



Technical Report

AS-R-2014-10-24

Environmental Management Programme as part of the Basic Assessment for the proposed upgrade of provincial roads OP09810 and OP09811 and associated infrastructure from the National Route N7 via Stofkraal and construction of a new private road and associated infrastructure to the proposed Zandkopsdrift Mine, Northern Cape Province

October 2014

Prepared for: **Sedex Minerals (Pty) Ltd**
Document version 1.0 – Final



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Environmental Management Programme as part of the Basic Assessment for the proposed upgrade of provincial roads OP09810 and OP09811 and associated infrastructure from the National Route N7 and construction of a new private road and associated infrastructure to the proposed Zandkopsdrift Mine, Northern Cape Province

October 2014

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DOCUMENT HISTORY

Report no	Date	Version	Status
AS-R-2014-06-30	30 June 2014	1.0	Draft for departmental and public review
AS-R-2014-10-24	24 October 2014	2.0	Final for departmental and public review

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LIST OF ABBREVIATIONS

BAR	Basic Assessment Report
DEAT	Department of Environmental Affairs and Tourism
DWA	Department of Water Affairs
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPR	Environmental Management Programme
IEM	Integrated Environmental Management
NAAQS	National Ambient Air Quality Standards
NEMA	National Environmental Management Act
ROD	Record of Decision



TABLE OF CONTENTS

1	INTRODUCTION	8
1.1	PURPOSE.....	8
1.2	OBJECTIVES	8
1.3	SCOPE.....	9
1.4	PHASES OF THE PROJECT.....	12
1.4.1	<i>Planning Phase</i>	12
1.4.2	<i>Construction Phase</i>	13
1.4.3	<i>Operational Phase</i>	13
2	ROLES AND RESPONSIBILITIES	14
2.1	THE PROJECT PROPONENT (SEDEX MINERALS (PTY) LTD)	14
2.2	THE ENVIRONMENTAL CONTROL OFFICER.....	14
2.3	CONTRACTORS AND SUB-CONTRACTORS	15
3	ENVIRONMENTAL MANAGEMENT ACTIVITIES CHECKLIST	16
5	ENVIRONMENTAL MONITORING AND AUDITING	36
5.1	GENERAL MONITORING AND MANAGEMENT	36
5.2	SPECIFIC MONITORING REQUIREMENTS	36
5.3	MONITORING PROTOCOL	37
5.3.1	<i>Monitoring Requirements and Record Keeping</i>	37
5.3.2	<i>Construction phase</i>	37
5.4	OPERATIONAL PHASE	39
5.5	AUDIT PROTOCOL	40
5.5.1	<i>Construction phase</i>	40
5.5.2	<i>Operational Phase</i>	41
5.6	ENVIRONMENTAL INCIDENTS	41
5.7	ENVIRONMENTAL AWARENESS	41

LIST OF TABLES

<i>Table 1-1: Regulatory requirements and Report Structure</i>	9
<i>Table 3-1: Management and Mitigation Measures – Construction Phase</i>	17
<i>Table 3-2: Management and Mitigation Measures - Operational Phase</i>	28

1 INTRODUCTION

This Environmental Management Programme contains guidelines, operating procedures and rehabilitation/pollution control requirements which will ensure that the impacts of the development are minimised and the positive benefits enhanced.

1.1 Purpose

This EMPr is to act as a flexible, standalone document and it is recommended that it must be employed during all phases of the development. This document requires that responsibility, accountability and commitment be promoted at all times by the developer/owner, the main contractor and subcontractors.

Any non-compliance with the conditions set out in this EMPr will be regarded as an offence and will consequently be dealt with in terms of the relevant Sections in the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). Environmental incidences and the handling thereof, should be recorded by filling out the incidence logs, this responsibility should be taken up by the Environmental Control Officer or Environmental Liaison Officer.

The process which was followed in compiling the EMPr is in compliance with the NEMA, and applies the principles of Integrated Environmental Management (IEM).

1.2 Objectives

The main objective of Environmental Protection during construction and operation are:

- To ensure that the proposed operations do not impact on water quality or quantity available from local sources.
- To prevent where possible, or otherwise minimise soil, air, noise, surface- and groundwater pollution to acceptable levels.
- To minimise disturbance to and destruction of habitat of flora and faunal species.
- To minimise disturbances and destruction of heritage, archaeological and paleontological sites (if present).
- To minimise and control the production of waste and the effects of waste on the environment; and to minimise the risk of accidental waste release and make provisions for emergency situations.

- To ensure compliance with relevant environmental legislation.
- To ensure effective environmental management is implemented at the proposed operations throughout the project lifespan.

1.3 Scope

In order to achieve the above objectives, the scope of the EMPr should include the following:

- Definition of the environmental management objectives to be realized during the life of a project (i.e. pre-construction, construction, operation and/or decommissioning phases) in order to enhance benefits and minimise adverse environmental impacts.
- Description of the detailed actions needed to achieve these objectives, including how they will be achieved, by whom, with what monitoring/verification, and to what target or performance level. Mechanisms must also be provided to address changes in the project implementation, emergencies or unexpected events, and the associated approval processes.
- Clarification of institutional structures, roles, communication and reporting processes required as part of the implementation of the EMPr.
- Description of the link between the EMPr and associated legislated requirements.
- Description of requirements for record keeping, reporting, review, auditing and updating of the EMPr.

The scope of work is according to the requirements as stipulated in the EIA Regulations, Government Notice No. R. 543 of 18 June 2010 (Environmental Impact Assessment Regulations). The EIA Regulations stipulate the requirements for the content of draft environmental management programmes. The scope of work in compiling this EMPr is cross referenced to the NEMA Requirements in Table 1-1 below:

Table 1-1: Regulatory requirements and Report Structure

No	Requirement	Comment
33	A Draft Environmental Management Programme must comply with section 24N of the Act and include -	
(a)	Details of – (i) The person who prepared the environmental management	This report was

Environmental Management Programme – Zandkopsdrift Access Road

	programme; and (ii) The expertise of that person to prepare an environmental management programme	prepared by AGES Gauteng, acting as independent environmental assessment practitioners. Please Refer to Appendix H of the BAR
(b)	Information on any proposed management or mitigation measures that will be taken to address the environmental impacts that have been identified in a report contemplated by these Regulations, including environmental impacts or objectives in respect of –	
	(i) Planning and design;	Please refer to planning and design measures which have been implemented according to the Preliminary Road Design Report (Appendix D5 of the BAR)
	(ii) Pre-construction and construction activities;	Table 3-1
	(iii) Operation or undertaking of the activity;	Table 3-2
	(iv) Rehabilitation of the environment; and	Table 3-1 and Table 3-2
	(v) Closure	N/A
(c)	A detailed description of the aspects of the activity that are covered by the draft environmental management programme;	Refer to Section 3
(d)	An identification of the persons who will be responsible for the implementation of the measures contemplated in paragraph (b);	Refer to Section 3
(e)	Proposed mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon;	Refer to Section 5.3
(f)	As far as is reasonably practicable, measures to rehabilitate the environment affected by the undertaking of any listed activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development, including where appropriate, concurrent or progressive rehabilitation measures.	Refer to Section 3 and Appendix D1 of the BAR
(g)	A description of the manner in which it intends to –	Refer to Section 3
	(i) Modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;	
	(ii) Remedy the cause of pollution or degradation and migration of pollutants;	
	(iii) Comply with any prescribed environmental management standards or practices;	
	(iv) Comply with any applicable provisions of the Act regarding closure, where applicable;	N/A
	(v) Comply with any provisions of the Act regarding financial	N/A

