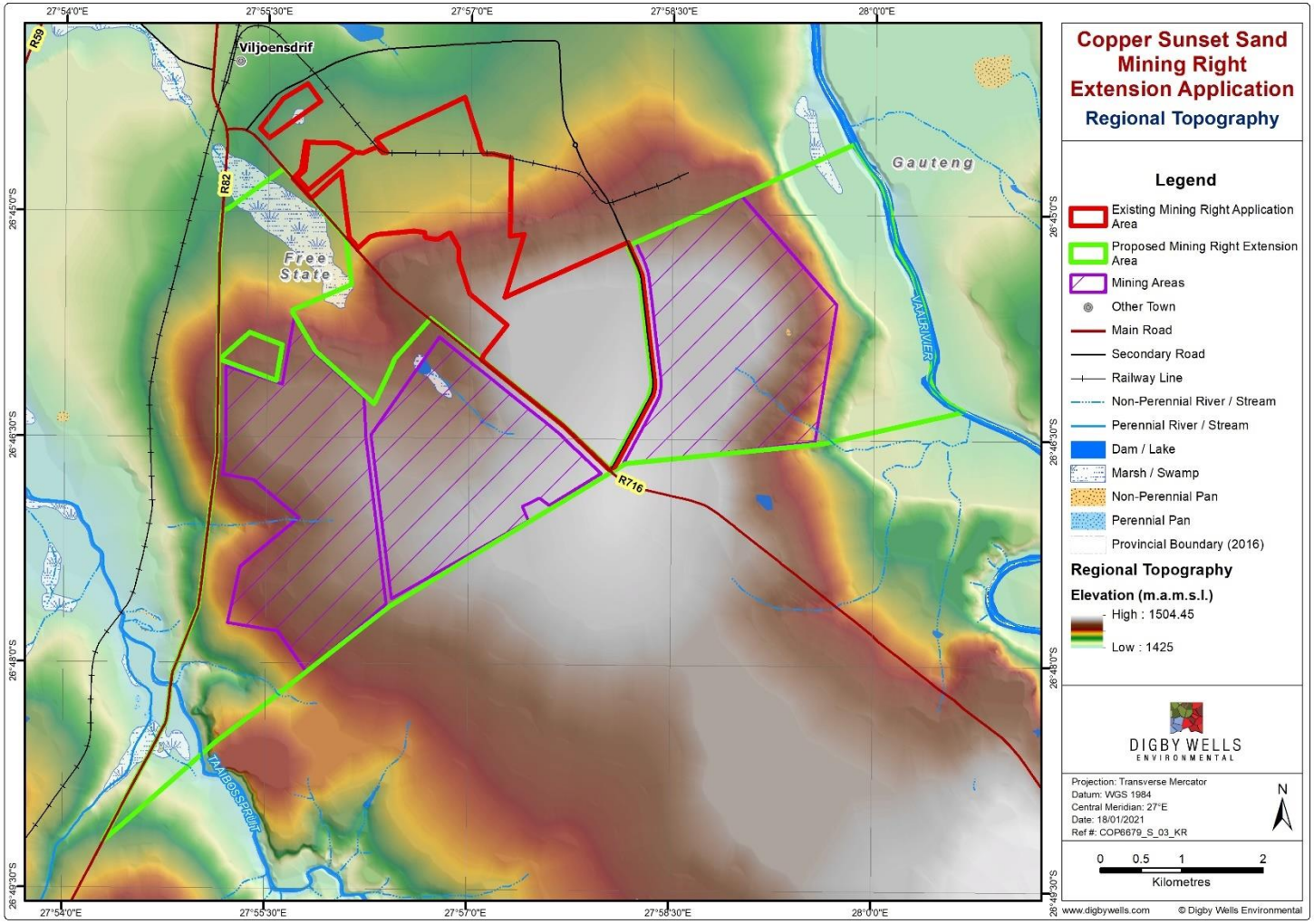


Figure 11-6: Topographical Map of the Project Area

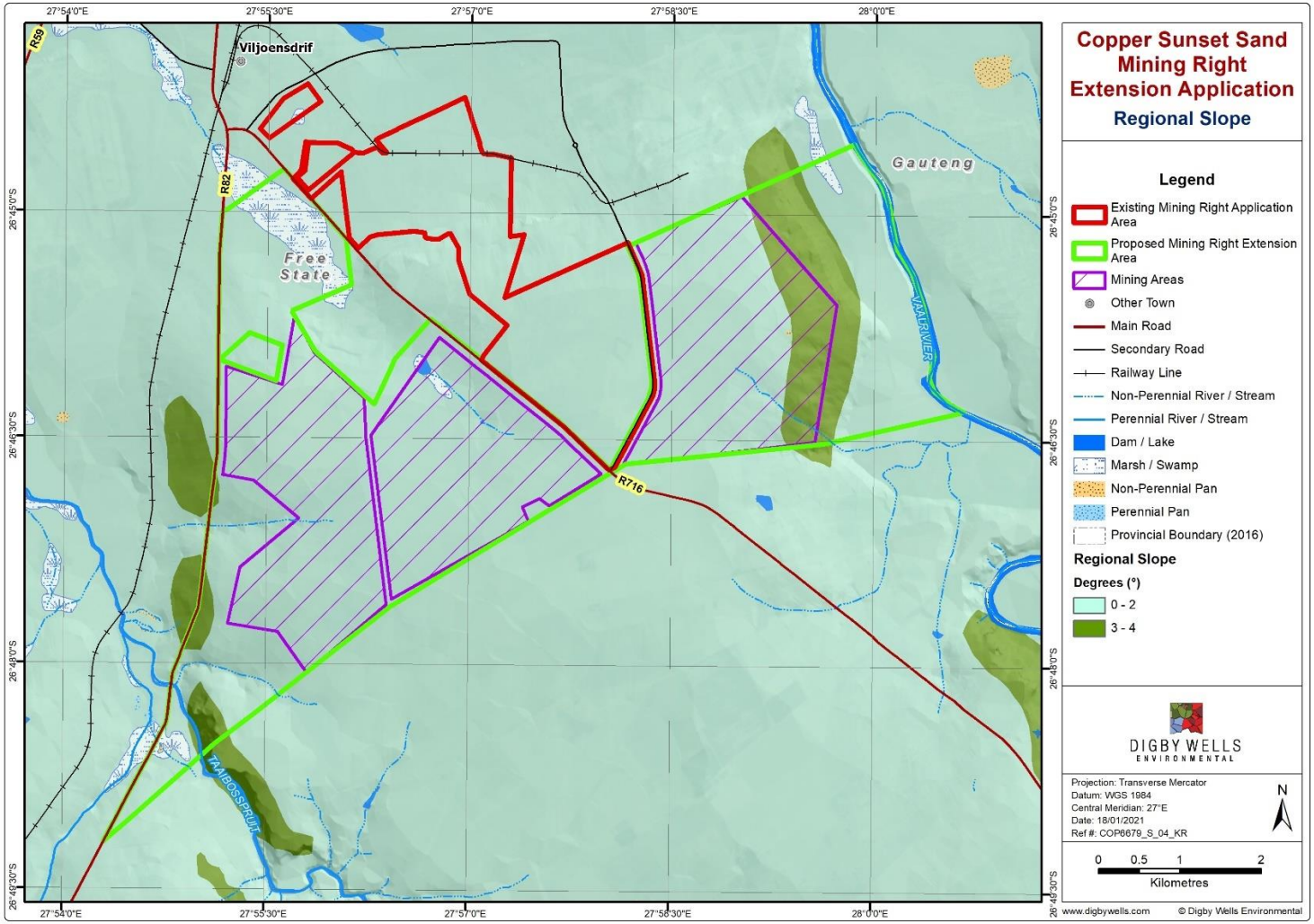


Figure 11-7: Slope Model of the Project Area

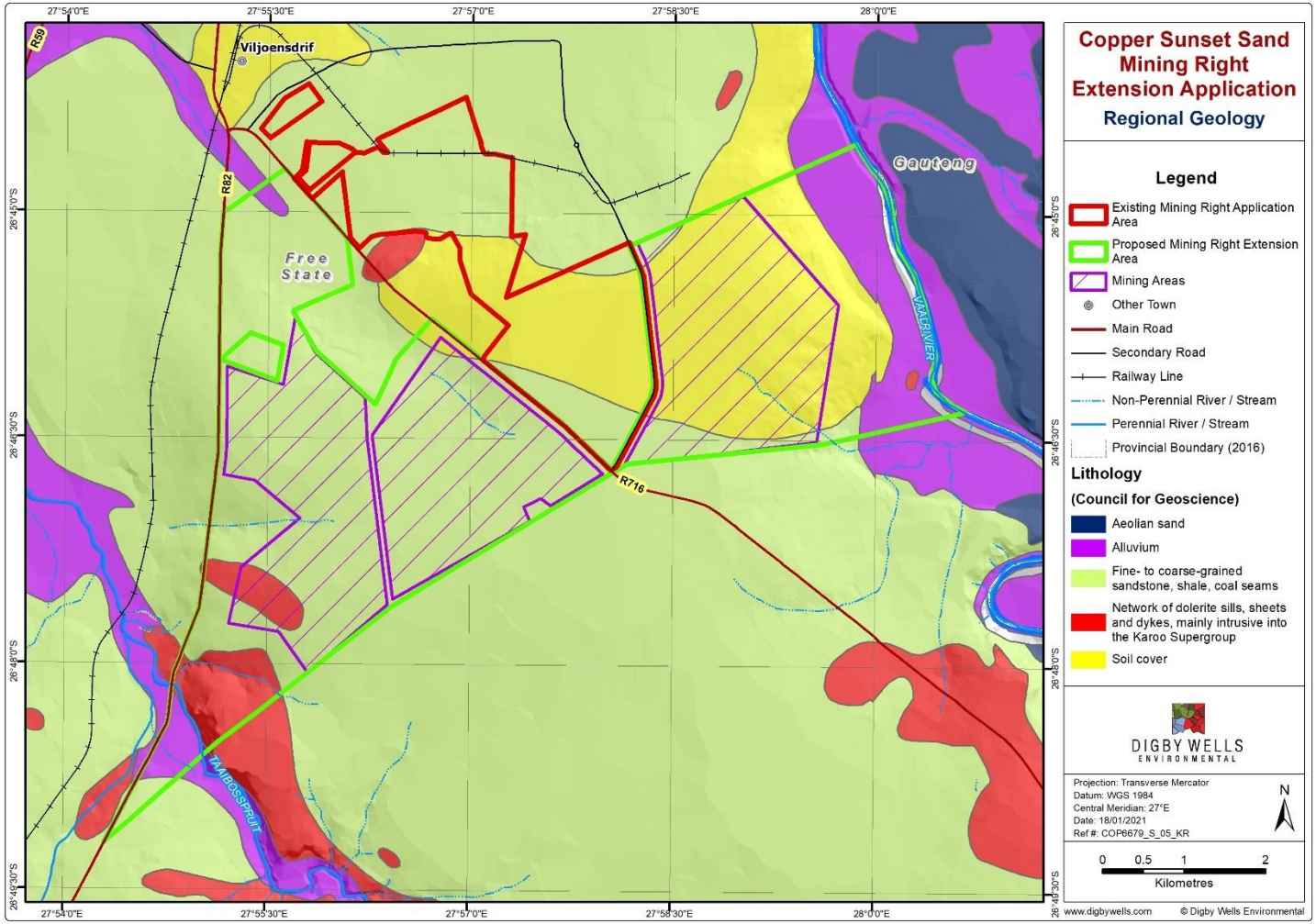


Figure 11-8: Regional Geology

11.4 Soils, Land Use and Land Capability

The Soil, Land Use and Land Capability Assessment undertaken during the EIA Phase is appended to this report as . The subsections below provide a summary of the baseline findings.

11.4.1 Land Type

Existing Land Type and soil data was used to obtain generalised soil patterns and terrain types for the Project area. Land Type data exists in the form of published 1:250 000 maps. These maps indicate delineated areas of similar climate and pedo-systems, which include areas of uniform terrain and soil patterns (Land Type Survey Staff, 1972 – 2006).

Baseline data suggested that the land types for the proposed MREA are predominantly of the Ca1 type, with a small area on the western side of the site as Bb23 and Dc7 soil types. The main land types and dominant soil forms are briefly described below in Table 11-3, and illustrated in Figure 11-9 below (also attached as Appendix B, Plan 6).

Table 11-3: Land Type and Dominant Soil Forms

Land Type	Soil Forms	Geology	Characteristics
Bb23 (section in western extension area)	• Avalon • Clovelly • Estcourt • Glencore • Glenrosa • Hutton • Katspruit • Kroonstad • Longlands • Mispah • Rensburg • Sterkspruit • Valsrivier • Wasbank • Willowbrook	• Plinthic Catena; • Ecca shale and sandstone with occasional dolerite sills; • Pretoria shale and quartzite with diabase sills; • Sporadic occurrence of Ventersdorp lava, Witwatersrand quartzite, dolomite and Black Reef quartzite; and • Occasional small pans in the Ecca Group.	• Red and yellow, dystrophic/mesotrophic not widespread; and • Apedal soils with plinthic subsoils (plinthic soils comprise >10% of the land type; red soils comprise <33% of the land type).

Land Type	Soil Forms	Geology	Characteristics
Ca1 (Dominant)	• Avalon • Clovelly • Estcourt • Fernwood • Glencore • Hutton • Kroonstad • Longlands • Rensburg • Valsrivier • Wasbank & Westleigh	• Plinthic Catena; • Upland duplex and/or margalitic soils common; and • Sandstone and grit of the Ecca Group, Karoo Sequence.	• Land type qualifies as Ba-Bd, but >10% occupied by upland duplex/margalitic soils.
Dc7 (small section in western corner)	• Valsrivier • Serkspruit • Oakleaf • BonheimArcadia • Avalon • Bonheim • Estcourt • Glenrosa • Hutton • Katspruit • Mayo • Milkwood • Mispah • Rensburg • Shortlands • Sterkspruit • Swartland • Valsrivier • Westleigh • Willowbrook	• Ecca shale and sandstone, with many dolerite sills. Sporadic occurrence of Basement Complex granite in the west; and • Occasional small pans occur.	• Either red or non-red duplex soils (sandier topsoil abruptly overlying more clayey subsoil) comprise >50% of land type; plus >10% occupied by black or red clays.

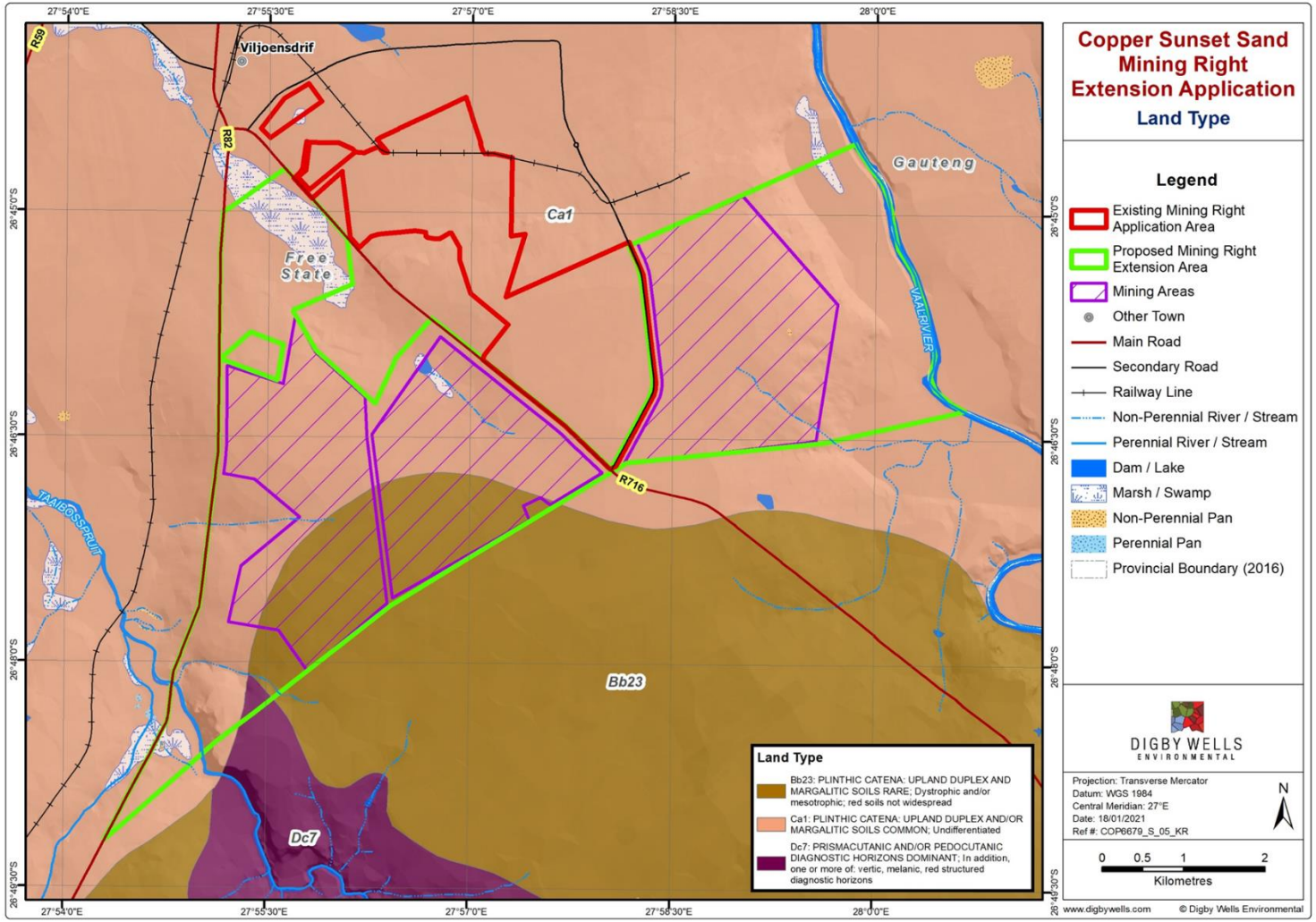


Figure 11-9: Land Type Map for Copper Sunset Mine

11.4.2 Soil Forms

The soil forms within the MREA are described in the subsections below. The following soil forms were identified and delineated within the MREA (Figure 11-10):

- Clovelly;
- Avalon;
- Katspruit;
- Mispah;
- Arcadia;
- Glencoe;
- Dresden;
- Hutton;
- Pinedene;
- Bloemdal;
- Garies;
- Longlands;
- Rensburg; and
- Witbank

Soil forms are conceptual generalizations based on specific soil properties. Each soil form is composed of soil horizons, uniquely combined, and integrated. The typical augured soil horizons were identified as:

- Orthic A-horizons, overlying Yellow-brown to Red Apedal B-horizons with a Plinthic B-horizon. These soils were deep, sandy-loam soils with increased clay content with depth;
- Vertic A-horizons overlying an unspecified material in the low-lying areas. These soils are high in clay content, young soils with evidence of emerging soil development in the form of colour variations and clay lamellae. These soils were mainly associated with wetlands and low-lying areas; and
- Shallow Orthic A-horizon overlying hard rock (dolerite). These soils were identified within the eastern area, between the floodplain and hillslope.

The Orthic A-horizons are generally low in organic carbon while the Apedal B-horizons consist of uniform yellow-brown to red, iron-rich pigmented chroma soils. The Apedal soils identified on-site are deep, sandy, well-drained soils that are generally low in organic carbon but are rather easily manageable soils for cultivation. Some areas within the eastern side showed limited soil depths with high volumes of peds (an individual, natural soil aggregate), gravel, and stones. These characteristics caused restricted handheld auguring, and will restrict rooting depth, and root development. This may limit the cultivation potential (decrease land capability) of the area and can lead to underestimated volumes of calculated soil volumes.

Clovelly and Avalon soils are typically deep soils, dominated by a yellow-brown Apedal (non-structure), sandy B-horizons with a clayey underlying material such as Soft-Plinthic. Clay content increases with depth, increasing the water holding capacity, organic material, and cation exchange capacity (CEC) of the soil, and therefore increasing the agricultural potential.

Katspruit, Longlands, Rensburg and Arcadia soils are typically associated with wetlands and low-lying areas, also known as hydromorphic soils. These soils are very high in clay content,

causing permanent, seasonal and/or temporary waterlogging. Waterlogged conditions create anaerobic soil conditions which in effect change the soil chemical and physical characteristics, therefore changing the hydrological functioning, vegetation type and biophysical nature of the area.

A large section of the MREA has historically been and are currently being impacted by agropastoral and mining activities. These activities cause changes to the soil physical, chemical and biological functioning, therefore changing the natural soil form to Witbank (man-made soils). The area has low vegetation cover, disturbed topographies, water ponding, increased surface runoff and increased Alien Invasive Plants (AIPs).

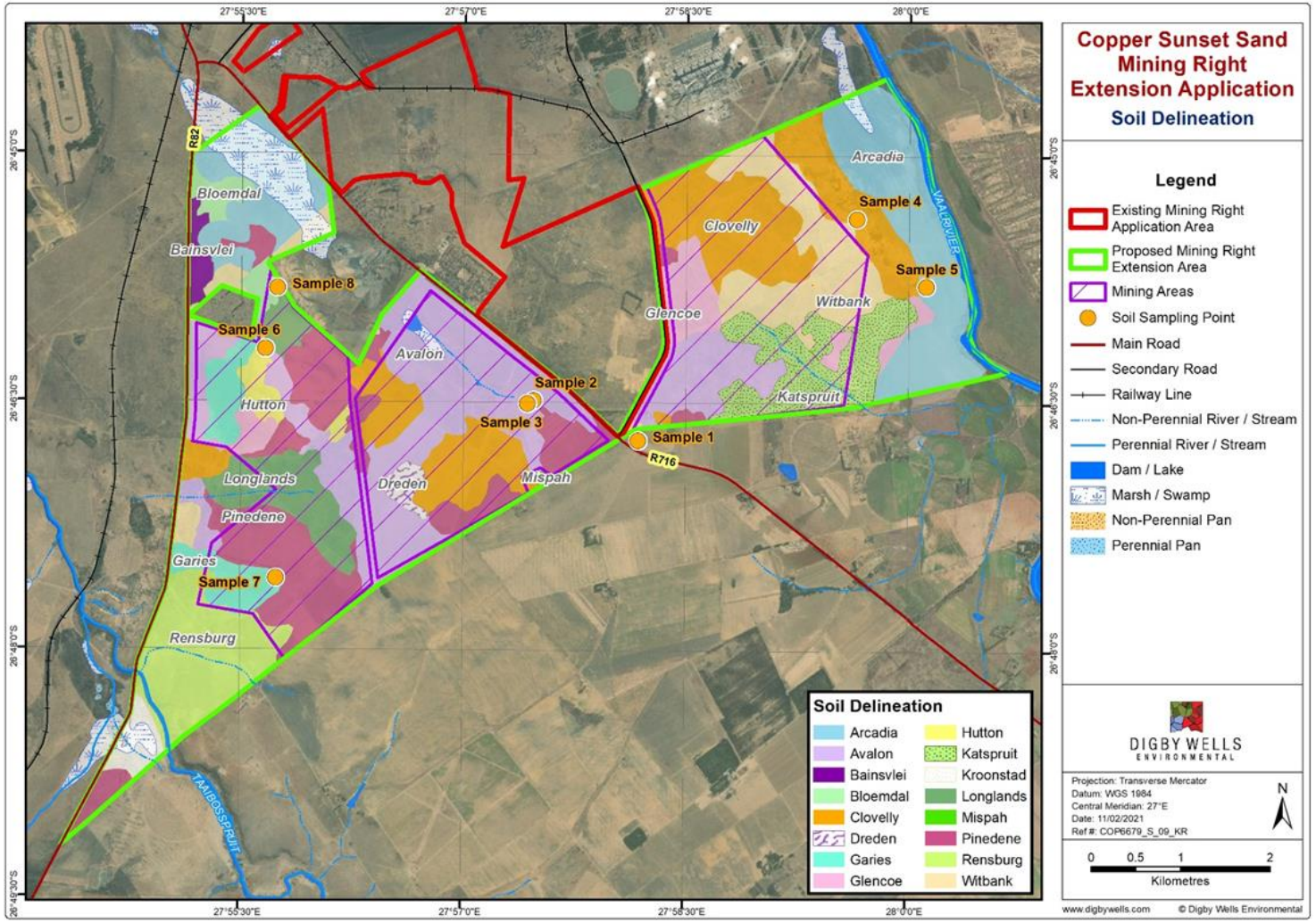


Figure 11-10: Soil Delineation

11.4.3 Land Capability

The land capability was determined by assessing a combination of soil type, terrain and climate features. Land capability is defined as the most intensive long-term sustainable use of land under rain-fed conditions (Soil Conservation Service: U.S. Department of Agriculture, 1973; Schoeman *et al.*, 2000).

The dominant land capability class in the MREA is Class III (Arable Land – Moderate Cultivation/Intensive Cultivation: Figure 11-11) which is not suitable for agriculture but has a high land use potential for pastures, woodland, rangeland, wildlife food or cover and a very small section of Class IV. A detailed breakdown is given below in Table 11-4.

Table 11-4: Land Capability Classification of Copper Sunset Mine Area

Class	Classification	Dominant Limitation Influencing the Physical Suitability for Agricultural Use
III (dominant)	Arable Land – Moderate Cultivation/Intensive Cultivation	Soils have severe limitations that reduce the choice of plants or require special conservation practices, or both.
IV (small section in western corner)	Arable Land – Moderate Grazing	Soils have severe limitations that will restrict choice of plants and will require very careful management

11.4.4 Land Use

The current land use of the proposed Copper Sunset MREA was identified by aerial imagery during the desktop assessment. The land use in the MREA is dominated by grassland and cultivated land (Figure 11-12; also attached as Appendix B, Plan 7). Other land use types identified include forested land, waterbodies, wetlands, mines and quarries, built-up areas and shrubland.

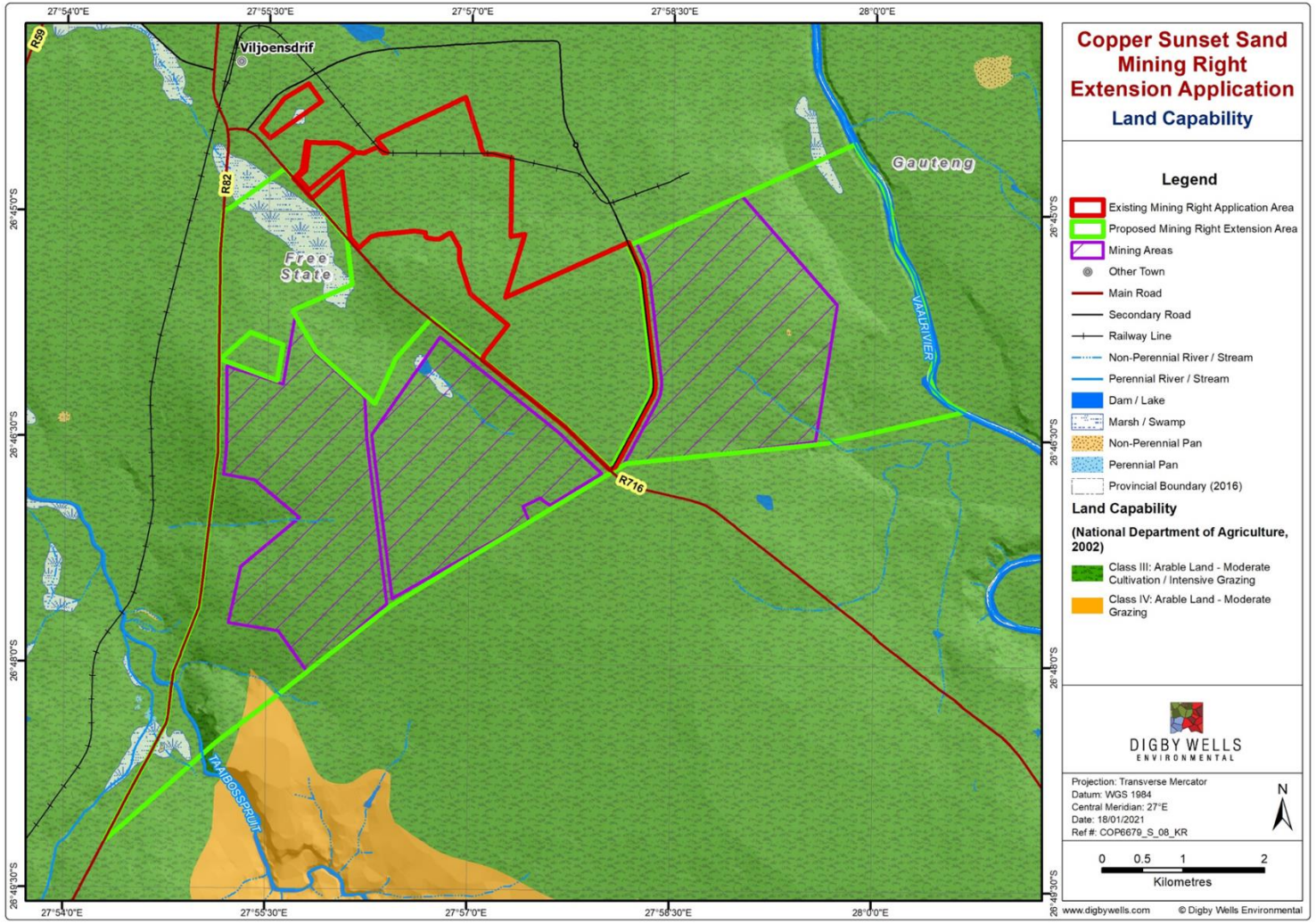


Figure 11-11: Land Capability Map

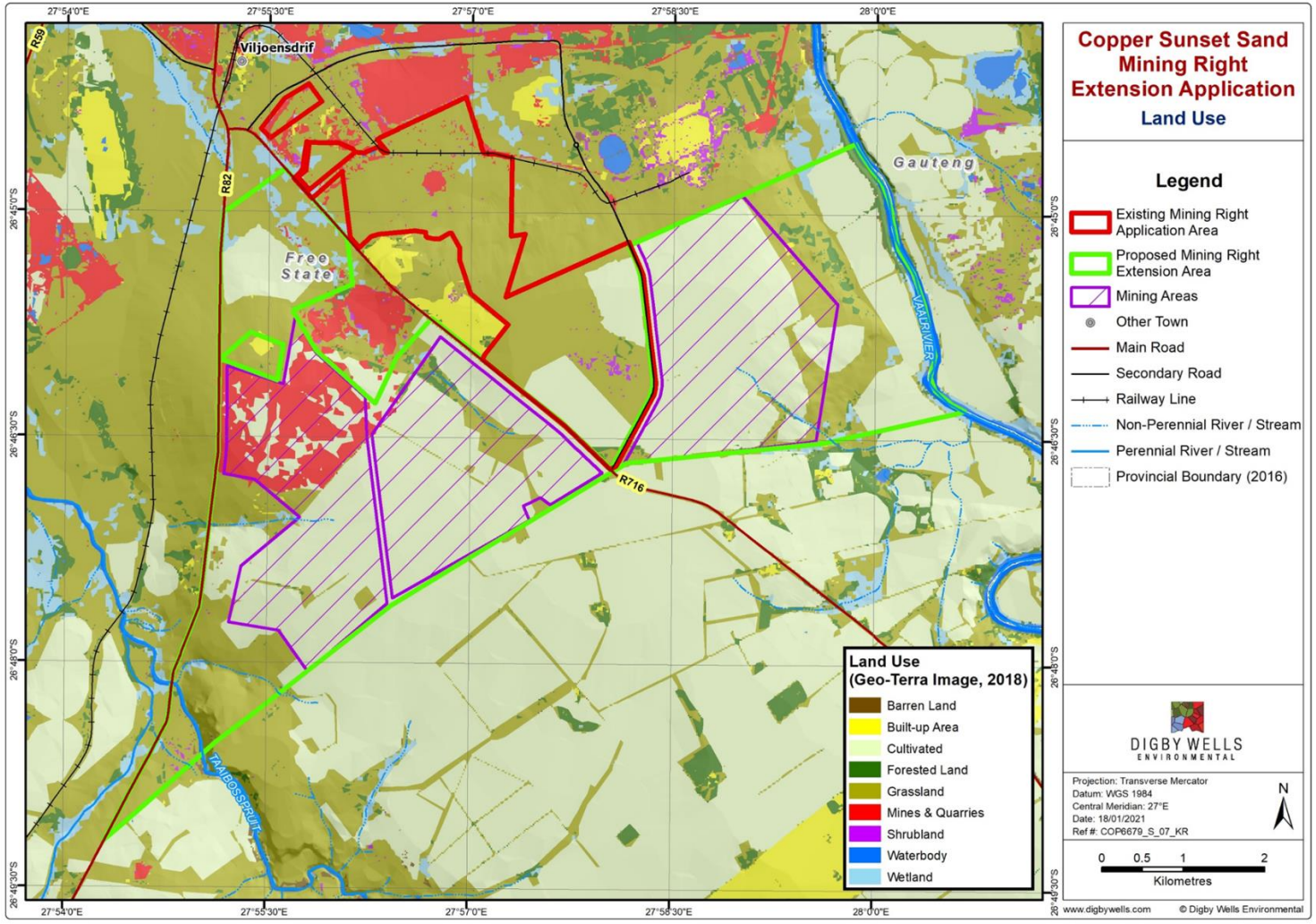


Figure 11-12: Land Use Map

11.4.5 Soil Chemical and Physical Characteristics

The results of the soil analysis for the representative samples taken during the September 2020 and January 2021 surveys are presented in Table 11-6. As a basis for interpreting the data, Soil Screening Values (SSV) and local soil fertility guidelines, together with the pH guidelines, are presented in Table 11-5 below. The soil sampling points selected for assessment are shown in Figure 11-10 above.

Table 11-5: Soil Fertility Guidelines

Guidelines (mg per kg)			Source
Macro Nutrient	**Low**	**High**	
Boron (B)	<0.5	>1.5	USA Guidelines, (Allison, et al., 1954)
Calcium (Ca)	<200	>3000	South Africa Guidelines, (NEM:WA 2008)
Copper (Cu)	<36.0	>190	Dutch Guidelines, (Dutch VROM, 2000)
Magnesium (Mg)	<50	>300	South Africa Guidelines, (NEM:WA 2008)
Organic Carbon (OC)	<2 %	>3 %	South Africa Guidelines, (du Preez, Mnkeni, & van Huyssteen, 2010)
Phosphorus (P)	<5	>35	South Africa Guidelines, (NEM:WA 2008)
Potassium (K)	<40	>250	South Africa Guidelines, (NEM:WA 2008)
Sodium (Na)	<50	>200	South Africa Guidelines, (NEM:WA 2008)
Zinc (Zn)	<140	>720	Dutch Guidelines, (Dutch VROM, 2000)
Electrical Conductivity (EC)	110 (mS/m)	570 (mS/m)	Australian Guidelines, (Department of Agriculture and Rural Affairs, 1986)
Cation Exchange Capacity (CEC)	5%	25%	Australian Guidelines, (Department of Agriculture and Rural Affairs, 1986)

pH					
Very Acid	**Acid**	**Slightly Acid**	**Neutral**	**Slightly Alkaline**	**Alkaline**
<4	4.1-5.9	6-6.7	6.8-7.2	7.3-8	>8

Table 11-6: Soil Physico-Chemical Properties

Sample ID	Dominant soil form	pH (KCl)	Electrical Conductivity (EC)	Soil Organic Carbon	Cation Exchange Capacity (CEC)	P (Bray1)	K	Na	Ca	Mg	C (WB)	NH_4-N	NO_3-N	Clay	Sand	Silt	Texture
			mS/m	%	cmol(+)/kg	%											
1	Avalon	4.44	-	0.88	-	20	87	6	207	50	0.51	2.29	3.35	8	91	1	Sand
2	Avalon	5.17	-	0.49	-	2	53	10	226	33	0.28	0.36	0.06	6	93	1	Sand
3	Avalon	4.86	-	0.75	-	32	86	7	216	48	0.44	0.19	0.31	6	93	1	Sand
4	Clovelly	4.51	-	0.86	-	67	51	5	190	25	0.50	0.75	0.28	8	91	1	Sand
5	Arcadia	4.80	-	1.94	-	2	43	61	271	68	1.13	1.51	0.22	9	87	4	Loamy-sand
6	Bloemdal	3.90	23	-	4.81	14.4	13.8	2.0	7.2	1.0	0.37	0.08	12.46	2.4	93.5	4.1	Sand
7	Garies	4.30	42	-	5.25	33.1	115.9	0.5	135.7	38.8	0.52	0.08	31.07	7.1	86.3	7.1	Loamy-sand
8	Pinedene	5.73	26	-	4.33	5.9	46.1	0.3	223.3	21.9	0.58	0.08	15.86	4.4	91.5	4.4	Sand

**Soil Samples 1 to 5 were taken during the first site visit in 2020, whereas Samples 6 to 8 were taken during the 2021 site visit period. Sample analysis were therefore done at two different laboratories.*

11.5 Hydropedology

A Hydropedological Assessment was undertaken during the EIA Phase and is appended to this report as .

11.5.1 Soil Form Distribution

As indicated in Figure 11-10 above, sixteen different soil forms were identified within the Copper Sunset MREA. Determined hydropedological soil types and associated soil forms and families are summarised in Table 11-7 and their distribution presented in Figure 11-13.

11.5.2 Conceptual Model of Hillslope Hydrological Processes

Hydropedological assessment indicates the prevalence of recharge at hillslope crests, interflow at soil/bedrock and variably at E/B and E/G Horizons within midslope positions and overland flow at the footslope (Figure 11-14). Since sand mining at the Copper Sunset MREA is proposed for depths not exceeding 5 m, soil/bedrock interflow pathways will least likely be interrupted within deep soils (>5 m). This implies that the soil/bedrock subsurface flows which are currently feeding the Vaal River and the Taaibosspruit will likely continue unhindered. Surface runoff or overland flow, at footslope positions of the Vaal River and the Taaibosspruit, will likely not be interrupted if proposed areas to be mined are adhered to (see Section 11.9.2 for delineated wetlands at the MREA). Interflow at soil E/B and E/G interfaces will likely be interrupted resulting in ponded water following excavations on mined-out strips and most of this water will be lost to evaporation.

Table 11-7: Soil Forms, Families and Hydrological Responses within the Copper Sunset MREA

Soil Form	Description	Soil Family	Observations	Hydrological Type
Clovelly	Dystrophic, Luvic B1 horizon	1200 Brereton	Deep (>1500 mm) unstructured well-drained characteristics	Recharge (Deep)
Katspruit	Non-calcareous G horizon	1000 Lammermoor	Poorly drained with relatively higher clay content	Responsive (Saturated)
Arcadia	Dark coloured, non-calcareous A horizon	1100 Lonehill	Poorly drained with relatively higher clay content	Responsive (Saturated)
Dresden	A horizon not bleached	1000 Tevreden	Shallow Orthic A horizon overlying a hard plinthic layer	Interflow (Soil/Bedrock)
Pinedene	Dystrophic, Luvic B1 horizon	1200 Jutland	Gradual transition from well-drained Orthic A & apedal B horizons to less permeable Unspecified material with signs of wetness	Interflow (Soil/Saprolite)
Garies	Non-luvic B1 horizon	1000 Nuwerus	Abrupt transition from apedal B to less permeable dorbank layer	Recharge (Shallow)
Rensburg	Non-calcareous upper G hroizon	1000 Greendale	Usually permanently saturated poorly drained wetland soil	Responsive (Saturated)
Bainsvlei	Dystrophic, non-luvic B1 horizon	1100 Morningside	Gradual transition from more permeable Orthic A to less permeable Soft Plinthic B horizon	Interflow (Soil/Bedrock)
Avalon	Dystrophic, Luvic B1 horizon	1200 Woodburn	Gradual transition from more permeable Orthic A to less permeable Soft Plinthic B horizon	Interflow (Soil/Bedrock)

Soil Form	Description	Soil Family	Observations	Hydrological Type
Mispah	Not bleached, non-calcareous A horizon	1100 Myhill	Shallow with a restricting water and rooting depth at 200 mm	Recharge (Shallow)
Glencoe	Eutrophic, luvic B1 horizon	3200 Vlakput	Gradual transition from more permeable Orthic A to less permeable Hard Plinthic B horizon	Interflow (Soil/Bedrock)
Hutton	Dystrophic, non-luvic B1 horizon	1100 Lillieburn	Deep (>1500 mm) unstructured well-drained characteristics	Recharge (Deep)
Bloemdal	Dystrophic, non-luvic B1 horizon	1100 Aandrus	Deep (>1500 mm) unstructured well-drained characteristics	Interflow (Soil/Bedrock)
Longlands	E horizon grey when moist	1000 Sherbrook	Poorly drained with relatively higher clay content	Soil (A, E and/or G) Interflow
Kroonstad	E horizon grey when moist	1000 Morgendal	Poorly drained with relatively higher clay content	Soil (A/E) Interflow
Witbank	Non-calcareous within 1500 mm of soil surface	1000 Thornlea	Compacted anthropic soils restrictive to water and root penetration	Recharge (Shallow)

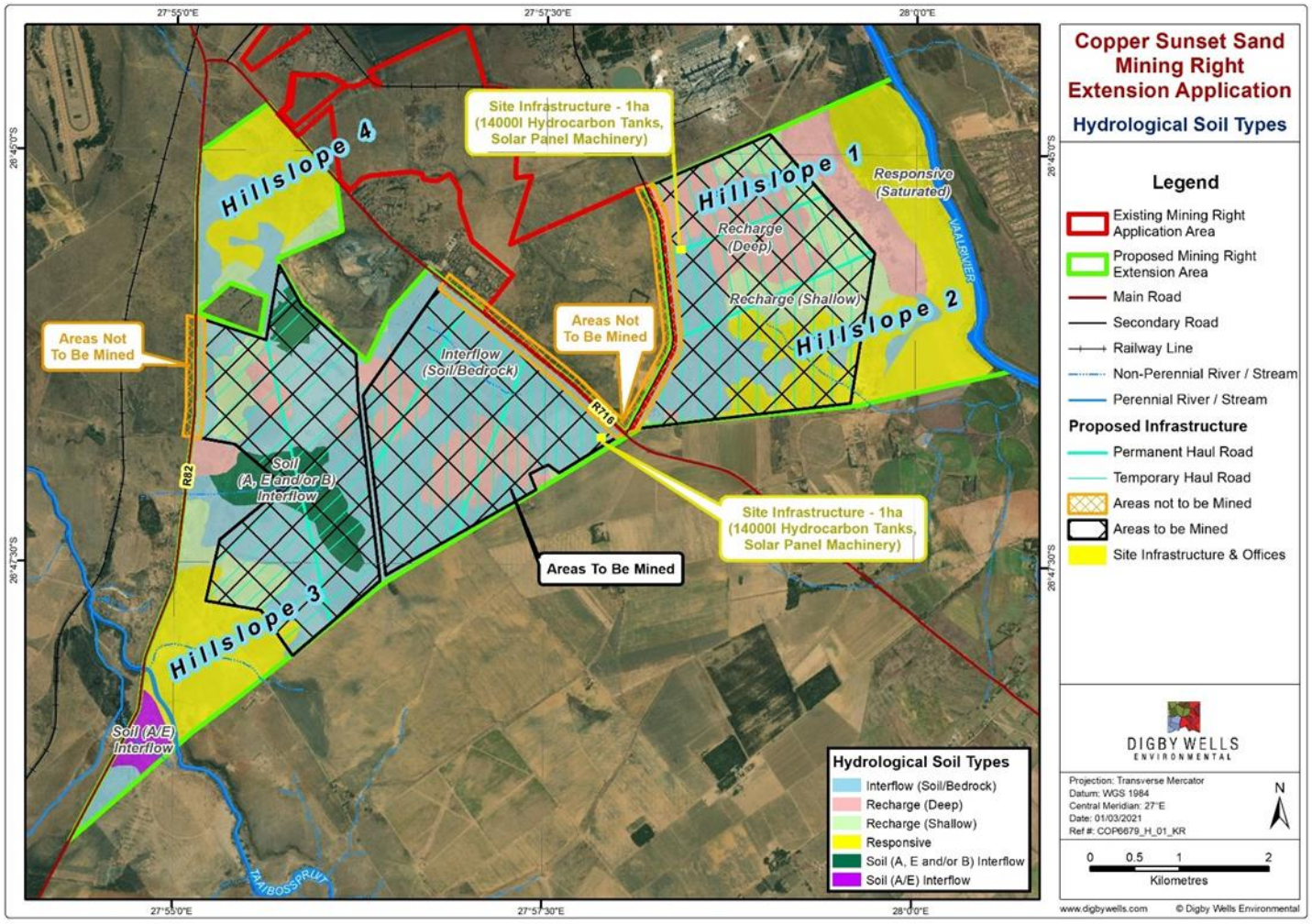


Figure 11-13: Distribution of Hydrological Soil Types at the Copper Sunset MREA

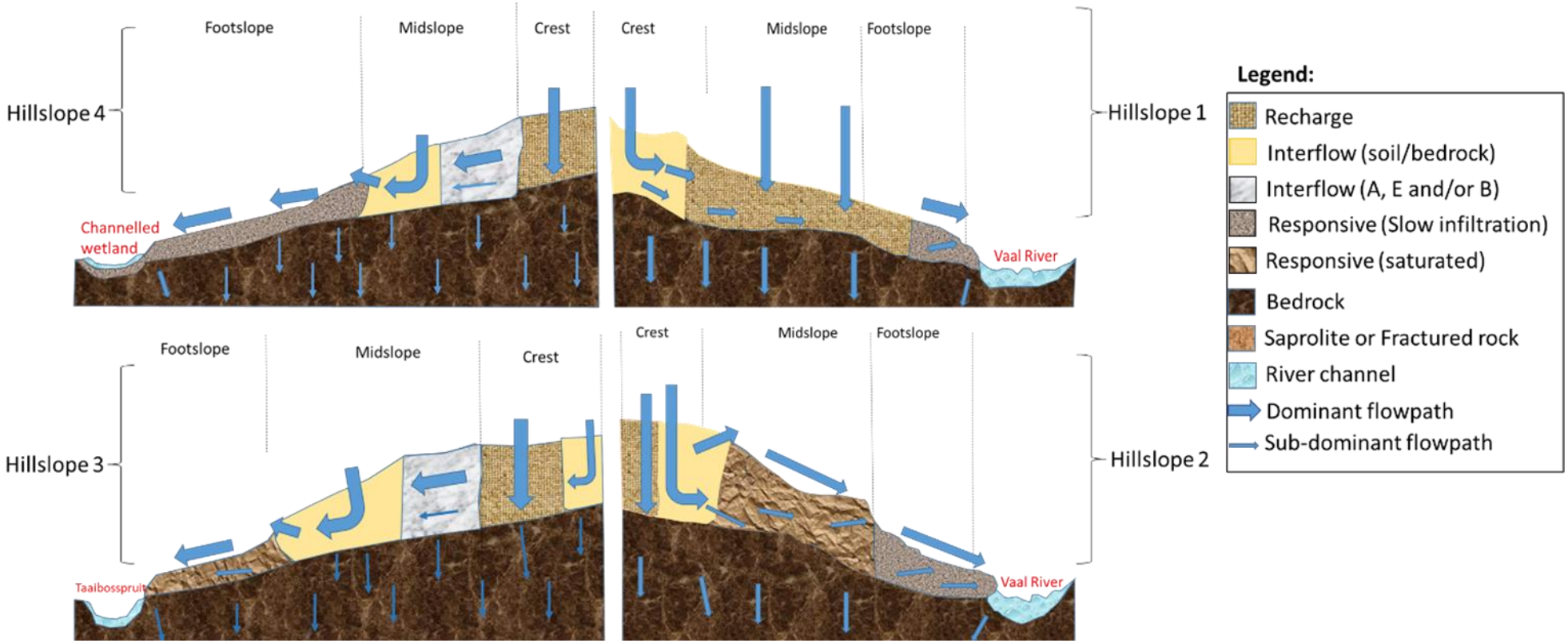


Figure 11-14: Conceptual Hydrological Process Models of Four Surveyed Hillslopes

11.6 Hydrology (Surface water)

A Surface Water Assessment was undertaken during the EIA Phase. A detailed surface water report is appended to this report (Appendix F).

11.6.1 Hydrological Setting

The MREA stretches across three different quaternary catchments, namely C22F, C22G and C22K within the Vaal Water Management Area (WMA 5) (Figure 11-15). The catchment area is drained by the Vaal River. The water quality in the Vaal River catchments varies from poor in the highly developed areas to good in the less developed areas (Digby Wells & Associates, 2010). The land use in the catchment includes agriculture, extensive gold and coal mining, power generation, industrial activities and urban developments (Digby Wells & Associates, 2010).

11.6.2 Water Quality

The water quality data of the selected monitoring points (Figure 11-16) was benchmarked against the Department of Water and Sanitation (DWS) target water quality guidelines for domestic use, aquatic ecosystems, livestock watering and irrigation (Table 11-8).

Based on the water quality results, the baseline water quality is generally acceptable and has slight exceedances in relation to the guideline values. Slight exceedances in Aluminium and Iron were observed at monitoring points SW1, SW2, SW4 and SW5. A slight exceedance of Zinc was observed at all monitoring points, while Calcium was elevated at SW3. Iron and aluminium are among the most abundant elements in the earth's crust and natural waters contain variable amounts of these elements depending on the underlying geology. The presence of the slightly elevated aluminium and iron in streams is likely from industrial activities within the region.

The results indicate only minimal impact on water resources as a result of human activities as evidenced by relatively low values of Total Dissolved Solids (TDS) and Suspended Solids (SS).

11.6.3 Sensitivity Assessment

Water features such as rivers, dams, pans and wetlands within and around the Project area (Figure 11-17) constitute the establishment of sensitive water features which are sensitive to developmental impacts and due care should be taken to ensure that they are protected from degradation. Contamination of the water resources will impact on downstream water users including aquatic ecosystems which rely on these resources for water supply and habitat.

Table 11-8: Baseline Surface Water Quality within the Copper Sunset Study Area

Parameter	DWS Domestic Use	DWS Aquatic Ecosystem	DWS Livestock Watering	DWS Irrigation	SW1	SW2	SW3	SW4	SW5
	mg/L (unless otherwise stated)								
pH, at 25˚C *(pH meter units)*	6.0 - 9.0	NS	NS	6.5 - 8.4	8	7.8	7.5	7.0	7.0
Electrical Conductivity, *(mS/m)*	<70	NS	NS	NS	18	19	70	12.4	11.2
Total Dissolved solids (TDS)	<450	NS	<1000	NS	140	140	448	154	140
Aluminium	<0.15	<0.01	<5	<5	0.315	0.312	< 0.100	1.85	0.512
Ammonia	NS	NS	NS	NS	<0.1	0.3	1.1	0.1	1.1
Arsenic	≤200	0.01	≤1	0.1	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Barium	NS	NS	NS	NS	0.048	0.046	0.030	0.056	0.065
Beryllium	NS	NS	NS	0.1	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Bismuth	NS	NS	NS	NS	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Boron	NS	NS	<5	<0.5	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Cadmium	<0.005	<0.00015	<0.01	<0.01	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Calcium	<32	NS	<1000	NS	14	15	51	7	8
Cerium	NS	NS	<5	NS	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Caesium	NS	NS	<5	NS	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Chloride	<100	NS	<1500	<100	8	9	44	12	11
Chromium	<0.05	0.007	<1	<0.1	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Cobalt	NS	NS	<1	<0.05	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Copper	<1	<0.0003	<0.5	<0.2	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Fluoride	<1	<0.75	<2	<2	<0.2	<0.2	0.2	0.2	0.2
Iron	<0.1	NS	<10	<5	0.292	0.235	0.058	1.23	0.386
Lead	<0.01	<0.0002	<0.1	<0.2	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Lithium	NS	NS	NS	NS	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Magnesium	<30	NS	<500	NS	7	7	19	4	4
Manganese	<0.05	<0.18	<10	<0.02	< 0.025	< 0.025	< 0.025	0.039	<0.025
Mercury	<1	0.04	<1	NS	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Molybdenum	NS	0.04	0.01	0.01	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Nickel	NS	NS	<1	<0.2	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Nitrate	≤6	NS	<200	100	0.6	0.6	2.9	0.4	1.8
Total Phosphate, as P	NS	NS	NS	NS	0.3	0.2	1.1	0.5	0.6
Potassium	<50	NS	NS	NS	3.0	3.2	8.7	5.7	5.6
Selenium	<0.02	<0.002	<0.05	<0.02	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Silicon	NS	NS	NS	NS	5.1	5.0	5.3	< 0.010	< 0.010
Silver	NS	NS	NS	NS	< 0.010	0.010	< 0.010	< 0.010	< 0.010
Sodium	<100	NS	<2000	<70	8	9	51	9	8
Strontium	NS	NS	NS	NS	0.071	0.071	0.113	0.038	0.040
Sulphate	<200	NS	<1000	NS	22	25	137	14	12
Suspended Solids at 105^{o}	NS	NS	NS	<50	50	38	37	93	103
Tin	NS	NS	NS	NS	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Titanium	NS	NS	NS	NS	0.029	0.036	0.026	0.121	0.195
Uranium	0.070 - 0.284	NS	NS	0.01	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Vanadium	<0.1	NS	<1	<0.1	< 0.010	< 0.010	< 0.010	<0.010	0.010
Zinc	<3	<0.002	<20	<1	0.048	0.037	0.029	<0.010	0.011
KEY:									
Exceeds either the DWS standards for domestic, aquatic ecosystem, livestock watering and irrigation water uses									
No Standard							NS		

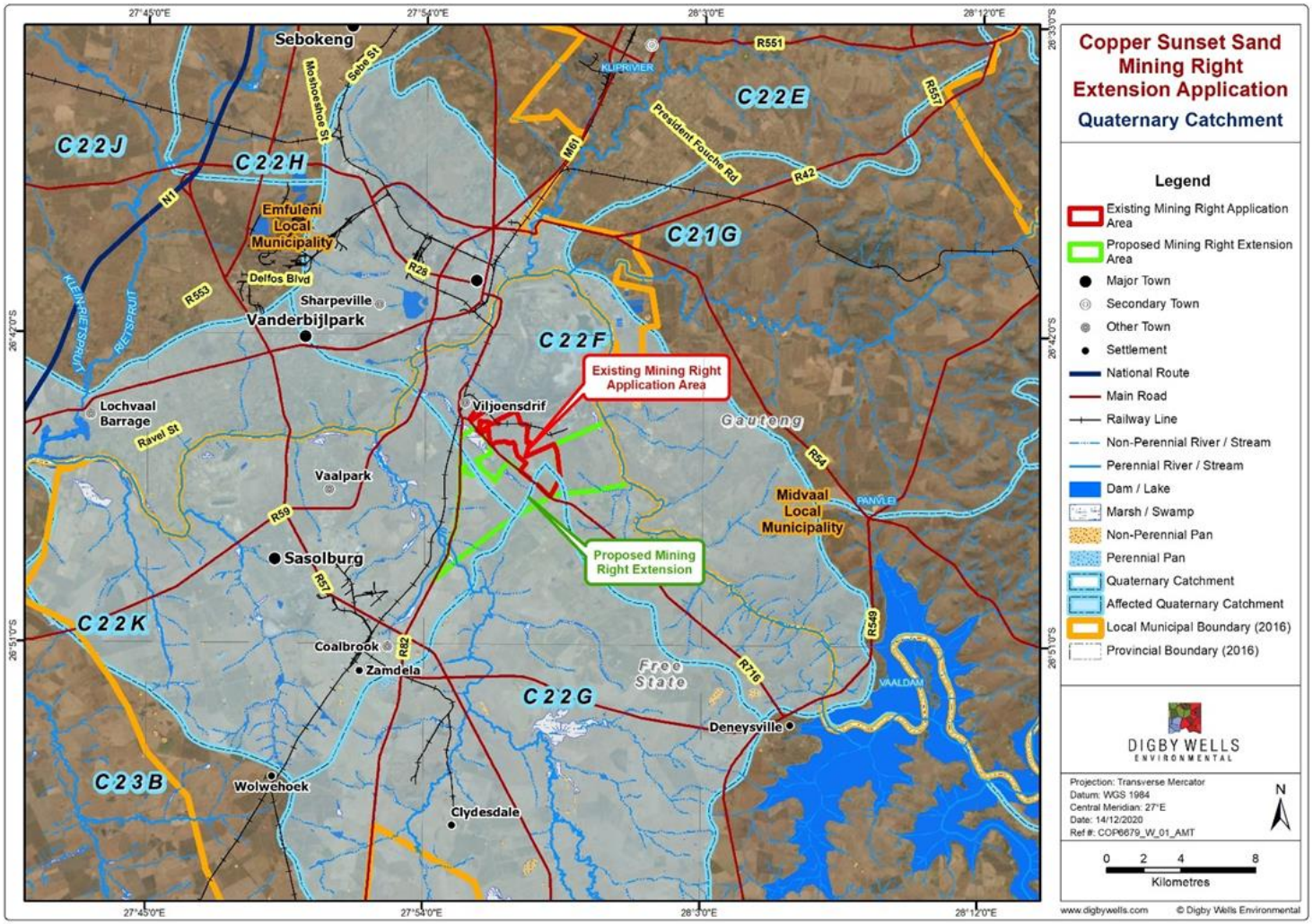


Figure 11-15: Hydrological Setting of the Copper Sunset Operations

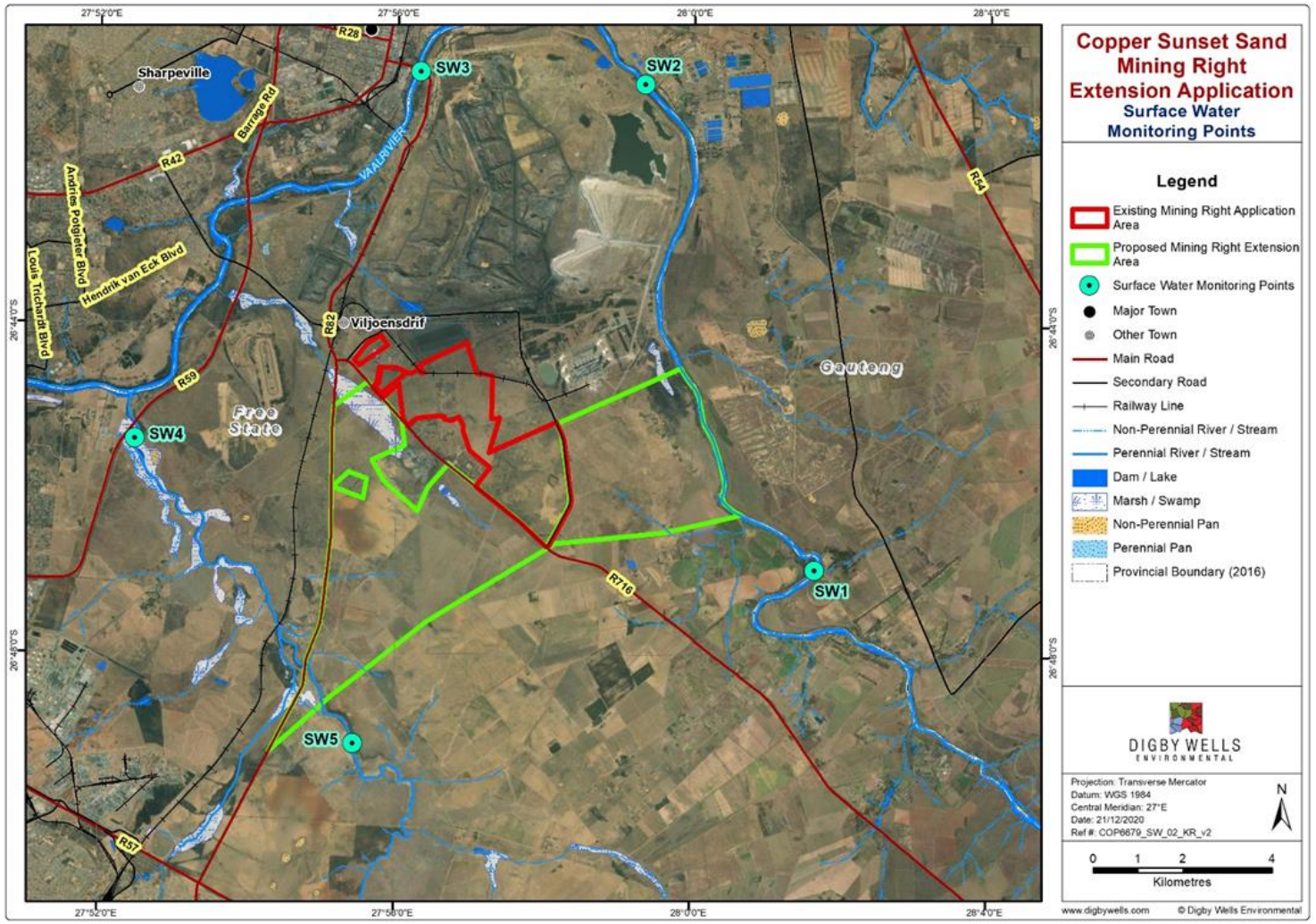


Figure 11-16: Surface Water Quality Monitoring Points

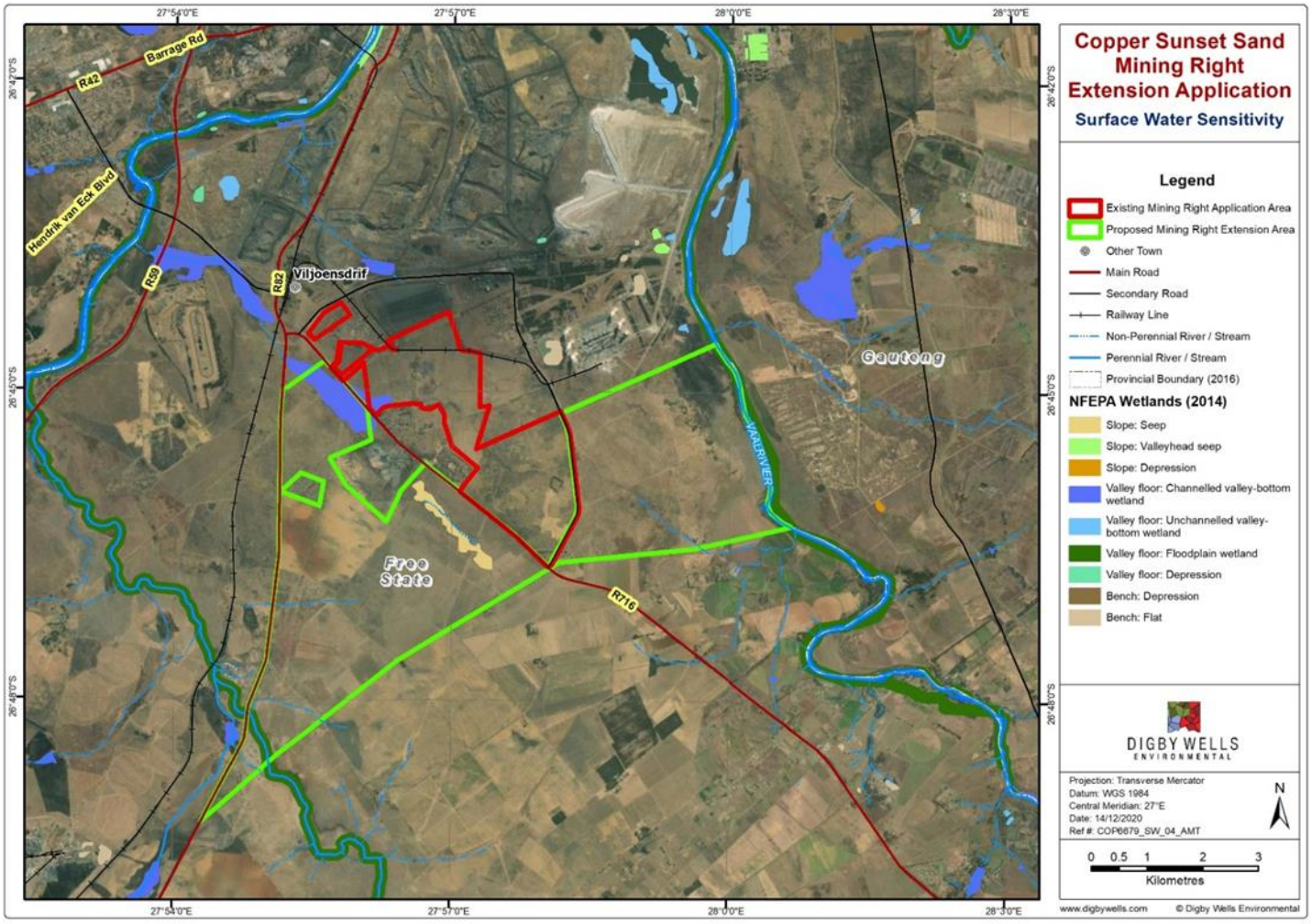


Figure 11-17: Surface Water Sensitivity Assessment

11.6.4 Floodline Assessment

11.6.4.1 Delineated Catchments and Peak Flows

Two catchments were delineated (Figure 11-18) to cover the existing and proposed extension of the Copper Sunset MRA. Results from the Rational Method Alternative 3 (RM3) were used in hydraulic modelling since these were representative of the area due to site-specific runoff coefficients which were generated using an in-built RM3 module. The Midgley and Pitman (MIPI) results helped in the selection of suitable peak flows because these were of the same order of magnitude to the RM3 method. The Standard Design Flood (SDF) results were deemed an over-estimate of peak flows for the site possibly due to high regionalised runoff coefficients.

Calculated peak flows which account for the combined contribution of the catchment downstream of the Vaal Dam and attenuated releases from the Vaal Dam are presented in Table 11-9.

Table 11-9: Peak Flows for the Vaal River and Taaibosspruit adjacent to the Copper Sunset Mine

Catchment	Method					
	RM3		SDF		MIPI	
	1:50yr	1:100yr	1:50yr	1:100yr	1:50yr	1:100yr
	(m^3/s)					
Vaal River	1427.75	1922.45	3452.37	4395.28	2321.85	2956.13
Taaibosspruit	322.52	451.83	473.75	623.19	498.81	653.34

11.6.4.2 Floodlines

Modelled floodlines indicate that the existing and proposed Copper Sunset infrastructure including the areas to be mined are outside the floodwater way for both the 1:50-year and 1:100-year flood events (Figure 11-19: also attached as Appendix B, Plan 8). Placement of any future additional infrastructure should be outside the modelled 1:100-year floodlines from the edge of both the Vaal River and the Taaibosspruit to avoid impacting on water resources and to prevent infrastructure inundation.

