

Appendix G – Environmental Management Programme

DUVHA POWER STATION ASH DAM, RAW AND ASH WATER RETURN DAMS SEEPAGE INTERCEPTION DRAINS IN MPUMALANGA PROVINCE

ENVIRONMENTAL MANAGEMENT PROGRAMME

OCTOBER 2019

DRAFT

PREPARED FOR: ESKOM HOLDINGS SOC LTD



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Amendments Page

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List of Abbreviations

BA	Basic Assessment
BAR	Basic Assessment Report
CA	Competent Authority
DALRRD	Department of Agriculture, Land Reform and Rural Development
DEFF	Department of Environment, Forestry and Fisheries
DHSWS	Department of Human Settlements, Water and Sanitation
DM	District Municipality
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EO	Environmental Officer
GN	Government Notice
IAP	Interested and Affected Party
km	Kilometer
m	Meter
MSDS	Material Safety Data Sheets
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NWA	National Water Act, 1998 (Act No. 36 of 1998)
OHS	Occupational Health and Safety
RE	Resident Engineer
SANS	South African National Standards

1 PURPOSE OF THE DOCUMENT

This document serves as the Environmental Management Programme (EMPr) for the pre-construction, construction and operational phase activities for the Duvha Power Station Seepage Interception Drains in Mpumalanga Province.

The EMPr contains all suitable mitigation measures proposed to manage (i.e. prevent, reduce, rehabilitate and/or compensate) the environmental impacts of the project. This document must be implemented during the pre-construction, construction and operational phase of the project.

An EMPr represents a detailed plan of action prepared to ensure that recommendations for enhancing positive impacts and/or limiting or preventing negative environmental impacts are implemented during the lifecycle of a project.

The scope of the Duvha Power Station Seepage Interception Drains EMPr is as follows:

- Establish management objectives during the project lifecycle in order to enhance benefits and minimise adverse environmental impacts;
- Provide targets for management objectives, in terms of desired performance;
- Describe actions required to achieve management objectives;
- Outline institutional structures and roles required to implement the EMPr;
- Provide legislative framework; and
- Description of requirements for record keeping, reporting, review, auditing and updating of the EMPr.

The primary objectives of the EMPr are to:

- Provide mitigation measures to limit environmental impacts, and improve management of activities thereby reducing the probability of impacts occurring; and
- Define organisational and administrative arrangements for environmental management and monitoring of the work contract, including defining the responsibilities of staff and co-ordination, liaison and reporting procedures.

2 DOCUMENT ROADMAP

The information documented serves as the EMPr for the Duvha Power Station Seepage Interception Drains. The EMPr is intended to meet all requirements as stipulated in Government Notice (GN) No. 982 of the 2014 EIA Regulations, as amended (07 April 2017), Appendix 4. **Table 1** presents the document's composition in terms of the aforementioned regulatory requirements.

Table 1: Document Roadmap

Chapter	Title	Correlation with Appendix 4 of G.N. No. 982	
1	Purpose of the Document	-	
2	Document Roadmap	-	
3	Project Background and Motivation	-	
4	Environmental Assessment Practitioners	1(a)	Details of – (i) the EAP who prepared the EMPr; and (ii) the expertise of that EAP to prepare an EMPr, including curriculum vitae.
5	Legislation and Guidelines Considered	-	
6	Roles and Responsibilities	1(i)	An indication of the persons who will be responsible for the implementation of the impact management actions contemplated in paragraph (f).
7	Monitoring and Auditing	1(g)	The method of monitoring the implementation of the impact management actions contemplated in paragraph (f).
		1(h)	The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f).
		1(k)	The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f).
		1(l)	A programme for reporting on compliance, taking into account the requirements as prescribed by the Regulations.
8	Environmental Training and Awareness Creation	1(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.
9	Environmental Activities, Aspects and Impacts	1(b)	A detailed description of the aspects of the activity that are covered by the final environmental management plan.
10	Sensitive Environmental Features	1 (c)	A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the

Chapter	Title	Correlation with Appendix 4 of G.N. No. 982	
			preferred site, indicating any areas that should be avoided, including buffers.
11	Impact Management	1(d)	Information on any proposed management or mitigation measures that will be taken to address the environmental impacts that have been identified in a report contemplated by the EIA Regulations, including environmental impacts or objectives in respect of – (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.
		1(e)	A description and identification of impact management outcomes required for the aspects contemplated in paragraph (d).
		1(f)	A description of proposed impact management sections, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (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.
		1(j)	The time periods within which the impact management actions contemplated in paragraph (f) must be implemented.
		1(l)	A programme for reporting on compliance, taking into account the requirements as prescribed by the Regulations.
	-	1(n)	Any specific information that may be required by the competent authority

3 PROJECT OVERVIEW

3.1 Project Description

Duvha Power Station generates 3600MW consisting of 6x600MW units and has been in operation for a period of 40 years. The power station gets its water supply from the Komati Water Scheme (KWS) and from the Witbank Dam.

The Duvha Power Station produces wet ash that gets pumped into an Ash Dam. The settled water is then decanted to a Low Level Ash Water Return Dam (LLAWRD), before it is pumped back to the station for reuse. A groundwater study revealed that the Ash Dam is experiencing water seepage towards the Witbank Dam, leading to groundwater contamination and possible contamination of the Witbank Dam. Polluted seepage is also emanating from the LLAWRD and High Level Ash Water Return Dam (HLAWRD).

A solution is required to prevent the groundwater seepage as Duvha Power Station's Water Use License (WUL) states that "Any water containing waste or any substance which causes or is likely to cause pollution of a water resource must be prevented from entering any water resource, either by seepage or natural flow." Department of Water and Sanitation (now the Department of Human Settlements, Water and Sanitation (DHSWS)) thus instructed Eskom to mitigate and prevent groundwater pollution. The construction of subsoil groundwater seepage interception drains at the Ash Dam, LLAWRD and HLAWRD, as well as a Raw Water Dam, is proposed to mitigate seepage from the Ash Dam and prevent contamination of the Witbank Dam.

Seepage interception drains are deemed to be the only possible solution to prevent contamination of Witbank Dam. The advantage of the system is that the seepage water will be pumped and re-used by the power station, and thus polluting of the Witbank Dam will be avoided or minimised.

In order to limit groundwater seepage from the existing Ash Dam, as well as the HLAWRD and LLAWRD, it is proposed to construct cut-off interceptor drains along sections of the perimeter of each of these dams and to convey the intercepted water to designated discharge points. The seepage interception drains will be constructed with manholes and perforated pipes. A float level switch to pump the water back to the dam will have to be installed and the process will continue as a cycle. This same system will be used for the LLAWRD and HLAWRD.

located on the Remaining Extent of Farm Duvha Kragstasie 337 JS. The Ash Dam is located 1.7km east of the Witbank Dam.

In addition to the drains, three temporary construction camp sites are proposed near the drain servitudes. **Figure 5** shows the cut-off trenches in within the proposed servitudes.

