Environmental Management Programme Addendum Report:

Clearing of Diamondiferous Material from Buffalo Camp, Kimberley

Report Prepared for

De Beers Consolidated Mines Ltd

Report Number 483962/01

DMR Ref. Number: NC 30/5/1/2/2/142 MR

Report Prepared by

srk consulting

October 2015

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De Beers Consolidated Mines Ltd

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October 2015

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Executive Summary

De Beers Consolidated Mines Ltd (De Beers) is the largest diamond producer in South Africa with mining operations in Venetia and Voorspoed and surface diamond recovery in Kimberley.

De Beers has appointed SRK Consulting (South Africa) (Pty) Ltd (SRK) to compile an EMPR Addendum Report, compiled in terms of the Mineral and Petroleum Resources Development Act 28 of 2002 (MPRDA) and MPRDA Regulations, for the removal of diamondiferous material from the portion of the Buffalo Camp in the Mining Right Area to the north of Kimberley Mines.

De Beers has an approved EMPR to mine and process ore for a Mining Right Area. An EMPR Addendum (this document) has been compiled to incorporate removal of diamondiferous material from the portion of the Buffalo Camp in the Mining Right Area.

The purpose of this Addendum Report is to ensure that the potential impacts of the removal of the diamondiferous material from the site are identified and addressed, and mitigation (and optimisation) measures are effectively implemented to avoid and/or minimise negative impacts and maximise positive impacts. The EMPR Addendum Report, therefore, is a tool that ensures that De Beers allocates resources and assigns roles and responsibilities in a manner which incorporates the management measures for the proposed activities on the site.

Potential impacts were identified by considering the planned project activities and each of the environmental aspects as discussed in Section 3 and determining how the activities may interact with the environmental aspects to result in a change in the baseline environment.

Based on the professional experience of the environmental consultants, the following key environmental issues – potential negative impacts and potential benefits – were identified:

- **Soil and land capability** – potential disturbance and loss of the soil profile and land capability, noting that the activities include the removal of the diamondiferous material deposited on the site many years ago;
- **Air Quality** – dust generation from e.g. material handling and movement of heavy vehicles, with associated potential impacts to human health and vegetation;
- **Noise** – potential impact of noise on surrounding receptors, but noting the location of the site in an uninhabited area. Noise generated from the project is unlikely to affect any off-site receptors;
- **Groundwater** - Groundwater is generally 20-30 m below surface and is of poor quality with a medium aquifer at 30-60 m of improved groundwater quality. Potential impacts on groundwater resources are highly unlikely;
- **Surface Water** – Diamondiferous material within 100 m of the wetland feature on the western boundary of the site will not be removed. As there are no other natural surface water features on site, potential impacts on surface water resources are highly unlikely;
- **Vegetation** – potential loss of floral habitat, floral biodiversity, Species of Conservation Concern and protected floral species noting that the vegetation type on site is listed as *Least Threatened* and no Critical Biodiversity Areas or Ecological Support Areas will be affected;
- **Faunal** – potential loss of faunal habitat, faunal diversity, protected species and migratory corridors noting that the site is not likely to support a large diversity of faunal species due to historical disturbance and current anthropogenic activities on and surrounding the site;
- **Socio-economic** – The socio-economic impact is not expected to be significant. Although the illegal miners at Buffalo Camp will no longer benefit from the mining of diamondiferous material,

and it is acknowledged that preventing this mining may reduce household income of surrounding communities, it (illegal mining) is an illicit activity;

- **Heritage** - potential impacts on heritage and archaeological resources noting the highly disturbed nature of the site; and
- **Visual Character and Sense of Place** – altered sense of place and visual quality caused by earthworks, scarring and associated infrastructure.

The majority of the potential impacts will be localised and of low intensity, as the activities will take place within De Beers' Mining Right Area and the activities will only occur until the diamondiferous material has been cleared from site, i.e. over the short term.

The EMP details the management and control measures to be implemented to minimise potential negative impacts and enhance potential positive impacts. The project will be subject to the environmental management principles and procedures set out in the approved EMPR (and any approved Addendums). This EMPR Addendum Report should therefore be read in conjunction with the approved EMPR.

Profile and Expertise of EAPs

SRK Consulting (South Africa) (Pty) Ltd (SRK) has been appointed by De Beers Consolidated Mines (Pty) Ltd (De Beers) to compile an Environmental Management Programme (EMP) Addendum Report in terms of the Mineral and Petroleum Resources Development Act 28 of 2002, as amended, (MPRDA) and the MPRDA Regulations.

SRK Consulting comprises over 1 400 professional staff worldwide, offering expertise in a wide range of environmental and engineering disciplines. SRK's Cape Town environmental department has a distinguished track record of managing large environmental and engineering projects and has been practising in the Western and Northern Cape since 1979. SRK has rigorous quality assurance standards and is ISO 9001 accredited.

The qualifications and experience of the key individual practitioners responsible for this project are detailed below.

Project Director: Christopher Dalgliesh, BBusSc (Hons); MPhil (EnvSci)

Certified with the Interim Board for Environmental Assessment Practitioners South Africa (CEAPSA)

Chris Dalgliesh is a Partner at SRK Consulting and the Head of the Environmental Department in Cape Town. He has over 22 years of experience as an environmental consultant working on a broad range of EIA, auditing, environmental planning and management, public consultation and environmental management system projects. Chris's experience includes managing and co-ordinating major EIAs throughout Southern Africa and South America in the mining, energy, land-use planning and development, water and waste management, and industrial sectors.

Project Consultant: Scott Masson, BSc (Hons) (EnvMan); MLA (L.Arch.)

Certified with the Interim Board for Environmental Assessment Practitioners South Africa (CEAPSA) and Professionally Registered with the South African Council for the Landscape Architecture Profession

Scott Masson is an Environmental Consultant and has been involved in the environmental and landscape architectural field for the past 6 years. His expertise includes Visual Impact Assessments, Environmental Impact Assessment, Environmental Management Plans and Environmental Control Officer work, Integrated Water and Waste Management Plans, environmental planning and sensitivity studies; and landscape architectural planning and design. Scott is a Certified Environmental Practitioner of South Africa and is a registered Professional Landscape Architect with the South African Council of the Landscape Architecture Profession.

Statement of SRK Independence

Neither SRK nor any of the authors of this Report have any material present or contingent interest in the outcome of this Report, nor do they have any pecuniary or other interest that could be reasonably regarded as being capable of affecting their independence or that of SRK.

SRK has no beneficial interest in the outcome of the assessment which is capable of affecting its independence.

Disclaimer

The opinions expressed in this report have been based on the information supplied to SRK De Beers. SRK has exercised all due care in reviewing the supplied information, but conclusions from the review are reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information and does not accept any consequential liability arising from commercial decisions or actions resulting from them. Opinions presented in this report apply to the site conditions and features as they existed at the time of SRK's investigations, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this Report, about which SRK had no prior knowledge nor had the opportunity to evaluate.

Applicant Details

DMR Reference No	NC 30/5/1/2/2/142 MR
Name of Applicant	De Beers Consolidated Mines (Pty) Ltd
Registration No.	1888/000007/07
Postal Address	Kimberley Mines PO Box 10191 Beaconsfield 8315
Physical Address	Molyneaux Road Beaconsfield Kimberley 8315
Contact Person	Sara Sparks (Environmental Superintendent)
Telephone	+27 53 838 7274
Fax	086 623 7389
Email	Sara.Sparks@debeersgroup.com

Surface Rights Holders

Farm / Erf Name	Portion	Surface Title	Extent (hectares)				
			Total	Petra (Transferred)	Petra (Proposed Transfer)	De Beers (Final)	Petra (Final)
Alexandersfontein 123	Portion	7211/1899	453.1807	30.2644	-	422.9163	30.2644
Benauwdheidfontein 124	Portion	4117/1891	1030.4030	143.4887	56.9984	829.9159	200.4871
Bultfontein 80	Portion	7211/1899	188.7062	107.9529	10.5400	70.2133	118.4929
Dorstfontein 77	Portion	7211/1899	1429.1424	81.3911	32.5958	1315.1555	113.9869
Kenilworth Estate 71	Portion	3313/1888	355.6382	-	-	355.6382	-
Erf 6489	-	737/1959	25.6971	-	-	25.6971	-
Dutoitspan 119	Portion	41835/1891	377.3979	15.7511	222.4829	139.1639	238.234
Rietpan 79	-	4480/1893	131.7792	-	-	131.7792	-
Rooifontein 211	-	41835/1891	1.1179	-	1.1179	-	1.1179
Vooruitzicht 81	Erven	-	-	-	-	-	-
Erf 9851	Remainder	8935/1903	4.5890	-	-	4.589	-
Erf 9852	-	176/1941 (21)	0.9642	-	-	0.9642	-
Erf 9852	-	176/1941 (14)	0.0004	-	-	0.0004	-
Erf 5045	Portion	176/1941 (13)	-	-	-	-	-
Erf 4815	-	127/1960	98.6625	-	-	98.6625	-
Erf 4812	Remainder	176/1941 (2)	115.3028	-	-	115.3028	-
Erf 5045	Portion	-	108.8566	-	-	108.8566	-
Erf 5024	Portion of Remainder	176/1941 (10)	38.5341	-	-	38.5341	-

Note: *The table above provides the title deed information for which De Beers holds surface rights, as well as the first phase transfer of surface rights to Crown Resources (Pty) Ltd Kimberley Underground Venture (Petra) and the proposed surface rights transfer in a second phase.*

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Acronyms and Abbreviations

CTP	Combined Treatment Plant
De Beers	De Beers Consolidated Mines Ltd
DMR	Department of Mineral Resources
EAP	Environmental Assessment Practitioner
EMP	Environmental Management Programme
EMPR	Environmental Management Programme Report
FEL	Front-end Loader
GGP	Gross Geographic Product
GN	Government Notice
IAP	Interested and Affected Parties
IBA	Important Bird Area
L/s	Litres per Second
mbgl	Metres below ground level
Mg/L	Milligrams per Litre
MPRDA	Mineral and Petroleum Resources Development Act 28 of 2002
MRA	Mining Right Area
MSDS	Material Safety Data Sheet
NCDENC	Northern Cape Department of Environment and Nature Conservation
NCNCA	Northern Cape Nature Conservation Act 9 of 2009
NFA	National Forests Act 84 of 1998
NHRA	National Heritage Resources Act 25 of 1999
Petra	Crown Resources (Pty) Ltd Kimberley Underground Venture
SAHRA	South African National Heritage Resources Agency
SAS	Scientific Aquatic Services
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern
SRK	SRK Consulting (South Africa) (Pty) Ltd

Glossary

Aquifer	An underground body of water.
Biodiversity	The diversity, or variety, of plants, animals and other living things in a particular area or region. It encompasses habitat diversity, species diversity and genetic diversity
Diamondiferous material	Material potentially containing diamonds from kimberlite ore.
Environment	The external circumstances, conditions and objects that affect the existence and development of an individual, organism or group. These circumstances include biophysical, social, economic, historical and cultural aspects.
Environmental Impact Assessment	A process of evaluating the environmental and socio-economic consequences of a proposed course of action or project.
Environmental Management Programme	A description (in an EMPR) of the means by which (the environmental specification for) achieving environmental objectives and targets during all stages of a specific proposed activity.
Environmental Management Programme Report	A document containing the Environmental Management Programme as well as other supporting or supplementary information in compliance with the requirements of the MPRDA and the MPRDA Regulations, 2004.
Eutrophic	Rich in mineral and organic nutrients
Fauna	The collective animals of a given region.
Floors	Deposits of mined (diamondiferous) material laid out in lines to weather.
Flora	The collective plants growing in a geographic area.
Heritage Resources	Refers to something, e.g. a building, an area, a ritual, etc. that forms part of a community's cultural legacy or tradition and is passed down from preceding generations.
Life of Mine	The time in which the ore reserves of a mine will be extracted.
Mining Right	A right to enter upon and occupy a specific piece of ground (in South Africa) for the purpose of working it for the extraction or collection of minerals.
Mitigation measures	Design or management measures that are intended to minimise or enhance an impact, depending on the desired effect. These measures are ideally incorporated into a design at an early stage.
Specialist study	A study into a particular aspect of the environment, undertaken by an expert in that discipline.
Tailings	Tailings comprise a coarse and fine fraction; the fine fraction is historically known as slimes or fine residue deposits and the coarse fraction as coarse residue deposits. These are the materials left over after the process of separating the valuable fraction from the uneconomic fraction of an ore. Tailings are distinct from overburden, which is the waste rock or materials overlying an ore or mineral body that are displaced during mining without being processed.

1 Introduction

1.1 Background to the Project

De Beers Consolidated Mines (Pty) Ltd (De Beers) is the largest diamond producer in South Africa with mining operations in Venetia and Voorspoed and surface diamond recovery in Kimberley.

The Department of Mineral Resources (DMR) converted De Beer's old order Mining Right at Kimberley Mines in terms of the Mineral and Petroleum Resources Development Act 28 of 2002, as amended, (MPRDA) on 7 May 2010 (NC 30/5/1/2/2/142 MR). An Environmental Management Programme Report (EMPR) was compiled for Kimberley Mines and subsequent amendments and addendums to the EMPR have been approved through the MPRDA. A consolidated document comprising the approved EMPR and addendums was compiled into a single report (Clean Stream Environmental Services, 2009) as per the requirements of the MPRDA and MPRDA Regulations Government Notice (GN) R527.

De Beers has appointed SRK Consulting (South Africa) (Pty) Ltd (SRK) to compile an EMPR Addendum Report, in terms of the MPRDA and MPRDA Regulations, for the removal of diamondiferous material from the portion of the Buffalo Camp in the Mining Right Area (MRA) to the north of Kimberley Mines (see Figure 1-1).

1.2 Brief Project Overview

De Beers intends to remove diamondiferous material from an old 'Floors' area (see Figure 1-1) which has been illegally mined (by third parties) over a period of time and poses a safety, health and security risk to the company. The diamondiferous material occurs within the remnants of kimberlite floors which were deposited over 100 years ago across approximately 70 ha. The area under consideration is located in De Beers' MRA in the conservation area known as Buffalo Camp (see Figure 1-1).

De Beers has an approved EMPR to mine and process ore for the MRA. An EMPR Addendum (this document) has been compiled to incorporate removal of diamondiferous material from the portion of the Buffalo Camp in the MRA (the site).

1.3 Purpose of the Report

This document (Addendum Report) is an addendum to De Beers' approved EMPR and should be read as such. The purpose of this addendum is to ensure that the potential impacts of the removal of the diamondiferous material from the site are identified and addressed, and mitigation (and optimisation) measures are effectively implemented to avoid and/or minimise negative impacts and maximise positive impacts. The EMPR Addendum Report, therefore, is a tool that ensures that De Beers allocates resources and assigns roles and responsibilities in a manner which incorporates the management measures for the proposed activities on the site (discussed in Section 2).

1.4 Structure of this Report

This report describes the proposed activities and their biophysical and socio-economic context, presents the Impact Assessment and sets out the management measures. The report consists of the following sections:

Section 1: Introduction

Provides an introduction and background to the proposed project and outlines the purpose of this document and the assumptions and limitations applicable to the study.

Section 2: Project Description

Describes the location and current status of the site and provides a brief summary of the surrounding land uses as well as background to, motivation, and description of, the proposed project.

Section 3: Description of the Affected Environment

Describes the biophysical and socio-economic characteristics of the affected environment against which potential project impacts are assessed.

Section 4: Environmental Impact Assessment

Assesses the potential impacts of the project utilising SRK's proven impact assessment methodology.

Section 5: Environmental Management Programme

Details the management and control measures to be implemented to minimise potential negative impacts and optimise potential positive impacts during the Operations Phase and Decommissioning/Closure Phase.

Section 6: Financial Provision

Explains the quantum of financial provision for the project.

Section 7: Conclusion

Summarises the recommendations of the EMPR Addendum Report.

1.5 Assumptions and Limitations

As is standard practice, this report is based on a number of assumptions and is subject to certain limitations. These are as follows:

- The Scope of Work is confined to (activities on) De Beers property, i.e. the MRA within Buffalo Camp (the site);
- Information provided by De Beers and specialists is assumed to be accurate and correct;
- SRK's assessment of the significance of impacts of the proposed activities on the affected environment has been based on the assumption that the activities will be confined to those described in Section 2. If there are any substantial changes to the project description, impacts may need to be reassessed;
- At the time of the specialists' field visit, the identified diamondiferous material deposits in the MRA portion of Buffalo Camp weren't observed to be as extensive as depicted in the current layout presented in Figure 1-1. The specialists subsequently confirmed that, provided all recommended mitigation measures are implemented, the impact significance rating associated with removal of this material will remain the same; and
- De Beers will, in good faith, implement the agreed mitigation measures identified in this report. To this end, it is assumed that De Beers will commit sufficient resources and employ suitably qualified personnel.

Notwithstanding the above, SRK is confident that these assumptions and limitations do not compromise the overall findings of this report.

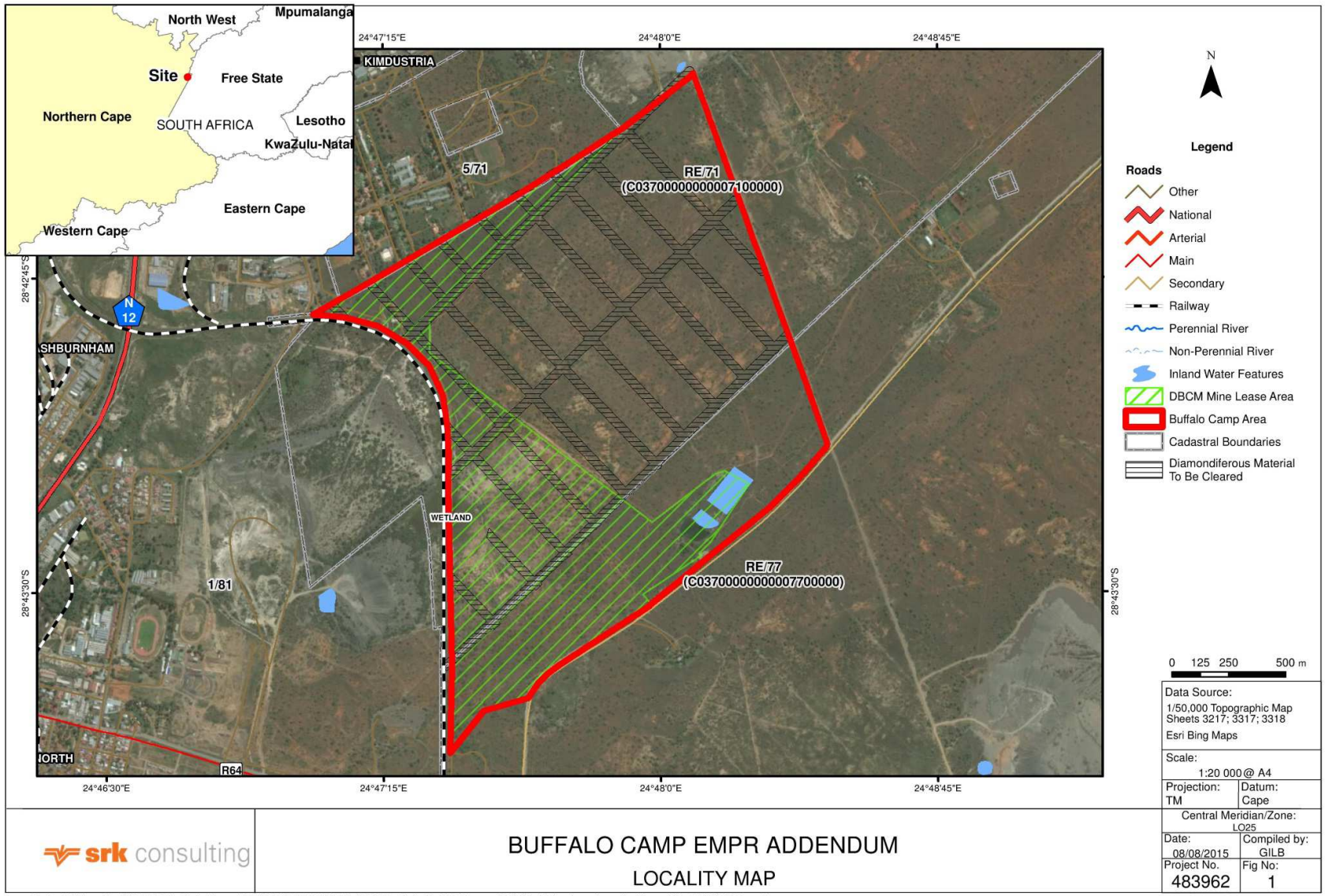

Figure 1-1: Locality Map of Buffalo Camp

2 Project Description

2.1 Description of the Project Area

2.1.1 Site Description

Buffalo Camp is a conservation area owned by De Beers, originally used to provide habitat and grazing for a tuberculosis-free herd of buffalo. The herd has subsequently been relocated to another camp.

The western portion of Buffalo Camp falls within De Beers' MRA (see Figure 1-1).

As the diamondiferous material was deposited over 100 years ago, the vegetation has re-established and the site can now be described as savannah grassland with scattered thorn trees – Kimberley Thornveld (see Figure 2-1). A number of gravel roads traverse the site.

The diamondiferous material on the site is only identifiable from the remnants of illegal mining activities - linear excavations causing scarring (see Figure 2-2). In these areas, litter and artisanal mining equipment are also indicators of illegal mining.

srk consulting	DE BEERS EMPR ADDENDUM REPORT VEGETATION	Project No. 483962

Figure 2-1: Vegetation at Buffalo Camp

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Figure 2-2: Evidence of Illegal Mining

2.1.2 Surrounding Land Use

The site is located approximately 2 km north-east of the urban centre of Kimberley adjacent to the residential suburb of Kenilworth. Kimberley is the economic centre of the region, and the administrative seat of the Frances Baard District Municipality and the Sol Plaatje Local Municipality.

The closest residential areas are the suburbs of Kenilworth (north), Cassandra (~1 km south), and Moghul Park (~1.2 km west) (refer to Figure 1-1). A railway line runs adjacent to the site on the western boundary, and a gravel road to Samaria along the south-eastern boundary provides access to the site.

The R64 regional road to Boshof (Hull Street) is located to the south of the site. Kimdustria is located north of the site beyond the suburb of Kenilworth.

The Kenilworth Tailings Resource is located to the north-east of the site, and the Stadium Tailings Resource and the Stadium Retreated Tailings Resource are located to the west of the site between the railway line and Moghul Park. These resources are all within De Beers' MRA. A gravel road from the Kenilworth Tailings Resource to the Combined Treatment Plant (CTP) at Kimberley Mines runs along the eastern boundary of the site. The predominant activity beyond Buffalo Camp (east) is extensive dryland agriculture (stock farming).

A reservoir is located on the Buffalo Camp property.

Buffalo Camp is not arable due to shallow soils, relatively low rainfall and limited water available for irrigation purposes.

2.2 Proponent's Project Motivation

The diamondiferous material at Buffalo Camp has been subjected to illegal mining over a period of time, posing health, safety and security risks to De Beers. De Beers spends approximately R150 000 per month to keep trespassers out of Buffalo Camp and other De Beers' properties.

De Beers proposes to remove the diamondiferous material to prevent the illegal mining of this material, and to eliminate associated health, safety and security risks to the company.

2.3 Project Description

The recovery method for diamondiferous material from kimberlite ore in the beginning of the 20th century included the formation of 'floors' in areas surrounding the mines. When the mining of the soft, near-surface kimberlite (yellow-ground) diminished, the harder "blue-ground" was laid out in lines to weather. The weathered material was then crushed before being washed to produce a heavy mineral concentrate. The flooring-and-washing system was abandoned when more efficient direct methods for treatment of the kimberlite ore were introduced.

De Beers would like to remove diamondiferous material from an old floors area from the portion of the Buffalo Camp in the MRA which has been subjected to illegal mining (by third parties) over a period of time. The diamondiferous material occurs within the remnants of the kimberlite floors which were deposited over 100 years ago across approximately 70 ha. Removal of the diamondiferous material will require the stripping of vegetation which has re-established in the area subsequent to deposition of the material.

The diamondiferous material will be removed by bulldozer to a depth of approximately 300 - 800 mm in 50 m wide strips (see Figure 1-1) and loaded into 30 - 50 tonne dump trucks using a front end loader (FEL). The material will be hauled approximately 6 km to the De Beers CTP and stockpiled for processing if and when it is deemed appropriate to feed the material to the CTP. A portion of the gravel haul route has been constructed over the Buffalo Camp area and meets the Samaria gravel road which then joins the R64 tar road to the De Beers CTP.

The removal of the diamondiferous material will take approximately 4 - 6 months depending on the availability of earthmoving equipment.

3 Affected Environment

This chapter provides a brief description of the biophysical and socio-economic environment in the area surrounding Buffalo Camp.

3.1 Biophysical Environment

3.1.1 Topography and Soils

Buffalo Camp is located on a continental plateau with a regional gradient towards the south. The surrounding landscape has been significantly altered by mining operations with tailings dumps now regarded as permanent features in the Kimberley landscape, visible from great distances.

Shallow soils (Hutton Sands) overly a shale/dolerite substrate which is exposed in places. Due to the relatively low rainfall the soils are mainly eutrophic.

3.1.2 Climate

Kimberley has a semi-arid climate: summers are hot with occasional rain and winters are mild and very dry. Average midday temperatures range from about 11°C in June to more than 25°C in January, with maximum temperatures occasionally reaching 40°C in summer. Most rain falls during the summer months (November to February). Mean annual precipitation is 420 mm per year but much less rain has fallen in recent years. Prevailing winds are from the north-west for most of the year with a monthly average wind speed between 1.1 m/s and 4.8 m/s. Frost can occur in the winter months when the temperature falls below - 5°C.

3.1.3 Air Quality

In arid areas such as Kimberley, particulate matter (e.g. dust) generated by exposed soils (sparse vegetation) and the movement of vehicles contributes to elevated dust levels. Air quality in the vicinity of Buffalo Camp is affected by wind-blown dust from resource stockpiles and traffic along gravel and haul roads, while dust from the surrounding farms is also quite significant.

3.1.4 Noise

Buffalo Camp is located on the outskirts of Kimberley. Background noise in the area is generated by vehicles travelling on the surrounding roads (e.g. N12 west and R64 south), industrial activities to the north-west and the railway line to the west.

3.1.5 Surface Water

Buffalo Camp falls within the Lower Vaal Water Management Area. No natural watercourses traverse the site. A wetland is located on the site's western boundary adjacent to the railway line (Figure 1-1). A reservoir is located on the Buffalo Camp property.

3.1.6 Groundwater

Most of the site is underlain by a fractured rock aquifer with an average yield ranging between 0.5 and 2.0 L/s. In the far south-eastern part of Buffalo Camp, an intergranular and fractured non-aquifer occurs with an average yield between 0.0 and 0.1 L/s.

Depth to groundwater in the far western portion of the site varies between 10 and 20 mbgl. For the greater part of the site, depth to groundwater varies between 20 and 30 mbgl with a medium aquifer lying between 30- 60 mbgl.

Groundwater found in the shallow aquifer is of poor quality with Total Dissolved Solids ranging between 1500 and 2000 mg/L, which is above the recommended limit for human consumption (1200 mg/L). Groundwater found in the medium aquifer is normally found to be of a good quality.

Groundwater from surrounding boreholes is used mainly for domestic purposes, watering of gardens and livestock and game watering.

3.1.7 Vegetation

This section is based on the Terrestrial Ecology Specialist Study undertaken by Scientific Aquatic Services (SAS) (see Appendix A)[1,2].

Buffalo Camp is located within the Savanna biome and within the Eastern Kalahari Bushveld bioregion. The vegetation type indicated by Mucina and Rutherford (2009) is Kimberley Thornveld characterised by a scattered tree layer, dominated by *Vachellia tortilis* subsp. *Heteracantha*, subtended by a continuous grassy layer (see Figure 2-1). Kimberley Thornveld is not considered to be of conservation concern (National List of Threatened Ecosystems for South Africa, 2011) although this vegetation type is under increased threat from mining activities in the region.

Although Buffalo Camp has historically been disturbed by mining activities, these activities took place over 100 years ago and the vegetation in the area has subsequently begun to recover. The floral habitat and natural systems associated with the site are functional and the floral diversity is considered to be largely representative of the vegetation type for the area with the exception of a few isolated areas recently disturbed by small scale, illegal mining activities.

Three Species of Conservation Concern (SCC), *Vachellia erioloba* (Declining), *Drimia sanguinea* (Near Threatened) and *Aloinopsis rubrolineata* (Rare) are identified as occurring in the area by the South African National Biodiversity Institute (SANBI) database. However, only *Vachellia erioloba* (Camel thorn) was observed during the terrestrial ecology field assessment. There is a moderate probability that *Drimia sanguinea* occurs and a low probability that *Aloinopsis rubrolineata* occurs within Buffalo Camp.

Two protected floral species were encountered scattered throughout Buffalo Camp. These include the SCC *Vachellia erioloba,* which is protected under the National Forests Act 84 of 1998 (NFA), and *Psilocaulon coriarium* (Asbos) (Figure 3-1), which is protected under Schedule 2 of the Northern Cape Nature Conservation Act 9 of 2009 (NCNCA). Although not encountered at the time of the assessment, there is a high probability that *Boscia albitrunca* (Shepherd's tree), which is protected under the NFA, occurs within Buffalo Camp.

[1] The terrestrial ecology specialist study included an assessment of terrestrial ecology across the entire Buffalo Camp site.

[2] At the time of the specialist's field visit, the identified diamondiferous material deposits in the MRA portion of Buffalo Camp weren't observed to be as extensive as depicted in the current layout presented in Figure 1-1. The specialist subsequently confirmed that, other than the wetland feature on the western boundary of the site, the site has been disturbed and the remaining vegetation is similar to the vegetation of the rest of Buffalo Camp.

Figure 3-1: *Vachellia erioloba* (a) and *Psilocaulon coriarium* (b)

Source: SAS, 2015

3.1.8 Fauna

This section is based on the Terrestrial Ecology Specialist Study undertaken by SAS (see Appendix A).

Buffalo Camp is not likely to support a large diversity of faunal species due to historical disturbance and current anthropogenic activities on and in close proximity to the site. All faunal species identified and/or expected to utilise the site for breeding or foraging are considered *Least Threated* within the region (IUCN 2015).

Four mammal species: *Pedetes capensis* (Springhare) *Raphicerus campestris* (Steenbok), *Sylvicapra grimmia* (Common duiker) and *Canis mesomelas* (Black-backed jackal) were identified within Buffalo Camp. These mammals are common species for the area and are listed as *Non-Threatened* by the IUCN. However, *Pedetes capensis, Raphicerus campestris* and *Sylvicapra grimmia* are listed as protected by the NCNCA. Should these species have to be removed, displaced or killed, a permit will be required from the Northern Cape Department of Environment and Nature Conservation (NCDENC).

All avifaunal species identified within Buffalo Camp are listed as species of *Least Concern* (IUCN, 2013) and are common species for the region. However, the majority of the species identified are listed as protected species by the NCNCA and a permit will be required from the NCDENC should these species have to be removed, displaced or killed.

It must be noted that the site is located in close proximity to three Important Birding Areas (IBAs):

- Kamfers Dam (3.7 km north-west);
- Dronfield (1.5 km east); and
- Benfontein (12.4 km south).

Buffalo Camp may provide connectivity for avifaunal species between the IBAs listed above, although the site is only considered to be of importance for foraging habitat.

No reptile or amphibian species were identified during the site survey, but Buffalo Camp does provide habitat for a relatively diverse reptile community. Species expected to be found on the site would most likely be terrestrial species adapted to grassland and that prey on avifauna and small

mammal species. No amphibian species are likely to occur because of a lack of aquatic and wetland habitat.

All faunal species occurring in the area as identified by the Animal Demography Unit are listed as *Least Concern* or have not been evaluated in terms of their threat status. The provincial protection status of the species must be taken into consideration as a permit will be required from the NCDENC for the removal of protected species.

3.2 Socio-Economic Context

The Sol Plaatje Local Municipality is located within the Frances Baard District Municipality and comprises approximately 3 150 km^2, with a population of approximately 250 000 (2011 estimate), growing at an average rate of 2% per annum (Sol Plaatje Municipality, 2014). The municipality comprises the following population groups (Sol Plaatje Municipality, 2014):

- 61% Black African;
- 27% Coloured;
- 8% White;
- 1% Indian; and
- 3% Other.

Education levels in the area are high compared to the rest of the Northern Cape Province, with approximately 95% of the population (aged 15 years and up) having received some form of schooling, and functional literacy/numeracy levels are high at around 86% compared to the literacy rate of 69.8% in the Northern Cape Province (Sol Plaatje Municipality, 2012).

At 31.9% (2011 estimate), unemployment in the Sol Plaatje Municipality is high, contributing to poverty levels in the area with household income in almost 21% of households (average size of 3.8) below R30 000 per annum (Sol Plaatje Municipality, 2012).

The Sol Plaatje Municipality, with a Gross Geographic Product (GGP) of R18.9 billion in 2010, contributes approximately 82% to the District's regional GGP and 29.7% to the GGP of the Northern Cape Province (Sol Plaatje Municipality, 2012). The local economy is dependent on community services (public administration, education, health and social work - contributing 33% to total economic activity in the Municipality) followed by the financial sector (24%) and the trade sector (14%) (Sol Plaatje Municipality, 2012). The mining sector, seen as a driver in local economic development, contracted significantly in 2008/2009 and only contributes 8% (Sol Plaatje Municipality, 2012).

3.3 Heritage Resources

This section is based on the Heritage Specialist Study undertaken David Morris of the McGregor Museum (see Appendix B)[3, 4].

The Northern Cape has a wealth of precolonial archaeological sites often clustered along rivers, around koppies, or at the verges of pans. Important archaeological sites occur in the ancient dunes that flank Samaria Road just north-east of Buffalo Camp.

[3] The heritage specialist study included an assessment of heritage resources across the entire Buffalo Camp site.