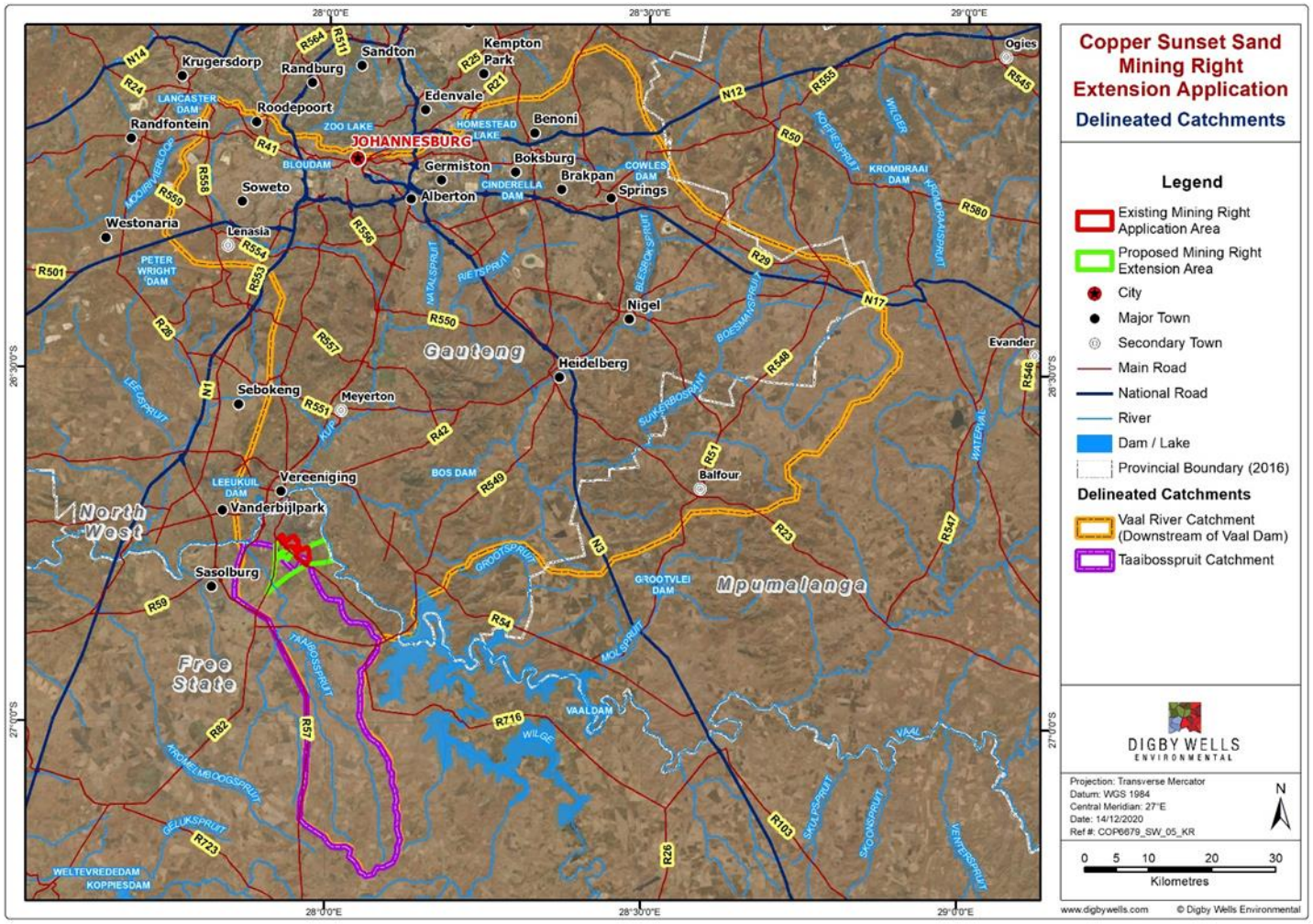


Figure 11-18: Delineated Catchments for Rivers adjacent to the Copper Sunset Mine

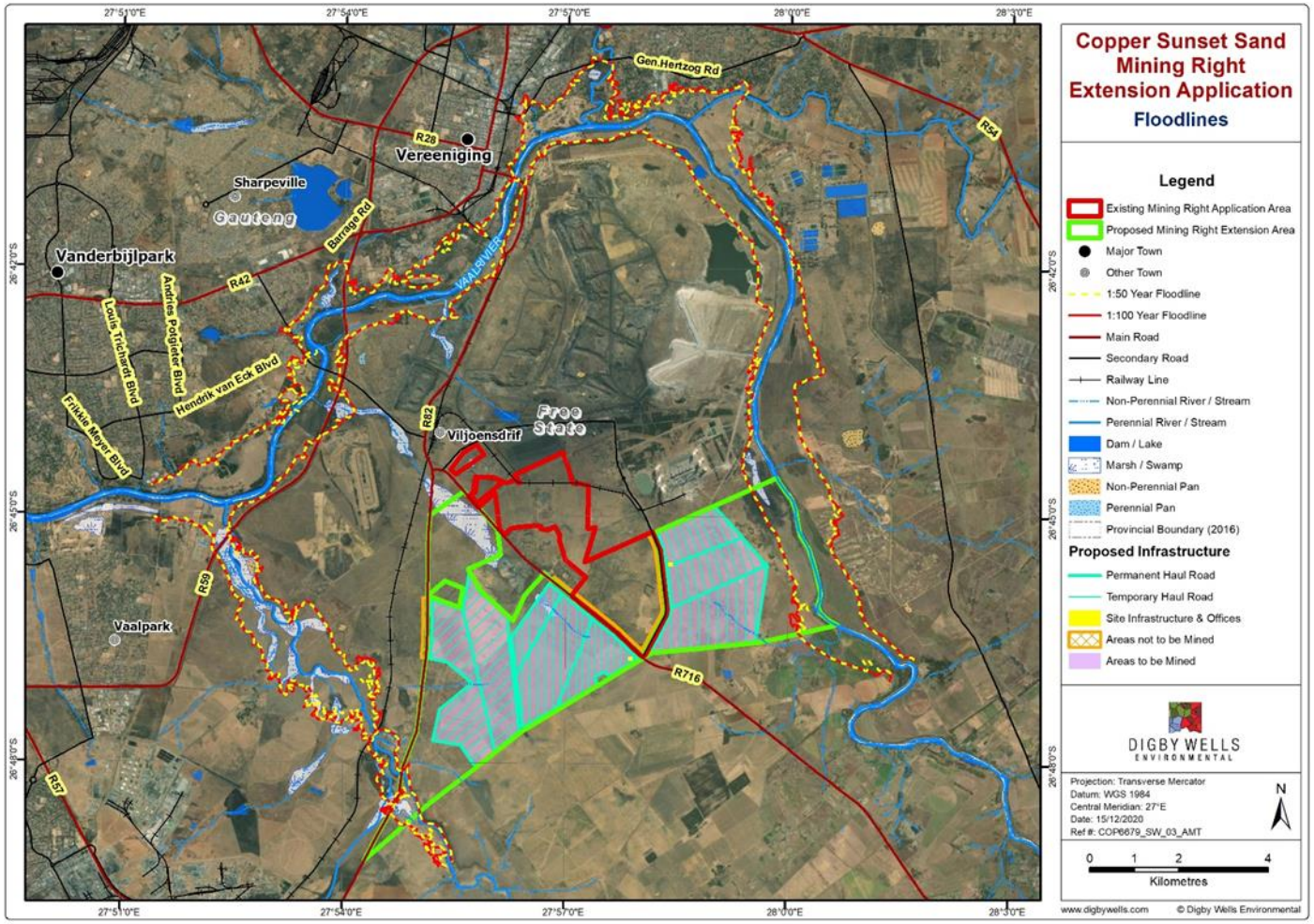


Figure 11-19: Floodlines for the 1:50-year and 1:100-year Flood Events

11.7 Flora

The proposed Copper Sunset MREA falls predominantly within the Central Free State Grassland vegetation type, with a small section on the western side within the Andesite Mountain Bushveld vegetation type (Mucina & Rutherford, 2012) (Figure 11-20, attached as Appendix B, Plan 9). The Grassland Biome is the second most bio-diverse biome in South Africa (Mucina & Rutherford, 2012). The Grassland Biome is situated primarily on the central plateau of South Africa, and the inland areas of Kwa-Zulu-Natal and the Eastern Cape provinces. This biome is rich in flora and fauna diversity but is under threat due to rapid urbanisation and expansion of mining and industrial activities.

The Central Free State Grassland regional vegetation type is characterised by short grassland covering undulating plains (Mucina & Rutherford, 2012). It is considered a 'Vulnerable' vegetation type with only small portions legally conserved. In natural conditions, *Themeda triandra* is dominant, whereas *Eragrostis curvula* and *E. chloromelas* become dominant in degraded habitats. Almost a quarter of the area has been transformed, either for cultivation or building of dams such as Allemanskraal, Erfenis, Groothoek, Koppies and Kroonstad. Parts of the areas have been subjected to overgrazing with subsequent *Vachellia karoo* encroachment.

The Andesite Mountain Bushveld is dominated by dense, medium-tall thorny bushveld with grass layers being well developed on hill slopes and some valleys in undulating landscapes (Mucina & Rutherford, 2012). The conservation status is considered Vulnerable, with roughly 7% statutorily conserved, predominantly in the Suikerbosrand Nature Reserve and Magaliesberg area. The vegetation type has succumbed to a staggering transformation of 60% and a conservation target of 24% (Collins, 2016). Table 11-10 lists species characteristic of the two vegetation types.

Table 11-10: Characteristic Plant Species of the two Regional Vegetation

Plant form	Central Free State Grassland	Andesite Mountain Bushveld
Graminoids	*Brachiaria serrata, Cynodon dactylon, Cynodon hirsutus, Digitaria ternata, Elionurus muticus, Eragrostis chloromelas, Eragrostis patentipilosa, Eragrostis plana, Eragrostis racemosa, Heteropogon contortus, Hyparrhenia hirta, Microchloa caffra, Setaria sphacelata, Themeda triandra, Trachypogon spicatus, Abildgaardia ovata, Andropogon schirensis, Cymbopogon caesius, Diheteropogon amplectens, Melinis nerviglumis, Panicum gilvum and Setaria nigrirostris.*	*Cymbopogon pospischilii, Digitaria eriantha subsp. eriantha, Elionurus muticus, Eragrostis racemosa, E. curvula, E. superba, Hyparrhenia hirta, Panicum maximum, Setaria sphacelata, Themeda triandra.*

Plant form	Central Free State Grassland	Andesite Mountain Bushveld
Herbs	*Acanthospermum australe, Ajuga ophrydis, Eriosema salignum, Euryops transvaalensis, Gerbera viridifolia, Helichrysum nudifolium, Helichrysum rugulosum, Hermannia depressa, Lotononis macrosepala, Nidorella hottentotica, Pentanisia prunelloides, Peucedanum afrum, Rotheca hirsuta, Selago paniculata, Senecio coronatus, Senecio inornatus, Sonchus nanus and Hilliardiella oligocephala.*	*Commelina africana, Hilliardiella galpinii, H. oligocephala.* *Succulent Herb: Aloe greatheadii var. davyana.*
Geophytic	*Oxalis depressa, Raphionacme dyeri.*	-
Woody Climbers	-	*Rhoicissus tridentata.*
Succulents	*Tripteris aghillana var. integrifolia.*	-
Small Tress	-	*Celtis africana, Protea caffra, Senegalia caffra, S. karroo, Zanthoxylum capense, Ziziphus mucronate.*
Low Shrubs	*Anthospermum rigidum subsp. pumilum, Felicia muricata, Helichrysum dregeanum, Melolobium candicans, Pentzia globosa.*	-
Tall, Low and Soft Shrubs	-	*Tall Shrubs: Asparagus laricinus, Diospyros lycioides subsp. lycioides, Euclea crispa subsp. crispa, Gymnosporia polyacantha, Lippia javanica, Rhamnus prinoides, Searsia pyroides var. pyroides,* *Low Shrubs: Asparagus suaveolens, Searsia rigida var. margaretae, Teucrium trifidum.* *Soft Shrubs: Isoglossa grantii.*

11.7.1 Conservation Status of the Unit

The Free State Biodiversity Plan (Collins, 2016) is a spatial tool that forms part of the national biodiversity planning tools and initiatives that are provided for in national legislation and policy. The Free State Biodiversity Plan was published in 2016, and like those of the other provinces, identifies and maps terrestrial categories with associated land-use and management guidelines. The categories are divided into Protected Area (PACBA, ESA, Other Area and Degraded Area.

The western section of the proposed Copper Sunset MREA is predominantly classified as Degraded Land, with the remaining area classified as ESA1 and ESA2 (Figure 11-21). The eastern section of the MREA is predominantly classified as ESA2, with smaller areas classified as ESA1.

According to the National List of threatened terrestrial ecosystems, the proposed MREA does not fall within any original or remaining extents of a threatened ecosystem. The MREA traverses no protected areas. The Vaal Dam Nature Reserve is approximately 17 km from the proposed Copper Sunset MREA. The MREA also does not fall within or close to any Important Bird Areas (IBA), the nearest, Suikerbosrand Nature Reserve IBA, is about 35 km from the Project area. The Suikerbosrand Nature Reserve is a fully protected provincial reserve that is recognised as an IBA on account of the presence of two globally threatened species (i.e. the African Grass Owl and Secretarybird), and several regionally threatened taxa.

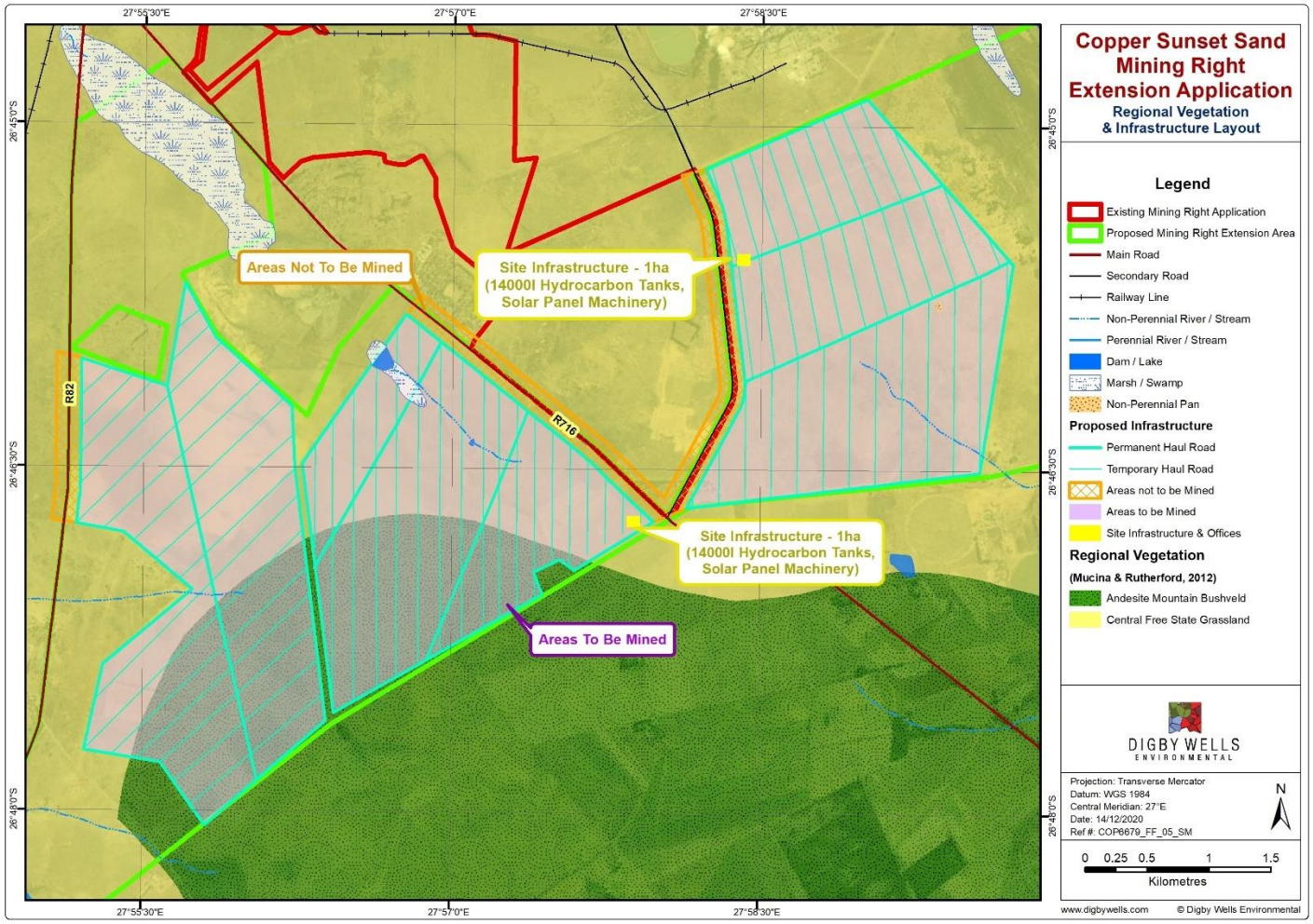


Figure 11-20: Regional Vegetation

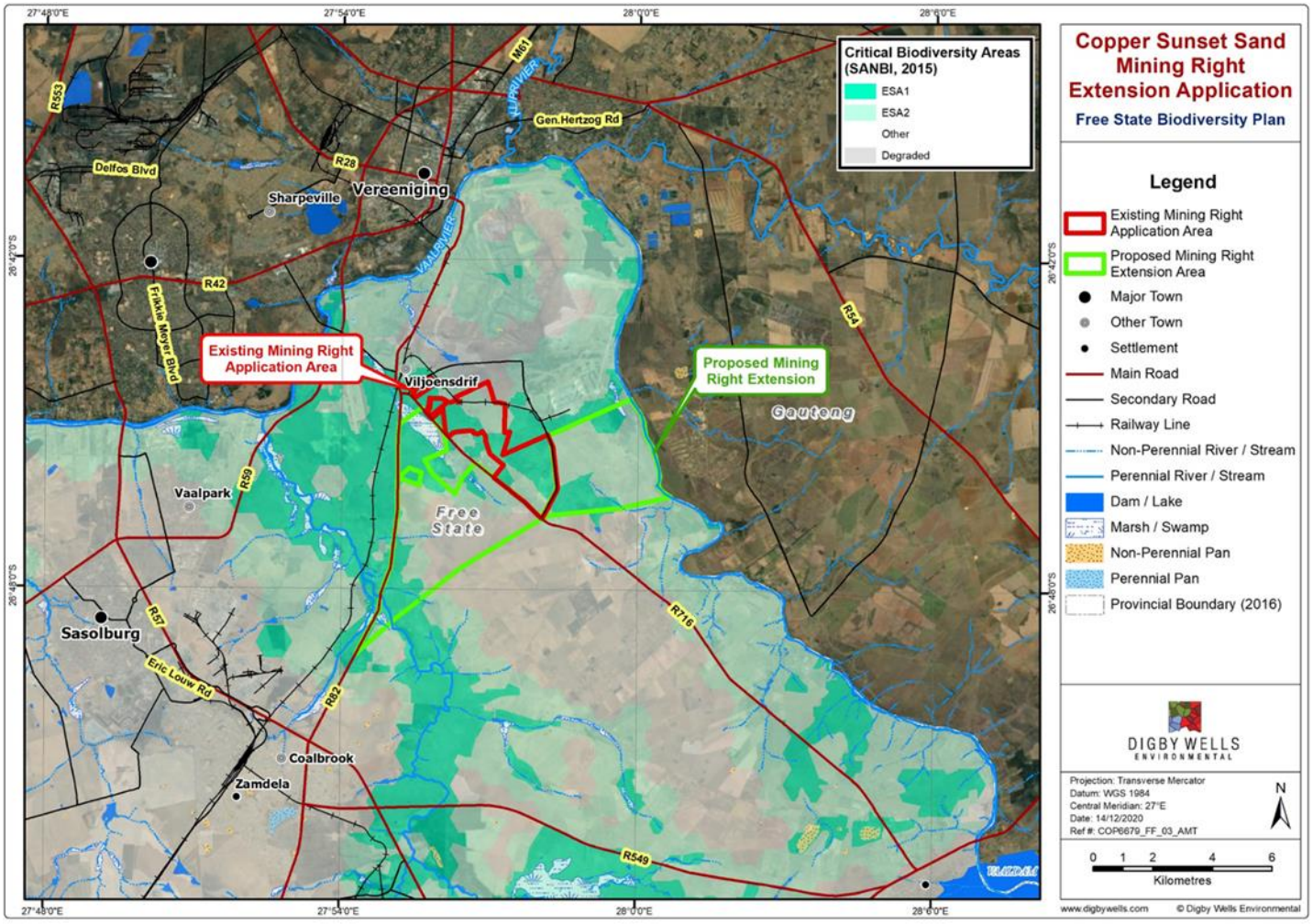


Figure 11-21: Free State Biodiversity Plan

11.7.2 Species of Conservation Concern

The Project area is situated within the Quarter Degree Square (QDS) 2627DD. Based on the results of a search of historical records for the QDS on the Botanical Research and Herbarium Management Software (BRAHMS) New Plants of southern Africa website (NEWPOSA), a total of 362 species are indicated to potentially occur in the Project area. Of these potentially occurring species, five are Red Data listed and may potentially occur within the Project area (Table 11-11). The succeeding headings discuss the flora Species of Conservation Concern (SCC) that occur and are likely to occur within the Project area.

Table 11-11: Red Data Flora Occurring in the Grid Square 2627DD

Family	Species Name	IUCN (2011)	Free State Nature Conservation Ordinance (Ordinance No. 8 of 1969)
Amaryllidaceae	*Crinum bulbispermum*	Declining	Protected
Amaryllidaceae	*Alepidea attenuate*	NT	Protected
Apocynaceae	*Brachystelma incanum*	Vu	-
Aquifoliaceae	*Stenostelma umbelluliferum*	NT	-
Asphodelaceae	*Kniphofia typhoides*	NT	Protected

VU = Vulnerable, NT = Near Threatened

11.7.2.1 Protected Flora

The Digby Wells Scoping Report (Digby Wells Environmental, 2020) listed a potential 21 floral SCC that may occur within and near the Project area. During the recent surveys (2020 and 2021 surveys), only three floral SCC were encountered. These species and their respective statutory protection are listed in Table 11-12 below. Two species are listed under Schedule 6 Protected Plants (Section 30) in the Free State Nature Conservation Ordinance (Ordinance 8 of 1969) (FSNCO), and one species is a Red Data listed species under South African National Biodiversity Institute (SANBI). The three species observed are depicted in Figure 11-22 below.

Table 11-12: Floral SCC Encountered at the MREA

Species	Conservation Status
Boophone disticha	Provincially Protected
Silene burchellii var. burchellii	Near Threatened (SANBI)
Eucomis autumnalis	Provincially Protected

Figure 11-22: Left: *Silene burchellii var. burchellii.* Middle: *Boophone disticha* and Right: *Eucomis autumnalis*

11.8 Fauna

This section represents various animals encountered from the field survey conducted during January 2021.

11.8.1 Mammals

A total of nine mammal species were recorded during the infield assessments. High faunal activity was observed within the Floodplain and associated Valley Bottom. Various mammals of the Herpestidae (Mongoose) family were observed east of the western boundary within the wetland. Tracks of a Water Mongoose were also observed in the marshes of the floodplain and associated Valley Bottom wetland. This portion of the Project area appeared less transformed, possibly due to its perennial inundations and inability to traverse or cultivate. It has now provided habitat, as a microclimate refugia, for numerous faunal species and acts as a ecological corridor for the movement of various animals. Camera traps were set up in this location and observations of Meerkats and Slender Mongoose were captured on the cameras. Ground Squirrels, Scrub Hares and Yellow Mongoose were observed throughout the Project area and have constructed numerous burrows in the sandy soils. Larger mammals such as Zebra, Fallow Deer (introduced species) and Blesbok were encountered within the Bankfontein mining area, they are presumed introduced and monitored by the current landowners possibly for hunting. All encountered and recorded mammals are listed in the Fauna and Flora report (Appendix G), no mammals of SCC were recorded.

The Virtual Museum of the Animal Demography Unit (ADU) (http://www.adu.org.za) was consulted to investigate the recent recordings of mammal of SCC. According to this database, the following SCC have been previously recorded within the designated QDS and may potentially occur in the Project area (Table 11-13).

Table 11-13: Mammal SCC likely to Occur within the Project Area

Family	Species	Common Name	Conservation Status (IUCN)
Bovidae	*Hippotragus equinus*	Roan Antelope	EN
Mustelidae	*Aonyx capensis*	African Clawless Otter	NT
Nesomyidae	*Mystromys albicaudatus*	African White-tailed Rat	VU
Bovidae	*Hippotragus niger niger*	Sable	VU

EN = Endangered, VU = Vulnerable, NT = Near Threatened

11.8.2 Birds

Birds are viewed as good ecological indicators, as their presence or absence tends to represent conditions of a functioning ecosystem. The direct link between bird diversity and land cover portrays a direct indication of the habitats in the area of interest.

According to the South African Bird Atlas Project (SABAP2), 160 species of bird have been identified in the area, majority of these birds are comprised of grassland species. All birds that could be present within the QDS 2627DD are listed in the Fauna and Flora report (Appendix G). Forty-seven birds have been recorded in the Project area during the survey undertaken in January 2021. The identified birds are listed in Appendix G. No listed or Red Data species were recorded during the field survey. The large dam in the central portion of the Project area hosts an ideal habitat for a variety of water birds. Species such as Spur-winged Geese, a Dwarf Bittern, Little Grebes, Yellow-billed Ducks, Red Knobbed Coots and Red-Billed Teals were observed enjoying the filled dam. It should be noted that a Marsh Owl was observed among the secondary grassland in the Zandfontein mining area. The month of January is renowned for its nesting period, and it is likely that nests may be situated throughout the grassland. Table 11-14 lists bird of SCC likely to occur within the Project area. An important observation to take note of was the presence of favourable habitat of the African Grass-Owl within the Project area. It favours damp vicinities of marshes, vleis and well-watered grasslands, which nationally have been subjected to the pressures of urban sprawl and has led to the loss of habitat for the Owl. Therefore, thorough screening for the presence of the African Grass Owl before the establishment phase is required to ensure that impacts from the Project do not affect the vulnerable species.

Table 11-14: Bird SCC likely to Occur within the Project Area

Common Name	Species	Conservation Status*
Greater Flamingo	*Phoenicopterus roseus*	NT (NEMBA, 2007)
Secretarybird	*Sagittarius serpentarius*	VU (IUCN, 2013)
African Grass Owl	*Tyto capensis*	VU (NEMBA, 2007)

VU = Vulnerable, NT = Near Threatened

11.8.3 Herpetofauna

Based on the results of a search of historical records for the 2627DD QDS, the ADU database and field records from historical studies, a total of 35 herpetofauna species may potentially be present in the Project area. Twenty-one species of reptiles and 14 species of amphibians have previously been recorded in the QDS. These potentially occurring species are listed in in the

Fauna and Flora report ( ).

The brevity of the survey meant that relatively few reptiles were observed compared to that of mammals and birds. During the field assessment, one amphibian species was identified within the wetland regions, via its call, the Boettger's Caco (*Cacosternum boettgeri*) (LC). This species is abundant in grassy areas and it can breed in almost any small, temporary water body such as pools in inundated grasslands, culverts and other rain-filled depressions. Its predominant prey is mosquitos, and it is prey to the Yellow-billed Egret (*Ardea intermedia*) and the Giant African Bullfrog (*Pyxicephalus adspersus*) (Scott, 2021). The Giant African Bullfrog is therefore expected to occur within the Project area. This is a SCC due to the loss of habitat from negative anthropogenic activities. The Giant African Bullfrog is listed as Near Threatened in South Africa according to the IUCN.

One species of reptile was identified, namely a Montane Speckled Skink (*Thachylepis punctatissima*) (LC). This species was encountered in the transformed habitat in and amongst old building rubble. The weather during the field survey was cool and overcast, this may have hindered the presence of herpetofauna species within the Project area.

11.8.4 Invertebrates

A total of 33 invertebrates were observed during the filed survey (see Appendix G). Various images of invertebrates were captured during the field assessment and are presented in Figure 11-23 below.

Figure 11-23: Top Row: Rivulet Milkweed Bug, Twig Wilter, Garden Locust nymph & Brown-veined White. Bottom Row: Painted Lady, Lily Borer larva, Mellitidae Bee & Northern Harvester Termite.

One Red Data species expected to occur in the Project area is the Highveld Giant Cupid (*Lepidochrysops praeterita*), listed as Endangered. This species has a fairly narrow habitat specificity and a large geographic range but has shown a rapid decline in both number of localities as well as numbers of emerging adults in the past 20 years (Henning, 2009). Expected butterfly species are listed in the Fauna and Flora report (Appendix G)

11.9 Wetlands

The Wetland Impact Assessment undertaken during the EIA Phase is appended to this report as Appendix H. The field assessment was carried out in September 2020 and January 2021. The aim was to delineate the wetlands within the Project area and determine their PES and EIS.

11.9.1 Wetland Indicators

The wetland indicators used to delineate the wetlands are described in the subsections below.

11.9.1.1 Terrain Unit Indicators

The topography of the MREA is of the Highveld Lower Ecoregion with gentle, rolling grassland slopes and many valley systems (Figure 11-24). Detailed imagery and contours, coupled with field verifications, allows the geomorphic setting of the wetland and catchments to be understood and the Hydro-geomorphic (HGM) to be determined. Terrain indicators are important for understanding the specific functionality of the wetland and determining the potential risks from anthropological activities on the wetland.

Large areas of the MREA have previously been cultivated and affected by adjacent mining activities. The natural topographies have therefore been impacted in areas and not natural.

The topography of the MREA consists of steep slopes towards the Vaal River and the Taaibosspruit, with ridges associated with these systems in proximity of the rivers. The catchment divider consequently divides the eastern and western MREA into the Vaal River and Taaibosspruit systems. The topography is typically that of the Plinthic Catena, with deep, sandy, interflow soils at the top of the catchment and clayey soil, associated with wetlands towards the valley floor systems.

	
Gentle, rolling grassland slopes with many valley systems, depressions, and seeps	*Low-lying areas identified as Valley Bottom systems within cultivated fields*

Figure 11-24: Topography Indicators

11.9.1.2 Soil Indicators

Soil indicators, including soil forms and soil wetness, such as mottling and gleying, were used extensively throughout the MREA to identify and confirm wetland delineations.

The low-lying areas of the MREA showed increased clay content and soil wetness. These soils were identified as wetland soils (hydromorphic soils) and are saturated for long periods with a fluctuating water table, altering the morphology of the soils. These soils are somewhat limited for cultivation and highly mobile (high erosion probability). Clovelly, Avalon, Katspruit, Arcadia and Pinedene soils were typical soils identified within the wetland systems (Figure 11-25). The land uses in these areas were generally observed to be cultivation, cattle grazing and perennial grasslands.

Hydromorphic soils are significant to the overall site sensitivity analysis. The low angled topographic slopes and resulting wide expansive drainage lines coupled with the presence of restrictive sedimentary layers (sandstone predominantly) have resulted in proportionately much larger areas of transition zones, moist grasslands and wet based soils that meet the wetland classification both pedologically as well as ecologically.

	
Hydromorphic soil with high clay content, leached soil matrix and manganese (Mg) mottling	Hydromorphic, recharge soil with clear mottling of iron (Fe) within a leached soil matrix

Figure 11-25:Soil Indicators

11.9.1.3 Vegetation Indicators

Vegetation communities of the various wetlands and their respective HGM units were relatively variable. Large portions of the natural vegetation communities had been historically altered due to the predominant surrounding land use activities such as cultivation and cattle grazing.

Wetland plant species used in the identification and delineation of the various HGM units included, but was not limited to, those tabulated in Table 11-15. Please refer to the Fauna and

Flora Impact Assessment Report ( ) for a detailed plant species list.

Table 11-15: Vegetation Indicators Species List (Water Research Commission, 2014)

Class	Abbreviation	Example
Obligate Wetland Species	OWS	*Agrostis lachnantha*, *Leersia hexandra, Phragmites australis, Paspalum distichum*
Facultative Wetland Species	FWS	*Andropogon eucomis, Hemarrthria altissima, Hyparrhenia tamba, Paspalum urvillei*
Seasonal Wetland Species	SWS	*Setaria sphacelata; Aristida junciformis, Themeda triandra, Eragrostis gummiflua*
Temporary Wetland Species	TWS	*Imperata cylindrica; Paspalum dilatatum*
Mostly Wetland Dependant Species	MWS	*Typha capensis, Juncus* sp., *Cyperus* sp., *Persicaria* sp.

11.9.2 Wetland Delineation

The wetlands were categorised into six HGM types (Figure 11-26; also attached as Appendix B, Plan 10). Due to the location of the Project area on the watershed, wetlands are draining in a multitude of different directions. The HGM units associated with the eastern MREA are marked as east, draining into the Vaal River, whereas the wetlands within the western MREA are marked as west, and drain into the Taaibosspruit River.

The wetlands cover 1638.733 ha which amounts to 58.62 % of the total 2821.5 ha MREA. The breakdown of the wetland HGM units' areas are detailed in Table 11-16. Field verification focused on the wetlands located within the proposed MREA, especially near the Vaal River and Taaibosspruit where impacts are expected to be greatest. Wetlands that will be impacted to a lesser extent, such as wetlands located within the 500 m zone of regulation were only verified at a desktop level.

Table 11-16: Wetland HGM Units of the Copper Sunset MREA

HGM Unit	Associated river system	Area (ha)
CVB and seep (east)	Vaal River	125.53
Floodplain (east)	Vaal River	268.52
Seep (east)	Vaal River	158.408
CVB (west)	Taaibosspruit River	508.9
Floodplain and associated VBs (west)	Taaibosspruit River	549.25
Valley head seep and CVB (west)	Taaibosspruit River	28.125
Total wetland coverage of the MREA		**1638.733**

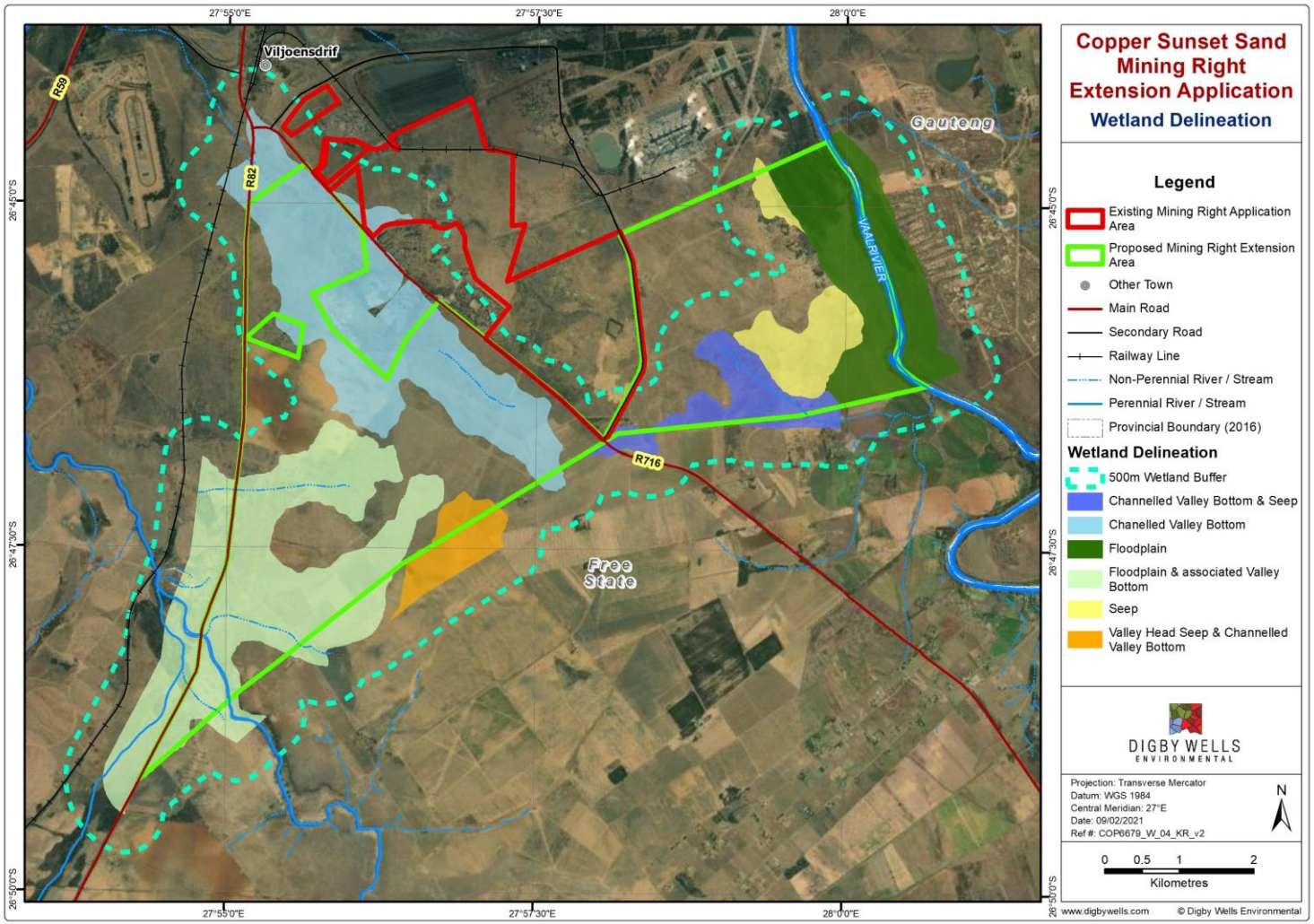


Figure 11-26: Wetland Delineation

11.9.3 Present Ecological Health Assessment

The wetland PES scores were assessed according to their hydrology, geomorphology and vegetation functionality.

The wetlands are important ecosystems within the MREA and include most of the wetland habitat types (HGM units). The HGM units were considered to have an ecological state ranging between 'Moderately Modified' (PES Category C) and 'Highly Modified' (PES Category E) (Table 11-17). According to the integrity (health) method described by Kotze *et al.* (2009) a Category C wetland has undergone a moderate change in ecosystem processes including loss of natural habitats, however the natural habitat remains predominantly intact. A Category D wetland has undergone large modifications to the natural ecosystem processes and loss of natural habitat and biota. Finally, a Category E wetland is described as the change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognizable.

Table 11-17: Wetland Ecological Importance and Sensitivity Scores

HGM Unit	Hydrological Health Score	Geomorphological Health Score	Vegetation Health Score	Final PES	PES Category
CVB and seep (east)	19.5	2.4	16.1	5.429	D
Floodplain (east)	27	2.75	15.5	6.464	E
Seep (east)	24	1.95	16	5.993	D
CVB (west)	22.5	2.2	16.8	5.929	D
Floodplain and associated VBs (west)	22.5	1.35	17.3	5.879	D
Valley head seep and CVB (west)	12	1.9	13.4	3.900	C

11.9.4 Wetland Ecological Services (WET-EcoServices)

The general features of the wetlands were assessed in terms of functioning and the overall importance of each HGM unit was then determined at a landscape level. Figure 11-27 represents radial plots showing the relative importance of each ecosystem service and Table 11-18 lists the summary of the scores obtained.

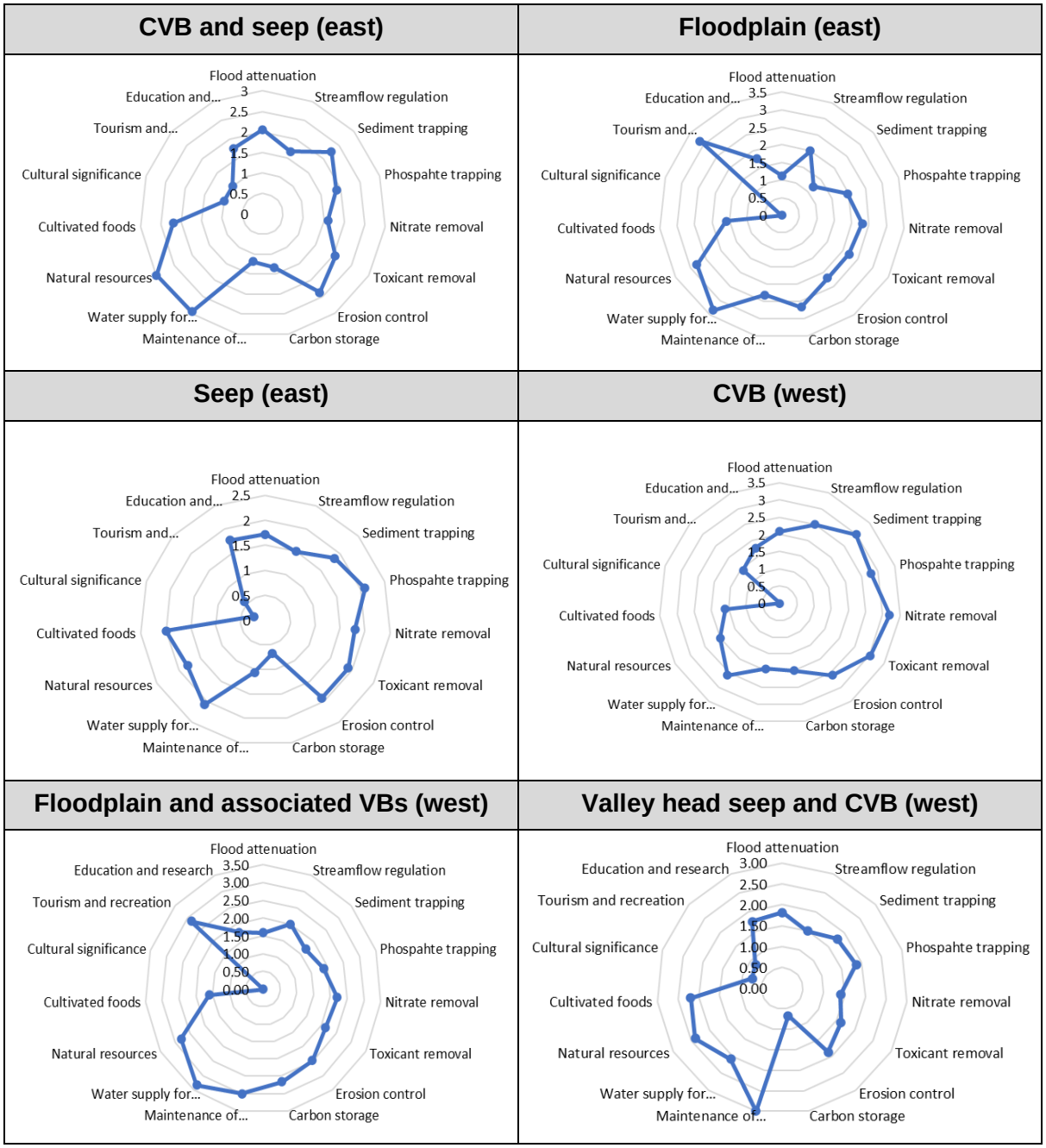


Figure 11-27: Wetland Ecological Services

The CVB (west) and the Floodplain and associated VBs (west) have been determined to be of High ecological importance, whereas the remainder of the HGM units measured as Moderately High Importance (Table 11-18).

Overall, all six systems provide services of varying importance which should not be considered in isolation, nor can these units be considered individually. The removal or degradation of a unit will inadvertently impose increased stresses on the remaining units. Some of the services provided by these systems include the following:

- Water for human and animal consumption. Multiple farm dams are present in CVBs, for livestock watering and for abstraction;
- CVB and floodplains aid in streamflow regulation, nutrient assimilation, and sediment trapping;
- UVB also provide the aforementioned services, with the addition of flood attenuation. These functions are strongly linked to the absence of a channel as water is spread throughout the wetland unit;
- Seeps sustain streamflow during the dry season as they are slowly fed with sub-surface flow that moves laterally into the valley floor and river systems. Due to the diffuse nature of water movement through seep systems, sediment trapping, and nutrient assimilation is an important water quality enhancement benefit;
- Wetlands provide habitat for a variety of aquatic and terrestrial fauna and flora species. The gentle, grassland slopes of the seeps could possibly provide habitat for important species of the area, however none was observed during the site visit. Floodplain and channelled valley bottoms provide habitat for aquatic species as well as birds and mammals that feed off aquatic species. Depressions provide unique habitat in the landscape for species. Provincially protected plant species (*Eucomis autumnalis* (pineapple lilies) and *Boophone disticha*) were noted within the wetlands which increases the biodiversity maintenance function; and
- Most of the wetlands are cultivated and/or used for grazing and therefore are providing high service provision in this regard. Additionally, the use of pesticides and fertilisers within these areas will likely increase the assimilation function of the wetlands to remove phosphates, nitrates and toxicants.

Table 11-18: Wetland Ecological Services

Ecosystem Service	CVB and seep (east)	Floodplain (east)	Seep (east)	CVB (west)	Floodplain and associated VBs (west)	Valley head seep and CVB (west)
Flood Attenuation	2.06	1.13	1.71	2.09	1.59	1.81
Streamflow Regulation	1.67	2.00	1.50	2.50	2.00	1.50
Sediment Trapping	2.26	1.21	1.86	2.98	1.69	1.77
Phosphate Assimilation	1.90	1.97	2.09	2.79	1.88	1.86
Nitrate Assimilation	1.60	2.30	1.80	3.20	2.20	1.40

Toxicant Assimilation	2.05	2.21	1.90	3.03	2.14	1.62
Erosion Control	2.38	2.21	1.92	2.58	2.47	1.88
Carbon Storage	1.33	2.67	0.67	2.00	2.67	0.67
Biodiversity Maintenance	1.19	2.31	1.06	1.94	3.00	3.00
Water Supply	2.94	3.33	2.08	2.58	3.33	2.08
Harvestable Resources	3.00	2.80	1.80	2.00	2.80	2.40
Cultivated Foods	2.20	1.60	2.00	1.60	1.60	2.20
Cultural Value	1.00	0.00	0.25	0.00	0.00	0.75
Tourism and Recreation	1.00	3.14	0.57	1.43	2.86	0.86
Education and Research	1.75	1.75	1.75	1.75	1.75	1.75
SUM	**28.33**	**30.64**	**22.97**	**32.46**	**31.98**	25.55
Average Score	**3.54**	**3.83**	**2.87**	**4.06**	**4.00**	3.19
Category	Moderately High	Moderately High	Moderately High	High	High	Moderately High

11.9.5 Ecological Importance and Sensitivity

The EIS scores are indicated in Table 11-19 below. The Floodplain and associated VBs (west) were measured as '**Very High**' due to their Ecological Importance & Sensitivity, whereas the Floodplain (east), Valley head seep and CVB (west) are of '**High**' importance. The CVB and seep (east) and Seep (east) were of '**Moderate**' importance given the impacts to the HGM units as well as the low hydrological functioning thereof.

Table 11-19: Wetland Ecological Importance and Sensitivity Scores

HGM Unit	Ecological Importance & Sensitivity	Hydrological/Functional Importance	Direct Human Benefits	Final EIS	EIS Category
CVB and seep (east)	1.3	1.9	2.0	2.0	Moderate
Floodplain (east)	2.7	2.0	2.1	2.7	High

HGM Unit	Ecological Importance & Sensitivity	Hydrological/Functional Importance	Direct Human Benefits	Final EIS	EIS Category
Seep (east)	1.0	1.7	1.4	1.7	Moderate
CVB (west)	2.0	2.4	1.6	2.4	High
Floodplain and associated VBs (west)	3.7	2.1	2.1	3.7	Very high
Valley head seep and CVB (west)	2.3	1.6	1.6	2.3	High

11.10 Aquatic Ecology

The Aquatic Ecology Assessment undertaken during the EIA Phase is appended to this report as Appendix I.

Details pertaining to the aquatic sampling points selected for assessment are provided in Table 11-20, along with a brief description of the characteristics observed at each of the assessment sites (the map showing the points is included in Appendix B as Plan 11). Appropriate monitoring sites were selected based on the location of the proposed MREA and areas suspected to support sensitive aquatic species, including species of potential conservation concern.

Table 11-20: Aquatic Sampling Sites within the Study Area

Site/Point	Coordinates	Description
COP1	26°47'27.85"S 28° 00'49.72"E	Located along the Vaal River upstream of the eastern side of the MREA. Site serves as a reference site for the Vaal River.
COP2	26°40'57.81"S 27°56'18.33"E	Located along the Vaal River at a river crossing north of the MREA. Site serves as a downstream site.
COP3	26°49'22.44"S 27°55'57.68"E	Located along the Taaibosspruit south west of the MREA. Site serves as an upstream reference site.
COP4	26°48'09.15"S 27°54'47.25"E	Lies along the Taaibosspruit at the R82 crossing, downstream of Site COP3.
COP5	26°47'05.43"S 27°55'05.65"E	Located at an unnamed non-perennial tributary of the Taaibosspruit west of the MREA.

11.10.1 *In-situ* Water Quality

The *in-situ* water quality results of the wet season survey for the watercourses associated with the MREA are presented in Table 11-21.

Table 11-21: *In-situ* Water Quality Results for Watercourses Associated with the MREA

Monitoring Site	COP1	COP2	COP3	COP4	COP5	Guideline
Temperature (°C)	23.5	23.6	24.8	24.5	DRY	5-30
pH	**8.08**	7.36	7.62	7.23		6-8
Conductivity (µS/cm)	162.3	**578.0**	166.5	131.5		≤500
Dissolved oxygen (mg/l)	7.61	**4.20**	7.03	**3.82**		>5
Dissolved oxygen (Saturation %)	97.1	**48.9**	83.5	**43.4**		80-120
Target Water Quality Range (TWQR), as described in **red** (DWAF, 1996; Nebeker *et al.*, 1996; USEPA, 2010)						

- Temperature values recorded at the assessed sites ranged from 23.5 °C to 24.8 °C, typical of the summer season temperatures in South Africa. Therefore, all recordings were within the expected temperature ranges of inland waters in the country, thus none of the assessed sites were expected to deter colonising aquatic biota;
- The pH values recorded exhibited close to neutral to slightly alkaline conditions, ranging from 7.23 pH units to 8.08 pH units during the present study. The DWAF (1996) guideline upper limit of 8 pH units was slightly exceeded at site COP1 only. Nonetheless, this exceedance can be considered insignificant and not likely to deter existing aquatic biota, however, this site must be closely monitored to prevent further increases in pH levels;
- Conductivity values recorded during the present study were predominantly low and recorded within the recommended guideline of 500 µS/cm (USEPA, 2010) at all the sites, except at Site COP2. Site COP2 lies along the Vaal River at a river crossing flanked by residential, industrial and mining areas in close proximity and as such, the water quality at this site is likely influenced by cumulative impacts. During the current survey, there was a pungent odour and solid waste disposal (i.e litter) was evident; and
- Dissolved oxygen levels were predominantly low throughout the sampled sites, however only recorded below the recommended guidelines of 5 mg/l and 80% saturation (Nebeker *et al*., 1996; DWAF, 1996) at sites COP2 and COP4. A high abundance of marginal vegetation and some aquatic vegetation were observed at both sites (COP2 and COP4) during the survey. Thus, dissolved oxygen at these sites was not expected to be below the recommended limit. This may therefore be attributed to a myriad of sources including anthropogenic activities stemming from the nearby residential, industrial and mining areas.

11.10.2 Index for Habitat Integrity

The Index for Habitat Integrity (IHI) was completed on a desktop-level for each aquatic ecosystem considered in the present survey and populated with observations recorded during the field survey (Table 11-22).

Table 11-22: IHI Findings for the Watercourses Associated with the Proposed MREA

River system	Site	Habitat Component	IHI Score	Ecological Category	Major Impacts
Vaal River	COP1	Instream	56.5	D	Water quality deterioration due to nutrient enrichment stemming from the surrounding land use activities including farms and sewage treatment plants
		Riparian	56.7	D	Exotic vegetation encroachment following land disturbances/manipulation for mining and farming activities
	COP2	Instream	51.3	D	Water quality deterioration resulting from the surrounding land use activities including industrial, residential and mining areas
		Riparian	55.7	D	Exotic vegetation encroachment due to land disturbances/manipulation along the riverbanks
Taaibosspruit	COP3	Instream	61.8	C	Water quality deterioration stemming from the upstream farms. Erosion resulting in channel modification and increase in sedimentation
		Riparian	65.4	C	Exotic vegetation encroachment and bank erosion resulting in flow modification and water quality impacts
	COP4	Instream	61.8	C	Presence of exotic fauna. Erosion resulting in channel modification and increase in sedimentation.
		Riparian	66.4	C	Exotic vegetation encroachment and bank erosion resulting in flow modification and water quality impacts
	COP5	Instream	-	N/A	No instream habitat assessment could be undertaken at the time of

River system	Site	Habitat Component	IHI Score	Ecological Category	Major Impacts
					the survey, as this stream was observed to be **dry**
		Riparian	65.6	**C**	This site lies on an unnamed non-perennial tributary of the Taaibosspruit. Exotic vegetation encroachment resulting in channel and flow modifications
N/A = Not suitable for assessment					

The findings from the IHI assessments conducted during the current survey indicate that the habitat integrity along the assessed Vaal River reaches was *Largely Modified* (Ecological Category D) for both instream and riparian components. Major impacts of the instream habitat were water quality deterioration due to potential nutrient enrichment stemming from the surrounding land use activities including farms, mines, industries and residential areas. For the riparian habitat, major impacts include exotic vegetation encroachment as a result of land disturbances/ manipulation.

Along the Taaibosspruit systems, the IHI assessments indicate that the habitat integrity was *Moderately Modified* (Ecological Category C) for both instream and riparian components. Major impacts of the instream habitat were exotic fauna and water quality deterioration stemming from anthropogenic activities at the surrounding farms. The alien fish species *Gambusia affinis* (mosquito fish) was sampled in high abundances along the Taaibosspruit reach. The riparian component was found to be impacted by exotic alien vegetation encroachment.

11.10.3 Aquatic Macroinvertebrate Assessment

The following sections provide insights into the available habitat that was sampled at each respective monitoring site at the time of the current survey, as well as the South African Scoring System (SASS, Version 5) metrics obtained and the subsequent determination of the ecological condition of the observed assemblages in relation to reference conditions.

11.10.3.1 Invertebrate Habitat Assessment System

The results of the Integrated Habitat Assessment System (IHAS) scores at the sites assessed during the current survey are presented in Table 11-23.

Table 11-23: IHAS values and Interpretation for the Sampled Sites

Site	IHAS Score (%)	Interpretation
COP1	47.3	**Poor**
COP2	23.6	**Poor**
COP3	41.8	**Poor**

Site	IHAS Score (%)	Interpretation
COP4	50.9	**Poor**
COP5	DRY	

During the survey, the sampled sites were dominated by deep, still and/or slow-flowing water with marginal vegetation, sand and mud being the most prevalent biotopes along the Vaal River. Similarly, along the Taaibosspruit, the sampled sites were dominated by shallow to deep and slow-flowing water with marginal vegetation, sand and mud being the most prevalent biotopes. A lack of flow and depth variety, aquatic vegetation and the stones biotope was a common feature throughout the selected sampling sites, which may have attributed to their condition representing largely poor habitat availability for aquatic macroinvertebrates. Findings of the aquatic macroinvertebrate habitat availability at the Vaal River and the Taaibosspruit are consistent with those obtained in the 2018 survey (Golder Associates Africa, 2019), which also observed a poor habitat availability.

11.10.3.2 Benthic Communities and Composition

Table 11-24 presents the SASS5 results for the assessed monitoring sites within the proposed MREA. Table 11-25 presents the SASS5 data obtained in 2018, which generally correlates quite closely to each of the assessed site. These differences could be due to the timing of the surveys. The 2018 survey was undertaken in October.

Table 11-24: SASS5 Data for the Sites Assessed during the Current Survey

Site	SASS5 Score	Number of Taxa	ASPT
Vaal River			
COP1	48	9	5.3
COP2	22	7	3.1
Taaibosspruit			
COP3	46	9	5.1
COP4	36	10	3.6
COP5	DRY		
ASPT = Average Score Per Taxon			

The SASS5 scores recorded for all assessed sites were regarded as low, especially in comparison to typical riverine ecosystems. The low macroinvertebrate diversity can be linked to the poor availability of macroinvertebrate habitat. A total of 20 macroinvertebrate taxa (out of the expected 53) were collected throughout the assessed sites, ranging from seven at the Vaal River downstream site (site COP2) to 10 at the Taaibosspruit downstream site (site COP4).

Table 11-25: SASS5 Data for the Sites Assessed during the 2018 Survey (Golder Associates Africa, 2019)

River	Site	No. of Taxa	SASS5 Score	ASPT
Kromellenboogspruit (KBS)	NWV1	*Dry*		
Taaibosspruit	NWV1a	15	53	3.5
	NWV7	10	34	3.4
	NWV9	17	72	4.2
Robspruit	NWV3	5	22	4.4
Vaal	NWV13	12	51	4.3
	NWV14	7	27	3.9

The aquatic macroinvertebrate community assemblages were predominantly composed of taxa that have *"low"* water quality requirements. Of the collected taxa, a single taxon with a "*high*" water quality requirement (Heptageniidae, - sensitivity score of 13) was collected at the Vaal River upstream site (site COP1) and three taxa with a "*Moderate"* water quality requirement (Atyidae, Aeshnidae and Elmidae - sensitivity score of 8) were all collected at the Taaibosspruit upstream site (site COP3). In comparison to the 2018 survey (Golder Associates Africa, 2019), the sampled macroinvertebrate assemblages collected are variable.

11.10.3.3 Ecological Condition of the Aquatic Macroinvertebrate Assemblages

The aim of the Macro-Invertebrate Response Assessment Index (MIRAI) is to provide a habitat-based cause-and-effect foundation to interpret the deviation of the aquatic macroinvertebrate community (assemblage) from the reference condition (Thirion, 2008). The SASS5 data obtained was used in the MIRAI to determine the Present Ecological State (PES, or Ecological Category) of the associated macroinvertebrate assemblage. Results for the MIRAI at the assessed sites are shown in Table 11-26 and discussed below.

Table 11-26: MIRAI Data for the Assessed Sites

Site	MIRAI Value	Ecological Category	Description
Vaal River			
COP1	22.7	**E**	Seriously Modified
COP2	18.6	**E/F**	Seriously to Critically Modified
Taaibosspruit			
COP3	25.1	**E**	Seriously Modified
COP4	18.7	**E/F**	Seriously to Critically Modified
COP5	DRY		

The macroinvertebrate assemblage at the upstream sites of the assessed river systems, site COP1 at the Vaal River and site COP3 at the Taaibosspruit, exhibited *Seriously Modified* conditions (Ecological Category E), whilst the downstream sites (site COP2 and site COP4)

at the respective river systems exhibited *Seriously to Critically Modified* conditions (Ecological Category E/F).

Along the Vaal River, collected aquatic macroinvertebrate assemblages indicated that major changes from the reference assemblage were largely attributed to habitat dependence of the reference assemblage. Along the Taaibosspruit, collected macroinvertebrate assemblages indicated that major changes from the reference assemblage were largely due to flow dependence of the reference assemblage.

11.10.4 Ichthyofaunal Assessment

The fish species collected during the present study are presented in Table 11-27. It should be noted that sampling within the Vaal River sites and the Taaibosspruit downstream site was restricted to the marginal areas due to the non-wadeable depth presenting instream inaccessibility issues.

Table 11-27: Fish Collected (or Observed) within the Study Area

Fish Species	COP1	COP2	COP3	COP4	COP5
Austroglanis sclateri	-	-	-	-	DRY
Clarias gariepinus	-	-	-	1	
Enteromius anoplus	9	2	3	-	
Enteromius cf. pallidus	-	-	-	-	
Enteromius paludinosus	-	-	-	-	
Enteromius trimaculatus	-	-	-	-	
*Gambusia affinis**	6	-	15	70	
Labeo capensis	9	-	-	1	
Labeo umbratus	-	-	-	-	
Labeobarbus aeneus	3	-	-	-	
Labeobarbus kimberleyensis	-	-	-	-	
Pseudocrenilabrus philander	-	-	2	6	
Tilapia sparrmanii	-	-	-	3	
Number of Species	**4**	**1**	**3**	**5**	
Total Catch	**27**	**2**	**20**	**81**	

* Alien species.

A total of seven fish species were collected (or observed), of which one was regarded as an alien invasive species (*Gambussia affinis,* or Mosquitofish). Along the Vaal River sites, four species were collected at the upstream site COP1, whilst a single species was observed at the downstream site COP2. At the Taaibosspruit sites, three species were collected at the upstream site COP3 and five species were collected at the downstream site COP4. Two

species (*E. anoplus* and *G. affinis*) dominated the assessed watercourses and were each collected at three of the four sites. The Mosquitofish was also the most abundant with a total catch of 91 specimens, most of which were collected at the Taaibosspruit downstream site COP4.

The alien Mosquitofish was introduced in South Africa as a mosquito control agent and forage for bass but has proved to be an aggressive invader species capable of restricting other fish populations by preying on fish larvae (Skelton, 2001). Its occurrence and dominance at site COP4 can be attributed to its habitat requirements, which were suited at the time of the survey (i.e. standing or slow-flowing water with plant cover).

Similarly, a total of seven fish species were collected during the 2018 survey (Golder Associates Africa, 2019), which excluded the *Labeo capensis* and *Labeobarbus aeneus*. The two species that were collected during the 2018 survey and not during the current survey are *Enteromius paludinosus* and *Enteromius trimaculatus*.

11.10.4.1 Ecological Condition of the Fish Assemblages

Fish Response Assessment Index (FRAI) results for the sampled river reaches are presented in Table 11-28.

Table 11-28: FRAI Results for the Assessed Vaal River and Taaibosspruit Sites

Site	FRAI Score (%)	Ecological Category	Description
Vaal River			
COP1	48.9	**D**	Largely Modified
COP2	28.1	**E**	Seriously Modified
Taaibosspruit system			
COP3	36.4	**E**	Seriously Modified
COP4	51.8	**D**	Largely Modified
COP5	DRY		

A dominant feature among the current fish assemblage is the tolerance to modified water quality. The absence of the species *Enteromius pallidus* and *Labeobarbus kimberleyensis,* which are moderately intolerant to modified water quality suggests the impacted state of the water quality associated with the sampled reaches within the Project area. However, it should be noted that some sites lacked potential habitat for fish and sampling was restricted to the margins within the Vaal River sites and the Taaibosspruit downstream site.

FRAI results indicate *Largely Modified* conditions (Ecological Category D) at the Vaal River upstream Site COP1 and *Seriously Modified* conditions (Ecological Category E) at the downstream Site COP2. For the Taaibosspruit sites, FRAI results indicate *Seriously Modified* conditions (Ecological Category E) at the upstream Site COP3 and *Largely Modified* conditions (Ecological Category D) at the downstream Site COP4.

The biotic integrity for the previous assessment (Golder Associates Africa, 2019) ranged from *Moderately Modified* to *Seriously Modified* conditions (Ecological Category C to E) along the assessed Taaibosspruit sites and from *Seriously Modified* to *Critically Modified* (Ecological Category E to F) conditions along the Vaal assessed sites.

11.10.5 Integrated EcoStatus Determination

The EcoStatus is defined as: "*The totality of the features and characteristics of the river and its riparian areas that bear upon its ability to support an appropriate natural flora and fauna and its capacity to provide a variety of goods and services*" (Iversen *et al*., 2000). In essence, the EcoStatus represents an integrated ecological state representing the drivers (hydrology, geomorphology, physico-chemical) and responses (fish, aquatic invertebrates and riparian vegetation; Kleynhans & Louw, 2008). The Instream Biological Integrity, as well as the integrated EcoStatus, for the sampled river reaches within the Project area were determined (Table 11-29).

Following integration of the defined ecological conditions obtained for the instream biological integrity (i.e. MIRAI from aquatic invertebrates) and the riparian component (i.e. IHI from riparian vegetation assessment), it was determined that the sampled river reaches along the Vaal River and the Taaibosspruit systems represented an integrated EcoStatus of *Largely Modified* (Ecological Category D).

Table 11-29: The PES of the Reaches under Study Through the use of the ECOSTATUS4 (Version 1.02; Kleynhans & Louw, 2008)

Site	Response Indices				EcoStatus	
	MIRAI EC	FRAI EC	Instream EC	Riparian Vegetation EC (IHI)	Score	Category
Vaal River						
COP1	24.1	44.4	33.76	56.7	49.1	D
COP2	19.4	28.1	23.5	55.7	45	D
Taaibosspruit system						
COP3	25.1	36.4	30.7	65.4	53.8	D
COP4	19.2	47.3	33	61.8	52.2	D
COP5	-	-	-	65.6	N/A	

EC = Ecological Category; N/A = EcoStatus could not be determined due to missing instream data

11.11 Air Quality

The Air Quality Impact Assessment (AQIA) undertaken during the EIA Phase is appended to this report as Appendix J.

11.11.1 Wind Speed

Hourly meteorological data was analysed and used to understand the prevailing wind patterns at the Project area. Data was used to assess the wind speed and wind direction regime on

site. The wind rose for the Project area is depicted in Figure 11-28. The dominant winds are from the north northeast (9.7%), north (9.6%), east (9.2%), and north northwest 8.6%) respectively.

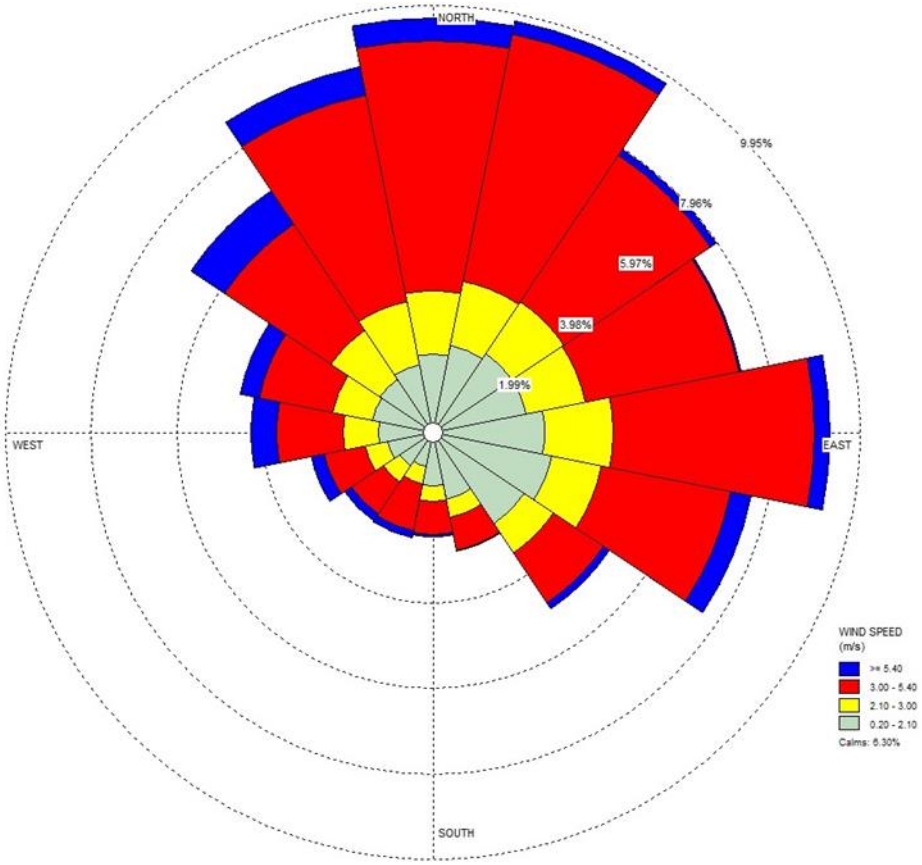


Figure 11-28: Surface Windrose

(Source: Lakes Environmental)

The average wind speed at the Project area is 2.8 m/s and calm conditions (<0.5 m/s) occurred for some 6.3% of the time. Wind speed capable of causing wind erosion i.e. ≥5.4 m/s occurred for about 5.5% of the time (Figure 11-29). This equates to about 20 days in a year. This is made up of five days in summer, one day in autumn, five days in winter, and nine days in springs.