Environmental Management Programme – Zandkopsdrift Access Road

	provisions for rehabilitation, where applicable.	
(h)	Time periods within which the measures contemplated in the environmental management programme must be implemented;	Refer to Section 3
(i)	The process for managing any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity	Refer to Section 3
(j)	An environmental awareness plan describing the manner in which – (i) The applicant intend to inform his or her employees of any environmental risk which may result from their work; and (ii) Risks must be dealt with in order to avoid pollution or the degradation of the environment;	Refer to Section 2.2 and 3
(k)	Where appropriate, closure plans, including closure objectives.	N/A
Specific information required by DEA as per the acknowledgement letter dated 20/06/2013		Section in Report
All recommendations and mitigation		Please refer to the EMPr
Plant rescue and protection plan		Please refer to Section 5.2.2 of the Ecological Impact Assessment (Appendix D1 of the BAR) and Table 3-2 of the EMPr, as well as Sections 4.1 and 4.9.1 of the Rehabilitation Plan (Appendix D7 of the BAR)
Open space management plan		As the project entails the upgrade of existing roads and construction of a new private road, an open space management plan will not be applicable
Re-vegetation and habitat rehabilitation plan		Please refer to Section 7.1 of the Ecological Impact Assessment (Appendix D1 of the BAR), as well as Section 4.9 and 6 of the Rehabilitation Plan (Appendix D7 of the BAR)

Alien invasive management plan	Section 5.2.3 and 7 of the Ecological Impact Assessment (Appendix D1 of the BAR), as well as Section 4.10 of the Rehabilitation Plan (Appendix D7 of the BAR)
Storm water management plan	Please refer to Section 4 of the EMPr
Effective monitoring system to detect any leakage or spillage of hazardous substances during transportation, handling, use and storage	Please refer to Appendix E of the EMPr
Erosion management plan	Section 7 of the Ecological Impact Assessment (Appendix D1 of the BAR) and Table 3-3 of the EMPr, as well as Section 4.7 of the Rehabilitation Plan (Appendix D7 of the BAR)
Traffic management plan	Please refer to Appendix D5 of the BAR
Environmental sensitivity map	Please refer to Appendix A of the BAR
Measures to protect hydrological features such as streams, rivers, pans, wetlands, dams and their catchments, and other environmental sensitive areas	Please refer to Table 3-4 of the EMPr

1.4 Phases of the Project

The EMPr takes a pro-active route by addressing potential problems before they occur. This should limit corrective measures required during the construction and operational phases of the development. In particular, this EMPr deals with the following phases as detailed below:

1.4.1 Planning Phase

The EMPr offers an ideal opportunity to incorporate pro-active environmental management measures with the goal of attaining sustainable development. Pro-active environmental measures minimize the chance of impacts taking place during the construction and operational

phase. There is still the chance of accidental impacts taking place; however, through the incorporation of contingency plans (e.g. this EMPr) during the planning phase, the necessary corrective action can be taken to further limit potential impacts.

The planning phase includes the Basic Environmental Impact Assessment and authorisations period. The outcome of this phase will be to receive all the relevant authorisations prior to starting with construction. This phase will also include planning the detailed designs.

1.4.2 Construction Phase

The majority of the impacts during this phase will have immediate effect (e.g. noise-, dust- and water pollution). If the site is monitored as per the specialist recommendations during the construction phase, it is possible to identify these impacts as they occur. These impacts will then be mitigated through the contingency plans identified in the planning phase, together with a commitment to sound environmental management from the developer. Please refer to Table 3-1 for the construction phase activities.

1.4.3 Operational Phase

By taking pro-active measures during the planning and construction phases, potential environmental impacts emanating during the operational phase will be minimised. This, in turn, will minimise the risk and reduce the monitoring effort, but it does not make monitoring obsolete. Please refer to Table 3-2 for the operational phase activities.

2 ROLES AND RESPONSIBILITIES

A number of role-players will be responsible to ensure responsible environmental practices as described in this report are implemented on the proposed development site throughout each of the project cycles and throughout the project lifespan.

Key individuals are briefly discussed in this section, and are identified in the table below where specific responsibility is assigned to each.

2.1 The Project Proponent (Sedex Minerals (Pty) Ltd)

The project proponent is ultimately responsible to ensure that activities associated with the proposed facility operations occur in accordance with the approved EMPr under NEMA and all other relevant legislation, authorizations and best practice guidelines. Many of these responsibilities are delegated to representatives, employees or agents of Sedex Minerals, but the holder of an environmental authorization (for which Sedex Minerals has applied) remains ultimately responsible to ensure legal compliance and environmental best practice occurs.

Sedex Minerals will be liable for restoring the environment in the event of negligence leading to damage to the environment by implementing the mitigation measures as proposed in Table 3-1 and Table 3-2. Sedex Minerals must therefore ensure that the EMPr is included in tender documentation so that any sub-contractors appointed are bound to the conditions of the EMPr.

The project proponent must also appoint an Environmental Control Officer (ECO) prior to commencement of any of the project phases and for the duration of the operational activities to oversee all the environmental aspects relating to the development (Refer to Section 2.2).

2.2 The Environmental Control Officer

An Environmental Control Officer (ECO) should be appointed to periodically verify compliance to the EMPr and provisions of relevant legislation at the operations. The ECO should have the right to enter the site and do monitoring and auditing at any time, subject to the health and safety requirements applicable to the site. It is proposed that the ECO conduct site inspections during the construction phase. The ECO should also be involved in post-rehabilitation monitoring. In the event that non-compliances are observed, the ECO may advise the project proponent on reaching compliance, but will also be responsible for reporting non-compliances to the relevant authorities

Additionally, the ECO can assist in conducting environmental awareness workshops with the contractors and subcontractors. The ECO is also responsible for liaison with relevant authorities

as well as contractors and the community on matters relating to environmental management.

2.3 Contractors and Sub-contractors

All contractors have the responsibility to implement and adhere to the EMPr and ensure that the factors which may compromise the achievements of the objectives of sustainable development and environmentally responsible operations are brought to the attention of the project proponent. The contractor must comply with all orders pertaining to environmental management issues (whether verbal or written) given by the ECO or directly by the project proponent.

Contractors also have the responsibility to ensure that their employees are fully cognizant of, and abide by the EMPr.

It is the service provider's responsibility to ensure that the works will comply with the specifications as set out in the management plan. Operators should be properly trained and informed of operational and maintenance responsibilities and environmental liabilities.

3 ENVIRONMENTAL MANAGEMENT ACTIVITIES CHECKLIST

The following table forms the core of this EMPr for the planning, construction and operational phases of this construction project. This table ought to be used as a checklist on site. During the construction phase, compliance with this EMPr must be audited monthly.

