ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)

File Reference Number:
1/3/1/16/1E-268

Project Title:
Remediation of SAPPI Ngodwana Dam, on Farm Ngodwana 1030JT, Ngodwana, Mpumalanga Province.

Prepared for:

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DOCUMENT CONTROL

Table 1. Document Control.

COMPILED/REVISED BY	STATUS	REVISION	SIGNATURE	DISTRIBUTED ON
Philip Radford	Draft	00		
Justin Bowers	Draft	01		
Justin Bowers	Final	00		

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat., MGSSA) & S.D. MacGregor (MSc., Pr.Sci.Nat.)
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EXECUTIVE SUMMARY

Ngodwana Dam is a 41 m high zoned earthfill Category III Dam. The dam is located on a tributary of the Elands River, Mpumalanga Province, directly upstream from the N4 highway and the Ngodwana Paper Mill, 40 km from Mbombela. The water surface area of the dam at the Full Supply Level of 959.8 masl is 87 ha. The catchment area of the dam is 229 km^2, which covers the entire X21H quaternary catchment. The Mean Annual Runoff (MAR) is 66.7 million m^3. The dam's gross storage capacity of 10.4 million m^3 is 16 % of the MAR. The historical firm yield of the dam is 26.3 million m^3/a.
The purpose of the rehabilitation is to ensure the continued safe operation of this Category III dam and the stability of the main and right flank embankments and its foundations.

The scope of construction works to be included in the rehabilitation and to be authorised is:

1. Stabilizing berm on the downstream face of the main embankment to RL 941.3 m, including approximately 30 000 m^3 of earthworks (predominantly rockfill), a new internal drainage system (sand & gravel filters, rock toe and drain pipes with inspection concrete manholes) and gabion retaining walls.
2. Subsoil pipe drains above the berm of 133 m length with inspection concrete manholes.
3. Raising of the right flank embankment with earth fill to prevent overtopping and failure during large floods and to improve the stability of the embankment (earthworks to be confirmed), including a subsoil toe drainpipe with inspection concrete manholes.
4. Improvements to the road surfaces of existing roads, including widening to provide for passing lanes and extending in length of others.
5. Construction of a pedestrian bridge over the Ngodwana River to allow access during construction and dam safety inspections during operation.

This Environmental Management Programme (EMPr) is developed in compliance with section 24N of the NEMA, 1998, as amended and contains those requirements prescribed in the EIA Regulations, 2014, as amended, including section 23 and Appendix 4 of GN No. R. 326 of 7 April 2017.

The EMPr has been developed in conjunction with the Draft Basic Assessment Report (DBAr) providing detail on the affected environment as well as an impact assessment for the anticipated environmental impacts and the General Authorisation (GA) (once issued).

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Reg: 2006/023163/23

Activities to be undertaken during the construction, operational and decommissioning phases include:

Construction Phase

- Site preparation;
  - Clearly delineate the construction footprint to avoid construction creep outside the approved development footprint;
  - Search and rescue for fauna/flora of conservation concern and protected status ahead of any construction activities;
- Lengthen and upgrade internal haulage roads (Routes 1 and 2);
- Transport components and equipment to site;
- Establishment of laydown areas;
- Establishment of ancillary infrastructure;
- Earthworks to stabilise the main embankment, toe berm and lifting of the right flank embankment;
- Site rehabilitation; and
- Environmental management and monitoring throughout the construction process, inclusive of:
  - Continuous monitoring and removal of alien invasive plant species;
  - Dust monitoring and management;
  - Storm water monitoring and management;
  - Erosion monitoring and remediation;
  - Fire management;
  - Habitat vegetation monitoring and management;
  - Hazardous substance monitoring and management, including detecting any leakage or spillage; and
  - Monitoring and management measures to protect hydrological features.

Operational Phase

- Maintenance and repairs of the Ngodwana Dam and associated equipment inclusive of:
  - Maintenance of roads;
  - Cleaning and maintaining spillway;
  - Removal of alien invasive vegetation; and
  - Maintain and repair fencing.
- Environmental management and monitoring throughout the operational process, inclusive of:
  - Continuous monitoring and removal of alien invasive plant species;
  - Storm water monitoring and management;
  - Erosion monitoring and remediation;
  - Fire management;
  - Habitat vegetation monitoring and management;
  - Monitoring and management measures to protect hydrological features.
- Waste management; and
- Health and safety implementations.

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Reg: 2006/023163/23

- Dam failure Emergency Evacuation Plan

1. Decommissioning

The complete decommissioning of the Ngodwana Dam is unlikely, however should it no longer be economically feasible to continue the Ngodwana Mill operation could cause financial constraints for dam maintenance requirements, leading to structural weakness from neglect. Activities will include:

- Licence application to DWS for decommissioning a dam with safety risk;
- Site reparation;
- Demolition of the dam leaving the river to flow freely and recycling of existing components of the dam and associated infrastructure; and
- Rehabilitation of the site.

The implementation of the EMPr within the project is not an optional additional or "add on" requirement. The EMPr is legally binding, integral to the contract and is as important as the engineering aspects of the contract. The EMPr is a working document to be used throughout the life of the project, until such time that closure is achieved.

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Reg: 2006/023163/23

TABLE OF CONTENTS

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat., MGSSA) & S.D. MacGregor (MSc., Pr.Sci.Nat.)
Reg: 2006/023163/23

CHECKLIST

An environmental management programme (EMPr) must comply with section 24N of the NEMA, 1998, as amended and contain those requirements prescribed in the EIA Regulations, 2014, as amended, including regulation 23 and Appendix 4. The full suite of requirements is listed in Table 2, which have dictated the layout and content of this EMPr.

Table 2. Environmental Management Programme Checklist.

Content of Environmental Management Programme (EMPr)	Checked
1. (1) An EMPr must comply with section 24N of the Act and include-	☑
(a) details of	☑
(i) the EAP who prepared the EMPr; and	☑
(ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae;	☑
(b) a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	☑
(c) a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;	☑
(d) a description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including-	☑
(i) planning and design;	☑
(ii) pre-construction activities;	☑
(iii) construction activities;	☑
(iv) rehabilitation of the environment after construction and where applicable post closure; and	☑
(v) where relevant, operation activities;	☑
(f) a description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraph (d) will be achieved, and must, where applicable, include actions to -	☑
(i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;	☑
(ii) comply with any prescribed environmental management standards or practices;	☑
(iii) comply with any applicable provisions of the Act regarding closure, where applicable; and	N/A
(iv) comply with any provisions of the Act regarding financial provisions for	N/A

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Reg: 2006/023163/23

rehabilitation, where applicable;	
(g) the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	☑
(h) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	☑
(i) an indication of the persons who will be responsible for the implementation of the impact management actions;	☑
(j) the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	☑
(k) the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	☑
(l) a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	☑
(m) an environmental awareness plan describing the manner in which-	☑
(i) the applicant intends 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; and	☑
(n) any specific information that may be required by the competent authority.	☑
(2) Where a government notice gazetted by the Minister provides for a generic EMPr, such generic EMPr as indicated in such notice will apply.	N/A

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Reg: 2006/023163/23

ABBREVIATIONS / ACRONYMS AND DEFINITIONS

Table 3. List of terms for abbreviations used in this document.

Abbreviation / Acronym	Term
BA	Basic Assessment as provided for in NEMA (Act 107 of 1998) and EIA Regulations (2014), as amended.
CA	Competent Authority
CAR	Corrective Action Reports
CLO	Community Liaison Officer
CRE	Chief Resident Engineer
DARDLEA	Department of Agriculture, Rural Development, Land and Environmental Affairs
DMR	Department of Mineral Resources
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAPASA	Environmental Assessment Practitioners Association of South Africa
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment as provided for in NEMA (Act 107 of 1998) and EIA Regulations (2014), as amended.
EIR	Environmental Impact Assessment Report
EMPr	Environmental Management Programme
ELU	Existing Lawful Use as per Part 3 of the National Water Act (Act 36 of 1998)
EM	Environmental Manager
IEA	Independent Environmental Auditor
GA	General Authorisation as per Section 39 of the National Water Act (Act 36 of 1998)
HSO	Health and Safety Officer
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
LA	Listed Activity (EIA Regulations, 2014)
LN1	Listing Notice 1: GN. No. R. 983, 4 December 2014, as amended in GN. No. R. 327, 7 April 2017.
LN2	Listing Notice 2: GN R. 984, 4 December 2014, as amended in GN. No. R. 325, 7 April 2017.
LN3	Listing Notice 3: GN R. 985, 4 December 2014, as amended in GN. No. R. 324, 7 April

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Reg: 2006/023163/23

	2017.
MPRDA	Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NWA	National Water Act, 1998 (Act No. 36 of 1998)
SACNASP	South African Council for Natural Scientific Professions
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework
SEO	Site Environmental Officer
SO	Social Officer
WUL	Water Use License

Table 4: Definitions of some terms used in this document.

Term	Source	Definition
Aspect (environmental)	ISO 14001: 2015	Element of an organisation's activities or products or services that interacts or can interact with the environment. An environmental aspect can cause (an) environmental impact(s). A significant environmental aspect is one that has or can have one or more significant environmental impact(s).
Corrective Action	ISO 14001: 2015	Action to eliminate the cause of a non-conformity (or non-compliance in the case of an EMPr) and prevent recurrence.
Development	EIA Regulations (2014)	Means the building, erection, construction or establishment of a facility, structure or infrastructure, including associated earthworks or borrow pits, that is necessary for the undertaking of a listed or specified activity, but excludes any modification, alteration or expansion of such a facility, structure or infrastructure, including associated earthworks or borrow pits, and excluding the redevelopment of the

		same facility in the same location, with the same capacity and footprint.
Environmental Impact	ISO 14001: 2015	Change to the environment, whether adverse or beneficial, wholly or partially resulting an organisation's environmental aspects.
Maintenance	EIA Regulations (2014)	Means actions performed to keep a structure or system functioning or in service on the same location, capacity and footprint.
Performance	ISO 14001: 2015	Measurable unit. Performance can relate either to quantitative or qualitative findings.
Significant impact	EIA Regulations (2014)	Means an impact that may have a notable effect on one or more aspects of the environment or may result in non-compliance with accepted environmental quality standards, thresholds or targets and is determined through rating the positive and negative effects of an impact on the environment based on criteria such as duration, magnitude, intensity and probability of occurrence.

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Reg: 2006/023163/23

SECTION 1: DETAILS & EXPERTISE OF THE EAP AND APPLICANT

Details of –

(i) The EAP who prepared the report;

Environmental Assessment Practitioner	Ecoleges Environmental Consultants
Contact Person	Philip John Radford
Postal Address	PO Box 9005, Nelspruit, 1200
Telephone	+27(0)83 644 7179
E-mail	philip@ecoleges.co.za

Project Applicant	Sappi Paper and Paper Packaging
Trading Name (if any)	SAPPI
Contact Person	Mr. Errol van Berg
Physical Address	N4 highway, Ngodwana Paper Mill, Ngodwana 209
Postal Address	Private Bag X1001, Ngodwana
Postal Code	209
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Email	Errol.VonBerg@sappi.com

(i) The expertise of the EAP to prepare the EMPr, including a curriculum vitae;

Philip John Radford

Name	Philip Radford
Date of birth / ID No.	11 May 1971 710511 5898 181
Nationality	British with RSA residency
Marital Status	Divorced with one child
Current Address	P O Box 9005, Nelspruit, 1200 ● 7 Garden Villas, Kiaat Street, White River, 1240, South Africa ● Work: 083 984 9936 ● e-mail: philip@ecoleges.co.za
Languages	English
Driver's License	Code EB
Specializations	Key Fields: Environmental Control Officer (ECO), Environmental Compliance Auditing, Basic & Environmental Impact Assessment.
Qualifications & Courses Attended	**1989-1992** BSc., University of Plymouth, UK **1998-2001** PG Dip., University of Salford, UK **2007** Advance Auditing for Modern Regulators, Environment Agency, UK **2009** Environmental Impact Assessment: A Practical Approach, CEM, RSA **2015** Implementing Environmental Management Systems, CEM, RSA **2017** Transition ISO 14001 course, Centre for Environmental Management, North-West University, Pretoria locale. **2017** Environmental Management Systems: Lead Auditor, Centre for Environmental Management, North-West University, Potchefstroom.
Memberships & Registrations	**2009** South African National Parks Honorary Rangers (Lowveld) **2010** International Association for Impact Assessment, South Africa (IAIAsa) (Mpumalanga Branch Chairperson and NEC member).
Career Summary	**Sept 1994 – April 1996** Scientific Support Officer for the Greater Manchester Waste Regulation Authority. **April 1996 – Sept 2000** Contaminated Land Officer for the Environment Agency (North West, UK). **Sept 2000 – Dec 2006**

	Environment Officer (Level 2) for the Environment Agency (North West, UK). **Jan 2006 – May 2009** Environment Officer (Level 1) for the Environment Agency (South West, UK). **June 2009 – Dec 2010** Environmental Manager for Wandima Environmental Services, Nelspruit. **Jan 2011 – Present** Senior Consultant for Ecoleges, Nelspruit.

Full Curriculum Vitae available if required

SECTION 2: INTRODUCTION AND BACKGROUND

The EMPr has been developed in conjunction with the Basic Assessment Report (EIAr) providing detail on the affected environment as well as an impact assessment for the anticipated environmental impacts and the General Authorisation (GA) (once issued).

The Ngodwana Dam is a 41 m high zoned earth fill Category III Dam. The dam is located on a tributary of the Elands River, Mpumalanga Province, directly upstream from the N4 highway and the Ngodwana Paper Mill, 40 km from Mbombela. The water surface area of the dam at the Full Supply Level of 959.8 masl is 87 ha. The catchment area of the dam is 229 km^2, which covers the entire X21H quaternary catchment. The Mean Annual Runoff (MAR) is 66.7 million m^3. The dam's gross storage capacity of 10.4 million m^3 is only 16 % of the MAR. The historical firm yield of the dam is 26.3 million m^3/a.

The purpose of the rehabilitation is to ensure the continued safe operation of this Category III dam and the stability of the main and right flank embankments and its foundations.

The scope of construction works to be included in the rehabilitation and to be authorised is:

1. Stabilizing berm on the downstream face of the main embankment to RL 941.3 m, including approximately 30 000 m3 of earthworks (predominantly rockfill that will be commercially sourced), a new internal drainage system (sand & gravel filters, rock toe and drain pipes with inspection concrete manholes) and gabion retaining walls.
2. Subsoil pipe drains above the berm of 133 m length with inspection concrete manholes.
3. Raising of the right flank embankment with earth fill to prevent overtopping and failure during large floods and to improve the stability of the embankment (earthworks to be confirmed), including a subsoil toe drainpipe with inspection concrete manholes.
4. Improvements to the road surfaces of existing roads, including widening to provide for passing lanes and extending in length of others, sections of which fall within the extent of a watercourse.
5. Construction of a pedestrian bridge over the Ngodwana River to allow access during construction and dam safety inspections during operation.

The dam wall is going to have an expanded footprint due to the introduction of large quantities of infill to increase its strength and integrity, by 10 or more square metres. Additionally, the access road upgrades may require improvements to existing watercourse crossings e.g. culverts. These activities will take place within 32m of a watercourse, outside an urban area, within a critical biodiversity area and within 5km of a protected area. The existing western access road is going to be widened along several sections of the road by more than 4m to allow for passing lanes and provide greater width to large plant and vehicles. Additionally, the central access road is going to be widened to provide for larger plant as well as being lengthened by an additional 200m to better access the works and site establishment area on the eastern side of the dam spillway. Thirdly, the existing roads to the General Fill and Topsoil Stockpile areas will require improvements to the road surface which in some cases is overgrown with vegetation with minor expansion activities possible. There will be more than 1

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Reg: 2006/023163/23

hectare but less than 20 hectares of indigenous vegetation to be cleared as part of the scope of the project. This activity takes place outside an urban area, within a critical biodiversity area and within 5km of a protected area. The development footprint sizes for the scope of works is given below in **Table 6**.

Table 6. Development Footprint Sizes

Scope of Works	**Development Footprint Size**
Temporary rock, fill and topsoil storage area	10,000m2
Widening (including passing lanes) of existing haul road (west)	1.2km x 4m = 4,800m2
Widening/upgrading of existing haul road (central)	750m x 4m = 3,000m2
Lengthening of existing road	200m x 6m = 1,200m2
Saddle-back site establishment area	32,150m2 (including short access road)
Main embankment site establishment area	3,300m2
Stabilising berm	9,900m2 plus working area of 4,200m2
Raising of fuse plug embankment	6,100m2 plus working area of 5,000m2
Alternative site establishment area	3,000m2
Sub-soil toe drains East	108m x 5m = 540m2
Sub-soil toe drains West	62m x 5m = 310m2
Total footprint size	**83,500m2**

SECTION 3: DESCRIPTION OF THE ACTIVITY

(b) a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description.

