UMCEBO MINING (PTY) LTD

WATER PIPELINE FOR THE WONDERFONTEIN MINE

Locality: Carolina

Departmental Ref No: 17/2/3 GS-238

Date: 9 December 2014

SHANGONI
Management Services (Pty) Ltd

DRAFT BASIC ASSESSMENT REPORT

UMCEBO MINING (PTY) LTD

WATER PIPELINE FOR THE WONDERFONTEIN MINE

Locality: Carolina

Departmental Ref No: 17/2/3 GS-238

9 December 2014

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SHANGONI
Management Services (Pty) Ltd

PROJECT DETAILS

Mpumalanga Department of Economic Development, Environment and Tourism

Reference No.: 17/2/3 GS-238

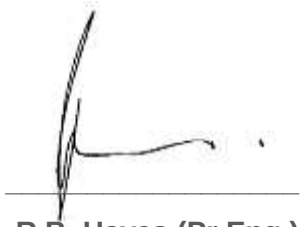
Project Title: Water Pipeline for the Wonderfontein Mine

Project Number: KOR-WON-12-10-03

Compiled by: Lizette Crous

Date: 9 December 2014

Technical Reviewer: Brian Hayes



R.B. Hayes (Pr.Eng.)

EXECUTIVE SUMMARY

The Applicant

Umcebo Mining (Pty) Ltd is joint venture operation between Mbokobo Mining (Pty) Ltd and Anglo Coal. The company was incorporated in 2003 with the head office based in Johannesburg, South Africa. Umcebo Mining (Pty) Ltd. owns and operates various coal mining collieries.

One of the coal mining operations operated by Umcebo Mining is the Wonderfontein Mine. Umcebo Mining has submitted a mining right application to the Department of Minerals and Energy (DME) to mine coal at various portions of the farm Wonderfontein 428 JS and also on Portion 14 of the farm Klippan 452 JS (JKC, 2010).

Background description

The Wonderfontein mine was established in 2009 and has been active ever since. The mine is hereby applying for Environmental Authorisation for the construction of a water pipeline within the reserve of the road between Wonderfontein and Carolina. The purpose of the proposed pipeline is to provide clean water to the mine.

Project description

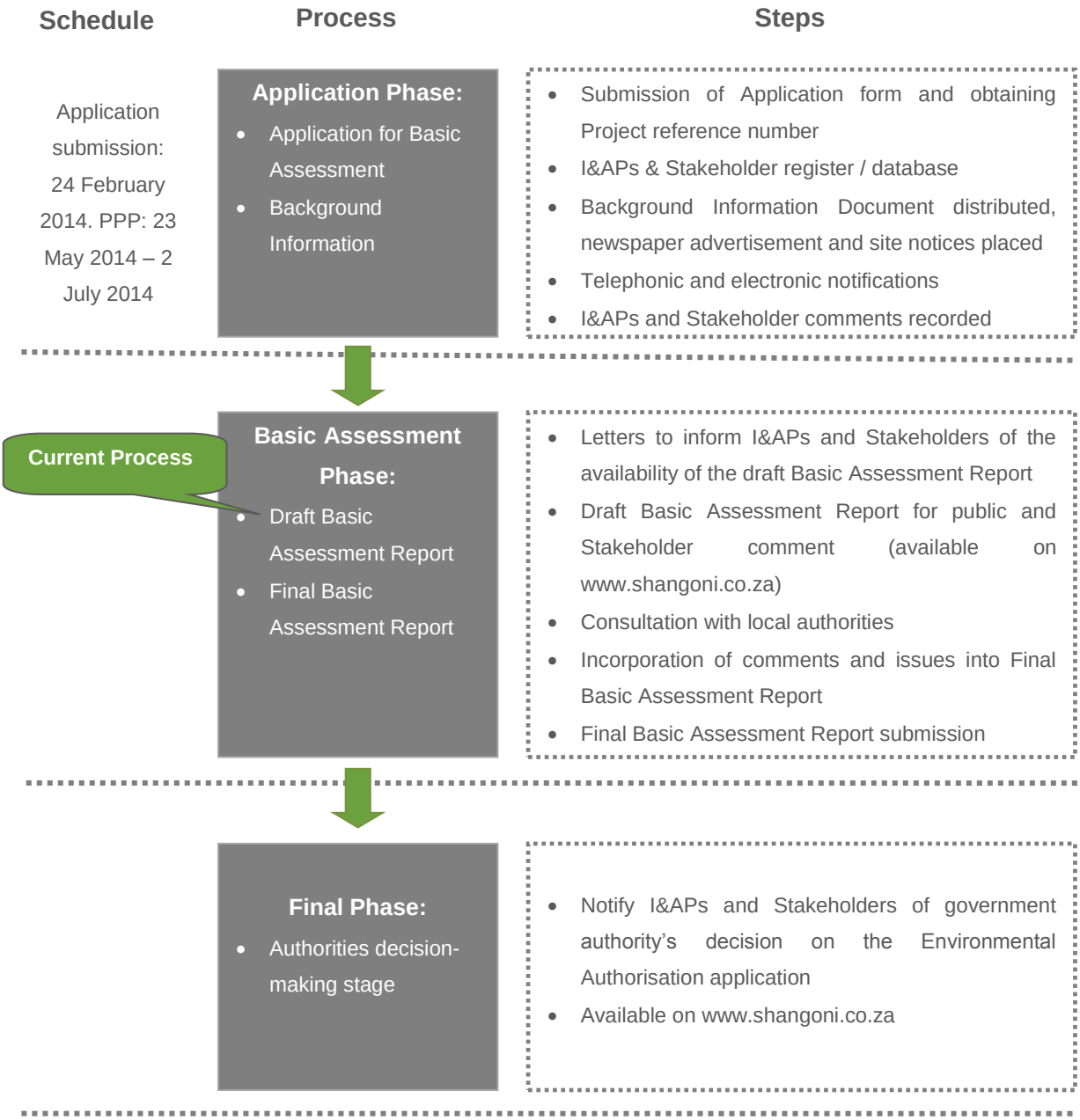
Umcebo Mining wishes to construct a 200-300mm diameter pipeline in order to supply water to the Wonderfontein Mine. The pipeline will be approximately 10km long and will be situated within 32 meters of the edge of a number of watercourses. The pipeline will also be situated within 10km of the Nooitgedacht Dam Nature Reserve and falls within Critical Biodiversity Areas in terms of the Mpumalanga Biodiversity Conservation Plan.

Legal requirements and legislative process

As part of the proposed water pipeline project, listed activities defined under the National Environmental Management Act, Act 107 of 1998 (NEMA, 1998) and the regulations there under will take place. Relevant listed activities triggered by the proposed activities are described further in this Basic Assessment Report (BAR) (refer to Part 1.5).

It is the intention of this BAR to provide the necessary information pertaining to the proposed activities associated with the project, as required in terms of the Environmental Impact Assessment Regulations (EIA Regulations R543: EIA Regulations in terms of Chapter 5 of the NEMA, 1998, dated June 2010) under the NEMA, 1998. This BAR intends to highlight all information relevant to the proposed water pipeline project.

The diagram below provides a visual representation of the Basic Assessment approach followed in terms of NEMA, 1998, and the Environmental Impact Assessment Regulations, dated 2010.


Schedule
Process
Steps
Application submission: 24 February 2014. PPP: 23 May 2014 – 2 July 2014
Application Phase:
Application for Basic Assessment
Background Information
Submission of Application form and obtaining Project reference number
I&APs & Stakeholder register / database
Background Information Document distributed, newspaper advertisement and site notices placed
Telephonic and electronic notifications
I&APs and Stakeholder comments recorded
Current Process
Basic Assessment Phase:
Draft Basic Assessment Report
Final Basic Assessment Report
Letters to inform I&APs and Stakeholders of the availability of the draft Basic Assessment Report
Draft Basic Assessment Report for public and Stakeholder comment (available on www.shangoni.co.za)
Consultation with local authorities
Incorporation of comments and issues into Final Basic Assessment Report
Final Basic Assessment Report submission
Final Phase:
Authorities decision-making stage
Notify I&APs and Stakeholders of government authority's decision on the Environmental Authorisation application
Available on www.shangoni.co.za

Environmental impacts associated with the project

The purpose of this document is to supply the Mpumalanga Department of Economic Development, Environment and Tourism with the requested information pertaining to the National Environmental Management Act (NEMA), as amended, and Regulation 28 of the Environmental Impact Assessment Regulations, dated 2010. Contained in this document is a detailed investigation of the activity and site-specific potential impacts associated with the proposed Wonderfontein mine water pipeline project.

The application for environmental authorisation of the mentioned activities entails conducting a Basic Environmental Assessment process.

Regulation 22 (of Regulation 543) of the EIA Regulations, 2010, under the NEMA, 1998, requires that a Basic Assessment Report (BAR) includes an assessment of the status, extent, duration, probability, reversibility, replaceability of resources and mitigatory potential of the major potential environmental impacts of the proposed project be undertaken. Refer to Part 7 for a detailed environmental risk/impact assessment. The table below summarises the impacts that have been identified and evaluated for the proposed project.

Potential Impact	Environmental Significance Pre Mitigation			Environmental Significance Post Mitigation		
	P[1]	M[2]	S[3]	P	M	S
General Environment						
Construction Phase: Harm to the environment in general	5	3	H	3	3	M
Operational Phase: Harm to the environment in general	4	2	M	3	2	M
Vegetation						
Construction Phase: Vegetation clearance	5	3	H	3	3	M
Construction Phase: Removal of plant species of conservation concern	3	3	M	2	2	L
Construction Phase: Spread of alien invasive plant species	3	4	H	2	4	M
Construction Phase: Deterioration of rocky and moist grasslands	3	4	H	3	3	M
Construction Phase: Removal of alien invasive plant species	**Positive impact**			**Positive impact**		
Construction Phase: Veld fires	3	3	M	2	3	M
Operational Phase: Destruction of naturally occurring vegetation and the colonisation of alien invasive plant species	3	3	M	2	2	L
Operational Phase: Veld fires	3	3	M	2	3	M
Rehabilitation Phase: Deterioration of vegetation	2	3	M	2	2	L
Fauna						
Construction Phase: Fauna habitat fragmentation	5	3	H	3	2	M
Construction Phase: Light pollution and associated disturbance to fauna species	5	3	H	3	2	M
Construction Phase: Snaring, hunting or killing of fauna species	4	3	H	2	1	L
Operational Phase: Snaring, hunting or killing of fauna species	3	3	M	2	1	L
Wetlands						
Construction Phase: Route Alternative 1: Disturbance, alteration and destruction of wetlands	5	3	H	5	3	H
Construction Phase: Route Alternative 2: Disturbance, alteration and destruction of wetlands	5	4	H	5	3	H
Construction Phase: Impedance of flow and sedimentation of wetlands	5	3	H	3	3	M
Construction Phase: Sedimentation of wetlands and disturbance of slopes	4	3	H	3	3	M

CHAP

[1] Probability
[2] Magnitude
[3] Severity

Potential Impact	Environmental Significance Pre Mitigation			Environmental Significance Post Mitigation		
	P[1]	M[2]	S[3]	P	M	S
Construction Phase: Deterioration of water quality in the wetlands due to the release of additional nutrients into the wetlands	3	3	M	2	2	L
Construction Phase: Deterioration of water quality in the wetlands due to the release of toxic contaminants into the wetlands	4	4	H	3	3	M
Construction Phase: Change to the physical structure of the water resources/habitats	4	3	H	3	3	M
Operational Phase: Disturbance, alteration and destruction of wetlands	5	3	H	4	3	H
Operational Phase: Damage to vegetated areas	4	3	H	3	3	M
Operational Phase: Sedimentation of wetlands	4	3	H	3	3	M
Operational Phase: Deterioration of water quality in the wetlands due to the release of additional nutrients into the wetlands	3	3	M	2	2	L
Operational Phase: Deterioration of water quality in the wetlands due to the release of toxic contaminants into the wetlands	4	4	H	3	3	M
Operational Phase: Change to the physical structure of the water resources/habitats	4	3	H	3	3	M
Topsoil and soil erosion						
Construction Phase: Loss of topsoil and sedimentation of wetlands	5	3	H	3	3	M
Construction Phase: Degradation and loss of topsoil due to prolonged exposure	3	2	M	2	2	L
Operational Phase: Soil erosion	3	3	M	2	2	L
Operational Phase: Degradation and loss of topsoil due to prolonged exposure	3	2	M	2	2	L
Heritage						
Construction Phase: Disturbance or destruction of sites, features or artefacts of archaeological and/or historical importance	3	4	H	3	3	M
Operational Phase: Disturbance or destruction of sites, features or artefacts of archaeological and/or historical importance	3	4	H	3	3	M
Infrastructure						
Construction Phase: Wear of access roads, accidents on access roads, unpermitted transport of materials and loss of materials being transported on access roads	4	2	M	2	2	L
Operational Phase: Wear of access roads, accidents on access roads, unpermitted transport of materials and loss of materials being transported on access roads.	4	2	M	2	2	L
Atmosphere and Noise						
Construction Phase: Degradation of ambient air quality due to dust generation	5	2	M	4	1	L
Construction Phase: Noise pollution and nuisance to neighbours	5	3	H	3	3	M
Construction Phase: Noise pollution and disturbance to fauna species	5	3	H	3	2	M
Operational Phase: Disturbance, dust generation and nuisance to neighbours due to maintenance activities	4	3	H	3	3	M

Potential Impact	Environmental Significance Pre Mitigation			Environmental Significance Post Mitigation		
	P[1]	M[2]	S[3]	P	M	S
Soil, surface water, stormwater and groundwater pollution						
Construction Phase: Soil and surface water pollution due to spillages and/or improper handling-, storage-, mixing- or disposal- of cement and concrete	5	4	H	3	3	M
Construction Phase: Soil and surface water pollution as a result of contaminated wash water entering the environment	5	4	H	3	3	M
Construction Phase: Soil, surface water and groundwater pollution due to poor waste management	4	3	H	3	3	M
Construction Phase: Soil, surface water and groundwater pollution from unsanitary conditions onsite	4	4	H	3	3	M
Construction Phase: Soil, surface water and groundwater pollution due to poor management and accidental spills of hazardous chemical substances	4	4	H	3	3	M
Construction Phase: Hydrocarbon pollution of soil, surface water and groundwater	4	4	H	3	3	M
Operational Phase: Soil and surface water pollution due to spillages and/or improper handling-, storage-, mixing- or disposal- of cement and concrete	4	3	H	2	2	L
Operational Phase: Soil and surface water pollution as a result of contaminated wash water entering the environment	4	3	H	2	2	L
Operational Phase: Soil, surface water and groundwater pollution due to poor waste management	4	3	H	2	2	L
Operational Phase: Soil, surface water and groundwater pollution from unsanitary conditions onsite	4	3	H	1	2	L
Operational Phase: Soil, surface water and groundwater pollution due to poor management and accidental spills of hazardous chemical substances	4	4	H	2	2	L
Operational Phase: Hydrocarbon pollution of soil, surface water and groundwater	4	4	H	2	2	L
Resource usage						
Construction Phase: Wastage or depletion of valuable resources like water due to inefficient or redundant usage	3	3	M	2	2	L
Operational Phase: Wastage or depletion of the water that is pumped to the Wonderfontein mine using the proposed pipeline	4	3	H	3	2	M

Appropriate mitigation measures will assist in minimising the potential impacts on the surrounding environment during the construction and operational phases of the development. A draft Environmental Management Programme (EMP) has been compiled, with the aim of serving as a working document in order to manage and/or mitigate the identified potential impacts. Refer to Addendum A for a copy of the draft EMP.

Based on the outcomes of the Environmental Impact Assessment conducted as part of this Basic EIA as well as the alternatives assessment, it is recommended that the project be authorised and allowed to proceed on **Route Alternative 1**. The disturbance of vegetation and wetland areas will remain a negative impact, but can be mitigated and rehabilitated provided that all the mitigation measures contained in this report and the draft Environmental Management Programme are implemented.

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DEFINITIONS

Environment

The surroundings (biophysical, social and economic) within which humans exist and that are made up of

i. the land, water and atmosphere of the earth;
ii. micro-organisms, plant and animal life;
iii. any part or combination of (i) and (ii) and the interrelationships among and between them; and
iv. the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing.

Environmental Aspects

Elements of an organisation's activities, products or services that can interact with the environment.

Environmental Degradation

Refers to pollution, disturbance, resource depletion, loss of biodiversity, and other kinds of environmental damage; usually refers to damage occurring accidentally or intentionally as a result of human activities.

Environmental Impacts

Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's activities, products or services.

Environmental Impact Assessment

A study of the environmental consequences of a proposed course of action.

Environmental Impact Report

A report assessing the potential significant impacts as identified during the environmental impact assessment.

Environmental impact

An environmental change caused by any human act.

Land use

The various ways in which land may be employed or occupied. Planners compile, classify, study and analyse land use data for many purposes, including the identification of trends, the forecasting of

space and infrastructure requirements, the provision of adequate land area for necessary types of land use, and the development or revision of comprehensive plans and land use regulations.

Pollution Prevention

Any activity that reduces or eliminates pollutants prior to recycling, treatment, control or disposal.

Public Participation Process

A process of involving the public in order to identify needs, address concerns, to contribute to more informed decision making relating to a proposed project, programme or development.

Topography

Topography, a term in geography, refers to the "lay of the land" or the physio-geographic characteristics of land in terms of elevation, slope and orientation.

Vegetation

All of the plant life growing in and characterising a specific area or region; the combination of different plant communities found there.

Waste

Waste is unwanted or undesired material left over after the completion of a process. "Waste" is a human concept: in natural processes there is no waste, only inert end products.

ABBREVIATIONS

BID	-	Background Information Document
BAR	-	Basic Assessment Report
CRR	-	Comments and Responses Report
DWA	-	Department of Water Affairs
EAP	-	Environmental Assessment Practitioner
EMP	-	Environmental Management Programme
GN	-	Government Notice
I&AP	-	Interested and Affected Party
MDEDET	-	Mpumalanga Department of Economic Development, Environment and Tourism
NEMA	-	National Environmental Management Act, Act No. 107 of 1998, as amended
R	-	Regulation

1. INTRODUCTION

This draft Basic Assessment Report forms part of an application for environmental authorisation for the proposed pipeline project for the Wonderfontein mine. The application is made in terms of the EIA Regulations, dated 2010, under the National Environmental Management Act, 1998 (NEMA, 1998) (Act No. 107 of 1998), and as amended in 2008.

The application process is undertaken on behalf of the applicant, Umcebo Mining (Pty) Ltd, by Shangoni Management Services (Pty) Ltd. Shangoni was appointed, as independent environmental practitioner, to assist the applicant in undertaking the process as prescribed in the before mentioned environmental legislation.

An application to undertake a Basic Environmental Impact Assessment process was submitted to the identified competent authority (the Mpumalanga Department of Economic Development, Environment and Tourism). The Department subsequently registered the project and the formal Basic Assessment process was initiated.

This BAR is divided into the following parts:

- Part 1: Introduction (including a description of the project);
- Part 2: Nature and extent of the environment affected by activity;
- Part 3: Applicable legislation and guidelines;
- Part 4: Public Participation Process;
- Part 5: Need and desirability for the activity;
- Part 6: Consideration of alternatives;
- Part 7: Environmental Impact Assessment;
- Part 8: Environmental Impact Assessment Statement; and
- Part 9: Conclusion.

1.1 Process followed

1.1.1 The BAR in terms of the requirements of NEMA, 1998

Regulation 22(2) of the EIA Regulations, 2010, under the NEMA, 1998, lists aspects that must be included in Basic Environmental Assessment Reports (BARs). The table below indicates the parts where the required information has been provided as part of this BAR.

Table 1: The BAR in terms of the EIA Regulations, 2010, under the NEMA, 1998

Regulation No:		Description	EIR Part
R543 Regulation 22(2)(a)		Details of the Environmental Assessment Practitioner (EAP).	Part 1 & Appendix F

Regulation No:		Description	EIR Part
	(i)	Details of the EAP who prepared the report.	
	(ii)	Details of the expertise of the EAP to carry out the environmental impact assessment.	
R543 Regulation 22(2)(b)		A description of the proposed activity.	Part 1
R543 Regulation 22(2)(c)		A description of the property on which the activity is to be undertaken and the location of the activity on the property.	Part 1
R543 Regulation 22(2)(d)		A description of the environment that may be affected by the activity and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity.	Part 2
R543 Regulation 22(2)(e)		An identification of all legislation and guidelines that have been considered in the preparation of the basic assessment report.	Part 3
R543 Regulation 22(2)(f)		Details of the public participation process conducted:	Part 4 & Appendix E
	(i)	Steps taken to notify potentially interested and affected parties of the proposed activity.	
	(ii)	Proof that notice boards, advertisements and notices notifying potentially interested and affected parties of the proposed application have been displayed, placed or given.	
	(iii)	A list of all persons, organisations and organs of state that were registered as interested and affected parties.	
	(iv)	A summary of the issues raised by interested and affected parties, the date of receipt and the response of the EAP to those issues.	
R543 Regulation 22(2)(g)		A description of the need and desirability of the proposed activity.	Part 5
R543 Regulation 22(2)(h)		A description of identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity.	Part 6
R543 Regulation 22(2)(i)		An assessment of each identified potentially significant impact, including:	Part 7
	(i)	Cumulative impacts.	
	(ii)	The nature of the impact.	
	(iii)	The extent and duration of the impact.	
	(iv)	The probability of the impact occurring.	

Regulation No:		Description	EIR Part
	(v)	The degree to which the impact can be reversed.	
	(vi)	The degree to which the impact may cause irreplaceable loss of resources.	
	(vii)	The degree to which the impact can be mitigated.	
R543 Regulation 22(2)(j)		Any environmental management and mitigation measures proposed by the EAP	Part 7 and Addendum A
R543 Regulation 22(2)(k)		Any inputs and recommendations made by specialists to the extent that may be necessary.	Part 2 and 7
R543 Regulation 22(2)(l)		A draft environmental management programme containing the aspects contemplated in regulation 33.	Addendum A
R543 Regulation 22(2)(m)		A description of any assumptions, uncertainties and gaps in knowledge.	Part 9
R543 Regulation 22(2)(n)		A reasoned opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation.	Part 9
R543 Regulation 22(2)(o)		Any representations and comments received in connection with the application or the basic assessment report.	Part 4
R543 Regulation 22(2)(p)		The minutes of any meetings held by the EAP with interested and affected parties and other role players which record the views of the participants.	Appendix E (if applicable)
R543 Regulation 22(2)(q)		Any responses by the EAP to those representations, comments and views.	Appendix E (if applicable)
R543 Regulation 22(2)(r)		Any specific information that may be required by the competent authority.	N/A*
R543 Regulation 22(2)(s)		Any other matters required in terms of sections 24(4)(a) and (b) of the Act.	N/A*

** No specific requests have been received from the competent authorities to date.*

1.2 Details of the project applicant

Name of Applicant	Umcebo Mining (Pty) Ltd
Postal Address	Suite MW 113, Private Bag X1838, Middelburg, 1050
Telephone No.	013 244 8000
Fax No.	086 666 5548
Farm name and portion on which the activities take place	P15-1 (between Wonderfontein and Carolina) (Road servitude)
Title Deed Number and 21 Digit	P15-1 (Road reserve)

Code	
Co-ordinates of operation	**Alternative 1 - Start point:** 25°57'8.199''S 29°57'12.472''E. **Middle:** 25°56'18.654''S 29°56'28.873''E; 25°56'2.139''S 29°56'28.873''E; and 25°52'54.529''S 29°54'53.746''E. **End point:** 25°52'30.747''S 29°54'24.019''E. **Alternative 2 – Start point:** 25°57'8.199''S 29°57'12.472''E. **Middle:** 25°56'18.654''S 29°56'28.873''E; 25°56'2.139''S 29°56'28.873''E; 25°53'26.238''S 29°55'32.722''E; 25°52'47.262''S 29°55'15.546''E; and 25°52' 54.529''S 29°54'53.746''E. **End point:** 25°52'30.747''S 29°54'24.019''E.

1.3 Appointed Environmental Assessment Practitioner

Name of firm	Shangoni Management Services	
Postal address	P.O. Box 74726 Lynnwood Ridge Pretoria 0040	
Telephone No.	012 807 7036	
Fax	012 807 1014 / 086 643 5360	
E-mail	lizette@shangoni.co.za	
Team of Environmental Assessment Practitioners on project		
Name	**Qualifications & experience to conduct the EIA***	**Responsibility**
Mr Lourens de Villiers	• Bsc. (Hons) (PU for CHE) MSc.(UP) • More than 10 years' experience conducting Environmental Impact Assessments and Waste Management License Applications	EIA Project Leader and Co-ordinator
Ms Lizette Crous	• Post Graduate Certificate Environmental Management (University of London) • 3 years' experience conducting Environmental Impact Assessments and Waste Management License Applications	EAP

* Detailed CVs for the project team are attached (Appendix F).

1.4 Current situation

A mining right application was submitted to the Department of Minerals and Energy (DME) in 2009 for the new Wonderfontein Mine (Greenfields mining development). The application was for the mining of coal on a number of portions of the farm Wonderfontein 428 JS and on Portion 14 of the farm Klippan

452 JS, between Carolina and Wonderfontein, Mpumalanga Province. Once fully developed, the mine will be both opencast (seven pits) and underground (two areas). The opencast mining will cover approximately 1 320ha and the underground mining will cover approximately 146ha. It is estimated that 90 million tons of 1#, 2#, 4# and 5# seam coal is present within the mining right application area. The mine will have an operational life of approximately 15 to 22 years. Infrastructure at the mine will include the processing plant, mine residue facilities (discard dumps), a crusher, roads, product coal stockpiles, diesel storage facilities, topsoil stockpiles, pollution control measures, offices and workshops. Drinking water (domestic water use) is being obtained from a number of boreholes on the remaining extent of Portion 2 of the farm Wonderfontein 428 JS (JKC, 2009).

1.5 Proposed activity

Umcebo Mining (Pty) Ltd wishes to construct a 200-300mm diameter pipeline in order to supply additional water to the Wonderfontein Mine. The pipeline will be approximately 10km long and will follow existing servitudes for gravel roads and the tarred R104 (Engeolab CC, 2013) (P15-1). The two proposed routes for the pipeline are shown in Figure 1 below. The preferred route is shown in red on this figure. There is also an alternative segment to the route, shown in green. The alternative segment follows the P15-1 road further north than the preferred route and then turns back towards the preferred route, travelling along an existing road. In contrast to this alternative segment, the preferred route follows a more direct path to the Wonderfontein mine, with a segment following a servitude of an existing telephone line.

The proposed pipeline will run in a north-westerly direction from the Eskom water supply point, approximately 1km south of the Strathrae Colliery and will end at the boundary of the mining area of the Wonderfontein mine. The pipeline will be installed approximately 1.2m below the ground by way of trenching and backfilling. The trenches will be opened and closed in sections no longer than one to two kilometres at a time. Once the trench has been opened, the pipes will be installed and linked/joined and the trenches will thereafter be backfilled. It is possible that Pipe Jacking will be used at one or more of the watercourse crossings.

The proposed pipeline will cross a number of watercourses along its route. The following definition of a watercourse is applicable to this project as stated in the National Environmental Management Act, 1998 (Act No. 107 of 1998) Listing Notice 1: List of Activities and competent authorities identified in terms of Sections 24(2) and 24D (Government Gazette No. 544 of 18 June 2010):

"watercourse" *means –*
(a) a river or spring;
(b) a natural channel or depression in which water flows regularly or intermittently;
(c) a wetland, lake or dam into which, or from which, water flows; and

(d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse as defined in the National Water Act, 1998 (Act No. 36 of 1998) and a reference to a watercourse includes, where relevant, its bed and bank".

The proposed pipeline will be constructed within and in close proximity to a number of wetlands and pans, as shown later on in Section 2.9. The pipeline will be constructed within 10km of the Nooitgedacht Dam Nature Reserve and lies within Critical Biodiversity Areas, as discussed later on in Section 2.5.

The following listed activities in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) are being applied for, for the construction of the proposed pipeline:

Table 2: Listed activities in terms of GN. No R 544 and 546, dated 2010 under NEMA, 1998

Number and date of the relevant notice	Activity No	Description
No. 33306. R.544 of 18 June 2010. Listing Notice 1	11	The construction of: (i) canals; (ii) channels; (iii) bridges; (iv) dams; (v) weirs; (vi) bulk storm water outlet structures; (vii) marinas; (viii) jetties exceeding 50 square metres in size; (ix) slipways exceeding 50 square metres in size; (x) buildings exceeding 50 square metres in size; or (xi) infrastructure or structures covering 50 square metres or more where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.
No. 33306. R.546 of 18 June 2010. Listing Notice 3	12	The clearance of an area of 300 square metres or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation. (a) Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; (b) Within critical biodiversity areas identified in bioregional plans; (c) Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuary, whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas.

Number and date of the relevant notice	Activity No	Description
No. 33306. R.546 of 18 June 2010. Listing Notice 3	16	The construction of: (i) jetties exceeding 10 square metres in size; (ii) slipways exceeding 10 square metres in size; (iii) buildings with a footprint exceeding 10 square metres in size; or (iv) infrastructure covering 10 square metres or more where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line. **(a) In Eastern Cape, Free State, KwaZulu-Natal, Limpopo, Mpumalanga and Northern Cape:** ii. Outside urban areas, in: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. (hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve.

A Water Use License application in terms of Section 21 of the NWA, 1998 (Act No. 36 of 1998) will also be submitted to the Department of Water Affairs for the following water uses:

- Section 21 (c): Impeding or Diverting the Flow of Water in a Watercourse; and
- Section 21 (i): Altering the Bed, Banks, Course or Characteristics of a Watercourse.

1.5.1 Proposed locality

The construction of the proposed water pipeline is within the road reserve of the road P15-1, between Wonderfontein and Carolina, in the Mpumalanga Province.

The proposed site is situated within the Chief Albert Luthuli Local Municipalities' jurisdiction. This local municipality forms part of the Gert Sibande District Municipality, located within the Mpumalanga province.

Table 3: Land owner of property where pipeline is to be installed

Property Name	Title deed	Owner
P15-1 (between Wonderfontein and Carolina) (Road servitude)	Not Applicable	Mpumalanga Department of Public Works, Roads and Transport

Table 4: Administrative and water management boundaries

Province	Mpumalanga
District Municipality	Gert Sibande District Municipality
Local Municipality	Chief Albert Luthuli Municipality
Ward	21
Department of Water Affairs (DWA) Local Office	Mpumalanga - Nelspruit
Mpumalanga Department of Economic Development, Environment and Tourism Local Office	Ermelo
Catchment Zone	X11A and X11C
Water Management Area (if applicable)	Inkomati

Table 5: Direction from site and distance to the nearest town(s)

Closest town	Distance from the site	Direction from the site
Carolina	21km	South-east
Belfast	25km	North-east

The site locality map is given below as Figure 1 and is also attached in Appendix A. Site photographs are also provided below.

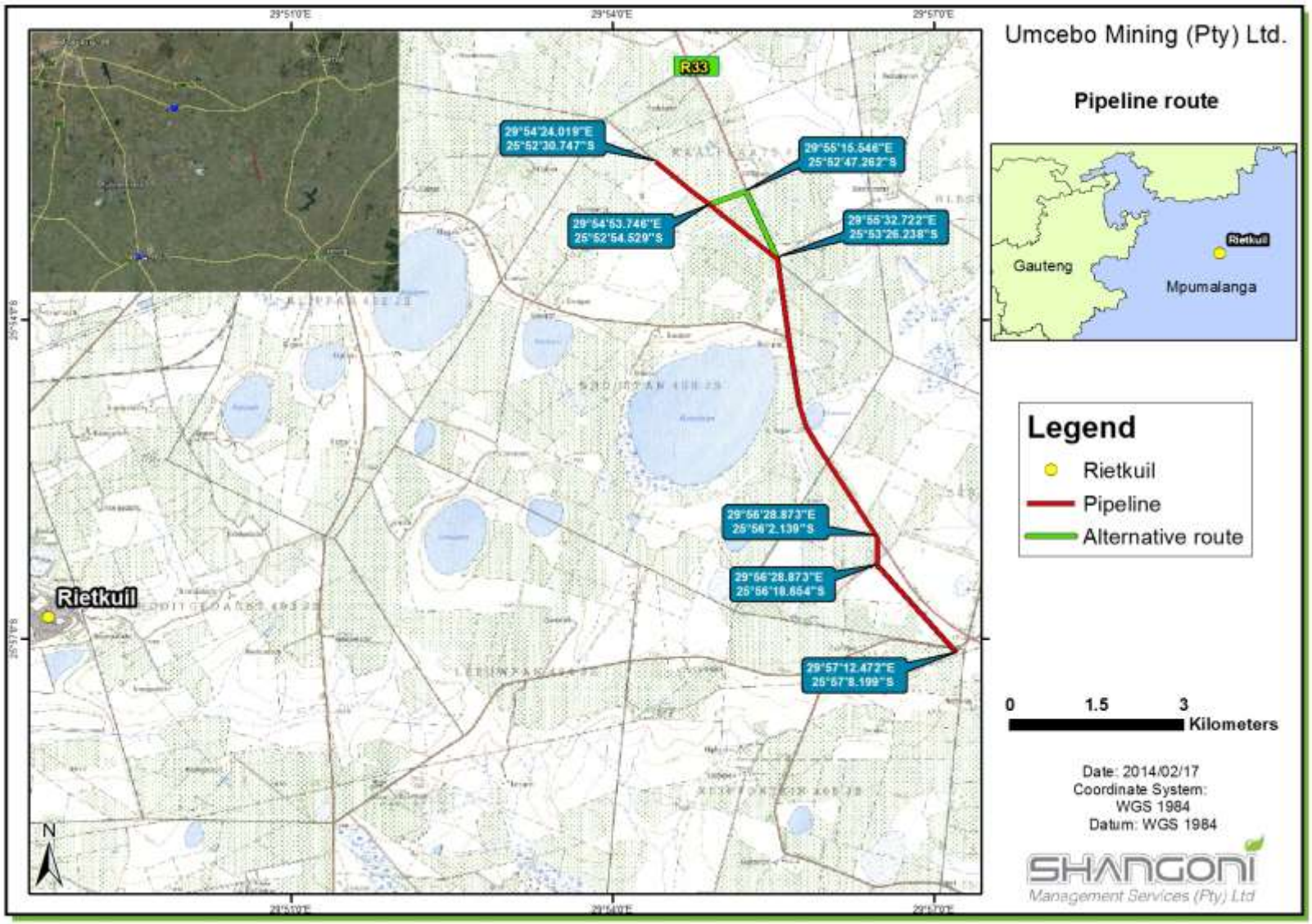


Figure 1: Site locality map


SHANDUKA
KLIPPAN COLLIERY

Figure 2: Site photographs

1.5.2 Land tenure and use of immediately adjacent land

Land use adjacent to the preferred and alternative routes for the proposed pipeline consists of a combination of the following:

- Open land;
- Privately owned agricultural land used for crop production and cattle grazing;
- Mining operations, such as the Strathrae Colliery and Klippan Colliery;
- Brick manufacturers; and
- Informal settlements and homesteads.

The following table summarises the surface owners of the properties that lie adjacent to the preferred and alternative routes for the proposed pipeline. Refer also to Part 4 for more detail regarding the Public Participation Process conduced for this project.

