



DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME (EMP)

UMCEBO MINING (PTY) LTD

WATER PIPELINE FOR THE
WONDERFONTEIN MINE – draft EMP

Locality: Middelburg

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

DECEMBER 2014

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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: Karien du Plessis

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LIST OF ABBREVIATIONS

BID - Background Information Document

BAR - Basic Assessment Report

CRR - Comments and Responses Report

DWA - Department of Water Affairs

EAP - Environmental Assessment PractitionerEMP - Environmental Management Programme

GN - Government Notice

I&AP - Interested and Affected Party

MDEDET - nalanga Department of Economic Development, Environment and Tourism
 NEMA - National Environmental Management Act, Act No. 107 of 1998, as amended

R - Regulation

REFERENCES

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



1. INTRODUCTION

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

Number and date of	Activity	Description
the relevant notice	No	Description
		The construction of:
		(i) canals;
		(ii) channels;
		(iii) bridges;
		(iv) dams;
		(v) weirs;
No. 33306. R.544 of 18		(vi) bulk storm water outlet structures;
June 2010. Listing	11	(vii) marinas;
Notice 1		(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		The clearance of an area of 300 square metres or more of vegetation
June 2010. Listing	12	where 75% or more of the vegetative cover constitutes indigenous
Notice 3		vegetation.



Number and date of the relevant notice	Activity	Description	
the relevant notice	NO		
		 (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. 	
		The construction of:	
No. 33306. R.546 of 18 June 2010. Listing Notice 3	16	 (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. 	



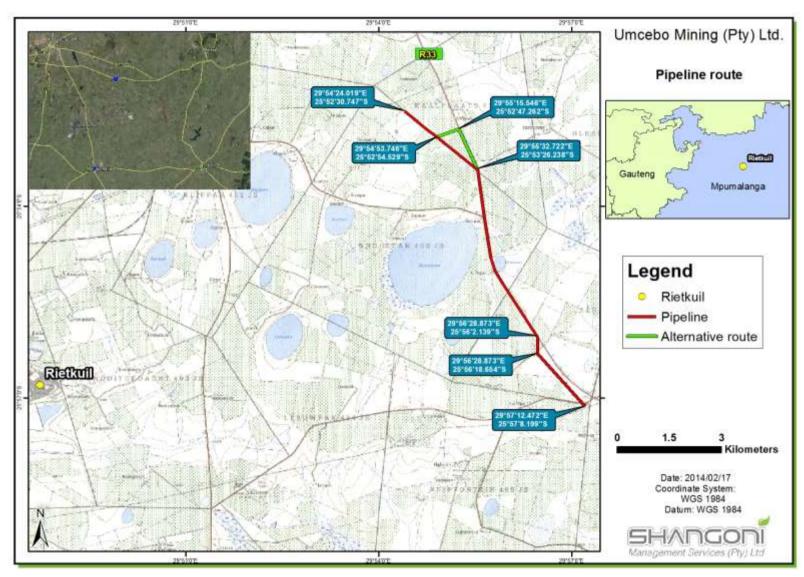


Figure 1: Site locality map



2. ENVIRONMENTAL ASSESSMENT PRACTITIONER

Name of firm	Shangoni Management Services (Pty) Ltd.			
Postal address	PO Box 74726 Lynwood Ridge Pretoria 0040			
Telephone No.	(012) 807 7036			
Fax	(012) 807 1014 / 086 643 5360			
E-mail	lizette@shangoni.co.za			
Team of Environmental Ass	sessment Practitioners (EAP) on project			
Name	Qualifications	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 Coordinator		
	Post Graduate Certificate Environmental			
Ms Lizette Crous	Management (University of London) 3 years' experience conducting Environmental Impact Assessments and Waste Management License Applications	EAP		

and Waste Management License Applications.

3. SITE DOCUMENTATION

The following documentation must be available at the site office at all times:

- A copy of the Basic Assessment Report.
- A copy of this Environmental Management Programme (EMP).
- A copy of the Environmental Authorisation.