Table 5 describes all the activities that will be undertaken during the lifespan of this project including the identified listed activities and associated activities that do not require environmental authorization, but are needed to achieve the desired objective, that is the remediation of the Ngodwana Dam via:

Stabilising the Dam main embankment berm, raising of the right flank embankment, improving internal haulage roads and a pedestrian bridge over the Ngodwana River.

Table 5. A detailed description of the activities (including Listed Activities as per the EIA Regulations, 2014 as amended) and resultant aspects of the project that are covered by the EMPr.

Phase	Activity	Sub-activities	Aspects
Planning & Design (including pre-construction)	Compliance with legal requirements by acquiring authorisations, permits and/or licenses for activities/uses undertaken during construction and operation	Protected Species	Impacting protected species prior to obtaining the required licenses / permits.
		Dam Safety Licence	Conditions and requirements of licence to construct, enlarge, alter, or repair dam with safety risk.
		Water Use (21 c & i)	Impeding or altering the beds and banks of a watercourse.
		Access Roads (not to exceed thresholds and layout to have minimal impacts)	Poor alignment and extent of linear activities like roads, fences, pipelines, or other cleared servitudes can increase runoff, cause erosion and sedimentation of aquatic habitats and result in regulatory non-compliance.
		Servitudes and wayleaves	Commencement without authorisation / permit from relevant authorities.
		Compliance monitoring	Commencement without appointment of an Environmental Control Officer (ECO) to monitor compliance with the EA and EMPr.
		Municipal bylaws	Non-compliance with the municipal bylaws.
		Protection of archaeological findings	Destruction of graves and other sites of archaeological value and need for relevant permits where necessary.
	Socio-economic considerations	Employment of local labour	Insufficient employment of local labour.
			Presence of construction workforce.
			Influx of job seekers.
			Loss of farm labour to construction work.

Phase	Activity	Sub-activities	Aspects
			Job seekers may begin enquiring prior to commencement of construction as awareness of the project grows.
		Economic benefits from professionals	If the professionals are unreasonably expensive, the funds to head the projects might be exhausted.
		Expectations	Job seekers may begin enquiring prior to commencement of construction as awareness of the project grows.
		Uncertainty	Community confusion, frustration, and lack of information.
		Construction and use of Temporary Access Roads	Dust generation.
			Loss of Vegetation, habitat, and soil fertility.
			Increased potential for erosion.
			Increase in vehicle movement in area.
		Provision of sanitation systems	Dust generation.
			Loss of vegetation, habitat, and soil fertility.
			Ground water contamination.
		Demarcation, fencing and gates	Loss of vegetation and habitat.
			Impede faunal movement.
			Impeded human movement and disrupted daily activities.
		Vegetation Clearing and Soil Hardening	Loss of vegetation, habitat, and soil fertility.
		Working near or on the watercourse	Decline in water availability of water resource.
		Water Use, abstraction and Management	

Phase	Activity	Sub-activities	Aspects
Construction Phase	Site establishment (construction camp, sanitation, temporary accommodation)	Clear and grub (Earthworks operations area, access roads, stockpiles, and spillway maintenance)	Dust generation.
			Loss of vegetation, habitat, and soil fertility.
			Noise Generation.
		Construction, upgrade and use of Haulage Roads	Loss of Vegetation, habitat, and soil fertility.
			Increased potential for erosion.
			Increased level of noise generation.
			Increase in vehicle movement in area.
			Dust generation.
		Sanitation	Dust generation.
			Loss of vegetation, habitat, and soil fertility.
			Ground water contamination.
		Fencing and gates	Loss of vegetation and habitat.
			Impede faunal movement.
			Impeded human movement and disrupted daily activities.
		Lighting	Visual intrusion in remote areas.
	Access control	Construction and use of Temporary Access Roads	Loss of Vegetation, habitat, and soil fertility.
			Increased potential for erosion.
			Increased level of noise generation.
			Increase in vehicle movement in area.
			Dust generation.
	Contractor's employees (staff conduct, movement)	Water use and management	Water contamination.
			Misuse of available water.
		Cooking of food	Harvesting and fire control.

Phase	Activity	Sub-activities	Aspects
		Sanitation	Unpleasant odours.
			Mismanagement of sewerage.
		Employment of local labour	Insufficient employment of local labour.
			Presence of construction workforce.
			Influx of job seekers.
			Loss of farm labour to construction work.
	Construction of permanent and temporary access roads	Vegetation Clearing and Soil Hardening	Dust generation.
			Loss of vegetation, habitat, and soil fertility.
			Increased level of noise generation.
		Impact on the existing road conditions	The development of potholes.
			Damage to vehicles.
			Potential increase in vehicle accidents.
	Transport on site and accommodation of traffic (parking areas)	Parking	Increase in vehicle movement in area.
			Impact on the existing road conditions.
			Increase human safety risk.
			Increase in the level of noise generation.
			Greenhouse gas emissions.
		Impact on the existing road conditions	The development of potholes.
			Damage to vehicles.
			Potential increase in vehicle accidents.
	Sourcing and management of water (for drinking, sanitation, and construction activities)	Drinking, dust suppression and sanitation	Water contamination.
			Misuse of available water.
	Sourcing and management of dam	Excavation of suitable	Dust generation.

Phase	Activity	Sub-activities	Aspects
	remediation material	bedding and backfill material	Loss of vegetation, habitat, and soil fertility.
			Increased potential for erosion.
		Topsoil stripping and storage	Dust generation.
			Loss of vegetation, habitat, and soil fertility.
			Increased potential for erosion.
			Soil contamination.
			Encroachment and establishment of alien vegetation.
		Slopes and slope stabilisation	Dust generation.
			Increased potential for erosion.
			Water contamination.
			Decline in aesthetic quality of the environment.
			Increase human safety risk.
	Stockpiling and material laydown areas (spoil, mulch, building sand, topsoil, windrows, material, and equipment)	Topsoil stripping storage	Dust generation.
			Loss of vegetation, habitat, and soil fertility.
			Increased potential for erosion.
			Soil contamination.
			Encroachment and establishment of alien vegetation.
			Reduced productivity of subsistence farmland.
		Slopes and slope stabilisation	Dust generation.
			Increased potential for erosion.
			Water contamination.
			Decline in the aesthetic quality of the environment.
			Increase human safety risk.

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Reg: 2006/023163/23

Phase	Activity	Sub-activities	Aspects
	Earthworks and drainage pipeline excavations (associated with the remedial works for the main embankment berm foundations and raising of the right flank embankment)	Trenching	Dust generation.
			Increased potential for erosion.
			Increase human safety risk.
		Importing of suitable bedding and backfill material	Dust generation.
			Loss of vegetation, habitat, and soil fertility.
			Reduced productivity of subsistence farmland.
			Increased potential for erosion.
		Topsoil stripping and storage	Dust generation.
			Loss of vegetation, habitat, and soil fertility.
			Increased potential for erosion.
			Soil contamination.
			Reduced productivity of subsistence farmland.
			Encroachment and establishment of alien vegetation.
		Slopes and slope stabilisation	Dust generation.
			Increased potential for erosion.
			Water contamination.
			Decline in aesthetic quality of the environment.
			Increase human safety risk.
		Crushing of material	Dust generation.
			Loss of vegetation, habitat, and soil fertility.
	Construction of the concrete gabions and associated infrastructure.	Spoil material generation and management	Dust generation.
			Loss of vegetation, habitat, and soil fertility.
			Decline in the aesthetic quality of the environment.

Phase	Activity	Sub-activities	Aspects
	A new internal drainage system (sand & gravel filters, rock toe and drainpipes with inspection concrete manholes) and gabion retaining walls.	Transportation and storage of the cement and associated materials	Increase in vehicle movement in area.
			Impact on the existing road conditions.
			Increase human safety risk.
			Increase in the level of noise generation.
			Greenhouse gas emissions.
		Protection of archaeological findings	Destruction of graves and other sites of archaeological value.
	Handling of waste and generation (solid waste including 'spoil', liquid waste, separation, storage, and disposal)	Domestic and construction waste collection, storage, handling and disposal	Unpleasant odours.
			Increase in waste generation.
			Decline in the aesthetic quality of the environment.
		Spoil material generation and management	Dust generation.
			Loss of vegetation, habitat, and soil fertility.
			Decline in the aesthetic quality of the environment.
	Handling of hazardous substances (fuel/oil, cement, bitumen, sewage/grey water) and management (including storage) at sanitation sites, kitchens, batching sites, refuelling areas and on site.	Maintenance of sanitation systems	Unpleasant odours.
			Soil contamination.
			Water contamination.
			Mismanagement of sewerage.
		Bund area for fuel storage	Dust generation.
			Loss of vegetation, habitat, and soil fertility.
			Soil contamination.
		Use of flammable material and other material stores	Dust generation.
			Loss of vegetation, habitat, and soil fertility.
			Soil contamination.

Phase	Activity	Sub-activities	Aspects
		Refuelling of construction vehicles and plant	Soil contamination.
			Water contamination.
		Handling, storage, disposal of hazardous waste	Unpleasant odours.
			Soil contamination.
			Water contamination
		Transportation of hazardous waste	Potential spillages of hazardous waste.
			Increase human safety risk.
			Greenhouse gas emission.
	Plant management (parking, driving, repair and maintenance, and refuelling)	Refuelling of construction vehicles and plant	Soil contamination.
			Water contamination.
		Bund area for fuel storage	Dust generation.
			Loss of vegetation, habitat, and soil fertility.
			Soil contamination.
		Operation and movement of construction vehicles and plant	Dust generation.
			Increase in level of noise generation.
			Soil contamination.
			Increase human safety risk.
			Vibration.
			Greenhouse gas emissions.
	Building work (concrete work)	Water use and management	Water contamination.
			Misuse of available water.
		Spoil material generation and management	Dust generation.
			Loss of vegetation, habitat, and soil fertility.

Phase	Activity	Sub-activities	Aspects
			Decline in the aesthetic quality of the environment.
		Excavation of suitable bedding and backfill material	Dust generation.
			Loss of vegetation, habitat, and soil fertility.
			Increased potential for erosion.
	Disturbing natural areas	Slopes and slope stabilisation	Dust generation.
			Increased potential for erosion.
			Water contamination.
			Decline in aesthetic quality of the environment.
			Increase human safety risk.
		Topsoil stripping and storage	Dust generation.
			Loss of vegetation, habitat, and soil fertility.
			Increased potential for erosion.
			Soil contamination.
			Reduced productivity of subsistence farmland.
			Encroachment and establishment of alien vegetation.
	Site closure & rehabilitation	Removal of structures and infrastructures	Increase in waste generation.
		Removal of inert waste and rubble	
		Hazardous waste and pollution control	
		Final shaping of disturbed areas	Increased potential for erosion.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat., MGSSA) & S.D. MacGregor (MSc., Pr.Sci.Nat.)
Reg: 2006/023163/23

Phase	Activity	Sub-activities	Aspects
		Topsoil replacement and soil amelioration	
		Ripping and scarifying	
		Planting	Reduced productivity of subsistence farmland.
		Grassing	
		Maintenance	Encroachment and establishment of alien vegetation.
		Management of alien vegetation	Loss of vegetation, habitat, and soil fertility.
Operation (including maintenance)	Operation employment	Consultation with affected parties	Insufficient consultation.
		Employment of local labour	Insufficient employment of local labour.
			Presence of construction workforce.
			Influx of job seekers.
			Loss of farm labour to construction work.
	Consumption (energy, water, and other resources)	Water use and management	Water contamination.
			Misuse of available water.
		Cooking of food	Fire hazard.
			Illegal wood harvesting.
	Maintenance	Refuelling of operational vehicles and plant	Soil contamination.
			Water contamination.
		Handling, storage, and disposal of waste	Unpleasant odours.
			Soil contamination.
			Water contamination.

Phase	Activity	Sub-activities	Aspects
		Maintenance of sanitation systems	Unpleasant odours.
			Mismanagement of sewerage.
	Lighting to create visibility at night	Use of generators	Increase in level of noise generation.
			Soil contamination.
		Security	Trespassing.
	Terrestrial and aquatic ecological management	Use of herbicides	Loss of vegetation, habitat, and soil fertility.
			Soil contamination.
		Harvesting of indigenous plants	Encroachment and establishment of alien vegetation.
		Overgrazing	Increased potential for erosion.
			Reduced productivity of subsistence farmland.
			Dust generation.
	Inspection manholes, spillway, and scour valve infrastructure	Cleaning and Maintenance	Water contamination.
			Misuse of available water.
	Social and community changes	Security	Trespassing.
		Fire Control	Loss of vegetation, habitat, and soil fertility.
		Employment of local labour	Insufficient employment of local labour.
			Presence of construction workforce.
			Influx of job seekers.
			Loss of farm labour to construction work.
		Visual aspects	Visual Intrusiveness.
sioning (including rehabilitati	Disposal of dam infrastructure including reinforced concrete and other waste	Demolition activities	Dust generation.
			Increased level of noise generation.
			Vibration.

Phase	Activity	Sub-activities	Aspects
			Increase in waste generation.
			Increase human safety risk.
		Removal of inert waste and rubble	Decline in the aesthetic quality of the environment.
			Soil contamination.
	Removal of impoundment on the Ngodwana River.	Reinstated flow of the Ngodwana River & Flooding risk	Loss of Aquatic habitat downstream
		Drainage of dam storage	Loss of Aquatic habitat
	Human influence (staff conduct, movement)	Harvesting of indigenous plants	Loss of vegetation, habitat, and soil fertility.
			Decline in the aesthetic quality of the environment.
		Fires for heat & cooking	Fire hazard.
			Loss of vegetation, habitat, and soil fertility.
			Illegal wood harvesting.
		Littering	Decline in the aesthetic quality of the environment.
			Unpleasant odours.
			Increase in waste generation.
			Decline in the aesthetic quality of the environment.
		Noise	Increase human safety risk.
			Increase in the level of noise generation.
	Roads and access routes	Topsoil stripping and storage	Dust generation.
			Loss of vegetation, habitat, and soil fertility.
			Increased potential for erosion.
			Encroachment and establishment of alien vegetation.
		Road decommissioning and rehabilitation	Dust generation.
			Increased level of noise generation.

Phase	Activity	Sub-activities	Aspects
			Soil contamination.
	Rehabilitation of affected footprint	Removal and transportation of structures and infrastructures;	Increase in vehicle movement in area.
			Impact on the existing road conditions.
			Increase human safety risk.
			Increase in the level of noise generation.
			Greenhouse gas emissions.
			Increased potential for erosion.
		Maintenance and management of alien vegetation	Loss of vegetation, habitat, and soil fertility.
			Increased potential for erosion.
		Planting and grassing	Reduced productivity of subsistence farmland.
		Topsoil replacement and soil improvement	Loss of vegetation, habitat, and soil fertility.
		Final Shaping of disturbed areas	Increased potential for erosion.

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Reg: 2006/023163/23

SECTION 4: LAYOUT MAP OF PROPOSED ACTIVITY

(c) a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that any areas that should be avoided, including buffers.

"The Environmental Management Programme (EMPr) to be submitted as part of the EIAr must include the following:
ii. The final site layout map.
iv. An environmental sensitivity map indicating environmental sensitive areas and features identified during the EIA process.
v. A map combining the final layout map superimposed (overlain) on the environmental sensitivity map."

Figure 1 provides a map of the final site layout of the Ngodwana Dam and how they fit into the preferred alternative footprints. **Figure 2** provides a map of the proposed preferred development footprint in the context of the surrounding environmental sensitivities. The preferred footprint development has been determined through an iterative process, to ensure that it remains outside of all sensitive receptors assessed, including buffer zones (where applicable).