Table 6: Surface right holders of properties adjacent to the preferred and alternative routes for the proposed pipeline

Farm Name	Owner
Remaining Extent (Portion 0) of the Farm Kaalplaats 453 – JS	Xstrata South Africa (Pty) Ltd
Portion 8 of the Farm Kaalplaats 453 - JS	Magdaleen van Nikkelen Kuyper Will Trust
Remaining Extent (Portion 0) of the Farm Grootpan 456 – JS	Willie & Leona Trustfonds Trust
Portion 2 of the Farm Grootpan 456 - JS	Corlouis Boerderye (Pty) Ltd
Portion 4 of the Farm Grootpan 456 - JS	Willie & Leona Trustfonds Trust
Portion 10 of the Farm Grootpan 456 - JS	Corlouis Boerderye (Pty) Ltd
Portion 11 of the Farm Grootpan 456 - JS	Corlouis Boerderye (Pty) Ltd
Portion 16 of the Farm Grootpan 456 - JS	Umsimbithy Mining (Pty) Ltd
Portion 2 of the Farm Strathrae 496 - JS	Exxaro Coal Mpumalanga (Pty) Ltd
Portion 3 of the farm Goedehoop 498 – JS	Braam Roos
Portion 24 of the farm Goedehoop 498 – JS	Braam Roos
Portion 9 of the farm Klipfontein 495 – JS	Exxaro Coal Mpumalanga (Pty) Ltd

1.5.3 Design

Preliminary design plans for the proposed water pipeline are attached under Appendix C.

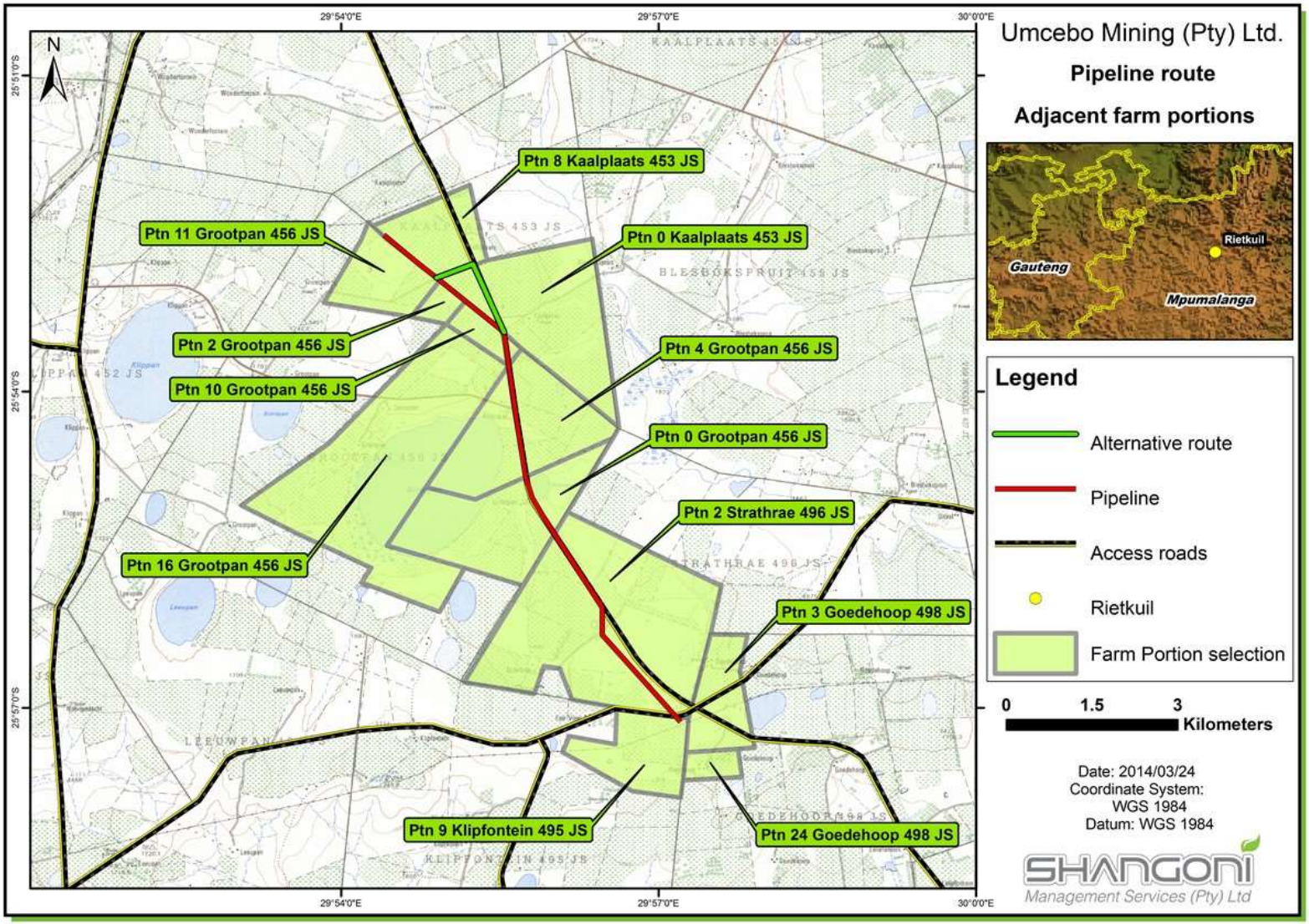


Figure 3: Properties Adjacent to the Proposed Site

2. NATURE AND EXTENT OF THE ENVIRONMENT AFFECTED BY ACTIVITY

2.1 Geology and Soil

The general geology and soils underlying the preferred and alternative routes of the proposed pipeline are given in the figures below. The soils in the general area surrounding the proposed pipeline routes are S17 and S2 soils. S17 soils are associated with classes 1 to 4 and are undifferentiated, structureless soils. These soils have favourable physical properties, but are limited by low base statuses, restricted soil depth, high erodibility and excessive or imperfect drainage. S2 soils are characterised as freely drained, structureless soils that may be prone to restricted soil depths, excessive drainage, high erodibility and low natural fertility.

A geotechnical investigation of the proposed pipeline route was undertaken by Engeolab CC in 2013. The main purpose of the investigation was to identify bedrock geology, soil characteristics, excavatability, the presence of groundwater, areas susceptible to flooding, the availability of bedding material and to visually assess the stability of excavations. The following is a summary of the geotechnical report. The full report is attached under Appendix D.

The geotechnical investigation involved test pitting (29 test pits), profiling, sampling, soil testing of disturbed representative samples and 109 hand-held dynamic core penetration (DCP) tests at approximately 150m intervals along the proposed pipeline route. The soil sample tests were conducted to verify the engineering characteristics of the soil as well as to investigate its workability, bedding material, excavatability and the stability of trench excavations. The DCPs were conducted to verify the consistency of the in situ soils, the thickness of weathered overburden as well as the depth to well cemented pedocrete or bedrock, where applicable.

2.1.1 Geology and soils of the proposed pipeline routes

The pipeline routes are underlain by three distinct geological units, namely the younger Vryheid Formation (PE), the older Dwyka Formation (Pd) and the Dullstroom Formation (Vdb), which is the oldest. The Vryheid Formation consists of mainly sedimentary bedrock such as sandstone, shale and coal seams. The Dwyka Formation contains amorphous tillite and shale, whilst the Dullstroom Formation consists of intrusive andesite and basalt.

The investigated study area has a climatic N value of ±2.0 (Weinert, 1980) and therefore weathering of rock mainly occurs by means of chemical deposition. In general, the depth of weathering is controlled by topography. Flat, poorly drained areas generally comprise of deeper soils with superficial pedocretes, whereas steeper areas generally comprise of thin, residual and cover soils. Alluvial clays and sands occur within and along the banks of drainage features. In general, the

bedrock is overlain by residuum, followed by partially- to well-cemented pedocrete. This is in turn overlain by loose transported soils of various origins. The partially developed pedocrete and indurated hardpan ferricrete are common superficial deposits in the area and often dominate the top 1.5mm of the soil profile. The pedogenic horizon occurs either as well cemented, honeycomb hardpan ferricrete or ferricrete nodules in a partially ferruginised matrix of brown soil.

2.1.2 Drainage and Seepage

The investigated study area is generally well drained with slight seepage occurring adjacent to the drainage courses. Ferricrete, ranging from scattered nodules to shallow hardpan, was observed in a number of the test pits, especially in the vicinity of test pits TP12-15 and TP27-29. The presence of hardpan ferricrete is generally indicative of a seasonal, fluctuating, perched water table. Shallow bedrock could, in places, further impede rainwater percolation during wet spells.

2.1.3 Findings and Recommendations

The following main findings and recommendations were made by Engeolab CC:

- TLB mechanical excavations (soft excavations) will be adequate to excavate through imported material, colluvium, residuum and very soft sediments (Vryheid Formation), tillite (Dwyka Formation) and Dullstroom andesite/basalt to a depth of 1.5m, followed by intermediate or hard excavation in some places. Approximately 89% of the route has soft excavatable soils;
- Refusal on hardpan ferricrete in test pits TP12-15 and TP28 indicate that short sections (11% of the route), especially in the central parts of the preferred route and at the Eskom water supply point, may require intermediate excavation to reach the required depths;
- Bedding material is required below the pipeline at the base of the trench. The material should ideally be non-reactive and relatively clean sand or fine gravel. The bedding is used to create an even floor for the pipeline and to protect the pipeline from jagged edges within the trenches. The selected granular material requirements in terms of SABS 1200LB are very seldom met by natural soils. Only one potential source of adequate bedding material has been identified along the proposed pipeline routes. The material is mostly non-active, easily workable and compactable and can be loaded and hauled over short distances;
- The in-situ soils can be used for backfilling above the pipeline provided that oversized materials are removed and free drainage is permitted. The alluvium soils, however, classify as medium active;
- Visual assessment of test pits TP5, 6, 9, 18, 19, 24 and 25 indicated imminent collapse. The DCP tests also confirmed loose to medium dense sandy materials. The slumping or ravelling of the test pit side walls can be attributed to the high moisture content of the soils onsite;
- Base flows are expected along the water courses, stream crossings and areas underlain by hardpan ferricrete;

- Seepage was recorded in test pits TP5, 9, 10 and 26. However, most of the sandy-clay-silt soil mixes were dry enough and had a sufficient silt/clay fraction within the matrix to provide adequate strength against collapse of the test pit side walls with sufficient stand-up time;
- If seepage or an elevated moisture content is present, then even trenches shallower than 1.5m should be regarded as dangerous and stand-up time could be in the order of minutes;
- The stability of trench excavations in the lower ferruginised residuum should also be regarded as unstable when moisture conditions range from very moist to saturated;
- Poor subsurface drainage along the proposed pipeline routes were indicated by the tabular grasses and hydrophilic plants observed, especially in marshy areas (TP5, 9, 10, 19 and 26). Groundwater seepage ranged from slightly moist to very moist profiles and point seepages;
- Water samples taken during test pitting indicated that the water has serious corrosive tendencies;
- Testing of soil samples indicated that soils underlying the proposed pipeline routes are moderately to mildly corrosive;
- Areas susceptible to flooding are seemingly absent; and
- Five road crossings are envisaged as part of the proposed project. Pipe-jacking will not be necessary and only half or proportional road closures will be necessary during construction at the road crossings. Three overhead power lines and associated ESKOM servitudes will also be traversed (Engeolab CC, 2013).

The test pit profiles and test results are attached under Appendix D.

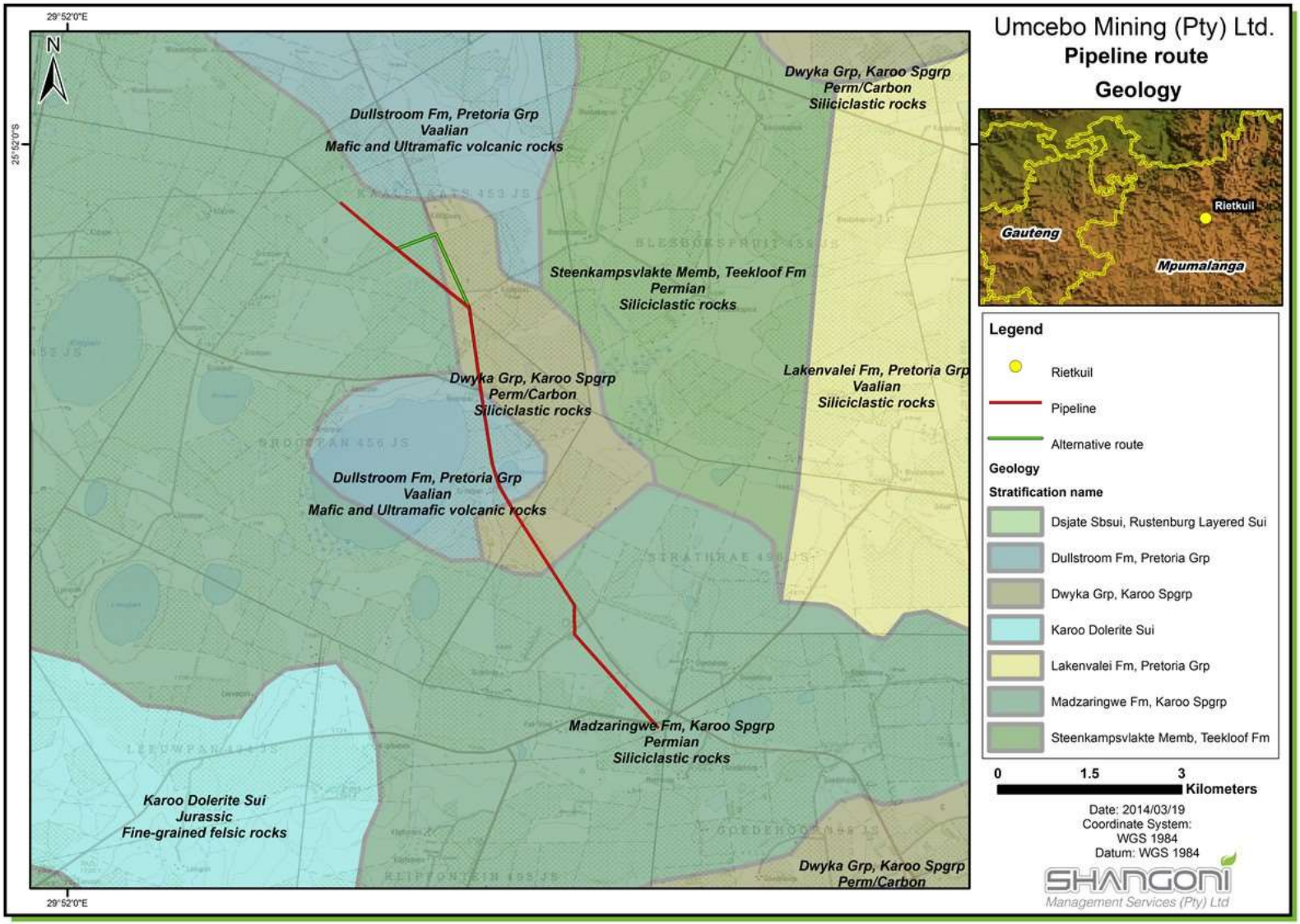


Figure 4: Geology underlying the pipeline routes

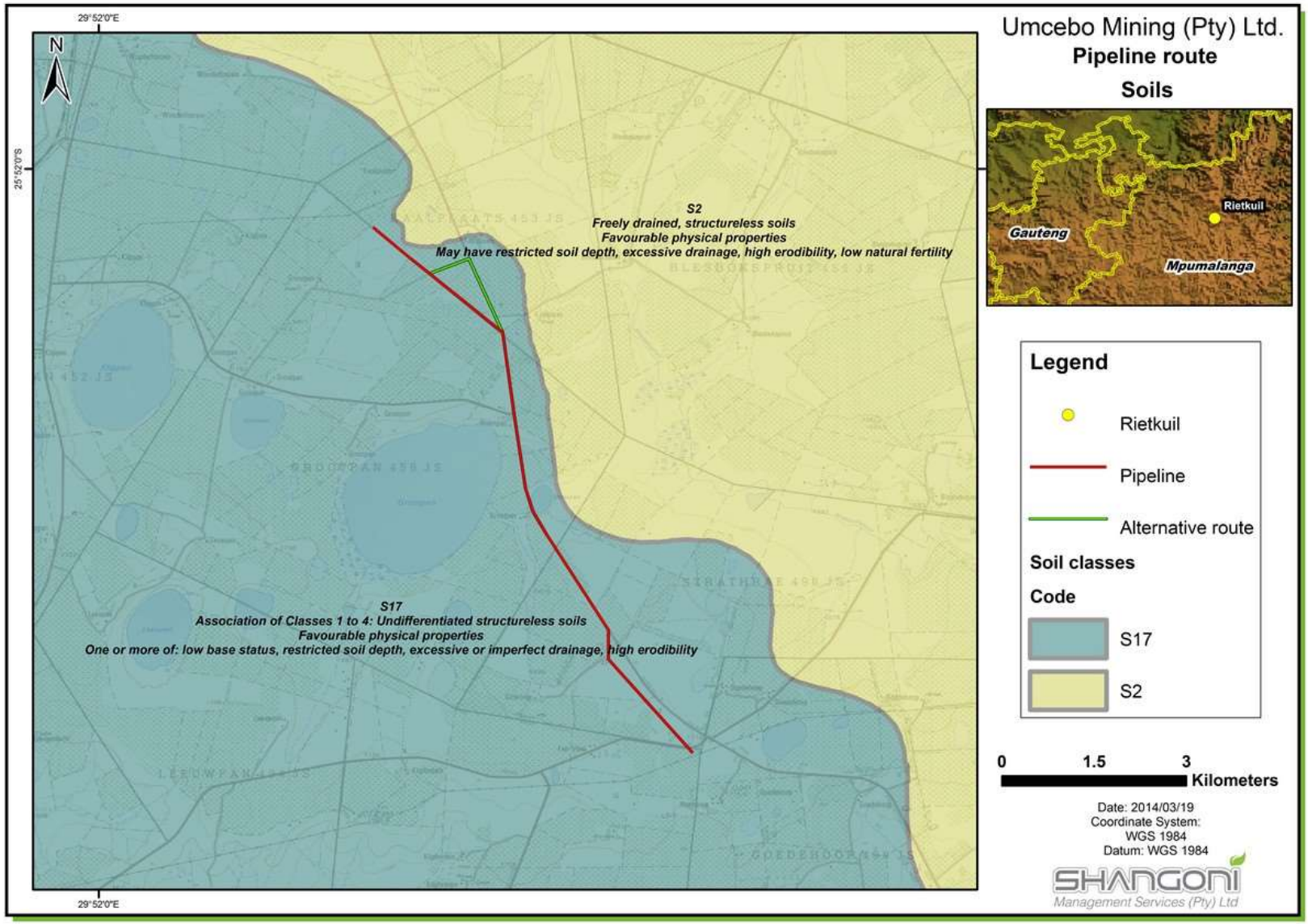


Figure 5: Soils underlying the pipeline routes

2.1.4 Regional geology

Post-Karoo dolerite intrusives (Jd) in the form of large sills occur south-west of the proposed routes (Engeolab CC, 2013).

2.2 Regional climate

The climate of the area is typical of Highveld conditions with relatively warm to hot summers and fairly high rainfall, and moderate to cool winters with little or no rain. Valleys and wetlands are much cooler at night and more prone to frost than higher lying areas. The area experiences thunderstorms during the summer months, which usually occur in the late afternoons.

2.2.1 Rainfall

The study area lies within in a summer rainfall area. According to the AGIS Comprehensive Atlas (2007), the mean annual rainfall of the area is 601-800mm per annum. The figure below shows the long-term mean annual rainfall for the area.

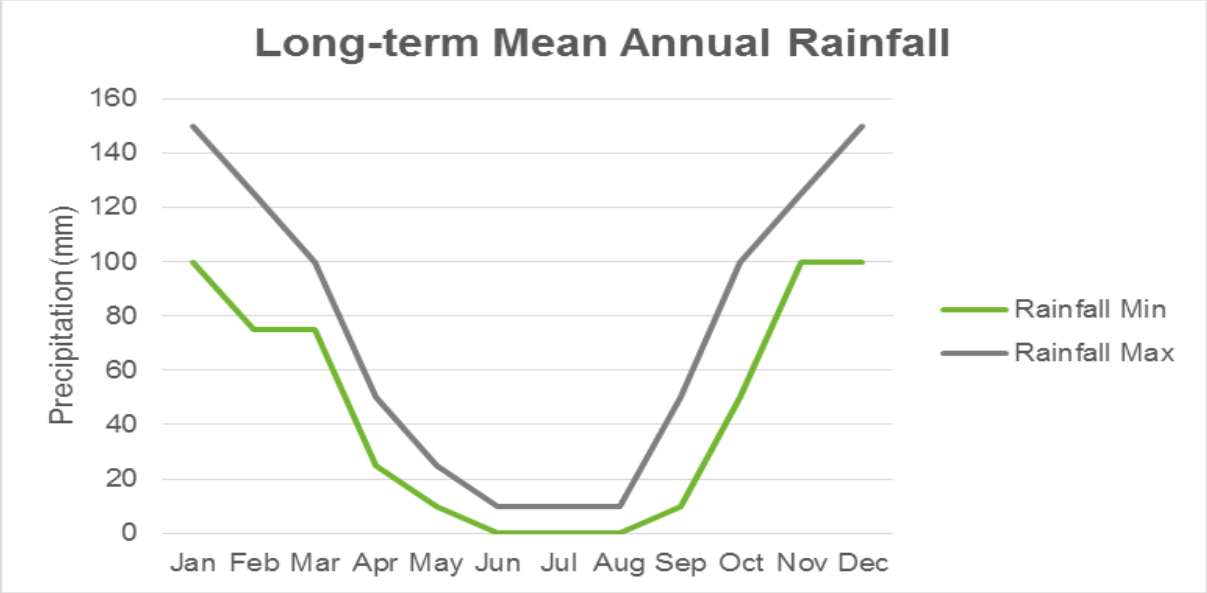


Figure 6: Long-term Mean Annual Rainfall at the study site

2.2.2 Temperature

The maximum mean annual temperature for the study area is between ≤25°C and 27°C and the minimum mean annual temperature for the area is between -1.9°C and 4°C (AGIS, 2007). The figure below shows the long-term mean annual temperature for the study area.

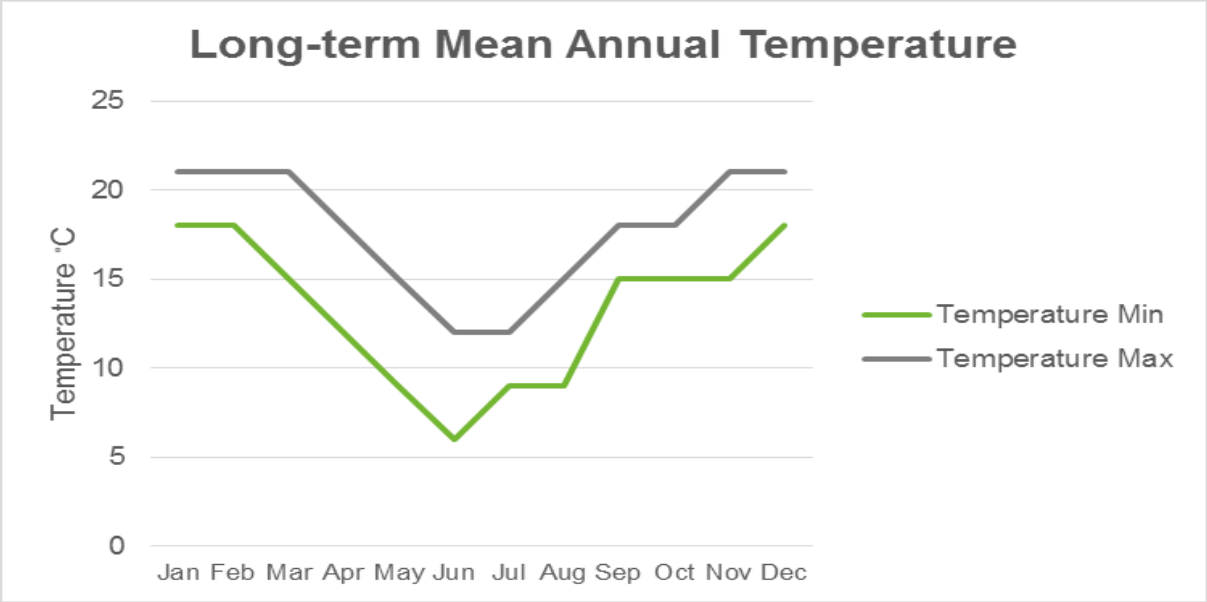


Figure 7: Long-term mean annual temperatures at the study site

2.2.3 Evaporation

The Mean Annual Evaporation of the area is 1 601mm - 2 000mm per annum (DWAF, 2010).

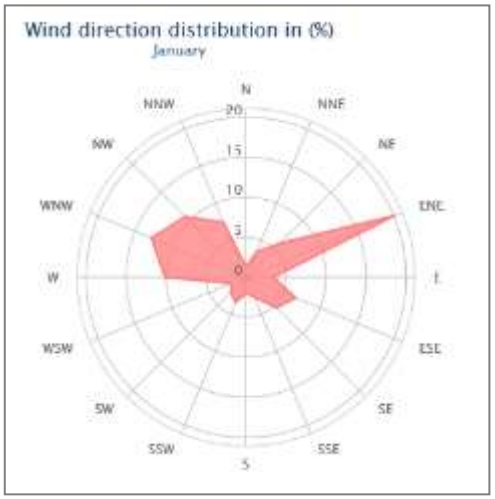
Average monthly evaporation data (for an S Class Pan) obtained from weather station X1E003 (Nooitgedacht Dam) is summarised in the table below. Weather station X1E003 is between 13 and 20km from the proposed pipeline routes.

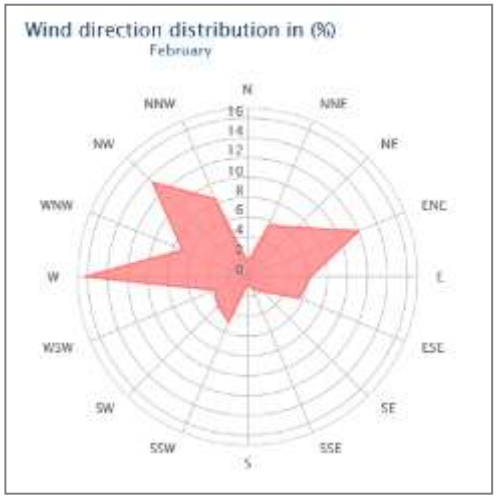
Table 7: Average monthly evaporation from weather station X1E003

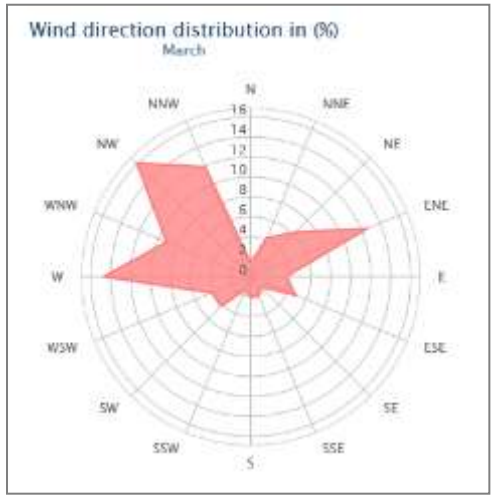
Month	Evaporation (mm)
January	193.3
February	171.7
March	162.8
April	125.1
May	108.4
June	87.6
July	96.1
August	127.2
September	169.2
October	185
November	179.9
December	191.6
Mean Annual Evaporation	**1801.7**

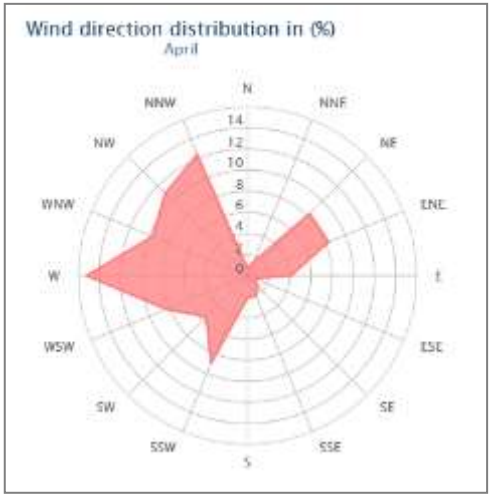
2.2.4 Wind

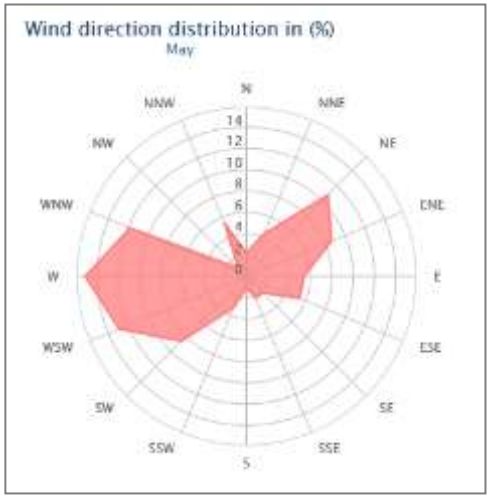
The proposed pipeline routes are situated approximately 21km North-west of Carolina. The figures below give an indication of wind direction distributions in Carolina, as compiled from www.windfinder.com.

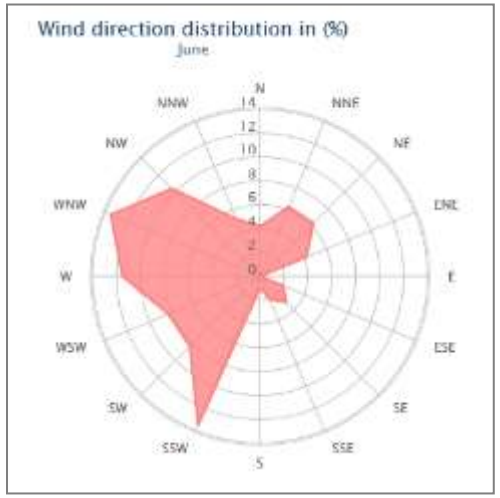

Wind direction distribution in (%)
January
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
20
15
10
5
0


Wind direction distribution in (%)
February
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
16
14
12
10
8
6
4
2
0


Wind direction distribution in (%)
March
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
16
14
12
10
8
6
4
2
0


Wind direction distribution in (%)
April
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
14
12
10
8
6
4
2
0


Wind direction distribution in (%)
May
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
14
12
10
8
6
4
2
0


Wind direction distribution in (%)
June
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
14
12
10
8
6
4
2
0

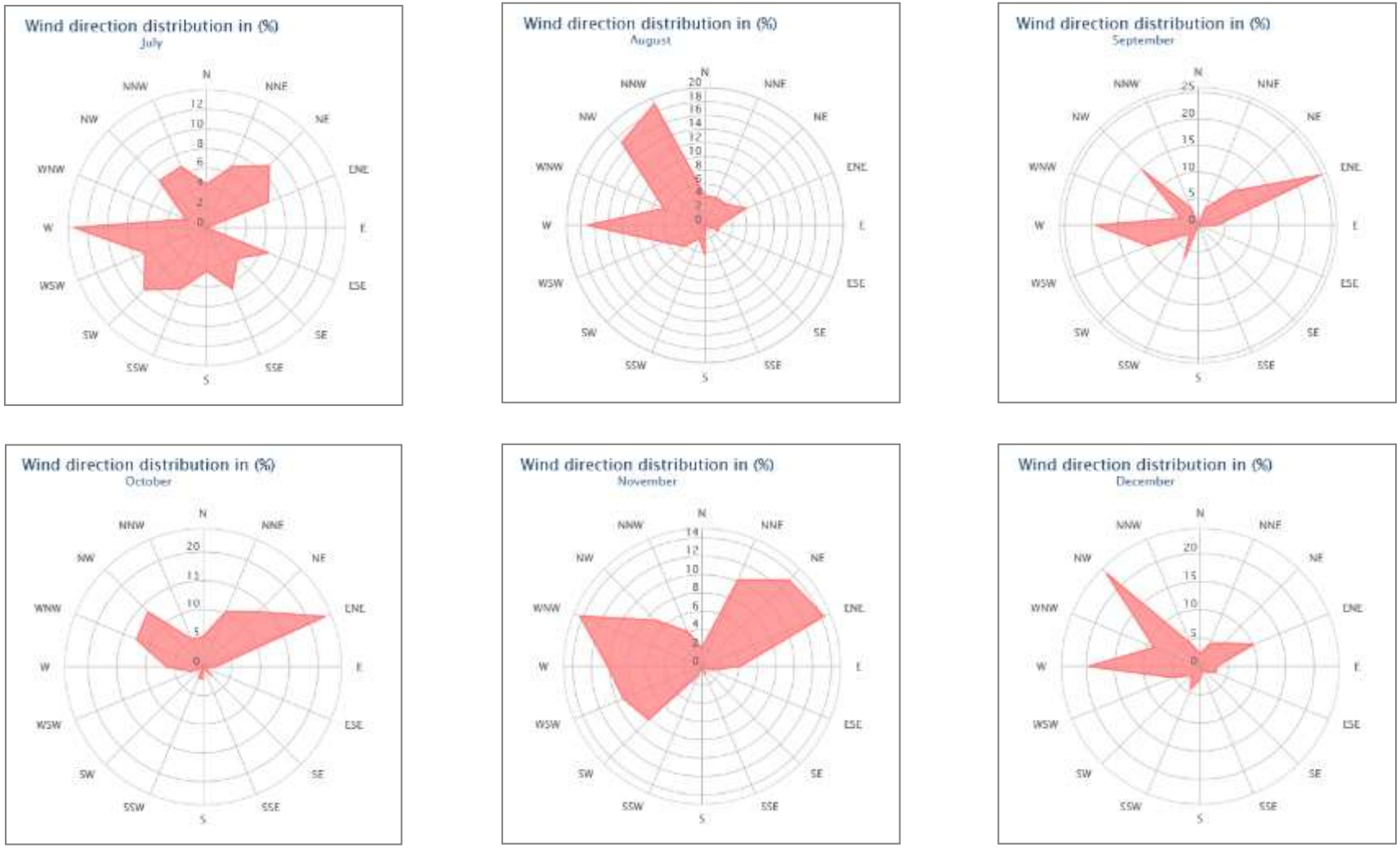


Figure 8: Wind Roses Showing the Monthly Wind Direction at the Site

2.3 Topography

The topography of the preferred and alternative routes for the proposed pipeline are given in the figure below. The route's highest point is 1 730m above mean sea level near its Northern extent and its lowest point is 1 678m above mean sea level close to where the route passes the "Grootpan" pan.

