



ECOLOGICAL IMPACT ASSESSMENT

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CONSTRUCTION OF THE NEW BOSHOEK LOOP, NORTH WEST PROVINCE

Title: Construction of the new Boshhoek Loop Transnet Rail line,
North West Province: Ecological Impact Assessment
Prepared for: Transnet
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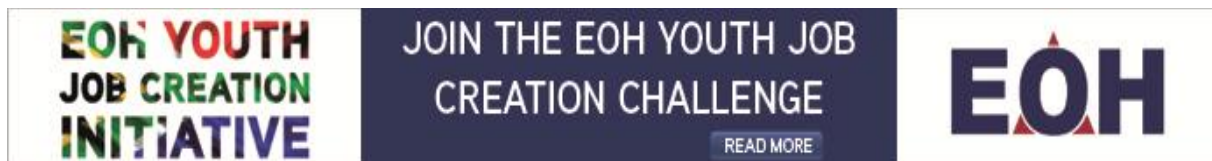
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Contents of the specialist report

The contents of this specialist report complies with the legislated requirements as described in Appendix 6 of the National Environmental Management Act (No 107 of 1998; NEMA) Regulations of 2014 and updated in 2017 (GN R. 326 of 2017).

Appendix 6: Specialist Reports

1. (1) A specialist report prepared in terms of these Regulations must contain—
 - (a) details of—
 - (i) the specialist who prepared the report; and
 - (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;
 - (b) a declaration that the specialist is independent in a form as may be specified by the competent authority;
 - (c) an indication of the scope of, and the purpose for which, the report was prepared;
 - (cA) an indication of the quality and age of base data used for the specialist report;
 - (cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;
 - (d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;
 - (e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;
 - (f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;
 - (g) an identification of any areas to be avoided, including buffers;
 - (h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;
 - (i) a description of any assumptions made and any uncertainties or gaps in knowledge;
 - (j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;
 - (k) any mitigation measures for inclusion in the EMPr;
 - (l) any conditions for inclusion in the environmental authorisation;
 - (m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;
 - (n) a reasoned opinion—
 - (i) whether the proposed activity, activities or portions thereof should be authorised;
 - (iA) regarding the acceptability of the proposed activity or activities; and
 - (ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;
 - (o) a description of any consultation process that was undertaken during the course of preparing the specialist report;
 - (p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and
 - (q) any other information requested by the competent authority.
- (2) Where a government notice by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.

THE PROJECT TEAM

1. (1) A specialist report prepared in terms of these Regulations must contain—
- (a) details of—
 - (i) the specialist who prepared the report; and
 - (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;
 - (b) a declaration that the specialist is independent in a form as may be specified by the competent authority;

Mr Roy de Kock M.Sc., Pri. Nat. Sci.
(Botanist)

SACNASP Registration Number: 400216/16

Roy is a Principal Consultant holding a BSc Honours in Geology and an MSc in Botany from the Nelson Mandela University in Port Elizabeth. He has recently started a PhD in Botany focussing on the impact of fracking fluids on vegetation and soils in the Karoo Basin. He has been working for EOH since 2010, and is based at the East London branch where he focuses on Vegetation, Biodiversity, Ecological and Agricultural Assessments, Geological and Geotechnical analysis, Environmental Management Plans, mining applications and various environmental impact studies. Roy has worked on numerous projects in South Africa and Africa at large. Roy is registered with the South African Council for Natural Scientific Professional (SACNASP).

Dr Alan Carter Pri. Nat Sci.
(Report reviewer)

Alan has extensive training and experience in both financial accounting and environmental science disciplines with international accounting firms in South Africa and the USA. He is a member of the American Institute of Certified Public Accountants (licensed in Texas) and holds a PhD in Plant Sciences. He is also a certified ISO14001 EMS auditor with the American National Standards Institute. Alan has been responsible for leading and managing numerous and varied consulting projects over the past 25 years.

Expertise:

Relevant projects Roy and Alan have worked on include:

Name of project	Description of responsibility	Date completed
Waterfall Citrus Farm EIA for the development of a new citrus farm outside Peddie, Eastern Cape	Ecological Impact Assessment	Current
Indwe Biodiversity Study on the development of a new essential oils farm outside Kidds Beach, East London, Eastern Cape	Biodiversity study for an essential oils farming development	December 2017
Earth Free (Pty) Ltd Biodiversity study for a housing development in Kei Road,	Biodiversity study for a housing development extension	October 2017

Name of project	Description of responsibility	Date completed
Eastern Cape		
City of Johannesburg Biodiversity Assessment and Conservation management Plans for 4 Nature Reserves	Vegetation and Ridgeline Biodiversity Study	January - April 2017
Terreco Butterworth Bypass Alternatives EIA (EC)	Botanical Impact Assessment	Oct 2016
Terreco Idutywa Bypass Alternatives EIA (EC)	Botanical Impact Assessment	Oct 2016
SANRAL N2 between Tetyana & Sitebe Komkulu EIA (EC)	Ecological Impact Assessment	June 2015
Laman Mining renewal of Mining License (EC)	Botanical Impact Assessment	February 2015
ACSA East London Airport Vegetation Study (EC)	Botanical Impact Assessment	February 2014
SANRAL R61 Baziya to Mthatha EIA (EC)	Ecological Impact Assessment	November 2014

Declaration:

Role on Study Team	Declaration of independence
Report Writing and Mapping	I, Roy de Kock , declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed development, application or appeal in respect of which I was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work.
Project Management and Report Review	I, Alan Carter , declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed development, application or appeal in respect of which I was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work.

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1. Introduction

1. (1) A specialist report prepared in terms of these Regulations must contain—
 - (c) an indication of the scope of, and the purpose for which, the report was prepared;
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 - (o) a description of any consultation process that was undertaken during the course of preparing the specialist report;
 - (p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and
 - (q) any other information requested by the competent authority.

1.1. Project description

Transnet SOC Ltd have appointed EOH Coastal and Environmental Services (EOH CES) to conduct an Ecological Impact Assessment, in accordance with the National Environmental Management Act (107 of 1998; NEMA), for the proposed construction of the new 1.67km long Boshhoek Loop along the existing railway line at the Boshhoek Station in the North West Province (Figure 1.1). The construction work includes a new rail parallel along the northern side of the existing rail as well as moving the existing gravel service road to accommodate for the new track. This will allow two trains to safely pass each other on the rail. This “passing” lane is called a loop. The construction of the new loop will be undertaken within the existing Transnet servitude and as a result some vegetation will be impacted.

The project forms part of the Transnet Waterberg rail corridor expansion programme between Ermelo, located in the Mpumalanga province, and Lephalale, located in the Limpopo Province. The railway line is a key corridor to Transnet for the transportation of various commodities, including coal, chrome, ferrochrome, cement, lime, granite, iron ore, container and general freight. The construction activities focus specifically on the upgrades required for the coal expansion of the line.

1.2. Project location

The proposed new Boshhoek Loop is located at the Boshhoek Station near the R565 between Rustenburg and Sun City in the North West Province (Figure 1.1).

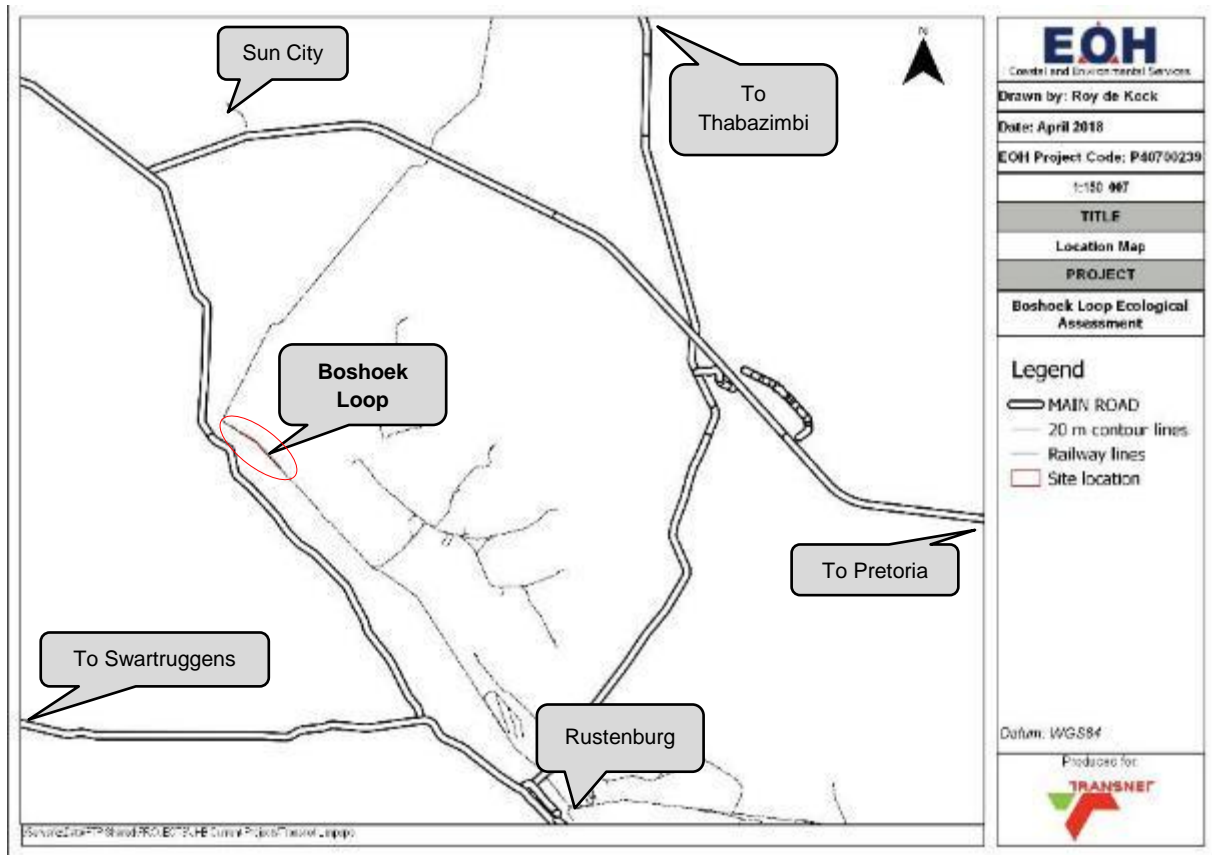


Figure 1.1: Location of the proposed new Boshhoek Loop.

1.3. Alternatives

As this is the expansion of an existing railway line, no site alternatives or layout alternatives are proposed.

1.4. Objectives

The objectives of the project were to:

- Identify any significant landscape features of rare or important vegetation/faunal associations such as seasonal wetlands, seeps or rocky areas that might support rare or important species;
- Place the project area within the biodiversity context of the wider area (i.e. provide the “broad overview”);
- Provide a detailed description of the ecological (fauna and flora) environment within the area and immediately surrounding the footprint of the proposed road and consider terrestrial fauna and flora;
- Review relevant legislation, policies, guidelines and standards;
- Assess the potential direct and indirect impacts resulting from the proposed construction works and associated infrastructure, both on the footprint and the immediate surrounding area during construction and operation;
- Provide a detailed description of appropriate mitigation measures that can be adopted to reduce negative impacts for each phase of the project, where required; and
- Check all faunal groups identified in the region to date, highlighting sensitive species and their possible areas of distribution.

This aspect of the report will specifically include the identification of –

- Areas of high biodiversity;
- The presence of species of conservation concern;
- Habitat associations and conservation status of the identified fauna and flora;
- The presence of areas sensitive to invasion by alien species; and
- The presence of conservation areas and sensitive habitats where disturbance should be avoided or minimised.

1.5. Approach

The study site and surrounding areas were assessed using a two-phased approach. Firstly, a desktop assessment of the site was conducted in terms of current vegetation classifications and biodiversity programmes and plans. This included the consideration of:

- The South African Vegetation Map (Mucina and Rutherford, 2012);
- North West Biodiversity Sector Plan (2015);
- Department of Agriculture, Fisheries and Forestry (DAFF) - Indigenous forest maps;
- National Environmental Management Biodiversity Act (NEMBA) - Biodiversity Regulations; and
- Plant of South Africa (POSA) – Quarter degree square level.

A site visit was conducted between the 03rd to the 5th April 2018. The site visit was used to conduct ecological observations and to identify potential impacts of the proposed construction of the new Boshhoek Loop on the surrounding natural environment and to inform the significance of the potential impacts identified.

1.6. Assumptions and limitations

This report is based on currently available information and, as a result, is limited to the information provided. The presented ecological data was based on a single site survey of plants and animals conducted in April 2018 (late summer).

1.7. Public consultation

No consultation requirements were identified during the drafting of this specialist report. The findings should be presented to stakeholders and I&APs during a public meeting as part of the Environmental Impact Assessment (EIA) Public Participation Process (PPP).

No comments were received to date on this report.

2. Assessment methodology

Appendix 6 Specialist Reports

1. (1) A specialist report prepared in terms of these Regulations must contain—
 - (e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;

The objective of this assessment is to identify areas of ecological importance and to evaluate these in terms of their conservation importance. In order to do so, the ecological sensitivity of the area is assessed in addition to identifying plant and animal Species of Conservation Concern (SCC) that may occur in habitats present in the area.

To achieve this, this study must identify areas of high sensitivity and assess this against possible impacts as a result of the proposed development layout. The SANBI Guidelines for a botanical assessment (Driver *et al*; 2009) was used for guidance.

Aspects that affect ecological impact significance include:

- Presence of plant SCC;
- Presence of animal SCC;
- Vegetation types (which also constitute faunal habitats) of conservation concern;
- Presence of threatened ecosystems;
- Areas of high biodiversity; and
- The presence of process areas:
 - Ecological corridors; and
 - Complex topographical features (especially steep and rocky slopes or aquatic environments that provide niche habitats for plants and/or animals).

It is not the aim of this study to produce a complete list of all plant and animal species occurring in the region, but rather to examine a representative sample. It is however, important to note that areas of high sensitivity as well as SCC have been identified as far as possible, either from records from the site or a review of their habitat requirements, and whether or not these habitats occur within the site.

2.1. Species of conservation concern

Plant SCC in terms of the project area is defined as:

1. Species listed in the revised South African Red Data Books (Driver *et al* 2009);
2. Species listed in Schedule 2 of the North West Biodiversity Management Act (Act No 4 of 2016)
3. Species listed in the NEMBA Threatened or Protected Species List (G.NR. 256 of 2015)
4. Species included in other international lists (e.g., 2010 International Union for Conservation of Nature (IUCN) Red List of Threatened Plants).

Animal SCC in terms of the project area is defined as:

1. Animal species listed in the Endangered or Vulnerable categories in the revised South African Red Data Books (SA RDB – amphibians, du Preez and Carruthers, 2009; reptiles, Branch 1988; birds, SA Birding, 2008; terrestrial mammals, Apps, 2017); and/or
2. Species included in other international lists (e.g., 2010 International Union for Conservation of Nature (IUCN) Red List of Threatened Animals).

Definitions:

The South African (SA) Red List system contains nine categories, with the main purpose of classifying species from lowest (Least Concern) to highest (Critically Endangered) threat in terms of risk of extinction (see Figure 2.1). Species that are at high risk of extinction are placed in one of three categories: Vulnerable (VU), Endangered (EN) or Critically Endangered (CR). If a species is classified into one of these three categories, it is considered as a SCC.