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Reg: 2006/023163/23

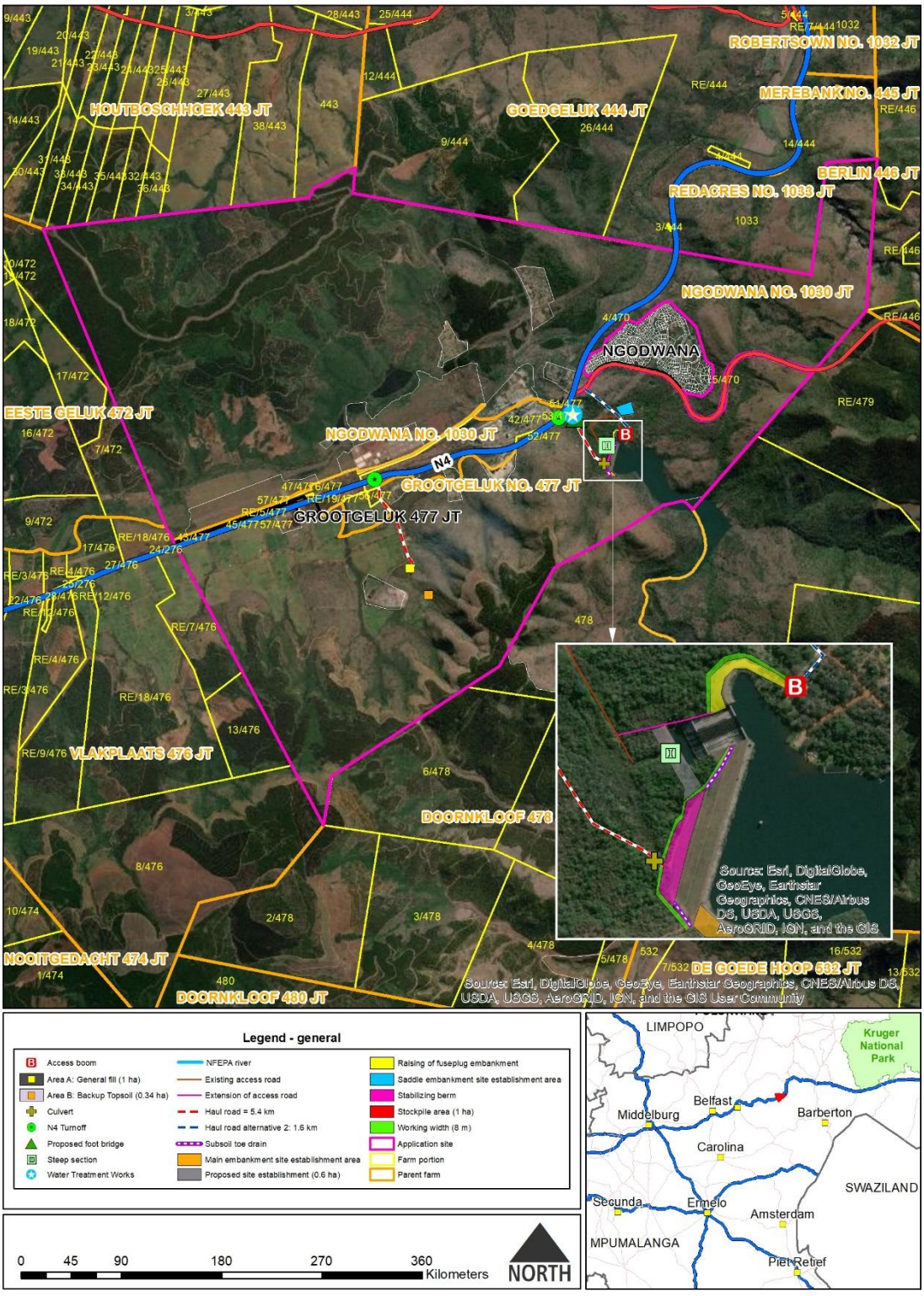

Figure 1. Site layout map.

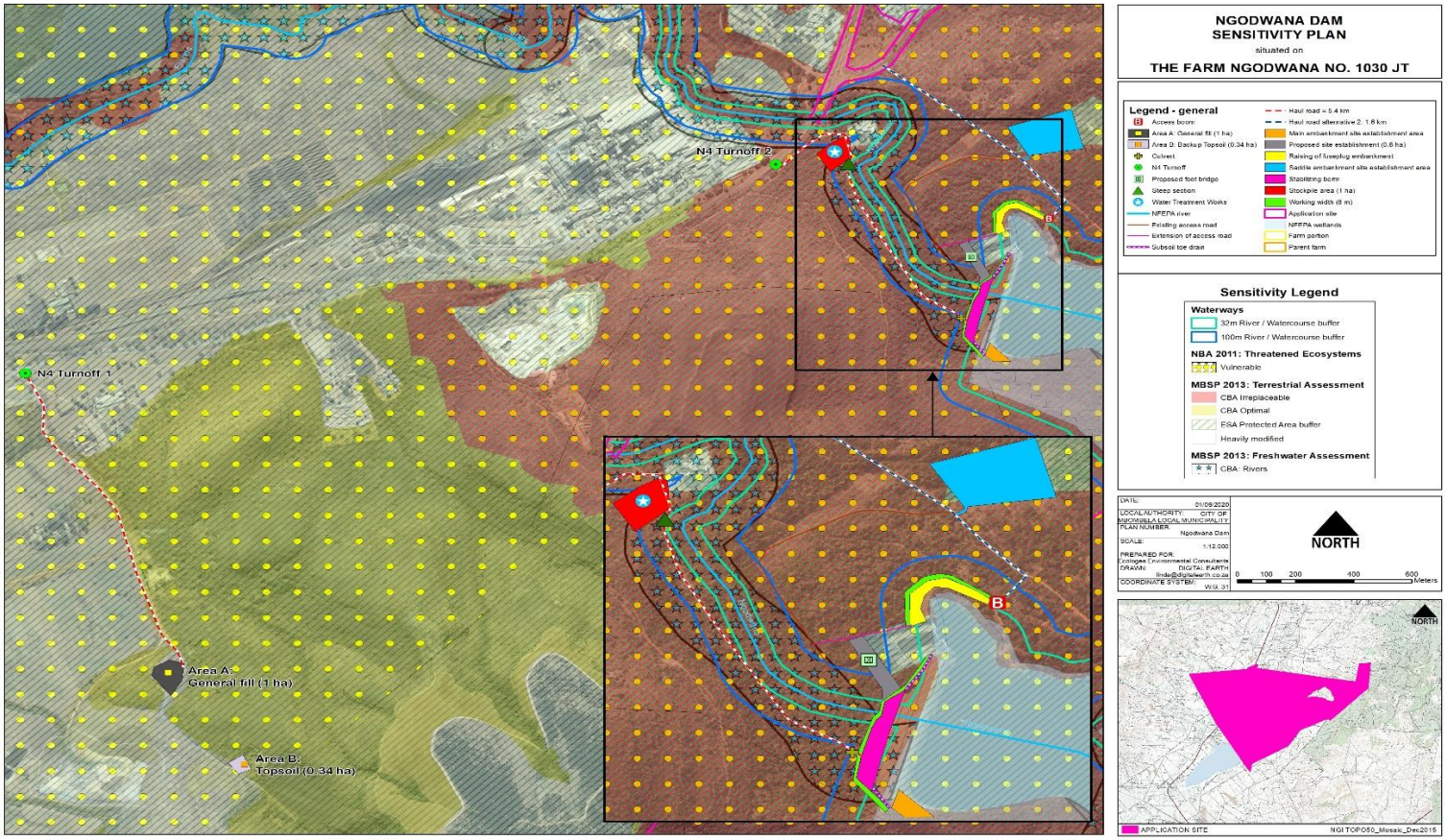

Figure 2. Site sensitivity map including proposed site development footprint.

SECTION 5: ACTIVITIES, ASPECTS AND IMPACTS AND THEIR MANAGEMENT, MITIGATION & DESIRED OUTCOMES

(d) a description of the impact management objectives, including management statements, identifying the impacts and risks that need to be avoided, managed, and mitigated as identified through the environmental impact assessment process for all phases of the development including-
(i) planning and design;
(ii) pre-construction activities;
(iii) construction activities;
(iv) rehabilitation of the environment after construction and where applicable post closure; and
(v) where relevant, operation activities;

(e) a description and identification of impact management outcomes required for the aspects contemplated in paragraph (d),

(f) a description of proposed impact management actions, identifying the way the impact management objectives and outcomes contemplated in paragraph (d) and (e) will be achieved, and must, where applicable, include actions to -
(i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;
(ii) comply with any prescribed environmental management standards or practices;
(iii) comply with any applicable provisions of the Act regarding closure, where applicable; and
(iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;

(g) the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);
(h) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);
(i) an indication of the persons who will be responsible for the implementation of the impact management actions;
(j) the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;
(k) the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);
(l) a program for reporting on compliance, considering the requirements as prescribed by the Regulations;
(m) an environmental awareness plan describing the manner in which-
(i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and
(ii) risks must be dealt with to avoid pollution or the degradation of the environment; and
(n) any specific information that may be required by the competent authority.

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Reg: 2006/023163/23

The impacts are considered within the scope of the project, including but not limited to the Listed Activities. The relevant impacts resulting from listed activities and associated activities, including environmental, socio-economic and cultural heritage, are informed by a predetermined list of potential environmental impacts (generated by way of a Leipold Matrix), comments received from Interested and Affected Parties and the findings contained in specialist studies that were used to generate the EIR.

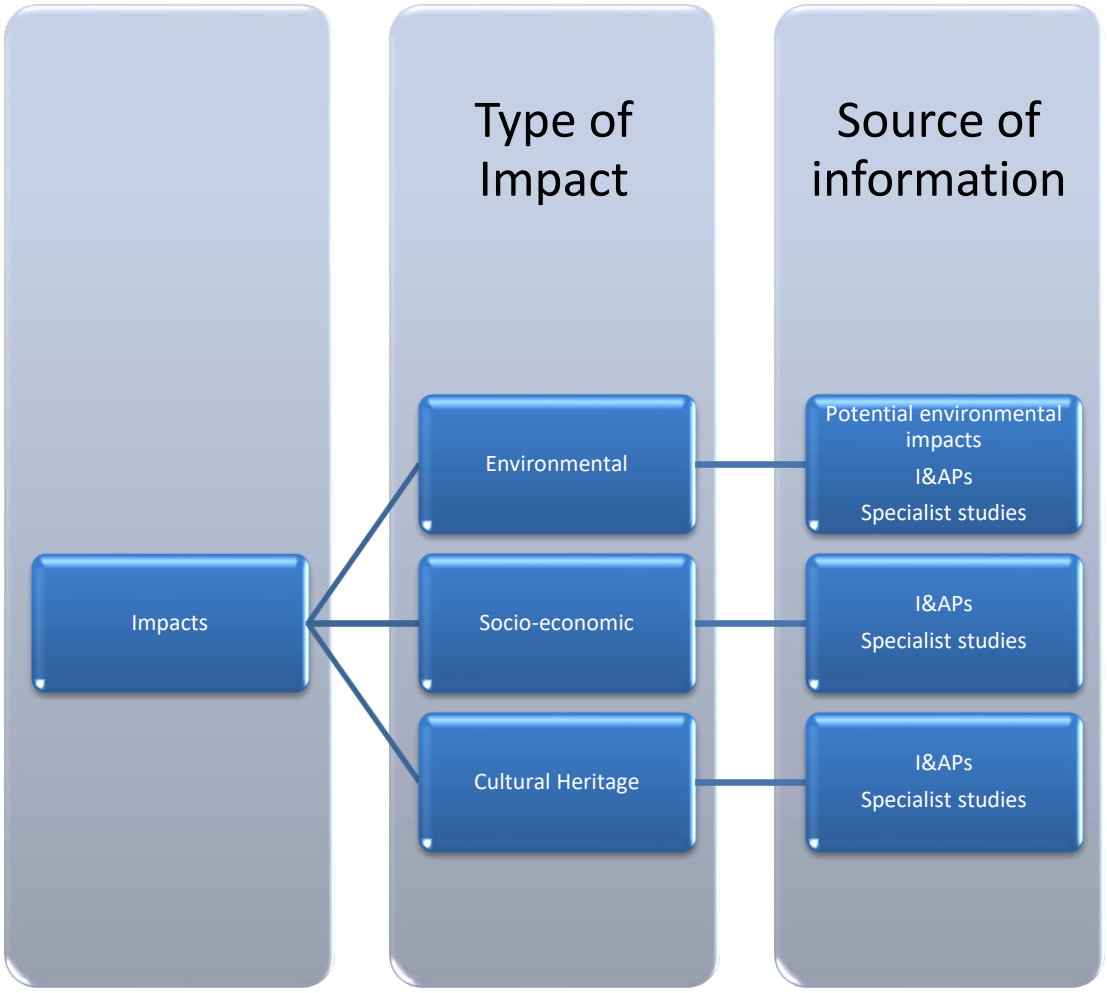

Figure 4. A breakdown of the different types of impacts including the resources used to identify them.

As stipulated in regulation 1(1)(d) of Appendix 4 of the EIA regulation (2014), as amended; the setting of desired impact management outcomes forms the principle objective of an EMPr. Outcomes are driven by impact management actions including measures and mitigations to avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; to comply with any prescribed environmental management standards or practices, including legal requirements and in some cases, “best practices” that the Implementer aspires to fulfil (e.g. Equator Principles). The outcomes are achieved by implementing and achieving measurable Targets (both quantitative and qualitative). Management and mitigation measures are set to afford guidance and parameters to the implementer to achieve the set outcomes. The following section describes management

programmes for the different environmental attributes pertaining to the Project. As part of the Management Programmes, the section describes the potential environmental impacts which may result from the identified aspects / activities, the desired outcomes of mitigating these impacts as well as the targets used to measure the level of environmental compliance and performance.

The following legislation, guidelines, departmental policies, environmental management instruments and / or other decision-making instruments that have been developed or adopted by a competent authority in respect of activities associated with a development of this nature, were identified and considered in the preparation of this EMPr:

1. Amended EIA Regulations, 2014 published in Government Notice No. R. 324, R. 325, R. 327 and R. 328 in Government Gazette No. 40772 dated 07 April 2017.
2. Conservation of Agricultural Resources Act, 1993 (No 43 of 1983) and the regulations dealing with declared weeds and invader plants.
3. Constitution of the Republic of South Africa Act, 1996 (No. 108 of 1996), including section 24.
4. DAFF (1970) Sub-Division of Agricultural Land Act, 1970 (No. 70 of 1970).
5. Dams Safety Act (Act of 2015)
6. DEA (2010), Guideline on Need and Desirability, Integrated Management Guideline Series 9, Department of Environmental Affairs (DEA), Pretoria, South Africa.
7. DEA (2010), Public Participation 2010, Integrated Environmental Management Guideline Series 7, Department of Environmental Affairs, Pretoria, South Africa.
8. DEA (2011), National list of ecosystems that are threatened and in need of protection. GN 1002, GG 34809, 9 December 2011.
9. DEA&DP (2010), Guideline on Alternatives, EIA Guideline and Information Document Series. Western Cape Department of Environmental Affairs & Development Planning (DEA&DP).
10. DEAT (2002), Specialist Studies, Information Series 4, Department of Environmental Affairs and Tourism (DEAT), Pretoria.
11. DWA (2007), Guideline for Developments within a Flood line (Edition 1), Department of Water Affairs and Forestry, Pretoria, South Africa.
12. DWS (2016), General Authorisation in GN No. 509 published in Government Gazette No. 40229 dated 26 August 2016.
13. DWS (2016), General Authorisation in GN No. 538 published in Government Gazette No. 40243 dated 2 September 2016.
14. Ehlanzeni District Municipality IDP (Final) 2020/21.
15. Environment Conservation Act, 1989 (No 73 of 1989), including Schedules 4 and 5 of the National Regulations regarding Noise Control made under Section 25 of the Environment Conservation Act, 1989 (Act 73 of 1989) in GN No. R 154 of Government Gazette No. 13717 dated 10 January 1992. (Note that this particular section of the Environment Conservation Act is not repealed by NEMA (107 of 1998)).
16. Health Act, 2003 (Act No. 61 of 2003).
17. Mbombela Local Municipality IDP (Draft) 2017/22.

18. Minerals and Petroleum Resources Development Act, 2002 (No 28 of 2002).
19. Mpumalanga Biodiversity Conservation Sector Plan (2014).
20. National Environmental Management Act, 1998 (No 107 of 1998) including EIA Regulations, 2014 published in Government Notice No. R. 982, R. 983, R. 984 and R. 985 in Government Gazette No. 38282 dated 04 December 2014.
21. National Environmental Management: Air Quality Act, 2003 (No 57 of 2003) including the list of activities which result in atmospheric emissions published in GN No. 248 of Government Gazette No. 33064 dated 31 March 2010.
22. National Environmental Management: Biodiversity Act, 2004 (No 10 of 2004).
23. National Environmental Management: Waste Act, 2009 (Act No. 59 of 2009) ("NEM: WA").
24. National Forest Act, 1998 (No 84 of 1998).
25. National Heritage Resources Act, 1999 (No 25 of 1999).
26. National Veld and Forest Fire Act, 1998 (No 101 of 1998).
27. National Water Act, 1998 (Act No. 36 of 1998), Sections 27, 28,29,30,31 and 39 (Sections dealing with General Authorisations and Water Use Licenses).

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat., MGSSA) & S.D. MacGregor (MSc., Pr.Sci.Nat.)
Reg: 2006/023163/23

The following management programme aims to set management actions to achieve stated desired outcomes for each environmental aspect, including quantifying the measurable targets. While the impacts and management and mitigations have been addressed under the various project development phases, they are not intended to be mutually exclusive, and impacts from one phase are likely to occur in subsequent phases; but in the interest of reducing redundancy they have not been repeated for each phase. Any appendices to this EMPr form part of the EMPr which must be implemented accordingly.

TABLE 6. COMPLIANCE MANAGEMENT.