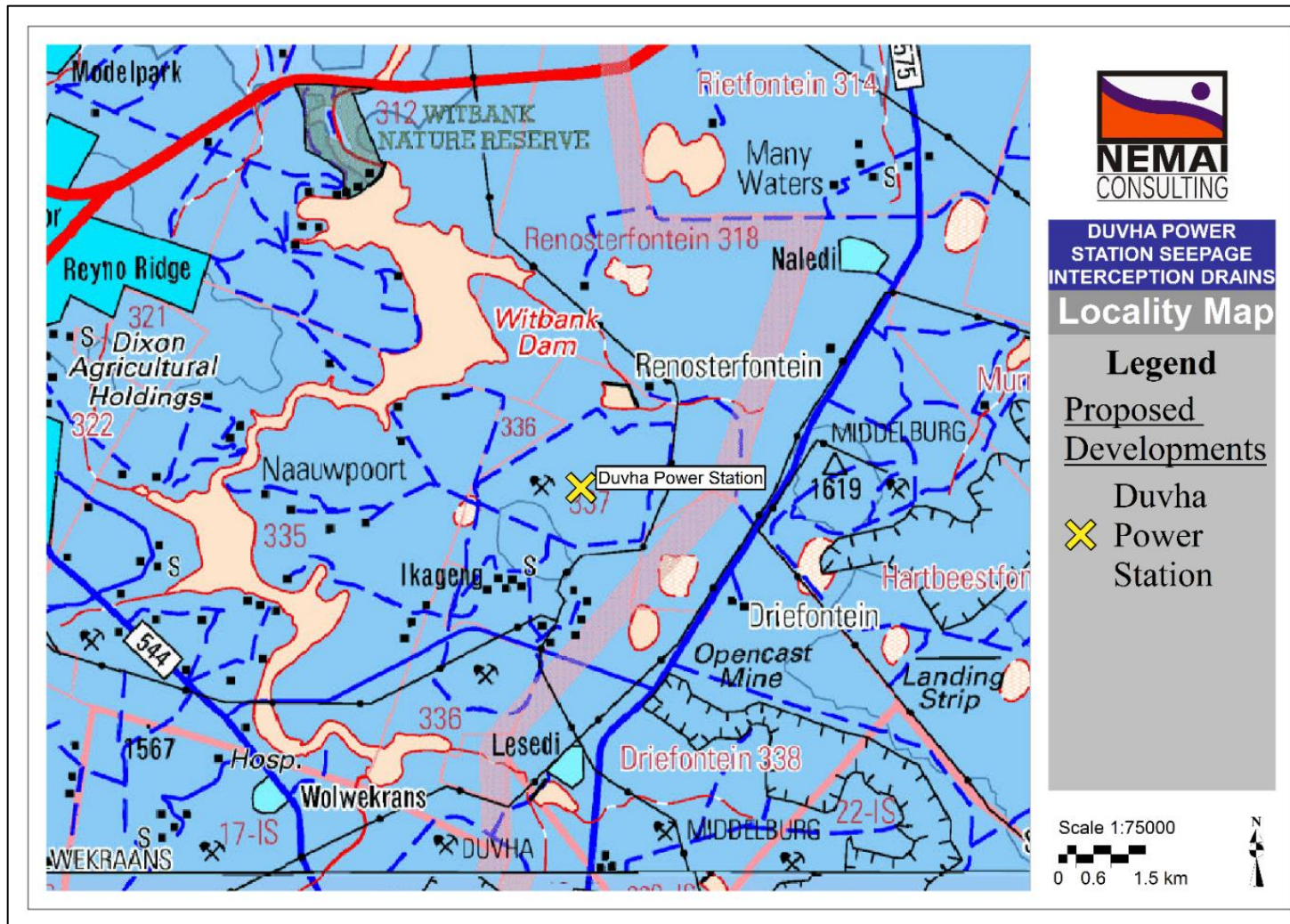


Figure 3: Regional Locality Map

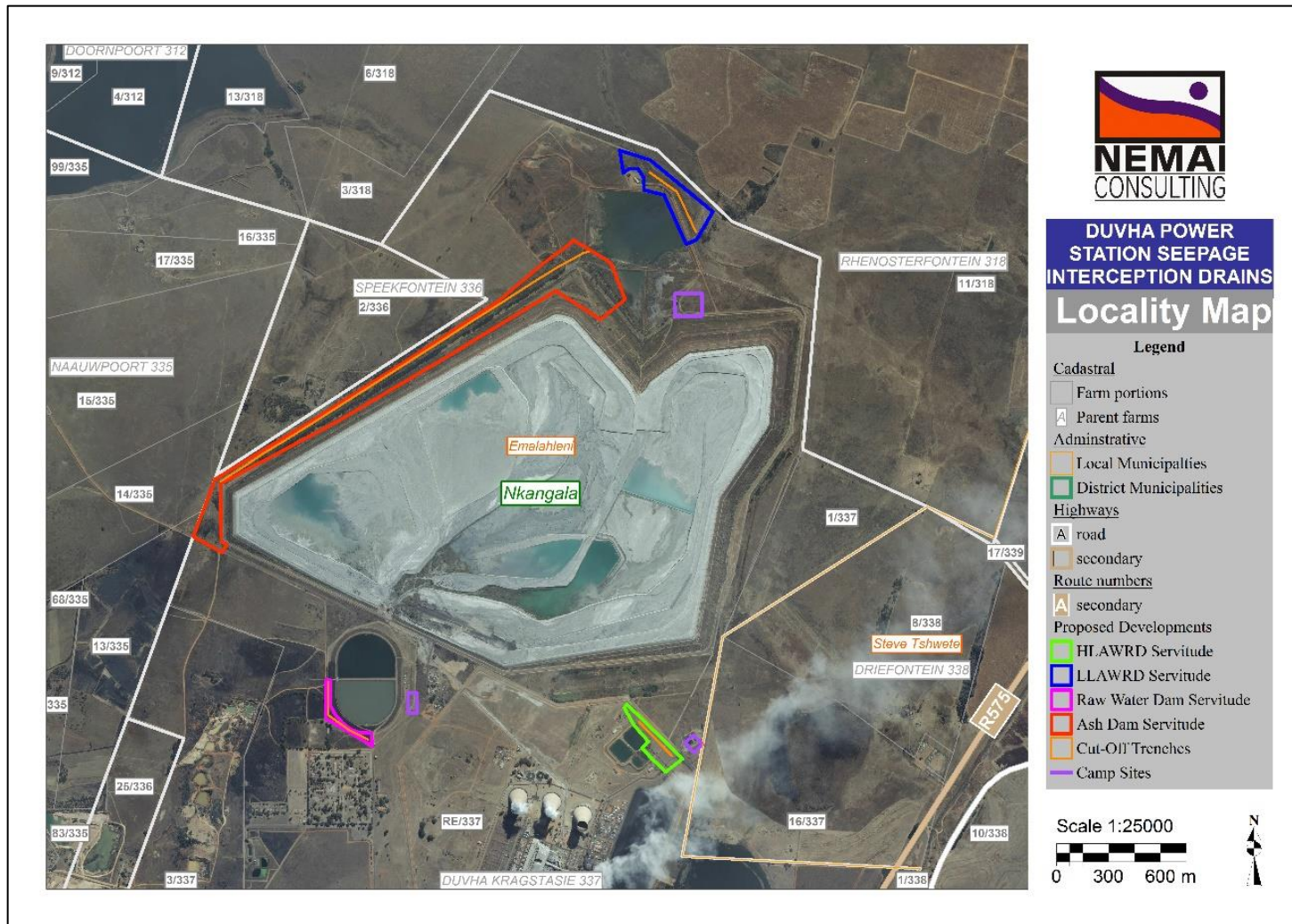


Figure 4: Locality Map

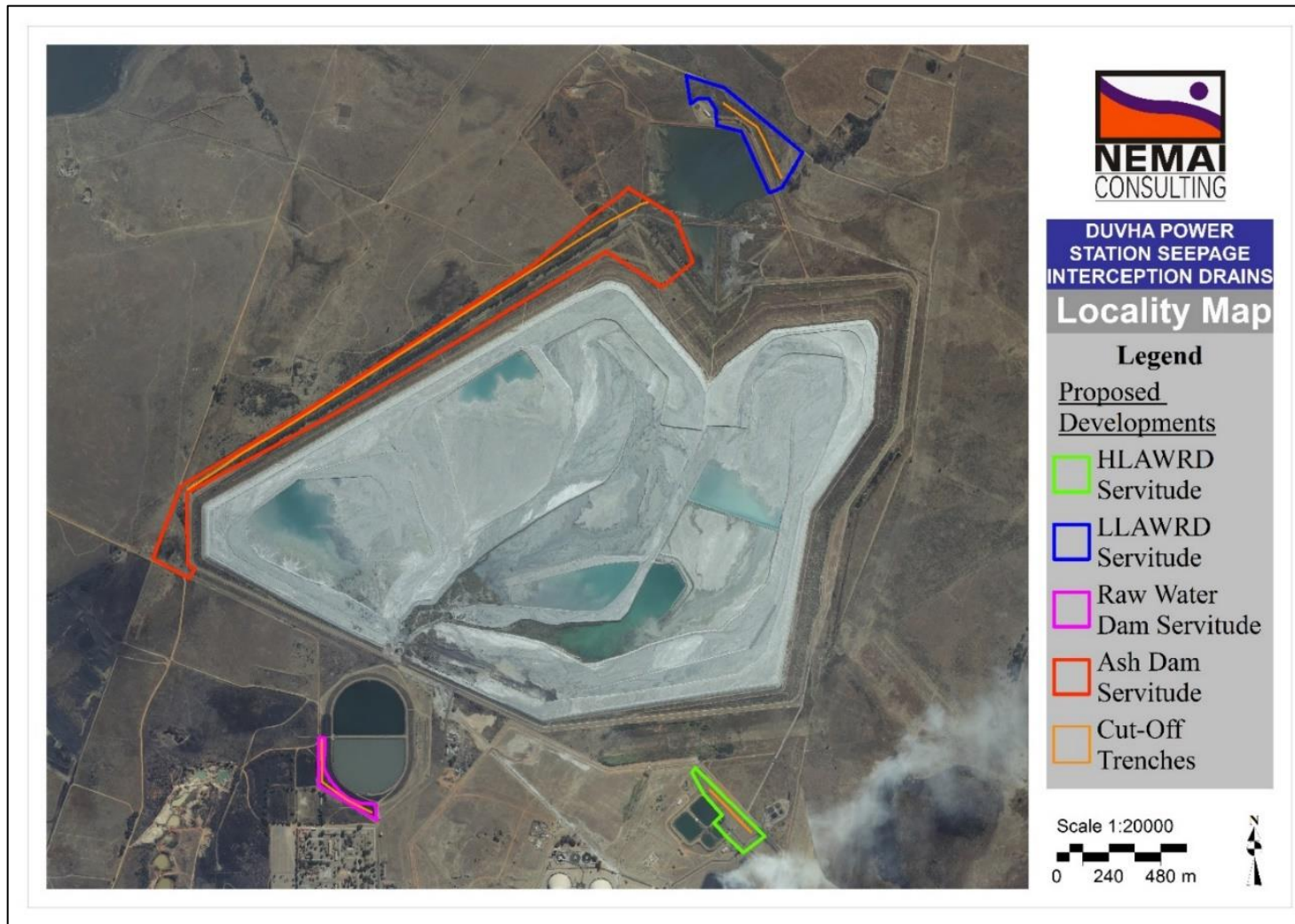


Figure 5: Locality Map indicating the cut-off drains within the servitudes

4 ENVIRONMENTAL ASSESSMENT PRACTITIONER

Nemai Consulting was appointed by Eskom Holdings SOC Ltd as the Independent EAP to undertake the Environmental Authorisation for the proposed Duvha Power Station Seepage Interception Drains. This section provides an overview of Nemai Consulting and the company's experience with Environmental Impact Assessments (EIAs), as well as the details and experience of the EAPs that form part of the Basic Assessment (BA) team.

Nemai Consulting is an independent, specialist environmental, social development and Occupational Health and Safety (OHS) consultancy, which was founded in December 1999. The company is directed by a team of experienced and capable environmental engineers, scientists, ecologists, sociologists, economists and analysts. The company has offices in Randburg (Gauteng).

The core members of Nemai Consulting that are involved with the BA Process for the proposed development are captured in **Table 2** below, and their respective Curricula Vitae are contained in to **Appendix F** of the BAR.

Table 2: BA Process core team members

Name	Qualification	Responsibility
Ms. S. Gerber	BSc Hons – Ecology, Environment, and Conservation	Environmental Assessment Practitioner
Ms. J. Davis	BSc Hons – Geography	Environmental Manager

5 LEGISLATION AND GUIDELINES CONSIDERED

5.1 Overview of Legislation

Some of the pertinent environmental legislation that has bearing on the proposed development is captured in **Table 3** below. A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process.

Table 3: Environmental Legislative Framework

Legislation	Relevance
Constitution of the Republic of South Africa (Act No. 108 of 1996)	Chapter 2 – Bill of Rights. Section 24 – environmental rights.

Legislation	Relevance
National Environmental Management Act (Act No. 107 of 1998)	Section 24 – Environmental Authorisation (control of activities which may have a detrimental effect on the environment). Section 28 – Duty of care and remediation of environmental damage. Environmental management principles. Authority – DEFF
GN. R. 982 of amended 2014 EIA Regulations (07 April 2017)	Purpose – regulate the procedure and criteria as contemplated in Chapter 5 of the Act relating to the preparation, evaluation, submission, processing and consideration of, and decision on, applications for environmental authorisations for the commencement of activities, subjected to EIA, in order to avoid or mitigate detrimental impacts on the environment, and to optimise positive environmental impacts, and for matters pertaining thereto.
GN. No. R. 983 of 2014 EIA Regulations, as amended (07 April 2017) (Listing Notice 1)	Process for undertaking BA / Scoping and EIA Processes.
GN. No. R. 984 of 2014 EIA Regulations, as amended (07 April 2017) (Listing Notice 2)	Activities that need to be assessed through a BA Process.
GN. No. R. 985 of 2014 EIA Regulations, as amended (07 April 2017) (Listing Notice 3)	Activities that need to be assessed through a Scoping and EIA Process.