Please note that provincial roads OP09810 and OP09811 will be handed over to the District Municipality after the upgrade of these roads. The District Municipality will therefore resume the responsibilities for maintaining the public road and storm water management infrastructure and implementing the relevant mitigation measures as per Table 3-2 and Section 4 with regards to the following:

- Spread and establishment of alien invasive plant species
- Enforcement of speed limits
- Road traffic signage
- Road maintenance
- Maintenance of storm water management- and erosion control infrastructure

Environmental Management Programme – Zandkopsdrift Access Road

Table 3-1: Management and Mitigation Measures – Construction Phase

Nr	Impact	Significance	Mitigation	Significance	Responsibility	Frequency / Timeframe
		WOM		WM		
Noise Impacts						
1	Increased noise from construction vehicles and machinery	Negligible	Construction work must be restricted primarily from 06:00 to 22:00	Negligible	Contractor	Continuous
Air Quality Impacts						
2	Decreased air quality due to dust and emissions from construction vehicles and machinery	Low	Wet suppression or chemical stabilization of unpaved roads	Negligible	Contractor	As required
			Haul trucks to be restricted to specified haul roads		Contractors and sub-contractors, all drivers	Continuous
			Reduction of unnecessary traffic		Contractors and sub-contractors, all drivers	Continuous
			Strict speed control (not exceeding 40 km/h on dirt roads)		Contractors and sub-contractors, all drivers	Continuous
Water Impacts						
3	Potential pollution of the Swart-Doring River, its tributaries and drainage lines and groundwater resources due	Low	Water falling on areas polluted with oil/diesel or other hazardous substances must be contained. Hazardous substances should be handled in a contained area with an impervious floor which should be bunded. Any excess or waste material or chemicals should be removed from the site and discarded at the Van Rhynsdorp registered landfill site	Negligible	Contractor	Continuous
			All construction vehicles should be inspected for oil and fuel leaks regularly, and any vehicle showing signs of leaking should be serviced immediately		Contractor	Continuous

Environmental Management Programme – Zandkopsdrift Access Road

	to hydrocarbon spillages		Vehicle maintenance yards must not be situated in close proximity to water courses and all used oil and other waste products should be disposed of in an accepted way – preferably it should be removed from the site and recycled		Contractor	Continuous
			Ensure that refuelling stations on site are constructed so as to prevent spillage of fuel or oil onto the soil, and put in place measures to ensure that any accidental spillages can be contained and cleaned up promptly		Contractor	Once-off
4	Potential pollution of the Swart-Doring River, its tributaries and drainage lines and groundwater resources from asphalt and concrete batching and mixing areas	Low	Asphalt and concrete shall only be mixed in areas which have been specifically demarcated for those purposes.	Negligible	Contractor	Continuous
			All spilled asphalt and concrete shall promptly be removed by the contractor to an approved disposal site.		Contractor	Continuous / As required
			After mixing is complete; all waste shall be removed from the batching area and disposed of at an approved disposal site.		Contractor	Continuous / As required
			No storm water will be permitted to flow through the batching site.			
			Batching areas are to be enclosed by a bunded wall.		Contractor	Once-off
5	Increased siltation of water resources due to soil erosion caused by construction activities	Low	Construct storm water management infrastructure along route alignment at drainage and river crossings	Negligible	Contractor	Once-off
			Institute a storm water management plan including strategies such as: <ul style="list-style-type: none"> Minimising impervious area; Increasing infiltration to soil by use of recharge areas; Use of natural vegetated swales instead of pipes; or Installing detention or retention facilities with graduated outlet control structures. 		Engineer	Once-off
			Control dust on construction sites and access roads using chemical dust suppressants		Contractor	As required
6	Impact on natural drainage regime of area	High	Work in rivers, streams and wetlands should preferably be done during the low flow season. No major alteration of important drainage areas is recommended, especially considering it to form part of an important catchment.	Low	Engineer / Ecologist	Once-off

Environmental Management Programme – Zandkopsdrift Access Road

(total distance of route at major crossings and tributaries		<p>The proposed road upgrade will cross drainage channels and in some instances licensing (IWUL) should be obtained from DWA. The road should cross the major drainage channels in the least sensitive areas and preferably at a perpendicular angle to prevent any serious erosion. The site should be indicated by an ecologist after consultation by the engineers.</p>		Engineer / Ecologist	Once-off
		<p>The following mitigation measures and management actions should be taken to minimize potential impacts of the road crossing drainage channels:</p> <ul style="list-style-type: none"> • Minimize changes to natural drainage patterns and crossings to drainages. During construction through a crossing, the majority of the flow of the stream / river must be allowed to pass down the stream (i.e. no damming must be allowed to take place). In-stream diversions must allow for continuous water flow. The construction of new channels shall not be allowed. • Drainage crossings are potentially problematic, so they must be well designed. Changes to natural drainage patterns or channels often result in either environmental damage or failures. Where wetland, stream or drainage line crossings are unavoidable, drains and culverts must be designed in conjunction with relevant experts to the correct invert levels to prevent damming of flows or draining of wet areas. Culverts should be designed to prevent concentration of flows, and to maintain natural flows as free flowing as possible. Another important consideration in culvert design is maintenance in the long-term: consideration should be given to designs that minimise blockages by silt that could, in turn, result in hydrological impacts on adjacent wetlands, streams or drainage lines; • Identify areas of historic or potential vulnerability, such as geologically unstable materials or areas subject to flooding; • Avoid problematic areas and avoid road upgrade route locations in areas of high natural hazard risk, such as landslides, rock-fall areas, steep slopes (over 60-70%), wet areas, saturated soils, etc.; • Avoid or minimize construction in narrow canyon bottoms or on flood plains of rivers that will inevitably be inundated during major 		Engineer	Once-off

Environmental Management Programme – Zandkopsdrift Access Road

			<p>storm events;</p> <ul style="list-style-type: none"> • Typically keep cut and fill slopes as flat as possible and well covered (stabilized) with vegetation to minimize slumping as well as minimize surface erosion. Well-cemented but highly erosive soils may best resist surface erosion with near-vertical slopes that minimize the surface area exposed to erosion; • Locate the road upgrade route on narrow sections of rivers and in areas of bedrock where possible. Avoid fine, deep alluvial deposits (of fine sand and silt) that are scour susceptible and problematic, or which otherwise require costly foundations; • Ensure that structural designs for the road crossing the drainage channels include appropriate design criteria and have good foundations to prevent failures during floods; • Place retaining structures, foundations, and slope stabilization measures into bedrock or firm, in-place material with good bearing capacity to minimize undermining, rather than placing these structures on shallow colluvial soil or on loose fill material; • Appropriate measures must be taken to manage storm water run-off and potential flooding 			
Soil Impacts						
7	Soil erosion due to construction activities	Moderate	<p>Rehabilitate disturbed areas</p> <p>Minimize the amount of land disturbance and implement stringent soil erosion control measures. Temporary control measures should include:</p> <ul style="list-style-type: none"> • Silt fencing; • Temporary silt trap basins; • Short term seeding or mulching of exposed soil areas. Bare surfaces should be grassed as soon as possible after construction to minimise time of exposure. Locally occurring, indigenous runner grasses should be used, for example <i>Stenotaphrum secundatum</i>, <i>Dactyloctenium australe</i> and <i>Cynodon dactylon</i>. Where runners cannot be locally sourced from natural areas within a 50 km radius, then a sterile variety of Couch Grass (<i>Cynodon dactylon</i>) can be commercially sourced and planted. Alien invasive grasses such as <i>Pennisetum clandestinum</i> (Kikuyu) must not be used; 	Low	Contractor Engineer /Contractor	Continuous / as required Once-off / as required

