

Environmental Management Programme EMPr

**Bruintjieslaagte Dam – Devil’s Creek –
Schoemanskloof**

MDARDLEA reference no. 1/3/1/16/1E-91

MAY 2017

Notice no. R 983, 2014: Activity 12, 19, 27.

Notice no. R 984, 2014: Activity 16.

Notice no. R 985, 2014: Activity 12.



**ENPACT ENVIRONMENTAL
CONSULTANTS CC**

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PROJECT DETAILS	
TITLE	Bruintjieslaagte Dam – Devil’s Creek – Schoemanskloof.
REPORT STATUS:	Environmental Management Programme.
LOCATION:	Bruintjieslaagte 465 JT Schoemanskloof, City of Mbombela, Mpumalanga. The site is located south west of the N4 Schoemanskloof road on the Devil’s Creek which is a tributary to the Crocodile River.
SG 21 DIGIT CODE:	T O J T 0 0 0 0 0 0 0 0 0 0 4 6 5 0 0 0 0 0
EAP:	Enpact Environmental Consultants CC PO Box 12027, Nelspruit, 1200 Tel: 013 752 6766 Fax: 088 013 7526766 E-mail: info@enpact.co.za
REPORT COMPILED BY:	Heinrich Kammeyer Enpact Environmental Consultants CC E-mail: heinrich@enpact.co.za
APPLICANT:	FJ Joubert & Seuns (Pty) Ltd Mr FJ Joubert PO Box 29, Schagen, 1207 Tel 083 227 2415
REPORT PREPARED FOR SUBMISSION TO:	Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs: DARDLEA Ehlanzeni District Offices The Directorate: Environmental Impact Management 18 Jones Street Nelspruit, 1200
DATE OF COMPILATION:	May 2017
ACTIVITIES APPLIED FOR:	Notice no. R 983, 2014: Activity 12, 19, 27 Notice no. R 984, 2014: Activity 16. Notice no. R 985, 2014: Activity 12.
MDARDLEA REFERENCE NUMBER:	1/3/1/16/1E-91

EAP EXPERTISE	
Maryke André	Maryke André has 12 years’ experience in the EIA consulting industry and 10 years with Enpact Environmental Consultants CC. Qualifications include a Btech Nature Conservation degree. Experience in Environmental Impact Assessments spans a wide range of projects including residential and business developments, tourism developments, infrastructure projects (roads, water, sewer and renewable power generation), concentrate farming and waste management facilities. She also deals extensively with the compilation of waste management and water use licence applications.
Heinrich Kammeyer	Heinrich Kammeyer is the owner of Enpact Environmental Consultants CC. Qualifications include a degree in Chemical Engineering, MBL and Masters Environmental Engineering (Cum laude). The Environmental Consulting Business which was started in 2004 has completed more than 150 Environmental Impact Assessment Applications to date. Experience in Environmental Impact Assessments, over the past 12 years, spans a wide range including residential and business developments, tourism developments, roads, water and sewer, renewable power generation, concentrate farming and waste management facilities. In addition he also has extensive experience in waste management licences as well as water use licence applications.

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Abbreviations:	
EA:	Environmental Authorisation
EIA:	Environmental Impact Assessment
ECO:	Environmental Control Officer
EMPr:	Environmental Management Programme
MDARDLEA:	Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs
NEMA:	National Environmental Management Act

Definitions:

Environmental Management Programme (EMPr): An EMPr is an environmental action plan or tool used to ensure that undue or reasonably avoidable adverse impacts of an activity are prevented, and that positive impacts are enhanced. It thus addresses the how, when, who, where and what of integrating environmental mitigation and monitoring measures through the project development activities.

Alien Vegetation: alien vegetation is defined as undesirable plant growth which will include, but not be limited to all declared category 1 and 2 listed invader species as set out in the Conservation of Agricultural Resources Act (CARA), 1983 regulations. Other vegetation deemed to be alien shall be those plant species that show the potential to occupy in number, any area within the defined construction area and which are declared to be undesirable.

Environment: environment means the surroundings within which humans exist and that could be made up of the following:

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

Environmental Aspect: an environmental aspect is any component of a contractor's construction activity that is likely to interact with the environment.

Environmental Impact: an impact or environmental impact is the change to the environment, whether desirable or undesirable, that will result from the effect of a construction activity. An impact may be the direct or indirect consequence of a construction activity.

Environmental Authorisation: an environmental authorisation is a written statement from the Department of Agriculture, Rural Development, Land and Environmental Affairs, (MDARDLEA), which records its approval of a planned activity and the conditions of approval which may include mitigating measures required to prevent or reduce the effects of environmental impacts during the life of an activity.

Watercourse: means –

- (a) river or spring;
- (b) a natural channel in which water flows regularly or intermittently;
- (c) a wetland, pan or lake or dam into which , or from which water flows; and any collection of water which the Minister ay, by notice in the Gazette, declare to be a watercourse as defined in the National Water Act, 1998 (Act No. 36 of 1998)

Environmental Management Programme Bruintjieslaagte Dam – Devil’s Creek - Schoemanskloof

1. INTRODUCTION

Enpact Environmental Consultants CC was appointed by the applicant to compile the Environmental Management Programme (EMPr) as part of the environmental impact assessment process. This EMPr complies with the requirements in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) and the EIA Regulations, 2014.

The Environmental Management Programme prescribes and directs the management of all environmental aspects, physical, natural and/social associated with and arising from the activities that meets the thresholds of activities listed under the EIA Regulations.

This Environmental Management Programme sets out the methods and guidance by which proper environmental controls are to be implemented to minimise and remediate environmental damage.

The EMPr must be read as a whole and complete document. The provisions of this EMPr are binding on the Holder of the Authorisation and/or Contractor during the life of the contract. The EMPr must be read in conjunction with the conditions of the Environmental Authorisation for the specific project. In the event that any conflict occurs between the terms of the EMPr and the project specifications or environmental authorisation, the terms herein shall be subordinate.

The EMPr identifies the following:

- Construction activities that will impact on the environment.
- Relevant parties and their responsibilities.
- Specifications with which the Holder of the Authorisation/Contractor shall comply in order to protect the environment from the identified impacts.
- Actions that shall be taken in the event of non-compliances.

2. PROJECT OVERVIEW

Project: Bruintjieslaagte Dam – Devil’s Creek – Schoemanskloof.

Location: The dam site will be located on a Portion of the farm Bruintjieslaagte 465 JT, Devil’s Creek, Schoemanskloof, City of Mbombela Local Municipality, Mpumalanga. The site is located south west of the N4 Schoemanskloof road in The Devil’s Creek that is a tributary to the Crocodile River. Refer to Appendix 1: The locality map.