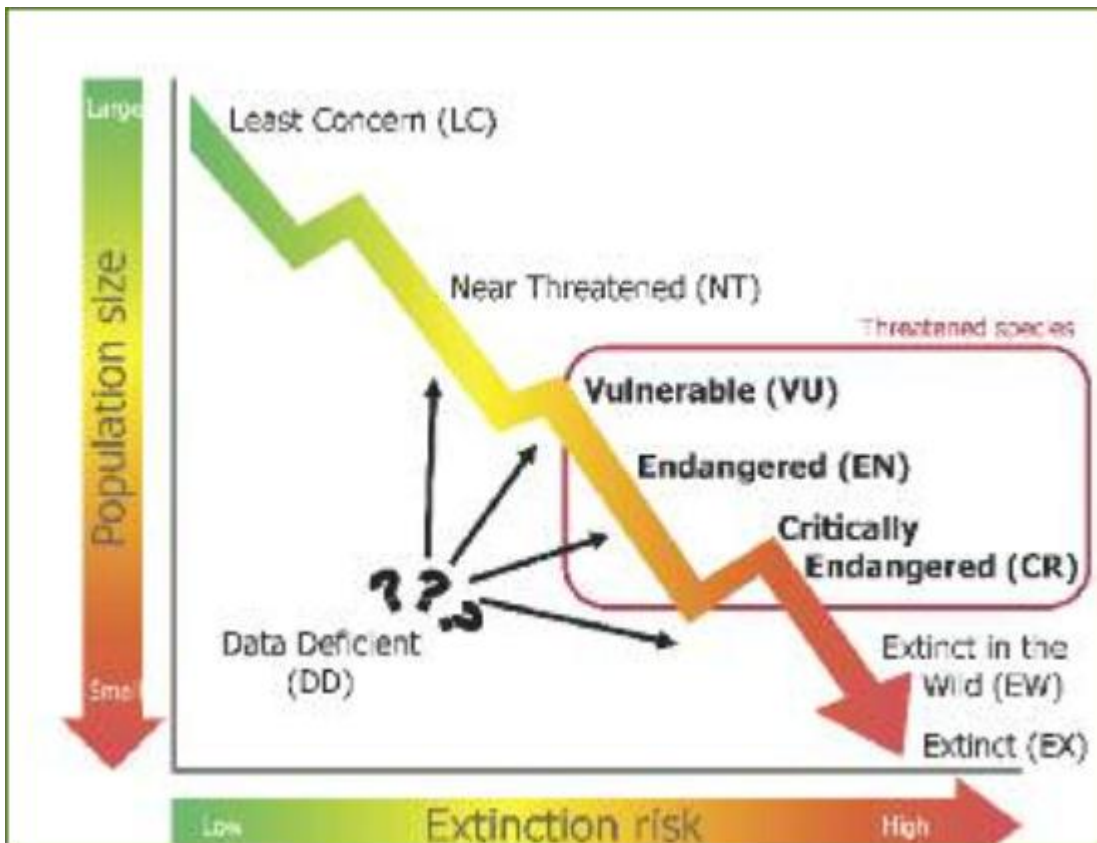


Figure 2.1: The SA Red List system categorizes species according to their risk of extinction (Source: SA Red Data Guidelines).

A species’ classification is guided by five criteria relating to different biological factors that indicate danger of extinction (Table 2.2). A species should always be evaluated against all five criteria, but available data only need to meet the requirements for at least one criterion in order to classify a species as threatened. A species is always classified in the highest category of threat for which it meets the quantitative thresholds of at least one criterion.

The following management guidelines for threatened species are provided in Table 2.1 below (Source: SA Red Data Guidelines):

Table 2.1: Guidelines for the management of the various categories

Status	Criterion*	Guidelines for Recommendation
<p>^a Please notify the Threatened Species Programme immediately and provide details of the location, size and threats to the subpopulation. The fact that a subpopulation of the species was found at a site zoned for development means that its Red List status has to be reviewed and is likely to be upgraded.</p> <p>* Refer to Table 2.2 for criteria descriptions</p>		
^a Critically Endangered	E	No further loss of natural habitat should be permitted as the species is on the brink of extinction, and all other known subpopulations have been lost. The subpopulation in question is likely to be newly discovered and the only remaining subpopulation of this species.
Critically Endangered	A,B,C,D	No further loss of natural habitat should be permitted as the species is on the verge of extinction.
Endangered	B,C,D	No further loss of habitat should be permitted as the species is likely to go extinct in the near future if current pressures continue. All remaining subpopulations have to be conserved if this species is to survive in the long term.
Endangered	A	If the species has a restricted range (< 2 000 km ²), recommend no further loss of habitat. If range size is larger, the species is possibly long-lived but widespread, and limited habitat loss may be considered under certain circumstances, such as the implementation of an offset whereby another viable, known subpopulation is formally conserved in terms of the National Environmental Management: Protected Areas Act (Act 57 of 2003), and provided that the subpopulation to be destroyed does not occur (i) within a threatened ecosystem or (ii) within an area required for biodiversity conservation in terms of a relevant spatial biodiversity plan or (iii) on a site associated with additional ecological sensitivities.
^a Vulnerable	D	This species either constitutes less than 1 000 individuals or is known from a very restricted range. No further loss of habitat should be permitted as the species' status will immediately become either Critically Endangered or Endangered, should habitat be lost.
Vulnerable	B,C	The species is approaching extinction but there are still a number of subpopulations in existence. Recommend no further loss of habitat as this will increase the extinction risk of the species.
Vulnerable	A	If the species has a restricted range, < 2 000 km ² , recommend no further loss of habitat. If range size is larger, the species is possibly long-lived but widespread, and limited habitat loss may be considered under certain circumstances, such as the implementation of an offset whereby another viable, known subpopulation is formally conserved in terms of the Protected Areas Act, and provided that the subpopulation to be destroyed does not occur (i) within a threatened ecosystem or (ii) within an area required for biodiversity conservation in terms of a relevant spatial biodiversity plan or (iii) on a site associated with additional ecological sensitivities.
^a Data Deficient	D	This species is very poorly known, with insufficient information on its habitat, population status or distribution to assess it. However, it is highly likely to be threatened. If a Data Deficient species will be affected by a proposed activity, the subpopulation should be well surveyed and the data sent to the Threatened Species Programme. The species will be reassessed and the new status of the species, with a recommendation, will be provided within a short timeframe.

Status	Criterion*	Guidelines for Recommendation
Data Deficient		There is uncertainty regarding the taxonomic status of this species, but it is likely to be threatened. Contact the taxonomist working on this group to resolve its taxonomic status; the species will then be reassessed by the Threatened Species Programme.
^a Near Threatened	D	Currently known from fewer than 10 locations, therefore preferably recommend no loss of habitat. Should loss of this species' habitat be considered, then an offset that includes conserving another viable subpopulation (in terms of the Protected Areas Act) should be implemented, provided that the subpopulation to be destroyed does not occur (i) within a threatened ecosystem or (ii) within an area required for biodiversity conservation in terms of a relevant spatial biodiversity plan or (iii) on a site associated with additional ecological sensitivities.
Near Threatened	B,C	The species is approaching thresholds for listing as threatened but there are still a number of subpopulations in existence and therefore there is need to minimise loss of habitat. Conservation of subpopulations is essential if they occur (i) within a threatened ecosystem or (ii) within an area required for biodiversity conservation in terms of a relevant spatial biodiversity plan or (iii) on a site associated with additional ecological sensitivities.
Near Threatened	A	If the species has a restricted range, < 2 000 km ² , then recommend no further loss of habitat. If range size is larger, the species is possibly long-lived but widespread, and limited habitat loss may be considered. Conservation of subpopulations is essential if they occur (i) within a threatened ecosystem or (ii) within an area required for biodiversity conservation in terms of a relevant biodiversity conservation plan or (iii) on a site associated with additional ecological sensitivities.
^a Critically Rare		This is a highly range-restricted species, known from a single site, and therefore no loss of habitat should be permitted as it may lead to extinction of the species. The Threatened Species Programme is not aware of any current threats to this species and should be notified without delay.
^a Rare		The species is likely to have a restricted range, or be highly habitat specific, or have small numbers of individuals, all of which makes it vulnerable to extinction should it lose habitat. Recommend no loss of habitat. The Threatened Species Programme is not aware of any current threats to this species and should be notified without delay.
Declining		The species is declining but the population has not yet reached a threshold of concern; limited loss of habitat may be permitted. Should the species is known to be used for traditional medicine and if individuals will not be conserved <i>in situ</i> , plants should be rescued and used as mother stock for medicinal plant cultivation programmes.

Table 2.2: The biological indicators of extinction risk as contained in each of the five SANBI criteria

Criterion	Biological indicator	Risk factor	Quantitative thresholds		
			CR	EN	VU
A	Large and rapid reduction in population size relative to the life history of the species	Proportion by which population is reduced	>80%	>50%	>30%
B	Small geographic range and decline, population fluctuation or fragmentation	Extent of occurrence (EOO)	<100 km ²	<5 000 km ²	<20 000 km ²
		Area of occupancy (AOO)	<10 km ²	<500 km ²	<2 000 km ²
C	Small population size and decline	Population size	<250	<2 500	<10 000
		Number of mature individuals in largest subpopulation	<50	<250	<1 000
		Proportion of population in largest subpopulation	>90%	>95%	100%
D	Critically small population size or very restricted distribution	Population size	<50	<250	<1 000
		Area of occupancy (AOO)			<20 km ²
		Number of locations			Five or fewer
E	Quantitative analysis of extinction risk	Probability of extinction over a specified time period	50%	20%	10%

2.2. Sampling protocol

The entire 1.67 km length of the existing Boshhoek railway line where the new Loop is proposed was inspected to evaluate vegetation, animals and ecosystems and to provide more detailed information on the communities present. The site inspection took into account the amount of time available for the study and limitations such as the seasonality of vegetation.

Vegetation communities were described according to the dominant species recorded from each type. These were mapped and assigned a sensitivity score.

The assessment of animals was based on a general observation of species noted onsite during the site assessment, but with particular consideration of known potential animal SCC.

2.3. Vegetation mapping

Mucina and Rutherford (2012) developed the National Vegetation Map as part of a South African National Biodiversity Institute (SANBI) funded project: *“It was compiled in order to provide floristically based vegetation units of South Africa, Lesotho and Swaziland at a greater level of detail than had been available before.”* This map (also called the SANBI Vegmap) was developed using a wealth of data from several contributors and has allowed for the best national vegetation map to date. This SANBI Vegmap project has two main aims:

- to determine the variation in and between units of southern African vegetation based on the analysis and synthesis of data from vegetation studies throughout the region; and
- to compile a vegetation map. The aim of the map was to accurately reflect the distribution and variation on the vegetation and indicate the relationship of the vegetation with the environment. For this reason the collective expertise of vegetation scientists from universities and state departments were harnessed to make this project as comprehensive as possible.

The SANBI Vegmap describes each vegetation type in detail, along with the most important species including endemic species and those that are biogeographically important. This is the most comprehensive data for vegetation types in South Africa. In this study the SANBI Vegmap is used to inform anticipated site conditions regarding the vegetation type occurring on the property.

2.4. Sensitivity assessment

The sensitivity assessment approach entails identifying zones of high, moderate and low sensitivity according to a system developed by EOH CES and used in numerous ecological studies. It must be noted that the sensitivity zonings in this study are based solely on ecological characteristics and social and economic factors have not been taken into consideration. The sensitivity analysis described here is based on 11 criteria which are considered to be of importance in determining ecosystem and landscape sensitivity. The method predominantly involves identifying sensitive vegetation or habitat types, topography and land transformation, biodiversity patterns (hotspots) and biodiversity process areas (ecological infrastructure and corridors) (Table 2.3).

Although very simple, this method of analysis provides a good, yet conservative and precautionary assessment of the ecological sensitivity.

Table 2.3: Criteria used for the analysis of the sensitivity of the area.

CRITERIA		LOW SENSITIVITY	MODERATE SENSITIVITY	HIGH SENSITIVITY
1	Topography	Level or even	Undulating; fairly steep slopes	Complex and uneven with steep slopes
2	Vegetation - Extent or habitat type in the region	Extensive	Restricted to a particular region / zone	Restricted to a specific locality / site
3	Conservation status of fauna / flora or habitats	Well conserved independent of conservation value	Not well conserved, moderate conservation value	Not conserved - has a high conservation value
4	Species of special concern - Presence and number	None, although occasional regional endemics	No endangered or vulnerable species, some indeterminate or rare endemics	One or more endangered and vulnerable species, or more than 2 endemics or rare species
5	Habitat fragmentation leading to loss of viable populations	Extensive areas of preferred habitat present elsewhere in region not susceptible to fragmentation	Reasonably extensive areas of preferred habitat elsewhere and habitat susceptible to fragmentation	Limited areas of this habitat, susceptible to fragmentation
6	Biodiversity contribution	Low diversity or species richness	Moderate diversity, and moderately high species richness	High species diversity, complex plant and animal communities
7	Erosion	Very stable and	Some possibility of	Large possibility of

CRITERIA	LOW SENSITIVITY	MODERATE SENSITIVITY	HIGH SENSITIVITY
potential or instability of the region	an area not subjected to erosion	erosion or change due to episodic events	erosion, change to the site or destruction due to climatic or other factors
8 Rehabilitation potential of the area or region	Site is easily rehabilitated	There is some degree of difficulty in rehabilitation of the site	Site is difficult to rehabilitate due to the terrain, type of habitat or species required to reintroduce
9 Disturbance due to human habitation or other influences (alien invasive species)	Site is very disturbed or degraded	There is some degree of disturbance of the site	The site is hardly or very slightly impacted upon by human disturbance
10 Ecological function in the landscape (corridor, niche habitats)	Low ecological function. No corridors or niche habitats	N/A (There are NO moderate ecological functions. It is considered either high or low)	High ecological function. Portions of entire sections of the site contains corridors or niche habitats
11 Ecological services (food, water filter, grazing, etc.)	Low to no ecological services on site	Some sections of the site contains ecological services	Most of the site contains ecological services

A sensitivity map was developed with the aid of a satellite image so that the sensitive regions and vegetation types could be plotted (see Chapter 6). The following was also taken into account:

2.4.1. Biodiversity Regulations

National:

The National Environmental Management: Biodiversity Act, (Act No. 10 OF 2004) (NEM:BA) provides a National List of Ecosystems that are threatened and in need of protection – GN 1002 of 2011. These areas are included in the sensitivity map.

Provincial:

The North West Biodiversity Sector Plan (2015) identifies a network of Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) in the province based on a systematic biodiversity plan. Collectively, the CBAs and ESAs cover 57% of the province. The following biodiversity categories exist:

Category	Management objectives
Protected areas	As per protected areas management plan
CBA1	Maintain in a natural or near-natural state that maximises the retention of biodiversity pattern and ecological process:

Category	Management objectives
	<ul style="list-style-type: none"> • Ecosystems and species fully or largely intact and undisturbed. • These are areas with high irreplaceability or low flexibility in terms of meeting biodiversity pattern targets. If the biodiversity features targeted in these areas are lost then targets will not be met. • These are biodiversity features that are at, or beyond, their limits of acceptable change.
CBA2	<p>Maintain in a natural or near-natural state that maximises the retention of biodiversity pattern and ecological process:</p> <ul style="list-style-type: none"> • Ecosystems and species fully or largely intact and undisturbed. • Areas with intermediate irreplaceability or some flexibility in terms of meeting biodiversity targets. There are options for loss of some components of biodiversity in these landscapes without compromising the ability to achieve biodiversity targets, although loss of these sites would require alternative sites to be added to the portfolio of CBAs. • These are biodiversity features that are approaching but have not passed their limits of acceptable change.
ESA1	<p>Maintain in at least a semi-natural state as ecologically functional landscapes that retain basic natural attributes:</p> <ul style="list-style-type: none"> • Ecosystem still in a natural, near-natural state or semi-natural state, and has not been previously developed. • Ecosystems moderately to significantly disturbed but still able to maintain basic functionality. • Individual species or other biodiversity indicators may be severely disturbed or reduced. • These are areas with low irreplaceability with respect to biodiversity pattern targets only.
ESA2	<p>Maintain as much ecological functionality as possible (generally these areas have been substantially modified):</p> <ul style="list-style-type: none"> • Maintain current land use or restore area to a natural state. • Ecosystem NOT in a natural or near-natural state • Ecosystem significantly disturbed but still able to maintain some ecological functionality. • Individual species or other biodiversity indicators are severely disturbed or reduced and these are areas that have low irreplaceability with respect to biodiversity pattern targets only; • These are areas with low irreplaceability with respect to biodiversity pattern targets only. These areas are required to maintain ecological processes especially landscape connectivity.
Other Natural Areas and No Natural Habitat Remaining	<p>Production landscapes</p> <ul style="list-style-type: none"> • Manage land to optimise sustainability utilisation of natural areas

2.4.1. Protected areas

The National Environmental Management Protected Areas Act (Act No 57 of 2003; NEMPAA) was developed to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes. All protected areas within 15km of the study site were listed. Impacts were identified and mitigations proposed.