National Water Act (Act No. 36 of 1998)	Chapter 3 – Protection of water resources. Section 19 – Prevention and remedying effects of pollution. Section 20 – Control of emergency incidents. Chapter 4 – Water use. Chapter 12 – Safety of dams Authority – DHSWS
National Environmental Management: Protected Areas Act (Act No. 57 of 2003)	Protection and conservation of ecologically viable areas representative of South Africa's biological diversity and natural landscapes. Authority – DEFF
National Environmental Management: Air Quality Act (Act No. 39 of 2004)	Air quality management. Section 32 – dust control. Section 34 – noise control. Authority – DEFF
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)	Management and conservation of the country's biodiversity. Protection of species and ecosystems. Authority – DEFF
National Environmental Management: Waste Act (Act No. 59 of 2008)	Chapter 5 – licensing requirements for listed waste activities (Schedule 1). Authority – Minister (DEFF) or MEC (provincial authority)
Occupational Health & Safety Act (Act No. 85 of 1993)	Provisions for Occupational Health & Safety. Authority – Department of Employment and Labour (DEL).

Legislation	Relevance
National Heritage Resources Act (Act No. 25 of 1999)	Section 34 – protection of structure older than 60 years. Section 35 – protection of heritage resources. Section 36 – protection of graves and burial grounds. Section 38 – Heritage Impact Assessment for linear development exceeding 300m in length; development exceeding 5 000m ² in extent. Authority – Mpumalanga Provincial Heritage Resource Authority (MPHRA).
National Forestry Act (Act No. 84 of 1998)	Section 15 – authorisation required for impacts to protected trees. Authority – Department of Agriculture, Land Reform and Rural Development (DALRRD).
Minerals and Petroleum Resources Development Act (Act No. 28 of 2002)	Permit required for borrow pits. Authority – Department of Mineral Resources and Energy (DMRE)
National Road Traffic Act (Act No. 93 of 1996)	Authority – Department of Transport (DoT).
Spatial Planning and Land Use Management Act (Act No.16 of 2013)	Directs and regulates planning and development in South Africa. Govern planning permissions and approvals, sets parameters for new developments and provides for different lawful land uses in South Africa. Authority – DEFF.

5.2 National Environmental Management Act, 1998

The National Environmental Management Act (Act No. 107 of 1998) (NEMA) is the overarching Act dealing with the management of the environment. The environment as referred to in NEMA does not only relate to the biophysical environment but supports the sustainability principle by including the socio-economic environment as well.

The EIA Regulations (04 December 2014, as amended) consist of the following:

- EIA procedures – Government Notice No. R. 982;
- Listing Notice 1 – Government Notice No. R. 983;
- Listing Notice 2 – Government Notice No. R. 984; and
- Listing Notice 3 – Government Notice No. R. 985.

The proposed development triggered activities under Listing Notices 1 and 3 and thus a BA Process needs to be undertaken. The listed activities are fully explained in context of the project in **Table 4**.