[4] At the time of the specialist's field visit, the identified diamondiferous material deposits in the MRA portion of Buffalo Camp weren't observed to be as extensive as depicted in the current layout presented in Figure 1-1. The specialist subsequently confirmed that, other than the Stable Compound Ruins on the western boundary of the site (see Figure 3-3), the heritage resources are likely to be similar across the site.

Colonial era traces are predominantly associated with the development of the diamond mines and the evolution of Kimberley, and include industrial archaeology/heritage and material traces of the city's cultural history, most notably at Buffalo Camp in the traces of floors and the adjacent mine features such as Kenilworth Dump. The unique late nineteenth century Kenilworth village development, originally for white mine workers, is situated north-west of Buffalo Camp.

As an archaeological landscape, the floors transformed an older Stone Age landscape which nevertheless is evident from the presence of probably largely displaced artefacts which lie at the surface in places.

A generally low density and widespread occurrence of mainly Pleistocene Stone Age material occurs at Buffalo Camp. The artefacts noted by the heritage specialist at several locales (Figure 3-2) are not likely to be *in situ* or complete (because of the overlay of mining floors) and thus cannot be construed as significant. Considerable historical and recent surface disturbance has already occurred over the entire terrain ruling out the possibility of *in situ* Stone Age material.

A lack of features on Buffalo Camp such as hills or rocky outcrops precludes the possibility of rock engravings and no convincing Later Stone Age material was found. Dolerite exposures were noted in a few places but were not of a nature that would support rock art.

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Figure 3-2: Archaeological artefacts including mining-associated objects
Source: Morris, 2015

Industrial archaeological traces are most obviously present in the remains of the floors. Artificial ridges of material are the principal traces of the old floors. Also present are artificial furrows (south - western side) and remains of rail haulage lines. No rails remain but the large iron pins that held the rails in place are present. Carbon rods from arc-lamp lighting are also present in places. Much that would have been of interest from an industrial archaeological point of view has long since been removed through prior systematic recovery of metal and other infrastructure.

A ruin, thought to be remains of late nineteenth century stables, is located on the western boundary of the site, but has not yet been accurately delineated (see Figure 3-3).A stone beacon was noted on Buffalo Camp (Figure 3-4).

Recent activity on the site, namely illegal digging, leaves its own archaeological trace – numerous shallow excavations into the seams of diamondiferous material at or just below the surface and the associated mining equipment.

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Figure 3-3: Location of Stable Compound

Source: Morris, 2015

srk consulting	DE BEERS EMPR ADDENDUM REPORT STONE BEACON	Project No. 483962

Figure 3-4: Stone Beacon

Source: Morris, 2015

3.4 Visual Character and Sense of Place

The landscape of the Kimberley region is characterised by flat plains. The history and infrastructure of mining in the region has contributed to the sense of place. Tailings dumps and mining infrastructure can be seen from great distances and have become permanent features in the landscape.

Buffalo Camp has been set aside for conservation. The visual character of the site is characterised by natural veld – grassland with scattered thorn trees - surrounded by a railway line and tailings resources to the west, the residential area of Kenilworth to the north and open veld to the east and south.

Vegetation clearance from illegal mining activities has caused visual scarring on site. Other signs of human influence are low farm fences and a network of gravel roads.

4 Environmental Impact Assessment

4.1 Introduction

This chapter provides an assessment of the potential direct and indirect, negative and positive impacts on the biophysical and socio-economic environment for the proposed removal of diamondiferous material from the site.

Potential impacts were identified by considering the planned project activities and each of the environmental aspects as discussed in Section 3 and determining how the activities may interact with the environmental aspects to result in a change in the baseline environment. The proposed activities are similar to those already addressed in the approved EMPR and the proposed activities are not expected to result in any new types of impacts.

Based on the professional experience of the environmental consultants, the following key environmental issues – potential negative impacts and potential benefits – were identified:

- **Soil and land capability** – potential disturbance and loss of the soil profile and land capability, noting that the activities include the removal of the diamondiferous material deposited on the site many years ago;
- **Air Quality** – dust generation from e.g. material handling and movement of heavy vehicles, with associated potential impacts to human health and vegetation;
- **Noise** – potential impact of noise on surrounding receptors, but noting the location of the site in an uninhabited area. Noise generated from the project is unlikely to affect any off-site receptors;
- **Groundwater** - Groundwater is generally 20-30 m below surface and is of poor quality with a medium aquifer at 30-60 m of improved groundwater quality. Potential impacts on groundwater resources are highly unlikely;
- **Surface Water** – Diamondiferous material within 100 m of the wetland feature on the western boundary of the site will not be removed. As there are no other natural surface water features on site, potential impacts on surface water resources are highly unlikely;
- **Vegetation** – potential loss of floral habitat, floral biodiversity, SCC and protected floral species noting that the vegetation type on site is listed as *Least Threatened* and no Critical Biodiversity Areas or Ecological Support Areas will be affected;
- **Faunal** – potential loss of faunal habitat, faunal diversity, protected species and migratory corridors noting that the site is not likely to support a large diversity of faunal species due to historical disturbance and current anthropogenic activities on and surrounding the site;
- **Socio-economic** – The socio-economic impact is not expected to be significant. Although the illegal miners at Buffalo Camp will no longer benefit from the mining of diamondiferous material, and it is acknowledged that preventing this mining may reduce household income of surrounding communities, it (illegal mining) is an illicit activity;
- **Heritage** - potential impacts on heritage and archaeological resources noting the highly disturbed nature of the site; and
- **Visual Character and Sense of Place** – altered sense of place and visual quality caused by earthworks, scarring and associated infrastructure.

The majority of the potential impacts will be localised and of low intensity, as the activities will take place within De Beers' MRA and the activities will only occur while diamondiferous material is cleared from site, i.e. over the short term.

The potential impacts are described below with a significance rating assigned to each impact. Impact significance is rated both prior to mitigation and with the assumed successful implementation of recommended measures to avoid/mitigate negative impacts and/or optimise benefits. The recommended mitigation measures are also incorporated as environmental management and control measures into the EMPR presented in Chapter 5.

4.2 Impact Assessment Methodology

The significance of an impact (either positive or negative impact) is defined as a combination of the consequence of the impact occurring and the probability that the impact will occur.

The criteria used to determine impact consequence are presented in the table below.

Table 4-1: Criteria Used to Determine the Consequence of an Impact

Rating	Definition of Rating	Score
A. Extent – the area over which the impact will be experienced		
Local	Confined to Buffalo Camp and immediate surroundings (i.e. Kimberley Mines and immediate surroundings)	1
Regional	The region, i.e. the Kimberley area	2
(Inter) national	Nationally or beyond	3
B. **Intensity** – the magnitude of the impact in relation to the sensitivity of the receiving environment, taking into account the degree to which the impact may cause irreplaceable loss of resources		
Low	Natural and/or social functions and processes are negligibly altered	1
Medium	Natural and/or social functions and processes continue albeit in a modified way	2
High	Natural and/or social functions or processes are severely altered	3
C. **Duration** – the timeframe over which the impact will be experienced and its reversibility		
Short-term	Up to 2 years	1
Medium-term	2 to 15 years	2
Long-term	More than 15 years	3

The combined score of these three criteria corresponds to a consequence rating, as follows:

Table 4-2: Method Used to Determine the Consequence Rating

Combined Score: (A+B+C)	3 – 4	5	6	7	8 – 9
Consequence Rating:	Very low	Low	Medium	High	Very high

Once the consequence rating is derived, the probability of the impact occurring is considered, using the probability classifications presented in the table below.

Table 4-3: Probability Classification

Probability – the likelihood of the impact occurring	
Improbable	< 40% chance of occurring
Possible	40% - 70% chance of occurring
Probable	> 70% - 90% chance of occurring
Definite	> 90% chance of occurring

The overall significance of impacts is then determined by considering consequence and probability using the rating system prescribed in the table below.

Table 4-4: Impact Significance Ratings

		Probability			
		Improbable	Possible	Probable	Definite
Consequence	Very Low	**INSIGNIFICANT**	**INSIGNIFICANT**	**VERY LOW**	**VERY LOW**
	Low	**VERY LOW**	**VERY LOW**	**LOW**	**LOW**
	Medium	**LOW**	**LOW**	**MEDIUM**	**MEDIUM**
	High	**MEDIUM**	**MEDIUM**	**HIGH**	**HIGH**
	Very High	**HIGH**	**HIGH**	**VERY HIGH**	**VERY HIGH**

The impact significance rating should be considered by authorities in their decision-making process based on the implications of ratings ascribed below:

- **INSIGNIFICANT**: the potential impact is negligible and **will not** have an influence on the decision regarding the proposed activity/development.
- **VERY LOW**: the potential impact is very small and **should not** have any meaningful influence on the decision regarding the proposed activity/development.
- **LOW**: the potential impact **may not** have any meaningful influence on the decision regarding the proposed activity/development.
- **MEDIUM**: the potential impact **should** influence the decision regarding the proposed activity/development.
- **HIGH**: the potential impact **will** affect the decision regarding the proposed activity/development.
- **VERY HIGH**: The proposed activity should only be approved under special circumstances.

Practical mitigation and optimisation measures are recommended and impacts were rated in the prescribed way both without and with the assumed effective implementation of essential mitigation and optimisation measures. Mitigation and optimisation measures are either:

- **Essential**: must be implemented and are non-negotiable; and.
- **Optional**: must be shown to have been considered and sound reasons provided by the proponent if not implemented.

4.3 Assessment of Impacts

4.3.1 Potential Soil and Land Capability Impacts

Potential Impact S1: Loss of Soil and Land Capability

Diamondiferous material will be removed by bulldozer to a depth of approximately 300 - 800 mm in 50 m wide strips. Removal of the diamondiferous material from the site will displace topsoil and may disturb soil profiles. Repetitive movements of construction vehicles and machinery over exposed soil surfaces will also disturb soil and potentially compromise land capability. However, although the activities on site may compromise land capability, the removal of the diamondiferous material may improve the land capability of the site in the (very) long term.

The impact is assessed to be of ***low*** significance with and without the implementation of mitigation (Table 4-5).

Table 4-5: Significance of the Potential Loss of Soil and Land Capability

	Extent	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Without mitigation	Local 1	Low 1	Long-term 3	**Low** **5**	Definite	**LOW**	**- ve**	High
Key Essential Mitigation Measures: • Stockpile topsoil prior to the commencement of activities for rehabilitation. • Limit vegetation clearance and the footprint of activities (including access) to the minimum necessary. • Restrict the movement of heavy vehicles and machinery to existing roads where possible. • Rehabilitate disturbed areas incrementally and as soon as possible, not necessarily waiting until all material has been removed from site.								
With mitigation	Local	Low	Long-term	**Low**	Probable	**LOW**	**- ve**	Medium

4.3.2 Potential Air Quality Impacts

Potential Impact A1: Impaired Human Health caused by Suspended Particulates generated during Operations

Dust may be generated during the removal of diamondiferous material from the site and by vehicles transporting the material to the CTP. Emissions will also be generated by vehicles and other equipment, emitting nitrogen oxides, carbon dioxide, carbon monoxide and volatile organic compounds.

Dust and emissions generated during operations are unlikely to be harmful to off-site receptors as the site is located more than 300 m from such receptors.

The impact is assessed to be of ***very low*** significance, and with the implementation of mitigation measures, is reduced to ***insignificant*** (Table 4-6).

Table 4-6: Significance of Impaired Human Health caused by Suspended Particulates

	Extent	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Without mitigation	Local 1	Low 1	Short-term 1	**Very Low** **3**	Probable	**VERY LOW**	**- ve**	High
Key Essential Mitigation Measures: • Implement dust suppression measures if dust plumes are visible. • Implement a speed limit of 30 km/h on all un-surfaced areas. • Avoid handling of materials which may generate dust under very windy conditions. • Limit clearing of vegetation to the affected footprint. • Respond rapidly to complaints and take appropriate corrective action.								
With mitigation	Local	Low	Short-term	**Very Low**	Improbable	**INSIGNIFICANT**	**- ve**	High

4.3.3 Potential Noise Impacts

Potential Impact N1: Increased Noise Levels during Operations Affecting Surrounding Receptors

The closest receptors in Kenilworth Estate are located approximately 275 m from the nearest floors deposits. The potential noise at the site (excavating and transport) is unlikely to be intrusive for off-site receptors.

The impact is considered to be ***insignificant*** with and without the implementation of mitigation (Table 4-7).

Table 4-7: Significance of Increased Noise Levels during Operations Affecting Surrounding Receptors

	Extent	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Without mitigation	Local 1	Low 1	Short-term 1	**Very Low** **3**	Improbable	**INSIGNIFICANT**	**- ve**	High
Key Essential Mitigation Measures: • Maintain engines and machinery to minimise noise. • Limit on-site vehicle speeds to 30 km/h. • Confine floors removal to normal working hours. • Undertake standardised noise measurements on major items of equipment upon delivery to provide a noise reference against which regular checks can be compared. • Investigate and respond to complaints about excessive noise.								
With mitigation	Local	Low	Short-term	**Very Low**	Improbable	**INSIGNIFICANT**	**- ve**	High

4.3.4 Potential Water Impacts

Potential Impact W1: Contamination of Surface Water

A No Go area of 100 m has been delineated around the wetland feature on the western boundary of the site. Diamondiferous material will not be removed from this area.

No watercourses traverse the site although water does collect in cleared (illegal) diggings following heavy rainfall events. Accidental hydrocarbon leaks or spills from vehicles and machinery and suspended solids from the diamondiferous material may contaminate surface water if the removal of the material occurs during heavy rainfall events.

Contamination of surface water resources is unlikely and considered to be ***insignificant*** with and without mitigation (Table 4-8).

Table 4-8: Significance of the Contamination of Surface Water

	Extent	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Without mitigation	Local 1	Low 1	Short-term 1	**Very Low** **3**	Improbable	**INSIGNIFICANT**	**- ve**	High
Key Essential Mitigation Measures: • Prohibit any activities within 100 m of the wetland feature. • Restrict activities (excavation) during high rainfall events. • Remove contaminated soil from site as soon as possible.								
With mitigation	Local	Low	Short-term	**Very Low**	Improbable	**INSIGNIFICANT**	**- ve**	High

Potential Impact W2: Contamination of Groundwater

Accidental hydrocarbon leaks or spills from vehicles and machinery may infiltrate and contaminate groundwater. Since groundwater is generally 30 m below surface level, the removal of diamondiferous material from the surface will not directly impact on groundwater.

Contamination of groundwater resources is unlikely and considered to be ***insignificant*** with and without mitigation (Table 4-9).

Table 4-9: Significance of the Contamination of Groundwater

	Extent	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Without mitigation	Local 1	Low 1	Short-term 1	**Very Low 3**	Improbable	**INSIGNIFICANT**	**- ve**	High
Key Essential Mitigation Measures: • Restrict activities (excavation) during high rainfall events. • Remove contaminated soil from site as soon as possible.								
With mitigation	Local	Low	Short-term	**Very Low**	Improbable	**INSIGNIFICANT**	**- ve**	High

4.3.5 Potential Vegetation Impacts

Potential Impact V1: Loss of Floral Habitat and associated Floral Biodiversity, SCC and Protected Floral Species

Removal of diamondiferous material from the site will result in the removal of vegetation and the disturbance of soils. The edge effects of operational activities (movement of vehicles and personnel, proliferation of alien and invasive species and dust creation) may also impact on vegetation beyond the immediate affected footprint.

Although the site has been historically disturbed by mining activities, the vegetation has recovered and the floral habitat is functional. Floral diversity is considered to be largely representative of the vegetation type for the area with the exception of a few isolated areas which have been more recently disturbed by small scale, illegal mining activities. Although the vegetation type associated with the site is listed as *Least Threatened* and no CBAs or ESAs are indicated for the area, individuals of the SCC *Vachelia erioloba* and the protected floral species *Psilocaulon coriarium* in the affected footprint will be destroyed.

Vegetation is likely to recover within disturbed areas. The rescue and relocation of *Vachelia erioloba* is not considered practical and only acquisition of a cut and destroy permit for this species is recommended. *Psilocaulon coriarium* is a pioneer of disturbed areas (Goldblatt and Manning, 2000). However, the species falls within the Aizoaceae family and all floral species within this family are protected under the NCNCA. As this is a common, pioneer species which occurs on disturbed sites, the rescue and relocation of individuals of this species is not deemed necessary and only acquisition of a cut and destroy permit for this species is recommended.

It is recommended that earth-moving activities are restricted to the drier winter months to avoid erosion of exposed soils and sedimentation of surrounding habitats.

The impact is assessed to be of ***medium*** significance and with the implementation of mitigation is reduced to ***low*** (Table 4-10).

Table 4-10: Significance of the Loss of Floral Habitat and associated Floral Biodiversity, SCC and Protected Floral Species

	Extent	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Without mitigation	Local 1	Medium 2	Long-term 3	**Medium** **6**	Definite	**MEDIUM**	**- ve**	High
Key Essential Mitigation Measures: • Limit vegetation clearance and the affected footprint to the minimum size necessary. • Demarcate/delineate site boundaries clearly. Confine all activities to this area. • Restrict all activities and movement of heavy vehicles and machinery to the site and existing roads to avoid destruction of vegetation/habitat outside the site boundaries. • Remove alien and weed species from the site to comply with existing legislation: o Ensure that no additional impacts to remaining indigenous species occur due to the herbicide used; and o Dispose of removed alien plant material at a licensed waste disposal site. • Stockpile topsoil prior to the commencement of activities for rehabilitation and locate topsoil stockpiles in areas that are not susceptible to erosion or contamination. • Dispose contaminated soil at a licensed hazardous waste disposal site. • Rehabilitate the affected footprint area: o Rip and reprofile all compacted soils to prevent ponding, altered drainage patterns and erosion and sedimentation. Special attention should be paid to alien and invasive control within these areas; o Replace topsoil (with seed bank) once excavation activities have ceased; o An indigenous grass species seed mix may also be used in conjunction with topsoil to facilitate the rehabilitation process; and o Monitor rehabilitated areas to ensure the re-establishment of indigenous floral species. • Avoid the removal of the SCC *Vachelia erioloba* where possible. This may be achieved by removing diamondiferous material from around individuals of *Vachelia erioloba* by hand. • Obtain a cut and destroy permit from the NCDENC for the removal of any protected or indigenous species as listed by the NCNCA.. Rescue and relocation is not warranted.								
With mitigation	Local	Low	Long-term	**Low**	Definite	**LOW**	**- ve**	High

4.3.6 Potential Fauna Impacts

Potential Impact F1: Loss of Faunal Habitat and associated Faunal Biodiversity and Protected Species

Removal of diamondiferous material from the site will result in the loss of faunal habitat. Trees used by birds for nesting may be destroyed and burrows of smaller mammals such as *Pedetes capensis* (Springhare) may be destroyed. Furthermore, an increase in anthropogenic activity, noise and disturbance may cause fauna to flee the site, and an increase in the movement of vehicles through the area could cause increase the incidence of collisions with fauna.

The site is not likely to support a large diversity of fauna due to historical disturbance and current anthropogenic activities within and near the site, and no Red Data List fauna species were encountered during the field assessment. The site is located in close proximity to three IBAs and may provide connectivity and foraging habitat for avifauna migrating between these IBAs.

Although faunal habitat is likely to recover after removal of the diamondiferous material, this may take many years and the duration of the impact is therefore considered to be long term.

The impact is assessed to be of ***medium*** significance and with the implementation of mitigation is reduced to ***insignificant*** (Table 4-11).

Table 4-11: Significance of the Loss of Faunal Habitat and associated Faunal Biodiversity and Protected Species

	Extent	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Without mitigation	Local 1	Medium 2	Long-term 3	**Medium** **6**	Definite	**MEDIUM**	**- ve**	High
Key Essential Mitigation Measures: • Limit vegetation clearance and the affected footprint to the minimum size necessary. • Demarcate/delineate site boundaries clearly. Confine all activities to this area. • Restrict all activities and movement of heavy vehicles and machinery to the site and existing roads to avoid destruction of vegetation/habitat outside the site boundaries. • Remove alien and weed species from the site to comply with existing legislation: o Ensure that no additional impacts to remaining indigenous species occur due to the herbicide used; and o Dispose of removed alien plant material at a licensed waste disposal site. • Store topsoil containing the seedbank of the natural vegetation for future use in rehabilitation and locate topsoil stockpiles in areas that are not susceptible to erosion or contamination. • Dispose contaminated soil at a licensed hazardous waste disposal site. • Rehabilitate the affected footprint area: o Rip and reprofile all compacted soils to prevent ponding, altered drainage patterns and erosion and sedimentation. Special attention should be paid to alien and invasive control within these areas; o Replace topsoil (with seed bank) once excavation activities have ceased; o Use an indigenous grass species seed mix in conjunction with topsoil, if required, to facilitate the rehabilitation process; and o Monitor rehabilitated areas to ensure the re-establishment of indigenous floral species. • Avoid the removal of the SCC *Vachelia erioloba* where possible. This may be achieved by manually removing diamondiferous material around individuals of *Vachelia erioloba*. • Obtain a permit from the NCDENC for the removal of any protected or indigenous species as listed by the NCNCA. • Rescue and relocate faunal species found within the site with the assistance of a suitably qualified specialist. • Prohibit trapping or hunting of fauna.							
With mitigation	Local	Low	Short-term	**Very Low**	Possible	**INSIGNIFICANT**	**- ve**	Medium

Potential Impact F2: Loss of Fauna Migratory Corridors

Buffalo Camp is surrounded by mining activities and urban development to the north, west and south andis not likely to function as a viable migratory corridor for smaller terrestrial faunal species moving through the area. Although Buffalo Camp is located in close proximity to three IBAs, Buffalo Camp is only considered to be of importance in terms of foraging habitat for avifauna.

Removal of diamondiferous material from the site may cause disturbance to fauna and faunal habitat, but the activity will not necessarily prevent the migration of faunal species through the area.

The impact is assessed to be ***insignificant*** with and without mitigation (Table 4-12).

Table 4-12: Significance of Loss of Fauna Migratory Corridors

	Extent	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Without mitigation	Local 1	Low 1	Short-term 1	**Very Low** **3**	Possible	**INSIGNIFICANT**	**- ve**	High
Key Essential Mitigation Measures: • Refer to mitigation measures as listed for Impact F1.								
Without mitigation	Local	Low	Short-term	**Very Low**	Possible	**INSIGNIFICANT**	**- ve**	High

4.3.7 Potential Socio-economic Impacts

The socio-economic impact of the proposed activity is not expected to be significant as diamondiferous material at Buffalo Camp has been subjected to illegal mining over a period of time and the activity of removing this material by De Beers will not have any direct socio-economic (positive or negative) impacts on surrounding communities.

Although the illegal miners at Buffalo Camp will no longer benefit from the mining of diamondiferous material, and it is acknowledged that preventing this mining may reduce household income of surrounding communities, it (illegal mining) is an illicit activity and this socio-economic impact has therefore not been assessed further.

It is unlikely that additional direct employment opportunities will be created for the removal of the diamondiferous material, but the (minor) economic benefit of the material will be realised when the material is processed at the CTP. This impact is assessed to be ***insignificant*** with and without mitigation (Table 4-13).

Table 4-13: Significance of economic benefit

	Extent	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Without mitigation	Local 1	Low 1	Short-term 1	**Very Low** **3**	Possible	**INSIGNIFICANT**	**+ ve**	High
Key Essential Mitigation Measures: • Should De Beers use external contractors to remove the diamondiferous material, they must make use of local contractors where possible.								
Without mitigation	Local	Low	Short-term	**Very Low**	Possible	**INSIGNIFICANT**	**+ ve**	High

4.3.8 Potential Heritage Impacts

Potential Impact H1: Loss of Heritage Resources

Buffalo Camp has already been disturbed by historic mining operations primarily through deposition of floors, the rehabilitation/recycling of historic mining infrastructure and subsequent illegal digging. Consequently, very little of heritage significance remains or is *in situ* in Buffalo Camp.

On the western boundary of the site, close to the railway line, there are ruins taken to be remains of a 'Stable Compound' or its associated features.

There is a small chance that some material of significance may still occur subsurface which, if encountered, should be brought to the attention of heritage authorities. With the exception of the Stable Compound ruins, no significant heritage traces were found on site.

The impact on heritage resources is assessed to be ***low*** with and without mitigation (Table 4-14).

Table 4-14: Significance of Loss of Heritage Resources

	Extent	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Without mitigation	Local 1	Low 1	Long-term 3	**Low** **5**	Definite	**LOW**	**- ve**	High
Key Essential Mitigation Measures: • Appoint a heritage specialist to record the floor plan, and where possible, elevations of structures at the Stable Compound for submission to South African Heritage Resources Agency (SAHRA) prior to any excavation occurring within 150 m of the Stable Compound. • Heritage specialist to delineate a buffer area around the Stable Compound. Diamondiferous material can only be removed from this area by hand under the supervision of the heritage specialist. • Inform employees and contractors that archaeological artefacts might be exposed during excavation. • Advise contractors and workers of the penalties associated with the unlawful removal of cultural, historical, archaeological or paleontological artefacts, as set out in the NHRA. • Cease work immediately and notify the Environmental Co-ordinator should any archaeological or paleontological artefacts be exposed. Do not remove, destroy or interfere with any artefacts on the site. • Report all discoveries to the SAHRAand/or the Northern Cape Heritage Resources Agency, so that an investigation and evaluation of the finds can be made. Acting upon advice from these specialists, the Environmental Co-ordinator will advise the necessary actions to be taken.								
With mitigation	Local	Low	Long-term	**Low**	Definite	**LOW**	**- ve**	High

4.3.9 Potential Visual Impacts

Potential Impact V1: Altered Visual Character and Sense of Place

Visual impacts will result from the stripping of vegetation resulting in scars on the landscape; associated infrastructure (plant); and dust generated during excavation and from trucks travelling on gravel roads.

The visual impact of removing the diamondiferous material will be lessened since the proposed activity is congruent with mining activities (stockpiles) to the west and north of the site. It is also highly unlikely that the stripping of the vegetation and the excavation of the material will be visible to sensitive receptors (e.g. residents of Kenilworth) as the natural vegetation of Buffalo Camp will visually screen activities.

Dust generated during excavation and handling of diamondiferous material and from trucks (travelling on gravel roads) is visually unappealing and may detract from the visual quality of the area. The intensity of this visual impact is influenced by the vehicle trips, meteorological conditions and management commitment to manage dust. This visual impact is often intermittent, i.e. it is not a continuous impact.

Scarring will be visible over the medium term, i.e. >2 years, but the loss is expected to be reversible with appropriate rehabilitation of the landscape. The visual impact of activities on site and dust will only persist while diamondiferous material is cleared (i.e. short term).

The impact is assessed to be ***insignificant*** with and without the implementation of mitigation (Table 4-15).

Table 4-15: Significance of Altered Visual Character and Sense of Place

	Extent	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Without mitigation	Local 1	Low 1	Medium-term 2	**Very Low** **4**	Possible	**INSIGNIFICANT**	**- ve**	High
Key Essential Mitigation Measures: • Limit vegetation clearance and the affected footprint to the minimum size necessary. Retain as much vegetation on site as possible especially along the northern edge of the site to screen the activities from receptors to the north. • Utilise existing roads where possible and ensure speed limits on roads are respected at all time. • Implement an effective dust suppression/control management programme to reduce dust, especially during the dry season and when conditions are windy. • Avoid the removal of large trees where possible. This may be achieved by manually removing diamondiferous material around trees. • Rehabilitate disturbed areas incrementally and as soon as possible.								
With mitigation	Local	Low	Medium-term	**Very Low**	Improbable	**INSIGNIFICANT**	**- ve**	High

5 Environmental Management Programme

The project will be subject to the environmental management principles and procedures set out in the approved EMPR (and any approved Addendums). This EMPR Addendum Report should therefore be read in conjunction with the approved EMPR.

5.1 Purpose and Scope

The primary purpose of the Environmental Management Programme (EMP) is to detail the management and control measures required to ensure that:

- All activities are conducted in an environmentally responsible manner;
- The mitigation and optimisation measures identified in Chapter 4 are effectively implemented in order to minimise the potential negative impact and enhance any benefits of the proposed activities; and
- Unforeseen or unidentified impacts are detected and adequately addressed.

5.2 Roles and Responsibilities

The implementation of this EMP (and the existing, approved EMPR) requires the involvement of several roleplayers, each fulfilling a different but vital role to ensure sound environmental management.

5.2.1 Department of Mineral Resources (DMR)

The DMR is the designated agency responsible for authorising this EMPR Addendum and therefore has overall responsibility for monitoring compliance with this EMP.

5.2.2 De Beers

De Beers will have overall responsibility for implementation of and compliance with this EMP. De Beers will be directly accountable for the potential impacts of the project and will be responsible for monitoring contractors' compliance with the EMP. De Beers will have the authority to stop work on site should circumstances demand it (e.g. in the case of repeated non-compliance with the EMP, etc.).

Contracts with contractors must include a clause which regulates the activities of contractors' workers. Disciplinary measures for offenders should be negotiated, agreed upon and communicated to all site personnel and construction crews. Responsibility for enforcing these measures should also be made clear.

5.2.3 Contractors

Contractor(s) (including sub-contractors) may be appointed to undertake the required activities. The contractors will then be responsible for implementing the relevant environmental specifications and management actions contained in the EMP, to the satisfaction of De Beers (and, ultimately, the DMR).

5.3 Environmental Management and Control Measures Applicable to the Operations Phase

The environmental management and control measures that must be implemented in order to avoid and /or minimise the potential negative impacts and enhance any benefits of the project during the Operations Phase are presented in matrices below.

The project will also be subject to the environmental management principles and procedures set out in the approved De Beers EMPR (including approved Addendums). The table below (Table 5-1) indicates the environmental management objectives, environmental management and control measures that must be implemented during the Operations Phase, as well as responsible parties, monitoring and performance evaluation.