The goal of the National Protected Areas Expansion Strategy (NPAES) is to achieve cost-effective protected area expansion for ecological sustainability and increased resilience to climate change. It sets targets for protected area expansion, provides maps of the most important areas for protected area expansion, and makes recommendations on mechanisms for protected area expansion. The NPAES has classified protected areas into three categories: formally protected areas, informally protected areas and focus areas. Focus areas are large, intact and unfragmented areas suitable for the creation or expansion of large protected areas.

2.5. Impact assessment

2.5.1. Impact rating methodology

To ensure a direct comparison between various specialist studies, a standard rating scale has been defined and will be used to assess and quantify the identified impacts. This is necessary since impacts specific parameters that need to be assessed. Five factors need to be considered when assessing the significance of impacts, namely:

- Relationship of the impact to **temporal scales** - the temporal scale defines the significance of the impact at various time scales, as an indication of the duration of the impact.
- Relationship of the impact to **spatial scales** - the spatial scale defines the physical extent of the impact.
- The **severity of the impact** - the **severity/beneficial scale** is used in order to scientifically evaluate how severe negative impacts would be, or how beneficial positive impacts would be on a particular affected system (for ecological impacts) or a particular affected party.
- The severity of impacts can be evaluated with and without mitigation in order to demonstrate how serious the impact is when nothing is done about it. The word 'mitigation' means not just 'compensation', but also the ideas of containment and remedy. For beneficial impacts, optimization means anything that can enhance the benefits. However, mitigation or optimization must be practical, technically feasible and economically viable.
- The **likelihood** of the impact occurring - the likelihood of impacts taking place as a result of project actions differs between potential impacts. There is no doubt that some impacts would occur (e.g. loss of vegetation), but other impacts are not as likely to occur (e.g. vehicle accident), and may or may not result from the proposed development. Although some impacts may have a severe effect, the likelihood of them occurring may affect their overall significance.
- Each criterion is ranked with scores assigned as presented in Table 2.4 to determine the overall significance of an activity. The criterion is then considered in two categories, viz. effect of the activity and the likelihood of the impact. The total scores recorded for the effect and likelihood

are then read off the matrix presented in Table 2.5, to determine the overall significance of the impact. The overall significance is either negative or positive.

- The **significance** scale is an attempt to evaluate the importance of a particular impact. This evaluation needs to be undertaken in the relevant context, as an impact can either be ecological or social, or both. The evaluation of the significance of an impact relies heavily on the values of the person making the judgment. For this reason, impacts of a social nature need to reflect the values of the affected society.

Cumulative Impacts:

Cumulative impacts affect the significance ranking of an impact because the impact is taken in consideration of both onsite and offsite sources. For example, pollution making its way into a river from a development may be within acceptable national standards. Activities in the surrounding area may also create pollution which does not exceed these standards. However, if both onsite and offsite activities take place simultaneously, the total pollution level may exceed the standards. For this reason it is important to consider impacts in terms of their cumulative nature.

Seasonality:

Although seasonality is not considered in the ranking of the significance, it may influence the evaluation during various times of the year. As seasonality will only influence certain impacts, it will only be considered for these, with management measures being imposed accordingly (i.e. dust suppression measures being implemented during the dry season).

Table 2.4. Significance Rating Table.

Temporal Scale (The duration of the impact)	
Short term	Less than 5 years (many construction phase impacts are of a short duration).
Medium term	Between 5 and 20 years.
Long term	Between 20 and 40 years (from a human perspective almost permanent).
Permanent	Over 40 years or resulting in a permanent and lasting change that will always be there.
Spatial Scale (The area in which any impact will have an affect)	
Individual	Impacts affect an individual.
Localised	Impacts affect a small area of a few hectares in extent. Often only a portion of the project area.
Project Level	Impacts affect the entire project area.
Surrounding Areas	Impacts that affect the area surrounding the development
Municipal	Impacts affect either the Local Municipality, or any towns within them.

Regional	Impacts affect the wider district municipality or the province as a whole.
National	Impacts affect the entire country.
International/Global	Impacts affect other countries or have a global influence.
Will definitely occur	Impacts will definitely occur.
Degree of likelihood of an impact occurring (The confidence with which one has predicted the significance of an impact)	
Definite	More than 90% likely of the impact occurring. Should have substantial supportive data.
Probable	Over 70% sure of a particular fact, or of the likelihood of that impact occurring.
Possible	Over 40% sure of a particular fact, or of the likelihood of an impact occurring.
Unsure	Less than 40% sure of a particular fact, or of the likelihood of an impact occurring.

Table 2.5. Impact Severity Rating.

Overall Significance (The combination of all the above criteria as an overall significance)	
VERY HIGH NEGATIVE	VERY BENEFICIAL
<p>These impacts would be considered by society as constituting a major and usually permanent change to the (natural and/or social) environment, and usually result in severe or very severe effects, or beneficial or very beneficial effects.</p> <p>Example: The loss of a species would be viewed by informed society as being of VERY HIGH significance.</p> <p>Example: The establishment of a large amount of infrastructure in a rural area, which previously had very few services, would be regarded by the affected parties as resulting in benefits with VERY HIGH significance.</p>	
HIGH NEGATIVE	BENEFICIAL
<p>These impacts will usually result in long term effects on the social and/or natural environment. Impacts rated as HIGH will need to be considered by society as constituting an important and usually long term change to the (natural and/or social) environment. Society would probably view these impacts in a serious light.</p> <p>Example: The loss of a diverse vegetation type, which is fairly common elsewhere, would have a significance rating of HIGH over the long term, as the area could be rehabilitated.</p> <p>Example: The change to soil conditions will impact the natural system, and the impact on affected parties (such as people growing crops in the soil) would be HIGH.</p>	
MODERATE NEGATIVE	SOME BENEFITS
<p>These impacts will usually result in medium to long term effects on the social and/or natural environment. Impacts rated as MODERATE will need to be considered by society as constituting a fairly important and usually medium term change to the (natural and/or social) environment. These impacts are real but not substantial.</p>	

<p>Example: The loss of a sparse, open vegetation type of low diversity may be regarded as MODERATELY significant.</p>	
LOW NEGATIVE	FEW BENEFITS
<p>These impacts will usually result in medium to short term effects on the social and/or natural environment. Impacts rated as LOW will need to be considered by the public and/or the specialist as constituting a fairly unimportant and usually short term change to the (natural and/or social) environment. These impacts are not substantial and are likely to have little real effect.</p> <p>Example: The temporary changes in the water table of a wetland habitat, as these systems are adapted to fluctuating water levels.</p> <p>Example: The increased earning potential of people employed as a result of a development would only result in benefits of LOW significance to people who live some distance away.</p>	
NO SIGNIFICANCE	
<p>There are no primary or secondary effects at all that are important to scientists or the public.</p> <p>Example: A change to the geology of a particular formation may be regarded as severe from a geological perspective, but is of NO significance in the overall context.</p>	
DON'T KNOW	
<p>In certain cases it may not be possible to determine the significance of an impact. For example, the primary or secondary impacts on the social or natural environment given the available information.</p> <p>Example: The effect of a particular development on people's psychological perspective of the environment.</p>	

3. Relevant legislation

The proposed new Boshhoek Loop will be subject to the requirements of various items of South African legislation. These are described below.

Table 3.1. Environmental legislation considered in the preparation of the Ecological Assessment for the proposed new Boshhoek Loop.

Title of Environmental legislation, policy or guideline	Implications for the proposed new Boshhoek Loop
Constitution Act (No. 108 of 1996)	<ul style="list-style-type: none"> - Obligation to ensure that the proposed development will not result in pollution and ecological degradation; and - Obligation to ensure that the proposed development is ecologically sustainable, while demonstrating economic and social development.
National Environmental Management Act (NEMA) (No. 107 of 1998)	<ul style="list-style-type: none"> - The developer must apply the NEMA principles, the fair decision-making and conflict management procedures that are provided for in NEMA; and - The developer must apply the principles of Integrated Environmental Management and consider, investigate and assess the potential impact of existing and planned activities on the environment, socio-economic conditions and the cultural heritage.
National Environment Management: Biodiversity Act (NEMBA) (No. 10 of 2004)	<ul style="list-style-type: none"> - The proposed development must : <ul style="list-style-type: none"> o conserve endangered ecosystems and protect and promote biodiversity; o assess the impacts of the proposed development on endangered ecosystems; - No protected species may be removed or damaged without a permit; and - The proposed site must be cleared of alien vegetation using appropriate means.
North West Biodiversity Management Act (NWBMA) (No 4 of 2016)	<ul style="list-style-type: none"> - All species of plants listed as Schedule 2 specially protected species must be identified on site; - Identifying and listing alien and listed invasive species occurring onsite that required management and control; and - All species identified must be removed/relocated for site after the issuing of a permit by the provincial Department: Rural, Environment and Agricultural Development (READ).
North West Biodiversity Sector Plan (NW BSP; 2015)	<ul style="list-style-type: none"> - All areas considered as critical for biodiversity conservation including corridors identified to support ecological functioning, that occur on site must be identified and relevant mitigation to limit the impact on these areas must be recommended.
Conservation of Agricultural Resources Act (CARA) (No. 43 Of 1983)	<ul style="list-style-type: none"> - The objects of this Act are to provide for the conservation of the natural agricultural resources by the maintenance of the production potential of land, by the combating and prevention of erosion and weakening or destruction of the water sources, and by the protection of the vegetation and the combating of weeds and invader plants.
National Environmental	<ul style="list-style-type: none"> - The objective of this Act is to provide for the protection and

Title of Environmental legislation, policy or guideline	Implications for the proposed new Boshhoek Loop
Management: Protected Areas Act (NEMPAA) (No. 57 of 2003)	<p>conservation of ecologically viable areas representative of South Africa’s biological diversity and its natural landscapes and seascapes; and</p> <ul style="list-style-type: none"> - In terms of Section 50 (1)(a)(ii) of this Act, the management authority may <i>“Carry out or allow an activity in the reserve aimed at raising revenue”</i>. However, Section 50 (2) states that such activity may not negatively affect the survival of any species in, or significantly disrupt the integrity of the ecological system of the nature reserve. Furthermore, in terms Section 51 (a), the Minister or MEC is responsible for the regulations or restrictions of the development and other activities in a protected environment, <i>“which may be inappropriate for the area, given the purpose for which the area was declared”</i>.
National Forest Act (84 of 1998)	<ul style="list-style-type: none"> - Requires that a permit be obtained should any forests or protected trees be removed during the construction phase of the project.

4. Description of the biophysical environment

As mentioned, the proposed new Boshhoek Loop was described using a two-phased approach. Firstly, a desktop assessment of the site was conducted in terms of current vegetation classifications and biodiversity programmes and plans (This Chapter). This was followed by a site visit between the 03rd and the 05th April 2018 in order to assess the actual ecological state, current land-use, identify potential sensitive ecosystems and identify plant species associated with the proposed project activities (Chapter 5).

4.1. Background and Literature review

Published literature on the ecology of the area was referenced in order to describe the study site in the context of the region and the North West Province. The following documents/plans are referenced:

- SANBI vegetation (Mucina & Rutherford, 2012);
- North West Biodiversity Sector Plan (NW BSP);
- The National Freshwater Ecosystem Priority Areas (NFEPA);
- National Environmental Management: Protected Areas Act (NEMPAA);
- National Protected Areas Expansion Strategy (NPAES);
- Review of the SANBI Red Data List (Plants and animals);
- Convention on International Trade in Endangered Species (CITES);
- International Union for Conservation of Nature (IUCN);
- North West Biodiversity Management Act (NWBMA);
- Conservation of Agricultural Resources Act (CARA)
- National Environmental Management: Biodiversity Act (NEMBA) List of Threatened or Protected Species;
- National Environmental Management: Biodiversity Act (NEMBA) List of Alien Invasive Vegetation;
- National Environmental Management: Biodiversity Act (NEMBA) National List of Ecosystems that are Threatened and in need of protection; and
- National Forestry Act (NFA): List of Protected Trees.

4.2. Climate

Rustenburg, the nearest town to the site with climate data (located approx. 17 km towards the southeast) normally receives about 513mm of rain per year, with most rainfall occurring during mid-summer. Figure 4.1(a) shows the average rainfall values for Rustenburg per month. It receives the lowest rainfall (0mm) in June and the highest (101mm) in January. The monthly distribution of average daily maximum temperatures (Figure 4.1(b) shows that the average midday temperatures for Rustenburg range from 19.3°C in June to 29.4°C in January. The region is the coldest during July when temperatures drops to 1.7°C on average during the night (Figure 4.1(c)).

a) Average rainfall (mm)	b) Average midday temperature	c) Average night-time
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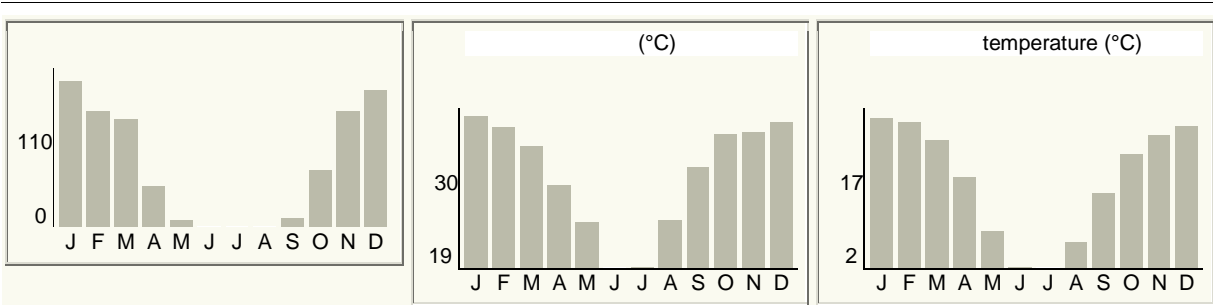


Figure 4.1 Climate conditions of Rustenburg, the nearest town to the Boshhoek Loop (SA Explorer; 24 April 2018)

4.3. Topography

The proposed new Boshhoek Loop is found on a level area at 1150 meter above sea level.