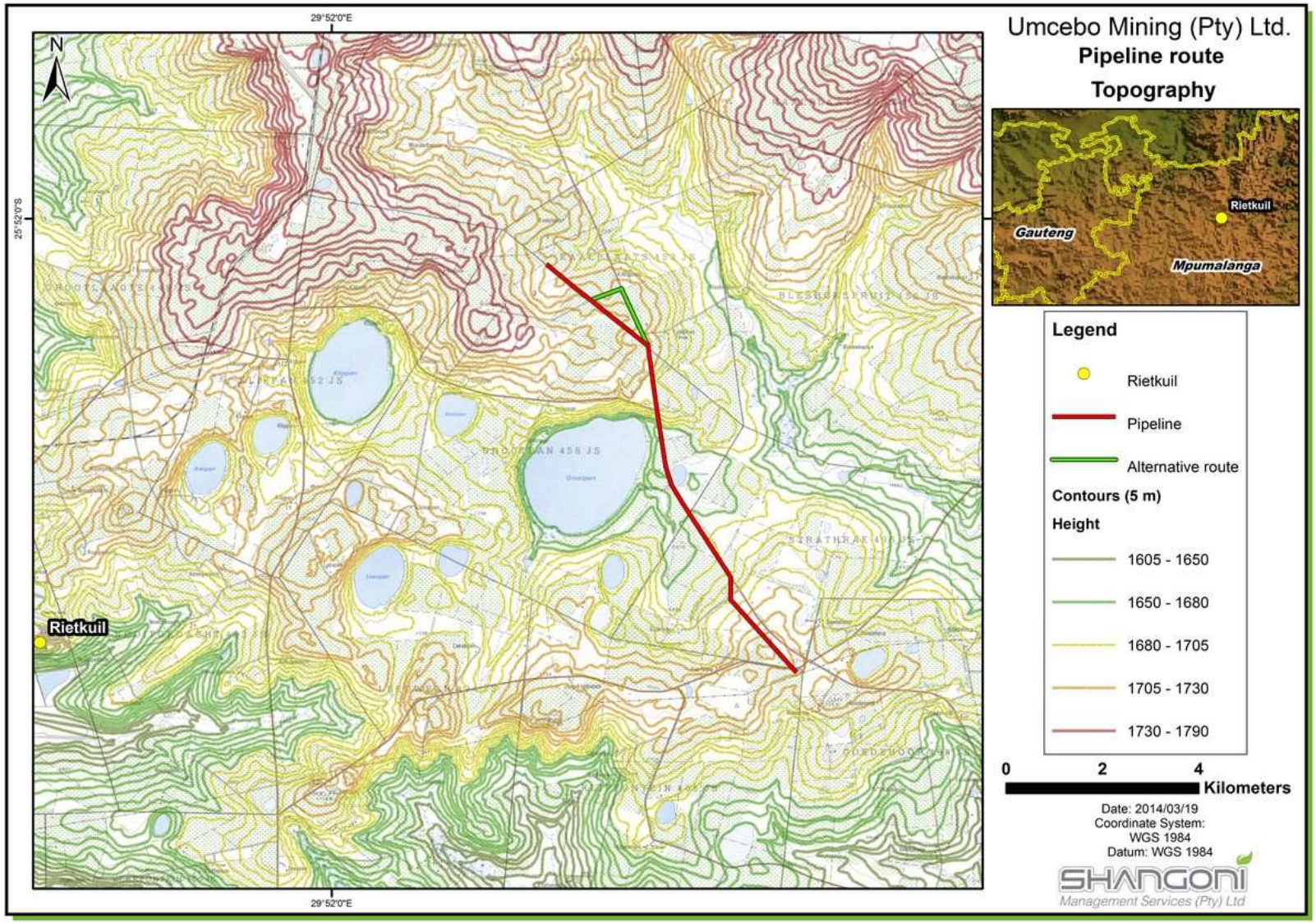


Figure 9: Topography of the pipeline routes

2.4 Land use and land capability

According to the AGIS Comprehensive Atlas (2007), the routes for the pipeline lie within an area of moderate to high potential arable land. The surrounding properties are mostly comprised of agricultural land (dry land and irrigated), grazing land, mines, minimal built up areas and natural grasslands (AGIS, 2007).

2.5 Vegetation

A vegetation assessment was conducted by Dimela Eco Consulting during 2013. The following is an extract from their report. The full report is attached under Appendix D.

2.5.1 Vegetation type(s)

The study site is located within the grassland biome of South Africa. This biome is dominated by grasses and plants with underground storage organs, such as tubers and bulbs. Most of the plant species are non-grassy herbs (forbs) of which the growth is stimulated by fire. Trees are scarce within this biome as the dry winters, high summer rainfall and veld fires create unfavourable conditions for the growth of indigenous tree species.

The grassland biome is further divided into smaller units known as vegetation types. The vegetation type that is expected to occur at the study site is Eastern Highveld Grassland (Dimela Eco Consulting, 2013) (also shown in the figure below). Natural Eastern Highveld Grasslands comprise of typical highveld grasses like *Themedia, Aristida* and *Eragrostis* species on an undulating landscape with pan depressions and low hills (Mucina & Rutherford, 2006). Eastern Highveld Grasslands are listed as “Endangered” and are poorly conserved. Much of the former grassland areas have been transformed by agriculture, urbanisation, mining and plantations. The exotic tree *Acacia mearnsii* (Black Wattle) becomes dominant in disturbed areas and can displace natural vegetation. Remaining portions of grassland are classified as “endangered” in terms of the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) due to their high conservation value and sensitivity (Dimela Eco Consulting, 2013). Only a small fraction (0.3%) of these grasslands are currently conserved in statutory reserves (Nooitgedacht Dam and Jericho Dam Nature Reserves) and private reserves (Holkranse, Kransbank and Morgenstond) (Mucina & Rutherford, 2006).

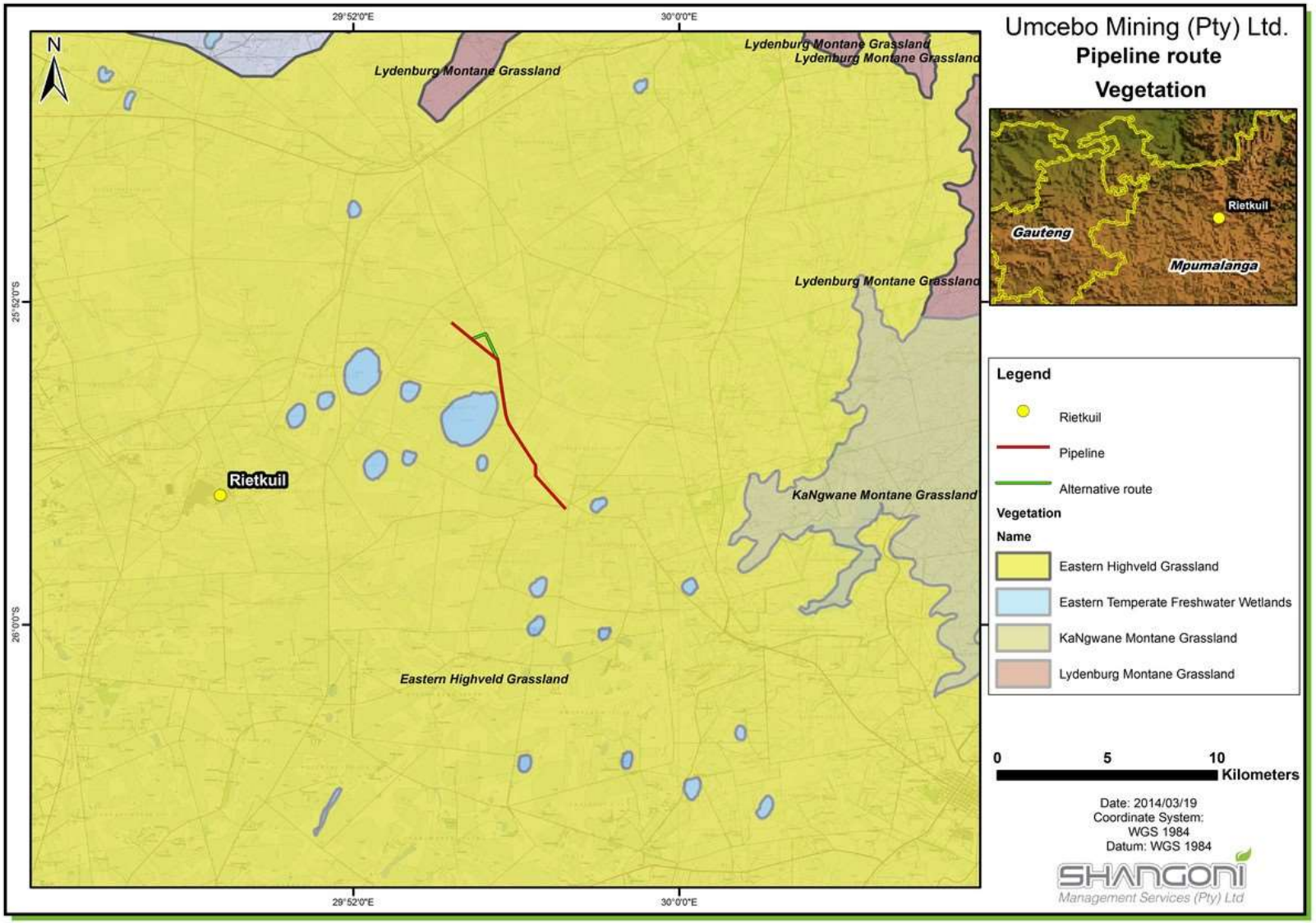


Figure 10: Vegetation at the study site

In terms of the Mpumalanga Biodiversity Conservation Plan, the northern extent of the proposed pipeline routes lie within an area designated as “Least Concern” and “No Natural Habitat Remaining”. These areas correspond largely to cultivated lands and the Wonderfontein mine. The southern extent of the proposed pipeline routes include areas that are classified as “Irreplaceable” and “Highly Significant”. These areas correspond to the natural grasslands surrounding the Grootpan pan and a number of other pans that provide suitable habitat for the persistence and conservation of flora and fauna species in an area that is otherwise largely fragmented by mining and cultivation. Each conservation category (Protected Areas, Irreplaceable Areas, Highly Significant Areas, Important and Necessary Areas, Areas of Least Concern, or Areas with No Natural Habitat Remaining) in terms of the Mpumalanga Biodiversity Conservation Plan has a broad land-use guideline assigned to it. The table below summarises the suitability of the biodiversity categories present within the study area to the proposed pipeline as a land use. “Linear Engineering Structures” and “Water Projects and Transfers” are restricted by compulsory, site specific conditions in all the present biodiversity categories, except within the “Irreplaceable” areas where this form of development is actively discouraged. These guidelines apply only to untransformed land with natural vegetative cover (Dimela Eco Consulting, 2013).

Table 8: Types of land-use suited to each biodiversity conservation category present at the study area (modified from Ferrar & Lötter, 2007) (Dimela Eco Consulting, 2013)

Type of Land Use	Irreplaceable	Highly Significant	Important and Necessary	Least Concern
Linear Engineering Structures	R	R	R	R
Water Projects and Transfers	N	R	R	R

Y – Yes, permitted and actively encouraged activity

N – No, not permitted, actively discouraged activity

R – Restricted by compulsory, site-specific conditions and controls when unavoidable, not usually permitted

The figure below illustrates the location of the various critical biodiversity areas in relation to the preferred and alternative pipeline routes.

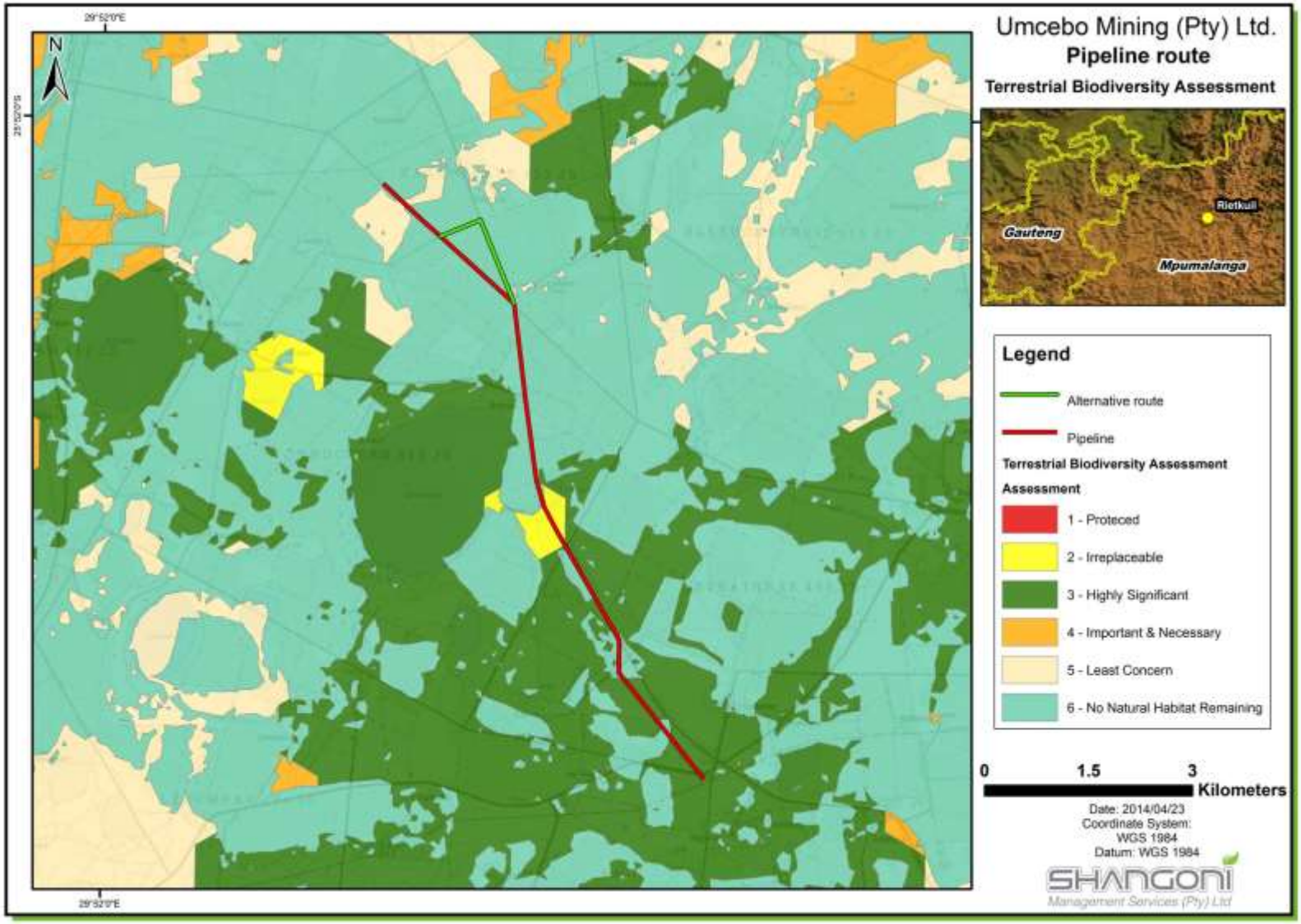


Figure 11: Critical Biodiversity Areas within which the pipeline routes lie

2.5.2 Observed vegetation communities at the study site

Large areas of vegetation along the proposed pipeline routes were found to be in a transformed state due to current and historical cultivation or mining and mining related practices. Some natural areas do, however, remain along drainage lines, pans and to the southern extent of the proposed pipeline routes. The observed vegetation can be grouped into the following categories:

1. Transformed grassland;
2. Secondary grassland;
3. Disturbed grassland;
4. Rocky grassland (largely natural); and
5. Moist grassland.

All plant species observed during the field survey are attached under Appendix D (as part of the Vegetation Assessment Report). The following section summarises the different vegetation groups observed.

1. Transformed grassland

Transformed grasslands were characterised by vegetation that no longer comprised the natural species diversity and included monocultures, areas where no natural vegetation persists, such as mining areas, and areas that are dominated by alien invasive plant species, such as stands of Blue Gum (*Eucalyptus*) or Wattle (*Acacia mearsnii*) trees. These grasslands were characterised by monocultures, such as maize fields, and had a low diversity of plant species that are naturally occurring within the Eastern Highveld vegetation type. Soil disturbances render these grasslands unlikely habitats for threatened plant species and none of such species were observed within the transformed grasslands.

2. Secondary grassland

The study area included pieces of land that were historically ploughed for maize or used to plant pastures. Where the pipeline routes align with the road, they lie mostly within road verges where previous disturbances due to road building and maintenance occurred. Grassland has re-established within the fallow lands or disturbed road verges, but succession has not yet progressed to where original species diversities are reached. This is likely due to severe, long-term soil disturbances, such as ploughing, and a depletion of the seed bank, which has resulted in the disturbance of the grassland beyond a threshold from where is could have reverted back to a climax grassland state. Secondary grassland could potentially become primary grassland through succession. The plant community may be in a state of equilibrium under the current conditions, but has not reached its natural climax, or has regressed from, it due to biotic factors like human intervention. This is called “plagioclimax” and is the result of continuous human activities, including livestock grazing. The constant grazing pressure will likely keep these grasslands in a sub-climax state.

The species composition within the secondary grasslands varied depending on the past land use of the area. *Eragrostis curvula, Hyparrhenia hirta, Sporobulus pyrimidialis* and *Cynodon dactylon* grassland species were dominant. Herbaceous species included *Helichrysum rugulosum*, *Hypoxis rigidula, Pentanissia angustifolia, Hermannia depressa, Selago densiflora* and *Gomphocarpus fructicosa* (Milkweed). A patchy occurrence of *Seripheum plumosum* (Bankrupt Bush) was also present. This species is known to increase in overgrazed grasslands. The provincially protected orchid, *Satyrium parvifolium,* was observed directly east of the Umcebo Strathrea Mine, within the proposed pipeline footprint.

3. Disturbed grassland

The disturbed grasslands had a diversity of Increaser II and III grasses (species that increase in over utilised or grazed veld) and a higher frequency of *Seripheum plumosum* (Bankrupt Bush) (Dimela Eco Consulting, 2013). Continuous grazing pressure reduced palatable grasses and changed the species composition from what is expected in natural Eastern Highveld Grasslands (Mucina & Rutherford, 2006). There was a patchy occurrence of *Aristida congesta* (Tassel Three-awn), *Hyparrhenia hirta* (Common Thatching Grass), *Cynodon dactylon* (Couch Grass), *Eragrostis curvula* (Weeping Love Grass) and *Eragrostis gummiflua* (Gum Grass). The forb layer had limited species diversity, but this could be attributed to the assessment being undertaken in late summer. The following forb species were observed: *Pentanissia prunelloides* (Broad-leaved Pentanissia), *Helichrysum rugulosum, H nudifolium* (Hottentots Tea), *Hermannia depressa* (Creeping Hermannia), *Felicia muricata, Seripheum plumosum* (Bankrupt Bush) *Dicoma anomala, Gnidia* species and *Selago densiflora*. A gladiolus species that had just finished flowering was observed. It is thought to be *Gladiolus crassifolius*. The provincially protected orchid, *Satyrium parvifolium,* was observed north-east of the Umcebo Strathrea Mine, within the proposed pipeline footprint. Other than the gladiolus species and *Satyrium parvifolium*, no other plant species of known conservation concern were observed.

4. Rocky grassland (largely natural)

Most rocky and steep areas were found to be in a largely naturally vegetated state with a few localised disturbances and signs of overgrazing. This vegetation group consisted mostly of grasses such as *Eragrostis curvula, E chloromelas, Monocymbium ceresiforme* (Boat Grass) and *Themeda triandra* (Red Grass). In some areas, high numbers of Invader II and III grasses were indicative of continuous grazing pressure (Dimela Eco Consulting, 2013). These grasses included *Aristida congesta, Diheteropogon filifolius* (Thread-leaved Bluestem)*, Eragrostis gummiflua* and *Cynodon dactylon* (Couch Grass), as well as a patchy occurrence of *Seripheum plumosum* (Bankrupt Bush). Other herbaceous species included *Dicoma anomala, Ipoemoea crassipes, Pentanisia prunelloides, Eriosema cordatum, Chamaecrista mimosoides* (Fishbone Cassia) and *Senecio coronatus* (Wooly Senecio). The fern, *Cheilanthus* cf *hirta,* was observed between rocks north east of Grootpan (outside of the assumed impacted area). The small tree *Searsia rigida* was also observed wedged between the rocks. 11 grass species, 19 forbs, one sedge, one fern and one alien invasive plant species were

noted within this vegetation group, compared to 11 grasses, 11 forb species and eight alien invasive plant species within the secondary and degraded grasslands.

5. Moist grassland

The area along the proposed pipeline route contained moist grasslands, especially in proximity to the pans and in the lowest lying areas. Some historically cultivated lands infringe on wetland areas. These grasslands were dominated by the grass species *Eragrostis gummiflua, E. plana* or *Aristida junciformis.* Various sedges as well as moisture loving forbs like *Lobelia erinus, Nidorella anomala* and *Centella asiatica* were observed, together with the exotic *Persicaria* species (Knotweed/Snakeroot). The species composition within the grasslands varied depending on whether an area was cultivated in the past or not. Areas under high grazing pressure were mainly along the edges of permanent wetland areas, such as the larger pans, and were dominated by grasses like *Eragrostis gummiflua*, *E. plana, E curvula, Agrostis lachnantha* (Bent Grass) and/or *Aristida aequiglumis.* In areas with minimal disturbances, the grasses *Agrostis lachnantha, Panicum repens* (Couch Panicum), *Setaria* species (Bristle Grass) and *Paspalum dilatatum* (Dallis Grass) dominated, while *Leersia hexandra* (Rice Grass) had a patchy occurrence in the northern extent of the proposed pipeline. Sedges were common and included *Cyperus denudatus,* as well as *Typha capensis,* in permanently inundated soils. Herbaceous species within the moist grasslands included *Haplocapra lyrata, Berkheya* species, *Monopsis decipiens* (Butterfly Lobelia), *Nidorella anomala* and *Centella asiatica* (Marsh Pennyworth). The declining plant species *Crinum bulbispermum* could occur within moist grasslands that were not subjected to prolonged disturbances, but was not noted during the survey. Eight grass species, three forbs, six sedges and eight weedy or invasive plants species were noted (Dimela Eco Consulting, 2013).

2.5.3 Endangered or rare species

During the survey, three nationally protected plant species were observed within the study area. These included a *Gladiolus* specie, *Satyrium parviflorum* and the *Cheliantuhus* cf *hirta.* The *Cheilanthus* is situated west of the proposed footprint of the pipeline and is unlikely to be impacted on. There are also three other protected species that may occur at the study site, namely *Crinum* species, *Eucomis autumnalis* and *Watsonia* species. Details of the above are given in the next table.

Table 9: List of protected plants that were confirmed to occur or could potentially occur in the area

Species	Protection	Occurrence
Satyrium parviflorum	Whole family: Orchidaceae	Confirmed to occur in secondary and degraded grassland east of the Umcebo Mine. The secondary grassland included moist patches, likely seepage from the mining area, wherein the orchid grew. The proposed pipeline will traverse their localities. **Latitude Longitude** -25.9308 29.93883

Species	Protection	Occurrence
		-25.9263 29.9362
Gladiolus species	All species	Confirmed occurrence of *Gladiolus* cf *crassifolius* in degraded and rocky grasslands. The proposed pipeline will traverse their habitat. **Latitude Longitude** -25.9505 29.95245 -25.9044 29.92681
Crinum species	All species	Possible occurrence in the moist grassland
Eucomis autumnalis	All species	Possible occurrence in moist and rocky grassland
Watsonia species	All species	Possible occurrence in moist and rocky grassland
Cheilanthus cf *hirta*	All ferns except bracken fern	Confirmed to occur in rocky grassland north-east of Grootpan – not within the assumed footprint of the pipeline

2.5.4 Alien and invasive species

Declared weeds and invader plant species have a tendency to dominate or replace the canopy or herbaceous layer of natural ecosystems, thereby transforming the structure, composition and functioning of natural ecosystems. It is therefore important that these plants are controlled and eradicated by means of an eradication and monitoring programme. Some invader plants may also degrade ecosystems through superior competitive capabilities that exclude native plant species (Henderson, 2001).

The main invasive species [in terms of the list of categories of invasive species (National Environmental Management: Biodiversity Act (Act No. 10 of 2004)] that were observed within the study area were:

- *Cirsium vulgare* (Scotch Thistle) – proposed Category 1b invader;
- *Acacia mearsnii* (Black Wattle) - Category 2 invader*;*
- *The* ruderal weed *Conyza alba;* and
- *The* ruderal weed *Bidens formosa* (Cosmos)*.*

Category 1b invasive species require compulsory control as part of an invasive species control programme. The plants must be removed and destroyed. They are deemed to have such a high invasive potential that infestations can qualify to be placed under a government sponsored invasive species management programme. No permits will be issued for these plants.

Category 2 invasive species are regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. No permits will be issued for Category 2 plants to exist in riparian zones.

Other alien species identified include *Bidens pilosa* (Blackjack), *Conyza bonariensis* (Flax-leaf Fleabane), *Eucalyptus specie* (Blue Gum), *Oenothera stricta* (Yellow Evening Primrose), *Persicaria lapathifolia* (Knotweed/Snakeroot), *Rumex crispus* (Curly Dock) and *Verbena bonariensis* (Wild Verbena).

2.5.5 Vegetation Importance and Sensitivity

A vegetation sensitivity assessment was undertaken to determine whether the vegetation within the study area is of conservation concern and therefore sensitive to development. The assessment methodology is given in the Vegetation Assessment attached under Appendix D.

The sensitivity of the various vegetation groups observed at the study site are summarised in the table below.

Table 10: Sensitivities of the various vegetation groups

Vegetation Group	Sensitivity
Transformed Grasslands	Low
Secondary Grasslands	Low
Degraded Grasslands	Medium
Rocky/natural Grasslands	Medium
Moist Grasslands	High

The location of the various vegetation groups and their corresponding sensitivities are shown visually in the figure below (Dimela Eco Consulting, 2013).

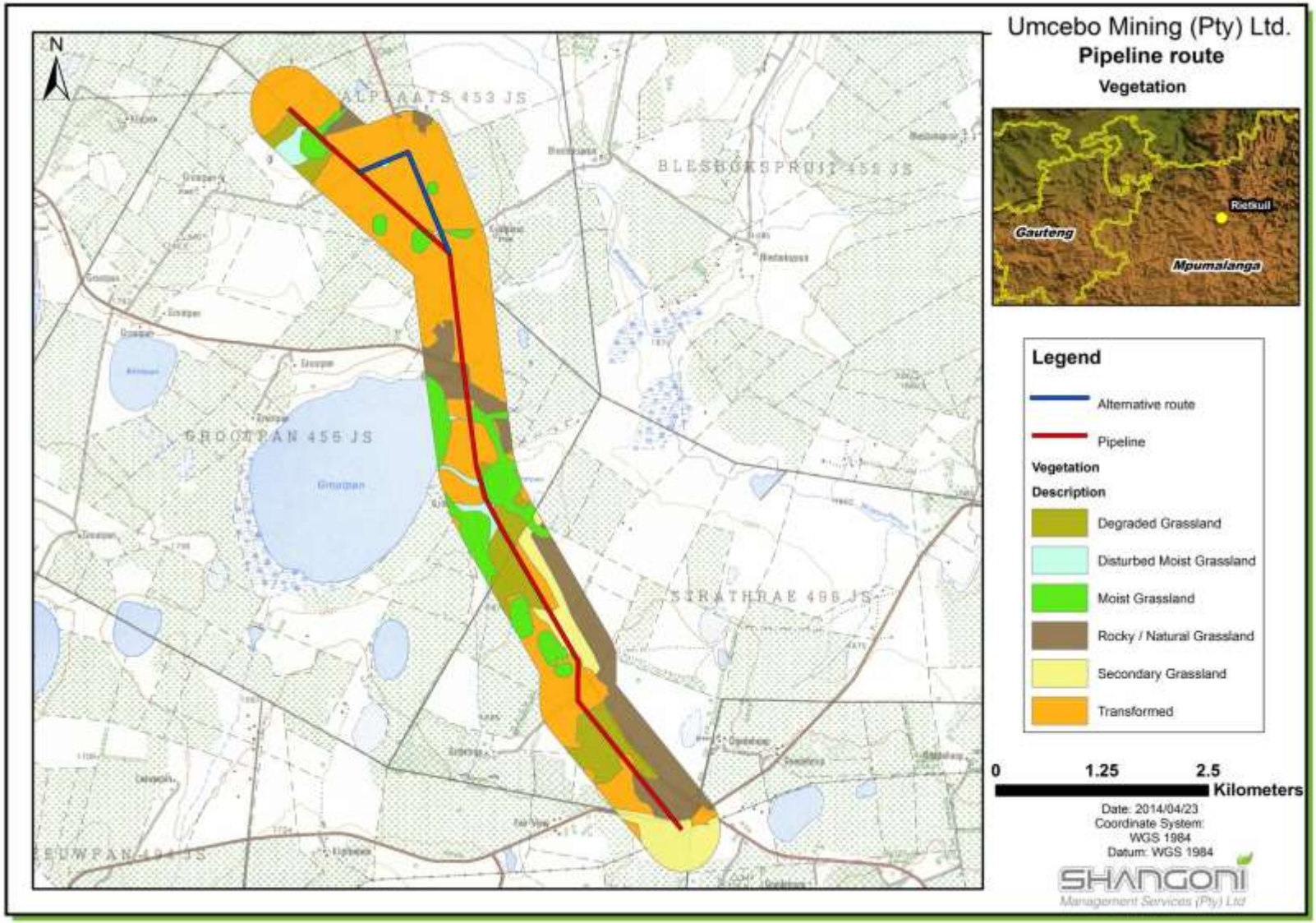


Figure 12: Vegetation groups along the pipeline routes

2.6 Animal life

A faunal assessment was conducted by Classical Environmental Management Services in 2013. The following is an extract from their report. The full report is attached under Appendix D.

The majority of mammal, reptile and amphibian species are nocturnal and birds are highly mobile. Therefore, for the faunal assessment, the presence of suitable habitats were used to determine the status of the species through the use of a variety of field guides and atlases. The assessment also took into account the presence of possible sensitive habitats to inform the identification of potential impacts from the proposed development. The probability of the occurrence of mammal, reptile, bird and amphibian species was based on their geographical areas of occupancy, habitat suitability and observations during the site survey.

2.6.1 Fauna Habitats on site

The following habitats for fauna species were identified on site:

- Disturbed grasslands;
- Wetland areas and moist grassland; and
- Rocky outcrops.

The range of different altitudes, slopes, light conditions and hydrological conditions associated with rocky outcrops result in a high spatial heterogeneity and therefore high faunal biodiversity is present. Rocky outcrops also act as wildlife corridors.

Rocky outcrops were found on the northern portions of the study area, but have been impacted upon by anthropogenic activities such as livestock grazing. The rocky outcrops can, however, provide suitable habitat for various faunal species including mammals, invertebrates, birds and reptiles that will use the area for shelter and roosting. Visual confirmations of jackals and small antelope species were made within this area during the site survey.

2.6.2 Commonly occurring species

Amphibians

A diurnal survey was undertaken to identify suitable habitats for amphibian species based on the hydrology of the site. Most frog species in Mpumalanga are classified as “explosive breeders” which complete their short-duration reproductive cycles in the early summer months of November to January. The frogs emerge after the first heavy summer rains and are dormant during cold winter months. The table below summarises the frog species that area likely to be present within the area and that have been confirmed by the Animal Demographic Unit (2013). However, no occurrences were confirmed during the site survey for this project.

Table 11: Possible amphibian species that may occur within the study site

Scientific Name	Common Name	Conservation Status
Bufo gutturalis	Guttural Toad	Least Concern
Bufo rangeri	Rangers Toad	Least Concern
Cacosternum boettgeri	Common Caco	Least Concern
Kassina senegaensis	Senegal Kassina	Least Concern
Phrynobatrachus natalensis	Snoring Puddle Frog	Least Concern
Afrana angolensis	Common River Frog	Least Concern
Afrana fuscigula	Cape River Frog	Least Concern
Semnodactylus wealii	Weale's Running Frog	Least Concern
Strongylopus fasciatus	Striped Stream Frog	Least Concern
Tomopterna cryptosis	Common Sand Frog	Least Concern
Tomopterna tandyi	Tandy's Sand Frog	Least Concern
Tomopterna natalensis	Natal Sand Frog	Least Concern
Xenopus laevis	African Clawed Frog	Least Concern

Most frogs lay their eggs in water where they develop into tadpoles. The tadpoles live in the water until they metamorphose into juvenile fogs which are terrestrial. This dependence on water *and* land for their life cycles, together with the fact that these animals have semi-permeable skins, makes frogs particularly vulnerable to pollutants and other environmental stresses. In addition, extensive habitat transformation and high levels of human activities within the study area have resulted in low amphibian diversity. As such, the amphibian species expected to occur at the study site will be common and generally hardy species.

Reptiles

South Africa has a high diversity of reptile species, with more endemic reptile species than mammal species. Reptiles are generally shy and extremely sensitive to habitat destruction and transformation (Branch, 1998). As such, a comprehensive species list specific to the study area could not be compiled.

According to Schedule 2 of the Mpumalanga Nature Conservation Act (Act No. 10 of 1997), all reptile species, excluding both monitor species (*Varanus exanthematicus* and *V. niloticus*) and all snakes are listed as protected. In addition, two species, namely Breyer's long-tailed seps (*Tetradactylus breyeri*) and the Striped Harlequin snake (*Homoroselaps dorsalis*) are listed by the IUCN (International Union for Conservation of Nature) as Vulnerable and Near Threatened, respectively.

Reptiles are extremely secretive and difficult to observe during field surveys. The identification of reptile species therefore relied upon an assessment of the vegetation and surrounding areas of the site. Due to the disturbed and transformed nature of the site, it is supposed that the reptile assemblages of the area and site are also transformed. No termite mounds were present within the assessed areas or immediate surrounds, although rocky outcrops and large trees were present and

could be utilised by reptile species. After careful analysis of the habitat on site, it is not expected for any reptiles of conservation concern to occur within the study area.

Avifauna

Assessing the presence or absence of bird species as part of this study relied upon previous data, the vegetation assessment, bird calls, direct sightings, the presence of nests and the geological features of the study area. Relatively few avifaunal species were visually identified and there was a distinct lack of roosting sites within the study area. During the site survey, a pair of Secretary Birds were observed.

A list of bird species that are important in terms of their conservation value and which may be present within the study area was obtained from the Mpumalanga Tourism and Parks Agency. The likelihood of occurrence of each species is given in the table below.

Table 12: Conservation Important Bird Species of Mpumalanga

Scientific Name	Common Name	Conservation Status	Likelihood of Occurrence
Falco peregrinus	Peregrine Falcon	Near Threatened	Low: This species typically nests on cliffs or tall buildings. The study area has no cliffs or tall buildings and therefore roosting sites are not present. The Peregrine Falcon does feed on other bird species and small mammals and may therefore use the area for foraging.
Buphagus erythrorhynchus	Red-billed Oxpecker	Near Threatened	Medium – low: The Red Billed Oxpecker prefers open country where it eats insects, especially parasites, such as ticks that live on mammal species. The occurrence of mammal species and livestock indicates that this species will have a medium - low occurrence within the study area, but only when livestock or large herds of non-domesticated mammals are present.
Falco naumanni	Lesser Kestrel	Vulnerable	Medium: This species feeds on small rodents, birds and insects. It does not build a nest, but likely roosts include buildings (showing its adaption to human interaction) and tree holes. It is likely that this species could utilise the site for foraging and roosting.
Polemaetus bellicosus	Martial Eagle	Vulnerable	Medium: In southern Africa, this species has adapted to the more open habitats of scattered trees, wooded hillocks and, as a recent adaptation, man-made pylons. The Martial Eagle has large foraging areas and

Scientific Name	Common Name	Conservation Status	Likelihood of Occurrence
			likely uses the site for foraging. Roosting is likely in more pristine areas.
Tyto capensis	African Grass-Owl	Vulnerable	Low: Grass owls prefer to roost in long grasses where they make tunnels. They are highly disturbed by agricultural practices and the lack of long grasses in the immediate study area makes the area unsuitable for roosting.
Sagittarius serpentarius	Secretary Bird	Near Threatened	Definite – High: This species is associated with open grasslands and savannahs where they hunt mainly for snakes and other reptiles. They are terrestrial birds that hunt on the ground and roost in Acacia trees. No roosting sites were present within the assessed areas or immediate surrounds. However, the species was visually identified using the secondary grassland along the route for foraging.
Ciconia nigra	Black Stork	Near Threatened	Medium – low: This species is found in marshy areas, rivers or inland waters. The study area contains such areas, but these areas are not likely to be utilised for the development of the pipeline.
Mirafra cheniana	Melodious Lark	Near Threatened	Low: This species enjoys seasonally wet or flooded, lowland grassland. The site does contain areas of moist grassland, but their transformation by anthropological activities makes the area less likely to be utilised by this species.