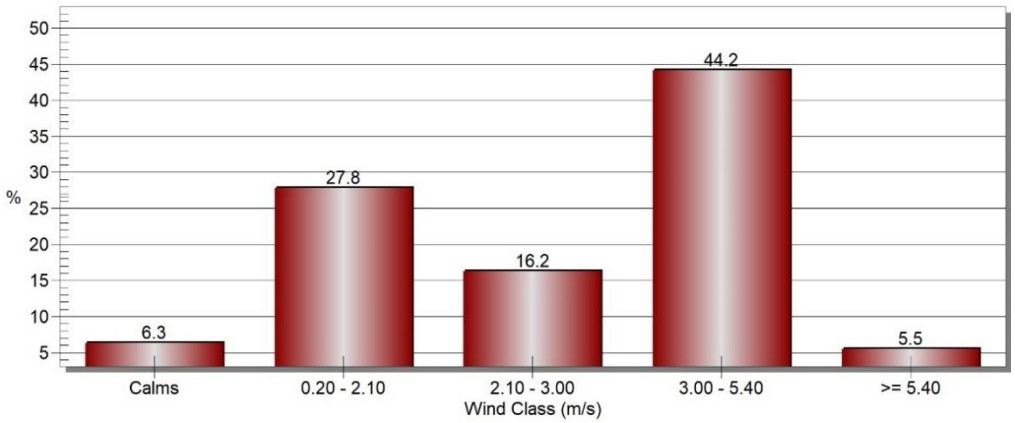


Figure 11-29: Wind Class Frequency

(Source: Lakes Environmental)

11.11.2 Existing Air Quality

The historical ambient air quality data for the area, comprising mainly of dustfall records for the period 2013-2015 were used to assess background air quality. Data encompassing other pollutants were not available for evaluation. A summary of the results is discussed below and encompasses the ambient levels of Total Suspended Particulates (TSP) and Particulate Matter (PM) less than 10 microns in diameter (PM_{10}).

11.11.2.1 TSP

Archived dust deposition data collected using the ASTM D1739 for the area was used to assess background scenarios in the Project area. The monitoring locations and other contributing sources to the background air quality in the area are depicted in Figure 11-30. Data for 26 months, from August 2013 to October 2015 from four sites were obtained and the graphs showing the result are depicted below (Figure 11-31 to Figure 11-33). Based on reports from the National Occupational Health and Safety Consultants for the period, all the dust monitoring sites were classified as non-residential. The site names are replaced with acronyms in the graphs, i.e. At Main Gate (AMG); Behind Workshop (BW), Haul Road from Quarry (HRQ), and Behind Washing Plant (BWP). The dustfall rates were compared with the South African Government Notice 827 in Gazette 36974, 1 November 2013 *Dust Control Regulations*. The results are summarised below:

- BW measured exceedances in December 2013 (**1,489** mg/m^{2}d) and June 2014 (**1,342** mg/m^2/d), respectively. These monitoring locations are within the mine boundary and are most likely impacted by the sand mining activities. Mine-related localised activities result in particulates being airborne, deposited, and re-suspended. Thus leading to the high dustfall rates measured on-site; and
- BWP measured exceedances in November 2013 (**3,855** mg/m^{2}d). The dustfall rate measured was more than three times the non-residential limit of 1,200 mg/m^2/d.

Despite the above, for the 26 months, only the aforementioned exceedances were recorded and none occurred in sequential months.

11.11.2.2 PM_{10}

The ambient concentrations of fine particulate matter with an aerodynamic diameter less than 10 microns could not be determined as data was not available for evaluation. If this is made available in future, it will be analysed and used to comprehensively assess daily PM_{10} variability on site.

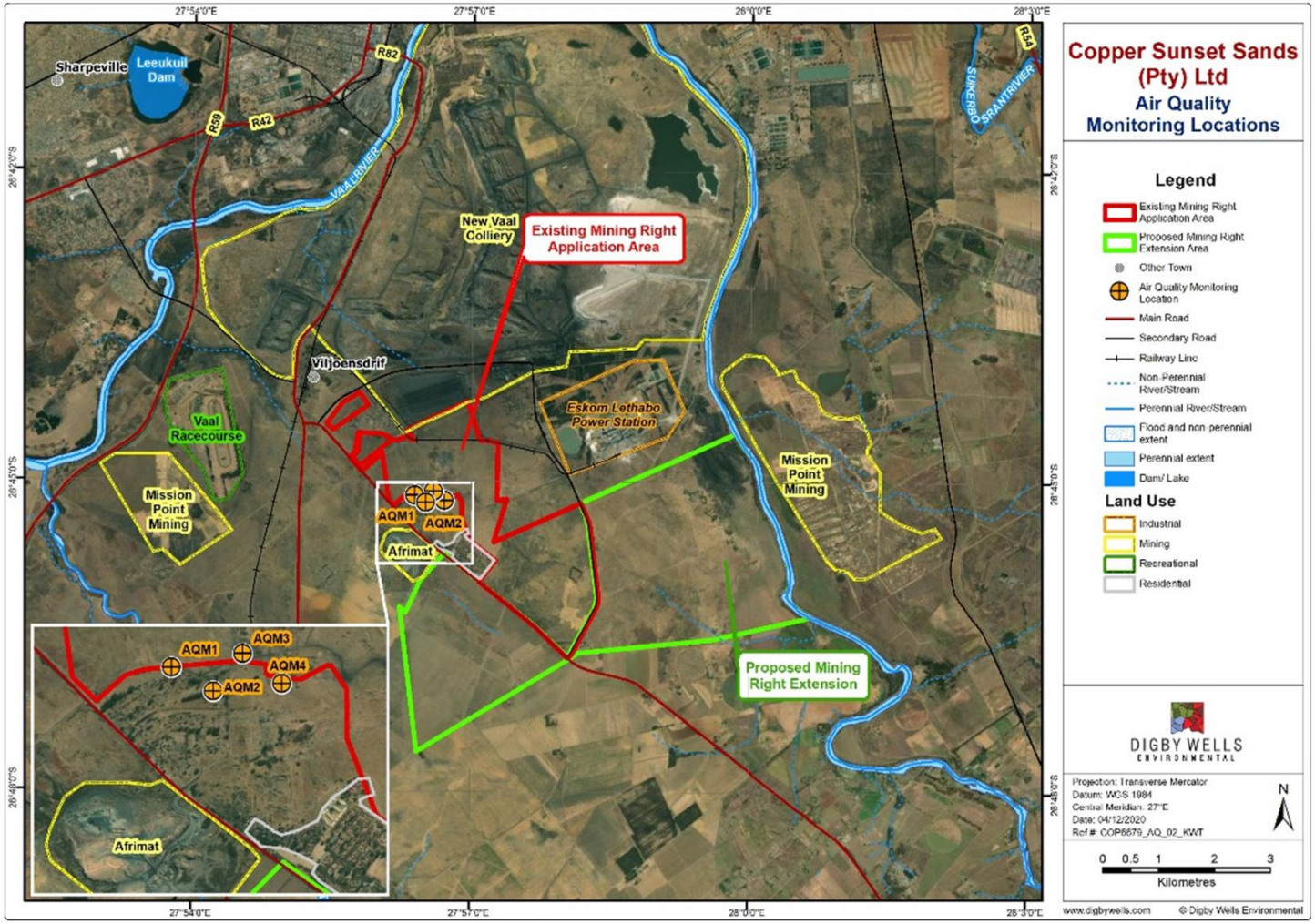
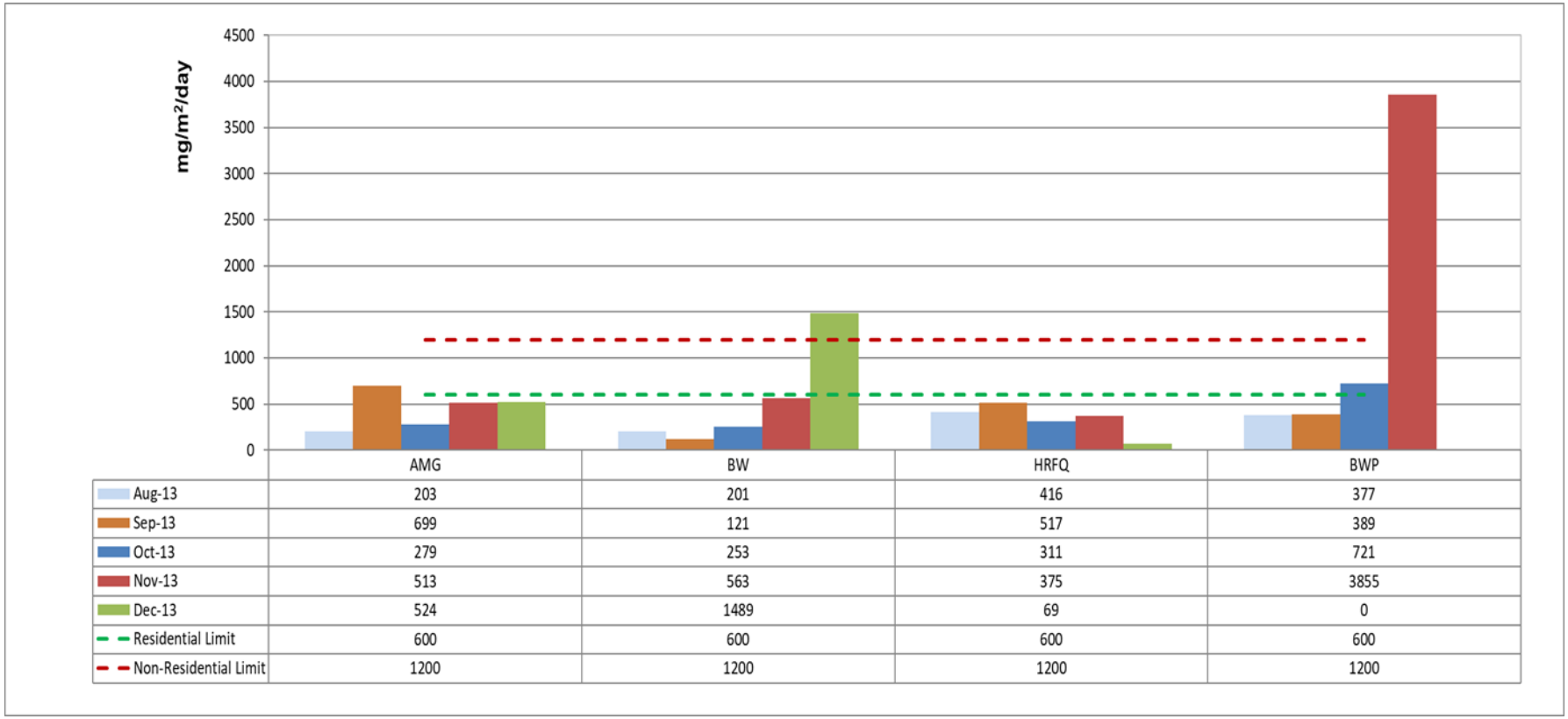
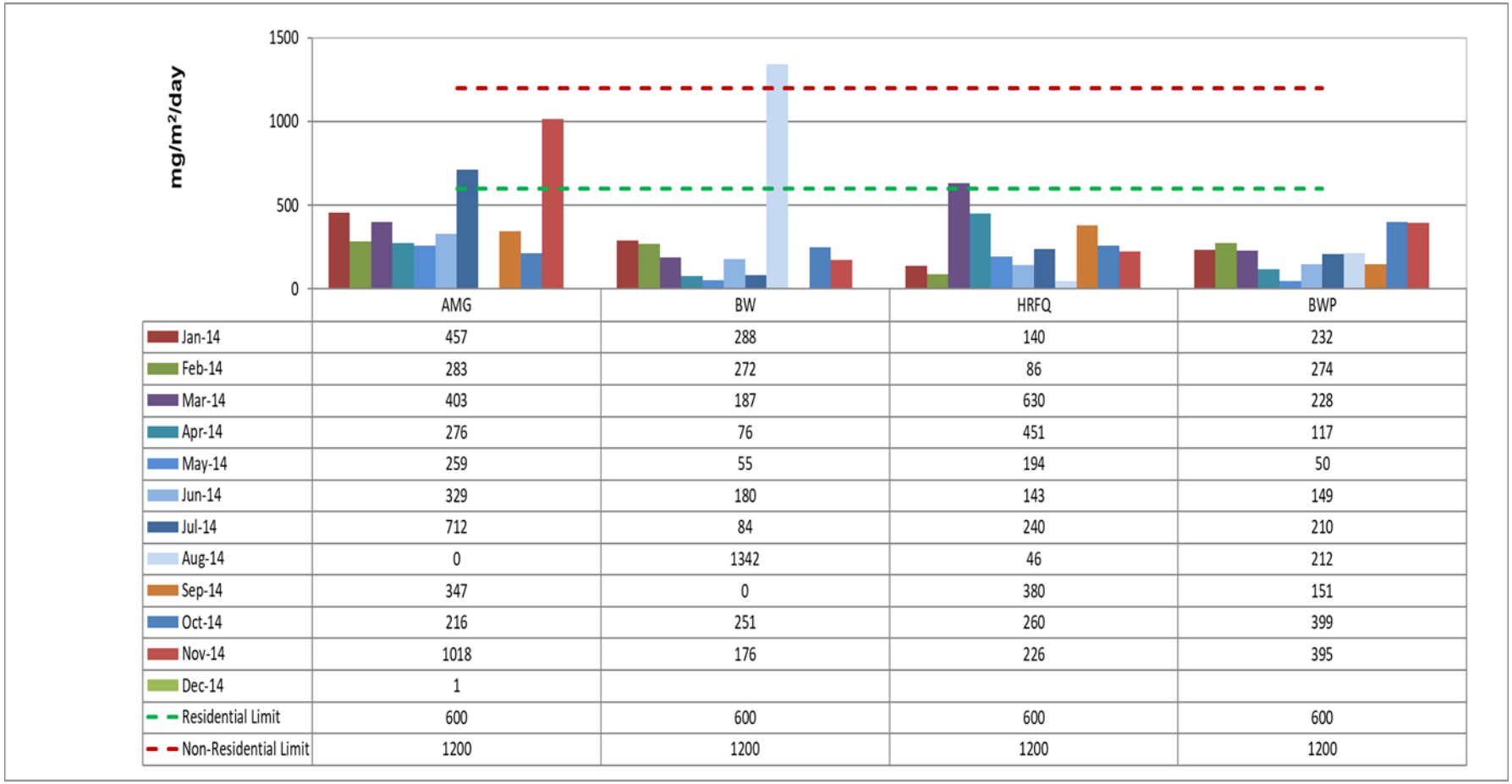


Figure 11-30: Local Setting Showing Nearby Sources of Air Pollution and Dust Monitoring Locations



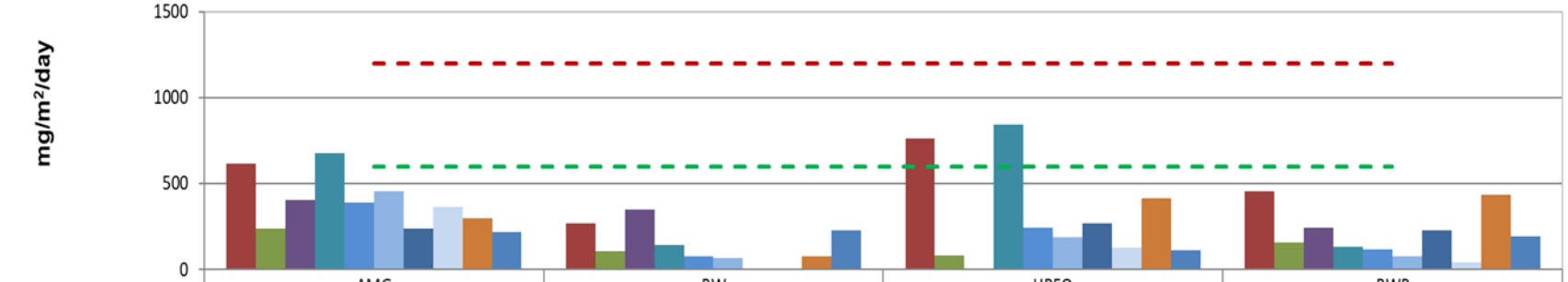
	AMG	BW	HRFQ	BWP
Aug-13	203	201	416	377
Sep-13	699	121	517	389
Oct-13	279	253	311	721
Nov-13	513	563	375	3855
Dec-13	524	1489	69	0
Residential Limit	600	600	600	600
Non-Residential Limit	1200	1200	1200	1200

Figure 11-31: Copper Sunset Dustfall Data (2013)



	AMG	BW	HRFQ	BWP
Jan-14	457	288	140	232
Feb-14	283	272	86	274
Mar-14	403	187	630	228
Apr-14	276	76	451	117
May-14	259	55	194	50
Jun-14	329	180	143	149
Jul-14	712	84	240	210
Aug-14	0	1342	46	212
Sep-14	347	0	380	151
Oct-14	216	251	260	399
Nov-14	1018	176	226	395
Dec-14	1			
Residential Limit	600	600	600	600
Non-Residential Limit	1200	1200	1200	1200

Figure 11-32: Copper Sunset Dustfall Data (2014)



	AMG	BW	HRFQ	BWP
Jan-15	617	268	764	455
Feb-15	239	105	80	159
Mar-15	406	350	0	244
Apr-15	675	143	840	131
May-15	388	74	241	118
Jun-15	455	66	186	76
Jul-15	236	0	266	228
Aug-15	363	0	125	41
Sep-15	297	77	415	432
Oct-15	218	226	113	190
Residential Limit	600	600	600	600
Non-Residential Limit	1200	1200	1200	1200

Figure 11-33: Copper Sunset Dustfall Data (2015)

11.12 Noise

The Noise Impact Assessment report is attached in Appendix K. The ambient (background) noise conditions were determined in the Project area based on the results of one monitoring campaign that was conducted in October 2020 at selected sensitive receiver locations. Google Earth® Imagery was used to identify the optimal noise-sensitive receivers in the vicinity of the MRA, where measurements were conducted. The approach used in investigating the noise impacts was based on the guidelines provided by SANS10103:2008.

The MRA and surroundings are characterised by scattered farmstead, low population density and can therefore be classified as Rural (Pateman, 2011). The predominant land use types in and around the Project area as identified from the Google Earth® imagery are agriculture, mining (New Vaal Colliery, Afrimat, Copper Sunset Mine and Mission Point Mining), industry (Eskom Lethabo Power Station), recreational (Vaal Racecourse) and residential. The activities associated with these land-use types have the potential to generate a disturbing noise that may influence the existing noise soundscape. The road network R82 and R716 surrounding the MRA are also contributors to the background noise.

11.12.1 Ambient Noise Measurements

Ambient noise levels were measured over four days from 01 October until 05 October 2020 in accordance with SANS 10103:2008. Continuous day and night-time measurements were taken at three locations designated as N1, N2, and N3 (Table 11-30 and Figure 11-34). The SANS10103:2008 guidelines describe Daytime as 6 am to 22 pm and Night-time means 22 pm to 6 am.

According to the guidelines in GN R320 of 20 March 2020, measurement of current ambient sound levels at each receiver must be collected over a minimum period of two nights, with each sample being a minimum of ten minutes and taken at two different times of the night (such as early evening and late at night). The approach in this campaign fulfilled the latter.

Table 11-30: Noise Measurement Locations

Site ID	Farm/location	Category of receiver	GPS coordinates
N1	Bankfontein No.9	Rural	26°45'37.73"S 27°56'43.76"E
N2	Modderfontein No.1279	Rural	26°47'6.44"S 27°58'53.96"E
N3	Zandfontein No.259	Rural	26°47'29.46"S 27°54'55.90"E

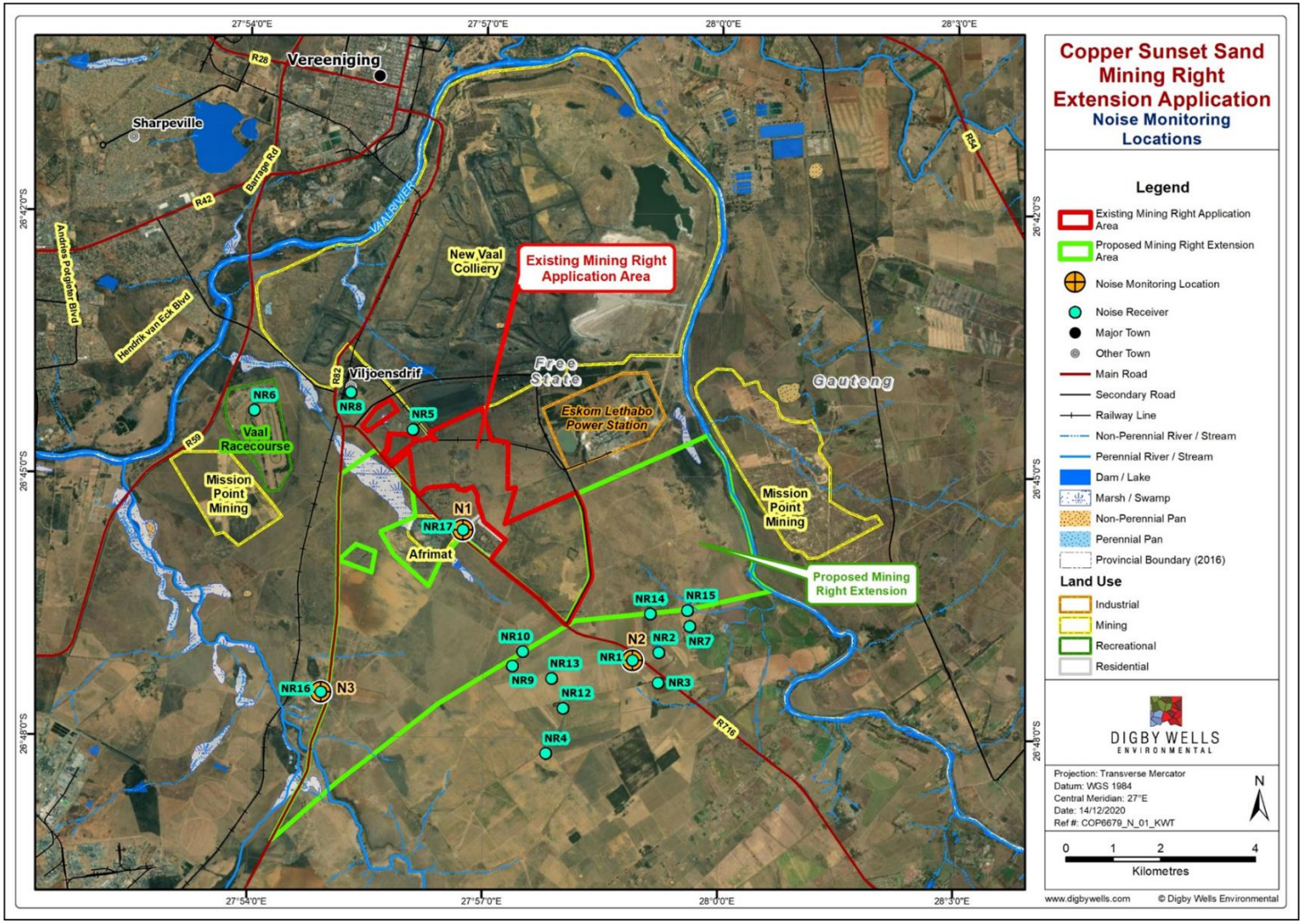


Figure 11-34: Noise Monitoring Locations

The results of the baseline measurements are presented in Table 11-31 below. The ambient noise levels recorded on site and the rating limits according to the SANS 10103:2008 guidelines, are presented for comparison. The time history graph per noise measurement location (N1, N2, and N3) can be seen in Figure 11-35 to Figure 11-37.

Table 11-31: Results of the Baseline Noise Levels Measured

Sample ID	SANS 10103:2008 rating limit					
	Type of district	Period	Acceptable rating level Decibels (dBA)	$L_{Aeq,T}$ dBA	Maximum/Minimum dBA	Date
N1	Rural	Daytime	45	51	90 / 34	01/10/2020 – 05/10/2020
		Night time	35	43	54 / 31	01/10/2020 – 05/10/2020
N2	Rural	Daytime	45	47	74 / 33	01/10/2020 – 05/10/2020
		Night time	35	41	59 / 28	01/10/2020 – 05/10/2020
N3	Rural	Daytime	45	50	65 / 40	01/10/2020 – 05/10/2020
		Night time	35	46	56 / 32	01/10/2020 – 05/10/2020
	Indicates current $L_{Aeq,T}$ levels above either the daytime rating limit or the night time rating limit					

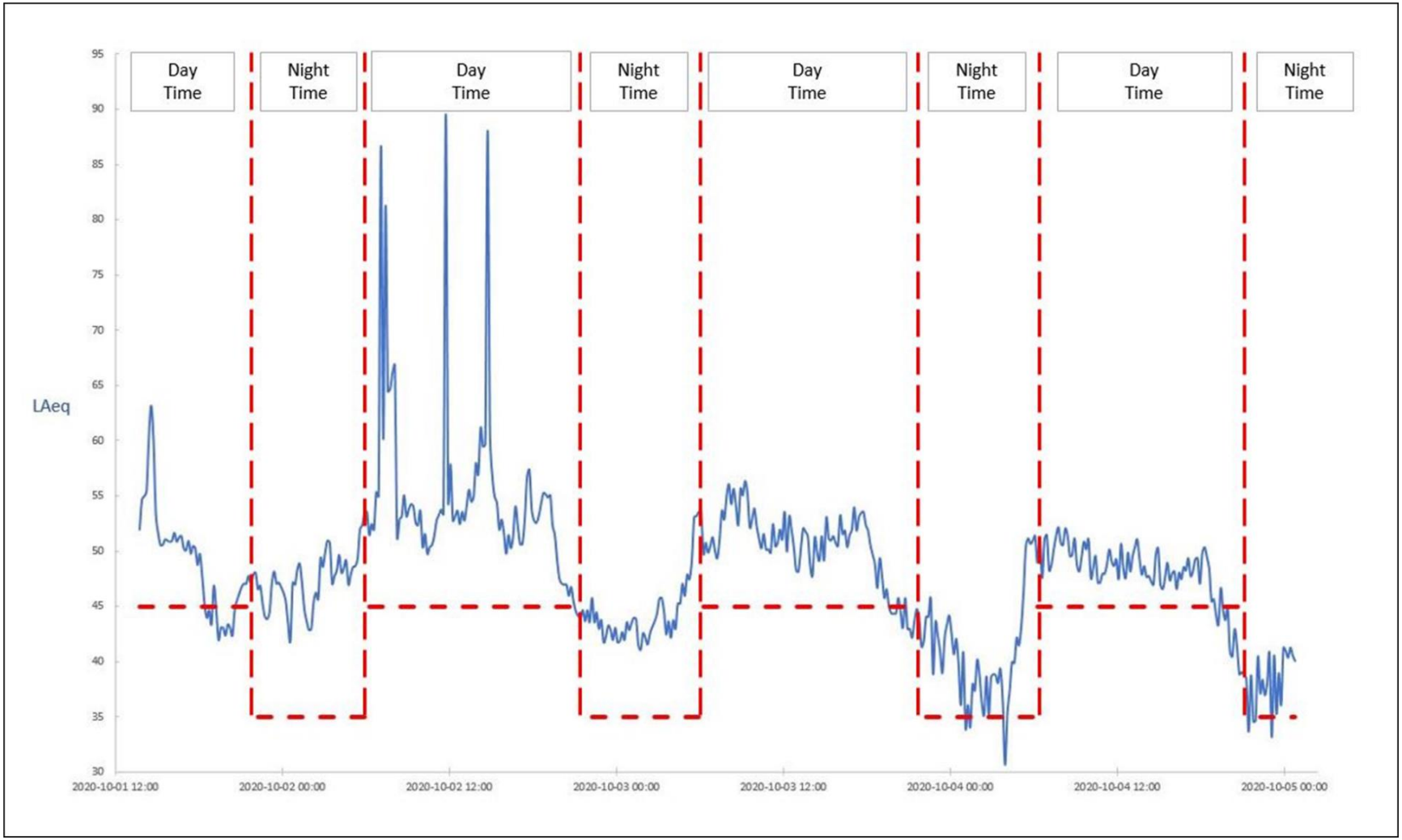


Figure 11-35: Noise Time Series Graph for N1 Monitoring Location

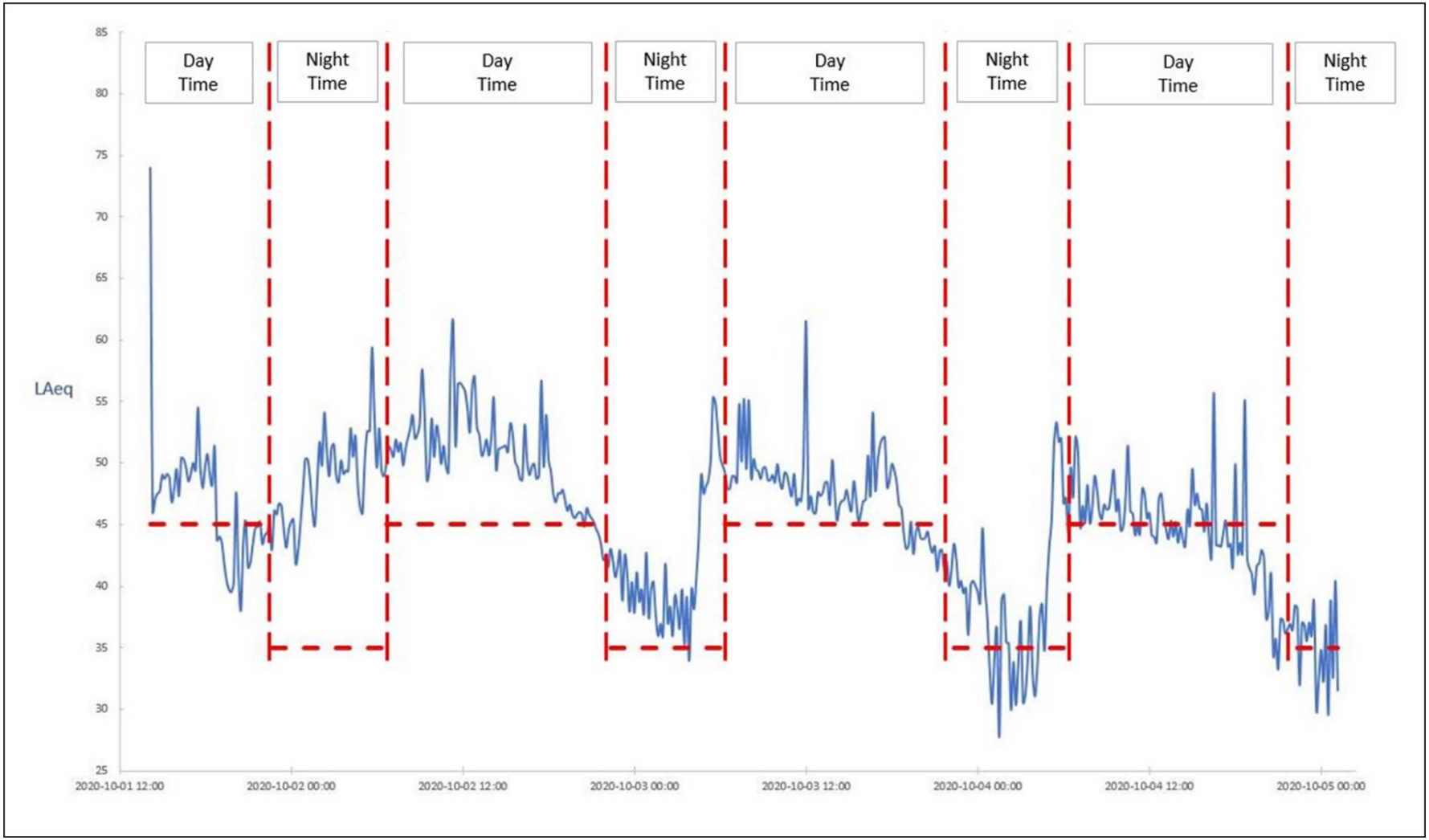


Figure 11-36: Noise Time Series Graph for N2 Monitoring Location

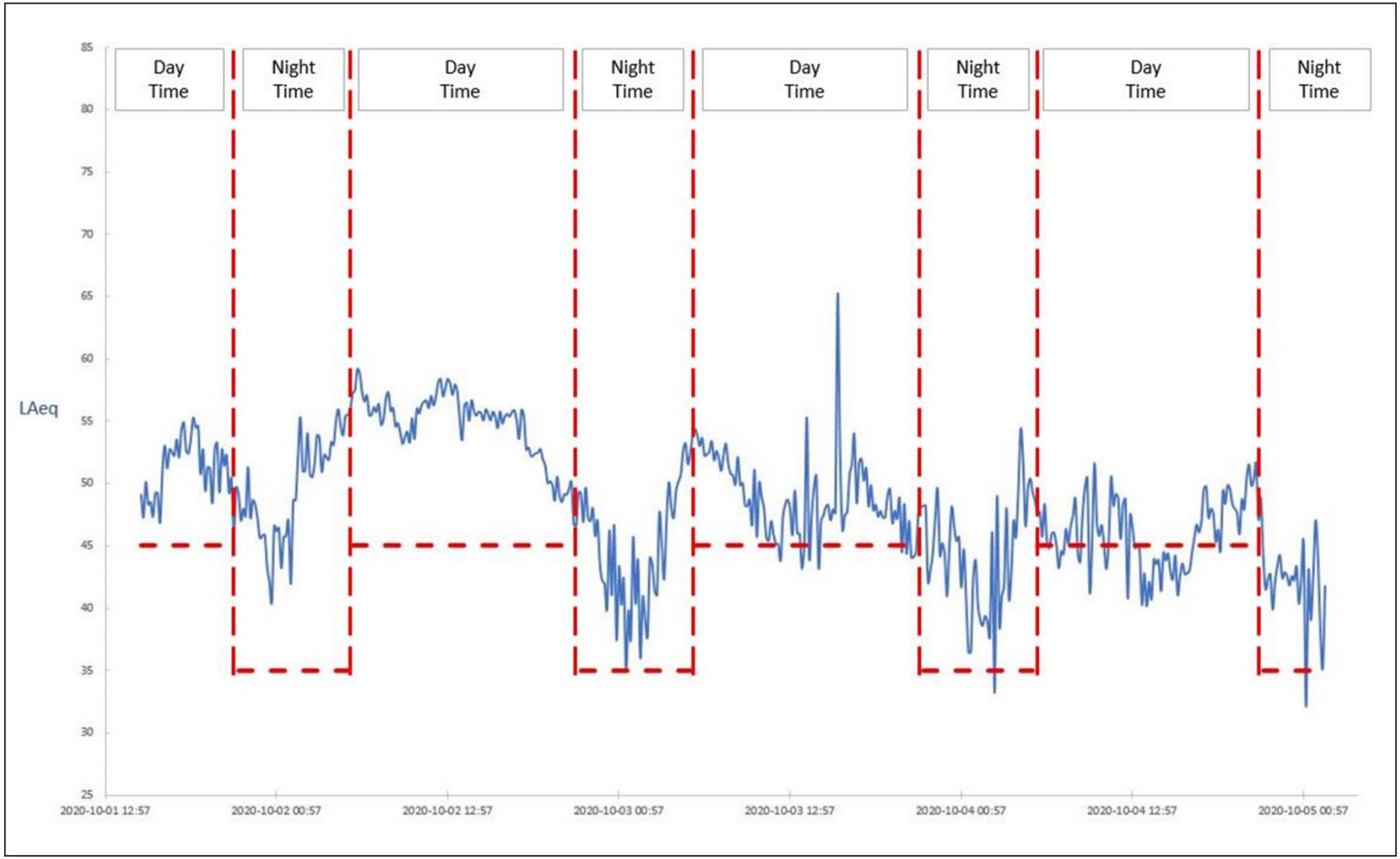


Figure 11-37: Noise Time Series for N3 Monitoring Location

11.12.1.1 Day-Time Results

The average daytime ambient noise level measured throughout the measuring period was 49dBA. The daytime noise levels at the different measurement locations indicate that the ambient daytime noise levels at all measurement locations were above the SANS guidelines maximum limit rating of 45dBA allowable for outdoor ambient noise in rural districts. The main noise sources influencing the daytime sound levels at the various measurement locations were mining activities to the north of the MRA, sound from kids screaming and playing from the residential area at N1, continuous birdsong, metal clanging, and hammering from the workshop in the vicinity of N2, intermittent noise from domestic animals (dogs) and vehicular activity on the R716 road.

11.12.1.2 Night-Time Results

The average night-time ambient noise level measured throughout the measuring period was 43dBA. The night-time noise levels at the different measurement locations indicate that the ambient night-time noise levels at all measurement locations were above SANS guidelines rating levels of 35dBA allowable for outdoor ambient noise in rural districts. The main noise sources influencing the night-time sound levels at the various measurement locations were the continuous mining activities to the north of the MRA, coupled with intermittent noise from domestic animals (dogs) and vehicular activity on the R716 road.

The noise sources that were audible during the baseline survey, contributing to the background soundscape measured in the MRA are depicted in Table 11-32.

Table 11-32: Noise Sources During Baseline Measurements

Noise source description			
Day	**Noise Type**	**Night**	**Noise Type**
Birdsong	Continuous	Domestic animals (dogs)	Intermittent
Kids screaming and playing	Continuous	Mining activities to the north of measurement location N2	Continuous
Domestic animals (dogs)	Intermittent	Vehicular activity on the R716 road	Intermittent
Vehicular activity on the R716 road	Intermittent		
Mining activities to the north of measurement location N2	Continuous		

11.13 Heritage

The Heritage Impact Assessment (HIA) undertaken during the EIA Phase is appended to this report as Appendix L.

11.13.1 Cultural Heritage Baseline Description

The site-specific Project area is underlain by geological features within the Karoo Supergroup, specifically the *Vryheid Formation*. The *Vryheid Formation* is the basal layer of the Ecca Group and dates to approximately 280 million years ago (mya). These layers were deposited in a deltaic[1] environment (Bamford, 2016). The *Vryheid Formation* includes shales, mudstones, sandstones, and coal. This unit is considered of very-high palaeontological sensitivity (SAHRA, 2013).

Fossil plants are usually preserved in the shales between the coal horizons and, to a lesser extent, within the sandstone surface outcrops (Bamford, 2012; 2014; 2016). Common fossil plants within the *Vryheid Formation* include *Glossopteris* leaves, roots and inflorescences, and *Calamites* stems. Coal deposits can potentially also include fossils of mammal-like reptiles and amphibians. These are, however, rarely, if ever, preserved with plant fossils.

Table 11-33 provides a general breakdown of the timeframes within the archaeological and cultural past in South Africa. Figure 11-38 below provides a breakdown of the previously identified heritage resources representing each of these periods.

Table 11-33: Archaeological Periods in South Africa

The Stone Age	Early Stone Age (ESA)	2 mya to 250 thousand years ago (kya)
	Middle Stone Age (MSA)	250 kya to 20 kya
	Later Stone Age (LSA)	20 kya to 500 CE (Common Era[2])
Farming Communities	Early Farming communities (EFC)	500 to 1400 CE
	Late Farming Communities (LFC)	1100 to 1800 CE
Historical Period	-	1500 CE to 1994 (Behrens & Swanepoel, 2008)

Adapted from Esterhuysen & Smith (2007)

[1] When lithologies are deposited onto an alluvial plain through river action.

[2] Common Era (CE) refers to the same period as *Anno Domini* (“In the year of our Lord”, referred to as AD): i.e., the time after the accepted year of the birth of Jesus Christ and which forms the basis of the Julian and Gregorian calendars. Years before this time are referred to as ‘Before Christ’ (BC) or, here, BCE (Before Common Era).

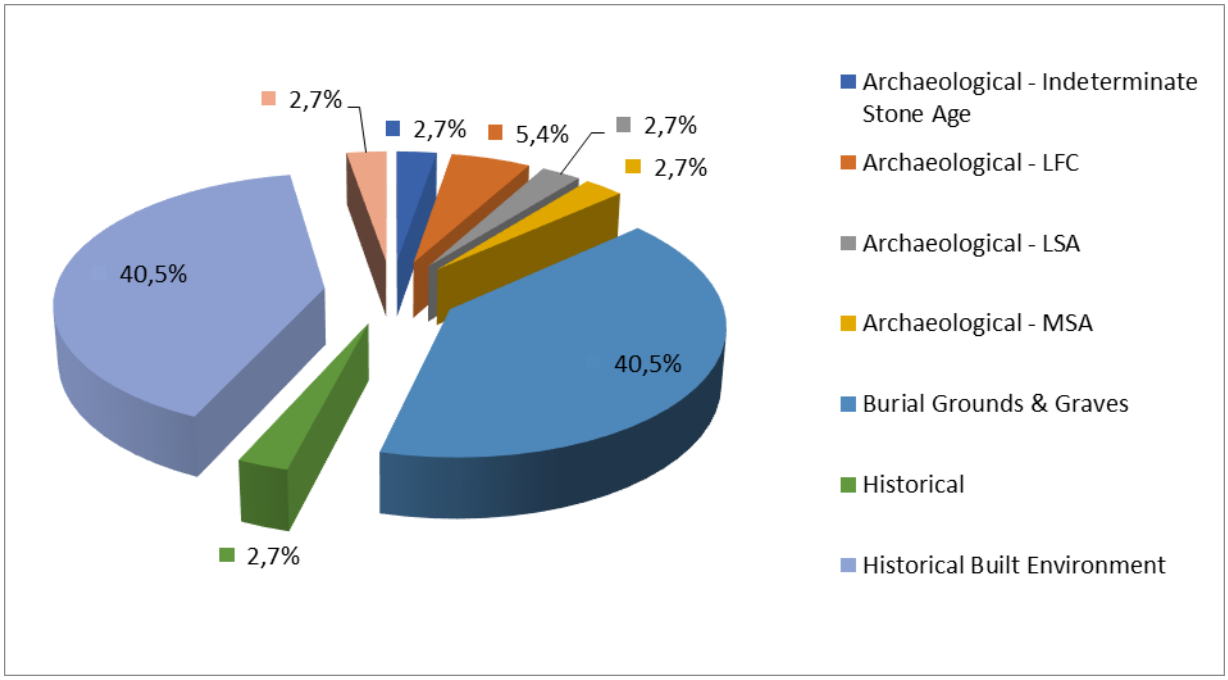


Figure 11-38: Heritage Resources Identified within the Regional Study Area

The cultural heritage landscape is dominated by the historical built environment and burial grounds and graves, although there are expressions of the MSA, LSA and LFC periods. The section that follows will present a brief overview of the archaeological periods present within the regional study area. The reviewed literature included no reports of archaeological material representing the ESA or EFC periods and, as such, these will not be described further in this report.

The Stone Age is divided into three phases defined by the production of stone tools by various hominid species: the ESA, the MSA and the LSA. The MSA dates from approximately 250 to 20 kya. High proportions of blades that are created through the Levallois technique and which are minimally modified characterise the early MSA (Clark, 1982). The MSA is further defined by blades and points which were produced from good-quality raw materials and the use of bone tools, ochre, beads, and pendants (Deacon & Deacon, 1999). A low-density scatter of MSA tools exposed by transmission lines represents the period in this area (Du Piesanie & Nel, 2014). An additional stone tool scatter was recorded but the period was not established (Du Piesanie & Nel, 2014).

The LSA started approximately 40 kya and continued up to the historical period, overlapping in some areas with the Farming Community period. LSA stone tools are specialised, and specific tools are created for specific functions (Mitchell, 2002). The inclusion of bone tools into the archaeological record further characterises this period. LSA sites commonly include diagnostic artefacts, such as microlithic scrapers and segments.

In southern Africa, the LSA is closely associated with hunter-gatherer groups, including the San (Mitchell, 2002). Due to the nomadic nature of the LSA peoples, open-air sites are generally poorly preserved and difficult to identify. The LSA is further characterised by

evidence of ritual practises and complex societies (Deacon & Deacon, 1999). This can be expressed through rock art. No rock art was identified within the study area. The LSA was represented by a low-density scatter of lithics (Van Schalkwyk *et al.,* 1996).

The Farming Community period correlates to the movements of Bantu-speaking agro-pastoralists into southern Africa. The results of the literature review demonstrate heritage resources associated only with the LFC. The LFC is represented by stonewalling or through secondary tangible indicators such as ceramics and evidence for domestic animals, including dung deposits and faunal remains.

Stonewalling is the most visible indicator of LFC settlements. Several types of stonewalling have been described through decades of research and, within the larger study area, the most common is Type V. Maggs (1976) first described these settlements, which consist of many primary enclosures grouped around a ring. The enclosures may be contiguous or linked by secondary walling to form a secondary enclosure. There is no surrounding perimeter wall, although there may be additional free-standing structures around the periphery of the settlement.

Heritage resources associated with the LFC account for 5.4% of the identified heritage resources. Two instances of stonewalling have been identified in the area (Van Schalkwyk *et al*., 1996). Van Schalkwyk *et al.* (1996) did not describe the type of walling, but given its location it is most likely Type V.

The historical period[3] is commonly regarded as the period characterised by contact between Europeans and Bantu-speaking African groups and the written records associated with this interaction. However, the division between the LFC and historical period is artificial, as there is a large amount of overlap between the two.

The period of approximately 1817 to 1826 AD is generally referred to as the *Mfecane* or, north of the Orange River, the *Difaqane*. Many aspects of the *Mfecane/Difaqane* have been debated and challenged (Landau, 2010). The traditional understanding of the period is that Mzilikazi and his Ndebele group were pushed out of their territory by the Zulu group led by Shaka. This displacement had a knock-on effect, as multiple groups were subsequently displaced to the north and the west. A drought during this time exacerbated the instability and increased the pressure on food supplies, which were already running low. European settlers, traders, missionaries, and travellers moving into the interior further added to instability and resulting power struggles. The *Mfecane/Difaqane* was characterised by unprecedented (at least within the records of the Europeans travelling within southern Africa) social and political mobilisation and violence across the Highveld as individuals sought personal and food security.

As a result of social and political upheaval, the Highveld was vulnerable to intrusive groups including the Swazi and the *Voortrekkers*. Groups of Afrikaners initiated a move from the Cape

[3] In southern Africa, the last 500 years represents a formative period that is marked by enormous internal economic invention and political experimentation that shaped the cultural contours and categories of modern identities outside of European contact. This period is currently not well documented but is being explored through the 500 year initiative (Swanepoel, et al., 2008).

to the interior to establish an independent state in approximately 1835. The migration of these *Voortrekkers* is commonly referred to as the Great Trek (or *Groot Trek*) (Delius & Cope, 2007; Voortrekkers, 2014).

Soon after settling in the Highveld area, the Trekboers (now farmers) discovered and exploited the Highveld Coalfields. The coal was initially used by the Boers as a domestic resource; however, the discovery of gold in the Witwatersrand in 1886 created an enormous demand for coal (Brodie, 2008). This increase in the demand for coal drove the commercial exploitation of the coal, until the industry was put on hold by the outbreak of the South African War of 1899-1902 (previously referred to as the Second Anglo-Boer War), which officially started on October 9th, 1899.

Heritage resources representing the historical period include the historical built environment (15 records or 40.5% of the total records), a historical place of significance (one record or 2.7% of all records), a memorial (one record or 2.7% of all records) and burial grounds and graves (15 records or 40.5% of all records). These have been recorded as:

- Burial grounds and graves, which range in size from single graves to more than fifty but less than one hundred graves (Van Schalkwyk *et al*., 1996; Dreyer, 2005; Birkholtz & James, 2008; Beater, 2017; Hardwick & Du Piesanie, 2019);
- The historical place of significance is the site of the Coalbrook Mine Disaster of 21 January 1960 (Birkholtz & James, 2008);
- The memorial was constructed in the memory of Frits Pistorius, a young boy who had been murdered in 1952 (Dreyer, 2005); and
- Historical buildings which include buildings, structural remains, remains of functional structures and the remains of *werwe* (farmsteads) (Dreyer, 2005; Van Ryneveld, 2007; Du Piesanie & Nel, 2014; Higgitt & Du Piesanie, 2015; Beater, 2017; Hardwick & Du Piesanie, 2019).

11.13.2 Results from the Pre-disturbance Survey

Shannon Hardwick undertook a pre-disturbance survey of the site-specific study area on 21 September 2020, 20 January 2021 and 27 to 28 January 2021. The pre-disturbance survey focused on areas intended for sand mining activities and was a mix of pedestrian and vehicular travel amongst areas under investigation, depending on the disturbances observed within the Project area. The survey was recorded as GPS tracks and identified heritage resources were marked as waypoints. Identified heritage resources were also recorded through written notes and photographs.

The natural vegetation of the site-specific study area has been disturbed in varying degrees by human activities. The environment at the time of the verification survey was disturbed through anthropogenic and animal activities. Burrowing animals were present within the Project area and cattle and game (including ostriches and blesbok) graze the area. Burrows were inspected for the presence of any archaeological materials.

Anthropogenic disturbances included cultivation, including maize and extensive soybean fields. Additional farming infrastructure (including cattle kraals, water tanks, boreholes and modern structures), electrical infrastructure (including pylons and powerlines) and formal and informal roads have been established within the Project area. During the September survey, part of the area had recently been burned, which improved visibility. In other areas and especially during the January 2021 survey, the natural grass was overgrown, limiting ground visibility.

The following section describes the observations made during the survey and the outcomes of the survey.

11.13.2.1 Newly Identified Heritage Resources

During the pre-disturbance survey undertaken for the current Heritage Resources Management (HRM) process, three additional heritage resource were identified. Table 11-34 includes a summary of the heritage resources.

A preliminary assessment of the Genealogical Society of South Africa (2011) database did not indicate additional burial grounds are known to exist within the Project area.

Table 11-34: Heritage Resources identified within the Project Area

Heritage Resource	Description
BGG-001	Burial ground of 65 identified graves. The graves within the burial ground are marked by sand heaps with upright stone headstones, brick or cement headstones or no headstones, stone and brick heaps with no headstone, cement dressings (with and without individual fences), granite dressings with headstones and brick borders with headstones. Most of the headstones that have inscriptions are illegible and in poor condition. Grave goods are present on some graves. The burial ground is currently not fenced, but parts have been fenced off in the past, as there are dilapidated remains of fencing.

Heritage Resource	Description
BGG-002	Burial ground of approximately 52 visible graves. The graves are marked by stone and soil heaps, no or brick dressings with cement headstones and brick dressings with a brick headstone with an inscribed granite plate. The legible gravestones include a mix of languages. The families represented include: Kheswa, Mahlase, Mokoena, Morobi, Motolo and Nlhapo and the legible graves date between 1931 and 1987. There is an additional grave dated to "13" which could refer to 1913 or 2013. The burial ground is currently not fenced, but parts have been fenced off in the past, as there are dilapidated remains of fencing. It appears that the burial ground was fenced in two phases or two sections. Most of the graves are not in good condition – many of the headstones have fallen over or have subsided, some of the graves and headstones are broken and many inscriptions have faded away and are illegible. The burial ground has been affected by erosion and animal burrows and there are cattle tracks crossing the burial ground.
H-ft-001	An old round of artillery. The round has rusted, and no markings were visible on the object. A pen is included in the photograph below for scale.

11.14 Socio-Economic

The Social Impact Assessment (SIA) undertaken during the EIA Phase is appended to this report (Appendix M). The baseline profile of the receiving socio-economic environment is presented in this section.

This Section presents the socio-economic characteristics of the regional, secondary, and primary study areas.

- The regional and secondary study areas are presented comparatively with the information presented in tables and figures depicting data trends; and
- The socio-economic characteristics of the primary study area are described in a stand-alone subsection – focused on the Project site, the community residing near the proposed Project site namely the Eskom Holdings Housing Properties (Vaal Power), other sand mining operations in the area and the Eskom Lethabo Power Station.

11.14.1 Regional and Secondary Study Areas

11.14.1.1 Population Demographics

The Free State Province has the third largest geographic area in South Africa; however, it is the second least populous province and has the second lowest population density (21 persons per km^2). In turn, FDDM is the smallest district in the Province but has a slightly higher population density (24 person/ km^2,) compared to that of the provincial level. Similarly, to the district, MLM is also small geographically but has a higher population density of 87 persons / km^2. This has been attributed to its housing of the town of Sasolburg which is near the

economically active City of Johannesburg; attracts a large workforce for Sasol synthetic fuels and enhances other economic drives which uplifts the local economy. In relation to the Electoral Wards, Ward 18 has a lower population compared to Ward 19, which is attributed by being mostly rural and characterised by commercial farming activities.

The demographic indicators of the population for the regional and secondary study areas are further summarised in Table 11-35 below.

Table 11-35: Population Demographic Indicators

Study Area:	Regional		Secondary		
Indicators	**Free State**	**FDDM**	**MLM**	**Ward 18**	**Ward 19**
Population	2 834 714	494 777	163 564	4 570	7 553
Size (*km²*)	129 825	20 829.1	1 720.1	82.4	163.1
Population density	21 km²	24 km²	87 km²	-	-
Number of Households	946 637	172 370	59 115	1 713	2 624
Number of child-headed households[4]	5 411	751	167	4	5

11.14.1.2 Population Age Groups

The population across the regional and secondary study areas is characterised by a higher number of economically active persons (i.e., 18 to 64 years) and lower numbers of elderly people. This may be indicative of in-migration of economically active persons into the region whilst the elderly out-migrate to their areas of origin or high mortality amongst the elderly. Figure 11-39 presents an overview of the population by age in percentage.

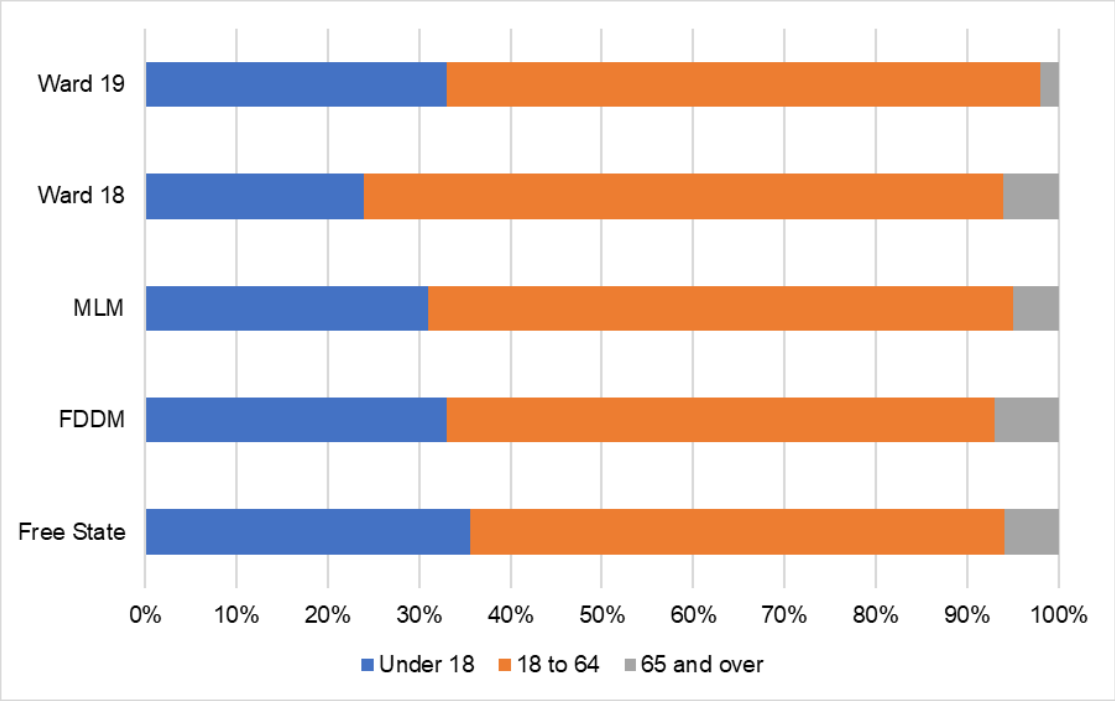
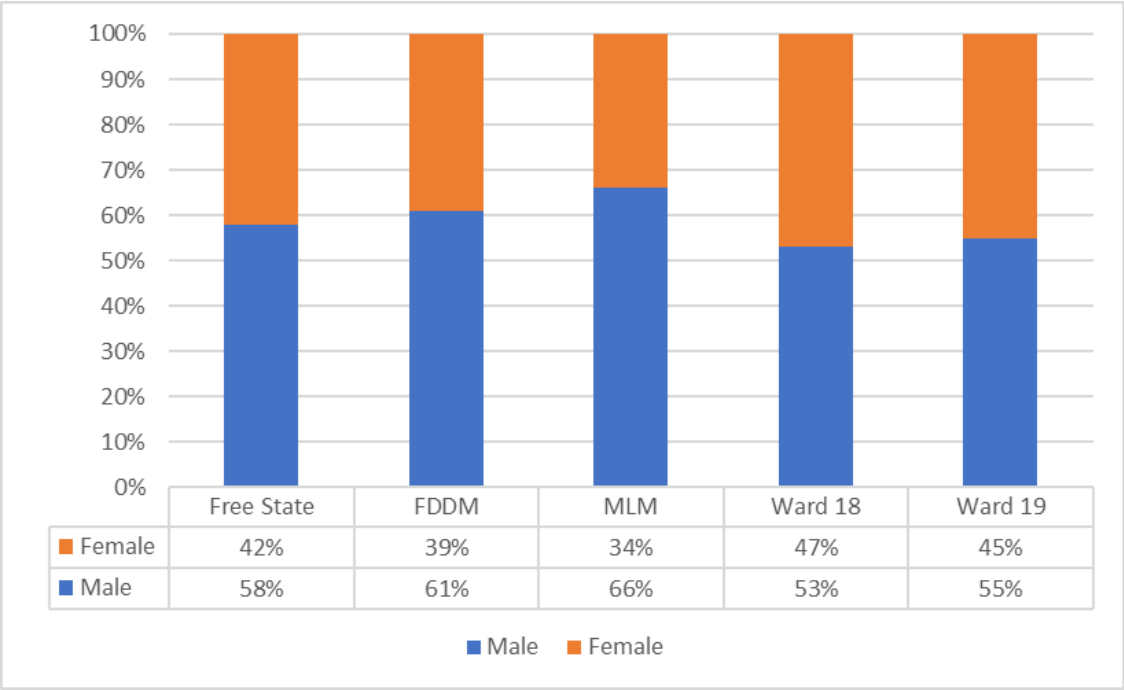


Figure 11-39: Overview of Population by Age

11.14.1.3 Gender Distribution of the Population

The population across the study areas is comprised of more males than females which is often indicative of the presence of a young migrant labour force. The population distribution by gender is highlighted in Figure 11-40 below.



	Free State	FDDM	MLM	Ward 18	Ward 19
Female	42%	39%	34%	47%	45%
Male	58%	61%	66%	53%	55%

Figure 11-40: Gender Distribution

11.14.1.4 Racial Distribution of the Population

Most of the population (average of 77%) in both the regional and secondary study areas are of Black/ African ethnicity. The exception is found in Ward 18, where the predominant ethnic group is Whites (64%) followed by Black/ Africans at 33%. The least ethnic groups found in these study areas are Coloured and Indian / Asians as depicted in Figure 11-41 below.

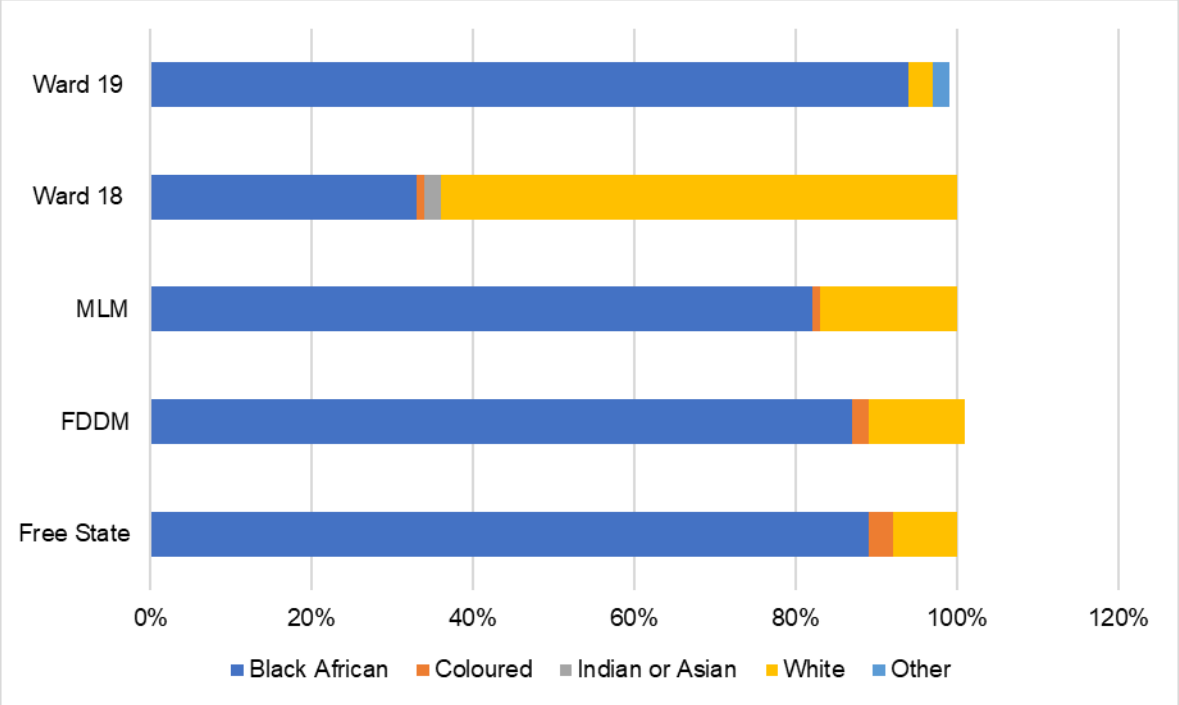


Figure 11-41: Distribution of the Population by Race

11.14.1.5 Predominant Spoken Languages

Figure 11-42 below depicts the predominant spoken languages in the study areas. It is evident that SeSotho is the predominant language spoken at home as most of the population is Black/African. The FDDM has the highest percentage of SeSotho speaking population (75%) which is slightly above the Province (71%), followed by the MLM (68%). However, at Electoral Ward level, the except is observed within Ward 18 (58%) whereby Afrikaans is the most spoken language due to the area being dominated by White Afrikaans speakers. Afrikaans is the dominating language in Ward 18 (58%). Across the study areas English and SeTswana areas amongst the least spoken languages. Other predominant languages include isiXhosa, IsiZulu and SePedi which are dominant in the study areas.

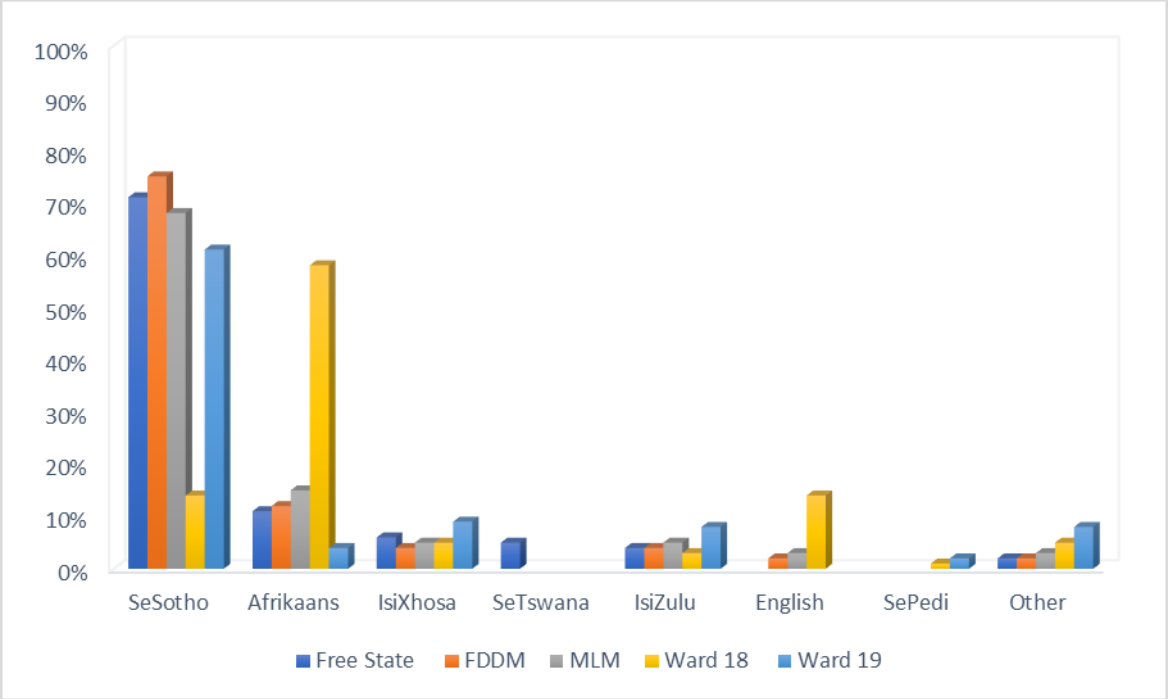


Figure 11-42: Predominant Spoken Languages

11.14.1.6 Education

The National Development Plan 2030 makes a crucial observation that "too few South Africans work, the quality of school education for the majority is of poor quality and the country lacks capacity in crucial areas". It is also argued that access to and improved education will lead to higher employment and earnings, while more rapid economic growth will broaden opportunities for all and generate the resources required to improve education.

In February 2021, the Department of Basic Education (DBE) announced that the Free State Province produced the most matric pass rate of 85.1% which is way above the national pass rate of 76.2% for the year 2020 despite the challenges experienced with the Covid-19 global pandemic and the country being on Lockdown. The 2019 pass rate for the Free State was 81.3% which indicates a slight average increase of 3% for the year 2020 (DBE, 2021).

As depicted in Table 11-36 below, the Municipality's education profile indicates that 36% of the population obtained Grade 12 or equivalent education in relation to 34% and 33% at District and Regional Levels. The total number of people who have not completed matric (including those with no schooling), constitutes 9% of the population at Municipal Level. An average of 3% of the adult population who completed a post-matric qualification have been recorded. Based on the readily available data, Ward 18 recorded the highest percentage of people who obtained their Grade 12 (46%) compared regional, district and local level with an average of 13% of the adult population having obtained a post-matric qualification, ranging from diplomas to post PhD-degree.

Table 11-36: Educational Levels for Regional and Secondary Study Areas

Education Level	Free State	FDDM	MLM	Ward18	Ward 19
None	6%	7%	9%	1%	4%
Other	1%	0%	0%	0%	0%
Some primary	12%	12%	9%	5%	12%
Primary	5%	4%	3%	2%	5%
Some secondary	35%	35%	34%	18%	41%
Grade 12 (Matric)	33%	34%	36%	46%	31%
Undergrad	3%	3%	3%	14%	1%
Post-grad	3%	2%	3%	11%	0%
N/A	2%	2%	2%	2%	6%

11.14.1.7 Employment and Unemployment Rates

The overall employment rate of the economically active population in the Project area is around 45.5%, with the overall lowest employment rate recorded at regional level (36.2%). The highest employment rate has been recorded for Ward 18 (71%) in comparison to Ward 19 (41%). It should be noted that the data recorded may be outdated and may not reflect the current employment rate. It is, therefore, assumed that the data reflects the employment opportunities in mining and construction sectors around the area. The overall percentage of unemployed persons across the regional to municipal levels including the wards is 18%. Most of the population falls within discouraged work-seekers across regional, district and local levels with an average of 16.8% as reflected in Figure 11-43 below.