4. LEGISLATION

Table 2: 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		To establish a Constitution with a Bill		
South Africa, 1996 (Act No. 108 of	-	of Rights for the RSA.		
1996)				
Environment Conservation Act, 1989	Mpumalanga Department of	To control environmental		
(Act No. 73 of 1989, as amended)	Economic Development,	conservation.		
	Environment and Tourism			
National Environmental Management	Mpumalanga Department of	To provide for the integrated		
Act, 1998 (Act No. 107 of 1998) and	Economic Development,	management of the environment,		
National Environmental Management	Environment and Tourism	and to regulate the 'Duty of Care'		
Amendment Act, 2008 (Act No. 62 of		Principle.		
2008).				
Promotion of Access to Information		To give effect to the constitutional		
Act, 2000 (Act No. 2 of 2000, as		right of access to any information		
amended)	_	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	Gert Sibande District	To reform the law regulating air		
Management: Air Quality Act (Act No.	Municipality	quality to protect the environment by		
39 of 2004)		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	Department of Water Affairs	To provide for fundamental reform of		
No. 36 of 1998)		the law relating to water resources.		
Government Notice No. 1199 of 18	Department of Water Affairs	To replace Government Notice No.		
December 2009: Replacement of		398 of 26 March 2004 for water uses		
general authorisation in terms of		21(c) and (i).		
Section 39 of the National Water Act,				
1998 (Act No. 36 of 1998)				
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	Mpumalanga Department of	To provide for the management and
Biodiversity Act, 2004 (Act No. 10 of 2004)	Economic Development, Environment and Tourism	conservation of South Africa's biodiversity within the framework of the National Environmental Management Act, 1998.
Conservation of Agricultural	Mpumalanga Department of	To provide for control over the
Resources Act, 1983 (Act No. 43 of 1983)	Agriculture, Rural Development and Land Administration	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,	Mpumalanga Department of	To reform the law on veldt and forest
1998 (Act No. 101 of 1998)	Agriculture, Rural Development and Land Administration	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.
N. C. LE.	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	Mpumalanga Department of	To control environmental
(Act No. 73 of 1989, as amended)	Economic Development, Environment and Tourism	conservation.
Her	itage and Archaeological Resour	ces
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



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



5. ENVIRONMENTAL MANAGEMENT PROGRAMME

Refer to the tables below for the EMP. Responsibility is assigned to the relevant parties, keeping in mind that Umcebo Mining (Pty) Ltd are ultimately still responsible for ensuring implementation of the EMP. The EMP must be updated should any significant changes occur to the operations with regards to the Wonderfontein Pipeline. The mitigation measures are set out in the tables below (per project phase), for the proposed water pipeline.

Note: Mitigation measures, as contained in the tables below, have taken the various alternatives into consideration.

5.1 GOVERNMENT NOTICE NO R544 (LISTING NOTICE 1), ACTIVITY 11, AND GOVERNMENT NOTICE NO 546 (LISTING NOTICE 3), ACTIVITIES 12 AND 16

5.1.1 Planning, Construction, Operational, Rehabilitation and Decommissioning Phases

Table 3: EMP – Planning and Design Phase

Activity:

• Planning and design of the water pipeline

Aspect

- Inadequate design of the water pipeline.
- Inadequate planning for the construction phase of the pipeline.

Nature and significance of environmental impact					
Impact Description	Environmental Objective	Management / Mitigation Measures	Monitoring and Compliance Reporting	Timeframe	Responsibility
Planning and Design Phase					
 Damage to existing services and infrastructure. Destruction of natural areas and wetlands. Resource wastage due to ineffective pumping of water to the mine. 	To ensure adequate design of the water pipeline	The chosen pipeline route must minimise the disturbance of existing infrastructure and services such as roads, other pipelines and railway lines. The chosen pipeline route must minimise the disturbance of natural areas and wetlands. The pipeline must be designed to effectively transfer water by minimising friction and subsequently the electricity required to pump the water.	Umcebo Mining (Pty) Ltd must verify implementation of mitigation measures proposed in this EMP.	Before construction commences	Umcebo Mining Civil engineers
 Delays due to poor planning. Legal non-compliances to the Environmental Authorisation and EMP. Harm to the environment and wetlands in particular. 	To ensure pro-active planning for the construction phase of the proposed pipeline	The approved EMP and Environmental Authorisation must be binding on the construction contractor and included in the tender documentation and contracts. Adequate planning and scheduling of the construction activities to allow for disruptions caused by rain and wet conditions. The scheduling must make provision for environmental training/awareness raising for workers prior to the commencement of construction. Records of all training must be maintained. Adjacent land owners must be timeously informed that the construction phase will commence and must be kept informed of the progress throughout. Appoint an independent Environmental Control Officer (ECO) prior to the commencement of the construction phase. Ensure that a complaints register is kept at the construction site from the first day of construction. Ensure that the Environmental Authorisation and EMP are kept at the construction site from the first day of construction. Source unskilled labour locally, wherever possible.	Umcebo Mining (Pty) Ltd must verify implementation of mitigation measures proposed in this EMP.	Before construction commences	Umcebo Mining Construction contractor