By nature, birds are mobile fauna assemblages able to adapt and relocate rapidly to more pristine areas.

The rivers, wetlands and moist grassland within the study area will play an important role as microhabitat for avifauna species that may use the surrounding grassland for foraging and roosting. These rivers, wetlands and moist grassland will also provide migratory corridors and flight paths for avifauna.

Mammals

Assessing the presence or absence of mammal species relied upon the vegetation assessment and was supplemented by dropping and spoor observations. During the site survey, signs of mammals were seen and these included spoor, burrows and droppings. Rodent activity was evident from

burrows and disturbed plant material, especially seed baring grasses. It is therefore inferred that the study area is capable of supporting a high diversity of small mammal species. The transformed nature of the study site is also suitable for hardy, large mammal species such as hares and buck that utilise secondary grasslands, as well as carnivorous mammal species that rely on the small mammal species for food. The table below gives a list of the mammal species identified during the site survey.

Table 13: Mammal species identified within the study area

Scientific Name	Common Name	Conservation Status
Raphicerus campestris	Steenbok	Least Concern
Sylvicapra grimmia	Common Duiker	Least Concern
Canis mesomelas	Black-Backed Jackal	Least Concern
Cryptomys hottentotus	Common Molerat	Least Concern
Cynictis penicillata	Yellow Mongoose	Least Concern
Galerella pulverulenta	Small Grey Mongoose	Least Concern
Lepus saxatilis	Shrub Hare	Least Concern
Mastomys coucha	Multimammate Mouse	Least Concern
Pedetes capensis	Springhare	Least Concern

By nature, mammals are mobile fauna assemblages able to adapt and relocate rapidly to prime areas.

Invertebrates

Invertebrate species are mobile in nature and are not likely to be affected by the proposed development. They have therefore not been included in this study.

2.6.3 Ecological Importance and Sensitivity

Wetlands/Moist Grasslands and Rocky Outcrops

These habitat types have a medium ecological function and conservation importance due to the following:

- Wetlands are noteworthy movement corridors for terrestrial faunal species, especially those with a preference for temperate conditions (for example small rodent species) and serve as important flight paths for bird species. They may also connect other suitable foraging and roosting areas;
- The areas could provide suitable habitat for sensitive and non-sensitive fauna species, including amphibians; and
- Wetlands and moist grasslands could provide breeding, foraging and roosting areas for a variety of fauna species.

Disturbed grassland areas

This habitat type has a medium ecological function and conservation importance due to the following:

- The grassland could provide foraging areas, although it is not expected to be utilised extensively. The grassland vegetation is uniform within the study area and immediate surroundings and is comprised of succession grasses;
- The majority of mammal, reptile, bird and amphibian species that could be found on site are mostly of “least concern” and mitigation measures for the development will ensure their protection;
- Mammal and bird species of conservation concern are likely to utilise the area for foraging, but are expected to utilise large ranges that include the surrounding areas;
- The area was utilised by the conservation important Secretary Bird; and
- The high levels of transformation and cultivation disturbance has resulted in areas with transformed habitat that have a medium – low ecological function (Classical Environmental Management Services, 2013).

2.7 Surface water

2.7.1 Catchment areas

The site lies within the X11C quaternary catchment area as shown in the figure below. This catchment area is situated in the Inkomati Water Management Area. All the rivers from this catchment flow through Mozambique before flowing into the Indian Ocean (DWAF, 2004). The ratio of Mean Annual Precipitation (MAP) to Potential Evapotranspiration (PET) is 0.4 in this quaternary catchment. This indicates that any wetlands within this catchment (refer to Section 2.9.1) are sensitive to changes in the regional hydrology, especially where the wetlands’ catchments are transformed and the water available for their sustenance becomes redirected (Limosella, 2013).

2.7.2 Mean annual runoff (MAR)

The total Mean Annual Runoff for the Inkomati Water Management Area is 3 539 million m^3/annum and the Ecological Reserve is 1 008 million m^3/annum (DWAF, 2004).

2.7.3 Water authority

The relevant water authority is the Mpumalanga Department of Water Affairs.

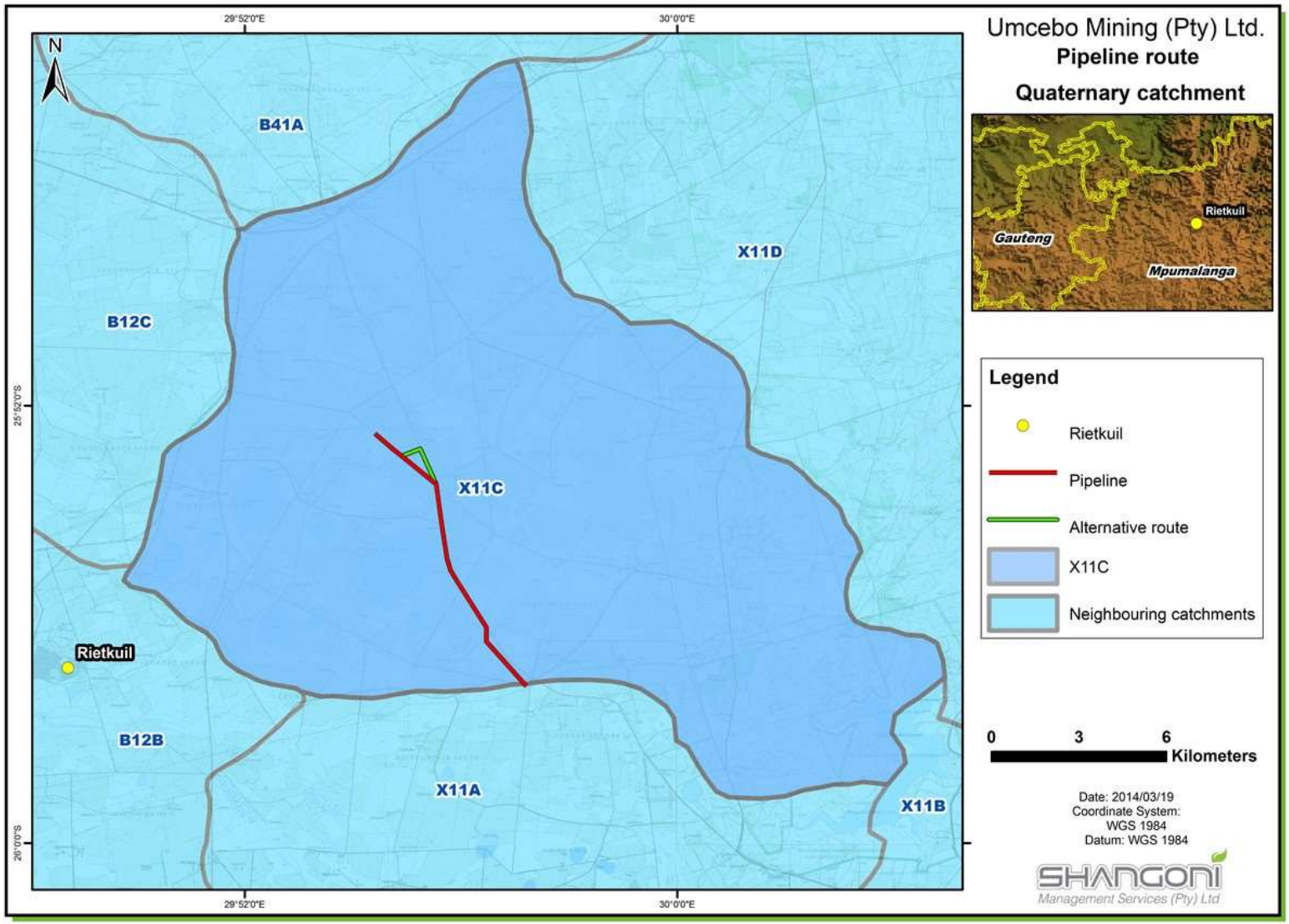


Figure 13: Quaternary Catchment of the study area

2.8 Groundwater

2.8.1 Aquifer type

The aquifer types of the area are d2, intergranular and fractured aquifers with median borehole yields of 0.1-0.5 litres/second (Geohydrological Map Sheet 2526, 1999). The aquifers are classified as "minor" aquifers (DWA, 2012).

2.8.2 Depth of water tables

The depth to the water level is approximately 12.9mbgl (metres below ground level) and the groundwater recharge is approximately 13mm per annum. The baseflow is approximately 25mm per annum in the vicinity of the site (DWAF, 2010).

2.8.3 Boreholes and springs

The Wonderfontein mine currently uses groundwater from boreholes within the mining area. No boreholes form part of this proposed water pipeline project.

2.8.4 Groundwater quality

The mean TDS (Total Dissolved Solids) found in groundwater in the area is 291mg/ℓ (DWAF, 2010).

2.9 Sensitive landscapes

2.9.1 Wetlands

A wetland delineation and functional assessment was conducted by Limosella Consulting in 2013. The following is an extract from their report. The full report is attached under Appendix D.

Wetlands are defined as *"land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil"* (National Water Act, 1998).

According to Regulation 1199 of the National Water Act, 1998 (Act No. 36 of 1998), any wetlands situated within a 500m radius from a proposed activity should be regarded as sensitive features that may be affected by said activity or development. The wetlands should therefore be delineated prior to any development.

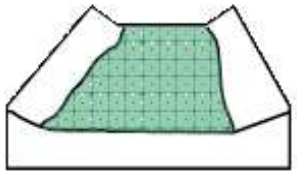
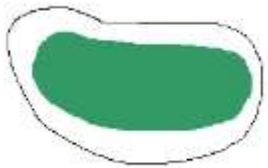
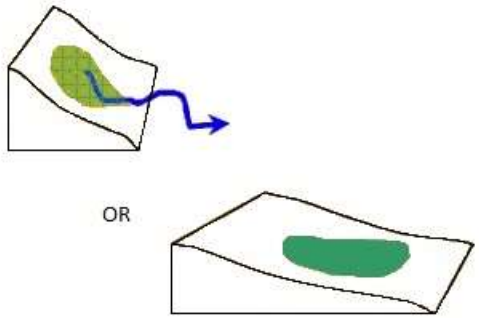
Wetland systems in the region are classified as Eastern Temperate Freshwater Wetlands (Mucina & Rutherford, 2006). The Eastern Temperate Freshwater Wetlands occur in shallow depressions or flat landscapes filled with water. The water bodies have aquatic zones and outer parts with hygrophilous

vegetation associated with temporarily flooded grasslands. The vegetation type is classified as Endangered (Mucina & Rutherford, 2006).

Several pans and perennial and non-perennial rivers are located in the vicinity of the proposed pipeline routes. Specifically, the Otterpan and Grootpan are located in close proximity to the proposed route while the Witkloofspruit and Blekbokspruit are located north-east of the proposed route. Most of the wetlands along the proposed route have been largely affected by farming activities and grazing practices. The catchment of the surrounding area has also been transformed to agricultural and grazing areas. Even though the proposed pipeline is located adjacent to an existing road, it is still likely that the proposed activities will have an impact on the wetlands.

From north to south the wetlands are classified as an Unchannelled Valley Bottom wetland (Wetland 1), an Unchannelled Valley Bottom wetland linked to a stream (Wetland 2), a Seepage Wetland linked to a Pan (Grootpan) (Wetland 3), another Pan (Otterpan) (Wetland 4) and an Unchannelled Valley Bottom wetland located adjacent to the Strathrea mine (Wetland 5). Details of the wetlands are given in the table and figure below. A number of these wetlands are located on farm land and have been transformed by crop planting. Wetland 2 has been affected by damming of the stream in various places. Exotic vegetation is present in most of the wetlands.

Table 14: Classification of Wetland and Riparian Areas (Adapted from Brinson, 1993; Kotze, 1999; Marneweck and Batchelor, 2002; and DWAF, 2005)

Hydro-geomorphic types	Visual Representation	Description
Unchannelled Valley Bottom wetland		Linear fluvial, net depositional valley bottom surfaces that do not have a channel. The valley floor is a depositional environment composed of fluvial or colluvial deposited sediment. These systems tend to be found in the upper catchment areas or at tributary junctions where the sediment from the tributary smothers the main drainage line. An artificial drain has been created within the wetland system for stormwater management as well as the construction of dams within the area, leading to an unnatural drain within the wetland system.
Depressional pans		Small (deflationary) depressions that are circular or oval in shape. They are usually found on the crest positions of the landscape. The topographic catchment area can usually be well defined, i.e. a small catchment area following the surrounding watershed. Although often seemingly endorheic (inward draining), many pans are “leaky” in the sense that they are hydrologically connected to adjacent valley bottoms through subsurface diffuse flow paths.
Seepage Wetlands		Seepage wetlands are the most common type of wetland (in number), but probably also the most overlooked. These wetlands can be located on the mid- and footslopes of hillsides, either as isolated systems or connected to downslope valley bottom wetlands. They may also occur fringing depressional pans. Seepages occur where springs are decanting into the soil profile near the surface, causing hydric conditions to develop, or where through flow in the soil profile is forced close to the surface due to impervious layers, such as plinthite layers or where large outcrops of impervious rocks force subsurface water to the surface.

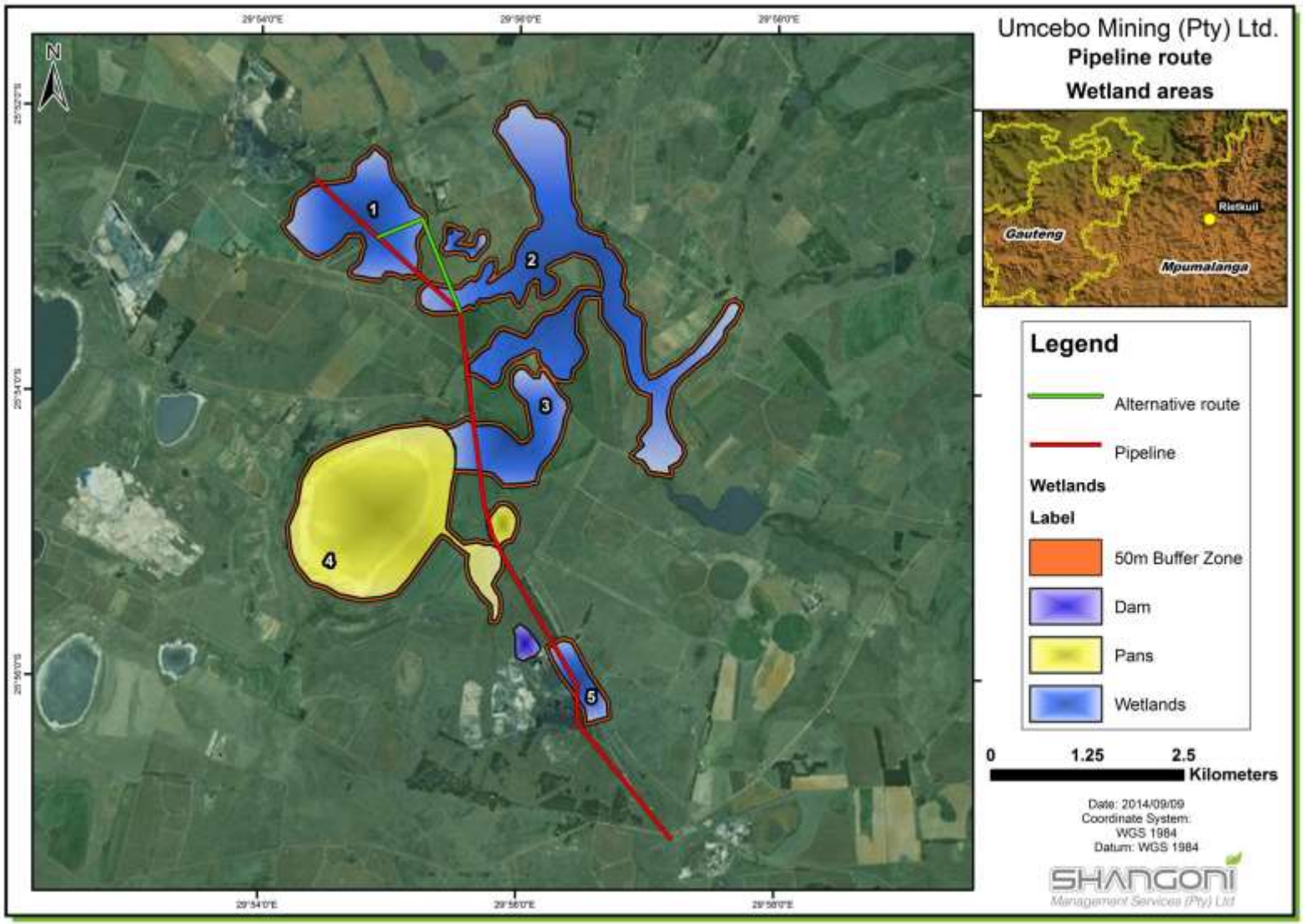


Figure 14: Wetland Areas and Associated Buffer Zones along the Proposed Pipeline and Alternatives (Limosella Consulting, 2013)

Wetland delineations rely upon the presence of the following wetland indicators:

1. Hydrophytic vegetation;
2. Hydromorphic soil; or
3. The presence of standing water or a high water table.

The following exotic vegetation was associated with the wetlands throughout the proposed pipeline routes:

- *Cosmos bipinnatus;*
- *Amaranthus viridis;*
- *Tagetes minuta;*
- *Verbena bonariensis;*
- *Cirsium vulgare;*
- *Bidens pilosum;*
- *Acacia mearnsii;* and
- *Conyza bonariensis*.

Hydrophytic vegetation

The following hydrophytic plants were observed in the wetlands throughout the proposed pipeline routes:

- *Typha capensis* (Bulrush)*;*
- *Berkeya* sp.*;*
- *Imperata cylindrical;*
- *Cyperus congestus;*
- *Kylinga melanosperma;*
- *Kylinga erecta;*
- *Juncus effesus;*
- *Paspalum urvillei;*
- *Phragmites australis;* and
- *Leersia hexandra.*

Hydromorphic soils

Soil samples of the study site showed a range of soil types, from clay to sandy soils. Iron precipitation as well as root oxidation were found along the proposed pipeline routes. Towards the north of the proposed routes a thin layer of organic material was also found within the wetlands. Underneath the organic layer the soil was generally dark clay soils with clear root oxidation visible. Areas around the wetlands where the soil has been disturbed by farming activities were generally unstructured red soils. Bleached soils were also observed with clear orange mottling in the north of the unchannelled valley bottom wetland. Soil surrounding the pans were mostly clay soils changing to more sandy soils further away from the pans.

Standing water or a high water table

Standing water was found in a few of the wetlands and it is therefore likely that the water table is at or near the surface. Soil auguring also indicated wet, shallow soils far from the centre of the wetlands. The presence of an "oily sheen" on the surface of some parts of these standing water areas indicate prolonged saturation of the area and is the result of anaerobic organisms that produces methane. A small percentage of the methane is converted into hydrocarbons that are lighter than water and therefore float on the surface of the water.

2.9.2 Wetland Functionality, Status and Sensitivity

Wetland functionality is a measure of the deviation of a wetland's structure and function from its natural reference condition. In the current assessment, hydrological, geomorphological and vegetation integrity were assessed for the wetland units associated with the study area, to provide a Present Ecological Status (PES) score (Macfarlane *et al*, 2007) and an Environmental Importance and Sensitivity category (EIS) (DWAF, 1999).

The following table shows the existing impacts on the various wetlands within the study area as well as the Present Ecological Status score for each wetland. The functional assessment methodologies presented below take into consideration these existing impacts in various ways to determine the scores attributed to each functional Hydrogeomorphic (HGM) wetland unit. The aspects of wetland functionality and integrity that are predominantly addressed include hydrological and geomorphological function and the integrity of the biodiversity component (mainly based on the intactness of natural vegetation).

Currently, no single integrity assessment methodology exists that can be used to determine the Present Ecological State of all the various HGM types. Therefore, each HGM type should be evaluated by using the functional assessment best suited to its particular characteristics. In this study, Wetlands 1, 2, 3, 4 and 5 were assessed using WetEcoServices (Kotze *et al.,* 2005), WET-Health (Macfarlane *et al*., 2007) and the Ecological Importance and Sensitivity (DWAF, 1999).

Table 15: Existing impacts associated with the various HGM units in the study area as used for determining the functionality, status and sensitivity of these units later on.

HGM Unit	Current and Potential Impacts	PES Score (See 2.9.4)
Unchannelled Valley Bottom wetland (Wetland 1)	The unchannelled valley bottom wetland is impacted on by various current and historical activities. The main impact is from the amount of farm land that surrounds and encroaches onto the wetland. Large parts of the wetland have been completely transformed into agricultural land and the characteristics of the wetland have been diminished. Transformation of the wetland into farmland caused the wetland to have a decreased chance of providing any ecological function other than to water crops. The wetland is also dammed up	E

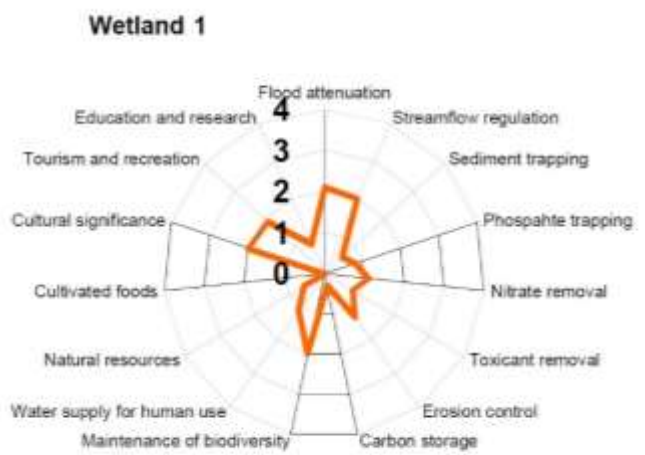
HGM Unit	Current and Potential Impacts	PES Score (See 2.9.4)
	in two areas close to the proposed pipeline. The most eastward dam has a high dam wall and is located where the proposed pipeline is intended to cross. Adjacent to the dam wall there is also a dirt road that transects the wetland. The dam wall has a cement walkway on it. Should the pipeline cross over the dam wall, this will have the least effect on the surrounding wetland.	
Unchannelled Valley Bottom wetland linked to a Stream (Wetland 2)	The wetland comprises a large area and is crossed by the proposed pipeline route once as well as coming very close to it at another point. The unchannelled valley bottom wetland is linked to a stream located in the east. This stream has also been dammed up farther north and has subsequently created a large dam. The main impacts associated with this wetland are current and historical farming and grazing. Large parts of the wetland have been completely transformed into agricultural land and where the wetland has not been ploughed, the area surrounding the wetland has. Therefore, the wetland is subject to a large increase in sediment, toxicants, phosphate and nitrate input from the surrounding farm land. The wetland flows from west to east and the proposed pipeline is intended to only dissect a small area of the wetland in the west. Although the impact will subsequently be less, it is still likely that the proposed pipeline will have some effect on the wetland.	E
Seepage Wetland linked to a Pan (Grootpan) (Wetland 3)	The pan is surrounded by mostly farm land and the area immediately surrounding the pan is characterised by a small amount of natural vegetation as well as a large number of grazing animals. The pan is hydrologically connected to another smaller pan in the south as well as a seepage wetland in the east. The seepage wetland is impacted on by the road that transects it, as well as the farming and grazing activities in the surrounding area. The proposed pipeline is likely to have some effect on the wetland and it is likely that the hydrology might be somewhat effected depending on the depth on the proposed pipeline. Although the seepage wetland is hydrologically connected to the pan it is unlikely that the proposed pipeline will have a large effect on the pan.	C
Pan (Otterpan) (Wetland 4)	The Otterpan is located directly adjacent to the proposed pipeline (and road) and was likely impacted upon by the construction of the road as well as by surface run-off from the road which includes toxicants, hydrocarbons and other foreign materials. The catchment of the pan has also been greatly transformed into predominantly agricultural land and it is therefore likely to have an increased input of sediments, nitrate, and phosphate. The proposed pipeline is likely to have some impact on the wetland, however,	D

HGM Unit	Current and Potential Impacts	PES Score (See 2.9.4)
	being a pan the impact is likely to be considerably less if construction takes place during winter months when the pan is empty or less full.	
Unchannelled Valley Bottom wetland (Adjacent to mine) (Wetland 5)	The wetland is located adjacent to a mine and road. Although the vegetation of the area is mainly disturbed, the orchid *Satyrium parvifolium* was found abundant in the wetland. The main concern for the wetland is the input of foreign materials into the wetland from the road and mine. The amount of exotic plants that occur in the wetland are also a problem and this is likely to increase over time.	E

2.9.3 Provision of Goods and Services – WET-Ecoservices

Disturbances and modifications decrease the degree to which hydrogeomorphic wetland units can perform various ecosystem services. The following tables show the WET-Ecoservice evaluations for the wetlands found on site.

Table 16: Ecosystem Services provided by Wetland 1 (Unchannelled Valley Bottom)

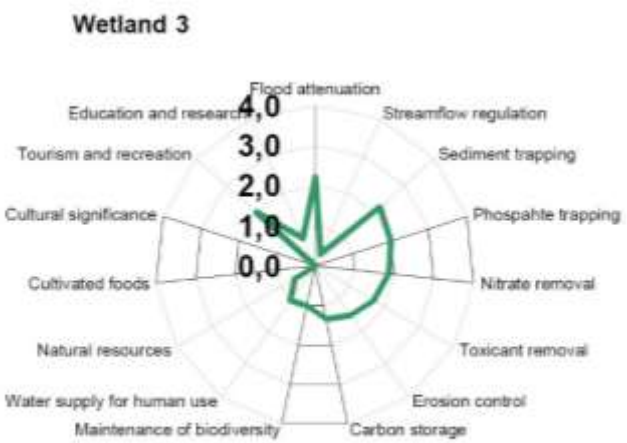


Function	Score	Significance	
Flood attenuation	2.1	Moderately High	The unchannelled valley bottom scored highest for flood attenuation. This is likely due to the amount of dams that are located within the wetland. Although large areas of the wetland have been transformed into agricultural land, the wetland scored low for cultivated foods due to the fact that the farming is at a large scale and not for individuals in local self-sufficient living.
Stream flow regulation	0.3	Low	
Sediment trapping	1.6	Moderately Low	
Phosphate trapping	1.7	Moderately Low	
Nitrate removal	1.5	Moderately Low	
Toxicant removal	1.5	Moderately Low	
Erosion control	1.1	Moderately Low	
Carbon storage	1.0	Moderately Low	
Maintenance of biodiversity	0.9	Low	
Water supply for human use	1.4	Moderately Low	
Natural resources	0.6	Low	
Cultivated foods	0.4	Low	
Cultural significance	0.0	Low	
Tourism and recreation	0.4	Low	
Education and research	0.8	Low	

Table 17: Ecosystem Services provided by Wetland 2 (Unchannelled Valley Bottom linked to a Stream)

Function	Score	Significance	
Flood attenuation	2.1	Moderately High	Although the wetland area close to the proposed pipeline has been greatly transformed into farmland it does link up to a stream in the east which seems to be less impacted upon. The wetland scored highest for flood attenuation, phosphate trapping and toxicant removal. This is due to the extent of farms in the area.
Stream flow regulation	0.5	Low	
Sediment trapping	1.6	Moderately Low	
Phosphate trapping	1.9	Moderately Low	
Nitrate removal	1.6	Moderately Low	
Toxicant removal	1.8	Moderately Low	
Erosion control	1.1	Moderately High	
Carbon storage	1.0	Moderately Low	
Maintenance of biodiversity	0.9	Low	
Water supply for human use	1.4	Moderately Low	
Natural resources	0.6	Low	
Cultivated foods	0.4	Low	
Cultural significance	0.0	Low	
Tourism and recreation	0.6	Low	
Education and research	0.8	Low	

Table 18: Ecosystem Services provided by Wetland 3 (Seepage Wetland linked to a Pan (Grootpan)

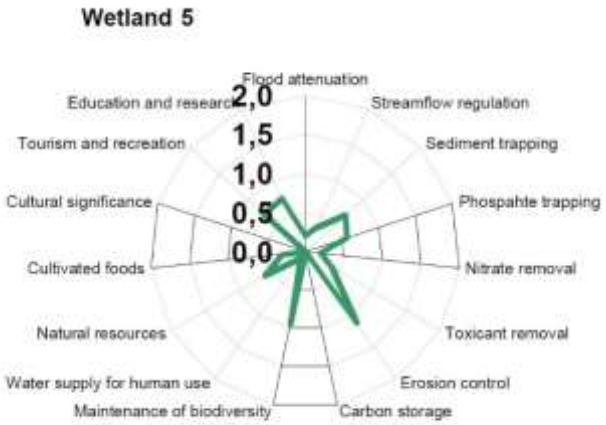


Function	Score	Significance	
Flood attenuation	2.2	Moderately High	The wetland scored highest for sediment trapping and flood attenuation. This is likely due to the pan that forms part of the wetland. Water is able to fill the pan before it floods. Sediment can also be trapped in the pan. Cultivated foods and cultural significance scored 0 due to the lack of any nearby communities. Although this wetland is surrounded by farms, it does have many species of birds and other faunal species that could contribute towards tourism in the future.
Stream flow regulation	0.3	Low	
Sediment trapping	2.2	Moderately High	
Phosphate trapping	2.0	Intermediate	
Nitrate removal	1.9	Moderately Low	
Toxicant removal	1.7	Moderately Low	
Erosion control	1.5	Moderately Low	
Carbon storage	1.3	Moderately Low	
Maintenance of biodiversity	1.0	Moderately Low	
Water supply for human use	1.1	Moderately Low	
Natural resources	0.6	Low	
Cultivated foods	0.0	Low	
Cultural significance	0.0	Low	
Tourism and recreation	2.0	Intermediate	
Education and research	0.8	Low	

Table 19: Ecosystem Services provided by Wetland 4 (Otterpan)

Function	Score	Significance	
Flood attenuation	2.1	Moderately High	The wetland scored highest for flood attenuation due to the amount of water that can be taken up by the pan. The wetland also scored high for maintenance of biodiversity. This is due to the high number of wildlife often associated with pans.
Stream flow regulation	0.3	Low	
Sediment trapping	0.6	Low	
Phosphate trapping	0.8	Low	
Nitrate removal	1.1	Moderately Low	
Toxicant removal	0.8	Low	
Erosion control	1.3	Moderately Low	
Carbon storage	0.3	Low	
Maintenance of biodiversity	2.0	Moderately High	
Water supply for human use	1.1	Moderately Low	
Natural resources	0.6	Low	
Cultivated foods	0.0	Low	
Cultural significance	0.2	Low	
Tourism and recreation	1.1	Low	
Education and research	0.8	Low	

Table 20: Ecosystem Services provided by Wetland 5 (Unchannelled Valley Bottom adjacent to mine)



Function	Score	Significance	
Flood attenuation	0.2	Low	This wetland generally scored low for most functions. This is largely due to the degraded state of the wetland which is located adjacent to a road and mine. The highest score was obtained for Maintenance of biodiversity. This is due to the presence of somewhat scarce plants at the wetland.
Stream flow regulation	0.3	Low	
Sediment trapping	0.7	Low	
Phosphate trapping	0.6	Low	
Nitrate removal	0.2	Low	
Toxicant removal	0.4	Low	
Erosion control	1.1	Moderately Low	
Carbon storage	0.0	Low	
Maintenance of biodiversity	0.9	Low	
Water supply for human use	0.1	Low	
Natural resources	0.6	Low	
Cultivated foods	0.3	Low	
Cultural significance	0.0	Low	
Tourism and recreation	0.7	Low	
Education and research	0.8	Low	

2.9.4 Present Ecological Status (PES) – WET-Health

All wetlands associated with the proposed pipeline routes have been impacted upon by present or historical farming and/or grazing activities. The vegetative cover of the wetlands is therefore lower, although for both the pan wetlands (Wetlands 3 and 4) the vegetation score was higher than expected. This is because the majority of the surface area is under water for most of the year, has little to no vegetation and therefore also little to no exotic vegetation. The roads that cause soil compaction and the presence of dams within some of the wetlands (Wetlands 1 and 2) contribute negatively to the hydrology and geomorphology of these wetlands. Furthermore, for all the wetlands except the pans, the vegetation is likely to degrade over time. The wetlands are under increased pressure from the surrounding farming activities and often dry out or become more encroached with crops.

A summary of the three components of the WET-Health, namely the Hydrological, Geomorphological and Vegetation Health assessments for the wetlands within the study area are given in the table below.

Table 21: Summary of the hydrology, geomorphology and vegetation heath assessment for Wetland 1

Assessment	Hydrology module	Geomorphology module	Vegetation module
Assessment of impacts and Present State (Categories A-F)	E	E	D
Assessment of Trajectory of Change (Categories ↑↑,↑,→,↓,↓↓)	→	↓↓	↓

Table 22: Summary of the hydrology, geomorphology and vegetation heath assessment for Wetland 2

Assessment	Hydrology module	Geomorphology module	Vegetation module
Assessment of impacts and Present State (Categories A-F)	D	E	D
Assessment of Trajectory of Change (Categories ↑↑,↑,→,↓,↓↓)	→	↓	↓

Table 23: Summary of the hydrology, geomorphology and vegetation heath assessment for Wetland 3

Assessment	Hydrology module	Geomorphology module	Vegetation module
Assessment of impacts and Present State (Categories A-F)	C	D	B
Assessment of Trajectory of Change	↓	→	→

Assessment	Hydrology module	Geomorphology module	Vegetation module
(Categories ↑↑,↑,→,↓,↓↓)			

Table 24: Summary of the hydrology, geomorphology and vegetation heath assessment for Wetland 4

Assessment	Hydrology module	Geomorphology module	Vegetation module
Assessment of impacts and Present State (Categories A-F)	D	D	B
Assessment of Trajectory of Change (Categories ↑↑,↑,→,↓,↓↓)	→	→	→

Table 25: Summary of the hydrology, geomorphology and vegetation heath assessment for Wetland 5

Assessment	Hydrology module	Geomorphology module	Vegetation module
Assessment of impacts and Present State (Categories A-F)	E	E	E
Assessment of Trajectory of Change (Categories ↑↑,↑,→,↓,↓↓)	↓	↓	↓↓

Table 26: Health categories used by WET-Health for describing the integrity of wetlands (Macfarlane et al., 2007).

Description PES score	Description PES score
Unmodified, natural.	A
Largely natural with few modifications. A slight change in ecosystem processes is discernable and a small loss of natural habitats and biota may have taken place.	B
Moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place, but the natural habitat remains predominantly intact.	C
Largely modified. A large change in ecosystem processes and loss of natural habitat and biota has occurred.	D
Seriously modified. The change in ecosystem processes and loss of natural habitat and biota is great, but some remaining natural habitat features are still recognisable.	E
Modifications have reached a critical level and the ecosystem processes have been modified completely with an almost complete loss of natural habitat and biota.	F

2.9.5 Ecological Importance and Sensitivity (EIS)

Ecological importance is an expression of a wetland's importance to the maintenance of ecological diversity and functioning on local and wider spatial scales. Ecological sensitivity refers to the system's ability to tolerate disturbance and its capacity to recover from disturbance once they have occurred

(DWAF, 1999). This classification of water resources allows for an appropriate management class to be allocated to the water resource and includes the following:

- Ecological Importance in terms of ecosystems and biodiversity;
- Ecological functions; and
- Basic human needs.