Table 4: Listed Activities for the proposed Duvha Power Station Seepage Interception Drains

Notice No.	Activity No.	Activity Description	Project Applicability
GN 983	12 (ii)(a and c)	The development of- (ii) infrastructure or structures with a physical footprint of 100 square metres or more where such development occurs- (a) within a watercourse (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse	As the Ash Dam servitude and LLAWRD servitude will have a physical footprint of 10 square metres or more within a watercourse, this activity will trigger.
	19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse.	The Ash Dam servitude and LLAWRD servitude fall within a watercourse, therefore this activity will trigger.
	27	The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation	The four drain servitudes and three temporary construction camp sites fall within terrestrial threatened ecosystems, namely the Rand Highveld Grassland and the Eastern Highveld Grassland, as well as fall within CBA Optimal areas. As the drains and camp sites will clear an area of indigenous vegetation larger than 1 hectare, this activity will trigger.
GN 985	12 (f)(i and ii)	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. (f) In Mpumalanga (i) Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; (ii) Within critical biodiversity areas identified in bioregional plans.	The four drain servitudes and three temporary construction camp sites fall within terrestrial threatened ecosystems, namely the Rand Highveld Grassland and the Eastern Highveld Grassland, as well as fall within CBA Optimal areas. As the drains and camp sites will clear an area of indigenous vegetation larger than 300 square metres within the Mpumalanga Province, this activity will trigger.
	14 (ii)(a and c)(f)(i)(ff)	The development of – (ii) infrastructure or structures with a physical footprint of 10 square meters or more; where such development occurs – (a) within a watercourse	The Ash Dam servitude, LLAWRD servitude, and the Raw Water Dam servitude fall within CBA Optimal areas. As Ash Dam servitude, LLAWRD servitude, and the Raw Water Dam servitude will have a physical footprint

Notice No.	Activity No.	Activity Description	Project Applicability
		(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; (f) In Mpumalanga (i) Outside urban areas: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.	of 10 square metres or more within a watercourse in the Mpumalanga Province outside the urban edge, this activity will trigger.

5.3 National Water Act (Act No. 36 of 1998) (NWA)

NWA regulates the surface and subsurface water of South Africa. Water is considered a scarce commodity and should therefore be adequately protected. Amongst others, the act deals with the protection of water sources, water uses, water management strategies and catchment management, dam safety and general powers and functions.

The purpose of the act is to ensure that South Africa's water resources are protected, used, developed, conserved, managed and controlled, and for achieving this purpose, to establish suitable institutions and to ensure that they have appropriate community, racial and gender representation.

Section 21 of the NWA provides information on what water uses require approval (i.e. Water Use License Applications or WULAs). These include:

- a) Taking water from a water resource;
- b) Storing water;
- c) Impeding or diverting the flow of water in a watercourse;
- d) Engaging in a stream flow reduction activity;
- e) Engaging in a controlled activity;
- f) Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;
- g) Disposing of waste in a manner which may detrimentally impact on a water resource;
- h) Disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;
- i) Altering the bed, banks, course or characteristics of a watercourse;
- j) Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and
- k) Using water for recreational purposes.

In terms of Section 21 (c) and (i) of the NWA, any development within 500m of a wetland or within the 1:100 year floodline / “Riparian Zone” (whichever is greatest) of a watercourse requires a WULA.

As the proposed developments occurs within a regulated area of a watercourse, a WULA is required in terms of Sections 21 (c) and (i) of the NWA (**Table 8**). A process of acquiring a WUL has commenced.

Table 5: Explanation of the relevant NWA Section 21 Activities

Section 21	Description of Water Use	Relevance to Project
21 (c)	Impeding or diverting the flow of water in a watercourse	The Ash Dam and the Low Level Ash Water Return Dam seepage interception drains traverse delineated wetlands within the Duvha Power Station. The High Level Ash Water Return Dam falls within 500m of the delineated wetlands. Only the Raw Water Dam does not traverse or fall within 500m of a wetland.
21 (i)	Altering the bed, banks, course or characteristics of a watercourse	

The requisite documentation to satisfy DHSWS’s requirements for the Water Use Authorisation process will be compiled. .

5.4 The National Environmental Management Waste Act (Act No. 59 of 2008)

The National Environmental Management Waste Act (Act No. 59 of 2008) (NEM: WA) regulates waste management in order to protect the health and environment of South African citizens. This is achieved through pollution prevention, institutional arrangements and planning matters, national norms and standards and the licensing and control of waste management activities.

The latest list of waste management activities that have or are likely to have a detrimental effect (GN No. 921 of 29 November 2013) contains activities listed in Categories A and B that would require licensing from the provincial or national authorities and activities contained in Category C which would require meeting the requirements of various Norms and Standards.

No authorisation will be required in terms of the NEM: WA, as the project will not include any of the listed waste management activities.

5.5 The Mineral and Petroleum Resources Development Act (Act No. 28 of 2002)

The Mineral and Petroleum Resources Development Act (Act No. 28 of 2002) (MPRDA) sets out the requirements with which applicants for prospecting rights, mining rights and mining permits must comply in Sections 16, 22 and 27 of the MPRDA. The MPRDA aims “to make

provision for equitable access to and sustainable development of the nation's mineral and petroleum resources; and to provide for matters connects therewith".

No Mining Permits are required for the proposed development as construction material (e.g. soil, gravel or sand) will be sourced from a commercial source.

5.6 National Environmental Management: Biodiversity Act (Act 10 of 2004)

The National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEMBA) was promulgated for the management and conservation of South Africa's biodiversity through the protection of species and ecosystems and the sustainable use of indigenous biological resources. The main implication of this act is the protection of biodiversity.

No threatened species were observed on the sites, but one plant species of conservation concern was noted, namely *Hypoxis hemerocallidea* (Star flower/African potato) and this species is listed as *Declining*.

5.7 The National Environmental Management: Protected Areas Act (Act No. 57 of 2003)

The aim of the National Environmental Management: Protected Areas Act (Act No. 57 of 2003) (NEMPA) is to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and natural seascapes. The purpose of a Protected Environment is amongst others to protect a specific ecosystem outside a special nature reserve world heritage site or nature reserve and also to ensure the use of the natural resources in the area is sustainable. The proposed development does not occur within a Protected Area.

5.8 National Forest Act (Act No. 84 of 1998)

In terms of the National Forests Act (Act 84, 1998), trees in natural forests or protected tree species (as listed in Government Gazette Notice 1012 of 27 August 2004) may not be cut, disturbed, damaged, destroyed and their products may not be possessed, collected, removed, transported, exported, donated, purchased or sold – except under licence granted by the DEFF.

A Permit is required from DEFF if any protected tree species are to be to either cut, destroy, disturb and/or transplant within the proposed development.

5.9 National Heritage Resources Act (Act No. 25 of 1999)

The National Heritage Resources Act (Act No. 25 of 1999) was promulgated for the protection of National Heritage Resources and the empowerment of civil society to conserve their heritage resources.

The proposed developments will trigger certain categories as listed below that require a Heritage Impact Assessment (HIA) in terms of Section 38 of the National Heritage Resources Act. These categories are:

- Any development or other activity which will change the character of a site
 - Exceeding 5 000 m² in extent; or
 - Involving three or more existing erven or subdivisions thereof; or
 - Involving three or more erven or divisions thereof which have been consolidated within the past five years;
 - The costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority; or
 - Any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority.

The Act also makes provision for General Protections, which apply automatically to certain categories of heritage resources such as archaeological and paleontological sites, cemeteries and graves, and structures older than 60 years.

As the seepage interception drains exceed 5 000 m² in size, a Phase 1 HIA is required to be submitted to MPHRA. A HIA has been conducted and is summarised in **Section 15.4**.

5.10 The National Environmental Management: Air Quality Act (Act No. 39 of 2004)

The National Environmental Management: Air Quality Act (Act No. 39 of 2004) (NEMAQA) provides for the setting of national norms and standards for regulating air quality monitoring, management and control and describes specific air quality measures so as to protect the environment and human health or well-being by:

- Preventing pollution and ecological degradation; and
- Promoting sustainable development through reasonable resource use.

It also includes the establishment of national ambient dust fall out levels that may be relevant to the construction.

There will be dust impacts associated with the construction phase of the project. Therefore, no authorisation in terms of NEMAQA is required. However, NEMAQA needs to be considered to decrease ambient dust impacts associated with construction activities.

5.11 The Occupational Health and Safety Act (Act No. 85 of 1993)

The Occupational Health and Safety Act (Act No. 85 of 1993) provides for the health and safety of people at work as well as the health and safety of persons using plant and machinery.

This act will need to be taken into account should the proposed development be approved.