No.	Potential Impacts	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
6.1	**All Phases with special emphasis on Planning & Design Phase (including Pre-Construction)**						
6.1.1	**DAM SAFETY REPAIR LICENCE FOR REMEDIATION WORKS**						
6.1.1.1	Contravention of section 23 (3) Regulations Regarding the Safety of Dams in terms of Section 123 (1) of the NWA.	Comply with the relevant sections of section 23 (3) Regulations Regarding the Safety of Dams in terms of Section 123 (1) of the NWA for the proposed remediation and repair of the Ngodwana Dam.	Obtain and provide proof of issuance of necessary Dam Safety Repair Licence for the proposed remediation and repair of the Ngodwana Dam.	The applicant shall apply for and obtain the relevant Dam Repair license from DWS to complete the repair and remediation works on the Ngodwana Dam.	Applicant / Dam Engineer	Prior to commencement of construction.	Compliance to be verified by ECO & IEA.
6.2.1	**PROTECTED SPECIES**						
6.2.1.1	Impacts on protected plants.	Comply with the relevant sections	Obtain and provide proof of	The applicant shall apply for and obtain the relevant	Applicant / Contractor to	Prior to commencement	Compliance to be verified

No.	Potential Impacts	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
		of the National Forest Act (NFA) (Act 84 of 1984), National Environmental Management: Biodiversity Act, 2004 (NEM:BA) (Act No. 10 of 2004), and the Northern Cape Nature Conservation Act (NCNCA) (Act 9 of 2009).	issuance of necessary permits for any listed species under NFA, NEMBA & NCNCA.	licenses / permits from the appropriate authorities (DAFF, DEA, and Provincial Authority) prior to disturbing or destroying any protected species. Removing large trees should be avoided as far as possible and unnecessary clearing of areas should also be avoided. Trees, such as indigenous Paperbark thorn (Vachellia sieberana) and Sweet thorn (Vachellia karroo) that grows vigorously, should be planted during rehabilitation and thus replace trees that have been removed.	appoint botanist.	of construction.	by ECO & IEA.
6.1.2	**WATER USE AUTHORISATION FOR ACTIVITIES WITHIN A WATERCOURSE**						
6.1.2.1	Contravention of section 21 (c) and (i) of the NWA.	The commencement of water uses	Confirmation letter from DWS on relevant	The applicant shall adhere to the GA (Ref WU8518) for section 21(c) and (i) water	Applicant / EAP.	Prior to commencement of construction.	Compliance to be verified by ECO &

No.	Potential Impacts	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
		that are authorised in terms of the NWA, 1998 (Act No. 36 of 1998).	General Authorisation registration (GN. No. 665, GG. No. 36820, 6 September 2013).	uses for diverting, altering, or impacting the beds and banks of a watercourse.			IEA.
6.1.3	**WATER USE AUTHORISATION FOR ABSTRACTION AND STORAGE**						
6.1.3.1	Contravention of section 21 (a) of the NWA.	The commencement of water uses that are authorised in terms of the NWA, 1998 (Act No. 36 of 1998).	SAPPI have an existing WUL No: 24060427 for the Ngodwana Mill and associated activities for the Ngodwana Dam.	Water required during construction and operation for human consumption (drinking, sanitation, and food preparation), building activities (mixing concrete, watering gravel roads), maintenance (cleaning the tools).	Applicant / EAP.	Prior to commencement of construction.	Compliance to be verified by ECO & IEA.
6.1.3.2	Depletion of already constrained groundwater resource	Utilisation of borehole water within the WUL Authorisation limit.	Records demonstrating abstraction volumes in compliance with GA.	Abstraction must not exceed the limits prescribed in the WUL for this area, and Abstraction volumes must be measured and recorded against the	Applicant / Contractor.	Applicant.	Compliance to be verified by ECO & IEA.

No.	Potential Impacts	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				limit prescribed in the GA.			
6.1.5	**Compliance Monitoring**						
6.1.5.1	Commencement of construction prior to the appointment of an ECO.	Ensure compliance with the EA and EMPr from the onset of construction and until the rehabilitated development is handed over to the Applicant for operation.	Proof of ECO appointment prior to commencement of construction.	A qualified, suitably experienced and independent ECO must be appointed to monitor and report to the competent authority on compliance with the EA and EMPr, and where necessary oversee or facilitate the identification and permitting / licensing of protected species prior to clearing of any vegetation.	Applicant.	Prior to commencement of construction and until the rehabilitated development is handed over to the applicant for operation. The minimum frequency for ECO inspections is monthly.	To be verified by IEA.
6.1.7	**DECOMMISIONING OF A DAM WITH SAFETY RISK**						
6.1.7.1	Commencement of decommissioning prior to submission and approval of a decommissioning licence application for a dam with safety risk to DWS.	DWS approval or rejection of licence application for a dam with safety risk	Obtain and provide proof of issuance of the necessary Dam with safety risk decommissioning Licence for the Ngodwana Dam	The applicant shall apply for and obtain the relevant decommissioning license from DWS for the closure of the Ngodwana Dam.	Applicant / Dam Engineer	Prior to commencement of decommissioning.	Compliance to be verified by ECO & IEA.

No.	Potential Impacts	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
			closure.				

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Reg: 2006/023163/23

TABLE 7. CONSTRUCTION CAMP, LAYDOWN AREAS, STOCKPILES, STORES & EQUIPMENT.

No.	Potential Impacts	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
7.1	**Planning and Design Phase (including Pre-Construction)**						
7.1.1	Land surface pollution.	Low risk of pollution or harm to sensitive environments from the inappropriate location of construction related sites within or within proximity to those sensitive environments.	Approved and effectively implemented layout plan indicating designated construction-related sites.	A construction site layout plan must be developed by the contractor and approved by the SEO to ensure that all construction related sites are located outside sensitive environments, including no-go areas and buffer zones. Furthermore, those construction related sites or activities with the greater risk or potential for causing pollution or harm to the receiving environment, including but not necessarily limited to laydown areas, material stockpiles, toilets, waste skips and stores, must not be within close proximity to the aforesaid sensitive environments, i.e. these construction related sites or activities	Applicant / Contractor	Prior to commencement of construction.	SEO, ECO & IEA.

No.	Potential Impacts	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				must not, as far as is practical, be located on the watercourse-side of any construction camp or area demarcated for construction activities.			
7.1.2	Degradation of the environment outside of the development footprint.	Zero construction creep into and subsequent degradation of areas outside the preferred or approved development footprint.	Approved and effectively implemented (demarcated on site) layout plan indicating all environmental sensitivities, especially no-go areas,	Permanent and temporary construction footprints must be designated, and sensitive terrestrial and aquatic habitats demarcated as no-go areas during construction, including required buffer zones. The Contractor shall locate the construction camp on existing disturbed or the least sensitive sites above the 1:100-year flood line or further than 100m from the edge of a watercourse, whichever is greatest. The project footprint must be clearly demarcated on the ground to ensure that no construction creep results toward any watercourses or defined	Applicant / Contractor	Prior to and ongoing enforcement during construction.	SEO, ECO & IEA.

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Reg: 2006/023163/23

No.	Potential Impacts	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				sensitive areas. Placement of infrastructure and laydown and stockpile areas must be done so as not to negatively affect surface water runoff in a way that leads to erosion and export of material to be deposited in any watercourses.			
7.2	**Construction Phase**						
7.2.1	Land surface pollution.	To avoid and reduce human induced environmental pollution.	Incident registers that indicate incidence and reduction in pollution events, from the operation of construction plant, equipment or other vehicles, over time.	Emergency breakdowns in the parking areas or along roads, must be addressed with immediate and adequate pollution containment measures have been implemented including but not limited to drip trays and spill kits. No washing of plant and equipment within the construction camp, and no repairs or servicing of construction plant, equipment or other vehicles, except for emergency breakdowns, are permitted within the preferred or	Applicant / Contractor	Throughout construction.	SEO, ECO & IEA.

No.	Potential Impacts	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				approved development footprint, construction-related areas, no-go areas and on neighbouring properties. The contractor(s) and any sub-contractors, including their employees, are prohibited from entering the designated no-go areas for whatever reason and without the prior written consent of the SEO. Refuelling of vehicles and plant may only take place at a designated and permitted (from local Fire Chief) fuel storage tank or mobile fuel bowser, under the guidance of a Specific Operating Procedure (SOP) that limits spillage and addresses remedial actions in the event of a spillage.			

No.	Potential Impacts	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				The contractor shall restrict the following activities to the construction camp: - Sanitation, - Waste storage, - Parking, - Storing hazardous materials, - Emergency vehicle or plant repair and maintenance as far as practicable, - Designated concrete mixing area - Material stockpiles, and - Lay down areas. Use chemical toilets that contain the sewerage in a closed and removable 'tank', i.e. do not use open drums. Environmentally friendly toilets should also be considered e.g. E-loos. In the event that alternative ablution facilities are easily accessible, mobile ablutions will not			

No.	Potential Impacts	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				be required. Use drip trays for refuelling, emergency repair / maintenance work and all stationary construction plant and equipment that can leak, such as TLBs, compressors and generators. Washing of equipment including brushes shall not occur on site or in a watercourse but shall be restricted to the main construction camp where adequate containment measures are in place.			
7.2.2	Noise pollution.	To avoid nuisance noise to affected landowners and occupiers and reduce noise impacts to the environment.	Noise must fall within the parameters set by: **1.**(SANS) Standard 10103:2008: The	Noise generation must be managed, including the use of radios and other music playing appliances. Vehicles and plant must be in a good state of repair to limit noisy operations.	Applicant / Contractor.	Frequency of monitoring as stipulated in relevant regulation and standard, as amended from time to time.	SEO or appointed specialist service provider. Verification to be done by ECO & IEA.

No.	Potential Impacts	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
			measurement and rating of environmental noise with respect to annoyance and speech communication. **2.** DEA Regulations No. R.154. Noise Control Regulations promulgated in terms of Section 25 of the Environment Conservation Act, 1989 (Act No. 73 of 1989). GG No. 13717, 10				

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Reg: 2006/023163/23

No.	Potential Impacts	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
			January 1992.				
7.2.3	Degradation of the environment outside of the development footprint.	To avoid impacts to the biodiversity integrity and ecological function of areas outside the development footprint.	No impacts outside the development footprint. All contraventions to be recorded in incident register.	No residues of stockpiled material must be left on site, that can impede restoration of ecological function and remain a visual intrusion on the landscape. Disturbed habitats resulting from construction-related activities must be rehabilitated immediately after the cessation of those activities on or near the disturbed habitats. The alignment of fences or roads and the placement of potential impediments, such as walls, laydown and material stockpile areas must not alter surface water runoff patterns (i.e. impede or increase surface water runoff) in a way that will cause ponding or erosion and sedimentation of a watercourse.	Applicant / Contractor.	Update to incident register following each contravention.	ECO & IEA.
No significant operational or decommissioning impacts expected.							

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat., MGSSA) & S.D. MacGregor (MSc., Pr.Sci.Nat.)
Reg: 2006/023163/23

TABLE 8. WASTE MANAGEMENT (generation, handling, storage, and disposal, including hazardous waste).

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
8.1	**Planning & Design Phase (including Pre-Construction)**						
8.1.1	Shortening the lifespan of the local waste disposal sites.	To minimise the generation of project-specific waste by implementing an effective waste management strategy based on the waste hierarchy.	Keep accurate records of waste volumes (litres, kg and / or m^3) generated by type.	Establish and implement an Integrated Waste Management Strategy including avoidance, reduction, re-using, recycling and disposal, i.e. the production of hazardous waste can be **avoided** by providing drip trays, **reduce** waste by using the correct quantities, **re-use** concrete rubble as back fill or **recycle** steel off-cuts and **dispose** of non-hazardous solid waste at a registered municipal dump site. Induct all labourers on the waste management strategy and enforce it through regular (at least	Applicant / Contractor (SEO).	Prior to commencement of construction with ongoing maintenance and updates to Strategy.	ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				weekly) toolbox talks. Keep accurate records of waste generated by type.			
8.2	**Construction Phase**						
8.2.1	Removal of inert Waste and rubble. Loss of ecological function and agricultural potential.	Maintain ecological function and agricultural potential'	Zero concrete hard pan layers observed on the ground.	In the event of concrete hard pan layers, break up all concrete hard pan layers and dispose of appropriately (at a legitimate dump site) or re-use the concrete (following permission from Competent Authority for reuse).	Applicant / Contractor (SEO).	For each disposal event.	ECO & IEA.
8.2.2	The high economic cost of disposing hazardous waste at authorised landfills, and potential contamination of land by illegal dumping.	The reduced generation of hazardous waste and the avoidance of environmental (land and water) contamination.	Indicators and trends in hazardous waste generation and management over time while considering amount of active construction to	The contractor shall contain contaminated water from washing brushes and other tools as well as the dirty water (possibly hazardous) in a conservancy tank until sufficient volume warrants disposal by a registered	Applicant / Contractor (SEO).	Throughout construction.	ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
			contextualise efforts. All waste waybills and landfill licenses in register and on file.	hazardous waste management company. The contractor shall return used oil to the supplier or an oil recycling company.			
8.2.3	Solid and liquid waste can be harmful to fauna if swallowed / ingested or if the creature becomes entangled or impaled.	Healthy animals (wild and domesticated).	Zero incidence (in the incident register) of waste induced harm to wildlife or livestock. No litter observed in the development footprint and no-go areas.	Designate a temporary waste storage area, enclose it in a fence that cannot be breached by fauna, and provide sufficient scavenger proof dust bins with black bags inside the construction camp. Do not litter and ensure sound housekeeping.	Applicant / Contractor (SEO).	Throughout construction.	ECO & IEA.
8.2.4	Improper handling, storage or disposal of waste can cause toxicity – the introduction of toxic	To ensure sound waste management practices that do not affect any	Zero incidence (in the incidence register) of waste induced impacts on aquatic	Hard-surfaces and parking areas with storm water outlets should not channel litter, oil, and fuel spills into a watercourse, causing	Applicant / Contractor (SEO).	Throughout construction.	ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
	or hazardous substances into a watercourse - spills can be washed into the watercourse by storm water run-off.	aquatic environments.	environments.	water pollution. The contractor is prohibited from discharging wastewater, including domestic water from sanitation facilities, into a watercourse. The contractor shall store and contain hazardous chemicals within a secure, safe and bunded facility at the construction camp, to ensure spillages do not enter any aquatic environments.			
8.2.5	Construction activities will produce solid and liquid waste, which can contaminate the ground (litter, spillage) if	To reduce contamination of the soil through improper management of waste.	Low incidence of waste induced ground contamination, with a trend indicating constant improvement over	Do not mix concrete on open ground. Mix in a wheel barrow, a mixing tray, on a level plastic sheet or similar containment measure.	Applicant / Contractor (SEO).	Throughout construction.	ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
	improperly handled, stored, or disposed of.		time (not just quantities but procedural. improvements too). Suitable close-out documentation and reviews of SOPs & MS following significant contamination events.	In the event of a leak or spill onto the ground, immediately remove contaminated soil to the depth of penetration and temporarily store in a designated solid hazardous waste container until sufficient volume warrants disposal at a registered hazardous waste dump site. Alternatively, onsite treatment of contaminated soil should be considered with a registered hazardous waste management company. The burning, burying or illegal dumping of waste is prohibited. When handling hazardous			

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat., MGSSA) & S.D. MacGregor (MSc., Pr.Sci.Nat.)
Reg: 2006/023163/23

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				materials, such as when refuelling vehicles or generators, the contractor shall implement appropriate precautionary measures, such as a ground cover or drip trays, to prevent spills from contaminating the ground. The contractor shall prevent the run-off of slurry or cement contaminated water from concrete / plaster mixing sites. Adequate waste receptacles must be available, including those that track with the active work fronts, to ensure effective waste			

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				management. Remove ineffective danger tape / netting that has begun to litter the site or surrounding areas. Follow housekeeping rules to avoid littering (littering is likely to be more prevalent at designated eating / rest areas).			
8.2.6	The contamination of soil.	To reduce the amount of hazardous waste, specifically contaminated soil, that is generated during construction.	Sound management and disposal of contents of drip trays and / or utilisation of alternative hydrocarbon absorbents in drip trays.	Use drip trays for refuelling, emergency repair work and all stationary construction plant and equipment that can leak, such as TLBs, compressors and generators. Drip trays must be regularly emptied, or they	Applicant / Contractor (SEO & Plant Operators).	Throughout construction.	ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
			Zero sand observed in drip trays and bunds. Zero spills or leaks observed under or near stationary construction plant and equipment.	can be filled with hydrophobic hydrocarbon absorbent material to avoid the content from overflowing during rainfall events.			
8.2.7	The contamination of soil (and generation of waste) by undesirable practices.	To reduce the amount of hazardous waste, specifically contaminated soil, that is generated during construction.	Zero observations of spills covered with soil.	Do not cover spills with virgin soil. It merely increases the disposal cost for a greater volume of hazardous waste. Utilise as an alternative, hydrocarbon absorbents, for spillages.	Applicant / Contractor.	Throughout construction.	ECO & IEA.
8.2.8	Illegal dumping will result in the loss of certain land uses like agriculture and conservation and	Continued self-sustainability of the site's ecological and agricultural	Waybills or receipts of safe disposal from the service provider.	The contractor shall dispose of general waste, that cannot be recycled, at a registered municipal dump site.	Applicant / Contractor.	Construction.	SEO, ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
	remove natural habitat.	integrity.	No evidence of illegal dumping of project-specific waste within the development footprint, no-go areas, or neighbouring properties.	All waste to be removed to a suitable waste disposal facility by a registered service provider.			
8.3	**Operational Phase**						
8.3.1	Solid waste can be blown away and into the landscape.	A pristine environment, devoid of wind-blown litter.	No litter or other open sources of waste observed within the fenced premises.	The site will be kept tidy always. All waste shall be picked up daily. Maintain good housekeeping tendencies.	Applicant / Operator.	Throughout operation.	IEA.
8.4	**Decommissioning Phase**						
8.4.1	The generation of potentially harmful waste that has the potential of contaminating the	To minimize waste and ensure suitable disposal at the end of project life.	No evidence of residual structures relating to the project.	Properly dispose of all waste and residual structures.	Applicant.	At decommissioning phase.	IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
	environment if not disposed at a licensed landfill or, if disposed at an appropriate landfill, reduces the capacity and lifespan of that site.						
8.4.2	Illegal dumping sites cannot retain the ecological functions and land use required to generate ecosystem goods and services and tangible economic benefits including income from conservation or farming.	To ensure that no illegal waste dumps are left *in situ* following decommissioning.	Restoration of the footprint to a functional ecological and agricultural state.	The illegal dumping or disposal of waste generated from the decommissioning of the Ngodwana Dam within the development footprint, no-go areas or on adjacent properties is strictly prohibited.	Applicant.	At decommissioning phase.	IEA.