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Planned access roads to the construction site must be documented and roads that may not be		
used must be clearly marked with "No entry for construction vehicles" signage.		
A construction site plan must be compiled and approved by Umcebo Mining and the ECO. The		
site plan must include the location of the construction camp, toilets, stores and site office.		

Table 4: EMP - Construction, Operational, Rehabilitation and Decommissioning Phases – General Environment

Activity:

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

Aspect:

Applicable Alternatives: All route alternatives.					
		Nature and significance of environmental impact			
Impact Description	Environmental Objective	Management / Mitigation Measures	Monitoring and Compliance Reporting	Timeframe	Responsibility
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.	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.	ECO to verify implementation of mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority.	During the construction phase.	Construction contractorECO
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).	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 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.	Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed.	Life of operation	Pipeline Manager
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 5: EMP - Construction, Operational, Rehabilitation and Decommissioning Phases – 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	Environmental Objective	Management / Mitigation Measures	Monitoring and Compliance Reporting	Timeframe	Responsibility	
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 natural), and moist grassland (shown in Error! Reference source not found.). 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.	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. 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 sensitiv	ECO to verify implementation of mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority.	During the construction phase.	 Construction contractor ECO 	

		Planning of the construction site must incorporate eventual rehabilitation (Figure 2).		
		Figure 2: 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 <i>Gladiolus</i> of <i>crassifolius</i> and <i>Satyrium parviflorum</i> are likely to be impacted upon by the proposed project.	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. 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). 	ECO to verify implementation of mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority.	During the construction phase. • Construction contractor • ECO
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.	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. 	ECO to verify implementation of mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority.	During the construction phase. • Construction contractor • ECO



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.	To ensure that the rocky and moist grasslands adjacent to the pipeline route do not deteriorate.	 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. 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. 	ECO to verify implementation of mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority.	During the construction phase.	 Construction contractor ECO
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.	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 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. 	ECO to verify implementation of mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority.	During the construction phase.	Construction contractorECO
Loss of indigenous grassland and habitats for indigenous fauna species surrounding the site as a result of runaway veld fires.	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. 	ECO to verify implementation of mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority.	During the construction phase.	 Construction contractor ECO



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		 Activities Cooking during lunch is to be restricted to bottled gas facilities in designated areas approved by the ECO. This facility is to be 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.	To prevent destruction of naturally occurring vegetation and the	 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 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 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. 	Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed.	Life of operation	Pipeline Manager
Loss of indigenous grassland and habitats for indigenous fauna species surrounding the site as a result of runaway veld fires created during maintenance activities.	To prevent the occurrence and spreading of a veld fire.	Apply the same mitigation measures as for the construction phase.	 Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	Life of operation	Pipeline Manager
Rehabilitation Phase				1	<u>'</u>

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	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			
Vegetation along the pipeline footprint could deteriorate over time if suitable rehabilitation doesn't take place or if rehabilitation fails. To ensure adequate, successful rehabilitation of all disturbed areas.	 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. 	ECO to verify implementation of mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority.	has been completed	Construction contractor ECO
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 N/A				
Mpumalanga Department of Economic Development, Environment				
and Tourism prior to decommissioning.				