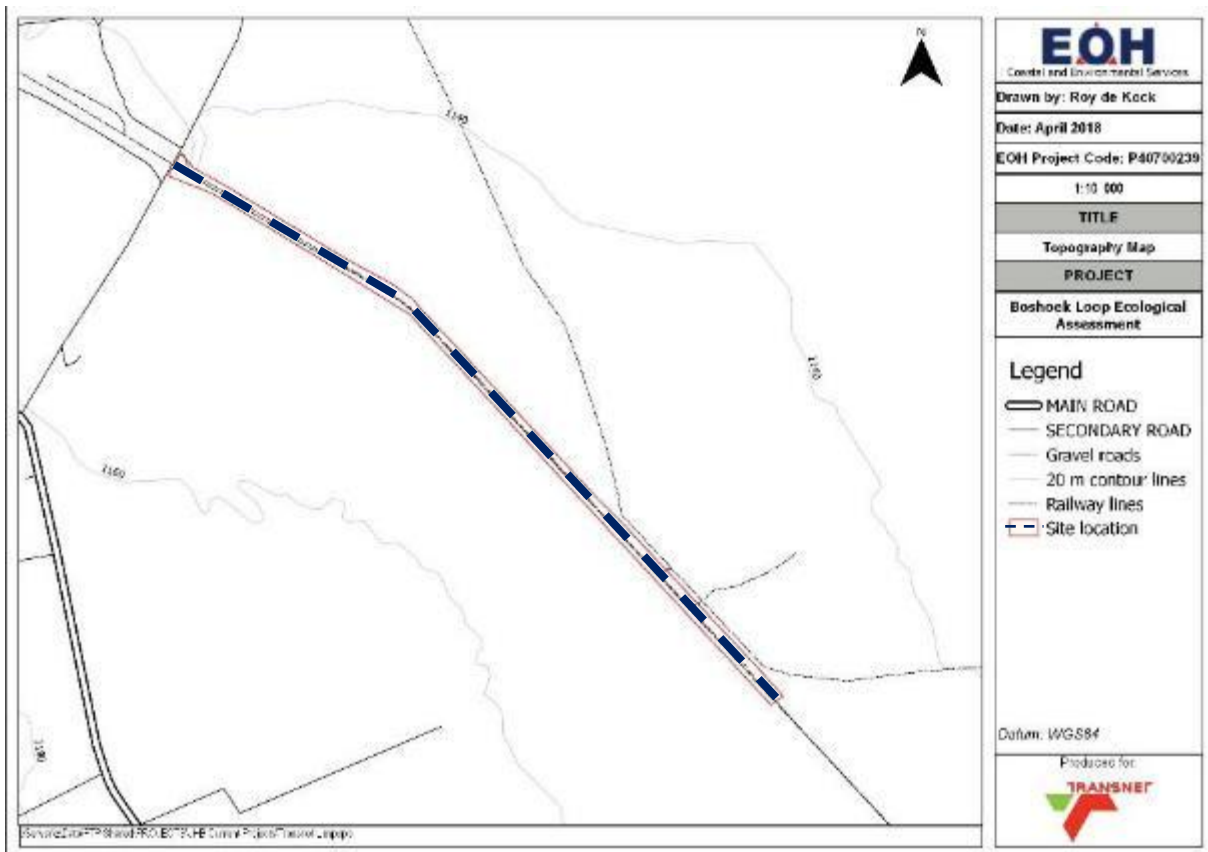


Figure 4.2 Topography showing contours with height above sea level in meters

4.4. Geology and Soils

The proposed new Boshhoek Loop falls within the Western Limb of the Rustenburg Layered Suite (RLS) of rocks that forms part of the Bushveld Complex (Figure 4.3). The mafic rocks of the Bushveld Complex constitute the most voluminous preserved mafic layered intrusion in the world underlying an area of 65 000 km². Surface rocks consist of the Schilpadsnest Subsuite that constitutes the Critical Zone of the RLS in the Western Limb. The Critical Zone contains huge deposits of chromite and platinum and are locally mined in the area.

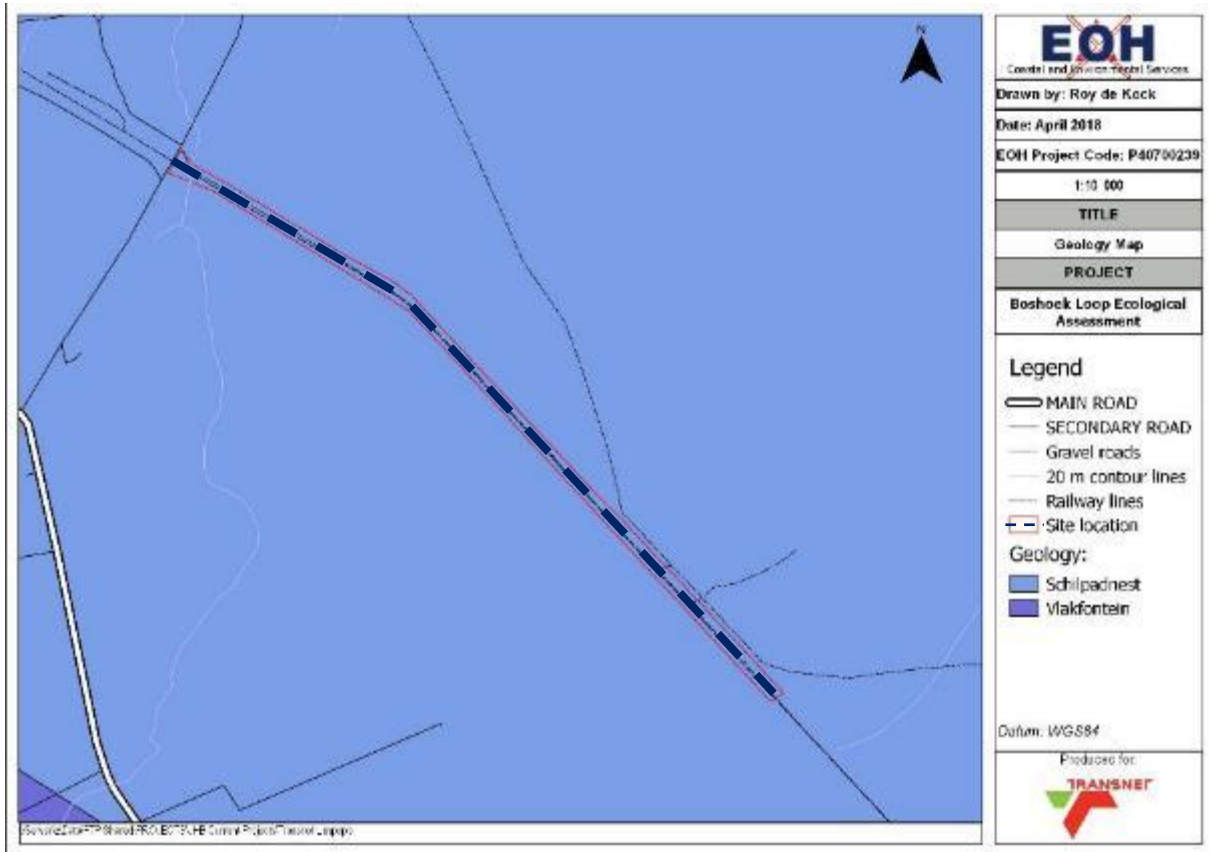


Figure 4.3 Regional Geology of the Boshhoek Loop and surrounding areas

Soils are mostly deep, red-yellow to black in colour, apedal and drains freely while have a high base status with some vertic or melanic clays (Figure 4.4). Erosion is considered very low to low.

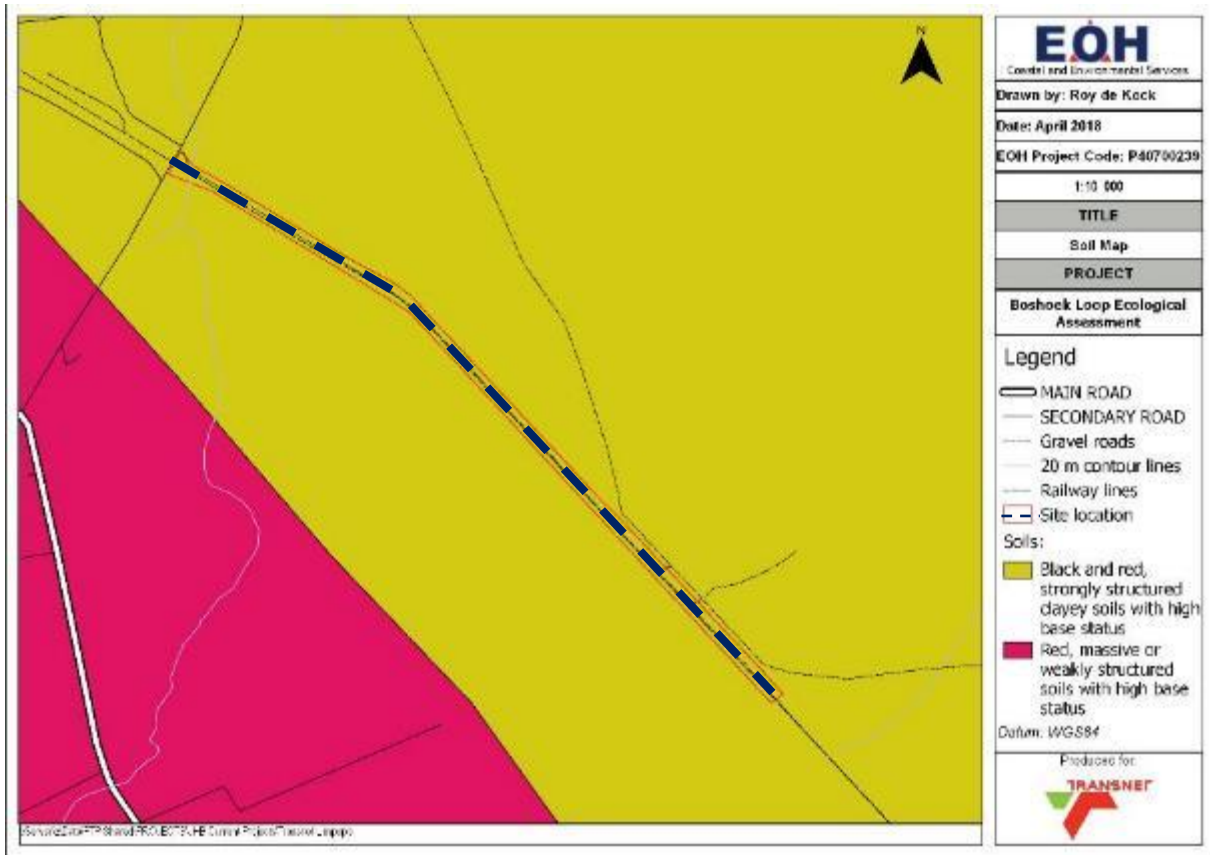


Figure 4.4 Regional soils of the Boshhoek Loop and surrounding areas

4.5. Land use

The proposed new Boshhoek Loop is located within the existing Transnet servitude for the railway line. Included in this servitude is a single track rail and a 3.5m wide gravel road immediately adjacent to the rail. The remaining area is covered by natural vegetation (Figure 4.4).



Figure 4.5 Land use of the Boshhoek Loop and surrounding areas

4.6. Vegetation and floristics

4.6.1. SANBI classification (Mucina and Rutherford, 2012)

According to the South African National Biodiversity Institute Map (Mucina and Rutherford; 2012) the proposed new Boshhoek Loop is located in the Savanna biome. This biome is defined by a herbaceous layer dominated by grass species and a discontinuous to sometimes very open tree layer. The proposed new Boshhoek Loop only occur on a single savanna vegetation type namely:

- Zeerust Thornveld

Zeerust Thornveld is a deciduous, open to dense short thorny woodland dominated by *Acacia* species with an herbaceous layer consisting of mainly grasses (Figure 4.6). SANBI considers this vegetation type as **Least Threatened** although only 4% is statutory conserved (target is 19%). Some 16% has already been transformed by cultivation and to a lesser extent by urban built-up.

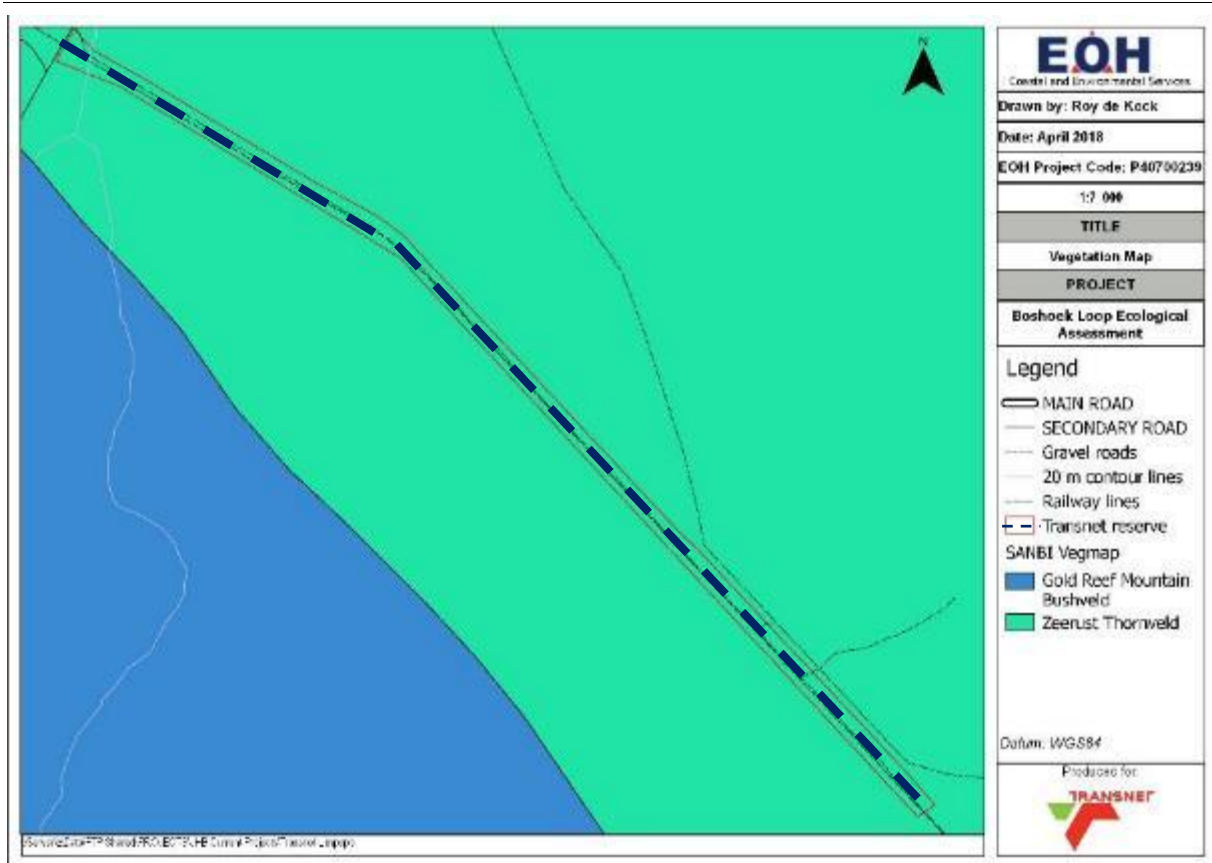


Figure 4.6: Vegetation found at the Boshhoek Loop site and surrounding areas.

4.6.2 Forest classification (NFA)

The NFA identified trees that is considered as protected and therefore requires approval from the Department of Forestry prior to impact. The following chapter listed protected tree species that will be impacted by the proposed Boshhoek Loop development and will require permits.

4.6.3. Protected species

Table 4.1 below list all plant SCC that may potentially occur on site. This list was used to assist in the location and identification of any SCC found on site during the site visit (see Chapter 5 below for a full list of plant species found on site).

Table 4.1. Protected plants that may be found within the Boshhoek Loop site

Family	Species	Threat status	Growth forms
ANACARDIACEAE	<i>Sclerocarya birrea</i>	Protected (DAFF)	Tree
ASPHODELACEAE	<i>Aloe grandidentata</i>	Important species	Succulent

4.7. Biodiversity indicators

South Africa's policy and legislative framework for biodiversity is well developed, providing a strong basis for the conservation and sustainable use of biodiversity. South Africa is one of the few countries in the world to have a Biodiversity Act and a National Biodiversity Institute.

Key components of the policy and legislative framework for biodiversity include:

- The White Paper on the Conservation and Sustainable Use of South Africa's Biological Diversity (1997);
- The National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA);
- NEMBA List of Ecosystems in need of Protection;
- NEMBA List of Threatened or Protected Species;
- NEMBA List of Alien Invasive Species;
- The National Environmental Management: Protected Areas Act (Act 57 of 2003) (NEMPAA);
- The National Biodiversity Strategy and Action Plan (NBSAP) (2015);
- The National Biodiversity Assessment (2011) (NBA);
- The National Protected Area Expansion Strategy (2008) (NPAES); and
- Important Bird Areas (2015) (IBAs).