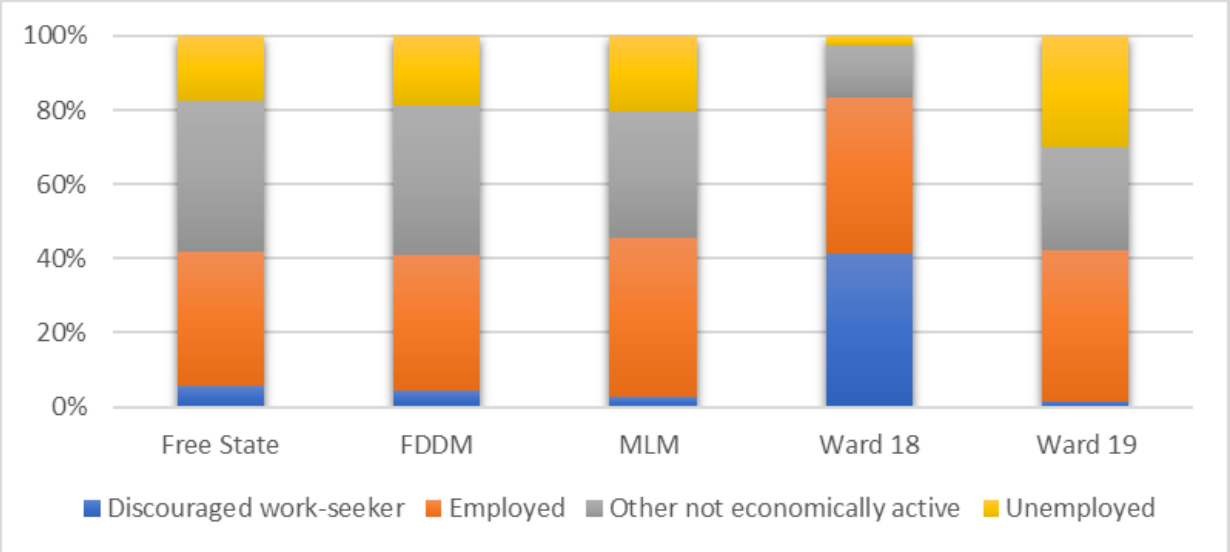


Figure 11-43: Employment and Unemployment Rates

11.14.1.8 Income Levels

Figure 11-44 below depicts the annual income for employed individuals. These figures are as per the 2011 census and have not been updated to consider inflation. An average of seven percent (or 7%) of individuals are without income across the study area. An average of 36% across the study areas earn an income between R10 000.00 and R 39 000.00. A family of four with a monthly household income of R 1 600.00 or less would be considered to live in poverty, as this income would leave the family unable to meet their food needs with no money left for non-food items.

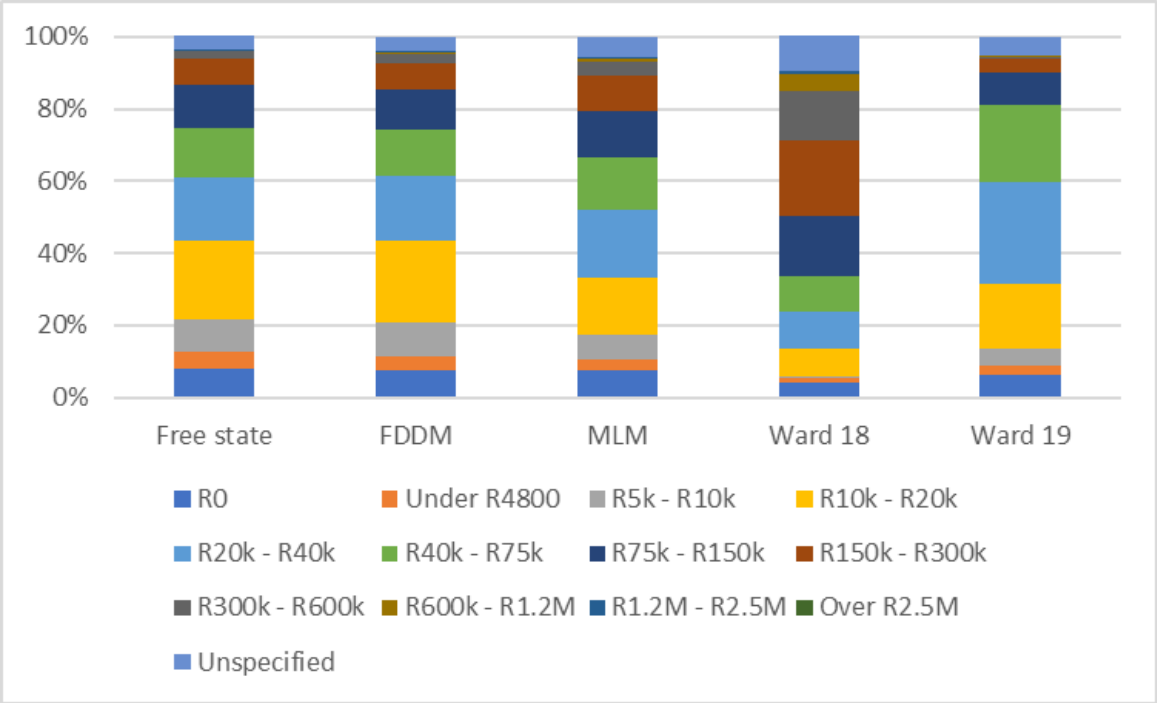


Figure 11-44: Overview of Annual Income for Employed Individuals

11.14.1.9 Health Profile

According to the FDDM IDP (2021/2022), there was around 80 812 HIV positive people in the district. HIV/AIDS was the second leading cause of death for the 15-24 and 25-64 age groups, at 13.3% and 14.9%, respectively. Lower respiratory infections (22.7%) and diarrhoeal diseases (18.4%) is the leading causes of death for children under 5. For this reason, the FDDM implemented a HIV/AIDS Strategy and Plan as a multi-sectoral intervention aimed at providing strategic and policy direction in combating TB and HIV/AIDS in the district, as per the following strategic goals:

- Increase the number of prevention interventions to reduce the rate of new infections;
- Improve access to treatment; and
- Mitigate the socio-economic impact of HIV/AIDS, TB and other STIs, especially amongst the most vulnerable groups.

No new data is available on the HIV/TB prevalence rate for the MLM.

11.14.1.9.1 Access to Health Care Services

Table 11-37 presents an overview of the healthcare facilities within the MLM and FDDM. Despite the numbers presented in the table, healthcare provision is not adequate within the MLM as numerous settlements occur more than 5 km from a healthcare facility (FDDM, 2021/2022). Accessibility of clinics still remains a challenge for Ward 18 and Ward 19. Some rural villages are more than 20 km away from the nearest hospital and more than 5 km from a clinic. In such instances, the communities are serviced by a mobile clinic which visits the area once per week and offer basic health care such as medications and childhood vaccines.

Table 11-37: Number of Healthcare Facilities in the MLM and FDDM

Healthcare Facility	MLM	FDDM Total
Hospital	1	4
Clinics including Mobile Clinics	7	32
Emergency Medical Services (EMS) Stations	2	12

11.14.1.10 Household Access to Public Services and Infrastructure

11.14.1.10.1 Sources of Water

According to the Municipal IDP, the Water Services Development Plan (WSDP) is still yet to be developed. There is no plan in place to manage the sanitation in the area although the municipality is in the process of addressing the challenge. In its Plan, the Municipality aims to:

- To ensure that the municipality broadly delivers service according to the strategic orientation based on key sector plans;
- To ensure universal access to reliable and quality basic municipal services by all communities; and
- To build environmental sustainability and resilience.

The major water supply sources across the Project area are dependent on local service water supply (96%) which refers to water supply that is operated by municipality or other appointed water service provider as depicted in Figure 11-45 below. Both the regional and district municipalities have an average water supply from boreholes (4%) as majority of the land use is agriculturally based.

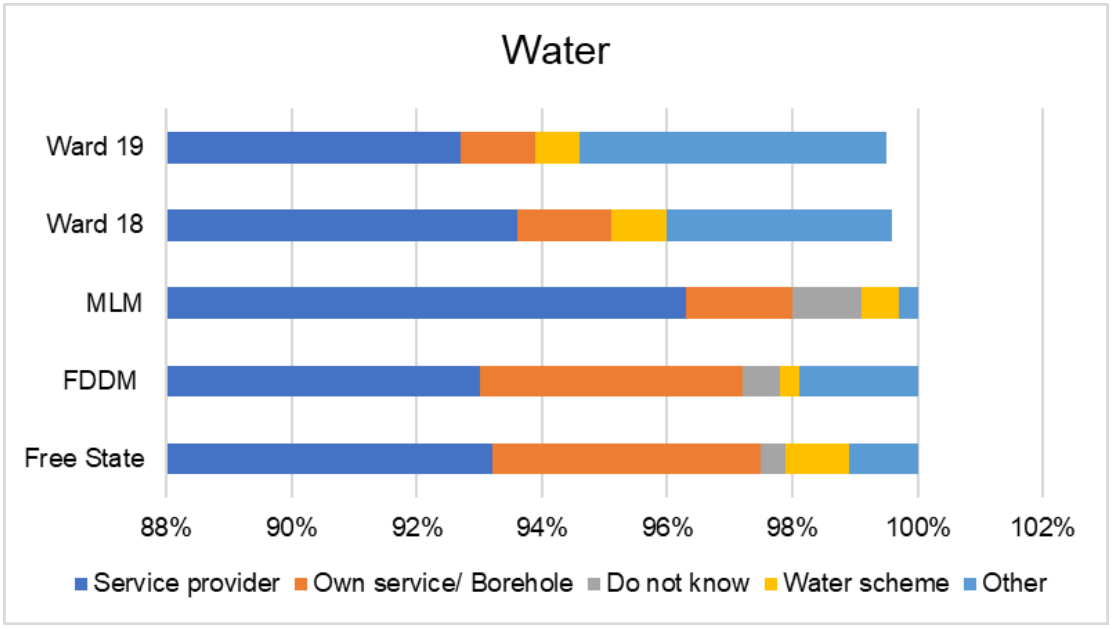


Figure 11-45: Sources of Water Supply for the Study Areas

11.14.1.10.2 Sanitation Resources

Figure 11-46 below depicts access to sanitation services including the use of flush toilets connected to septic tanks or sewerage system, pit toilets with and without ventilation and bucket systems. Overall, there has been an increase in access to sanitation facilities across the Project areas (74%); noting that households in Ward 18 have the highest access to flushing toilets (96%) in comparison to Ward 19 (45%) which has the highest percentage of the informal households still utilising the pit toilet system (37%). The challenges with sanitation service at Ward 19 may be due to some informal settlements having not received proper sanitation service due to deteriorating infrastructure and incomplete projects or ageing and frequently busting asbestos pipes for bulk supply.

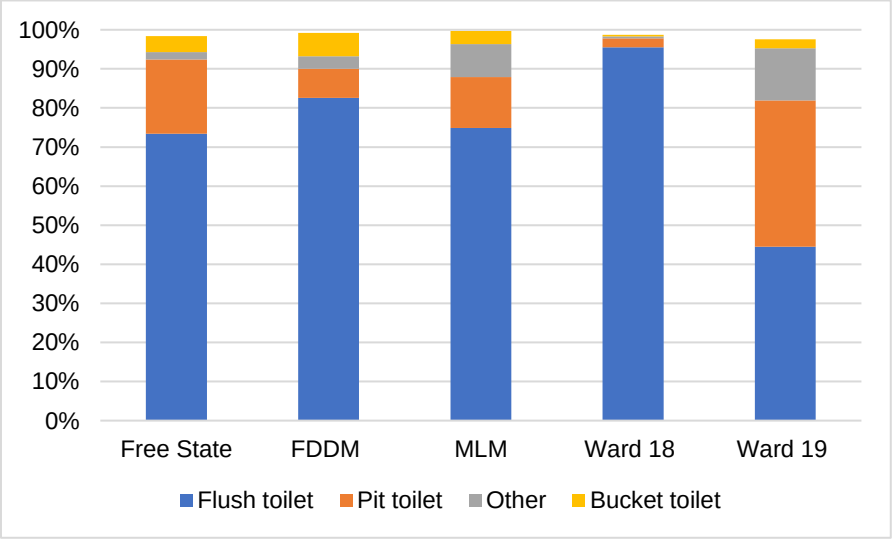


Figure 11-46: Household Access to Toilet Facilities within the Study Areas

11.14.1.11 Waste Management

The MLM currently provides solid waste removal service to approximately 50 000 households and 800 businesses. The waste service delivery is coordinated from the municipality's main headquarters in Sasolburg and a regular waste removal service is provided to all households and businesses with the municipal areas, except to the households in rural areas. The service is provided once a week to all households in Sasolburg, Deneysville, Oranjeville, Zamdela, Refengkgotso and Metsimaholo. Refer to Figure 11-47 for waste removal services within the Project area.

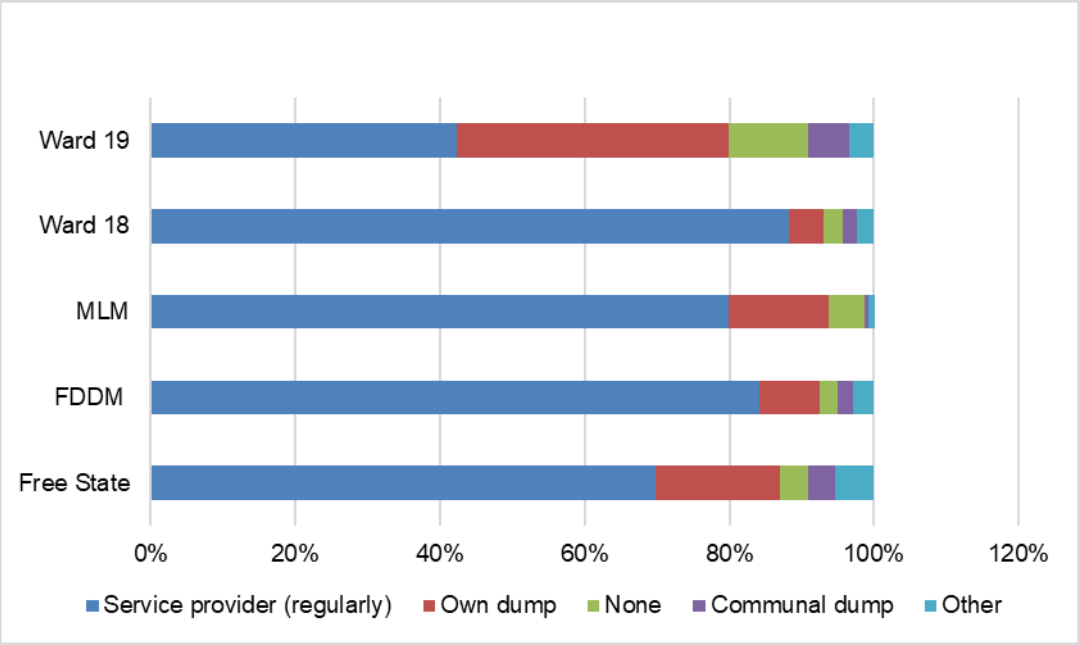


Figure 11-47: Waste Removal Services

11.14.1.12 Electricity Supply

The number and percentage of households with access to electricity through conventional meters is approximately 8 196 households (13.9%) whilst those who have access to electricity through prepaid meters is approximately 41 558 households (70.3%) and those that pay for electricity supply is 737 households (1.2%). The remaining population, 7 862 households (13.3%) have no access to basic electricity. Figure 11-48 below depicts the total average of households including informal houses with basic access to electricity at 56% compared to 35% of the households using paraffin. Challenges with electricity services include the rising cost of bulk electricity, electricity theft, distribution losses and high costs of maintenance and repairs of network and distribution infrastructure. The current network and distribution infrastructure needs to be extended to newly developed areas. Availability of service to schools, clinics, police stations is relatively available.

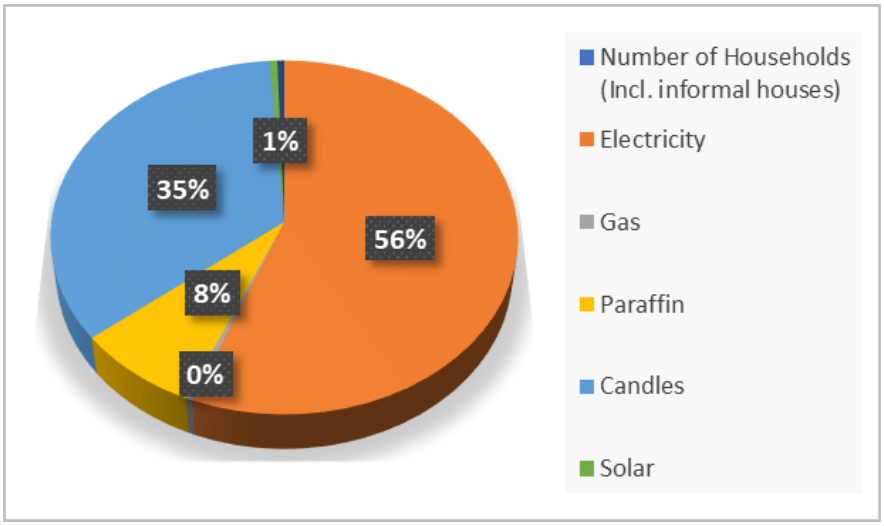


Figure 11-48: Average Number of Households with access to electricity for Ward 18 and Ward 19

11.14.1.13 Public Transport and Road Infrastructure

The MLM currently does not have an Integrated Transport Plan. The IDP classifies the status of the gravel which stretches to approximately 322 km in comparison to 379 km stretch of tarred roads. Due to limited financial resources, the MLM is currently resealing internal roads through a skilled external contractor and patching of potholes and grading of dirt roads is undertaken to maintain the road infrastructure. Other challenges with local roads and deterioration include encroachment of roads, reserves, servitudes and building lines.

11.14.2 Primary Study Area

This section describes the socio-economic characteristics of the primary site-specific study area.

11.14.2.1 Land Use

The primary study area is comprised of mining (coal and quarries), energy or power generation, and commercial farming (i.e., livestock and crops) sectors, tourism and recreational (Vaal Racecourse) and residential including the surrounding communities of Vaal Power. Commercial agricultural is the most dominant land use in the District while the petrochemical industry is the main contributor to municipal output. Mining and Energy Power Generation sectors are also an important land use, with Sasol, Seriti and Eskom being the most active businesses in the area within MLM. The expansion of industrial activity, while promoting economic growth, has led to the encroachment of agricultural land. Similarly, the most dominant land use within the proposed Project area is agricultural activities, with several commercial maize farms located within the primary study area. Soya is also commonly cultivated, and the land is also used to graze livestock.

11.14.2.2 Mining and Quarries

A single FGM was held with the Environmental Department representatives including the Manager and Environmental Superintendent from New Vaal Colliery on 20 January 2021. The representatives indicated the following issues as it relates to the landownership of the properties:

- There are other sand mining operations around the area, one of them being Jongilizwe Sand Mine located on the farm Zandfontein. They have a mining permit for sand mining and have a lease agreement with Seriti. Other surrounding farm landowners also lease the farms for grazing and crop farming and have lease agreements with Seriti as well;
- When updating the lease agreement that Copper Sunset has with Seriti, the servitudes for the conveyor belt that will be running through the Project area must be taken into consideration. Seriti has a mining right for their underground operations that comprises of a conveyor belt that will be running to the current plant at New Vaal Colliery. The EIA and Integrated Water Use License Application is currently with DMRE for approval; and
- Surface and shallow aquifer water flow will be impacted due to mining and rehabilitation. This could reduce the water flow into an already impacted wetland.

11.14.2.3 Energy Power Generation Sector – Eskom Lethabo Coal Fired Power Station

The Project site is located close to the Lethabo Coal Fired Power Station owned by Eskom Holdings. As such a FGM was held with the environmental representative from the Power Station to record their comments, issues and concerns. These include:

- There is an existing water supply servitude currently supplying water to New Vaal Lethabo Properties which must be taken into consideration when implementing the project;
- Copper Sunset must take into consideration specifically the portions of the Farm Bankfontein where SCC, namely the Gifbol Plant occur. The Gifbol Plant is part of the several species of plant of the family Amaryllidaceae with highly toxic bulbs and leaves, especially *Boophone disticha*. An EIA application for mining in the area was submitted by Eskom in 2018 and the project was rejected due to the discovery of these plants. The area was deemed as a “no-go” area and thus no further studies were undertaken;
- It should be noted that the Lethabo Power Station is built between two existing earth-faults. This will affect the sand mining activities as the earth fault is running along the current mining operations and extending to the proposed areas. There is currently a sinkhole within the wetland areas. This poses a safety risk as it is prone to veld fires. In 2020, there was a massive veld fire in the area that occurred, and the case was taken to court and both Eskom and the landowner were found to be at fault as the firebreaks were not properly put in operation as the entire grass was exposed to fire. The veld fires burnt the entire wetland area and impacted on the movement of reptiles

such as snakes in the area. As such, Eskom has implemented a Disaster Management Plan and Emergency Response Plan as per the Western Cape guidelines which must include all landowners to respond promptly to veld fires when they occur. Eskom further referred the project team to the Coalbrook mining disaster which was the worst mining accident in the history of South Africa. To this end, Eskom has taken a pro-active approach to ensure that such incidents do not take place within the surrounds of their operations; and

- There is also a concern of the current activities occurring within the Eskom Lethabo Power Station areas where local people are hunting in the dump area; putting snare-traps around the wetland area to catch other animals including Validairs for their own consumption which is against the Free State Nature Conservation Policy. Further indicated that the presence of "Validairs" in the area is of concern as it breeds with Blesbok. As such, security needs to be improved and will take this issue further with relevant Departmental officials from the Free State Nature Conservation.

11.14.2.4 Seriti Leaseholders

Most of the leaseholders are commercial farmers involved in livestock and crop farming (specifically mealies, beans, etc.). There are no permanent residents on the properties owned and leased-out by Seriti. The workers come into the land to work on their fields and leave once the work is done for the day. Most of the farm workers live in Vaal Power community and others in near-by farms not impacted by the Project. The leaseholders consulted during the PPP on 20 January and 02 February 2021 had no objection to the proposed Project; however, raised the following comments:

- Copper Sunset must ensure that there is continuous engagement with the landowners prior to commencement of mining activities. This will assist them to plan their farming activities accordingly;
- Fences must be erected prior to the commencement of the mining activities so that the livestock will not enter the mining areas;
- Concerns around safety and security in the area were raised. Livestock theft is on the rise. In addition, there is an annual dog racing event hosted by local people who hunt wildlife in the area. They make fires and on certain occasions leave the area exposed. This has the potential to cause wildfires. The issues were reported to the local police station at Viljoensdrift; however, the issue remains unresolved; and
- The source of water supply for the mine was also raised by the landowners.

11.14.2.5 Other Sand Mining Operations Around the Area

There are other sand mining operations in the surrounds of the proposed Project area. The following companies were informed of the project, namely Afrimat Clinker Suppliers, Jongilizwe Sand Mining and Mission Point Mining.

To Note: Jongilizwe Sand Mine's Director and Manager indicated that he is objecting to the proposed Project as he has also submitted an EA application to the Free State DMRE for expanding his operations onto the same pieces of land as Copper Sunset. Copper Sunset was made aware of this information and a legal opinion has been sought to understand the implications of this application to the Copper Sunset EA application.

The Site Manager from Afrimat indicated that the Afrimat operation is nearing its closure. Once done; they will rehabilitate the area and move to other operations. He raised no objection to the proposed Project.

11.15 Traffic

The Traffic Impact Assessment (TIA) was conducted by Zutari (Pty) Ltd and is attached to this report as Appendix N. The study was undertaken to assess the traffic impact associated with the proposed extension Project on the existing and planned transport network.

11.15.1 Surrounding Road Network

The following roads and streets are likely to be affected by the traffic generated by the Copper Sunset extension Project:

- **Dihlabakela Road:** This is a local access road currently serving Lethabo Power Station only. Dihlabakela Road loops around the existing Copper Sunset MRA, starting and ending at its intersections with R716, about 5 km apart. Dihlabakela Road is a single carriageway road with one lane in each direction. Access to the northern site is proposed off this road;
- **Gravel Road:** The gravel road is a farm access road and is the fourth leg at the intersection of R716 and Dihlabakela Road. It is a very narrow road that can only accommodate one vehicle at a time;
- **R716:** This is a regional road that connects Vanderbijlpark (Gauteng Province) with Villiers and Frankfort in the Free State. It passes towns/ suburbs along its length, including Viljoensdrif, Deneysville and Oranjeville;

  R716 is a Class 2 Road and in the study area, it is a single carriageway road with one lane in each direction and extends at key intersection to include separate turning lanes;
- **R82:** This is a Regional road which extends from Johannesburg southern suburbs from M1 and passes through several town and suburbs including Kibler Park, Lenasia, Vereeniging before crossing the Vaal River into the Free State and proceeding to Kroonstad; and

  R82 is also a Class 2 Road and in the study area, it is a single carriageway road with one lane in each direction and extends at key intersection to include separate turning lanes. The R82 connect the site to the wider regional road network which includes R59, R57, R54, R42 and R28, among others.

11.15.2 Existing Traffic Conditions

The surrounding road network experienced slightly higher traffic volumes during the AM peak than the PM peak, except for R716 section in the vicinity of the site, which has slightly higher volume in the PM peak.

The road sections of R82 north of R716, and R716 east of R82 are the busiest road sections in the road network. Table 11-38 presents the observed peak hour traffic volumes. These roads carried two-way traffic volumes ranging between 4 000 and 5 200 vehicles during the day (12 hour – from 06h00 to 18h00) and peak hour volumes ranging between 700 and 1 300 vehicles.

It should be noted that the R716 experiences much lower volumes (about 300 vehicles per hour two-way) in the vicinity of the site as much of the traffic on R716 in the study area is generated by land uses north of the site which includes the existing Copper Sunset Mine. Dihlabakela Road carries very low volumes of not more than 100 vehicles per hour during the peak hours. The Gravel Road is used by very few vehicles, not more than 5 vehicles over 12 hours period. The peak hour traffic data is provided in the TIA Report (Appendix N).

Table 11-38: Surrounding Road Network Volumes

Road	12hr volumes (Two-way)	Heavy Vehicles (% of 12hr volumes)	AM peak (Two-way)	PM Peak (Two-way)
R82	5160	21%	1224	1091
R716 (east of R82)	4024	7%	1084	790
R716 (in the vicinity of the site)	1298	10%	272	281
Dihlabakela Road	259	47%	79	51
Gravel Road	3	-	1	1

11.15.3 Existing Public Transport and Non-motorised Transport

Minibus taxis were observed along the R716 and R82 in the study area during the site visit. There are no public transport facilities such as lay-bys in the vicinity of the site. No pedestrians or cyclist were observed along Dihlabakela Road, Gravel Road and R716 in the vicinity of the site. All the roads in the study area do not have sidewalks.

11.15.4 Existing Road Conditions

For the purpose of this study, only the road conditions of local access roads, Dihlabakela Road and the Gravel Road, were assessed. The 3 km road was divided in unit lengths of 250 m for the assessment. The Gravel Road is currently only a trail for farming machines, and the inspection of this section only focussed on assessing the *in-situ* subgrade conditions.

11.15.4.1 Existing Road Condition - Visual Condition Assessment of Dihlabakela Road

The visual condition assessment of the Dihlabakela Road was conducted on the 9th of February 2021 (by pavement engineers from Zutari). The assessment was completed in accordance with TMH9: Visual assessment manual for flexible pavements (1992) standards. Table 11-39 shows a summary of the degree and extent of visual defects observed on the existing pavement, Dihlabakela Road. Figure 11-49 depicts the findings of the visual condition assessment.

Table 11-39: Summary of Pavement Distresses observed on Dihlabakela Road

DISTRESS		AVG. RATING (Deg. > 3)	No SECTIONS (Deg.>3)	% of Road	CRITERIA RATING (TRH 12)
Dry/Brittle	Degree	3.1	11	56.7%	Severe
	Extent	3.5			
Potholes	Degree	3.7	9	55.0%	Severe
	Extent	3.5			
Aggregate Loss	Degree	3.4	9	51.7%	Severe
	Extent	4.1			
Deformation	Degree	4.3	6	43.3%	Severe
	Extent	3.0			
Crocodile Cracks	Degree	3.7	6	36.7%	Severe
	Extent	3.0			
Surfacing Failure	Degree	3.2	5	26.7%	Severe
	Extent	3.2			
Surfacing Patching	Degree	3.0	7	35.0%	Warning
	Extent	3.6			
Patching	Degree	3.5	4	23.3%	Warning
	Extent	3.1			
Pumping	Degree	3.5	4	23.3%	Warning
	Extent	3.0			
Rutting	Degree	3.7	3	18.3%	Warning
	Extent	3.0			
Surfacing Cracks	Degree	3.5	2	11.7%	Warning
	Extent	0.0			
Edge Breaks	Degree	4.3	3	21.7%	Sound
	Extent	3.0			
	Degree	3.0	1	5.0%	Sound

DISTRESS		AVG. RATING (Deg. > 3)	No SECTIONS (Deg.>3)	% of Road	CRITERIA RATING (TRH 12)
Transverse Cracks	Extent	0.0			

a) Base Patches and potholes

b) Ravelling/ Aggregate loss

c) Deforming/ Shoving

d) Edge breaks

Figure 11-49: Visual Condition Assessment Findings

11.15.4.1.1 Visual Condition Index

The road can be described as being in a poor condition with an average Visual Condition Index of approximately 40%. This confirms that rehabilitation of the road pavement is required. The worst section of the road is the first 750 m with very poor conditions, mainly due to poor base patches, potholes and shear failures.

11.15.4.2 Visual Condition Assessment of the Dirt Road

As stated above, the Gravel Road is just a dirt road that is used by farming machinery. No heavy road vehicles are currently using the road. Visual inspection of the *in-situ* material indicated a dark brown silty sand material which will likely be classified as G9/G10 quality.

Figure 11-50 below shows the current state of the dirt road, which is uneven and prone to ponding.

Figure 11-50: Status of the Gravel Road

12 Item 3(j): Impacts and Risks Identified Including the Nature, Significance, Consequence, Extent, Duration and Probability of the Impacts

This section aims to rate the significance of the identified potential impacts pre-mitigation and post-mitigation.

The potential impacts associated with the Copper Sunset Project (approved MRA) activities presented in Table 5-1 above were assessed and approved as part of a previous EIA process.

The Impact Assessment provided in Section 12.1 only considers impacts associated with the proposed new activities trigged as indicated in Table 5-2.

The EMPr included as Part B of this report includes all activities (current MRA and those now proposed at the MREA) as part of the Regulation 31 Amendment Process to enable Copper Sunset to have one consolidated EMPr to use as a tool against which potential environmental impacts are managed.

The potential impacts identified in this section are informed by the baseline investigations presented in Section 11 above and are a result of both the environment in which the project activity takes place, as well as the activity itself. The potential impacts are discussed per environmental feature/aspect and according to each phase of the project i.e. the establishment, operational and decommissioning and closure phases.

12.1 Impacts and Mitigations per Project Phase

The potential impacts that were identified for the establishment, operational and decommissioning phases, are discussed in Table 12-2. The impact matrix abbreviations used in Table 12-2 are provided in Table 12-1 below.

Table 12-1: Impact Matrix Abbreviations

Abbreviation	Definition
D	Duration
E	Extent
I	Intensity
P	Probability
S	Significance

Table 12-2: Impact Assessment associated with the Establishment, Operational and Decommissioning Phases

Phase	Activity	Aspect	Impacts	D	E	I	P	S	Rating (Pre-Mitigation)	Mitigation Measures	D	E	I	P	S	Rating (Post-Mitigation)
Establishment	Site Clearance: Vegetation and topsoil will be removed with a bulldozer and stockpiled along the mined-out strip.	Soil, land use and land capability	• Compaction of soil and therefore increased surface runoff; • Increased wind, and water erosion on unprotected soils and consequently sedimentation as these soils are highly erodible; • Removal of vegetation and basal cover, increasing the potential loss of topsoil, organic material and decreased soil fertility; • Compaction, ponding, and changes to the natural hydrological functioning of the landscape; • Loss of usable soil as a resource for agriculture – disturbance, low fertility, erosion and compaction; and • Loss of Land Capability and agricultural land due to complete restrictions to cattle grazing (current land use). Reduced area for cattle grazing.	7	3	6	7	112	Major (negative)	• Restrict extent of disturbance within the Copper Sunset Project area and minimise activity within designated areas of disturbance; • Minimise the period of exposure of soil surfaces through dedicated planning; • Stripping operations should not take place during large rain events as this executed when soil moisture content will minimise the risk of compaction (during dry season); • Aim to minimise (or even cease) workings on windy days; • During stockpiling, preferably use the 'end-tipping' method to keep the stockpiled soils loose; • Ensure stockpiles are placed on a free draining location to limit erosion loss and waterlogging; • Limit stockpile height – a safe height can be regarded as the height at which material can be placed without repeated traffic over already placed material; and • Soil surface (only where top soil is partially removed) can be loosened via tillage/ripping.	5	2	4	6	66	Minor (negative)
Establishment	Construction of a temporary haul road (20 m width) to gain access to the sand mining area. (It is important to note that the haul road will move as mining progresses through life of mine).	Soil, land use and land capability	• Compaction of soil and increased runoff potential; • Reduced infiltration rate, reduced rooting depth (vegetation cover) and increased surface runoff; • Increased erosion, and consequently sedimentation of wetlands and freshwater bodies; • Impacting agricultural activities in short, medium and long term due to changes in the soil agricultural potential and complete restriction to cattle grazing (current land use); and • Soil contamination from spills and leakages.	5	3	3	7	77	Moderate (negative)	• If erosion has occurred, topsoil should be sourced, replaced, vegetated and shaped to reduce the recurrence of erosion; • Only the designated access routes are to be used to reduce any unnecessary compaction; • Compacted areas are to be ripped to loosen the soil structure to increase the land capability (vegetation growth potential); • Un-used haul roads should be rehabilitated by ripping the soil to 300 mm and revegetating the area; and • Clean up spills to prevent migration of contaminants into the soil profile, entering the groundwater.	5	2	2	5	45	Minor (negative)
Establishment	Site Clearance: Vegetation and topsoil removal to a depth of about 0.3 – 0.4 m with a bulldozer and stockpiled along the	Hydropedology	• Sedimentation and siltation of nearby watercourses due to erosion of disturbed soils.	5	4	4	6	78	Moderate (negative)	• Keep vegetation clearance and soil disturbance to a minimum, within the confines of the mining footprint; • Reprofile disturbed portions of the affected streams, rivers or wetlands to allow free drainage;	2	2	2	3	18	Negligible (negative)

Phase	Activity	Aspect	Impacts	D	E	I	P	S	Rating (Pre-Mitigation)	Mitigation Measures	D	E	I	P	S	Rating (Post-Mitigation)
	mined-out strip; Construction of 20 m wide haul/access road to the sand mining area									• Adhere to sound storm water management planning to effectively separate sediments from runoff with the use of silt fences; • Movement of vehicles and machinery should be confined to the designated access road to minimise the extent of soil compaction; • Drip trays must be used to capture any oil leakages. Servicing of vehicles and machinery should be undertaken at designated hard park areas. Any used oil should be disposed of by accredited vendors; • Disposal of general and other forms of waste should continue to be done into clearly marked skip bins which are collected by approved contractors for final disposal to appropriate disposal sites; and • Any hydrocarbon spills should quickly be cleaned-up and contaminated soils removed before wash-offs and/or further infiltration into the ground occurs.						
Establishment	Construction of 20 m wide haul/access road to the sand mining area	Hydropedology	• Alteration of watercourse geometry and fluvial patterns of disturbed river channels.	6	3	4	7	91	Moderate (negative)		2	2	4	4	32	Negligible (negative)
	Movement of vehicles and machinery during construction of haul road and during site clearance activities; Use of mobile toilets on site and the handling of general waste	Hydropedology	• Surface water contamination leading to deterioration of water quality.	5	3	4	5	60	Minor (negative)		5	2	2	2	18	Negligible (negative)
Establishment	Site clearance and vegetation removal; and establishment of a haul road / tracks	Surface Water	• Sedimentation and siltation of nearby watercourses.	5	3	4	6	72	Minor (negative)	• Clearing of vegetation must be limited to the development footprint, and the use of any existing access roads must be prioritised to minimise creation of new ones; • Dust suppression on the haul roads and other cleared areas must be undertaken on a regular basis to prevent or limit dust generation; • Hydrocarbon and hazardous waste storage facilities must be appropriately bunded to ensure that leakages can be contained. Spill kits should be in place and workers should be trained in the use of spill kits, to contain and immediately clean up any leakages or spills; • Vehicles should regularly be maintained as per the developed maintenance program. This should also be inspected daily before use to ensure there are no leakages underneath; • Drip trays must be used to capture any oil leakages. Servicing of vehicles and machinery should be undertaken at designated hard park areas. Any used oil should be disposed of by accredited contractors; and • Implementation of a stormwater management to separate clean and dirty water areas, if dirty water is generated.	2	2	2	3	18	Negligible (negative)
Establishment	Placement of the mobile offices and other infrastructure	Surface Water	• Surface water contamination leading to deterioration of water quality due to handling and storing general and hazardous waste.	5	3	4	5	60	Minor (negative)		5	2	2	2	18	Negligible (negative)
Establishment	Site/vegetation clearance	Fauna and Flora	• Loss of plant communities including floral SCC; • Loss of biodiversity;	5	3	5	7	91	Moderate (negative)	• Keep site clearing to a minimal, and restrict vehicle movement outside of dedicated areas, specifically close to wetlands;	5	3	3	6	66	Minor (negative)

Phase	Activity	Aspect	Impacts	D	E	I	P	S	Rating (Pre-Mitigation)	Mitigation Measures	D	E	I	P	S	Rating (Post-Mitigation)
			• Increased erosion; • Potential for AIP proliferation; • Loss of faunal habitat including faunal SCC; and • Loss of vegetation types.							• Keep site clearing and impacts to the Copper Sunset MREA; • Thorough screening for the presence of the African Grass Owl before the establishment phase is required to ensure that impacts from the Project do not affect the vulnerable species • Alien plant management strategy should be implemented; • Make use of existing roads to encourage minimal impacts/footprint; • The mining area should be screened for protected species before commencing mining activities. If protected species are identified, permits will be required before the removal and an Ecological Management Plan must be compile; and • Mitigation measures on waste management are discussed in Section 5, Part B.						
Establishment	Access and haul roads construction	Fauna and Flora	• Removal of vegetation and basal layer; • Increased proliferation of AIPs; • Increased faunal casualties; and • Increased dust pollution.	5	3	4	6	72	Minor (negative)	• Keep site clearing to a minimum; • If any erosion occurs, corrective actions must be taken to minimise any further erosion from taking place at regular intervals or after high rainfall events; • Staff of the mine must adhere to policies within the operation of the mine, such as adhering to designated speed limits; • Establishment must be kept within the mining footprint area, to reduce as much fragmentation as possible; • To counteract the negative impacts of dust pollution, see Section 5, Part B; and • AIPs should be continuously monitored and controlled throughout the LoM and thereafter.	5	3	3	6	66	Minor (negative)
Establishment	Stockpiling of topsoil	Fauna and Flora	• Heavy machinery utilised increasing vehicle movement in the area, increasing soil compaction, habitat disturbances and vegetation removal; • Natural vegetation will be removed, damaged and fragmented promoting edge effects and AIP proliferation; and • Increased soil compaction and erosion.	5	4	5	7	98	Moderate (negative)	• Establishment of effective vegetation around constructed infrastructure for adequate topsoil protection from wind, and water erosion; • While topsoils are being stockpiled, the soils should be revegetated to limit erosion and loss of organic material; • Alien invasive plants should be continuously monitored and controlled throughout the life of the mine and thereafter; and • Corridors (infrastructure and ecological) set aside within the mine area would mitigate fragmentation substantially, especially if this could be managed with the community over an extended period of time.	5	3	3	6	66	Minor (negative)
Establishment	Site Clearance: Vegetation and topsoil will be	Wetlands	• Direct loss of wetland areas; • Habitat loss; • Loss of biodiversity; and	7	4	6	7	119	Major (negative)	• Avoid infrastructure within wetlands as far as possible, especially wetlands with a high PES, EIS and ES rating;	6	3	5	6	84	Moderate (negative)

Phase	Activity	Aspect	Impacts	D	E	I	P	S	Rating (Pre-Mitigation)	Mitigation Measures	D	E	I	P	S	Rating (Post-Mitigation)
	removed with a bulldozer and stockpiled along the mined-out strip		• Erosion and sedimentation of wetland areas.							• Establishment of a 100 m buffer zone to protect wetland areas from infrastructure within the study area. This would require that development occur further than 100 m from a delineated wetland area; • Place sediment trapping berms on the boundary of the 100 m buffer or end of development; • Minimise the period of exposed areas to prevent erosion, loss of vegetation and sedimentation within the wetlands; and • Ensure concurrent rehabilitation with special attention to reshaping the areas and re-vegetating.						
Establishment	Construction of a temporary haul roads (20 m width) to gain access to the sand mining area. It is important to note that the haul road will move as mining progresses through life of mine	Wetlands	• Fragmentation of wetland areas; • Habitat loss; • Loss of biodiversity; and • Erosion and sedimentation of wetland areas.	6	3	4	6	78	Moderate (negative)	• If erosion has occurred, topsoil should be sourced, replaced, vegetated and shaped to reduce the recurrence of erosion in wetlands; • Only the designated access routes are to be used to reduce any unnecessary compaction of surfaces and therefore increased flow into the wetlands; • Place sediment trapping berms where erosion has occurred; • Minimise the period of exposed areas to prevent erosion, loss of vegetation and sedimentation within the wetlands; and • When the temporary haul roads are deconstructed, the area should be ripped and re-vegetated to prevent impacts to the environment.	5	3	3	5	55	Minor (negative)
Establishment	Site clearance and establishment of proposed infrastructure in proximity to the watercourses.	Aquatics	• Sedimentation and water quality deterioration.	5	3	-4	5	60	Minor (negative)	• Limit vegetation removal to the infrastructure and mining footprint area only. Where removed or damaged, vegetation areas (riparian or aquatic related) should be revegetated as soon as possible; • Bare land surfaces downstream of construction activities must be vegetated to limit erosion from the expected increase in surface runoff from infrastructure; • Environmentally friendly barrier systems (such as silt nets or) should be used, in severe cases, use trenches downstream from construction sites to limit erosion and possibly trap contaminated runoff from construction; • Storm water must be diverted from construction activities and managed in such a manner to disperse runoff and prevent the concentration of storm water flow; • Water used at construction sites should be utilised in such a manner that it is kept on site and not allowed to run freely into nearby watercourses; • Construction chemicals, such as hydrocarbons, should be used in an environmentally safe manner	5	2	-2	3	27	Negligible (negative)

Phase	Activity	Aspect	Impacts	D	E	I	P	S	Rating (Pre-Mitigation)	Mitigation Measures	D	E	I	P	S	Rating (Post-Mitigation)
										with correct storage as per each chemical's specific storage descriptions; • All vehicles must be frequently inspected for leaks; • No material may be dumped or stockpiled within any rivers, drainage lines in the vicinity of the proposed project; • All waste must be removed and transported to appropriate waste facilities; and • High rainfall periods (usually November to March) should be avoided during the Establishment of infrastructure to possibly avoid increased surface runoff in attempt to limit erosion and the entering of external material (i.e. contaminants and/or dissolved solids) into associated aquatic systems.						
Establishment	Site Clearing, Construction of Surface Infrastructure and Topsoil Stockpiling	Air Quality	• Reduction in ambient air quality.	1	2	2	6	30	Negligible (negative)	• Application of dust suppressant on the haul roads and exposed areas; • Limit activity to non-windy days (wind speed less than 5.4 m/s); • Set maximum speed limits on haul roads and have these limits enforced; • The area of disturbance must be kept to a minimum at all times and no unnecessary clearing, digging, or scraping must occur, especially on windy days; and • The drop heights when loading onto trucks and at tipping points should be minimised.	1	1	1	4	12	Negligible (negative)
Establishment	Establishment phase activities	Noise	• Noise emanating from the machinery and vehicles operating during the establishment activities.	2	2	2	6	36	Minor (negative)	• Construction activities should be restricted to daylight hours (06:00 – 18:00); • Construction machinery and vehicles should be switched off when not in use; • Construction vehicles should have buzzer type reverse alarms (producing band-limited white noise) installed, rather than the conventional beeping type reverse alarms (which produce a tonal sound); • Vehicles should be serviced as per their design requirements to ensure noise suppression mechanisms are effective (e.g. installed exhaust mufflers); and • Regulate vehicle speeds on the access and haul roads.	2	1	1	3	12	Negligible (negative)
Establishment	Site Clearance	Heritage	• Direct impact to Heritage Resource BGG-001 and BGG-002.	7	7	-7	7	147	Major (negative)	• Amendment of the Project design to avoid the potential negative impact to the heritage resources; • This Project redesign must include a 100 m no-go buffer zone around the heritage resource; and • The development and implementation of a Heritage Site Management Plan (HSMP). Should Copper Sunset have an established HSMP for the existing	6	3	5	6	84	Moderate (positive)

Phase	Activity	Aspect	Impacts	D	E	I	P	S	Rating (Pre-Mitigation)	Mitigation Measures	D	E	I	P	S	Rating (Post-Mitigation)
										operation, the current HSMP must be updated to include BGG-001 and BGG-002. Digby Wells recommends Copper Sunset implements this option and the post-mitigation impact assessment considers this mitigation strategy. Where Project redesign and *in situ* conservation is not feasible based on the current mining operations and location of the sand resources: • Heritage mitigations must be undertaken in accordance with the requirements of the NHRA and the NHRA Regulations; and • Such mitigations may include a Burial Grounds and Graves Consultation (BGGC) process to assess whether a Grave Relocation Process (GRP) (which must be undertaken in accordance with Section 36 of the NHRA and Chapters IX and XI of the NHRA Regulations) is feasible.						
Establishment	All project related activities associated with establishment	Socio-economic	• Creation of Employment Opportunities.	2	4	2	5	40	Minor (positive)	• Ensure implementation of the existing company Employment Policy; • Should Contractors be used during establishment, ensure that local employment targets are set regardless of the size of the work program. Local employment targets must include employment of youths and women from historically disadvantaged backgrounds; • Prioritise employment and training of people living within the primary study area over outsiders especially for unskilled and semi-skilled positions; • Widely advertise all Project employment opportunities in local community newspapers and placed in public places in local languages; • Where possible, the construction workforce must be for the operation of the mine; • Ensure that the mine's Community Liaison Officer is informed of all project developments to facilitate on going and active engagement with stakeholders; • Comply with minimum wage requirements for unskilled labour; • Ensure that no employment take place at the entrance to the site (to avoid people congregating at the work site). Only formal channels for employment must be used; and • Implement company grievance procedure to record and resolve complaints and issues/ concerns of project affected communities.	4	4	4	5	60	Minor (positive)

Phase	Activity	Aspect	Impacts	D	E	I	P	S	Rating (Pre-Mitigation)	Mitigation Measures	D	E	I	P	S	Rating (Post-Mitigation)
Establishment	All project related activities associated with establishment	Socio-economic	• Impacts associated with Population Influx.	5	3	-7	6	90	Moderate (negative)	• Develop an In-Migration Plan that addresses how the Project will seek to minimise Project-induced in-migration as far as possible. Implement mitigation measures to address the adverse environmental and social consequences, and maximise the benefits, of in-migration. The management plan should be developed together with other industry role players and government; • Where possible, construction employees should be locally sourced as they will live with their families; • Explore opportunities for collaboration with local police with regards to safety and security issues relating to Project activities in general and any concerns about contractors; • To discourage influx of job-seekers, consider prioritisation of employment of unemployed members of local communities; • Liaise with Local Government to ensure that expected population influx is considered in infrastructure development and spatial development planning; • Ensure continuous consultation with local communities, farm landowners and government and promote partnerships to address illegal activities on-site and in the surrounds of the Project area; • Develop information, education and communication campaigns around diseases and health practices including sanitation and hygiene; • Monitoring changes in land cover and land use outside the Project site to identify loss of areas of importance for biodiversity and cultural heritage; and • Discourage informal settlements along Project roads to minimise loss of habitat of value for biodiversity.	5	3	-4	6	72	Minor (negative)
Establishment	All project related activities associated with establishment	Socio-economic	• Opportunities and Capabilities within the Supply Chain.	5	4	2	4	44	Minor (positive)	• Conduct an audit of local businesses and their capacity to meet Project needs, including those businesses in the study area, and maintain a database of local business information; • Implement the company's existing Procurement Policy or Plan; • Ensure that the policy or plan sets-out guidance on targets for local businesses used by the Project and that these are monitored; • Unbundle all work programs to the smallest components to allow local businesses to take-up the opportunities; • Adaptation of Project procurement documents to suit local businesses as far as possible within the standards required of the Project;	5	5	6	6	96	Moderate (positive)

Phase	Activity	Aspect	Impacts	D	E	I	P	S	Rating (Pre-Mitigation)	Mitigation Measures	D	E	I	P	S	Rating (Post-Mitigation)
										• Provision of incentives for Project contractors to purchase locally and partner with local businesses, including tender requirements regarding local procurement; • Continue using the Short Medium Enterprises (SME) electronic portal to facilitate communication of contract opportunities and management training materials to SMEs; • Promotion of joint ventures between large and small Contractors to ensure equitable sharing of economic benefits and skills development; and • Implement procedure for dissemination of procurement opportunities as early as possible, with clearly defined requirements for the goods or service to manage expectations; and • Implementation of the grievance procedure.						
Establishment	All project related activities associated with establishment	Socio-economic	• Impacts to community health safety and security.	6	4	-5	6	78	Moderate (negative)	• In partnership with government authorities, Copper Sunset will be required to support improvements to existing health services to handle the increase in population numbers and changes to the existing health profile of the area. This may include facilities, quality of medical personnel, diagnostic capacity, and treatment, etc. To mitigate community safety from road traffic: • Implement the mitigation measures and management plans as proposed in the Traffic Impact Assessment study. • Furthermore, implement the following management actions as they relate to community safety and road traffic awareness: • Access to Project sites, especially alongside the road, must be controlled to prohibit the public from entering the site; • Develop a Traffic Management Plan covering vehicle safety, driver, and passenger behaviour, use of drugs and alcohol, hours of operation, rest periods and accident reporting and investigations; • Strictly enforce drug and alcohol policies in relation to Project drivers and undertake regular and random testing of drivers and in response to suspicious behaviour; • Require Project drivers to be trained in defensive driving and provided regular refresher courses;	4	3	-3	5	50	Minor (negative)

Phase	Activity	Aspect	Impacts	D	E	I	P	S	Rating (Pre-Mitigation)	Mitigation Measures	D	E	I	P	S	Rating (Post-Mitigation)
										• Propose road bypasses where there is a significant risk to public safety from road accidents; • Establish preparedness and response capabilities to deal with any road traffic or other accidents that may occur including multiple casualty events; • In partnership with local authorities and the police, educate communities on road traffic laws and road safety; and • Implement an Emergency Prevention, Preparedness and Response Plan: • Design and implement measures to minimise the risk of hazardous substances entering the environment, including development of an Emergency Prevention, Preparedness and Response Plan for accidents involving release of hazardous substances to the environment. This will include: • Installation of oil water separators and grease traps as appropriate at fixed refuelling facilities, workshops, parking areas, fuel storage and containment areas; • Use of drip trays and other temporary measures to prevent entry of hazardous substances into the environment during fuelling or servicing of vehicles and equipment on site; • Provision of spill kits and training of staff in their use; • Secure storage and labelling of hazardous substances in line with the manufacturer's recommendations and measures to prevent contact with untrained personnel, birds, animals; and • Secondary containment using impervious, chemically resistant material and designed to prevent contact between incompatible materials in the event of a release. To mitigate dust impacts: • Implement mitigation measures proposed in the Air Quality Impact Assessment Study. • Furthermore, implement induction programmes for all employees and contractors to increase sensitivity and compliance with these standards during mining activities.						

Phase	Activity	Aspect	Impacts	D	E	I	P	S	Rating (Pre-Mitigation)	Mitigation Measures	D	E	I	P	S	Rating (Post-Mitigation)
										• Ensure mitigation measures are factored into the daily operation at the mine; and • Implement particulate monitoring onsite, and at upwind and downwind sensitive receptor locations to assess the effectiveness of the mitigation measures and ensure compliance. To mitigate noise impacts: • Ensure mitigation measures are factored into the day-to-day operation onsite; and • Conduct noise monitoring periodically (i.e. on a quarterly basis to ensure the sand mining noise footprint is not exacerbating background condition).						
Establishment	Transportation of establishment material, mining equipment, storage tanks and employees	Traffic	• Increased traffic volumes resulting in a reduction of road capacity.	2	2	1	2	5	Negligible (negative)	No mitigation measures required.						
Establishment	Transportation of establishment material, mining equipment and storage tanks	Traffic	• Increased road safety risk.	2	5	4	5	55	Minor (negative)	• Ensure heavy vehicles and abnormal load vehicles comply with limitations on vehicle dimensions and axle, vehicle masses and safety standards set out in the Road Traffic Act, 1996 (Act No 93 of 1996) and the National Road Traffic Regulations, 2000 for vehicle using a public road; • Discourage routing of heavy vehicle traffic through populated area; • Avoid transporting abnormal load during peak periods; and • Heavy vehicle drivers should attend a specialised road safety and driving course that sensitises them to the impact that they have on driving conditions for other road users.	2	5	3	2	20	Negligible (negative)
Establishment	Employee transportation	Traffic	• Increase in public transport and non-motorised transport (NMT) demand	2	1	1	4	16	Negligible (negative)	• The existing shuttle services provided by Copper Sunset will accommodate additional public transport trips. No additional public transport facilities and NMT infrastructure are recommended.	2	1	1	1	4	Negligible (negative)
Operational	Mining of sand resources to approximately 0.4 – 5 m. This include screening (if required) and stockpiling in a separate area	Soil, land use and land capability	• Loss of usable soil as a resource – Mining of sand, erosion and compaction; • Soil contamination; and • Loss of usable soil for agriculture – changing the land capability.	7	3	7	7	119	Major (negative)	• Make sure the end-use soil depth is adequate for rehabilitation (minimum of 600 mm) depth; • If any erosion occurs, corrective actions (erosion berms) must be taken to minimise any further erosion from taking place; • A Topsoil Management Plan (TMP) must be prepared to demonstrate how topsoil will be preserved in a condition as near as possible to its pre-mining condition to allow successful mine rehabilitation (Statham, 2014); and	7	2	5	6	90	Moderate (negative)

Phase	Activity	Aspect	Impacts	D	E	I	P	S	Rating (Pre-Mitigation)	Mitigation Measures	D	E	I	P	S	Rating (Post-Mitigation)
										• If a spill has occurred, soil pollution monitoring should be conducted to detect any high levels of pollutants and the extent of the contamination plume.						
Operational	Transportation of material on haul roads	Soil, land use and land capability	• Compaction of soil and increased runoff potential; • Reduced infiltration rate, reduced rooting depth (vegetation cover) and increased surface runoff; • Increased erosion, and consequently sedimentation; and • Soil contamination from spills and leakages.	6	4	4	7	98	Moderate (negative)	• Only the designated access routes are to be used to reduce any unnecessary compaction; • Make use of erosion berms, sediment traps, culverts at wetland crossings and erosion control to prevent impacts to the hail roads; and • Clean up spills as soon as possible to prevent migration of contaminants into the soil profile, entering the groundwater.	5	3	3	6	66	Minor (negative)
Operational	Refuelling of machinery within the mining area or at the mobile offices	Soil, land use and land capability	• Soil Contamination from hydrocarbon waste (lubricants, explosives, and fuels) spills and leakages from leaking diesel tanks as well as vehicles; and • Increased soil compaction and runoff, causing erosion and sedimentation.	7	4	6	4	68	Minor (negative)	• Soil pollution monitoring should be conducted after spills have occurred to detect any extreme levels of pollutants; • Any spillages should be cleaned up immediately, and the contaminated soils should be disposed of at licenced disposal sites; • Runoff must be controlled, and managed by use of proper stormwater management measures; • Vehicles should regularly be surveyed and checked that oils spill and other contaminants are not exposed to the soils; • Re-fuelling must take place on bunded impervious surfaces to prevent seepage of hydrocarbons into the soil; • All vehicles and machines must be parked within hard park areas, and must be checked daily for fluid leaks; and • Fuel, grease, and oil spills should be remediated using a commercially available emergency clean up kits. However, for major spills (>5L), if soils are contaminated, they must be stripped and disposed of at a licensed waste disposal site.	5	2	3	3	30	Negligible (negative)
Operational	Mining of sand resources including screening (if required) to approximately 0.4 – 5 m and stockpiled in a separate area	Hydropedology	• Disruption of water flow paths and subsequent alteration of streamflow regime and deterioration of wetlands functioning.	6	5	6	7	119	Major (negative)	• Restrict any excavations to less than the proposed 5 m depths and any vehicle or machinery movements should be confined to the designated sand extraction areas in order to minimise disruption of water flow paths within hillslopes; • The edge of the non-directly impacted freshwater resources, and at least a 100 m buffer or 1:100 flood line buffer, should be demarcated in the field with wooden stakes painted white as no-go zones that will last for the duration of the operational phase; • Establishment of a 500 m buffer zone to protect wetland areas from the proposed developments within the mining area. This would require that	6	2	2	7	70	Minor (negative)
Operational	Handling of hydrocarbon fuels, oils, grease during the operation of a fleet of tipper trucks, front-end loaders,	Hydropedology	• Water Contamination from hydrocarbon and chemical spillages and leakages.	5	3	4	4	48	Minor (negative)		5	2	2	3	27	Negligible (negative)

Phase	Activity	Aspect	Impacts	D	E	I	P	S	Rating (Pre-Mitigation)	Mitigation Measures	D	E	I	P	S	Rating (Post-Mitigation)
	excavators, water trucks, tractor, bulldozers and screening machines; Operation of a mobile office; mobile screening plants, portable toilets, diesel bowser and a water bowser; and Refuelling of equipment at the mobile office area within the expanded mining area									development occur further than 500 m from a delineated wetland area, as much as practically possible; • Development of a Wetland Offset Strategy and Rehabilitation plan for the wetlands in the Project area (Digby Wells, 2021); • Water quality monitoring should continue downstream and upstream of the mine site, and within all surface water circuits at the mine to detect any contamination arising from operational activities; • Hydrocarbon materials (fuel, oil & grease) storage areas should be located on hard-standing impermeable and bunded areas in accordance with SANS1200 specifications. This helps to prevent mobilisation of leaked hazardous substances; • Mine workers should be trained in the use of spill kits to contain and immediately clean up any leakages or spills; • Servicing and washing of vehicles and machinery should be conducted at appropriately designated paved areas. All used oils should be disposed of by accredited vendors from the mine site; • Disposal of general and other forms of waste should continue to be done into clearly marked skip bins which are collected by approved contractors for final disposal to appropriate disposal sites; • Ensure that storm runoff from wash bays is controlled by storm water management infrastructure and should not be allowed to flow into the watercourses; and • Concurrent rehabilitation through backfilling, reprofiling and revegetation of mined-out landscapes to allow free drainage should be implemented as proposed for the MREA to comply with rehabilitation guidelines.						
Operational	Concurrent rehabilitation (backfilling, reprofiling and revegetation) of mined-out strips as sand mining progresses	Hydropedology	• Restoration of close to natural hydrological responses through concurrent rehabilitation (backfilling, reprofiling & re-vegetation) of mined-out landscapes.	7	4	4	6	90	Moderate (positive)							
Operational	Mining of sand resources including screening (if required), and transportation of mined sand	Surface Water	• Sedimentation and siltation of nearby watercourses.	5	3	4	6	72	Minor (negative)		2	2	2	3	18	Negligible (negative)
Operational	Refuelling of machinery within the mining area including handling of general and hazardous waste	Surface Water	• Surface water Contamination from hydrocarbon and chemical spillages and leakages.	5	3	4	6	72	Minor (negative)		5	2	2	2	18	Negligible (negative)

Phase	Activity	Aspect	Impacts	D	E	I	P	S	Rating (Pre-Mitigation)	Mitigation Measures	D	E	I	P	S	Rating (Post-Mitigation)
										• The overall housekeeping and storm water system management (including the maintenance of berms, conveyance channels and clean-up of leaks) must be maintained throughout the LoM; • The hydrocarbon and chemical storage areas and facilities must be located on hard-standing area (paved or concrete surface that is impermeable), roofed and bunded in accordance with SANS1200 specifications. This will prevent mobilisation of leaked hazardous substances; • Training of mine personnel and contractors in proper hydrocarbon and chemical waste handling procedures is recommended; and • Vehicles must only be serviced within designated service bays.						
Operational	Sand transportation, vehicle and heavy machinery movement	Fauna and Flora	• Habitat destruction by removal of vegetation; • Increase in dust production; • AIP spread; • Increased compaction, erosion, and consequently sedimentation potential; and • Increased faunal casualties.	5	3	4	6	72	Minor (negative)	• Reduce the footprint of the mine by clearing only the strips and associated access road / tracks that will be mined out; • Access should be restricted to already impacted areas (haul roads); • To minimise loss of faunal species and floral SCC, posters and signage demarcating sensitive habitats must be incorporated during the mine life cycle. Anti-poaching units should be activated and security patrols enlisted to prevent snaring. Create a sanctuary for faunal species identified within the Project area during the operational phase; • Alien invasive plants should be continuously monitored and controlled throughout the life of the mine and thereafter. It is recommended that AIP programme be established to control the spread; and • Monitoring of the vegetation communities present must be completed every 2 years to document the impacts of the edge effect and fragmentation.	5	3	2	5	50	Minor (negative)
Operational	Transportation of the sand	Fauna and Flora	• Increased potential of faunal casualties through roadkill and destruction and removal of vegetation (floral SCC); • AIP sprawl; and • Increased dust pollution due to erosion and vehicular activity.	5	3	3	7	77	Moderate (negative)	• Monitoring of alien invasive sprawl during the operation is recommended as the surrounding vegetation is relatively intact and free from alien invasive plants; • Ensure no loss of faunal SCC by activating establishing signage or posters to create awareness of high faunal activity and adhering to speed limits within the Project area; • To monitor and mitigate dust pollution please refer to the Digby Wells Air Quality Report 2020; and • Keep sight clearing to a minimal, and restrict vehicle movement outside of dedicated areas, specifically close to wetlands.	4	3	3	4	40	Minor (negative)

Phase	Activity	Aspect	Impacts	D	E	I	P	S	Rating (Pre-Mitigation)	Mitigation Measures	D	E	I	P	S	Rating (Post-Mitigation)
Operational	Refuelling of diesel on site	Fauna and Flora	• Contamination of soil, water and surrounding areas / habitats (pan vegetation) from hydrocarbon waste/spills (lubricants, oil, explosives, and fuels).	5	3	5	6	78	Moderate (negative)	• All spills should be immediately cleaned up and treated accordingly. Additionally, spill kits must be available at the hydrocarbon storage area; • Drip trays must be placed beneath stationary vehicles; and • Re-fuelling must take place on a sealed surface area away from sensitive habitats such as the pan vegetation to prevent the ingress of hydrocarbons into the topsoil. The hydrocarbon storage area must be bunded and be able to contain a 110% capacity of the largest storage tank.	5	3	2	3	30	Negligible (negative)
Operational	Mining of sand resources including screening (if required) to approximately 0.4 – 5 m and stockpiling	Wetlands	• Direct loss of wetlands; • Water quality contamination and deterioration; • Habitat loss as a result of poor water quality; • Loss of biodiversity; and • Erosion and sedimentation within the wetlands	6	3	6	7	105	Major (negative)	• Avoid infrastructure as far as possible within wetlands, especially wetlands with a high PES, EIS and ES rating; • Establish a 100 m buffer zone to protect wetland areas from the proposed infrastructure within the study area. This would require that development occur further than 100 m from a delineated wetland area; • Place sediment trapping berms on the boundary of the end of development; • Minimise the period of exposed areas to prevent erosion, loss of vegetation and sedimentation within the wetlands; • Ensure concurrent rehabilitation with special attention to reshaping the areas and re-vegetating; • Develop and implement a Wetland Offset Strategy and Rehabilitation plan for the wetlands in the Project area. • Maintain and monitor wetland functionality; and • Monitor the roads monthly to identify and rectify any areas that have begun to erode and where water may be flowing towards wetland areas.	5	2	5	6	72	Moderate (negative)
Operational	Transportation of material on haul roads.	Wetlands	• Erosion of wetland crossings associated with the haul road; • Accidental spills casing soil and water contamination; • Habitat loss as a result of poor water quality; • Loss of biodiversity; • Siltation of wetlands due to erosion; and • Change in habitat and potential change in species composition.	5	3	4	6	72	Moderate (negative)	• Restrict vehicle movement in delineated wetlands; • Only the designated access routes are to be used to reduce any unnecessary compaction leading to erosion, increased runoff and fragmentation of wetlands; • Rip rehabilitated areas to reduce compaction and reseed to increase vegetation cover; and • Clean up spills immediately to prevent migration of contaminants into the wetlands.	3	2	3	4	32	Negligible (negative)
Operational	Refuelling of machinery within	Wetlands	• Water quality contamination; • Potential spills may lead to loss of vegetation, causing sedimentation	4	3	5	4	48	Minor (negative)	• Conduct pollution monitoring along the low-lying areas (wetlands) to detect any high levels of pollutants if spills has occurred;	3	2	4	3	27	Negligible (negative)

Phase	Activity	Aspect	Impacts	D	E	I	P	S	Rating (Pre-Mitigation)	Mitigation Measures	D	E	I	P	S	Rating (Post-Mitigation)
	the mining area or at the mobile offices		of wetlands, contamination, habitat loss and potential change in species composition; • Habitat loss as a result of poor water quality; and • Loss of biodiversity.							• Create a designated refuelling area; • Prevent contaminated water entering the remaining freshwater systems (wetlands); and • Any spillages should be cleaned up immediately, and the contaminated material should be disposed of at licenced disposal sites.						
Operational	Uncontrolled runoff of stormwater from or through the surface infrastructure and mining area	Aquatics	• Water quality and habitat deterioration of watercourses receiving unnatural/contaminated runoff.	5	4	-5	5	70	Minor (negative)	• Runoff should not be allowed to flow into the nearby watercourses, unless DWS discharge authorisation and compliance with relevant discharge standards, as stipulated in the NWA is obtained; • Bare surfaces downstream from the developments where silt traps are not an option should be vegetated in order to attempt to limit erosion and runoff that might be carrying contaminants; • Careful monitoring of the areas where dust suppression is proposed should be undertaken regularly. Areas concentrating water runoff should be addressed and not allowed to flow freely into associated watercourses; and • Biannual biomonitoring of the associated water courses should be done by an aquatic specialist to determine potential impacts, where after new mitigation actions should be implemented, as per the specialist's recommendations.	2	1	-1	3	12	Negligible (negative)
Operational	Tipping, Screening, Stockpiling, and Material handling	Air Quality	• Dust generation and poor ambient air quality	5	2	5	6	72	Minor (negative)	• Application of dust suppressant on the haul roads and exposed areas; • Conduct mining activities judiciously on non-windy days (wind speed less than 5.4 m/s); • Set maximum speed limits on haul roads and have these limits enforced; • The area in the mining schedule for each year should be opened up in phases and no unnecessary clearing, digging or scraping must occur, especially on windy days; • The drop heights when tipping and loading should be minimised; and • Implement ambient air quality monitoring Dustfall and PM_{10} rates to assess the effectiveness of the mitigation measures in place.	5	2	2	4	36	Minor (negative)
Operational	Hazardous Materials and Diesel Storage	Air Quality	• Release of Volatiles Resulting in Poor Air Quality.	5	2	2	4	36	Minor (negative)	• Strictly adhere to products and waste management plan; • Handle, store, and dispose hazardous substances in accordance with the local regulations; • Store hazardous substances in clearly labelled containers and demarcated area; • Deal with emergencies promptly (i.e. spills); and	5	1	1	3	21	Negligible (negative)