The Ecological Importance and Sensitivity of each of the wetlands is represented in the tables below.

Table 27: EIS scores obtained for the Wetland 1 (DWAF, 1999)

Wetland Importance and Sensitivity	Importance	Confidence
Ecological Importance and Sensitivity	1.3	3.0
Hydro-functional importance	0.8	3.0
Direct human benefits	0.8	3.0
Overall score	**0.97**	

Table 28: EIS scores obtained for the Wetland 2 (DWAF, 1999)

Wetland Importance and Sensitivity	Importance	Confidence
Ecological Importance and Sensitivity	1.7	3.0
Hydro-functional importance	0.8	3.0
Direct human benefits	1.2	3.0
Overall score	**1.19**	

Table 29: EIS scores obtained for the Wetland 3 (DWAF, 1999)

Wetland Importance and Sensitivity	Importance	Confidence
Ecological Importance and Sensitivity	1.4	3.0
Hydro-functional importance	1.0	3.0
Direct human benefits	0.7	3.0
Overall score	**1.02**	

Table 30: EIS scores obtained for the Wetland 4 (DWAF, 1999)

Wetland Importance and Sensitivity	Importance	Confidence
Ecological Importance and Sensitivity	1.4	3.0
Hydro-functional importance	0.9	3.0
Direct human benefits	0.9	3.0
Overall score	**1.05**	

Table 31: EIS scores obtained for the Wetland 5 (DWAF, 1999)

Wetland Importance and Sensitivity	Importance	Confidence
Ecological Importance and Sensitivity	1.2	3.0
Hydro-functional importance	0.6	3.0
Direct human benefits	0.4	3.0

Wetland Importance and Sensitivity	Importance	Confidence
Overall score	**0.73**	

Table 32: Environmental Importance and Sensitivity rating scale used for calculation of EIS scores (DWAF, 1999)

Ecological Importance and Sensitivity Categories	Rating	Recommended Ecological Management Class
Very High Wetlands that are considered ecologically important and sensitive on a national or even international level. The biodiversity of these wetlands is usually very sensitive to flow and habitat modifications. They play a major role in moderating the quantity and quality of water in major rivers.	>3 and <=4	A
High Wetlands that are considered to be ecologically important and sensitive. The biodiversity of these wetlands may be sensitive to flow and habitat modifications. They play a role in moderating the quantity and quality of water of major rivers.	>2 and <=3	B
Moderate Wetlands that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these wetlands is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water in major rivers.	>1 and <=2	C (Wetland 2, 3 and 4)
Low/Marginal Wetlands that are not ecologically important and sensitive at any scale. The biodiversity of these wetlands is ubiquitous and not sensitive to flow and habitat modifications. They play an insignificant role in moderating the quantity and quality of water in major rivers.	>0 and <=1	D (Wetland 1 and 5)

2.9.6 Buffer Zones

A buffer zone is defined as a strip of land surrounding a wetland or riparian area where activities are controlled or restricted (DWAF, 2005). Developments have several impacts on the surrounding environment and on a watercourse. Developments change habitats, the ecological environment, infiltration rates, the amount of runoff and runoff intensity of the site and therefore the water regime of the entire site.

Even though the proposed development is linear, and crosses watercourses, the buffer zone identified in this report serves to highlight an ecologically sensitive area in which activities should be conducted with this sensitivity in mind. Buffer zones have been shown to perform a wide range of functions and have therefore been widely proposed as a standard measure to protect water resources

and their associated biodiversity. Generic functions of buffer zones relevant to the study area are given in the table below.

Table 33: Generic functions of buffer zones relevant to the study site (adapted from Macfarlane et al., 2010)

Primary Role	Buffer Functions
Maintaining basic aquatic processes, services and values.	• Groundwater recharge: Seasonal flooding into wetland areas allows infiltration to the water table and replenishment of groundwater. This groundwater will often discharge during the dry season providing the base flow for streams, rivers, and wetlands.
Reducing impacts from upstream activities and adjoining land uses.	• Sediment removal: Surface roughness provided by vegetation or litter reduces the velocity of overland flow, enhancing settling of particles. Buffer zones can therefore act as effective sediment traps, removing sediment from runoff water from adjoining lands and therefore reducing the sediment load of surface waters. • Removal of toxins: Buffer zones can remove toxic pollutants, such as hydrocarbons that would otherwise affect the quality of water resources and therefore their suitability for aquatic biota and human use. • Nutrient removal: Wetland vegetation and vegetation in terrestrial buffer zones may significantly reduce the amount of nutrients (N and P) entering a water body, thereby reducing the potential for excessive outbreaks of microalgae that can have an adverse effect on both freshwater and estuarine environments. • Removal of pathogens: By slowing down water contaminated with faecal material, buffer zones encourage deposition of pathogens which die quickly upon exposure to the elements.

Despite limitations, buffer zones are well suited to perform functions such as sediment trapping, erosion control and nutrient retention that can significantly reduce the impact of activities taking place adjacent to water resources. Buffer zones are therefore proposed as a standard mitigation measure to reduce impacts of land uses or activities planned adjacent to water resources. These must, however, be considered in conjunction with other mitigation measures.

Local government policies require that protective buffer zones be calculated from the outer edge of the temporary zone of a wetland (KZN DAEA, 2002; CoCT, 2008; GDACE, 2009). Although research is underway to provide further guidance on appropriate defensible buffer zones, there is no current standard other than the generic recommendation of 50m for wetlands outside the urban edge (GDARD, 2012). It is therefore suggested that a generic 50m buffer zone be applied to the outer edge of the wetlands (shown in Figure 14) (Limosella Consulting, 2013).

2.10 Sites of archaeological and cultural interest

A Phase 1 Heritage Impact Assessment was conducted by A Pelser Archaeological Consulting in 2013. The following is an extract from their report. The full report is attached under Appendix D.

No sites, features or objects of any cultural heritage origin (archaeological or historical) or significance were identified or recorded during the investigation of the study area. The areas of study have been extensively disturbed by mining, road development, farming activities and power lines. If any sites, features or materials of cultural heritage nature or significance did exist in the past, these artefacts would have been extensively disturbed or destroyed.

The possibility of single, scattered, stone tools cannot be excluded, but any located within the study area would be out of context. Such artefacts could be found at the numerous pans in the area. There is also always a possibility that unknown, unmarked or low stone-packed graves may be present within the area. The Eastern Highveld grassland is known for many graveyards (A Pelser Archaeological Consulting, 2013).

2.11 Socio-economic aspects

The site is located in the Chief Albert Luthuli Local Municipality within the Gert Sibande District Municipality, Mpumalanga Province.

2.11.1 Demography

According to the 2011 census, 186 010 people formed part of the 47 705 households in the Chief Albert Luthuli Municipality. The average household size is 3.9 people per household. The growth rate in the municipality is -0.09% per annum. There are 88.2 men for every 100 women in the municipality (Statistics South Africa, 2011). The table below shows the age structure of the municipality.

Table 34: Demographic Profile of the Chief Albert Luthuli Municipality

Age Group	Percentage of Population (%)
Under 15 years of age	36.5
15 to 64 years of age	58.2
Over 65 years of age	5.3
Total	**100**

2.11.2 Major economic activities

The following are the main economic sectors/industries within the Chief Albert Luthuli Municipality:

- Agriculture;
- Mining;
- Manufacturing;
- Utilities;
- Construction;
- Trade;
- Transport;
- Finance; and

- Community services.

“Community services” is the leading sector in terms of employment (28.8%) and its contribution to the economy (37.1%). The second leading sector is the “trade” sector. The construction industry employs 4.9% of the working population within the municipality and contributes 2.9% towards the municipalities’ economy. The mining sector has shown a slight increase towards employing 7.6% of the working population and contributing 7.9% towards the economy of the municipality (Chief Albert Luthuli Municipality, 2014).

2.11.3 Unemployment and employment

The 2011 census found that the official unemployment rate was 35.4% and the youth unemployment rate (15 to 34 years of age) was 45.1%. The dependency ratio was 71.7 per 100 people between the ages of 15 and 64 years (Statistics South Africa, 2011).

3. APPLICABLE LEGISLATION AND GUIDELINES

The table below provides an indication of the main legislation, policies and/or guidelines applicable to the Wonderfontein water pipeline project.

Table 35: Applicable legislation, policies and/or guidelines

Title of legislation, policy or guideline	Administering authority	Aim of legislation, policy or guideline
Laws of General Application		
The Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996)	-	To establish a Constitution with a Bill of Rights for the RSA.
Environment Conservation Act, 1989 (Act No. 73 of 1989, as amended)	Mpumalanga Department of Economic Development, Environment and Tourism	To control environmental conservation.
National Environmental Management Act, 1998 (Act No. 107 of 1998) *and* National Environmental Management Amendment Act, 2008 (Act No. 62 of 2008).	Mpumalanga Department of Economic Development, Environment and Tourism	To provide for the integrated management of the environment, and to regulate the 'Duty of Care' Principle.
Promotion of Access to Information Act, 2000 (Act No. 2 of 2000, as amended)	-	To give effect to the constitutional right of access to any information held by the State and any information that is held by another person and that is required for the exercise or protection of any rights.
Air Quality and Noise		
National Environmental Management: Air Quality Act (Act No. 39 of 2004)	Gert Sibande District Municipality	To reform the law regulating air quality to protect the environment by providing reasonable measures for the prevention of pollution. To provide for national norms and standards regulating air quality monitoring, management and control.
Water Management		
National Water Act (NWA), 1998 (Act No. 36 of 1998)	Department of Water Affairs	To provide for fundamental reform of the law relating to water resources.
Government Notice No. 1199 of 18 December 2009: Replacement of general authorisation in terms of Section 39 of the National Water Act, 1998 (Act No. 36 of 1998)	Department of Water Affairs	To replace Government Notice No. 398 of 26 March 2004 for water uses *21(c) and (i)*.
Waste Management		

Title of legislation, policy or guideline	Administering authority	Aim of legislation, policy or guideline
National Environmental Management: Waste Act (Act No. 59 of 2008)	Mpumalanga Department of Economic Development, Environment and Tourism	To reform the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation.
Biodiversity		
National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004)	Mpumalanga Department of Economic Development, Environment and Tourism	To provide for the management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act, 1998.
Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)	Mpumalanga Department of Agriculture, Rural Development and Land Administration	To provide for control over the utilisation of the natural agricultural resources of South Africa in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants.
National Veld and Forest Fire Act, 1998 (Act No. 101 of 1998)	Mpumalanga Department of Agriculture, Rural Development and Land Administration	To reform the law on veldt and forest fires.
Agricultural Pest Act, 1983 (Act No. 36 of 1983, as amended) – GN R276 of 5 March 2004	Mpumalanga Department of Agriculture, Rural Development and Land Administration	To regulate plants, plant products and other regulated articles when imported into South Africa.
Soil and Land Management		
National Environmental Management Act, 1998 (Act No. 107 of 1998) *and* National Environmental Management Amendment Act, 2008 (Act No. 62 of 2008).	Mpumalanga Department of Economic Development, Environment and Tourism	To provide for the integrated management of the environment and to regulate the 'Duty of Care' Principle.
Environment Conservation Act, 1989 (Act No. 73 of 1989, as amended)	Mpumalanga Department of Economic Development, Environment and Tourism	To control environmental conservation.
Heritage and Archaeological Resources		
National Heritage Resources Act No 25 of 1999 (Act No. 25 of 1999, as amended)	South African Heritage Resources Agency	To introduce an integrated and interactive system for the management of the national heritage resources; to promote good government at all levels, and empower civil society to nurture and conserve their heritage resources so that they may be bequeathed to future generations.

Title of legislation, policy or guideline	Administering authority	Aim of legislation, policy or guideline
Protected Areas		
National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003, as amended)	Mpumalanga Department of Economic Development, Environment and Tourism	To provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes.
Planning of New Activities		
National Environmental Management Act, 1998 (Act No. 107 of 1998) *and* National Environmental Management Amendment Act, 2008 (Act No. 62 of 2008).	Mpumalanga Department of Economic Development, Environment and Tourism	To provide for the integrated management of the environment and to regulate the 'Duty of Care' Principle.
EIA Regulations R 543, R 544, R 545 and R 546, dated 18 June 2010) under the NEMA, 1998	Mpumalanga Department of Economic Development, Environment and Tourism	To regulate and control the authorisation of certain listed activities.
Government Notice 921 of 29 November 2014: List of waste management activities that have, or are likely to have a detrimental effect on the environment.	Mpumalanga Department of Economic Development, Environment and Tourism	To regulate and control the authorisation of certain waste-related listed activities.

4. PUBLIC PARTICIPATION PROCESS

4.1 Objectives of the Public Participation Process (PPP)

Section 24 of the Constitution of the Republic of South Africa of 1996 guarantees everyone the right to an environment that is not harmful to their health and well-being and to have the environment protected for the benefit of present and future generations. In order to give effect to this right, the National Environmental Management Act (NEMA), 1998, as amended, came into effect.

In terms of Section 24(4) of the NEMA, 1998, as amended, procedures for the investigation, assessment and communication of the potential consequences or impacts of activities on the environment must, *inter alia*, ensure, with respect to every application include:

- Coordination and cooperation between organs of state in the consideration of assessments where an activity falls under the jurisdiction of more than one organ of state;
- That the findings and recommendations flowing from an investigation, the general objective of integrated management laid down in NEMA, 1998, as amended, and the principles of environmental management set out in Section 2 of NEMA, 1998, as amended, are taken into account in any decision made by the organ state in relation to any proposed policy, programme, process, plan or projects, consequences or impacts; and
- Public information and participation procedures that provide all integrated and affected parties, including all organs of state in all spheres of government that may have jurisdiction over any aspect of the activity, with a reasonable opportunity to participate in those information and participation procedures.

One of the general objectives of integrated environmental management laid down in Section 23(2) (d) of NEMA, 1998, as amended, is to: “ensure adequate and appropriate opportunity for public participation in decisions that may affect the environment”.

The National Environmental Management Principles as stipulated in NEMA, 1998, as amended state:

- “Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably; and
- The participation of all interested and affected parties in environmental governance must be promoted, and all people must have an opportunity to develop the understanding, skills and capacity necessary to achieve equitable and effective participation, and participation by vulnerable and disadvantage persons must be ensured”.

4.2 Legislation and guidelines followed for the PPP

The public participation process for this project was conducted by Shangoni Management Services in terms of:

- The procedures and provisions in terms of the NEMA, 1998, as amended;
- Chapter 6 of the EIA Regulations of 2010;
- GN 807; Public Participation Guideline in the Environmental Impact Assessment Process, dated October 2012; and
- Other relevant legislation such as the Promotion of Access to Information Act (PAIA), 2000.

Refer to Appendix E for an extract regarding the required public participation process to be followed, taken from the relevant legislation and guidelines.

4.3 Public Participation Process followed

4.3.1 Identification and registration of I&APs and key stakeholders

The table below lists the adjacent landowners identified and notified (by means of hand delivery, e-mail, fax and/or post) of the proposed project. Copies of notifications to the I&APs have been included in Appendix E.

Table 36: List of adjacent landowners identified and notified

Farm Name	Owner
Remaining Extent (Portion 0) of the Farm Kaalplaats 453 – JS	Xstrata South Africa (Pty) Ltd
Portion 8 of the Farm Kaalplaats 453 - JS	Magdaleen van Nikkelen Kuyper Will Trust
Remaining Extent (Portion 0) of the Farm Grootpan 456 – JS	Willie & Leona Trustfonds Trust
Portion 2 of the Farm Grootpan 456 - JS	Corlouis Boerderye (Pty) Ltd
Portion 4 of the Farm Grootpan 456 - JS	Willie & Leona Trustfonds Trust
Portion 10 of the Farm Grootpan 456 - JS	Corlouis Boerderye (Pty) Ltd
Portion 11 of the Farm Grootpan 456 - JS	Corlouis Boerderye (Pty) Ltd
Portion 16 of the Farm Grootpan 456 - JS	Umsimbithy Mining (Pty) Ltd
Portion 2 of the Farm Strathrae 496 - JS	Exxaro Coal Mpumalanga (Pty) Ltd
Portion 3 of the farm Goedehoop 498 – JS	Braam Roos
Portion 24 of the farm Goedehoop 498 – JS	Braam Roos
Portion 9 of the farm Klipfontein 495 – JS	Exxaro Coal Mpumalanga (Pty) Ltd

All organs of state that may have jurisdiction in respect of the proposed project are considered to be registered I&APs.

The following organs of state were notified of the proposed project:

- Department of Water Affairs, Mpumalanga;
- Chief Albert Luthuli Local Municipality;

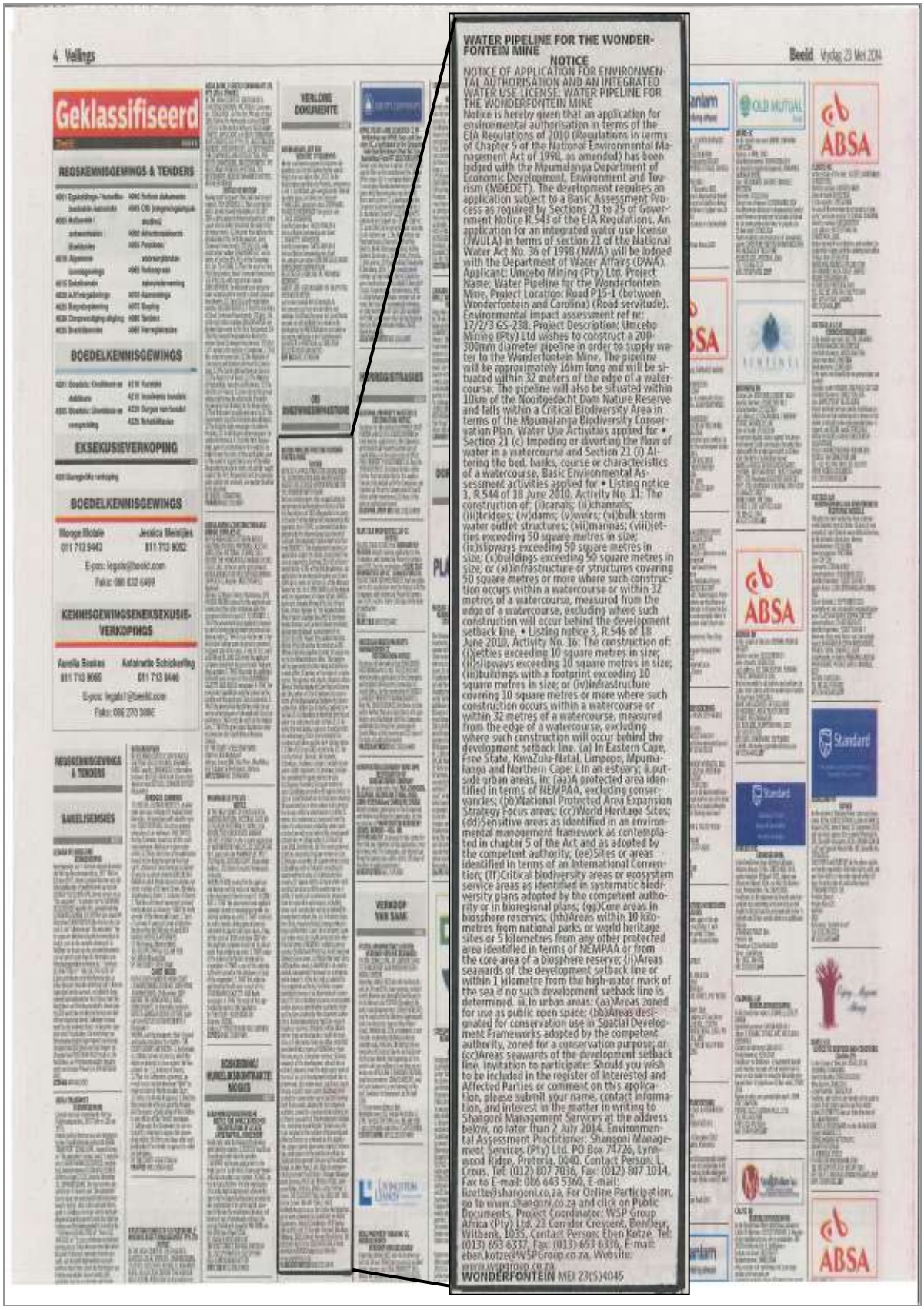
- Emakhazeni Local Municipality;
- Gert Sibande District Municipality;
- Nkangala District Municipality;
- Mpumalanga Department of Agriculture, Rural Development and Land Administration;
- Mpumalanga Department of Community Safety, Security and Liaison;
- Mpumalanga Department of Co-operative Governance and Traditional Affairs;
- Mpumalanga Department of Human Settlements;
- Mpumalanga Department of Public Works, Roads and Transport;
- SANRAL Eastern Region;
- SANRAL Northern Region; and
- South African Heritage Resources Agency (SAHRA).

Copies of the notifications to the organs of state have been included in Appendix E and examples are included under Section 4.3.2.3. below. Proof that the letters were sent are also given under Section 4.3.2.3. Proof of notices that were hand delivered are attached under Appendix E.

4.3.2 Methods of notification

4.3.2.1 Advertisement(s)

The proposed project was advertised in a local newspaper, the Beeld, on the 23rd of May 2014. The Beeld was found to be the most appropriate newspaper in terms of its accessibility to the I&APs. A copy of the advertisement and proof of the placement thereof is attached in Appendix E and is also given in the figure below.



4 Veilings

Beeld Vrydag 23 Mei 2014

Geklassifiseerd

REGSKENNISGEWINGS & TENDERS

BOEDELKENNISGEWINGS

EKSEKUSIEVERKOPING

BOEDELKENNISGEWINGS

KENNISGEWINGSENEKSEKUSIE-VERKOPINGS

VERLORE DOKUMENTE

WATER PIPELINE FOR THE WONDERFONTEIN MINE

NOTICE

NOTICE OF APPLICATION FOR ENVIRONMENTAL AUTHORISATION AND AN INTEGRATED WATER USE LICENSE: WATER PIPELINE FOR THE WONDERFONTEIN MINE

Notice is hereby given that an application for environmental authorisation in terms of the EIA Regulations of 2010 (Regulations in terms of Chapter 5 of the National Environmental Management Act of 1998, as amended) has been lodged with the Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET). The development requires an application subject to a Basic Assessment Process as required by Sections 21 to 25 of Government Notice R.543 of the EIA Regulations. An application for an integrated water use license (IWULA) in terms of section 21 of the National Water Act No. 36 of 1998 (NWA) will be lodged with the Department of Water Affairs (DWA). Applicant: Umcebo Mining (Pty) Ltd. Project Name: Water Pipeline for the Wonderfontein Mine. Project Location: Road P15-1 (between Wonderfontein and Carolina) (Road servitude). Environmental impact assessment ref nr: 17/2/3 GS-238. Project Description: Umcebo Mining (Pty) Ltd wishes to construct a 200-300mm diameter pipeline in order to supply water to the Wonderfontein Mine. The pipeline will be approximately 16km long and will be situated within 32 meters of the edge of a watercourse. The pipeline will also be situated within 10km of the Noorlgedacht Dam Nature Reserve and falls within a Critical Biodiversity Area in terms of the Mpumalanga Biodiversity Conservation Plan. Water Use Activities applied for • Section 21 (c) Impeding or diverting the flow of water in a watercourse and Section 21 (i) Altering the bed, banks, course or characteristics of a watercourse. Basic Environmental Assessment activities applied for • Listing notice 1, R.544 of 18 June 2010, Activity No. 11: The construction of: (i)canals; (ii)channels; (iii)bridges; (iv)dams; (v)weirs; (vi)bulk storm water outlet structures; (vii)marinas; (viii)jetties exceeding 50 square metres in size; (ix)slipways exceeding 50 square metres in size; (x)buildings exceeding 50 square metres in size; or (xi)infrastructure or structures covering 50 square metres or more where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line. • Listing notice 3, R.546 of 18 June 2010, Activity No. 16: The construction of: (i)jetties exceeding 10 square metres in size; (ii)slipways exceeding 10 square metres in size; (iii)buildings with a footprint exceeding 10 square metres in size; or (iv)infrastructure covering 10 square metres or more where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line. (a) In Eastern Cape, Free State, KwaZulu-Natal, Limpopo, Mpumalanga and Northern Cape: i.In an estuary; ii.outside urban areas, in: (aa)A protected area identified in terms of NEMPAA, excluding conservancies; (bb)National Protected Area Expansion Strategy Focus areas; (cc)World Heritage Sites; (dd)Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (ee)Sites or areas identified in terms of an International Convention; (ff)Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (gg)Core areas in biosphere reserves; (hh)Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; (ii)Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined. iii.In urban areas: (aa)Areas zoned for use as public open space; (bb)Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority, zoned for a conservation purpose; or (cc)Areas seawards of the development setback line. Invitation to participate: Should you wish to be included in the register of interested and Affected Parties or comment on this application, please submit your name, contact information, and interest in the matter in writing to Shangoni Management Services at the address below, no later than 2 July 2014. Environmental Assessment Practitioner: Shangoni Management Services (Pty) Ltd. PO Box 74726, Lynnwood Ridge, Pretoria, 0040. Contact Person: L Cross. Tel: (012) 807 7016, Fax: (012) 807 1014, Fax to E-mail: 086 643 5360, E-mail: lizette@shangoni.co.za. For Online Participation, go to www.shangoni.co.za and click on Public Documents. Project Coordinator: WSP Group Africa (Pty) Ltd. 23 Corridor Crescent, Bevleyf, Witbank, 1035. Contact Person: Eben Kotze. Tel: (013) 653 6337, Fax: (013) 653 6336, E-mail: eben.kotze@WSPGroup.co.za, Website: www.wspgroup.co.za

WONDERFONTEIN MED 23(5)4045

ABSA

Standard

Figure 15: Proof of Placement of an Advertisement in the Beeld Newspaper

4.3.2.2 Placement of site- and public notices

Notice was also given to Interested and Affected Parties via the placement of notice boards. Notice boards were placed at 13 different, noticeable and conspicuous places (approximately every 1km along the proposed pipeline routes) on the 27th of May 2014. A copy of the site notice and photographs of the site notices are attached in Appendix E and are also given in the figures below.

a

b

c

d

e

f

g

h

i

j

k

l

m

Figure 16(a-m): Proof of Placement of Site Notices

UMCEBO MINING (PTY) LTD.

PUBLIC NOTICE OF APPLICATION FOR ENVIRONMENTAL AUTHORISATION AND AN INTEGRATED WATER USE LICENSE

Notice is hereby given that an application for environmental authorisation in terms of the EIA Regulations of 2010 (Regulations in terms of Chapter 5 of the National Environmental Management Act of 1998, as amended) has been lodged with the Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET). The development requires an application subject to a Basic Assessment Process as required by Sections 21 to 25 of Government Notice R.543 of the EIA Regulations. An application for an Integrated Water Use License (IWULA) in terms of section 21 of the National Water Act No 36 of 1998 (NWA) will be lodged with the Department of Water Affairs (DWA).

Reference Numbers: MDEDET: 17/2/3 GS-238

Applicant: Umcebo Mining (Pty) Ltd

Project Name: Water Pipeline for the Wonderfontein Mine

Project Location: Road P15-1 (between Wonderfontein and Carolina) (Road servitude), Mpumalanga Province.

Activity Description: The project will entail the following: Umcebo Mining (Pty) Ltd wishes to construct a 200-300mm diameter pipeline in order to supply water to the Wonderfontein Mine. The pipeline will be approximately 16km long and will be situated within 32 meters of the edge of a watercourse. The pipeline will also be situated within 10km of the Nooitgedacht Dam Nature Reserve and falls within a Critical Biodiversity Area in terms of the Mpumalanga Biodiversity Conservation Plan.

The following authorisation- and license applications are required for proposed activity:

- Application for Environmental Authorisation
- Integrated Water Use License

Legislation:
National Environmental Management Act, 1998 (Act No. 107 of 1998): Listing notice 1, R. 544 of 18 June 2010, Activity No. 11: The construction of: (i) canals; (ii) channels; (iii) bridges; (iv) dams; (v) weirs; (vi) bulk storm water outlet structures; (vii) marinas; (viii) jetties exceeding 50 square metres in size; (ix) slipways exceeding 50 square metres in size; (x) buildings exceeding 50 square metres in size; or (xi) infrastructure or structures covering 50 square metres or more where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.

Listing notice 3, R. 546 of 18 June 2010, Activity No. 16: The construction of: (i) jetties exceeding 10 square metres in size; (ii) slipways exceeding 10 square metres in size; (iii) buildings with a footprint exceeding 10 square metres in size; or (iv) infrastructure covering 10 square metres or more where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line. **(a) In Eastern Cape, Free State, KwaZulu-Natal, Limpopo, Mpumalanga and Northern Cape:** i. In an estuary; ii. Outside urban areas, in: (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (cc) World Heritage Sites; (dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (ee) Sites or areas identified in terms of an International Convention; (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (gg) Core areas in biosphere reserves; (hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; (ii) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined. iii. In urban areas: (aa) Areas zoned for use as public open space; (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority, zoned for a conservation purpose; or (cc) Areas seawards of the development setback line.

Integrated Water Use License Application according to Chapter 4 of the National Water Act, 1998 (Act No. 36 of 1998): Section 21 (c) impeding and diverting the flow of water in a watercourse; and Section 21 (i) altering the bed, bank, course or characteristics of a watercourse.

Invitation to Participate:
Should you require any additional information or wish to register as I&AP and/or inform us of any other I&APs and/or organisation and/or organ of state who should be notified, please submit your name, contact information, and interest in the matter in writing to Shangoni Management Services at the below address not later than **2 July 2014**.

Environmental Consultants: Shangoni Management Services (Pty) Ltd
PO Box 74726, Lynnwood Ridge, Pretoria, 0040
Tel: (012) 807 7036, Fax: (012) 807 1014 / 086 643 5360, E-mail: lizette@shangoni.co.za

Project Coordinator: WSP Group Africa (Pty) Ltd, SA Civil and Structural Engineers Division
23 Corridor Crescent, Benfleur, Witbank, 1035
Tel: (013) 653 6337, Fax: (013) 653 6336, E-mail: eben.kotze@WSPGroup.co.za, www.wspgroup.co.za

Project Officials:
Application for Environmental Authorisation (MDEDET): Ms Sindisiwe Mbuyane: (017) 811 3951

UMCEBO MINING (EDMS.) BPK.

PUBLIEKE KENNISGEWING TER AANSOEK VIR OMGEWINGSMAGTIGING EN 'n WATERGEBRUIK LISENSIE

Neem kennis dat 'n aansoek om omgewingsmagtiging in terme van die OIS Regulasies van 2010 (Regulasies in terme van Hoofstuk 5 van die Wet op Nasionale Omgewingsbestuur van 1998, soos gewysig) ingedien is by die Mpumalanga Departement van Ekonomiese Ontwikkeling, Omgewing en Toerisme. Die ontwikkeling vereis 'n aansoek onderhewig aan 'n Basiese Evalueringsproses soos vereis deur artikel 21 tot 25 van Goewermentskennisgewing R.543 van die OIE-regulasies. Neem ook hiermee kennis dat 'n Watergebruik Lisensie Aansoek in terme van Artikel 21 van die Nasionale Waterwet, 1998 (Wet Nr. 36 van 1998) ingedien sal word by Departement van Waterwese.

Verwysingsnommers: MDEDET: 17/2/3 GS-238

Applikant: Umcebo Mining (Edms.) Bpk.

Projek Naam: Water pyplyn vir die Wonderfontein-myn.

Ligging: Pad P15-1 (tussen Wonderfontein en Carolina) (Pad serwituut), Mpumalanga Provinsie.

Beskrywing van aktiwiteit: Die projek behels die volgende: Umcebo Mining (Edms.) Bpk beoog om 'n 200-300mm deursnee pyplyn te bou om water te voorsien aan die Wonderfontein-myn. Die pyplyn sal ongeveer 16 km lank wees en sal binne 32 meter van die rand van 'n waterloop gelee wees. Die pyplyn sal ook gelee wees binne 10 km van die Nooitgedacht Dam Natuurreservaat en binne 'n kritiese Biodiversiteit area in terme van die Mpumalanga Biodiversiteit Bewaring Plan.

Die volgende magtiging- en lisensie aansoeke word benodig vir die voorgestelde aktiwiteit:

- Aansoek om Omgewingsmagtiging
- Watergebruik Lisensie

Wetgewing:
Wet op Nasionale Omgewingsbestuur, 1998 (Wet Nr. 107 van 1998): Kennisgewing 2, R. 544 van 18 Junie 2010, Aktiwiteit Nr. 11: Die konstruksie van: (i) slote; (ii) kanale; (iii) brûe; (iv) damme; (v) keerwalle; (vi) grootmaat stormwater uitlaat strukture; (vii) marinas; (viii) hawehoofde groter as 50 vierkante meter; (ix) skeepshellings groter as 50 vierkante meter; (x) geboue groter as 50 vierkante meter; of (xi) infrastruktuur of strukture wat 50 vierkante meter of meer dek waar sodanige konstruksie plaasvind binne 'n waterloop of binne 32 meter van 'n waterloop, gemeet van die rand van 'n waterloop, uitsluitende waar sodanige konstruksie sal plaasvind agter die ontwikkeling terugsetlyn.

Kennisgewing 3, R. 546 van 18 Junie 2010, Aktiwiteit Nr. 16: Die konstruksie van: (i) hawehoofde groter as 10 vierkante meter; (ii) skeepshellings groter as 10 vierkante meter; (iii) geboue met 'n voetspoor van meer as 10 vierkante meter; of (iv) infrastruktuur wat 10 vierkante meter of meer dek waar sodanige konstruksie plaasvind binne 'n waterloop of binne 32 meter van 'n waterloop, gemeet van die rand van 'n waterloop, uitsluitende waar sodanige konstruksie sal plaasvind agter die ontwikkeling terugsetlyn. (a) In die Oos-Kaap, Vrystaat, KwaZulu -Natal, Limpopo, Mpumalanga en Noord-Kaap: i. In 'n rivermonding; ii . Buite stedelike gebiede, in: (aa) 'n Beskermde gebied geidentifiseer in terme van NEMPAA, uitsluitende bewaringsgebiede; (bb) Nasionale Beskermde Areas Uitbreiding Strategie Fokus gebiede; (cc) Wêreelderfenisterreine; (dd) Sensitiewe gebiede soos in 'n omgewingsbestuursplan geidentifiseer, soos beoog in Hoofstuk 5 van die Wet en soos die bevoegde owerheid aanvaar; (ee) Terreine of gebiede wat geidentifiseer in terme van 'n internasionale konvensie; (ff) Kritieke biodiversiteitsgebiede of ekosisteem diens gebiede soos in sistematiese biodiversiteit planne geidentifiseer deur die bevoegde owerheid of in biostreekvlak planne; (gg) Kerngebiede in biosfeerreservate; (hh) Gelsede binne 10 kilometer van nasionale parke of wêreelderfenisterreine of 5 kilometer van enige ander beskermde gebied geidentifiseer ingevolge NEMPAA of van die kerngebied van 'n biosfeerreservaat; (ii) Gebiede seewaarts van die ontwikkeling terugsetlyn of binne 1 kilometer van die hoogwatermerk van die see as daar nie so ' ontwikkeling terugsetlyn bepaal is nie. III. In stedelike gebiede: (aa) Gebiede wat gesoneer is vir gebruik as openbare oop ruimte; (bb) Gebiede wat vir bewaring aangewys is in die Ruimtelike Ontwikkelingsraamwerke wat deur die bevoegde owerheid aangeneem is, gesoneer vir bewaring doeleindes; of (cc) Gebiede seewaarts van die ontwikkeling terugsetlyn.