In addition, some of South Africa's nine provinces have their own provincial biodiversity legislation, as nature conservation is a concurrent function of national and provincial government in terms of the Constitution (Act 108 of 1996). The North West Biodiversity Sector Plan (NW BSP; 2015) covers the entire North West Province.

4.7.1. North West Province Biodiversity Sector Plan

According to the NW BSP (2015) the Boshhoek Loop area is located mostly in a CBA2 with an ESA2 flanking a small portion of the site. (Figure 4.7). The management requirements for CBA2 and ESA2 areas are as follows (taken from the Technical Guidelines for CBA Maps, 2015):

Table 4.1. CBAs identified within the Boshhoek Loop

CBA area	Description	Management requirements
CBA 2	<ul style="list-style-type: none"> • Ecosystems and species fully or largely intact and undisturbed. • Areas with intermediate irreplaceability or some flexibility in terms of meeting biodiversity targets. There are options for loss of some components of biodiversity in these landscapes without compromising the ability to achieve biodiversity targets, although loss of these sites would require alternative sites to be added to the portfolio of CBAs. • These are biodiversity features that are approaching but have not passed their limits of acceptable change. 	Maintain in a natural or near-natural state that maximises the retention of biodiversity pattern and ecological process
ESA2	<ul style="list-style-type: none"> • Ecosystem NOT in a natural or near-natural state • Ecosystem significantly 	Maintain as much ecological functionality as possible (generally these areas have been substantially modified)

	<p>disturbed but still able to maintain some ecological functionality.</p> <ul style="list-style-type: none"> • Individual species or other biodiversity indicators are severely disturbed or reduced and these are areas that have low irreplaceability with respect to biodiversity pattern targets only; • These are areas with low irreplaceability with respect to biodiversity pattern targets only. These areas are required to maintain ecological processes especially landscape connectivity. 	
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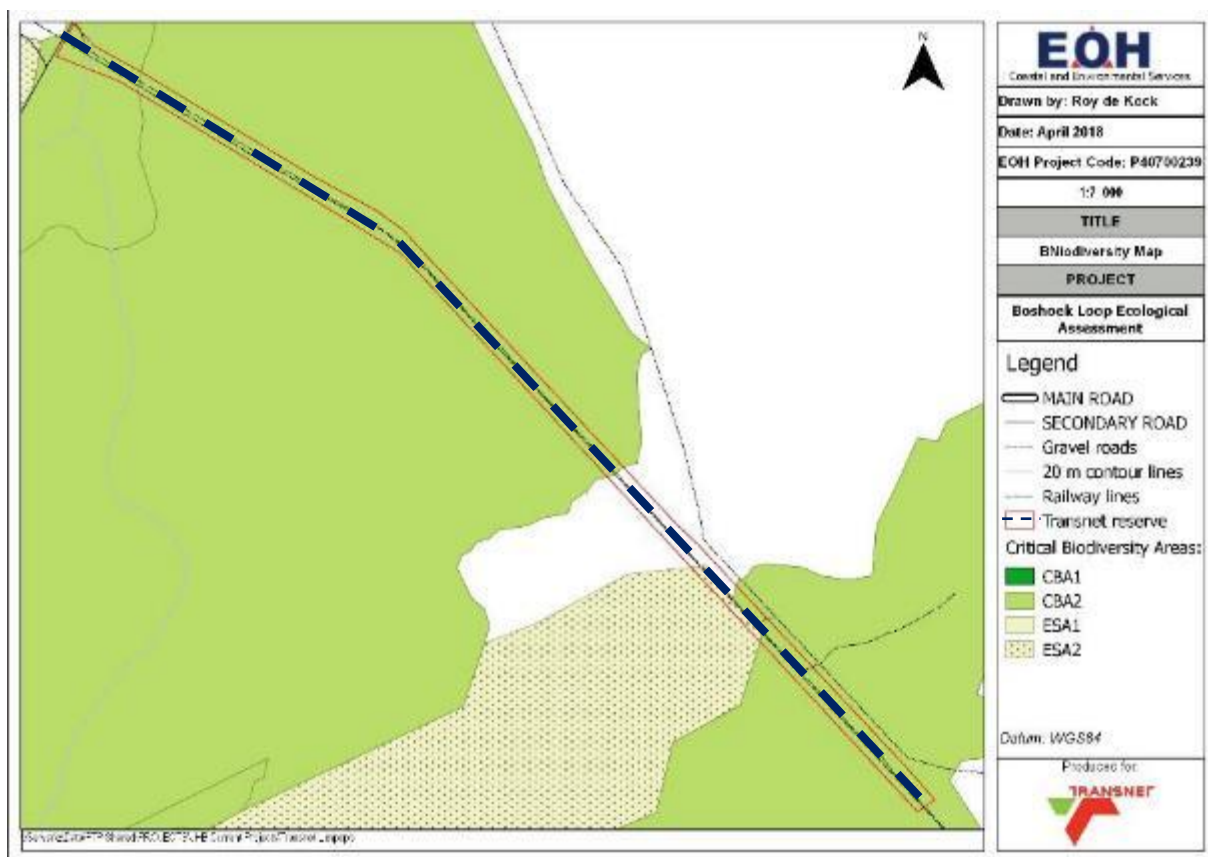


Figure 4.7: North West Province Terrestrial CBA Map (2015) for the Boshhoek Loop site.

4.7.2. Protected areas

Various areas that are protected by legislation are located within 50km from the proposed new Boshhoek Loop (Figure 4.8). Protected areas in the vicinity include:

Table 4.2. Protected areas found within 50km of the proposed new Boshhoek Loop

Name of protected area	Distance from site
Pilanesberg Provincial Nature Reserve	18km towards the north
Vaalkop Dam Nature Reserve	35km towards the northeast
Kgaswane Nature Reserve	13.8km towards the south
Magaliesberg Protected natural Environment	36km towards the southeast

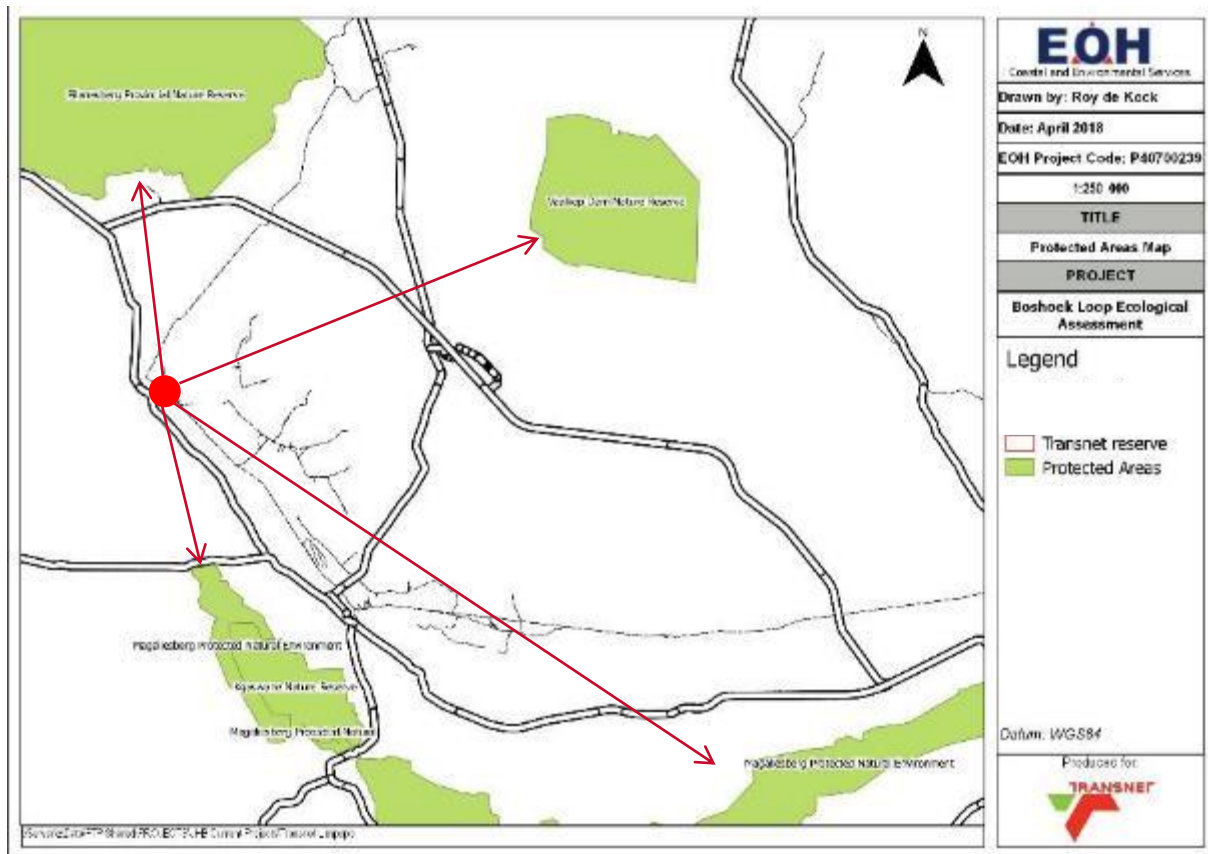


Figure 4.6: Illustrating the distances of various protected areas to the Boshhoek Loop

4.7.3. Threatened Ecosystems

The National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEMBA) published a national list of ecosystems that are threatened and in need of protection (GN. 1002 of 2011). The proposed new Boshhoek Loop is **NOT located in any threatened ecosystems** as legislated by NEMBA. The nearest threatened ecosystem is Marikana Thornveld located 1.3 km towards the southeast of the site (Figure 4.7).

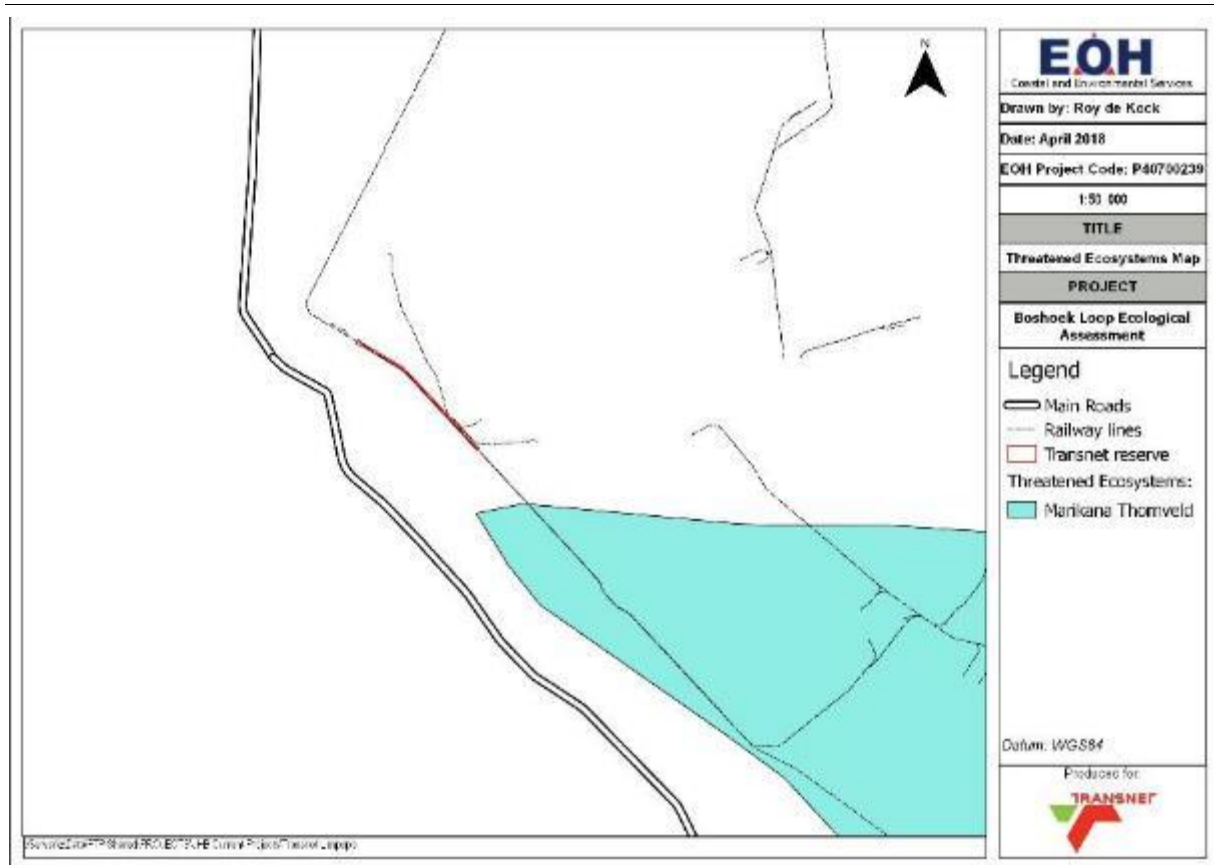


Figure 4.7: Illustrating the proximity of the nearest Threatened Ecosystem to the Boshhoek Loop

4.8. Fauna

The proposed new Boshhoek Loop site is located approximately 14km north of the Magaliesberg Important Bird Area (IBA). Previously known as the Magaliesberg and Witwatersberg IBA, this IBA consists mainly of the Magaliesberg mountain range, which extends in an arc from just north-west of Rustenburg in the west to the N1 in the east near Pretoria. To the south, the Witwatersberg mountain range runs parallel to the Magaliesberg, extending from the town of Magaliesburg in the west to Hartbeespoort Dam in the east.

Literature on local fauna was limited. All information for faunal groups occurring within the region was therefore obtained from the Magaliesberg IBA literature description (Marnewick *et al.*; 2015).