TABLE 9. FAUNA AND FLORA MANAGEMENT.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
9.1	**Planning & Design Phase (including Pre-Construction)**						
9.1.1	The establishment of laydown areas, stockpiles and construction of new service roads can destroy plants of conservation concern.	To reduce the impacts of construction activities including laydown areas, stockpiles and roads on fauna and flora.	The successful relocation of plants of conservation concern into suitable habitats.	Prior to the construction of any new roads, a search and rescue must be conducted by a suitably qualified specialist for protected fauna and flora and those of conservation concern; which must then be transplanted outside the works area in a comparative habitat type. Ascertaining similar habitat types may require soil sampling and analysis over and above above-ground similarities.	Applicant / Contractor.	Prior to & during construction.	SEO, ECO & IEA.
9.2	**Construction Phase**						
9.2.1	Increased risk of alien plant invasion to the detriment of the local ecology and	To effectively control the invasion of any alien plants.	No new alien plant recruitment (directly or indirectly resulting from construction	All aggressive alien species should be removed. In terms of the Conservation of Agricultural Resources	Applicant / Contractor.	Throughout construction.	SEO, ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
	agricultural potential.		activities) within the development footprint and neighbouring no-go areas or immediate surroundings.	Act (CARA, Act No. 43 of 1984), alien species need to be managed and controlled in terms of their respective categories, where category 1 must be removed. Species specific and area specific eradication recommendations: Footprint areas should be kept as small as possible when removing alien plant species. 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. Monitor all sites disturbed			

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				by construction activities for colonisation by exotics or invasive plants and control these as they emerge.			
9.2.2	Construction activities (i.e. clearing and grading) have the potential to directly impact, that is damage / injure and destroy / kill, local fauna, and flora. (The impacts are exacerbated when the species affected are classified as protected, sensitive, rare, or threatened and endangered).	To reduce *in situ* losses of protected and conservation important flora & fauna.	Spatially explicit "Search and Rescue" register indicating the nature & position of all translocated flora & fauna.	A search and rescue must be undertaken of all footprints that will be temporarily or permanently affected during construction of the development footprint. Removing large trees should be avoided as far as possible and unnecessary clearing of areas should also be avoided. All fauna and flora that are protected or of conservation importance must either be cordoned off and protected or translocated outside of the site establishment and	Applicant / Contractor. All search & rescue & translocation activities must be carried out by suitably qualified specialists.	Pre-Construction.	ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				dam remediation footprint, into habitats of a similar nature. Avoid direct contact with fauna, through clearing and grading as it can cause injury or death.			
9.2.3	Harvesting of: - indigenous plants for muthi - firewood; and - poaching of animals.	To ensure no harvesting of natural resources within and adjacent to the development footprint.	Zero incidence of harvesting/poaching. All incidences recorded in the incident register including close-out actions.	The harvesting or collection of any natural product(s) from the environment is strictly forbidden. Do not poach or hunt animals within the development footprint, no-go areas and property. "Problem" animals must be handled with assistance from the provincial conservation authority. Except for search and	Applicant / Contractor.	Throughout construction and operation.	ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				rescue operations, no mammal, bird, reptile, invertebrate or fish shall be intentionally caught, hunted or poached, within the development footprint and no-go areas.			
9.2.4	Fragmenting the riparian corridor by removing riparian bushes or riverbank vegetation and thus compromise the function of riparian connectivity.	Prevent the clearing of vegetation or covering of indigenous riverine habitat in the project footprint area for construction purposes.	Many different areas will be cleared and covered during the proposed project construction period. By adhering to the main mitigation aspects, a "Medium" significance can be mitigated to a "Low" significance:	•Care must be taken not to impact on areas outside the demarcated route and unnecessary clearing of areas should also be avoided. •Removing large trees should be avoided as far as possible. •Whenever tall trees are removed on haul roads, these trees must be replaced to mimic the natural habitat impacted on. •During site clearing, large trees should be left intact as they can become	Applicant / Contractor.	Throughout construction and operation.	ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				incorporated as shade and garden features in the site establishment areas. •Refrain from fragmenting the riparian corridor by respecting the buffer zones. •No indigenous plants of Special Concern must be impacted on. •Indigenous vegetation should be planted during rehabilitation. •Corridors and buffers must be respected, and the riparian zone must not be disturbed at all.			
9.2.5	Vehicle and human movement and sounds will disturb riparian fauna in the vicinity of the construction activities.	Prevent the disturbance of local fauna from audio-visual disturbance during the construction activities.	Restrict construction activities within approved footprints and the movement of construction staff. By adhering to the main mitigation	The disturbance will be for a relative short period and the activities will be contained to the dam wall and roads leading to the construction site. Workers should be forbidden to move around off the	Applicant / Contractor.	Throughout construction and operation.	ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
			aspects, a "Medium" significance can be mitigated to a "Low" significance:	construction site.			
9.3	**Operational Phase**						
9.3.1	Disturbance to or destruction of roosting & nesting sites.	An uninterrupted breeding season for the avifauna.	The effective control of incidental bird breeding sites with the least impact to the affected birds during the breeding season, and then the prevention of future disturbances.	Birds should not be shot, poisoned, or harmed as this is not an effective control method and has negative ecological consequences. Birds already with eggs and chicks should be allowed to fledge their chicks before nests are removed. If there are any persistent problems with avifauna, then an avifaunal specialist should be consulted for advice on further mitigation.	Applicant / Operator through appointed avifauna specialist.	Throughout construction and operation.	IEA & Avifauna Specialist.
9.3.2	Increased risk of	To effectively	No new alien plant	Invasive alien plant	Applicant /	Throughout	IEA &

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
	alien plant invasion to the detriment of the local ecology and agricultural potential.	control the invasion of any alien plants.	recruitment (directly or indirectly resulting from construction activities) within the development footprint and neighbouring no-go areas or immediate surroundings.	management plan. Ensure alien plants do not become dominant in parts of the site, or the whole site, through the control and management of alien and invasive species presence, dispersal, and encroachment. • Develop and implement a monitoring and eradication programme for alien and invasive plant species. • Promote the natural re-establishment and planting of indigenous species to retard erosion and alien plant invasion. This plan should be updated throughout the life-cycle of the operation, as required in order to ensure	Operator through appointed ecologist specialist	construction and operation.	Ecologist Specialist.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				that appropriate measures are in place to manage and control the establishment of alien and invasive plant species and to ensure compliance with relevant legislation.			
9.4	**Decommissioning Phase**						
9.4.1	Impacts on biological functioning and productivity of vegetation.	To ensure restoration of ecological function following decommissioning.	No degraded areas within the decommissioned footprint.	Reinstate ecological function by recreating an open system by removing all project related fencing. The Applicant is to rehabilitate the site after decommissioning in accordance with conditions of this EMPr.	Applicant / Landowner.	At completion of decommissioning activities	IEA.
9.4.2	Alien Plant Invasion Risk.	To ensure no residual alien plants at cessation of	Zero incidence of alien plants within the decommissioned footprint.	The rehabilitated servitudes shall be monitored following the completion of decommissioning of the	Applicant / Landowner.	At completion of decommissioning activities, within the growth	IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
		operations.		Ngodwana Dam for the recruitment and subsequent control of weed, invader, and alien plant species, in accordance with this EMPr.		season, as well as the following growth season following decommissioning.	

TABLE 10. WATER USE & MANAGEMENT (INCLUDING WATERCOURSES).

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
10.1	**Planning & Design Phase (including Pre-Construction)**						
10.1.1	Decrease in water quality of watercourses.	To minimise the risk of impacts to water resources in and around the project footprint.	No high-risk activities located within proximity to water resources.	Avoid placing high risk (pollution generating) activities within proximity to a watercourse as they can cause water pollution.	Applicant / Contractor.	During site establishment and throughout construction.	SECO, ECO & IEA.
10.1.2	Uncontrolled and unsustainable abstraction from a watercourse or aquifer (borehole) and depletion of already constrained groundwater resource.	Utilisation of borehole water within the sustainable yield of the groundwater resource.	Implementation of a register recording static head of borehole against "control" boreholes elsewhere on the property. Provision of adequate storage of water allowing for abstraction rates within sustainable yield of borehole/s.	The static head of the borehole must be measured to ensure the resource is not being depleted (taking cognisance of seasonal variability and comparative "control" borehole levels – will also require ongoing monitoring). Adequate storage of water must be provided, to allow for suitable abstraction rates that	Applicant / Contractor / Landowner	Prior to and monthly throughout construction.	SECO, ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				will not exceed the borehole recharge rate throughout the construction process. Adequate storage will allow a slower abstraction rate, equal to or less than the recharge rate. Water meters must be installed on all boreholes to ensure that utilisation rates are measured and monitored and do not exceed the permissible limits.			
10.2	**Construction Phase**						
10.2.1	Altering bed, banks, or course of a watercourse.	Prevent impacting the flow and water	No physical and structural damage to the seep zone,	Flow down the Ngodwana catchment seep must be allowed to	Applicant / Contractor.	Throughout construction.	SECO, ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
	Impediments to surface water runoff impacting stream flow of the Ngodwana catchment seep on the western slope and other surrounding network of riverine wetland areas which could be impacted adversely by the proposed project activities.	quality of this near-pristine mountain stream due to construction activities.	watercourses, and riverine wetlands.	flow unhindered to its confluence with the Ngodwana River. All riverine wetlands should be treated with care throughout the construction phase. Respect buffer zones. No covering of material or dumping of any rubble will be allowed into the wetland system. Water flow in drainage lines and wetland systems must not be obstructed. Construction activities inside the riparian buffer zone must proceed with special care.			

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
10.2.2	Soil erosion and siltation of watercourses from disturbing the soil during the construction of roads, clearing areas, and creating bare patches, channelling stormwater and road run-off.	To retain as far as possible surface water hydrology.	Limited signs of erosion along haulage roads or resulting from the construction activities. Due to the proximity of the Ngodwana River and associated network of riverine wetland areas, erosion and siltation originating from construction activities could be impacted adversely by the proposed project activities. By adhering to the main mitigation aspects, a "Medium" significance can be mitigated to a "Low" significance:	Best Practice measures should be implemented during construction and rehabilitation. Mitigation and management measures are to be specified to ensure that areas susceptible to potential erosion are protected both during the construction and operational phase of the development. Stringent mitigation measures must be imposed during construction to minimize runoff and stop possible silt run-off.	Applicant / Contractor.	Throughout construction.	SECO, ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				The contamination of water leaving the site could be controlled by the use of silt-fencing, rows of hessian bags, mulch, brushwood and deflection berms. All areas susceptible to erosion must be identified and protection measures be implemented. In any areas where the risk of erosion is evident, appropriate temporary or permanent works and water energy dispersion structures must be installed.			

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				Cleared or bare areas prone to erosion should be monitored and rehabilitation should be implemented wherever indications of potential erosion become evident.			
10.2.3	Excessive abstraction from a watercourse or aquifer.	To reduce water usage for construction activities.	Evidence of dust control additives used to minimise water usage for dust suppression activities, including completed logbooks and no evidence of over wetting, i.e. erosion or pools of water (puddles).	An environmentally friendly water-soluble dust control additive / binder must be added as an additive to the water used for dust suppression. The additives generally assist with surface stabilization thereby significantly reducing water usage. All water bowsers must maintain logbooks in	Applicant / Contractor.	Throughout construction.	SECO, ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				which quantities used for construction and dust suppression are recorded. Water bowsers implementing dust suppression, must determine optimal rates of application to ensure over-wetting does not occur.			
10.3	**Operational Phase**						
10.3.1	The excessive and/or wasteful use of water has the potential to reduce the ecological reserve required for sustaining the local ecosystem.'	To use water in a manner that is ecologically sustainable and not wasteful.	No drips, leaks, or other evidence of wasteful water use.	Water leaks shall be repaired immediately upon being found. Educate employees on the importance and practices of water efficiency.	Applicant / Operator.	Throughout operation.	IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
10.3.2	Poor water quality can be a health risk or harmful to humans and animals.	To ensure safe potable water for employees and livestock.	Compliance of potable water to SANS 241 standard.	Water used for potable (drinking) purposes must be tested to ensure compliance with the minimum standards. Should elements of the water not comply, the water must be treated to ensure no acute or chronic health risks.	Applicant / Operator.	Quarterly.	IEA.
10.4	**Decommissioning Phase**						
10.4.1	Impact on upstream and downstream aquatic/terrestrial flora and fauna from change in hydrology of catchment and possible flooding.	The safe and compliant decommissioning of the Ngodwana Dam.	Compliance with section 38 of the Regulations Regarding the Safety of Dams in terms of Section 123 (1) of the NWA for the decommission of a Dam with safety risk.	Conditions under section 38 of the Regulations Regarding the Safety of Dams in terms of Section 123 (1) of the NWA for the decommission of a Dam with safety risk.	Applicant / Operator.	Throughout operation.	IEA.
10.4.2	Impact on water users due to change in hydrology of the	The safe and compliant decommissioning of the Ngodwana	Compliance with section 38 of the Regulations Regarding the Safety of Dams in terms of	Conditions under section 38 of the Regulations Regarding the Safety of Dams in	Applicant / Operator.	Throughout operation.	IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
	catchment following decommissioning.	Dam.	Section 123 (1) of the NWA for the decommission of a Dam with safety risk.	terms of Section 123 (1) of the NWA for the decommission of a Dam with safety risk.			

TABLE 11. AIR QUALITY MANAGEMENT.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
11.1	**Planning & Design Phase (including Pre-Construction)**						
No pre-construction impacts associated with this phase.							
11.2	**Construction Phase**						
11.2.1	Old and poorly maintained vehicles cause the most air pollution from cars, specifically GHG emissions that are released to the atmosphere, contributing to global warming and acid rain.	To reduce the level of car or other combustion-related pollutants entering the atmosphere (by keeping well-maintained plant and equipment).	Evidence of servicing at required intervals. No visible evidence of excessive emissions.	Construction plant and equipment shall be kept in a good state of repair to reduce combustion-related emissions.	Applicant / Contractor.	During construction.	Plant Manager, SEO, ECO & IEA.
11.2.2	Negative effects on	To manage dust	Full	Effective implementation of the	Applicant /	During	Monitoring of

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
	floral photosynthetic functioning and potential increase in breathing ailments of site staff, surrounding landowners, communities, and fauna.	entrainment on access roads which may not exceed the thresholds stipulated in the National Dust Control Regulations.	compliance with National Dust Regulations. Acceptable Dust fallout rate ($mg/m^2/day$): Residential area < 600 Non-residential area < 1200 Exceedance not more than twice in a year, not sequential months.	National Dust Control Regulations. Excessive vehicle movement, and the transport and off-loading of dispersive materials shall be avoided during windy conditions, unless additional dust suppression methods will ensure that the dust fallout does not exceed the acceptable limits. We suggest that the contractor take into consideration predicted wind speeds from the local weather station when planning construction-related activities with a high risk of generating dust. Dust suppressant must be prioritised for any drilling activities.	Contractor.	construction, monthly.	dust fallout to be undertaken by a professional service provider if excessive emissions evident and compliance to be verified by ECO & IEA.
11.2.3	Safety risks and road accidents due to reduced visibility.	To reduce vehicular accidents due to	Full compliance with National	Dust suppression must be carried out on access roads where high dust entrainment is evident.	Applicant / Contractor.	During construction. Dust fallout	Monitoring of dust fallout to be undertaken

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
		poor dust-induced visibility.	Dust Regulations.			evaluation monthly and dust suppression as conditions dictate.	by a professional service provider if excessive emissions evident and compliance to be verified by ECO & IEA.
11.2.4	Unpleasant odours.	To reduce unpleasant odours often associated with ablution facilities.	Records of regular servicing, and daily cleaning log.	Chemical toilets shall be kept hygienic and cleaned daily to avoid unpleasant odours.	Applicant / Contractor.	During construction.	SEO, HSO, ECO & IEA.
11.3	**Operational Phase**						
11.3.1	Decrease in air quality.	To manage dust entrainment on access roads which may not exceed the thresholds stipulated in the National Dust	Full compliance with National Dust Regulations.	Effective implementation of Dust Control Regulations. Dust suppression must be carried out on access roads to minimise operational dust emissions.	Applicant / Operator.	As required to minimise dust emissions.	WMCO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
		Control Regulations.					
There are no significant impacts anticipated during the decommissioning phase.							