Watergebruik Lisensie Aansoek vir aktiwiteite volgens Hoofstuk 4 van die Nasionale Waterwet, 1998 (Wet Nr. 36 van 1998): Artikel 21 (c) Belemmer of wegleer van die vloei van water in 'n waterloop en Artikel 21 (i): Verandering van die bedding, walle, loop of kenmerke van 'n waterloop.

Publieke Deelname Uitnodiging:
Vir enige navrae, of indien u as belanghebbende en/of geaffekteerde party wil registreer of ons wil inlig van enige ander partye en/of organisasie en/of staatsinstelling wat in kennis gestel moet word, kan u gerus vir Shangoni Management Services kontak by die ondergenoemde kontakbesonderhede, nie later as **2 Julie 2014** nie.

Omgewingskonsultante: Shangoni Management Services (Pty) Ltd.
Posbus 74726, Lynnwood Ridge, Pretoria, 0040
Tel: (012) 807 7036, Faks: (012) 807 1014 / 086 643 5360, E-pos: lizette@shangoni.co.za

Projekkoördineerder: WSP Group Africa (Pty) Ltd. SA Civil and Structural Engineers Division
23 Corridor Crescent, Benfleur, Witbank, 1035
Tel: (013) 653 6337, Faks: (013) 653 6336, E-pos: eben.kotze@WSPGroup.co.za, www.wspgroup.co.za

Projek beamptes:
Aansoek om Omgewingsmagtiging (MDEDET): Mev Sindisiwe Mbuyane: (017) 811 3951

SHANGONI
Management Services (Pty) Ltd

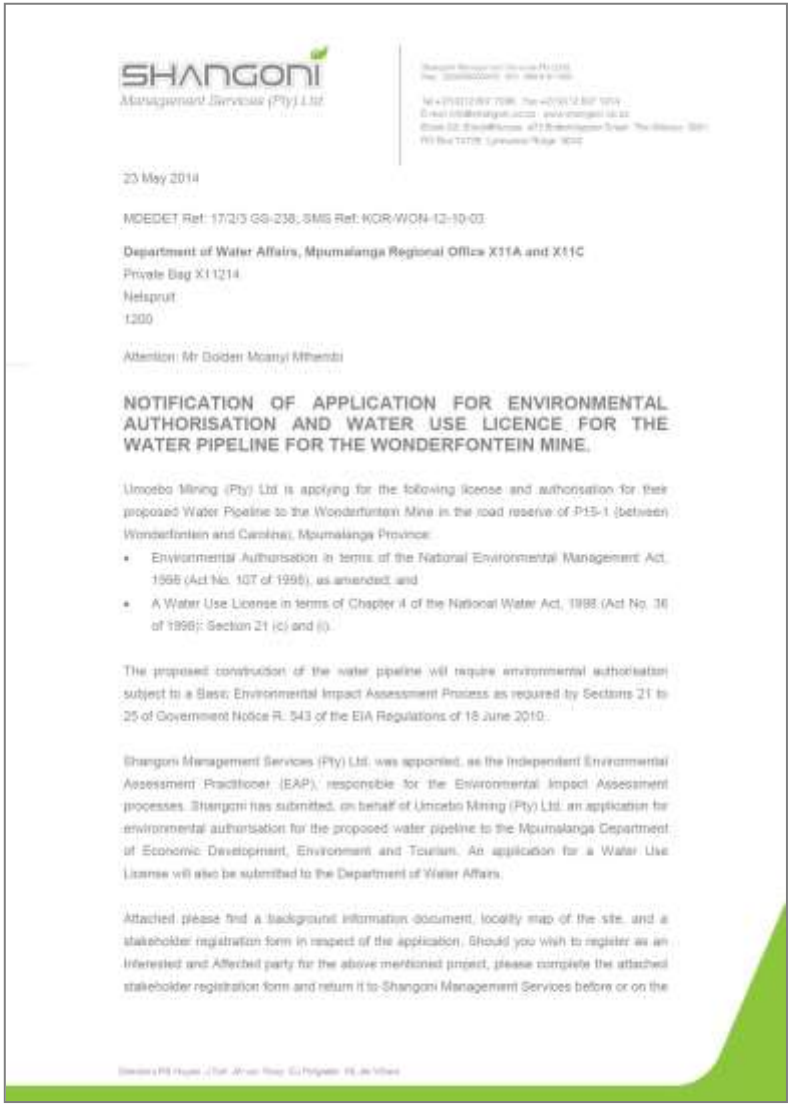
Figure 17: Wording of the Notice Board

4.3.2.3 Notification Letters and Background Information Document

Notification Letters and the Background Information Document (BID) developed for the proposed project provides background information pertaining to the project and is intended to inform I&APs of the proposed project. The BID also includes a registration form which I&APs, stakeholders and organs of state are encouraged to complete in order to register as I&APs for the proposed project.

The Notification Letters and BID were made available to all landowners adjacent to the proposed site/route, as well as to all organs of state that may have jurisdiction over any aspect of the activity.

Copies of the notification letters and BID and proof of their distribution to the adjacent landowners and organs of state are attached under Appendix E. Proof of postage of the notification letters is given in the figures below. Further proofs are also attached under Appendix E.



SHANGONI
Management Services (Pty) Ltd

23 May 2014

MDEDET Ref: 17/2/3 GS-238; SMS Ref: KOR/WON-12-10-03

Department of Water Affairs, Mpumalanga Regional Office X11A and X11C
Private Bag X11214
Nelspruit
1200

Attention: Mr Golden Moanyi Mthembi

NOTIFICATION OF APPLICATION FOR ENVIRONMENTAL AUTHORISATION AND WATER USE LICENCE FOR THE WATER PIPELINE FOR THE WONDERFONTEIN MINE.

Umcebo Mining (Pty) Ltd is applying for the following license and authorisation for their proposed Water Pipeline to the Wonderfontein Mine in the road reserve of P13-1 (between Wonderfontein and Carolina), Mpumalanga Province:

- Environmental Authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended; and
- A Water Use License in terms of Chapter 4 of the National Water Act, 1998 (Act No. 36 of 1998): Section 21 (c) and (i).

The proposed construction of the water pipeline will require environmental authorisation subject to a Basic Environmental Impact Assessment Process as required by Sections 21 to 25 of Government Notice R. 543 of the EIA Regulations of 18 June 2010.

Shangoni Management Services (Pty) Ltd. was appointed, as the Independent Environmental Assessment Practitioner (EAP), responsible for the Environmental Impact Assessment processes. Shangoni has submitted, on behalf of Umcebo Mining (Pty) Ltd, an application for environmental authorisation for the proposed water pipeline to the Mpumalanga Department of Economic Development, Environment and Tourism. An application for a Water Use License will also be submitted to the Department of Water Affairs.

Attached please find a background information document, locality map of the site, and a stakeholder registration form in respect of the application. Should you wish to register as an Interested and Affected party for the above mentioned project, please complete the attached stakeholder registration form and return it to Shangoni Management Services before or on the

2nd of July 2014. Should you wish to not be part of this Environmental Impact Assessment process, it will be appreciated if we could receive a written confirmation thereof to enable us to continue with the application.

Please do not hesitate to contact the undersigned should you require any additional information.

Environmental Assessment Practitioners: Shangoni Management Services (Pty) Ltd.
Lizelle Crous
E-mail: lizelle@shangoni.co.za
Tel: 012 807 7073
Fax 2 E-mail: 086 643 5360
Fax: 012 807 1014
Online Participation: Go to www.shangoni.co.za and click on Public Documents

Project Coordinator: WSP Group Africa (Pty) Ltd, SA Civil and Structural Engineering Division
Eben Kotzé
E-mail: eben.kotze@WSPGroup.co.za
Tel: 013 653 6337
Fax: 013 653 6338
Website: www.wspgroup.co.za

Official – EIA Application in terms of NEMA, 1998
Ms Sindisiwe Mbuyane
Tel: 017 811 3951

Regards,

Lizelle Crous
Environmental Assessment Practitioner

Figure 18: Example of a Notification letter sent to Interested and Affected Parties

Figure 19: Proof of Postage of Notification Letters

4.3.3 I&AP register

Once all adjacent landowners, organs of state and the public were notified of the proposed project, an I&AP register (as also provided in Appendix E) was compiled. The table below provides an extract of the I&AP Register indicating the organs of state and other I&APs that have been registered.

Table 37: Registered I&APs

No.	Department	Name
Organs of State		
1	Mpumalanga Department of Agriculture, Rural Development and Land Administration	C.H.P. Kleynhans
2	Mpumalanga Department of Agriculture, Rural Development and Land Administration	Mr Jan Venter
3	Mpumalanga Department of Co-operative Governance and Traditional Affairs	Mr David Mahlobo
4	Mpumalanga Department of Community Safety, Security and Liaison	Mr Thulani Sibuyi
5	Mpumalanga Department of Human Settlements	Mr S. Mstweni
6	Mpumalanga Department of Public Works, Roads and Transport	Landowner: Mr Kgopana Mathew Mohlasedi
7	Department of Water Affairs, Mpumalanga Regional Office X11C	Golden Mcanyi Mthembi
8	Department of Water Affairs, Mpumalanga Regional Office X11A	Golden Mcanyi Mthembi
9	Chief Albert Luthuli Local Municipality	Zeph F. Mkhwanazi
10	Chief Albert Luthuli Local Municipality Ward 21	Cllr. Matukutela Walter Mngomezulu
11	Gert Sibande District Municipality	Mr T.D. Hlanvane
12	South African Heritage Resources Agency	TBA
13	SANRAL Northern Region	Mr Jan Olivier
14	SANRAL Eastern Region	TBA
15	Emakhazeni Local Municipality	HOD: Technical Services Department
16	Emakhazeni Local Municipality	HOD: Proposed Development and Planning Department
17	Emakhazeni Local Municipality Ward 8	Cllr. John James Stevens
18	Nkangala District Municipality	Mr Mathe Boetie
No.	**Interest/Company/Entity**	**Name**
Registered I&APs		
1	Chief Albert Luthuli Local Municipality Ward 21	Cllr. Matukutela Walter Mngomezulu
2	Emakhazeni Local Municipality	Mrs Thandi Shoba

Refer also to Appendix E for a detailed I&AP Register including contact information for all registered organs of state and I&APs.

4.3.4 Public meeting(s)

No public meetings have been held nor is one anticipated at present.

4.3.5 Access and opportunity to comment on written submissions

4.3.5.1 Basic Environmental Assessment Report

This draft Basic Environmental Assessment Report will be made available to I&APs and key stakeholders for review and commenting for a period of fourty (40) days. The report will also be submitted to Mpumalanga Department of Economic Development, Environment and Tourism to obtain their comments.

An electronic copy of the draft Basic Assessment Report will also be posted on Shangoni Management Services' website (www.shangoni.co.za) for public comment for the same review period of fourty days.

4.3.6 Consultation with the relevant Authorities

4.3.6.1 Application form in terms of the NEMA, 1998

The applicable Environmental Authorisation application form under NEMA, 1998, was submitted to the Mpumalanga Department of Economic Development, Environment and Tourism on the 24th of February 2014. A reference number (17/2/3 GS-238) was issued by the Mpumalanga Department of Economic Development, Environment and Tourism on the 5th of March 2014. The letter of acknowledgement indicating the above mentioned reference number is attached as Appendix F.

4.3.6.2 Authorities meeting(s)

No meetings have been held with any of the competent authorities nor are such meetings anticipated at present**.**

4.3.7 Further consultation with relevant Authorities

No further consultation has occurred.

4.3.8 Comments and responses

All issues, comments and questions received from I&APs thus far have been summarised in the table below. Copies of the comments received have also been included in Appendix E.

Table 38: Comments and responses report

Name of contact person	Company	Date	Method of comment	Issue raised	Response
C. Landman	SANRAL Regional Manager: Eastern Region	09/07/2014	Post	**PROPOSED WATER PIPELINE FOR THE WONDERFONTEIN MINE** Your letter and drawing submission dated 23 May 2014 regarding the abovementioned proposal has reference. Please be advised that your application does not affect the Eastern Region of SANRAL and will be referred to our Northern Region for the attention of Mr Jan Oliver who can be contacted on 012 426 6200.	Comments noted. The SANRAL Northern Region office was also informed of the project.
Nokukhanya Khumalo	South African Heritage Resources Agency (SAHRA)	26/09/2014	SAHRIS Website	**Final Comment** **In terms of Section 38(8) of the National Heritage Resources Act (Act 25 of 1999)** **UMCEBO MINING (PTY) LTD - APPLICATION FOR ENVIRONMENTAL AUTHORISATION AND A WATER USE LICENSE - WATER PIPELINE FOR THE WONDERFONTEIN MINE** Thank you for notifying SAHRA of the proposed Water pipeline for	Comments noted. The mitigation measures indicated in SAHRA's letter have been incorporated into this report and the draft Environmental Management Programme for this project.

Name of contact person	Company	Date	Method of comment	Issue raised	Response
				Wonderfontein Mine, situated by a road servitude, and the P15-1 road between Wonderfontein and Carolina. The pipeline is intended to be 16km's in length at a 200-300mm diameter and is situated 32 metres from a water course and 10km's from the Nooitgedacht Dam Nature Reserve and falls. The pipeline passes along Shanduka Coal's Strathrae road, Klippan farm and is 30km's away from Carolina and is proposed to supply the Wonderfontein mine with water. The water pipeline will pass through the farms Blesbokspruit, Leeupan and Klippan, in the eMalahleni Local Municipality, Mpumalanga Province. Under sections 34, 35 and 36 of the National Heritage Resources Act (25 of 1999) heritage resources are protected from damage from mining and development activities. These resources are for instance burial grounds, unmarked and marked graves that are older than 60 years, built structures that are older than 60 years old, archaeology (stone tools, stone walled sites, prehistoric and historic pottery sherds,	

Name of contact person	Company	Date	Method of comment	Issue raised	Response
				ash grounds etc.) and palaeontology (fossils of plant and animal material). Although there is no mention of palaeontology in the heritage report, it should be noted that the intended pipeline will be constructed along alternating very high and moderate palaeontologically sensitive zones. Due to the shallow surface disturbances of the development and the disturbed nature of the surrounding lands, with palaeontology being most visible when there is rocky outcrops a field assessment will not be required for this development. Pelser, A. J. April 2013. *A report on a Phase I Heritage Assessment for a proposed pipeline (two options), on the Wonderfontein-Carolina road near Wonderfontein, Mpumalanga Province.* Mr A. J. Pelser undertook a field assessment of the proposed water pipeline route, and its alternative route. Along the route, no significant heritage was found due to the developed nature of the surround areas, as mentioned in the	

Name of contact person	Company	Date	Method of comment	Issue raised	Response
				heritage report, the route follows alongside existing road servitudes. Thus any heritage that may be uncovered may be of low significance. **Final Comment** Based on the submitted information to this case and in the heritage report referenced above, SAHRA APM Unit does not object to the proposed development. On condition that a fossil finds procedure is developed for the EIA/EMP, meaning that the Construction Manager must be responsible and be knowledgeable of fossils, this may require for them to go and acquaint themselves with how fossils look like and what types of fossils that may possibly occur in the project location. This is for in case there are any discoveries of fossils on the route the water pipeline will traverse. If it were to happen then they must also know of a paleontologist or have contact details of one, whereby they will come and investigate the site and fossils found. However any heritage resources are still	

Name of contact person	Company	Date	Method of comment	Issue raised	Response
				generally protected from damage and destruction by the NHRA (25 of 1999) under section 35 for archaeology, palaeontology and meteorites, and section 36 for graves and cemeteries. Although the route in which the power line will traverse is already disturbed by other recent developments, agricultural activities and servitude road to the Shanduka mine, any heritage resources uncovered during construction should be reported to a heritage specialist and work on the site should be stopped until a heritage specialist has inspected the resources and site. Heritage resources that may likely be uncovered are stone tools as they most likely to occur near the water pans and graves. Should you have any further queries, please contact the designated official using the case number quoted above in the case header.	

4.3.9 Conclusions of the PPP

In conclusion, the Public Participation exercise has provided adequate information to enable an understanding of what the proposed Wonderfontein water pipeline would entail and to address the concerns and comments received during the Basic Assessment process.

5. NEED AND DESIRABILITY FOR THE ACTIVITY

A need and desirability for this project is evident from the following perspectives:

5.1 Developer / Applicant

Drinking water (domestic water use) at the Wonderfontein mine is currently being obtained from a number of boreholes on the remaining extent of Portion 2 of the farm Wonderfontein 428 JS (JKC, 2009). The proposed water pipeline is required to supply additional clean water to the mine to ensure its continued operation and development. The provision of water via the pipeline will also ensure that additional, non-sustainable pressure is not placed on the groundwater resource.

5.2 Local community

Unemployment rates in the local municipality are high. This project will provide 15 employment opportunities during the construction phase and 1 employment opportunity during the operational phase. The creation of jobs will have a positive impact on the local community. The local economy can also be stimulated through, for example, local procurement of construction materials.

5.3 District and provincial benefit

The provision of water to the Wonderfontein mine will facilitate the mine's development and sustain its operation for the foreseeable future. This development will therefore indirectly contribute to the continued provision of current jobs at the mine and the future provision of additional employment opportunities as well as the stimulation of the district economy through the businesses associated with the mine and its supply chains.

6. CONSIDERATION OF ALTERNATIVES

The following definition of "alternatives" is given in the EIA Regulations of 18 June 2010: "alternatives", in relation to the proposed activity, *means different means of meeting the general purpose and requirements of the activity, which may include alternatives to-*

a) the property on which or location where it is proposed to undertake the activity;
b) the type of activity to be undertaken;
c) the design or layout of the activity;
d) the technology to be used in the activity;
e) the operational aspects of the activity; and
f) the option of not implementing the activity".

Typically, alternative assessments are conducted to assist in comparing various projects or attributes of projects that will occur. The most critical comparison is evaluating any proposed project against the No-Go option. The alternatives assessment then considers alternatives to project site selection for the proposed development; alternatives to layout of the development; and alternatives to construction methodologies and/or materials used for the development.

The alternatives assessment was conducted using a simple cost-benefit analysis of each proposed alternative, through assessing various environmental attributes. These attributes can include physical (geology and soils, surface water quality and quantity, groundwater quality and quantity); biophysical (flora and fauna, sensitive environments); and social attributes (site of archaeological or cultural importance, land use issues, social health and welfare).

The impact of the each alternative was then evaluated in terms of whether it has a positive, negative, or no impact. In this instance, the impact is not evaluated in terms of significance but rather whether or not it will arise. Positive impacts are assigned a value of 1; no impact a value of 0; and a negative impact a value of -1.

By adding all of the attribute scores for each alternative, a suitability score is derived that indicates the preferred alternative. A total positive score indicates the project benefits outweigh the potential negative impacts, while a total negative score indicates the project environmental costs outweigh the potential benefits. Essentially, the highest scoring alternative is then carried forward for full impact evaluation.

6.1 No-Go option

The potential impact of the preferred project option on environmental and socio-economic attributes identified during the assessment phase is evaluated against the potential impact of the No-Go option on the same attributes. The summary of this assessment is provided in the table below.

Table 39: Development vs. No-Go option

Attribute	Development Option	No-go Option
Physical environment		
Air Pollution	0	0
Noise Pollution	0	0
Water Quality	0	0
Water Quantity	-1	-1
Visual Aesthetics	0	0
Biophysical environment		
Fauna and Flora	-1	0
Sensitive Environments	-1	0
Social environment		
Traffic	0	0
Impact on property values	0	0
Safety and security	0	0
Local and regional economy	1	0
Infrastructure development	1	0
Total	**-1**	**-1**

As can be seen in the table above, the development option and the no-go option both have an overall score of -1. For the no-go option, the negative impact on water quantity will result from the additional groundwater that may be abstracted by the mine from their boreholes should they not be able to obtain clean water via the proposed pipeline. For the proposed pipeline (development option), the water at the Eskom water supply point will also have been sourced from a groundwater or surface water resource, or both, and there is therefore also a negative impact on water quantity for the development option. As the proposed pipeline will run through wetland areas as well as “highly significant” and “irreplaceable” areas according to the Mpumalanga Biodiversity Conservation Plan, there will be negative impacts on fauna and flora as well as sensitive environments (wetlands). The development option will have a positive impact on the local and regional economy through job creation as well as a positive impact on infrastructure development as new water supply infrastructures will be constructed.

6.2 Alternatives considered

6.2.1 Activity alternatives

The proposed activity is for the provision of clean water to the Wonderfontein mine. There are two potential alternative ways in which water can be supplied to the mine.

The first alternative is via the abstraction of groundwater from the boreholes at the Wonderfontein mine [on the remaining extent of Portion 2 of the farm Wonderfontein 428 JS (JKC, 2009)]. Groundwater is currently abstracted from these boreholes for use at the mine, but the mine requires additional supplies of water which the boreholes cannot sustainably supply. Such additional abstractions would also not be covered by the mine's Integrated Water and Waste Management Plan (IWWMP). Based on the above, this alternative is not a feasible alternative to supply additional water to the mine.

The second alternative is the proposed project, namely the construction of the water supply pipeline from the Eskom water supply point to the mine boundary. Sufficient spare capacity exists at the Eskom water supply point to satisfy the additional water requirements of the mine. This proposed pipeline is feasible from an engineering and technical design perspective as well as in terms of its financial costs to the mine.

6.2.2 Location/route alternatives

Two potential routes have been identified for the proposed pipeline. The routes were shown in Figure 1. The proposed route is shown in red on this figure (Route Alternative 1) whilst the alternative segment to the route is shown in green (Route Alternative 2). Route Alternative 1 is 10.2km in length whilst Route Alternative 2 is 10.7km in length.

The Phase 1 Heritage Impact Assessment indicated that no cultural heritage artefacts are present along the proposed pipeline routes. Both route alternatives could therefore be used. In terms of the vegetation assessment, the sensitivities of both route alternatives are approximately the same. In terms of the wetland assessment, both route alternatives cross the same number of wetland areas (five). Route Alternative 2, does, however, pass close to another wetland area and also crosses Wetland 1 in an unfavourable place. In comparison, Route Alternative 1 crosses Wetland 1 on or near the existing road. Route Alternative 1 is therefore the preferred alternative.

6.2.3 Comparative assessment

An evaluation of the advantages and disadvantages of each option is given in the table below.

Table 40: Comparison of the various alternatives

	Route Alternative 1 (Preferred Option)	Route Alternative 2
Advantages	• This route alternative crosses Wetland 1 on or near an existing road. • No observed cultural heritage artefacts will be disturbed by the construction of the pipeline. • This route is shorter than Route Alternative 2 and it is therefore possible that construction costs will be lower for this route.	• No observed cultural heritage artefacts will be disturbed by the construction of the pipeline.
Disadvantages	• This route will run through a number of wetland areas (five). • This route will run through or close to medium and high vegetation sensitivity areas in terms of the Mpumalanga Biodiversity Conservation Plan.	• This route crosses Wetland 1 in an unfavourable place. • This route is longer than Route Alternative 1 and it is therefore possible that construction costs will be higher for this route. • This route will run through a number of wetland areas (five). • This route will run through or close to medium and high vegetation sensitivity areas in terms of the Mpumalanga Biodiversity Conservation Plan.

7. ENVIRONMENTAL IMPACT ASSESSMENT

7.1 Aims of Environmental Impact Assessment

Potential environmental impacts (biophysical) associated with the proposed water pipeline project have been identified.

The Environmental Impact Assessment (EIA) phase aims to adequately investigate and address all potentially significant environmental issues in order to provide the Mpumalanga Department of Economic Development, Environment and Tourism with sufficient information to make an informed decision regarding the proposed project.

This part of the document focuses on identification of the major potential impacts that the activities, processes and actions may have on the surrounding environment. It indicates the major impacts that these activities may have on the environmental components associated with the study area, as required in terms of R.543 of the EIA Regulations, 2010.

The EIA aims to achieve the following:

- To provide a detailed assessment of the biophysical environments affected by the proposed project;
- To assess impacts on the study area in terms of environmental criteria; and
- To identify and recommend appropriate mitigation measures for potentially significant environmental impacts.

This draft Basic Assessment Report addresses the following:

- A detailed description of the proposed project;
- Detailed assessment of the identified potentially significant impacts;
- Recommendations regarding the mitigation of significant impacts; and
- To meet the requirements and to comply with the necessary legislation and Acts.

Any specialist studies are combined into this consolidated report to allow for easy assessment of the potential aspects with associated impacts.

7.2 Environmental Impact Assessment Procedure

The environmental risk of any aspect is determined by a combination of parameters associated with the impact. Each parameter connects the physical characteristics of an impact to a quantifiable value to rate the environmental risk.

Impact assessments should be conducted based on a methodology that includes the following:

- Clear processes for impact identification, predication and evaluation;
- Specification of the impact identification techniques;
- Criteria to evaluate the significance of impacts;
- Design of mitigation measures to lessen impacts;
- Definition of the different types of impacts (indirect, direct or cumulative); and
- Specification of uncertainties.

After all impacts have been identified, the nature of each impact can be predicted. The impact prediction will take into account physical, biological, socio-economic and cultural information and will then estimate the likely parameters and characteristics of the impacts. The impact prediction will aim at providing a basis from which the significance of each impact can be determined and appropriate mitigation measures can be developed.

The risk assessment methodology is based on defining and understanding the three basic components of the risk, i.e. the source of the risk, the pathway and the target that experiences the risk (receptor). Refer to the figure below for a model representing the above principle (as contained in the DWA's Best Practice Guideline: G4 – Impact Prediction).

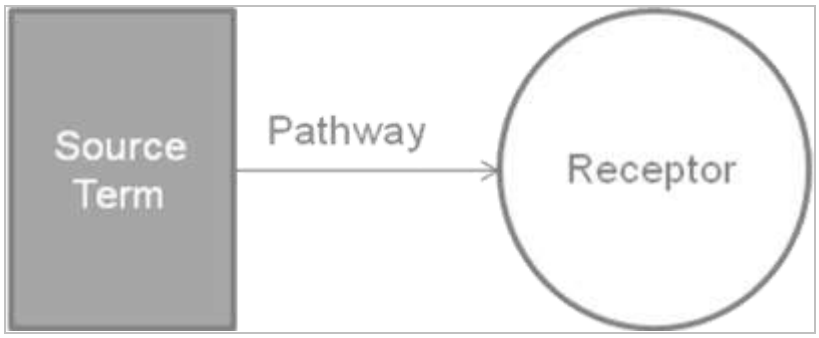


Figure 20: DWAs model for impact prediction (risk assessments)

Tables 41 and 42 below indicate the methodology to be used in order to assess the Probability and Magnitude of the impact, respectively, and Table 43 provides the Risk Matrix that will be used to plot the Probability against the Magnitude in order to determine the Severity of the impact.

Table 41: Determination of Probability of the Impact

Frequency of Aspect / Unwanted Event	Score	Availability of pathway from the source to the receptor	Score	Availability of receptor	Score
Never known to have happened, but may happen	1	A pathway to allow for the impact to occur is never available	1	The receptor is never available	1
Known to happen in industry	2	A pathway to allow for the impact to occur is almost never available	2	The receptor is almost never available	2
< once a year	3	A pathway to allow for the impact to occur is sometimes available	3	The receptor is sometimes available	3
Once per year to up to once per month	4	A pathway to allow for the impact to occur is almost always available	4	The receptor is almost always available	4
Once a month - Continuous	5	A pathway to allow for the impact to occur is always available	5	The receptor is always available	5

Step 1: Determine the **PROBABILITY** of the impact by calculating the average between the Frequency of the Aspect, the Availability of a pathway to the receptor and the availability of the receptor.

Table 42: Determination of Magnitude of impact

Source								Receptor			
Duration of impact	**Score**	**Extent**	**Score**	**Volume / Quantity / Intensity**	**Score**	**Toxicity / Destruction Effect**	**Score**	**Reversibility**	**Score**	**Sensitivity of environmental component**	**Score**
Lasting days to a month	1	Effect limited to the site. (metres);	1	Very small quantities / volumes / intensity (e.g. < 50L or < 1Ha)	1	Non-toxic (e.g. water) / Very low potential to create damage or destruction to the environment	1	Bio-physical and/or social functions and/or processes will remain unaltered.	1	Current environmental component(s) are largely disturbed from the natural state. Receptor of low significance / sensitivity	1
Lasting 1 month to 1 year	2	Effect limited to the activity and its immediate surroundings. (tens of metres)	2	Small quantities / volumes / intensity (e.g. 50L to 210L or 1Ha to 5Ha)	2	Slightly toxic / Harmful (e.g. diluted brine) / Low potential to create damage or destruction to the environment	2	Bio-physical and/or social functions and/or processes might be negligibly altered or enhanced / Still reversible	2	Current environmental component(s) are moderately disturbed from the natural state. No environmentally sensitive components.	2
Lasting 1 – 5 years	3	Impacts on extended area beyond site boundary (hundreds of metres)	3	Moderate quantities / volumes / intensity (e.g. > 210 L < 5000L or 5 – 8Ha)	3	Moderately toxic (e.g. slimes) Potential to create damage or destruction to the environment	3	Bio-physical and/or social functions and/or processes might be notably altered or enhanced / Partially reversible	3	Current environmental component(s) are a mix of disturbed and undisturbed areas. Area with some environmental sensitivity (scarce / valuable environment etc.).	3
Lasting 5 years to Life of Organisation	4	Impact on local scale / adjacent sites (km's)	4	Very large quantities / volumes / intensity (e.g. 5000 L – 10 000L or 8Ha– 12Ha)	4	Toxic (e.g. diesel & Sodium Hydroxide)	4	Bio-physical and/or social functions and/or processes might be considerably altered or enhanced / potentially irreversible	4	Current environmental component(s) are in a natural state. Environmentally sensitive environment / receptor (endangered species / habitats etc.).	4
Beyond life of Organization / Permanent impacts	5	Extends widely (nationally or globally)	5	Very large quantities / volumes / intensity (e.g. > 10 000 L or > 12Ha)	5	Highly toxic (e.g. arsenic or TCE)	5	Bio-physical and/or social functions and/or processes might be severely/substantially altered or enhanced / Irreversible	5	Current environmental component(s) are in a pristine natural state. Highly Sensitive area (endangered species, wetlands, protected habitats etc.)	5

Step 2: Determine the **MAGNITUDE** of the impact by calculating the average of the factors above.

Table 43: Determination of Severity of impact

ENVIRONMENTAL IMPACT RATING / PRIORITY					
	MAGNITUDE				
PROBABILITY	**1 Minor**	**2 Low**	**3 Medium**	**4 High**	**5 Major**
5 Almost Certain	Low	Medium	High	High	High
4 Likely	Low	Medium	High	High	High
3 Possible	Low	Medium	Medium	High	High
2 Unlikely	Low	Low	Medium	Medium	High
1 Rare	Low	Low	Low	Medium	Medium

Step 3: Determine the **SEVERITY** of the impact by plotting the averages that were obtained above for Probability and Magnitude in the table below.

7.3 Description of Environmental Impacts

The aim of this section of this EIA report is to provide information regarding the potential environmental impacts associated with the proposed activities. In order to provide background information and a framework for the environmental risk assessment, a description of the different phases of the project is provided below. Refer to the tables below for the impacts associated with the Wonderfontein water pipeline project.

7.3.1 Design and Planning Phase

- Design of the pipeline; and
- Planning for the construction of the pipeline and notification of landowners that may be affected by the proposed project.

7.3.2 Construction Phase

- Establishment of the construction camp;
- Laydown of material within the work areas;
- Removal of topsoil;
- Excavation of trenches for the pipeline;
- Laying of bedding material within the trenches;
- Installation and connection of the pipeline segments;
- Backfilling of the trenches;
- Spreading of topsoil; and
- Rehabilitation of the affected footprint of the pipeline.

7.3.3 Operational Phase

- Routine maintenance of the pipeline; and
- Repair work on the pipeline, when required.

7.3.4 Decommissioning Phase

Decommissioning of the pipeline is not anticipated for the foreseeable future. Should the pipeline be decommissioned, a detailed closure and rehabilitation plan will be submitted to the Mpumalanga Department of Economic Development, Environment and Tourism prior to decommissioning.

7.3.5 Impacts associated with the proposed Wonderfontein Water Pipeline project (triggered listed activity)

Table 44: Environmental impact assessment: General Environment

Activity:
- Construction activities associated with the pipeline.
- Maintenance of the pipeline (routine or in case of failures).

Aspect:
- Lack of knowledge amongst workers and contractors in terms of how their actions may impact on the environment.

Applicable Alternatives: All route alternatives.

Nature and significance of environmental impact												
Impact Description	Risk rating (before mitigation)			Environmental Objective	Management / Mitigation / Monitoring Measures	Timeframe	Responsibility	Risk rating (after mitigation)			Applicable legislation / other documents
	Probability	Magnitude	Severity					Probability	Magnitude	Severity	
Construction Phase											
Harm to the environment in general (this includes pollution of soil and water resources, as well as harm to employees and wasteful practices in terms of resource use and waste management) during construction of the pipeline.	5	3	H	To prevent harm to the environment by educating workers and contractors.	• The contractor is to ensure that all employees, including sub-contractors and their employees, attend onsite Environmental Awareness/Training prior to commencing work on site. • Follow-up Environmental Awareness/Training may be required from time to time as new subcontractors or crews commence work or for specific activities that may potentially impact the environment. • The contractor is to maintain accurate records of any training undertaken. • The ECO shall monitor the contractor's compliance with the requirement to provide sufficient environmental awareness training to all site staff. • Training is to cover all aspects of the EMP and procedures to be followed. • All construction workers shall be issued with ID badges and clearly identifiable uniforms.	During the construction phase.	• Construction contractor • ECO	3	3	M	• NEMA, 1998 • NEMWA, 2008 • OHSA, 1993
Operational Phase											
Harm to the environment in general (this can include pollution of soil and water resources, as well as harm to employees and wasteful practices in terms of resource use and waste management) during maintenance of the pipeline (routine or in case of failures).	4	2	M	To prevent harm to the environment by educating workers and contractors.	• All employees are required to attend onsite Environmental Awareness/Training prior to commencing work on site. • Follow-up Environmental Awareness/Training may be required from time to time as new employees commence work or for specific activities that may potentially impact the	Life of operation	Pipeline Manager	3	2	M	• NEMA, 1998 • NEMWA, 2008 • OHSA, 1993

					environment. • The facility manager is to maintain accurate records of any training undertaken. • Training is to cover all aspects of the EMP and procedures to be followed.							
Decommissioning Phase												
Decommissioning of the pipeline is not anticipated for the foreseeable future. Should the pipeline be decommissioned, a detailed closure and rehabilitation plan will be submitted to the Mpumalanga Department of Economic Development, Environment and Tourism prior to decommissioning.	N/A											

Table 45: Environmental impact assessment: Vegetation

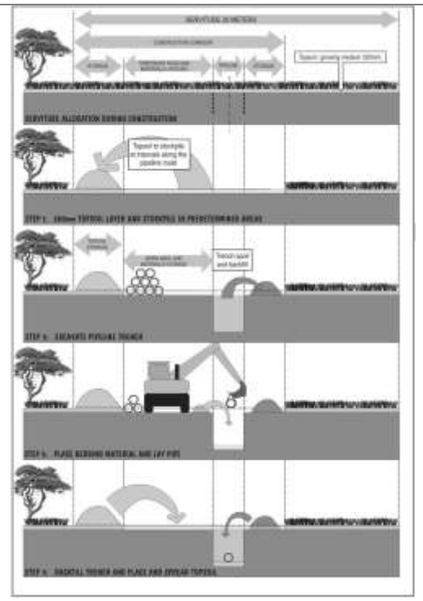
Activity:
- Site clearance and construction activities associated with the pipeline.
- Hot work activities, smoking and cooking as part of the construction phase.
- Maintenance of the pipeline (routine or in case of failures).
- Rehabilitation of disturbed areas.