Activities:

EIA Regulations, 2014 published in the Government Notice No. R982, R983, R984 and R985 under Section 24(5) of the National Environmental Management Act, 1998 (Act No. 107 of 1998):

Listed activity:	Project description:
Description of the relevant Basic Assessment Activities as per Listing Notice 1 (GN No. R983)	
R.983, 2014: Activity 12 - The development of - (iv) dams, where the dam, including infrastructure and water surface area, exceeds 100 square metres in size; where such development occurs - (a) within a watercourse; excluding - (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such development activities are related to the	The construction of a dam with a capacity of approximately 1 000 000m ³ and surface area of approximately 13 hectares.

<p>development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such development occurs within an urban area; or (ee) where such development occurs within existing roads or road reserves.</p>	
<p>R.983, 2014: Activity 19 - The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from (i) a watercourse - but excluding where such infilling, depositing, dredging, excavation, removal or moving a) will occur behind a development setback; (b) is for maintenance purposes undertaken in accordance with a maintenance management plan; or c) falls within the ambit of activity 21 in this Notice in which case that activity applies.</p>	<p>The construction of a dam which will require the excavation, removal or moving of soil, sand or rock or/and the infilling or depositing of any material of more than 5 cubic meters.</p>
<p>R.983, 2014: Activity 27 - The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for- (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.</p>	<p>The establishment of the Brintjieslaagte dam will require the removal of more than 1 hectare of indigenous vegetation, approximately 13 hectares.</p>
<p>Description of the relevant Scoping and EIA Activities as per Listing Notice 2 (GN No. R984)</p>	
<p>R.984, 2014: Activity 16 - The development of a dam where the highest part of the dam wall, as measured from the outside toe of the wall to the highest part of the wall, is 5 metres or higher or where the high water mark of the dam covers an area of 10 hectares or more.</p>	<p>The construction of a dam with a wall height of approximately 20m and the high water mark of the dam will covers an area of approximately 13 hectares.</p>
<p>Description of the relevant Basic Assessment Activities as per Listing Notice 3 (GN No. R985)</p>	
<p>R.985, 2014: Activity 12 - The development of – (iv) dams, where the dam, including infrastructure and water surface area exceeds 10 square metres in size;</p> <p>ii. Outside urban areas, in: (bb) National Protected Area Expansion Strategy Focus areas; and (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.</p>	<p>The construction of a dam with a capacity of approximately 1 000 000 m³ and the surface area of the dam will covers an area of approximately 13 hectares.</p>

The EMPr as a guideline document sets out what needs to be considered to mitigate identified potential impacts and describes how this could be achieved. It is therefore not a specification of exact methods. The document provides a basis for managing, mitigating and monitoring the environmental impacts associated with all phases of the project in terms of NEMA, 1998 (Act No. 107 of 1998).

This EMPr is for the activities that must still take place and for rehabilitation of affected areas.

3. LEGAL REQUIREMENTS

Construction will be according to the best industry practices, as identified in the project documents. This EMPr, which forms an integral part of the contract documents, informs the Contractor as to his duties in the fulfilment of the project objectives, with particular reference to the prevention and mitigation of environmental impacts caused by construction activities associated with the project.

The Contractor should note that obligations imposed by the EMPr are legally binding in terms of environmental statutory legislation and in terms of the additional conditions to the general conditions of contract that pertain to this project. In the event that any rights and obligations contained in this document contradict those specified in the standard or project specifications then the latter shall prevail.

Statutory and other applicable legislation

The Contractor is deemed to have made himself conversant with all legislation pertaining to the environment, including provincial and local government ordinances, which may be applicable to the contract.

Major environmental legislation includes but is not limited to the following:

The Constitution, 1996 (Act No. 108 of 1996), which states that everyone has the right to an environment that is not harmful to their health or well-being, and to have the environment protected through reasonable legislative and other measures to prevent pollution and ecological degradation; promote conservation and ensure ecologically sustainable development and use of natural resources.

The National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998), which provide for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by organs of state; and provide for matters connected therewith. The most recent Environmental Impact Assessment Regulations that were promulgated in terms of this Act was in 2010.

Environmental Regulations in Terms of Chapter 5 of NEMA, 1998, Regulations R982, R983 and R984 of 2014 describing the procedures and criteria for the submission, processing and consideration and decision of applications for environmental authorisation for activities and for matters pertaining thereto.

National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) makes provisions to accomplish the objectives of the United Nations’ Convention on Biological Diversity.

The Environment Conservation Act, 1989 (Act No. 73 of 1989) provides for the effective protection and controlled utilisation of the environment and for matters incidental thereto.

The Conservation of Agricultural Resources Act (CARA), 1983 (Act No. 43 of 1983) provides for control over the utilisation of the natural agricultural resources of South Africa in order to promote the conservation of soil, water sources and vegetation, as well as combating weeds and invader plants.

The Mpumalanga Conservation Act, 1998 (Act No. 10 of 1998), consolidate and amend the laws relating to nature conservation within the Province and to provide for matters connected therewith.

National Water Act, 1998 (Act No. 36 of 1998), makes provision for the protection of surface water and groundwater and their sustainable management for the prevention and remediation of the effects of pollution, as well as for the management of emergency situations.

National Veld and Forest Fire Act, 1998 (Act No. 101 of 1998), the purpose of this Act is to prevent and combat veld, forest and mountain fires. The applicant must be aware of the duty on owners to prepare and maintain firebreaks irrelevant of the applied for activities or the proposed land use.

The Water Services Act, 1997 (Act No. 108 of 1997), makes provision for the rights of access to basic water supply and basic sanitation and for the setting of national standards and norms and the regulation of water administration.

Occupational Health and Safety Act, 1993 (Act No. 85 of 1993), aims to provide for the health and safety of persons at work and for the health and safety of persons in connection with the activities of persons at work and to establish an advisory council for occupational health and safety.

Promotion of Access to Information Act (Act No. 2 of 2000), to give effect to the constitutional right of access to any information held by the state and any information that is held by another person and that is required for the exercise or protection of any rights; and to provide for matters connected therewith.

National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) makes provisions to accomplish the objectives of the United Nations’ Convention on Biological Diversity.

National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004), provides reasonable measures for the prevention of pollution and ecological degradation; and provides for specific air quality measures; for national norms and standards regulating air quality monitoring, management and control by all spheres of government.

National Environment Management: Waste Act, 2008 (Act No. 59 of 2008), aims to regulate waste management practices through provision of national norms and standards; specific waste measures; licensing and control of waste activities; remediation of contaminated land; as well as providing for compliance and law enforcement.