Environmental Management Programme – Zandkopsdrift Access Road

		<ul style="list-style-type: none"> Permanent erosion control plans should focus on the establishment of stable native vegetation communities. 		
		Ensure the amount of bare soil exposed is minimized by staging earthworks in phases and leaving as much ground cover intact as possible during construction.	Contractor	Continuous
		Cut slope gradients must not exceed the natural angle of repose for the particular soil type wherever possible. Cut and fill slopes should be finished as roughened surfaces which emulate the natural surroundings and accumulate soil.	Contractor	Continuous
		Repair all erosion damage as soon as possible and in any case not later than six months before the termination of the construction period.	Contractor	As required / no later than 6 months following construction
		Line overflow and scour channels with stone pitching along their length and at their points of discharge to prevent soil erosion. The point of discharge must be at a point where there is dense natural grass cover.	Contractor	As required
		Ensure that channels do not discharge straight down the contours. These must be aligned at such an angle to the contours that they have the least possible gradient.	Contractor	As required
		<p>Conservation of topsoil during construction of the road should be prioritized on site and done as follows:</p> <ul style="list-style-type: none"> Where new roads are constructed and foundations are excavated, the original topsoil (the upper most 250 mm of soil, together with plant roots and organic matter) must be stripped and stockpiled separately. During rehabilitation, topsoil must be reinstated to ensure rapid re-establishment of groundcover on bare areas. This must be done after any rare/threatened or protected species have been translocated. Topsoil should be handled twice only - once to strip and stockpile, and secondly to replace, level, shape and scarify. Stockpile topsoil separately from subsoil. Stockpile in an area that is protected from storm water runoff and wind. Topsoil stockpiles should not exceed 2.0 m in height and should be protected by a mulch cover where possible. 	Contractor	Continuous

Environmental Management Programme – Zandkopsdrift Access Road

			<ul style="list-style-type: none"> Maintain topsoil stockpiles in a weed free condition. Topsoil should not be compacted in any way, nor should any object be placed or stockpiled upon it. Stockpile topsoil for the minimum time period possible i.e. strip just before the relevant activity commences and replace as soon as it is completed. Soil erosion controls must be inspected and maintained on a regular basis during construction and operation phases. 			
8	Potential soil pollution from asphalt and concrete batching and mixing areas	High	Asphalt and concrete shall only be mixed in areas which have been specifically demarcated for those purposes.	Low	Contractor	Continuous
			All spilled asphalt and concrete shall promptly be removed by the contractor to an approved disposal site.		Contractor	Continuous / As required
			After mixing is complete; all waste shall be removed from the batching area and disposed of at an approved disposal site.		Contractor	Continuous / As required
			No storm water will be permitted to flow through the batching site.			
			Batching areas are to be enclosed by a bunded wall.		Contractor	Once-off
Waste Impacts						
9	Generation of construction solid waste during construction	Negligible	All construction solid waste to be disposed of at a registered landfill site	Negligible	Contractor	Weekly
			The contractor shall dispose of all refuse generated by his staff and sub-contractors on a weekly basis at an approved disposal site.			
10	Generation of domestic effluent - contractors staff	Moderate	The contractor must provide chemical latrines for all staff at the construction camp and along the rest of the site where construction activities may take place.	Low	Contractor / sub-contractor	During construction phase
Ecological Impacts						
11	Direct natural habitat modification / destruction: High sensitivity areas (drainage	High	<ul style="list-style-type: none"> The removal of indigenous flora should only occur on the footprint area of the development and not over the larger area. The clearing and damage of plant growth in these areas should be restricted to the footprint way leave area. Permits should be obtained from local authorities before any protected flora are eradicated, and the same applies to any translocation of red data 	Moderate	Project Proponent / Contractor	Continuous

Environmental Management Programme – Zandkopsdrift Access Road

	channels)		<ul style="list-style-type: none"> / protected plant species on site; Contractors should be made aware of red data / protected plant species that occur on site; Revegetation of disturbed areas must be undertaken with site indigenous species. This can provide a buffer to protect indigenous vegetation from invasion by weeds; 			
12	Direct natural habitat modification / destruction: Semi-natural areas (medium sensitivity)	Moderate	<ul style="list-style-type: none"> Ongoing monitoring and maintenance of revegetation works following commissioning of proposal; Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications; Where trenches pose a risk to animal safety, they should be adequately cordoned off to prevent animals falling in and getting trapped and/or injured. This could be prevented by the constant excavating and backfilling of trenches during the road construction; 	Low	Project Proponent / Contractor	Continuous
13	Direct natural habitat modification / destruction: Degraded areas	Negligible	<ul style="list-style-type: none"> Poisons for the control of problem animals should rather be avoided since the wrong use thereof can have disastrous consequences for the raptors occurring in the area. The use of poisons for the control of rats, mice or other vermin should only be used after approval from an ecologist; Should the development be approved by authorities, environmental monitoring of environmental aspects should be implemented during the construction phase of the development to ensure that minimal impact is caused to the fauna and flora of the area. All construction activities should be conducted in such a way that minimal damage is caused to the riparian and floodline zone. 	Negligible	Project Proponent / Contractor	Continuous
14	Natural habitat fragmentation: High sensitivity outcrops / riparian woodland	Moderate	<ul style="list-style-type: none"> Use existing facilities (e.g., current road surface) to the extent possible to minimize the amount of new disturbance. Ensure protection of important resources by establishing protective buffers to exclude unintentional disturbance. All possible efforts must be made to ensure as little disturbance as 	Moderate	Contractor	Continuous

Environmental Management Programme – Zandkopsdrift Access Road

15	Natural habitat fragmentation: Semi natural areas (medium sensitivity)	Moderate	<p>possible to the entire riparian zone, forests and natural vegetation representation during construction.</p> <ul style="list-style-type: none"> • During construction, sensitive habitats must be avoided by construction vehicles and equipment, wherever possible, in order to reduce potential impacts. Only necessary damage must be caused and, for example, unnecessary driving around in the veld or bulldozing natural habitat must not take place. 	Low	Contractor	Continuous
16	Natural habitat fragmentation: Degraded areas	Negligible	<ul style="list-style-type: none"> • Construction activities must remain within defined construction areas and the road servitudes. No construction / disturbance will occur outside these areas. 	Negligible	Contractor	Continuous
17	Spread and establishment of alien invasives	High	Institute strict control over materials brought onto site, which should be inspected for potential invasive invertebrate species and steps taken to eradicate these before transport to the site. Routinely fumigate or spray all materials with appropriate low-residual insecticides prior to transport on site. The contractor is responsible for the control of weeds and invader plants within the construction site for the duration of the construction phase. Alien invasive tree species should be eradicated	Moderate	Contractor	Continuous
			Control involves killing the plants present, killing the seedlings which emerge, and establishing and managing an alternative plant cover to limit re-growth and re-invasion. Weeds and invader plants will be controlled in the manner prescribed for that category by the Conservation of Agricultural Resources Act or in terms of Working for Water guidelines		Contractor	Continuous
			Rehabilitate disturbed areas as quickly as possible to reduce the area where invasive species would be at a strong advantage and most easily able to establish		Contractor	Continuous
			Institute a monitoring programme to detect alien invasive species early, before they become established and, in the case of weeds, before the release of seeds		Contractor	Once-off / Continuous
			Institute an eradication/control programme for early intervention if invasive species are detected, so that their spread to surrounding natural ecosystems can be prevented		Contractor	Once-off / Continuous
			A plan should be developed for control of noxious weeds and invasive plants that could occur as a result of new surface disturbance activities at the site. The plan should address monitoring, weed identification, the manner in which weeds spread, and methods for treating infestations. Require the use of certified weed-free mulching. Prohibit		Contractor	Once-off / Continuous