Table 5-1: General Environmental Management and Mitigation Measures for the Project during the Operations Phase

Aspect	ID	Mitigation measure / Procedure	Responsible Parties	Implementation Timeframe	Monitoring Methods	Performance Indicators
Site Preparation and Boundaries	1.	• Demarcate/delineate site boundaries clearly, including No Go areas, e.g area within 100m of the wetland. Confine all activities to the portion of Buffalo Camp within the MRA but excluding no-go areas.	• De Beers and/or Contractor	• Duration of activities	• Visual Inspection	• No impact on surrounding areas • No impact on wetland
	2.	• Avoid damage to all areas that fall outside of the site boundaries.	• De Beers and/or Contractor	• Duration of activities	• Visual Inspection	• No impact on surrounding areas
	3.	• Stockpile topsoil prior to the commencement of activities for rehabilitation and locate topsoil stockpiles in areas that are not susceptible to erosion or contamination.	• De Beers and/or Contractor	• Duration of activities	• Visual Inspection	• Separate topsoil stockpiles
	4.	• Do not permit vehicles, machinery, materials or people beyond the designated site without the express permission of the Environmental Co-ordinator.	• De Beers and/or Contractor	• Duration of activities	• Visual Inspection	• No impact on surrounding areas
	5.	• Make all workers aware of the associated restrictions with regards to the site boundaries.	• De Beers and/or Contractor	• Duration of activities	• Visual Inspection	• No impact on surrounding areas
Vegetation and Fauna Management	6.	• Avoid removal of vegetation until soil stripping is required.	• De Beers and/or Contractor	• Duration of activities	• Visual Inspection	• Vegetation removal limited to work areas
	7.	• Limit vegetation clearance and the affected footprint to the minimum size necessary. Retain as much vegetation on site as possible.	• De Beers and/or Contractor	• Duration of activities	• Visual Inspection	• Vegetation removal limited to work areas
	8.	• Restrict all activities and movement of heavy vehicles and machinery to the site and existing roads to avoid destruction of vegetation/habitat outside the site boundaries. Workers and vehicles must be prohibited from entering areas beyond the demarcated areas.	• De Beers and/or Contractor	• Duration of activities	• Visual Inspection	• No activities beyond site boundaries
	9.	• Prohibit workers from collecting/damaging plants hunting/injuring and collecting of animals.	• De Beers and/or Contractor	• Duration of activities	• Visual Inspection	• No collecting/damaging of plants • No hunting//injuring animals • Penalties in contracts
	10.	• Avoid the removal of the SCC *Vachelia erioloba* where possible. This may be achieved by manually removing diamondiferous material around individuals of *Vachelia erioloba*.	• De Beers and/or Contractor	• Duration of activities	• Visual Inspection	• No unnecessary removal of *Vachelia erioloba*

Aspect	ID	Mitigation measure / Procedure	Responsible Parties	Implementation Timeframe	Monitoring Methods	Performance Indicators
	11.	• Obtain a cut and destroy permit from the NCDENC for the removal of any protected or indigenous flora species as listed by the NCNCA. • Obtain a permit from the NCDENC for the removal of any protected or indigenous fauna species as listed by the NCNCA.	• De Beers	• Duration of activities	• Visual Inspection	• Permit
	12.	• Rescue and relocate faunal species found within the site with the assistance of a suitably qualified specialist.	• De Beers	• Duration of activities	• Visual Inspection	• Appointment of specialist
	13.	• Undertake a continuous environmental awareness and education programme for employees.	• De Beers and/or Contractor	• Duration of activities	• Environmental Co-ordinator to monitor records of such training	• Training records • Awareness of staff
Hazardous Substances	14.	• Ensure relevant Material Safety Data Sheets (MSDS) are available at De Beers for all potentially hazardous substances (as defined in the regulations for hazardous chemical substances). In the event of an emergency, procedures detailed in the MSDS shall be followed.	• De Beers and/or Contractor	• Duration of activities	• Visual inspections and audits	• MSDS on site
	15.	• Do not store hazardous substances (including hazardous waste substances e.g. oils, bitumen, hydraulic fluids) on site. All hazardous materials shall be stored at a designated area within Kimberley Mines.	• De Beers and/or Contractor	• Duration of activities	• Visual inspections	• No hazardous materials stored on site
	16.	• Do not dispose hazardous substance on site.	• De Beers and/or Contractor	• Duration of activities	• Visual inspections	• No disposal on site
	17.	• Refuel all plant equipment at a designated refuelling area at Kimberley Mines designed to prevent potential pollution.	• De Beers and/or Contractor	• Duration of activities	• Visual inspections	• No refuelling on site
	18.	• Use drip trays at all times if refuelling does take place in the field.	• De Beers and/or Contractor	• Duration of activities	• Visual inspections	• Presence of drip trays • No evidence of contamination
Water Management	19.	• Prohibit any activities within 100 m of the wetland feature.	• De Beers and/or Contractor	• Duration of activities	• Visual inspections • Designated No Go area	• No disturbance in the No Go area
	20.	• Wash vehicles and machinery in designated areas designed to prevent water pollution.	• De Beers and/or Contractor	• Duration of activities	• Visual inspections	• No washing on site
	21.	• Restrict activities (excavation) during high rainfall events.	• De Beers and/or Contractor	• Duration of activities	• Visual inspections	• No excavating during high rainfall events
	22.	• Stabilise exposed surfaces if required to prevent soil erosion.	• De Beers and/or Contractor	• Duration of activities	• Visual Inspection	• No visible erosion

Aspect	ID	Mitigation measure / Procedure	Responsible Parties	Implementation Timeframe	Monitoring Methods	Performance Indicators
Dust Management	23.	• Avoid excavation, handling and transport of materials, which may generate dust, under very windy conditions.	• De Beers and/or Contractor	• Duration of activities	• Visual inspections	• No visible dust plume
	24.	• Implement a speed limit of 30 km/h on all un-surfaced areas.	• De Beers and/or Contractor	• Duration of activities	• Visual inspections	• No visible dust plume
	25.	• Implement dust suppression measures if dust plumes are visible.	• De Beers	• Duration of activities	• Visual inspections	• No visible dust plume
	26.	• Maintain vehicles and equipment to ensure that exhaust emissions are minimised.	• De Beers and/or Contractor	• Duration of activities	• Visual inspections	• No visible emissions from vehicles / equipment
	27.	• Limit clearing of vegetation to the minimum size necessary.	• De Beers and/or Contractor	• Duration of activities	• Visual inspections	• No visible emissions from vehicles / equipment
	28.	• Respond rapidly to complaints and take appropriate corrective action.	• De Beers	• Duration of activities	• Register of complaints	• Action plan
Waste Management	29.	• Do not bury or burn waste on site.	• De Beers and/or Contractor	• Duration of activities	• Visual inspections	• No disposal on site
	30.	• Implement waste management strategies to ensure that non-hazardous and hazardous substances are appropriately identified, collected and disposed of at a designated area at Kimberley Mines.	• De Beers and/or Contractor	• Duration of activities	• Visual inspections	• No disposal or storage on site
	31.	• Dispose contaminated soil at a licensed hazardous waste disposal site.	• De Beers and/or Contractor	• Duration of activities	• Visual inspections	• No contaminated soil on site
Noise Management	32.	• Ensure that vehicles and machinery are kept in good working order to avoid excessive noise generation.	• De Beers and/or Contractor	• Duration of activities	• Visual inspections	• No excessive noise or complaints
	33.	• Undertake standardised noise measurements on major items of equipment upon delivery to provide a noise reference against which regular checks can be compared.	• De Beers and/or Contractor	• Duration of activities	• Auditing	• No excessive noise or complaints
	34.	• Investigate and respond to complaints about excessive noise.	• De Beers and/or Contractor	• Duration of activities	• Complaints register	• No excessive noise or complaints
	35.	• Confine floors removal to normal working hours.	• De Beers and/or Contractor	• Duration of activities	• Visual inspections	• No excessive noise or complaints

Aspect	ID	Mitigation measure / Procedure	Responsible Parties	Implementation Timeframe	Monitoring Methods	Performance Indicators
Heritage Resources	36.	• Appoint a heritage specialist to record the floor plan, and where possible, elevations of structures at the Stable Compound for submission to South African Heritage Resources Agency (SAHRA) prior to any excavation occurring within 150 m of the Stable Compound. • Heritage specialist to delineate a buffer area around the Stable Compound. Diamondiferous material can only be removed from this area by hand under the supervision of the heritage specialist.	• De Beers and/or Contractor	• Prior to activities within 150 m of the Stable Compound	• Visual inspections • Designated No Go area • Appointment of heritage specialist	• No work within close proximity to the ruins • Submission of records to SAHRA
	37.	• Inform employees and contractors that archaeological or paleontological artefacts might be exposed during activities.	• De Beers and/or Contractor	• Duration of activities	• Environmental Co-ordinator to monitor records of such training	• Training records • Awareness of staff
	38.	• Advise contractors and workers of the penalties associated with the unlawful removal of cultural, historical, archaeological or paleontological artefacts, as set out in NHRA.	• De Beers and/or Contractor	• Duration of activities	• Environmental Co-ordinator to monitor records of such training	• Training records • Awareness of staff
	39.	• In the event that archaeological and paleontological artefacts or human remains are unearthed, works in the area are to be stopped immediately and the Environmental Co-ordinator and SAHRA, and/or the Northern Cape Heritage Resources Agency, shall be informed immediately.	• De Beers	• Duration of activities	• Visual inspections	• Authorities informed
	40.	• Artefacts/remains must not be disturbed or removed until inspected by SAHRA and approval to proceed has been obtained.	• De Beers	• Duration of activities	• Visual inspections	• Permit received before activities commence
Visual Aspects	41.	• Keep site tidy and confine all activities, material and machinery to as small an area as possible.	• De Beers and/or Contractor	• Duration of activities	• Visual inspections	• Site relatively non-intrusive, visually
	42.	• Limit vegetation clearance and the affected footprint to the minimum size necessary. Retain as much vegetation on site as possible especially along the northern edge of the site to screen the activities from receptors to the north.	• De Beers and/or Contractor	• Duration of activities	• Visual inspections	• Vegetation removal limited to work areas
	43.	• Avoid the removal of large trees where possible. This may be achieved by manually removing diamondiferous material around trees.	• De Beers and/or Contractor	• Duration of activities	• Visual inspections	• No unnecessary removal of large trees
	44.	• Utilise existing roads where possible and ensure speed limits on roads are respected at all time.	• De Beers and/or Contractor	• Duration of activities	• Visual inspections	• No visible dust plumes • Use of existing roads
	45.	• Implement an effective dust suppression/control management programme to reduce dust, especially during the dry season and when conditions are windy.	• De Beers and/or Contractor	• Duration of activities	• Visual inspections	• No visible dust plumes

Aspect	ID	Mitigation measure / Procedure	Responsible Parties	Implementation Timeframe	Monitoring Methods	Performance Indicators
	46.	• Rehabilitate disturbed areas incrementally and as soon as possible.	• De Beers and/or Contractor	• Duration of activities	• Rehabilitation Plan	• Rehabilitation of site as soon as possible
Socio-Economic	47.	• Use local Sub-contractors where possible.	• De Beers and/or Contractor	• Duration of activities	• Audits	• Local sub-contractors on site
Response to Environmental Pollution	48.	• Stop work immediately in the event of environmental pollution, e.g. through spillages.	• De Beers and/or Contractor	• Duration of activities	• Visual inspections	• Activity ceases if pollution occurs
	49.	• Only resume activity once corrective action has been taken or (in the case of spillages) the spill can be contained and won't impact the surrounding environment.	• De Beers and/or Contractor	• Duration of activities	• Visual inspections	• Source of pollution solved before commencement of activities
	50.	• Repair faulty equipment as soon as possible.	• De Beers and/or Contractor	• Duration of activities	• Visual inspections	• No recurring incidents
	51.	• Treat hydrocarbon spills, e.g. during refuelling, with adequate absorbent material, which then needs to be disposed of at a suitable landfill.	• De Beers and/or Contractor	• Duration of activities	• Visual inspections • Records of waste disposal certificates	• Contaminated soil removed from site and disposed at a licenced facility
Fire Control	52.	• Provide adequate and suitably maintained fire-fighting equipment on site.	• De Beers and/or Contractor	• Duration of activities	• Visual inspection	• Fire-fighting equipment in place
	53.	• Do not permit fires on site.	• De Beers and/or Contractor	• Duration of activities	• Visual inspection	• No fires on site
	54.	• Do not permit smoking in areas that pose a fire hazard.	• De Beers and/or Contractor	• Duration of activities	• Visual inspection	• Designated smoking areas
Ablution Facilities	55.	• Provide ablution facilities for all site staff at a minimum ratio of 1 toilet per 25 workers (preferred 1:15).	• De Beers and/or Contractor	• Duration of activities	• Visual inspection	• Suitable ablution facilities in place
	56.	• Secure all temporary/portable ablutions to the ground to prevent them toppling due to wind or any other cause.	• De Beers and/or Contractor	• Duration of activities	• Visual inspection	• Suitable ablution facilities in place • No contamination
	57.	• Prohibit urination on site, other than at the designated ablution facilities.	• De Beers and/or Contractor	• Duration of activities	• Visual inspection	• No urination on site

Aspect	ID	Mitigation measure / Procedure	Responsible Parties	Implementation Timeframe	Monitoring Methods	Performance Indicators
Environmental Awareness	58.	• Undertake awareness training to ensure that all staff are aware of the general environmental sensitivity of the site in which they are working and the stipulations of the EMP.	• De Beers and/or Contractor	• Regularly, for the duration of activities • At regular toolbox talks • When new personnel come on site	• Environmental Co-ordinator to monitor records of such training	• Training records • Awareness of staff
Site Closure and Rehabilitation	59.	• Incorporate site into existing Rehabilitation Plan and implement accordingly.	• De Beers	• During operations and prior to closure	• Revised Rehabilitation Plan	• Revised Rehabilitation Plan incorporates site
	60.	• Reinstate all areas disturbed by activities.	• De Beers	• As soon as activities are completed	• Visual inspection • Rehabilitation Plan	• Rehabilitation takes place immediately after activities end
	61.	• Remove all vehicles, equipment, waste and surplus materials from site.	• De Beers	• As soon as activities are completed	• Visual inspection • Rehabilitation Plan	• No material left behind / in adjacent areas
	62.	• Ensure that all spills have been cleaned up and contaminated soil removed from site.	• De Beers	• As soon as activities are completed	• Visual inspection	• No contaminated soil
	63.	• Rip and reprofile all compacted soils to prevent ponding, altered drainage patterns and erosion and sedimentation. Special attention should be paid to alien and invasive control within these areas.	• De Beers	• As soon as activities are completed	• Visual inspection	• Soil ripped and reprofiled
	64.	• Replace topsoil (with seed bank) once excavation activities have ceased	• De Beers	• As soon as activities are completed	• Visual inspection	• Topsoil replaced
	65.	• Use an indigenous grass species seed mix in conjunction with topsoil, if required, to facilitate the rehabilitation process.	• De Beers	• During rehabilitation	• Visual inspection	• Suitable recovery of vegetation
	66.	• Remove alien and weed species from the site to comply with existing legislation: o Ensure that no additional impacts to remaining indigenous species occur due to the herbicide used; and o Dispose of removed alien plant material at a licensed waste disposal site.	• De Beers	• During rehabilitation	• Visual inspection	• No invasive vegetation
	67.	• Manage and monitor rehabilitated areas to ensure the re-establishment of indigenous floral species.	• De Beers	• During rehabilitation	• Visual inspection	• Rehabilitation reports

5.4 Environmental Management and Control Measures Applicable to the Decommissioning/Closure Phase

The environmental management and control measures that must be implemented in order to avoid and /or minimise the potential negative impacts and enhance any benefits of the project during the Decommissioning/Closure Phase are presented in matrices below.

The project will also be subject to the environmental management principles and procedures set out in the approved De Beers EMPR (including approved Addendums) and De Beers' Closure Plan. The table below (Table 5-2) indicates the environmental management objectives, environmental management and control measures that must be implemented during the Decommissioning/Closure Phase, as well as responsible parties, monitoring and performance evaluation.

Table 5-2: General Environmental Management and Mitigation Measures for the Project during the Decommissioning/Closure Phase

Decommissioning Phase Measures						
Aspect	**ID**	**Mitigation measure / Procedure**	**Responsible Parties**	**Implementation Timeframe**	**Monitoring Methods**	**Performance Indicators**
Closure and Rehabilitation	1.	• Remove all construction equipment, vehicles, equipment, waste and surplus materials, site office facilities, temporary fencing and other items from the site.	• De Beers	• As soon as activities are completed	• Visual inspection of site • Keep record of rehabilitation measures	• Records of waste disposal • State of areas on and surrounding the site • Performance Assessment • Site Closure Report • Approval of DMR
	2.	• Clean up and remove any spills and contaminated soil in the appropriate manner.				
	3.	• Do no bury discarded materials on site or on any other land not designated for this purpose.				
	4.	• Grade all disturbed areas to reflect the natural topography of the surrounding area.				
	5.	• Rip and reprofile all compacted soils to prevent ponding, altered drainage patterns and erosion and sedimentation.				
	6.	• Spread harvested topsoil (with seed bank) evenly over the disturbed areas once excavation activities have ceased.				
	7.	• Use an indigenous grass species seed mix in conjunction with topsoil, if required, to facilitate the rehabilitation process.				
	8.	• Implement soil erosion measures if required to prevent soil erosion during rehabilitation. Measures include: o Straw mulch; o Soil binders; and o Wind protection screens.				
	9.	• Implement an alien vegetation eradication programme until formal closure has been received. • Remove alien and weed species from the site to comply with existing legislation: o Ensure that no additional impacts to remaining indigenous species occur due to the herbicide used; and o Dispose of removed alien plant material at a licensed waste disposal site.				
	10.	• Monitor the rehabilitation areas (annually) and implement ongoing maintenance as required until formal closure is received.				
	11.	• Submit an annual performance assessment report to DMR.				

6 Closure Plan

R527 of the MPRDA specifies that the EMPR must include environmental objectives and specific goals for closure. De Beers must make prescribed financial provision for the rehabilitation or management of negative environmental impacts, which must be reviewed annually (section 41). R527 provides principles for mine closure (sections 56 and 60), which state that the holder of a mining right must ensure:

- the closure of its mining operation incorporates a process which starts at the commencement of operation and continues throughout the life of mine;
- risks pertaining to environmental impact are quantified and managed proactively, which includes gathering relevant information throughout the mine's operations;
- safety and health requirements of the Mine Health and Safety Act 29 of 1996 are complied with;
- residual and possible latent environmental impacts are identified and quantified;
- the land is rehabilitated, as far as practicable, to its natural state, or to a predetermined and agreed standard or land use which conforms with the concept of sustainable development;
- mining operations are closed efficiently and cost effectively;
- key objectives for mine closure to guide project design development and management of environmental impacts are included in the EMPR;
- the EMPR includes broad future land use objectives; and
- the EMPR includes proposed closure costs.

6.1 Closure Objective

De Beers' closure objective is to rehabilitate the area affected by the removal of diamondiferous material to a condition comparable to its current land use i.e. conservation. Table 5-2 indicates the management and mitigation measures to be implemented by De Beers during the Closure Phase in order to achieve this objective.

6.2 Closure Costs

Financial provision for the environmental rehabilitation and closure of mining is a key requirement of the MPRDA. Section 54(1) of GN R527 indicates that provision is required for:

- Premature closure related to rehabilitation (of land) and prevention of impacts;
- Decommissioning and final closure of the operation; and
- Post closure management of residual and latent environmental impacts.

De Beers has calculated the liability to achieve the total quantum for rehabilitation and remediation of environmental impacts. The quantum for financial provision is presented in Table 6-1.

Table 6-1: Calculation of closure costs (financial provision)

Closure Cost per hectare	No. of hectares	Total
R42 395.71	70	R2 967 699.70

6.3 Closure Certificate

De Beers will remain responsible for any environmental liability and the management thereof, until De Beers is issued with a closure certificate by the DMR (section 43). An application for closure must

be made to the DMR's Regional Manager within 180 days of closure and must be accompanied by an environmental risk report. The DMR cannot issue the closure certificate unless the Chief Inspector (of Mines) and DWS have confirmed in writing that the provisions pertaining to health and safety and management of potential pollution of water resources have been adequately addressed.

7 Stakeholder Engagement

7.1 Objectives and Approach to Stakeholder Engagement

The overall aim of stakeholder engagement is to ensure that all Interested and Affected Parties (IAPs) have adequate opportunity to provide input into the process and raise their comments and concerns. More specifically, the objectives of stakeholder engagement are to:

- Identify IAPs and inform them about the project and EMPR Addendum process;
- Provide stakeholders with the opportunity to participate effectively in the process and identify relevant issues and concerns; and
- Provide stakeholders with the opportunity to review documentation and assist in identifying mitigation and management options to address potential environmental issues.

7.2 Stakeholder Engagement Activities

The stakeholder engagement activities planned are outlined in Table 7-1.

Table 7-1: Planned stakeholder engagement activities

Task	Objectives	Dates
Advertise commencement of EMPR Addendum process and release EMPR Addendum Report for public comment period	To notify IAPs of the commencement of the EMPR Addendum process and to provide a description of the project, the affected environment, and environmental issues.	14 October 2015
Public comment period	To provide stakeholders with the opportunity to review and comment on the EMPR Addendum Report.	14 October 13 November 2015
Compile Comments and Responses Summary and finalise EMPR Addendum Report	To record all issues and concerns raised and collate these comments in the final report and submit the EMPR Addendum Report to DMR to facilitate their decision.	20 November 2015

The key activities (that will be) undertaken in the stakeholder engagement process are described further below.

7.2.1 Identification of Key Stakeholders

Relevant local, provincial and national authorities, conservation bodies, local forums and representatives and surrounding land owners and occupants have been notified of the release of the EMPR Addendum Report for comment.

The authorities (and other organs of state) that will be consulted include:

- Frances Baard District Municipality;
- Sol Plaatje Local Municipality;
- Northern Cape Department of the Environment and Nature Conservation;
- Northern Cape Department of Agriculture;
- Department of Water and Sanitation; and

- SAHRA.

Relevant authorities (Organs of State) have been automatically registered as IAPs. All other persons must request in writing to be placed on the register or submit written comments in order to be registered as stakeholders and included in future communication regarding the project.

A list of stakeholders that were initially notified of the process is provided in **Appendix C**. The stakeholder database will be updated throughout the process.

7.2.2 Notification of the Release of the EMPR Addendum Report for Public Comment

Newspaper advertisements announcing the commencement of the EMPR Addendum process, the availability of the EMPR Addendum Report for stakeholder review and inviting IAPs to register on the project database were placed in:

- The DFA Newspaper (in Afrikaans and English).

Site notices with details of the project and EMPR Addendum process and EAP contact details have been placed at the following locations:

- Northern boundary fenceline; and
- Entrance to the site on the southern boundary.

Hard copies of the full report are available for viewing at the following venues:

- De Beers' security office; and
- SRK's offices in Kimberley.

An electronic version of the report can also be accessed on SRK's website **www.srk.co.za** (via the 'Library' and 'Public Documents' links).

Stakeholders will be provided with a 30 day comment period.

7.2.3 Submission of Final Scoping Report / Next Steps

Following review of the EMPR Addendum Report, issues raised by authorities and the public will be summarised and responded to in a Comments and Responses Summary, which will be appended to the EMPR Addendum Report. The EMPR Addendum Report will be updated (if necessary) taking stakeholder input into account. The Final EMPR Addendum Report will then be submitted to DMR.

8 Conclusion

De Beers intends removing diamondiferous material from an old floors area from the portion of the Buffalo Camp in the MRA which has been illegal mined (by third parties) over a period of time. The diamondiferous material occurs within the remnants of the kimberlite floors which were deposited over 100 years ago across several hundred hectares. Removal of the diamondiferous material will require the removal of the natural vegetation which has re-established in the area subsequent to deposition of the material.

De Beers has an approved EMPR to mine and process ore for a MRA. An EMPR Addendum (this document) has been compiled to incorporate removal of diamondiferous material from the portion of the Buffalo Camp in the MRA.

Potential impacts were identified by considering the planned project activities and each of the environmental aspects as discussed in Section 3 and determining how the activities may interact with the environmental aspects to result in a change in the baseline environment. The proposed activities are similar to those already addressed in the approved EMPR and are not expected to result in any new types of impacts. The majority of the potential impacts will be localised and of low intensity, as the activities will take place on De Beers' property and the activities will only occur while diamondiferous material is cleared.

The EMP details the management and control measures to be implemented to minimise potential negative impacts and enhance potential positive impacts. The project will be subject to the environmental management principles and procedures set out in the approved EMPR (and any approved Addendums). This EMPR Addendum Report should therefore be read in conjunction with the approved EMPR.

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All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

9 References

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Appendices

Appendix A:

Terrestrial Ecology Specialist Study

TERRESTRIAL ECOLOGICAL ASSESSMENT AS PART OF THE ENVIRONMENTAL ASSESSMENT AND AUTHORISATION PROCESS FOR THE PROPOSED CLEARING OF DIAMONDIFEROUS MATERIAL FROM THE BUFFALO CAMP, KIMBERLEY, NORTHERN CAPE PROVINCE.

Prepared for

SRK Consulting

May 2015

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Report Reference:	**SAS 215011**
Date:	**May 2015**

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Declaration

This report has been prepared according to the requirements of Section 23 (5) of the Environmental Impact Assessments EIA Regulations, 2014 (No. R. 982). We (the undersigned) declare the findings of this report free from influence or prejudice.

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EXECUTIVE SUMMARY

Scientific Aquatic Services cc (SAS cc) was appointed to conduct a vegetation impact assessment and a faunal screening assessment as part of the environmental assessment and authorisation process for the proposed clearing of diamondiferous material from the Buffalo Camp within Kimberley in the Northern Cape Province, hereafter referred to as the 'project footprint'.

De Beers Consolidated Mines Ltd aim to remove diamondiferous material from an old 'Floors' area which has been subjected to illegal mining over a period of time and poses a safety, health and security risk to the company. The diamondiferous material is found within the remains of Kimberlite floors which were deposited over 100 years ago across several hundred hectares. The area under consideration is located on a portion of a De Beers conservation area (Buffalo Camp) which is located approximately 1km to the east of the N12 national road and is located to the north of Sumaria Road. The lines of remaining diamondiferous material lie in a layer approximately 300 mm thick just below the surface of the ground. De Beers proposes to remove this material from site to stop the illegal mining as De Beers are spending significant resources on securing the area and illegal mining is a considerable safety risk.

DESKTOP ASSESSMENT

The following general conclusions were drawn on completion of the desktop assessment:

- The majority of the project footprint is indicated to be natural land with urban development located to the north of the project footprint;
- According to the Northern Cape Provincial Spatial Development Framework (PSDF, 2012), the project footprint is not located within a centre of endemism;
- According to the National List of Threatened Terrestrial Ecosystems (2011) the project footprint does not fall within a threatened terrestrial ecosystem; and
- According to the National Biodiversity Assessment (NBA, 2011) the project footprint is not located within either a formal or informal protected area.

VEGETATION ASSESSMENT

The following general conclusions were drawn on completion of the vegetation assessment:

- The project footprint is located within the Savanna biome and is situated within the Eastern Kalahari Bushveld bioregion;
- The vegetation type indicated by Mucina and Rutherford (2009) is Kimberley Thornveld which is not considered to be of conservation concern;
- One habitat unit, the Kimberley Thornveld habitat unit, was encountered within the project footprint at the time of the assessment;
- The Kimberley Thornveld habitat unit is characterised by a scattered tree layer, dominated by *Vachellia tortilis* subsp. *heteracantha*, subtended by a continuous grassy layer;
- Although the project footprint has been historically disturbed as a result of mining activities, these activities took place over 100 years ago and the vegetation in the area has subsequently begun to recover. The floral habitat and natural systems associated with the project footprint are therefore functioning well and the floral diversity is considered to be largely representative of the vegetation type for the area with exception of a few isolated areas which have been more recently disturbed as a result of small scale, illegal mining activities;
- The information gathered during the assessment of the project footprint was used to determine the Vegetation Index Score (VIS) for the habitat unit associated with the project footprint. A moderate score was calculated for the Kimberley Thornveld habitat unit which falls within Class C – Moderately modified;
- Although grass species dominating the vegetation are considered to be species indicative of disturbance, they are also indicators for the natural vegetation type for the area (Kimberley Thornveld). The majority of these species are listed as subclimax grasses. These species are therefore considered to form part of the natural progression of the recovery of the veld due to disturbance as a result of historical mining activities and will eventually be replaced by climax species. Climax species were also encountered within the project footprint which indicates the improvement and recovery of veld conditions from the disturbed conditions created as a result of historical mining activities;

- Three floral Species of Conservation Concern (SCC), *Vachellia erioloba* (Camel Thorn) (declining), *Drimia sanguinea* (Slangkop) (near threatened) and *Aloinopsis rubrolineata* (rare) are indicated for the quarter degree square (QDS) 2824DB by the PRECIS South African National Biodiversity Institute (SANBI) database. However, only *Vachellia erioloba* (declining) was encountered scattered throughout the project footprint at the time of the assessment;
- Two protected floral species were also encountered scattered throughout the project footprint. These include the SCC *Vachellia erioloba* which is protected under the National Forest Act (NFA, Act 84 of 1998) as well as *Psilocaulon coriarium* (Asbos) which is within the Mesembryanthemacea family which is protected under Schedule 2 of the Northern Cape Nature Conservation Act (NCNCA, Act 9 of 2009). Although not encountered at the time of the assessment, there is a high probability that the tree *Boscia albitrunca* (Shepherd's tree), which is protected under the NFA, occurs within the project footprint; and
- Should protected and indigenous species to be cut, disturbed, damaged or destroyed, applications for such activities must be made to the Northern Cape Department of Environment and Nature Conservation and to the Department of Agriculture, Forestry and Fisheries.

FAUNAL SCREENING ASSESSMENT

The following general conclusions were drawn on completion of the faunal screening assessment:

- The project footprint is not likely to support a large diversity of faunal species due to historical disturbance and current anthropogenic activities that are present within the site and in close proximity to the site;
- Faunal species that were identified within the project footprint and that are expected to utilise the project footprint for either breeding or foraging are considered least threatened within the region (IUCN 2015);
- Four mammal species *Pedetes capensis* (Springhare), *Raphicerus campestris* (Steenbok), *Sylvicapra grimmia* (Common duiker) and *Canis mesomelas* (Black-backed jackal) were identified within the project footprint. All mammal species are common species for the area and are listed as non-threatened species by the IUCN. However, all of the species, with exception of *Canis mesomelas* (Black-backed jackal), are listed as protected within the NCNCA (2009). Should these species be removed or displaced from the project footprint a permit will be required from the Northern Cape Department of Environment and Nature Conservation;
- All avifaunal species identified within the project footprint are listed as species of least concern (IUCN, 2013) and are common species for the region. However, the majority of the species identified are listed as protected species by the NCNCA (2009). Should these species be removed or displaced from the project footprint a permit will be required from the Northern Cape Department of Environment and Nature Conservation;
- The project footprint is located in close proximity to three Important Birding Areas (IBAs):
    - Kamfers Dam (3.7km North-West of the project footprint). **Status**: Global IBA (A1, A4i), Ramsar proposed. Is unprotected (BLSA 2015), and is 1170ha in size;
    - Dronfield (1.5km of the project footprint). **Status**: Sub-regional IBA (C1). Is unprotected (BLSA 2015) and is 11 030ha; and
    - Benfontein (12.4km South of the project footprint). **Status**: Sub-regional IBA (C1). Is unprotected (BLSA 2015), and 9 770ha.
- In terms of faunal migratory connectivity the project footprint may provide connectivity for avifaunal species between the IBAs listed above, however, the project footprint is only considered to be of importance in terms of foraging habitat for these avifaunal species;
- No reptile species were identified during the site survey. The project footprint does provide habitat for a relatively diverse reptile community, however their secretive nature makes detection difficult during a field survey of limited duration. Species expected to be found within the project footprint would most likely be terrestrial species adapted to grassland and that prey on avifaunal and small mammal species;
- No amphibian species were identified within the project footprint and none are likely to occur due to a lack of aquatic and wetland habitat in the project footprint; and
- Faunal species lists as provided by the Animal Demography Unit Virtual Museum for mammals, amphibians, reptiles and invertebrates for the QDS 2824DB were also considered (refer to Appendix C). All faunal species listed for the QDS are nationally listed as least concern or have not been evaluated in terms of their threat status. However, the provincial protection status of the species must be taken into consideration as a permit will be required from the Northern

Cape Department of Environment and Nature Conservation for the removal of protected species.

SENSITIVITY MAPPING

Habitat sensitivity was determined based on the irreplaceability of the habitat unit, on observations of the abundance and diversity of floral and faunal species present at the time of the assessment, on the presence of SCC and RDL species within the habitat units, on the presence of Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) and on the degree of disturbance encountered as a result of historical and current activities.

Terrestrial habitat associated with the project footprint is considered to be of a moderate sensitivity based on the following factors:

- The vegetation type associated with the project footprint is listed as least threatened within the region;
- The project footprint is not indicated to fall within an ESA or a CBA;
- Although the project footprint has been historically disturbed as a result of mining activities, these activities took place over 100 years ago and the vegetation in the area has subsequently begun to recover. The floral habitat and natural systems associated with the project footprint are therefore functioning well and the floral diversity is considered to be largely representative of the vegetation type for the area with exception of a few isolated areas which have been more recently disturbed as a result of small scale, illegal mining activities;
- One floral SCC, *Vachellia erioloba,* was encountered within the project footprint;
- Two protected floral species, *Vachellia erioloba* and *Psilocaulon coriarium* were encountered within the project footprint;
- No faunal RDL species were encountered within the project footprint; and
- Twenty one provincially protected faunal species were encountered within the project footprint, however, all faunal species encountered are common in the region and are considered to be of least concern on a national scale.

IMPACT ASSESSMENT

The table below serves to summarise the significance of perceived impacts on the floral and faunal biodiversity of the project footprint before mitigation measures are implemented. Also indicated is the impact significance of each perceived impact after the implementation of mitigation measures.

Table A: Summary of vegetation impact significance before and after mitigation.

Habitat Unit	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
IMPACT 1: LOSS OF FLORAL HABITAT AND ASSOCIATED FLORAL BIODIVERSITY AS WELL AS SCC AND PROTECTED FLORAL SPECIES					
Without Mitigation	Medium	Definite	**MEDIUM**	–ve	High
With Mitigation	Low	Definite	**LOW**	–ve	High
IMPACT 2: LOSS OF FAUNAL HABITAT AND ASSOCIATED FAUNAL BIODIVERSITY AND PROTECTED SPECIES					
Without Mitigation	Medium	Definite	**MEDIUM**	–ve	High
With Mitigation	Low	Possible	**VERY LOW**	–ve	High
IMPACT 3: LOSS OF FAUNAL MIGRATORY CORRIDORS					
Without Mitigation	Very Low	Possible	**INSIGNIFICANT**	–ve	High

From the results of the impact assessment it is evident that the proposed removal of diamondiferous material from the project footprint will have a medium (negative) impact on floral and faunal habitat, biodiversity and SCC/protected species prior to the implementation of mitigation measures. However, with the implementation of mitigation measures such as the limitation of the disturbance footprint area to what is absolutely essential, and the rehabilitation of disturbed areas, the impact on floral habitat, biodiversity and SCC can be reduced to a low (negative) significance and the impact on faunal habitat, biodiversity and protected species can be reduced to a very low (negative) significance.

The impact of the removal of diamondiferous material on faunal migratory corridors is considered to be insignificant prior to the implementation of mitigation measures. The application of any additional mitigatory measures in addition to those as stipulated for Impact 2 is therefore considered unnecessary.

After conclusion of the terrestrial assessment, it is the opinion of the ecologist that, from an ecological point of view, the proposed removal of diamondiferous material from the project footprint will not lead to an unacceptable loss of biodiversity or important ecological aspects and can be considered favourably, provided that the mitigation measures as presented in the impact assessment of this report are strictly adhered to.

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Glossary of Terms

Alien Invasive vegetation - Alien invaders are plants that are of exotic origin and are invading previously pristine areas or ecological niches

Biome – A broad ecological unit representing major life zones of large natural areas – defined mainly by vegetation structure and climate.

Protected species - Any species which is of such high conservation value or national importance that it requires national protection". Species listed in this category will include, among others, species listed in terms of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Red Data listed species – Organisms that fall into the Extinct in the Wild, Critically Endangered, Endangered, Vulnerable categories of ecological status as listed by the IUCN.

Species of Conservation Concern –Floral species that have a high conservation importance in terms of preserving South Africa's high floristic diversity and include not only threatened species, but also those classified in the categories Extinct in the Wild, Regionally Extinct, Near Threatened, Critically Rare, Rare, Declining and Data Deficient - Insufficient Information.

Subtend – To underlie

Threatened species - Species that are facing a high risk of extinction. Any species classified in the IUCN categories Critically Endangered, Endangered or Vulnerable is a threatened species.

Acronyms

BGIS - Biodiversity Geographic Information Systems

CITES – Convention on International Trade in Endangered Species

DEA – Department of Environmental Affairs

EAP – Environmental Assessment Practitioner

EIS – Ecological Importance and Sensitivity

CARA – Conservation of Agricultural Resources Act

GIS – Geographic Information System

IUCN – International Union for Conservation of Nature and Natural Resources

NBA – National Biodiversity Assessment

NCNCA – Northern Cape Nature Conservation Act

NEMA – National Environmental Management Act

NEMBA – National Environmental Management Biodiversity Act

NFA – National Forests Act

NT – Near Threatened

NYBA – Not Yet Been Assessed

PES – Present Ecological State

PRÉCIS – Pretoria Computer Information Systems

PSDF – Provincial Spatial Development Framework

QDS – Quarter degree square (1:50,000 topographical mapping references)

RDL - Red Data listed

SANBI – South African National Biodiversity Institute

SAS – Scientific Aquatic Services

SCC – Species of Conservation Concern

Sp. – Species

1 INTRODUCTION

1.1 Background

Scientific Aquatic Services cc (SAS cc) was appointed to conduct a vegetation impact assessment and a faunal screening assessment as part of the environmental assessment and authorisation process for the proposed clearing of diamondiferous material from the Buffalo Camp within Kimberley in the Northern Cape Province, hereafter referred to as the 'project footprint'.