4.8.1. Birds

The following birds occur within the Magaliesberg IBA and may be observed at the proposed new Boshhoek Loop (located approximately 14 to the north):

Table 4.3. Birds found within the Magaliesberg IBA (Source: Marnewick *et al.* (2015))

Bird name	Common name	Occurrence
<i>Gyps coprotheres</i>	Cape Vulture	Breeds at Nooitgedacht and at Skeerpoort, the larger of the two colonies. No breeding activity was recorded at a third colony, Roberts' Farm, in 2014
<i>Gyps africanus</i>	White-backed Vulture	Individuals only. No breeding pairs are known

Bird name	Common name	Occurrence	
<i>Torgos tracheliotu</i>	Lappet-faced Vulture		
<i>Aquila verreauxii</i>	Verreaux Eagle	Breeds in the Magaliesberg	
<i>Falco biarmicus</i>	Lanner falcon	Throughout IBA	
<i>Tyto capensis</i>	African Grass Owl	Recorded regularly throughout the IBA	
<i>Sagittarius serpentarius</i>	Secretary bird		
<i>Lophaetus occipitalis</i>	Long-crested Eagle	Is a more recent coloniser of the range	
<i>Eupodotis senegalensis</i>	White-bellied Korhaan	Found in grassland at the top of the Magaliesberg and Witwatersberg.	
<i>Ciconia nigra</i>	Black Stork	One pair of breeds at Skeerpoort	
<i>Alcedo semitorquata</i>	Half-collared Kingfisher	Densely wooded valleys along overgrown, slow-flowing streams	
<i>Podica senegalensis</i>	African Finfoot	Recorded regularly along rivers in the IBA, such as the Hennops and Magalies	
<i>Halcyon chelicuti</i>	Striped Kingfisher	Occurs in woodland areas	
<i>Eremomela usticollis</i>	Burnt-necked Eremomela		
<i>Calamonastes fasciolatus</i>	Barred Wren-Warbler		
<i>Bradornis mariquensis</i>	Marico Flycatcher		
<i>Laniarius atrococcineus</i>	Crimson-breasted Shrike		
<i>Sporopipes squamifrons</i>	Scaly-feathered Finch		
<i>Uraeginthus granatinus</i>	Violet-eared Waxbill		
<i>Estrilda erythronotos</i>	Black-faced Waxbill		
<i>Anthus lineiventris</i>	Striped Pipit		
<i>Monticola brevipes</i>	Short-toed Rock Thrush		
<i>Motacilla clara</i>	Mountain Wagtail		Patches of Northern Afro-temperate forest in the kloofs
<i>Cinnyris talatala</i>	White-bellied Sunbird		Throughout IBA
<i>Turdus libonyanus</i>	Kurrichane Thrush		
<i>Cossypha humeralis</i>	White-throated Robin-chat		
<i>Erythropygia paena</i>	Kalahari Scrub Robin		

The following protected bird species occur within the Magaliesberg IBA and may be found at the proposed new Boshhoek Loop (located approximately 14 to the north):

Table 4.4. Important birds found within the Magaliesberg IBA (Source: Marnewick *et al.* (2015))

Bird name	Common name	Occurrence
Cape Vulture	<i>Gyps coprotheres</i>	Breeds at Nooitgedacht and at Skeerpoort, the larger of the two colonies. No breeding activity was recorded at a third colony, Roberts' Farm, in 2014
Verreaux Eagle	<i>Aquila verreauxii</i>	Breeds in the Magaliesberg
Lanner falcon	<i>Falco biarmicus</i>	Throughout IBA

Bird name	Common name	Occurrence
African Grass Owl	<i>Tyto capensis</i>	Recorded regularly throughout the IBA
Secretary bird	<i>Sagittarius serpentarius</i>	
Half-collared Kingfisher	<i>Alcedo semitorquata</i>	Densely wooded valleys along overgrown, slow-flowing streams
Barred Wren-Warbler	<i>Calamonastes fasciolatus</i>	Occurs in woodland areas
White-bellied Sunbird	<i>Cinnyris talatala</i>	Throughout IBA
Kurrichane Thrush	<i>Turdus libonyanus</i>	
White-throated Robin-chat	<i>Cossypha humeralis</i>	
Kalahari Scrub Robin	<i>Erythropygia paena</i>	

4.8.2. Reptiles

Southern African endemic reptiles that are found in the region are:

Table 4.5. Reptiles found within the Magaliesberg area (Source: Marnewick *et al.* (2015))

Reptile	Common name
<i>Psammobates oculiferus</i>	Kalahari tent tortoise
<i>Atractaspis duerdeni</i>	Duerden's burrowing asp
<i>Leptotyphlops distanti</i>	Distant's thread snake
<i>Prosymna bivittata</i>	Two-striped shovel-snout
<i>Aspidelaps scutatus</i>	Shield-nose snake
<i>Acontias gracilicauda</i>	Thin-tailed legless skink
<i>Python sebae natalensis</i>	Southern African python

Any of these reptile species may be found within the Boshhoek Loop site.

4.8.3. Mammals

Of the 112 mammal species that occur in the area, brown hyaena (*Hyaena brunnea*) and leopard (*Panthera pardus*) are the major large predators (Marnewick *et al.*, 2005). The leopard is the apex predator, while the brown hyaena shares the scavenging guild with the vultures – with, however, a temporal separation in that the hyaena is largely nocturnal. It is however highly unlikely that any of these mammal species will occur within the proposed new Boshhoek Loop. Smaller mammals like field mice, porcupines, aardvark etc. may occur although they were not observed during the site assessment.

5. Site investigation

A site investigation was conducted between the 3rd and 5th March 2018 in order to:

- Verify desktop findings,
- Assess the actual ecological state,
- Assess the current land-use,
- Identify potential sensitive ecosystems
- Identify plant species communities and associated with the proposed project activities.
- Identify animal species associated with the proposed project activities.

The site visit also served to inform potential impacts of the proposed project and to inform the significance of these impacts on the surrounding ecological environment. Vegetation was assessed along the entire length of the Boshhoek Loop. Although the site assessment was conducted in late summer, specific flowering times of geophytic species (like Amaryllidaceae and Orchidaceae) may have been missed. Only animal species that was observed during the site assessment were recorded as part of the assessment.

5.1. Vegetation survey

The proposed new Boshhoek Loop study area is almost entirely cleared of any vegetation as it is covered by either existing rail or a gravel road (Figure 5.1; Plate 5.1). Natural vegetation occur on either sides of the railway track and are concentrated on the edges of the length of the site. The section that was covered by natural vegetation consist of mesic savanna in various degrees of degradation (Plate 5.2). As construction will occur on the northern side of the railway track some vegetation will be impacted by clearing. Vegetation composition, although changing in levels of degradations, appears to be mostly uniform along the entire length of the 1.67km section proposed for the new Boshhoek Loop.

The proposed site camp and laydown areas will be located at an offsite location situated 1.5km to the north of the start point of the Boshhoek Loop (Figure 5.2; Plate 5.2). The proposed site is an old mining site that has been transformed by mining activities. The site does not contain any vegetation and therefore does not require to be assessed further. No animal species was observed within this area. Material will be transported between this site and the Boshhoek Loop via existing roads.



Figure 5.1: Aerial image of the Boshhoek Loop (Source: GoogleEarth)



Figure 5.2: Aerial image of the Boshhoek laydown area and site camp (Source: GoogleEarth)

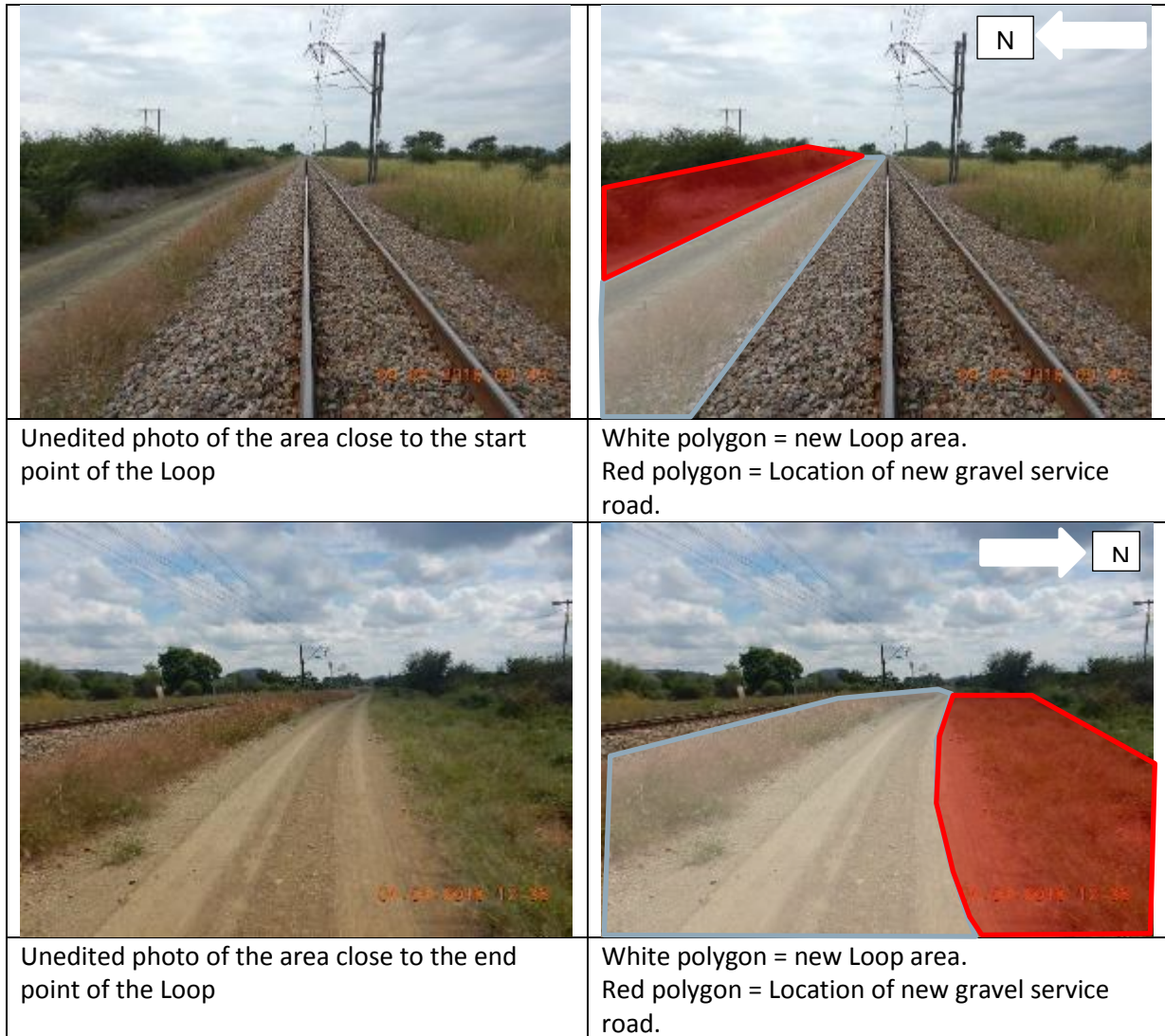
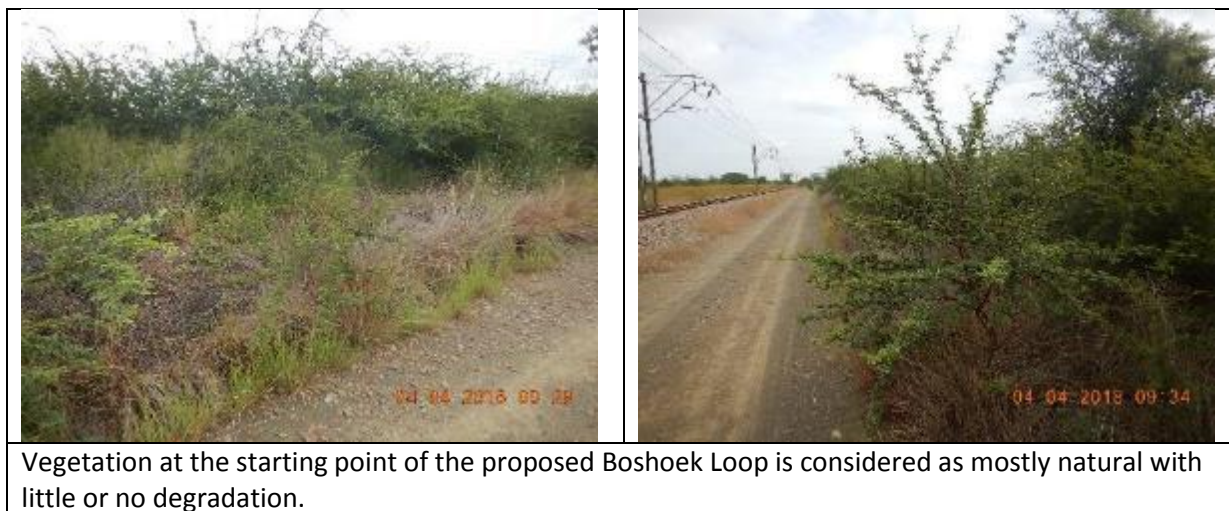


Plate 5.1: Photographs showing the extent of development of the proposed new Boshhoek Loop.





Vegetation along the southern side of the existing rail consist mostly of open savanna where the grassland mosaic is dominant. This vegetation will not be impacted by construction.



Vegetation along the northern side of the existing road is considered as dense thornveld where the woody component is dominant interspersed with grasses in small open areas. Sections of this vegetation will be removed.



Vegetation closer to the Boshhoek Station appear to be transformed, less dense with various Alien and Invasive Plants present.

Plate 5.2: Photographs showing existing vegetation within the proposed new Boshhoek Loop.

5.1.1. Plant species observed

A total of 35 plant species were identified along the 1.67km section proposed for the new Boshhoek Loop (Figure 5.1). Savanna is the dominant vegetation biome present with vegetation consisting of dense mesic thornveld interspersed with various grass types. Alien & invasive plants occur in places but are not dominant. See Chapter 7 for details. Of these 35 plant species, only two are listed as SCC (Table 5.3; Plate 5.3). These species will require a permit for removal, destruction or transplant prior to construction. This should be done through a Search and Rescue exercise conducted by a qualified botanist prior to commencement of clearing.

The following vegetation species were identified:

Table 5.1. Plants species identified within the proposed new Boshhoek Loop.

Family	Species	Threat status	Growth forms
ACANTHACEAE	<i>Barleria macrostegia</i>	LC	Herb
	<i>Blepharis integrifolia</i>	LC	Herbaceous
ANACARDIACEAE	<i>Sclerocarya birrea</i>	Protected (DAFF)	Tree
	<i>Sersia grandidens</i>	LC	Shrub
	<i>Sersia lancea</i>	LC	Tree
APOCYNACEAE	<i>Carissa macrocarpa</i>	LC	Shrub
ASPHODELACEAE	<i>Aloe grandidentata</i>	Protected	Succulent
ASTERACEAE	<i>Helichrysum azeyheri</i>	LC	Herb
	<i>Osteospermum muricatum</i>	LC	Herb
	<i>Xanthium strumarium</i>	Invasive	Herbaceous
BORAGINACEAE	<i>Ehretia rigida</i>	LC	Tree, shrub
CACTACEAE	<i>Opuntia ficus-indica</i>	Invasive	Succulent, climber
COMBRETACEAE	<i>Terminalia sericea</i>	LC	Tree
CONVOLVULACEAE	<i>Ipomoea indica</i>	Invasive/Weed	Herbaceous, climber
FABACEAE	<i>Acacia burkei</i>	LC	Tree, shrub
	<i>Acacia erioloba</i>	LC	Tree, shrub
	<i>Acacia nilotica</i>	LC	Tree, shrub
	<i>Acacia tortilis</i>	LC	Tree, shrub
	<i>Chamaecrista absus</i>	LC	Herbaceous
	<i>Stylosanthes fruticosa</i>	LC	Herbaceous
LAMIACEAE	<i>Clerodendron ternatum</i>	LC	Herbaceous
LEGUMINOSIAEA	<i>Indigofera filipes</i>	LC	Herbaceous
MELIACEAE	<i>Melia azedarach</i>	Invasive	Tree
MOLLUGINACEAE	<i>Limeum viscosum</i>	LC	Herbaceous
NYCTAGINACEAE	<i>Bougainvillea glabra</i>	Invasive	Creeper, shrub
POACEAE	<i>Aristida congesta subsp. congesta</i>	LC	Graminoid
	<i>Eragrostis lehmanniana var. lehmanniana</i>	LC	Graminoid
	<i>Panicum maximum</i>	LC	Graminoid
	<i>Themeda triandra</i>	LC	Graminoid
RHAMNACEAE	<i>Ziziphus mucronata</i>	LC	Tree, shrub
RUBIACEAE	<i>Agathisanthemum bojeri</i>	LC	Herbaceous

Family	Species	Threat status	Growth forms
SOLANACEAE	<i>Datura stramonium</i>	Invasive	Herbaceous, climber, shrub
	<i>Solanum elaeagnifolium</i>	Invasive	Herbaceous, climber, shrub
TILIACEAE	<i>Grewia flava</i>	LC	Shrub
VERBENACEAE	<i>Lantana camera</i>	Invasive	Shrub, scrambler

Table 5.2: Plant SCC observed on site

Species	Threat status
<i>Aloe grandidentata</i>	Important species
<i>Sclerocarya birrea</i>	Protected (DAFF)





Various *Aloes* were found along the entire length of the proposed new Boshhoek Loop

Plate 5.3: Plant SCC identified within the proposed new Boshhoek Loop.

5.2. Faunal survey

Chapter 4, Section 4.8 list various faunal species (birds, reptiles and mammals) that may potentially occur within the proposed new Boshhoek Loop and associated areas. Few animal species were however recorded during the site visit (Table 5.1). These were mostly limited to birds. That does not mean that faunal species did not occur on site but merely that they were not observed at the time.

Table 5.1. Animals observed during the site assessment of the proposed new Boshhoek Loop.