Environmental Management Programme – Zandkopsdrift Access Road

			the use of fill materials from areas with known invasive vegetation problems. The spread of invasive non-native plants should be avoided by keeping vehicles and equipment clean and reseeding disturbed areas with native plants			
18	Negative effect of human activities on fauna and flora	Moderate	Staff that will stay on site should be accommodated in one location of the site to ensure that the impact will be minimal on the larger area	Low	Contactors	Once-off
			Maintain proper firebreaks around entire development footprint		Contactors	Continuous
			Construction activities must remain within defined construction areas and the road servitudes. No construction / disturbance will occur outside these areas		Contactors	Continuous
			Construction activities must be restricted to working hours Monday to Saturday, unless otherwise approved by the appropriate competent person in consultation with the affected residents		Contactors	Continuous
			Educate workers regarding the occurrence of important resources in the area and the importance of protection		Contactors	Once-off / Continuous
			Instruct employees, contractors, and site visitors to avoid harassment and disturbance of wildlife, especially during reproductive (e.g. courtship, nesting) seasons. In addition, control pets to avoid harassment and disturbance of wildlife		Contactors	Once-off / Continuous
			Camp fires at construction sites must be strictly controlled to ensure that no veld fires are caused		Contactors	Continuous
19	Air pollution (impact on natural vegetation): High sensitivity areas	Moderate	<ul style="list-style-type: none"> Dust suppression must be undertaken. Implement standard dust control measures, including chemical dust suppression and / or strategic surfacing of some roads in the project area (frequency will depend on many factors including weather conditions, soil composition and traffic intensity and must thus be adapted on an ongoing basis) of construction areas and access roads, and ensure that these are continuously monitored to ensure effective implementation; 	Low	Contactors	Continuous
20	Air pollution (impact on natural vegetation): Semi-natural areas (moderate or moderate-low sensitivity)	Low	<ul style="list-style-type: none"> Soil dumps may be covered if necessary; A speed limit (preferably 40 km/hour) should be enforced on dirt roads; Air Quality monitoring should take place as per the monitoring protocol in Section 6 of the EMPr. 	Negligible	Contactors	Continuous

Environmental Management Programme – Zandkopsdrift Access Road

21	Air pollution (impact on natural vegetation): Degraded areas	Negligible		Negligible	Contractor	Continuous
22	Road mortality: fauna	Moderate	More fauna are normally killed the faster vehicles travel. A speed limit should be enforced (40km/h for dirt roads on mining area; 50km/h for access roads and 80km/h for national roads). It can be considered to install speed bumps in sections where the speed limit tends to be disobeyed. (Speed limits will also lessen the probability of road accidents and their negative consequences)	Low	Contractor	Once-off / Continuous
			Travelling at night should be avoided during all of the project phases or limited as much as possible		Contractor	Continuous
Heritage Impacts						
23	Impact on isolated Middle and Later Stone Age Scatters	Low	A careful watching brief monitoring process should be implemented during construction. Should any subsurface paleontological or archaeological material be exposed during construction activities, all activities should be suspended and the archaeological specialist should be notified immediately.	Low	Contractor	Continuous
Socio-economic Impacts						
24	Creation of job opportunities	High +	Local labour must be used as far as possible.	High +	Contractor	Continuous
25	Access to and potential damage to property	Negligible	Any damage to private property must be rectified immediately if possible. If it cannot be rectified then the proper compensation procedure must be followed.	Negligible	Contractor	As required
26	Potential damage to existing infrastructure	Negligible	The contractor shall be liable for all unnecessary and unreasonable damage caused by his equipment and/or transport to the existing roads.	Negligible	Contractor	Continuous
27	Road safety	High	In key locations, deep cuts have been incorporated into the vertical alignment traversing steep crests in order to achieve an acceptable level of safety.	Low	Contractor	Once-off
			Speeds of 40km/h should be enforced for all construction vehicles.		Contractor	Continuous

Environmental Management Programme – Zandkopsdrift Access Road

			Fencing should be installed along sections of the road to improve the safety of the local community and to prevent live stock from crossing the roadway. Gated entrances should be implemented to allow for pedestrian and vehicular access.		Contractor	As required
			Road studs should be provided to improve visibility during poor weather conditions and at night.		Contractor	As required
			Adequate and appropriate traffic warning signage must be placed along the route to be used by the construction vehicles.		Contractor	As required
			Yellow safety mesh must be placed around all excavation areas and trenches (including culverts), to reduce the possibility of injury to workers, residents and livestock, and appropriate safety signage must be placed around excavation area. The contractor shall on a daily basis inspect all pit construction and ensure that all safety mesh and all exposed "pits" are appropriately covered		Contractor	Continuous
			Design and implement a road conduct policy. The policy should cover aspects like speeding, reckless driving, limiting of road use during certain times (peak times, at night, etc.), clear marking of vehicles, road safety, etc. Ensure that vehicle drivers are adequately trained and licensed, and aware of specific areas in which to be extra careful (near communities, around bends etc.)		Project Proponent / Contractor / Engineer	Once-off
			Design and implement a transport policy for workers to prevent them from walking through farming areas. This must include picking them up and dropping them in residential areas		Contractor	Once-off
			Ensure that vehicle drivers employed during the construction phase are adequately trained and licensed, and aware of specific areas in which to be extra careful (near communities, around bends etc.)		Contractor	Continuous
28	Open trenches and unsafe areas	Negligible	Yellow safety mesh shall be put in place by the contractor and placed around any excavation area or trench, to reduce the possibility of injury to workers, residents and domestic animals	Negligible	Contractor	Continuous / as required

Environmental Management Programme – Zandkopsdrift Access Road

Table 3-2: Management and Mitigation Measures - Operational Phase

Nr	Impact	Significance	Mitigation	Significance	Responsibility	Frequency/Ti meframe
		WOM		WM		
Noise Impacts						
1	Increased noise from vehicular movement of transport vehicles (employee transport and transport of chemicals and supplies to mine) on roads	Negligible	Use of roads by heavy vehicles should be restricted to daytime. Travelling at night should be avoided or limited as far as possible	Negligible	Transport subcontractor	Continuous
			All vehicles shall be provided with effective mufflers and adhere to SABS noise reduction standards.		Transport subcontractor	Continuous
Air Quality						
2	Decreased air quality due to vehicular emissions	Low	Vehicle associated with the mine should be regularly maintained and serviced in order to prevent excessive vehicular emissions.	Negligible	Transport subcontractor	Continuous
3	Dust mitigated due to impermeable all-weather road surface	High +	The new private road should be subject to regular maintenance. The road surface should be constantly monitored. All surface cracking and perishing must be reported and immediately repaired to prevent further degradation of the road surface. Repairs should always be carried out with the same material as in the original construction and the surface structure should be maintained	High +	Project Proponent	As required
			The public (provincial) road should be subject to regular maintenance. The road surface should be constantly monitored. All surface cracking and perishing must be reported and immediately repaired to prevent further degradation of the road surface. Repairs should always be carried out with the same material as in the original construction and the surface structure should be maintained		District Municipality	As required

Environmental Management Programme – Zandkopsdrift Access Road

Water Impacts						
4	Potential pollution of the Swart-Doring River, its tributaries and drainage lines due to dirty run-off from surfaced roads	Low	Waste material or chemicals on the new private access road should be removed from the road and discarded at the Van Rhynsdorp registered landfill site. Spillages of chemicals and other materials by transport contractors associated with the mine should likewise be removed and discarded. Please refer to Transport SOP attached as Appendix F.	Negligible	ECO	Continuous
			All vehicles associated with mining operations should be inspected for oil and fuel leaks regularly, and any vehicle showing signs of leaking should be serviced immediately		Transport subcontractor	Continuous
5	Storm water management resulting in improved drainage	High +	Please refer to storm water management table below.	High +		
6	Decrease in flooding of road at low-lying sections and subsequent road closure	High +	Please refer to storm water management table below.	High +		
Soil Impacts						
7	Decrease in siltation of water resources[1]	High +	Please refer to storm water management table below.	High +		
8	Decrease in soil erosion	High +	Please refer to storm water management table below.	High +		
Ecological Impacts						
9	Direct natural habitat modification / destruction: High sensitivity	Moderate	<ul style="list-style-type: none"> All maintenance activities should be conducted in such a way that minimal damage is caused to the riparian and floodline zone. The riparian zones and floodplains should be monitored over the longer term to prevent any negative impact on these sensitive ecosystems. 	Low	Project Proponent / Contractor	Continuous