Aspect:
- The removal and/or disturbance of endangered vegetation within critical biodiversity areas.
- Unclean construction vehicles gaining access to the construction site.
- Removal of alien and invasive plant species.
- Disturbance or destruction of natural vegetation surrounding the site as a result of runaway veld fires caused by workers or contractors.
- Inadequate rehabilitation of disturbed areas.

Applicable Alternatives: All route alternatives.

Nature and significance of environmental impact												
Impact Description	**Risk rating (before mitigation)**			**Environmental Objective**	**Management / Mitigation / Monitoring Measures**	**Timeframe**	**Responsibility**	**Risk rating (after mitigation)**			**Applicable legislation / other documents**
	Probability	**Magnitude**	**Severity**					**Probability**	**Magnitude**	**Severity**	
Construction Phase											
The construction of the pipeline will entail the removal of vegetation to create a trench for the pipeline to be installed within. The vegetation type of the area is the Eastern Highveld Grassland which is an Endangered vegetation type. Large areas of vegetation along the proposed pipeline routes were found to be transformed by current and historic agricultural and mining activities, but some natural grasslands remain in close proximity to drainage lines, pans and the southern parts of the proposed pipeline routes. The following grassland types were recorded along the routes: Transformed grassland, secondary grassland, disturbed grassland, rocky grassland (largely	5	3	H	To prevent the disturbance of vegetation and in particular the moist, degraded and rocky/natural grasslands.	• An independent Ecological Control Officer (ECO) should be appointed to oversee the construction activities. • Suitable demarcation must be erected around the construction area (including the servitude, construction camps, areas where material is stored and the actual footprint of the development) to prevent access to sensitive areas. • Vehicular or pedestrian access must be prohibited in natural areas beyond the demarcated boundary of the construction site.	During the construction phase.	• Construction contractor • ECO	3	3	M	• NEMA, 1998 • NEMBA, 2004

natural), and moist grassland (shown in Figure 12). The pipeline routes also run through “irreplaceable” and “highly significant” critical biodiversity areas in terms of the Mpumalanga Biodiversity Conservation Plan. Areas where structures are stored will flatten vegetation and this could be detrimental to the persistence of the vegetation. The illegal disposal of construction materials like cement could also destroy natural vegetation.					• No open fires should be permitted within naturally vegetated areas. • Access roads should be formalised and existing roads and tracks should be used where possible, rather than creating new roads. • A vegetation rehabilitation plan should be implemented. Grassland can be removed as sods and stored within transformed vegetation. Alien invasive vegetation must be removed prior to storing the grassland sods. The sods must preferably be removed during the winter months and be replanted by latest springtime. The sods should not be stacked on top of each other. Once construction is completed, these sods should be used to rehabilitate the disturbed areas from where they have been removed. In the absence of timely rainfall, the sods should be watered well after planting and at least twice more over the next 2 weeks. • Construction workers and other personnel shouldn’t remove nor collect seed from any of the plants without permission from the local authority. • No activities should take place during rainy days or at least 2 days thereafter. • Site demarcations should be maintained until the cessation of all construction activities. • For pipelines, a servitude width of 15m should be permitted for machine excavation and 6m for manual excavation, unless otherwise specified by the ECO. This working servitude must accommodate all construction related activities, including materials storage, access routes etc. (DWAF, 2005). • The constructed access road should not be wider that 3m in sensitive areas. • A rehabilitation plan must be implemented that will restore the natural vegetation to what it was prior to the construction of the pipeline, so that the long term impact could be negligible. • Planning of the construction site must incorporate eventual rehabilitation (Figure 21).					

					 *Figure 21: Typical lifecycle of a trenching operation showing a fully rehabilitated site at the end of construction*						
The construction of the pipeline could result in the removal of plant species of conservation concern. It could also impact upon their habitat, pollination and eventually the persistence of the species. This could put additional strain on already declining populations. Two provincially protected species, namely *Gladiolus* cf *crassifolius* and *Satyrium parviflorum* are likely to be impacted upon by the proposed project.	3	3	M	To protect any plants species of conservation concern as well as to protect their habitats.	• Construction activities must be restricted to previously disturbed areas, as far as possible. • A suitably qualified person (botanist/horticulturist) should survey the final pipeline route alignment and footprint within the growing season of the plants, in order to confirm whether these plants will be impacted upon (especially within the moist grassland areas). • A Plant Rescue and Rehabilitation Plan should be implemented. Threatened plants should be removed by a suitably qualified specialist and replanted, with the permission of the provincial authority. • If any provincially protected species are used as part of rehabilitation, their survival must be monitored for at least two growing seasons after rehabilitation is completed. • Both *Gladiolus* cf *crassifolius* and *Satyrium parviflorum* should be able to survive if removed with grass sods (e.g. 1m x1m grass sods) that are then replanted in the same area from which they were removed as part of the rehabilitation process. • Construction workers or any other persons may not tamper or remove any protected plants. In addition, no one may collect seeds from the plants without permission from the local authority.	During the construction phase.	• Construction contractor • ECO	2	2	L	• NEMA, 1998 • NEMBA, 2004

					• Sensitive vegetation containing protected plant species and plants of conservation concern must be cordoned off and protected from construction activities and vehicles. • Slight deviations of roads and route alignments must be permitted in order to avoid plants of conservation concern that are located within the pipeline route (DWAF, 2005).						
The seeds of alien invasive species occurring at the construction areas could spread into disturbed soil as well as into soil stockpiles. Construction vehicles could also introduce alien invasive plant seeds or seeds of indigenous plants not belonging to the area to the construction site.	3	4	H	To prevent the establishment of alien invasive plants at the construction areas, as well as the establishment of indigenous plants that do not belong to the vegetation unit of the area.	• Alien invasive plant species identified within the study area and especially within the final pipeline route should be removed prior to construction-related soil disturbances taking place. By removing these species, the spread of seeds into disturbed soils will be prevented. This could have a positive impact on the surrounding natural vegetation. • All alien seedlings and saplings should be removed. The use of manual/mechanical removal is preferred instead of chemical control. • All construction vehicles, equipment and material should be cleaned thoroughly so that they are free from any plant material before gaining access to the construction site. This should be verified by the ECO.	During the construction phase.	• Construction contractor • ECO	2	4	M	• NEMA, 1998 • NEMBA, 2004
Although the rocky grasslands north-east of Grootpan may not directly be affected by the development, these grasslands may be impacted upon by edge effects. The moist grasslands may be indirectly affected by altered hydrology or a change in topography. Hydrology changes could lead to desiccation of the moist grasslands or flooding of adjacent grasslands, subsequently leading to deterioration of existing vegetation.	3	4	H	To ensure that the rocky and moist grasslands adjacent to the pipeline route do not deteriorate.	• A vegetation monitoring programme should be implemented. The indigenous vegetation directly impacted and those likely to be indirectly impacted upon must be monitored for species survival and changes in species composition. If significant deterioration is detected, corrective action should be taken where possible. For example, restore the flow of water to the moist grasslands. • Colonisation of disturbed areas by plants species from the surrounding natural vegetation must be monitored to ensure that vegetation cover is sufficient within one growing season. If not, the areas need to be rehabilitated with a grass seed mix containing species that naturally occur within the study area.	During the construction phase.	• Construction contractor • ECO	3	3	M	• NEMA, 1998 • NEMBA, 2004
The removal of alien invasive plant species along the pipeline route could reduce the total number of invasive specimens present as well as the potential of these plants to spread into disturbed soil.	**Positive impact**			To promote the eradication of alien invasive plant species and thereby limit their spread within the grasslands surrounding the pipeline route.	• An alien invasive monitoring plan should be implemented to remove alien invasive species along the chosen pipeline route prior to construction activities commencing. • Rehabilitate all areas cleared of invasive plants as soon as practically possible, utilising the specified methods and species. • Monitor all sites that were disturbed by the construction activities for the colonisation of exotics or invasive plants and control these as they emerge. Monitoring should continue for at	During the construction phase.	• Construction contractor • ECO	**Positive impact**			• NEMA, 1998 • NEMBA, 2004

			least two years after construction is complete. • Follow the manufacturer's instruction when using chemical methods for invasive plant control, especially in terms of quantities to use, time of application etc. • Ensure that only trained people handle and apply chemicals. • Eradicated plant material should be disposed of at an approved solid waste disposal site. • Only indigenous plant species that occur naturally in the area should be used during rehabilitation activities.					
Loss of indigenous grassland and habitats for indigenous fauna species surrounding the site as a result of runaway veld fires.	3	3	M	To prevent the occurrence and spreading of a veld fire.	**Equipment** • Basic fire-fighting equipment is to be placed at strategic locations at the construction site and must be readily available (e.g. at the site office, flammable material store and watchman's container). • Equipment is to be maintained in good working order to the satisfaction of local fire authorities. **Signage** • Safety signage including "No Smoking", "No Naked Lights" and "Danger", and product identification signs, are to be clearly displayed on fuel storage facilities and tanks. • Emergency numbers are to be clearly displayed. **Training** • An emergency procedure, taking into consideration all potential emergencies, such as a fire outbreak, hazardous chemical spill, etc. should be compiled. • The contractor is to ensure that all employees, including sub-contractors and their employees, are trained on the emergency procedure. • Follow-up emergency training may be required from time to time as new subcontractors or crews commence work. • The contractor is to maintain accurate records of any emergency training undertaken. • The ECO shall monitor the contractor's compliance with the requirement to provide sufficient emergency training to all site staff. **Activities** • Cooking during lunch is to be restricted to bottled gas facilities in designated areas approved by the ECO. This facility is to be	During the construction phase.	• Construction contractor • ECO	2	3	M	• NEMA, 1998 • National Veld and Forest Fire Act, 1998

					supervised and strictly controlled. • Smoking is prohibited near places where any readily combustible or flammable materials are present. Notices are to be prominently displayed prohibiting smoking in such areas. • Welding, flame cutting and other hot work is only to be undertaken in places where the necessary safety precautions are in place (i.e. not near potential sources of combustion and with a fire extinguisher immediately accessible). • If applicable, night watchmen are to be provided with adequate cooking and heating facilities (no open fires), a suitable method of disposing of wastewater and access to communication equipment. • No open fires are permitted. **Flammable materials** • Flammable materials storage must comply with standard fire safety regulations. • All flammable materials are to be stored in a suitable, lockable storage area. • Combustible materials may not accumulate at the construction site. • Access to fuel and chemical stores should be strictly controlled. • Stockpiles of vegetation are only to be located in areas approved by the facility manager and may not exceed 2m in height. Methods of stacking must take cognisance of the possible creation of a fire hazard. • Burning of stockpiled vegetation is not permitted.						
Operational Phase											
Maintenance vehicles driving within the grassland areas may cause destruction of naturally occurring vegetation, compaction of the soil and subsequently the colonisation of alien invasive plant species. The water released from a burst pipe may cause sedimentation, the washing away of vegetation or the contamination of nearby watercourses.	3	3	M	To prevent destruction of naturally occurring vegetation and the colonisation of alien invasive plant species.	• Maintenance work should be conducted according to a fixed plan and should not occur haphazardly. • Areas under rehabilitation should be cordoned off as no-go areas to prevent vehicular, pedestrian and livestock access. • Maintenance workers may not trample natural vegetation and work should be restricted to the previously disturbed footprint. In addition, mitigation measures as set out for the construction phase should be adhered to. • Leaks and issues of water wastage should be repaired as soon as they are identified. • Erosion donga crossings should be addressed through the application of soil erosion control and bank stabilisation procedures as specified by the	Life of operation	Pipeline Manager	2	2	L	• NEMA, 1998 • NEMBA, 2004

					ECO. • Do not allow erosion to develop on a large scale before effecting repairs. When in doubt, seek advice from the ECO. • Repair all erosion damage as soon as possible, no later than six months before the termination of the Maintenance Period to allow for sufficient rehabilitation growth to occur.						
Loss of indigenous grassland and habitats for indigenous fauna species surrounding the site as a result of runaway veld fires created during maintenance activities.	3	3	M	To prevent the occurrence and spreading of a veld fire.	• Apply the same mitigation measures as for the construction phase.	Life of operation	Pipeline Manager	2	3	M	• NEMA, 1998 • National Veld and Forest Fire Act, 1998
Rehabilitation Phase											
Vegetation along the pipeline footprint could deteriorate over time if suitable rehabilitation doesn't take place or if rehabilitation fails.	2	3	M	To ensure adequate, successful rehabilitation of all disturbed areas.	• After construction activities have been completed, the land must be cleared of rubbish, surplus material and equipment. It must be left in a condition as close as possible to how it was prior to the construction of the pipeline. • Areas under rehabilitation should be cordoned off as no-go areas to prevent vehicular, pedestrian and livestock access. • The re-introduction of livestock to rehabilitated areas should be delayed until an acceptable level of re-vegetation has been reached. • Workers may not trample natural vegetation and work should be restricted to the previously disturbed footprint. In addition, mitigation measures as set out for the construction phase should be adhered to.	Until all rehabilitation has been completed and successfully established to the satisfaction of the ECO.	• Construction contractor • ECO	2	2	L	• NEMA, 1998 • NEMBA, 2004
Decommissioning Phase											
Decommissioning of the pipeline is not anticipated for the foreseeable future. Should the pipeline be decommissioned, a detailed closure and rehabilitation plan will be submitted to the Mpumalanga Department of Economic Development, Environment and Tourism prior to decommissioning.	N/A										

Table 46: Environmental impact assessment: Fauna

Activity: • Site clearance and construction activities. • Maintenance of the pipeline (routine or in case of failures).
Aspect: • The removal and/or disturbance of endangered vegetation within critical biodiversity areas. • The use of floodlights at night. • Uneducated practices by construction and maintenance workers.
Applicable Alternatives: All route alternatives.
Nature and significance of environmental impact

Impact Description	Risk rating (before mitigation)			Environmental Objective	Management / Mitigation / Monitoring Measures	Timeframe	Responsibility	Risk rating (after mitigation)			Applicable legislation / other documents
	Probability	Magnitude	Severity					Probability	Magnitude	Severity	
Construction Phase											
Construction of the proposed pipeline will involve the clearance of vegetation which currently serves as a habitat for fauna species. This vegetation clearance may also result in the fragmentation and/or alteration of existing habitats. The area surrounding the construction site will likely be used by the fauna assemblages for foraging, roosting and movement.	5	3	H	To protect fauna habitats against fragmentation and/or alteration.	• Areas with high ecological sensitivity outside of the pipeline footprint should be avoided during the construction activities. Where areas of high ecological sensitivity need to be disturbed, the necessary permits and mitigation measures recommended by the wetland and vegetation specialist should be implemented. • As far as possible, no natural watercourses, pans, or wetlands outside of the pipeline footprint should be disturbed by the development. • Demarcation should be friendly to faunal species, allowing for movement between areas. This can include the use of culverts and open mesh. • As much natural vegetation as possible must be left intact to maintain ecological corridors for the movement of faunal species. Ecological corridors should include rivers, wetlands and moist grassland as well as their associated buffer zones per the wetland and vegetation assessments. Identified areas should remain undisturbed to provide the structural diversity required for safe movement of faunal species and to provide migration corridors. • The development area should be rehabilitated and re-vegetated as soon as possible using an appropriate rehabilitation plan that incorporates indigenous plant species. • Should any faunal species need to be removed from the construction area, a faunal capture and relocation plan should be developed and implemented. A suitably qualified person must undertake the capturing and relocation of the animals.	During the construction phase.	• Construction contractor • ECO	3	2	M	• NEMA, 1998 • NEMBA, 2004
The use of floodlights at night can disturb nocturnal fauna species. By nature, birds and mammals are mobile fauna assemblages able to adapt and relocate rapidly to more pristine areas. It is therefore unlikely that the proposed pipeline construction will	5	3	H	To minimise the generation of light pollution during the construction activities so that fauna species are disturbed as little as possible.	• Construction activities should be restricted to daylight hours to prevent disturbances from floodlights. • Should floodlights need to be used, the must point inwards towards where the light is required and must not create harsh light.	During the construction phase.	• Construction contractor • ECO	3	2	M	• NEMA, 1998

have a significant negative impact on avifauna or mammal species of conservation concern should the mitigation measures identified be implemented.											
Construction workers or other personnel on site may snare, hunt or kill fauna species. This may occur out of fear for certain fauna species, out of a need for food, or for sport.	4	3	H	To protect all fauna species at the construction site.	• Construction personnel should be informed about the Animal Protection Act, 1962 (Act No. 71 of 1962) and should be encouraged not to harm wildlife. • Construction personnel should undergo awareness training regarding the faunal assemblages that they may encounter on site. They should be informed of the correct procedures to follow should fauna be encountered on site. • Personnel must be informed of the policies and procedures applicable to fauna and the environment. • A management plan to prevent the personnel from harassing or poaching the faunal species should be developed and implemented.	During the construction phase.	• Construction contractor • ECO	2	1	L	• NEMA, 1998 • APA, 1962
Operational Phase											
Maintenance workers or other personnel on site may snare, hunt or kill fauna species. This may occur out of fear for certain fauna species, out of a need for food, or for sport.	3	3	M	To protect all fauna species within the vicinity of the pipeline.	• Maintenance personnel should be informed about the Animal Protection Act, 1962 (Act No. 71 of 1962) and should be encouraged not to harm wildlife. • Maintenance personnel should undergo awareness training regarding the faunal assemblages that they may encounter on site. They should be informed of the correct procedures to follow should fauna be encountered on site. • Personnel must be informed of the policies and procedures applicable to fauna and the environment. • A management plan to prevent the personnel from harassing or poaching the faunal species should be developed and implemented.	Life of operation	Pipeline Manager	2	1	L	• NEMA, 1998 • APA, 1962
Decommissioning Phase											
Decommissioning of the pipeline is not anticipated for the foreseeable future. Should the pipeline be decommissioned, a detailed closure and rehabilitation plan will be submitted to the Mpumalanga Department of Economic Development, Environment and Tourism prior to decommissioning.	N/A										

Table 47: Environmental impact assessment: Sensitive Landscapes: Wetlands

Activity: • Site clearance and construction activities. • Maintenance of the pipeline (routine or in case of failures).											
Aspect: • Construction activities within wetlands, diverting or impeding the flow of water. • Inadequate rehabilitation.											
Applicable Alternatives: All route alternatives.											
Nature and significance of environmental impact											
Impact Description	**Risk rating (before mitigation)**			**Environmental Objective**	**Management / Mitigation / Monitoring Measures**	**Timeframe**	**Responsibility**	**Risk rating (after mitigation)**			**Applicable legislation / other documents**
	Probability	**Magnitude**	**Severity**					**Probability**	**Magnitude**	**Severity**	
Construction Phase											
Route Alternative 1: The proposed construction of the water pipeline will directly cross or come close to five wetlands and will therefore disturb, alter and damage the wetlands where trenches are excavated for the pipeline, in conjunction with associated construction activities (construction vehicles and workers moving within the wetlands). This route alternative crosses Wetland 1 on or near an existing road and is the preferred route alternative. All the wetlands in the vicinity of the proposed route have been impacted upon by historic and present farming and grazing practices. All five of the wetlands that the route crosses are deemed to have "modified" Present Ecological States (PES) ranging from "moderately" to "seriously" modified.	5	3	H	To minimise the negative impact on the wetlands in the vicinity of the pipeline routes.	• Route Alternative 1 should be the chosen route for the pipeline. • The contractor is to draw up a plan for submission to the ECO and the facility manager indicating the locations of construction infrastructure including the site-camp, cement cleaning pits, toilets, stores, stockpiles (topsoil and building rubble), site office and wetland zones. • Construction areas should be cordoned off prior to and during construction. • As little land within each wetland must be disturbed as possible. Where possible, no equipment may be stored within any of the wetland zones. • Unnecessary vehicles, equipment and workers must be excluded from the wetland areas. • A Water Use Licence must be obtained from the Department of Water Affairs for the proposed pipeline project.	During the construction phase.	• Construction contractor • ECO	5	3	H	• NEMA, 1998 • NWA, 1998
Route Alternative 2: The proposed construction of the water pipeline will directly cross or come close to five wetlands and will therefore disturb, alter and damage the wetlands where trenches are excavated for the pipeline, in conjunction with associated construction activities (construction vehicles and workers moving within the wetlands). This route alternative crosses Wetland 1 in an unfavourable place and also runs close to another wetland. This route alternative is not preferred. All the wetlands in the vicinity of the proposed route have been impacted upon by historic and present farming and grazing practices. All five of the wetlands that the route crosses are deemed to have "modified" Present Ecological States (PES) ranging from "moderately" to "seriously"	5	4	H			During the construction phase.	• Construction contractor • ECO	5	3	H	• NEMA, 1998 • NWA, 1998

modified.											
Stormwater input or the restriction of water flow due to construction activities can cause changes to the quantity and fluctuation properties of the watercourses. This may be caused by the diversion or impedance of flow within the wetlands, the lack of adequate rehabilitation, the movement of vehicles within the wetlands as well as sedimentation due to the trenches required for the pipes. All the wetlands in the vicinity of the proposed routes have been impacted upon by historic and present farming and grazing practices. All five of the wetlands that the routes cross are deemed to have “modified” Present Ecological States (PES) ranging from “moderately” to “seriously” modified.	5	3	H	To prevent the impedance or diversion of flow within the wetlands in the vicinity of the pipeline routes. To prevent sedimentation of the wetlands and to ensure adequate rehabilitation of the wetlands.	• No activities should take place in the watercourses and associated buffer zones. Where the above is unavoidable, only the construction footprint and no access roads can be considered. This is subjected to authorisation by means of a water use license. • Construction must be restricted to the dryer winter months. • Suitable demarcation must be erected around the construction works area to prevent access to the adjacent portions of the wetland. The works areas generally include the servitude, construction camps, areas where material is stored and the actual footprint of the pipeline. • Prevent pedestrian and vehicular access into the wetland and buffer areas. • Formalise access roads and make use of existing roads and tracks, where feasible, rather than creating new routes through naturally vegetated areas. • Manage on-site water use and prevent stormwater or contaminated water from directly entering the wetlands. • Point discharges should be managed responsibly, where applicable. • The planning of the construction site must include the eventual rehabilitation/restoration of indigenous vegetative cover. • Conduct alien plant eradication activities before the construction activities commence so as to prevent the spread of alien species into disturbed soils. Follow-up control during the construction phase must take place. • As little vegetation should be removed as possible. • Rehabilitation of damaged/disturbed areas must be implemented immediately upon completion of the construction activities in that area of the wetland.	During the construction phase.	• Construction contractor • ECO	3	3	M	• NEMA, 1998 • NWA, 1998
Construction activities may change the amount of sediment entering the water resource and subsequently change the turbidity of the water (increase or decrease in turbidity). This may occur, for example, when the clearing of vegetation during excavation activities exposes the soil and this soil is then washed into the wetlands during rain events. This causes sedimentation. Erosion also results from the above mentioned scenario. Slopes may be disturbed by the creation of roads	4	3	H	To prevent sedimentation of the wetlands and the disturbance of slopes.	• Water is expected to seep into any area of trenching and is therefore likely to fill the trenches where the pipeline is to be installed. However, it is likely that water will be contaminated within these trenches and should therefore be cleaned or dissipated into a structure that allows for additional sediment input and slows down the velocity of the water, reducing the risk of erosion.	During the construction phase.	• Construction contractor • ECO	3	3	M	• NEMA, 1998 • NWA, 1998

and tracks adjacent to the wetlands. All the wetlands in the vicinity of the proposed routes have been impacted upon by historic and present farming and grazing practices. All five of the wetlands that the routes cross are deemed to have “modified” Present Ecological States (PES) ranging from “moderately” to “seriously” modified.					Structures like boulder weirs should be considered for their ability to absorb excess sediment as well as dissipating the water over a larger area. • Construction in and around watercourses must be restricted to the dryer winter months. • Suitable demarcation must be erected around the construction works area to prevent water runoff and erosion of disturbed or heaped soils into wetland areas. • Formalise access roads and make use of existing roads and tracks where feasible, rather than creating new routes through naturally vegetated areas. • Keep vegetation and soil undisturbed for as long as possible, removing it immediately before construction activities/earthworks in that area commence (DWAF, 2005). • A vegetation rehabilitation plan should be implemented. Grassland can be removed as sods and stored within transformed vegetation. The sods must preferably be removed during the winter months and be replanted by latest springtime. The sods should not be stacked on top of each other or within sensitive environs. Once construction is completed, these sods should be used to rehabilitate the disturbed areas from where they have been removed. In the absence of timely rainfall, the sods should be watered well after planting and at least twice more over the next 2 weeks. • Remove only the vegetation where necessary for construction activities and do not allow any disturbance to the adjoining natural vegetative cover. • Rehabilitation plans must be submitted and approved for the rehabilitation of damage caused during construction activities. The plan must be implemented immediately upon completion of construction in the area. • Cordon off areas under rehabilitation as “no-go areas” to prevent vehicular, pedestrian and livestock access. • Ideally, the rehabilitated pipeline footprint, especially on slopes and along riparian and wetland areas, must be fenced to prevent livestock grazing and trampling. Once monitoring has shown that the rehabilitation is successful, the fences may be removed (provided that it is at least two years after rehabilitation has been completed).						

					• During the construction phase, measures must be put in place to control the flow of excess water so that it does not impact on the surface vegetation. • Protect all areas susceptible to erosion and ensure that there is no undue soil erosion from activities within and adjacent to the construction camp and work areas. • Runoff from the roads must be managed to avoid erosion and pollution problems. • Implement best management practices. • Implement source-directed controls (DWA, 1998). • Maintain buffer zones to trap sediments. • Conduct active rehabilitation during the construction activities.						
Construction activities may alter the water quality by increasing the amount of nutrients like phosphate, nitrite and nitrate. This may occur through the disposal or discharge of human sewage into the wetlands or their surroundings. All the wetlands in the vicinity of the proposed routes have been impacted upon by historic and present farming and grazing practices. All five of the wetlands that the routes cross are deemed to have “modified” Present Ecological States (PES) ranging from “moderately” to “seriously” modified.	3	3	M	To prevent the release of additional nutrients into the wetland environments.	• Adequate sanitation facilities must be provided outside of the wetland/riparian areas and their associated buffer zones. • Implement appropriate stormwater management around the excavation areas to prevent the ingress of run-off into the excavation trenches.	During the construction phase.	• Construction contractor • ECO	2	2	L	• NEMA, 1998 • NWA, 1998
Construction activities may alter the water quality due to toxic contaminants like metal ions (e.g. copper, lead and zinc) and hydrocarbons entering the environment of the wetlands. For example, this may occur due to run-off from road surfaces and/or the discharge of solvents and other industrial chemicals into the environment. All the wetlands in the vicinity of the proposed routes have been impacted upon by historic and present farming and grazing practices. All five of the wetlands that the routes cross are deemed to have “modified” Present Ecological States (PES) ranging from “moderately” to “seriously” modified.	4	4	H	To prevent the release of toxic contaminants into the wetland environments.	• After construction has been completed, the land must be cleared of rubbish, surplus materials and equipment. The land must be left in a condition that is as close as possible to how it was prior to the pipeline construction. • Maintenance of construction vehicles/equipment should not take place within the wetlands or wetland buffers. • Waste discharges must be controlled and may not be into the wetlands or wetland buffers. • Maintain buffer zones so that they may trap sediments with associated toxins.	During the construction phase.	• Construction contractor • ECO	3	3	M	• NEMA, 1998 • NWA, 1998
Construction activities may change the physical structure of the water resources/habitats. This may be caused by the construction of the pipeline within the watercourses, the deposition of wind-blown sand, the loss of fringing vegetation, soil erosion and the alteration of the natural fire regime. All the wetlands in the vicinity of the proposed routes have been impacted upon by historic and present farming and grazing practices. All five of the wetlands that the routes cross are deemed to have “modified” Present Ecological States (PES) ranging from “moderately” to “seriously” modified.	4	3	H	To prevent soil erosion, the alteration of the natural fire regime, the loss of fringing vegetation and the deposition of wind-blown wind so that the physical structure of the water resources/habitats do not change.	• Other than the approved and authorised pipeline, no other development or maintenance infrastructures are allowed within the delineated wetlands or associated buffer zones. • Demarcate the wetland areas and buffer zones to limit disturbances. Clearly mark these areas as “no-go areas”. • Implement weed control in the buffer zones. • Monitor rehabilitation and the occurrence of erosion twice during the rainy season for at least two years. Take immediate corrective action, where required. • Monitor the establishment of alien invasive	During the construction phase.	• Construction contractor • ECO	3	3	M	• NEMA, 1998 • NWA, 1998

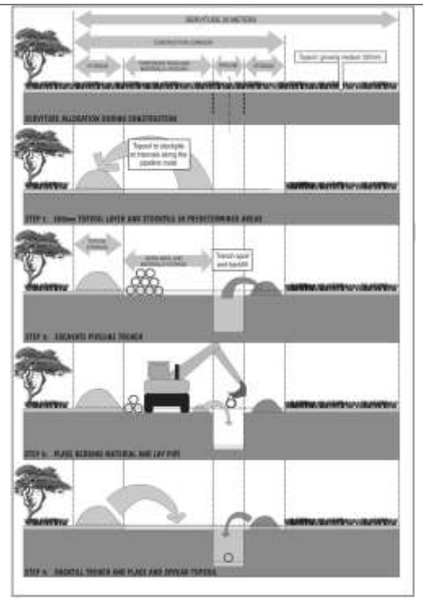
					species within the areas affected by the construction and maintenance of the pipeline and take immediate corrective action where invasive species have established.						
Operational Phase											
Maintenance and repair activities may occur within five wetlands and can therefore disturb, alter and damage the wetlands where trenches are excavated for maintenance or repairing of the pipeline. Construction vehicles and workers moving within the wetlands will also have negative impacts on the wetlands. All the wetlands in the vicinity of the proposed routes have been impacted upon by historic and present farming and grazing practices. All five of the wetlands that the routes cross are deemed to have "modified" Present Ecological States (PES) ranging from "moderately" to "seriously" modified.	5	3	H	To minimise the negative impact on the wetlands within the vicinity of the pipeline route.	• Maintenance or repair areas should be cordoned off prior to and during the maintenance activities. • As little land within each wetland must be disturbed as possible. Where possible, no equipment may be stored within any of the wetland zones. • Unnecessary vehicles, equipment and workers must be excluded from the wetland areas.	Life of operation	Pipeline Manager	4	3	H	• NEMA, 1998 • NWA, 1998
Stormwater input or the restriction of water flow due to maintenance activities can cause changes to the quantity and fluctuation properties of the watercourse. This may be due to vehicles driving within the wetlands, damage to vegetated areas as well as inadequate rehabilitation of the wetlands. All the wetlands in the vicinity of the proposed routes have been impacted upon by historic and present farming and grazing practices. All five of the wetlands that the routes cross are deemed to have "modified" Present Ecological States (PES) ranging from "moderately" to "seriously" modified.	4	3	H	To prevent damage to vegetated areas and to ensure adequate rehabilitation of the wetlands after maintenance activities.	• Maintenance activities should not take place within watercourses or buffer zones. Where unavoidable, the footprint needed for maintenance must be kept to a minimum. This is subjected to authorisation by means of a water use license. • Where possible, maintenance within the wetland must be restricted to the drier winter months. • Maintenance activities should not impact on rehabilitated areas and must be followed-up with additional rehabilitation where required. • Maintenance workers should respect and also maintain fences that are in place to prevent access into rehabilitated areas, until such time as monitoring shows that rehabilitation is successful and the fences are removed. • Maintenance should not impact upon natural vegetation. • Maintenance vehicles must remain on dedicated roads/servitudes.	Life of operation	Pipeline Manager	3	3	M	• NEMA, 1998 • NWA, 1998
Maintenance activities, such as the movement of maintenance vehicles, may change the amount of sediment entering the water resource and subsequently change the turbidity of the water (increase or decrease in turbidity). The vehicles also impact upon the wetland vegetation, damaging or destroying the vegetation and causing exposed soils that can be washed away. All the wetlands in the vicinity of the proposed routes have been impacted upon by historic and present farming and grazing practices. All five of the wetlands that the routes cross are deemed to have "modified" Present Ecological States (PES) ranging from "moderately" to "seriously" modified.	4	3	H	To prevent sedimentation of the wetlands and to minimise the negative impact of vehicles on surface vegetation in wetlands.	• Maintenance activities should not take place within watercourses or buffer zones. Where unavoidable, the footprint needed for maintenance must be kept to a minimum. This is subjected to authorisation by means of a water use license. • Where possible, maintenance within watercourses must be restricted to the drier winter months. • Maintenance vehicles must remain on dedicated roads and servitudes. • Rehabilitated vegetation should not be impacted upon by maintenance activities. If this is unavoidable, maintenance must be followed-up with additional rehabilitation of the area.	Life of operation	Pipeline Manager	3	3	M	• NEMA, 1998 • NWA, 1998

Maintenance activities may alter the water quality by increasing the amount of nutrients like phosphate, nitrite and nitrate within the wetlands. This may occur through the disposal or discharge of human sewage into the wetlands or their surroundings. All the wetlands in the vicinity of the proposed routes have been impacted upon by historic and present farming and grazing practices. All five of the wetlands that the routes cross are deemed to have "modified" Present Ecological States (PES) ranging from "moderately" to "seriously" modified.	3	3	M	To prevent the release of additional nutrients into the wetland environments.	• Maintenance workers are not allowed to use watercourse and associated buffer zones as ablution facilities. • Adequate sanitation facilities must be provided outside of the wetland/riparian areas and their associated buffer zones.	Life of operation	Pipeline Manager	2	2	L	• NEMA, 1998 • NWA, 1998
Maintenance activities may alter the water quality due to toxic contaminants like metal ions (e.g. copper, lead and zinc) and hydrocarbons entering the wetlands. This may occur from, for example, run-off from road surfaces and/or the discharge of solvents and other industrial chemicals into the environment. All the wetlands in the vicinity of the proposed routes have been impacted upon by historic and present farming and grazing practices. All five of the wetlands that the routes cross are deemed to have "modified" Present Ecological States (PES) ranging from "moderately" to "seriously" modified.	4	4	H	To prevent the release of toxic contaminants into the wetland environments.	• Maintenance work must not take place haphazardly, but according to a fixed plan, from one area to the other. • After maintenance has been completed, the land must be cleared of rubbish, surplus materials and equipment and the land must be left in a condition that is as close as possible how it was prior to the maintenance activities taking place. • Ensure that maintenance vehicles are in proper order and well maintained. • Waste discharges must be controlled and may not be into the wetlands or wetland buffers.	Life of operation	Pipeline Manager	3	3	M	• NEMA, 1998 • NWA, 1998
Maintenance activities may change the physical structure of the water resources/habitats. This may be caused by the loss of vegetation during excavation of the pipeline. All the wetlands in the vicinity of the proposed routes have been impacted upon by historic and present farming and grazing practices. All five of the wetlands that the routes cross are deemed to have "modified" Present Ecological States (PES) ranging from "moderately" to "seriously" modified.	4	3	H	To prevent changes to the physical structure of the water resources/habitats.	• Maintenance activities should not take place within watercourses or buffer zones. Where unavoidable, the footprint needed for maintenance must be kept to a minimum. This is subjected to authorisation by means of a water use license. • Where possible, maintenance within watercourses must be restricted to the drier winter months. • Maintenance activities should not impact on rehabilitated or naturally vegetated areas.	Life of operation	Pipeline Manager	3	3	M	• NEMA, 1998 • NWA, 1998
Decommissioning Phase											
Decommissioning of the pipeline is not anticipated for the foreseeable future. Should the pipeline be decommissioned, a detailed closure and rehabilitation plan will be submitted to the Mpumalanga Department of Economic Development, Environment and Tourism prior to decommissioning.	N/A										

Table 48: Environmental impact assessment: Topsoil and soil erosion

Activity: • Site clearance and construction activities associated with the pipeline. • Stockpiling of topsoil. • Maintenance of the pipeline (routine or in case of failures).
Aspect: • Prolonged exposure of cleared areas. • Topsoil being exposed to the elements.
Applicable Alternatives: All route alternatives.