Table 6: EMP - Construction, Operational, Rehabilitation and Decommissioning Phases – 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

		Nature and significance of environmental impact			
Impact Description	Environmental Objective	Management / Mitigation Measures	Monitoring and Compliance Reporting	Timeframe	Responsibility
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.	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.	ECO to verify implementation of mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority.	During the construction phase.	Construction contractorECO



		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.			
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 have a significant negative impact on avifauna or mammal species of conservation concern should the mitigation measures identified be implemented.	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.	ECO to verify implementation of mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority.	During the construction phase.	Construction contractor ECO
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.	To protect all fauna species at the construction site.	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.	ECO to verify implementation of mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority.	During the construction phase.	Construction contractor ECO
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.	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.	 Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	Life of operation	Pipeline Manager
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 7: EMP - Construction, Operational, Rehabilitation and Decommissioning Phases – 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	Environmental Objective	Management / Mitigation Measures	Monitoring and Compliance Reporting	Timeframe	Responsibility
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.	To minimise the negative impact on the wetlands in the vicinity of the pipeline routes.	 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. 	ECO to verify implementation of mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority.	During the construction phase.	 Construction contractor ECO
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" modified.				During the construction phase.	 Construction contractor ECO
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.	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. 	ECO to verify implementation of mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority.	During the construction phase.	Construction contractorECO



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 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.	To prevent sedimentation of the wetlands and the disturbance of slopes.	 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. 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. 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. Formalies 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 wh	ECO to verify implementation of mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority. During the construction phase. **Construction contractor** **Construction contractor** **ECO**
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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. Construction activities may alter the water quality due to toxic	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. 	ECO to verify implementation of mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority. During the construction phase. • Construction contractor • ECO
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.	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. 	ECO to verify implementation of mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority. During the construction phase. • Construction contractor • ECO
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.	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 species within the areas affected by the construction and maintenance of the pipeline and take immediate corrective action where invasive species have established. 	ECO to verify implementation of mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority. During the construction phase. • Construction contractor • ECO
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.	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. 	Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. Pipeline Manager Pipeline Manager



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.	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. 	Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. Life of operation addressed.	Pipeline Manager
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.	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. 	Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. Regular site inspections. Life of operation	Pipeline Manager
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.	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. 	Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. Regular site inspections. Life of operation be addressed.	Pipeline Manager
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.	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. 	Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. Life of operation	Pipeline Manager
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.	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. 	Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records	Pipeline Manager



All the wetlands in the vicinity of the proposed routes have been		Maintenance activities should not impact on rehabilitated or naturally vegetated areas.	kept onsite. Shortcomings	
impacted upon by historic and present farming and grazing			must immediately be	
practices. All five of the wetlands that the routes cross are deemed			addressed.	
to have "modified" Present Ecological States (PES) ranging from				
"moderately" to "seriously" modified.				
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	N/A			
Mpumalanga Department of Economic Development, Environment				
and Tourism prior to decommissioning.				

Table 8: EMP - Construction, Operational, Rehabilitation and Decommissioning Phases - 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.

	Nature and significance of environmental impact					
Impact Description	Environmental Objective	Management / Mitigation Measures	Monitoring and Compliance Reporting	Timeframe	Responsibility	
Construction Phase						
The removal of vegetation will expose the cleared areas. During rain events, the soil could then wash away into wetlands, causing sedimentation.	To minimise the duration of exposure of cleared areas and to limit erosion of the subsoil.	 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. 	ECO to verify implementation of mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority.	During the construction phase.	 Construction contractor ECO 	
Degradation and loss of a valuable resource (topsoil).	To reduce the duration and extent of exposure of topsoil to preserve	 If possible, schedule construction activities for dry months (winter). Topsoil is to be stockpiled and replaced as indicated in the figure below. 	eco to verify implementation of mitigation measures proposed in this EMP. Eco to	During the construction phase.	Construction contractorECO	

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		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.	
		approved by the EGO.	
Operational Phase			
		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 prevent vehicular, pedestrian	
		and livestock access.	
		Maintenance workers may not trample natural vegetation and work should be restricted to the	Regular site inspections.
Maintenance vehicles driving within the grassland areas may cause		previously disturbed footprint. In addition, mitigation measures as set out for the construction	Internal audits against this
destruction of naturally occurring vegetation, compaction of the soil	To prevent soil erosion due to	phase should be adhered to.	EMP must be conducted
and subsequent soil erosion. The water released from a burst pipe	maintenance activities.	 Leaks and issues of water wastage should be repaired as soon as they are identified. 	every 6 months and records
may also cause soil erosion, sedimentation, the washing away of		 Erosion donga crossings should be addressed through the application of soil erosion control and 	kept onsite. Shortcomings
vegetation or the contamination of nearby watercourses.		bank stabilisation procedures as specified by the ECO.	must immediately be
			addressed.
		Do not allow erosion to develop on a large scale before effecting repairs. When in doubt, seek advice from the ECO.	
		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).	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. 	Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed.	Life of operation	Pipeline Manager
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	N/A				
Mpumalanga Department of Economic Development, Environment					
and Tourism prior to decommissioning.					