Phase	Activity	Aspect	Impacts	D	E	I	P	S	Rating (Pre-Mitigation)	Mitigation Measures	D	E	I	P	S	Rating (Post-Mitigation)
										• Ensure secondary containment for all fuel storage tank leaks in accordance with good engineering practice.						
Operational	Operational phase activities	Noise	• Noise will emanate from the machinery and vehicles operating during the operational activities.	5	2	3	7	70	Minor (negative)	• Machinery and vehicles should be switched off when not in use; • It should be considered to prescribe the installation of buzzer type reverse alarms (producing band-limited white noise), rather than the conventional beeping type reverse alarms (which produce a tonal sound) on machinery and vehicles employed in surface operations and haul roads; • Vehicles should be serviced as per their design requirements to ensure noise suppression mechanisms are effective (e.g. installed exhaust mufflers); • Regulate vehicle speeds on the access and haul roads; • The generator and screening facility (if possible) should be enclosed to limit noise; • The concentration (i.e., number of machineries being utilised) of mining activities should be limited in close proximity to sensitive receivers; • The mine should plan and consider a mining schedule that limits the duration of mining activities in close proximity to sensitive receivers i.e., South (closest to receivers) to North (furthest from receivers) mining approach; and • The mine should implement a long-term (48 hour) quarterly noise monitoring programme to detect any changes in ambient sound levels due to the activities of the mine.	5	2	2	3	27	Negligible (negative)
Operational	Operation of mobile machinery to extract resources; Operation of mobile screening plants; and Customer trucks collecting material.	Heritage	Digby Wells envisages no additional impact to the cultural heritage landscape, given the nature of the proposed activities and their intended location within the areas disturbed through clearing and mining activities. Where applicable, the mitigation measures implemented in the establishment phase must continue into this phase (for example, the implementation of the HSMP).													
Operational	All project related activities associated with operation.	Socio-economic	• Creation of Employment, Work Skills Development and Experience - Retaining Workforce and Provision of Skills Development and Training	5	6	2	4	52	Minor (Positive)	• Ensure the implementation of SLP to support the promotion of education and skills uplift among local communities within the study areas, including the implementation of on-the-job training, learnership and scholarship programmes; • Implementation of the SLP HRD programs – mentorship and career progression; and • Implement a grievance procedure.	5	5	3	6	78	Moderate (positive)

Phase	Activity	Aspect	Impacts	D	E	I	P	S	Rating (Pre-Mitigation)	Mitigation Measures	D	E	I	P	S	Rating (Post-Mitigation)
Operational	All project related activities associated with operation.	Socio-economic	• Social/ community Development as part of the SLP.	6	3	5	5	70	Minor (positive)	• Implement and continuously update the SLP to ensure maximum benefits to the community. The SLP must align with the associated legislation and include intensive stakeholder consultations as prescribed in the law. This includes: ○ Conduct baseline socio-economic survey of households located within primary study area prior to commencement of community development initiatives to enable accurate identification of eligible Mine Community Development project(s) and skills training beneficiaries and measure impacts of development initiatives on households; ○ Collaboration with other developmental role players during implementation; ○ Establishing an external monitoring programme to monitor and evaluate community development initiatives as well as Human Resource Development (HRD) and procurement policy implemented by the mine; ○ Expanding skills development and capacity building programmes to non-employees such as learnerships and bursaries; and ○ Maintaining a record of training courses completed per individual and community. Where training is offered to non-employees, their contact information and qualifications can be shared with other industries.	7	3	6	6	96	Moderate (positive)
Operational	All project related activities associated with operation.	Socio-economic	• Impacts to decreased community health safety and security.	6	4	-6	6	96	Moderate (negative)	• Ensure mitigation measures are factored into the daily operation at the mine; • Implement particulate monitoring onsite, and at upwind and downwind sensitive receptor locations to assess the effectiveness of the mitigation measures and ensure compliance; • Ensure necessary road upgrades to increase road capacity to ensure that the impacted road network operates at better or the same level of service during operation phase; • In addition to adhering to regulation set out in in the. Road Traffic Act, 1996 (Act No 93 of 1996) and the National Road Traffic Regulations, 2000, to promote safety on the surrounding road network, it is recommended that drivers of all heavy vehicles be required to attend a specialised road safety and driving course that sensitises them to the impact that they have on driving conditions for other road users; • The following noise management actions are recommended as good practice guidelines:	6	4	-5	5	75	Moderate (negative)

Phase	Activity	Aspect	Impacts	D	E	I	P	S	Rating (Pre-Mitigation)	Mitigation Measures	D	E	I	P	S	Rating (Post-Mitigation)
										• Ensure mitigation measures are factored into the day-to-day operation onsite; and • Conduct noise monitoring periodically (i.e. on a quarterly basis to ensure the sand mining noise footprint is not exacerbating background condition).						
Operational	Transportation of establishment material, mining equipment, storage tanks and employees	Traffic	• Increase traffic volumes resulting in a reduction of road capacity.	5	5	5	5	18	Negligible (negative)	No mitigation measures required.						
Operation	Transportation of sand	Traffic	• Increased road safety risk.	5	5	4	5	70	Minor (negative)	• Ensure heavy vehicles comply with limitations on vehicle dimensions and axle, vehicle masses and safety standards set out in the Road Traffic Act, 1996 (Act No 93 of 1996) and the National Road Traffic Regulations, 2000 for vehicle using a public road; • Discourage routing of heavy vehicle traffic through populated area; and • Avoid transporting abnormal load during peak periods.	5	5	3	2	26	Negligible (negative)
Operational			• Deterioration of road conditions.	5	5	4	5	70	Minor (negative)	• The developer should engage with the planning authorities concerning maintenance of public roads near the development sites; and • The developer should ensure that the internal roads and access roads are maintained to acceptable maintenance standards.	5	5	3	2	26	Negligible (negative)
Operational	Employee transportation	Traffic	• Increased public transport and NMT demand	5	1	1	4	28	Negligible (negative)	• The existing shuttle services provided by Copper Sunset will accommodate additional public transport trips. No additional public transport facilities and NMT infrastructure are recommended.	5	1	1	1	7	Negligible (negative)
Decommissioning	Concurrent rehabilitation (topsoil cover, ripping and vegetation establishment) and monitoring of vegetation establishment	Soil, land use and land capability	• Loss of usable soil as a resource – Erosion and compaction; • Increased AIPs and loss of soil fertility; and • Loss of Land capability	6	1	3	5	50	Minor (negative)	• Continue with concurrent rehabilitation, and implement land rehabilitation measures as soon as soils have been mined; • When areas have been mined, backfilled with waste material and covered with topsoil it should be levelled and contoured to mimic pre- mining natural topography to avoid ponding of water; • The rehabilitated area must be allowed to naturally re-vegetate, however, where vegetation is not establishing well within three months, an indigenous seed mix must be utilised to improve vegetation establishment; • Address compacted areas by deep ripping (up to 300 mm) to loosen the soil, and revegetate the area as soon as possible;	3	1	3	4	28	Negligible (negative)

Phase	Activity	Aspect	Impacts	D	E	I	P	S	Rating (Pre-Mitigation)	Mitigation Measures	D	E	I	P	S	Rating (Post-Mitigation)
										• Re-seed rehabilitated areas to increase vegetation cover; • Ensure proper stormwater management designs (contouring) are in place to ensure no excessive run-off or pooling occurs; • Only designated access routes are to be used to reduce any unnecessary compaction; • The backfilled, reprofiled landscape should be topsoiled and revegetated to allow free drainage close to the pre-mining conditions; and • Implement a Rehabilitation Audit program, including soil fertility and infiltration tests to remediate and rehabilitate soils back to near-natural or high land capability standards.						
Decommissioning	Backfilling of the mined excavations with topsoil and waste from the screening plants	Soil, land use and land capability	• Loss of usable soil as a resource – Erosion and compaction; • Soil geomorphological changes; and • Loss of land capability.	6	3	4	5	65	Minor (negative)	• Ensure proper stormwater management designs (contouring and land scaping) are in place to ensure no run-off or pooling occurs; • Backfill and compact the areas first with the waste material, such as large rocks and gravel before topsoil is placed; and • The backfilled, reprofiled landscape should be topsoiled and revegetated to allow free drainage close to the pre-mining conditions.	3	2	2	3	21	Negligible (negative)
Decommissioning	Post-closure monitoring	Soil, land use and land capability	• Compaction of soil and increased runoff potential; • Reduced infiltration rate, reduced rooting depth (vegetation cover) and increased surface runoff; and • Increased erosion, and consequently sedimentation.	5	3	4	3	36	Minor (negative)	• Only designated access routes are to be used to reduce any unnecessary compaction; and • If any erosion, contamination, water ponding, AIPs proliferation or impact to the soils, land use or land capability is observed, remediation/rehabilitation actions should be implemented as soon as possible.	3	3	2	3	24	Negligible (negative)
Decommissioning	Rehabilitation processes/activities including backfilling, topsoiling of mined-out areas and ripping of decommissioned haul road	Hydropedology	• Sedimentation and siltation of nearby watercourses and deterioration of water quality.	2	3	4	7	63	Minor (negative)	• Reseeding of exposed rehabilitated surfaces should be undertaken to reduce soil evacuation and sedimentation in nearby watercourses; • Prior to vegetation establishment, seeded areas should have temporary silt fences to keep soils from being washed away; • Implement wetland rehabilitation measures to restore mined-out wetlands and disturbed channel geometry at haul road crossings; • Only designated access routes should be used to reduce unnecessary impacts to the undisturbed environment including wetlands; and • Disposal of general and other forms of waste should continue to be conducted using clearly marked skip bins which are collected by approved contractors for final disposal to appropriate disposal sites.	2	2	2	2	12	Negligible (negative)
Decommissioning	Leakage of oils, fuels and grease from moving vehicles and machinery during backfilling, reprofiling and revegetation activities	Hydropedology	• Contamination of surface water resources leading to deteriorated water quality.	5	3	4	4	48	Minor (negative)		2	1	1	2	8	Negligible (negative)

Phase	Activity	Aspect	Impacts	D	E	I	P	S	Rating (Pre-Mitigation)	Mitigation Measures	D	E	I	P	S	Rating (Post-Mitigation)
Decommissioning	Soil stabilisation and revegetation with natural or indigenous seed mix; Erosion monitoring at rehabilitated, reprofiled and re-vegetated surfaces; and Water quality monitoring upstream and downstream of the decommissioning Project site	Hydropedology	• Restoration of free drainage to rehabilitated landscapes that suits desired post-closure land use.	7	5	4	7	112	Major (positive)	No mitigation required.						
Decommissioning	Demolition and removal of infrastructure; and Rehabilitation and closure.	Surface Water	• Sedimentation and siltation of nearby watercourses and deterioration of water quality.	2	3	4	7	63	Minor (negative)	• Restore the topography to pre-mining conditions as much as is practically possible by backfilling, removing stockpiles and restore the slope gradient and angle of the site; • Clearing of vegetation should be limited to the decommissioning footprint area and immediate revegetation of cleared areas; • Immediate revegetation of cleared areas; • Movement of demolition machinery and vehicles should be restricted to designated access roads to minimise the extent of soil disturbance; • Use of accredited contractors for removal or demolition of infrastructure during decommissioning is recommended; this will reduce the risk of waste generation and accidental spillages; and • Ensure that the infrastructure (pipelines, fuel storage areas, pumps) are first emptied of all residual material before decommissioning.	2	2	2	2	12	Negligible (negative)
Decommissioning			• Restoration of pre-mining streamflow regime in nearby watercourses.	7	5	4	7	112	Major (positive)	No mitigation required.						
Decommissioning	Dismantling of infrastructure and preparation for rehabilitation of affected areas	Fauna and Flora	• Disturbance of soils, and subsequent erosion by wind, and water; • Increased vehicle movement in the area, increasing soil erosion and habitat destruction; • Potential spillage of hydrocarbons such as oils, fuels, and grease, thus contamination of the surrounding grounds; • AIP proliferation; and	6	3	4	5	65	Minor (negative)	• Continue with Concurrent Rehabilitation, begin with stockpiles, sand mined areas, implement rehabilitation measures; • Address eroded and compacted areas by deep ripping to loosen the soil, and revegetate the area as soon as possible to prevent AIP sprawl (please see Digby Wells Rehabilitation Report 2021 for recommended seed mix); • Inventory of hazardous waste materials stored on-site should be compiled and complete removal arranged; and	2	2	2	4	24	Negligible (negative)

Phase	Activity	Aspect	Impacts	D	E	I	P	S	Rating (Pre-Mitigation)	Mitigation Measures	D	E	I	P	S	Rating (Post-Mitigation)
			• Unexpected changes in topography and landscape.							• Only designated access routes are to be used to reduce any unnecessary compaction.						
Decommissioning	Rehabilitation – re-vegetation and profiling of the land.	Fauna and Flora	• Exposure of soils, and subsequent compaction, erosion, and sedimentation; • Soil compaction, and increased runoff potential due to vehicle movement during rehabilitation programs; • AIP proliferation; • Loss of organic material, basal layer and vegetation cover; and • Potential spillage of hydrocarbons such as oils, fuels, and grease, thus contamination of soil.	4	4	5	5	65	Minor (negative)	• During the decommissioning phase, rehabilitation must start as soon as possible and preferably in the growing season to ensure adequate plant recruitment; • Address eroded and compacted areas by deep ripping to loosen the soil, and revegetate the area as soon as possible; • Inventory of hazardous waste materials stored on-site should be compiled and complete removal arranged; and • Only designated access routes are to be used to reduce any unnecessary compaction.	6	3	2	6	66	Minor (positive)
Decommissioning	Post-closure monitoring and rehabilitation	Fauna and Flora	• Minimal negative impacts on the environment.	5	1	4	5	50	Minor (negative)	• During the decommissioning phase, rehabilitation must start as soon as possible and preferably in the growing season to ensure adequate plant recruitment; • AIP monitoring should be implemented to prevent the sprawl of AIPs; • Ensure sufficient irrigation and fertilizing of newly planted vegetation to facilitate a rapid establishment; and • Replant with species identified within each vegetation community, refer to the Digby Wells Rehabilitation Report 2021 for a recommended seed mix to promote soil stability and the correct climax species.	6	3	2	6	66	Minor (positive)
Decommissioning	Concurrent rehabilitation (topsoil cover, ripping and vegetation establishment) and monitoring of vegetation establishment	Wetlands	• Erosion due to exposed areas to wind and surface water runoff; • Siltation of surface water resources leading to deteriorated water quality and quantity of the wetlands; • Siltation of wetlands due to erosion; • Change in habitat and potential change in species composition;	5	2	3	5	50	Minor (negative)	• Continue with concurrent rehabilitation, and implement wetland rehabilitation measures; • Address areas of AIPs proliferation by utilizing a AIPs Program; • Ensure proper stormwater management designs are in place to ensure no excessive run-off or pooling occurs; • Only designated access routes are to be used to reduce any unnecessary impacts to the wetlands; and • The backfilled, reprofiled landscape should be top soiled and revegetated to allow free drainage close to the pre-mining conditions.	3	1	3	4	28	Negligible (negative)
Decommissioning	Backfilling of the mined excavations with topsoil unusable soil (pebbles, rocks,	Wetlands	• Water quality deterioration due to an increase in sedimentation and unusable soil (pebbles, rocks, gravel etc.) material; • Habitat and biodiversity loss as a result of poor water quality;	5	2	3	5	50	Minor (negative)	• The unusable soil (pebbles, rocks, gravel etc.) must be placed below the topsoil and compacted to prevent increased infiltration; • The backfilled, reprofiled landscape should be top soiled and revegetated to allow free drainage close to the pre-mining conditions;	3	2	2	4	28	Negligible (negative)

Phase	Activity	Aspect	Impacts	D	E	I	P	S	Rating (Pre-Mitigation)	Mitigation Measures	D	E	I	P	S	Rating (Post-Mitigation)
	gravel etc.) from the screening plants		• Water ponding and preferential flow paths; • Siltation of wetlands leading to deteriorated water quality and quantity; and • Change in habitat and potential change in species composition.							• If erosion has occurred, topsoil should be sourced, replaced, vegetated and shaped to reduce the recurrence of erosion in wetlands; • Only the designated access routes, outside of wetlands, are to be used to reduce any unnecessary compaction of surfaces and therefore increased flow into the wetlands; • Place sediment trapping berms where erosion has occurred; and • Minimise the period of exposed areas to prevent erosion, loss of vegetation and sedimentation within the wetlands.						
Decommissioning	Post-closure monitoring	Wetlands	• Soil compaction, leading to increased runoff and changes to the wetland functionality (e.g., erosion); • AIPs proliferation due to changes to the natural landscape, soils and wetlands; and • Changes to the habitat, wetland functionality and biodiversity.	5	2	2	3	27	Negligible (negative)	• Only use designated roads; • Use vehicles as little as possible in the wetlands, monitoring should preferable be done on foot; and • Wetland monitoring during the wet season for three years post-closure and report with rehabilitation recommendations if necessary.	5	2	2	3	27	Negligible (negative)
Decommissioning	Physical removal of surface infrastructure and rehabilitation activities near and within drainage lines	Aquatics	• Water quality and habitat deterioration of watercourses in contact with heavy machinery and receiving runoff from surface workings.	2	4	-5	5	55	Minor (negative)	• Removed or damaged vegetation areas should be revegetated; • Storm water must be diverted from decommissioning activities; • Water used during decommissioning should be kept onsite and not be allowed to freely flow into nearby watercourses; and • Ensure the revegetation activities use appropriate indigenous plant species.	2	1	-1	3	12	Negligible (negative)
Decommissioning	Rehabilitation of the MRA	Air Quality	• Poor ambient air quality.	3	1	1	4	20	Negligible (negative)	• Application of dust suppressant on exposed areas prior to vegetation establishment; • Conducting rehabilitation activities judiciously by avoiding windy days (days with wind speed greater than 5.4 m/s); • Set maximum speed limits onsite and have these limits enforced; • The area of disturbance must be kept to a minimum at all times, especially on windy days; • The drop heights when loading or tipping should be minimised; and • Undertake post-closure monitoring to assess the effectiveness of the rehabilitation (i.e regular assessment of vegetation growth and Dustfall monitoring).	3	1	1	3	15	Negligible (negative)

Phase	Activity	Aspect	Impacts	D	E	I	P	S	Rating (Pre-Mitigation)	Mitigation Measures	D	E	I	P	S	Rating (Post-Mitigation)
Decommissioning	Decommissioning phase activities	Noise	• Noise will emanate from the machinery and vehicles operating during the decommissioning activities.	2	2	2	3	18	Negligible (negative)	• Restrict decommissioning activities to daylight hours (06:00 – 18:00); • Regularly service decommissioning related machines and vehicles to ensure noise suppression mechanisms are effective (e.g. installed exhaust mufflers); • Vehicles should have buzzer type reverse alarms (producing band-limited white noise) installed, rather than the conventional beeping type of reverse alarms (which produce a tonal sound); • Regulate speed limits on access roads; and • Switch off equipment when not in use.	2	1	1	3	12	Negligible (negative)
Decommissioning	Concurrent rehabilitation: mined-out areas will be backfilled with stockpiled topsoil and waste material from the screening plant; Backfilled material will be levelled and contoured to avoid ponding of water; and Revegetation: either naturally or through use of an indigenous seed mix where vegetation is not suitably established.	Heritage	Digby Wells envisages no impact to the cultural heritage landscape, given the nature of the proposed activities and the location of identified heritage resources in relation to the proposed Project infrastructure. Should any infrastructure intended for demolition increase in age to older than 60 years during the Project lifecycle, the structure must be considered a heritage structure and must not be destroyed or altered without the correct permit issued in terms of Section 34 of the NHRA.													
Decommissioning	Decommissioning activities.	Socio-economic	• Impacts of Downscaling and Retrenchment.	3	5	5	6	78	Moderate (negative)	• Plan, update and implement an integrated Mine Decommissioning, Rehabilitation, and Mine Closure Plan with associated Social Closure Planning five years prior to Mine Closure; and • Proactively assess and manage the social and economic impacts on individuals, regions, and economies where retrenchment and/or closure of the Project are certain.	3	5	-3	6	66	Minor (negative)
Decommissioning/ Rehabilitation	Transportation of rehabilitation machinery, infrastructure, and employees	Traffic	• Increased traffic volumes resulting in a reduction of road capacity.	2	2	1	2	10	Negligible (negative)	No mitigation measures required						

Phase	Activity	Aspect	Impacts	D	E	I	P	S	Rating (Pre-Mitigation)	Mitigation Measures	D	E	I	P	S	Rating (Post-Mitigation)
Decommissioning	Transportation of rehabilitation machinery and site infrastructure	Traffic	• Increased road safety risk.	2	5	4	5	55	Minor (negative)	• Ensure heavy vehicles and abnormal load vehicles comply with limitations on vehicle dimensions and axle, vehicle masses and safety standards set out in the Road Traffic Act, 1996 (Act No 93 of 1996) and the National Road Traffic Regulations, 2000 for vehicle using a public road; • Discourage routing of heavy vehicle traffic through populated area; and • Avoid transporting abnormal load during peak periods.	2	5	3	2	20	Negligible (negative)
Decommissioning	Employee transportation	Traffic	• Increased public transport and NMT demand.	2	1	1	4	16	Negligible (negative)	• The existing shuttle services provided by Copper Sunset will accommodate additional public transport trips. No additional public transport facilities and NMT infrastructure are recommended.	2	1	1	1	4	Negligible (negative)

12.2 Cumulative Impacts

The importance of identifying and assessing cumulative impacts is that the whole is often greater than the sum of its parts. This implies that the total effect of multiple stressors or change processes acting simultaneously on a system may be greater than the sum of their effects when acting in isolation. The cumulative impacts considered by the relevant specialists are discussed per environmental aspect, below.

12.2.1 Soil, Land Use and Land Capability

The dominant land use in the catchment is mining and agropastoral activities. These land uses have various impacts directly and indirectly on the soils, land uses and land capability of the area. The impacts include:

- Soil contamination e.g., hydrocarbon spills, pesticides and herbicides from mines and agropastoral activities;
- Direct loss of soil due to water and wind erosion;
- Compaction;
- Loss of soil depth and useable land for cultivation;
- Over grazing;
- Proliferation of AIPs; and
- Decreased soil fertility.

The major impacts associated with Copper Sunset sand mining is the disturbance of natural occurring soil profiles consisting of layers or soil horizons. Soils will be stripped and removed, changing the natural soil profiles, depth, physiology, and chemistry, therefore impacting the land use and capability thereof. Rehabilitation of disturbed areas aims to restore land capability, but the South African experience is that post-mining land capability usually decreases compared to pre-mining land capability. Soil formation is an extremely slow process and soil can therefore be considered as a non-renewable resource.

Soil quality deteriorates during stockpiling and replacement of the soil during rehabilitation. Re-shaping and backfilling cannot imitate pre-mining soil quality properties. Soil depth will decrease due to mining of the sub-soil (soil mining), however, impacts can be controlled through limiting mining depth and replacing a sufficient topsoil layer (minimum of 300 mm) on the mined areas.

The impact on soil is irreplaceable because natural soil layers are stripped and mined. In addition, land use, land capability and soil fertility are impacted because stripped soil layers are usually thicker than the defined usable soil layer, the natural topography will be altered, and the overall soil depth will decrease. Mining and associated activities impacting the soil resources include changes to the physicochemical properties of the soil. The cumulative impacts may, therefore, have a significant effect on the soil resources therefore impacting the

land use and land capability of the Project area. Contaminated soil will directly impact the water quality and quantity as well as the vegetation and land capability of the area.

12.2.2 Hydropedology

Existing developments within and around the Copper Sunset MREA have contributed to losses of water resources including wetlands and rivers systems and continued impacts on the remaining areas. The alteration of the vegetation due to crop cultivation and cattle grazing that has led to overgrazing, the contamination of water resources because of industrial process and increased surface inflows, have all contributed to the physical impacts on the wetlands and rivers such as erosion and sedimentation.

The mining activities within the catchment have led to losses in wetland areas that may have facilitated increased water flow and quantity of pollutants flowing into the water resources. The alteration of vegetation and surface flow has led to the onset of erosion in the wetland areas, and this may be perpetuated further by mining and related activities within the MREA. Mining may disturb the hydrological patterns further which could in turn lead to large scale desiccation of wetland areas and the direct loss of some of the wetland areas because of water flow being cut off.

12.2.3 Surface Water

Due to the low risk of the Project, no significant cumulative impacts are envisaged from downstream of the study area. Additionally, the quality of the water flowing from upstream of the study area shows minimal impact due to human activities, hence it is unlikely that there will be significant cumulative impacts as a result of the proposed Project. Cumulatively, considering other mining projects within the region, the mine will contribute to quality issues in the Vaal River. However, since this is a sand mine the impacts will be insignificant.

12.2.4 Fauna and Flora

The Central Free State Grassland and Andesite Mountain Bushveld uphold a vulnerable conservation status with a conservation target of 24%. These landscapes have been subjected to transformations from overgrazing and damming. The cumulative loss of these vegetation types as well as SCC within it should be considered proactively.

The further removal of habitat/vegetation types to allow establishment will bring about a reduction of natural areas, and the increase of the edge effect. The impacts on the ecology of the area will be significant. It is expected that there will be great losses of vegetation and flora along with associated faunal habitat. The primary impacts will be fragmentation and edge effects with a reduction in movement of remaining naturally occurring wildlife and isolated pockets of vegetation.

Secondary cumulative impacts will include increased accessibility to the site and the resulting increase in development and resource dependence. Ideally, a strategic environmental plan for the area should be developed and adhered to. This should include the conservation of

important areas and make provisions for ecological corridors for the movement of faunal species.

12.2.5 Wetlands

The mining activities within the catchment have led to losses in wetland areas that may have facilitated increased water flow and also have increased the number of pollutants flowing into the water resources. The alteration of vegetation and surface flow has led to the onset of erosion in the wetland areas, and this may be perpetuated further by mining and related activities within the MREA.

Mining may disturb the hydrological patterns further which could in turn lead to large scale desiccation of wetland areas and the direct loss of some of the wetland areas because of water flow being cut off.

12.2.6 Aquatics

The MREA lies downstream of the Vaal Dam within a watershed draining the Vaal River and Taaibosspruit catchments flanked by agriculture fields, mining/Industrial zones, and residential areas, such as Vereeniging, Vanderbijlpark and Sasolburg. Consequently, current activities already appear to potentially impact on the identified aquatic ecosystems.

It is suspected that additional impacts associated with the proposed expansion areas will significantly contribute towards any notable changes to the ecological integrity of the Vaal River and Taaibosspruit systems.

12.2.7 Air Quality

Copper Sunset is already in operation and mining of sand is ongoing. The tonnage and the machineries used will remain the same, the only change will be mining activities moving from the current footprint to the expanded areas to extend the LoM.

Since mining will continue at the scale and pace, and based on the aforementioned, it is difficult to calculate the cumulative impacts. The current sand mining is already contributing to the background and this will not change once mining commences in the extension areas.

12.2.8 Noise

The proposed Project based on the findings detailed in this report is considered to have minor to negligible impacts on the ambient noise levels in the area. Results from the baseline assessment indicate that ambient noise levels are relatively high (exceeding the acceptable rating levels for ambient noise in different districts) with the main contributors being existing mining activities (i.e. the New Vaal Colliery, Afrimat, Mission Point Mining, including ongoing sand mining at Copper Sunset, coupled with Eskom's Lethabo Power Station, Vaal Racecourse and noise from vehicles plying the R716 and R82 routes) in the area.

In essence, the continuation of mining by Copper Sunset in the extension area will not change the background soundscape in the MRA.

The Copper Sunset Mine has an approved MR and has been in operation since 2009. The tonnage and number of equipment will remain the same for the LoM, therefore the impact on the background soundscape will be similar as mining shifts from the existing MRA (current operations) to the proposed extension MRA. As a result, it is considered that the cumulative impact is as measured in the baseline field survey and will remain the same, and if changes occur, this will be negligible.

12.2.9 Heritage

This Project in conjunction with other planned developments in line with the strategic development plans for the Free State province requires consideration to identify the possible in-combination effects of various impacts to known heritage resources. Table 12-3 presents a summary of the possible cumulative impacts of the Project.

Table 12-3: Summary of Potential Cumulative Impact

Type	Cumulative Impact	Direction of Impact	Extent of Impact
Space-crowding	The proposed Project will add to the existing landscape associated with mining activities characterising the area immediately surrounding the proposed Project area and further afield. The implementation of the Project will result in a loss of the area within which heritage resources can exist.	Negative	Local

12.2.10 Social

Potential cumulative impacts associated with the Project and the potential of more mines being established in the study area are outlined in Table 12-4.

Table 12-4: Potential Cumulative Impacts Related to Proposed Project

Risks	Mitigation Measures
Economic dependency on surrounding mines will negatively impact local, regional, and national economies with decommissioning and mine closure.	Collaborate with government, agencies, and civil society to identify alternative economic activities in the study area.
The presence of mining activities in the study area is likely to result in the influx of business and job seekers attracted by the economic activities. The increased in-migration of people may result in: Housing backlog and / or growth of informal settlements.	Develop and implement an In-migration Plan in collaboration with government, civil society, and other active mines in the study area.

Risks	Mitigation Measures
Increased social capital associated with an increase in number of highly educated and skilled people searching for economic opportunities associated with the mines. Increased population, demand for goods and services, and constraints on supply because of pressure on resources, will all contribute to inflation in local prices and increased economic vulnerability of local people, those who are already vulnerable. Increased anti-social behaviours will adversely affect the lives of the local population.	
It is anticipated that there will be potential increase in noise and dust generation due to proposed and future establishment of new mining operators in the area.	Establish a new or support existing mine forums in partnership with government and local communities to address cumulative impacts associated on communities.
Increased risks associated with road traffic accidents between humans, livestock and crop farming and mining vehicles. In some cases, this will lead to fatalities.	Make financial provisions to be used in case of reported and proven incidences of health, safety, and security issues.

13 Item 3(k): Methodology used in Determining and Ranking the Nature, Significance, Consequence, Extent, Duration and Probability of Potential Environmental Impacts and Risks

Details of the impact assessment methodology used to determine the significance of physical, bio-physical and socio-economic impacts are provided below.

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

Significance = CONSEQUENCE X PROBABILITY X NATURE

Where

Consequence = intensity + extent + duration

And

Probability = likelihood of an impact occurring

And

Nature = positive (+1) or negative (-1) impact

The matrix calculates the rating out of 147, whereby intensity, extent, duration and probability are each rated out of seven as indicated in Table 13-3. 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 EIA report. The significance of an impact is then determined and categorised into one of eight categories, as indicated in Table 13-2, extracted from Table 13-1. The descriptions of the significance ratings are presented in Table 13-3.

It is important to note that the pre-mitigation rating takes into consideration the activity as proposed, (i.e., there may already be some mitigation included in the engineering design). If the specialist determines the potential impact is still too high, additional mitigation measures are proposed.

Table 13-1: Impact Assessment Parameter Ratings

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

Rating	Intensity		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.	Local 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.	Limited 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 because of design, historic experience or implementation of adequate mitigation measures. <10% probability.

Rating	Intensity		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.	Very limited/Isolated 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 13-2: Probability/ Consequence Matrix

Probability \ Significance	-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
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

Consequence

Table 13-3: 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 major and usually a long-term change to the (natural and / or social) environment and result in severe 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) (-)

13.1 Item 3(k)(i): The Positive and Negative Impacts that the Proposed Activity and Alternatives will have on the Environment and the Community that may be Affected

Section 9.1 above provides an explanation of the site layout, alternatives and aspects that were considered during the finalisation of the layout. The Impact Assessment detailed in Section 12.1, Table 12-2 above describes all identified potential positive and negative impacts associated with the preferred site layout and planned Project activities.

13.2 Item 3(k)(ii): The Possible Mitigation Measures that Could be Applied and the Level of Risk

Mitigation measures for each identified impact have been proposed and are presented with the impact ratings in Section 12.1 above.

13.3 Item 3(k)(iii): Motivation where no Alternative Sites were Considered

The preferred site is primarily influenced by the established Copper Sunset mining operation taking place on the adjacent portion of land. This application relates to the extension of the existing MRA to now include the additional portions of the RE of the Farm Bankfontein No. 9 and a portion of the RE of the Farm Zandfontein No. 259. Viable sand reserves have been identified over the extension areas, through extrapolation of the existing disturbance within the existing MRA.

Therefore, locational alternatives were not considered as the site has been selected based on the availability of sand. The alternatives considered in this report include the design or layout, mining method, and the “No-Go” alternative.

The alternatives considered for the new proposed activities have been detailed in Section 9.1 above.

13.4 Item 3(k)(iv): Statement Motivating the Alternative Development Location within the Overall Site

The preferred overall location has been selected based on the availability of sand and its proximity to the existing mining operation. However, the proposed infrastructure layout for the MREA was informed by various specialist investigations. No other site alternatives were identified.

Wetlands have been identified within the proposed extension areas and cover 1638.733 ha of the area. A large section of the MREA has historically been impacted by anthropogenic activities. The Applicant intends to mine severely disturbed wetland areas (leaving sensitive wetlands unmined) to fully maximise the mineral resource available on the properties. A wetland offset assessment will be undertaken to determine the extent of wetlands to be offset and to compensate for significant residual adverse impacts.

The heritage specialist identified three heritage resources within the Project area. It has been recommended that the Project design should be amended to avoid the heritage resources and a 100 m no-go buffer zone implemented around each of the identified graves. Where Project design amendments are not feasible, Copper Sunset will need to embark on a consultation process to assess whether a Grave Relocation Process is feasible.

The preferred mining method for Copper Sunset is strip mining as it suits shallow sand reserves and is deemed most economically viable for the proposed Project. The no-mining option will mean that all potential negative impacts associated with the proposed extension and its associated infrastructure would not occur. However, the potential benefits (i.e. job creation and security, etc.) associated with the Project would also not occur. A more detailed description of the alternatives is provided in Section 9.

14 Item 3(l): Full Description of the Process Undertaken to Identify, Assess and Rank the Impacts and Risks the Activity will Impose on the Preferred Site (In respect of the final site layout plan) Through the Life of the Activity

The identification of potential impacts associated with the proposed Project were informed by the environmental and technical specialist investigations undertaken.

Following the identification of potential impacts and detailed baseline environment, the impacts were assessed utilising the Digby Wells methodology which assesses the nature of the impact, duration and extent, intensity and the probability of the impact occurring (Section 13). Following the assessment of the potential impacts, mitigation measures are provided, and the potential impacts are assessed post-mitigation. The significance of the pre-mitigation impacts, the proposed mitigation measures and the post-mitigation significance ratings are detailed per environmental aspect per phase of the Project in Section 12.1, Table 12-2.

The determined site sensitivities were also considered in the selection of the preferred project site for proposed activities at Copper Sunset. The identified impacts associated with the activities are presented in Table 15-1 below.

15 Item 3(m): Assessment of each Identified Potentially Significant Impact and Risk

Table 15-1 presents the potential impacts assessed per project activity and per phase as well as their proposed mitigation / enhancement measures for the proposed activities subject to the EIA Phase.

Table 15-1: Assessment of each identified Potentially Significant Impact

Phase	Activity	Aspect	Impacts	Rating (Pre-Mitigation)	Mitigation Measures	Rating (Post-Mitigation)
Establishment	Site Clearance: Vegetation and topsoil will be removed with a bulldozer and stockpiled along the mined-out strip.	Soil, land use and land capability	• Compaction of soil and therefore increased surface runoff; • Increased wind, and water erosion on unprotected soils and consequently sedimentation as these soils are highly erodible; • Removal of vegetation and basal cover, increasing the potential loss of topsoil, organic material and decreased soil fertility; • Compaction, ponding, and changes to the natural hydrological functioning of the landscape; • Loss of usable soil as a resource for agriculture – disturbance, low fertility, erosion and compaction; and • Loss of Land Capability and agricultural land due to complete restrictions to cattle grazing (current land use). Reduced area for cattle grazing.	Major (negative)	• Restrict extent of disturbance within the Copper Sunset Project area and minimise activity within designated areas of disturbance; • Minimise the period of exposure of soil surfaces through dedicated planning; • Stripping operations should not take place during large rain events as this executed when soil moisture content will minimise the risk of compaction (during dry season); • Aim to minimise (or even cease) workings on windy days; • During stockpiling, preferably use the ‘end-tipping’ method to keep the stockpiled soils loose; • Ensure stockpiles are placed on a free draining location to limit erosion loss and waterlogging; • Limit stockpile height – a safe height can be regarded as the height at which material can be placed without repeated traffic over already placed material; and • Soil surface (only where top soil is partially removed) can be loosened via tillage/ripping.	Minor (negative)
Establishment	Construction of a temporary haul road (20 m width) to gain access to the sand mining area. (It is important to note that the haul road will move as mining progresses through life of mine).	Soil, land use and land capability	• Compaction of soil and increased runoff potential; • Reduced infiltration rate, reduced rooting depth (vegetation cover) and increased surface runoff; • Increased erosion, and consequently sedimentation of wetlands and freshwater bodies; • Impacting agricultural activities in short, medium and long term due to changes in the soil agricultural potential and complete restriction to cattle grazing (current land use); and • Soil contamination from spills and leakages.	Moderate (negative)	• If erosion has occurred, topsoil should be sourced, replaced, vegetated and shaped to reduce the recurrence of erosion; • Only the designated access routes are to be used to reduce any unnecessary compaction; • Compacted areas are to be ripped to loosen the soil structure to increase the land capability (vegetation growth potential); • Un-used haul roads should be rehabilitated by ripping the soil to 300 mm and revegetating the area; and • Clean up spills to prevent migration of contaminants into the soil profile, entering the groundwater.	Minor (negative)
Establishment	Site Clearance: Vegetation and topsoil removal to a depth of about 0.3 – 0.4 m with a bulldozer and stockpiled along the mined-out strip; Construction of 20 m wide haul/access	Hydropedology	• Sedimentation and siltation of nearby watercourses due to erosion of disturbed soils.	Moderate (negative)	• Keep vegetation clearance and soil disturbance to a minimum, within the confines of the mining footprint; • Reprofile disturbed portions of the affected streams, rivers or wetlands to allow free drainage; • Adhere to sound storm water management planning to effectively separate sediments from runoff with the use of silt fences; • Movement of vehicles and machinery should be confined to the designated access road to minimise the extent of soil compaction;	Negligible (negative)

Phase	Activity	Aspect	Impacts	Rating (Pre-Mitigation)	Mitigation Measures	Rating (Post-Mitigation)
	road to the sand mining area				• Drip trays must be used to capture any oil leakages. Servicing of vehicles and machinery should be undertaken at designated hard park areas. Any used oil should be disposed of by accredited vendors; • Disposal of general and other forms of waste should continue to be done into clearly marked skip bins which are collected by approved contractors for final disposal to appropriate disposal sites; and • Any hydrocarbon spills should quickly be cleaned-up and contaminated soils removed before wash-offs and/or further infiltration into the ground occurs.	
Establishment	Construction of 20 m wide haul/access road to the sand mining area	Hydropedology	• Alteration of watercourse geometry and fluvial patterns of disturbed river channels.	Moderate (negative)		Negligible (negative)
	Movement of vehicles and machinery during construction of haul road and during site clearance activities; Use of mobile toilets on site and the handling of general waste	Hydropedology	• Surface water contamination leading to deterioration of water quality.	Minor (negative)		Negligible (negative)
Establishment	Site clearance and vegetation removal; and establishment of a haul road / tracks	Surface Water	• Sedimentation and siltation of nearby watercourses.	Minor (negative)	• Clearing of vegetation must be limited to the development footprint, and the use of any existing access roads must be prioritised to minimise creation of new ones; • Dust suppression on the haul roads and other cleared areas must be undertaken on a regular basis to prevent or limit dust generation; • Hydrocarbon and hazardous waste storage facilities must be appropriately bunded to ensure that leakages can be contained. Spill kits should be in place and workers should be trained in the use of spill kits, to contain and immediately clean up any leakages or spills; • Vehicles should regularly be maintained as per the developed maintenance program. This should also be inspected daily before use to ensure there are no leakages underneath; • Drip trays must be used to capture any oil leakages. Servicing of vehicles and machinery should be undertaken at designated hard park areas. Any used oil should be disposed of by accredited contractors; and • Implementation of a stormwater management to separate clean and dirty water areas, if dirty water is generated.	Negligible (negative)
Establishment	Placement of the mobile offices and other infrastructure	Surface Water	• Surface water contamination leading to deterioration of water quality due to handling and storing general and hazardous waste.	Minor (negative)		Negligible (negative)
Establishment	Site/vegetation clearance	Fauna and Flora	• Loss of plant communities including floral SCC; • Loss of biodiversity; • Increased erosion; • Potential for AIP proliferation; • Loss of faunal habitat including faunal SCC; and • Loss of vegetation types.	Moderate (negative)	• Keep site clearing to a minimal, and restrict vehicle movement outside of dedicated areas, specifically close to wetlands; • Keep site clearing and impacts to the Copper Sunset MREA; • Thorough screening for the presence of the African Grass Owl before the establishment phase is required to ensure that impacts from the Project do not affect the vulnerable species; • Alien plant management strategy should be implemented; • Make use of existing roads to encourage minimal impacts/footprint;	Minor (negative)

Phase	Activity	Aspect	Impacts	Rating (Pre-Mitigation)	Mitigation Measures	Rating (Post-Mitigation)
					• The mining area should be screened for protected species before commencing mining activities. If protected species are identified, permits will be required before the removal and an Ecological Management Plan must be compile; and • Mitigation measures on waste management are discussed in Section 5, Part B.	
Establishment	Access and haul roads construction	Fauna and Flora	• Removal of vegetation and basal layer; • Increased proliferation of AIPs; • Increased faunal casualties; and • Increased dust pollution.	Minor (negative)	• Keep site clearing to a minimum; • If any erosion occurs, corrective actions must be taken to minimise any further erosion from taking place at regular intervals or after high rainfall events; • Staff of the mine must adhere to policies within the operation of the mine, such as adhering to designated speed limits; • Establishment must be kept within the mining footprint area, to reduce as much fragmentation as possible; • To counteract the negative impacts of dust pollution, see Section 5, Part B; and • AIPs should be continuously monitored and controlled throughout the LoM and thereafter.	Minor (negative)
Establishment	Stockpiling of topsoil	Fauna and Flora	• Heavy machinery utilised increasing vehicle movement in the area, increasing soil compaction, habitat disturbances and vegetation removal; • Natural vegetation will be removed, damaged and fragmented promoting edge effects and AIP proliferation; and • Increased soil compaction and erosion.	Moderate (negative)	• Establishment of effective vegetation around constructed infrastructure for adequate topsoil protection from wind, and water erosion; • While topsoils are being stockpiled, the soils should be revegetated to limit erosion and loss of organic material; • Alien invasive plants should be continuously monitored and controlled throughout the life of the mine and thereafter; and • Corridors (infrastructure and ecological) set aside within the mine area would mitigate fragmentation substantially, especially if this could be managed with the community over an extended period of time.	Minor (negative)
Establishment	Site Clearance: Vegetation and topsoil will be removed with a bulldozer and stockpiled along the mined-out strip	Wetlands	• Direct loss of wetland areas; • Habitat loss; • Loss of biodiversity; and • Erosion and sedimentation of wetland areas.	Major (negative)	• Avoid infrastructure within wetlands as far as possible, especially wetlands with a high PES, EIS and ES rating; • Establishment of a 100 m buffer zone to protect wetland areas from infrastructure within the study area. This would require that development occur further than 100 m from a delineated wetland area; • Place sediment trapping berms on the boundary of the 100 m buffer or end of development; • Minimise the period of exposed areas to prevent erosion, loss of vegetation and sedimentation within the wetlands; and • Ensure concurrent rehabilitation with special attention to reshaping the areas and re-vegetating.	Moderate (negative)
Establishment	Construction of a temporary haul roads (20 m width) to gain access to the sand	Wetlands	• Fragmentation of wetland areas; • Habitat loss; • Loss of biodiversity; and • Erosion and sedimentation of wetland areas.	Moderate (negative) -78	• If erosion has occurred, topsoil should be sourced, replaced, vegetated and shaped to reduce the recurrence of erosion in wetlands;	Minor (negative)

Phase	Activity	Aspect	Impacts	Rating (Pre-Mitigation)	Mitigation Measures	Rating (Post-Mitigation)
	mining area. It is important to note that the haul road will move as mining progresses through life of mine				• Only the designated access routes are to be used to reduce any unnecessary compaction of surfaces and therefore increased flow into the wetlands; • Place sediment trapping berms where erosion has occurred; • Minimise the period of exposed areas to prevent erosion, loss of vegetation and sedimentation within the wetlands; and • When the temporary haul roads are deconstructed, the area should be ripped and re-vegetated to prevent impacts to the environment.	
Establishment	Site clearance and establishment of proposed infrastructure in proximity to the watercourses.	Aquatics	• Sedimentation and water quality deterioration.	Minor (negative)	• Limit vegetation removal to the infrastructure and mining footprint area only. Where removed or damaged, vegetation areas (riparian or aquatic related) should be revegetated as soon as possible; • Bare land surfaces downstream of construction activities must be vegetated to limit erosion from the expected increase in surface runoff from infrastructure; • Environmentally friendly barrier systems (such as silt nets or) should be used, in severe cases, use trenches downstream from construction sites to limit erosion and possibly trap contaminated runoff from construction; • Storm water must be diverted from construction activities and managed in such a manner to disperse runoff and prevent the concentration of storm water flow; • Water used at construction sites should be utilised in such a manner that it is kept on site and not allowed to run freely into nearby watercourses; • Construction chemicals, such as hydrocarbons, should be used in an environmentally safe manner with correct storage as per each chemical's specific storage descriptions; • All vehicles must be frequently inspected for leaks; • No material may be dumped or stockpiled within any rivers, drainage lines in the vicinity of the proposed project; • All waste must be removed and transported to appropriate waste facilities; and • High rainfall periods (usually November to March) should be avoided during the Establishment of infrastructure to possibly avoid increased surface runoff in attempt to limit erosion and the entering of external material (i.e. contaminants and/or dissolved solids) into associated aquatic systems.	Negligible (negative)
Establishment	Site Clearing, Construction of Surface Infrastructure and Topsoil Stockpiling	Air Quality	• Reduction in ambient air quality.	Negligible (negative)	• Application of dust suppressant on the haul roads and exposed areas; • Limit activity to non-windy days (wind speed less than 5.4 m/s); • Set maximum speed limits on haul roads and have these limits enforced; • The area of disturbance must be kept to a minimum at all times and no unnecessary clearing, digging, or scraping must occur, especially on windy days; and • The drop heights when loading onto trucks and at tipping points should be minimised.	Negligible (negative)

Phase	Activity	Aspect	Impacts	Rating (Pre-Mitigation)	Mitigation Measures	Rating (Post-Mitigation)
Establishment	Establishment phase activities	Noise	• Noise emanating from the machinery and vehicles operating during the establishment activities.	Minor (negative)	• Construction activities should be restricted to daylight hours (06:00 – 18:00); • Construction machinery and vehicles should be switched off when not in use; • Construction vehicles should have buzzer type reverse alarms (producing band-limited white noise) installed, rather than the conventional beeping type reverse alarms (which produce a tonal sound); • Vehicles should be serviced as per their design requirements to ensure noise suppression mechanisms are effective (e.g. installed exhaust mufflers); and • Regulate vehicle speeds on the access and haul roads.	Negligible (negative)
Establishment	Site Clearance	Heritage	• Direct impact to Heritage Resource BGG-001 and BGG-002.	Major (negative)	• Amendment of the Project design to avoid the potential negative impact to the heritage resources; • This Project redesign must include a 100 m no-go buffer zone around the heritage resource; and • The development and implementation of a Heritage Site Management Plan (HSMP). Should Copper Sunset have an established HSMP for the existing operation, the current HSMP must be updated to include BGG-001 and BGG-002. Digby Wells recommends Copper Sunset implements this option and the post-mitigation impact assessment considers this mitigation strategy. Where Project redesign and *in situ* conservation is not feasible based on the current mining operations and location of the sand resources: • Heritage mitigations must be undertaken in accordance with the requirements of the NHRA and the NHRA Regulations; and • Such mitigations may include a BGGC process to assess whether a GRP (which must be undertaken in accordance with Section 36 of the NHRA and Chapters IX and XI of the NHRA Regulations) is feasible.	Moderate (positive)
Establishment	All project related activities associated with establishment	Socio-economic	• Creation of Employment Opportunities.	Minor (positive)	• Ensure implementation of the existing company Employment Policy; • Should Contractors be used during establishment, ensure that local employment targets are set regardless of the size of the work program. Local employment targets must include employment of youths and women from historically disadvantaged backgrounds; • Prioritise employment and training of people living within the primary study area over outsiders especially for unskilled and semi-skilled positions; • Widely advertise all Project employment opportunities in local community newspapers and placed in public places in local languages; • Where possible, the construction workforce must be for the operation of the mine; • Ensure that the mine's Community Liaison Officer is informed of all project developments to facilitate on going and active engagement with stakeholders; • Comply with minimum wage requirements for unskilled labour;	Minor (positive)

Phase	Activity	Aspect	Impacts	Rating (Pre-Mitigation)	Mitigation Measures	Rating (Post-Mitigation)
					• Ensure that no employment take place at the entrance to the site (to avoid people congregating at the work site). Only formal channels for employment must be used; and • Implement company grievance procedure to record and resolve complaints and issues/ concerns of project affected communities.	
Establishment			• Impacts associated with Population Influx.	Moderate (negative)	• Develop an In-Migration Plan that addresses how the Project will seek to minimise Project-induced in-migration as far as possible. Implement mitigation measures to address the adverse environmental and social consequences, and maximise the benefits, of in-migration. The management plan should be developed together with other industry role players and government; • Where possible, construction employees should be locally sourced as they will live with their families; • Explore opportunities for collaboration with local police with regards to safety and security issues relating to Project activities in general and any concerns about contractors; • To discourage influx of job-seekers, consider prioritisation of employment of unemployed members of local communities; • Liaise with Local Government to ensure that expected population influx is considered in infrastructure development and spatial development planning; • Ensure continuous consultation with local communities, farm landowners and government and promote partnerships to address illegal activities on-site and in the surrounds of the project area; • Develop information, education and communication campaigns around diseases and health practices including sanitation and hygiene; • Monitoring changes in land cover and land use outside the Project site to identify loss of areas of importance for biodiversity and cultural heritage; and • Discourage informal settlements along Project roads to minimise loss of habitat of value for biodiversity.	Minor (negative)
Establishment			• Opportunities and Capabilities within the Supply Chain.	Minor (positive)	• Conduct an audit of local businesses and their capacity to meet Project needs, including those businesses in the study area, and maintain a database of local business information; • Implement the company's existing Procurement Policy or Plan; • Ensure that the policy or plan sets-out guidance on targets for local businesses used by the Project and that these are monitored; • Unbundle all work programs to the smallest components to allow local businesses to take-up the opportunities; • Adaptation of Project procurement documents to suit local businesses as far as possible within the standards required of the Project;	Moderate (positive)

Phase	Activity	Aspect	Impacts	Rating (Pre-Mitigation)	Mitigation Measures	Rating (Post-Mitigation)
					• Provision of incentives for Project contractors to purchase locally and partner with local businesses, including tender requirements regarding local procurement; • Continue using the SME electronic portal to facilitate communication of contract opportunities and management training materials to SMEs; • Promotion of joint ventures between large and small Contractors to ensure equitable sharing of economic benefits and skills development; and • Implement procedure for dissemination of procurement opportunities as early as possible, with clearly defined requirements for the goods or service to manage expectations; and • Implementation of the grievance procedure.	

Establishment			• Impacts to community health safety and security.	Moderate (negative)	• In partnership with government authorities, Copper Sunset will be required to support improvements to existing health services to handle the increase in population numbers and changes to the existing health profile of the area. This may include facilities, quality of medical personnel, diagnostic capacity, and treatment, etc.
					To mitigate community safety from road traffic:
					• Implement the mitigation measures and management plans as proposed in the Traffic Impact Assessment study.
					• Furthermore, implement the following management actions as they relate to community safety and road traffic awareness:
					  ◦ Access to Project sites, especially alongside the road, must be controlled to prohibit the public from entering the site;
					  ◦ Develop a Traffic Management Plan covering vehicle safety, driver, and passenger behaviour, use of drugs and alcohol, hours of operation, rest periods and accident reporting and investigations;
					  ◦ Strictly enforce drug and alcohol policies in relation to Project drivers and undertake regular and random testing of drivers and in response to suspicious behaviour;
					  ◦ Require Project drivers to be trained in defensive driving and provided regular refresher courses;
					  ◦ Propose road bypasses where there is a significant risk to public safety from road accidents;
					  ◦ Establish preparedness and response capabilities to deal with any road traffic or other accidents that may occur including multiple casualty events;
					  ◦ In partnership with local authorities and the police, educate communities on road traffic laws and road safety; and
					• Implement an Emergency Prevention, Preparedness and Response Plan:
					  ◦ Design and implement measures to minimise the risk of hazardous substances entering the environment, including development of an
						Minor (negative)

Phase	Activity	Aspect	Impacts	Rating (Pre-Mitigation)	Mitigation Measures	Rating (Post-Mitigation)
					Emergency Prevention, Preparedness and Response Plan for accidents involving release of hazardous substances to the environment. This will include: • Installation of oil water separators and grease traps as appropriate at fixed refuelling facilities, workshops, parking areas, fuel storage and containment areas; • Use of drip trays and other temporary measures to prevent entry of hazardous substances into the environment during fuelling or servicing of vehicles and equipment on site; • Provision of spill kits and training of staff in their use; • Secure storage and labelling of hazardous substances in line with the manufacturer's recommendations and measures to prevent contact with untrained personnel, birds, animals; and • Secondary containment using impervious, chemically resistant material and designed to prevent contact between incompatible materials in the event of a release. To mitigate dust impacts: • Implement mitigation measures proposed in the Air Quality Impact Assessment Study. • Furthermore, implement induction programmes for all employees and contractors to increase sensitivity and compliance with these standards during mining activities. • Ensure mitigation measures are factored into the daily operation at the mine; and • Implement particulate monitoring onsite, and at upwind and downwind sensitive receptor locations to assess the effectiveness of the mitigation measures and ensure compliance. To mitigate noise impacts: • Ensure mitigation measures are factored into the day-to-day operation onsite; and • Conduct noise monitoring periodically (i.e. on a quarterly basis to ensure the sand mining noise footprint is not exacerbating background condition).	
No mitigation measures required.	Transportation of establishment material, mining equipment, storage tanks and employees	Traffic	• Increase traffic volumes resulting in a reduction of road capacity.	Negligible (negative)	No mitigation measures required.	
Establishment	Transportation of establishment material, mining	Traffic	• Increased road safety risk.	Minor (negative)	• Ensure heavy vehicles and abnormal load vehicles comply with limitations on vehicle dimensions and axle, vehicle masses and safety standards set	Negligible (negative)

Phase	Activity	Aspect	Impacts	Rating (Pre-Mitigation)	Mitigation Measures	Rating (Post-Mitigation)
	equipment and storage tanks				out in the Road Traffic Act, 1996 (Act No 93 of 1996) and the National Road Traffic Regulations, 2000 for vehicle using a public road; • Discourage routing of heavy vehicle traffic through populated area; • Avoid transporting abnormal load during peak periods; and • Heavy vehicle drivers should attend a specialised road safety and driving course that sensitises them to the impact that they have on driving conditions for other road users.	
Establishment	Employee transportation	Traffic	• Increase in public transport and non-motorised transport (NMT) demand	Negligible (negative)	• The existing shuttle services provided by Copper Sunset will accommodate additional public transport trips. No additional public transport facilities and NMT infrastructure are recommended.	Negligible (negative)
Operational	Mining of sand resources to approximately 0.4 – 5 m. This include screening (if required) and stockpiling in a separate area	Soil, land use and land capability	• Loss of usable soil as a resource – Mining of sand, erosion and compaction; • Soil contamination; and • Loss of usable soil for agriculture – changing the land capability.	Major (negative)	• Make sure the end-use soil depth is adequate for rehabilitation (minimum of 600 mm) depth; • If any erosion occurs, corrective actions (erosion berms) must be taken to minimise any further erosion from taking place; • A TMP must be prepared to demonstrate how topsoil will be preserved in a condition as near as possible to its pre-mining condition to allow successful mine rehabilitation (Statham, 2014); and • If a spill has occurred, soil pollution monitoring should be conducted to detect any high levels of pollutants and the extent of the contamination plume.	Moderate (negative)
Operational	Transportation of material on haul roads	Soil, land use and land capability	• Compaction of soil and increased runoff potential; • Reduced infiltration rate, reduced rooting depth (vegetation cover) and increased surface runoff; • Increased erosion, and consequently sedimentation; and • Soil contamination from spills and leakages.	Moderate (negative)	• Only the designated access routes are to be used to reduce any unnecessary compaction; • Make use of erosion berms, sediment traps, culverts at wetland crossings and erosion control to prevent impacts to the hail roads; and • Clean up spills as soon as possible to prevent migration of contaminants into the soil profile, entering the groundwater.	Minor (negative)
Operational	Refuelling of machinery within the mining area or at the mobile offices	Soil, land use and land capability	• Soil Contamination from hydrocarbon waste (lubricants, explosives, and fuels) spills and leakages from leaking diesel tanks as well as vehicles; and • Increased soil compaction and runoff, causing erosion and sedimentation.	Minor (negative)	• Soil pollution monitoring should be conducted after spills have occurred to detect any extreme levels of pollutants; • Any spillages should be cleaned up immediately, and the contaminated soils should be disposed of at licenced disposal sites; • Runoff must be controlled, and managed by use of proper stormwater management measures; • Vehicles should regularly be surveyed and checked that oils spill and other contaminants are not exposed to the soils; • Re-fuelling must take place on bunded impervious surfaces to prevent seepage of hydrocarbons into the soil; • All vehicles and machines must be parked within hard park areas, and must be checked daily for fluid leaks; and • Fuel, grease, and oil spills should be remediated using a commercially available emergency clean up kits. However, for major spills (>5L), if soils are contaminated, they must be stripped and disposed of at a licensed waste disposal site.	Negligible (negative)

Phase	Activity	Aspect	Impacts	Rating (Pre-Mitigation)	Mitigation Measures	Rating (Post-Mitigation)
Operational	Mining of sand resources including screening (if required) to approximately 0.4 – 5 m and stockpiled in a separate area	Hydropedology	• Disruption of water flow paths and subsequent alteration of streamflow regime and deterioration of wetlands functioning.	Major (negative)	• Restrict any excavations to less than the proposed 5 m depths and any vehicle or machinery movements should be confined to the designated sand extraction areas in order to minimise disruption of water flow paths within hillslopes; • The edge of the non-directly impacted freshwater resources, and at least a 100 m buffer or 1:100 flood line buffer, should be demarcated in the field with wooden stakes painted white as no-go zones that will last for the duration of the operational phase; • Establishment of a 500 m buffer zone to protect wetland areas from the proposed developments within the mining area. This would require that development occur further than 500 m from a delineated wetland area, as much as practically possible; • Development of a Wetland Offset Strategy and Rehabilitation plan for the wetlands in the Project area (Digby Wells, 2021); • Water quality monitoring should continue downstream and upstream of the mine site, and within all surface water circuits at the mine to detect any contamination arising from operational activities; • Hydrocarbon materials (fuel, oil & grease) storage areas should be located on hard-standing impermeable and bunded areas in accordance with SANS1200 specifications. This helps to prevent mobilisation of leaked hazardous substances; • Mine workers should be trained in the use of spill kits to contain and immediately clean up any leakages or spills; • Servicing and washing of vehicles and machinery should be conducted at appropriately designated paved areas. All used oils should be disposed of by accredited vendors from the mine site; • Disposal of general and other forms of waste should continue to be done into clearly marked skip bins which are collected by approved contractors for final disposal to appropriate disposal sites; • Ensure that storm runoff from wash bays is controlled by storm water management infrastructure and should not be allowed to flow into the watercourses; and • Concurrent rehabilitation through backfilling, reprofiling and revegetation of mined-out landscapes to allow free drainage should be implemented as proposed for the MREA to comply with rehabilitation guidelines.	Minor (negative)
Operational	Handling of hydrocarbon fuels, oils, grease during the operation of a fleet of tipper trucks, front-end loaders, excavators, water trucks, tractor, bulldozers and screening machines; Operation of a mobile office; mobile screening plants, portable toilets, diesel bowser and a water bowser; and Refuelling of equipment at the mobile office area within the expanded mining area	Hydropedology	• Water Contamination from hydrocarbon and chemical spillages and leakages.	Minor (negative)		Negligible (negative)
Operational	Concurrent rehabilitation (backfilling, reprofiling and revegetation) of mined-out strips as sand mining progresses	Hydropedology	• Restoration of close to natural hydrological responses through concurrent rehabilitation (backfilling, reprofiling & re-vegetation) of mined-out landscapes.	Moderate (positive)		
Operational	Mining of sand resources including screening (if required), and transportation of mined sand	Surface Water	• Sedimentation and siltation of nearby watercourses.	Minor (negative)	• Runoff from dirty areas should not be allowed to flow into the stream, unless DWS discharge authorisation and compliance with relevant discharge standards as stipulated in the NWA is obtained; • The water quality monitoring program provided in this report (Section 8, Part B) should be adhered to for monitoring water resources within and in	Negligible (negative)

Phase	Activity	Aspect	Impacts	Rating (Pre-Mitigation)	Mitigation Measures	Rating (Post-Mitigation)
Operational	Refuelling of machinery within the mining area including handling of general and hazardous waste	Surface Water	• Surface water Contamination from hydrocarbon and chemical spillages and leakages.	Minor (negative)	close proximity to the study area to allow detection of any contamination arising from operational activities; • The management of general and other forms of waste must ensure collection and disposal into clearly marked skip bins that can be collected by approved contractors for disposal to appropriate disposal sites; • The overall housekeeping and storm water system management (including the maintenance of berms, conveyance channels and clean-up of leaks) must be maintained throughout the LoM; • The hydrocarbon and chemical storage areas and facilities must be located on hard-standing area (paved or concrete surface that is impermeable), roofed and bunded in accordance with SANS1200 specifications. This will prevent mobilisation of leaked hazardous substances; • Training of mine personnel and contractors in proper hydrocarbon and chemical waste handling procedures is recommended; and • Vehicles must only be serviced within designated service bays.	Negligible (negative)
Operational	Sand transportation, vehicle and heavy machinery movement	Fauna and Flora	• Habitat destruction by removal of vegetation; • Increase in dust production; • AIP spread; • Increased compaction, erosion, and consequently sedimentation potential; • Increased faunal casualties.	Minor (negative)	• Reduce the footprint of the mine by clearing only the strips and associated access road / tracks that will be mined out; • Access should be restricted to already impacted areas (haul roads); • To minimise loss of faunal species and floral SCC, posters and signage demarcating sensitive habitats must be incorporated during the mine life cycle. Anti-poaching units should be activated and security patrols enlisted to prevent snaring. Create a sanctuary for faunal species identified within the Project area during the operational phase; • Alien invasive plants should be continuously monitored and controlled throughout the life of the mine and thereafter. It is recommended that AIP programme be established to control the spread; and • Monitoring of the vegetation communities present must be completed every 2 years to document the impacts of the edge effect and fragmentation.	Minor (negative)
Operational	Transportation of the sand	Fauna and Flora	• Increased potential of faunal casualties through road kill and destruction and removal of vegetation (floral SCC); • AIP sprawl; and • Increased dust pollution due to erosion and vehicular activity.	Moderate (negative)	• Monitoring of alien invasive sprawl during the operation is recommended as the surrounding vegetation is relatively intact and free from alien invasive plants. • Ensure no loss of faunal SCC by activating establishing signage or posters to create awareness of high faunal activity and adhering to speed limits within the Project area. • To monitor and mitigate dust pollution please refer to the Digby Wells Air Quality Report 2020. • Keep sight clearing to a minimal, and restrict vehicle movement outside of dedicated areas, specifically close to wetlands.	Minor (negative)
Operational	Refuelling of diesel on site	Fauna and Flora	• Contamination of soil, water and surrounding areas / habitats (pan vegetation) from Hydrocarbon waste/spills (lubricants, oil, explosives, and fuels).	Moderate (negative)	• All spills should be immediately cleaned up and treated accordingly. Additionally, spill kits must be available at the hydrocarbon storage area; • Drip trays must be placed beneath stationary vehicles; and	Negligible (negative)

Phase	Activity	Aspect	Impacts	Rating (Pre-Mitigation)	Mitigation Measures	Rating (Post-Mitigation)
					• Re-fuelling must take place on a sealed surface area away from sensitive habitats such as the pan vegetation to prevent the ingress of hydrocarbons into the topsoil. The hydrocarbon storage area must be bunded and be able to contain a 110% capacity of the largest storage tank.	
Operational	Mining of sand resources including screening (if required) to approximately 0.4 – 5 m and stockpiling	Wetlands	• Direct loss of wetlands; • Water quality contamination and deterioration; • Habitat loss as a result of poor water quality; • Loss of biodiversity; and • Erosion and sedimentation within the wetlands	Major (negative)	• Avoid infrastructure as far as possible within wetlands, especially wetlands with a high PES, EIS and ES rating; • Establish a 100 m buffer zone to protect wetland areas from the proposed infrastructure within the study area. This would require that development occur further than 100 m from a delineated wetland area; • Place sediment trapping berms on the boundary of the end of development; • Minimise the period of exposed areas to prevent erosion, loss of vegetation and sedimentation within the wetlands; • Ensure concurrent rehabilitation with special attention to reshaping the areas and re-vegetating; • Develop and implement a Wetland Offset Strategy and Rehabilitation plan for the wetlands in the Project area. • Maintain and monitor wetland functionality; and • Monitor the roads monthly to identify and rectify any areas that have begun to erode and where water may be flowing towards wetland areas.	Moderate (negative)
Operational	Transportation of material on haul roads.	Wetlands	• Erosion of wetland crossings associated with the haul road; • Accidental spills casing soil and water contamination; • Habitat loss as a result of poor water quality; • Loss of biodiversity; • Siltation of wetlands due to erosion; and • Change in habitat and potential change in species composition.	Moderate (negative)	• Restrict vehicle movement in delineated wetlands; • Only the designated access routes are to be used to reduce any unnecessary compaction leading to erosion, increased runoff and fragmentation of wetlands; • Rip rehabilitated areas to reduce compaction and reseed to increase vegetation cover; and • Clean up spills immediately to prevent migration of contaminants into the wetlands.	Negligible (negative)
Operational	Refuelling of machinery within the mining area or at the mobile offices	Wetlands	• Water quality contamination; • Potential spills may lead to loss of vegetation, causing sedimentation of wetlands, contamination, habitat loss and potential change in species composition; • Habitat loss as a result of poor water quality; and • Loss of biodiversity.	Minor (negative)	• Conduct pollution monitoring along the low-lying areas (wetlands) to detect any high levels of pollutants if spills has occurred; • Create a designated refuelling area; • Prevent contaminated water entering the remaining freshwater systems (wetlands); and • Any spillages should be cleaned up immediately, and the contaminated material should be disposed of at licenced disposal sites.	Negligible (negative)
Operational	Uncontrolled runoff of stormwater from or through the surface infrastructure and mining area	Aquatics	• Water quality and habitat deterioration of watercourses receiving unnatural/contaminated runoff.	Minor (negative)	• Runoff should not be allowed to flow into the nearby watercourses, unless DWS discharge authorisation and compliance with relevant discharge standards, as stipulated in the NWA is obtained; • Bare surfaces downstream from the developments where silt traps are not an option should be vegetated in order to attempt to limit erosion and runoff that might be carrying contaminants;	Negligible (negative)

Phase	Activity	Aspect	Impacts	Rating (Pre-Mitigation)	Mitigation Measures	Rating (Post-Mitigation)
					• Careful monitoring of the areas where dust suppression is proposed should be undertaken regularly. Areas concentrating water runoff should be addressed and not allowed to flow freely into associated watercourses; and • Biannual biomonitoring of the associated water courses should be done by an aquatic specialist to determine potential impacts, where after new mitigation actions should be implemented, as per the specialist's recommendations.	
Operational	Tipping, Screening, Stockpiling, and Material handling	Air Quality	• Dust generation and poor ambient air quality	Minor (negative)	• Application of dust suppressant on the haul roads and exposed areas; • Conduct mining activities judiciously on non-windy days (wind speed less than 5.4 m/s); • Set maximum speed limits on haul roads and have these limits enforced; • The area in the mining schedule for each year should be opened up in phases and no unnecessary clearing, digging or scraping must occur, especially on windy days; • The drop heights when tipping and loading should be minimised; and • Implement ambient air quality monitoring of Dustfall rates and PM_{10} to assess the effectiveness of the mitigation measures in place.	Minor (negative)
Operational	Hazardous Materials and Diesel Storage	Air Quality	• Release of Volatiles Resulting in Poor Air Quality.	Minor (negative)	• Strictly adhere to products and waste management plan; • Handle, store, and dispose hazardous substances in accordance with the local regulations; • Store hazardous substances in clearly labelled containers and demarcated area; • Deal with emergencies promptly (i.e. spills); and • Ensure secondary containment for all fuel storage tank leaks in accordance with good engineering practice.	Negligible (negative)
Operational	Operational phase activities	Noise	• Noise will emanate from the machinery and vehicles operating during the operational activities.	Minor (negative)	• Machinery and vehicles should be switched off when not in use; • It should be considered to prescribe the installation of buzzer type reverse alarms (producing band-limited white noise), rather than the conventional beeping type reverse alarms (which produce a tonal sound) on machinery and vehicles employed in surface operations and haul roads; • Vehicles should be serviced as per their design requirements to ensure noise suppression mechanisms are effective (e.g. installed exhaust mufflers); • Regulate vehicle speeds on the access and haul roads; • The generator and screening facility (if possible) should be enclosed to limit noise; • The concentration (i.e., number of machineries being utilised) of mining activities should be limited in close proximity to sensitive receivers; • The mine should plan and consider a mining schedule that limits the duration of mining activities in close proximity to sensitive receivers i.e., South (closest to receivers) to North (furthest from receivers) mining approach; and	Negligible (negative)

Phase	Activity	Aspect	Impacts	Rating (Pre-Mitigation)	Mitigation Measures	Rating (Post-Mitigation)
					• The mine should implement a long-term (48 hour) quarterly noise monitoring programme to detect any changes in ambient sound levels due to the activities of the mine.	
Operational	Operation of mobile machinery to extract resources; Operation of mobile screening plants; and Customer trucks collecting material.	Heritage	Digby Wells envisages no additional impact to the cultural heritage landscape, given the nature of the proposed activities and their intended location within the areas disturbed through clearing and mining activities. Where applicable, the mitigation measures implemented in the establishment phase must continue into this phase (for example, the implementation of the HSMP).			
Operational	All project related activities associated with operation	Socio-economic	• Creation of Employment, Work Skills Development and Experience - Retaining Workforce and Provision of Skills Development and Training.	Minor (Positive)	• Ensure the implementation of SLP to support the promotion of education and skills uplift among local communities within the study areas, including the implementation of on-the-job training, learnership and scholarship programmes; • Implementation of the SLP HRD programs – mentorship and career progression; and • Implement a grievance procedure.	Moderate (positive)
Operational			• Social/ community Development as part of the SLP.	Minor (positive)	• Implement and continuously update the SLP to ensure maximum benefits to the community. The SLP must align with the associated legislation and include intensive stakeholder consultations as prescribed in the law. This includes: • Conduct baseline socio-economic survey of households located within primary study area prior to commencement of community development initiatives to enable accurate identification of eligible Mine Community Development project(s) and skills training beneficiaries and measure impacts of development initiatives on households; • Collaboration with other developmental role players during implementation; • Establishing an external monitoring programme to monitor and evaluate community development initiatives as well as Human Resource Development (HRD) and procurement policy implemented by the mine; • Expanding skills development and capacity building programmes to non-employees such as learnerships and bursaries; and • Maintaining a record of training courses completed per individual and community. Where training is offered to non-employees, their contact information and qualifications can be shared with other industries.	Moderate (positive)
Operational			• Impacts to decreased community health safety and security.	Moderate (negative)	• Ensure mitigation measures are factored into the daily operation at the mine; • Implement particulate monitoring onsite, and at upwind and downwind sensitive receptor locations to assess the effectiveness of the mitigation measures and ensure compliance;	Moderate (negative)

Phase	Activity	Aspect	Impacts	Rating (Pre-Mitigation)	Mitigation Measures	Rating (Post-Mitigation)

					• Ensure necessary road upgrades to increase road capacity to ensure that the impacted road network operates at better or the same level of service during operation phase;
					• In addition to adhering to regulation set out in in the. Road Traffic Act, 1996 (Act No 93 of 1996) and the National Road Traffic Regulations, 2000, to promote safety on the surrounding road network, it is recommended that drivers of all heavy vehicles be required to attend a specialised road safety and driving course that sensitises them to the impact that they have on driving conditions for other road users;
					• The following noise management actions are recommended as good practice guidelines:
					  ◦ Ensure mitigation measures are factored into the day-to-day operation onsite; and
					  ◦ Conduct noise monitoring periodically (i.e. on a quarterly basis to ensure the sand mining noise footprint is not exacerbating background condition).	