De Beers Consolidated Mines Ltd aim to remove diamondiferous material from an old 'Floors' area which has been subjected to illegal mining over a period of time and poses a safety, health and security risk to the company. The diamondiferous material is found within the remains of Kimberlite floors which were deposited over 100 years ago across several hundred hectares. The area under consideration is located on a portion of a De Beers conservation area (Buffalo Camp) which is located approximately 1km to the east of the N12 national road and is located to the north of Sumaria Road. The lines of remaining diamondiferous material lie in a layer approximately 300 mm thick just below the surface of the ground. De Beers proposes to remove this material from site to stop the illegal mining as De Beers are spending significant resources on securing the area and illegal mining is a considerable safety risk.

The final document, after consideration and description of the ecological sensitivity of the project footprint, will aim to guide the property owner, Environmental Assessment Practitioner (EAP) and authorities by means of recommendations as to the viability of the activity from an environmental perspective, with a specific focus on terrestrial ecology.

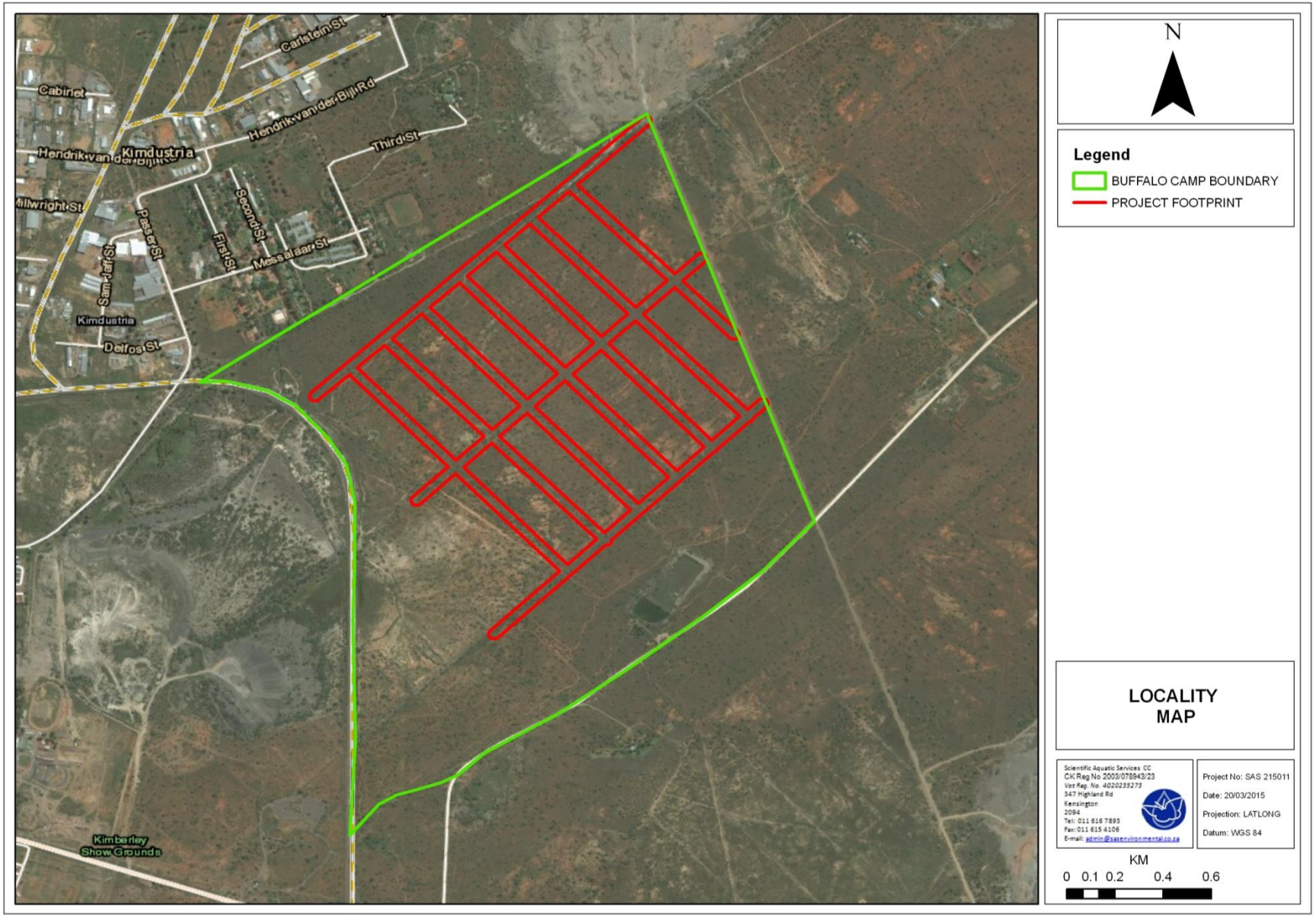

Figure 1: Digital satellite image depicting the location of the project footprint in relation to surrounding areas.

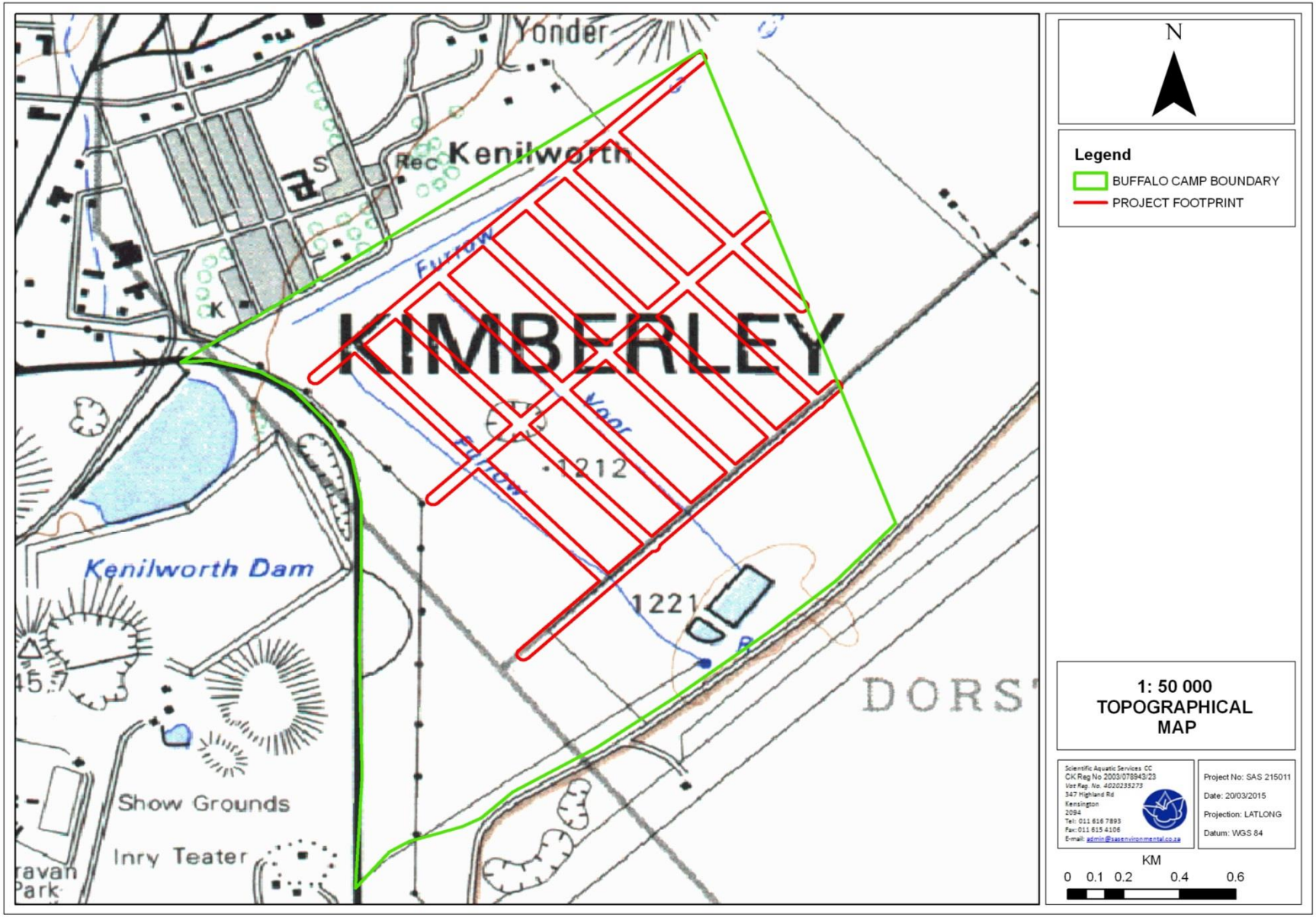

Figure 2: Location of the project footprint depicted on a 1:50 000 topographical map in relation to surrounding areas

1.2 Scope

Specific outcomes in terms of this report are as follows:

- Undertake a site visit to the project footprint in order to gather general information on the floral and faunal ecology of the area;
- Describe the baseline terrestrial ecology characteristics of the project footprint, emphasising but not limited to sensitive and threatened habitats and threatened, rare or protected fauna and flora;
- Describe pertinent characteristics of the terrestrial environment including, amongst others, the following components:
    - Habitat type based on conservation importance and Present Ecological State (PES);
    - Floral assemblages;
    - Faunal species including mammals, avifauna, herpetofauna, and invertebrates; and
    - Red Data List (RDL) and protected species;
- Identify and assess potential impacts resulting from the proposed Project (only impacts associated with the operations phase) using SRK's prescribed impact rating methodology;
- Identify and describe potential cumulative impacts resulting from the proposed Project in relation to proposed and existing developments in the surrounding area; and
- Recommend mitigation measures to avoid and/or minimise impacts and enhance benefits associated with the proposed Project.

1.3 Assumptions and Limitations

The following assumptions and limitations are applicable to this report:

- The terrestrial assessment was confined to the project footprint as well as the immediate adjacent areas of relevance and does not include the neighbouring and adjacent properties. These were however considered as part of the desktop assessment;
- Sampling by its nature, means that not all individuals are assessed and identified. Some species and taxa within the project footprint may therefore have been missed during the assessment;
- Due to the nature and habits of most faunal taxa it is unlikely that all species would have been observed during a site assessment of limited duration. Therefore, site observations are compared with literature studies where necessary;
- With ecology being dynamic and complex, some aspects may have been overlooked; and
- The level of detail undertaken in the study is considered sufficient to ensure that the results of this assessment accurately define the Ecological Importance and Sensitivity (EIS) and PES of the project footprint and to provide the relevant planners and decision makers with sufficient information to formulate an opinion on the viability of the proposed activity from an ecological conservation viewpoint.

1.4 Indemnity and Terms of Use of this Report

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

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1.5 Legislative requirements

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

The National Environmental Management Act (NEMA) (Act 107 of 1998) as amended and the associated Regulations (Listing No R. 983, No R. 984 and R. 985), states that prior to any development taking place which triggers any activity as listed within the abovementioned regulations, an environmental authorisation process needs to be followed. This could follow either the Basic Assessment process or the Environmental Impact Assessment (EIA) process depending on the nature of the activity and scale of the impact.

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

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

- the management and conservation of biological diversity within the Republic of South Africa and of the components of such diversity;
- the use of indigenous biological resources in a sustainable manner; and
- the fair and equitable sharing among stakeholders of benefits arising from bio-prospecting involving indigenous biological resources.

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

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

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

National Forests Act (NFA, Act 84 of 1998, as amended in 2011)

In terms of section 15(1) of the NFA (Act No. 84 of 1998, as amended in 2011):

- No person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a licence granted by the Minister to an applicant and subject to such period and conditions as may be stipulated.

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

<u>Restricted activities involving specially protected plants:</u>

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

(a) Pick;
(b) Import;
(c) Export;
(d) Transport;

(e) Possess;
(f) Cultivate; or
(g) Trade in,

A specimen of a specially protected plant.

Restricted activities involving protected plants:

50 (1) Subject to the provision of section 52, no person may, without a permit –

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

A specimen of a protected plant.

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

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

2 METHOD OF ASSESSMENT

A site visit was undertaken during March 2015 in order to determine the EIS of the project footprint and the surrounding areas. A thorough 'drive through' of the area was undertaken to determine the general habitat types found throughout the project footprint. Special emphasis was placed on areas that may potentially support floral Species of Conservation Concern (SCC) as listed by the South African National Biodiversity Institute (SANBI) PRECIS (National Herbarium Pretoria (PRE) Computerised Information System) database. Portions of the project footprint were investigated on foot in order to identify the occurrence of the dominant floral and faunal communities, species and habitat diversities. The presence of any faunal inhabitants of the project footprint was also assessed through direct visual observation or identifying such species through calls, tracks, scats and burrows.

A detailed explanation of the terrestrial method of assessment is provided in Appendix A.

3 DESKTOP RESULTS

3.1 National Land Cover (2009)

Land cover and land use changes often indicate major impacts on biodiversity, especially if those changes show the loss of natural habitat due to urban sprawl, cultivation, etc. The majority of the project footprint is indicated to be natural land with urban development located to the north of the project footprint.

3.2 Importance According to the Northern Cape Provincial Spatial Development Framework (PSDF, 2012)

According to the PSDF (2012) the project footprint is not located within a centre of endemism.

3.3 National List of Threatened Terrestrial Ecosystems for South Africa (2011)

The NEMBA (Act 10 of 2004) provides for listing of threatened or protected ecosystems, in one of four categories: Critically Endangered, Endangered, Vulnerable or Protected. Threatened ecosystems are listed in order to reduce the rate of ecosystem and species extinction by preventing further degradation and loss of structure, function and composition of threatened ecosystems. The purpose of listing protected ecosystems is primarily to conserve sites of exceptionally high conservation value (SANBI, Biodiversity Geographic information Systems (BGIS)).

The project footprint does not fall within the remaining extent of a threatened terrestrial ecosystem.

3.4 National Biodiversity Assessment (NBA), 2011

The recently completed NBA (2011) provides an assessment of South Africa's biodiversity and ecosystems, including headline indicators such as ecosystem threat status and ecosystem protection level, and national maps for the terrestrial, freshwater, estuarine and marine environments. The NBA (2011) includes a summary of spatial biodiversity priority areas that have been identified through systematic biodiversity plans at national, provincial and local levels.

According to the NBA (2011) the project footprint is not located within either a formal or informal protected area and is listed as a Least Threatened ecosystem and Not Protected.

4 DESCRIPTION OF THE AFFECTED ENVIRONMENT: VEGETATION

4.1 Regional Context

The project footprint is located within the Sol Plaatjie Municipality which is located within the Northern Cape Province. The project footprint is located within the Savanna biome and is situated within the Eastern Kalahari Bushveld bioregion. The vegetation type indicated by Mucina and Rutherford (2009) is Kimberley Thornveld (Figure 3) which is not considered to be of conservation concern (National list of threatened ecosystems for South Africa, 2011). However, the vegetation type is under conserved and is under increased threat as a result of habitat loss to mining activities in the region.

Figure 3: Vegetation types associated with the project footprint (Mucina & Rutherford, 2009).

4.2 Vegetation Descriptions

4.2.1 Kimberley Thornveld Habitat Unit

One habitat unit, the Kimberley Thornveld habitat unit, was encountered within the project footprint at the time of the assessment. The Kimberley Thornveld habitat unit is characterised by a scattered tree layer, dominated by *Vachellia tortilis* subsp. *heteracantha*, subtended by a continuous grassy layer. Floral species dominating the habitat unit include *Enneapogon cenchroides, Eragrostis lehmanniana, Eragrostis echinochloidea, Eragrostis trichophora, Eragrostis rigidior, Eragrostis superba, Aristida canescens, Aristida congesta subsp. barbicolis, Cenchrus ciliaris, Cynodon dactylon, Fingerhuthia africana, Setaria verticilata, Heteropogon contortus, Sporobolus fimbriatus, Schmidtia pappophoroides, Themeda triandra, Tragus berteronianus, Chloris virgata, Stipagrostis ciliata, Chenopodium album, Pentzia incana, Barleria rigida, Cleome angustifolia, Tribulus terrestris, Lycium cinereum, Lycium boscifolium, Grewia flava, Salsola kali, Salsola aphylla, Peliostomum leucorrhizum Eriocephalus ericoides, Chrysocoma ciliata*, *Psilocaulon coriarium* (Asbos), *Asparagus* spp., *Tarchonanthus camphoratus, Gisekia africana, Atriplex semibaccata, Geigeria ornativa, Solanum tomentosum, Searsia lancea, Searsia ciliata Vachellia erioloba* (Camel Thorn)*, Senegalia mellifera* (Black Thorn) and *Vachellia hebeclada*.

Although the project footprint has been historically disturbed as a result of mining activities, these activities took place over 100 years ago and the vegetation in the area has subsequently begun to recover. The floral habitat and natural systems associated with the project footprint are therefore functioning well and the floral diversity is considered to be largely representative of the vegetation type for the area with exception of a few isolated areas which have been more recently disturbed as a result of small scale, illegal mining activities.

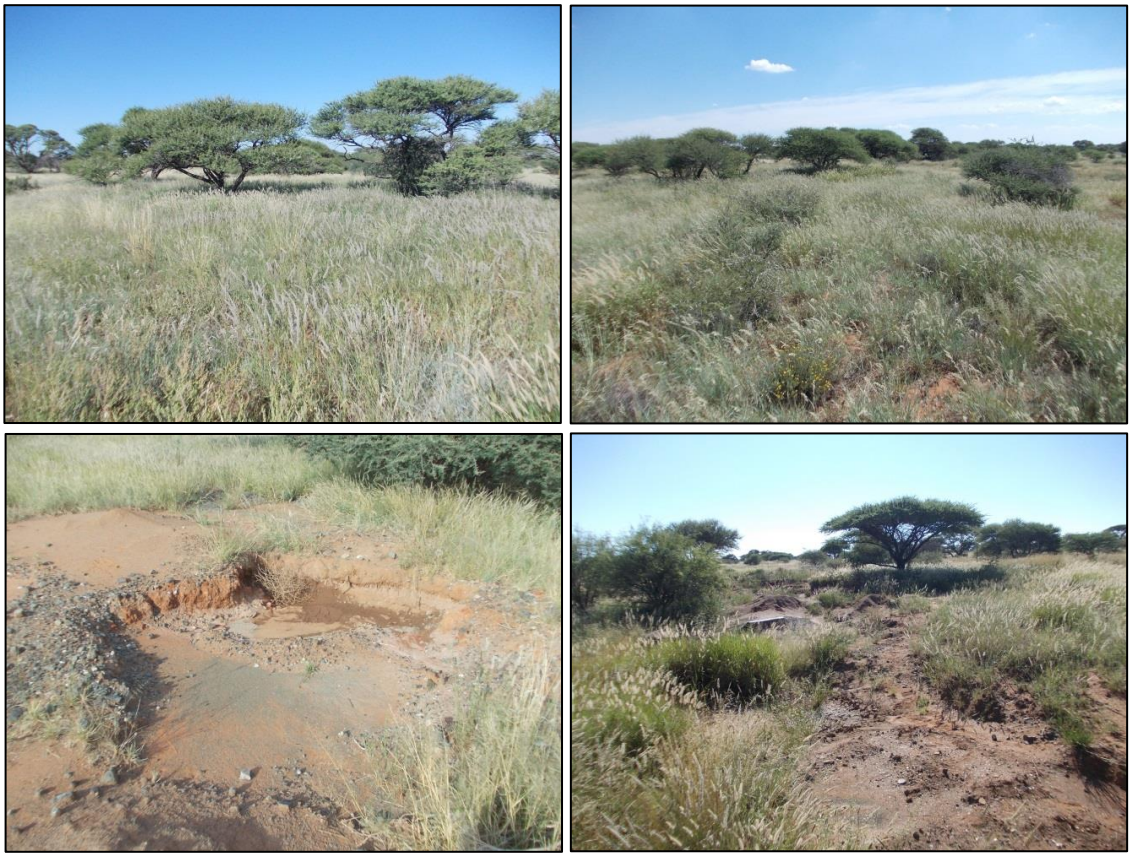


Figure 4: The Kimberley Thornveld habitat unit (top) and small scale illegal mining encountered within the project footprint (bottom).

4.3 Vegetation Index Score

The information gathered during the assessment of the project footprint was used to determine the Vegetation Index Score (VIS) – see Appendix C, for vegetation associated with the Kimberley Thornveld habitat unit. The final VIS scores were then categorised as follows:

Table 1: VIS classes.

VIS	Assessment Class	Description
25	**A**	Unmodified, natural
20 to 24	**B**	Largely natural with few modifications.
15 to 20	**C**	Moderately modified
10 to 15	**D**	Largely modified
5 to 10	**E**	The loss of natural habitat extensive
<5	**F**	Modified completely

A moderate score was calculated for the Kimberley Thornveld habitat unit which falls within Class C – Moderately modified. The floral habitat and natural systems associated with the project footprint are functioning well and the floral diversity is considered to be largely representative of the vegetation type for the area with limited disturbance encountered as a result of more recent small scale, illegal mining activities.

4.4 Graminoid Community Assessment

Floral communities can provide information regarding the ecological status of specific areas within a project footprint. If the species composition is quantitatively determined and characteristic of all components of the floral community taken into consideration, it is possible to determine the PES of the portion of land represented by the assessment point. Different transect lines were chosen within areas that were perceived to best represent the graminoid communities associated with the project footprint. Graminoid species were recorded for each transect assessed. The locations of the various transects are depicted in the figure below.

Any given grass species is specifically adapted to specific growth conditions. This sensitivity to specific conditions make grasses good indicators of veld conditions. The sections below summarise the dominant floral (grass) species identified within each transect with their associated habitats and optimal growth conditions with reference to the table and figure below.

Table 2: Grouping of grasses (Van Oudtshoorn, 2006).

Pioneer	Hardened, annual plants that can grow in very unfavourable conditions. In time improves growth conditions for perennial grasses.
Subclimax	Weak perennials denser than pioneer grasses. Protects soils leading to more moisture, which leads to a denser stand, which deposits more organic material on the surface. As growth conditions improve subclimax grasses are replaced by climax grasses.
Climax	Strong perennial plants adapted to optimal growth conditions.
Decreaser	Grasses abundant in good veld.
Increaser I	Grasses abundant in underutilized veld.
Increaser II	Grasses abundant in overgrazed veld.
Increaser III	Grasses commonly found in overgrazed veld.

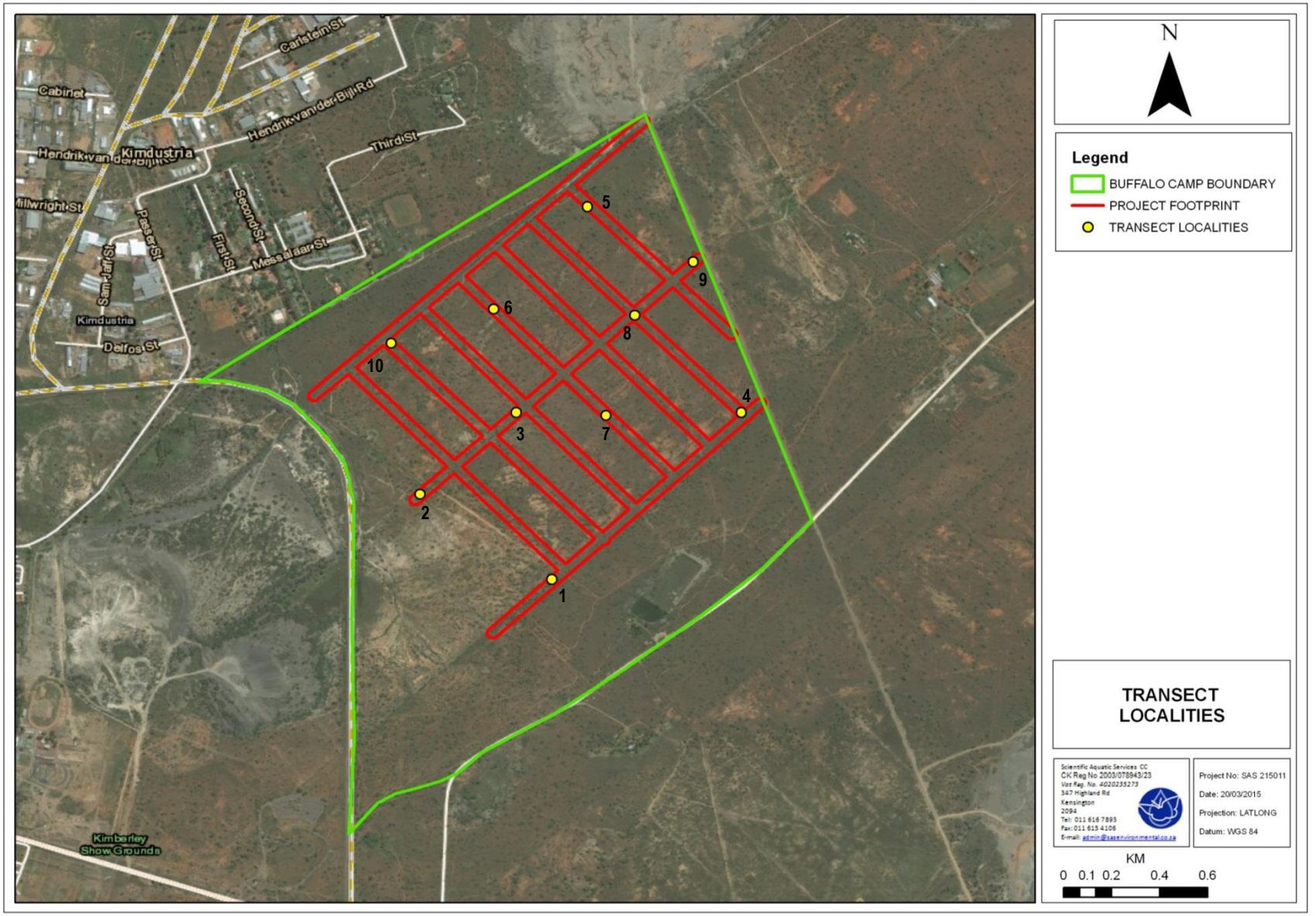
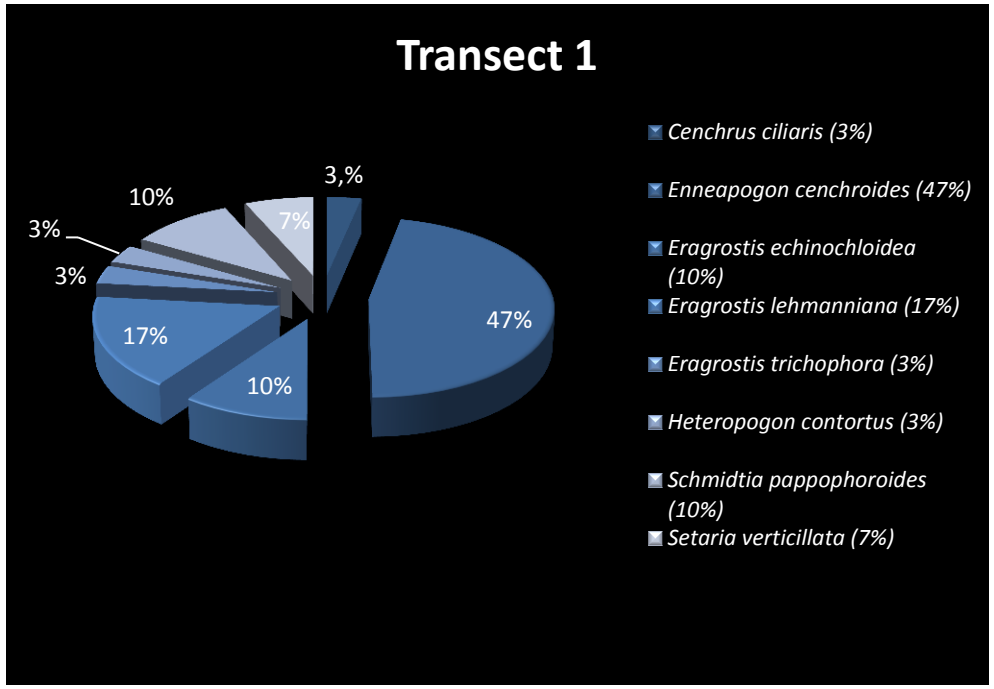


Figure 5: Aerial map depicting locations of transects 1-10.



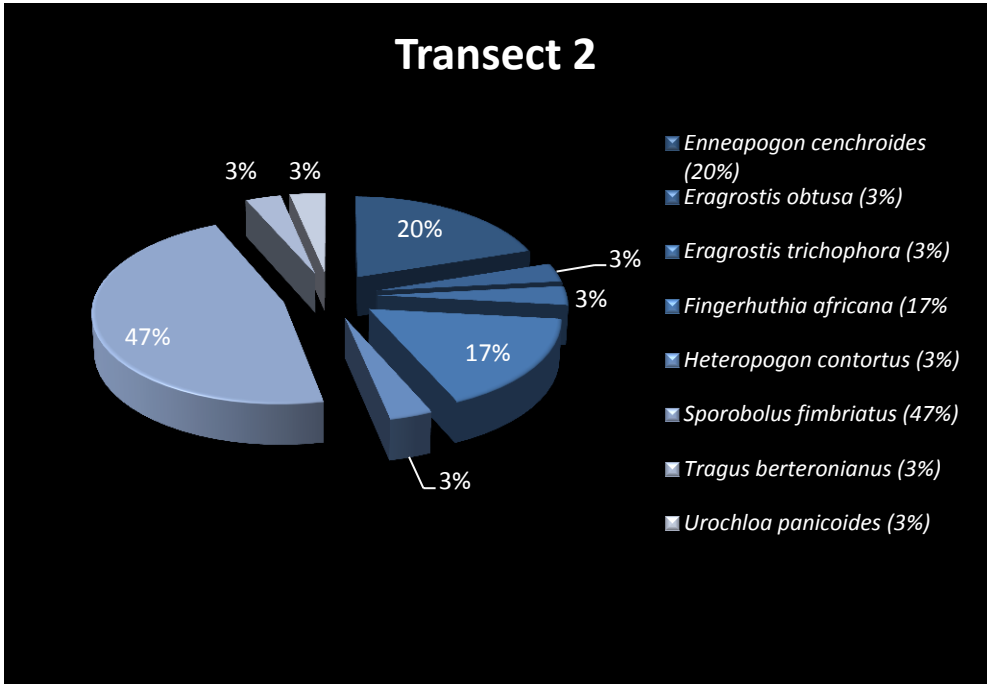
Transect 1

- *Cenchrus ciliaris* (Foxtail Buffalo Grass) [Climax grass; Decreaser]. Foxtail buffalo grass (also called blue buffalo grass) grows in dry warm parts. It grows in all types of soil, but mostly in sandy soil and other well drained soil types. It is often found along roadsides where it utilises the additional runoff rainwater.
- *Enneapogon cenchroides (Nine Awned Grass)* [Pioneer and Subclimax; Increaser II]. Nine awned grass usually grows in disturbed veld. It is often also found along roadsides. It mostly grows in sandy and gravelly soil and is common in mopaneveld and limestone areas.
- *Eragrostis echinochloidea* (Tick grass) [Subclimax grass; Increaser II]. Tick grass usually grows in disturbed places such as old cultivated lands and road reserves; mostly in shallow lime soil, as well as sandy soil. It is often found in the vicinity of pans.
- *Eragrostis lehmanniana* (Lehmann's Love Grass) [Climax grass; Increase II]. Lehmann's love grass usually grows in parts where disturbance took place in the past, such as overgrazed veld, old cultivated lands and road reserves; mostly in sandy soil. It also grows in undisturbed sandveld in arid regions.
- *Eragrostis trichophora* (Hairy Love Grass) [Subclimax grass; Increaser II]. Hairy love grass usually grows in disturbed places such as roadsides and bare patches in veld. It is mostly found in shallow gravelly and sandy soil, often in patches where rain water collects.
- *Heteropogon contortus* (Spear Grass) [Subclimax grass, Increaser II]. Spear grass grows especially in gravelly and other well drained soil. It often grows on slopes and in disturbed places such as road reserves where it can form dense stands.
- *Schmidtia pappophoroides* (Sand Quick) [Climax & Sub climax grass; Increaser & Decreaser grass]. Sand quick grows in warm areas with a relatively low rainfall; mostly in sandy, loam and gravelly soil. It often grows in limeveld, and sometimes in gravelly clay soil.
- *Setaria verticillata* (Bur bristle grass) [Subclimax grass; Increaser II]. Bur bristle grass often grows under trees (for example Acacia trees), especially in disturbed (due to overgrazing, trampling or drought) and damp soil. It is a common weed in gardens and in cultivated lands. It grows best in fertile soil.

Kimberley Thornveld Indicators:
Enneapogon cenchroides, Eragrostis lehamnniana

Conclusion: Grass species diversity is considered to be reasonably high. The vegetation is dominated by *Enneapogon cenchroides* which is an indicator of disturbed veld, however, this species is also an indicative species for the natural Kimberley Thornveld vegetation type.

Figure 6: Transect 1.