Nature and significance of environmental impact												
Impact Description	Risk rating (before mitigation)			Environmental Objective	Management / Mitigation / Monitoring Measures	Timeframe	Responsibility	Risk rating (after mitigation)			Applicable legislation / other documents
	Probability	Magnitude	Severity					Probability	Magnitude	Severity	
Construction Phase											
					• The route impacting mostly on disturbed areas should take preference (Route Alternative 1). • Do not allow erosion to develop on a large scale before taking action. • No construction activities should be undertaken in the moist grasslands or wetland areas without a Water Use License being granted by the Department of Water Affairs. • Existing roads should be used instead of creating new routes through grassland areas. • Vegetation and soil should remain undisturbed for as long as possible. It should only be remove immediately before construction or earthwork activities commence (DWAF, 2005). • Vegetation should only be removed where essential for construction activities. The grasslands can be removed as sods and re-established after the construction activities are completed. • Site clearing is to be limited to only the area necessary for carrying out the specified work. • Colonisation of the disturbed areas by plants from the surrounding natural vegetation must be monitored to ensure that vegetation cover is sufficient within one growing season. If not, the area must be rehabilitated with a grass seed mix containing species that naturally occur in the study area. • Areas susceptible to erosion should be protected. It must be ensured that there is no undue soil erosion from activities within and adjacent to the construction camp and work areas.						
The removal of vegetation will expose the cleared areas. During rain events, the soil could then wash away into wetlands, causing sedimentation.	5	3	H	To minimise the duration of exposure of cleared areas and to limit erosion of the subsoil.		During the construction phase.	• Construction contractor • ECO	3	3	M	• NEMA, 1998 • NEMBA, 2004
Degradation and loss of a valuable resource (topsoil).	3	2	M	To reduce the duration and extent of exposure of topsoil to preserve it as a resource and protect it from erosion.	• If possible, schedule construction activities for dry months (winter). • Topsoil is to be stockpiled and replaced as indicated in the figure below.	During the construction phase.	• Construction contractor • ECO	2	2	L	• NEMA, 1998

					 • Any sub-soil or rocks removed should also be stockpiled separately and be used during the rehabilitation. • Minimise the length and steepness of slopes. • If sterilisation of the topsoil has occurred during stockpiling, inorganic fertilisers will be used to supplement the soils before seeding of the area takes place. • Replace topsoil concurrent with construction, whenever possible. • Aim to replace stockpiled topsoil to its original depth. • Topsoil should be returned to the same area from where it was stripped. • If there is not enough topsoil available from a particular soil zone, topsoil of a similar quality may be used to replace it. The suitability of substitute topsoil will be determined by a soil analysis and approved by the ECO.						
Operational Phase												
Maintenance vehicles driving within the grassland areas may cause destruction of naturally occurring vegetation, compaction of the soil and subsequent soil erosion. The water released from a burst pipe may also cause soil erosion, sedimentation, the washing away of vegetation or the contamination of nearby watercourses.	3	3	M	To prevent soil erosion due to maintenance activities.	• Maintenance work should be conducted according to a fixed plan and should not occur haphazardly. • Areas under rehabilitation should be cordoned off as no-go areas to prevent vehicular, pedestrian and livestock access. • Maintenance workers may not trample natural vegetation and work should be restricted to the previously disturbed footprint. In addition, mitigation measures as set out for the construction	Life of operation	Pipeline Manager	2	2	L	• NEMA, 1998

					phase should be adhered to. • Leaks and issues of water wastage should be repaired as soon as they are identified. • Erosion donga crossings should be addressed through the application of soil erosion control and bank stabilisation procedures as specified by the ECO. • Do not allow erosion to develop on a large scale before effecting repairs. When in doubt, seek advice from the ECO. • Repair all erosion damage as soon as possible, no later than six months before the termination of the Maintenance Period to allow for sufficient rehabilitation growth to occur.						
Degradation and loss of a valuable resource (topsoil).	3	2	M	To reduce the duration and extent of exposure of topsoil to preserve it as a resource and protect it from erosion.	• Topsoil is to be stockpiled and replaced once the maintenance or repairs have been completed. • Aim to replace stockpiled topsoil to its original depth. • Topsoil should be returned to the same area from where it was stripped.	Life of operation	Pipeline Manager	2	2	L	• NEMA, 1998
Decommissioning Phase											
Decommissioning of the pipeline is not anticipated for the foreseeable future. Should the pipeline be decommissioned, a detailed closure and rehabilitation plan will be submitted to the Mpumalanga Department of Economic Development, Environment and Tourism prior to decommissioning.	N/A										

Table 49: Environmental impact assessment: Heritage

Activity: • Site clearance and construction activities. • Maintenance of the pipeline (routine or in case of failures).											
Aspect: • Disturbance of artefacts or sites of cultural heritage (archaeological and historical) significance.											
Applicable Alternatives: All route alternatives.											
Nature and significance of environmental impact											
Impact Description	**Risk rating (before mitigation)**			**Environmental Objective**	**Management / Mitigation / Monitoring Measures**	**Timeframe**	**Responsibility**	**Risk rating (after mitigation)**			**Applicable legislation / other documents**
	Probability	**Magnitude**	**Severity**					**Probability**	**Magnitude**	**Severity**	
Construction Phase											
Construction activities may disturb or destroy sites, features or artefacts of archaeological and/or historical importance.	3	4	H	To protect artefacts or sites of cultural heritage (archaeological	• The subterranean presence of archaeological and/or historical sites, features or artefacts remain	During the construction phase.	• Construction contractor • ECO	3	3	M	• NEMA, 1998 • NHRA, 1999

No sites, features or objects of any cultural heritage (archaeological or historical) origin or significance were identified during the Phase 1 Heritage Impact Assessment conducted for this project.				and historical) significance.	a distinct possibility and this needs to be kept in mind at all times. If during any construction activities, any sites, features and objects of a cultural heritage (archaeological or historical) nature are exposed, an expert should be called in to investigate and suitable mitigation measures must be implemented. All activities in the area should be halted until the situation has been resolved. • A Fossil Finds Procedure must be developed. • The Construction contractor must be responsible for the implementation of the Fossil Finds Procedure, if required, and must be knowledgeable about the appearance and types of fossils that may occur within the development area.					
Operational Phase										
Maintenance activities may disturb or destroy sites, features or artefacts of archaeological and/or historical importance. No sites, features or objects of any cultural heritage (archaeological or historical) origin or significance were identified during the Phase 1 Heritage Impact Assessment conducted for this project.	3	4	H	To protect artefacts or sites of cultural heritage (archaeological and historical) significance.	• The subterranean presence of archaeological and/or historical sites, features or artefacts remain a distinct possibility and this needs to be kept in mind at all times. If during any maintenance activities, any sites, features and objects of a cultural heritage (archaeological or historical) nature are exposed, an expert should be called in to investigate and suitable mitigation measures must be implemented. All activities in the area should be halted until the situation has been resolved.	Life of operation	Pipeline Manager	3	3	M	• NEMA, 1998 • NHRA, 1999
Decommissioning Phase										
Decommissioning of the pipeline is not anticipated for the foreseeable future. Should the pipeline be decommissioned, a detailed closure and rehabilitation plan will be submitted to the Mpumalanga Department of Economic Development, Environment and Tourism prior to decommissioning.	N/A									

Table 50: Environmental impact assessment: Infrastructure

Activity: • Increased traffic frequency on road infrastructure during construction activities. • Maintenance of the pipeline (routine or in case of failures).								
Aspect: • Wear of access roads and insufficient vehicle inspections.								
Applicable Alternatives: All route alternatives.								
Nature and significance of environmental impact								
Impact Description	**Risk rating (before mitigation)**	**Environmental Objective**	**Management / Mitigation / Monitoring Measures**	**Timeframe**	**Responsibility**	**Risk rating (after mitigation)**	**Applicable legislation / other documents**	

	Probability	Magnitude	Severity					Probability	Magnitude	Severity	
Construction Phase											
Wear of access roads, accidents on access roads, unpermitted transport of materials and loss of materials being transported on access roads.	4	2	M	To minimise the impact of an increase of traffic on access roads to the construction site.	• Ensure that all construction vehicles using access roads are roadworthy. • All loads are to be securely fastened when being transported. • All vehicles are to adhere to the tonnage limitation and acquire a permit as required. • All speed limits and other traffic regulations on the public roadways must be adhered to.	During the construction phase.	• Construction contractor • ECO	2	2	L	• NEMA, 1998
Operational Phase											
Wear of access roads, accidents on access roads, unpermitted transport of materials and loss of materials being transported on access roads.	4	2	M	To minimise the impact of an increase of traffic on access roads to the site where maintenance or repair work needs to be undertaken.	• Apply the same mitigation measures as for the construction phase.	Life of operation	Pipeline Manager	2	2	L	• NEMA, 1998
Decommissioning Phase											
Decommissioning of the pipeline is not anticipated for the foreseeable future. Should the pipeline be decommissioned, a detailed closure and rehabilitation plan will be submitted to the Mpumalanga Department of Economic Development, Environment and Tourism prior to decommissioning.	N/A										

Table 51: Environmental impact assessment: Atmosphere and Noise

Activity:
- Site clearance and construction activities.
- Excavation activities, loading and offloading activities and vehicles travelling to and from the construction site.
- Construction workers, vehicles, machinery and general noisy construction activities at the construction site.
- Maintenance of the pipeline (routine or in case of failures).

Aspect:
- Dust generation.
- Generation of noise and nuisance.

Applicable Alternatives: All route alternatives.

Nature and significance of environmental impact							
Impact Description	**Risk rating (before mitigation)**	**Environmental Objective**	**Management / Mitigation / Monitoring Measures**	**Timeframe**	**Responsibility**	**Risk rating (after mitigation)**	**Applicable legislation / other documents**

	Probability	Magnitude	Severity					Probability	Magnitude	Severity	
Construction Phase											
Degradation of ambient air quality due to dust generation. Dust will be generated from the following: • Construction vehicles travelling to and from the construction areas; • During excavation of the trenches; • From the storage of topsoil next to the trenches; and • During backfilling of the trenches and spreading of topsoil.	5	2	M	To minimise the impact of excavation activities, loading and offloading activities and vehicles travelling to and from the construction site on the ambient air quality.	• A dustcart needs to be onsite to water down dusty areas with clean water. • Regular maintenance of vehicles to address wear of tires and breaks. Optimal engine combustion will allow for 'cleaner' exhaust emissions. • A complaints register must be kept at the construction site. The register must record the following: Date when complaint was received, name of person who reported the complaint, details of the complaint and when and how concern was addressed.	During the construction phase.	• Construction contractor • ECO	4	1	L	• NEMA, 1998
Noise will be generated when the trenches are excavated and backfilled after the pipelines have been installed. The pipeline will be constructed along existing roads and vehicles travelling on the roads also generate noise. According to Jorgensen & Johnson (1981), the noise levels generated by general construction activities can reach levels of approximately 70 dB, caused by for instance heavy machinery. It can therefore be assumed that the construction activities will have a negative impact on the environmental noise of the area once construction starts. Sound is inversely proportional to the distance from the source and can get absorbed by buildings and vegetation barriers. Noise intensities (dB) will be at their highest at the construction site and will decrease as one moves away from their sources. The noise decline curve gives an indication of how noise generated at the construction site will decrease with distance. It gives an indication of the distance that the sound would have travelled upon reaching a level of 60 dB, prescribed by the SABS as being the acceptable limit for environmental noise. According to noise decline curve, at a distance of 27 metres from the construction site, the generated noise would have decreased to a level of 60 dB and at a distance of 45 metres it would have decreased to approximately 55dB. It can therefore be said that noise travelling further than 45 metres will have a low impact on neighbouring farms and residential areas. The distance to sensitive noise receptors (residences) is mostly more than 45 metres, but both routes pass within 45	5	3	H	To minimise noise generation and nuisance during the construction phase.	• Schedule activities that will generate the most noise during times of the day that will result in least disturbance to neighbours. • Site workers and contractors will adhere to the requirements of the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) regarding hearing protection and noise control measures. • Regular maintenance of vehicles and equipment. • All equipment and machinery should be fitted with adequate silencers. • Working hours should be restricted to daylight hours. • No sound amplification equipment such as sirens, loud hailers or hooters are to be used on site except in emergencies and no amplified music is permitted on site. • If work is to be undertaken outside of normal work hours permission must be obtained from the ECO and the facility manager. • No noisy work is to be conducted over the weekends or on public holidays. • A complaints register must be kept onsite. The register must record the following: Date when complaint was received, name of person who reported the complaint, details of the complaint and when and how concern was addressed.	During the construction phase.	• Construction contractor • ECO	3	3	M	• NEMA, 1998 • OHSA, 1993

metres of one residential area consisting of a number of houses.											
High ambient noise levels generated during the construction activities could disturb fauna species. This includes, for example, construction vehicles, workers that are present on site and related activities. Many of the terrestrial species will vacate the construction site or become displaced during the construction phase. The noise from the construction vehicles and related activities could disturb and therefore deter fauna from the surrounding areas. This could lead to a decline in species number and/or the eradication of faunal species. This may not be a problem with vermin species, but consideration needs to be taken towards larger mammal, amphibian, reptile and avifauna species that currently utilise the area, especially those of conservation concern. By nature, birds and mammals are mobile fauna assemblages able to adapt and relocate rapidly to more pristine areas. It is therefore unlikely that the proposed pipeline construction will have a significant negative impact on avifauna or mammal species of conservation concern should the mitigation measures identified be implemented.	5	3	H	To minimise the generation of noise pollution during the construction activities so that fauna species are disturbed as little as possible.	• Regular maintenance of vehicles and equipment. • All equipment and machinery should be fitted with adequate silencers. • Working hours should be restricted to daylight hours. • No sound amplification equipment such as sirens, loud hailers or hooters are to be used on site except in emergencies and no amplified music is permitted on site.	During the construction phase.	• Construction contractor • ECO	3	2	M	• NEMA, 1998
Operational Phase											
Disturbance, dust generation and nuisance to neighbours due to maintenance activities.	4	3	H	To minimise noise and dust generation and subsequent nuisance during the maintenance or repair activities.	• Apply the same mitigation measures as for the construction phase.	Life of operation	Pipeline Manager	3	3	M	• NEMA, 1998 • OHSA, 1993
Decommissioning Phase											
Decommissioning of the pipeline is not anticipated for the foreseeable future. Should the pipeline be decommissioned, a detailed closure and rehabilitation plan will be submitted to the Mpumalanga Department of Economic Development, Environment and Tourism prior to decommissioning.	N/A										

Table 52: Environmental impact assessment: Soil, surface water, stormwater and groundwater pollution

Activity: • The handling, storage, mixing and disposal of cement and concrete. • The cleaning of equipment and construction areas. • Handling, storage and disposal of general/domestic and hazardous waste. • Installation and use of ablution facilities. • Storage and handling of hazardous chemical substances including fuel, greases and oils. • Vehicle and equipment maintenance and refuelling. • Maintenance of the pipeline (routine or in case of failures).

Aspect:

- Concrete and cement spillages.
- Generation and runoff of contaminated wash water.
- Poor waste management.
- Unsanitary conditions on site.
- Poor management and spillages of hazardous chemical substances including fuel, greases and oils.
- Leaking and/or spillages of fuels, greases and oils.

Applicable Alternatives: All route alternatives.

Nature and significance of environmental impact												
Impact Description	Risk rating (before mitigation)			Environmental Objective	Management / Mitigation / Monitoring Measures	Timeframe	Responsibility	Risk rating (after mitigation)			Applicable legislation / other documents
	Probability	Magnitude	Severity					Probability	Magnitude	Severity	
Construction Phase											
Soil and surface water pollution due to spillages and/or improper handling-, storage-, mixing- or disposal- of cement and concrete.	5	4	H	To prevent the pollution of soils and surface water as a result of spillage, improper handling, storage, mixing or disposal of cement and concrete.	• Cement may only be mixed on an impermeable surface (not on bare soil). • Dry cement must be removed from the soil surface to prevent an impermeable layer forming on top of the soil. The cement must be disposed of together with any building rubble. • Ready-mix trucks are not permitted to clean chutes on site. • Both used and unused cement bags are to be stored in weatherproof containers so as not to be affected by rain or runoff. • Contaminated soil resulting from concrete or cement spills are to be removed immediately after the spillage has occurred and placed on the appropriate rubble stockpile. • All reasonable measures must be taken to prevent the dirty water from contaminating a watercourse.	During the construction phase.	• Construction contractor • ECO	3	3	M	• NEMA, 1998
Soil and surface water pollution as a result of contaminated wash water entering the environment.	5	4	H	To prevent the pollution of soil and surface water bodies, including wetlands, through contaminated wash water. An example of this would be water that is contaminated with cement or concrete.	• No washing of vehicles is permitted on site. • A dedicated temporary cleaning area is to be identified to facilitate washing of all cement equipment. The cleaning area could be a plastic lined cleaning pit or dedicated plastic or metal drums, located as close as possible to a water point. • No wastewater/wash water may be disposed of on site, onto the soil or into any water body. • Runoff from the washing activities is to be contained by berms around the trenches.	During the construction phase.	• Construction contractor • ECO	3	3	M	• NEMA, 1998

Soil, surface water and groundwater pollution due to poor waste management. Nuisance caused by odours and unsightly appearance of waste onsite.	4	3	H	To prevent soil, surface and groundwater pollution and nuisance due to poor waste management.	• Building waste must be disposed of as per the mine procedure. • Installation of sufficient waste bins, skips or bulk containers. Containers must be present on site at all times. • All containers (bins, skips or bulk containers) shall be kept in a clean and hygienic manner. • Containers (bins, skips or bulk containers) utilised for the disposal of general and hazardous waste must be demarcated accordingly. • Waste material may only be temporarily stored at areas demarcated for such storage practices. • General waste shall be stored in a manner that prevents the harbouring of pests. • General waste materials should always be stored or disposed of separately from hazardous waste material (e.g. oil, diesel). • General and hazardous waste can be deposited into appropriately demarcated bins at the construction activities. Bins are then emptied into appropriately demarcated skips or bulk containers at the end of each day or more often if required. • The construction contractor should remove skips or bulk containers to a licensed landfill site when the skips are full, at least on a weekly basis.	During the construction phase.	• Construction contractor • ECO	3	3	M	• NEMA, 1998
Soil, surface water and groundwater pollution from unsanitary conditions onsite.	4	4	H	To prevent soil, surface and groundwater pollution from unsanitary conditions onsite.	• Sufficient ablution facilities shall be provided – minimum of 1 toilet per 15 workers. • The ablution facilities must be on impermeable surfaces and at least 50m from all wetlands. • The location of toilets is to be approved by the ECO prior to site establishment, but shall be located within 100m of any work point. • Ablating anywhere other than in the toilets shall not be allowed. • The ablution facilities are to be secured to avoid them from blowing or falling over. • The contractor shall ensure that any chemicals and/or waste from the ablution facilities are not spilled on the ground at any time. • Ablution facilities are to be serviced weekly or more frequently if required. • The contractor is to ensure that no spillage occurs and that the contents are removed from site on a regular basis.	During the construction phase.	• Construction contractor • ECO	3	3	M	• NEMA, 1998

Soil, surface water and groundwater pollution due to poor management and accidental spills of hazardous chemical substances including fuel, greases and oils used onsite.	4	4	H	To prevent and minimise soil and water pollution as a result of poor management and accidental spills of hazardous chemical substances including fuel, greases and oils used onsite.	• Identify all hazardous chemical substances used onsite including fuel, greases and oils. • Obtain the material safety data sheet of each of hazardous chemical substance. • Ensure that the material safety data sheets have sufficient information to enable the user to take the necessary measures to protect his/her health and safety and that of the environment. • Material Safety Data Sheets for all hazardous chemical substances must be readily available on site. • Keep a stock inventory register of all chemicals in the store. • Powders must be stored above liquids. • Proper storage of chemicals in a lockable, well ventilated building. • Ensure adequate access control for the storage area. • Storage areas for hazardous chemicals are to comply with standard fire safety regulations. • Safety signage including “No Smoking”, “No Naked Lights” and “Danger”, and product identification signs, are to be clearly displayed in areas housing chemicals. • Appropriate equipment to deal with emergency spill incidents is to be readily available on site. This includes fire extinguishers, spill kits for hydrocarbon spills, drip trays for equipment and/or machinery leaks, drums or containers for contaminated water. • Chemicals are to be properly labelled and handled in a safety conscious manner. • All personnel handling hazardous chemicals and hazardous materials are to be issued with the appropriate Personal Protective Equipment (PPE). • Ensure that diesel/fuel tanks are in a bunded area with capacity of holding 110% of the total storage volume. • The removal of only the daily-required amount of chemicals to be used from the shed. • If refuelling on site or from drums, the ground must be protected and proper dispensing equipment is to be used i.e. hand pumps and funnels. Drums may not be tipped to dispense fuel. • Use of drip trays during filling of machinery or	During the construction phase.	• Construction contractor • ECO	3	3	M	• NEMA, 1998

					equipment. Drip trays should be emptied into secondary containers on a regular basis. • Ensure that any spilled chemicals cannot exit the designated storage area by constructing a berm or bump at the exit, or store chemicals in a spill tray. • Immediately clean all spillage of fuels, lubricants and other petroleum based products. • The contaminated material must be disposed of in accordance with the waste management procedure. • No hazardous chemical must be discarded into the environment. • Train staff on the use of chemicals in accordance with the risks as described in the material data sheets. • Soil contaminated with hazardous chemical substances shall be treated as hazardous waste and removed from site.						
Hydrocarbon pollution of soil, surface water and groundwater due to the fuel, grease or oil spillages or leaking equipment and vehicles.	4	4	H	To prevent hydrocarbon pollution of soil, surface and groundwater through the spilling of fuel, grease or oil or leaking equipment and vehicles.	• Equipment and vehicles are to be repaired immediately upon developing leaks. • Drip trays shall be supplied for all repair work undertaken on machinery on site. • Drip trays are to be utilised during greasing and re-fuelling of machinery and to contain incidental spills and pollutants. • Drip trays are to be inspected daily for leaks and effectiveness and emptied when necessary. This is to be closely monitored during rain events to prevent overflow. • Appropriate equipment to deal with emergency spill incidents is to be readily available on site. This includes fire extinguishers, spill kits for hydrocarbon spills, drip trays for equipment and/or machinery leaks and drums or containers for contaminated water. • Soil contaminated with hazardous substances, fuel or oil shall be treated as hazardous waste and removed from site. • If refuelling on site or from drums, the ground must be protected and proper dispensing equipment is to be used i.e. hand pumps and funnels. Drums may not be tipped to dispense fuel. • All liquid fuels (petrol and diesel) are to be stored in tanks or containers with lids. • Inspect vehicles on entering the construction site to ensure that they are in sound condition	During the construction phase.	• Construction contractor • ECO	3	3	M	• NEMA, 1998

					to reduce the risk of oil or diesel spillages.						
Operational Phase											
Soil and surface water pollution due to spillages and/or improper handling-, storage-, mixing- or disposal- of cement and concrete during maintenance activities.	4	3	H	To prevent the pollution of soil and surface water as a result of spillage, improper handling, storage, mixing or disposal of cement and concrete.	Apply the same mitigation measures as for the construction phase.	Life of operation	Pipeline Manager	2	2	L	• NEMA, 1998
Soil and surface water pollution as a result of contaminated wash water entering the environment during maintenance activities.	4	3	H	To prevent the pollution of soil and surface water bodies, including wetlands, through contaminated wash water. An example of this would be water that is contaminated with cement or concrete.				2	2	L	
Soil, surface water and groundwater pollution due to poor waste management during maintenance activities. Nuisance caused by odours and unsightly appearance of waste onsite.	4	3	H	To prevent soil, surface and groundwater pollution and nuisance due to poor waste management.				2	2	L	
Soil, surface water and groundwater pollution from unsanitary conditions onsite during maintenance activities.	4	3	H	To prevent soil, surface and groundwater pollution from unsanitary conditions onsite.				1	2	L	
Soil, surface water and groundwater pollution due to poor management and accidental spills of hazardous chemical substances including fuel, greases and oils used during maintenance activities.	4	4	H	To prevent and minimise soil and water pollution as a result of poor management and accidental spills of hazardous chemical substances including fuel, greases and oils used onsite.				2	2	L	
Hydrocarbon pollution of soil, surface water and groundwater due to the fuel, grease or oil spillages or leaking equipment and vehicles during maintenance activities.	4	4	H	To prevent hydrocarbon pollution of soil, surface and groundwater through the spilling of fuel, grease or oil or leaking equipment and vehicles.				2	2	L	
Decommissioning Phase											
Decommissioning of the pipeline is not anticipated for the foreseeable future. Should the pipeline be decommissioned, a detailed closure and rehabilitation plan will be submitted to the Mpumalanga Department of Economic Development, Environment and Tourism prior to decommissioning.	N/A										

Table 53: Environmental impact assessment: Resource usage

Activity: • Usage of resources, such as electricity and water. • Pumping of water to the Wonderfontein mine using the proposed pipeline.	
Aspect: • Inefficient and redundant use of valuable resources. • Pipe leakage or failure.	
Applicable Alternatives: All route alternatives.	
Nature and significance of environmental impact	

Impact Description	Risk rating (before mitigation)			Environmental Objective	Management / Mitigation / Monitoring Measures	Timeframe	Responsibility	Risk rating (after mitigation)			Applicable legislation / other documents
	Probability	Magnitude	Severity					Probability	Magnitude	Severity	
Construction Phase											
Wastage or depletion of valuable resources like water due to inefficient or redundant usage.	3	3	M	To prevent the wastage or depletion of valuable resources.	**General** • Ensure that all employees have been informed of the importance of natural resources (proper environmental training and awareness). • Regular site inspection by supervisors. **Water** • Regular inspection and maintenance of all water tanks, toilets, water pipes and taps. • Leaking tanks, taps, toilets and pipes are to be repaired immediately. • Running water taps and pipes may not be left unattended. • All pipe, hose and tap connections are to be fitted with correct and appropriate plumbing fittings.	During the construction phase.	• Construction contractor • ECO	2	2	L	• NEMA, 1998 • NWA, 1998
Operational Phase											
Wastage or depletion of the water that is pumped to the Wonderfontein mine using the proposed pipeline.	4	3	H	To prevent the wastage or depletion of a valuable resource.	• Ensure that all employees have been informed of the importance of natural resources (proper environmental training and awareness). • Regular site inspection by supervisors. • Regular maintenance and inspection of the water pipeline. • Monitoring of resource consumption to detect leakages as soon as possible.	Life of operation	Pipeline Manager	3	2	M	• NEMA, 1998 • NWA, 1998
Decommissioning Phase											
Decommissioning of the pipeline is not anticipated for the foreseeable future. Should the pipeline be decommissioned, a detailed closure and rehabilitation plan will be submitted to the Mpumalanga Department of Economic Development, Environment and Tourism prior to decommissioning.	N/A										

Refer to Part 8 below for a summary on the key findings related to the proposed pipeline project.

7.3.6 Cumulative Impacts

Cumulative impacts refer to the situation where an activity may in itself not have a significant impact, but may become significant when added to existing and potential impacts from similar or different activities in the area.

The following potential cumulative impacts have been identified.

Table 54: Cumulative impacts

Activity	Aspect	Cumulative Aspect
Excavation activities as part of the construction phase of the proposed project.	The generation of dust and noise and subsequent nuisance to sensitive receptors in the vicinity of the proposed pipeline route.	There are a number of operational mines located along the proposed routes for the water pipeline. The mines generate dust and noise and the comparatively minimal dust and noise that will be generated during the excavation activities for the proposed pipeline will combine with the dust and noise generated from the mines to increase the overall negative, cumulative impact of the mines on sensitive receptors in the area.
Vegetation clearance as part of the construction activities for this project.	The clearance of vegetation from grasslands and wetlands to dig trenches for the proposed pipeline will result in disturbance and/or destruction of the vegetation within the pipeline footprint.	Rehabilitation measures should restore the disturbed/destroyed vegetation within the grasslands and wetlands to their original state. However, should the rehabilitation not be successful, the vegetation disturbance/ destruction will add to the cumulative negative impact of agriculture, grazing and mining on the grasslands and wetlands in the area.

8. ENVIRONMENTAL IMPACT STATEMENT

8.1 Summary of key findings

This application for Environmental Authorisation in terms of the National Environmental Management Act, 1998, has been initiated to allow Umcebo Mining (Pty) Ltd. to construct a water pipeline to supply additional water to their Wonderfontein mine. The mine is currently obtaining water for domestic purposes from boreholes within the mining boundary, but more water will be required in future. The pipeline is therefore crucial for the continued operation and development of the mine in future, without placing additional, unsustainable strain on the groundwater resource through increased abstraction from the boreholes on site.

All alternatives will have an impact on the environment to some extent. The following section describes the main positive and negative impacts of the alternatives for the proposed project.

8.2 Comparative assessment of positive and negative implications of the proposed activity and alternatives

Part 6 of this EIR contains a detailed investigation and assessment of the alternative options for the proposed water pipeline project. As can be seen in Part 6, the impacts from the only feasible alternatives, namely the two routes for the proposed pipeline, are all the same (equal Severity for each activity, aspect and impact), except for their impacts on the wetlands in the vicinity of the pipeline routes. The Severity for Route Alternative 2 is higher than it is for Route Alternative 1.

In the table below, distinction is only made between the above mentioned alternatives, namely the route alternatives. In the table, the positive and negative implications of the proposed activities are described and compared to the No-go option. This should provide a fundamental consideration of the feasibility of the project.

Table 55: Comparison of the proposed preferred activities and the no-go option

	Proposed activity (water pipeline construction) with Route Alternative 1	**Proposed activity (water pipeline construction) with Route Alternative 2**	**No-go option**
Positive impacts	• The provision of water from the Eskom take-off point to the Wonderfontein mine via the proposed pipeline will enable the mine to continue operating and developing in future. • The use of this available	• The provision of water from the Eskom take-off point to the Wonderfontein mine via the proposed pipeline will enable the mine to continue operating and developing in future. • The use of this available	• No new disturbances to an endangered vegetation type. • No new disturbances to vegetation within “Irreplaceable” and “Highly Significant” critical biodiversity areas.

	Proposed activity (water pipeline construction) with Route Alternative 1	Proposed activity (water pipeline construction) with Route Alternative 2	No-go option
	water source will mean that additional pressure would not be placed on the boreholes that currently provide water to the mine. • This route alternative crosses Wetland 1 in a favourable place when compared to Route Alternative 2. • The creation of job opportunities and a stimulation of the local economy. • This route is shorter than Route Alternative 2 and it is therefore possible that construction costs will be lower for this route.	water source will mean that additional pressure would not be placed on the boreholes that currently provide water to the mine. • The creation of job opportunities and a stimulation of the local economy.	• No new disturbances to wetlands. • No noise or dust generation and subsequently no nuisance to nearby sensitive receptors.
Negative impacts	• Disturbances to an endangered vegetation type. • Disturbances to vegetation within “Irreplaceable” and “Highly Significant” critical biodiversity areas. • Disturbances to wetlands as the route crosses five wetlands. • Noise or dust generation and subsequent nuisance to nearby sensitive receptors.	• Disturbances to an endangered vegetation type. • Disturbances to vegetation within “Irreplaceable” and “Highly Significant” critical biodiversity areas. • Disturbances to wetlands as the route crosses five wetlands. This route also runs close to another wetland and crosses Wetland 1 in an unfavourable place. • Noise or dust generation and subsequent nuisance to nearby sensitive receptors. • This route is longer than Route Alternative 1 and it is therefore possible that	• The additionally required water cannot be supplied to the Wonderfontein mine. Additional pressure may therefore be placed on the boreholes that currently supply water to the mine so as to provide the additionally required volumes. The boreholes may subsequently be used in an un-sustainable manner, leading to depression of the groundwater table.

	Proposed activity (water pipeline construction) with Route Alternative 1	Proposed activity (water pipeline construction) with Route Alternative 2	No-go option
		construction costs will be higher for this route.	

As can be seen in the table above, the No-go option has fewer negative impacts than both of the development alternatives. The negative impacts of the No-go option are that additionally required water cannot be supplied to the Wonderfontein mine in future via a pipeline and that the additional water might be obtained from existing boreholes on the mine, potentially resulting in their un-sustainable use. As the mine would not like to over-utilise the boreholes in such a manner, the No-go option is not a feasible alternative for the provision of additional water to the mine.

The positive and negative impacts of the two route alternative options are the same except for the wetlands associated with the two routes and their construction costs. Route Alternative 1 crosses Wetland 1 at a favourable place on or near an existing road whereas Route Alternative 2 crosses the wetland at an unfavourable place and also runs close to yet another wetland. As Route Alternative 1 is shorter, it is possible that the construction of the pipeline using this route will be cheaper than using Route Alternative 2. For these reasons, Route Alternative 1 is the preferred alternative for the development option.

9. CONCLUSION

Information has been provided to Mpumalanga Department of Economic Development, Environment and Tourism and interested and affected parties during the Basic Assessment process. Comments and concerns were received and integrated into the Basic Assessment Report. This document serves as the draft report to be considered by the registered I&APs and state departments for environmental authorisation. Should there be any comments received on this report within the notice period provided, these comments will be address in the final Basic Assessment Report that will be submitted to the competent authority, the Mpumalanga Department of Economic Development, Environment and Tourism, for final perusal.

This BAR process has been carried out in accordance with the NEMA, 1998, and the Regulations there under.

The identified impacts/environmental risks to the environment as a result of the proposed pipeline project are mostly **High**. The impacts can, however, be mitigated to mostly **Medium**, provided that the draft Environmental Management Programme, containing all proposed mitigation measures, is implemented. It is further important that the EMP must be viewed as a dynamic, working document that will be improved upon as and when required.

The impacts from the two route alternatives that have been identified and assessed are the same (same Severity for each activity, aspect and impact), except for their impacts on the wetlands in the vicinity of the proposed pipeline. The Severity of Route Alternative 2 is higher than for Route Alternative 1 as Alternative 2 crosses Wetland 1 at an unfavourable place and also runs close to yet another wetland in addition to the five wetlands that both route alternatives cross.

Positive impacts from the proposed project include the creation of jobs as well as the stimulation of the local and regional economy.

Based on the outcomes of the Environmental Impact Assessment conducted as part of this Basic EIA as well as the alternatives assessment, the following recommendations are made:

1. The project should be authorised and allowed to proceed on **Route Alternative 1**.
2. The disturbance of vegetation and wetland areas will remain a negative impact, but can be mitigated and rehabilitated provided that all the mitigation measures contained in this report and the draft Environmental Management Programme are implemented.
3. The mitigation measures proposed in this report and the draft Environmental Management Programme must be implemented during all phases of the proposed project.
4. It is assumed that the mitigation measures proposed in this report and the draft Environmental Management Programme will be correctly implemented by the applicant and that they will be effective.
5. A communications pathway must be established that would allow the designated ECO to accept and deal with stakeholder complaints.
6. Proposed mitigation measures should be incorporated as far as possible into the operational plan for the development.
7. Strict monitoring and enforcement of requirements of the EMP must be undertaken to ensure that contractors and operators adhere to these requirements.