4. ENVIRONMENTAL MANAGEMENT AND RESPONSIBILITIES

The implementation of this EMPr requires the involvement and cooperation of all the role players involved in the project. Each will fulfil different but important roles as outlined in this document to ensure sound environmental management during the project specifically the construction phase. This EMPr includes conditions that must be specifically monitored and/or implemented by the following role players:

Table 1: Typical roles and responsibilities

Roles/Party	Responsibility
Competent Authority	The Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs (MDARDLEA) is the designated authority responsible for authorising and enforcing the EMPr.
Holder of the Authorisation	The Holder of the Authorisation is ultimately responsible for compliance with the conditions as set out in the approved EMPr and authorisation in order to comply with environmental legislation. Duties include: a) Responsible for compliance with the provisions of the Duty of Care and Rehabilitation of Environmental Damage contained in Section 28 of the NEMA;

Roles/Party	Responsibility
	<ul style="list-style-type: none"> b) Ensuring that the necessary environmental authorisations and permits have been obtained; c) Finding environmentally responsible solutions to activity related environmental problems and following all guidelines as set out in the EMPr; d) Issuing instructions to the contractor where environmental considerations call for action to be taken; e) Instituting action against transgressions i.e. instituting a fine system, including ordering the removal of person(s) and/or equipment not complying with the EMPr specifications.
<p>Environmental Control Officer (ECO)</p>	<p>An independent appointment by the Holder of the Authorisation to objectively monitor/audit the implementation of the EMPr and the conditions of the authorisation for a particular project during the construction period/specified period through audits conducted at a specified frequency. The ECO must remain employed until all rehabilitation measures as well as the site clean-up is completed and the site is handed over to the Holder of the Authorisation for operation. The ECO must have the necessary expertise or access to specialist input as may be required for the size and environmental sensitivity of a particular project, and shall give recommendations and communicate effectively with the other role-players.</p> <p>Duties of the ECO includes:</p> <ul style="list-style-type: none"> a) Keep a copy of the Environmental Authorisation and all applicable permits, licences on site. b) Establish an effective environmental control program and routine management, liaison and reporting systems and prepare management reports. c) Audit the site at least once a month or on a frequency as specified in the authorisation. Reports must be made available on request to Interested and Affected Parties and as specified in the Authorisation to the MDARDLEA. d) Advise the Holder of the Authorisation/Contractor on environmental issues or incidents during implementation of the EMPr and advise them of actions required. The results are to be included in the monthly report. e) Ensure continuous auditing of the activities during all phases for adherence to the EMPr. f) Identify problem areas and provide action plans to avoid further environmental damage. g) Review the Contractor's proposals for pollution control measures and advise on their adequacy. h) Ensure that any significant environmental incidents are reported to the MDARDLEA. i) Keep a site dairy (record complaints received on site and resolutions thereto, non-compliances as well as instructions) and copies of all environmental reports submitted to the MDARDLEA. Complaints shall be investigated within 24 hours, corrective action implemented and feedback should be given to the complainant on the remedial action taken. j) Ensure that open communication lines exist to receive and resolve any problems or complaints from the public.

Specific implementation and monitoring roles are highlighted in the environmental mitigation table.

5. ENVIRONMENTAL AWARENESS PLAN AND TRAINING

The Holder of the Authorisation/Contractor shall ensure that adequate environmental training takes place. All employees must have been given an induction presentation on environmental awareness to understand the obligations in terms of the EMPr.

Where possible, the presentation needs to be conducted in the language of the employees and aim to:

- ❖ Inform all the staff/workers of the environment they will work in and the sensitivity with regards of certain areas and/or aspects;
- ❖ Explain certain aspects and the general measures that should be implemented in order to meet the requirements of the EA and EMPr.
- ❖ Training must be recorded and an attendance register kept.

6. REPORTING AND RECORD KEEPING

The Holder of the Authorisation must programme his work in such a way that the cause and effect of the authorised activity is identified and the activity planned so as to prevent any impact from happening.

If prevention is not practicable, or in the event of accidents or misapplications, the Holder of the Authorisation shall provide plans and measures, which will limit the magnitude, duration and intensity of the impact.

The ECO shall review the environmental management performance of the Holder of the Authorisation on a regular basis. The party shall be deemed not to have complied with the EMPr if:

- There is evidence of the contravention of any of the conditions of the EMPr.
- The person fails to comply with corrective or other instructions by the Environmental Control Officer.
- The person fails to respond to complaints from the public.
- The staff is found removing vegetation, entering neighbouring areas or cause disturbances due to unacceptable behaviour.

The ECO should document the nature and magnitude of the non-compliance in a designated register, the action taken to discontinue the non-compliance, the action taken to mitigate its effects and the results of the actions.

The Holder of the Authorisation shall advise the ECO of any emergencies on Site, together with a record of action taken, within 24 hours of the emergency occurring. Such emergency shall be reported to the holder of the EA.

Any non-compliance with the agreed procedures of the EMPr is a transgression of the various statutes and laws that define the manner by which the environment is managed.

Failure to redress the cause shall be reported to the relevant authority. The responsible provincial or national authorities shall ensure compliance and impose penalties relevant to the transgression as allowed for within its statutory powers.

Table 2: Typical task table

Responsible party	Task	Frequency
Holder of Authorisation (representative) and/or Contractor	Visual Inspections	Daily
Environmental Control Officer	Site Inspections and Compliance Audits	Monthly
	Environmental Audit Reports	Monthly or as prescribed by MDARDLEA

7. PROJECT ACTIVITIES AND MANAGEMENT STATEMENTS

The EMPr mainly addresses the construction phase and rehabilitation of affected areas.

General measures are prescribed for the activities, which will entail that some potentially occurring impacts are minimised or prevented.

This project/activity does not have any decommissioning or closure aspects.

Table 3: Summary of the activities, aspects and impacts/risks that need to be avoided and/or mitigated