6 ROLES AND RESPONSIBILITIES

A high-level outline of the institutional arrangements for the implementation of the EMPr during the pre-construction, construction and operational phases of the project, as well as the conditions of the EA, is provided in **Figure 6**.

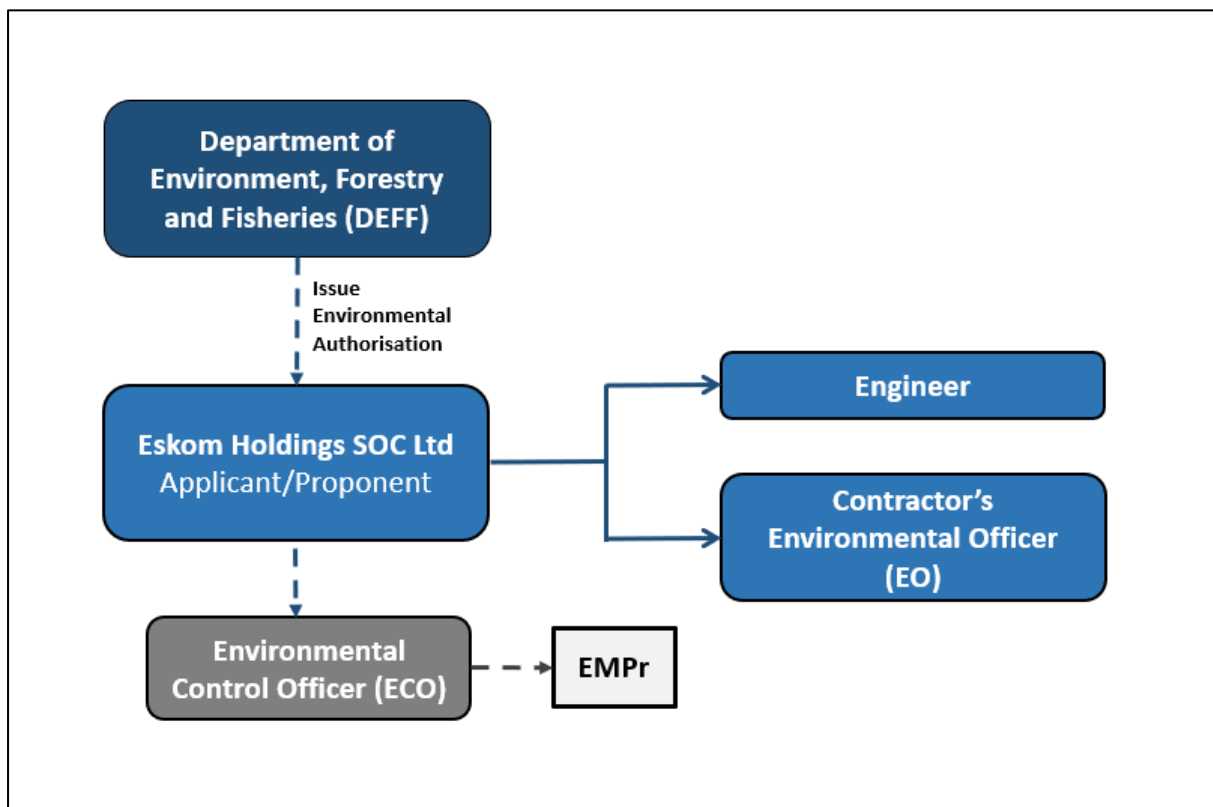


Figure 6: Institutional arrangements: roles and responsibilities

6.1 Department of Environment, Forestry and Fisheries (DEFF)

DEFF (previously the Department of Environmental Affairs) are the mandated authority in terms of NEMA that determine whether authorisation can be issued for the project, following a decision-making process.

DEFF also fulfils a compliance and enforcement role with regards to the authorisation. The Department may perform random inspections to check compliance. DEFF will also review the monitoring and auditing reports compiled by the Environmental Control Officer (ECO).

6.2 Project Applicant

Eskom Holdings SOC Ltd is the applicant in terms of NEMA. Eskom Holdings SOC Ltd is the Project Proponent for all components of the work related to the development and is ultimately responsible for the development and implementation of the EMPr and ensuring that the conditions in the EA are satisfied. The liability associated with environmental non-compliance rests with the Project Proponent.

6.3 Project Manager

The Project Manager has overall responsibility for managing the project and for ensuring that the environmental management requirements are met with regards to the EMPr, EA, and other environmental licenses or permits. During the operational phase, it is expected that this role will be fulfilled by the Operations Manager.

The Project Manager's responsibilities will include the following (amongst others):

- Management of environmental matters and compliance with environmental licenses, permits and authorisations; and
- Management of the project team including the ECO, the Contractor and the other project role players.

6.4 Environmental Control Officer (ECO)

The ECO is a competent and independent representative. The ECO will undertake inspections of the site and full compliance auditing against the EMPr and EA. The audit reports will be submitted to the project manager and also be made available to the relevant authorities, on their request.

The ECO will check the following:

- The record of environmental incidents (spills, impacts, legal transgressions, etc.) as well as corrective and preventive actions taken;

- The public complaints register in which all complaints are recorded, as well as actions taken; and
- Results from the environmental monitoring programme (air, noise, water quality).

Further duties of the ECO will be the following:

- Monitoring of compliance with the EA, EMPr and the Project Specification.
- Make recommendations on how to best apply the environmental requirements on site and advise the Contractor on the site instructions required to facilitate effective environmental compliance.
- Participate in the quality management system by issuing non-conformances when there are areas of the project environmental requirements that are not being met.

7 MONITORING AND AUDITING

Monitoring is required to ensure that the receiving environment at the study area is suitably safeguarded against the identified potential impacts, and to ensure that the EMPr requirements are adequately implemented and adhered to during the pre-construction, construction and operational phase.

The project is to be implemented in accordance with Eskom's Environmental Management Policy and ISO 14001 based Environmental Management System (EMS).

The standard Eskom site documentation shall be used to keep records on site. All documents shall be kept on site and be made available for monitoring purposes. Site inspections by an Environmental Audit Team may require access to this documentation for auditing purposes. The documentation shall be signed by all parties to ensure that such documents are legal. Regular monitoring of site works by the ECO is imperative to ensure that all problems encountered are solved punctually and amicably. When the ECO is not available, the Site Supervisor shall keep abreast of all works to ensure no problems arise.

7.1 Baseline Monitoring

Baseline monitoring aims to determine the pre-construction state of the receiving environment and serves as a reference to measure the residual impacts of the project by evaluating the deviation from the baseline conditions and the associated significance of the adverse effects.

The environmental parameters to be included in the baseline monitoring are shown in **Table 5**.

Table 6: Baseline Monitoring Requirements

Environmental Parameter	Monitoring Locations	Requirements
Water Quality	<ul style="list-style-type: none"> All major watercourses to be affected by the project, including the affected Berg River. Sites to be located at suitable locations up- and downstream of the construction sites and in-stream works, to be determined in consultation with the ECO. <i>In situ</i> water quality monitoring to be conducted. 	<ul style="list-style-type: none"> Comply with relevant standards - SANS 5667.
Air Quality	<ul style="list-style-type: none"> Dust fallout units to be located taking into consideration significant sources of air pollution, sensitive receptors, and dominant wind direction. Particulate matter (PM₁₀) – strategic monitoring point(s) to be selected. 	<ul style="list-style-type: none"> Dust fallout – comply with ASTM D1739; SANS 1929, SANS 69. Particulate matter (PM₁₀) – comply with the National Ambient Air Quality Standards.
Noise	<ul style="list-style-type: none"> Noise monitoring sampling sites to be located taking into consideration significant sources of noise, sensitive receptors, and dominant wind direction. Sites to coincide with dust fallout sites (where relevant). 	<ul style="list-style-type: none"> Comply with SANS 10103:2008.

Currently, the Duvha Power Station monitors aspects including water quality, air quality and noise on a monthly basis for the area. Therefore, results of this monitoring will be used as a baseline.

7.2 Compliance Monitoring

Compliance monitoring will commence in the pre-construction phase, where those conditions in the EA that need to be adhered to prior to project implementation will need to be checked and recorded. Compliance monitoring will be completed at the end of the defects liability period to check the performance of rehabilitation measures and whether the related objectives have been met.