Operational	Transportation of establishment material, mining equipment, storage tanks and employees	Traffic	• Increase traffic volumes resulting in a reduction of road capacity.	Negligible (negative)	No mitigation measures required.	
Operation	Transportation of sand	Traffic	• Increased road safety risk.	Minor (negative)	• Ensure heavy vehicles comply with limitations on vehicle dimensions and axle, vehicle masses and safety standards set out in the Road Traffic Act, 1996 (Act No 93 of 1996) and the National Road Traffic Regulations, 2000 for vehicle using a public road; • Discourage routing of heavy vehicle traffic through populated area; and • Avoid transporting abnormal load during peak periods.	Negligible (negative)
Operational			• Deterioration of road conditions.	Minor (negative)	• The developer should engage with the planning authorities concerning maintenance of public roads near the development sites; and • The developer should ensure that the internal roads and access roads are maintained to acceptable maintenance standards.	Negligible (negative)
Operational	Employee transportation	Traffic	• Increased public transport and NMT demand	Negligible (negative)	• The existing shuttle services provided by Copper Sunset will accommodate additional public transport trips. No additional public transport facilities and NMT infrastructure are recommended.	Negligible (negative)
Decommissioning	Concurrent rehabilitation (topsoil cover, ripping and vegetation establishment) and monitoring of vegetation establishment	Soil, land use and land capability	• Loss of usable soil as a resource – Erosion and compaction; • Increased AIPs and loss of soil fertility; and • Loss of Land capability	Minor (negative)	• Continue with concurrent rehabilitation, and implement land rehabilitation measures as soon as soils have been mined; • When areas have been mined, backfilled with waste material and covered with topsoil it should be levelled and contoured to mimic pre- mining natural topography to avoid ponding of water; • The rehabilitated area must be allowed to naturally re-vegetate, however, where vegetation is not establishing well within three months, an indigenous seed mix must be utilised to improve vegetation establishment;	Negligible (negative)

Phase	Activity	Aspect	Impacts	Rating (Pre-Mitigation)	Mitigation Measures	Rating (Post-Mitigation)
					• Address compacted areas by deep ripping (up to 300 mm) to loosen the soil, and revegetate the area as soon as possible; • Re-seed rehabilitated areas to increase vegetation cover; • Ensure proper stormwater management designs (contouring) are in place to ensure no excessive run-off or pooling occurs; • Only designated access routes are to be used to reduce any unnecessary compaction; • The backfilled, reprofiled landscape should be topsoiled and revegetated to allow free drainage close to the pre-mining conditions; and • Implement a Rehabilitation Audit program, including soil fertility and infiltration tests to remediate and rehabilitate soils back to near-natural or high land capability standards.	
Decommissioning	Backfilling of the mined excavations with topsoil and waste from the screening plants	Soil, land use and land capability	• Loss of usable soil as a resource – Erosion and compaction; • Soil geomorphological changes; and • Loss of land capability.	Minor (negative)	• Ensure proper stormwater management designs (contouring and land scaping) are in place to ensure no run-off or pooling occurs; • Backfill and compact the areas first with the waste material, such as large rocks and gravel before topsoil is placed; and • The backfilled, reprofiled landscape should be topsoiled and revegetated to allow free drainage close to the pre-mining conditions.	Negligible (negative)
Decommissioning	Post-closure monitoring	Soil, land use and land capability	• Compaction of soil and increased runoff potential; • Reduced infiltration rate, reduced rooting depth (vegetation cover) and increased surface runoff; and • Increased erosion, and consequently sedimentation.	Minor (negative)	• Only designated access routes are to be used to reduce any unnecessary compaction; and • If any erosion, contamination, water ponding, AIPs proliferation or impact to the soils, land use or land capability is observed, remediation/rehabilitation actions should be implemented as soon as possible.	Negligible (negative)
Decommissioning	Rehabilitation processes/activities including backfilling, topsoiling of mined-out areas and ripping of decommissioned haul road	Hydropedology	• Sedimentation and siltation of nearby watercourses and deterioration of water quality.	Minor (negative)	• Reseeding of exposed rehabilitated surfaces should be undertaken to reduce soil evacuation and sedimentation in nearby watercourses; • Prior to vegetation establishment, seeded areas should have temporary silt fences to keep soils from being washed away; • Implement wetland rehabilitation measures to restore mined-out wetlands and disturbed channel geometry at haul road crossings; • Only designated access routes should be used to reduce unnecessary impacts to the undisturbed environment including wetlands; and • Disposal of general and other forms of waste should continue to be conducted using clearly marked skip bins which are collected by approved contractors for final disposal to appropriate disposal sites.	Negligible (negative)
Decommissioning	Leakage of oils, fuels and grease from moving vehicles and machinery during backfilling, reprofiling and revegetation activities	Hydropedology	• Contamination of surface water resources leading to deteriorated water quality.	Minor (negative)		Negligible (negative)
Decommissioning	Soil stabilisation and revegetation with natural or indigenous seed mix; Erosion	Hydropedology	• Restoration of free drainage to rehabilitated landscapes that suits desired post-closure land use.	Major (positive)	No mitigation required.	

Phase	Activity	Aspect	Impacts	Rating (Pre-Mitigation)	Mitigation Measures	Rating (Post-Mitigation)
	monitoring at rehabilitated, reprofiled and re-vegetated surfaces; and Water quality monitoring upstream and downstream of the decommissioning Project site					
Decommissioning	Demolition and removal of infrastructure; and Rehabilitation and closure.	Surface Water	• Sedimentation and siltation of nearby watercourses and deterioration of water quality.	Minor (negative)	• Restore the topography to pre-mining conditions as much as is practically possible by backfilling, removing stockpiles and restore the slope gradient and angle of the site; • Clearing of vegetation should be limited to the decommissioning footprint area and immediate revegetation of cleared areas; • Immediate revegetation of cleared areas; • Movement of demolition machinery and vehicles should be restricted to designated access roads to minimise the extent of soil disturbance; • Use of accredited contractors for removal or demolition of infrastructure during decommissioning is recommended; this will reduce the risk of waste generation and accidental spillages; and • Ensure that the infrastructure (pipelines, fuel storage areas, pumps) are first emptied of all residual material before decommissioning.	Negligible (negative)
Decommissioning			• Restoration of pre-mining streamflow regime in nearby watercourses.	Major (positive)	No mitigation required.	
Decommissioning	Dismantling of infrastructure and preparation for rehabilitation of affected areas	Fauna and Flora	• Disturbance of soils, and subsequent erosion by wind, and water; • Increased vehicle movement in the area, increasing soil erosion and habitat destruction; • Potential spillage of hydrocarbons such as oils, fuels, and grease, thus contamination of the surrounding grounds; • AIP proliferation; and • Unexpected changes in topography and landscape.	Minor (negative)	• Continue with Concurrent Rehabilitation, begin with stockpiles, sand mined areas, implement rehabilitation measures; • Address eroded and compacted areas by deep ripping to loosen the soil, and revegetate the area as soon as possible to prevent AIP sprawl (please see Digby Wells Rehabilitation Report 2021 for recommended seed mix); • Inventory of hazardous waste materials stored on-site should be compiled and complete removal arranged; and • Only designated access routes are to be used to reduce any unnecessary compaction.	Negligible (negative)
Decommissioning	Rehabilitation – re-vegetation and profiling of the land.	Fauna and Flora	• Exposure of soils, and subsequent compaction, erosion, and sedimentation; • Soil compaction, and increased runoff potential due to vehicle movement during rehabilitation programs; • AIP proliferation; • Loss of organic material, basal layer and vegetation cover; and	Minor (negative)f	• During the decommissioning phase, rehabilitation must start as soon as possible and preferably in the growing season to ensure adequate plant recruitment; • Address eroded and compacted areas by deep ripping to loosen the soil, and revegetate the area as soon as possible; • Inventory of hazardous waste materials stored on-site should be compiled and complete removal arranged;	Minor (positive)

Phase	Activity	Aspect	Impacts	Rating (Pre-Mitigation)	Mitigation Measures	Rating (Post-Mitigation)
			• Potential spillage of hydrocarbons such as oils, fuels, and grease, thus contamination of soil.		• Only designated access routes are to be used to reduce any unnecessary compaction.	
Decommissioning	Post-closure monitoring and rehabilitation	Fauna and Flora	• Minimal negative impacts on the environment.	Minor (negative)f	• During the decommissioning phase, rehabilitation must start as soon as possible and preferably in the growing season to ensure adequate plant recruitment; • AIP monitoring should be implemented to prevent the sprawl of AIPs; • Ensure sufficient irrigation and fertilizing of newly planted vegetation to facilitate a rapid establishment; and • Replant with species identified within each vegetation community, refer to the Digby Wells Rehabilitation Report 2021 for a recommended seed mix to promote soil stability and the correct climax species.	Minor (positive)
Decommissioning	Concurrent rehabilitation (topsoil cover, ripping and vegetation establishment) and monitoring of vegetation establishment	Wetlands	• Erosion due to exposed areas to wind and surface water runoff; • Siltation of surface water resources leading to deteriorated water quality and quantity of the wetlands; • Siltation of wetlands due to erosion; • Change in habitat and potential change in species composition;	Minor (negative)	• Continue with concurrent rehabilitation, and implement wetland rehabilitation measures; • Address areas of AIPs proliferation by utilizing a AIPs Program; • Ensure proper stormwater management designs are in place to ensure no excessive run-off or pooling occurs; • Only designated access routes are to be used to reduce any unnecessary impacts to the wetlands; and • The backfilled, reprofiled landscape should be top soiled and revegetated to allow free drainage close to the pre-mining conditions.	Negligible (negative)
Decommissioning	Backfilling of the mined excavations with topsoil unusable soil (pebbles, rocks, gravel etc.) from the screening plants	Wetlands	• Water quality deterioration due to an increase in sedimentation and unusable soil (pebbles, rocks, gravel etc.) material; • Habitat and biodiversity loss as a result of poor water quality; • Water ponding and preferential flow paths; • Siltation of wetlands leading to deteriorated water quality and quantity; and • Change in habitat and potential change in species composition.	Minor (negative)	• The unusable soil (pebbles, rocks, gravel etc.) must be placed below the topsoil and compacted to prevent increased infiltration; • The backfilled, reprofiled landscape should be top soiled and revegetated to allow free drainage close to the pre-mining conditions; • If erosion has occurred, topsoil should be sourced, replaced, vegetated and shaped to reduce the recurrence of erosion in wetlands; • Only the designated access routes, outside of wetlands, are to be used to reduce any unnecessary compaction of surfaces and therefore increased flow into the wetlands; • Place sediment trapping berms where erosion has occurred; and • Minimise the period of exposed areas to prevent erosion, loss of vegetation and sedimentation within the wetlands.	Negligible (negative)
Decommissioning	Post-closure monitoring	Wetlands	• Soil compaction, leading to increased runoff and changes to the wetland functionality (e.g., erosion); • AIPs proliferation due to changes to the natural landscape, soils and wetlands; and • Changes to the habitat, wetland functionality and biodiversity.	Negligible (negative)	• Only use designated roads; • Use vehicles as little as possible in the wetlands, monitoring should preferable be done on foot; and • Wetland monitoring during the wet season for three years post-closure and report with rehabilitation recommendations if necessary.	Negligible (negative)
Decommissioning	Physical removal of surface infrastructure and rehabilitation	Aquatics	• Water quality and habitat deterioration of watercourses in contact with heavy machinery and receiving runoff from surface workings.	Minor (negative)	• Removed or damaged vegetation areas should be revegetated; • Storm water must be diverted from decommissioning activities;	Negligible (negative)

Phase	Activity	Aspect	Impacts	Rating (Pre-Mitigation)	Mitigation Measures	Rating (Post-Mitigation)
	activities near and within drainage lines				• Water used during decommissioning should be kept onsite and not be allowed to freely flow into nearby watercourses; and • Ensure the revegetation activities use appropriate indigenous plant species.	
Decommissioning	Rehabilitation of the MRA	Air Quality	• Poor ambient air quality.	Negligible (negative)	• Application of dust suppressant on exposed areas prior to vegetation establishment; • Conducting rehabilitation activities judiciously by avoiding windy days (days with wind speed greater than 5.4 m/s); • Set maximum speed limits onsite and have these limits enforced; • The area of disturbance must be kept to a minimum at all times, especially on windy days; • The drop heights when loading or tipping should be minimised; and • Undertake post-closure monitoring to assess the effectiveness of the rehabilitation (i.e. regular assessments of vegetation growth and dustfall monitoring.	Negligible (negative)
Decommissioning	Decommissioning phase activities	Noise	• Noise will emanate from the machinery and vehicles operating during the decommissioning activities.	Negligible (negative)	• Restrict decommissioning activities to daylight hours (06:00 – 18:00); • Regularly service decommissioning related machines and vehicles to ensure noise suppression mechanisms are effective (e.g. installed exhaust mufflers); • Vehicles should have buzzer type reverse alarms (producing band-limited white noise) installed, rather than the conventional beeping type reverse alarms (which produce a tonal sound); • Regulate speed limits on access roads; and • Switch off equipment when not in use.	Negligible (negative)
Decommissioning	Decommissioning phase activities	Socio-economic	• Impacts of Downscaling and Retrenchment.	Moderate (negative)	• Plan, update and implement an integrated Mine Decommissioning, Rehabilitation, and Mine Closure Plan with associated Social Closure Planning five years prior to Mine Closure; and • Proactively assess and manage the social and economic impacts on individuals, regions, and economies where retrenchment and/or closure of the Project are certain.	Minor (negative)
Decommissioning/ Rehabilitation	Transportation of rehabilitation machinery, infrastructure, and employees	Traffic	• Increased traffic volumes resulting in a reduction of road capacity.	Negligible (negative)	No mitigation measures required.	
Decommissioning	Transportation of rehabilitation machinery and site infrastructure	Traffic	• Increased road safety risk.	Minor (negative)	• Ensure heavy vehicles and abnormal load vehicles comply with limitations on vehicle dimensions and axle, vehicle masses and safety standards set out in the Road Traffic Act, 1996 (Act No 93 of 1996) and the National Road Traffic Regulations, 2000 for vehicle using a public road; • Discourage routing of heavy vehicle traffic through populated area; and • Avoid transporting abnormal load during peak periods.	Negligible (negative)

Phase	Activity	Aspect	Impacts	Rating (Pre-Mitigation)	Mitigation Measures	Rating (Post-Mitigation)
Decommissioning	Employee transportation	Traffic	• Increased public transport and NMT demand.	Negligible (negative)	• The existing shuttle services provided by Copper Sunset will accommodate additional public transport trips. No additional public transport facilities and NMT infrastructure are recommended.	Negligible (negative)

16 Item 3(n): Summary of Specialist Reports

Numerous specialist impact assessments were undertaken for the proposed Project, as set out in Table 16-1. Separate specialist reports were compiled and have been attached as appendices to this report. The specialist input included the baseline environment, potential impacts and the recommended mitigation measures. Table 16-1provides a summary of the key recommendations of the studies.

Table 16-1: Specialist Studies Undertaken for the Copper Sunset Project

List of studies undertaken	Recommendations of specialist reports	Specialist Recommendations that have been included in the EIA report	Reference to applicable section of report where specialist recommendations have been included
Soils, Land Use and Land Capability	• Ensure the end-use soil depth is a minimum of 300 mm; • Slope and contour the area back to natural topographies as far as possible to enable natural free-flow; • Rip rehabilitated soils to ensure increased infiltration, soil depth and rooting and water movement; • Revegetate the rehabilitated areas as soon as possible to prevent decreased soil fertility and thus land capability; • If any erosion occurs, corrective actions must be taken to minimise any further erosion from taking place at regular intervals or after high rainfall events. Such as revegetation, erosion berms, culverts or gabions; • The area must be fenced, and animals should be kept off the area until the vegetation is self-sustaining; • Runoff must be controlled and managed using proper stormwater management measures; • Restriction of vehicle movement over sensitive areas to reduce compaction; • Keep vehicle movement to designated haul roads to avoid change in soil morphology due to compaction of areas, and associated mine infrastructure; • If soil is polluted, treat the soil using in-situ bioremediation; • If *in-situ* treatment is not possible then the polluted soil must be classified according to the minimum requirements for the handling, classification, and disposal of hazardous material, and disposed at an appropriate, permitted or licensed disposal facility; • All vehicles and machines must be parked within hard park areas, and must be checked daily for fluid leaks; • Re-fuelling must take place on a sealed surface area away from soils to prevent seepage of hydrocarbons into the soil; • Place drip trays where vehicles or machinery leaks are occurring; • Fuel, grease, and oil spills should be remediated using a commercially available emergency clean up kits; • Any contractors on site must ensure that all employees are aware of the procedure for dealing with spills, and leaks, and undergo training on-site; • Soil pollution monitoring should be conducted after spills has occurred to detect any extreme levels of pollutants; and • To avoid loss of the soil resource due to the disturbance, and clearing of vegetation, establish effective soil cover such as lawn grass around constructed infrastructure for adequate protection from wind, and water erosion and minimise unnecessary removal of the natural vegetation cover outside the mining footprint.	X - All recommendations have been considered and included in this report.	Appendix D
Hydropedology	• Keep vegetation clearance and soil disturbance to a minimum, within the confines of the mining footprint; • Continue to adhere to sound storm water management planning to effectively separate sediments from runoff with the use of silt fences; • Movement of vehicles and machinery should be confined to designated access road to minimise the extent of soil compaction; • Drip trays must be used to capture any oil leakages. Servicing of vehicles and machinery should be undertaken at designated hard park areas. Any used oil should be disposed of by accredited vendors; • Any hydrocarbon spills should quickly be cleaned-up and contaminated soils removed before wash-offs and/or further infiltration into the ground occurs; • Disposal of general and other forms of waste should continue to be done into clearly marked skip bins which are collected by approved contractors for final disposal to appropriate disposal sites;	X - All recommendations have been considered and included in this report.	Appendix E

List of studies undertaken	Recommendations of specialist reports	Specialist Recommendations that have been included in the EIA report	Reference to applicable section of report where specialist recommendations have been included
	• Restrict any excavations to less than or equal to the proposed 5 m depths, and any vehicle or machinery movements should be confined to the designated access/haul road in order to minimise disruption of water flow paths within hillslopes; • The edge of the indirectly impacted wetlands should have a 500 m buffer or should be outside the 1:100 floodline if it is a river or stream; • Water quality monitoring should continue downstream and upstream of the mine site, and within all surface water circuits at the mine to detect any contamination arising from operational activities; • Hydrocarbon materials (fuel, oil & grease) storage areas should be located on hard-standing impermeable and bunded areas in accordance with SANS1200 specifications. This helps to prevent mobilisation of leaked hazardous substances; • Mine workers should be trained in the use of spill kits to contain and immediately clean up any leakages or spills; • Servicing and washing of vehicles and machinery should be conducted at appropriately designated paved areas. All used oils should be disposed of by accredited vendors from the mine site; • Ensure that contaminated storm runoff from wash bays is controlled by storm water management infrastructure and should not be allowed to flow into the watercourses; • Concurrent and final rehabilitation through backfilling, reprofiling and revegetation of mined-out landscapes should be conducted to allow free drainage as proposed for the MREA to comply with rehabilitation guidelines; • Reseeding of exposed rehabilitated surfaces should be undertaken to reduce soil evacuation and sedimentation in nearby watercourses; • Prior to vegetation establishment, seeded areas should have temporary silt fences to keep soils from being washed away; • It is recommended to do a Wetland Offset Assessment to calculate the total wetland lost and determine the extent of wetlands to be offset. The complete removal of wetlands in the headwaters of the catchment may cause loss of water inputs to the lower catchment and therefore have a major effect on the downstream biodiversity, aquatic systems, fauna and flora; • It is recommended that quantification of fluxes be conducted to provide more information on the magnitude of envisaged water losses due to disruption of hillslope flow paths by partial disturbance or total mining-out of wetlands in the Project area; • Periodic monitoring of wetlands conditions should be undertaken to detect any impacts on the size and wetness status of the wetlands (refer to the Wetland Report: Digby Wells, 2021); and • Baseflow monitoring upstream and downstream of the Copper Sunset MREA on the Vaal River and the Taaibosspruit to detect any changes in flow regimes.		
Surface water	• Ongoing surface water monitoring is imperative during all phases of the project life and post closure to allow for early detection of potential contaminants that may cause unforeseen negative impacts on the receiving environment.	X - All recommendations have been considered and included in this report.	Appendix F

Fauna and Flora	• All identified faunal SCC identified must be located and relocated, if possible, before the establishment phase;
	• All floral SCC must be identified and located. Regional relocation of protected species within development footprint must be instilled to offset the overall loss of floral SCC within the Project area. As recommended in Section **Error! Reference source not found.** of the fauna and flora report, replanting of suitable indigenous flora during the rehabilitation phase to re-vegetate the area after rehabilitation of the mine.
	• Thorough screening for the presence of the African Grass Owl before the establishment phase is required to ensure that impacts from the Project do not affect the vulnerable species.
	• For habitat and landscape fragmentation, the following is recommended;
	  ◦ Restriction of vehicle movement over sensitive areas to reduce degradation of untouched areas;
	  ◦ Minimise unnecessary removal of the natural vegetation cover outside the development footprint; and
		X - All recommendations have been considered and included in this report.	Appendix G

List of studies undertaken	Recommendations of specialist reports	Specialist Recommendations that have been included in the EIA report	Reference to applicable section of report where specialist recommendations have been included
	• After rehabilitation, the area must be fenced, and animals should be kept off the area until the vegetation is self-sustaining and established.		
Wetlands	• Identify the most important wetland system (high PES, ES and or EIS score) on site and use for wetland offsetting. Compensate the loss of other wetlands that will be mined with one wetland that will be rehabilitated and offset; • Improve vegetation cover and establish hydrophytic plants and facultative hydrophytes that are native to the area. Reduce risk of erosion and sedimentation. This should be done as soon as possible to avoid long standing bare areas; • Reduce risk of erosion, compaction, and the creation of preferential flow paths. Maintain linear infrastructure and ensure proper stormwater management; • Reduce risk of erosion and sedimentation of downstream wetland areas by re-vegetation, sediment traps and monitoring; and • Employment of a protective vegetated buffer strip around the wetlands and creating 'no-go' areas after rehabilitation to ensure establishment of vegetation.	X - All recommendations have been considered and included in this report.	Appendix H
Aquatics	• The depth of the Vaal River presents challenges in sampling the instream habitat, therefore, diatom assemblage assessments should be undertaken to provide a better indication of the PES and determine the potential drivers of change; and • The developed Aquatic Biomonitoring Programme must be adopted on an annual basis after commencement of the Establishment Phase of the Project. This programme should continue for the life of the Project and for at least three years post the Decommissioning Phase.	X - All recommendations have been considered and included in this report.	Appendix I
Air Quality	• Review the dustfall monitoring network by adding more sites, preferably in residential areas; • Apply dust suppressants or binders on exposed areas and haul roads; • Conduct activities judiciously and limit operation to non-windy days (with wind speed ≤ 5.4 m/s); • Keep the area of disturbance to a minimum and mine the areas designated in the annual schedule, in phases. Avoid any unnecessary clearing, digging, or scraping, especially on windy days (≥5.4 m/s); • Minimise the drop heights when loading onto trucks and at tipping points; • Set maximum speed limits and have these limits enforced on-site; • Store hazardous substances in clearly labelled containers; • Emergencies spills must be dealt with promptly; • Set up a real-time continuous air quality monitoring station to measure criteria particulate; and • Monitor the air quality management measures and information to ensure that adopted mitigation measures are sufficient and efficient to achieve current air quality standards at the MRA boundary and the closest receptors.	X - All recommendations have been considered and included in this report.	Appendix J
Noise	• It is recommended that even though the proposed activities could have a minor to negligible impacts on the noise sensitive receivers, the implementation of the proposed mitigation measures could further reduce the significance of the noise impacts. The implementation of a noise monitoring plan would also be imperative to identifying, monitoring, and managing future noise impacts (increases and/or decreases in noise levels) throughout the project's life.	X - All recommendations have been considered and included in this report.	Appendix K

Cultural Heritage	• The avoidance of impacts to BGG-001 and BGG-002 through amending the Project design to avoid the heritage resources and implement a 100 m no-go buffer zone around each of the identified graves:
	  • Where this option is implemented and the impact to these resources is avoided, Copper Sunset must develop and implement an HSMP or amend an existing HSMP to include these resources for *in situ* conservation; or
	  • Where Project design amendments are not feasible, Copper Sunset will need to embark on a consultation process to assess whether a GRP is feasible; and
		X - All recommendations have been considered and included in this report.	Appendix L

List of studies undertaken	Recommendations of specialist reports	Specialist Recommendations that have been included in the EIA report	Reference to applicable section of report where specialist recommendations have been included
	• The mitigation of potential direct impacts against previously unidentified heritage resources and where Copper Sunset has not done so already, Copper Sunset must develop and implement a CFP prior to the commencement of Project activities. This CFP must be approved by the HRAs prior to implementation.		
Social	• The mitigation and enhancement measures listed for each impact, negative and positive, must be implemented; especially those relating to potential in-migration into the Vaal Power community; • A social management plan and social monitoring plan must be developed to manage and monitor the implementation of these measures and recommend corrective measures, where necessary; and • Implement mitigation measures recommended in other specialist studies, including traffic, air quality, fauna and flora, ground and surface water and others, that are likely to have socio-economic impacts.	X - All recommendations have been considered and included in this report.	Appendix M
Traffic and Transport	• Ensure that heavy vehicles and abnormal load vehicles comply with limitations on vehicle dimensions and axle and vehicle masses and safety standards set out in the Road Traffic Act, 1996 (Act No 93 of 1996) and the National Road Traffic Regulations, 2000 for vehicle using a public road; • Discourage routing of heavy vehicle traffic through populated area; • Avoid transporting abnormal load during peak periods; • Drivers of all heavy vehicles should be required to attend a specialised road safety and driving course that sensitises them to the impact that they have on driving conditions for other road users; • The developer should engage with the planning authorities concerning maintenance of public roads near the development sites; and • The developer should ensure that the internal roads and access roads are maintained and to acceptable maintenance standards	X - All recommendations have been considered and included in this report.	Appendix N
Rehabilitation and Closure	• To work towards achieving an environmentally safe and sustainably closed Project area, concurrent rehabilitation is the key; • Monitoring and maintenance for the areas impacted upon should be undertaken for two to three years after closure; • Remove and control alien invasive species; • Compilation and Implementation of a Wetland Rehabilitation and Offset Strategy; and • Management of topsoil resources.	X - All recommendations have been considered and included in this report.	Appendix O

17 Item 3(o): Environmental Impact Statement

17.1 Item 3(o)(i): Summary of the Key Findings of the Environmental Impact Assessment

The Environmental Impact Statement is utilised to summarise all the potential environmental impacts identified during each phase of the proposed Project. The significance of the impacts associated with the relevant Project Phases, pre-mitigation and post-mitigation, is summarised in Table 15-1, above.

Negative impacts are to be expected with undertaking the proposed activities at the MREA as they will require direct environmental disturbance. The most significant negative impacts identified are associated with site clearing during the establishment phase and general operational and maintenance (i.e. Mining of sand resources, transportation of the sand, Refuelling of diesel on site, etc) activities during the operational phase which may result in soil erosion, soil compaction, topsoil loss, subsequent sedimentation, and siltation of nearby watercourses due to eroded disturbed soils. The proposed mining activities will have direct negative ecological impacts, most notably habitat loss and fragmentation as well as AIP proliferation.

A key finding is that the proposed mining activities will have a major impact on wetlands. The wetlands cover an area of approximately 1638.733 ha, and the overall impacts of the project were determined to be significant and may potentially lead to an irreversible damage to the remaining wetland in the MREA. The recommended mitigation measures will not restore wetland areas that are lost because of the Project; however, will be to rehabilitate and preserve un-impacted wetlands and improve their functioning. A Wetland Offset Assessment is recommended to compensate for significant residual adverse impacts (Appendix H). In addition, heritage resources were identified within the MREA, and it is recommended that these should be avoided through amending the project design to avoid the heritage resources and implement a 100 m no-go buffer zone around each of the identified graves. However, if amending the project design is not feasible, the Applicant will need to embark on a consultation process to assess whether a GRP is feasible.

17.2 Item 3(o)(ii): Final Site Map

The infrastructure layout plan on which this impact assessment is based is provided in Figure 5-1 above and appended as Appendix B.

17.3 Item 3(o)(iii): Summary of the Positive and Negative Implications and Risks of the Proposed Activity and Identified Alternatives

The negative and positive impacts are tabulated in Section 12.1 of this report, in Table 12-2.

The proposed activities will have a considerable impact on the vegetation and associated habitat types present in the mining and infrastructure areas. The key negative impacts include the loss of topsoil resources, soil erosion, loss of habitat, removal of protected SCC, loss of

wetlands and subsequent sedimentation of freshwater systems from cleared areas as a result of site clearance as well as operational activities.

Mitigation and management measures have been proposed for each identified impact associated with the proposed activities. The loss of wetlands, especially within the proposed excavation areas cannot be mitigated or reduced, thus an Offset Assessment should be undertaken to compensate for wetland impacts associated with the Project.

The key negative impacts associated with the proposed Copper Sunset Project include but are not limited to:

- Loss of wetlands;
- Noise and limited air pollution;
- Potential negative impacts on ecology, including SCC;
- Potential for alien invasive plants proliferation;
- Potential for water resource contamination;
- Loss of heritage resources; and
- Potential social impacts (i.e. impacts associated with Population Influx, community health, safety and security etc.).

Please Note: if the proposed mitigation and management strategies are implemented, the impacts can be reduced.

The key positive impacts associated with the proposed Project include but are not limited to:

- Prolong the jobs already created from the existing sand mining activities for a further 20 years or more;
- Increased quality of life through improved employment options; and
- Provision of sand required for the extensive development activities taking place within the region.

18 Item 3(p): Proposed Impact Management Objectives and the Impact Management Outcomes for Inclusion in the EMPR

The EMP Report seeks to achieve a required end state and describes how activities that have, or could have, an adverse impact on the environment and surrounding communities will be mitigated, controlled and monitored.

The EMP will address the environmental impacts and possible unplanned events during each phase of the Project (Establishment, Operational, Decommissioning and Post-Closure). Due regard must be given to environmental protection during the entire Project; a number of environmental recommendations are made to achieve environmental protection. These recommendations are aimed at ensuring that the Applicant and contractors maintain adequate control over the Project to:

- Minimise the extent of an impact during the life of the Project;
- Ensure appropriate restoration of areas affected by the Project; and
- Prevent long term environmental degradation.

19 Item 3(q): Final Proposed Alternatives

The location of the Project is primarily influenced by the established Copper Sunset mining operation taking place on the adjacent portion of land. This application relates to the extension of the existing MRA to now include the additional portions of the RE of the Farm Bankfontein No. 9 and a portion of the RE of the Farm Zandfontein No. 259. Viable sand reserves have been identified over the extension areas, through extrapolation of the existing disturbance within the existing MRA. Therefore, locational alternatives were not considered as the site has been selected based on the availability of sand.

Alternatives were therefore assessed for the layout of the Project with consideration given to the environmental and technical assessments undertaken, these are detailed in 9.1 above. The layout for the proposed Project infrastructure was informed by environmental and technical studies. Where impacts cannot be avoided, mitigation and management measures have been provided. Although sensitive areas have been avoided as far as possible, wetlands cover a total of 1638.733 ha and some wetland areas (i.e. those in the proposed excavation areas) cannot be avoided. It should, however, be noted that the wetland health, functionality and ecological state of most of the wetlands are low and not natural. A wetland offset strategy has been proposed to offset the loss of wetland areas. The strip-mining method is deemed economically viable for the Copper Sunset Project.

The alternatives considered and motivations for the preferred alternatives are detailed in Section 9 above.

20 Item 3(r): Aspects for Inclusion as Conditions of Authorisation

The EAP recommends the following conditions for the DMRE to consider for inclusion into the Authorisation:

- The mitigation/enhancement measures contained in the attached specialist reports and EMPr must be adhered to;
- An Environmental Practitioner must be appointed to ensure all monitoring is undertaken and that Copper Sunset adheres to the EMPr;
- Monitoring must be undertaken as described in the monitoring programme provided in Part B Section 8;
- Copper Sunset must develop and implement a HSMP or amend an existing HSMP to include identified resources for *in situ* conservation;
- Chance Finds Procedure (CFPs) must be developed for the establishment phase in the event of accidental exposure of unidentified heritage resources;

- The closure cost assessment should be updated and submitted as per the legislative requirements;
- Environmental audits must be undertaken as set out in conditions for authorisation and license conditions;
- The Rehabilitation Plan will be implemented concurrently;
- Areas to be mined should be screened by a specialist for the identified floral SCC and any other Red Data/protected species prior to establishment. If found these species should be relocated to a nearby site of similar habitat. If protected species are identified, permits will be required before the removal and an Ecological Management Plan must be compile;
- A Wetland Offset Calculator should be applied to determine the total wetland loss and to compensate for significant residual adverse impacts; and
- A WUL in terms of Section 21 of the NWA must be issued by the DWS prior to any activities taking place.

The specialist studies and impact assessment have been based on the proposed preferred site layout for the new proposed activities. The full extent of the proposed MREA has been assessed to establish the environmental baseline. Should there be any changes to the project description or site layout plan as provided, the adequacy and accuracy of the work may be affected, and additional studies may be required to assess the impacts of these proposed changes.

21 Item 3(s): Description of any Assumptions, Uncertainties and Gaps in Knowledge

This section highlights the assumptions, uncertainties, limitations and knowledge gaps relevant to the assessment and mitigation measures of the various specialist studies undertaken. Refer to Table 21-1 below.

Table 21-1: Specialist Studies Assumptions, Uncertainties, and Gaps

Specialist Study	Assumptions, Uncertainties and Gaps
Soil, Land Use, and Land Capability	• The area surveyed was based on the layout presented by the Copper Sunset in December 2020; • Land suited for crop production was also assumed to be suitable for other, less intensive uses such as pasture, natural grazing, forestry and wildlife; • Soils are contiguous hence differentiation is not abrupt, and the transition zone cannot be completely captured during any given soil survey; and • The soils within the capability classes are similar only with respect to the degree of limitations in soil use for agricultural purposes or with respect to the impact on the soils when they are so used.
Hydropedology	• Hydrological fluxes were not quantified but only conceptualized as quantification was out of the scope of this study; and • It was assumed that the surveyed hillslopes are dominantly representative of the entire site despite inherent heterogeneity within the landscapes.
Surface water	• The historical data used to represent the climate data for the study area is from 1920 to 2009 which is considered adequate for the purposes of this study; • The floodlines delineation provided in this study are indicative floodlines, hence can only be used for environmental purposes and not for detailed engineering designs; and • The stormwater management scope and water balance have been excluded in the study due to the nature of the proposed project as there is no expected mixing of clean and dirty water areas given that there will be effective implementation of the proposed mitigation measures.
Fauna and Flora	• Whilst every effort is made to cover as much of the site as possible, representative sampling was completed as per the nature of this type of investigation. The major limitation associated with the sampling approach is the narrow temporal window of sampling. Ideally, a site should be visited several times during the different seasons to ensure a comprehensive fauna and flora species list. However, due to time and cost restraints, this is not always possible. It is therefore possible that some plant and animal species that are present on site were not recorded during the field investigations. In order to overcome this limitation, the list of species observed during the site visit is supplemented with species of conservation concern that are known to occur in the area; and

Specialist Study	Assumptions, Uncertainties and Gaps
	• This report (as well as the fauna and flora report) lists the findings of an on-site baseline evaluation within the area and is in support of the MREA process. Potential impacts of the proposed mining operations were evaluated based on the layout provided at the time of writing the report, and where necessary, recommendations for the most appropriate mitigation measures have been proposed.
Wetlands	• Wetlands situated within the 500 m zone of regulation were assessed mostly on a desktop level with very limited ground-truthing; • The area surveyed was based on the layout presented by Copper Sunset in December 2020; and • This wetland study should be read in conjunction with other related specialist studies.
Aquatics	• One site along the Taaibosspruit system was dry. This is a non-perennial tributary of the Taaibosspruit and likely only flows following periods of rainfall; and • Sampling along the Vaal River sites and a single site along the lower reaches of the Taaibosspruit were restricted to the marginal areas due to the excessive depth, which presented instream inaccessibility issues. This may have limited the number of collected biota as some aquatic biota prefer the deeper instream habitats and as such, a lower confidence is assigned to the data obtained.
Air Quality	• Excavation will take place at a maximum depth of 5 m; • Baseline was assessed with dustfall records only. No PM_{10} or $PM_{2.5}$ records were available for assessment; and • Since mining activities were selected to demonstrate the worst-case scenario, the predicted concentrations may have resulted in an overestimation, thus the uncertainty associated with dispersion models.
Noise	• Cumulative impact assessment has been excluded from the study; • The modelling adopted a conservative worst-case scenario approach assuming that all activities for each phase are being carried out simultaneously; • The establishment phase is assumed to be carried out during the daylight hours only (06:00-18:00); and • It is assumed that during the operational phase of the project, 80% of the mining machinery will be operational for day and night-time.

Specialist Study	Assumptions, Uncertainties and Gaps
Cultural Heritage	• Whilst every attempt was made to obtain the latest available information, the reviewed literature does not represent an exhaustive list of information sources for the various study areas; • At the time of the pre-disturbance survey, details as to the proposed mining areas were provided but the information provided did not include the proposed layout of the ancillary infrastructure (e.g., office, parking and diesel storage); • Whilst every attempt was made to survey the extent of the site-specific study area, this report does not present an exhaustive list of identified heritage resources. Overgrown vegetation limited visibility at the time of the pre-disturbance survey; and • Archaeological and palaeontological resources commonly occur at subsurface levels. These types of resources cannot be adequately recorded or documented by assessors without destructive and intrusive methodologies and without the correct permits issued in terms of Section 35 of the NHRA.
Social	• Although all reasonable efforts were made to provide an updated and representative picture of socio-economic baseline profile relevant to the study areas; the SIA study was conducted at a period when the country was under national lockdown - Alert Level 3 due to the prevalence of the Coronavirus (COVID-19) Pandemic. As such, an integrated approach was adopted to consult identified I&APs concurrently during the PPP undertaken for the proposed Project. Focus Group Meetings (FGMs) were held instead as the majority of the I&AP's were reluctant to attend any mass gatherings. This limited consultations with the Eskom Holdings Housing Properties (Vaal Power) Community which is located adjacent to proposed Project area. However, the Ward Councillor and representatives from the local ward committee were consulted and their comments have been integrated into the SIA report. Furthermore, consultations were held with the landowner of the properties (Seriti Coal (Pty) Ltd), Seriti Leaseholders, representatives from other surrounding sand mining operators and a representative from Eskom Lethabo Coal Fired Power Station between January and February 2021; • The report used secondary data that was drawn from Census 2011 as the last official census and the Community Survey undertaken in 2016. Data from the latter is only available on municipal level (i.e., not always at the ward level); and • A socio-economic survey was not conducted with households located in primary study (Electoral Wards 18 and 19) areas. Instead, a baseline questionnaire was developed to understand the socio-economic background of the environment and surrounding communities. Furthermore, the socio-economic indicators were derived from official census data, on ward level, where available (2011; 2016).

Specialist Study	Assumptions, Uncertainties and Gaps
Rehabilitation and Closure Plan (RCP)	• The rehabilitation plan is based on the current information available; • The RCP must be considered as a living document and will be updated as information becomes available, and as monitoring and rehabilitation progresses; and • For post-closure monitoring costs, vegetation monitoring and maintenance will take place for a period of 2-3 years. The assumptions that the costing (financial provision) are based on are provided below: • The rehabilitation of the mined strips has been included under general surface rehabilitation as the mining is not considered open pit mining as defined by the guideline; • An inflation rate of 3.3% has been utilised for the 2020/2021 calculations; • Remove alien invasive species from site; • Repair minor erosion patches; • Re-seed in areas where there is low basal cover; • Costs for water management have been included to allow for general shaping of mined areas; and • Monitoring for a period of two-three years has been included.

22 Item 3(t): Reasoned Opinion as to Whether the Proposed Activity should or should not be Authorised

The proposed Copper Sunset Project is not without risk and impact, however, after careful assessment the potential impacts associated with the proposed activities, can be mitigated and managed to have a minimal impact. A summary of the specialists' findings which has informed the EAP's opinion is summarised in Section 22.1 below.

22.1 Reasons why the Activity should be Authorised or Not

Various specialist studies were undertaken during the EIA Phase with the objective of identifying and weighing anticipated impacts and risks associated with the proposed activities. The findings of the impact assessment have shown that the proposed Project will have impacts on the receiving environment, namely, the loss of topsoil on cleared land, soil erosion, subsequent sedimentation and siltation of water resources. The site is also characterised by ecologically sensitive areas, especially with regards to flora, fauna, and wetlands. However, adequate mitigation measures have been included in the EMPr to reduce the significance of all the identified negative impacts. Most negative impacts can be reduced through the implementation of mitigation measures.

In terms of fauna and flora, SCC (i.e. *Boophone disticha* (Sore-eye Flower)*, Eucomis autumnalis* (Pineapple Flower) and *Silene burchellii* var. *burchellii.* (Gunpowder Plant) were identified within the development footprint. It is recommended that areas to be mined should be screened for the identified floral SCC and any other Red Data/protected species prior to establishment. If found these species should be relocated to a nearby site of similar habitat.

The wetlands cover an area of approximately 1638.733 ha of the MREA. The MREA is significantly impacted by agropastoral activities as well as historical and current mining activities. The wetland health, functionality, and ecological state of most of the wetlands are low and not natural. Nonetheless, this project will have major impacts on the wetlands. The recommended mitigation measures will not restore wetland areas that will be lost because of the Project. Therefore, the wetland specialist has recommended that an offset assessment should be undertaken to compensate for significant residual adverse impacts. In addition, a 'no-go' zone is recommended for the rehabilitated wetlands and mined out areas to aid in the re-establishment of wetland functions and vegetation and also to make provision for rehabilitation results. Furthermore, three heritage resources were identified within the Project area. However, the identified impacts to the heritage resources can be mitigated through the mitigation measures provided in the Heritage Impact Assessment report (Appendix L).

The potential positive impacts of the proposed Project include the creation of jobs, generation of wealth within the community and economy and potential community development through the implementation of the SLP.

Based on the assessment of the impacts associated with the Project, it is recommended that the proposed Copper Sunset Project should be authorised, provided that the mitigation measures proposed herein are applied diligently.

22.2 Conditions that must be Included in the Authorisation

All mitigation measures included in this EIA/EMP Report and the associated specialist studies should be conditions to the authorisation. All specialist recommendations have been captured in Table 16-1.

22.2.1 Specific Conditions to be Included into the Compilation and Approval of the EMPR

The following specific conditions are proposed:

- The mitigation/enhancement measures contained in the attached specialist reports and EMPr must be adhered to;
- An Environmental Practitioner must be appointed to ensure all monitoring is undertaken and that Copper Sunset adheres to the EMPr;
- Monitoring must be undertaken as described in the monitoring programme provided in Part B Section 8;
- Copper Sunset must develop and implement a HSMP or amend an existing HSMP to include identified resources for in situ conservation;
- Chance Finds Procedure (CFPs) must be developed for the establishment phase in the event of accidental exposure of unidentified heritage resources;
- The closure cost assessment should be updated and submitted as per the legislative requirements;
- Environmental audits must be undertaken as set out in conditions for authorisation and license conditions;
- The Rehabilitation Plan will be implemented concurrently;
- Areas to be mined should be screened by a specialist for the identified floral SCC and any other Red Data/protected species prior to establishment. If found these species should be relocated to a nearby site of similar habitat. If protected species are identified, permits will be required before the removal and an Ecological Management Plan must be compile;
- A Wetland Offset Calculator should be applied to determine the total wetland loss and to compensate for significant residual adverse impacts; and
- A WUL in terms of Section 21 of the NWA must be issued by the DWS prior to any activities taking place.

22.2.2 Rehabilitation Requirements

The rehabilitation requirements, as set out in the rehabilitation plan (Appendix O), will be adhered to.

23 Item 3(u): Period for which the Environmental Authorisation is Required

The expected LoM for the Copper Sunset Project is 20 years. The Environmental Authorisation should be aligned to this LoM.

24 Item 3(v): Undertaking

The undertaking required to meet the requirements of this section is provided at the end of the EMPr in Part B, Section 12.

25 Item 3(w): Financial Provision

The Closure Cost Report is included in Appendix O. The closure cost calculation is aligned with the Financial Provision Regulations, 2015 (GN R. 1147) as amended. Two calculations have been provided. The first is an estimate for the first year of mining and the second estimate is for the LoM. Both of the costings have been updated to include the current provision that was calculated for 2020.

The financial provision estimate based on the DMRE calculation model is **R2,969.354.00 (Current and First Year of Mining)** and **R4,677,168.00 (Current and LoM)**. This includes P&Gs (12%) and a Contingency cost (10%) as per the DMRE Guideline document. The DMRE cost includes VAT at 15%. The closure cost estimate breakdown is included Table 25-1 below.

The DMRE currently holds a provision of R2,150,000.00 in guarantee from Copper Sunset. The provision amount will need to be increased to cater for the shortfall between the current disturbance on site, to include the first year of mining. It is anticipated that the LoM costing could be reduced significantly as concurrent rehabilitation is undertaken.

Table 25-1: Summary of Financial Provision (Current + First Year of Mining)

Class C (Medium Risk)		Unit:	A	B	C	D	E=A*B*C*D
Component	Description:		Quantity	Master rate	Multiplication factor	Weighting factor 1	Amount (Rands)
			Step 4.5	Step 4.3	Step 4.3	Step 4.4	
1	Dismantling of processing plant & related structures (incl. overland conveyors & Power lines)	m^3	-	R 15.63	1.00	1.00	R 0
2 (A)	Demolition of steel buildings & Structures	m^2	20.00	R 217.74	1.00	1.00	R 4,394
2 (B)	Demolition of reinforced concrete buildings & structures	m^2	150.00	R 320.87	1.00	1.00	R 48,560
3	Rehabilitation of access roads	m^2	6,000.00	R 38.96	1.00	1.00	R 0
4(A)	Demolition & rehabilitation of electrified railway lines	m	-	R 378.17	1.00	1.00	R 0
4(B)	Demolition & rehabilitation of non-electrified railway lines	m	-	R 206.28	1.00	1.00	R 0
5	Demolition of housing &/or administration facilities	m^2	85.00	R 435.47	1.00	1.00	R 37,345
6	Opencast rehabilitation including final voids & ramps	ha	-				
	Working Area (Current Mining Area - Included in Component 10 - Assumed 70% of area still requires rehabilitation)	ha	6.13				
	Area Rehabilitated (maintenance under Component 14)	ha	55.17				
7	Sealing of shafts, adits & inclines	m^3	-	R 116.89	1.00	1.00	R 0
8(A)	Rehabilitation of overburden & spoils	ha	-	R 152,186.02	1.00	1.00	R 0
8(B)	Rehabilitation of processing waste deposits & evaporation ponds (basic, salt producing waste)	ha	-	R 189,544.94	1.00	1.00	R 0
8(C)	Rehabilitation of processing waste deposits & evaporation ponds (acidic, metal-rich waste)	ha	-	R 550,528.34	**0.66**	1.00	R 0
9	Rehabilitation of subsided areas	ha	-	R 127,432.87	1.00	1.00	0
10	General surface rehabilitation	ha	6.13	R 120,557.00	1.00	1.00	R 885,473
11	River diversions	ha	-	R 120,557.00	1.00	1.00	R 0
12	Fencing	m	-	R 137.52	1.00	1.00	R 0
13	Water management	ha	6.13	R 45,839.16	**0.25**	1.00	R 120,243
14	2 to 3 years of maintenance & aftercare		-				
	Infrastructure Areas	ha	0.03	R 16,043.71	1.00	1.00	R 413
	Mined Areas, including recent rehabilitated areas	ha	61.30	R 16,043.71	1.00	1.00	R 221,757
15(A)	Specialist studies						
							R 2,116,432
Weighting Factor 2 (step 4.4)			**1.00**			**Sub Total 1**	**R 2,116,432**

Class C (Medium Risk)		Unit:	A	B	C	D	E=A*B*C*D
Component	Description:		Quantity	Master rate	Multiplication factor	Weighting factor 1	Amount (Rands)
			Step 4.5	Step 4.3	Step 4.3	Step 4.4	
				Preliminary and General	12% of Sub Total 1		R253,971.83
				Contingency	10% of Sub Total 1		R211,643.19
						Sub Total 2	**R 2,582,047**
						VAT (15%)	**R 387,307**
GRAND TOTAL							**R 2,969,354**

Table 25-2: Summary of Financial Provision (Current + LoM)

Class C (Medium Risk)		Unit:	A	B	C	D	E=A*B*C*D
Component	Description:		Quantity	Master rate	Multiplication factor	Weighting factor 1	Amount (Rands)
			Step 4.5	Step 4.3	Step 4.3	Step 4.4	
1	Dismantling of processing plant & related structures (incl. overland conveyors & Power lines)	m^3	-	R 15.63	1.00	1.00	R 0
2 (A)	Demolition of steel buildings & Structures	m^2	20.00	R 217.74	1.00	1.00	R 4,355
2 (B)	Demolition of reinforced concrete buildings & structures	m^2	150.00	R 320.87	1.00	1.00	R 48,131
3	Rehabilitation of access roads	m^2	12,000.00	R 38.96	1.00	1.00	R 467,559
4(A)	Demolition & rehabilitation of electrified railway lines	m	-	R 378.17	1.00	1.00	R 0
4(B)	Demolition & rehabilitation of non-electrified railway lines	m	-	R 206.28	1.00	1.00	R 0
5	Demolition of housing &/or administration facilities	m^2	85.00	R 435.47	1.00	1.00	R 37,015
6	Opencast rehabilitation including final voids & ramps	ha	-				
	Working Area (Current Mining Area - Included in Component 10 - Assumed 70% of area still requires rehabilitation)	ha	6.13				
	Area Rehabilitated (maintenance under Component 14)	ha	55.17				
7	Sealing of shafts, adits & inclines	m^3	-	R 116.89	1.00	1.00	R 0
8(A)	Rehabilitation of overburden & spoils	ha	-	R 152,186.02	1.00	1.00	R 0
8(B)	Rehabilitation of processing waste deposits & evaporation ponds (basic, salt producing waste)	ha	-	R 189,544.94	1.00	1.00	R 0
8(C)	Rehabilitation of processing waste deposits & evaporation ponds (acidic, metal-rich waste)	ha	-	R 550,528.34	**0.66**	1.00	R 0
9	Rehabilitation of subsided areas	ha	-	R 127,432.87	1.00	1.00	0

Class C (Medium Risk)		Unit:	A	B	C	D	E=A*B*C*D
Component	Description:		Quantity	Master rate	Multiplication factor	Weighting factor 1	Amount (Rands)
			Step 4.5	Step 4.3	Step 4.3	Step 4.4	
10	General surface rehabilitation	ha	6.13	R 120,557.00	1.00	1.00	R 739,014
11	River diversions	ha	-	R 120,557.00	1.00	1.00	R 0
12	Fencing	m	-	R 137.52	1.00	1.00	R 0
13	Water management	ha	6.13	R 45,839.16	**0.25**	1.00	R 70,249
14	2 to 3 years of maintenance & aftercare		-				
	Infrastructure Areas	ha	0.03	R 16,043.71	1.00	1.00	R 409
	Mined Areas, including recent rehabilitated areas	ha	122.60	R 16,043.71	1.00	1.00	R 1,966,958
15(A)	Specialist studies		-				
							R 3,333,691
Weighting Factor 2 (step 4.4)			**1.00**			**Sub Total 1**	**R 3,333,691**
					Preliminary and General	12% of Sub Total 1	R400,042.91
					Contingency	10% of Sub Total 1	R333,369.09
						Sub Total 2	**R 4,067,103**
						VAT (15%)	**R 610,065**
GRAND TOTAL							**R 4,677,168**

25.1 Explain how the Aforesaid Amount was Derived

This section details the cost estimate as calculated using the DMRE method of calculation. As per the DMRE Guideline Document, Digby Wells assumed that the mine infrastructure has no salvage value. This is necessary as it is often difficult to determine the salvage value of the infrastructure.

25.1.1 Rates

The DMRE rates were published in 2005, however, due to inflation, are no longer accurate. The 2005 Master Rates were escalated yearly by the average annual inflation rate to reflect rates more representative of the year 2019/2020.

25.1.2 DMRE Classification

The DMR Guideline Document classifies a mine according to a number of factors which allows one to determine the appropriate weighting factors to be used during the quantum calculation. The following factors are considered:

- The mineral mined;
- The risk class of the mine;
- Environmental sensitivity of the mining area;
- Type of mining operation; and
- Geographic location.

Once the risk class (i.e. Class A, B or C) and the sensitivity of the area where the mine is located (i.e. Low, Medium or High) had been determined, the unit rates for the applicable closure components were identified. The classification of the Project area has been summarised in Table 25-3.

Table 25-3: Mine Classification

Mine	Risk Class	Sensitivity	Terrain	Proximity to Urban Area
Copper Sunset	C	Medium	Flat	Urban

25.2 Confirm that this Amount can be Provided for from Operating Expenditure

Copper Sunset has made provision for closure as legally required. A liability assessment update will continue to be undertaken annually to ensure the financial provision is in line with the closure cost.

26 Item 3(x): Deviations from the Approved Scoping Report and Plan of Study

There are no deviations from the approved Scoping Report.

27 Item 3(y): Specific Information Required by the Competent Authority

The sub-sections below provide additional information which should be considered by the competent authority for the Project. The impact on the socio-economic conditions and the potential impacts and risks on heritage resources are considered below. Table 27-1 presents the list of information requested by the DMRE in the scoping acceptance letter received on 17 May 2021, together with relevant reference for proof.

Table 27-1: Information Requested by the DMRE

Information required	Reference in the Report
a) The total footprint of the proposed development	Part A, Section 3
b) Should a WUL be required, proof of application for licence needs to be submitted	Part B, Section 4.8
c) Possible impacts and effects of the development on the vegetation ecology with regard to lowland-highland interface in the locality should be indicated	Part A, Section 12 and Appendix G
d) The impacts of the proposed facility on avifauna and bats must be assessed	Appendix G
e) Information on services required on site, e.g. sewage, refuse removal, water and electricity. Who will supply these services and has confirmation of capacity been obtained?	Part A, Section 5.2.5
f) A construction and operational EMPr to include mitigation and monitoring measures.	Part B, Section 5 and Section 8
g) Should blasting be required, appropriate mitigation measures should be provided.	Not applicable. No blasting will be undertaken at the mine.
7. The EIA should include the A3 size locality maps of the area and illustrate the exact location of the proposed development. The maps must be of	Appendix B: Plans

Information required	Reference in the Report
acceptable quality and as a minimum, have the following attributes: • Maps are relatable to one another; • GPS Co-ordinates; • Indicate alternatives; • Scale and Vegetation types of the study area.	
You are requested to submit four copies of the EIA report and EMPr and at least one electronic copy (USB flash drive) of the complete EIA and EMPr report to the Regional Office	To be completed during the Final submission of the EIA report.
You are also instructed to determine the final provision for the proposed project in line with the Financial Provisioning Regulations, 2015 read together with section 24P of the NEMA.	Part A, Section 25 and Appendix O.
The provisions of the Financial Provisioning Regulations, 2015 must be met in all applications for an EA relating to prospecting, exploration, mining, or productions operations.	

27.1 Impact on the Socio-economic Conditions of any Directly Affected Person

The potential socio-economic impacts expected to arise as a result of the Project have been investigated and assessed in the Social Impact Assessment (Appendix M). The findings of this report take into consideration the project's proposed activities, location of the project, the status of the existing socio-economic environment, and the ultimate effect that the project will have on this environment. The pre- and post-mitigation ratings assigned to the various impacts discussed in the report are summarised in Table 27-2 below. A total of six socio-economic impacts were identified for the proposed Project, of which four were rated positive and two negative. It was found that the majority of impacts fall within ratings of minor positive and moderate negative.

Adequate mitigation measures are expected to reduce the significance of negative impacts to acceptable levels, while positive impacts will be enhanced to maximise benefits to surrounding communities such as the sustainable development of the local economy. It is recommended that the mitigation measures, where relevant, be incorporated into the contract conditions to be issued to the contractors. Measures should also be put in place to monitor and assess the implementation of these mitigation measures and to take corrective action where necessary.

Table 27-2: Summary of Socio-Economic Impacts

Phase	Activity	Aspect	Impacts	Rating (Pre-Mitigation)	Rating (Post Mitigation)
Establishment	• All establishment activities.	Socio-economic	Creation of Employment Opportunities	Minor (positive)	Minor (positive)
Establishment	• All project related activities associated with establishment and operation.	Socio-economic	Impacts associated with Population Influx such as increased competition for residential land and other natural resources as well as an increased strain in accessing government services	Moderate (negative)	Minor (negative)
Establishment	• Site clearance and vegetation removal; • Placement of the Offices and associated mining equipment; • Construction of the hydrocarbon storage tank and refuelling area; • Establishment of a haul road / tracks; and • Stockpiling of topsoil.	Socio-economic	Opportunities and Capabilities within the Supply Chain	Minor (positive)	Moderate (positive)
Establishment		Socio-economic	Community Health, Safety and Security - Increase in nonsense factors	Moderate (negative)	Minor (negative)
Operational	All project related activities associated with establishment and operation:	Socio-economic	Creation of Employment, Work Skills Development and Experience - Retaining Workforce and Provision of Skills Development and Training	Minor (positive)	Moderate (positive)

Phase	Activity	Aspect	Impacts	Rating (Pre-Mitigation)	Rating (Post Mitigation)
Operation	• Ongoing monitoring of socio-economic and environmental aspects; • Continuous implementation of the management plans; • Mining of sand resources including screening (if required); • Transportation of sand; and • Refuelling of machinery within the mining area or at the mobile offices.	Socio-economic	Community Development as part of the SLP	Minor (positive)	Moderate (positive)
Operation		Socio-economic	Impacts associated with decreased community health, safety, and security.	Moderate (negative)	Moderate (negative)
Decommissioning	• Decommissioning activities	Socio-economic	Economic boom-bust after the establishment and operation phases.	Moderate (negative)	Minor (negative)

27.2 Impact on any National Estate Referred to in Section 3(2) of the National Heritage Resources Act

The HIA (Appendix L) was completed as part of this Project. Potential impacts and risks on heritage resources were investigated and assessed, and where possible, mitigation measures were provided. During the pre-disturbance survey, two categories of heritage resources were recorded. These include two burial grounds and graves (BGG-001 and BGG-002) and a historical artefact (H-ft-001). The assessment of the Cultural Significance (CS) and field ratings demonstrated that the identified resources have very high to low significance. The identified impacts to these heritage resources can be mitigated through the implementation of mitigation measures provided in this report and the HIA report.

28 Item 3(z): Other Matters Required in Terms of Sections 24(4)(a) and (b) of the Act

This section is not applicable to the proposed Project.

Part B: Environmental Management Programme Report

1 Item 1(a): Details of the EAP

Digby Wells Environmental (Digby Wells) has been appointed as the independent Environmental Assessment Practitioner (EAP) to conduct the Environmental Authorisation Application process, the associated specialist studies and the required Public Participation Process for the proposed Copper Sunset Project in the Free State Province of South Africa. The details of the EAP are contained in the table below and the Curriculum Vitae and Qualifications of the EAP are attached in Appendix A.

Table 1-1: Contact details of the EAP

Name of EAP:	Claire Wannenburgh		
Professional affiliation/registration:	EAPASA Registration No. 2019/1013		
Contact person: *(if different from EAP)*	Claire Wannenburgh		
Company:	Digby Wells Environmental		
Physical address:	Turnberry Office Park, Digby Wells House 48 Grosvenor Road, Bryanston, Johannesburg, 2191		
Postal address:	Private Bag X10046, Randburg, South Africa		
Postal code:	2125	**Cellphone:**	082 852 8482
Telephone:	011 789 9498	**Fax:**	011 789 9495
Email:	claire.wannenburg@digbywells.com		

2 Item 1(b): Description of the Aspects of the Activity

Copper Sunset intends to extend the MRA to incorporate adjacent properties. The plan of study was approved in the Scoping Report, which was approved by the DMRE on 17 May 2021. This EMPr has been compiled as a tool which will be utilised to manage and mitigate as far as possible against any potential adverse environmental impacts associated with each phase of the Project. A number of specialist studies were undertaken as part of the environmental regulatory process during the EIA Phase for the proposed Project. Table 11-1, Part A above provides each aspect investigated and the appendix they are found under. Specialist studies are valuable as they investigate the bio-physical and socio-economic environmental aspects of the Project area.

3 Item 1(c): Composite Map

The composite map is shown in Figure 3-1 (also found in Appendix B as Plan 12), which depicts the mining associated infrastructure and environmental aspects assessed which informed the impact assessment.