Common name	Taxon name	Conservation status	
		SA Red Data List	IUCN Red Data List
Birdsoop			
Bee-eater, European	<i>Merops apiaster</i>	-	-
Bush-shrike, Grey-headed	<i>Malaconotus blanchoti</i>	-	-
Chat, Familiar	<i>Cercomela familiaris</i>	-	-
Dove, Rock	<i>Columba livia</i>	-	-
Drongo, Fork-tailed	<i>Dicrurus adsimilis</i>	-	-
Kestrel, Lesser	<i>Falco naumanni</i>	-	-
Plover, Common Ringed	<i>Charadrius hiaticula</i>	-	-
Wagtail, African Pied	<i>Motacilla aguimp</i>	-	-
Waxbill, Common	<i>Estrilda astrild</i>	-	-
Reptiles			
Striped skink	<i>Mabuya s. punctatissimus</i>	-	-

No animal SCC were observed on site during the site assessment.

6. Sensitivity assessment

Appendix 6

Specialist Reports

1. (1) A specialist report prepared in terms of these Regulations must contain—
 - (f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;
 - (g) an identification of any areas to be avoided, including buffers;
 - (h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;

6.1. Conservation and spatial planning tools

Several conservation planning tools are available for the study area. These tools allow for the potential identification of any sensitive and important areas from a vegetation perspective at the early stage of a development and allow for the fine-tuning of plans and infrastructure layouts.

The following tools were identified as relevant to the site and are summarised below:

- SANBI Vegetation threat status;
- North West Biodiversity Sector Plan; and
- Important Bird Areas.

The conservation status of Zeerust Thornveld, the only vegetation type identified on site is considered as **Least Concern** by SANBI even though only small portions of this vegetation type is statutory conserved (4%). The proposed new Boshhoek Loop is **NOT located in any threatened ecosystems** as legislated by NEMBA. The nearest threatened ecosystem is Marikana Thornveld located 1.3 km towards the southeast of the site.

The North West Biodiversity Sector Plan (2015) describes the area as containing important biodiversity needed to meet national biodiversity targets. Most of the Boshhoek Loop has been classified as CBA2 areas and should be maintained in a natural or near-natural state that maximises the retention of biodiversity pattern and ecological process. A small section approximately flanks an ESA2 classified area on the southern section but should not be impacted during development of the proposed new Boshhoek Loop.

The Boshhoek Loop is located approximately 14km north of the Magaliesburg IBA which contains diverse and important bird and other animal species that may frequent the site.

These tools together with the field survey have been used to assess the sensitivity of the study area. Sensitivity of the proposed new Boshhoek Loop is shown on a sensitivity map (Figure 6.1 below).

6.2. Sensitivity allocation

A sensitivity map was developed based on the methodology presented in Table 6.1, for the entire study area. The following sensitivity criteria were allocated for the proposed new Boshhoek Loop. The allocation of criteria were based on both the desktop biophysical description of the site as well as the observations made during the site visit.

Table 6.1. Criteria used for the analysis of the sensitivity of the proposed new Boshhoek Loop.

CRITERIA		LOW SENSITIVITY	MODERATE SENSITIVITY	HIGH SENSITIVITY
1	Topography	Level or even	Undulating; fairly steep slopes	Complex and uneven with steep slopes
2	Vegetation - Extent or habitat type in the region	Extensive throughout the region	Restricted to a particular region / zone	Restricted to a specific locality / site
3	Conservation status of fauna / flora or habitats	Well conserved independent of conservation value	Not well conserved, moderate conservation value	Not conserved - has a high conservation value
4	Species of conservation concern - Presence and number	None, although occasional regional endemics	No Species of Conservation Concern, some indeterminate or rare endemics	One or more Species of Conservation Concern, or more than 2 endemics or rare species
5	Habitat fragmentation leading to loss of viable populations	Extensive areas of preferred habitat present elsewhere in region not susceptible to fragmentation	Reasonably extensive areas of preferred habitat elsewhere and habitat susceptible to fragmentation	Limited areas of this habitat, susceptible to fragmentation
6	Biodiversity contribution	Low diversity or species richness	Moderate diversity, and moderately high species richness	High diversity and species richness
7	Erosion potential or instability of the region	Very stable and an area not subjected to erosion	Some possibility of erosion or change due to episodic events	Large possibility of erosion, change to the site or destruction due to climatic or other factors
8	Rehabilitation potential of the area or region	Site is easily rehabilitated	There is some degree of difficulty in rehabilitation of the site	Site is difficult to rehabilitate due to the terrain, type of habitat or species required to reintroduce
9	Disturbance due to human habitation or other	Site is very disturbed or degraded	There is some degree of disturbance of the site	The site is hardly or very slightly impacted upon by human disturbance

CRITERIA		LOW SENSITIVITY	MODERATE SENSITIVITY	HIGH SENSITIVITY
	influences (alien invasive species)			
10	Ecological function	Habitat widely represented in the landscape not specifically harbouring any unique habitat features...etc.	Intermediate role in ecological function	Key habitat involved in ecological processes (ecological corridors and network areas or key niche habitats)
11	Ecological Services	Little to no ecological services	Some ecological services.	Various ecological services. Areas should be conserved.

Site sensitivity was determined based on the following criteria as classified in Table 6.1 above:

Table 6.2: List of criteria contributing to the sensitivity map

Ecological element	Sensitivity mapping rule	Sensitivity allocation
– Plant SCC	Presence throughout the site. Includes a 5m buffer.	High sensitivity for SCC locations only
– Biodiversity	Some areas show signs of disturbance. Up to 35 different plant species observed.	Moderate sensitivity for entire site
– Ecological services	Some ecological services.	Moderate sensitivity for relevant areas

The following map reflects ecological sensitivity identified within the proposed new Boshhoek Loop:

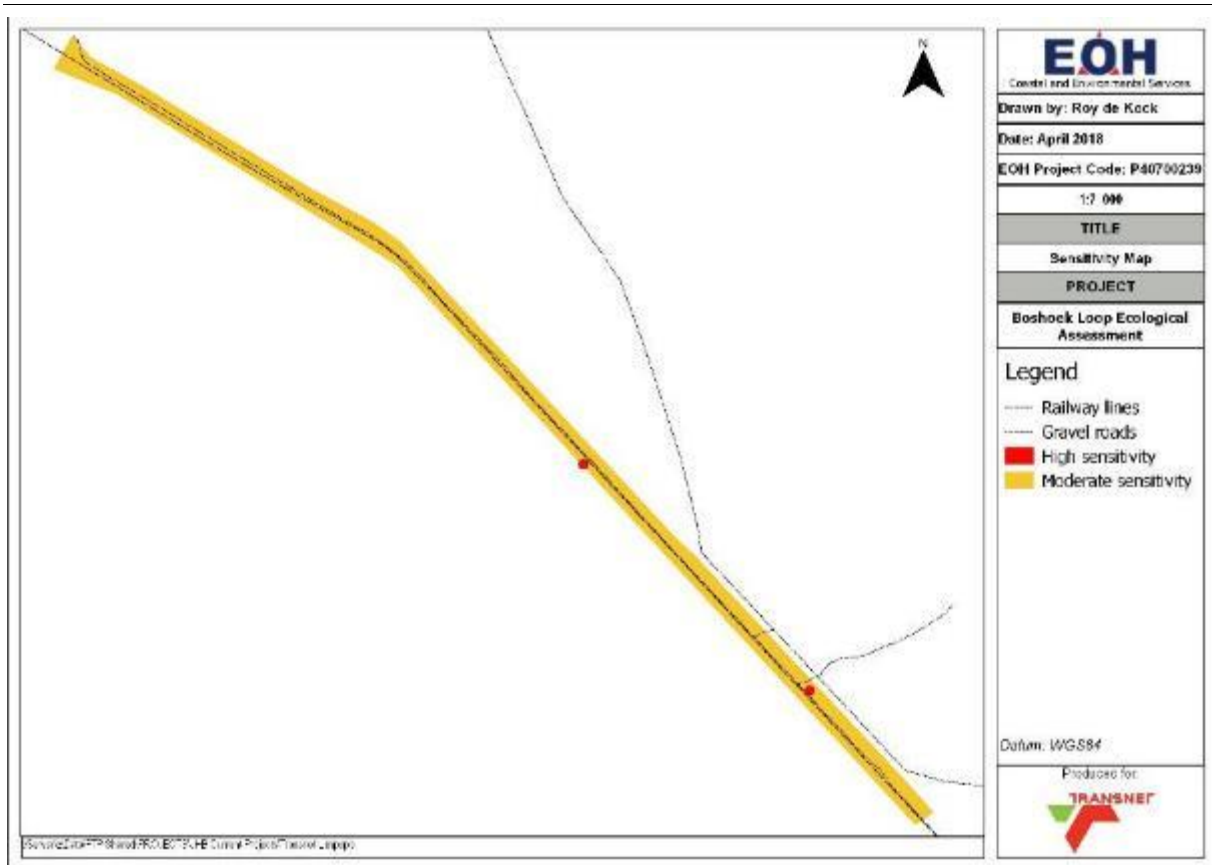


Figure 6.1: Ecological sensitivity within the proposed new Boshhoek Loop

High sensitivity:

These areas include various Marula trees (*Sclerocarya birrea*) that is protected by the NFA and require a permit from DAFF for removal prior to commencement of construction. These areas also include *Aloe grandidendata*. These species also require removal and should be relocated to nearby areas that will not be affected by construction. This should be done through a Search and Rescue exercise conducted by a qualified botanist prior to commencement of clearing.

Moderate sensitivity:

Most of the site is considered as moderate sensitive areas. These areas may include *Aloe grandidendata*. These species require removal and should be relocated to nearby areas that will not be affected by construction. A Search and Rescue exercise conducted by a qualified botanist is required prior to commencement of clearing to identify all SCC.

6.3. Issues and impacts identified

Various issues have been identified that will impact the local ecology along the proposed new Boshhoek Loop during all phases of development (including Planning and Design, Construction and Operational phases)

The following issues were identified during the sensitivity assessment:

Table 6.2: Issues identified during the sensitivity assessment of the proposed new Boshhoek Loop

ISSUES IDENTIFIED	DESCRIPTION OF IMPACTS
Loss of natural vegetation	The clearing of indigenous vegetation will lead to the permanent loss of natural savanna.
Loss of SCC	The clearing of natural vegetation will lead to the destruction of habitat for identified and unidentified plant SCC.
Rehabilitation of disturbed areas	Poor rehabilitation of disturbed areas after clearing and establishment may lead to the permanent degradation of ecosystems as well as allow invading alien vegetation species to establish.

Various mitigations are recommended (based on the various levels of sensitivity) to reduce the impacts of the proposed development on the natural environment within the proposed new Boshhoek Loop. These are discussed in more detail in Section 8.

7. Alien invasive species

An “invasive species” is any species whose establishment and spread outside of its natural distribution range (i) threatens ecosystems, habitats or other species or has a demonstrable potential to threaten ecosystems, habitats or other species; and (ii) may result in economic or environmental harm or harm to human health. Invasive alien plant species are globally considered as one of the greatest threats to the environment, biodiversity, ecosystem integrity and the economy.

According to the Conservation of Agricultural Resources Act (No. 43 of 1983 - Regulation 15, 30 March 2001) (CARA), for agricultural land, and the National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEMBA), for natural areas, invasive alien plant species should be controlled and eradicated with an emphasis on urgent action in biodiversity priority areas. NEMBA published a list of Alien and Invasive Species (No 599) in 2014 which regulates the management of alien and invasive plants in natural environments.

Alien and Invasive plant species were identified within the proposed new Boshhoek Loop. These include:

Table 7.1: List of Alien and Invasive Plant Species identified within the proposed new Boshhoek Loop.

<i>Plant name</i>	<i>Common name</i>	<i>Category</i>
<i>Datura stramonium</i>	Common thorn apple	1b
<i>Ipomoea indica</i>	Morning glory	1b
<i>Lantana camera</i>	Lantana	1b
<i>Melia azedarach</i>	Seringa	1b
<i>Opuntia ficus-indica</i>	Prickly pear	1b
<i>Solanum elaeagnifolium</i>	Silver leaf bitter apple	1b
<i>Xanthium strumarium</i>	Large cocklebur	1b

No Alien an Invasive animal species were identified within the Boshhoek Loop. Other non-declared alien vegetation recorded within the proposed new Boshhoek Loop area include:

- *Bidens bipinnata* (Blackjacks)
- *Bougainvillea glabra* (Bougainvillea)
- *Oxalis corniculata* (Creeping sorrel)
- *Pennisetum clandestinum* (kikuyu grass)
- *Tagetes minuta* (khaki-weed)

7.1. Discussion

All alien and invasive plants identified within the Boshhoek Loop area were classified as Category 1b invasives as per Notice 1 of GN. 599 of 2014 of NEMBA.

7.1.1. Category 1b invasive species

Plants classified as Category 1b alien invasive species are prohibited from:

- Being imported into the Republic;
- growing or in any other way propagating any specimen;
- conveying, moving or otherwise translocating any specimen;
- spreading or allowing the spread of any specimen; and
- releasing any specimen

All Category 1b alien and invasive plant species must be controlled during all phases of development according to a Management Plan. It is recommended that an Alien Vegetation Management Plan be developed and implemented for the proposed new Boshhoek Loop.

7.2. Issues identified

The following issues were identified during the Alien and invasive Species assessment:

Table 7.2: Issues identified during the Alien and Invasive Species assessment of the proposed new Boshhoek Loop.

ISSUES IDENTIFIED	DESCRIPTION OF IMPACTS
Control of alien plant species	The lack of an effective alien vegetation management plan may exacerbate the problem of alien plant invasion.

Various alien invasive control measures are recommended in Section 8 to reduce the impact of alien invasive plant species within the proposed new Boshhoek Loop.

8. Manner in which the environment may be affected

Appendix 6

Specialist Reports

1. (1) A specialist report prepared in terms of these Regulations must contain—
- (j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;
 - (k) any mitigation measures for inclusion in the EMP;.

8.1. Issues identified

Table 8.1 below list all the issues identified during the assessment of the proposed new Boshhoek Loop:

Table 8.1. Issues identified during all development phases of the proposed new Boshhoek Loop

MIND MAP: Ecological Impacts for the proposed new Boshhoek Loop				
THEMES	CATEGORIES/ISSUES	PLANNING & DESIGN PHASE	CONSTRUCTION PHASE	OPERATIONAL PHASE
Legislation	Legal and policy compliance	X		
Terrestrial environment	Loss of natural savanna	X	X	
	Loss of SCC	X	X	
	Rehabilitation of disturbed areas	X	X	X
	Control of alien species	X	X	X

Ecological impacts that were identified during the Planning and Design, Construction and Operational Phases of the proposed new Boshhoek Loop and are described below:

Table 8.2. Impacts identified during all phases of the proposed new Boshhoek Loop

Categories/Issue	Description of Impact		
	Planning and Design	Construction	Operation
Legislation			
Legal and policy compliance	Non-compliance with the laws and policies of South Africa as they pertain to the ecological environment could lead to damage of the environment, unnecessary delays in establishment activities, and potentially criminal cases, based on the severity of the non-compliance, being brought	N/A	N/A

Categories/Issue	Description of Impact		
	Planning and Design	Construction	Operation
	against the proponent and his/her contractors.		
Terrestrial environment			
Loss of natural vegetation	Inappropriate design of the project infrastructure will lead to the unnecessary loss of natural vegetation and habitat for other taxonomic groups.	Clearing of natural vegetation outside the planned development footprint will lead to the unnecessary loss of natural vegetation and habitat for other taxonomic groups.	N/A
Loss of SCC	Inappropriate design of the project infrastructure will lead to the unnecessary loss of SCC.	Clearing of natural vegetation may result in the destruction of identified and unidentified plant and animal SCC.	N/A
Rehabilitation of disturbed areas	Failure to plan for the rehabilitation of impacted areas may lead to the permanent degradation of ecosystems as well as allow alien vegetation species to expand.	Poor rehabilitation of disturbed areas may lead to the permanent degradation of ecosystems as well as allow alien vegetation species to expand.	Poor rehabilitation of disturbed areas may lead to the permanent degradation of ecosystems as well as allow alien vegetation species to expand.
Control of alien species	Failure to plan for the removal and management of alien vegetation could result in the invasion of alien vegetation throughout the site during construction and operational phases.	Removal of natural vegetation creates 'open' habitats that will favour the establishment of undesirable alien plant species in areas that are typically very difficult to eradicate and may pose a threat to neighbouring natural ecosystems.	Loss of natural vegetation will increase the potential invasion by alien plant species. This coupled with the lack of an effective alien vegetation management plan may result in large scale alien plant invasion.