Activities and management aspects		Aspects	Potential impacts
1.	Planning <ul style="list-style-type: none"> ▪ Demarcation of areas to be cleared (reservoir and stream crossings) 	<ul style="list-style-type: none"> ➤ Site demarcation 	<ul style="list-style-type: none"> ➤ Loss of and disturbance of ground cover, indigenous vegetation and creation of hard surfaces ➤ Loss of conservation important species (terrestrial and riparian) ➤ Loss of topsoil and soil conditions
2.	Site clearance <ul style="list-style-type: none"> • Clearance of vegetation from stream crossings 	<ul style="list-style-type: none"> ➤ Vegetation loss ➤ Removal of groundcover ➤ Disturbance of soils ➤ Creation of hard surfaces ➤ Generation of waste (removed vegetation) 	<ul style="list-style-type: none"> ➤ Loss of ground cover and vegetation ➤ Loss of conservation important fauna/flora ➤ Impoverishment/degrading/fragmentation of terrestrial and aquatic habitat and environment ➤ Surface water pollution
3.	Fauna and flora management <ul style="list-style-type: none"> • Removal of aquatic vegetation • Drainage lines, riparian areas • Alien vegetation eradication and control 	<ul style="list-style-type: none"> ➤ Removal of vegetation ➤ Earthworks where activities occur close to and within watercourses ➤ Alien vegetation eradication and control 	<ul style="list-style-type: none"> ➤ Fragmentation and loss of habitat ➤ Loss of conservation important species ➤ Loss of fauna & flora and onsite biodiversity ➤ Degradation of aquatic ecosystems ➤ Increase in the invasion of alien vegetation
4.	Soil management <ul style="list-style-type: none"> • Soil disturbance – stream crossings 	<ul style="list-style-type: none"> ➤ Exposing of soil surfaces ➤ Creation of hard surfaces ➤ 	<ul style="list-style-type: none"> ➤ Loss of topsoil ➤ Soil pollution ➤ Erosion and siltation, sedimentation ➤ Surface water pollution
5.	Water management <ul style="list-style-type: none"> • Surface water 	<ul style="list-style-type: none"> ➤ Earthworks close to and within water resources ➤ Discharge of storm water into receiving environment ➤ Erosion protection measures ➤ Pollution control measures 	<ul style="list-style-type: none"> ➤ Surface water pollution (quality and quantity) ➤ Loss of aquatic fauna and flora ➤ Impacts on downstream receiving environment ➤ Changes to morphology, hydrology, flow, biota – erosion and sedimentation
6.	Waste management <ul style="list-style-type: none"> • Removed vegetative material 	<ul style="list-style-type: none"> ➤ Handling of removed vegetation & ground cover 	<ul style="list-style-type: none"> ➤ Impoverishment of and sedimentation of surface water resources
7.	Alien plant control, stabilisation of site/s <ul style="list-style-type: none"> • Alien plant control • Erosion and sedimentation control 	<ul style="list-style-type: none"> ➤ Removal of alien plant vegetation ➤ Stabilising of unprotected soil surfaces 	<ul style="list-style-type: none"> ➤ Negative impacts on receiving environment ➤ Loss of topsoil ➤ Surface water pollution ➤ Further and on-going erosion and sedimentation

Table 4: Impact Significance summary identifying the impacts and risks that need to be avoided and/or mitigated

IMPACT ASSESSMENT TABLE							
Impact description	Period	Extent	Duration	Intensity	Probability	Significance pre-mitigation	Significance post mitigation
Air pollution – dust	Construction	Local	Short	Low	Probable	Low	Low
Air pollution – smoke	Construction	Local	Short	Medium	Probable	Medium	Medium
Geology Excavation of soil for dam wall	Construction	Local	Short	Medium	Probable	Medium	Low
Riparian vegetation	Construction Operations	Local	Long term	Low	Definite	Low	Low
Wetlands	Construction Operations	Local	Long term	Low	Definite	Low	Low
Invasion of weeds and alien vegetation	Construction Operations	Site	Long	Medium	Probable	Medium	Low
Impact on fauna	Construction	Site	Short	Medium	Probable	Low	Low
Terrestrial Loss of vegetation	Construction	Site	Long term	Low	Definitely	Low	Low
Terrestrial Loss of conservation important flora & fauna	Construction	Site	Long term	Medium	Probable	Medium	Low
Terrestrial Invasion of weeds and alien vegetation	Construction Operations	Site	Long term	Medium	Probable	Medium	Low
Impact on fauna	Construction	Site	Short	Medium	Probable	Low	Low
Avifauna Loss of habitat – avifauna general	Construction Operations	Local	Long term	Low	Probable	Low	Low
Avifauna Loss of habitat – blue swallow	Construction Operations	Local	Long term	Low	Probable	Medium	Low
Disruption of breeding cycle – blue swallow	Construction	Local	Short	Medium	High	Medium	Low
Loss of archaeological site							
BL 1	Construction	Site	Short	Low	Unlikely	Low	Low
BL 2	Construction	Site	Long term	High	Definite	High	Medium
BL 3	Construction	Site	Short	Low	Unlikely	Low	Low
BL 4 & BL 4B	Construction	Site	Long term	High	Definite	High	Medium
BL 5	Construction	Site	Short	Low	Unlikely	Low	Low
BL 6	Construction	Site	Short	Low	Unlikely	Low	Low
BL 7	Construction	Site	Short	Low	Unlikely	Low	Low
Palaeontology impact	Construction	Local	Long term	Low	Unlikely	Low	Low
Socio- Economic Water quality –suspended solids	Construction	Regional	Short	Low	Unlikely	Low	Low

Socio-economic Water quantity in Crocodile River	Operations	Regional	Long term	Low	Probable	Medium	Low
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Potential Impact	Impacts Before Mitigation						Impacts After Mitigation					
	I	D	E	P	Total	Significance	I	D	E	P	Total	Significance
Construction Phase												
Disturbance of Riverine Habitats	-7	7	2	7	-112	Major (-)	-7	7	1	7	-105	Moderate (-)
Impact of Water Quality Deterioration on River Ecosystems	-6	2	3	7	-77	Moderate (-)	-1	2	3	7	-42	Minor (-)
Operational Phase												
Inundation of Riverine Habitats	-7	7	1	7	-105	Moderate (-)	-7	7	1	7	-105	Moderate (-)
Impact of Altered Water Quality on River Ecosystems	-5	7	3	7	-105	Moderate (-)	-4	7	3	7	-98	Moderate (-)
Impact of Altered Hydrology on River Ecosystems	-6	5	4	7	-105	Moderate (-)	-2	5	3	7	-70	Minor (-)
Impact of Alien and/or Translocated Fish	-4	7	3	7	-98	Moderate (-)	-4	7	3	4	-56	Minor (-)
Bed Armouring	-2	7	3	6	-72	Minor (-)	-2	7	3	6	-72	Minor (-)

8. MANAGEMENT OBJECTIVES

The objectives of the EMPr and the mitigation measure proposed to be implemented are to ensure that the biophysical and social environments receive due consideration during the planning and construction period. It will also outline guidelines for the sound management of environmental issues during the construction period.

This document provides detailed specifications for the management and mitigation of activities that have the potential to impact negatively on the environment. The measures prescribed aims to result in a cautious approach being applied to on-site environmental management to ensure prevention, minimising and remediation of potential impacts.

Furthermore, where opportunities arise to improve the biophysical and social environmental quality it should be investigated and implemented as appropriate (for example alien plant control, and erosion control in the streams, drainage lines and riparian areas).

The objectives of the EMPr are guided by the NEMA and EIA Regulations with the focus of ensuring sustainable development over the longer term.