TABLE 12. SOIL MANAGEMENT.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
12.1	**Planning & Design Phase**						
12.1.1	Loss of valuable topsoil.	To minimise disturbance and contamination of topsoil.	Compliance with site layout plans.	Clearing, and the location of topsoil stockpiles and / or windrows, shall take place in pre-authorised and clearly defined areas only.	Applicant / Contractor.	Prior to and during construction.	SEO, ECO & IEA.
12.2	**Construction Phase**						
12.2.1	Disturbing the soil during the construction of roads, clearing areas and creation of bare patches, channelling storm water and road run-off, will cause soil erosion.	To reduce erosion induced soil losses and consequential ecosystem degradation.	To record all areas prone and affected by erosion and implement suitable pre-emptive and remedial measures.	Areas disturbed and rehabilitated during construction shall be monitored for signs of erosion and if found to occur, immediately corrected ('source') and repaired ('symptom'). Bulk shape the areas where material is introduced to mimic or blend in with the surrounding, natural topography. Do not fine shape or rake because an uneven surface will impede surface water run-off and facilitate infiltration.	Applicant / Contractor (SEO).	During construction.	ECO & IEA.

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Reg: 2006/023163/23

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				Correct any cause of erosion at the onset thereof by controlling / diverting storm water run-off, immediately repairing and stabilizing / rehabilitating impacted areas in the most appropriate manner. Ensure a quick and adequate cover with indigenous and local grass species on all servitudes. Ensure storm water run-off is adequately controlled on disturbed sites before rehabilitating them (ripping, replacing the topsoil and mulching/brush packing), i.e. cut-off berms. Grading of access roads must not be promoted, but farm tracks must be utilised as far as possible.			

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Reg: 2006/023163/23

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				Sediment traps may be necessary to prevent erosion and soil movement if there are topsoil or other waste heaps present during the wet season.			
12.2.2	Decline in soil organisms.	To maintain the biological integrity of disturbed soil.	The list of plant species, and their relative abundancies, chosen for rehabilitation reflects the natural plant communities that need to be rehabilitated.'	Seeding of disturbed areas after construction with grass seeds of the naturally occurring plant species.	Applicant / Contractor (SEO).	Following construction or construction induced disturbance.	ECO & IEA.
12.2.3	Loss of valuable topsoil.	To retain all disturbed and cleared topsoil.	Comparative quantification of cleared and reinstated topsoil volumes.	Any topsoil removed during the establishment of parking areas, temporary roads, or any other cleared areas, must be protected from vehicular and construction impacts.	Applicant / Contractor (SEO).	During initial clearing and prior to reinstatement of topsoil.	ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				Do not mix topsoil with cement and / or subsoil or let it be pulverised by trucks.			
12.2.4	Potential sterilisation of the soil.	To maintain soil viability.	Use of only selective, environmentally friendly herbicides.	Where possible, refrain from using non-selective herbicides to control vegetation, depending on the active ingredient, it can sterilise the soil. Application of herbicides may only be applied by or under the supervision of a Certified Pest Control Officer.	Applicant / Contractor (SEO).	Every treatment episode.	ECO & IEA.
12.2.5	Soil contamination.	To reduce and avoid soil contamination.	No evidence of contaminating activities on unprotected ground, or in the case of accidental spills, documented evidence of	Construction plant and equipment shall be kept in a good state of repair to reduce hydrocarbon leakages. Immediately remove contaminated soil to the depth of penetration and temporarily store in a designated solid hazardous waste container until sufficient	Applicant / Contractor (SEO).	During construction.	ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
			rapid remediation.	volume warrants disposal at a registered hazardous waste dump site. Alternatively, onsite treatment of contaminated soil should be considered with and / or in consultation with a registered hazardous waste management company. Soil horizons must be stockpiled or windrowed separately during excavation to ensure they can be reinstated in reverse order and ensure restored soil structure.			
12.3	**Operational Phase**						
12.3.1	Decline in soil organisms.	To maintain the biological integrity of disturbed soil.	The list of plant species, and their relative abundancies, chosen for rehabilitation reflects the natural plant	Apply disturbed areas after construction, with grass seeds of the naturally occurring plant species.	Applicant / Contractor (SEO).	Following construction or construction induced disturbance.	ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
			communities that need to be rehabilitated.'				

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Reg: 2006/023163/23

TABLE 13. SOCIAL-ECONOMIC MANAGEMENT (HEALTH, SAFETY & SECURITY & COMMUNICATION).

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
13.1	**Planning & Design Phase (including Pre-Construction)**						
13.1.1	Community confusion, frustration, and lack of information.	To avoid creating false hope where job creation opportunities are concerned.	Development of an effective job seeker database.	Implementation of a community relations strategy until all activities on site cease and rehabilitation is completed. Develop a job seeker database or integrate with an existing service provider in the adjacent towns, to ensure job seekers' details are captured. As positions become available, this database can be searched for suitable skills within the local populous before positions are outsourced. These measures will reduce the potential nuisance factor to the landowner, caused by job seekers reverting to visiting the proposed site of development.	Applicant / Contractor / Operator	Prior to and during construction and operation.	ECO & IEA
13.2	**Construction & Operation Phase**						

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
13.2.1	Increase in crime including damage to farm infrastructure and vandalism.	Reduce impacts associated with crime.	No perpetuating criminal activity. Improvements to security must be demonstrated following an incident.	Security must be appointed throughout construction & operation phases to discourage criminal elements from site.	Applicant / Contractor / Operator.	At commencement of construction, especially site establishment and during operation.	ECO & IEA.
13.2.2	Potential social pathologies (social unrest).	Reduce impacts associated with disgruntled staff.	No strike actions by staff. Improvements to engagement with staff must be demonstrated following an incident.	Ensure effective communication and engagement with staff and surrounding community via inter alia the appointment of a suitably qualified CLO. Transparent communication through the right channels to communicate with the community as to when and how their contracts will come to an end.	Applicant / Contractor / Operator (CLO).	At commencement of construction, and during operation.	ECO & IEA.
13.2.3	Injury to site staff from construction, demolition and	To ensure effective Health and Safety	Appointment of a suitably qualified HSO	Implement a safety plan, access protocols, grievance mechanism and compensation policy.	Applicant / Contractor (HSO).	Construction.	Health & Safety Audits biannually.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
	blasting activities.	implementation.	and compliance monitoring against the OHSA (Act 85 of 1993).	All staff must undergo a site induction that outlines the socio-environmental & safety constraints of the site.			
13.2.4	Injury to trespassers resulting in possible lawsuits.	To avoid inadvertent injuries to trespassers.	No recorded injuries to trespassers.	Increase security to avoid trespassers accessing the project area/ Adequate signage must be placed around the development warning uninformed people of the potential hazards and dangers associated with the project.	Applicant / Contractor.	Throughout construction	ECO & IEA.
13.2.5	Negative effects on the wellbeing of the local inhabitants and site staff as well as the potential outbreak of disease (including HIV/AIDS & COVID-19).	To avoid negative impacts on the health of the residents and occupiers.	Effective implementation of awareness training including measures to assess effectiveness of training.	AIDS / HIV & COVID-19 awareness training must be undertaken to ensure that the labour force is well informed on the matter. Dangerous fumes, noise, dust and water impacts must be avoided that may affect both the labour force and surrounding landowners	Applicant / Contractor / Operator	Ongoing	ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				and users.			
13.2.6	Potential increase in pedestrian and livestock accidents.	To reduce impacts and injuries to pedestrian and livestock.	No injuries recorded in incident register. Close-out Reports must demonstrate improvements to avert a recurrence.	An awareness must be fostered to drive carefully to avoid killing or injuring people or animals and damage to property. Open excavations must be secure and cordoned off to avoid accidental injury to humans and animals alike.	Applicant / Contractor / Operator.	Ongoing awareness.	ECO & IEA.
13.3	**Decommissioning Phase**						
13.3.1	Increased unemployment after construction and operation ends.	To minimize the negative social impacts at the end of each phase of the project.	Develop and effective implementation of an Exit Strategy.	Develop and implement a holistic Exit Strategy that adequately and timeously communicates and buffers staff lay-offs and mitigates losses in employment and income through formalised and structured skills development programmes. Clearly make the terms and conditions of employment known to all employees (temporary and	Applicant.	Prior to commencement of decommissioning.	ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				permanent) including anticipated duration of each phase.			

TABLE 14. CULTURAL, HERITAGE, ARCHAEOLOGICAL & PALEONTOLOGICAL MANAGEMENT.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
14.1	**Planning & Design Phase (including Pre-Construction)**						
14.1.1	Surveying and pegging of temporary footprints can disturb sites of historical significance, i.e. Graves.	To ensure initial survey & clearing activities do not disturb know heritage sites.	All graves and know heritage sites are secure (fenced or cordoned-off)	Ensure that none of the layout & designs of permanent footprints will disturb sites of historical significance, including graves. All formal and informal cemeteries and burials must be left *in situ* and not be disturbed. If this is not possible, a permit must be applied for in terms of Section 36 of the NHRA (Act 25 of 1999) and is subject to mandatory public consultation.	Applicant.	Prior to surveying.	ECO & IEA.
14.1.2	Lack of awareness of heritage	To promote awareness about	Heritage content in site	Include an awareness of heritage resources in the environmental	Applicant / Contractor.	Throughout construction.	ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
	resources.	heritage resources and their presence within the development area.	induction and toolbox and awareness talks.	induction. Categories of heritage resources include, inter alia: • Evidence of archaeological sites or remains include remnants of stone-made structures, indigenous ceramics, bones, stone artifacts, ostrich eggshell fragments, marine shell and charcoal/ash concentrations. • Archaeological or paleontological sites over 100 years old, • Sites of cultural significance associated with oral histories, • Significant cultural landscapes or viewscapes, • Burial grounds, unmarked human burials, graves of victims of conflict, and/or graves older than 60 years, • Structures older than 60 years, • Fossils, etc.			
14.2	**Construction Phase**						
14.2.1	Loss of	To ensure	No loss of	All areas of heritage value must	Applicant /	Throughout	ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
	archaeological and palaeontological valuable artefacts.	construction activities do not disturb know or incidental heritage sites.	archaeological valuable artefacts. All known "heritage" sites within the development footprint is suitably cordoned off.	be demarcated and avoided. Incidental discoveries during clearing and grubbing must be disclosed to site management with immediate cessation of activities until their significance can be assessed by a qualified heritage specialist. Any archaeological artefacts unearthed during excavations must be protected and left *in situ*. Works must cease until the significance of the finding can be assessed by a qualified archaeological specialist.	Contractor.	construction.	
14.2.2	Loss of cultural and heritage value to society.	To ensure correct procedures are followed following chance finds to preserve the heritage resource.	Adherence to protocols specified in management actions following a chance find.	Contact a professional archaeologist, depending on the nature of the finds, as soon as possible to inspect the findings. In the event of discovering a heritage resource, stop reconstruction activities and alert	Applicant / Contractor.	Throughout construction.	ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				the SAHRA Archaeology, Palaeontology and Meteorites (APM) Unit immediately. Nokukhanya Khumalo, Heritage Officer T: +27 21 462 4502 | F: +27 21 462 4509 | C: +27 82 507 0378. E: nkhumalo@sahra.org.za			
14.3	**Operational & Decommissioning Phases**						
Significant heritage impacts are mostly expected to occur during the construction phase.							

TABLE 15. INFRASTRUCTURAL & TRAFFIC MANAGEMENT (INCLUDING PARKING ON SITE).

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
15.1	**Planning & Design Phase (including Pre-Construction)**						
There are no significant impacts expected during this phase.							
15.2	**Construction & Operation Phase**						
15.2.1	Dust entrainment from unsurfaced roads can result in unacceptably high dust fallout.	To manage dust entrainment on access roads which may not exceed the thresholds stipulated in the National Dust Control Regulations.	Full compliance with National Dust Regulations. Acceptable Dust fallout rate ($mg/m^2/day$): Residential area < 600 Non-residential area < 1200 Exceedance not more than twice in a year, not sequential months.	Dust suppression must be carried out on access roads where high dust entrainment is evident. To reduce water usage, a suitable soil binder must be used in dust suppression activities. Excessive water usage to control dust on dirt roads can cause erosion and lead to hazardous conditions for road users.	Applicant / Contractor.	During construction, monthly.	Monitoring of dust fallout to be undertaken by a professional service provider if excessive dust emissions are observed and compliance to be verified by ECO & IEA.
15.2.2	Parking and driving carelessly can	To avoid and minimise impacts	Compliance to speed limits.	Drivers shall always adhere to the relevant speed limit(s) (On the	Applicant / Contractor.	During construction.	Compliance to be verified by

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
	increase collisions with mammals, birds, reptiles, amphibians and insects – collectively referred to as "roadkill's".	from traffic on animals residing on and around the property.	No recorded project vehicle associated animal mortalities.	existing road network) and restrict their movements to the existing and / or approved roadway or servitude. The speed limit on the property shall be 40 km/h and 30km/h within the development footprint. A register must be maintained of all animal mortalities recorded on the property and localised access roads.			ECO & IEA.
15.2.3	Contamination from spills when refuelling, parking, driving, emergency repairing, operating plant or equipment to soil or nearby or within the watercourse.	To reduce contamination of soil from leaking plant and vehicles and upon occurrence is remediated promptly.	Spills are removed within 48 hours of event. Records of servicing by off-site workshop. Drip tray issued to all plant and recorded in a	Oil and fuel spills on roadways and parking areas must be removed to depth of penetration following their discovery and placed in a designated hazardous container for safe disposal. Drip trays must be placed under all plant that is parked overnight and extended periods not in operation.	Applicant / Contractor.	During construction.	Compliance to be verified by ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
			register.	Drip trays can be filled with hydrophobic hydrocarbon absorbent material to avoid content being leached out during rainfall events. No servicing or washing of vehicles or plant may take place in parking bays, and all servicing must be done off-site, no service or wash-bays are to be constructed on site. Emergency breakdowns in the parking areas or along roads, must be addressed after adequate pollution containment measures have been implemented including but not limited to drip trays and spill kits. Refuelling of vehicles and plant may only take place at a designated and permitted (from			

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				local Fire Chief) fuel storage tank or mobile fuel bowser, under the guidance of a Specific Operating Procedure (SOP) that limits spillage and addresses remedial actions in the event of a spillage.			
15.3	**Decommissioning Phase**						
There are no significant impacts expected during this phase.							

TABLE 16. VISUAL ASPECT MANAGEMENT.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
16.1	**Planning & Design Phase (including Pre-Construction)**						
There are no significant impacts expected during this phase, as footprint location has already mitigated the planning and design requirements.							
16.2	**Construction Phase**						
16.2.1	Impact of construction on visual receptors near the Ngodwana Dam, including road users and local homesteads.	To manage the facility in a way that minimised its visual impacts on the surrounding environment.	Demonstration of effects to minimise visual impacts.	Use visual screens to minimise the visual impact on the scenic resources of this region. Have minimal placements that can be visually intrusive to sensitive receptors. Utilise fencing options that do not create a significant visual barrier.	Applicant.	Throughout the project lifecycle.	ECO & IEA.
16.3	**Operational Phase**						
16.3.1	Impact of operational infrastructure on visual receptors near the Ngodwana Dam, including road users and local homesteads.	To manage the Dam and associated infrastructure in a way that minimised its visual impacts on the surrounding environment.	Demonstration of effects to minimise visual impacts.	The main embankment will have a rock finish after remediation. These rocks will require an application of ferric chloride which will help provide a more weathered appearance and reduce their visual impact.	Applicant.	Throughout the project lifecycle.	ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
There are no significant impacts expected during the decommissioning phase.							