Table 9: EMP - Construction, Operational, Rehabilitation and Decommissioning Phases - 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.

Nature and significance of environmental impact					
Impact Description	Environmental Objective	Management / Mitigation Measures	Monitoring and Compliance Reporting	Timeframe	Responsibility
Construction Phase					
Construction 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.	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 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.	ECO to verify implementation of mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority.	During the construction phase.	Construction contractor ECO
perational 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.	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.	 Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	Life of operation	Pipeline Manager
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	N/A
Mpumalanga Department of Economic Development, Environment	
and Tourism prior to decommissioning.	

Table 10: EMP - Construction, Operational, Rehabilitation and Decommissioning Phases - 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	Environmental Objective	Management / Mitigation Measures	Monitoring and Compliance Reporting	Timeframe	Responsibility	
Construction Phase						
Wear of access roads, accidents on access roads, unpermitted transport of materials and loss of materials being transported on access roads.	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. 	eco to verify implementation of mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority.	During the construction phase.	 Construction contractor ECO 	
Operational Phase						
Wear of access roads, accidents on access roads, unpermitted transport of materials and loss of materials being transported on access roads.	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. 	Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed.	Life of operation	Pipeline Manager	
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 11: EMP - Construction, Operational, Rehabilitation and Decommissioning Phases – 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

		Nature and significance of environmental impact			
Impact Description	Environmental Objective	Management / Mitigation Measures	Monitoring and Compliance Reporting	Timeframe	Responsibility
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. 	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.	ECO to verify implementation of mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority.	During the construction phase.	Construction contractor ECO
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 metres of one residential area consisting of a number of houses.	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.	ECO to verify implementation of mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority.	During the construction phase.	 Construction contractor ECO



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.	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.	ECO to verify implementation of mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority.	During the construction phase.	Construction contractorECO
Operational Phase			Regular site inspections.		
Disturbance, dust generation and nuisance to neighbours due to maintenance activities.	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.	Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed.	Life of operation	Pipeline Manager
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 12: EMP - Construction, Operational, Rehabilitation and Decommissioning Phases - 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	Environmental Objective	Management / Mitigation Measures	Monitoring and Compliance Reporting	Timeframe	Responsibility
Construction Phase	'				
Soil and surface water pollution due to spillages and/or improper handling-, storage-, mixing- or disposal- of cement and concrete.	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.	ECO to verify implementation of mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority.	During the construction phase.	Construction contractor ECO
Soil and surface water pollution as a result of contaminated wash water entering the environment.	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.	ECO to verify implementation of mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority.	During the construction phase.	Construction contractor ECO
Soil, surface water and groundwater pollution due to poor waste management. Nuisance caused by odours and unsightly appearance of waste onsite.	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.	ECO to verify implementation of mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority.	During the construction phase.	Construction contractorECO
Soil, surface water and groundwater pollution from unsanitary conditions onsite.	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.	ECO to verify implementation of mitigation measures proposed in this EMP. ECO to submit monthly compliance	During the construction phase.	Construction contractor ECO



	I	Ablatica convibore other there is the tellete aball set he allowed	reports to the competent
		Ablating anywhere other than in the toilets shall not be allowed.	reports to the competent
		The ablution facilities are to be secured to avoid them from blowing or falling over.	authority.
		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.	
		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	
	To provent and minimine soil and	machinery leaks, drums or containers for contaminated water.	ECO to verify implementation
	management and accidental spills		
Soil, surface water and groundwater pollution due to poor		Chemicals are to be properly labelled and handled in a safety conscious manner. All paragraph bandling beneather the properly and bandled in a safety conscious manner.	of mitigation measures proposed in this EMP. ECO to During the Construction
management and accidental spills of hazardous chemical		All personnel handling hazardous chemicals and hazardous materials are to be issued with the	submit monthly compliance construction phase.
substances including fuel, greases and oils used onsite.	including fuel, greases and oils	appropriate Personal Protective Equipment (PPE).	reports to the competent
	used onsite.	Ensure that diesel/fuel tanks are in a bunded area with capacity of holding 110% of the total	authority.
	used offsite.	storage volume.	authority.
		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 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.	
Hudragarhan pollution of goil gurface water and ground water due	To provent hydrocerbon collection	Equipment and vehicles are to be repaired immediately upon developing leaks.	ECO to verify implementation
Hydrocarbon pollution of soil, surface water and groundwater due	To prevent hydrocarbon pollution	Drip trays shall be supplied for all repair work undertaken on machinery on site.	of mitigation measures During the Construction
to the fuel, grease or oil spillages or leaking equipment and vehicles.	of soil, surface and groundwater through the spilling of fuel, grease	Drip trays are to be utilised during greasing and re-fuelling of machinery and to contain incidental	proposed in this EMP. ECO to construction phase. contractor
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		spills and pollutants.	submit monthly compliance