The ECO will undertake monthly monitoring against the requirements stipulated in the EMPr and EA.

Compliance monitoring with the EA and EMPr must be conducted in accordance with Regulation 34 of GN No. R 982 (07 April 2017) in terms of the following:

1. The holder of an EA must, for the period during which the EA and EMPr, remain valid -
 - a. Ensure that the compliance with the conditions of the EA and EMPr is monitored;
and
 - b. Submit environmental monitoring reports to DEFF.
2. The environmental monitoring report must-
 - a. Be prepared by an independent (i.e. someone who has no vested interest in the project) person with the relevant environmental monitoring expertise;
 - b. Provide verifiable findings, in a structured and systematic manner, on-
 - i. The level of performance against and compliance of an organization or project with the provisions of the requisite EA or EMPr; and
 - ii. The ability of the measures contained in the EMPr, to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity;
 - c. Contain the information set out in Appendix 7 of GN No. R 982 (07 April 2017); and
 - d. Be conducted and submitted to DEFF at intervals as indicated in the EA.

A document handling system must be established to ensure accurate updating of EMPr documents, and availability of all documents required for the effective functioning of the EMPr. Supplementary EMPr documentation could include:

- Method Statements;
- Site instructions;
- Emergency preparedness and response procedures;
- Record of environmental incidents;
- Non-conformance register;
- Training records;
- Site inspection reports;
- Monitoring reports;
- Auditing reports; and
- Public complaints register (single register for maintained for overall site).

The Contractor shall also develop and submit a Site Layout Plan illustrating the planned site layout, access routes, storage facilities, site camp area, parking areas, etc. This Site Layout Plan must first be approved by the Applicant and ECO prior to site establishment activities commencing.

8 ENVIRONMENTAL TRAINING AND AWARENESS CREATION

Training aims to create an understanding of environmental management obligations and prescriptive measures governing the execution of the project. It is generally geared towards project team members that require a higher-level of appreciation of the environmental management context and implementation framework for the project.

Awareness creation strives to foster a general attentiveness amongst the construction workforce to sensitive environmental features and an understanding of implementing environmental best practices. The various means of creating environmental awareness during the construction phase of the project may include:

- Induction course for all workers before commencing work on site;
- Refresher courses (as and when required);
- Daily toolbox talks, focusing on particular environmental issues (task- and area specific);
- Courses must be provided in a language and medium understood by the workers;
- Erect signage and barricading (where necessary) at appropriate points in the construction domain, highlighting sensitive environmental features (e.g. grave sites, protected trees); and
- Place posters containing environmental information at areas frequented by the construction workers (e.g. eating facilities).

Training and awareness creation will be tailored to the audience, based on their designated roles and responsibilities. Records will be kept of the type of training and awareness creation provided, as well as containing the details of the attendees.

9 ENVIRONMENTAL ACTIVITIES, ASPECTS AND IMPACTS

In order to establish best management practices and prescribe mitigation measures, the following project-related information needs to be adequately understood:

- **Activities** associated with the proposed project;
- **Environmental aspects** associated with the project activities;
- **Environmental impacts** resulting from the environmental aspects; and
- The nature of the surrounding **receiving environment**.

9.1 Environmental Activities

For the purposes of effective and efficient monitoring, the aspects of construction are outlined separately for pre-construction and construction phases. In order to understand the impacts related to the project it is necessary to unpack the activities associated with the project life-cycle, as shown below in **Tables 6 - 8**:

Table 7: Activities associated with the Pre-construction Phase

PRE-CONSTRUCTION PHASE	
Project Activities	
1.	Applicant to appoint ECO
2.	Negotiations and agreements with the individual affected landowners and stakeholders
3.	Detailed engineering design
4.	Detailed geotechnical design
5.	Site survey
6.	Procurement of contractors
7.	Mark construction servitude
8.	Pre-construction photographic records
9.	Development and approval of method statements
10.	Development and approval of construction plans
11.	Development of employment strategy
12.	Construction site planning, access and layout
Environmental Activities	
1.	Demarcation of buffers around sensitive areas
2.	Diligent compliance monitoring of the EA, EMP and other relevant environmental legislation
3.	Barricading and installing barriers around buffer areas identified in specialist studies
4.	Ongoing consultation with affected parties

Table 8: Activities associated with the Construction Phase

CONSTRUCTION PHASE	
Project Activities	

1. Site establishment (including site camp and labour camp)
2. Fencing of the construction area
3. Registration of the servitude
4. Pegging of central line and overall footprint
5. Site clearing
6. Delivery of construction material
7. Transportation of equipment, materials and personnel
8. Storage and handling of material
9. Cut and cover activities
10. Stockpiling (sand, crushed stone, aggregate, etc.)
11. Stormwater control mechanisms
12. Management of topsoil and spoil
13. Waste and wastewater management
14. Traffic control measures
15. Bulk earthworks
16. Site security
17. Electrical supply
18. Construction of the interception drains
19. Road surface finishes
20. Concrete works
21. Landscaping
Environmental Activities
1. Reinstatement and rehabilitation of construction domain
2. Control of invasive plant species
3. Diligent compliance monitoring of the EA, EMP and other relevant environmental legislation
4. Conduct environmental awareness training
5. Implement EMP

6. Ongoing consultation with landowners and affected parties
7. Ongoing search, rescue and relocation of red data, protected and endangered species, medicinal plants, heritage resources and graves (based on area of influence of the construction activities) – permits to be in place
8. Ongoing monitoring for red data, protected and endangered species, medicinal plants, heritage resources and graves (based on area of influence of the construction activities)

Table 9: Activities associated with Operational Phase

OPERATIONAL PHASE
Project Activities
1. Access arrangements and requirements
2. Routine maintenance inspections of the interception drains
3. Repair and maintenance works of the interception drains
Environmental Activities
1. Ongoing consultation with affected parties
2. Erosion monitoring programme
3. Management of sensitive areas or buffered areas
4. Management of vegetation clearance
5. Stormwater management
6. Pollution control measures
7. Control of invasive plant species

9.2 Environmental Aspects

Environmental aspects are regarded as those components of an organisation’s activities, products and services that are likely to interact with the environment and cause an impact. The following environmental aspects have been identified for the Duvha Power Station Seepage Interception Drains, which are linked to the project activities (note that only high-level aspects are provided). Refer to **Tables 9 – 11**:

Table 10: Environmental aspects associated with the Pre-Construction Phase

ENVIRONMENTAL ASPECTS
Pre-construction Phase
1. Insufficient construction site planning and layout
2. Poor consultation with affected parties, stakeholders and authorities
3. Site-specific environmental issues not fully understood
4. Inadequate environmental and compliance monitoring
5. Absence of relevant permits
6. Lack of barricading of sensitive environmental features
7. Poor waste management
8. Absence of ablution facilities

Table 11: Environmental aspects associated with the Construction Phase

ENVIRONMENTAL ASPECTS
Construction Phase
1. Poor consultation with landowners and affected parties
2. Inadequate environmental and compliance monitoring
3. Lack of environmental awareness creation
4. Construction starting without or inadequate search and rescue
5. Indiscriminate site clearing
6. Poor site establishment
7. Poor management of access and use of access roads
8. Inadequate provisions for working on steep slopes
9. Poor transportation practices
10. Poor traffic management

ENVIRONMENTAL ASPECTS
Construction Phase
11. Disturbance of topsoil
12. Disruptions to existing services
13. Inadequate storage and handling of material
14. Inadequate storage and handling of hazardous material
15. Erosion
16. Poor maintenance of equipment and plant
17. Poor management of labour force
18. Pollution from ablution facilities
19. Inadequate management of construction camp
20. Poor waste management practices – hazardous and general solid and liquid
21. Poor management of pollution generation potential
22. Poor management of water
23. Damage to significant fauna and flora
24. Environmental damage of sensitive areas
25. Disruption of archaeological and culturally significant features (if encountered)
26. Dust and emissions
27. Noise nuisance due to construction activities
28. Poor reinstatement and rehabilitation

Table 12: Environmental aspects associated with the Operational Phase

Operational Phase
1. Poor consultation with affected parties, stakeholders and authorities
2. Inadequate environmental and compliance monitoring

3. Inadequate management of access, routine maintenance and maintenance works

4. Inadequate management of vegetation

9.3 Potential Significant Environmental Impacts

Environmental impacts are the change to the environment resulting from an environmental aspect, whether desirable or undesirable. Refer to **Tables 11** and **12** for the potential significant impacts associated with the preceding activities and environmental aspects for the pre-construction, construction and operational phase.