A copy of the Environmental Authorisation and this EMPr must be available at the site/s at all times. Relevant staff must be acquainted with the contents of the documentation.

9. MANAGEMENT OUTCOMES

The EMPr should guide the Holder of the Authorisation and it should be implemented as an auditing list during the commencement of the authorised activities. Mitigation measures have been indicated for each management aspect or activity that may potentially result in impacts on the receiving environment. Refer to table 4 for the identified impacts and rated significance as well as the expected significance for each impact after mitigation is implemented.

Compliance with the EMPr should be monitored by the ECO and Department.

The management outcome of each identified measure is to prevent, minimise and/or remediate potential impacts to a degree that is environmentally acceptable.

10. PROJECT-SPECIFIC CONDITIONS

All the conditions as set out in the environmental authorisation is specific to this project and are to be read in conjunction with all other environmental documentation and permits. The conditions set out are proposed for the construction and operation of the Bruintjieslaagte dam and rehabilitation of areas affected by construction for which authorisation is required.

The discovery of any sites with archaeological or historical interest that have not been identified must be treated as specified in the EMPr. Implementation and monitoring of the proposed measures will ensure due consideration of the natural environment.

ENVIRONMENTAL MANAGEMENT MEASURES: PLANNING AND CONSTRUCTION

Activity/Aspect / Impact	Mitigation Required	Responsibility	Frequency/ Implementation
PLANNING AND DESIGN PHASE			
1. General			
1.1 Heritage and Archaeology	<ul style="list-style-type: none"> ▪ Detailed mapping and archaeological excavation of the identified stonewall sites, as described in the Heritage Report must be completed timeously to obtain the permit from SAHRA. ▪ The Permit from SAHRA for the destruction of the stonewall structures must be available before any construction activity may impact on these structures. 	Holder of Authorisation Kudzala Antiquity	Prior to start of construction
1.2 Blue Swallows	<ul style="list-style-type: none"> ▪ Support a project to determine the population size, number of breeding pairs, foraging areas and nesting and breeding sites of the Blue Swallows in the area in conjunction with the Endangered Wildlife Trust (EWT) and the Blue Swallow Working Group. ▪ Establish a monitoring program for the Blue Swallows in conjunction with the EWT and Blue Swallows Working Group. ▪ Investigate the viability in conjunction with the Blue Swallow Working Group to create artificial nesting sites in suitable areas (Dr Garth Batcher’s suggestion). ▪ Plan construction period for the months May to mid-August when Blue Swallows are not present in the area. 	Holder of Authorisation Enpact Environmental EWT Blue Swallow Working Group	From September 2017 when Blue Swallows return
1.3 Protected Area Status of the Bruintjeslaagte farm	<ul style="list-style-type: none"> ▪ Enter into discussions with the relevant regulating authority to include the Bruintjeslaagte farm into the National Protected Area Expansion Strategy. ▪ Obtain formal protected area status for the Bruintjeslaagte farm and enter into the required contractual agreement with the regulating authority. ▪ Develop in conjunction with the regulating authorities an environmental and game management plan for the protected area. This plan should include avifauna, terrestrial fauna and flora, riverine and aquatic ecology (including fish). 	Landowner Enpact Environmental Regulating Authority	June 2017 until completion
1.4 River Ecosystems	<ul style="list-style-type: none"> ▪ Stream Diversion: Prior to construction a pipeline with sufficient capacity to carry dry season flows should be installed to divert the stream during construction to ensure that turbidity in the river downstream of construction is not impacted. The pipeline should be sized to carry at least 119 l/s, a recommendation based on the 10th percentile natural flows. The outlet of the pipe should be positioned in the river to prevent erosion, and stabilised with gabions if necessary. ▪ Construction Schedule. Construction of the dam should be planned for the low-flow period 	Holder of Authorisation Engineer Contractor	Planning and design. Prior to start of construction and throughout construction phase
CONSTRUCTION PHASE			
2. Site establishment and general aspects			
2.1 Construction site Potential impacts: <ul style="list-style-type: none"> ○ Noise ○ Air pollution ○ Surface and ground water pollution 	<ul style="list-style-type: none"> ▪ The construction area must be clearly demarcated before the start of construction. ▪ Construction camps, laydown and storage areas, re-fuelling and parking should be located at least 50m from any stream or wetland. ▪ The site must be maintained in an orderly and tidy condition. ▪ Throughout the period of construction, the Contractor must restrict all activities to within the designated areas as indicated on the approved layout plan. 	Contractor ECO	Start of project

Activity/Aspect / Impact	Mitigation Required	Responsibility	Frequency/ Implementation
<ul style="list-style-type: none"> ○ Impacts on terrestrial and aquatic environments ○ Health, safety and security 	<ul style="list-style-type: none"> ▪ The employees must be informed to stay within demarcated boundaries. The restriction of movement of construction staff must be made a condition of contractor’s being awarded any contract. 		
<p>2.2 Ablution facilities</p> <p>Potential impacts:</p> <ul style="list-style-type: none"> ○ Health impacts ○ Surface and ground water pollution ○ Soil disturbances ○ Air quality (odours) 	<ul style="list-style-type: none"> ▪ Provide dry chemical toilets or e-loos at the construction site (1:10 users). ▪ Facilities must not be located within 50m of any watercourse. ▪ The use and maintenance of latrines in a clean, orderly and sanitary condition must be enforced. 	Contractor ECO	Start and duration of project
<p>2.3 Heating, cooking and eating facilities</p> <p>Potential impacts:</p> <ul style="list-style-type: none"> ○ Health impacts ○ Ecology, fauna and flora 	<ul style="list-style-type: none"> ▪ All reasonable steps to avoid unnecessary fires must be taken. ▪ Demarcate an area for cooking purposes if required. ▪ Collection of fuel wood for fire from the site or surrounding areas is not permitted. ▪ Provide the necessary refuse bins with sealed lids at the eating area. Bins must be emptied on a regular basis at the domestic waste disposal area of the site. ▪ Bins must be animal proof and waste storage must not attract animals. 	Contractor ECO	Start and duration of project
<p>2.4 Water use</p> <p>Potential impacts:</p> <ul style="list-style-type: none"> ○ Surface and ground water pollution 	<ul style="list-style-type: none"> ▪ Potable water for human consumption and personal hygiene must be available at the construction sites. 	Contractor ECO	Start and duration of project
<p>2.5 Fires</p> <p>Potential Impacts:</p> <ul style="list-style-type: none"> ○ Ecology, fauna and flora ○ Health and safety impacts ○ Impacts on adjacent land users ○ Air quality decline 	<ul style="list-style-type: none"> ▪ All reasonable steps to avoid any fires must be taken. ▪ Open fires for cooking purposes if allowed must only be allowed at a demarcated area. ▪ The Contractor must be prepared for the event of a fire. ▪ The Contractor must take all reasonable steps to extinguish any fires where other individuals may have started a fire, either intentionally or unintentionally. ▪ Burning of wastes (paper, plastics etc.) is strictly forbidden. 	Contractor ECO	Duration of project
<p>2.6 Site clearing</p> <p>Potential impact:</p> <ul style="list-style-type: none"> ○ Loss of terrestrial ecology – important fauna and flora ○ Soil disturbances ○ Surface water pollution 	<ul style="list-style-type: none"> ▪ Utilise the method for vegetation clearing most appropriate for the environment. Use mechanical methods wherever possible. ▪ Disturbances and construction activities must be strictly limited to the affected area/construction sites. ▪ Prior to construction identify all the plants that can be relocated. Obtain the necessary permits for the disturbance of species of conservation importance. ▪ Relocate all plants into the surrounding natural environment as far as possible. Where applicable seeds can be harvested for propagation. ▪ Ahead of any construction or excavation, topsoil must be stripped and stockpiled separately from rubble or subsoil. Stored topsoil must be stored for the rehabilitation of effected areas. 	Contractor ECO	Start of project
<p>2.7 Construction - Vehicles and access roads</p> <p>Potential Impacts;</p> <ul style="list-style-type: none"> ○ Soil, Surface and ground 	<ul style="list-style-type: none"> ▪ Contain fuel, oil or chemical spills, and arrange clean up in the event of spillage. ▪ Ensure that drip trays are placed below fuel or oil leakages from parked construction equipment and construction vehicles. ▪ The Contractor must make use of existing roads. 	Contractor ECO	Construction phase