Environmental Management Programme – Zandkopsdrift Access Road

	areas (drainage channels)					
10	Spread and establishment of alien invasive plant species	High	Institute a monitoring programme to detect alien invasive species early, before they become established and, in the case of weeds, before the release of seeds, for 6 months after the construction phase.	Moderate	Project Proponent / ECO	6 months
			Institute a monitoring programme to detect alien invasive species early, before they become established and, in the case of weeds, before the release of seeds once public (provincial) road have been handed over		District Municipality	Continuous
			A plan should be developed for control of noxious weeds and invasive plants that could occur as a result of new surface disturbance activities at the site. The plan should address monitoring, weed identification, the manner in which weeds spread, and methods for treating infestations. Require the use of certified weed-free mulching. Prohibit the use of fill materials from areas with known invasive vegetation problems.		District Municipality	Once-off / continuous
			Maintain proper firebreaks around entire route alignment		District Municipality	Continuous
11	Road mortality: fauna	Moderate	More fauna are normally killed the faster vehicles travel. A speed limit should be enforced (40km/h for dirt roads on mining area; 50km/h for public roads (provincial roads) and 80km/h for national roads). (Speed limits will also lessen the probability of road accidents and their negative consequences) ¹	Low	Project Proponent / District Municipality	Continuous
			Travelling at night by vehicles associated with the mine should be avoided or limited as much as possible		Project Proponent	Continuous
Socio-economic Impacts						
12	Increased accessibility for farmers and communities	High +	No mitigation proposed.	High +		

¹ The project proponent will be responsible for implementing speed limits on the new private access road as well as the internal haul roads. The enforcement of speed limits on the public (provincial and national) roads is the responsibility of the relevant municipality.

Environmental Management Programme – Zandkopsdrift Access Road

13	Road Safety: Increased traffic on roads	High	Speeds limits should be enforced for all vehicles (40km/h for dirt roads on mining area; 50km/h for access roads and 80km/h for national roads).	Moderate	Project Proponent / District Municipality	Continuous
14	Road Safety: Increased road speeds resulting in traffic accidents	High	Speeds limits should be enforced for all vehicles (40km/h for dirt roads on mining area; 50km/h for access roads and 80km/h for national roads).	Low	Project Proponent / District Municipality	Continuous
			Ensure adequate and appropriate traffic warning signage is in place along the route alignment.		Project Proponent / ECO	Once-off / as required
			Pedestrian crossways can be implemented where the road goes through the town of Stofkraal as well as the use of speed bumps.		Project Proponent / District Municipality	Once-off / as required
			Design and implement a road conduct policy for mine employees and contractors making use of the road. The policy should cover aspects like speeding, reckless driving, limiting of road use during certain times (peak times, at night, etc.), clear marking of vehicles, road safety, etc. Ensure that vehicle drivers are adequately trained and licensed, and aware of specific areas in which to be extra careful (near communities, around bends etc.).		Project Proponent	Once-off
			Design and implement a transport policy for mine employees to prevent them from walking through farming areas. This must include picking them up and dropping them in residential areas.		Project Proponent	Once-off
Ensure that vehicle drivers employed / sub-contracted by the mine are adequately trained and licensed, and aware of specific areas in which to be extra careful (near communities, around bends etc.).	Project Proponent	Continuous				

4 STORM WATER MANAGEMENT PLAN

The following table contains the storm water management measures to be implemented on site (refer to the Preliminary Road Design Report (Appendix D5 of the BAR) and the storm water management infrastructure drawings attached in Appendix E):

Nr	Impact	Significance	Mitigation	Significance	Responsibility	Frequency /Timeframe
		WOM		WM		
Water Impacts						
4	Storm water management resulting in improved drainage	High +	Construction of a concrete drift at the crossing with the Swart-Doring River and its tributary	High +	Engineer / Contractor	Once-off during construction
			600 mm Ø diameter pipe culverts will be installed at all crossings of drainage channels. The preliminary design and sizing of the various proposed culvert crossings has been based on the Rational Design Method and Mannings Free Flowing Conditions as per the South African National Roads Agency SOC Ltd Drainage Manual (please refer to storm water management map)			
			Where required earth side drains of the trapezoidal drain type with a minimum depth of 200 mm below sub-grade level will be installed			

Environmental Management Programme – Zandkopsdrift Access Road

			<p>where necessary at access roads and farm entrances, culverts should be installed in the side drain to allow safe access to the main road while allowing free flow of water. The minimum pipe culvert dimension is 300 mm, but the preferred size is 450 mm</p>			
			<p>Where required V-shaped concrete side drains with side slopes of 1:6 from the shoulder break point and 1:4 outwards from the low point of the drain will be installed</p>			
			<p>Mitre drains should generally be between 1,0 meter and 1,5 meter wide and spaced at approximately 50 meter intervals in flat terrain, decreasing to 10 meter as the slope increases to 1:10 will be installed where necessary.</p>			
			<p>Where required berms will be installed. Berms should be 0,5 meter deep and 0,75 meter wide and the side slope into the berm should be 1:1,5</p>			
			<p>Maintenance of storm water infrastructure should be undertaken regularly to repair damage to storm water infrastructure after major flood events and to remove any material from culverts and drains that restricts water flow for the new private road</p>	Project proponent	As required	
			<p>Maintenance of storm water infrastructure should be undertaken regularly to repair damage to storm water infrastructure after major flood events and to remove any material from culverts and drains that restricts water flow for the public (provincial) road</p>	District Municipality	As required	
5	Decrease in flooding of road at low-lying sections and	High +	<p>Construction of a concrete drift at the crossing with the Swart-Doring River and its tributary. Stone gabion boxes and mattresses will be placed on either side of the concrete drift on the approaches to prevent soil erosion</p>	High +	Engineer / Contractor	Once-off during construction

Environmental Management Programme – Zandkopsdrift Access Road

	subsequent road closure		Maintenance of storm water infrastructure should be undertaken regularly to repair damage to storm water management- and erosion control infrastructure after major flood events for the new private road		Project Proponent	As required
			Maintenance of storm water infrastructure should be undertaken regularly to repair damage to storm water management- and erosion control infrastructure after major flood events for the public (provincial) road		District Municipality	As required
Soil Impacts						
7	Decrease in siltation of water resources	High +	Embankment protection, in the form of gabion boxes and gabion mattresses, will be utilised along the route alignment to prevent soil erosion	High +	Engineer / Contractor	Once-off during construction
			Maintenance of gabion boxes and gabion mattresses should be undertaken regularly for the new private road in order to prevent erosion		Project Proponent	As required
			Maintenance of gabion boxes and gabion mattresses should be undertaken regularly for the public (provincial) road in order to prevent erosion		District Municipality	As required
8	Decrease in soil erosion	High +	Embankment protection, in the form of gabion boxes and gabion mattresses, will be provided to cater for the 1:20 year flood scenario	High +	Engineer / Contractor	Once-off during construction

Environmental Management Programme – Zandkopsdrift Access Road

			Maintenance of gabion boxes and gabion mattresses should be undertaken regularly for the new private road in order to prevent erosion		Project Proponent	As required
			Maintenance of gabion boxes and gabion mattresses should be undertaken regularly for the public (provincial) road in order to prevent erosion		District Municipality	As required

5 ENVIRONMENTAL MONITORING AND AUDITING

DEAT (2004) defines environmental auditing as “a process whereby an organisation’s environmental performance is tested against its environmental policies and objectives.” Monitoring and auditing is an essential environmental management tool which is used to assess, evaluate and manage environmental and sustainability issues:

In order to ensure that the objectives of sustainable development and integrated environmental management are met and in order to obtain data which can inform continuous improvement of environmental practices at the site (adaptive management), monitoring and reporting will be an essential component of the proposed operations.