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat., MGSSA) & S.D. MacGregor (MSc., Pr.Sci.Nat.)
Reg: 2006/023163/23

SECTION 6: ENVIRONMENTAL AWARENESS PLAN

This section of the report is included in compliance with Section 24N(3)(c) of the NEMA and the EIA Regulations (2014) as amended.

The EMPr needs to include, inter alia:
An environmental awareness plan describing the manner in which-
(i) The applicant intends to inform his or her employees of any environmental risk which may result from their work; and
(ii) Risks must be dealt with to avoid pollution or the degradation of the environment;

Throughout the construction and operational phases environmental as well as health and safety awareness training should be provided to all employees to promote the effective implementation of the EMPr actions.

This section of the report focusses on the environmental awareness training. It provides a guideline as to the possible environmental risks that may be experienced as part of the project as well as way to avoid the risks and subsequent environmental degradation. The aim is to provide a guide to developing a comprehensive yet easily understandable awareness plan to present to employees of all education and skill levels which should be presented to the employees at least one week prior to commencement of construction. The following pointers are given for the environmental awareness training course:

- Environmental awareness training should be undertaken by the environmental and / or health and safety representative of SAPPI with the input of an EAP or ECO if required;
- Environmental awareness reminders should be undertaken at least bi-annually to ensure that employees and Contractors are kept aware of the risks and management thereof;
- It is recommended that awareness posters be developed and placed on site in highly visible areas to provide the required information when it needs to be referred to as well as reminding employees of their obligations regarding environmental protection;
- A slideshow can also be developed for initial awareness induction and for use as a reminder of the environmental risks and responsibilities at the site or induction of future Contractors; and
- Throughout the presentations (posters, meetings, slideshows, etc.), it is recommended that visual aids be used to explain the potential risks and management thereof as thoroughly as possible.

Should any new personnel be contracted or arrive on site during the construction period, they should attend the environmental awareness course. The environmental awareness training should be provided to all labourers, technical staff and any other Contractor appointed.

The awareness training forms part of this EMPr and should be implemented as part of the conditions of environmental management and risk prevention. Refer to the management measures in Tables 6 through 16 above for proposed management and mitigation actions to be

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Reg: 2006/023163/23

undertaken to prevent or minimise the risks described below. Attention should be focussed on the following areas of sensitivity during the construction phase:

- Removal of vegetation during site clearance within a critical biodiversity area;
- Covering and clearing of riverine habitat leading to fragmentation;
- Altering bed, banks or course of seepage lines and riverine wetland network;
- Animal habitat disturbance due to vegetation clearance and noise;
- Soil erosion, siltation, and pollution of watercourses;
- Soil compaction;
- Health and safety;
- Degradation of roads; and
- Fire risks.

Other elements to be taken into consideration by the employees during both the construction and operational phases include:

- The presence of animals on site;
- Disturbances to neighbours due to noise and traffic;
- The positive impacts, of the greener technology being implemented, on the biophysical and socio-economic environments; and
- Awareness should be raised regarding the possible occurrence of sensitive plant and animal species and heritage features.

The awareness training for this project should aim to prevent, and where prevention is not possible, mitigate detrimental environmental impacts. It should promote awareness of environmental risks and management thereof. It should furthermore promote green thinking and provide information on alternative energy sources and energy consumption reduction.

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Reg: 2006/023163/23

SECTION 7: RESPONSIBILITIES OF ROLE PLAYERS

The approved EMPr shall be printed, completed, and kept in an on-site file designated for all matters pertaining to environmental management. Co-operation is required between the applicant, contractor, and ECO to ensure that activities are managed in an amicable and responsible manner and in accordance with the philosophies of environmental legislation and principles of the EMPr.

This EMPr is predominantly compiled for the management of construction and operations associated with the remediation of the Ngodwana Dam, once the Planning and Authorisation phases are complete. The tabulated management programmes assign responsibilities to one or more role player, the below descriptions identify responsibilities and accountabilities in the case of any uncertainty.

Applicant

The applicant remains ultimately accountable for ensuring that the development is implemented according to the requirements of the EMPr. Although the applicant delegates specific responsibilities to role players to perform functions on his / her behalf, the ultimate accountability cannot be delegated. The developer is responsible for ensuring that sufficient resources (time, financial, manpower, equipment, etc.) are available to the other role players (e.g. the contractor, SECO, etc) to efficiently perform their tasks in terms of the EMPr. The responsibility of restoring the environment in the event of any negligence, which leads to damage of the environment, also falls to the applicant.

The applicant must ensure that the EMPr is included in any documents (tender, appointment etc.) so that any contractor who is appointed is bound to the conditions of the EMPr. The applicant must appoint an independent Environmental Control Officer (ECO) prior to commencement of construction, to help identify pre-construction & construction criteria that need to be fulfilled timeously, to avoid non-compliance with the overarching authorisation conditions and/or legislation.

Contractor

The contractor, as the developer's agent on site, is bound to the EMPr conditions through his/her contract with the developer and is responsible for ensuring that she/he adheres to all the conditions of the EMPr. The contractor shall be responsible for the actions undertaken by all their employees including sub-contractors. The contractor must thoroughly familiarise him/herself with the EMPr requirements before coming onto site and must request clarification on any aspect of these documents, should they be unclear. The contractor must ensure that he/she has provided sufficient budget for complying with all EMPr conditions at the tender / appointment stage.

The contractor must comply with all instruction (whether verbal or written) given by the environmental manager, project manager or site engineer in terms of the EMPr.

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Reg: 2006/023163/23

Site Environmental Officer (SEO)

The Site Environmental Officer (SEO) shall be appointed by the contractor to implement the EMPr daily. The SEO shall ensure that all construction activities are carried out in accordance with the relevant conditions of the EMPr, Environmental Authorisation (EA), General Authorisation (GA) (under the National Water Act), wayleaves, provincial ordinances and provincial bylaws.

Environmental Control Officer (ECO)

The Environmental Control Officer (ECO) is appointed by the applicant as an independent monitor of the implementation of the EMPr, EA, and GA. He/she must form part of the project team and be involved in all aspects of the project planning that can influence environmental conditions on the site.

The ECO must attend relevant project meetings, conduct inspections to assess compliance with the EMPr, EA, and GA and be responsible for providing feedback on potential environmental problems associated with the development. In addition, the ECO is responsible for:

- Liaising with relevant authorities;
- Liaising with contractors regarding environmental management; and
- Undertaking routine monitoring and appointing a competent person / institution to be responsible for any specialist monitoring (if required).

The ECO has the right to enter the site and undertake monitoring and auditing at any time, subject to compliance with health and safety requirements applicable to the site (wearing safety boots, head gear, mouth mask etc.).

Independent Environmental Auditor (IEA)

An IEA shall be appointed by the Applicant to undertake EMPr, EA, and GA compliance audits at 6-monthly intervals. The purpose of conducting a periodic compliance audit would be to systematically check and evaluate progress on EMPr, EA, and GA implementation. The environmental audit will serve as a 'snapshot' of the environmental situation and progress at a given point in time. The purpose of the audit is to illustrate whether there has been any improvement or change over time.

The IEA will fulfil the auditing requirements by systematically auditing the Project's performance and compliance against the requirements of the EA, EMPr, and GA in a process that is carefully planned, structured and organised. The audit process must, on a sampled basis, track past actions, activities, events, and procedures through using existing documentation, conducting interviews with managers and personnel, and observing practices on site.

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Reg: 2006/023163/23

SECTION 8. COMMUNICATION

At least monthly site meetings should be held where feedback can be given, and any potential problems identified and remedied. If they cannot be remedied then construction in that area should be stopped, until a suitable remedy is identified.

Monitoring Compliance

Pre-construction, Construction and Post-construction:

The ECO will be responsible for monitoring and reporting on compliance of the activity from pre- to post-construction.

Inspections and resulting compliance reports shall be a systematic, independent, and documented process for obtaining compliance evidence and evaluating it objectively to determine the extent to which the compliance criteria are fulfilled. The compliance criteria (or reference) against which the compliance evidence is compared shall include this EMPr, the Environmental Authorisation, and General Authorisations (under then National Water Act).

The ECO must undertake monthly inspections of the site and submit monthly environmental compliance reports to the Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs as the competent authority (DARDLEA) for this project, unless otherwise prescribed in the EA. The compliance reports must identify the actual and potential transgressions, describe the impacts, provide verifiable evidence (photographs, records, or statements) and recommend corrective and preventive actions (including completion dates). The compliance reports must measure the applicant/contractor's level of compliance against the aforesaid criteria. Performance scoring/reporting is optional.

The SEO shall maintain an on-site diary to record environmental aspects (elements of the construction activities that can interact with the environment) and environmental impacts (any change to the environment, whether adverse or beneficial, wholly or partially resulting construction activities), daily.

Operation:

The relevant authorities should be responsible for monitoring compliance with aspects of the activity that fall within their jurisdiction.

Time Periods and Failure to Comply with the EMPr

The time periods within which the measures prescribed in this EMPr must be implemented shall be applicable to the full duration of the activity that is being undertaken and mitigated. The time periods within which corrective and preventive actions need to be implemented shall be determined by the SEO and/or ECO, depending on the nature and severity of the finding. In the absence of a prescribed deadline or completion date, findings shall be corrected or prevented immediately upon being found to occur, if practical.

The EMPr is a legally binding document and should form part of the contract. Should there be failure to comply with the EMPr the following steps are envisaged:

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Reg: 2006/023163/23

Step 1
The ECO meets with the contractor and points out the deviation from the EMPr. The ECO and Contractor agree on a solution and this non-compliance is recorded by the ECO as well as the solution put forward to rectify it.

Step 2
Should there still be non-compliance or there is a more serious infringement of the EMPr the contractor is informed in writing with a deadline by which the problem must be rectified. Any extra costs that may be accrued must be borne by the contractor.

Step 3
If non-compliance persists, the Chief Resident Engineer (CRE) or Project Manager (PM) shall order the contractor to suspend construction in that specific area or the project as a whole until the activity at variance with the EMPr is corrected and or remedial actions taken. Any cost that occurs because of such action shall be for the account of the contractor.

Step4
Where there is non-compliance with the EMPr and no evidence that the contractor intends complying even though the above 3 steps have been taken the applicant may terminate the contract due to non-compliance (breach of contract). Such measures do not replace any legal proceedings that may occur because of such non-compliance.

Environmental Awareness Plan
The applicant shall ensure that his project team, contractor, and labourers are adequately trained about the implementation of the EMPr, EA, & GA throughout construction.

Pre-construction

Environmental Awareness Inductions shall be targeted at two distinct levels of employment: management (applicant, architect, engineer, contractor / site agent) and labourers (including the site foreman). The SEO shall be responsible for preparing and presenting inductions appropriate to the audience. Inductions shall be undertaken prior to the commencement of construction. Where possible the presentation will be conducted in the language of the employees.

The Environmental induction for management shall include mitigations that are relevant to or require management's involvement prior to implementation including, but not limited to, the following:

- Measures required during the planning and design, and pre-construction phase, and
- Site establishment.

The Environmental induction for the contractor's labourers and foreman shall, as a minimum, include the following:

- A description of the actual and potential environmental impacts,

- Standard operating procedures for undertaking construction activities (i.e. mixing concrete, driving, etc.) that can have an environmental impact,
- Staff conduct including sanitation and movement,
- The integrated waste management strategy,
- The steps to be taken should any item of perceived environmental importance including archaeological artefacts be located or unearthed, and
- The environmental emergency plans.

Construction

The SEO and ECO shall undertake an informal training needs analysis throughout construction to identify appropriate environmental topics and the appropriate labourers to target. The analysis shall be informed by the findings contained in the site diary and compliance reports. Training shall be given during toolbox talks.

The SEO and ECO shall keep records of the environmental inductions and subsequent toolbox talks in an on-site file designated for all matters pertaining to environmental management.

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Reg: 2006/023163/23

SECTION 9: ENVIRONMENTAL EMERGENCY PLAN FOR THE CONTROL OF ENVIRONMENTAL INCIDENTS

Definition of an 'Environmental Incident'

1. An unexpected sudden occurrence including a major emission, fire or explosion leading to danger to the public or potentially serious pollution of or detriment to the environment whether immediate or delayed (NEMA, 1998, section 30 (1) (a)).

2. Any incident or accident in which a substance-
   (a) pollutes or has the potential to pollute a water resource or
   (b) has, or is likely to have, a detrimental effect on a water resource (NWA, 1998, section 20 (1))

Procedure

The contractor shall ensure that emergencies are reported and controlled in accordance with the sequence of events prescribed for spillages in a watercourse, on land and fire, including:

- Action to be taken
- Removal and remediation measures to be implemented
- Internal and external communication plan
- Prescribed reporting procedure

The measures prescribed in the tables to follow will need to be checked and compared to prevailing legislation, especially the NEMA & NWA, which are updated from time to time.

The contractor shall ensure that their employees are adequately trained to react to environmental emergencies in accordance with this procedure.

The SEO shall complete the table of contact numbers, erect them in a conspicuous place within the construction camp and make its whereabouts known to all the contractor's staff.

Equipment

The following equipment is required to successfully implement this procedure. It must be ensured that the equipment is supplied to or is readily available for all living quarters, site offices, kitchen areas, workshop areas, stores and on site.

1. A spill kit including absorbent fibres, mats, and booms
2. A net
3. A whistle
4. Adequate lighting for night shifts
5. Spades
6. Sandbags
7. Designated hazardous waste drums
8. (Trained personnel with) protective clothing for extinguishing fires
9. Fire extinguishers
10. Fire beaters
11. Water carts/tankers with pumps and hoses
12. Water pumps and pipes (for fires started at the watercourse crossings)

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Reg: 2006/023163/23

Contact Numbers

Organisation	Name	Telephone/cell Number
Project Personnel		
Applicant		
Engineer		
Contractor		
HSO		
SEO		
ECO		
Interested and Affected Parties		
Landowner		
Adjacent Landowner		
Adjacent Landowner		
Emergency Services		
Spill Clean-up Service Provider		
Fire Department		
Chief Fire Officer (Fire Chief)		
SA Police Services		
Disaster Management Centre		
Local Municipality		
District Municipality		
Irrigation Board		
Water Catchment Management Agency		
Water Treatment Works		
DWS (Regional Head of Department /		

Chief Director)		
DWS (Regional Director: Water sector Regulation & Use)		
DEA (Provincial Head of Department)		
DEA (Director: Environmental Impact Management)		
DEA (Director General)		
DEA (Director: Environmental Impact Evaluation)		

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Reg: 2006/023163/23

SPILLAGE IN A WATERCOURSE

ACTION TO BE TAKEN		
Personnel	**Responsibility**	**Action**
Employee	Reporting	The person responsible for, or who discovers, a hazardous substance spill must report the incident to their immediate Supervisor.
Supervisor	Reporting	Report the incident to the SEO, HSO and Resident Engineer. ● Note that the SEO will take control of all relevant actions once he/she arrives on the scene.
HSO	Reporting	Report the incident to an Inspector (designated under section 28 of the Occupational Health & Safety Act, 1993) within the prescribed period and manner.
Supervisor / SEO	Initial investigation	Determine the extent of the spill, i.e. its boundaries, by observing for the following: 1. Any visual indication of pollution, 2. Any odours or emissions detected, 3. Any indication of the source of pollution, 4. Any sign of damage to the natural system. ● The Supervisor/SEO should provide lighting if working at night.
Supervisor / SEO	Co-ordination	Sound an alarm/whistle. ● The designated response team consisting of area specific personnel and including the environmental leader, will congregate at the spill kit. ● All other employees who do not have specific duties to perform are to evacuate the affected area to a location designated by the Supervisor/SEO.
Supervisor/SEO	Co-ordination	Minimise the effects of the incident on the environment and persons by removing the source of the spill at least 100m away from the watercourse or cut-off the supply of the spill if the source is not moveable.
Supervisor/SEO	Co-ordination	Contain the spill by laying an absorbent sock or boom across the width of the watercourse AT A PRE-DETERMINED LOCATION downstream of the construction area (spill). ● A series of parallel booms may be required.
Supervisor/ECO	Co-ordination	Secure the affected area with danger tape.

HSO	Co-ordination	The site shall not be disturbed and no article or substance may be removed (without the consent of the inspector) if there is or likely to be a death, or if there is a loss of limb or part of a limb. However, action can be taken to prevent a further accident, to remove the injured or dead or rescue persons from danger.
Engineer/SEO/ HSO	Decision-making	The Engineer will assess the situation in consultation with the SEO and HSO and act as required. ● The risk involved shall be assessed before anyone approaches the scene of the incident. ● The HSO will consult the MSDSs. ● The scale of the spill will dictate whether the spill will be cleaned up by using the on-site spill kit and in the prescribed manner, or by contacting a Spill Clean-Up Service Provider for assistance. ● The SEO will take photographs of the affected area. ● No person shall be allowed to approach a spill unless he/she is equipped with the personal protective clothing.
SEO	Directions	If a Spill Clean-Up Service Provider is used, assist the emergency services by clearly marking the route to be taken to the spill site.
SEO	Co-ordination	Take such measures as the Catchment Management Agency may either verbally or in writing direct within the time specified by such institution.