Activity/Aspect / Impact	Mitigation Required	Responsibility	Frequency/ Implementation
water pollution, Ecology, Social and land use	<ul style="list-style-type: none"> ▪ Temporary roads to and at the construction site must be avoided but where no alternatives exist, the activity must be strictly monitored, the route approved by the ECO and vegetation clearance must be kept to a minimum. The area must be appropriately rehabilitated afterwards. ▪ Where re-fuelling of construction vehicles are required, these activities must not be allowed within 50m of watercourses. Refuelling of construction vehicles and equipment must be at dedicated areas. Refuelling area must have leak-proof and sloped impermeable surface to contain spillages that may occur during refuelling of vehicles. ▪ Diesel tanks must be placed in a bunded area with a leak-proof impermeable floor. 		
3. Heritage resource management and protection			
3.1 Impact on stonewall archaeological sites	<ul style="list-style-type: none"> ▪ Detailed mapping and archaeological excavation of the identified stonewall sites, as described in the Heritage Report must be completed timeously to obtain the permit from SAHRA. ▪ The Permit from SAHRA for the destruction of the stonewall structures must be available before any construction activity may impact on these structures. ▪ Limit the destruction of the stonewall structures to the approved areas and do not remove stone or cause any damage to other stonewall areas. ▪ If any sites of cultural significance or heritage importance or graves are discovered on site during the construction period, work in the vicinity must cease immediately in that area. The area must be secured and an archaeologist should be contacted. Construction may proceed in the relevant area once agreed mitigation measures have been implemented and approval from Heritage Resources Agency has been obtained. 	Holder of Authorisation Archaeologist Contractor ECO	Planning and construction
4. Ecology – riverine, wetlands and terrestrial			
4.1 Disturbance of Riverine Habitats	<p><u>Demarcate Work Areas.</u> Construction activities in riparian zones should be minimised, and all support operations should be done outside the riparian zone. A buffer zone of at least 50 m from the edge of the riparian zone is recommended for all activities that are not needed within the riparian zone. The Full Supply Area should be demarcated where necessary, and work activities should be focussed in this area, where feasible</p> <p><u>Protect Stream Banks.</u> Reasonable steps should be taken to protect and maintain a riparian corridor on either side of the river channel to ensure that stream banks are not destabilised and to ensure that sediment transport into the river is minimised. All areas close to the river that are disturbed by bulk earthworks during construction should be protected to minimise elevated turbidity in the river. Sediment barriers in the form of berms and/or silt fences made from geotextiles and/or indigenous grasses should be placed strategically around disturbed areas to minimise sediment transport and maintain water quality.</p> <p><u>Rehabilitate Disturbed Areas.</u> Rehabilitation of disturbed areas outside the area of inundation should aim to recreate the same mix of habitats, including stream substrates that were present prior to disturbance. Seeding of grasses is a priority, particularly along drainage lines, streams and river banks.</p> <p><u>Stream Diversion.</u> The length of the stream diversion should be minimised as far as practically possible.</p> <ul style="list-style-type: none"> ▪ 	Holder of Authorisation Contractor ECO	Construction

Activity/Aspect / Impact	Mitigation Required	Responsibility	Frequency/ Implementation
<p>4.2 Impact of Water Quality Deterioration on River Ecosystems</p>	<p><u>Stream Diversion.</u> Prior to construction a pipeline with sufficient capacity to carry dry season flows should be installed to divert the stream during construction to ensure that turbidity in the river downstream of construction is not impacted. The pipeline should be sized to carry at least 119 l/s, a recommendation based on the 10th percentile natural flows. The outlet of the pipe should be positioned in the river to prevent erosion, and stabilised with gabions if necessary.</p> <p><u>Construction Schedule.</u> Construction of the dam should be restricted to the low-flow period (i.e. June to August).</p> <p><u>Manage Stormwater.</u> Stormwater runoff from access roads and all construction areas should be directed to buffer zones before reaching rivers and streams. Temporary silt fences downstream of disturbed areas should be constructed, where appropriate. Drainage ditches or sandbag bunds should prevent straight run-off of wash water, especially cement, from entering the rivers or drainage lines.</p> <p><u>House Keeping.</u> Standard practises for good housekeeping should be applied. Site tools and equipment such as pumps, compressors and generators should be placed on bermed impermeable sheeting (e.g. polyethylene or other similar material) to prevent hydraulic fluid or fuel leaks from contaminating soil or ground water.</p> <p><u>Washing and Maintenance.</u> No washing of vehicles or equipment should be located within 50 m of the river. Washing and maintenance of vehicles and equipment should be conducted in the areas designated for this purpose.</p> <p><u>Refuelling.</u> Diesel/fuel should be stored on an impermeable surface and surrounded by a bund wall, in order to ensure that accidental spillage does not pollute local soil or water resources. No refuelling should be allowed within 50 m of the river.</p>	<p>Holder of Authorisation Contractor ECO</p>	<p>Construction phase</p>
<p>4.3 Impact of Altered Water Quality on River Ecosystems</p>	<p><u>Clear woody vegetation.</u> Woody vegetation within the Full Supply Level should be removed, where feasible. The material should be either used or burnt. The ash should be removed as far as feasible to reduce impacts on nutrient levels of the dam water.</p>	<p>Holder of Authorisation Contractor ECO</p>	<p>Construction and operational</p>
<p>4.4 Impact on ecologically sensitive areas, fauna and flora</p>	<ul style="list-style-type: none"> ▪ Allow animals to escape from construction area and don't kill snakes, aardvark or any other animal found. ECO to assist in capturing of animals found on the construction site and releasing of animals outside construction area. ▪ ECO (ecologist) to survey site and identify, rescue and relocate conservation important plant species prior to start of construction. ▪ ECO to identify trees and other plant species and obtain the required permits for destruction or relocation from the DAFF or MMTPA. ▪ Ahead of any construction or excavation, topsoil and vegetation must be stripped from the required footprints and kept to be spread over areas that need to be rehabilitated on completion of construction. ▪ Boundaries of construction area must be demarcated before start of construction. 	<p>Holder of Authorisation Contractor ECO</p>	<p>Construction phase</p>