Transect 2

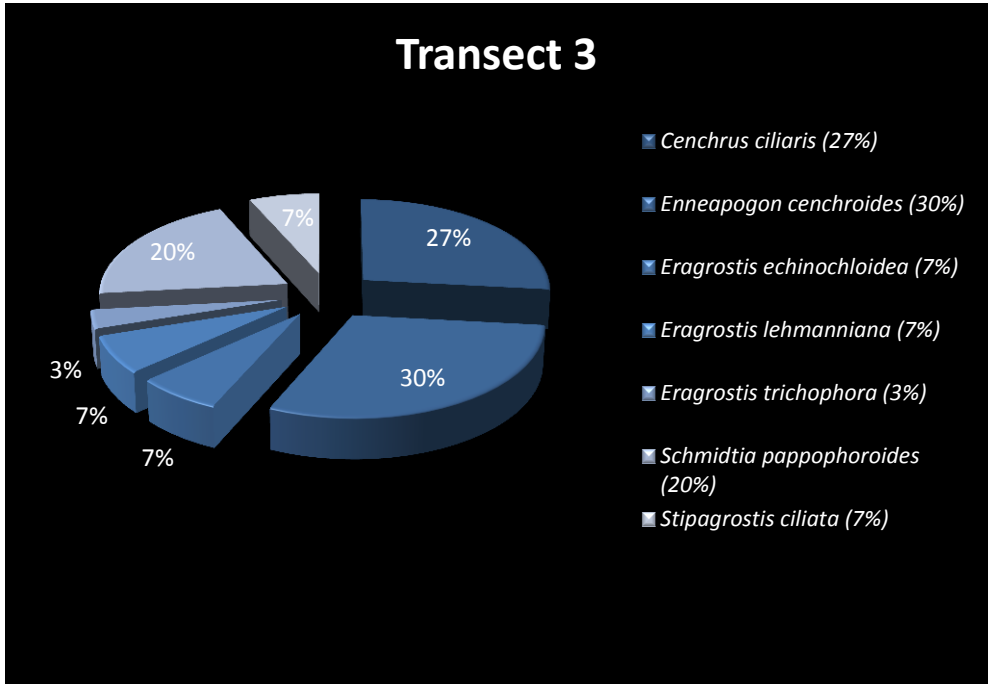
- *Enneapogon cenchroides* (Nine Awned Grass) [Pioneer and Subclimax; Increaser II]. Nine awned grass usually grows in disturbed veld. It is often also found along roadsides. It mostly grows in sandy and gravelly soil and is common in mopaneveld and limestone areas.
- *Eragrostis obtusa* (Dew Grass) [Pioneer and Subclimax; Increaser II]. Dew grass grows in disturbed places such as road reserves and trampled veld. It mostly grows in sandy and gravelly soil, especially limestone soil.
- *Eragrostis trichophora* (Hairy Love Grass) [Subclimax grass; Increaser II]. Hairy love grass usually grows in disturbed places such as roadsides and bare patches in veld. It is mostly found in shallow gravelly and sandy soil, often in patches where rain water collects.
- *Fingerhuthia africana* (Thimble Grass) [Subclimax and Climax grass; Decreaser]. Thimble grass usually grows in gravelly soil. It is often found in limestone and eroded places. It is mostly found in warm sunny places.
- *Heteropogon contortus* (Spear Grass) [Subclimax grass, Increaser II]. Spear grass grows especially in gravelly and other well drained soil. It often grows on slopes and in disturbed places such as road reserves where it can form dense stands.
- *Sporobolus fimbriatus* (Dropseed Grass) [Climax grass; Decreaser]. Dropseed grass often grows in damp places along rivers, in water courses, next to roads and often in the shade under trees. It mostly grows in well-drained soil.
- *Tragus berteronianus* (Carrotseed Grass) [Pioneer grass; Increaser II]. Carrotseed grass grows in disturbed places such as bare patches in veld as well as in and besides roads. It is often the first grass to colonise hard, compacted soils, mostly in sandy and loam soil.
- *Urochloa panicoides* (Garden Urochloa) [Pioneer grass; Increaser II]. Garden Urochloa grows in disturbed places such as cultivated lands, gardens and road reserves. It often grows in damp places where water collects, but also on hard, bare ground. It grows in most soil types, but mostly in clay soils.

Kimberley Thornveld Indicators:

Enneapogon cenchroides, Heteropogon contortus

Conclusion: Grass species diversity is considered to be reasonably high and the vegetation is dominated by *Sporobolus fimbriatus* which is a climax grass and a decreaser grass which is indicative of veld in good condition.

Figure 7: Transect 2.



Transect 3

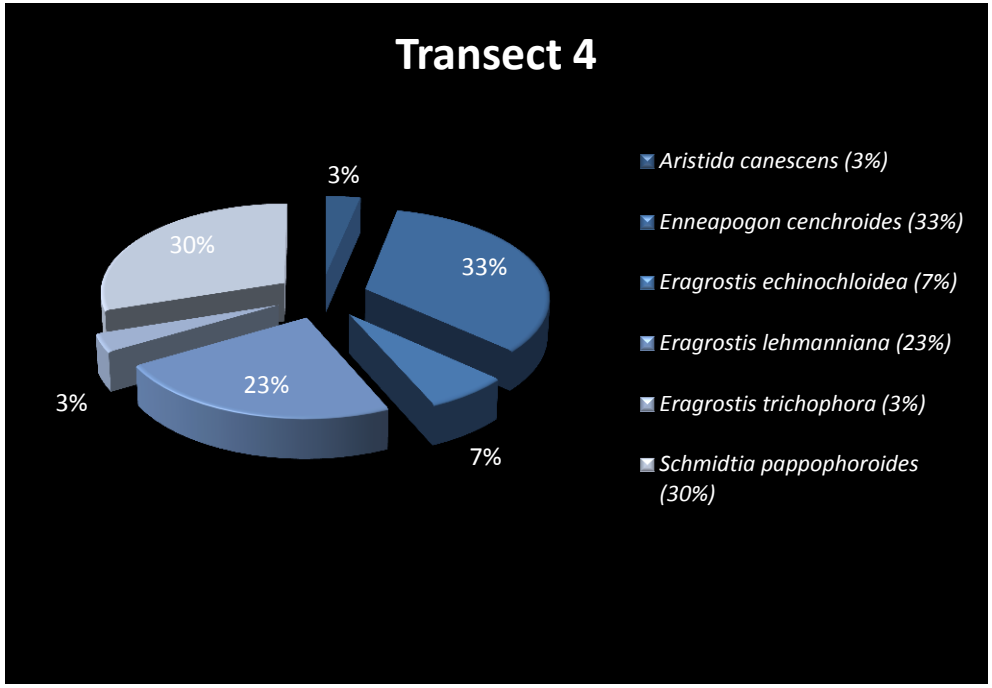
- *Cenchrus ciliaris* (Foxtail Buffalo Grass) [Decreaser; Climax grass]. Foxtail buffalo grass (also called blue buffalo grass) grows in dry warm parts. It grows in all types of soil, but mostly in sandy soil and other well drained soil types. It is often found along roadsides where it utilises the additional runoff rainwater.
- *Enneapogon cenchroides* (Nine Awned Grass) [Pioneer and Subclimax; Increaser II]. Nine awned grass usually grows in disturbed veld. It is often also found along roadsides. It mostly grows in sandy and gravelly soil and is common in mopaneveld and limestone areas.
- *Eragrostis echinochloidea* (Tick grass) [Increaser II; Subclimax grass]. Tick grass usually grows in disturbed places such as old cultivated lands and road reserves; mostly in shallow lime soil, as well as sandy soil. It is often found in the vicinity of pans.
- *Eragrostis lehmanniana* (Lehmann's Love Grass) [Climax grass; Increase II]. Lehmann's love grass usually grows in parts where disturbance took place in the past, such as overgrazed veld, old cultivated lands and road reserves; mostly in sandy soil. It also grows in undisturbed sandveld in arid regions.
- *Eragrostis trichophora* (Hairy Love Grass) [Subclimax grass; Increaser II]. Hairy love grass usually grows in disturbed places such as roadsides and bare patches in veld. It is mostly found in shallow gravelly and sandy soil, often in patches where rain water collects.
- *Schmidtia pappophoroides* (Sand Quick) [Climax & Sub climax grass; Increaser & Decreaser grass]. Sand quick grows in warm areas with a relatively low rainfall; mostly in sandy, loam and gravelly soil. It often grows in limeveld, and sometimes in gravelly clay soil.
- *Stipagrostis ciliata* (Tall Bushman Grass) [Climax, Decreaser]. Tall bushman grass usually grows in coarse, sandy soil such as on gravel plains and in riverbeds. It is associated with veld in good condition.

Kimberley Thornveld Indicators:

Enneapogon cenchroides, Eragrostis lehmanniana

Conclusion: The veld is dominated by three species, *Enneapogon cenchroides* which is indicative of the vegetation type, and *Cenchrus ciliaris* and *Schmidtia pappophoroides* which are classified as climax and decreaser grasses which are indicative of veld in good condition.

Figure 8: Transect 3.



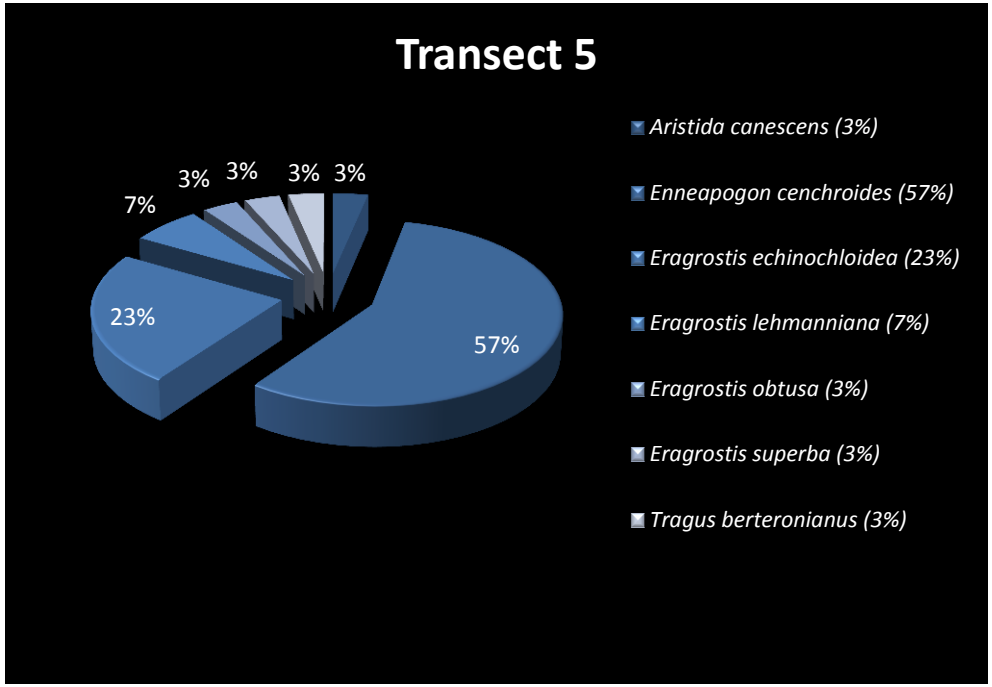
Transect 4

- *Aristida canescens* (Pale Three-awn) [Subclimax grass; Increaser II]. Pale three-awn occurs in disturbed and eroded places. It gows in poor, shallow, gravelly soils, often on hard, bare patches.
- *Enneapogon cenchroides* (Nine Awned Grass) [Pioneer and Subclimax; Increaser II]. Nine awned grass usually grows in disturbed veld. It is often also found along roadsides. It mostly grows in sandy and gravelly soil and is common in mopaneveld and limestone areas.
- *Eragrostis echinochloidea* (Tick grass) [Increaser II; Subclimax grass]. Tick grass usually grows in disturbed places such as old cultivated lands and road reserves; mostly in shallow lime soil, as well as sandy soil. It is often found in the vicinity of pans.
- *Eragrostis lehmanniana* (Lehmann's Love Grass) [Climax grass; Increase II]. Lehmann's love grass usually grows in parts where disturbance took place in the past, such as overgrazed veld, old cultivated lands and road reserves; mostly in sandy soil. It also grows in undisturbed sandveld in arid regions.
- *Eragrostis trichophora* (Hairy Love Grass) [Subclimax grass; Increaser II]. Hairy love grass usually grows in disturbed places such as roadsides and bare patches in veld. It is mostly found in shallow gravelly and sandy soil, often in patches where rain water collects.
- *Schmidtia pappophoroides* (Sand Quick) [Climax & Sub climax grass; Increaser & Decreaser grass]. Sand quick grows in warm areas with a relatively low rainfall; mostly in sandy, loam and gravelly soil. It often grows in limeveld, and sometimes in gravelly clay soil.

Kimberley Thornveld Indicators:
Aristida canescens; Enneapogon cenchroides; Eragrostis lehmanniana

Conclusion: The veld is dominated by three species, *Enneapogon cenchroides* and *Eragrostis lehmanniana* which are indicative of disturbance however the species are also indicator species for the natural vegetation type; and *Schmidtia pappophoroides* which is a climax and decreaser grass indicative of veld in good condition.

Figure 9: Transect 4.



Transect 5

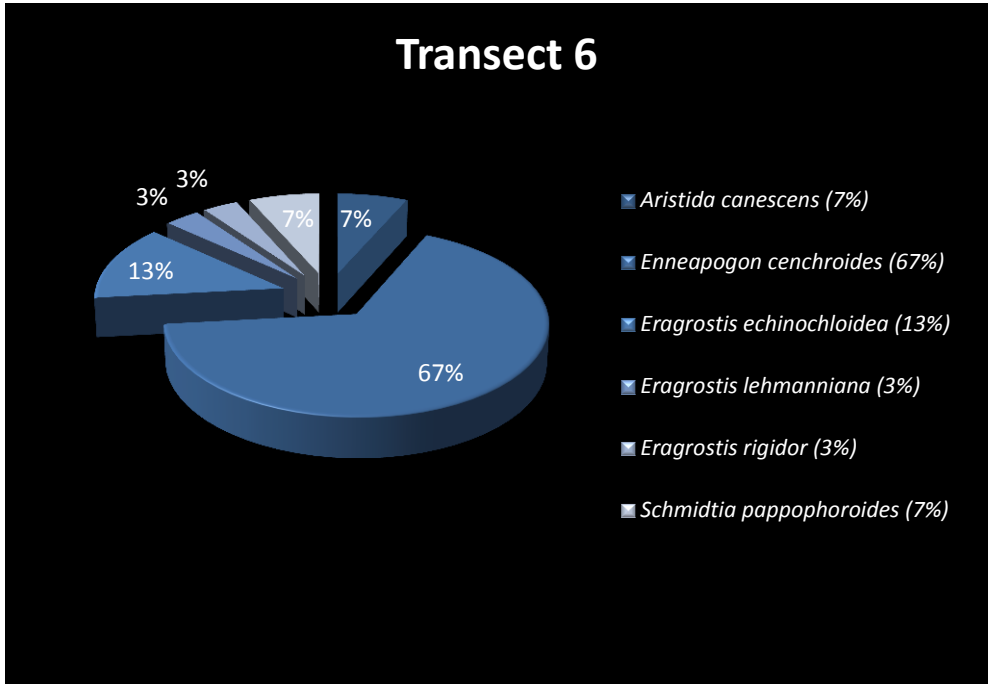
- *Aristida canescens* (Pale Three-awn) [Subclimax grass; Increaser II]. Pale three-awn occurs in disturbed and eroded places. It gows in poor, shallow, gravelly soils, often on hard, bare patches.
- *Enneapogon cenchroides* (Nine Awned Grass) [Pioneer and Subclimax; Increaser II]. Nine awned grass usually grows in disturbed veld. It is often also found along roadsides. It mostly grows in sandy and gravelly soil and is common in mopaneveld and limestone areas.
- *Eragrostis echinochloidea* (Tick grass) [Increaser II; Subclimax grass]. Tick grass usually grows in disturbed places such as old cultivated lands and road reserves; mostly in shallow lime soil, as well as sandy soil. It is often found in the vicinity of pans.
- *Eragrostis lehmanniana* (Lehmann's Love Grass) [Climax grass; Increase II]. Lehmann's love grass usually grows in parts where disturbance took place in the past, such as overgrazed veld, old cultivated lands and road reserves; mostly in sandy soil. It also grows in undisturbed sandveld in arid regions.
- *Eragrostis obtusa* (Dew Grass) [Pioneer and Subclimax; Increaser II]. Dew grass grows in disturbed places such as road reserves and trampled veld. It mostly grows in sandy and gravelly soil, especially limestone soil.
- *Eragrostis superba* (Saw-tooth Love Grass) [Subclimax grass; Increaser II]. Saw-tooth love grass usually grows in disturbed places such as bare patches in veld and along roadsides. It mostly grows in sand, loam and gravelly soil, but also sometimes in clay soil. It also grows on termite mounds.
- *Tragus berteronianus* (Carrotseed Grass) [Pioneer grass; Increaser II]. Carrotseed grass grows in disturbed places such as bare patches in veld as well as in and besides roads. It is often the first grass to colonise hard, compacted soils, mostly in sandy and loam soil.

Kimberley Thornveld Indicators:

Aristida canescens, Enneapogon cenchroides, Eragrostis lehmanniana

Conclusion: Grass species diversity is considered to be reasonably high. The vegetation is dominated by *Enneapogon cenchroides* which is an indicator of disturbed veld, however, this species is also an indicative species for the natural Kimberley Thornveld vegetation type. The remaining species are largely subclimax grasses which are indicators of disturbance. The presence of these species within the project footprint may be as a result of the historical disturbance of the site due to mining activities.

Figure 10: Transect 5.



Transect 6

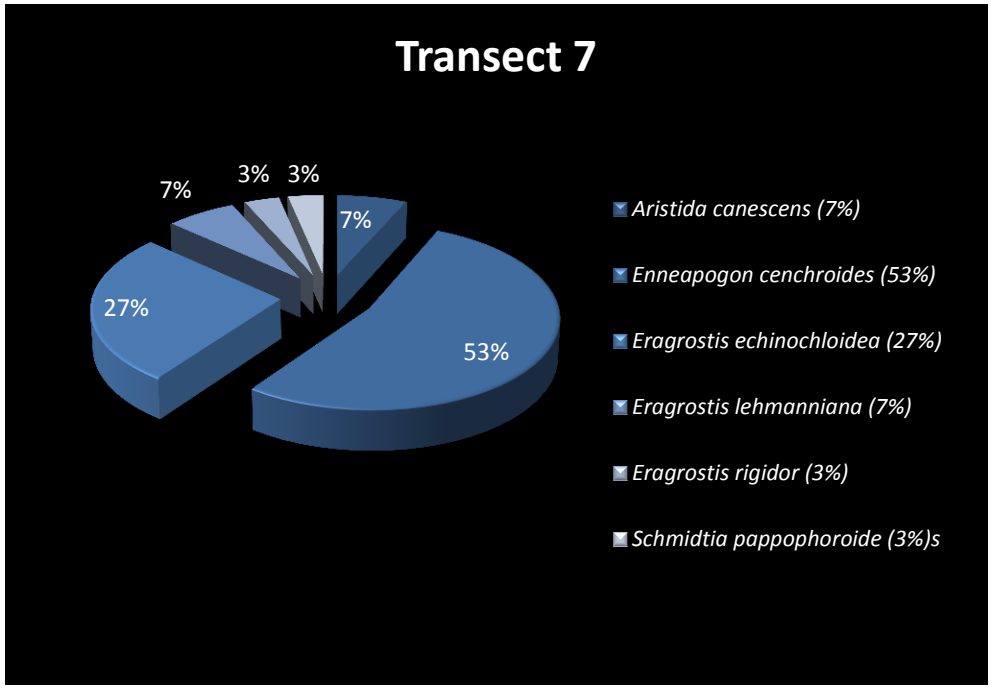
- *Aristida canescens* (Pale Three-awn) [Subclimax grass; Increaser II]. Pale three-awn occurs in disturbed and eroded places. It gows in poor, shallow, gravelly soils, often on hard, bare patches.
- *Enneapogon cenchroides* (Nine Awned Grass) [Pioneer and Subclimax; Increaser II]. Nine awned grass usually grows in disturbed veld. It is often also found along roadsides. It mostly grows in sandy and gravelly soil and is common in mopaneveld and limestone areas.
- *Eragrostis echinochloidea* (Tick grass) [Increaser II; Subclimax grass]. Tick grass usually grows in disturbed places such as old cultivated lands and road reserves; mostly in shallow lime soil, as well as sandy soil. It is often found in the vicinity of pans.
- *Eragrostis lehmanniana* (Lehmann's Love Grass) [Climax grass; Increase II]. Lehmann's love grass usually grows in parts where disturbance took place in the past, such as overgrazed veld, old cultivated lands and road reserves; mostly in sandy soil. It also grows in undisturbed sandveld in arid regions.
- *Eragrostis rigidior* (Broad Curly Leaf) [Subclimax grass; Increaser II]. Broad curly leaf usually grows in disturbed places such as old cultivated lands and in bare patches in overgrazed and/or eroded veld. It is mostly found in sandy and loam soil.
- *Schmidtia pappophoroides* (Sand Quick) [Climax & Sub climax grass; Increaser & Decreaser grass]. Sand quick grows in warm areas with a relatively low rainfall; mostly in sandy, loam and gravelly soil. It often grows in limeveld, and sometimes in gravelly clay soil.

Kimberley Thornveld Indicators:

Aristida canescens, Enneapogon cenchroides, Eragrostis lehmanniana, Eragrostis rigidior

Conclusion: The vegetation is dominated by *Enneapogon cenchroides* which is an indicator of disturbed veld, however, this species is also an indicative species for the natural Kimberley Thornveld vegetation type. The remaining species are largely subclimax grasses which are indicators of disturbance. The presence of these species within the project footprint may be as a result of the historical disturbance of the site due to mining activities.

Figure 11: Transect 6.



Transect 7

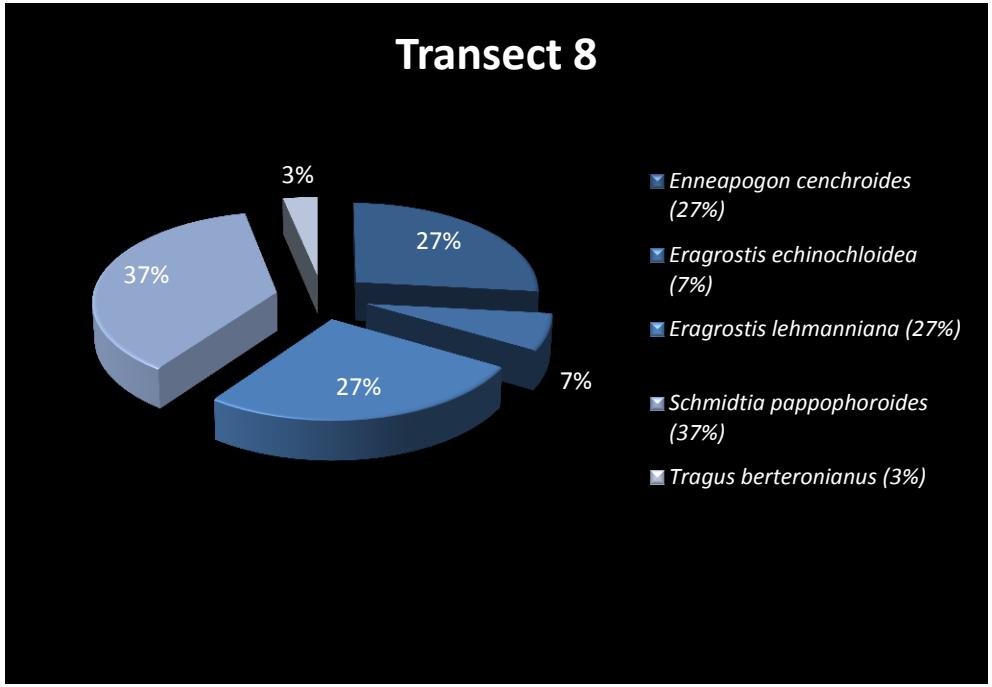
- *Aristida canescens* (Pale Three-awn) [Subclimax grass; Increaser II]. Pale three-awn occurs in disturbed and eroded places. It gows in poor, shallow, gravelly soils, often on hard, bare patches.
- *Enneapogon cenchroides* (Nine Awned Grass) [Pioneer and Subclimax; Increaser II]. Nine awned grass usually grows in disturbed veld. It is often also found along roadsides. It mostly grows in sandy and gravelly soil and is common in mopaneveld and limestone areas.
- *Eragrostis lehmanniana* (Lehmann's Love Grass) [Climax grass; Increase II]. Lehmann's love grass usually grows in parts where disturbance took place in the past, such as overgrazed veld, old cultivated lands and road reserves; mostly in sandy soil. It also grows in undisturbed sandveld in arid regions.
- *Eragrostis rigidior* (Broad Curly Leaf) [Subclimax grass; Increaser II]. Broad curly leaf usually grows in disturbed places such as old cultivated lands and in bare patches in overgrazed and/or eroded veld. It is mostly found in sandy and loam soil.
- *Schmidtia pappophoroides* (Sand Quick) [Climax & Sub climax grass; Increaser & Decreaser grass]. Sand quick grows in warm areas with a relatively low rainfall; mostly in sandy, loam and gravelly soil. It often grows in limeveld, and sometimes in gravelly clay soil.

Kimberley Thornveld Indicators:

Aristida canescens, Enneapogon cenchroides, Eragrostis lehmanniana, Eragrostis rigidior

Conclusion: The vegetation is dominated by *Enneapogon cenchroides* which is an indicator of disturbed veld, however, this species is also an indicative species for the natural Kimberley Thornveld vegetation type. Additional species which are indicators of the natural veld include *Aristida canescens*, *Eragrostis lehmanniana* and *Eragrostis rigidior*.

Figure 12: Transect 7.



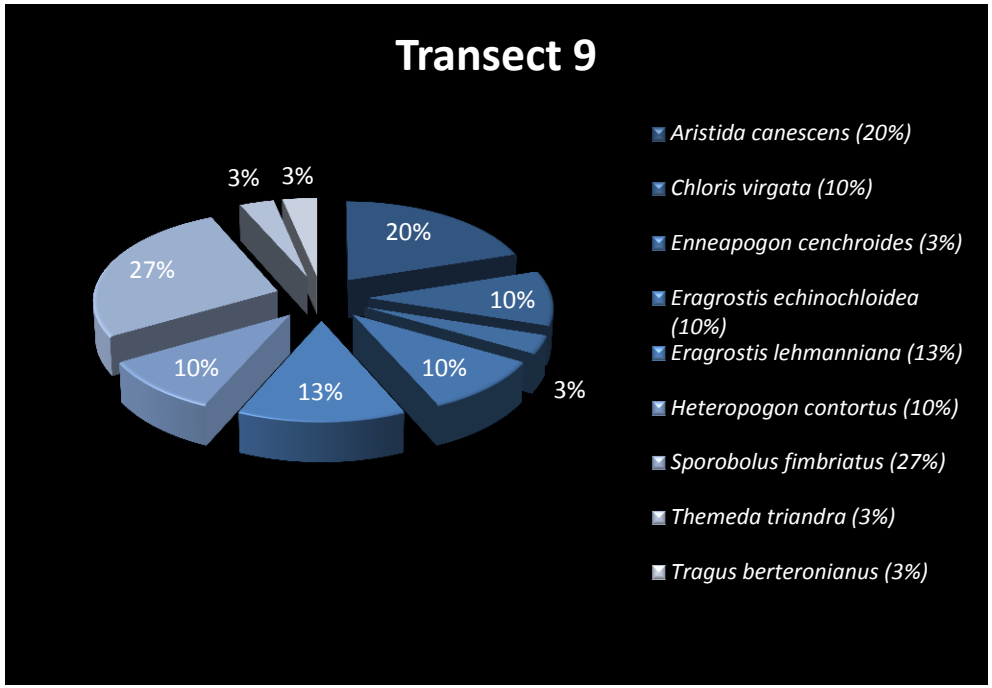
Transect 8

- *Enneapogon cenchroides* (Nine Awned Grass) [Pioneer and Subclimax; Increaser II]. Nine awned grass usually grows in disturbed veld. It is often also found along roadsides. It mostly grows in sandy and gravelly soil and is common in mopaneveld and limestone areas.
- *Eragrostis echinochloidea* (Tick grass) [Increaser II; Subclimax grass]. Tick grass usually grows in disturbed places such as old cultivated lands and road reserves; mostly in shallow lime soil, as well as sandy soil. It is often found in the vicinity of pans.
- *Eragrostis lehmanniana* (Lehmann's Love Grass) [Climax grass; Increase II]. Lehmann's love grass usually grows in parts where disturbance took place in the past, such as overgrazed veld, old cultivated lands and road reserves; mostly in sandy soil. It also grows in undisturbed sandveld in arid regions.
- *Schmidtia pappophoroides* (Sand Quick) [Climax & Sub climax grass; Increaser & Decreaser grass]. Sand quick grows in warm areas with a relatively low rainfall; mostly in sandy, loam and gravelly soil. It often grows in limeveld, and sometimes in gravelly clay soil.
- *Tragus berteronianus* (Carrotseed Grass) [Pioneer grass; Increaser II]. Carrotseed grass grows in disturbed places such as bare patches in veld as well as in and besides roads. It is often the first grass to colonise hard, compacted soils, mostly in sandy and loam soil.

Kimberley Thornveld Indicators:
Enneapogon cenchroides, Eragrostis lehmanniana

Conclusion: The veld is dominated by three species, *Enneapogon cenchroides* and *Eragrostis lehmanniana* which are indicative of disturbance however the species are also indicator species for the natural vegetation type; and *Schmidtia pappophoroides* which is a climax and decreaser grass indicative of veld in good condition.

Figure 13: Transect 8.



Transect 9

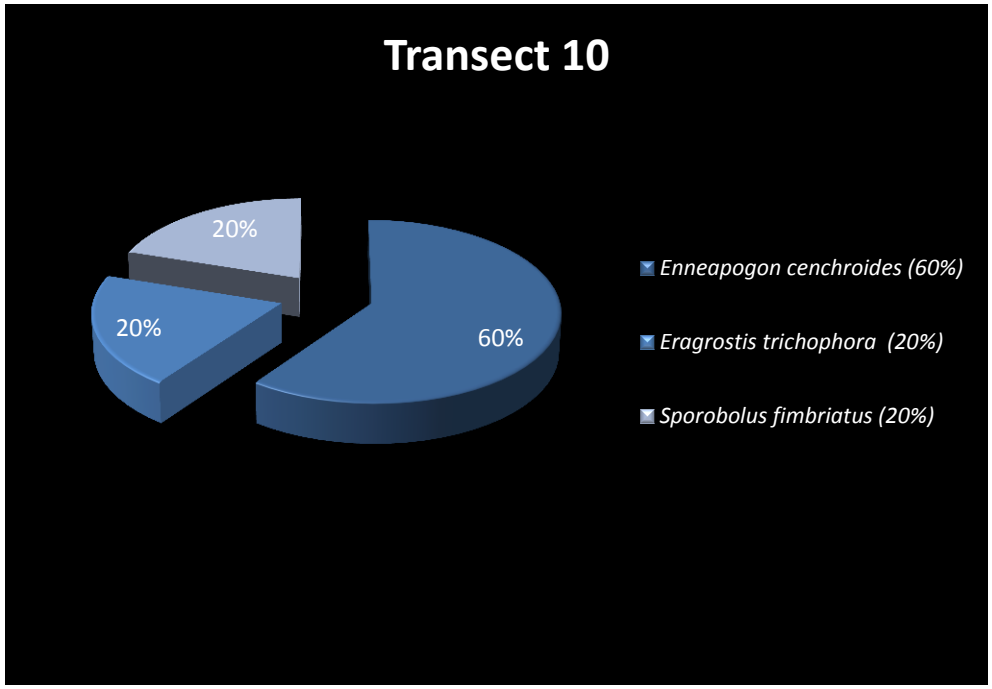
- *Aristida canescens* (Pale Three-awn) [Subclimax grass; Increaser II]. Pale three-awn occurs in disturbed and eroded places. It gows in poor, shallow, gravelly soils, often on hard, bare patches.
- *Chloris virgata* (Feather-top Chloris) [Pioneer grass; Increaser II]. Feather-top chloris grows mostly in disturbed places, especially where water collects after rain. It grows in all types of soil, but mostlyin clay soil. It can often be seen at the edge of seasonal pans. It is also a common weed in cultivated lands and gardens.
- *Enneapogon cenchroides* (Nine Awned Grass) [Pioneer and Subclimax; Increaser II]. Nine awned grass usually grows in disturbed veld. It is often also found along roadsides. It mostly grows in sandy and gravelly soil and is common in mopaneveld and limestone areas.
- *Eragrostis echinochloidea* (Tick grass) [Increaser II; Subclimax grass]. Tick grass usually grows in disturbed places such as old cultivated lands and road reserves; mostly in shallow lime soil, as well as sandy soil. It is often found in the vicinity of pans.
- *Eragrostis lehmanniana* (Lehmann's Love Grass) [Climax grass; Increase II]. Lehmann's love grass usually grows in parts where disturbance took place in the past, such as overgrazed veld, old cultivated lands and road reserves; mostly in sandy soil. It also grows in undisturbed sandveld in arid regions.
- *Heteropogon contortus* (Spear Grass) [Subclimax grass, Increaser II]. Spear grass grows especially in gravelly and other well drained soil. It often grows on slopes and in disturbed places such as road reserves where it can form dense stands.
- *Sporobolus fimbriatus* (Dropseed Grass) [Climax grass; Decreaser]. Dropseed grass often grows in damp places along rivers, in water courses, next to roads and often in the shade under trees. It mostly grows in well-drained soil.
- *Themeda triandra* (Red grass) [Climax grass; Decreaser]. Red grass is abundant in undisturbed open grassland and bushveld in parts with an average to high rainfall. It grows in any type of soil, but mostly in clay soil.
- *Tragus berteronianus* (Carrotseed Grass) [Pioneer grass; Increaser II]. Carrotseed grass grows in disturbed places such as bare patches in veld as well as in and besides roads. It is often the first grass to colonise hard, compacted soils, mostly in sandy and loam soil.

Kimberley Thornveld Indicators:

Aristida canescens, Enneapogon cenchroides, Eragrostis lehmanniana, Heteropogon contortus, Themeda triandra

Conclusion: Grass species abundance is considered to be relatively high and the abundance of each species is more evenly distributed. The area was also found to be dominated by species considered representative of the natural vegetation type for the area.

Figure 14: Transect 9.



Transect 10

- *Enneapogon cenchroides* (Nine Awned Grass) [Pioneer and Subclimax; Increaser II]. Nine awned grass usually grows in disturbed veld. It is often also found along roadsides. It mostly grows in sandy and gravelly soil and is common in mopaneveld and limestone areas.
- *Eragrostis trichophora* (Hairy Love Grass) [Subclimax grass; Increaser II]. Hairy love grass usually grows in disturbed places such as roadsides and bare patches in veld. It is mostly found in shallow gravelly and sandy soil, often in patches where rain water collects.
- *Sporobolus fimbriatus* (Dropseed Grass) [Climax grass; Decreaser]. Dropseed grass often grows in damp places along rivers, in water courses, next to roads and often in the shade under trees. It mostly grows in well-drained soil.