Monitoring and management actions associated with the project are contained in Section 5 of this report as well as in the various specialist reports associated with this project. This section provides a summary of the critical monitoring aspects per specific environmental field.

5.1 General Monitoring and Management

The appointment of a suitably qualified **on-site Environmental Control Officer (ECO)** is essential to the successful implementation of this project, although this role can be fulfilled by the SHE Representative. The ECO will be responsible for the implementation of the EMP, applicable environmental legislation and any stipulations/conditions set by the relevant competent authorities (including but not limited to the DEA and DWA). The Environmental officer will conduct **formal monthly site inspections** and conduct an **internal annual audit**.

An **independent Environmental Control Officer (ECO)** should also be appointed to conduct **annual audits** of the success and effective implementation of the environmental management measures stipulated by applicable legislation, the EIA, and EMP, and any conditions set by the competent authorities. Following each site visit, the ECO should submit a report to the DEA documenting the success/failure of the implementation of the management measures at the operations.

5.2 Specific Monitoring Requirements

Monitoring of the proposed access road (both on site and where appropriate in the surrounding environments) should be considered a high priority and should be conducted in accordance with the relevant specialist recommendations as summarized below:

5.3 Monitoring Protocol

It is essential that during the construction and operational phase of the proposed access road that the monitoring of certain elements are carried out to ensure compliance with regulatory bodies. A monitoring protocol for both the construction phase and the operational phase will be required. The monitoring only includes those activities identified in the EMPr and excludes any monitoring that should take place according to the water use license if and when it will be authorized.

5.3.1 Monitoring Requirements and Record Keeping

To ensure that the procedures outlined throughout the EMPr are implemented effectively it will be necessary to monitor the implementation of the EMPr and evaluate the success of achieving the objectives listed in the EMPr. To ensure that all personnel on site are aware of their obligation to protect the environment, induction training will also include environmental awareness.

The audit procedure will include a Compliance audit, conducted by the Environmental Control Officer. Where the objectives of the EMPr are not being met the reasons will be determined and remedial action or variation to the tasks will be recommended. Major residual effects shall be documented in a Non-Conformance Report, during the construction phase. Follow-up audits will be conducted as per the audit protocol in the EMPr.

5.3.2 Construction phase

The following monitoring needs to be conducted:

1. Ecological Monitoring
 - Institute a monitoring programme to detect alien invasive species early, before they become established and, in the case of weeds, before the release of seeds.
 - Environmental monitoring of environmental aspects should be implemented during the construction phase of the development to ensure that minimal impact is caused to the fauna and flora of the area.
 - Monitoring of threatened and near-threatened species and species that have been subject to elevated levels of utilization (e.g. medicinal plants and species utilised for fuel wood) should be conducted.

- The occurrence of common disturbances such as fire and episodic disturbances (e.g. floods) should be recorded since these have huge impacts on ecosystems. However, some plant species require fire for persistence. The extent (size of the area affected), and timing (date of occurrence) should be recorded. Causes of disturbances such as fire should be recorded.

2. Heritage

- A careful watching brief monitoring process should be implemented for the detection of any subsurface paleontological / archaeological material during construction.

3. Air quality

- The Zandkopsdrift Mine currently has a dust fallout monitoring network that consists of five dust buckets which was used to establish the air quality baseline for the project area. The measured dust fallout (July 2011 to March 2012) is below the draft dust fallout regulations of 600 mg/m²/day which is acceptable for residential areas (von Gruenewaldt, 2014).
- PM_{2.5} and PM₁₀ ambient monitoring is not currently included based on the low impacts with mitigation measures in place. If the haul roads are not mitigated it is recommended that a PM₁₀/PM_{2.5} sampler be placed to the east of operations and appropriate mitigation measures be implemented to ensure NAAQS are met.

4. Noise

- Noise during the construction phase is not expected to be audible at any of the noise-sensitive locations in the study area and no noise monitoring is therefore required.

5. Surface-and groundwater

- Visual monitoring in the form of site inspections should be conducted to determine whether the following management measures are being implemented at site:
 - Hazardous substances (hydrocarbons) are stored and handled in a bunded area with an impervious floor.
 - Water falling on areas polluted with oil/diesel or other hazardous substances is contained.
 - Construction vehicles are inspected for oil and fuel leaks.

- Used oil and other waste products are disposed of in an accepted way – preferably removed from the site and recycled.
- Vehicle maintenance yards are not situated in close proximity to water courses.
- Refuelling stations on site are constructed so as to prevent spillage of fuel or oil onto the soil.
- Measures to ensure that any accidental spillages can be contained and cleaned up promptly are in place.
- Asphalt and concrete are mixed in areas which have been specifically demarcated for these purposes.
- All spilled asphalt and concrete is promptly removed to an approved disposal site.
- After mixing is complete; all waste is removed from the batching area and disposed of at an approved disposal site.
- No storm water is permitted to flow through the batching site.
- Batching areas are enclosed by a bunded wall.
- The construction camp is not situated in close proximity to water courses (if applicable).
- Chemical latrines are provided at the construction camp and along the rest of the site where construction activities may take place.

5.4 Operational Phase

The following monitoring must be conducted

1. Ecological

- Alien plant infestation should be monitored to determine the proportion of the surface area of the study area covered by alien plants; and identify which plant species are problematic and should be controlled This monitoring will be the responsibility of the project proponent for 6 months after the construction phase after which the responsibility will become that of the District Municipality.
- The occurrence of common disturbances such as fire and episodic disturbances (e.g. floods) should be recorded since these have huge impacts on ecosystems. However, some plant species require fire for persistence. The extent (size of the area affected), and timing (date of occurrence) should be recorded. Causes of disturbances such as fire should be recorded.

2. Noise

- Noise monitoring should be carried out regularly at specific positions to detect deviations from predicted noise levels and enable corrective measures to be taken where warranted.

3. Surface-and groundwater

- Visual monitoring in the form of site inspections should be conducted to determine whether the following management measures are being implemented at site:
 - Spillages of chemicals and other materials by transport contractors associated with the mine are removed and discarded according to the Transport Standard Operating Procedures (Appendix F).
 - Regular inspections for oil and fuel leaks for all vehicles associated with mining operations are undertaken. Vehicles showing signs of leaking are serviced immediately.
 - Maintenance of storm water infrastructure is undertaken regularly. Damage to storm water infrastructure is undertaken after major flood events and material that restricts water flow is removed from culverts and drains.
 - Maintenance of erosion control infrastructure (gabion boxes and mattresses) is undertaken regularly, especially following flood events.