8.2. Impact assessment

The impacts identified in Section 8.1 are assessed in terms of the criteria described in Section 2.5 and are summarised in Tables 8.3- 8.5 below.

Table 8.3. Assessment of impacts during the Planning & Design Phase

ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
PLANNING & DESIGN PHASE									
<i>Legislation</i>									
Legal and policy compliance	During the planning and design phase non-compliance with the laws and policies of South Africa as they pertain to the ecological environment could lead to damage of the ecological environment, unnecessary delays in establishment activities, and potentially criminal cases, based on the severity of the non-compliance, being brought against the proponent and his/her contractors.	Direct, Cumulative	Localised	Short-term	Probable	Moderately severe	Moderate Negative	<ul style="list-style-type: none"> - All legal matters pertaining to permitting must be completed prior to any construction activity. - The relevant permits must be obtained from the competent authority in order to remove any protected species. - A qualified and independent Environmental Control Officer (ECO) must be appointed prior to commencement of any activity on site to monitor all legal and policy compliance. 	Low Negative
<i>Terrestrial environment</i>									
Loss of natural vegetation	During the planning and design phase the inappropriate design of the project infrastructure will lead to the unnecessary loss of natural vegetation and habitat supporting other taxonomic groups.	Direct, indirect, cumulative	Localised	Permanent	Definite	Moderately severe	High Negative	<ul style="list-style-type: none"> - Project infrastructure must be designed in such a way as to minimise the impact on natural vegetation. 	Moderate Negative
Loss of SCC	During the planning and design phase the inappropriate design and layout of the project infrastructure will lead to the unnecessary loss of plant and animal SCC.	Direct	Localised	Permanent	Probable	Moderately severe	Moderate Negative	<ul style="list-style-type: none"> - A Search and Rescue exercise must be undertaken by a qualified specialist prior to commencement of construction. - All identified SCC must be relocated to outside the development footprint prior to 	Low Negative

ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
								<ul style="list-style-type: none"> commencement of activities. All relevant permits must be obtained from the competent authority in order to remove any SCC. 	
Rehabilitation of Disturbed Areas	During the planning and design phase the failure to plan for the rehabilitation of impacted areas may lead to the permanent degradation of ecosystems as well as allow alien vegetation species to expand.	Indirect	Project Level	Medium-term	Probable	Moderately severe	Moderate Negative	<ul style="list-style-type: none"> A Rehabilitation Management Plan must be developed to manage rehabilitation during all phases of the project. The Rehabilitation Management Plan must be approved by the appointed ECO prior to implementation. 	Low Negative
Control of alien species	During the planning and design phase the failure to plan for the removal and management of alien vegetation could result in the invasion of alien vegetation in sensitive areas during the construction and operational phases.	Indirect	Project Level	Medium-term	Probable	Moderately severe	Moderate Negative	<ul style="list-style-type: none"> An Alien Vegetation Management Plan must be developed to mitigate the establishment and spread of undesirable alien plant species during all phases of the project. The Alien Vegetation Management Plan must be approved by the appointed ECO prior to implementation. 	Low Negative

Table 8.4. Assessment of impacts during the Construction Phase

ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
CONSTRUCTION PHASE									
<i>Ecological environment</i>									
Loss of Natural Vegetation	During the construction phase the clearing of natural vegetation outside the approved development footprint will lead to the unnecessary loss of natural vegetation and habitat for other taxonomic groups.	Direct, Indirect, Cumulative	Localised	Medium-term	Possible	Moderately severe	Moderate Negative	<ul style="list-style-type: none"> - The construction footprint must be surveyed and demarcated prior to construction commencing. - No construction activities will be allowed outside the demarcated footprint. - Where vegetation has been cleared, site rehabilitation in terms of soil stabilisation and vegetation must be undertaken. - Cleared vegetation must not be piled on top of natural vegetation but must be stockpiled temporarily on bare ground and removed to a registered landfill site. Alternatively, cleared vegetation may be mulched and used as ground cover during rehabilitation. 	Low Negative
Loss of SCC	During the construction phase the clearing of natural vegetation will lead to the destruction of habitats and identified and unidentified plant and animal SCC.	Direct, Indirect, Cumulative	Study Site	Medium-term	Definite	Moderately severe	Moderate Negative	<ul style="list-style-type: none"> - All areas that will be impacted must be surveyed and demarcated by a suitably qualified specialist prior to vegetation and topsoil removal in order to locate and rescue any SCC within the area and relocate them. - The contractor's staff must not poach or trap wild animals. - The contractor's staff must not harvest any natural vegetation. 	Low Negative
Rehabilitation of Disturbed	During the construction phase poor rehabilitation of disturbed areas may	Direct, Indirect, Cumulative	Localised	Long-term	Probable	Moderately severe	Moderate Negative	<ul style="list-style-type: none"> - All temporarily impacted areas must be rehabilitated with indigenous vegetation as soon as 	Low Negative

ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
Areas	lead to the permanent degradation of ecosystems as well as allow alien vegetation species to expand.							<p>construction in the particular area or phase of work is complete, i.e. rehabilitation is on-going throughout construction.</p> <ul style="list-style-type: none"> - Restoration must be conducted as per the approved Rehabilitation Management Plan. - Only topsoil from the development site, which has been appropriately stored, must be used for rehabilitation. 	
Control of Alien Species	During the construction phase the removal of natural vegetation creates 'open' habitats that will favour the establishment of undesirable alien plant species in areas that are typically very difficult to eradicate and may pose a threat to neighbouring natural ecosystems.	Indirect	Study Site	Long-term	Probable	Moderately severe	Moderate Negative	<ul style="list-style-type: none"> - The approved Alien Vegetation Management Plan must be implemented during the construction phase to reduce the establishment and spread of undesirable alien plant species. - Alien plants must be removed from the site through appropriate methods such as hand pulling, application of chemicals, cutting, etc. as in accordance to the NEMBA: Alien Invasive Species Regulations. 	Low Negative

Table 8.5. Assessment of impacts during the Operational Phase

ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
OPERATIONAL PHASE									
<i>Terrestrial environment</i>									
Rehabilitation of disturbed areas	During the Operational Phase, poor rehabilitation of disturbed areas may lead to the permanent degradation of ecosystems as well as allow alien vegetation species to expand.	Direct, Indirect, Cumulative	Study Site	Long-Term	Possible	Moderately Severe	Moderate Negative	<ul style="list-style-type: none"> - All cleared areas must be continuously rehabilitated with indigenous vegetation post-establishment. - The site will be considered as rehabilitated when 75% or more of the impacted areas are covered by primary growth (grasses and/or scrubs) 	Low Negative
Invasion of Alien Species	During the operational phase the loss of natural vegetation will increase the potential invasion by alien plant species. This, coupled with the lack of implementation of the Alien Vegetation Management Plan may result in large scale alien plant invasion.	Direct, Indirect, Cumulative	Study Site	Long-Term	Possible	Moderately Severe	Moderate Negative	<ul style="list-style-type: none"> - The approved Alien Vegetation Management Plan must be implemented during the operational phase to reduce the establishment and spread of undesirable alien plant species. - Alien plants must be removed through appropriate methods such as hand pulling, application of chemicals, cutting, etc. as in accordance to the NEMBA: Alien Invasive Species Regulations. 	Low Negative

9. Impact statement, recommendations and conclusion

Appendix 6

Specialist Reports

1. (1) A specialist report prepared in terms of these Regulations must contain—
 - (l) any conditions for inclusion in the environmental authorisation;
 - (m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;
 - (n) a reasoned opinion—
 - (i) whether the proposed activity, activities or portions thereof should be authorised;
 - (iA) regarding the acceptability of the proposed activity or activities; and
 - (ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;

9.1. Impact statement

A total of 35 plant species were identified within the proposed new Boshhoek Loop. Savanna is the dominant vegetation biome present with vegetation consisting of deciduous, open to dense short thorny woodland dominated by various *Acacia* species with an herbaceous layer consisting of mainly grasses. Of these 35 species, only two are listed as SCC (Table 5.6). The implication is that these species will require a permit for removal or transplant prior to construction. This should be done through a Search and Rescue exercise conducted by a qualified specialist prior to commencement of clearing.

Vegetation throughout the project site is considered as moderate sensitive mainly due to the presence of plant SCC, the presence of functioning ecological services and low levels of disturbance. The location of SCC (with a 5m buffer) is considered as highly sensitive.

The site identified for the proposed laydown area and site camp is located on transformed mine land containing no vegetation.

Most of the study area has been transformed as there is an existing railway line as well as a service gravel road immediately adjacent to the railway line. Vegetation occur as a strip next to the gravel road along the northern border of the new Boshhoek Loop. Approximately 1.6 hectares of natural vegetation will be permanently removed along the entire length of the proposed new Boshhoek Loop during construction.

Vegetation tend to be less dense with an increase in alien and invasive plant species closer to the existing Boshhoek Station. Alien species present on site and their category according to the NEMBA Alien and Invasive Species Regulations (published 1 August 2014) are presented in Section 8.1 above. It is advised that an Alien Vegetation Management Plan is generated and implemented during the construction phase (for clearing) AND operation phase, throughout the life of the project, and that active management of alien species is carried out.

Few animals were recorded during the site assessment. None of these were considered as SCC and therefore there is no permit application requirement for animals. No bird SCC were observed to nest

or roost within the site. Any birds that may occur within the site should move away when construction commences.

9.1.1. No-Go areas

No area within the study site was identified as a No-Go area. The construction site (including temporary impacted areas like site camps and laydown areas) must be demarcated prior to commencement of construction. All vegetated areas outside the demarcation will be considered as No-Go areas and must be avoided at all times during construction.

9.1.2. Alternatives

No alternatives were presented and therefore were not assessed.

9.1.3. Cumulative impact

The project entails the permanent removal of approximately 1.6 hectares of natural vegetation for the development of the new Boshhoek Loop. The removal of vegetation will occur within the Transnet railway line servitude and vegetation outside the servitude should not be affected. The clearing of vegetation will occur along a 1.63 km length of already cleared railway line and gravel road. Animals should not be affected by the development of the proposed new Boshhoek Loop other than temporary migration out of the local area during construction.

9.2. Recommendation

The following recommendations must be included into the final EMPr:

- The project construction site must be demarcated prior to commencement of activities on site. All areas outside the demarcation will be considered as No-Go areas during construction.
- A qualified, independent ECO must be appointed prior to commencement of any activity on site.
- Plant Permits must be obtained from the relevant competent authorities for the removal/destruction of the following SCC identified onsite:

Species	Common name	Threat status
<i>Aloe grandidentata</i>	Bontaalwyn	Important species
<i>Sclerocarya birrea</i>	Marula tree	Protected tree (DAFF)

- All mitigation measures indicated in this report must be included into the EMPr
- The following Management Plans must be developed prior to clearing and implemented during construction and operations of the proposed development. These management plans must be incorporated into the Environmental Management Programme (EMPr) during the Environmental Impact Assessment (EIA) for this project:
 - o Rehabilitation Management Plan
 - o Alien Vegetation Management Plan

9.2.1. Mitigation measures

All the mitigation measures provided below are to be implemented during the planning and design, construction and operational phases of the proposed new Boishoek Loop.

During planning and design:

- All legal matters pertaining to permitting must be completed prior to any construction activity.
- A qualified and independent ECO must be appointed prior to commencement of any activity on site to monitor all legal and policy compliance.
- Project infrastructure must be designed in such a way as to minimise the impact on natural vegetation.
- A Search and Rescue exercise must be undertaken by a qualified specialist prior to commencement of construction.
- All identified SCC must be relocated to outside the development footprint prior to commencement of activities.
- All relevant permits must be obtained from the competent authority in order to remove any SCC.
- A Rehabilitation Management Plan must be developed to manage rehabilitation during all phases of the project.
- The Rehabilitation Management Plan must be approved by the appointed ECO prior to implementation.
- An Alien Vegetation Management Plan must be developed to mitigate the establishment and spread of undesirable alien plant species during all phases of the project.
- The Alien Vegetation Management Plan must be approved by the appointed ECO prior to implementation.

During the construction phase:

- The construction footprint must be surveyed and demarcated prior to construction commencing.
- No construction activities will be allowed outside the demarcated footprint.
- Where vegetation has been cleared, site rehabilitation in terms of soil stabilisation and vegetation must be undertaken.
- Cleared vegetation must not be piled on top of natural vegetation but must be stockpiled temporarily on bare ground and removed to a registered landfill site. Alternatively, cleared vegetation may be mulched and used as ground cover during rehabilitation.
- All areas that will be impacted must be surveyed and demarcated by a suitably qualified specialist prior to vegetation and topsoil removal in order to locate and rescue any SCC within the area and relocate them.
- The contractor's staff must not poach or trap wild animals.
- The contractor's staff must not harvest any natural vegetation.
- All temporarily impacted areas must be rehabilitated with indigenous vegetation as soon as construction in the particular area or phase of work is complete, i.e. rehabilitation is on-going throughout construction.
- Restoration must be conducted as per the approved Rehabilitation Management Plan.
- Only topsoil from the development site, which has been appropriately stored, must be used for rehabilitation.
- The approved Alien Vegetation Management Plan must be implemented during the construction phase to reduce the establishment and spread of undesirable alien plant species.

- Alien plants must be removed from the site through appropriate methods such as hand pulling, application of chemicals, cutting, etc. as in accordance to the NEMBA: Alien Invasive Species Regulations.

During operational phase:

- All cleared areas must be continuously rehabilitated with indigenous vegetation post-establishment.
- The site will be considered as rehabilitated when 75% or more of the impacted areas are covered by primary growth (grasses and/or scrubs).
- The approved Alien Vegetation Management Plan must be implemented during the operational phase to reduce the establishment and spread of undesirable alien plant species.
- Alien plants must be removed through appropriate methods such as hand pulling, application of chemicals, cutting, etc. as in accordance to the NEMBA: Alien Invasive Species Regulations.

9.3. Conclusion

Table 9.1 summarises the change in impacts from pre- to post- mitigation for the development of the proposed new Boshhoek Loop. Only one impact was identified as high and will be reduced to moderate if the mitigation measures as proposed in this report is adhered to. All impacts identified as moderate will reduce to a low significance if the mitigation measures as proposed in this report is adhered to.

Table 9.1: Assessment of pre- and post-mitigation impact significance.

	PRE-MITIGATION				POST-MITIGATION			
	LOW	MODERATE	HIGH	UN-KNOWN	LOW	MODERATE	HIGH	UN-KNOWN
Planning and Design	0	4	1	0	4	1	0	0
Construction	0	4	0	0	4	0	0	0
Operational	0	2	0	0	2	0	0	0
TOTAL	0	10	1	0	10	1	0	0

9.3.1. Ecological Statement and Opinion of the Specialist

The ecological impacts of all aspects for the construction of the proposed new Boshhoek Loop were assessed and considered to be ecologically acceptable, provided that mitigation measures provided in this report are implemented. Most impacts are rated as MODERATE pre-mitigation (Table 9.1), therefore implementation of recommended mitigation measures coupled with comprehensive rehabilitation and monitoring in terms of re-vegetation and restoration is an important element of the mitigation strategy. Implementing the recommended mitigations measures will reduce most impacts to LOW.

The proposed development is **NOT considered to be Fatally Flawed**.

The **No-Go option** refers to the proposed Boshhoek Loop not being constructed. This option will therefore have no impact (positive or negative) on the local ecology if it is not established.

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