Table 13: Potential significant environmental impacts during Construction Phase

Feature	Impact
Geology and Soil	<ul style="list-style-type: none"> • Unsuitable geological conditions • Impacts associated with the sourcing of construction material and loss of topsoil • Soil erosion (land clearance and construction activities) • Soil pollution e.g. hydrocarbon and cement spillages • Compaction and erosion of removed and stockpiled soils • Soil contamination from incorrect storage/handling/disposal of hazardous waste • Soil contamination through spillages and leakages • Soil contamination due to mismanagement and/or incorrect storage of hazardous chemicals • Poor stormwater management during construction
Topography	<ul style="list-style-type: none"> • Visual impacts during construction • Crossing topographic features (watercourses) • Erosion of affected areas
Geohydrology	<ul style="list-style-type: none"> • Groundwater pollution due to spillages and poor construction practices
Surface Water	<ul style="list-style-type: none"> • Increased stormwater runoff • Water leakages and wastage
Flora	<ul style="list-style-type: none"> • Loss of sensitive vegetation and habitat • Damage and loss of vegetation of conservation significance • Proliferation of exotic vegetation in disturbed areas • Damage to vegetation in surrounding areas • Destruction of potential red list plants during site clearing and construction
Fauna	<ul style="list-style-type: none"> • Loss of habitat through site clearing and construction • Illegal killing or hunting of mammals • Killing of snakes during construction phase due to poor environmental education procedures • Potential illness and/or death of fauna due to pollution and/or littering • Damage / clearance of habitat of conservation importance • Loss of fauna species of conservation significance • Obstruction to animal movement corridors
Air Quality	<ul style="list-style-type: none"> • Increased dust generation • Greenhouse gas emissions

Feature	Impact
Transportation	<ul style="list-style-type: none"> • Construction-related traffic • Increase in traffic on the local road network • Damage to roads by heavy construction vehicles • Risks to road users
Noise	<ul style="list-style-type: none"> • Localised noise increase • Noise nuisance
Aesthetics	<ul style="list-style-type: none"> • Reduction in visual quality of area
Safety and Security	<ul style="list-style-type: none"> • Safety risk to employees and surrounding communities
Waste Management	<ul style="list-style-type: none"> • Waste generated from site preparations (e.g. plant material) • Domestic waste • Surplus and used building material • Hazardous waste (e.g. chemicals, oils, soil contaminated by spillages, diesel rags) • Disposal of excess spoil material (soil and rock) generated as part of the bulk earthworks • Land, air and water pollution through poor waste management practices
Socio – Economic	<ul style="list-style-type: none"> • Nuisance from noise and dust • Safety and security
Heritage Resources and Palaeontological Sensitivity	<ul style="list-style-type: none"> • Potential damage to heritage resources • Potential impacts to palaeontological sensitivity
Riparian Habitat	<ul style="list-style-type: none"> • Loss of wetland vegetation within construction domain • Wetland habitat unit destruction • Soil erosion and sedimentation of vegetation through dewatering activities
Aquatic Ecology	<ul style="list-style-type: none"> • Disruptions to aquatic biota community due to water contamination, alteration of flow and disturbance to habitat during construction (particularly relevant to construction activities that take place instream or in close proximity to watercourses) • Alteration of habitat • Loss of aquatic-dependent biodiversity
Water Quality	<ul style="list-style-type: none"> • Inflow of contaminated stormwater • Release of contaminants from equipment and concreting activities • Water quality impacts due to spillages and poor construction practices • Water quality impacts due to siltation and pollution
Flow Regime	<ul style="list-style-type: none"> • Alteration of flow • Affect aquatic biodiversity

Table 14: Potential significant environmental impacts for Operational Phase

Feature	Impact
Topography	<ul style="list-style-type: none"> • Visual impacts from disturbed area and infrastructure • Crossing topographic features (watercourses) • Erosion of affected areas
Flora	<ul style="list-style-type: none"> • Encroachment by exotic species through inadequate eradication programme

Feature	Impact
Aesthetics	<ul style="list-style-type: none"> Inadequate reinstatement and rehabilitation of construction footprint
Socio – Economic	<ul style="list-style-type: none"> Safety and security issues through improper access control during inspections and maintenance activities Use of local and internal road network for operation and maintenance purposes

10 SENSITIVE ENVIRONMENTAL FEATURES

Analyses of the nature and profile of the receiving environment identified several potential sensitive environmental features as indicated in the sensitivity map below (**Figure 7**). Cognisance must be taken of the following sensitive environmental features that should be afforded additional care and protection. The following sensitive features were identified:

- The existing structures and infrastructure in the area.
- Channelled Valley Bottom, Depression, Seepage, and Unchannelled Valley Bottom wetlands are affected by the proposed developments.
- The proposed drains fall within the grassland biome, within the Eastern Highveld Grassland and Rand Highveld Grassland vegetation units, of which both are listed as endangered.
- Eastern Highveld Grassland and Rand Highveld Grassland threatened terrestrial ecosystems were recorded on the proposed sites and these ecosystem types have a vulnerable status.
- According to the Mpumalanga Biodiversity Conservation Plan, the proposed development sites fall within the “*CBA Optimal*”, “*Heavily modified*” and “*Moderately modified- Old lands*”.
- One plant species of conservation concern was noted, namely *Hypoxis hemerocallidea* (Star flower/African potato) and this species is listed as *Declining*.
- Two heritage sites were identified just outside the boundary of one of the study areas. These include the remains of a demolished farmstead, most likely of recent to modern date (DUV 001 of Low heritage significance), and a burial ground, consisting of 11 graves, (DUV 002 of High heritage significance).

The sensitivity map shown in **Figure 7** needs to be made available to the implementation team (including the Project Manager, ECO and Contractor) in GIS format to allow for further consideration and adequate interpretation at an appropriate scale.