Kimberley Thornveld Indicators:
Enneapogon cenchroides

Conclusion: Grass species diversity within this portion of the project footprint was found to be relatively low when compared to other transects. This may due to the disturbance of the area as a result of the historical mining of the area However, the vegetation was dominated by *Enneapogon cenchroides* which is an indicator of the natural vegetation type. *Sporobolus fimbriatus* is also present and is considered a climax and decreaser grass which is indicative of veld in good condition

Figure 15: Transect 10.

Although grass species dominating the vegetation are considered to be species indicative of disturbance they are also indicators for the natural vegetation type for the area (Kimberley Thornveld). The majority of these species are listed as subclimax grasses. These species are therefore considered to form part of the natural progression of the recovery of the veld due to disturbance as a result of historical mining activities and will eventually be replaced by climax species. Climax species were also encountered within the project footprint which indicates the improvement and recovery of veld conditions from the disturbed conditions created as a result of historical mining activities.

4.5 SCC and Protected Species Status Assessments

Three SCC, *Vachellia erioloba* (declining), *Drimia sanguinea* (near threatened) and *Aloinopsis rubrolineata* (rare) are indicated for the quarter degree square (QDS) 2824DB by the PRECIS SANBI database. However, only *Vachellia erioloba* (declining) was encountered scattered throughout the project footprint at the time of the assessment. The probability of occurrence of *Drimia sanguinea* and *Aloinopsis rubrolineata* within the project footprint was calculated and is indicated in Table 3 below. There is a moderate probability that *Drimia sanguinea* occurs within the project footprint and there is a low probability that *Aloinopsis rubrolineata* occurs within the project footprint.

Two protected floral species were also encountered scattered throughout the project footprint. These include the SCC *Vachellia erioloba* which is protected under the NFA as well as *Psilocaulon coriarium* which is within the Mesembryanthemacea family which is protected under Schedule 2 of the NCNCA. Although not encountered at the time of the assessment, there is a high probability that the tree *Boscia albitrunca* (Shepherd's tree), which is protected under the NFA, occurs within the project footprint.

Figure 16: *Vachellia erioloba* (a) and *Psilocaulon coriarium* (b)

Table 3: SCC and their Probability of Occurrence (POC).

Species	Habitat	POC	Motivation
Drimia sanguinea	Open veld and scrubby woodland in a variety of soil types. [1]	66%	Although historically disturbed, suitable habitat is available within the project footprint
Aloinopsis rubrolineata	Grows in the Eastern Cape Karoo region, on shaly soils or silty flats[2]	27%	Indicated to grow in shaly soils or silty flats in the Eastern Cape Karoo, therefore not likely to occur within the project footprint

[1] Raimondo *et al*, 2009
[2] http://lttreasures.blogspot.com/2012/06/aloinopsis-rubrolineata-nebr-schwantes.html

4.6 Exotic and Invader Species

Alien invaders are plants that are of exotic origin and are invading previously pristine areas or ecological niches (Bromilow, 2001). Not all weeds are exotic in origin but, as these exotic plant species have very limited natural "check" mechanisms within the natural environment, they are often the most opportunistic and aggressively growing species within the ecosystem. Therefore, they are often the most dominant and noticeable within an area. Disturbances of the ground through trampling, excavations or landscaping often leads to the dominance of exotic pioneer species that rapidly dominate the area. Under natural conditions, these pioneer species are overtaken by sub-climax and climax species through natural veld succession. This process, however, takes many years to occur, with the natural vegetation never reaching the balanced, pristine species composition prior to the disturbance. There are many species of indigenous pioneer plants, but very few indigenous species can out-compete their more aggressively growing exotic counterparts.

Alien vegetation invasion causes degradation of the ecological integrity of an area, causing (Bromilow, 2001):

- A decline in species diversity;
- Local extinction of indigenous species;
- Ecological imbalance;
- Decreased productivity of grazing pastures; and
- Increased agricultural input costs.

Alien vegetation was encountered scattered throughout the project footprint and is considered to be of a low to medium low density. Alien and weed species encountered within the project footprint are to be removed in order to comply with existing legislation (amendments to the regulations under CARA, 1983 and Section 28 of the NEMA, 1998). Alien and invasive species encountered within the project footprint are listed below.

Table 4: Dominant exotic vegetation species identified during the general area assessment.

Scientific name	Common name	Category
TREES		
Prosopis glandulosa	Honey Mesquite	Category 2
Schinus molle	Brazilian pepper tree	X3
SHRUB AND FORBS		
Opuntia sp.	Prickly pear	Category 1
Chenopodium album	Bloubossie	N/A
Salsola kali	Russian tumbleweed	N/A
Solanum sp.	Bitter apple	N/A
Tagetes minuta	Tall khaki weed	N/A
Hibiscus canabinus	Wild stockrose	N/A
Datura ferox	Large thorn apple	Category 1
Alternanthera pungens	Khakiweed	N/A
Tribulus terrestris	Devils thorn	N/A
Schkuhria pinnata	Kleinkakiebos	N/A
GRASS		
Tragus berteronianus	Carrotseed Grass	N/A

Category 1 – Declared weed, prohibited and must be controlled; Category 2 - Declared invader (commercial and utility plants), allowed in demarcated areas by permit holders, X3 – Proposed weed

4.7 Medicinal Plants

Medicinal plant species were encountered scattered throughout the project footprint. The majority of medicinal plant species encountered are common within the region with exception of *Vachelia erioloba* which is listed as a SCC and as a protected tree. A permit will therefore be required should individuals of this species be removed from the project footprint.

Table 5: Traditional medicinal plants identified during the field assessment. Medicinal applications and application methods are also presented (van Wyk, Oudtshoorn, Gericke, 2012).

Scientific name	Common name	Plant part used	Uses
Asparagus sp	Katdoring	Rhizomes and fleshy roots	Asparagus species are traditionally used in southern Africa as a treatment for tuberculosis, kidney ailments and rheumatism.
Chrysocoma ciliata	Bitterbos	Entire plant	A decoction is used for the washing of wounds and sores, also as an external treatment for syphilis. This decoction is also claimed to be a remedy for gout and rheumatism, for jaundice, gastric fever, appendicitis and constipation.
Datura ferox	Common thorn apple	Leaves and fresh green fruit	Used for the relief of asthma and to reduce pain. Weak infusions are used as hypnotics by the elderly and as aphrodisiacs by adults. The fresh warm leaves may be used as a poultice to relive the pain of rheumatism, gout, boils, abscesses and wounds. The fresh green fruit is sometimes applied locally for toothache, a sore throat and tonsillitis. The leaf is rolled up and smoked to relieve asthma and bronchitis.
Elephantoriza elephantina	Elandsbean	Underground rhizomes.	This is a traditional remedy for a wide range of ailments, including diarrhoea and dysentery, stomach disorders, haemorrhoids and perforated peptic ulcers, and as emetics. It is popular for the treatment of skin diseases and acne.
Eriocephalus ericoides	Kapokbos	Leaves and twigs	Traditionally used as diuretics and diaphoretics.
Senna italica	Wild senna	Roots	Used to treat influenza, indigestion, liver and gall bladder complaints, gastrointestinal disorders, dysmenorrhoea and uterine pain.
Vachellia erioloba	Camel thorn	Pods, roots	Ground pods are used to treat ear infections. Roots are used to treat headache, Tuberculosis and also tooth ache.
Ziziphus mucronata	Buffalo-thorn	Roots, bark and leaves	Warm bark infusions are used as expectorants in cough and chest problems, while root infusions are popular as a remedy for diarrhoea and dysentery. Decoctions of roots and leaves are applied externally to boils, sores and glandular swellings, not only to promote healing bur also for pain relief.
Tarconanthus camphoratus	Wild camphor bush	Leaves and twigs	Infusions and tinctures of the leaves and twigs are used for stomach trouble, abdominal pain, headache, toothache, asthma, bronchitis and inflammation. A hot poultice on the chest is said to give relief from headache, asthma, bronchitis, and inflammation. Smoke or fumes from the fresh and dried plant are inhaled for asthma, headache and rheumatism.

5 DESCRIPTION OF THE AFFECTED ENVIRONMENT: FAUNA

After the site assessment it could be concluded that the project footprint is not likely to support a large diversity of faunal species due to historical disturbance and current anthropogenic activities that are present within the site and in close proximity to the site. Faunal species that were identified within the project footprint are listed in Table 6 below. All faunal species identified and that are expected to utilise the project footprint for either breeding or foraging are considered least threated within the region (IUCN 2015).

Table 6: Faunal species encountered within the project footprint.

Scientific Name	Common Name	IUCN Threat Status	Protection Status (NCNCA)
Mammals			
Pedetes capensis	Springhare	Least Concern	Protected
Raphicerus campestris	Steenbok	Least Concern	Protected
Sylvicapra grimmia	Common duiker	Least Concern	Protected
Canis mesomelas	Black-backed Jackal	Least Concern	Not Protected
Avifauna			
Myrmecocichla formicivora	Ant-eating Chat	Least concern	Protected
Hirundo rustica	Barn Swallow	Least concern	Protected
Prinia flavicans	Black-chested Prinia	Least concern	Protected
Crithagra atrogularis	Black-throated Canary	Least concern	Protected
Riparia paludicola	Brown-throated Martin	Least concern	Protected
Lamprotornis nitens	Cape Glossy Starling	Least concern	Protected
Cossypha caffra	Cape Robin-Chat	Least concern	Protected
Passer melanurus	Cape Sparrow	Least concern	Not Protected
Streptopelia capicola	Cape Turtle Dove	Least concern	Protected
Motacilla capensis	Cape Wagtail	Least concern	Protected
Lanius collaris	Common Fiscal	Least concern	Protected
Cercomela familiaris	Familiar Chat	Least concern	Protected
Numida meleagris	Helmeted Guineafowl	Least concern	Protected
Streptopelia senegalensis	Laughing Dove	Least concern	Protected
Columba livia	Rock Dove	Least concern	Protected
Ploceus velatus	Southern Masked Weaver	Least concern	Not Protected
Columba guinea	Speckled Pigeon	Least concern	Protected
Plocepasser mahali	White-browed Sparrow-Weaver	Least concern	Protected
Crithagra flaviventris	Yellow Canary	Least concern	Protected
Cisticola juncidis	Zitting Cisticola	Least concern	Protected
Invertebrates			
Anacridium moestum	Tree Locust	NYBA	Not Protected
Locris arithmetica	Red-spotted Spittle bug	NYBA	Not Protected
Hetrodes pupus	Corn Cricket	Least concern	Not Protected
Mylabris oculata	CMR Bean Beetle	NYBA	Not Protected
Family: Sphingidae	Hawk moth	N/A	Not Protected
Pantala flavescens	Wandering Glider	Least concern	Not Protected
Hodotermes mossambicus	Northern Harvester Termite	NYBA	Not Protected
Danaus chrysippus	African Monarch	NYBA	Not Protected
Anoplolepis custodiens	Pugnacious Ant	NYBA	Not Protected
Sphingonotus scabriculus	Blue-wing	NYBA	Not Protected
Rhachitopis sp	N/A	NYBA	Not Protected

NYBA = not yet been assessed according to the IUCN Red List, 2013

Four mammal species *Pedetes capensis* (Springhare), *Raphicerus campestris* (Steenbok), *Sylvicapra grimmia* (Common duiker) and *Canis mesomelas* (Black-backed jackal) were identified within the project footprint. All mammal species are common species for the area and are listed as non-threatened species by the IUCN. However, all of the species, with exception of *Canis mesomelas* (Black-backed jackal) are listed as protected within the NCNCA (2009). Should these species be removed, displaced or killed a permit will be required from the Northern Cape Department of Environment and Nature Conservation.

Figure 17: *Sylvicapra grimmia* (Common duiker) spoor (a), *Raphicerus campestris* (Steenbok) spoor (b), *Pedetes capensis* (Springhare) scat (c) and *Canis mesomelas* (Black-backed jackal) scat (d)

All avifaunal species identified within the project footprint are listed as species of least concern (IUCN, 2013) and are common species for the region. However, the majority of the species identified are listed as protected species by the NCNCA (2009) and a permit will be required from the Northern Cape Department of Environment and Nature Conservation should the species be removed, displaced or killed.

It should also be noted that the project footprint is located in close proximity to three Important Birding Areas (IBAs):

- Kamfers Dam (3.7km North-West of the project footprint). **Status**: Global IBA (A1, A4i), Ramsar proposed. Is unprotected (BLSA 2015), and is 1170ha in size;
- Dronfield (1.5km of the project footprint). **Status**: Sub-regional IBA (C1). Is unprotected (BLSA 2015) and is 11 030ha; and
- Benfontein (12.4km South of the project footprint). **Status**: Sub-regional IBA (C1). Is unprotected (BLSA 2015), and 9 770ha.

In terms of faunal migratory connectivity, the project footprint may provide connectivity for avifaunal species between the IBAs listed above, however, the project footprint is only considered to be of importance in terms of foraging habitat for these avifaunal species.

Figure 18: *Numida meleagris* (Helmeted Guineafowl) feather (left) and *Ploceus velatus* (Southern masked weaver) nest (right).

No reptile or amphibian species were identified during the site survey. The project footprint does provide habitat for a relatively diverse reptile community, however their secretive nature makes detection difficult during a field survey of limited duration. Species expected to be found within the project footprint would most likely be terrestrial species adapted to grassland and that prey on avifauna and small mammal species. No amphibian species are likely to occur due to a lack of aquatic and wetland habitat in the project footprint.

Faunal species lists as provided by the Animal Demography Unit Virtual Museum for mammals, amphibians, reptiles and invertebrates for the QDS 2824DB were also considered (refer to Appendix C). All faunal species listed for the QDS are listed as least concern or have not been evaluated in terms of their threat status. However, the provincial protection status of the species must be taken into consideration as a permit will be required from the Northern Cape Department of Environment and Nature Conservation for the removal of protected species.

6 SENSITIVITY

Habitat sensitivity was determined based on the irreplaceability of the habitat unit, on observations of the abundance and diversity of floral and faunal species present at the time of the assessment, on the presence of SCC and RDL species within the habitat units, on the presence of Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) and on the degree of disturbance encountered as a result of historical and current activities.

Terrestrial habitat associated with the project footprint is considered to be of a moderate sensitivity based on the following factors:

- The vegetation type associated with the project footprint is listed as least threatened within the region;
- The project footprint is not indicated to fall within an ESA or a CBA;
- Although the project footprint has been historically disturbed as a result of mining activities, these activities took place over 100 years ago and the vegetation in the area has subsequently begun to recover. The floral habitat and natural systems associated with the project footprint are therefore functioning well and the floral diversity is considered to be largely representative of the vegetation type for the area with exception of a few isolated areas which have been more recently disturbed as a result of small scale, illegal mining activities;
- One floral SCC, *Vachellia erioloba,* was encountered within the project footprint;

- Two protected floral species, *Vachellia erioloba* and *Psilocaulon coriarium,* were encountered within the project footprint;
- No faunal RDL species were encountered within the project footprint; and
- Twenty one provincially protected faunal species were encountered within the project footprint, however, all faunal species encountered are common in the region and are considered to be of least concern on a national scale.

7 IMPACT ASSESSMENT

The tables below serve to summarise the significance of potential impacts on vegetation and fauna associated with the project footprint. Impacts have been assessed for a single phase, the operational phase. The sections below present the impact assessment according to the method prescribed by SRK (refer to Appendix A, section A-4 for method). In addition, it also indicates the required mitigatory and management measures needed to minimise potential ecological impacts and presents an assessment of the significance of the impacts taking into consideration the available mitigatory measures, assuming that they are fully implemented. In the assessment of impacts prior to the implementation of mitigation measures the assumption has been made that all general good housekeeping measures as listed in Appendix D will be strictly adhered to.

7.1 Vegetation Impact Assessment

IMPACT 1: LOSS OF FLORAL HABITAT AND ASSOCIATED FLORAL BIODIVERSITY AS WELL AS SCC AND PROTECTED FLORAL SPECIES

Operational Phase

Activities leading to impact

- Clearing of diamondiferous material and the disturbance of soils,
- Clearing of diamondiferous material and the removal of vegetation;
- Compaction of soils; and
- Dust generation.

The removal of diamondiferous material from the project footprint will result in the removal of vegetation and the disturbance of soils. The edge effects of operational related activities (movement of vehicles and personnel, proliferation of alien and invasive species and dust creation) may also result in an impact on vegetation falling outside of the immediate disturbance footprint.

Although the project footprint has been historically disturbed as a result of mining activities, these activities took place over 100 years ago and the majority of vegetation in the area has subsequently begun to recover. The floral habitat and natural systems associated with the project footprint are therefore functioning well and the floral diversity is considered to be largely representative of the vegetation type for the area with exception of a few isolated areas which have been more recently disturbed as a result of small scale, illegal mining activities. Although the vegetation type associated with the project footprint is listed as least threatened and no CBAs or ESAs are indicated for the area, individuals of the SCC *Vachelia erioloba* and the protected floral species *Psilocaulon coriarium* will be lost from the disturbance footprint and the intensity of the impact is therefore considered to be medium. Furthermore, although vegetation is likely to recover within areas disturbed as a result of the clearing of diamondiferous material, individuals of *Vachelia erioloba* and *Psilocaulon coriarium* which are removed will be permanently lost and the duration of the impact is therefore considered to be permanent. However, the clearing of diamondiferous material will be limited to the project footprint and the extent of the impact is therefore considered to be local. The overall impact is therefore considered to be of a medium (negative) significance prior to the implementation of mitigation measures.

The implementation of mitigation measures such as the limitation of the disturbance footprint to that which is absolutely essential and the restriction of vehicles to designated roadways will result in the reduction of the overall impact intensity to low. However, mitigation measures will not prevent the permanent removal of SCC and protected floral species from the project footprint and the duration and probability of the impact therefore remains the same as prior to mitigation. The overall impact after the implementation of mitigation measures is therefore considered to be of a low (negative) significance.

	Extent	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Without mitigation	Local	Medium	Long-term	**Medium**	Definite	**MEDIUM**	**– ve**	High
	1	2	3	6				

Essential mitigation measures during the operational phase:

- Limit the disturbance footprint area to what is absolutely essential in order to minimise environmental damage;
- Clearly define the boundaries of disturbance footprint areas and ensure that all activities remain within defined footprint areas;
- Confine vehicles to designated roadways. The indiscriminate movement of vehicles through terrestrial habitat falling outside of the disturbance footprint must be strictly prohibited;
- Rip and profile soils in areas which have been compacted as a result of the removal of diamondiferous material. Special attention should be paid to alien and invasive control within these areas;
- Remove alien and weed species from the project footprint in order to comply with existing legislation (amendments to the regulations under the Conservation of Agricultural Resources Act, 1983 and Section 28 of the National Environmental Management Act, 1998). Species specific and area specific eradication recommendations:
    - Take care with the choice of herbicide to ensure that no additional impacts to remaining indigenous species occurs due to the herbicide used;
    - Dispose of removed alien plant material at a registered waste disposal site;
- Topsoils within the disturbance footprint area which contain the seedbank of the natural vegetation should be stored for future use in the rehabilitation of the project footprint;
- Ensure that topsoil stockpiles are located outside of any areas susceptible to erosion. Stockpiles should be placed away from areas known to contain hazardous substances such as fuel and if any soils are contaminated, they should be stripped and disposed of at a registered hazardous waste dumping site;
- Rehabilitate the disturbance footprint area. As part of the rehabilitation plan, attention should be afforded to the following:
    - Rip and reprofile all soils compacted as a result of excavation activities in order to prevent ponding, altered drainage patterns and erosion and sedimentation. Special attention should be paid to alien and invasive control within these areas;
    - Topsoil (with seed bank) removed from the disturbance footprint during removal of diamondiferous material should be replaced once excavation activities have ceased;
    - An indigenous grass species seed mix may also be used in conjunction with topsoil in order to facilitate the rehabilitation process;
    - Monitor rehabilitated areas to ensure the re-establishment of indigenous floral species;
- Avoid the removal of the SCC *Vachelia erioloba* where possible. This may be achieved by removing diamondiferous material from around individuals of *Vachelia erioloba* by hand;
- The removal of any protected or indigenous species as listed by Schedule 1, 2 and 3 of the NCNCA (Act 9 of 2009) will require a permit from the Northern Cape Department of Environment and Nature Conservation.

Recommended mitigation measures during the operational phase:

- Restrict earth moving activities to the drier winter months, if possible, to avoid erosion of exposed soils and sedimentation of surrounding habitats.

	Extent	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
With mitigation	Local	Low	Long-term	**Low**	Definite	**LOW**	**– ve**	High
	1	1	3	**5**				

7.2 Faunal Impact Assessment

IMPACT 2: LOSS OF FAUNAL HABITAT AND ASSOCIATED FAUNAL BIODIVERSITY AND PROTECTED SPECIES

Operational Phase

Activities leading to impact

- Clearing of diamondiferous material and the removal of faunal habitat;
- Increased disturbance and noise;
- Collision of fauna with vehicles.

The removal of diamondiferous material from the project footprint will result in the loss of faunal habitat from the disturbance footprint. Trees which are used for nesting by avifaunal species will be removed and burrows of smaller mammals such as *Pedetes capensis* (Springhare) will be destroyed. Furthermore, an increase in anthropogenic activity, noise and disturbance during operational activities may result in the migration of faunal species from the project footprint, and an increase in the movement of vehicles through the area may result in the collision of faunal species with vehicles.

The project footprint is however not likely to support a large diversity of faunal species due to the historical disturbance and current anthropogenic activities within the site and in areas surrounding the site, and no RDL faunal species were encountered at the time of the assessment. The project footprint is located in close proximity to three IBAs and may therefore provide connectivity and foraging habitat for avifaunal species migrating between these IBA's. The impact associated with the loss of faunal habitat, biodiversity and RDL species is therefore considered to be of a medium intensity. Although faunal habitat is likely to recover after the removal of diamondiferous material, this may take many years and the duration of the impact is therefore considered to be long term. However, the impact will be restricted to the project footprint and is therefore considered to be local in extent and the overall impact is therefore considered to be of a medium (negative) significance prior to the implementation of mitigation measures.

The recovery of faunal habitat after disturbance, with special mention of tree growth, will take many years and the duration of the impact is therefore still considered to be long term after the implementation of mitigation measures. However, the implementation of mitigation measures such as the limitation of the disturbance footprint to that which is absolutely essential, the restriction of vehicles to designated roadways and the rescue and relocation of faunal species will result in the reduction of the overall impact intensity to low and will result in the reduction of the probability of the impact to possible. The overall impact after the implementation of mitigation measures is therefore considered to be of a very low (negative) significance.

	Extent	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Without mitigation	Local	Medium	Long-term	**Medium**	Definite	**MEDIUM**	**– ve**	High
	1	2	3	6				

Essential mitigation measures during the operational phase:

- Limit the disturbance footprint area to what is absolutely essential in order to minimise environmental damage;
- Clearly define the boundaries of disturbance footprint areas and ensure that all activities remain within defined footprint areas;
- Confine vehicles to designated roadways. The indiscriminate movement of vehicles through terrestrial habitat falling outside of the disturbance footprint must be strictly prohibited;
- Rip and profile soils in areas which have been compacted as a result of the removal of diamondiferous material. Special attention should be paid to alien and invasive control within these areas;
- Remove alien and weed species from the project footprint in order to comply with existing legislation (amendments to the regulations

under the Conservation of Agricultural Resources Act, 1983 and Section 28 of the National Environmental Management Act, 1998). Species specific and area specific eradication recommendations;
  - Take care with the choice of herbicide to ensure that no additional impacts to remaining indigenous species occurs due to the herbicide used;
  - Dispose of removed alien plant material at a registered waste disposal site;
- Topsoils within the disturbance footprint area which contain the seedbank of the natural vegetation should be stored for future use in the rehabilitation of the project footprint;
- Ensure that topsoil stockpiles are located outside of any areas susceptible to erosion. Stockpiles should be placed away from areas known to contain hazardous substances such as fuel and if any soils are contaminated, they should be stripped and disposed of at a registered hazardous waste dumping site;
- Rehabilitate the disturbance footprint area. As part of the rehabilitation plan attention should be afforded to the following:
  - Rip and reprofile all soils compacted as a result of excavation activities in order to prevent ponding, altered drainage patterns and erosion and sedimentation. Special attention should be paid to alien and invasive control within these areas;
  - Topsoil (with seed bank) removed from the disturbance footprint during removal of diamondiferous material should be replaced once excavation activities have ceased;
  - An indigenous grass species seed mix may also be used in conjunction with topsoil in order to facilitate the rehabilitation process;
  - Monitor rehabilitated areas to ensure the re-establishment of indigenous floral species;
- Avoid the removal of the SCC *Vachelia erioloba* where possible. This may be achieved by removing diamondiferous material from around individuals of *Vachelia erioloba* by hand;
- Rescue and relocate faunal species found within the disturbance footprint area with the assistance of a suitably qualified specialist;
- Prohibit trapping or hunting of fauna;
- The removal of any protected or indigenous species as listed by Schedule 1, 2 and 3 of the NCNCA (Act 9 of 2009) will require a permit from the Northern Cape Department of Environment and Nature Conservation.

	Extent	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
With mitigation	Local	Low	Long-term	**Low**	Possible	**VERY LOW**	**– ve**	High
	1	1	3	**5**				

IMPACT 3: LOSS OF FAUNAL MIGRATORY CORRIDORS

Operational Phase

Activities leading to impact

- Clearing of diamondiferous material and the removal of faunal habitat;
- Increased disturbance and noise;
- Collision of fauna with vehicles.

The project footprint is bordered by the De Beers mining rights area to the west and by urban development to the north. The project footprint therefore lacks migratory connectivity and is not likely to provide a significant migratory corridor for smaller terrestrial faunal species moving through the area. Although the project footprint is located in close proximity to three IBAs and may therefore provide connectivity and foraging habitat for avifaunal species migrating between these IBAs, the project footprint is only considered to be of importance in terms of foraging habitat for these avifaunal species.

The intensity of the impact is therefore considered to be low and the extent of the impact is considered to be local. Furthermore, although the removal of diamondiferous material will result in the disturbance of fauna and faunal habitat, it will not necessarily prevent the migration of faunal species through the area and the probability of the impact is therefore considered to be possible. In addition, the impact on faunal migratory connectivity will likely only occur during the operational phase and although the faunal habitat that is disturbed will take years to fully recover, this will not prevent the movement of faunal species through the area. The duration of the impact is therefore considered to be short term and the overall impact is considered to be insignificant. The application of any additional mitigatory measures in addition to those as stipulated in Impact 2 above is therefore considered unnecessary.

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	Local	Low	Short-term	**Very Low**	Possible	**INSIGNIFICANT**	**– ve**	High
	1	1	1	3				
Essential mitigation measures during the operational phase: • Refer to mitigation measures as listed for Impact 2								

7.3 No Go Alternative

The project footprint is located within a De Beers conservation area in which recent anthropogenic activity and disturbance is limited although historic disturbance (more than 100 years ago) from the diamond mining operations extends over a significant portion of the project footprint. The only recent disturbance to the site at present is small scale mining activities. Should the removal of the diamondiferous material from the project footprint not proceed, these small scale mining activities will likely continue and will result in the ongoing and further disturbance and loss of vegetation from the area. Areas which are disturbed as a result of small scale mining will most likely not be rehabilitated. The no-go alternative is therefore also considered to have a negative impact on floral and faunal habitat in the long term.

7.4 Cumulative Impact Assessment

The vegetation associated with the region in which the project footprint is located has been significantly impacted as a result of urban development and as a result of mining activities associated with the De Beers Mine. This has resulted in the removal of large areas of vegetation and faunal habitat. The removal of diamondiferous material from the project footprint will result in the further loss of vegetation and faunal habitat from the region, however, the vegetation type associated with the project footprint is considered to be least threatened and once the diamondiferous material has been removed, the project footprint will be rehabilitated and will eventually recover. The removal of diamondiferous material from the project footprint is therefore not likely to result in the cumulative loss of floral and faunal habitat from the project footprint, provided that the mitigation measures within this report are strictly adhered to.

8 CONCLUSION

SAS was appointed to conduct a vegetation impact assessment and a faunal screening assessment as part of the environmental assessment and authorisation process for the proposed clearing of diamondiferous material from the Buffalo Camp within Kimberley in the Northern Cape Province.

De Beers Consolidated Mines Ltd aim to remove diamondiferous material from an old 'Floors' area which has been subjected to illegal mining over a period of time and poses a safety, health and security risk to the company. The diamondiferous material is found within the remains of Kimberlite floors which were deposited over 100 years ago across several hundred hectares. The area under consideration is located on a portion of a De Beers conservation area (Buffalo Camp) which is located approximately 1km to the east of the N12 national road and is located to the north of Sumaria Road. The lines of remaining diamondiferous material lie in a layer approximately 300 mm thick just below the surface of the ground. De Beers proposes to remove this material from site to stop the illegal mining as De Beers are spending significant resources on securing the area and illegal mining is a considerable safety risk.

DESKTOP ASSESSMENT

The following general conclusions were drawn on completion of the desktop assessment:

- The majority of the project footprint is indicated to be natural land with urban development located adjacent to the northern border;

- According to the Northern Cape PSDF (2012), the project footprint is not located within a centre of endemism;
- According to the National List of Threatened Terrestrial Ecosystems (2011) the project footprint does not fall within a threatened terrestrial ecosystem; and
- According to the NBA (2011) the project footprint is not located within either a formal or informal protected area.

VEGETATION ASSESSMENT

The following general conclusions were drawn on completion of the vegetation assessment:

- The project footprint is located within the Savanna biome and is situated within the Eastern Kalahari Bushveld bioregion;
- The vegetation type indicated by Mucina and Rutherford (2009) is Kimberley Thornveld which is not considered to be of conservation concern;
- One habitat unit, the Kimberley Thornveld habitat unit, was encountered within the project footprint at the time of the assessment;
- The Kimberley Thornveld habitat unit is characterised by a scattered tree layer, dominated by *Vachellia tortilis* subsp. *heteracantha*, subtended by a continuous grassy layer;
- Although the project footprint has been historically disturbed as a result of mining activities, these activities took place over 100 years ago and the vegetation in the area has subsequently begun to recover. The floral habitat and natural systems associated with the project footprint are therefore functioning well and the floral diversity is considered to be largely representative of the vegetation type for the area with exception of a few isolated areas which have been more recently disturbed as a result of small scale, illegal mining activities;
- The information gathered during the assessment of the project footprint was used to determine the VIS for the habitat unit associated with the project footprint. A moderate score was calculated for the Kimberley Thornveld habitat unit which falls within Class C – Moderately modified;
- Although grass species dominating the vegetation are considered to be species indicative of disturbance, they are also indicators for the natural vegetation type for the area (Kimberley Thornveld). The majority of these species are listed as subclimax grasses. These species are therefore considered to form part of the natural progression of the recovery of the veld due to disturbance as a result of historical mining activities and will eventually be replaced by climax species. Climax species were also encountered within the project footprint which indicates the improvement and recovery of veld conditions from the disturbed conditions created as a result of historical mining activities;
- Three floral SCC, *Vachellia erioloba* (declining), *Drimia sanguinea* (near threatened) and *Aloinopsis rubrolineata* (rare) are indicated for the QDS 2824DB by the PRECIS SANBI database. However, only *Vachellia erioloba* (declining) was encountered scattered throughout the project footprint at the time of the assessment;
- Two protected floral species were also encountered scattered throughout the project footprint. These include the SCC *Vachellia erioloba* which is protected under the NFA (Act 84 of 1998) as well as *Psilocaulon coriarium* which is within the Mesembryanthemacea family which is protected under Schedule 2 of the NCNCA (Act 9 of 2009). Although not encountered at the time of the assessment, there is a high probability that the tree *Boscia albitrunca*, which is protected under the NFA, occurs within the project footprint; and
- Should protected and indigenous species need to be cut, disturbed, damaged or destroyed, applications for such activities must be made to the Northern Cape Department of Environment and Nature Conservation and to the Department of Agriculture, Forestry and Fisheries.

FAUNAL SCREENING ASSESSMENT

The following general conclusions were drawn on completion of the faunal screening assessment:

- The project footprint is not likely to support a large diversity of faunal species due to historical disturbance and current anthropogenic activities that are present within the site and in close proximity to the site;
- Faunal species that were identified within the project footprint and that are expected to utilise the project footprint for either breeding or foraging are considered least threatened within the region (IUCN 2015);
- Four mammal species *Pedetes capensis* (Springhare), *Raphicerus campestris* (Steenbok), *Sylvicapra grimmia* (Common duiker) and *Canis mesomelas* (Black-backed jackal) were

identified within the project footprint. All mammal species are common species for the area and are listed as non-threatened species by the IUCN. However, all of the species with exception of *Canis mesomelas* (Black-backed jackal) are listed as protected within the NCNCA (2009). Should these species be removed or displaced from the project footprint a permit will be required from the Northern Cape Department of Environment and Nature Conservation;

- All avifaunal species identified within the project footprint are listed as species of least concern (IUCN, 2013) and are common species for the region. However, the majority of the species identified are listed as protected species by the NCNCA (2009). Should these species be removed or displaced from the project footprint a permit will be required from the Northern Cape Department of Environment and Nature Conservation;
- The project footprint is located in close proximity to three IBAs:
    - Kamfers Dam (3.7km North-West of the project footprint). **Status**: Global IBA (A1, A4i), Ramsar proposed. Is unprotected (BLSA 2015), and is 1170ha in size;
    - Dronfield (1.5km of the project footprint). **Status**: Sub-regional IBA (C1). Is unprotected (BLSA 2015) and is 11 030ha; and
    - Benfontein (12.4km South of the project footprint). **Status**: Sub-regional IBA (C1). Is unprotected (BLSA 2015), and 9 770ha.
- In terms of faunal migratory connectivity the project footprint may provide connectivity for avifaunal species between the IBAs listed above, however, the project footprint is only considered to be of importance in terms of foraging habitat for these avifaunal species;
- No reptile species were identified during the site survey. The project footprint does provide habitat for a relatively diverse reptile community, however their secretive nature makes detection difficult during a field survey of limited duration. Species expected to be found within the project footprint would most likely be terrestrial species adapted to grassland and that prey on avifaunal and small mammal species;
- No amphibian species were identified within the project footprint and none are likely to occur due to a lack of aquatic and wetland habitat in the project footprint; and
- Faunal species lists as provided by the Animal Demography Unit Virtual Museum for mammals, amphibians, reptiles and invertebrates for the QDS 2824DB were also considered (refer to Appendix C). All faunal species listed for the QDS are nationally listed as least concern or have not been evaluated in terms of their threat status. However, the provincial protection status of the species must be taken into consideration as a permit will be required from the Northern Cape Department of Environment and Nature Conservation for the removal of protected species.