Activity/Aspect / Impact	Mitigation Required	Responsibility	Frequency/ Implementation
	<ul style="list-style-type: none"> ▪ Construction camp must be located at least 50m away from any stream. ▪ After construction period the construction camp area must be cleared from all concrete, buildings and hardened surface and rehabilitated. Area must be ripped, topsoil spread and indigenous grass replanted (topsoil with grass residue should re-establish vegetation cover but if not hydro seeding must be done). ▪ Fuel for construction vehicles must be stored in tanks on concrete bunded areas. ▪ Construction vehicles must be refuelled in a dedicated area on a hardened surface where spillage of diesel can be contained. ▪ Clean and rehabilitate accidental spillage of fuel or lubricants. ▪ Monitor dust generated during construction and movement of vehicles and use water spraying to reduce dust if required. ▪ Strict measures must apply where materials in powder form, such as cement, lime, concrete additives, etc. are stored, handled or used, and for the proper disposal of packaging of any such materials. ▪ Limit disturbances to the demarcated construction sites and footprints. ▪ The collection of firewood or any other plant resources by construction staff is prohibited. ▪ Temporary access and construction roads must not result in the removal of trees. Make use of existing roads and tracks. Must be strictly monitored, the route approved by the ECO and vegetation clearance kept to a minimum. The area must be appropriately rehabilitated afterward. ▪ All reasonable steps to avoid spreading of any fires must be taken. ▪ Burning of woody material must be done inside the footprint area of the dam. ▪ Engineering designs, methods and specifications should be strictly adhered to. ▪ Target and control alien invasive plants at the construction site and dam area in general. 		
<p>4.4 Alien vegetation Potential impacts:</p> <ul style="list-style-type: none"> ○ Invasion of alien plant species 	<ul style="list-style-type: none"> ▪ Any proclaimed weed or alien species that propagates during the contract period where construction activities are taking place must be controlled in terms of the Conservation of Agricultural Resources Act. ▪ An alien plant eradication and management programme should be set up for the development area including areas already affected by alien plants. ▪ Areas invaded by alien species should be cleared in the appropriate manner and rehabilitated with indigenous species. ▪ Cleared areas must be stabilised and rehabilitated as soon as possible in order to minimise the risk of an increase in alien vegetation. 	<p>Holder of Authorisation Contractor ECO</p>	<p>Construction and operational phase</p>
5. Soil management			
<p>5.1 Management of geotechnical constraints Potential impacts:</p> <ul style="list-style-type: none"> ○ Erosion ○ Soil pollution 	<ul style="list-style-type: none"> ▪ Geotechnical conditions must be taken into consideration with the construction of dam wall and overflow. ▪ Refuelling of construction vehicles and equipment must be at dedicated areas. Refuelling area must have leak-proof and sloped impermeable surface to contain spillages that may occur during refuelling of vehicles. ▪ Diesel tanks must be placed in a bunded area with a leak-proof impermeable floor. ▪ Oil or diesel spillage on the construction site must be cleaned and the soil rehabilitated by a suitable specialist. 	<p>Holder of Authorisation Contractor ECO</p>	<p>Planning, Construction phase</p>
<p>5.3 Erosion protection Potential impacts:</p> <ul style="list-style-type: none"> ○ Erosion of currently undisturbed areas ○ Loss of topsoil 	<ul style="list-style-type: none"> ▪ Site appropriate mitigation must form a part of the plan to prevent and reduce the risk of any potential erosion. ▪ Areas sensitive to erosion should be protected using the appropriate measures. ▪ Prevent creation of an erosion prone construction site which may result in sedimentation of streams. ▪ Corrective actions have to be taken as and when required to stop any signs of erosion. 	<p>Holder of Authorisation Contractor ECO</p>	<p>Construction phase</p>

Activity/Aspect / Impact	Mitigation Required	Responsibility	Frequency/ Implementation
6. Water management – general			
<p>6.1 Surface, ground and stormwater management Potential impacts:</p> <ul style="list-style-type: none"> o Surface water pollution o Ground water pollution 	<ul style="list-style-type: none"> ▪ The construction site/areas should be clearly demarcated and construction activities must be strictly controlled. ▪ From the start of construction surface and stormwater management appropriate for the receiving environment must be implemented. ▪ Surface and stormwater must be managed and controlled and the flow of water must not be cause erosion. ▪ Remove all temporary sedimentation control structures and construction materials from water resources immediately after construction at the specific site/area is completed. ▪ No surface stormwater generated as a result of the activities may be channelled directly into any wetland, watercourse or riparian zone. ▪ Topsoil must be appropriately stockpiled and protected from storm water and erosion. Refer to the impacts assessed under geology and soil conditions. ▪ Encourage the infiltration of unpolluted surface water into the ground where possible. ▪ Any point of overland discharge must be located at least 30m away from any watercourse, wetland or riparian zones. It must occur over an area that has at least 80% vegetation cover. ▪ Engineering designs, methods and specifications should be strictly adhered to. ▪ Where erosion at the base of swales or channels or outlets from any pipe structures are likely to occur, inverts must be armoured to obviate scour and where appropriate swales must be grassed or lined. ▪ The current flow regime of watercourses may not be altered unless specifically authorised. 	Holder of Authorisation Contractor ECO	Planning, Construction phase
<p>6.2 Pollution control Potential impacts:</p> <ul style="list-style-type: none"> o Surface water pollution and potential erosion 	<ul style="list-style-type: none"> ▪ Runoff must be controlled. Prevent the discharge of water containing polluting matter or visible suspended materials. ▪ Storm water management must prevent run-off of contaminated storm water and must not result in increased flow velocity that may cause erosion. ▪ Dedicate storage areas for the collection of construction rubble and domestic wastes at least 50m away any watercourses, wetlands and riparian zones. This area should be bunded and not result in polluted run-off. ▪ No construction related facilities (camps, toilets, storage areas, concrete mixing or batching plants, stockpiles) must be permitted within 50 m from water resources. ▪ Contain fuel, oil or chemical spills, and arrange clean up in the event of spillage. ▪ Construction vehicles and equipment should be properly maintained and any spillages should be cleaned immediately. ▪ Should the onsite refuelling of vehicles be required, it should take place in a dedicated area on an impermeable hardened surface to prevent soil or water contamination. ▪ Where pollution of the water resource may potentially occur, the Contractor must ensure adequate measures are in place to prevent pollution. ▪ Any spillages of pollutants must be contained and cleaned immediately. ▪ Emergency spillage clean up measures must be put in place for the project to quickly and efficiently clean up all spillages of potential pollutants on site. 	Holder of Authorisation Contractor ECO	Construction phase