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Reg: 2006/023163/23

SPILLAGE IN A WATERCOURSE

REMOVAL AND REMEDIATION MEASURES TO BE IMPLEMENTED		
Personnel	**Responsibility**	**Action**
SEO	Co-ordination	Remove the contaminated sock or boom from the surface of the water. If lose fibres were scattered on the surface to capture hydrocarbons in shallow (still) pools, 'fish' it out with a net.
SEO	Co-ordination	Remove the contaminated soil from the banks of the watercourse, to the depth of penetration using a spade or shovel.
SEO	Co-ordination	Temporarily store the contaminant in the designated hazardous waste facility at the construction camp.
SEO	Co-ordination	Contact a licensed hazardous waste service provider to collect and transport the waste to a licensed hazardous waste landfill site.
SEO	Co-ordination	Rehabilitate the banks of the watercourse by replacing the topsoil and planting indigenous plants.
SEO	Monitoring	Immediately follow any known spillage of toxic substances into a stream or river with monitoring of the receiving streams or rivers and public health.
SEO	Co-ordination	Should water downstream of the spill be polluted, and fauna and flora show signs of deterioration or death, specialist hydrological or ecological advice must be sought for appropriate treatment and remedial procedures to be followed.
SEO	Monitoring	Take photographs of the affected area during rehabilitation.

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Reg: 2006/023163/23

SPILLAGE IN A WATERCOURSE

INTERNAL & EXTERNAL COMMUNICATION PLAN		
Personnel	**Responsibility**	**Action**
Employee	Reporting	The person responsible for, or who discovers, a hazardous waste spill must report the incident to their immediate Supervisor.
Supervisor	Reporting	Report the incident to the SEO, HSO and Resident Engineer.
HSO	Reporting	Report the incident to an Inspector (designated under section 28 of the Occupational Health & Safety Act, 1993) within the prescribed period and manner.
SEO	Reporting	Report the incident to the Site Agent and / or Manager and the ECO.
SEO	Reporting	If the spill is too big for the spill kit, contact a Spill Clean-Up Service Provider.
SEO	Reporting	If the spill is going to affect downstream users, inform the Landowner, the Irrigation Board and water treatment works (if applicable). ● Provide the following information to the water treatment works: 1. The exact location of the spillage, 2. The time of the spillage, 3. As much information about the nature of the pollution, 4. The name and telephone number of the person contacting them. ● Irrigation Boards control river structures and may be able to divert/or impound the river to protect 'water supply intakes.
SEO	Reporting	Report the incident to the following authorities within 24 hours. 1. DEA (Director General), 2. DWS (Director General and Chief Director), 3. SA Police Services, 4. Fire Department, 5. Catchment Management Agency, 6. DEA (provincial Head of Department) or Local Municipality, and 7. Any persons whose health may be affected by the incident.

SEO	Reporting	Provide the following information: 1. The nature of the incident, 2. Any risks posed by the incident to public health, safety & property, 3. the toxicity of substances or by-products released by the incident, and 4. any steps that should be taken in order to avoid or minimise the effects of the incident on public health and the environment.
ECO/Applicant/Site Agent/CRE	Reporting	If the nature of the impact constitutes a gross violation of the EA or any legislation: ● The ECO must report the incident to the applicant. ● The applicant must report the incident to the Local Municipality, DEA, and DWS. ● The Site Agent and / or Manager must report the incident to their Environmental Group Manager, Divisional MD and CEO. ● The Resident Engineer must report the incident to his Superiors.

SPILLAGE IN A WATERCOURSE

PRESCRIBED REPORTING PROCEDURE		
Incident recording		
Personnel	**Responsibility**	**Action**
SEO	Investigation	Investigate, including interviews, and record all details of the incident. ● The cause must be investigated.
SEO	Reporting	Complete an Environmental Incident Report and forward it to all key project personnel, except for the Emergency Services.
SEO	Reporting	Within 14 days of the incident, report the incident to the following authorities. 1. DEA (Director General), 2. DEA (Provincial Head of Department), 3. Local Municipality, 4. DWS (Regional Director).
SEO	Reporting	Provide the following information: 1. The nature of the incident, 2. The substances involved, and an estimation of the quantity released and their possible acute effect on persons & the environment & data needed to assess these effects, 3. Initial measures to minimise impacts, 4. Causes of the incident, whether direct or indirect including equipment, technology, system, or management failure, and 5. Measures taken & to be taken to avoid a recurrence of such incident.
SEO	Reporting	Submit an action plan within 14 days, or a shorter period, if specified by the Regional Director (DWS).
SEO	Reporting	The action plan must include the following information: 1. A detailed time schedule of measures taken to: 1.1 Correct the impacts resulting from the incident; 1.2 Prevent the incident from causing any further impact; and 1.3 Prevent a recurrence of a similar incident.
Progress reporting		
SEO	Revising	Identify methods for preventing the incident from

	Procedures	re-occurring and revise method statements and/or procedures for implementing as early as possible.
SEO	Training	Conduct either a toolbox talks or environmental awareness training/re-induction to the all employees and include additional mitigations to avoid a re-occurrence. ● Keep the program, including a signed attendance register, in the on-site environmental file.

SPILLAGE ON LAND

ACTION TO BE TAKEN		
Personnel	**Responsibility**	**Action**
Employee	Reporting	The person responsible for, or who discovers, a hazardous substance spill must report the incident to their immediate Supervisor.
Supervisor	Reporting	Report the incident to the SEO, HSO and Resident Engineer. ● Note that the SEO will take control of all relevant actions once he/she arrives on the scene.
HSO	Reporting	Report the incident to an Inspector (designated under section 28 of the Occupational Health & Safety Act, 1993) within the prescribed period and manner.
Supervisor/SEO	Initial investigation	Determine the extent of the spill, i.e. its boundaries, by observing for the following: ● Any visual indication of pollution, ● Any odours or emissions detected, ● Any indication of the source of pollution, ● Any sign of damage to the natural system. The Supervisor / SEO should provide lighting if working at night.
Supervisor/SEO	Co-ordination	Sound an alarm/whistle. ● The designated response team consisting of area specific personal and including the environmental leader, will congregate at the spill kit. ● All other employees who do not have specific duties to perform are to evacuate the affected area to a location designated by the Supervisor / SEO.
Supervisor / SEO	Co-ordination	Minimise the effects of the incident on the environment and persons by removing the source of the spill at least 100m away from the watercourse or cut-off the supply of the spill if the source is not moveable.
Supervisor / ECO	Co-ordination	Contain the spill to a confined area to prevent the spreading of the spilled chemical or substance. ● Use sandbags or construct earth berms. ● If relevant, close off all storm water drains with absorbent mats. ● Do not wash the spill with water as it will cause

		the spill to spread.
Supervisor/ECO	Co-ordination	Secure the affected area with danger tape.
HSO	Co-ordination	The site shall not be disturbed and no article or substance may be removed (without the consent of the inspector) if there is or likely to be a death, or if there is a loss of limb or part of a limb. However, action can be taken to prevent a further accident, to remove the injured or dead or rescue persons from danger.
Engineer/SEO/ HSO	Decision-making	The Engineer will assess the situation in consultation with the SEO and HSO and act as required. ● The risk involved shall be assessed before anyone approaches the scene of the incident. ● The HSO will consult the MSDSs. ● The scale of the spill will dictate whether the spill will be cleaned up by using the on-site spill kit and in the prescribed manner, or by contacting a Spill Clean-Up Service Provider for assistance. ● The SEO will take photographs of the affected area. ● No person shall be allowed to approach a spill unless he/she is equipped with the personal protective clothing.
SEO	Directions	If a Spill Clean-Up Service Provider is used, assist the emergency services by clearly marking the route to be taken to the spill site.

SPILLAGE ON LAND

REMOVAL AND REMEDIATION MEASURES TO BE IMPLEMENTED		
Personnel	**Responsibility**	**Action**
SEO	Co-ordination	Remove the contaminated soil to the depth of penetration using a spade or shovel.
SEO	Co-ordination	Temporarily store the contaminant in the designated hazardous waste facility at the construction camp.
SEO	Co-ordination	Contact a licensed hazardous waste service provider to collect and transport the waste to a licensed hazardous waste landfill site.
SEO	Co-ordination	Rehabilitate the area cleared of hazardous waste by replacing the topsoil and planting indigenous plants.
SEO	Monitoring	Immediately follow any known spillage of toxic substances with monitoring of the receiving environment, and public health if necessary.
SEO	Monitoring	Take photographs of the affected area during rehabilitation.

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Reg: 2006/023163/23

SPILLAGE ON LAND

INTERNAL & EXTERNAL COMMUNICATION PLAN		
Personnel	**Responsibility**	**Action**
Employee	Reporting	The person responsible for, or who discovers, a hazardous waste spill must report the incident to their immediate Supervisor.
Supervisor	Reporting	Report the incident to the SEO, HSO and Resident Engineer.
HSO	Reporting	Report the incident to an Inspector (designated under section 28 of the Occupational Health & Safety Act, 1993) within the prescribed period and manner.
SEO	Reporting	Report the incident to the Site Agent and/or Manager and the ECO.
SEO	Reporting	If the spill is too big for the spill kit, contact a Spill Clean-Up Service Provider.
SEO	Reporting	Report the incident to the following authorities. 1. DEA (Director General), 2. SA Police Services, 3. Fire Department, 4. DEA (Provincial Head of Department) or Local Municipality, and 5. Any persons whose health may be affected by the incident.
SEO	Reporting	Provide the following information: 1. The nature of the incident, 2. Any risks posed by the incident to public health, safety & property, 3. the toxicity of substances or by-products released by the incident, and 4. Any steps that should be taken to avoid or minimise the effects of the incident on public health and the environment.
ECO/Applicant/ Site Agent/RE	Reporting	If the nature of the impact constitutes a gross violation of the EA or any legislation: ● The ECO must report the incident to the applicant. ● The applicant must report the incident to the Local Municipality, DEA, and DWS. ● The Site Agent and/or Manager must report the incident to their Environmental Group Manager, Divisional MD, and CEO.

		● The Resident Engineer must report the incident to his Superiors.

SPILLAGE ON LAND

PRESCRIBED REPORTING PROCEDURE		
Incident recording		
Personnel	**Responsibility**	**Action**
SEO	Investigation	Investigate, including interviews, and record all details of the incident. ● The cause must be investigated.
SEO	Reporting	Complete an Environmental Incident Report and forward it to all key project personnel, except for the Emergency Services.
SEO	Reporting	Within 14 days of the incident, report the incident to the following authorities. 1. DEA (Director General) 2. DEA (Provincial Head of Department), and 3. Local Municipality.
SEO	Reporting	Provide the following information: 1. The nature of the incident, 2. The substances involved, and an estimation of the quantity released and their possible acute effect on persons & the environment & data needed to assess these effects, 3. Initial measures to minimise impacts, 4. Causes of the incident, whether direct or indirect including equipment, technology, system, or management failure, and 5. Measures taken & to be taken to avoid a recurrence of such incident.
Progress reporting		
SEO	Revising Procedures	Identify methods for preventing the incident from re-occurring and revise method statements and/or procedures for implementing as early as possible.
SEO	Training	Conduct either a toolbox talks or environmental awareness training/re-induction to the employee(s) responsible for the spill and include additional mitigations to avoid a re-occurrence. ● Keep the program, including a signed attendance register, in the on-site environmental file.

FIRE

ACTION TO BE TAKEN		
Personnel	**Responsibility**	**Action**
Employee	Reporting	The person who starts or discovers a fire must report the incident to their immediate Supervisor.
Supervisor	Reporting	Report the incident to the SEO, HSO and Resident Engineer. ● Note that the SEO will take over co-ordination of all relevant actions once he/she arrives on the scene.
SEO	Reporting	If there is potential for a fire to spread and endanger life, property, or the environment, alert the landowner and Fire Department.
Landowner	Reporting	Alert the owners of adjacent land.
HSO	Reporting	Report the incident to an Inspector (designated under section 28 of the Occupational Health & Safety Act, 1993) within the prescribed period and manner.
Supervisor / SEO	Co-ordination	Sound an alarm/whistle. ● The designated response team consisting of area specific personnel and including the environmental leader, will congregate at the fire-fighting equipment. ● All other employees who do not have specific duties to perform are to evacuate the affected area to a location designated by the Supervisor / SEO.
SEO	Directions	Assist the Fire Department by clearly marking the route to be taken to the fire.
SEO	Co-ordination	Extinguish the fire or assist in doing so.
SEO	Co-ordination	Stop the spread of the fire.
SEO	Co-ordination	Provide assistance to a fire protection officer or forest officer if they take control over the fighting of a fire.
HSO	Co-ordination	The site shall not be disturbed and no article or substance may be removed (without the consent of the inspector) if there is or likely to be a death, or if there is a loss of limb or part of a limb. However, action can be taken to prevent a further accident, to remove the injured or dead or rescue persons from danger.

FIRE

REMEDIATION MEASURES TO BE IMPLEMENTED		
Personnel	**Responsibility**	**Action**
SEO	Assessment	Immediately follow any fire with an assessment of the effects on the environment, public health, safety, and property.
SEO	Search	Search the scorched earth for reptiles and other creatures that can be rehabilitated and saved. ● Use only a licensed rehabilitation facility.
SEO	Monitoring	Monitor for signs of erosion after the first few rains and new flush. ● Manage erosion resulting from a loss in plant basal or aerial cover. ● Ensure that the control measures are not destructive.
SEO	Managing	No Vehicles or plant are permitted to drive through burnt areas.

FIRE

INTERNAL & EXTERNAL COMMUNICATION PLAN		
Personnel	**Responsibility**	**Action**
Employee	Reporting	The person who starts or discovers a fire must report the incident to their immediate Supervisor.
Supervisor	Reporting	Report the incident to the SEO, HSO and Resident Engineer. ● Note that the SEO will take control over all relevant actions once he/she arrives on the scene.
SEO	Reporting	Report the incident to the Site Agent and/or Manager and the ECO.
SEO	Reporting	If there is potential for a fire to spread and endanger life, property, or the environment, alert the landowner and Fire Department.
Landowner	Reporting	Alert the owners of adjacent land.
HSO	Reporting	Report the incident to an Inspector (designated under section 28 of the Occupational Health & Safety Act, 1993) within the prescribed period and manner.
SEO	Reporting	Report the incident to the following authorities. 1. DEA (Director General), 2. SA Police Services, 3. Fire Department, 4. DEA (Provincial Head of Department) or Local Municipality, and 5. Any persons whose health may be affected by the incident.
SEO	Reporting	Provide the following information: 1. The nature of the incident, 2. Any risks posed by the incident to public health, safety & property, 3. the toxicity of substances or by-products released by the incident, and 4. any steps that should be taken in order to avoid or minimise the effects of the incident on public health and the environment.
ECO / Applicant / Site Agent / RE	Reporting	If the nature of the impact constitutes a gross violation of the EA or any legislation: ● The ECO must report the incident to the applicant. ● The applicant must report the incident to the Local Municipality, DEA, and DWS. ● The Site Agent and / or Manager must report the incident to their Environmental Group Manager,

		Divisional MD, and CEO. ● The Resident Engineer must report the incident to his Superiors.

FIRE

PRESCRIBED REPORTING PROCEDURE		
Incident recording		
Personnel	**Responsibility**	**Action**
SEO	Investigation	Conduct an investigation, including interviews, and record all details of the incident. ● The cause must be investigated.
SEO	Reporting	Complete an Environmental Incident Report and forward it to all key project personnel, except for the Emergency Services.
SEO	Reporting	Within 14 days of the incident, report the incident to the following authorities. 1. DEA (Director General), 2. DEA (Provincial Head of Department), and 3. Local Municipality.
SEO	Reporting	Provide the following information: 1. The nature of the incident, 2. The substances involved, and an estimation of the quantity released and their possible acute effect on persons & the environment & data needed to assess these effects, 3. Initial measures to minimise impacts, 4. Causes of the incident, whether direct or indirect including equipment, technology, system, or management failure, and 5. Measures taken & to be taken to avoid a recurrence of such incident.
Progress reporting		
SEO	Revising Procedures	Identify methods for preventing the incident from re-occurring and revise method statements and/or procedures for implementing as early as possible.
SEO	Training	Conduct either a toolbox talks or environmental awareness training/re-induction to the employee(s) responsible for the spill and include additional mitigations to avoid a re-occurrence. ● Keep the program, including a signed attendance register, in the on-site environmental file.