SENSITIVITY MAPPING

Habitat sensitivity was determined based on the irreplaceability of the habitat unit, on observations of the abundance and diversity of floral and faunal species present at the time of the assessment, on the presence of SCC and RDL species within the habitat units, on the presence of CBAs and ESAs and on the degree of disturbance encountered as a result of historical and current activities.

Terrestrial habitat associated with the project footprint is considered to be of a moderate sensitivity based on the following factors:

- The vegetation type associated with the project footprint is listed as least threatened within the region;
- The project footprint is not indicated to fall within an ESA or a CBA;
- Although the project footprint has been historically disturbed as a result of mining activities, these activities took place over 100 years ago and the vegetation in the area has subsequently begun to recover. The floral habitat and natural systems associated with the project footprint are therefore functioning well and the floral diversity is considered to be largely representative of the vegetation type for the area with exception of a few isolated areas which have been more recently disturbed as a result of small scale, illegal mining activities;
- One floral SCC, *Vachellia erioloba,* was encountered within the project footprint;
- Two protected floral species, *Vachellia erioloba* and *Psilocaulon coriarium* were encountered within the project footprint;
- No faunal RDL species were encountered within the project footprint; and

- Twenty one provincially protected faunal species were encountered within the project footprint, however, all faunal species encountered are common in the region and are considered to be of least concern on a national scale.

IMPACT ASSESSMENT

The table below serves to summarise the significance of perceived impacts on the floral and faunal biodiversity of the project footprint before mitigation measures are implemented. Also indicated is the impact significance of each perceived impact after the implementation of mitigation measures.

Table A: Summary of vegetation impact significance before and after mitigation.

Habitat Unit	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
IMPACT 1: LOSS OF FLORAL HABITAT AND ASSOCIATED FLORAL BIODIVERSITY AS WELL AS SCC AND PROTECTED FLORAL SPECIES					
Without Mitigation	Medium	Definite	**MEDIUM**	–ve	High
With Mitigation	Low	Definite	**LOW**	–ve	High
IMPACT 2: LOSS OF FAUNAL HABITAT AND ASSOCIATED FAUNAL BIODIVERSITY AND PROTECTED SPECIES					
Without Mitigation	Medium	Definite	**MEDIUM**	–ve	High
With Mitigation	Low	Possible	**VERY LOW**	–ve	High
IMPACT 3: LOSS OF FAUNAL MIGRATORY CORRIDORS					
Without Mitigation	Very Low	Possible	**INSIGNIFICANT**	–ve	High

From the results of the impact assessment it is evident that the proposed removal of diamondiferous material from the project footprint will have a medium (negative) impact on floral and faunal habitat, biodiversity and SCC/protected species prior to the implementation of mitigation measures. However, with the implementation of mitigation measures such as the limitation of the disturbance footprint area to what is absolutely essential, and the rehabilitation of disturbed areas, the impact on floral habitat, biodiversity and SCC can be reduced to a low (negative) significance and the impact on faunal habitat, biodiversity and protected species can be reduced to a very low (negative) significance.

The impact of the removal of diamondiferous material on faunal migratory corridors is considered to be insignificant prior to the implementation of mitigation measures. The application of any additional mitigatory measures in addition to those as stipulated for Impact 2 is therefore considered unnecessary.

After conclusion of the terrestrial assessment, it is the opinion of the ecologist that, from an ecological point of view, the proposed removal of diamondiferous material from the project footprint will not lead to an unacceptable loss of biodiversity or important ecological aspects and can be considered favourably, provided that the mitigation measures as presented in the impact assessment of this report are strictly adhered to.

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APPENDIX A

Method of Assessment

Terrestrial

A-1 Desktop Study

- Maps, aerial photographs and digital satellite images were consulted prior to the field assessment in order to determine broad habitats, vegetation types and potentially sensitive sites. An initial visual on-site assessment of the project footprint was made in order to confirm the assumptions made during consultation of the maps;
- Literature review with respect to habitats, vegetation types and species distribution was conducted;
- Relevant data bases and reports considered during the assessment of the project footprint included:
    - The National Land Cover Dataset (2009);
    - The National Biodiversity Assessment (NBA, 2011);
    - The National List of Threatened Terrestrial Ecosystems (2011);
    - The Northern Cape Provincial Spatial Development Framework (PSDF, 2012);
    - The South African National Biodiversity Institute (SANBI) Threatened species programme (TSP);
    - Pretoria Computer Information Systems (PRECIS);
    - MammalMAP;
    - ReptileMAP;
    - LepiMAP;
    - FrogMAP; and
    - SpiderMAP

A-2 Vegetation Index Score

The Vegetation Index Score (VIS) was designed to determine the ecological state of each habitat unit defined within an assessment site. This enables an accurate and consistent description of the Present Ecological State (PES) concerning the project footprint in question. The information gathered during these assessments also significantly contributes to sensitivity mapping, leading to a more truthful representation of ecological value and sensitive habitats.

Each defined habitat unit is assessed using separate data sheets and all the information gathered then contributes to the final VIS score. The VIS is derived using the following formulas:

VIS = [(EVC) + (SI x PVC)+(RIS)]
Where:

1. **EVC** is extent of vegetation cover;
2. **SI** is structural intactness;
3. **PVC** is percentage cover of indigenous species; and
4. **RIS** is recruitment of indigenous species.

Each of these contributing factors is individually calculated as discussed below. All scores and tables indicated in blue are used in the final score calculation for each contributing factor.

1. ***EVC=[(EVC1+EVC2)/2]***

EVC 1 - Percentage natural vegetation cover:

Vegetation cover % Site score	0%	1-5%	6-25%	26-50%	51-75%	76-100%
EVC 1 score	0	1	2	3	4	5

EVC2 - Total site disturbance score:

Disturbance score	0	Very Low	Low	Moderately	High	Very High

Site score						
EVC 2 score	5	4	3	2	1	0

2. *SI=(SI1+SI2+SI3+SI4)/4)*

	Trees (SI1)		Shrubs (SI2)		Forbs (SI3)		Grasses (SI4)	
Score:	Present State	Perceived Reference State	Present State	Perceived Reference State	Present State	Perceived Reference State	Present State	Perceived Reference State
Continuous								
Clumped								
Scattered								
Sparse								

Present State (P/S) = currently applicable for each habitat unit
Perceived Reference State (PRS) = If in pristine condition

Each SI score is determined with reference to the following scoring table of vegetation distribution for present state versus perceived reference state.

	Present state (P/S)			
Perceived Reference state (PRS)	Continuous	Clumped	Scattered	Sparse
Continuous	3	2	1	0
Clumped	2	3	2	1
Scattered	1	2	3	2
Sparse	0	1	2	3

3. *PVC=[(EVC)-(exotic x 0.7) + (bare ground x 0.3)*

Percentage vegetation cover (exotic):

Vegetation cover %	0%	1-5%	6-25%	26-50%	51-75%	76-100%
PVC Score	0	1	2	3	4	5

Percentage vegetation cover (bare ground):

Vegetation cover %	0%	1-5%	6-25%	26-50%	51-75%	76-100%
PVC Score	0	1	2	3	4	5

4. *RIS*

Extent of indigenous species recruitment	0	Very Low	Low	Moderate	High	Very High
RIS	0	1	2	3	4	5

The final VIS scores for each habitat unit is then categorised as follows:

Vegetation Index Score	Assessment Class	Description
25	A	Unmodified, natural
20 to 24	B	Largely natural with few modifications.
15 to 20	C	Moderately modified
10 to 15	D	Largely modified
5 to 10	E	The loss of natural habitat extensive
<5	F	Modified completely

A-3 Graminoid Community Assessment

Different transect lines were chosen within areas that were perceived to best represent the graminoid communities associated with the project footprint. Graminoid species were recorded for each transect assessed. The graminoid species composition was analysed and the graminoid species lists were then compared with the species expected to occur in the Kimberley Thornveld vegetation type. This provided an accurate indication of the ecological integrity of the project footprint.

A-4 Floral Species of Conservation Concern (SCC) Assessment

Prior to the field visit, a record of floral SCC as well as protected species and their habitat requirements were acquired from SANBI for the applicable quarter degree square (QDS). Throughout the floral assessment special attention was paid with the identification of any of these SCC as well as identification of suitable habitat that could potentially sustain these species.

The probability of occurrence (POC) for each floral species of concern was determined using the following calculation wherein the habitat requirements and habitat disturbance were considered. The accuracy of the calculation is based on the available knowledge about the species in question, with many of the species lacking in depth habitat research. Therefore, it is important that the literature available is also considered during the calculation.

Each factor contributes an equal value to the calculation.

Literature availability

	No Literature available					Literature available
Site score						
Score	0	1	2	3	4	5

Habitat availability

	No Habitat available					Habitat available
Site score						
Score	0	1	2	3	4	5

Habitat disturbance

	0	Very Low	Low	Moderately	High	Very High
Site score						
Score	5	4	3	2	1	0

[Literature availability + Habitat availability + Habitat disturbance] / 15* 100 =POC%

A-5 Faunal Field Work

Larger faunal species were recorded during the project footprint assessment through direct visual identification and when spoor, call or dung was positively identified. It is important to note that due to the nature and habits of fauna it is unlikely that all species will have been recorded during the site assessment.

During the field assessment all avifaunal, reptilian, amphibian and invertebrate species observed were identified. Special attention was paid to the identification of any RDL faunal species that may inhabit the study area.

A-6 Impact Assessment Methodology for EIAs - Instructions to Specialists

The significance of all potential impacts that would result from the proposed project is determined in order to assist decision-makers. The significance rating of impacts is considered by decision-makers, as shown below.

- **INSIGNIFICANT**: the potential impact is negligible and **will not** have an influence on the decision regarding the proposed activity.
- **VERY LOW**: the potential impact is very small and **should not** have any meaningful influence on the decision regarding the proposed activity.
- **LOW**: the potential impact **may not** have any meaningful influence on the decision regarding the proposed activity.
- **MEDIUM**: the potential impact **should** influence the decision regarding the proposed activity.
- **HIGH**: the potential impact **will** affect a decision regarding the proposed activity.
- **VERY HIGH**: The proposed activity should only be approved under special circumstances.

The **significance** of an impact is defined as a combination of the **consequence** of the impact occurring and the **probability** that the impact will occur. The significance of each identified impact[3] must be rated according to the methodology set out below:

Step 1 – Determine the **consequence** rating for the impact by determining the score for each of the three criteria (A-C) listed below and then **adding** them[4]. The rationale for assigning a specific rating, and comments on the degree to which the impact may cause irreplaceable loss of resources and be irreversible, must be included in the narrative accompanying the impact rating:

Rating	Definition of Rating	Score
A. *Extent* *– the area over which the impact will be experienced*		
Local	Confined to project or study area or part thereof (e.g. site)	1
Regional	The region, which may be defined in various ways, e.g. cadastral, catchment, topographic	2
(Inter) national	Nationally or beyond	3
B. *Intensity* *– the magnitude of the impact in relation to the sensitivity of the receiving environment, taking into account the degree to which the impact may cause irreplaceable loss of resources*		
Low	Site-specific and wider natural and/or social functions and processes are negligibly altered	1

[3] This does not apply to minor impacts which can be logically grouped into a single assessment.

[4] Please note that specialists are welcome to discuss the rating definitions as they apply to their study with the EIA team.

Medium	Site-specific and wider natural and/or social functions and processes continue albeit in a modified way	2
High	Site-specific and wider natural and/or social functions or processes are severely altered	3
C. ***Duration***– *the timeframe over which the impact will be experienced and its reversibility*		
Short-term	Up to 2 years (i.e. reversible impact)	1
Medium-term	2 to 15 years (i.e. reversible impact)	2
Long-term	More than 15 years (state whether impact is irreversible)	3

The combined score of these three criteria corresponds to a **Consequence Rating**, as follows:

Combined Score (A+B+C)	3 – 4	5	6	7	8 – 9
Consequence Rating	Very low	Low	Medium	High	Very high

Example 1:

Extent	Intensity	Duration	**Consequence**
Regional 2	Medium 2	Long-term 3	**High** 7

Step 2 – Assess the **probability** of the impact occurring according to the following definitions:

Probability– the likelihood of the impact occurring	
Improbable	< 40% chance of occurring
Possible	40% - 70% chance of occurring
Probable	> 70% - 90% chance of occurring
Definite	> 90% chance of occurring

Example 2:

Extent	Intensity	Duration	**Consequence**	**Probability**
Regional 2	Medium 2	Long-term 3	**High** 7	Probable

Step 3 – Determine the overall **significance** of the impact as a combination of the **consequence** and **probability** ratings, as set out below:

		Probability			
		Improbable	Possible	Probable	Definite
Consequence	Very Low	**INSIGNIFICANT**	**INSIGNIFICANT**	**VERY LOW**	**VERY LOW**
	Low	**VERY LOW**	**VERY LOW**	**LOW**	**LOW**
	Medium	**LOW**	**LOW**	**MEDIUM**	**MEDIUM**
	High	**MEDIUM**	**MEDIUM**	**HIGH**	**HIGH**
	Very High	**HIGH**	**HIGH**	**VERY HIGH**	**VERY HIGH**

Example 3:

Extent	*Intensity*	*Duration*	***Consequence***	***Probability***	***Significance***
Regional 2	Medium 2	Long-term 3	**High** 7	Probable	**HIGH**

Step 4 – Note the **status** of the impact (i.e. will the effect of the impact be negative or positive?)

Example 4:

Extent	*Intensity*	*Duration*	***Consequence***	***Probability***	***Significance***	***Status***
Regional 2	Medium 2	Long-term 3	**High** 7	Probable	**HIGH**	**– ve**

Step 5 – State your level of **confidence** in the assessment of the impact (high, medium or low).

Depending on the data available, you may feel more confident in the assessment of some impact than others. For example, if you are basing your assessment on extrapolated data, you may reduce the confidence level to low, noting that further groundtruthing is required to improve this.

Example 5:

Extent	*Intensity*	*Duration*	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Regional 2	Medium 2	Long-term 3	**High** 7	Probable	**HIGH**	**– ve**	High

Step 6 – Identify and describe practical **mitigation** and **optimisation** measures that can be implemented effectively to reduce or enhance the significance of the impact. Mitigation and optimisation measures must be described as either:

- **Essential**: best practice measures which must be implemented and are non-negotiable; and.
- **Best Practice**: recommended to comply with best practice, with adoption dependent on the proponent's risk profile and commitment to adhere to best practice, and which must be shown to have been considered and sound reasons provided by the proponent if not implemented.

Essential mitigation and optimisation measures must be inserted into the completed impact assessment table. The impact should be re-assessed with mitigation, by following Steps 1-5 again to demonstrate how the extent, intensity, duration and/or probability change after implementation of the proposed mitigation measures. *Best practice* measures must also be inserted into the impact assessment table, but not considered in the "with mitigation" impact significance rating.

Example 6: A completed impact assessment table

	Extent	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Without mitigation	Regional 2	Medium 2	Long-term 3	**High** 7	Probable	**HIGH**	**– ve**	High
Essential mitigation measures: • Xxx1 • Xxx2 • Xxx3 **Best practice mitigation measures:** • Yyy1 • Yyy2								
With mitigation	Local 1	Low 1	Long-term 3	**Low** **5**	Improbable	**VERY LOW**	**– ve**	High

Step 7 – Summarise all impact significance ratings as follows in your executive summary:

Impact	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Impact 1: XXXX	Medium	Improbable	**LOW**	–ve	High
With Mitigation	Low	Improbable	**VERY LOW**		High

Impact 2: XXXX	Very Low	Definite	**VERY LOW**	–ve	Medium
With Mitigation:	*Not applicable*				

APPENDIX B
VIS

Vegetation Index Score –Kimberley Thornveld

EVC=[[(EVC1+EVC2)/2]

EVC 1 - Percentage natural vegetation cover:

Vegetation cover %	0%	1-5%	6-25%	26-50%	51-75%	76-100%
Site score						X
EVC 1 score	0	1	2	3	4	5

EVC2 - Total site disturbance score:

Disturbance score	0	Very Low	Low	Moderately	High	Very High
Site score				X		
EVC 2 score	5	4	3	2	1	0

SI=(SI1+SI2+SI3+SI4)/4)

	Trees (SI1)		Shrubs (SI2)		Forbs (SI3)		Grasses (SI4)	
Score:	Present State	Perceived Reference State	Present State	Perceived Reference State	Present State	Perceived Reference State	Present State	Perceived Reference State
Continuous							X	X
Clumped								
Scattered	X	X	X	X				
Sparse					X	X		

Present State (P/S) = Currently applicable for each habitat unit

Perceived Reference State (PRS) = If in pristine condition

Each SI score is determined with reference to the following scoring table of vegetation distribution for present state versus perceived reference state.

	Present state (P/S)			
Perceived Reference state (PRS)	Continuous	Clumped	Scattered	Sparse
Continuous	3	2	1	0
Clumped	2	3	2	1
Scattered	1	2	3	2
Sparse	0	1	2	3

PVC=[(EVC)-((exotic x 0.7) + (bare ground x 0.3))

Percentage vegetation cover (exotic):

	0%	1-5%	6-25%	26-50%	51-75%	76-100%
Vegetation cover %			X			
PVC Score	0	1	2	3	4	5

Percentage vegetation cover (bare ground):

	0%	1-5%	6-25%	26-50%	51-75%	76-100%
Vegetation cover %		X				
PVC Score	0	1	2	3	4	5

RIS

Extent of indigenous species recruitment	**0**	**Very Low**	**Low**	**Moderate**	**High**	**Very High**
						X
RIS	**0**	**1**	**2**	**3**	**4**	**5**

VIS = [(EVC)+((SIxPVC)+(RIS))] = 19.9

The final VIS scores for each habitat unit are then categorised as follows:

Vegetation Index Score	Assessment Class	Description
22 to 25	**A**	Unmodified, natural
18 to 22	**B**	Largely natural with few modifications.
14 to 18	**C**	Moderately modified
10 to 14	**D**	Largely modified
5 to 10	**E**	The loss of natural habitat extensive
<5	**F**	Modified completely

APPENDIX C

Faunal Species Lists for QDS

Table 7: Expected mammal, reptiles, amphibians and invertebrate species within the QDS 2824DB.

Family	Genus	Species	Common Name	Threat Status
Mammals				
No records				
Reptiles				
Scincidae	*Trachylepis*	*punctatissima*	Speckled Rock Skink	Least concern
Elapidae	*Naja*	*nivea*	Cape Cobra	Not Evaluated
Colubridae	*Psammophis*	*trinasalis*	Fork-marked Sand Snake	Not Evaluated
Colubridae	*Boaedon*	*capensis*	Brown House Snake	Not evaluated
Colubridae	*Pseudaspis*	*cana*	Mole Snake	Not evaluated
Gekkonidae	*Pachydactylus*	*capensis*	Cape Gecko	Least concern
Agamidae	*Agama*	*aculeata aculeata*	Common Ground Agama	Not Evaluated
Testudinidae	*Stigmochelys*	*pardalis*	Leopard Tortoise	Not Evaluated
Colubridae	*Dispholidus*	*typus typus*	Boomslang	Not Evaluated
Viperidae	*Bitis*	*arietans arietans*	Puff Adder	Not Evaluated
Lacertidae	*Meroles*	*squamulosus*	Common Rough-scaled Lizard	Not Evaluated
Testudinidae	*Psammobates*	*oculifer*	Serrated Tent Tortoise	Not Evaluated
Pelomedusidae	*Pelomedusa*	*subrufa*	Central Marsh Terrapin	Not Evaluated
Elapidae	*Elapsoidea*	*sundevallii media*	Highveld Garter Snake	Not Evaluated
Atractaspididae	*Xenocalamus*	*bicolor bicolor*	Bicoloured Quill-snouted Snake	Not Evaluated
Varanidae	*Varanus*	*albigularis albigularis*	Rock Monitor	Not Evaluated
Colubridae	*Dasypeltis*	*scabra*	Rhombic Egg-eater	Least Concern
Typhlopidae	*Rhinotyphlops*	*lalandei*	Delalande's Beaked Blind Snake	Not Evaluated
Colubridae	*Lycophidion*	*capense capense*	Cape Wolf Snake	Not Evaluated
Atractaspididae	*Aparallactus*	*capensis*	Black-headed Centipede-eater	Least Concern
Gekkonidae	*Lygodactylus*	*capensis capensis*	Common Dwarf Gecko	Not Evaluated
Colubridae	*Prosymna*	*bivittata*	Two-striped Shovel-snout	Not Evaluated
Lacertidae	*Nucras*	*intertexta*	Spotted Sandveld Lizard	Not Evaluated
Scincidae	*Trachylepis*	*capensis*	Cape Skink	Not Evaluated
Amphisbaenidae	*Monopeltis*	*capensis*	Cape Worm Lizard	Not Evaluated
Agamidae	*Agama*	*atra*	Southern Rock Agama	Not Evaluated
Amphibians				
No records				
Invertebrates				
Saturniidae	*Epiphora*	*mythimnia*	White Ringed Atlas	Not Evaluated

APPENDIX D

General “Housekeeping” mitigation measures

The list below provides an indication of the general housekeeping mitigation measures that must be adhered to in order to avoid or reduce general terrestrial impacts:

- Implement waste management as contemplated in the Environmental Management Programme;
- Provide appropriate sanitation facilities for the duration of the proposed construction activities and remove all waste to an appropriate facility;
- Any litter or waste material potentially generated on site as part of the excavation activities must be removed from the project footprint and disposed of at a suitable landfill site;
- Regularly inspect all construction vehicles for leaks;
- Carry out all servicing and refuelling of vehicles on a concrete platform with runoff traps and containment. If servicing of vehicles takes place in the field use drip trays at all times;
- Treat contaminated soils with an appropriate product and remove contaminated soil;
- Remove and appropriately dispose of any contaminated soil and water to a designated dump site as rapidly as possible following contamination;
- Do not allow open fires for heating and cooking;
- Poaching of faunal species must be strictly prohibited; and
- Reduce airborne dust through:
    - Damping dust generation areas with freshwater;
    - Use of cloth or brush barrier fences; and
    - Covering stockpiles with plastic sheets.

Appendix B:

Heritage Specialist Study

McGregor Museum
Department of Archaeology

Heritage Impact Assessment for proposed clearing of 70 ha diamondiferous material from the Buffalo Camp on the north eastern side of Kimberley, Northern Cape.

David Morris, McGregor Museum
May 2015

Heritage Impact Assessment for proposed clearing of 70 ha diamondiferous material from the Buffalo Camp on the north eastern side of Kimberley, Northern Cape.

David Morris
McGregor Museum, Kimberley
May 2015

Executive Summary

A Phase 1 Heritage Impact Assessment is presented.

It was found that the extent of previous disturbance, a) by historic mining operations in the form of depositing floors, b) by rehabilitation/recycling of historic mining infrastructure and c) by subsequent illegal digging, has meant that from a heritage perspective very little of significance remains or is in situ in the area now known as Buffalo Camp. At the periphery of the area, close to the railway line in the south western part of Buffalo Camp, there are ruins taken to be remains of a 'Stable Compound' or its associated features, which as far as possible should be left undisturbed.

It remains possible that some material of significance may still occur subsurface which, if encountered, should be brought to the attention of heritage authorities for further assessment and mitigation if necessary.

In terms of this report, no significant heritage traces were found in the area of expected clearance operations that are considered to require further mitigation.

The loss of heritage resources is therefore assessed to be of ***low*** significance with and without the implementation of mitigation.

Heritage Impact Assessment for proposed clearing of 70 ha diamondiferous material from the Buffalo Camp on the north eastern side of Kimberley, Northern Cape.

David Morris
McGregor Museum, Kimberley
May 2015

1. INTRODUCTION

The McGregor Museum Archaeology Department was appointed by SRK (by Mr Scott Masson) with respect to an EIA for the clearing of 70 ha of diamondiferous material from the Buffalo Camp, former De Beers Depositing Floors, on the north eastern side of Kimberley, Northern Cape. The request was to carry out a Phase 1 assessment of the possible impacts on heritage resources (archaeological and cultural) of this operation.

The site was inspected on foot on 31 March-1 April 2015 and relevant observations are indicated in this report.

Fieldnotes and photographs are lodged with the McGregor Museum, Kimberley.

2. THE AUTHOR OF THIS REPORT

The author is a professional archaeologist (PhD) accredited as a Principal Investigator by the Association of Southern African Professional Archaeologists. He has worked as a museum archaeologist and has carried out specialist research and surveys in the Northern Cape since 1985.

The author is independent of the organization commissioning this specialist input, and provides this heritage assessment (archaeology and colonial history but not palaeontology) within the framework of the National Heritage Resources Act (No 25 of 1999).

The National Heritage Resources Act no. 25 of 1999 (NHRA) protects heritage resources which include archaeological and palaeontological objects/sites older than 100 years, graves older than 60 years, structures older than 60 years, as well as intangible values attached to places. The Act requires that anyone intending to disturb, destroy or damage such sites/places, objects and/or structures may not do so without a permit from the

relevant heritage resources authority. This means that a Heritage Impact Assessment should be performed, resulting in a specialist report as required by the relevant heritage resources authority/ies to assess whether authorisation may be granted for the disturbance or alteration, or destruction of heritage resources.

Where archaeological sites and palaeontological remains are concerned, the South African Heritage Resources Agency (SAHRA) at national level acts on an agency basis for the Provincial Heritage Resources Agency (PHRA) in the Northern Cape. The Northern Cape Heritage Resources Authority (formerly called Ngwao Bošwa ya Kapa Bokone) is responsible for the built environment and other colonial era heritage and contemporary cultural values.

3. DESCRIPTION OF THE AFFECTED ENVIRONMENT

The environment of proposed recovery of diamondiferous material lies on the north eastern outskirts of Kimberley alongside (east and south east of) Yonder/Kenilworth. It consists predominantly of historical ‘Depositing Floors’ (part of the De Beers Mine operation) associated with the early mining history of Kimberley. As an archaeological landscape, the Floors make for an industrial/mining history palimpsest on top of an older Stone Age landscape (See the Glossary for definitions of any unfamiliar terms or usages, such as “palimpsest”). The Floors transformed this older landscape which nevertheless remains evident in the presence of probably largely displaced artefacts which today lie at the surface in places.

The existence of remaining expanses of diamondiferous material at the surface or just beneath it attracts illegal miners so that the area is today pock-marked with their shallow excavations, and lightly littered with the material accoutrements (including a hidden spade encountered during the survey) of these clandestine activities. The intention of the clearing operation for which this impact assessment is required is to recover the remaining diamondiferous material and thereby also end the illegal diggings.

The terrain is veneered with Hutton Sands over a shale/dolerite substrate (exposed in places), and supports Kimberley thornveld vegetation.

From an archaeological perspective there is relatively good visibility.

Figure 1: Google Earth image map indicating the extent of Buffalo Camp and the former De Beers Mine Depositing Floors (visible in its rectangular spatial spread orientated south west to north east), scheduled for clearing of diamondiferous material.

4. DESCRIPTION OF HERITAGE FEATURES OF THE REGION

The Northern Cape has a wealth of precolonial archaeological sites (Beaumont & Morris 1990; Morris & Beaumont 2004), these often being focused along rivers such as the nearby Vaal (e.g. Gibbon *et al*. 2009), or around koppies, for example Wildebeest Kuil (e.g. Morris 1988, 2006) just west of Kimberley, as well as at the verges of pans such as Alexandersfontein east of Kimberley (e.g. Morris 2002). Important Fauresmith age sites occur in the palaeodunes that flank the Samaria Road just north east of Buffalo Camp (Beaumont 1990; Morris 1992, 1999).

Colonial era traces are preponderantly associated with the development of the diamond mines and the evolution of the City of Kimberley and include industrial archaeology/heritage and material traces of the city's cultural history, most notably here in the traces of 'floors' which were part of the historical method of diamond recovery in which blue ground was exposed to weathering processes for a time, and the adjacent features such as the now largely cleared Kenilworth Dump (Morris 1999) where mine debris was ultimately deposited (Morris 1999). The unique late nineteenth century Kenilworth village development, originally for white mine workers (Roberts 1976), is situated north west of the Buffalo Camp, the Kenilworth Cemetery lying beyond it.

4.1 Environmental issues and potential impacts

Heritage resources including archaeological sites and colonial era features are in each instance unique and non-renewable resources. Area disturbances such as that envisaged can have a permanent destructive impact on such resources. The objective of this assessment is to evaluate the sensitivity of such resources where present, to assess the significance of potential impacts on these resources and, if and where appropriate, to recommend no-go areas and measures to mitigate or manage said impacts.

The destructive impacts that are possible in terms of heritage resources would tend to be direct, once-off events occurring during the diamondiferous material clearing operation envisaged.

5. METHODOLOGY

The area of the proposed clearing was inspected on foot. As noted above, the terrain is regarded as having fairly high archaeological 'visibility' in that surface traces are regarded

as presenting a fair indication of heritage features actually present – although clearly there is potential for features, possibly important ones, being buried. Observations of heritage traces where noted are characterised below and evaluated.

5.1 Assumptions and limitations

It was assumed that, by and large in this particular disturbed landscape, a palimpsest comprising mine 'floors' superimposed on the landscape, any older, i.e. precolonial, traces would tend not to be completely in situ. Some degree of rehabilitation of mining property had meant that much of the industrial landscape in the area had also since been disturbed by clearances, e.g. a systematic removal of metal objects including industrial railways and haulage lines. Recent illegal digging has further modified the industrial heritage layer in the landscape. It was not expected that much if anything substantial would remain of either the precolonial or the colonial history of this particular locale. The assessment was aimed in part to verify this and to record what little might remain.

A condition is routinely given, that should sites or features of significance be encountered during the clearing operation (this could include an unmarked burial or a high density of stone tools or of colonial era material, for instance), specified steps are necessary (cease work, report immediately to relevant heritage authority).

5.2 Potentially significant impacts to be assessed

Any area or linear, primary and secondary, disturbance of surfaces within the proposed site of operation could have a destructive impact on heritage resources, where present. In the event that such resources are found, they are likely to be of a nature that potential impacts could be mitigated by documentation and/or salvage following approval and permitting by SAHRA and, in the case of any built environment features, by the Northern Cape Heritage Resources Authority. Although highly unlikely in this instance, there may be some that could require preservation *in situ* and hence modification of intended clearance planning.

Disturbance of surfaces includes any *clearance* of, or *excavation* into, a land surface. In the event of archaeological materials being present such activity would alter or destroy their context (even if the artefacts themselves are not destroyed, which is also obviously possible). Without context, archaeological traces are generally rendered bereft of meaning and significance. It is the contexts as much as the individual items that are

protected by the heritage legislation: the protection of objects *in place* is concerned primarily with their preservation in context.

A number of broad expectations/concerns might be expressed for this vicinity:

5.2.1 Based on previous experience in the area, the terrain on the north eastern outskirts of Kimberley is likely to include a generally low density and widespread occurrence of mainly Pleistocene Stone Age material, including what has been defined as Fauresmith, mainly based on hornfels as raw material. It would tend to occur on calcrete where exposed, or in the lower margins of Hutton sands that veneer the landscape here.

5.2.2 There appear to be none of the features such as hills or rocky outcrops or even palaeodunes (the latter probably destroyed in the laying down of the depositing floors) in the area which in other parts of this landscape provide shelter or relatively resource-rich micro-habitats that attracted people particularly of the Later Stone Age (an example being the hill at Wildebeest Kuil Rock Art Centre, or the Fauresmith occurrences amongst the palaeodunes at Rosebery Plains on the Samaria Road). 'Off-site' distributions of artefacts would tend to be of low density and relatively lower significance.

5.2.3 Considerable historical and recent surface disturbance has already occurred over the entire terrain in question, the implications of which are that few *in situ* Stone Age occurrences would have survived past impacts, while industrial archaeological traces, as also noted above, have subsequently also been impacted to a large extent by mine rehabilitation, particularly here in the gathering up of metal, probably both formal and informal, for recycling. The highest point of the adjacent Kenilworth Dump was the site of a redoubt (fort) in the Defence of Kimberley during the Siege, 1899-1900, but this feature has since been cleared nearly to original surface level.

5.2.4 Significant intangible heritage values are not expected to be attached to this now much modified area. Socially fringe activity, principally informal small-scale illegal subsistence digging, has sprouted in the area, generating its own material traces as noted above.

5.2.5 Visual and other impacts might be considered, particularly alongside heritage landscapes, in this case especially the Kenilworth Village, although the activity of clearing is not likely to impinge visually or have a long-term visual impact. The impacts on trees/vegetation are not the province of this report.

5.3 Determining archaeological significance

In addition to guidelines provided by the NHRA, a set of criteria based on Deacon (nd) and Whitelaw (1997) for assessing archaeological significance has been developed for Northern Cape settings (Morris 2000a). These criteria include estimation of landform potential (in terms of its capacity to contain archaeological traces) and assessing the value of any archaeological traces (in terms of their attributes or their capacity to be construed as evidence, given that evidence is not given but constructed by the investigator). These significance assessment criteria are appended in table form at the end of this report.

6. OBSERVATIONS

The Buffalo Camp was visited at the end of March 2015. In summary, observations can be reported in relation to predictions made prior to fieldwork (see above).