Activity/Aspect / Impact	Mitigation Required	Responsibility	Frequency/ Implementation
	Batching sites: <ul style="list-style-type: none"> ▪ Carefully control all on-site operations that involve the use of cement or concrete. ▪ Concrete/cement mixing areas must be well-bunded on an impermeable surface and not within 50m from any watercourses or riparian zones. ▪ Runoff must be controlled. Minimise the mixing area. ▪ Prevent the discharge of water containing polluting matter or visible suspended materials. 		
7. Air quality			
7.1 Dust emissions Potential impacts: <ul style="list-style-type: none"> ○ Air quality decline 	<ul style="list-style-type: none"> ▪ Dust generation as a result of construction activities must be minimised. ▪ Enforce speed limits for construction vehicles onsite. ▪ Appropriate dust suppression techniques must be administered. Water used for such purposes should not result in increased run-off and pollute surface water. ▪ Excavation, handling and transport of erodible materials must be avoided during periods of excessive wind. ▪ Exposed soil surfaces must be appropriately re-vegetated, covered with indigenous vegetation or stabilised as soon as practically possible. ▪ Strict measures must apply where materials in powder form, such as cement, lime, concrete additives, etc. are stored, handled or used, and for the proper disposal of packaging of any such materials. ▪ No onsite burning of any wastes, papers or any other construction rubble must be allowed. 	Holder of Authorisation Contractor ECO	Construction phase
8. Visual impact –general			
8.1 Visual Potential impact: <ul style="list-style-type: none"> ○ Negative visual impact on surrounds 	<ul style="list-style-type: none"> ▪ The Holder of the Authorisation must undertake “good housekeeping” practices during all phases of the project. ▪ During construction domestic and construction waste must be stored at a demarcated area and removed on a regular basis. ▪ Areas where litter is stored must not be attractive to animals. ▪ Ensure that no uncontrolled dumping or spillage of wastes of take place. ▪ Excess concrete, rubble or other material must be disposed of in areas designated specifically for this purpose. ▪ The disturbed or must be rehabilitated or re-vegetated soon after construction. 	Holder of Authorisation Contractor ECO	Construction phase
9. Noise management			
9.1 Noise and vibration Potential impacts: <ul style="list-style-type: none"> ○ Construction noise may impact on terrestrial fauna 	<ul style="list-style-type: none"> ▪ The Contractor must endeavour to keep noise generating activities to a minimum. ▪ All noise-making equipment must be turned off when not in use. ▪ Noise during construction should be controlled at the source. Equipment control must be used to reduce the potential impact during construction. ▪ The construction activities must take place only during day time hours. 	Holder of Authorisation Contractor ECO	Construction phase
10. Waste management –general			
10.1 Solid waste, construction waste and rubble Potential impacts: <ul style="list-style-type: none"> ○ Surface water pollution ○ Visual ○ Odours and nuisances 	<ul style="list-style-type: none"> ▪ No on site littering or dumping of waste of any nature must be allowed. ▪ No waste may be burned or buried on site. Littering and pollution must be prevented. ▪ Waste must be collected at demarcated areas only and regularly disposed of at a controlled site. ▪ Litter must not attract or pose a threat to animals. 	Holder of Authorisation Contractor ECO	Construction phase

Activity/Aspect / Impact	Mitigation Required	Responsibility	Frequency/ Implementation
11. Health, safety and security			
11.1 General Potential impacts: <ul style="list-style-type: none"> o Construction activities may pose certain health and safety risks to workers and the public 	<ul style="list-style-type: none"> ▪ The contractor must comply with the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993). ▪ Engineering supervision should ensure that environmental, health and safety aspects are observed by the contractors during the construction activities on the site. 	Holder of Authorisation Contractor ECO	Start of construction and during construction phase
12. OPERATIONAL PHASE			
12.1 Rehabilitation of all disturbed areas Potential impacts: <ul style="list-style-type: none"> o Lack of rehabilitation may result in further alien plant invasion, erosion and impacts on terrestrial and aquatic environments 	<ul style="list-style-type: none"> ▪ All areas disturbed during construction but not inside the FSL of the dam must be rehabilitated and suitably re-vegetated. ▪ Rehabilitation and/or restoration should be done within the shortest possible time after completion of construction activities to reduce further impacts and speed up recovery. ▪ All construction material and waste must be removed from the site including water resources on completion of construction activities. ▪ The standard of rehabilitation must be to the satisfaction of the ECO and the relevant authorities. ▪ Re-vegetation should be undertaken using indigenous vegetation. 	Holder of Authorisation Contractor ECO	With completion of construction activities and end of construction period
12.2 Impact of Altered Hydrology on Aquatic Ecosystems	<u>Environmental Flow Requirements.</u> Environmental flows as specified should be released at all times from the impoundment, including the period when the impoundment first fills. During normal rainfall years (non-drought), the recommended monthly low flows for the 50% time of exceedance should be implemented and monitored at J-02. This means that the minimum flows should vary seasonally between 0.036 m ³ /s (September), and 0.106 m ³ /s (in February). During drought years, the recommended monthly low flows for the 90% time of exceedance should be implemented and monitored at J-02. This means that the minimum flows during drought periods should vary seasonally between 0.017 m ³ /s (September), and 0.046 m ³ /s (in February). The natural seasonal flow variability should be maintained, and in particular, winter low flows should not exceed summer lowflows.	Holder of Authorisation	Operational
12.3 Impact of Alien and/or Translocated Fish	<u>Environmental Awareness.</u> Awareness of the potential problems of introducing fish into the new impoundment should be fostered among staff working at the dam as well as the irrigation scheme. The aim of the awareness programme should be to prevent introductions of unwanted aliens taking place. It should be noted that translocation of fish is regulated by provincial and national legislation.	Holder of Authorisation	Operational