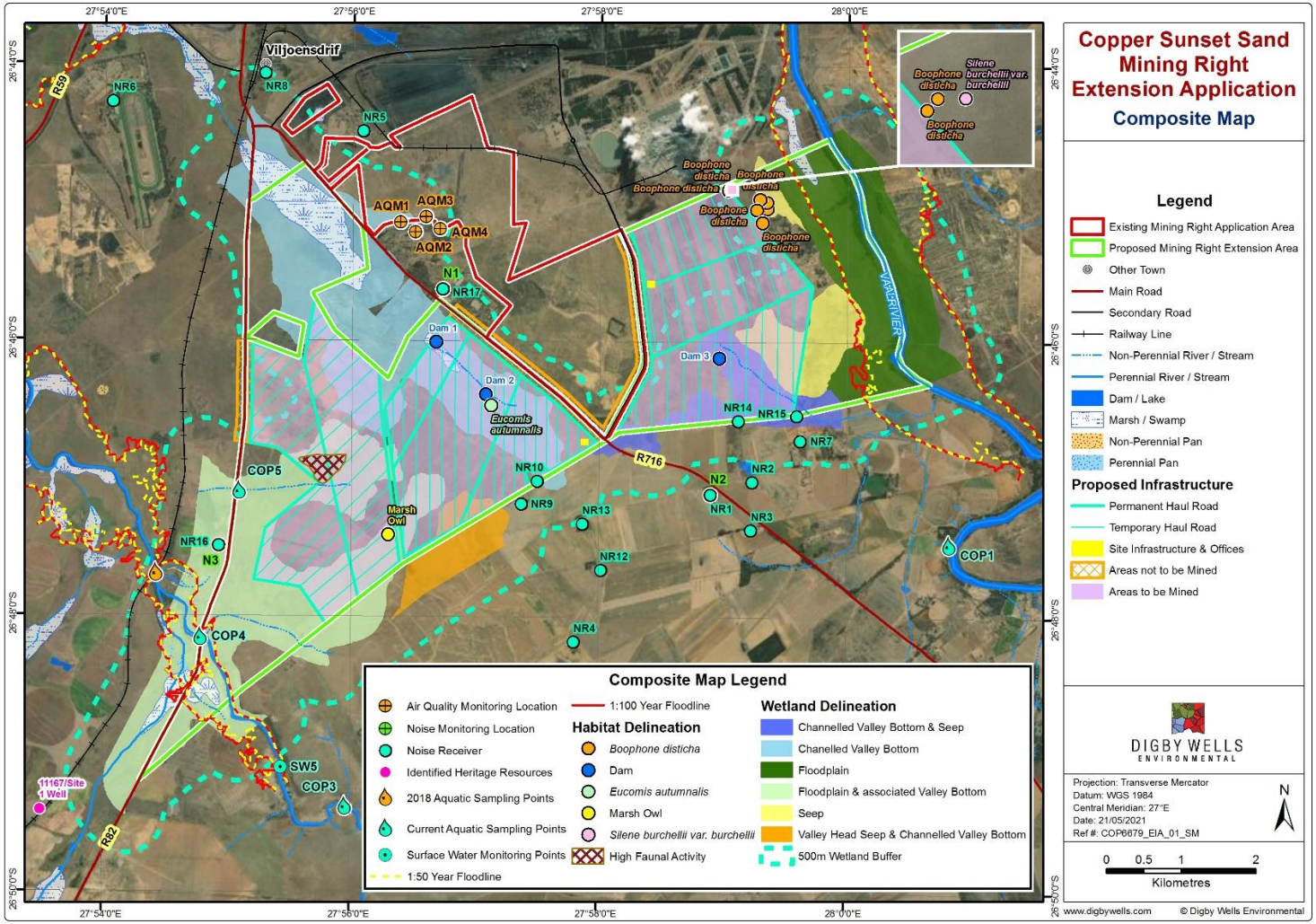


Figure 3-1: Composite Map of Environmental Sensitivities within the MREA

4 Item 1(d): Description of Impact Management Objectives Including Management Statements

The Closure and Rehabilitation Phases of the Project are important as their successful management aims to return the Project area, as much as possible, to its original state of environment. The following subsections describe the closure objectives and the Emergency Response Plan.

4.1 Item 1(d)(i): Determination of Closure Objectives

Closure and rehabilitation is a continuous series of activities that begin with planning prior to the project's design and construction and end with achievement of long-term site stability and the establishment of a self-sustaining ecosystem. Not only will the implementation of this concept result in a more satisfactory environmental outcome, but it will also reduce the financial burden of closure and rehabilitation. The following points outline the main objectives for rehabilitation and closure:

- **Physical stability** - To remove and/or stabilise surface infrastructure, rehabilitated land according to the planned land use plan after closure.
- **Environmental quality** - To manage the impact of physical effects and chemical contaminants on the environment such that the environmental quality is not adversely affected after closure.
- **Health and safety** - To limit, as far as reasonably possible, health and safety risks to humans accessing the site after closure.
- **Land capability/land-use** - To re-instate the pre-development land use through the implementation and maintenance of the post closure land-use plan.
- **Aesthetic quality** - To leave behind a site that gives an acceptable overall aesthetic appearance.
- **Biodiversity** - To encourage the re-establishment of native and/or appropriate flora and fauna on the reclaimed mine site such that the biodiversity is largely re-instated by natural succession over time.
- **Stakeholder Management** - To follow an appropriate stakeholder engagement process with all interested & affected parties and authorities.

4.2 Item 1(d)(ii): The Process for Managing any Environmental Damage, Pollution, Pumping and Treatment of Extraneous Water or Ecological Degradation as a Result of Undertaking a Listed Activity

Listed and specified activities associated with the Copper Sunset Project area will result in environmental disturbance and pollution. The potential impacts associated with such activities have been identified and assessed for each environmental aspect in Section 12.1, Part A.

Mitigation measures have been provided to reduce the significance of these associated impacts in Section 5 below. In addition, monitoring programmes have been provided in Section 8 below to monitor potential impacts, which will allow alternative mitigation measures to be implemented if necessary.

The establishment of the proposed Project will result in the loss of wetlands and grasslands. The loss of wetlands will be compensated for through an offset strategy. The loss of grassland areas is unavoidable. However, processes for managing environmental damage and ecological degradation are to ensure that water and sediment from the operational areas are contained and do not report to the catchment, which will prevent surface water quality deterioration and resultant impacts on the unimpacted wetlands and aquatic ecosystems. This can be achieved by implementing a stormwater management plan to separate clean and dirty water areas, if dirty water is generated. Similarly, erosion and generation of dust from exposed areas must be managed through dust suppression and limiting the areas cleared to operational areas only and rehabilitation of disturbed areas.

An Emergency Response Plan, which details a process to respond rapidly and effectively to and manage emergency situations that may arise at the Copper Sunset mine is already in place and should be implemented at the MREA. The Emergency Preparedness and Response Code of Practice will be compiled in accordance with the Occupational Health and Safety OHSAS 18001 and Mine Health and Safety Act, 1996 (Act No. 29 of 1996).

In the event of an emergency, the Emergency Response Plan/Procedure will be consulted, and the required actions implemented. To facilitate the effective implementation of the procedures, copies of the Emergency Response Plan will be placed in accessible and visible locations around the site.

4.3 Item 1(d)(iii): Potential Risk of Acid Mine Drainage

Not applicable for a sand mine.

4.4 Item 1(d)(iv): Steps taken to Investigate, Assess, and Evaluate the Impact of Acid Mine Drainage

Not applicable for a sand mine.

4.5 Item 1(d)(v): Engineering or Mine Design Solutions to be Implemented to Avoid or Remedy Acid Mine Drainage

Not applicable for a sand mine.

4.6 Item 1(d)(vi): Measures That Will be Put in Place to Remedy any Residual or Cumulative Impact that may Result from Acid Mine Drainage

Not applicable for a sand mine.

4.7 Item 1(d)(vii): Volumes and Rate of Water Use Required for the Mining, Trenching or Bulk Sampling Operation

Water will be utilised for potable water and for dust suppression. The water will be extracted from an approved borehole located at the existing Copper Sunset MRA (DMR Reference No. FS30/5/1/2/3/2/1 (164) MR). The borehole is authorised by the Department of Water and Sanitation (DWS) under Water use Licence (WUL) No. 08/C22F/AG/2315 granted 18 September 2013. It is anticipated that the water previously utilised for this sand mining operation will no longer be needed and can therefore be utilised at the new sand mining operation. The water will be pumped from the borehole and stored at the existing Copper Sunset Mining Operation. Water bowsers will be utilised to transport the water from the existing sand mining area to the new proposed MREA. The maximum allowable limit to be extracted from the borehole is 140 650 m^3 per annum and this limit will not be exceeded.

4.8 Item 1(d)(viii): Has a Water Use Licence Been Applied for?

Copper Sunset will be applying for a Water Use Licence from DWS as per the requirements in terms of the National Water Act, 1998 (Act No. 36 of 1998) (NWA). The Project triggers water uses in terms of Section 21 of the NWA and as such a Water Use Licence is required.

5 Item 1(e): Impacts to be Mitigated in their Respective Phases

The proposed mitigation measures and its compliance with the relevant standards are presented in Table 5-1.

* mitigation measures as prescribed under Copper Sunset's original EMPr approved in 2008 (DMRE Ref. No. FS30/5/1/1/2/164 MR dated 28/04/2009)

** mitigation measures as prescribed under the 2011 EA and EMPr associated with the construction of a washing plant, a Return Water Dam (RWD), a settling dam and brick building (DMRE Ref. No. FS30/5/1/2/3/2/1 (164) EM dated 19/09/2011)

*** mitigation measures as prescribed under the 2015 and 2016 EA and EMPr associated with the incorporation of additional areas into the MRA (DMRE Ref. No. FS30/5/1/2/3/2/1 (164) EM dated 08/03/2016 and 20/12/2016)

**** mitigation measures as prescribed under the 2017 EMPr associated with incorporation of additional areas into the MR (DMRE Ref. No. FS30/5/1/2/2 (164) MR dated 30/05/2018)

Table 5-1: Impacts to be Mitigated in their Respective Phases

Phase	Activity	Aspect	Impacts	Mitigation Measures	Compliance with standards	Time frame for implementation
Establishment	• Site Clearance: Vegetation and topsoil will be removed with a bulldozer and stockpiled along the mined-out strip.	Soil Land Use and Land Capability	• Compaction of soil and increased runoff potential; • Reduced infiltration rate, reduced rooting depth (vegetation cover) and increased surface runoff; • Increased erosion, and consequently sedimentation of wetlands and freshwater bodies; • Impacting agricultural activities in short, medium and long term due to changes in the soil agricultural potential and complete restriction to cattle grazing (current land use); • Soil contamination from spills and leakages; and • It is important to note that the haul road will move as mining progresses through life of mine.	• Restrict extent of disturbance within the Copper Sunset Project area and minimise activity within designated areas of disturbance; • Minimise the period of exposure of soil surfaces through dedicated planning; • Stripping operations should not take place during large rain events as this executed when soil moisture content will minimise the risk of compaction (during dry season); • Aim to minimise (or even cease) workings on windy days; • During stockpiling, preferably use the 'end-tipping' method to keep the stockpiled soils loose; • Ensure stockpiles are placed on a free draining location to limit erosion loss and waterlogging; • Limit stockpile height – a safe height can be regarded as the height at which material can be placed without repeated traffic over already placed material; • Soil surface (only where topsoil is partially removed) can be loosened via tillage/ripping; • If any erosion occurs, corrective actions must be taken to minimise any further erosion from taking place at regular intervals or after high rainfall events. Such as revegetation, erosion berms, culverts or gabions; • The area must be fenced, and animals should be kept off the area until the vegetation is self-sustaining; and • Runoff must be controlled and managed using proper stormwater management measures.	• NEMA; • NEMWA; and • CARA.	Life of Establishment Phase
Establishment	• Construction of a temporary haul road (20 m width) to gain access to the sand mining area. It is important to note that the haul road will move		• Loss of usable soil as a resource – Mining of sand, erosion and compaction; • Soil contamination; and • Loss of usable soil for agriculture – changing the land capability.	• If erosion has occurred, topsoil should be sourced, replaced, vegetated and shaped to reduce the recurrence of erosion; • Only the designated access routes are to be used to reduce any unnecessary compaction; • Compacted areas are to be ripped to loosen the soil structure to increase the land capability (vegetation growth potential); • Un-used haul roads should be rehabilitated by ripping the soil to 300 mm and revegetating the area; and		

Phase	Activity	Aspect	Impacts	Mitigation Measures	Compliance with standards	Time frame for implementation
	as mining progresses through life of mine.			• Clean up spills to prevent migration of contaminants into the soil profile, entering the groundwater.		
Establishment	• Site clearance: Vegetation and topsoil will be removed with a bulldozer and stockpiled along the mined-out strip.		• Sedimentation and siltation of nearby watercourses due to erosion of disturbed soils.	• Limit vegetation removal and construction activities to the infrastructure footprint area only, where removed or damaged vegetation areas should be revegetated as soon as possible with a suitable mix of plant species as determined by a qualified botanist; • Reprofile disturbed portions of the affected streams, rivers or wetlands to allow free drainage; • Adhere to sound storm water management planning to effectively separate sediments from runoff with the use of silt fence. • Movement of vehicles and machinery should be confined to designated access road to minimise the extent of soil compaction accelerated flow velocities; • Wherever possible, surface infrastructure should be relocated outside of wetland areas and a buffer of at least 100 m should be put in place to ensure there is no risk of impacts to the wetland systems; • Monitor revegetated areas to ensure successful re-establishment of vegetation; • Environmentally friendly barrier systems, such as silt nets/fences or, in severe cases, use of trenches, downstream from construction sites should be used to limit erosion and possibly trap contaminated runoff from construction; • Re-fuelling must take place on a sealed surface area away from river systems and wetlands to prevent the ingress of hydrocarbons into the topsoil. • Drip trays must be used to capture any oil leakages. Servicing of vehicles and machinery should be undertaken at designated hard park areas. Any used oil should be disposed of by accredited vendors; • Movement of vehicles and machinery should be confined to the designated access road to minimise the extent of soil compaction; • All vehicles must be regularly inspected for leaks; • Disposal of general and other forms of waste should continue to be done into clearly marked skip bins which are collected by approved contractors for final disposal to appropriate disposal sites; and • Any hydrocarbon spills should quickly be cleaned-up and contaminated soils removed before wash-offs and/or further infiltration into the ground occurs.	• NWA; and • NEMA.	Daily during the Establishment Phase
Establishment	• Construction of a temporary haul road (20 m width) to gain access to the sand mining area. It is important to note that the haul road will move as mining progresses through LoM.	Hydropedology	• Contamination of water resources from general waste, sewage and from spillage and leakage of hydrocarbon fuels, oils and grease.			

Phase	Activity	Aspect	Impacts	Mitigation Measures	Compliance with standards	Time frame for implementation
Establishment	• Construction of haul road.		• Alteration of channel geometry and fluvial patterns of disturbed river channels	• Reprofile disturbed portions of the streams to allow free drainage; and • At areas where the haul road crosses watercourses, the crossing should be at the narrowest point and should be at 90° angle with suitable drainage designed not to impede flows.		Soon after construction at the river crossing point
Establishment	• Site clearing; • Access and haul road construction; • Establishment of Infrastructure; • Topsoil stockpiling; and • Loading, transport, tipping and spreading of materials; • Use and repair of machinery and vehicles used for site clearance and construction.	Surface Water	• Siltation of water resources due to increased turbidity from dust and soil erosion; and • Water contamination due to leaks or spills of hazardous and hydrocarbon containing material.	• Clearing of vegetation must be limited to the development footprint, and the use of any existing access roads must be prioritised to minimise creation of new ones; • Dust suppression with water on the haul roads and cleared areas must be undertaken to limit dust; • Hydrocarbon and hazardous waste storage facilities must be appropriately bunded to ensure that leakages can be contained. Spill kits should be in place and workers should be trained in the use of spill kits, to contain and immediately clean up any potential leakages or spills; • Vehicles should regularly be maintained as per the developed maintenance program. This should also be inspected daily before use to ensure there are no leakages underneath; • Drip trays must be used to capture any oil leakages. Servicing of vehicles and machinery should be undertaken at designated hard park areas. Any used oil should be disposed of by accredited contractors; and • Implementation of a stormwater management to separate clean and dirty water areas, if dirty water is generated.	• NWA; • GN 704 of the Department of Water Affairs and Forestry, (DWAF) (now Department of Water and Sanitation, (DWS); and • NEMA.	During the Establishment Phase, preferably during the dry season
Establishment	• Site clearing, and preparation by the removal of vegetation and associated habitats and removal of soils; • Movement of vehicles, and heavy machinery; • Construction of infrastructure, including access and haul roads; • Washing plant • Stockpiling of soil; and • Waste management activities, including handling of hydrocarbon chemicals, and transportation of sand.	Fauna and Flora	• Removal of vegetation, basal cover, and thus increasing the potential of loss of topsoil, organic material, and increased erosion potential. • Removal of flora SCC and faunal habitat; • Removal of vegetation communities such as grasslands and wetland vegetation; • AIP proliferation; • Increased runoff potential and consequently sedimentation and compaction of the soil; • Potential spillage of hydrocarbons such as oils, fuels (diesel), and grease, thus contamination of the	• Floral SCC have been located on the eastern boundary of the Project area, hence, site clearing must be kept to an absolute minimum by adhering to the Project area only, and restrict vehicle movement outside of dedicated areas, specifically close to wetlands;. • Floral SCC plants located in areas of development should be marked prior to commencement of Establishment. Necessary permits for relocations of protected species must be obtained from the relative government authorities. The relocation strategy must be approved by relevant authorities prior to relocation to a safe and ideal location; • Ensure that thorough screening is conducted prior to the commencement of the Project to locate and potentially relocate SCC (this applies to both faunal and floral SCC); • Thorough screening for the presence of the African Grass Owl before the establishment phase is required to ensure that impacts from the Project do not affect the vulnerable species; • Make use of existing roads to encourage minimal impacts/footprint to the Project area;	• NEM: BA; • CARA; • NFA; and • Forestry Laws Amendment Act (Act No. 35 of 2005).	Life of Establishment Phase

Phase	Activity	Aspect	Impacts	Mitigation Measures	Compliance with standards	Time frame for implementation
			soils and surrounding grounds; and • Increased dust pollution	• Whilst the removal of vegetation is underway, key monitoring methods should be focussed on the prevention of AIP proliferation during the Establishment phase. Measures must be in place to prevent the spread of AIPs; • The regulatory speed limit must be communicated to all staff members of the mine to ensure no unnecessary loss of faunal species occur due to speeding; • In support of the Digby Wells Soil Land Use and Land Capability Report 2020, excavated topsoil should be stockpiled separate from the subsoil to enhance the rehabilitation process. Long term stockpiles should be revegetated to minimise loss of soil quality and minimise infestation by AIPs; • Erosion prevention is key thus runoff must be controlled, and managed by use of proper stormwater management measures; • Management of dust may involve the spraying of water and / or covering exposed pits with suitable dust suppressants; • Vehicles should regularly be surveyed and checked that hydrocarbon spill and other contaminants are not exposed to the soils; • Storage and re-fuelling of vehicles must take place on bunded impervious surfaces to prevent seepage of hydrocarbons into the soil; and • Fuel, grease, and oil spills should be remediated using a commercially available emergency clean up kits. However, for major spills (>5L), if soils are contaminated, they must be stripped, and disposed of at a licensed waste disposal site.		
Establishment	• Site clearance and vegetation removal.	Wetlands	• Direct loss of wetland areas; • Habitat loss; • Loss of biodiversity; and • Erosion and sedimentation of wetland areas.	• Avoid infrastructure within wetlands as far as possible, especially wetlands with a high PES, EIS and ES rating; • Establishment of a 100 m buffer zone to protect wetland areas from infrastructure within the study area. This would require that development occur further than 100 m from a delineated wetland area; • Place sediment trapping berms on the boundary of the 100 m buffer or end of development; • Ensure concurrent rehabilitation with special attention to reshaping the areas and re-vegetating. • If erosion has occurred, topsoil should be sourced, replaced, vegetated and shaped to reduce the recurrence of erosion in wetlands; • Only the designated access routes are to be used to reduce any unnecessary compaction of surfaces and therefore increased flow into the wetlands; • Minimise the period of exposed areas to prevent erosion, loss of vegetation and sedimentation within the wetlands; and	• NWA; • NEMA; • DWAF Guidelines for the Delineation of Wetlands (2005); • Wetland Management Series (WRC, 2007); and • NFEPA.	Life of Establishment Phase
Establishment	• Construction of a temporary haul road (20 m width) to gain access to the sand mining area.		• Fragmentation of wetland areas; • Habitat loss; • Loss of biodiversity; and • Erosion and sedimentation of wetland areas.			

Phase	Activity	Aspect	Impacts	Mitigation Measures	Compliance with standards	Time frame for implementation
				• When the temporary haul roads are deconstructed, the area should be ripped and re-vegetated to prevent impacts to the environment.		
Establishment	• Site clearing; • Access and haul road construction; • Topsoil stockpiling; and • Loading, transport, tipping and spreading of materials.	Aquatics	• Siltation of water resources due to increased turbidity from dust and soil erosion; and • Water contamination due to leaks or spills of hazardous and hydrocarbon containing material.	• Clearing of vegetation must be limited to the development footprint, and the use of any existing access roads must be prioritised to minimise creation of new ones; • If possible, construction activities must be prioritised to the dry months of the year to limit mobilisation of sediments, dust generation and hazardous substances from construction vehicles used during site clearing; • Bare land surfaces downstream of construction activities must be vegetated to limit erosion from the expected increase in surface runoff from infrastructure; • Environmentally friendly barrier systems, such as silt nets or, in severe cases, use trenches downstream from construction sites to limit erosion and possibly trap contaminated runoff from construction; • No material may be dumped or stockpiled within any rivers, drainage lines in the vicinity of the proposed project; • All waste must be removed and transported to appropriate waste facilities. Hydrocarbon and hazardous waste storage facilities must be appropriately bunded to ensure that leakages can be contained. Spill kits should be in place and workers should be trained in the use of spill kits, to contain and immediately clean up any potential leakages or spills; • All vehicles must be frequently inspected for leaks; • Vehicles should regularly be maintained as per the developed maintenance program. These should also be inspected daily before use to ensure there are no leakages underneath; • Water used at construction sites should be utilised in such a manner that it is kept on site and not allowed to run freely into nearby watercourses; • Drip trays must be used to capture any oil leakages. Servicing of vehicles and machinery should be undertaken at designated hard park areas. Any used oil should be disposed of by accredited contractors; and • Storm water must be diverted from construction activities and managed in such a manner to disperse runoff and prevent the concentration of storm water flow.	• NWA; and • NFEPA.	During the Establishment and Operational Phase
Establishment	• Site clearance and vegetation removal; • Placement of the Offices and associated mining equipment;	Air Quality	• Poor air quality due to the generation of dust.	• Apply dust suppressants or binders on exposed areas and haul roads; • Conduct activities judiciously and limit operation to non-windy days (with wind speed ≤ 5.4 m/s);	• NEMA; • NEM:AQA; and • NEM:AQA National Dust Control Regulation	Establishment phase and for the life of mine

Phase	Activity	Aspect	Impacts	Mitigation Measures	Compliance with standards	Time frame for implementation
	• Construction of the hydrocarbon storage tank and refuelling area; • Establishment of a haul road/tracks; and • Stockpiling of topsoil.			• Keep the area of disturbance to a minimum and avoid any unnecessary clearing, digging, or scraping, especially on windy days; • Minimise the drop heights when loading onto trucks and at tipping points; • Set maximum speed limits and have these limits enforced; and • Conduct ambient air quality monitoring.	2013 (GN No. 827 of 2013).	
Establishment	• Site clearance and vegetation removal. • Placement of the Offices and associated mining equipment. • Construction of the hydrocarbon storage tank and refuelling area. • Establishment of a haul road/tracks. • Stockpiling of topsoil.	Noise	• Emission of noise from activities.	• Construction activities should be restricted to daylight hours (06:00 – 18:00); • Construction machinery and vehicles should be switched off when not in use; • Construction vehicles should have buzzer-type reverse alarms (producing band-limited white noise) installed, rather than the conventional beeping type reverse alarms (which produce a tonal sound); • Vehicles should be serviced as per their design requirements to ensure noise suppression mechanisms are effective e.g., installed exhaust mufflers; and • Regulate vehicle speeds on the access and haul roads.	• NEMA; • National Noise Control Regulations, R.154 of 1992; • Noise Control Regulations for the Free State Province, PN.242 of 1997.	Upon commencement of the establishment phase
Establishment	• Establishment activities.	Heritage	• Damage to or destruction of BGG-001 and BGG-002.	• Project redesign to avoid the heritage resource and implement a 100 m no-go buffer zone around the resource; and • Develop or update and implement HSMP.	• NEMA; • NHRA; and • NHRA Regulations, 2000 (GN R 548).	Before the commencement of the project
Establishment	• All project activities.		• Damage to or destruction of previously unidentified heritage resources.	• Develop and implement CFP.		
Establishment	• All project related activities associated with establishment and operations.	Socio-economic	• Creation of employment opportunities.	• Ensure implementation of the existing company Employment Policy; • Should Contractors be used during establishment, ensure that local employment targets are set regardless of the size of the work program. Local employment targets must include employment of youths and women from historically disadvantaged backgrounds; • Prioritise employment and training of people living within the primary study area over outsiders especially for unskilled and semi-skilled positions; • Widely advertise all Project employment opportunities in local community newspapers and placed in public places in local languages; • Where possible, the construction workforce must be for the operation of the mine; • Ensure that the mine's Community Liaison Officer is informed of all project developments to facilitate on going and active engagement with stakeholders;	• NEMA; • FDDM: Reviewed Final IDP (2020/2021); and • MLM: Reviewed IDP 2020/21.	Pre-establishment and establishment

Phase	Activity	Aspect	Impacts	Mitigation Measures	Compliance with standards	Time frame for implementation
				• Comply with minimum wage requirements for unskilled labour; • Ensure that no employment take place at the entrance to the site (to avoid people congregating at the work site). Only formal channels for employment must be used; and • Implement company grievance procedure to record and resolve complaints and issues/ concerns of project affected communities.		
Establishment			• Impacts associated with Population Influx such as increased competition for residential land and other natural resources as well as an increased strain in accessing government services.	• Develop an In-Migration Plan that addresses how the Project will seek to minimise Project-induced in-migration as far as possible. Implement mitigation measures to address the adverse environmental and social consequences, and maximise the benefits, of in-migration. The management plan should be developed together with other industry role players and government; • Where possible, construction employees should be locally sourced as they will live with their families; • Explore opportunities for collaboration with local police with regards to safety and security issues relating to Project activities in general and any concerns about contractors; • To discourage influx of job-seekers, consider prioritisation of employment of unemployed members of local communities; • Liaise with Local Government to ensure that expected population influx is considered in infrastructure development and spatial development planning; • Ensure continuous consultation with local communities, farm landowners and government and promote partnerships to address illegal activities on-site and in the surrounds of the project area; • Develop information, education and communication campaigns around diseases and health practices including sanitation and hygiene; • Monitoring changes in land cover and land use outside the Project site to identify loss of areas of importance for biodiversity and cultural heritage; • Discourage informal settlements along Project roads to minimise loss of habitat of value for biodiversity.		Pre- establishment, establishment, and operation
Establishment			• Opportunities and Capabilities within the Supply Chain.	• Conduct an audit of local businesses and their capacity to meet Project needs, including those businesses in the study area, and maintain a database of local business information; • Implement the company's existing Procurement Policy or Plan; • Ensure that the policy or plan sets-out guidance on targets for local businesses used by the Project and that these are monitored accordingly; • Unbundle all work programs to the smallest components to allow local businesses to take-up the opportunities;		Pre- establishment, and establishment

Phase	Activity	Aspect	Impacts	Mitigation Measures	Compliance with standards	Time frame for implementation
				• Adaptation of Project procurement documents to suit local businesses as far as possible within the standards required of the Project; • Provision of incentives for Project contractors to purchase locally and partner with local businesses, including tender requirements regarding local procurement; • Continue using the SME electronic portal to facilitate communication of contract opportunities and management training materials to SMEs; • Promotion of joint ventures between large and small Contractors to ensure equitable sharing of economic benefits and skills development; and • Implement procedure for dissemination of procurement opportunities as early as possible, with clearly defined requirements for the goods or service to manage expectations; and • Implementation of the grievance procedure.		

Establishment			• Community Health, Safety and Security - Increase in nonsense factors.	General:
				• In partnership with government authorities, Copper Sunset will be required to support improvements to existing health services to handle the increase in population numbers and changes to the existing health profile of the area. This may include facilities, quality of medical personnel, diagnostic capacity, and treatment, etc.
				To mitigate community safety from road traffic:
				• Implement the mitigation measures and management plans as proposed in the Traffic Impact Assessment study.
				• Furthermore, implement the following management actions as they relate to community safety and road traffic awareness:
				  • Access to Project sites, especially alongside the road, must be controlled to prohibit the public from entering the site;
				  • Develop a Traffic Management Plan covering vehicle safety, driver, and passenger behaviour, use of drugs and alcohol, hours of operation, rest periods and accident reporting and investigations;
				  • Strictly enforce drug and alcohol policies in relation to Project drivers and undertake regular and random testing of drivers and in response to suspicious behaviour;
				  • Require Project drivers to be trained in defensive driving and provided regular refresher courses;		

Phase	Activity	Aspect	Impacts	Mitigation Measures	Compliance with standards	Time frame for implementation
				• Propose road bypasses where there is a significant risk to public safety from road accidents; • Establish preparedness and response capabilities to deal with any road traffic or other accidents that may occur including multiple casualty events; • In partnership with local authorities and the police, educate communities on road traffic laws and road safety; and • Implement an Emergency Prevention, Preparedness and Response Plan: • Design and implement measures to minimise the risk of hazardous substances entering the environment, including development of an Emergency Prevention, Preparedness and Response Plan for accidents involving release of hazardous substances to the environment. This will include: • Installation of oil water separators and grease traps as appropriate at fixed refuelling facilities, workshops, parking areas, fuel storage and containment areas; • Use of drip trays and other temporary measures to prevent entry of hazardous substances into the environment during fuelling or servicing of vehicles and equipment on site; • Provision of spill kits and training of staff in their use; • Secure storage and labelling of hazardous substances in line with the manufacturer's recommendations and measures to prevent contact with untrained personnel, birds, animals; and • Secondary containment using impervious, chemically resistant material and designed to prevent contact between incompatible materials in the event of a release. To mitigate dust impacts: • Implement mitigation measures proposed in the Air Quality Impact Assessment Study. • Furthermore, implement induction programmes for all employees and contractors to increase sensitivity and compliance with these standards during mining activities. • Ensure mitigation measures are factored into the daily operation at the mine; and • Implement particulate monitoring onsite, and at upwind and downwind sensitive receptor locations to assess the effectiveness of the mitigation measures and ensure compliance.		

Phase	Activity	Aspect	Impacts	Mitigation Measures	Compliance with standards	Time frame for implementation
				To mitigate noise impacts: • Ensure mitigation measures are factored into the day-to-day operation onsite; and • Conduct noise monitoring periodically (i.e. on a quarterly basis to ensure the sand mining noise footprint is not exacerbating background condition).		
Establishment	• Site clearing; • Access and haul road construction; • Construction of Infrastructure; • Topsoil stockpiling; and • Loading, transport, tipping and spreading of materials • Transportation of sand; • Refuelling of machinery within the mining area or at the mobile offices; • Concurrent rehabilitation (topsoil cover, ripping and vegetation establishment) and monitoring of vegetation establishment. • Backfilling of the mined excavations with topsoil and waste from the screening plants; • Dismantling and removal of infrastructure; • Rehabilitation (topsoil cover, ripping and vegetation establishment); and • Post-closure monitoring.	Traffic	• Transportation of materials, machinery, mining equipment, storage tanks, mining products will increase the number of heavy vehicles and abnormal load vehicles on public roads which have a potential of increasing road safety risk.	• Ensure heavy vehicles and abnormal load vehicles compliance with limitations on vehicle dimensions and axle and vehicle masses and safety standards set out in the Road Traffic Act, 1996 (Act No 93 of 1996) and the National Road Traffic Regulations, 2000 for vehicle using a public road; • Discourage routing of heavy vehicle traffic through populated area; • Avoid transporting abnormal load during peak periods; and • Drivers of all heavy vehicles must be required to attend a specialised road safety and driving course that sensitises them to the impact that they have on driving conditions for other road users.	• Road Traffic Act, 1996 (Act No 93 of 1996) and the National Road Traffic Regulations, 2000.	Throughout Construction, Operation and Decommissioning Phases
Operational	Sand mining	Topography	• Topographical disturbances.	• Store topsoil separately*; and • Ensure rehabilitation is done effectively throughout the life of mine*.	• NEMA	Life of Operational Phase and LoM

Phase	Activity	Aspect	Impacts	Mitigation Measures	Compliance with standards	Time frame for implementation
Operational	• Mining of sand resources including screening (if required) to approximately 0.2 – 5 m and stockpiled in a separate area.	Soil, Land Use and Land Capability	• Loss of usable soil as a resource – Mining of sand, erosion and compaction; • Soil contamination; and • Loss of usable soil for agriculture – changing the land capability.	• The removal of topsoil should be kept to a minimum*/**. • Stockpiles must be suppressed with water during windy conditions***; • Make sure the end-use soil depth is adequate for rehabilitation (minimum of 600 mm) depth; • If any erosion occurs, corrective actions (erosion berms) must be taken to minimise any further erosion from taking place; • A TMP must be prepared to demonstrate how topsoil will be preserved in a condition as near as possible to its pre-mining condition to allow successful mine rehabilitation (Statham, 2014); • If a spill has occurred, soil pollution monitoring should be conducted to detect any high levels of pollutants and the extent of the contamination plume. • Slope and contour the area back to natural topographies as far as possible to enable natural free-flow; • Rip rehabilitated soils to ensure increased infiltration, soil depth and rooting and water movement; • Revegetate the rehabilitated areas as soon as possible to prevent decreased soil fertility and thus land capability; and • Impacts on other aspects of the environment especially soil, should be mitigated or prevented to prevent the area to deteriorate completely*.	• NEMA; • NEMWA; and • CARA.	Life of Operational Phase
Operational	• Transportation of material on haul roads.		• Compaction of soil and increased runoff potential; • Reduced infiltration rate, reduced rooting depth (vegetation cover) and increased surface runoff; • Increased erosion, and consequently sedimentation; and • Soil contamination from spills and leakages.	• Only the designated access routes are to be used to reduce any unnecessary compaction; • Make use of erosion berms, sediment traps, culverts at wetland crossings and erosion control to prevent impacts to the hail roads; • Clean up spills as soon as possible to prevent migration of contaminants into the soil profile, entering the groundwater; • Ensure the spill clean-up kits are readily available in the event of a spillage***; • Limit the movement of heavy machinery to roads*; • Machinery must be serviced regularly to prevent hydrocarbon spillages**; • Machinery and vehicles must be serviced and maintained off site at a workshop and drip trays must be in place to capture the spillage and avoid soils from being contaminated***; and • Storage and use of hydrocarbons should be confined to bunded areas*.		
Operational	• Refuelling of machinery within the mining area or at the mobile offices; and		• Soil contamination from hydrocarbon waste (lubricants, explosives, and fuels) spills and leakages from leaking diesel tanks as	• Soil pollution monitoring should be conducted after spills have occurred to detect any extreme levels of pollutants; • Any spillages should be cleaned up immediately, and the contaminated soils should be disposed of at licenced disposal sites;		

Phase	Activity	Aspect	Impacts	Mitigation Measures	Compliance with standards	Time frame for implementation
	• Washing Plant Operation.		well as vehicles and machinery conducting concurrent rehabilitation and doing maintenance; and • Increased soil compaction and runoff, causing erosion and sedimentation.	• Runoff must be controlled, and managed by use of proper stormwater management measures; • Vehicles should regularly be serviced and checked that oils spill and other contaminants are not exposed to the soils; • Machinery must be serviced regularly**; • The removal of topsoil must be kept to a minimum**; • Re-fuelling must take place on bunded impervious surfaces to prevent seepage of hydrocarbons into the soil; • All vehicles and machines must be parked within hard park areas, and must be checked daily for fluid leaks; and • Fuel, grease, and oil spills should be remediated using a commercially available emergency clean up kits. However, for major spills (>5L), if soils are contaminated, they must be stripped and disposed of at a licensed waste disposal site.		
Operational	• Mining of sand resources including screening (if required) to approximately 0.4 – 5 m and stockpiled in a separate area.	Hydropedology	• Disruption of hillslope water flow paths and reduction of flows into rivers, streams and wetland resources.	• Restrict any excavations to less than the proposed 5 m depths and any vehicle or machinery movements should be confined to the designated sand extraction sites in order to minimise disruption of water flow paths within hillslopes; • The edge of indirectly impacted freshwater resources (rivers/streams) and wetlands, should at least have a 1:100 floodline buffer and /or a 100 m buffer; and • Develop a Wetland Offset for critical mined-out wetlands, which can be determined by a wetland offset assessment study.	• NWA; and • NEMA.	After every mined-out strip during the Operational Phase; Once-off for identified critical mined-out wetlands
Operational	• Transportation of material on haul roads and refuelling of machinery within the mining area or at the mobile offices.		• Contamination of water resources from general waste, sewage and from spillage and leakage of hydrocarbon fuels, oils and grease.	• Water quality monitoring should continue downstream and upstream of the mine site, and within all surface water circuits at the mine to detect any contamination arising from operational activities; • Hydrocarbon materials (fuel, oil & grease) storage areas should be located on hard-standing impermeable and bunded areas in accordance with SANS1200 specifications. This helps to prevent mobilisation of leaked hazardous substances; • Mine workers should be trained in the use of spill kits to contain and immediately clean up any leakages or spills; • Servicing and washing of vehicles and machinery should be conducted at appropriately designated paved areas. All used oils should be disposed of by accredited vendors from the mine site; • Disposal of general and other forms of waste should continue to be done into clearly marked skip bins which are collected by approved contractors for final disposal to appropriate disposal sites; • Ensure that storm runoff from wash bays is controlled by storm water management infrastructure and should not be allowed to flow into the watercourses; and		
Operational	• Concurrent rehabilitation (topsoil cover, ripping and vegetation establishment) and monitoring of vegetation establishment.		• Restoration of close to natural hydrological responses through concurrent rehabilitation of mined-out landscapes.			Monthly water quality monitoring

Phase	Activity	Aspect	Impacts	Mitigation Measures	Compliance with standards	Time frame for implementation
				• Concurrent rehabilitation through backfilling, reprofiling and revegetation of mined-out landscapes should be conducted to allow free drainage as proposed for the MREA to comply with rehabilitation guidelines.		
Operational	• Sand Mining; • Stockpiling; • Diesel storage; • Movement of vehicles and mine machinery; • Storage, handling and treatment of hazardous products (including fuel, explosives and oil) and waste; and • Washing plant operation.	Surface Water	• Siltation of water resources due to increased turbidity from dust and soil erosion; • Water contamination due to leaks or spills of hazardous and hydrocarbon containing material; and • Contamination from different waste streams.	• Keep the removal of vegetation to a minimum*/**; • The water quality monitoring program provided in this report should be adhered to for monitoring water resources within and in close proximity to the study area to allow detection of any contamination arising from operational activities; • The management of general and other forms of waste must ensure collection and disposal into clearly marked skip bins that can be collected by approved contractors for disposal to appropriate disposal sites; • The overall housekeeping and storm water system management (including the maintenance of berms, conveyance channels and clean-up of leaks) must be maintained throughout the LoM; • The hydrocarbon and chemical storage areas and facilities must be located on hard-standing area (paved or concrete surface that is impermeable), roofed and bunded in accordance with SANS1200 specifications. This will prevent mobilisation of leaked hazardous substances; • Ensure hydrocarbons are stored and managed correctly and report spillages*; • Ensure that waste is disposed of correctly according to different waste streams*; • Training of mine personnel and contractors in proper hydrocarbon and chemical waste handling procedures is recommended; and • Vehicles must only be serviced within designated service bays.	• NWA; • GN 704 of the Department of Water Affairs and Forestry, (DWAF) (now Department of Water and Sanitation, (DWS); and • NEMA.	• During the Operational Phase; and • Monthly monitoring of water quality
Operational	• Storage, handling and treatment of hazardous products (including fuel, explosives and oil) and waste; and • Washing Plant Operation.	Groundwater	• Contamination due to leaks, incorrect handling of sewage and the disposal of absorbent materials and hazardous waste; and • Contamination of hydrocarbons and chemicals by machines.	• Machinery must be serviced regularly**; • Emergency spill response plan required to handle any unplanned spillages****; • Fuel and lubricant storage facilities will be bunded in accordance with SANS specifications to reduce the risk of any leaks or failures*; • Sewage will be handled in portable chemical latrines to reduce the risk of contamination*; and • Construction/operational machines used during topsoil stripping will be checked, serviced, and maintained to reduce the risk of groundwater contamination*/** (Daily inspection of vehicles and machinery, undertaking of routine and as-required maintenance to prevent breakdowns****).	• NEMA	Life of Operational Phase
	• Abstraction of water; and		• Lowering of groundwater table.	• Only abstract the amount needed for the process**; and	• NEMA	Throughout the life of

Phase	Activity	Aspect	Impacts	Mitigation Measures	Compliance with standards	Time frame for implementation
	• Storing and disposing of water.			• Only store the amount of water needed for the washing plant process**.		mine
Operational	• Vehicle, and heavy machinery movement; • Waste management activities; • Maintenance and operation pipeline; • Washing plant operation; and • Processing of sand.	Fauna and Flora	• Increased vehicle movement in the area, Increasing the risk of faunal casualties due to road kill; • Increased risk of AIP proliferation without adequate control measures; • Increased dust pollution; • Increase risk of fire during dry season; • Increased erosion, runoff and compaction of soil and consequently sedimentation potential; • Changes to the landscape with subsequent removal of faunal habitats and a decrease in biodiversity and loss of SCC (faunal and floral); and • Potential spillage of hydrocarbons such as oils, fuels, and grease, thus contamination of the soils and surrounding grounds.	• Make use of existing roads to encourage minimal impacts/footprint to the Project area; • Monitor AIPs and ensure measures are in place to prevent spread and proliferation; • An exotic and invader control programme will be implemented*; • All bare patches of soil should be vegetated, preferably with pioneer species which will colonise open and disturbed patches quickly. Please refer to recommend seed mix mention in the Digby Wells Financial Provision and Rehabilitation and Closure Plan 2021; • Disturbed surfaces will be re-vegetated as soon as they become available*; • Avoid extensive footprint of sensitive areas such as wetlands as much as possible; • Visual assessments of the site will be conducted on a regular basis to monitor potential soil erosion*; • Adhere to recommended protective buffers around the pans as described by the Digby Wells Wetland Report, 2021; • Contractors must keep within designated areas**; • It is recommended that a nursery for indigenous flora that represent the identified vegetation communities be developed as a community-based project; • If found to be present, Red Data Status species will be removed and relocated prior to the clearing of mining areas*; • All workers, contractors and visitors will be informed about any rare and endangered species through an environmental awareness plan and the distribution of posters*; • Management of dust may involve the spraying of water and / or covering exposed mining areas with mulch. Mulch can be sourced from the removed vegetation from the site; • Monitoring must be carried out during the operational phase to ensure no unnecessary impact to the remaining vegetation and associated habitats, and if so that a remediation plan is put in place as soon as possible; • Hydrocarbons should be used in an environmentally safe manner with correct storage as per each chemical's specific storage descriptions; • Re-fuelling of vehicles and machinery must take place on a sealed surface area away from wetlands to prevent the ingress of hydrocarbons in the surrounding area; and	• NEM: BA; • CARA; • NFA; and • Forestry Laws Amendment Act (Act No. 35 of 2005).	Life of Operational Phase

Phase	Activity	Aspect	Impacts	Mitigation Measures	Compliance with standards	Time frame for implementation
				• Any pollution of water, soil and vegetation which can cause harm to aquatic invertebrates and other forms of animal life will be prevented as far as possible*.		
Operational	• Mining of sand resources including screening (if required) to approximately 0.4 – 5 m and stockpiled in a separate area.	Wetlands	• Direct loss of wetlands; • Water quality contamination and deterioration; • Habitat loss as a result of poor water quality; • Loss of biodiversity; and • Erosion and sedimentation within the wetlands.	• Avoid infrastructure as far as possible within wetlands, especially wetlands with a high PES, EIS and ES rating; • Establish a 100 m buffer zone to protect wetland areas from the proposed infrastructure within the study area. This would require that development occur further than 100 m from a delineated wetland area; • Place sediment trapping berms on the boundary of the end of development; • Minimise the period of exposed areas to prevent erosion, loss of vegetation and sedimentation within the wetlands; • Ensure concurrent rehabilitation with special attention to reshaping the areas and re-vegetating; • Develop and implement a Wetland Offset Strategy and Rehabilitation plan for the wetlands in the Project area. • Maintain and monitor wetland functionality; • Monitor the roads monthly to identify and rectify any areas that have begun to erode and where water may be flowing towards wetland areas. • Restrict vehicle movement in delineated wetlands; • Only the designated access routes are to be used to reduce any unnecessary compaction leading to erosion, increased runoff and fragmentation of wetlands; • Rip rehabilitated areas to reduce compaction and reseed to increase vegetation cover; • Clean up spills immediately to prevent migration of contaminants into the wetlands; • Conduct pollution monitoring along the low-lying areas (wetlands) to detect any high levels of pollutants if spills has occurred; • Create a designated refuelling area; • Prevent contaminated water entering the remaining freshwater systems (wetlands); and • Any spillages should be cleaned up immediately, and the contaminated material should be disposed of at licenced disposal sites.	• NWA; • NEMA; • DWAF Guidelines for the Delineation of Wetlands (2005); • Wetland Management Series (WRC, 2007); and • NFEPA.	Life of Operational Phase
Operational	• Transportation of material on haul roads.		• Erosion of wetland crossings associated with the haul road; • Accidental spills causing soil and water contamination; • Habitat loss as a result of poor water quality; • Loss of biodiversity; • Siltation of wetlands due to erosion; and • Change in habitat and potential change in species composition			
Operational	• Refuelling of machinery within the mining area or at the mobile offices.		• Water quality contamination and deterioration; • Potential spills may lead to loss of vegetation, causing sedimentation of wetlands, contamination, habitat loss and potential change in species composition; • Habitat loss as a result of poor water quality; and • Loss of biodiversity.			
Operational	• Stockpiling; • Diesel storage; • Movement of vehicles and mine machinery; and	Aquatics	• Siltation of water resources due to increased turbidity from dust and soil erosion; and • Water contamination due to leaks or spills of hazardous	• The water quality monitoring program provided in this report should be adhered to for monitoring water resources within and in close proximity to the Project area to allow detection of any contamination arising from operational activities; • Runoff should not be allowed to flow into the nearby watercourses, unless DWS discharge authorisation and	• NWA; and • NFEPA.	During the Establishment and Operational Phase

Phase	Activity	Aspect	Impacts	Mitigation Measures	Compliance with standards	Time frame for implementation
	• Storage, handling and treatment of hazardous products (including fuel and oil) and waste.		and hydrocarbon containing material.	compliance with relevant discharge standards, as stipulated in the NWA is obtained; • Channelled water should not be dispersed in a concentrated manner. Baffles should be incorporated into artificial drainage lines/channels around the surface infrastructure to decrease the kinetic energy of water, as it flows into the natural environment; • Bare surfaces downstream from the developments where silt traps are not an option should be vegetated in order to attempt to limit erosion and runoff that might be carrying contaminants; • Careful monitoring of the areas where dust suppression is proposed should be undertaken regularly. Areas concentrating water runoff should be addressed and not allowed to flow freely into associated watercourses; • The management of general and other forms of waste must ensure collection and disposal into clearly marked skip bins that can be collected by approved contractors for disposal to appropriate disposal sites; • The overall housekeeping and storm water system management (including the maintenance of berms and clean-up of leaks) must be maintained throughout the LoM; • The hydrocarbon and chemical storage areas and facilities must be located on hard-standing area (paved or concrete surface that is impermeable), roofed and bunded in accordance with SANS1200 specifications. This will prevent mobilisation of leaked hazardous substances; • Training of mine personnel and contractors in proper hydrocarbon and chemical waste handling procedures is recommended; and • Vehicles must only be serviced within designated service bays.		

Operational	• Mining of sand resources including screening;
	• Transportation of sand;
	• Refuelling of machineries within the mining area or at the mobile offices;
	• Handling of general and hazardous waste;
	• Washing Plant operation; and
	• Concurrent rehabilitation (topsoil cover, ripping, and
		Air Quality	• Poor air quality due to the generation of dust.	• Monthly monitoring of dust levels on site through a network of dust buckets located around the stripping, screening and dumping areas must be done*;
				• Apply dust suppressants or binders on exposed areas and haul roads;
				• Dust suppression measures should be employed in all tipping sites, haul roads, and areas where soil is exposed. Dust suppression should include*:
				  • Water truck operating along all haul roads and access roads to the site, as well as any exposed soils, the water should contain a binding agent to allow the water to soak the soil and stay damp for longer periods thus minimising the consumption of water;
				  • Spray nozzles over all tipping areas; and
					• NEMA;
					• NEM:AQA; and
					• NEM:AQA National Dust Control Regulation 2013 (GN No. 827 of 2013).
						Operational Phase and the life of mine

Phase	Activity	Aspect	Impacts	Mitigation Measures	Compliance with standards	Time frame for implementation
	vegetation establishment) and monitoring of vegetation establishment.			• A truck wash system will be constructed, if necessary, to prevent vehicles leaving the site with muddy tyres and spreading the material around surrounding roads. • Conduct activities judiciously and limit operation to non-windy days (with wind speed ≤ 5.4 m/s); • Keep the area of disturbance to a minimum and avoid any unnecessary clearing, digging, or scraping, especially on windy days; • Minimise the drop heights when loading onto trucks and at tipping points; • Set maximum speed limits and have these limits enforced; and • Monitor the air quality management measures and information to ensure that adopted mitigation measures are sufficient and efficient to achieve current air quality standards at the MRA boundary and the closest receptors (continued dust monitoring).		
Operational	• Operational activities.	Visual	• Visual impacts.	• Paint buildings a natural colour and minimise night lighting*; • Bare areas should be re-vegetated*; and • Trees, walls and vegetated berms can be used as a screen during mining*.	• NEMA	Life of Operational Phase
Operational	• Mining of sand resources including screening (if required; • Washing plant operation; • Transportation of sand; • Refuelling of machinery within the mining area or at the mobile offices; and • Handling of general and hazardous waste.	Noise	• Emission of noise from activities.	• Machinery and vehicles should be switched off when not in use; • Machinery must be serviced regularly & where possible silencers must be added to machinery**; • It should be considered to prescribe the installation of buzzer type reverse alarms (producing band-limited white noise), rather than the conventional beeping type reverse alarms (which produce a tonal sound) on machinery and vehicles employed in surface operations and haul roads; • Vehicles should be serviced as per their design requirements to ensure noise suppression mechanisms are effective (e.g. installed exhaust mufflers); • Regulate vehicle speeds on the access and haul roads; • The generator and screening facility (if possible) should be enclosed; • The concentration (i.e., number of machinery being utilised) of mining activities should be limited in close proximity to sensitive receivers; • The mine should plan and consider a mining schedule that limits the duration of mining activities in close proximity to sensitive receivers i.e., South (closest to receivers) to North (furthest from receivers) mining approach; and • The mine should implement a long-term (48 hour) quarterly noise monitoring programme to detect any changes in ambient sound levels due to the activities of the mine.	• NEMA; • National Noise Control Regulations, R.154 of 1992; • Noise Control Regulations for the Free State Province, PN.242 of 1997.	Upon commencement of the Operational Phase

Phase	Activity	Aspect	Impacts	Mitigation Measures	Compliance with standards	Time frame for implementation
Operational	• Sand mining and other operational activities.	Archaeological and Heritage	• Disturbance to unidentified archaeological and heritage resources.	• If any possible finds are made during the operational phase, the process must be stopped, and a qualified archaeologist be contacted for an assessment of the find*; and • Should preservation of these significant sites not be a viable option, it should be properly documented and assessed by relevant experts*.	• NHRA	Life of Operational Phase
Operational	• All project related activities associated with establishment and operation.	Socio-economic	• Creation of employment - Retaining Workforce and Provision of Skills Development and Training.	• Ensure the implementation of SLP to support the promotion of education and skills uplift among local communities within the study areas, including the implementation of on-the-job training, learnership and scholarship programmes; • Implementation of the SLP HRD programs – mentorship and career progression; • Implement a grievance procedure; and • Where possible local service providers and contractors will be recruited**.	• NEMA; • FDDM: Reviewed Final IDP (2020/2021); and • MLM: Reviewed IDP 2020/21.	Establishment and Operation
			• Community Development through the SLP.	• Implement and continuously update the SLP to ensure maximum benefits to the community. The SLP must align with the associated legislation and include intensive stakeholder consultations as prescribed in the law. This includes: • Conduct baseline socio-economic survey of households located within primary study area prior to commencement of community development initiatives to enable accurate identification of eligible Mine Community Development project(s) and skills training beneficiaries and measure impacts of development initiatives on households; • Collaboration with other developmental role players during implementation; • Establishing an external monitoring programme to monitor and evaluate community development initiatives as well as Human Resource Development (HRD) and procurement policy implemented by the mine; • Expanding skills development and capacity building programmes to non-employees such as learnerships and bursaries; and • Maintaining a record of training courses completed per individual and community. Where training is offered to non-employees, their contact information and qualifications can be shared with other industries.		
			• Impacts associated with decreased community Health, safety, and security.	• Ensure mitigation measures are factored into the daily operation at the mine. • Implement particulate monitoring onsite, and at upwind and downwind sensitive receptor locations to assess the effectiveness of the mitigation measures and ensure compliance.		

Phase	Activity	Aspect	Impacts	Mitigation Measures	Compliance with standards	Time frame for implementation

				• Ensure necessary road upgrades to increase road capacity to ensure that the impacted road network operates at better or the same level of service during operation phase.
				• In addition to adhering to regulation set out in in the. Road Traffic Act, 1996 (Act No 93 of 1996) and the National Road Traffic Regulations, 2000, to promote safety on the surrounding road network, it is recommended that drivers of all heavy vehicles be required to attend a specialised road safety and driving course that sensitises them to the impact that they have on driving conditions for other road users.
				• The following noise management actions are recommended as good practice guidelines:
				  • Ensure mitigation measures are factored into the day-to-day operation onsite; and
				  • Conduct noise monitoring periodically (i.e. on a quarterly basis to ensure the sand mining noise footprint is not exacerbating background condition).		

		I&APs	• Increased trespassing through the presence of mine employees on site; and • Impacts associated with increased dust and noise pollution on directly adjacent properties.	• Mine employees will be made aware that trespassing on private land is an offence and that they should respect the privacy and security of the adjacent landowners. Any theft or trespassing by employees that is noted will be dealt with severely by mine management*; • Noise pollution will be kept to a minimum during the operational phase of the project to ensure that interested parties are not affected more than necessary. All operations will be planned and executed according to current professional standards*; • Public participation will continue through the life of the mine to ensure local communities are kept informed and allowed to raise issues. These issues will then be addressed by the mine manager*; and • IAPs that are affected by Vaal Sand's activities will be consulted with on a regular basis. A complaints management system will be maintained by the mine to ensure that all issues raised by community members are followed up and addressed appropriately*/**.	• NEMA	Life of Operational Phase
Operational	• Transportation of sand; • Refuelling of machinery within the mining area or at the mobile offices.	Traffic	• Transportation of sand and fuel over a 20-year period have a potential of accelerating the deterioration of road conditions.	• The developer should engage with the planning authorities concerning maintenance of public roads near the development sites; and • The developer should ensure that the internal roads and access roads are maintained to acceptable maintenance standards.	• Road Traffic Act, 1996 (Act No 93 of 1996) and the National Road Traffic Regulations, 2000; and	Throughout Operational Phase

Phase	Activity	Aspect	Impacts	Mitigation Measures	Compliance with standards	Time frame for implementation
					• Technical Methods for Highways (TMH) 16 South African Traffic Impact and Site Traffic Assessment Manual Volume 1&2 (2012).	
		Traffic and Safety	• Accidents on site and vehicle and pedestrian accidents.	• Ensure machine operators are trained properly*; • Machine operators should be sensitised*; • Put road signs in place to indicate hazardous areas*; and • Ensure truck drivers are properly trained*.	• Road Traffic Act, 1996 (Act No 93 of 1996) and the National Road Traffic Regulations, 2000.	Life of Operational Phase
Decommissioning	• Concurrent rehabilitation (topsoil cover, ripping and vegetation establishment) and monitoring of vegetation establishment.	Soil, Land Use and Land Capability	• Loss of usable soil as a resource – Erosion and compaction; • Increased AIPs and loss of soil fertility; and • Loss of Land capability	• Continue with concurrent rehabilitation, and implement land rehabilitation measures as soon as soils have been mined to prevent soil erosion by wind and water; • When areas have been mined, backfilled with waste material and covered with topsoil it should be levelled and contoured to mimic pre- mining natural topography to avoid ponding of water; • The rehabilitated area will be allowed to naturally re-vegetate, however where vegetation is not establishing well within three months, an indigenous seed mix must be utilised to improve vegetation establishment; • Address compacted areas by deep ripping (up to 300 mm) to loosen the soil, and revegetate the area as soon as possible; • Re-seed rehabilitated areas to increase vegetation cover; • Ensure proper stormwater management designs (contouring) are in place to ensure no excessive run-off or pooling occurs; • Only designated access routes are to be used to reduce any unnecessary compaction; • Machine operators must keep to designated areas**; • The backfilled, reprofiled landscape should be top soiled and revegetated to allow free drainage close to the pre-mining conditions; and • Implement a Rehabilitation Audit program, including soil fertility and infiltration tests to remediate and rehabilitate soils back to near-natural or high land capability standards. Rehabilitation process should be monitored to ensure effective rehabilitation*.	• NEMA; • NEM: WA; and • CARA.	Life of Decommissioning Phase
Decommissioning and Closure	• Backfilling of the mined excavations with topsoil and waste from the screening plants.		• Loss of usable soil as a resource – Erosion and compaction;	• Ensure proper stormwater management designs (contouring and land scaping) are in place to ensure no run-off or pooling occurs; • Backfill and compact the areas first with the waste material, such as large rocks and gravel before topsoil is placed;		

Phase	Activity	Aspect	Impacts	Mitigation Measures	Compliance with standards	Time frame for implementation
			• Soil contamination from waste material; and • Loss of land capability.	• Storage and use of hydrocarbons should be confined to bunded areas to prevent spillage of hydrocarbons by machines*; • Machinery must be serviced regularly**; and • The backfilled, reprofiled landscape should be top soiled and revegetated to allow free drainage close to the pre-mining conditions.		
Decommissioning and Closure	• Post-closure monitoring.		• Compaction of soil and increased runoff potential; • Reduced infiltration rate, reduced rooting depth (vegetation cover) and increased surface runoff; and • Increased erosion, and consequently sedimentation.	• Only designated access routes are to be used to reduce any unnecessary compaction; • Limit the movement of heavy machinery to roads*; and • If any erosion, contamination, water ponding, AIPs proliferation or impact to the soils, land use or land capability is observed, remediation/rehabilitation actions should be implemented as soon as possible.		
Decommissioning and Closure	• Rehabilitation of areas.	Topography	• Topographical disturbances	• Ensure rehabilitation efforts are complete to rehabilitate the area to its original or better state**.	• NEMA	Decommissioning Phase
Decommissioning and Closure	• Rehabilitation processes/activities including backfilling, topsoiling of mined-out areas and ripping of decommissioned haul road.	Hydropedology	• Sedimentation and siltation of nearby watercourses.	• Reseeding of exposed rehabilitated surfaces should be undertaken to reduce soil evacuation and sedimentation in nearby watercourses; • Prior to vegetation establishment, seeded areas should have temporary silt fences to keep soils from being washed away; and • Ensure rehabilitation efforts are completed effectively**.	• NWA; and • NEMA.	Throughout the Decommissioning Phase
Decommissioning and Closure	• Leakage of oils, fuels and grease from moving vehicles and machinery during backfilling, reprofiling and revegetation activities.		• Contamination of surface water resources leading to deterioration of water quality.	• Disposal of general and other forms of waste should continue to be conducted using clearly marked skip bins which are collected by approved contractors for final disposal to appropriate disposal sites.		
Decommissioning and Closure	• Soil stabilisation and revegetation with natural or indigenous seed mix. Erosion monitoring at rehabilitated, reprofiled and re-vegetated surfaces. Water quality monitoring upstream and downstream of the decommissioning project site.		• Restoration of free drainage to rehabilitated landscapes that suits desired post-closure land use.	• Reseeding of exposed rehabilitated surfaces should be undertaken to reduce soil evacuation and sedimentation in nearby watercourses; • Prior to vegetation establishment, seeded areas should have temporary silt fences to keep soils from being washed away; • Implement wetland rehabilitation measures to restore mined-out wetlands and disturbed channel geometry at haul road crossings; and • Only designated access routes should be used to reduce unnecessary impacts to the undisturbed environment including wetlands.		Two years post-closure

Phase	Activity	Aspect	Impacts	Mitigation Measures	Compliance with standards	Time frame for implementation
Decommissioning and Closure	• Demolition and removal of infrastructure; and • Rehabilitation and closure.	Surface Water	• Siltation of water resources due to increased turbidity from soil erosion.	• Restore the topography to pre-mining conditions as much as is practically possible by backfilling, removing stockpiles and restore the slope gradient and angle of the site; • Clearing of vegetation should be limited to the decommissioning footprint area and immediate revegetation of cleared areas; • Disturbance of soils during infrastructure demolition should be restricted to relevant footprint areas; • Movement of demolition machinery and vehicles should be restricted to designated access roads to minimise the extent of soil disturbance; and • Ensure that the infrastructure (pipelines, fuel storage areas, pumps) are first emptied of all residual material before decommissioning.	• NWA; • GN 704 of the Department of Water Affairs and Forestry, (DWAF) (now Department of Water and Sanitation, (DWS); and • NEMA.	• During the Decommissioning phase; and • Water quality monitoring five years post closure, or until vegetation establishment.
			• Hydrocarbon spillages.	• Ensure that hydrocarbons are managed correctly, and that vehicles and machinery do not spill and are serviced regularly*/**; and • Spillages should be reported*.	• NEMA	Life of Decommissioning Phase
Decommissioning and Closure	• Decommissioning activities	Groundwater	• Groundwater contamination due to incorrect disposal of hazardous, industrial and domestic waste as well as incorrect sewage handling; and • Spillage of hydrocarbons by machines.	• A waste management system will be implemented which will make sure that domestic and hazardous waste, including sewage, generated during decommissioning and closure are disposed of in a manner that will not affect groundwater quality*; • Accidental hydrocarbon spillages will be remediated *in-situ* using appropriate microbial technologies*; • Machinery must be serviced regularly**; and • Sewage will be handled in portable chemical latrines to reduce the risk of contamination*.	• NEMA	Life of Decommissioning Phase
Decommissioning and Closure	• Rehabilitation – rehabilitation mainly consists of reprofiling the landscape via re-vegetation. • Post-closure monitoring, and rehabilitation.	Fauna and Flora	• Increased risk of AIP proliferation without adequate control measures; • Increased erosion, runoff and compaction of soil and consequently sedimentation potential; • Changes to the landscape with subsequent removal of faunal habitats and a decrease in biodiversity and loss of SCC (faunal and floral); and • Potential spillage of hydrocarbons such as oils, fuels, and grease, thus contamination of the soils and surrounding grounds.	• Ensure removal of all AIPs. This can be done manually and if necessary, with a systemic solution; • An exotic and invader control programme/ management plan will be implemented. All disturbed areas will be inspected at least annually (in spring) and any invader species will be eradicated using appropriate control measures*/ ***; • Address areas that have been impacted by erosion, compaction, sedimentation by loosening the soil, and revegetate the area as soon as possible. Disturbed surfaces will be re-vegetated as soon as they become available, by seeding with a seed-mix; • Visual assessments of the site will be conducted on a regular basis to monitor potential soil erosion on site and to assess the status of the vegetation cover on rehabilitated areas*; • Vegetation monitoring should be introduced to ensure good vegetation cover and monitor plant succession and biodiversity*; • The moment disturbed areas become available they must be rehabilitated with a seed mix**;	• NEM: BA; • CARA; • NFA; and • Forestry Laws Amendment Act (Act No. 35 of 2005).	Life of Decommissioning Phase

Phase	Activity	Aspect	Impacts	Mitigation Measures	Compliance with standards	Time frame for implementation
				• Begin with the rehabilitation of the vegetation and replant with indigenous flora identified in vegetation communities, particularly pioneer species; • Animal shelters and habitats will be re-created to encourage new animals, insects and birds into the area*; • The ongoing and long-term commitment to successfully re-establish the vegetation of the opencast areas will establish a habitat that will encourage animal life to return to the rehabilitated land*/**; • Ensure designated access routes and roads are used to reduce any unnecessary compaction and degradation; • Inventory of hazardous waste materials stored on-site should be compiled, and complete removal must be arranged; and • Rehabilitation and Monitoring Plan should be implemented.		
Decommissioning and Closure	• Concurrent rehabilitation (topsoil cover, ripping and vegetation establishment) and monitoring of vegetation establishment.	Wetlands	• Erosion due to rehabilitated areas being exposed to wind and surface water runoff; • Siltation of watercourses leading to deteriorated water quality and altered geomorphology; and • Change in habitat and potential change in species composition.	• Continue with concurrent rehabilitation, and implement wetland rehabilitation measures; • Address areas of AIPs proliferation by utilizing a AIPs Program; • Ensure proper stormwater management designs are in place to ensure no excessive run-off or pooling occurs; • The backfilled, reprofiled landscape should be top soiled and revegetated to allow free drainage close to the pre-mining conditions. • The unusable soil (pebbles, rocks, gravel etc.) must be placed below the topsoil and compacted to prevent increased infiltration; • If erosion has occurred, topsoil should be sourced, replaced, vegetated and shaped to reduce the recurrence of erosion in wetlands; • Only the designated access routes, outside of wetlands, are to be used to reduce any unnecessary compaction of surfaces and therefore increased flow into the wetlands; • Place sediment trapping berms where erosion has occurred; and • Minimise the period of exposed areas to prevent erosion, loss of vegetation and sedimentation within the wetlands. • Use vehicles as little as possible in the wetlands, monitoring should preferable be done on foot; and • Wetland monitoring during the wet season for three years post-closure and report with rehabilitation recommendations if necessary.	• NWA; • NEMA; • DWAF Guidelines for the Delineation of Wetlands (2005); • Wetland Management Series (WRC, 2007); and • NFEPA.	Life of Decommissioning and beyond
Decommissioning and Closure	• Backfilling of the mined excavations with topsoil and unusable soil (pebbles, rocks, gravel etc.) from the screening plants.		• Water quality contamination and deterioration due to an increase in sedimentation and waste material; • Habitat and biodiversity loss as a result of poor water quality; • Water ponding and preferential flow paths; • Siltation of wetlands leading to deteriorated water quality and quantity; and • Change in habitat and potential change in species composition.			
	• Post-closure monitoring.		• Soil compaction, leading to increased runoff and changes to the wetland functionality (e.g., erosion);			

Phase	Activity	Aspect	Impacts	Mitigation Measures	Compliance with standards	Time frame for implementation
			• AIPs proliferation due to changes to the natural landscape, soils and wetlands; • Changes to the habitat, wetland functionality and biodiversity.			
Decommissioning and Closure	• Removal of infrastructure; and • Rehabilitation and closure.	Aquatics	• Siltation of water resources due to increased turbidity from soil erosion; and • Restoration of the pre-mining streamflow regime	• Restore the topography to pre-mining conditions as much as is practically possible by backfilling, removing stockpiles and restore the slope gradient and angle of the site; • Clearing of vegetation should be limited to the Decommissioning footprint area and immediate revegetation of cleared areas is recommended; • Disturbance of soils during infrastructure demolition should be restricted to relevant footprint areas; • Movement of machinery and vehicles should be restricted to designated access roads to minimise the extent of soil disturbance; • Water used during Decommissioning should be kept onsite and not be allowed to freely flow into nearby watercourses; • Ensure the revegetation activities use appropriate indigenous plant species; and • Use of accredited contractors for removal of infrastructure during Decommissioning is recommended; this will reduce the risk of waste generation and accidental spillages.	• NWA; and • NFEPA.	During the Decommissioning Phase
Decommissioning and Closure	• Rehabilitation of the MRA; and • Post-closure and rehabilitation monitoring.	Air Quality	• Poor air quality due to the generation of dust.	• Monitoring of dust levels on site will continue through a network of dust buckets located around the stripping, screening and dumping areas whilst the surface infrastructure is being removed*; • Water truck to operate on haul and access roads & water should contain a binding agent to soak into the soil**; • Apply dust suppressants or binders on exposed areas (in all tipping sites, haul roads, and areas where soil is exposed while the infrastructure is removed from site); • Limit rehabilitation activities to non-windy days (with wind speed ≤ 5.4 m/s), if possible; • Keep the area of disturbance to a minimum and avoid any unnecessary clearing, digging, or scraping, especially on windy days (≥ 5.4 m/s); • Minimise the drop heights when loading onto trucks and at tipping points; • Set maximum speed limits and have these limits enforced; • Rehabilitated landscape should be vegetated; and	• NEMA; • NEM: AQA; and • NEM: AQA National Dust Control Regulation 2013 (GN No. 827 of 2013).	On commencement of the Decommissioning Phase and for the duration of the phase; Throughout the life of mine

Phase	Activity	Aspect	Impacts	Mitigation Measures	Compliance with standards	Time frame for implementation
				• Undertake ambient air quality monitoring to assess the effectiveness of the mitigation measures in place.		
Decommissioning and Closure	• Decommissioning activities.	Visual	• Negative visual impacts.	• Remove all buildings completely*/**; and • Rehabilitate and re-vegetate all the impacted areas*/**.	• NEMA	Decommissioning Phase
Decommissioning and Closure	• Backfilling of the mined excavations with topsoil and waste from the screening plants. • Dismantling and removal of infrastructure. • Concurrent rehabilitation (topsoil cover, ripping, and vegetation establishment). • Post-closure monitoring.	Noise	• Emission of noise from activities.	• Restrict decommissioning activities to daylight hours (06:00 – 18:00); • Regularly service decommissioning related machines and vehicles to ensure noise suppression mechanisms are effective (e.g., installed exhaust mufflers); • Construction vehicles should have buzzer-type reverse alarms (producing band-limited white noise) installed, rather than the conventional beeping type reverse alarms (which produce a tonal sound); • Regulate speed limits on access roads; and • Switch off equipment when not in use.	• NEMA; • National Noise Control Regulations, R.154 of 1992; • Regular Vehicle Inspections in accordance with ECA; and • Noise Control Regulations for the Free State Province, PN.242 of 1997.	Upon commencement of the Decommissioning Phase
Decommissioning and Closure	• Decommissioning activities.	Archaeology	• Disturbance of archaeological and heritage resources.	• Subsequent to the effective management of identified archaeological and heritage resources during construction and operational phases, impacts during the decommissioning and closure of the mine are not expected (i.e. rating not relevant)*; and • Should alternative sites or features of archaeological and heritage significance be made during the decommissioning phase, a qualified archaeologist be contacted for an assessment of the discovery*.	• NHRA	Decommissioning Phase
Decommissioning and Closure	•	Socio-economic	• Downscaling and Retrenchments Phases - Negative impacts that will be associated with job losses at the time that the mine closes.	• Plan, update and implement an integrated Mine Decommissioning, Rehabilitation, and Mine Closure Plan with associated Social Closure Planning five years prior to Mine Closure; • Proactively assess and manage the social and economic impacts on individuals, regions, and economies where retrenchment and/or closure of the Project are certain; • Vaal Sand will implement a SLP that deals with the re-skilling of employees. This will equip them to access job opportunities outside of the mining industry after closure*; • The mine will investigate the possibility of acquiring additional sand resources in the nearby area, thus extending the life of the operation*; and • The mine will sufficiently investigate opportunities for employees to become involved in other mining operations in the nearby area.	• NEMA; • FDDM: Reviewed Final IDP (2020/2021); and • MLM: Reviewed IDP 2020/21.	• Throughout the life of mine

Phase	Activity	Aspect	Impacts	Mitigation Measures	Compliance with standards	Time frame for implementation
				This will be done through liaison with other mining companies as well as the local Department of Labour centre*/**.		
		I&APs	• Positive impacts associated with mine closure and the ceasing of mine related activities.	• Undertake rehabilitation activities to the extent that the area is returned to as close to its original state as possible*; • All surface infrastructure will be dismantled so as not to cause further impact to surrounding residents*: and • Rehabilitation and decommissioning activities will be undertaken in such a manner that they cause minimal disturbance to nearby residents and businesses*.	• NEMA	• Decommissioning Phase
			• Dust creation and noise pollution.	• Water truck to operate on haul and access roads & water should contain a binding agent to soak into the soil**; and • Where possible silencers must be added to machinery**.		• As required

6 Item 1(f): Impact Management Outcomes

Table 6-1 explains the measures to rehabilitate the environment affected by the undertaking of any listed activity.