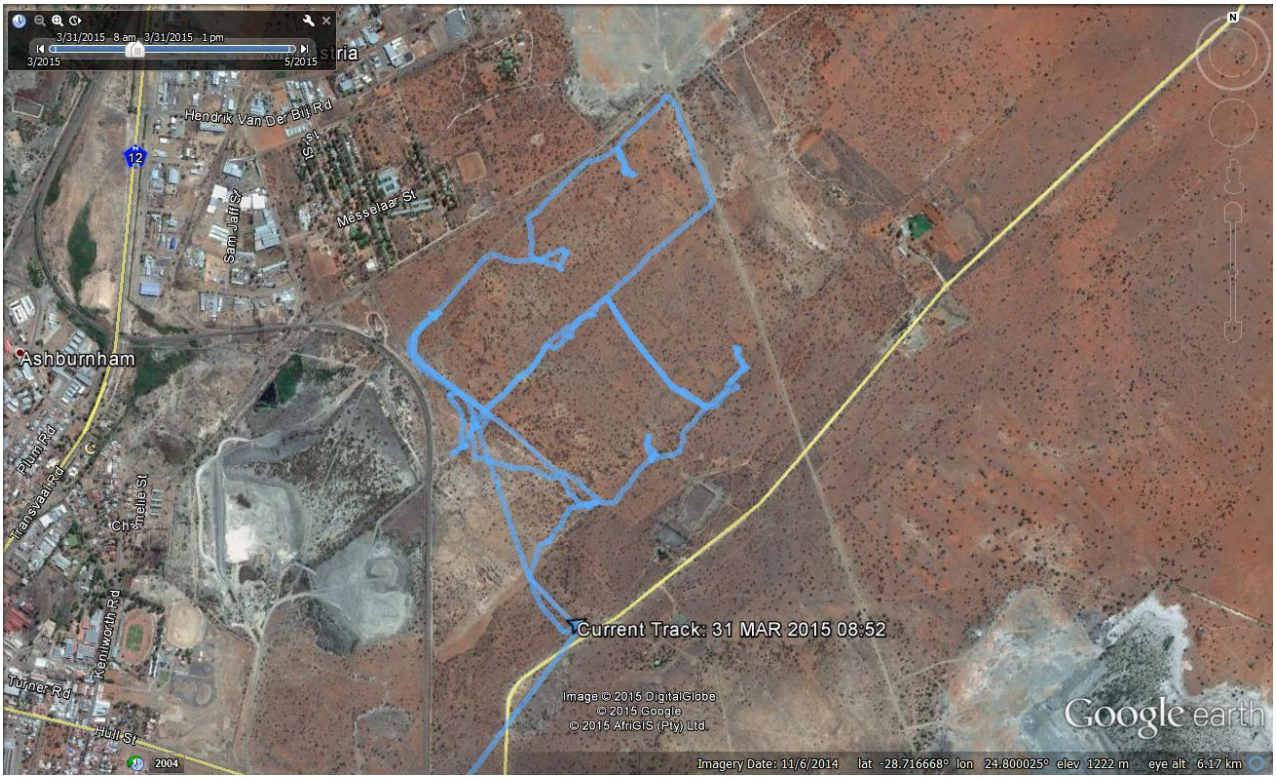

Figure 2: GPS track Day 1. A comprehensive idea of the nature and spread of heritage traces was obtained during a drive-through with regular stops and on-foot inspections.

Figure 3: The terrain today – over a century this thornveld has recovered across the erstwhile depositing floors.

6.1 A generally low density and widespread occurrence of mainly Pleistocene Stone Age material was found to have occurred here as predicted with indications of this being generally isolated stone tools noted on exposed substrate at the base of, but probably also within, the red Hutton sands. The artefacts noted at several locales are not likely to be in situ or complete (because of the overlay of mining depositing floors) and thus cannot be construed as being significant occurrences.

Figure 4: Probably Fauresmith age artefacts occur alongside mining-associated objects on parts of the depositing floors. (28.71556^{o} 24.80477^{o} & 28.71569^{o} 24.79350^{o}).

Figure 5: Fauresmith biface and other artefacts on a sheet erosion surface on the floors (28.71871^{o} 24.80040^{o}). These testify to the anticipated presence of such material, which however lacks integrity following disturbance by historical mining activity (depositing floors).

6.2 A lack of features such as hills or rocky outcrops precluded the possibility of rock engravings and no convincing Later Stone Age material was found. Dolerite exposures were noted in a few places but were not of a nature that would support rock art.

6.3 Considerable historical and recent surface disturbance has already occurred over the entire terrain. This rules out the possibility of *in situ* Stone Age occurrences (see above).

6.4 Industrial archaeological traces are most obviously present in the remains of the floors and the very presence of the diamondiferous material which the present project seeks to remove. Artificial ridges of material are the principal traces of the old floors. Also present are artificial furrows (south western side) and remains of rail haulage lines (no

rails remain but the large iron pins that held the rails in place are to be found). Carbon rods from arc-lamp lighting are to be found in places. Much that would have been of interest from an industrial archaeological point of view has long since been removed through prior systematic recovery of metal and other infrastructure.

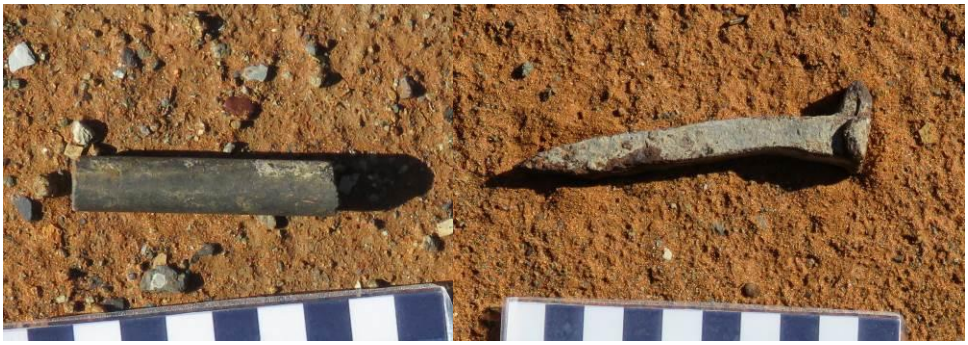

Figure 6: Carbon rod (28.72115^{o} 24.79811^{o}) and haulage line nail (28.71813^{o} 24.79253^{o}).

An 1893 map records the existence of a steam tramway and mechanical haulage system which both ran south west to north east through what is now Buffalo Camp, parallel with the Samaria Road (Morris 1999). Believed to be outside of the area of intended clearance but noted again here (see Morris 1999) is a ruin thought to be remains of late nineteenth century stables ('Stable Compound'), situated at 28.71855^{o} 24.79097^{o}.

Figure 7: Location of Stable Compound ruins (28.71855^{o} 24.79097^{o}): ***to be avoided in clearance operation*.**

Two second half of twentieth century pump houses at 28.71370^{o} 24.79055^{o} are not regarded as having heritage significance.

Figure 8: Pump infrastructure at 28.71370^{o} 24.79055^{o}

A stone beacon was noted at 28.71951^{o} 24.80058^{o}. Its destruction should be avoided if possible.

Figure 9: Beacon at 28.71951^{o} 24.80058^{o}.

6.5 Recent activity on the site, namely illegal digging, leaves its own archaeological trace – numerous shallow excavations into the seams of diamondiferous material at or just below the surface and the associated material accoutrements.

Figure 10: Illegal diggings.

6.6 Visual impacts are not expected to be a major aspect of the proposed clearing operation, other than in terms of excessive clearance of Kalahari thornveld vegetation which might otherwise mask the mining activities.

7. IMPACT ASSESSMENT

7.1 Assessment Criteria

The criteria for the description and assessment of environmental impacts derive from the EIA Regulations, published by the Department of Environmental Affairs and Tourism (April 1998) in terms of the National Environmental Management Act, 1998 (Act No.107 of 1998).

The significance of all potential impacts (positive and negative) that would result from the proposed clearance of diamondiferous material from Buffalo Camp is determined in order to assist decision-makers. The significance rating of impacts is considered as follows:

- INSIGNIFICANT: the potential impact is negligible and will not have an influence on the decision regarding the proposed activity.
- VERY LOW: the potential impact is very small and should not have any meaningful influence on the decision regarding the proposed activity.
- LOW: the potential impact may not have any meaningful influence on the decision regarding the proposed activity.
- MEDIUM: the potential impact should influence the decision regarding the proposed activity.
- HIGH: the potential impact will affect a decision regarding the proposed activity.
- VERY HIGH: The proposed activity should only be approved under special circumstances. The significance of an impact is defined as a combination of the consequence of the impact occurring and the probability that the impact will occur.

Following the criteria and procedure and assessment tables set out by SRK Consulting, the impact may be summarized as follows:

Overall impact assessment (loss of heritage) based on observations on heritage resources in Buffalo Camp. Note that many of the heritage resources observed would be disturbed/lost through the anticipated operation with greater than 90% probability but that in general their significance is low, many already being displaced and lacking in archaeological integrity.

	Extent	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Without mitigation	Local 1	Low 1	Long term 3	Low 5	Definite	LOW	-ve	High
Essential mitigation measures: • Avoid disturbance of the Stable Compound ruins which are indicated in the south western corner of the site. • Report any major subsurface finds made during any phase of the operation to the relevant heritage authority. Best practice mitigation measures: • N/A								
With mitigation	Local	Low	Long term	Low	Definite	LOW	-ve	High

8. CONCLUSIONS AND RECOMMENDATIONS

It was found that the terrain had already been disturbed a) by historic mining operations in the form of depositing floors, b) by rehabilitation/recycling of historic mining infrastructure and c) by subsequent illegal digging. This has meant that from a heritage perspective very little of significance remains or is in situ in the area now known as Buffalo Camp.

At the periphery of the area, close to the railway line in the south western part of Buffalo Camp, there are ruins taken to be remains of a 'Stable Compound' or its associated features, which as far as possible should be left intact (Morris 1999).

There is a remote chance, as noted above, that some material of significance may still occur subsurface which, if encountered, should be brought to the attention of heritage authorities. In such an event, in the course of the clearing operation, work should halt and SAHRA and/or the Northern Cape Heritage Resources Agency be contacted to allow for further assessment and mitigation recommendations.

In conclusion, with the exception of the Stable Compound ruins at the south western periphery of the proposed operation, no significant heritage traces were found that are considered to require further mitigation.

The loss of heritage resources is therefore assessed to be of ***low*** significance with and without the implementation of mitigation.

Acknowledgements

I thank Ms Abenicia Henderson (McGregor Museum Archaeology) together with De Beers security personnel who accompanied me on the visit to the site.

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GLOSSARY

Accoutrements Sundry equipment, used in this report in the sense of items brought to the site by illegal diggers.

Acheulean In Africa, stone tool industries called Acheulean date from about 1.6 million years ago, consisting of irregular flakes, cores that were sometimes prepared for pre-determining flake shape, and intentionally shaped tools called handaxes and cleavers. Acheulean sites in this region are typically found along rivers and at the margins of pans. The Acheulean was succeeded in the interior of South Africa, about 500 000 years ago, by a stone tool making tradition known as the Fauresmith, typified by cleavers and handaxes as well as the intentional shaping of flakes as blades and convergent points.

Artefact Portable object used, modified or made by humans, e.g., stone tools, pottery and metal weapons.

Anthropology Broadly, the study of humanity in its social, cultural, and physical aspects, past and present. Tim Ingold recently suggested that "the task of anthropology is to help dismantle the intellectual barriers that currently separate the humanities from natural science"; that "social/cultural anthropology, biological anthropology and archaeology form a necessary unity"; and that "anthropology deals, in the first place, not with entities and events, but with relations and processes". If, historically, there was a tendency for anthropology to be a study of "the other" in colonial situations by western academics, Ingold argues that in anthropology today "we study ourselves" - "the future of anthropology lies in changing our conception of who 'we' are, from an exclusive Western 'we' to an inclusive, global 'we'. He ends by suggesting that "Anthropology is philosophy with the people in."

Archaeology Is the study of the material traces of past human activity, a sub-discipline of Anthropology. It may be defined as a set of methods and techniques used for writing history based on the material record that humans leave behind or that may be relevant to that record. It covers the span of time from our earliest ancestors, and in principle extends to within moments of the present. It is most commonly applied to periods for which there is little record except the material one.

Earlier Stone Age (ESA) A division of the Stone Age, including Oldowan and Acheulean Industries. Approximately 2.5 million years to 250 000 years ago (assuming the Fauresmith to be Earlier rather than Middle Stone Age.

Fauresmith The Acheulean (Early Stone Age) stone tool industries were succeeded, about 500 000 years ago, by a tool-making tradition known as the Fauresmith, typified by handaxes and the intentional shaping of flakes as Levallois points; also including blades and sometimes backed items. It may be considered as a phase of the Early Middle Stone Age, ending about 250 000 years ago.

Handaxe Sometimes referred to as a biface - A flake or core tool made by fashioning a cobble.

Holocene A Geological timespan that covers the last 10 000 years. It may be referred to as Recent or Post-Glacial.

Hornfels Indurated shale, or shale that has been metamorphosed during intrusion of volcanic magma in Karoo times. Its flaking qualities made it a favoured raw material for stone tool making in the Karoo.

In situ In place, undisturbed.

Iron Age In Africa, this term is often applied to the period of and sites reflecting the farming way of life and associated with metal and ceramic technology.

Later Stone Age (LSA) A division of the Stone Age. Approximately 30 000 years ago to historic times. Stone tool traditions of what archaeologists term the Later Stone Age are mainly characterised by a diversity of "microliths" - small stone tools, some used as parts of composite tools, as barbs, or points for arrows. Hunting and gathering people of the Later Stone Age were ancestral to the historical San.

Middle Stone Age (MSA) A division of the Stone Age. By around 250 000 years ago handaxes and cleavers were no longer made (See Fauresmith). Middle Stone Age technology from this period to about 40-30 000 years ago is characterised by the presence of convergent points, with innovations including the use of pressure flaking in stone tool production, shaping (and rare decoration) of stone (e.g. Blombos Cave), bone and wooden items, and use of stone grindstones.

Palaeodune Result of Aeolian processes, i.e. the erosion, transport and deposition of material due to the action of wind at/near the earth's surface. Aeolian processes are at their most effective when the vegetation cover is reduced or absent. Palaeodunes occur in arears such a on the eastern outskirts of Kimberley that were once drier, with formerly active wind-blown dunes as a feature of the landscape

Palimpsest In archaeology traces of the past are generally found to have mounted up in layers or been swept away through time – this covering over or becoming uncovered being well described by the fine arts term “palimpsest”. Archaeologist Geoff Bailey suggests that palimpsests are an inherent feature of the world we inhabit. He defines different forms of palimpsest – true palimpsests in which successive layers of activity obliterate preceding ones, completely or nearly so; cumulative palimpsests (common in open sites of the Northern Cape) in which successive layers build up or are winnowed down, such that deposition episodes mingle and become ‘mixed’; spatial palimpsests in which the traces of spatially discrete events are difficult to correlate chronologically, or where spatially clustered materials disaggregate through time; temporal palimpsests in which objects of differing age are deposited in a single event, as in a burial, or a shipwreck; and finally, palimpsests of meaning revealed in the life histories or cultural

biographies of objects or places which, as they endure, may be put to continuous or changing uses or acquire different meanings through shifting contexts or associations in time which blend, potentially, across many generations of human life. Bailey suggests it is hard to think of any situation or place either in the archaeological past or in the contemporary world which is not, one way or another, a palimpsest.

Pleistocene A Geological timespan conventionally believed to have lasted from approximately 2 million years ago to the beginning of the Holocene about 10 000 years ago.

APPENDIX 1: Tables for determining archaeological significance

In addition to guidelines provided by the National Heritage Resources Act (Act No. 25 of 1999), a set of criteria based on Deacon (nd) and Whitelaw (1997) for assessing archaeological significance has been developed for Northern Cape settings (Morris 2000a). These criteria include estimation of landform potential (in terms of its capacity to contain archaeological traces) and assessing the value of any archaeological traces (in terms of their attributes or their capacity to be construed as evidence, given that evidence is not given but constructed by the investigator).

Estimating site potential

Table 1 (below) is a classification of landforms and visible archaeological traces used for estimating the potential of archaeological sites (after J. Deacon nd, National Monuments Council). Type 3 sites tend to be those with higher archaeological potential, but there are notable exceptions to this rule, for example the renowned rock engravings site Driekopseiland near Kimberley which is on landform L1 Type 1 – normally a setting of lowest expected potential. It should also be noted that, generally, the older a site the poorer the preservation, so that sometimes *any* trace, even of only Type 1 quality, can be of exceptional significance. In light of this, estimation of potential will always be a matter for archaeological observation and interpretation.

Assessing site value by attribute

Table 2 is adapted from Whitelaw (1997), who developed an approach for selecting sites meriting heritage recognition status in KwaZulu-Natal. It is a means of judging a site's archaeological value by ranking the relative strengths of a range of attributes (given in the second column of the table). While aspects of this matrix remain qualitative, attribute assessment is a good indicator of the general archaeological significance of a site, with Type 3 attributes being those of highest significance.

Table 1. Classification of landforms and visible archaeological traces for estimating the potential for archaeological sites (after J. Deacon, National Monuments Council).

Class	**Landform**	**Type 1**	**Type 2**	**Type 3**
L1	Rocky surface	Bedrock exposed	Some soil patches	Sandy/grassy patches
L2	Ploughed land	Far from water	In floodplain	On old river terrace
L3	Sandy ground, inland	Far from water	In floodplain or near feature such as hill	On old river terrace
L4	Sandy ground, Coastal	>1 km from sea	Inland of dune cordon	Near rocky shore
L5	Water-logged deposit	Heavily vegetated	Running water	Sedimentary basin
L6	Developed urban	Heavily built-up with no known record of early settlement	Known early settlement, but buildings have basements	Buildings without extensive basements over known historical sites
L7	Lime/dolomite	>5 myrs	<5000 yrs	Between 5000 yrs and 5 myrs
L8	Rock shelter	Rocky floor	Sloping floor or small area	Flat floor, high ceiling
Class	**Archaeo-logical traces**	**Type 1**	**Type 2**	**Type 3**
A1	Area previously excavated	Little deposit remaining	More than half deposit remaining	High profile site
A2	Shell or bones visible	Dispersed scatter	Deposit <0.5 m thick	Deposit >0.5 m thick; shell and bone dense
A3	Stone artefacts or stone walling or other feature visible	Dispersed scatter	Deposit <0.5 m thick	Deposit >0.5 m thick

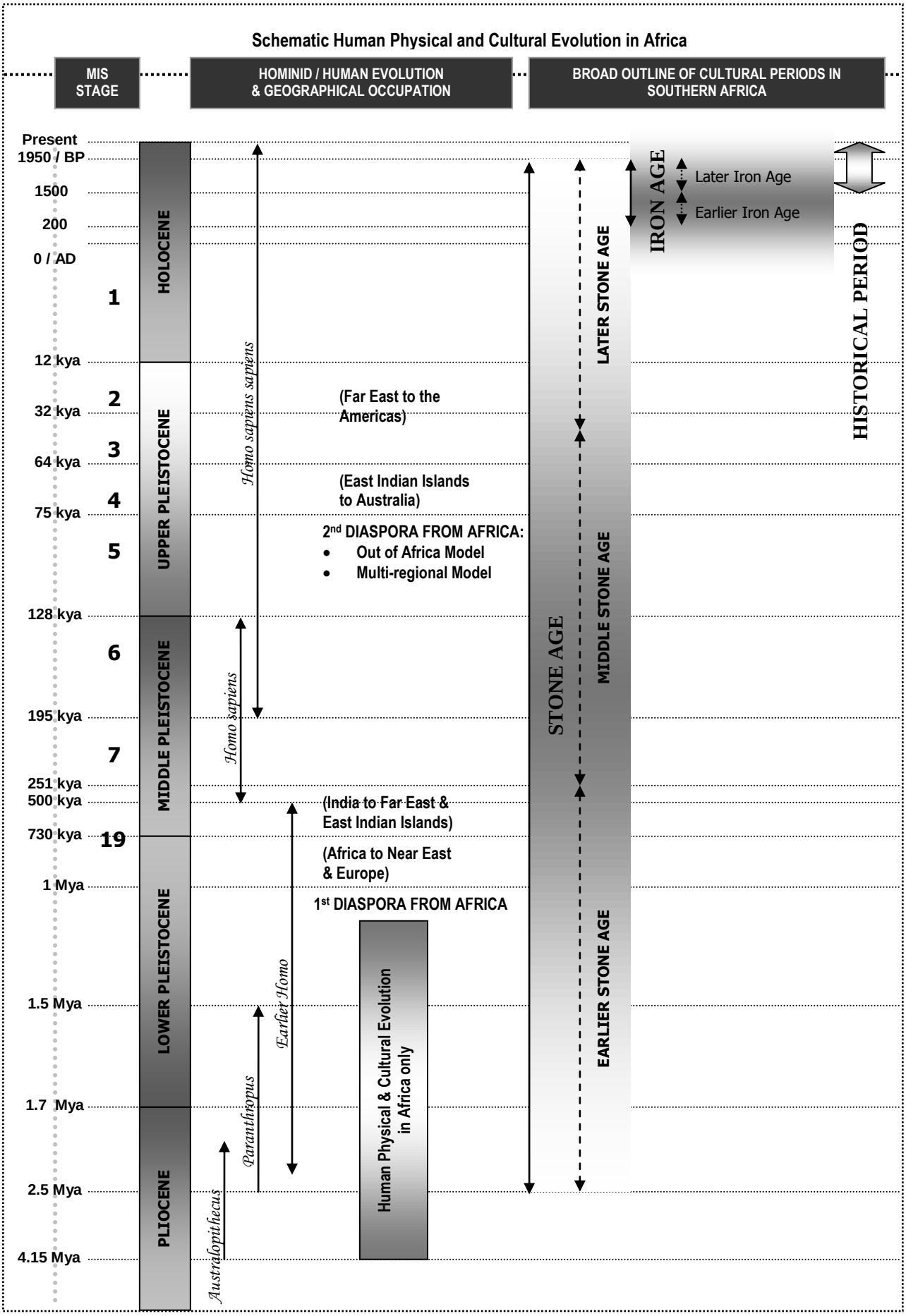
Table 2. Site attributes and value assessment (adapted from Whitelaw 1997)

Class	**Attribute**	**Type 1**	**Type 2**	**Type 3**
1	Length of sequence/context	No sequence Poor context Dispersed distribution	Limited sequence	Long sequence Favourable context High density of arte/ecofacts
2	Presence of exceptional items (incl regional rarity)	Absent	Present	Major element
3	Organic preservation	Absent	Present	Major element
4	Potential for future archaeological investigation	Low	Medium	High
5	Potential for public display	Low	Medium	High
6	Aesthetic appeal	Low	Medium	High
7	Potential for implementation of a long-term management plan	Low	Medium	High

In terms of the criteria set out in Table 1 all the observations made fall within Landform Class L3 Type 1 and Archaeological Trace Class A3 Type 1 – both likely to be of **Low** significance.

In terms of the criteria set out in Table 2 the observations fall preponderantly in Type 1 (**Low** significance) for all Classes 1-7.

The Stable Compound ruin site at the periphery of the project area may be classed as Site Attribute/Value Class 4 Type 2 **Medium** potential for future archaeological investigation.


Schematic Human Physical and Cultural Evolution in Africa
MIS STAGE
HOMINID / HUMAN EVOLUTION & GEOGRAPHICAL OCCUPATION
BROAD OUTLINE OF CULTURAL PERIODS IN SOUTHERN AFRICA
Present
1950 / BP
1500
200
0 / AD
12 kya
32 kya
64 kya
75 kya
128 kya
195 kya
251 kya
500 kya
730 kya
1 Mya
1.5 Mya
1.7 Mya
2.5 Mya
4.15 Mya
1
2
3
4
5
6
7
19
HOLOCENE
UPPER PLEISTOCENE
MIDDLE PLEISTOCENE
LOWER PLEISTOCENE
PLIOCENE
Homo sapiens sapiens
(Far East to the Americas)
(East Indian Islands to Australia)
2nd DIASPORA FROM AFRICA:
Out of Africa Model
Multi-regional Model
Homo sapiens
(India to Far East & East Indian Islands)
(Africa to Near East & Europe)
1st DIASPORA FROM AFRICA
Earlier Homo
Paranthropus
Australopithecus
Human Physical & Cultural Evolution in Africa only
STONE AGE
LATER STONE AGE
MIDDLE STONE AGE
EARLIER STONE AGE
IRON AGE
Later Iron Age
Earlier Iron Age
HISTORICAL PERIOD

Extracts from the

National Heritage Resources Act (No 25 of 1999)

DEFINITIONS
Section 2

In this Act, unless the context requires otherwise:

ii. "*Archaeological*" means –
   a) material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures;
   b) rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10 m of such representation;
   c) wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the Republic,… and any cargo, debris, or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation.

viii. "*Development*" means any physical intervention, excavation or action, other than those caused by natural forces, which may in the opinion of a heritage authority in any way result in a change to the nature, appearance or physical nature of a place, or influence its stability and future well-being, including –
   a) construction, alteration, demolition, removal or change of use of a place or structure at a place;
   b) carrying out any works on or over or under a place;
   c) subdivision or consolidation of land comprising, a place, including the structures or airspace of a place;
   d) constructing or putting up for display signs or hoardings;
   e) any change to the natural or existing condition or topography of land; and
   f) any removal or destruction of trees, or removal of vegetation or topsoil;

xiii. "*Grave*" means a place of interment and includes the contents, headstone or other marker of such a place, and any other structure on or associated with such place;

xxi. "*Living heritage*" means the intangible aspects of inherited culture, and may include –
   a) cultural tradition;
   b) oral history;
   c) performance;
   d) ritual;
   e) popular memory;
   f) skills and techniques;
   g) indigenous knowledge systems; and
   h) the holistic approach to nature, society and social relationships.

xxxi. "*Palaeontological*" means any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trance;

xli. "*Site*" means any area of land, including land covered by water, and including any structures or objects thereon;

xliv. "*Structure*" means any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith;

NATIONAL ESTATE
Section 3

1) For the purposes of this Act, those heritage resources of South Africa which are of cultural significance or other special value for the present community and for future generations must be considered part of the national estate and fall within the sphere of operations of heritage resources authorities.
2) Without limiting the generality of subsection 1), the national estate may include –
   a) places, buildings, structures and equipment of cultural significance;
   b) places to which oral traditions are attached or which are associated with living heritage;
   c) historical settlements and townscapes;
   d) landscapes and natural features of cultural significance;
   e) geological sites of scientific or cultural importance
   f) archaeological and palaeontological sites;
   g) graves and burial grounds, including –
      i. ancestral graves;

ii. royal graves and graves of traditional leaders;
iii. graves of victims of conflict
iv. graves of individuals designated by the Minister by notice in the Gazette;
v. historical graves and cemeteries; and
vi. other human remains which are not covered in terms of the Human Tissue Act, 1983 (Act No 65 of 1983)

h) sites of significance relating to the history of slavery in South Africa;
i) movable objects, including –
i. objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens;
ii. objects to which oral traditions are attached or which are associated with living heritage;
iii. ethnographic art and objects;
iv. military objects;
v. objects of decorative or fine art;
vi. objects of scientific or technological interest; and
vii. books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings, excluding those that are public records as defined in section 1 xiv) of the National Archives of South Africa Act, 1996 (Act No 43 of 1996).

STRUCTURES
Section 34

1) No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.

ARCHAEOLOGY, PALAEONTOLOGY AND METEORITES
Section 35

3) Any person who discovers archaeological or palaeontological objects or material or a meteorite in the course of development or agricultural activity must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority.
4) No person may, without a permit issued by the responsible heritage resources authority –
a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;
b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;
c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or
d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assists in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.
5) When the responsible heritage resources authority has reasonable cause to believe that any activity or development which will destroy, damage or alter any archaeological or palaeontological site is under way, and where no application for a permit has been submitted and no heritage resources management procedure in terms of section 38 has been followed, it may –
a) serve on the owner or occupier of the site or on the person undertaking such development an order for the development to cease immediately for such period as is specified in the order;
b) carry out an investigation for the purpose of obtaining information on whether or not an archaeological or palaeontological site exists and whether mitigation is necessary;
c) if mitigation is deemed by the heritage resources authority to be necessary, assist the person on whom the order has been served under paragraph a) to apply for a permit as required in subsection 4); and
d) recover the costs of such investigation from the owner or occupier of the land on which it is believed an archaeological or palaeontological site is located or from the person proposing to undertake the development if no application for a permit is received within two weeks of the order being served.
6) The responsible heritage resources authority may, after consultation with the owner of the land on which an archaeological or palaeontological site or meteorite is situated, serve a notice on the owner or any other controlling authority, to prevent activities within a specified distance from such site or meteorite.

BURIAL GROUNDS AND GRAVES
Section 36

3) No person may, without a permit issued by SAHRA or a provincial heritage resources authority –
a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;

b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
c) bring onto or use at a burial ground or grave referred to in paragraph a) or b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.

4) SAHRA or a provincial heritage resources authority may not issue a permit for the destruction of any burial ground or grave referred to in subsection 3a) unless it is satisfied that the applicant has made satisfactory arrangements for the exhumation and re-interment of the contents of such graves, at the cost of the applicant and in accordance with any regulations made by the responsible heritage resources authority.
5) SAHRA or a provincial heritage resources authority may not issue a permit for any activity under subsection 3b) unless it is satisfied that the applicant has, in accordance with regulations made by the responsible heritage resources authority –
   a) made a concerted effort to contact and consult communities and individuals who by tradition have an interest in such grave or burial ground; and
   b) reached agreements with such communities and individuals regarding the future of such grave or burial ground.
6) Subject to the provision of any other law, any person who in the course of development or any other activity discovers the location of a grave, the existence of which was previously unknown, must immediately cease such activity and report the discovery to the responsible heritage resources authority which must, in co-operation with the South African Police Service and in accordance with regulations of the responsible heritage resources authority –
   a) carry out an investigation for the purpose of obtaining information on whether or not such grave is protected in terms of this Act or is of significance to any community; and
   b) if such grave is protected or is of significance, assist any person who or community which is a direct descendant to make arrangements for the exhumation and re-internment of the contents of such grave or, in the absence of such person or community, make any such arrangements as it deems fit.

HERITAGE RESOURCES MANAGEMENT
Section 38

1) Subject to the provisions of subsections 7), 8) and 9), any person who intends to undertake a development categorised as –
   a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
   b) the construction of a bridge or similar structure exceeding 50 m in length;
   c) any development or other activity which will change the character of a site –
      i. exceeding 5 000 m² in extent; or
      ii. involving three or more existing erven or subdivisions thereof; or
      iii. involving three or more erven or subdivisions thereof which have been consolidated within the past five years; or
      iv. the costs which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
   d) the rezoning of a site exceeding 10 000 m² in extent; or
   e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority,

   must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.
2) The responsible heritage resources authority must, within 14 days of receipt of a notification in terms of subsection 1) –
   a) if there is reason to believe that heritage resources will be affected by such development, notify the person who intends to undertake the development to submit an impact assessment report. Such report must be compiled at the cost of the person proposing the development, by a person or persons approved by the responsible heritage resources authority with relevant qualifications and experience and professional standing in heritage resources management; or
   b) notify the person concerned that this section does not apply.
3) The responsible heritage resources authority must specify the information to be provided in a report required in terms of subsection 2a) …
4) The report must be considered timeously by the responsible heritage resources authority which must, after consultation with the person proposing the development decide –
   a) whether or not the development may proceed;
   b) any limitations or conditions to be applied to the development;
   c) what general protections in terms of this Act apply, and what formal protections may be applied, to such heritage resources;
   d) whether compensatory action is required in respect of any heritage resources damaged or destroyed as a result of the development; and

e) whether the appointment of specialists is required as a condition of approval of the proposal.

APPOINTMENT AND POWERS OF HERITAGE INSPECTORS
Section 50

7) Subject to the provision of any other law, a heritage inspector or any other person authorised by a heritage resources authority in writing, may at all reasonable times enter upon any land or premises for the purpose of inspecting any heritage resource protected in terms of the provisions of this Act, or any other property in respect of which the heritage resources authority is exercising its functions and powers in terms of this Act, and may take photographs, make measurements and sketches and use any other means of recording information necessary for the purposes of this Act.
8) A heritage inspector may at any time inspect work being done under a permit issued in terms of this Act and may for that purpose at all reasonable times enter any place protected in terms of this Act.
9) Where a heritage inspector has reasonable grounds to suspect that an offence in terms of this Act has been, is being, or is about to be committed, the heritage inspector may with such assistance as he or she thinks necessary –
    a) enter and search any place, premises, vehicle, vessel or craft, and for that purpose stop and detain any vehicle, vessel or craft, in or on which the heritage inspector believes, on reasonable grounds, there is evidence related to that offence;
    b) confiscate and detain any heritage resource or evidence concerned with the commission of the offence pending any further order from the responsible heritage resources authority; and
    c) take such action as is reasonably necessary to prevent the commission of an offence in terms of this Act.

A heritage inspector may, if there is reason to believe that any work is being done or any action is being taken in contravention of this Act or the conditions of a permit issued in terms of this Act, order the immediate cessation of such work or action pending any further order from the responsible heritage resources authority.

Appendix C:
Initial Stakeholder Database

Name	Contact	Capacity	Organization
OWNER OR PERSON IN CONTROL OF LAND			
De Beers			
OCCUPIERS OF THE SITE			
Unoccupied			
OWNERS / OCCUPIERS OF ADJACENT LAND			
Mark Charles Robinson		Owner	
Jannie Van Zyl		Manager	Yonder
Bernardus Van Der Sandt Van Zyl		Owner	
Ben-Johann Van Der Walt		Owner	
WARD COUNCILLORS			
PJ Louw		Ward Councillor	
RATEPAYERS ASSOCIATIONS			
N/A			
MUNICIPALITY			
Sol Plaatjie Local Municipality	Mr G Akharwaray	Municipal Manager	
Frances Baard District Municipality	Ms Mamikie Bogatsu	Municipal Manager	
ORGAN OF STATE			
Department of Mineral Resources	Kgaudi Shapo	Case Officer	
Department of Environment and Nature Conservation		Director	
Department of Water and Sanitation	Jonas Mosala	Director	
South African Heritage Resources Agency	Ragna Redelstorff	Case Officer	
Department of Agriculture, Land Reform and Rural Development	Mr W Mothibi	Head of Department	
I&APs REQUESTING REGISTRATION			

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