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Production of the continue of the service of production			Soil contaminated with hazardous substances, fuel or oil shall be treated as hazardous waste and	
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detailed closure and rehabilitation plan will be submitted to the	ne
Mpumalanga Department of Economic Development, Environme	nt
and Tourism prior to decommissioning.	

Table 13: EMP - Construction, Operational, Rehabilitation and Decommissioning Phases – 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	Environmental Objective	Management / Mitigation Measures	Monitoring and Compliance Reporting	Timeframe	Responsibility	
Construction Phase						
		General				
		Ensure that all employees have been informed of the importance of natural resources				
		(environmental training and awareness).	ECO to verify implementation			
		Regular site inspection by supervisors.	of mitigation measures		Construction	
Wastage or depletion of valuable resources like water due to	To prevent the wastage or		proposed in this EMP. ECO to	During the	contractor	
inefficient or redundant usage.	depletion of valuable resources.	Water	submit monthly compliance	construction phase.	ECO	
		 Regular inspection and maintenance of all water tanks, toilets, water pipes and taps. 	reports to the competent		2 200	
		 Leaking tanks, taps, toilets and pipes are to be repaired immediately. 	authority.			
		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.				
Operational Phase						
			Regular site inspections.			
		Ensure that all employees have been informed of the importance of natural resources	Internal audits against this			
Wastage or depletion of the water that is pumped to the	To prevent the wastage or	(environmental training and awareness).	EMP must be conducted			
Wonderfontein mine using the proposed pipeline.	depletion of a valuable resource.	Regular site inspection by supervisors.	every 6 months and records	cords Life of operation	Pipeline Manager	
3, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,		Regular maintenance and inspection of the water pipeline.	kept onsite. Shortcomings			
		 Monitoring of resource consumption to detect leakages as soon as possible. 	must immediately be			
			addressed.			
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	N/A					
Mpumalanga Department of Economic Development, Environment						
and Tourism prior to decommissioning.						

6. ENVIRONMENTAL AWARENESS PLAN

The following Environmental Awareness Plan must be implemented by Umcebo Mining in order to inform their employees and contractors of the environmental risk that may result from their work. The plan must be conducted as part of the induction process for all new employees (including contractors) that will perform work in terms of the proposed activities. Proof of all training provided must be kept on-site.

The Environmental Awareness Plan is referred to as the "SHE match" training programme. The training programme focuses on the following aspects:

- 1. Explaining clearly what the environment is and what the environment consist of namely: air, water, soil, fauna, flora and people.
- 2. Once participants have grasped the description of what the environment entails, the training focuses on the potential impacts that the construction and operational activities may have on each one of these environmental components. This is done by making use of the aspect register, where each one of the environmental aspects and associated impacts has been identified.
- To ensure that the training is effective, visual aids are used. Photos are taken of actual and
 potential impacts occurring on site and in some cases role-play is used to illustrate a potential
 impact.
- 4. The participants are then exposed to a poster that reflects the various environmental components. The various photos taken are posted on the poster on a rotational basis and the participants indicate (based on the visual component) what environmental component was or could have been affected by the activities portrayed on the photo.
- 5. By doing this the participants visualise the action as well as the potential consequence (environmental impact) of their action.
- 6. This general awareness training must be done before construction commences and also when new employees start work. The training should be done yearly, as part of induction, during the Operational Phase. The poster must be posted in a communal area where the impacts are visualised and the photos rotated on a monthly basis.