Table 6-1: Impacts to be Mitigated in their Respective Phases

Phase	Activity	Aspect	Impacts	Mitigation Type	Standard to be Achieved
Establishment	• Site Clearance: Vegetation and topsoil will be removed with a bulldozer and stockpiled along the mined-out strip.	Soil Land Use and Land Capability	• Compaction of soil and increased runoff potential; • Reduced infiltration rate, reduced rooting depth (vegetation cover) and increased surface runoff; • Increased erosion, and consequently sedimentation of wetlands and freshwater bodies; • Impacting agricultural activities in short, medium and long term due to changes in the soil agricultural potential and complete restriction to cattle grazing (current land use); • Soil contamination from spills and leakages; and • It is important to note that the haul road will move as mining progresses through life of mine.	• Concurrent rehabilitation through the life of mine.	• Soil Management in terms of the Chamber of Mines Guidelines for Rehabilitation; and • To prevent the loss of topsoil as a resource.
Establishment	• Construction of a temporary haul road (20 m width) to gain access to the sand mining area. It is important to note that the haul road will move as mining progresses through life of mine.		• Loss of usable soil as a resource – Mining of sand, erosion and compaction; • Soil contamination; and • Loss of usable soil for agriculture – changing the land capability.		
Establishment	• Site clearance: Vegetation and topsoil will be removed with a bulldozer and stockpiled along the mined-out strip.	Hydropedology	• Sedimentation and siltation of nearby watercourses due to erosion of disturbed soils.	• Control through storm water management planning.	• To prevent contamination of watercourses.

Phase	Activity	Aspect	Impacts	Mitigation Type	Standard to be Achieved
Establishment	• Construction of a temporary haul road (20 m width) to gain access to the sand mining area. It is important to note that the haul road will move as mining progresses through LoM.		• Contamination of water resources from general waste, sewage and from spillage and leakage of hydrocarbon fuels, oils and grease.		
Establishment	• Construction of haul road.		• Alteration of channel geometry and fluvial patterns of disturbed river channels	• Control through storm water management planning; and • Rehabilitation through reprofiling and revegetation of affected watercourse geometry.	
Establishment	• Site clearing; • Access and haul road construction; • Establishment of Infrastructure; • Topsoil stockpiling; and • Loading, transport, tipping and spreading of materials; • Use and repair of machinery and vehicles used for site clearance and construction.	Surface Water	• Siltation of water resources due to increased turbidity from dust and soil erosion; and • Water contamination due to leaks or spills of hazardous and hydrocarbon containing material.	• Control through implementation of Storm water management.	To prevent contamination of watercourses.
Establishment	• Site clearing, and preparation by the removal of vegetation and associated habitats and removal of soils; • Movement of vehicles, and heavy machinery; • Construction of infrastructure, including access and haul roads; • Stockpiling of soil; and • Waste management activities, including handling of hydrocarbon chemicals, and transportation of sand.	Fauna and Flora	• Removal of vegetation, basal cover, and thus increasing the potential of loss of topsoil, organic material, and increased erosion potential. • Removal of flora SCC and faunal habitat; • Removal of vegetation communities such as grasslands and wetland vegetation; • AIP proliferation; • Increased runoff potential and consequently sedimentation and compaction of the soil; • Potential spillage of hydrocarbons such as oils, fuels (diesel), and grease, thus contamination of the soils and surrounding grounds; and • Increased dust pollution	• Concurrent rehabilitation through the life of mine.	• To minimise disturbance of natural habitats; and • To minimise the loss of SCC.
Establishment	• Site clearance and vegetation removal.	Wetlands	• Direct loss of wetland areas; • Habitat loss; • Loss of biodiversity; and • Erosion and sedimentation of wetland areas.	• Concurrent rehabilitation through the life of mine.	• To prevent unnecessary impacts on wetlands.
Establishment	• Construction of a temporary haul road (20 m width) to gain access to the sand mining area.		• Fragmentation of wetland areas; • Habitat loss; • Loss of biodiversity; and • Erosion and sedimentation of wetland areas.		

Phase	Activity	Aspect	Impacts	Mitigation Type	Standard to be Achieved
Establishment	• Site clearing; • Access and haul road construction; • Topsoil stockpiling; and • Loading, transport, tipping and spreading of materials.	Aquatics	• Siltation of water resources due to increased turbidity from dust and soil erosion; and • Water contamination due to leaks or spills of hazardous and hydrocarbon containing material.	• Storm water management: Control contamination of receiving waterbodies by consideration of potential contamination sources and strategic Decommissioning to minimize on potential environmental impacts.	• To prevent the onset of erosion and sedimentation of water resources.
Establishment	• Site clearance and vegetation removal; • Placement of the Offices and associated mining equipment; • Construction of the hydrocarbon storage tank and refuelling area; • Establishment of a haul road/tracks; and • Stockpiling of topsoil.	Air Quality	• Poor air quality due to the generation of dust.	• Control through the implementation of mitigation measures in the air quality management plan; and • Ambient air quality monitoring.	• To prevent air pollution.
Establishment	• Site clearance and vegetation removal. • Placement of the Offices and associated mining equipment. • Construction of the hydrocarbon storage tank and refuelling area. • Establishment of a haul road/tracks. • Stockpiling of topsoil.	Noise	• Emission of noise from activities.	• Control through noise management plan and control measures.	• To comply with the definition of ‘noise disturbance’ as described by the National Noise Control Regulations.
Establishment	• Establishment activities.	Heritage	• Damage to or destruction of BGG-001 and BGG-002.	• Avoid identified heritage resources.	• Compliance with the NHRA. • To avoid heritage resources.
Establishment	• All project activities.		• Damage to or destruction of previously unidentified heritage resources.	• Control.	
Establishment	• All project related activities associated with establishment and operations	Socio-economic	• Creation of employment opportunities.	Enhancement measures: • Promotion of employment of local people and compliance with national employment related legislation.	• Compliance with the SLP.
Establishment			• Impacts associated with Population Influx such as increased competition for residential land and other natural resources as well as an increased strain in accessing government services.	Prevention measures: • Discourage in-migration of economic seekers settling in the nearby settlements.	
Establishment			• Opportunities and Capabilities within the Supply Chain.	Enhancement measures: • Promotion of local procurement of goods and	

Phase	Activity	Aspect	Impacts	Mitigation Type	Standard to be Achieved
				services as well as SME capacity development	
Establishment			• Community Health, Safety and Security - Increase in nonsense factors.	Enhancement measures: • Implement an Emergency Prevention, Preparedness and Response Plan; and • Implement the mitigation measures and management plans as proposed in the Traffic Impact Assessment study.	
Establishment	• Site clearing; • Access and haul road construction; • Construction of Infrastructure; • Topsoil stockpiling; and • Loading, transport, tipping and spreading of materials • Transportation of sand; • Refuelling of machinery within the mining area or at the mobile offices; • Concurrent rehabilitation (topsoil cover, ripping and vegetation establishment) and monitoring of vegetation establishment. • Backfilling of the mined excavations with topsoil and waste from the screening plants; • Dismantling and removal of infrastructure; • Rehabilitation (topsoil cover, ripping and vegetation establishment); and • Post-closure monitoring.	Traffic	• Transportation of materials, machinery, mining equipment, storage tanks, mining products will increase the number of heavy vehicles and abnormal load vehicles on public roads which have a potential of increasing road safety risk.	• Control through management and monitoring.	• To regulate traffic.
Operational	• Sand mining.	Topography	• Topographical disturbances.	• Control through effective rehabilitation.	• To prevent topographical disturbance.
Operational	• Mining of sand resources including screening (if required) to approximately 0.4 – 5 m and stockpiled in a separate area.	Soil, Land Use and Land Capability	• Loss of usable soil as a resource – Mining of sand, erosion and compaction; • Soil contamination; and • Loss of usable soil for agriculture – changing the land capability.	• Concurrent rehabilitation through the life of mine.	• Soil Management in terms of the Chamber of Mines Guidelines for Rehabilitation.
Operational	• Transportation of material on haul roads.		• Compaction of soil and increased runoff potential; • Reduced infiltration rate, reduced rooting depth (vegetation cover) and increased surface runoff;		

Phase	Activity	Aspect	Impacts	Mitigation Type	Standard to be Achieved
			• Increased erosion, and consequently sedimentation; and • Soil contamination from spills and leakages.		
Operational	• Refuelling of machinery within the mining area or at the mobile offices; and • Washing plant operation.		• Soil contamination from hydrocarbon waste (lubricants, explosives, and fuels) spills and leakages from leaking diesel tanks as well as vehicles and machinery conducting concurrent rehabilitation and doing maintenance; and • Increased soil compaction and runoff, causing erosion and sedimentation.		
Operational	• Mining of sand resources including screening (if required) to approximately 0.4 – 5 m and stockpiled in a separate area.	Hydropedology	• Disruption of hillslope water flow paths and reduction of flows into rivers, streams and wetland resources.	• Remedy through concurrent rehabilitation; and • Remedy through wetland offsetting.	• To avoid impacts to water resources.
Operational	• Transportation of material on haul roads and refuelling of machinery within the mining area or at the mobile offices.		• Contamination of water resources from general waste, sewage and from spillage and leakage of hydrocarbon fuels, oils and grease.	• Control through monitoring of water quality; • Control through training of personnel on best waste management practices; and • Remedy through concurrent rehabilitation.	
Operational	• Concurrent rehabilitation (topsoil cover, ripping and vegetation establishment) and monitoring of vegetation establishment.		• Restoration of close to natural hydrological responses through concurrent rehabilitation of mined-out landscapes.		
Operational	• Sand Mining; • Stockpiling; • Diesel storage; • Movement of vehicles and mine machinery; • Storage, handling and treatment of hazardous products (including fuel, explosives and oil) and waste; and • Washing plant operation.	Surface Water	• Siltation of water resources due to increased turbidity from dust and soil erosion; and • Water contamination due to leaks or spills of hazardous and hydrocarbon containing material.	• Implementation of the proposed stormwater management plan will control the impacts by mitigating the impacts; • Control by confining movement to designated access and haul roads; and • Monitoring of water quality including	• To avoid impacts to surface water.
Operational	• Storage, handling and treatment of hazardous products (including fuel, explosives and oil) and waste; and • Washing Plant Operation.	Groundwater	• Emergency spill response plan required to handle any unplanned spillages; • Fuel and lubricant storage facilities will be bunded in accordance with SANS specifications to reduce the risk of any leaks or failures; • Sewage will be handled in portable chemical latrines to reduce the risk of contamination; and • Construction/operational machines used during topsoil stripping will be checked, serviced, and maintained to reduce the risk of groundwater contamination*/** (Daily inspection of vehicles and machinery, undertaking of routine and as-required maintenance to prevent breakdowns).	• Control and manage through spill prevention plan.	• To prevent hydrocarbon spillages.
Operational	• Abstraction of water; and • Storing and disposing of water.		• Lowering of groundwater table.	• Manage through compliance to WUL.	• To limit the amount of groundwater abstraction.
Operational	• Vehicle, and heavy machinery movement; • Waste management activities;	Fauna and Flora	• Increased vehicle movement in the area, Increasing the risk of faunal casualties due to road kill; • Increased risk of AIP proliferation without adequate control measures; • Increased dust pollution;	• Concurrent rehabilitation through the life of mine.	• To minimise disturbance of natural habitats; and • To prevent the establishment and manage

Phase	Activity	Aspect	Impacts	Mitigation Type	Standard to be Achieved
	• Maintenance and operation pipeline; • Washing plant operation; and • Processing of sand.		• Increase risk of fire during dry season; • Increased erosion, runoff and compaction of soil and consequently sedimentation potential; • Changes to the landscape with subsequent removal of faunal habitats and a decrease in biodiversity and loss of SCC (faunal and floral); and • Potential spillage of hydrocarbons such as oils, fuels, and grease, thus contamination of the soils and surrounding grounds.		alien invasive vegetation according to the NEM: BA.
Operational	• Mining of sand resources including screening (if required) to approximately 0.4 – 5 m and stockpiled in a separate area.	Wetlands	• Direct loss of wetlands; • Water quality contamination and deterioration; • Habitat loss as a result of poor water quality; • Loss of biodiversity; and • Erosion and sedimentation within the wetlands.	• Concurrent rehabilitation through the life of mine.	• To prevent unnecessary impacts on wetlands.
Operational	• Transportation of material on haul roads.		• Erosion of wetland crossings associated with the haul road; • Accidental spills causing soil and water contamination; • Habitat loss as a result of poor water quality; • Loss of biodiversity; • Siltation of wetlands due to erosion; and • Change in habitat and potential change in species composition		
Operational	• Refuelling of machinery within the mining area or at the mobile offices.		• Water quality contamination and deterioration; • Potential spills may lead to loss of vegetation, causing sedimentation of wetlands, contamination, habitat loss and potential change in species composition; • Habitat loss as a result of poor water quality; and • Loss of biodiversity.		
Operational	• Stockpiling; • Diesel storage; • Movement of vehicles and mine machinery; and • Storage, handling and treatment of hazardous products (including fuel and oil) and waste.	Aquatics	• Siltation of water resources due to increased turbidity from dust and soil erosion; and • Water contamination due to leaks or spills of hazardous and hydrocarbon containing material.	• Implementation of the proposed stormwater management plan will control the impacts by mitigating the impacts.	• To prevent the onset of erosion and sedimentation of water resources.
Operational	• Mining of sand resources including screening; • Transportation of sand; • Refueling of machineries within the mining area or at the mobile offices; • Handling of general and hazardous waste; and • Concurrent rehabilitation (topsoil cover, ripping, and vegetation establishment) and monitoring of vegetation establishment.	Air Quality	• Poor air quality due to the generation of dust.	• Control through the implementation of mitigation measures in the air quality management plan; and • Ambient air quality monitoring.	• To minimise dust emissions and to ensure compliance with National Dust Control Regulations (2013).

Phase	Activity	Aspect	Impacts	Mitigation Type	Standard to be Achieved
Operational	• Operational activities.	Visual	• Negative visual impacts.	• Control through Dust Management Plan.	• To minimise the negative visual impacts caused by operational activities; and • To minimise visual intrusion to nearby receptors.
Operational	• Mining of sand resources including screening (if required); • Washing plant operation; • Transportation of sand; • Refuelling of machinery within the mining area or at the mobile offices; and • Handling of general and hazardous waste.	Noise	• Emission of noise from activities.	• Control through noise management plan and control measures.	• Mitigation measures will assist in keeping noise levels as low as possible to comply with the definition of a 'noise disturbance' as described by the National Noise Control Regulations.
Operational	• Sand mining and other operational activities.	Archaeological and Heritage	• Disturbance to unidentified archaeological and heritage resources.	• Avoid through establishment of 100 m no-go buffer zone; • Minimise through CFP.	• To avoid direct disturbance of heritage resources.
Operational	• Operational activities.	Socio-economic	• Creation of employment - Retaining Workforce and Provision of Skills Development and Training.	Enhancement and control measures: • Implement and continuously update the SLP to ensure maximum benefits to the community; and • Manage through SLP implementation and supporting workers.	• SLP
			• Community Development through the SLP.	Enhancement and control measures: • Implement and continuously update the SLP to ensure maximum benefits to the community.	
			• Impacts associated with decreased community health, safety, and security.	Avoidance/ Prevention: • Through the implementation of hazard assessments and controls.	
		I&APs	• Increased trespassing through the presence of mine employees on site; and • Impacts associated with increased dust and noise pollution on directly adjacent properties.	Control through: • Induction and SLP; • Operating hours; • Use of silencers; and	• To minimise illegal trespassing on adjacent land and minimise dust and noise pollution.

Phase	Activity	Aspect	Impacts	Mitigation Type	Standard to be Achieved
				• Routine maintenance and services.	
Operational	• Transportation of sand; • Refuelling of machinery within the mining area or at the mobile offices.	Traffic	• Transportation of sand and fuel over a 20-year period have a potential of accelerating the deterioration of road conditions.	• Control through management and monitoring.	• To regulate traffic and avoid impacts associated with the transportation of sand.
		Traffic and Safety	• Accidents on site and vehicle and pedestrian accidents.		
Decommissioning	• Concurrent rehabilitation (topsoil cover, ripping and vegetation establishment) and monitoring of vegetation establishment.	Soil, Land Use and Land Capability	• Loss of usable soil as a resource – Erosion and compaction; • Increased AIPs and loss of soil fertility; and • Loss of Land capability	• Concurrent rehabilitation through the life of mine.	• Soil Management in terms of the Chamber of Mines Guidelines for Rehabilitation.
Decommissioning and Closure	• Backfilling of the mined excavations with topsoil and waste from the screening plants.		• Loss of usable soil as a resource – Erosion and compaction; • Soil contamination from waste material; and • Loss of land capability.		
Decommissioning and Closure	• Post-closure monitoring.		• Compaction of soil and increased runoff potential; • Reduced infiltration rate, reduced rooting depth (vegetation cover) and increased surface runoff; and • Increased erosion, and consequently sedimentation.		
Decommissioning and Closure	• Rehabilitation of areas.	Topography	• Topographical Disturbance.	• Control and mange through effective rehabilitation.	• To rehabilitate the area to its original or better state.
Decommissioning and Closure	• Rehabilitation processes/activities including backfilling, topsoiling of mined-out areas and ripping of decommissioned haul road.	Hydropedology	• Sedimentation and siltation of nearby watercourses.	• Remedy through rehabilitation.	• To avoid impacts on water resources.
Decommissioning and Closure	• Leakage of oils, fuels and grease from moving vehicles and machinery during backfilling, reprofiling and revegetation activities.		• Contamination of surface water resources leading to deterioration of water quality.	• Control through monitoring.	
Decommissioning and Closure	• Soil stabilisation and revegetation with natural or indigenous seed mix. Erosion monitoring at rehabilitated, reprofiled and re-vegetated surfaces. Water quality monitoring upstream and downstream of the decommissioning project site.		• Restoration of free drainage to rehabilitated landscapes that suits desired post-closure land use.	• Remedy through monitoring the success of implemented rehabilitation measures; and • Control through post-closure monitoring.	
Decommissioning and Closure	• Demolition and removal of infrastructure; and • Rehabilitation and closure.	Surface Water	• Siltation of water resources due to increased turbidity from soil erosion.	• Storm water management: Control contamination of receiving waterbodies by consideration of potential contamination sources and strategic decommissioning	• To prevent siltation of surface water resources.

Phase	Activity	Aspect	Impacts	Mitigation Type	Standard to be Achieved
				to minimize on potential environmental impacts; and • Water quality monitoring three years after decommissioning as required by legislation or until vegetation is established.	
			• Hydrocarbon spillages.	• Control through surface water monitoring.	• To avoid spillages of hazardous substance into the natural environment.
Operational	• Decommissioning activities.	Groundwater	• Groundwater contamination due to incorrect disposal of hazardous, industrial and domestic waste as well as incorrect sewage handling; and • Spillage of hydrocarbons by machines.	• Control through monitoring.	• To avoid spillages of hazardous substance into the natural environment.
Decommissioning and Closure	• Rehabilitation – rehabilitation mainly consists of reprofiling the landscape via re-vegetation. • Post-closure monitoring, and rehabilitation.	Fauna and Flora	• Increased risk of AIP proliferation without adequate control measures; • Increased erosion, runoff and compaction of soil and consequently sedimentation potential; • Changes to the landscape with subsequent removal of faunal habitats and a decrease in biodiversity and loss of SCC (faunal and floral); and • Potential spillage of hydrocarbons such as oils, fuels, and grease, thus contamination of the soils and surrounding grounds.	• Concurrent rehabilitation through the life of mine.	• To minimise disturbance of natural habitats.
Decommissioning and Closure	• Concurrent rehabilitation (topsoil cover, ripping and vegetation establishment) and monitoring of vegetation establishment.	Wetlands	• Erosion due to rehabilitated areas being exposed to wind and surface water runoff; • Siltation of watercourses leading to deteriorated water quality and altered geomorphology; and • Change in habitat and potential change in species composition.	• Concurrent rehabilitation through the life of mine.	• To avoid unnecessary impacts to wetlands.
Decommissioning and Closure	• Backfilling of the mined excavations with topsoil and unusable soil (pebbles, rocks, gravel etc.) from the screening plants.		• Water quality contamination and deterioration due to an increase in sedimentation and waste material; • Habitat and biodiversity loss as a result of poor water quality; • Water ponding and preferential flow paths; • Siltation of wetlands leading to deteriorated water quality and quantity; and • Change in habitat and potential change in species composition.		
	• Post-closure monitoring.		• Soil compaction, leading to increased runoff and changes to the wetland functionality (e.g., erosion); • AIPs proliferation due to changes to the natural landscape, soils and wetlands; • Changes to the habitat, wetland functionality and biodiversity.		
Decommissioning and Closure	• Removal of infrastructure; and • Rehabilitation and closure.	Aquatics	• Siltation of water resources due to increased turbidity from soil erosion; and • Restoration of the pre-mining streamflow regime	• Storm water management: Control contamination of receiving waterbodies by consideration of potential contamination sources and strategic Decommissioning	• To prevent the onset of erosion and sedimentation of water resources.

Phase	Activity	Aspect	Impacts	Mitigation Type	Standard to be Achieved
				to minimize on potential environmental impacts.	
Decommissioning and Closure	• Rehabilitation of the MRA; and • Post-closure and rehabilitation monitoring.	Air Quality	• Poor air quality due to the generation of dust.	• Control through the implementation of mitigation measures in the air quality management plan; and • Ambient air quality monitoring.	• To minimise dust emissions and to ensure compliance with National Dust Control Regulations (2013).
Decommissioning and Closure	• Decommissioning activities.	Visual	• Negative visual impacts.	• Control through Dust Management Plan; and • Control through effective rehabilitation.	• To minimise the negative visual impacts caused by decommissioning activities.
Decommissioning and Closure	• Backfilling of the mined excavations with topsoil and waste from the screening plants. • Dismantling and removal of infrastructure. • Concurrent rehabilitation (topsoil cover, ripping, and vegetation establishment). • Post-closure monitoring.	Noise	• Emission of noise from activities.	• Control through noise management plan and control measures.	• To comply with the definition of 'noise disturbance' as described by the National Noise Control Regulations.
Decommissioning and Closure	• Decommissioning activities/ mine closure	Socio-economic	• Downscaling and Retrenchments Phases - Negative impacts that will be associated with job losses at the time that the mine closes.	Preventative and Management: • Timeous development of integrated Mine Decommissioning, Rehabilitation, and Mine Closure Plan with associated Social Closure Planning and ongoing consultation of stakeholders about mine closure; and • Avoid through implementation of SLP (during operations).	• To avoid local community, collapse due to closure of the mine.
			• Positive impacts associated with mine closure and the ceasing of mine related activities.	• Control through effective rehabilitation.	• To enhance positive impacts.
		I&APs	• Dust creation and noise pollution.	• Minimise through dust management plan; and • Control through operational hours.	• To minimise noise levels and dust generation created by decommissioning activities.

7 Item 1(g) Financial Provision

To complete the Financial Provision Assessment there are several tasks which were undertaken. These tasks are discussed below.

7.1 Item (g)(i): Determination of the Amount of Financial Provision

7.1.1 Item (g)(1)(a): Describe the Closure Objectives and the Extent to Which They Have been Aligned to the Baseline Environment Described under the Regulation

The objective of the Rehabilitation Plan is to ensure activities associated with the infrastructure located within the mining footprint area will be designed to prevent, minimise or mitigate adverse, long-term, environmental and social impacts and create a self-sustaining ecosystem. The following objectives have been identified thus far:

- Comply with the relevant local and national regulatory requirements;
- Re-establishment of the pre-mining land capability to allow for a suitable and sustainable post mining land use;
- Maintain and minimise impacts to the functioning / unimpacted wetlands and waterbodies within the area;
- Implement progressive rehabilitation measures where possible (i.e. areas used during the establishment phase);
- Prevent soil and surface water contamination; and
- Maintain and monitor the rehabilitated areas.

7.1.2 Item (g)(1)(b): Confirm Specifically that the Environmental Objectives in Relation to Closure have been Consulted with Landowner and Interested and Affected Parties

A Public Participation Process was undertaken during January / February 2021 for the Scoping Phase. I&APs were consulted, all comments, concerns raised and received during the commenting period were addressed and included in this report in Section 10 of Part A. The Rehabilitation and Closure Plan (RCP) has been made available for public review and comment together with this Draft EIA Report (please refer to Appendix O). All comments received that pertain to the RCP will be recorded in the final report.

7.1.3 Item (g)(1)(c): Provide a Rehabilitation Plan that Describes and Shows the Scale and Aerial Extent of the Main Mining Activities, Including the Anticipated Mining Area at the Time of Closure

The mining site will be rehabilitated concurrently meaning that as a new strip is mined the previous mined section will be rehabilitated. The rehabilitation process is summarised as follows:

- The open mined strip will be backfilled with stones and pebbles removed from the strips;
- The site will be re-shaped, levelled and ripped to ensure there is no compaction;
- The topsoil will be spread over the site and the site vegetated with indigenous vegetation;
- All waste will be removed from site and disposed of accordingly; and
- The site will be monitored for the success of the rehabilitation.

Table 7-1 provides a summary of the rehabilitation actions and plans which need to be followed. A Rehabilitation Plan has been compiled for the proposed MREA and is provided in Appendix O.

Table 7-1: Summary of Rehabilitation and Closure Actions

Copper Sunset Mining Area	Aspect	Rehabilitation Measures
Surface Infrastructure	Aesthetic quality	• Dismantle and demolish surface infrastructure with no beneficial re-use; • Decontaminate demolished steel infrastructure for off-site salvage/disposal; and • Dispose concrete and related demolition at an appropriate facility.
	Soil and Biodiversity and Wetlands	Once infrastructure have been demolished, removed and disposed of at waste site and/or transferred to a third party, the following rehabilitation measures will be implemented: • Shape and profile area to be free draining; • Rip all compacted infrastructure pads to alleviate compaction; and • Implement general surface rehabilitation on footprint areas as per detailed rehabilitation plan.
	Fauna	All fences within the area that are not associated with protecting rehabilitated sites should be removed post closure.
	Surface Water, Wetlands and Topography	Shape and profile rehabilitated areas to be free draining.
Access Roads	Biodiversity	Implement/improve erosion measures along rehabilitated roads; • Ensure AIP management is undertaken for areas that are rehabilitated to limit the spread of AIP's on site; • Shape the area to facilitate drainage; • Rip roads in order to create suitable conditions for vegetation establishment; and • Ensure re-instatement of vegetation cover on rehabilitated roads as per the end Land Use Plan (LUP).
	Soil	Clean up material, such as hydrocarbons if spilled.
	Social	Continue consultation with I&APs and stakeholders to ensure that their needs and expectations are considered.
	Topography	Shape and profile rehabilitated areas to be free draining as informed by detailed post-mining rehabilitation designs.
	Fauna	All fences within the area that are not associated with protecting rehabilitated sites should be removed post closure.

7.1.4 Item (g)(1)(d): Explain why it can be Confirmed that the Rehabilitation Plan is Compatible with the Closure Objectives

The rehabilitation plan has been compiled in support of the primary closure objective, which is to rehabilitate the mining area to as close as possible to a natural state, or to land use that conforms to the generally accepted principles of sustainable development. A Rehabilitation Plan has been compiled for the proposed Project area and is provided in Appendix O.

7.1.5 Item (g)(1)(e): Calculate and State the Quantum of the Financial Provision Required to Manage and Rehabilitate the Environment in Accordance with the Applicable Guideline

The closure cost calculation is aligned with the Financial Provision Regulations, 2015 (GN R. 1147) as amended. Two calculations have been provided. The first is an estimate for the first year of mining and the second estimate is for the LoM. Both of the costings have been updated to include the current provision that was calculated for 2020.

The financial provision estimate based on the DMRE calculation model is **R2,969.354 (Current and First Year of Mining)** and **R4,677,168 (Current and LoM)**. This includes P&Gs (12%) and a Contingency cost (10%) as per the DMRE Guideline document. The DMRE cost includes VAT at 15%. The calculations for these are in Table 25-1 and Table 25-2 in Part A.

7.1.6 Item (g)(1)(f): Confirm that the Financial Provision will be Provided as Determined

Copper Sunset has made provision for closure as legally required. A liability assessment update will continue to be undertaken annually to ensure the financial provision is in line with the closure cost.

8 Item 1(h) Monitoring Compliance and Performance Assessment

Copper Sunset will be responsible for the implementation of all monitoring of mitigation and management measures, as well as compliance with the EMPr. The recommended monitoring for the identified impacts is detailed in the subsections below. The Applicant will keep a record of all environmental monitoring taken on site. A summary of the environmental monitoring to be undertaken is included in Table 8-12.

8.1 Item 1(h)(i): Monitoring of Impact Management Actions

A monitoring programme is essential as a management tool to detect negative impacts as they arise and to ensure that the necessary mitigation measures are implemented. The monitoring programmes have been discussed below.

8.1.1 Soils, Land Use and Land Capability

The soils monitoring plan guidelines should be put in place to ensure the best chance of rehabilitative success. Monitoring should be done in terms of:

- EIA Regulations, 2014 (as amended);
- NEMA, 1998 (Act No. 107 of 1998);
- NEM: WA, 2008 (Act No. 59 of 2008);
- CARA, 1983 (Act No. 43 of 1983); and
- Results of chemical analyses of soils obtained must be measured against the SSV and reference samples and clearly demonstrate that the selection of guideline values is consistent with the principles of the Framework.

The Mine Manager and the Environmental Practitioner are responsible to report on results of the monitoring program. Internal monitoring reports should be required, reporting on the progress of the state of the monitoring and rehabilitation programme. This should be completed after each external monitoring report. Table 8-1 describes the monitoring plan which should be followed from the establishment phase through to the decommissioning and monitoring phase. The table includes each element of monitoring together with the frequency of monitoring and person responsible thereof.

Table 8-1: Soil Monitoring Plan

Monitoring Element	Requirement	Frequency	Responsibility
• Inspection of stripping depths; • Inspection of topsoil stockpiles to check degradation and or erosion; • Inspection of soil surfaces before replacing soil to ensure that pre mined topography is emulated; • Random inspection of soil thickness on rehabilitated sections (minimum of 300 mm); • Fertility analysis and amelioration procedures prior to re-vegetation; • Evaluating and readjusting the Rehabilitation Plan; and	• Assessment of rehabilitated soil thickness (soil depth) and soil characteristics by means of auger observations using a detailed grid; • A post-mining land capability map based on soil thickness and characteristics; • A proposed post-mining land use map; • Erosion occurrences; • Soil fertility analyses; and • Soil infiltration/bulk density testing to ensure rehabilitation success.	Progressive monitoring must take place biannually (two-yearly)	• The Mine Manager and Environmental; and • Soil Scientist.

Monitoring Element	Requirement	Frequency	Responsibility
• Implement a Rehabilitation Audit to evaluate the rehabilitation success for mine closure.			

8.1.2 Hydropedology

Periodic monitoring of wetlands conditions should be undertaken to detect any impacts on the size and wetness status of the wetlands (refer to the Wetland Report: Digby Wells, 2021). Baseflow monitoring upstream and downstream of the Copper Sunset MREA on the Vaal River and the Taaibosspruit is required to detect any changes in flow regimes. Flow monitoring points are provided in Table 8-2 below.

Table 8-2: Flow Monitoring Localities

Monitoring Point	Latitude	Longitude
Vaal River Upstream	-26.773083	28.014469
Vaal River Downstream	-26.735082	27.993810
Taaibosspruit Upstream	-26.813703	27.921453
Taaibosspruit Downstream	-26.754495	27.875265

8.1.3 Surface Water

The current monitoring plan provides a programme to detect any surface water impacts likely to occur during the establishment, operation and decommissioning phases of the proposed Project and subsequent rehabilitation of the site when mine operations cease. The surface water monitoring plan is summarised in Table 8-3 below.

Table 8-3: Surface Water Monitoring Plan

Monitoring Element	Comment	Frequency	Responsibility
Water quality	Water quality monitoring should continue to sample points in the Vaal and Taaibosspruit Rivers (Figure 11-16; Part A). Parameters should include but not limited to; pH, Electrical Conductivity, Bicarbonates, Iron, Calcium, Magnesium, Potassium, Nitrates, Ammonia, Total dissolved solids, Suspended Solids; and Turbidity.	Quarterly monitoring during operation and decommissioning; (hydrocarbons can be done on a quarterly basis). Monitoring needs to carry on at least 3 years after the project has ceased, as is standard or best practice to detect residual impacts.	Environmental Officer

8.1.4 Fauna and Flora

Table 8-4 describes the monitoring plan that is to be implemented from the establishment phase through to monitoring after decommissioning. The program includes each element, frequency of monitoring and the person responsible thereof.

Monitoring should be done in terms of:

- Appendix 6 of the NEMA EIA Regulations, 2014, (as amended);
- NEMA, 1998 (Act No. 107 of 1998);
- NEM: WA, 2008 (Act No. 59 of 2008) (NEM: WA);
- National Forest Act, 1998 (Act No. 84 of 1998) (NFA); and
- Biodiversity Plan v1.0 Free State Province (2016).

Table 8-4: Fauna and Flora Monitoring Plan

Monitoring Element	Frequency	Responsibility
Alien Invasive Management	Annually during the wet season for the first three years after rehabilitation.	Environmental Officer
Red Data listed fauna and flora	Monitored every 6 months from rehabilitation	Field Specialist
Flora and Fauna Monitoring	Monitored every 6 months from rehabilitation	Field Specialist

8.1.5 Wetlands

Table 8-5 describes the monitoring plan which should be followed from the establishment phase through to the decommissioning and monitoring phase. The table below includes each

element of monitoring together with the frequency of monitoring and person responsible thereof.

The monitoring programme are based on the following points:

- External monitoring should commence from prior to the establishment phase to ensure baseline information regarding soils and vegetation and to monitor any changes thereof;
- Throughout the establishment phase, external monitoring should be done annually for soils and vegetation, preferable right after the rainy season (March to May);
- Throughout the operational and decommissioning phases, bi-annual (twice a year) external monitoring of wetlands, preferable one survey after the rainy season (March to May) and one after the dry season (July to September);
- Monitoring should be done in terms of:
    - Appendix 6 of the NEMA EIA Regulations, 2014, (as amended);
    - NEMA;
    - NEM: WA; and
    - CARA.
- The Mine Manager is responsible to report on results of the monitoring program; and
- Internal monitoring reports should be required, reporting on the progress of the state of the monitoring and rehabilitation programme. This should be completed after each external monitoring report.

As the proposed MREA is comprised largely of wetland habitat, it is recommended that the WET-Health and WET-Ecoservices tools should be used to re-evaluate PES and eco-services on a bi-annual (twice a year) basis by a suitably qualified wetland specialist for the duration of the establishment phase, and annually for the duration of the operational phase. Upon closure and decommissioning, annual monitoring should take place for another three years to ensure no emerging impacts are identified, which may need to be addressed.

Table 8-5: Wetlands Monitoring Plan

Monitoring Element	Comment	Requirement	Frequency	Responsibility
Wetland area size.	Implementation of intervention measures.	Wetland update report and recommendations for impact mitigation, if any.	Once every year.	Environmental Officer.

Monitoring Element	Comment	Requirement	Frequency	Responsibility
Wetland health (PES, EIS and ES)	Implementation of intervention measures.	Wetland update report and recommendations for impact mitigation, if any.	Once every year.	Environmental Officer.
Wetland physical attributes.	Report any irregularities to the Environmental Officer for assessment and mitigation measures.	Take photos of wetland areas and record any impacts seen.	Every three months and after storm events.	Mine Environmental Manager.

8.1.6 Aquatics

An aquatic biomonitoring programme has been developed for the monitoring and preservation of the aquatic ecosystems assessed for the Project. This programme is aimed at better determining the ecological health of the ecosystems, as well as to act as an early detection tool for impacts that might severely affect the expected aquatic biota in the associated riverine systems.

Table 8-6 outlines the aquatic monitoring methods to be undertaken at the monitoring points on a bi-annual basis by a qualified aquatic ecologist. It is recommended that an additional site immediately below the MRA along the Vaal River is monitored to determine potential impacts stemming from the Project. The annual programme comprises of a single survey during the dry season (or low flow season) for the Project area and a single survey during the wet season (or high flow) at the monitoring points indicated. This will determine the PES for the assessed aquatic ecosystems which will further determine whether the proposed Project is impacting the associated aquatic ecology and to what extent.

Table 8-6: Biomonitoring Programme

Method and Aquatic Component of Focus	Details	Goal/Target
Water Quality: *In-situ* water testing focusing on temperature, pH, conductivity and oxygen content.	Water quality should be tested on a biannual basis at each monitoring site to determine the extent of change from baseline results.	No noticeable change from determined baseline* water quality for each respective season
Habitat Quality: • Instream and riparian habitat integrity; and	• The application of the IHI should be done for the Vaal River and the Taaibosspruit systems; and	The Ecological Category determined for each assessed site must be improved for the watercourses under study);

Method and Aquatic Component of Focus	Details	Goal/Target
• Availability/suitability of macroinvertebrate habitat at each monitoring site.	• The IHAS must be applied at each monitoring site prior to sampling.	and the baseline IHAS scores should improve.
Aquatic Macroinvertebrates: Aquatic Macroinvertebrate assemblages must be assessed biannually.	This must be done through the application of the latest SASS5, incorporated with the application of the MIRAI as outlined in this Aquatic Study.	The baseline SASS5 scores should not noticeably deteriorate; and Baseline Ecological Categories should not be allowed to drop in category for each assessed site.
Fish: Fish assemblages must be assessed biannually	Sampling of fish must be undertaken by utilising various methods such as cast nets in addition to the standard electro-narcosis techniques for the inaccessible deeper sites.	Baseline Ecological Categories should not be allowed to drop in category for each assessed site. The main goal for the Project must be to conserve the expected sensitive and conservation important species.

8.1.7 Air Quality

It is recommended that the historic dust monitoring network be revived and maintained from the establishment phase through the LoM. In addition, it is recommended that a continuous real-time fine particulate monitor with the ability to measure both PM_{10} and $PM_{2.5}$ be commissioned onsite. The frequency of monitoring should ensure diurnal, seasonal, annual, and inter-annual records are captured to inform management decision-making. Table 8-7 shows the pollutants to be measured and the frequency of monitoring as required by law.

Table 8-7: Air Quality Monitoring Plan

Method	Frequency	Target	Responsibility
Monitoring in accordance with: • EN14097 for PM2.5; • EN12341 for PM10; and • American Standard Test Method ASTM	• Continuous PM_{10}, $PM_{2.5}$ monitoring; and • Monthly dustfall monitoring on-site and at surrounding receptors.	Particulate pollutants from the mining operation must be kept below the South African standards: • GN R 1210 of 24 December 2009 • GN R 486 of June 2012; and • GN R 827 of 1 November 2013.	A designated Environmental Officer (EO) onsite to collect ambient air quality data and submit it to an independent consultant for interpretation and reporting.

1739-98 in SANS1137:2019			

8.1.8 Noise

Although the noise impacts of the proposed project on the sensitive receivers are minor to negligible, it is recommended that a monitoring programme be implemented to record the future noise impacts (increases and/or decreases in noise levels) throughout the LoM (Table 8-8). Components to be included in the proposed monitoring plan are discussed below:

- Noise monitoring is to be conducted throughout all phases (Establishment, Operation, and Decommission); and
- Quarterly, long-term (48 hrs) noise measurements must be conducted at the prescribed locations (including historical monitoring sites).

Table 8-8: Noise Monitoring Programme

Monitoring Element	Comment	Frequency	Responsibility
Noise Monitoring	Noise monitoring must be undertaken in line with the requirements of SANS 10103:2008 on-site, and at selected receivers.	Quarterly Noise Monitoring	Environmental Officer

8.1.9 Social

A summary of the aspects of monitoring are provided in the Table 8-9 below. The key social aspects which form the monitoring programme are:

- Local employment targets;
- Local procurement targets;
- Community and workforce health, safety, and security;
- Grievance registration; and
- SLP targets.

Table 8-9: Summary of Aspects to be Monitored

Monitoring Element	Comment	Frequency	Responsible Departments
Local employment targets	Review against set local employment targets	Quarterly	

Monitoring Element	Comment	Frequency	Responsible Departments
Local procurement targets	Review the numbers of local businesses engaged in programs either individuals or through joint ventures	Quarterly	Human Resources Community Development
Community and Workforce health, safety, and security;	On-going identification, management, monitoring of H&S risks	Daily	Health and Safety Community Development
SLP implementation	Conduct annual audits against set targets for implementation	Annually	Human Resources Community Development and Community Development
Grievance registration	Track and monitor the number of grievances registered on the matter	Daily/ weekly	Community Development

8.1.10 Traffic

A summary of the aspects of monitoring are provided in the Table 8-10 below.

Table 8-10: Traffic Monitoring Programme

Monitoring Element	Comment	Frequency	Responsibility
Heavy vehicle and abnormal loading	Ensure heavy vehicles and abnormal load vehicles compliance with limitations on vehicle dimensions and axle and vehicle masses and safety standards set out in the Road Traffic Act, 1996 (Act No 93 of 1996) and the National Road Traffic Regulations, 2000 for vehicle using a public road.	Daily monitoring during establishment, operation and decommissioning.	Safety Officer

8.1.11 Rehabilitation and Closure

The purpose of monitoring is to ensure that the objectives of rehabilitation are met, and that the rehabilitation process is followed. The physical aspects of rehabilitation should be carefully

monitored during the operational phase as well as during the progress of establishment of desired final ecosystems. The following items should be monitored continuously:

- Alignment of actual final topography to agreed planned landform;
- Depth of topsoil stripped and placed;
- Chemical, physical and biological status of replaced soil;
- Erosion status;
- Vegetation basal cover;
- Vegetation species diversity; and
- Proportion of land that has been fully rehabilitated.

The post-closure monitoring programme is detailed in Table 8-11 below.

Table 8-11: Post-Closure Monitoring Programme

Component / Aspect	Monitoring		Performance / success criteria	Corrective action
	Methodology	Frequency / duration		
Soil Management				
Soil fertility	• Undertake a visual assessment and delineate areas where poor vegetation growth has occurred; • Submit soil samples to an accredit soil laboratory to conduct soil fertility analysis.	Yearly until soil fertility supports the final land use or for at least 2 years post closure.	• Soil analysis results comply with remediation targets at a 95-percentile level; and • Self-sustaining vegetation establishment.	• Apply amelioration where required as informed by sampling undertaken.
Erosion	• Conduct a visual assessment to determine areas of potential erosion; and • Undertake field investigations, fixed point photography to document the significance of the erosion occurring on site	Twice yearly for at least 2 years post closure.	• No evidence of significant erosion; and • Good vegetation cover and species composition.	As required: • Re-shape areas to ensure that they are free draining; • Establish vegetation on bare patches; and • Repair and stabilisation of erosion gullies and sheet erosion.
Post-mining end land use	• Assess activities completed, as well as legal and related documentation completed and signed-off; and • Ensure rehabilitation measures are aligned to the LUP.	Once off, at mine closure.	• Area has been rehabilitated to an aesthetic quality not to compromise potential tourism; • Transfer land back to Seriti; • Legal and zoning issues have been addressed; and • Vegetation re-establishment, cover and composition are sustainable.	• Refer back to end land use approach and refine measures to be implemented in achieving the desired final land use.
General site status	• Conduct a visual assessment with respect to compliance of the afore-mentioned closure measures and to ensure that the site is aesthetically neat and tidy, and that no health or safety risks exist on site.	Once-off following implementation of rehabilitation measures.	• Waste/rubble free sites.	As required: • Clear remnant rubble and dispose of at a registered landfill site.
Terrestrial- and Aquatic Ecosystem Health Management				
Vegetation establishment	• Determine whether re-established vegetation communities are on a trajectory of achieving a stable self-sustaining community dominated by species typical of the climax-species present in the adjacent areas: ▪ Inspect rehabilitated areas to assess vegetation establishment and provide for early detection of erosion in recently planted/seeded areas (monthly); ▪ Undertake fixed point photography at specific points at the rehabilitated sites to obtain a long term directly comparable method of determining changes in the landscape; and ▪ Conduct evaluation of rehabilitated areas by means of field inspections. During these assessments'	Yearly for at least 3 years post closure.	• Limited to no erosion; and • Self-sustaining vegetation ecosystem.	As required: • Re-vegetate poorly established rehabilitated areas; • Re-seed bare patches; and • Apply additional fertiliser and/or organic matter, depending on the condition of the vegetation and the initial organic material application.

Component / Aspect	Monitoring		Performance / success criteria	Corrective action
	Methodology	Frequency / duration		
	measurement of growth performance and species abundance will be carried out to determine: i. Plant basal cover and species abundance in the grassed areas. Estimates of vegetation canopy and ground cover as well as height; ii. Distribution, growth and survival of woody species; iii. Dominant plant species (woody and herbaceous); iv. Presence of exotic invasive species, and degree of encroachment; v. Browsing or grazing intensity; vi. Notes regarding erosion, such as, type, severity, degree of sediment build-up; and vii. Species composition and richness.			
Invasive alien species	• Visually inspect areas where invasive species have been previously eradicated and areas prone to invasive species (e.g. eroded/degraded areas, along drainage lines, etc.); and • Undertake surveys on relevant sites where bush encroachment has previously been identified to determine the status quo of invasive vegetation.	Yearly for at least 2 years post closure.	• Limit and/or prevent declared Category 1, 2 and 3 invader species establishing; • Minimise extended threat to ecosystems, habitats or other species; • Increase the potential for natural systems to deliver goods and services; and • Minimise economic or environmental harm or harm to human health.	• Revisit mitigation measures; and • Continue control and management.

8.2 Item 1(h)(ii): Monitoring and Reporting Frequency

The monitoring and reporting frequency for the monitoring programmes per environmental aspect are supplied in Table 8-12.

8.3 Item 1(h)(iii): Responsible Persons

The responsible persons for the respective monitoring programmes are detailed in Table 8-12.

8.4 Item 1(h)(iv): Time Period for Implementing Impact Management Actions

The time period for implementing impact management actions has been provided for in Table 8-12.

8.5 Item 1(h)(v): Mechanism for Monitoring Compliance

Table 8-12 sets out the monitoring and management programme of environmental impacts for the Copper Sunset Project.

Table 8-12: Monitoring and Management of Environmental Impacts

Source Activity	Aspect	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
All activities throughout the Project	Soil, Land Use and Land Capability	• Erosion status; • Compaction; • Increased runoff; • Soil contamination; and • Vegetation cover.	• Assessment of rehabilitated soil thickness (soil depth) and soil characteristics by means of auger observations using a detailed grid; • A post-mining land capability map based on soil thickness and characteristics; • A proposed post-mining land use map; • Erosion occurrences; • Soil fertility analyses; • Soil infiltration/bulk density testing to ensure rehabilitation success; • A final post-mining rehabilitation performance assessment must be completed with information that is adequate for closure applications.	• The Mine Manager and the Environmental Practitioner should ensure soil contamination monitoring on site after large spills have occurred and random inspections where hydrocarbons are stored and applied; • Environmental Practitioner to give training to sub-contractors and all workers on the operational procedures and mitigation measures; • The Mine Manager and the Environmental Practitioner should be responsible to determine effectiveness of erosion control structures; and • Soil Scientist to evaluate the rehabilitated areas for appropriate soil depth, fertility, topography and vegetation cover.	• Progressive monitoring must take place biannually (two-yearly).
	Surface water	• Water quality	• Water quality should be monitored quarterly. The specific monitoring elements are discussed in Section 8.1.3 above.	• Environmental Officer	• Quarterly monitoring during operation and decommissioning; (hydrocarbons can be done on a quarterly basis); and • Monitoring needs to carry on at least 3 years after the project has ceased, as is standard or best practice to detect residual impacts.
	Fauna and Flora	• Alien Invasive Management.	• During the operational phase the presence of AIPs should be detected and monitored. An active programme of weed management, to control the presence and spread of invasive weeds, will need to be instituted so that encroaching weeds (from edge effects and fragmentation) are controlled by means appropriate to the species. This should run for the life of the mine and five years after rehabilitation.	• Environmental Officer.	• Annually during the wet season for the first three years after rehabilitation.
		• Red Data listed fauna and flora.	• All protected and Red Data plant and animal species must be marked prior to any site clearing.	• Field Specialist.	• Should be monitored every 6 months from rehabilitation.

Source Activity	Aspect	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 monitoring.	• This will be closely linked to the flora monitoring to enable scientific conclusions and comparisons. To successfully monitor faunal and floral biodiversity with a Grassland biome, a solid baseline (pre-establishment) will be established through the first round of monitoring. This needs to be supplemented with regular site visits to compile a reasonable comparison between the identified faunal communities present and faunal communities found in the same areas during various stages of the operation of the proposed Project. It is recommended that this monitoring be carried out through the life of the mine and concurrently during rehabilitation.	• Field Specialist.	• Should be monitored every 6 months from rehabilitation.
	Wetlands	• Wetland deterioration.	• Wetland area size	• Environmental Officer.	• Once every year.
			• Wetland health – PES, EIA and ES		• Once every year.
			• Wetland physical attributes	• Mine Environmental Manager.	• Every three months and after storm events.
	Aquatic Ecology	• Water quality.	• Water quality should be tested on a biannual basis at each monitoring site to determine the extent of change from baseline results.	• Qualified aquatic ecologist.	• Bi-annual basis: comprises of a single survey during the dry season for the Project area and a single survey during the wet season at the monitoring points indicated.
		• Habitat quality.	• The application of the IHI should be done for the Vaal River and the Taaibosspruit systems; and • The IHAS must be applied at each monitoring site prior to sampling.		
		• Macroinvertebrates.	• This must be done through the application of the latest SASS5, incorporated with the application of the MIRAI as outlined in the Aquatic Study.		
		• Fish assemblages.	• Sampling of fish must be undertaken by utilising various methods such as cast nets in addition to the standard electro-narcosis techniques for the inaccessible deeper sites.		
	Air quality	• Deterioration to the ambient air quality.	The following aspects should be monitored: • Dust deposition; and • PM10 and PM2.5. Particulate pollutants from the mining operation must be below the South African standard: • GN No. 1210 of 24 December 2009; • GN R 486 of June 2012; and • GN R 827 of 1 November 2013. Monitoring must be done in accordance with: • EN14097 for $PM_{2.5;}$	• A designated Environmental Officer must collect ambient air quality data and submit to an independent consultant for interpretation.	• Monthly dustfall monitoring on site and at surrounding receptors; and • Continuous PM_{10}, $PM_{2.5}$ monitoring.

Source Activity	Aspect	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
			• EN12341 for PM_{10}; and • American Standard Test Method ASTM 1739-98 in SANS1137:2019.		
	Noise	• Noise disturbance	Noise monitoring must be in line with the requirements of SANS 10103:2008 on-site, and at selected receivers.	• Monitoring is to be conducted by a designated Environmental Officer.	• Quarterly
	Heritage	• Heritage resources	A Watching Brief must be implemented during site establishment in the event that heritage resources are discovered. Identified heritage resources must be avoided and a 100 m buffer implemented	• Environmental Manager	• Daily
	Traffic	• Increased traffic	Ensure heavy vehicles and abnormal load vehicles compliance with limitations on vehicle dimensions and axle and vehicle masses and safety standards set out in the Road Traffic Act, 1996 (Act No 93 of 1996) and the National Road Traffic Regulations, 2000 for vehicle using a public road.	• Safety Officer	• Daily monitoring during establishment, operation and decommissioning
		• Access roads	• Machinery operators and drivers must be made aware of the possible safety hazards that they could pose.	• Site/ Environmental Manager	• Daily
		• Use of hydrocarbons	• Daily inspections of machinery must be undertaken, and spill trays will be placed under the machinery to collect any hydrocarbon leaks and spillages in the event it is required. • Should spillages occur, the soil must be cleared and disposed of to a hazardous waste landfill site.	• Site manager	• Daily
		• Ablution facilities	• The contents of the chemical toilets must be emptied on a regular basis, at least weekly, to prevent spillages.	• Site manager	• Weekly
		• Domestic waste	• Bins will be placed at various places around the Project area to collect the domestic waste and will be disposed of at a registered waste handling facility.	• Site manager	• Weekly
All activities throughout the Project	Audit Reports	• EMPr Conditions	• To determine compliance to EMPr conditions.	• Independent Environmental Compliance Specialist / Closure Specialist.	• Annual Environmental Audits.
		• Financial Provision Update.	• To ensure that the mine is compliant with the financial provision regulations and that there is sufficient funding provided by the mine for closure and rehabilitation cost and meets the requirements as stipulated in Regulation 11 (1) of the New Financial Provisioning Regulations.		• Annually and must be audited by an independent auditor.

9 Item 1(i): Indicate the Frequency of the Submission of the Performance Assessment/ Environmental Audit Report

In accordance with the EIA Regulations (2014), as amended, an external independent Environmental Audit will be undertaken every year. The Environmental Audit Report will be submitted to the DMRE and other relevant authorities and stakeholders where required.

10 Item 1(j): Environmental Awareness Plan

The sub-sections below outline the Environmental Awareness Plan for the proposed Copper Sunset Project. The Environmental Awareness Plan is primarily a tool to introduce and describe the requirements of the range of environmental and social plans for the proposed Project during the life of the Project.

10.1 Item 1(j)(i): Manner in which the Applicant Intends to Inform his or her Employees of any Environmental Risk which may Result from their Work

Copper Sunset has developed Environmental, Health and Safety Policies. The Environmental Policy will be communicated to all personnel, whether they are contractors or permanent staff, and the policy will be erected at the mining site.

Employees will receive general environmental awareness training on specific items contained in this EMP, as well as on Best Possible Environmental Practices (BPEP).

10.1.1 Specific Environmental Training

Environmental Awareness Training will be undertaken to make employees and contractors aware of the following:

- The significant social and environmental impacts of their work activities and the environmental benefits of improved personal performance;
- Their roles and responsibilities in achieving conformance with the environmental policy and procedures and with the requirements of the environmental management system;
- The potential consequences of departure from specified operating procedures; and
- Possible archaeological finds action steps for mitigation measures, surface collections, excavations and communication routes to follow in the case of a discovery.

The guidelines for training are summarised below (Table 10-1), which are in line with the ISO 14001:2004 guidelines with regards to training and awareness creation.

Table 10-1: Training Guidelines

Types of Training	Audience	Purpose
Raising awareness of the strategic importance of environmental management	Senior management	To gain commitment and alignment to the organisation's environmental policy.
Raising general environmental awareness	All employees	To gain commitment to the environmental policy and objectives and to instil a sense of individual responsibility.
Skill enhancement	Employees with environmental responsibilities	To improve performance in specific tasks.
Compliance	Employees whose actions can affect compliance	To ensure that regulatory and internal requirements for training are met.

The training programme will consist of the following elements:

- Identification of employee training needs;
- Development of a training plan to address defined needs;
- Verification of conformance of the training programme to regulatory or organisational requirements and standards;
- Training of target employee groups;
- Documentation of training received; and
- Evaluation of training received.

This training will be undertaken on an annual basis for all personnel, together with the annual required induction programmes. The training material provided will be subject to annual review, based on issues such as incidents, accidents, new legislative requirements, modified processes and environmental and social aspects identified from time to time. This training is to be carried out and coordinated internally by Copper Sunset. Copper Sunset will, therefore, develop the capabilities and support mechanisms necessary to achieve its environmental policy, objectives and targets. In addition, an Emergency Preparedness Plan will be communicated and trained to all site personnel during the induction process.

10.1 Item 1(j)(ii): Manner in which Risks will be Dealt with in Order to Avoid Pollution or the Degradation of the Environment

Unplanned events may occur during the Project that may have potential impacts which will need mitigation and management measures implemented. The unplanned events that may happen at the Project site and the proposed mitigation plan are listed in **Error! Reference source not found.**. An Emergency Response Plan has been developed and is the approach

used by Copper Sunset to respond to risks that may pollute or degrade the environment during the establishment, operational and closure and rehabilitation phases.

Table 10-2: Unplanned Events, Risks and their Management Measures

Unplanned event	Potential Impact	Mitigation/ Management/ Monitoring
Spillage from moving machinery.	Water and soil contamination	• Machines must be checked and maintained regularly and serviced at designated service bays; • Access roads and haul roads must be maintained regularly; • Ensure emergency clean-up response plans are in place and that hydrocarbon spill kits must be available on-site at all locations where hydrocarbon spills could take place; • If a spill occurs, it is to be cleaned up immediately (spill kits) and for major spills should be reported to the authorities; • Contractors must ensure that all employees are aware of the procedure for dealing with spills and undergo training on site; and • Contaminated soils must be disposed in a registered and licensed waste facility.
Erosion, sedimentation and loss of soil due to flash floods		• Implement concurrent rehabilitation; • Rip rehabilitated areas to 300 mm to increase infiltration rate and improve soil aeration before re-seeding; • Re-seed and re-vegetate the area directly after topsoil has been replaced and landscaped; and • Make use of sediment traps to prevent sediment entering watercourses.
Hazardous material spillage		• An emergency response plan and spill kits should be in place and accessible to the responsible monitoring team in case of pipeline bursts. The Material Safety Data Sheets (MSDS) should be kept on site for the Life of Mine for anytime reference in terms of best practice guidelines for handling, storage and disposal of materials.
Hydrocarbon spillage from vehicles		• If leak occurs from vehicle, place drip trays below the leak;

Unplanned event	Potential Impact	Mitigation/ Management/ Monitoring
		• All vehicles are to be serviced on concrete areas and off site; and • Machines must be parked upon hard parking surfaces and checked daily for leaks.
Infrastructure malfunction leading towards dirty water spillage or spontaneous combustion	Habitat destruction and contamination	• All infrastructure, machinery and associated setups are to be serviced and checked throughout the project life cycle; • All staff are to be informed about potential hazards and consequently prepared for malfunctioning; • Protocols are to be induced at every phase of the project life cycle; and • If such hazards were to incur, the appropriate authorities are to be notified and the incident recorded.
Excess dust pollution	Poor air quality	• Excess dust in mining areas is mitigated via various methods and are site specific. The recommended methods for this site would be spraying of water, tackifiers and soil stabilisers that do not harden the soils.
Extreme wind erosion event		• Minimise exposed areas prone to erosions to avoided source(s) during such episode. • Conduct mining and concurrent rehabilitation in phases
Increased antisocial behaviours associated with presence of mine followers such as prostitution, illegal gambling, illegal shebeens, drug uses, etc.	Social issues	• Collaborate with the relevant government offices and partners to manage the increase in antisocial behaviours.
• Potential for accidental spillage of hazardous materials such as fuel (heavy fuel oil or diesel), lubricants, sewerage etc. along transport routes or at proposed infrastructure. • Improper management and disposal of hazardous materials	Contamination and poor air quality (social impacts)	Develop and implement the following industry standard procedures and protocols: • Spill Prevention, Control and Containment Plan • Waste Management Plan • Emergency Preparedness and Response Plan • Traffic Management Plan

Unplanned event	Potential Impact	Mitigation/ Management/ Monitoring
during establishment, operation and closure of the mine that could result in water resource contamination. • Land-disturbing activities that may result in increased dust emissions. • Project related traffic along the Transport Corridor that may be sources of fugitive dust emissions, and combustion emissions leading to higher levels of air pollution		
Encountering unidentified *in situ* remnants of historical built environment resources during the implementation of the Project.	Damage or destruction of heritage resources generally protected under Section 34 of the NHRA	Establish Project-specific CFP as a condition of authorisation. Refer to Section 16, Part A (cultural Heritage) for more detailed recommendations.
Accidental exposure of fossil-bearing material implementation of the Project.	Damage or destruction of heritage resources generally protected under Section 35 of the NHRA	
Accidental exposure of *in situ* archaeological material during the implementation of the Project.		
Accidental exposure of *in situ* burial grounds or graves during the implementation of the Project.	Damage or destruction of heritage resources generally protected under Section 36 of the NHRA.	
Accidental exposure of human remains during the implementation of the Project.		

11 Item 1(k): Specific Information Required by the Competent Authority

The financial provision for the environmental rehabilitation and closure requirements of mining operations is governed by NEMA, as amended, which provides in Section 24P that the holder of a mining right must make financial provision for rehabilitation of negative environmental impacts. The financial provision will continue to be reviewed annually. The assumptions, uncertainties and gaps in knowledge provided by specialists are presented in Section 21, Part A and conditions of authorisation and approval of the EMP to be considered by the Competent Authority are presented in Section 22.2 (Part A). Table 11-1 presents the list of information requested by the DMRE in the scoping acceptance letter received on 17 May 2021, together with relevant reference for proof.

Table 11-1: Information Requested by the DMRE

Information required	Reference in the Report
h) The total footprint of the proposed development	Part A, Section 3
i) Should a WUL be required, proof of application for licence needs to be submitted	Part B, Section 4.8
j) Possible impacts and effects of the development on the vegetation ecology with regard to lowland-highland interface in the locality should be indicated	Part A, Section 12 and Appendix G
k) The impacts of the proposed facility on avifauna and bats must be assessed	Appendix G
l) Information on services required on site, e.g. sewage, refuse removal, water and electricity. Who will supply these services and has confirmation of capacity been obtained?	Part A, Section 5.2.5
m) A construction and operational EMPr to include mitigation and monitoring measures.	Part B, Section 5 and Section 8
n) Should blasting be required, appropriate mitigation measures should be provided.	Not applicable.
8. The EIA should include the A3 size locality maps of the area and illustrate the exact location of the proposed development. The maps must be of acceptable quality and as a minimum, have the following attributes:	Appendix B: Plans

Information required	Reference in the Report
• Maps are relatable to one another; • GPS Co-ordinates; • Indicate alternatives; • Scale and Vegetation types of the study area.	
You are requested to submit four copies of the EIA report and EMPr and at least one electronic copy (USB flash drive) of the complete EIA and EMPr report to the Regional Office	To be done during final submissions
You are also instructed to determine the final provision for the proposed project in line with the Financial Provisioning Regulations, 2015 read together with section 24P of the NEMA.	Part A, Section 25 and Appendix O.

12 Undertaking

The EAP herewith confirms: -

- the correctness of the information provided in the reports;
- the inclusion of comments and inputs from stakeholders and I&APs;
- the inclusion of inputs and recommendations from the specialist reports where relevant; and
- the acceptability of the Project in relation to the finding of the assessment and level of mitigation proposed.

Signature of the Environmental Assessment Practitioner:	 Claire Wannenburgh
Name of Company:	Digby Wells Environmental
Date:	July 2021

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Appendix A: EAP CV and Qualifications

Appendix B: Plans

Plan 1: Land Tenure

Plan 2: Regional Setting

Plan 3: Local Setting

Plan 4: Infrastructure Layout

Plan 5: LoM

Plan 6: Land Type

Plan 7: Land Use

Plan 8: Floodlines for the 1:50-year and 1:100-year Flood Events

Plan 9: Regional Vegetation

Plan 10: Wetland Delineation

Plan 11: Aquatic Sampling Points

Plan 12: Composite Map

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Appendix C: PP Chapter

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Appendix D: Soil, Land Use and Land Capability Impact Assessment

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Appendix E: Hydropedological Assessment

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Appendix F: Surface water Impact Assessment

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Appendix G: Fauna and Flora Impact Assessment

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Appendix H: Wetlands Impact Assessment

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Appendix I: Aquatics Impact Assessment

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Appendix J: Air Quality Impact Assessment

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Appendix K: Noise Impact Assessment

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Appendix L: Heritage and Palaeontology Impact Assessment

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Appendix M:Social Impact Assessment

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Appendix N: Traffic Impact Assessment

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Appendix O: Rehabilitation and Closure Assessment