5.5 Audit Protocol

It is essential that during the construction and operational phase of the proposed road upgrade and construction, the monitoring and auditing of certain elements are carried out to ensure compliance with regulatory bodies. An Audit Protocol for both the construction phase and the actual operational phase will be required. The auditing only includes those activities identified in the EIA and excludes any auditing that should take place according to the water use license or any other legislative authorization process if and when they will be authorized.

5.5.1 Construction phase

The following audits need to be completed:

1. EMPr compliance (on a monthly basis): to be checked by an on-site Environmental

Control Officer (ECO).

2. EMPr compliance (on a yearly basis): to be checked by an independent Environmental Control Officer (ECO).

5.5.2 Operational Phase

The following audits must be completed:

1. Annual external environmental compliance audits (ROD and EMPr) – Independent Environmental Control Officer (ECO).

5.6 Environmental incidents

An environmental incident is defined as any unplanned event that results in actual or potential damage to the environment, whether of a serious or non-serious nature. An incident may involve non-conformance with environmental legal requirements, the requirements of the EMP, or contravention of written or verbal orders given by the ECO or relevant authority.

In the event of any incident, an Environmental Incident Log should be completed and these reports should be kept on file by the SHE Officer (or EO). Such reports should provide the following details:

- Date of the Incident (and time if relevant)
- Description of the nature of the incident (what happened)
- Explanation for current conditions (why it happened), responsible person, supporting photographs etc.
- Description of corrective actions taken

Corrective action to mitigate the impact (appropriate to the nature and scale of the incident) should be conducted immediately and affected parties notified.

In the case of serious incidents or emergencies, the incident report should be sent to the relevant authority as soon as possible after the incident has been recorded.

5.7 Environmental awareness

Environmental awareness training is critical for two primary reasons:

- a) The workforce must understand how they can play a role in achieving the objectives specified in the EMP; and

- b) The workforce must understand their obligations in terms of the implementation of the EMP and adherence to environmental-legislative requirements.

This section of the report contains the environmental awareness plan which is aimed at ensuring that employees, contractors, subcontractors and other relevant parties are aware of and able to meet their environmental commitments. This plan is to be updated on a yearly basis during the construction and operational phases of the project in light of operational changes, learning experiences and identified training needs.

All full time staff and contractors are required to attend an induction session when they start, which session should include environmental aspects.

It is therefore recommended that the ECO be involved in induction training (if this entity is separate from the SHE rep). The induction sessions may be modified / adapted based on the audience attending the specific session, but it should ensure that all employees gain a suitable understanding of:

- Environmental requirements of the project, and how these will be implemented and monitored, including each employee's responsibilities with respect to environmental issues;
- Contents and commitments of the EMP, including no-go areas, employee conduct, pollution prevention (prohibitions against littering, unauthorized fires, loud music, entry to adjacent properties, road conduct etc.);
- Environmentally sensitive areas on and around the road alignment, including why these are deemed important and how these are to be managed. Employees will also be made aware of protected species found on the site and how these are to be conserved, as well as alien invasive species potentially found on the site and how these should be managed; and
- Incident identification, remediation and reporting requirements: what constitutes an environmental incident (spillages, fire etc.) and how to react when such an incident occurs.

Environmental training will not be restricted to induction training sessions alone, but will be conducted on an on-going basis throughout the lifecycle of the access road as and when required. Records are to be kept of the type of training given (matters discussed and by whom), date on which training was given and the attendees of each training session.

6 CONCLUSIONS

The purpose of this report is to provide the relevant authority with sufficient information regarding the potential impacts of the development to make an informed decision. This Environmental Management Programme (EMPr) is to be applied during all phases of this development as an on-site reference document.

The project will result in limited negative environmental impacts, provided this development is mitigated, as per this EMPr. The responsibility lies with the Contractor to familiarise themselves with the contents of this EMPr. Furthermore auditing, by the ECO, will take place to ensure compliance with this EMPr. Parties transgressing this EMPr will be held accountable for any rehabilitation that may need to be undertaken.

Any non-compliance with the conditions set out in this EMPr will be regarded as an offence and will consequently be dealt with in terms of the relevant Sections in the National Environmental Management Act, 1998 (Act No. 107 of 1998). Environmental incidences and the handling thereof, should be recorded by filling out the incidence logs, this responsibility should be taken up by the Environmental Control Officer or Environmental Liaison Officer.

7 REFERENCES

- Aucamp, S.-M. (2014). Zandkopsdrift Mine Social Impact Assessment. Equispectives Research and Consulting Services.
- DEAT, 2004 Guideline Document on the EIA Regulations implementation of sections 21, 22 and 26 of the Environment Act. Pretoria.
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APPENDIX A ENVIRONMENTAL INCIDENT LOG

Environmental Management Programme – Zandkopsdrift Access Road

Date	Description of Environmental incident	Comments (Explanation for current conditions, responsible person, photographs etc)	Corrective action taken (Give details and attach documentation as far as possible)	Signature

APPENDIX B COMPLAINTS RECORD SHEET

Environmental Management Programme – Zandkopsdrift Access Road

COMPLAINTS RECORD SHEET	File Ref:	DATE:
	Page	
COMPLAINT RAISED BY:		
CAPACITY OF COMPLAINANT:		
COMPLAINT RECORDED BY:		
COMPLAINT:		
PROPOSED REMEDIAL ACTION:		
ECO: _____	Date: _____	
NOTES BY ECO:		
ECO: _____	Date: _____	Site Manager: _____ Date: _____

**APPENDIX C PENALTIES AND FINES FOR NON-COMPLIANCE TO THE EMPR
PENALTIES AND FINES FOR NON-COMPLIANCE OR MISCONDUCT**

This EMPr forms part of the contract agreement between the Client and the Principal contractor. As such, non-compliance with conditions of the EMPr will amount to a breach of contract. Penalties will be issued directly to the PC by the ECO in the event of non-compliance to the EMPr specifications. The issuing of a penalty will be preceded by a verbal warning by the ECO, as well as strict instruction in at least one monthly ECO report to rectify the situation. The ECO and PC will communicate with regards to realistic time-frames for possible rectification of the contravention, and possible consequences of continued non-compliance to the EMPr.

Penalties incurred do not preclude prosecution under any other law. Cost of rehabilitation and/or repair of environmental resources that were harmed by the actions of the PC if such actions were in contravention of the specifications of the EMPr will be borne by the PC himself. Penalties may be issued over and above such costs. The repair or rehabilitation of any environmental damage caused by non-compliance with the EMPr cannot be claimed in the Contract Bill, nor can any extension of time be claimed for such works. Penalty amounts shall be deducted from Certificate payments made to the Contractor.

The following categories of non-compliance are an indication of the severity of the contravention, and the fine or penalty amounts may be adjusted depending on the seriousness of the infringement.

- Category One – Acts of non-compliance that are unsightly, a nuisance or disruptive to adjacent landowners, existing communities or persons passing through the area.
- Category Two – Acts of non-compliance that cause minor environmental impact or localised disturbance.
- Category Three – Acts of non-compliance that affect significant environmental impact extending beyond point source.
- Category Four – Acts of non-compliance that result in major environmental impact affecting large areas, site character, protected species or conservation areas.

**APPENDIX D PROPOSED ROUTE ALIGNMENT AND STORM WATER
INFRASTRUCTURE MAP**

APPENDIX E STORM WATER INFRASTRUCTURE DESIGN DRAWINGS

APPENDIX F TRANSPORT CONTRACTOR SOP FOR HANDLING SPILLAGES