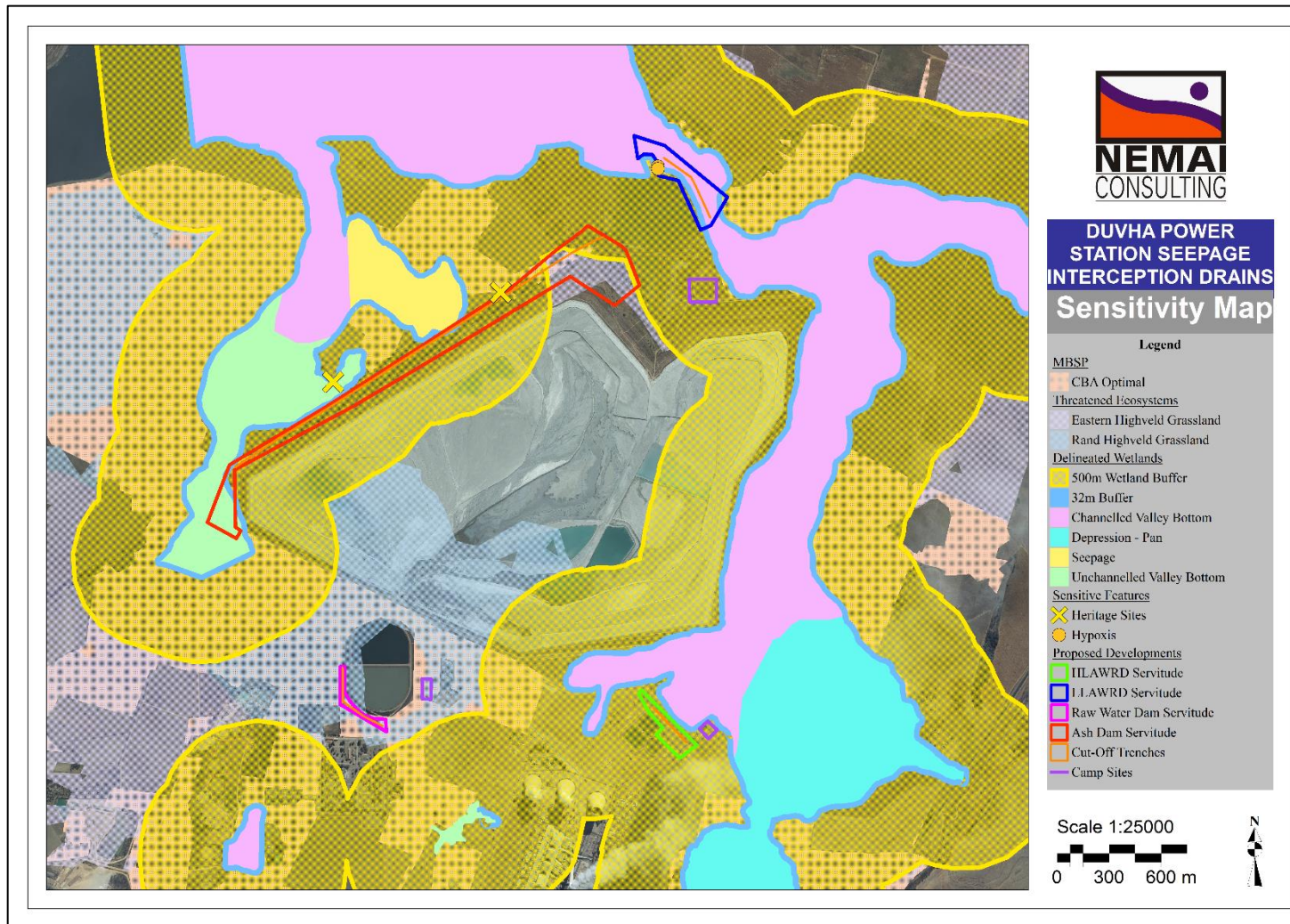


Figure 7: Sensitivity Map

11 IMPACT MANAGEMENT

The impact assessment carried out for each environmental impact that may result from the proposed project, forms the basis for determining which management measures are required to prevent or minimise these impacts. The management measures are furthermore a means by which the mitigation measures, determined in the impact assessment are translated to action items required to prevent or keep those impacts that cannot be prevented within acceptable levels.

Mitigation should strive to abide by the following hierarchy (1) prevent; (2) reduce; (3) rehabilitate; and/or (4) compensate for the environmental impacts.



Figure 8: Mitigation hierarchy

11.1 Environmental Principles

The following principles should be considered at all times during the pre-construction, construction and operational phase activities.

The environment is considered to be composed of both biophysical and social components.

- Construction is a disruptive activity and all due consideration must be given to the environment, including the social environment, during the execution of a project to minimise the impact on affected parties.
- Minimisation of areas disturbed by construction activities (i.e. the footprint of the construction area) should minimise many of the construction related environmental impacts of the project and reduce rehabilitation requirements and costs.
- As minimum requirements, all relevant standards relating to international, national, provincial and local legislation, as applicable, shall be adhered to. This includes requirements relating to waste emissions (e.g. hazardous, airborne, liquid and solid), waste disposal practices, noise regulations, road traffic ordinances, etc.
- Every effort should be made to minimise, reclaim and/or recycle “waste” material.

11.2 Pre-construction Phase

The planning or pre-construction phase largely entailed conducting the necessary specialist studies, determining the site layout and carrying out the requisite environmental processes to obtain authorisation.

General requirements during the pre-construction phase include the following:

- Design to consider and incorporate environmental requirements.
- Define and communicate roles and responsibilities for the implementation of the EMPr.
- Develop and implement an environmental awareness programme.
- Compile and implement an employment strategy for construction labour.

11.2.1 Specialist Environmental Investigations

Management Objective:

- Identify sensitive and protected environmental features in addition to those that have been identified as part of the BA Process.

Target:

- All sensitive and protected environmental features to be identified in the construction domain (all the components of the project).
- All relevant approvals to be obtained prior to relocation of red data, protected and endangered flora and fauna species, medicinal plants, heritage resources and graves.

Management Actions:

- Suitable specialist(s)/ECO to identify sensitive environmental features (including watercourses, fauna, and flora) where special care needs to be taken and implement suitable mitigation measures to safeguard these features (e.g. barricading, signage and awareness creation).
- Baseline studies should be undertaken to be completed as soon as possible before implementation commences in order to provide a benchmark against which impacts resulting from the construction and operation of the project can be measured. Aspects to be included are terrestrial ecology, air quality and noise.
- DUV 002 (burial ground): Demarcate the site as a “no go” area, with a 30m buffer and a fence.
- It is recommended that prior to construction, the *Hypoxis hemerocallidea*, a plant species recorded on site must be searched and rescued and then following construction activities, they can be re-established at the site.

- Given that the species of conservation importance were observed, it is important that species of conservation importance and threatened species which may occur on the proposed development sites are addressed through a search and rescue plan.
- Prior to construction, animals of conservation concern must be rescued and relocated. An experienced person who knows the animals in the region well will identify any possible Red Data fauna on site and acquire the necessary permits to relocate fauna if avoidance is not possible.
- Given that construction activities will expose workers to excessive noise rating levels, it is recommended that a baseline noise survey also be conducted as soon as possible following commencement of site activities – in accordance with the requirements of the Noise Induced Hearing Loss Regulations (OHS Act 85 of 1993) and SANS 10083:2004.
- An ECO must be appointed who will identify any possible Red Data fauna on site and will be responsible for acquiring the necessary permits to relocate fauna if avoidance is not possible.

Responsibilities:

- Applicant to appoint suitably qualified specialists/ECO.
- Specialists to execute the management actions.

Monitoring Requirements:

- Approval by relevant environmental authorities.

11.2.2 Construction Site Planning and Layout

Management Objective:

- Appropriate planning and layout of construction site to ensure environmental protection.

Target:

- No impacts to sensitive environmental features as a result of construction site planning and layout.

Management Actions:

- Conduct a pre-construction survey of the area to be affected by the development. This must include site investigations with photographic records.
- Before construction commences, all sensitive habitats must be clearly demarcated with fencing or orange mesh netting. These sensitive areas are to be defined in accordance with recommendations from the appointed specialists or ECO. Barricading measures to be utilised should not restrict the movement of the fauna in the area.
- During site preparation, special care must be taken during the clearing of the works area where organic material will be stored separately from the topsoil and spoil material to

ensure for the protection thereof. This topsoil must be re-used during the rehabilitation phase.

- During site preparation, topsoil and subsoil are stripped separately from each other and must be stored separately from spoil material for use in the rehabilitation phase. It should be protected from wind and rain, as well as contamination from diesel, concrete or wastewater.
- Records of all environmental incidents must be maintained and a copy of these records must be made available to authorities on request throughout the project execution.
- No access to no-go areas without the permission of the Project Manager.
- The Contractor to develop method statements to be approved by the Project Manager prior to construction taking place. The plan must show the following (as relevant), as a minimum:
 - Buildings and structures;
 - Contractors' camp and lay down areas;
 - Site offices;
 - Roads and access routes;
 - Gates and fences;
 - Essential services (permanent and temporary water, electricity and sewage);
 - Rubble and waste rock storage and disposal sites;
 - Solid waste storage and disposal sites;
 - Site toilets and ablutions;
 - Topsoil stockpiles;
 - Construction materials stores;
 - Vehicle and equipment stores;
 - Sensitive environmental features; and
 - Any other activities, facilities and structures deemed relevant.
- Define and communicate roles and responsibilities for the implementation of the EMPr.
- Determining and documenting the road conditions for all identified haul roads.
- Develop and implement an environmental awareness plan.
- The appointment of an ECO.
- Records of compliance/non-compliance must be kept on site at all times for DEFF on request.
- Records of all environmental incidents must be maintained and a copy of these records be made available to DEFF on request throughout the project execution.
- Prior to establishment of the site camp(s), the Contractor shall produce a plan showing the positions of all buildings, lay down yards, batch plants, and infrastructure for approval.
- Project Management shall allocate a laydown area for Contractor-supplied items. At all times, the Contractor shall be responsible for the safe and adequate storage of all materials and equipment on site which he is to install, whether they are supplied by himself or others. The safe handling, unloading and loading of material receipts and dispatches at site or storage areas shall be the Contractors' responsibility.

Responsibilities:

- Applicant – acquire permits.
- Project Manager and ECO – to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Approved site plan.
- Barricading and signage.
- Records of awareness creation.
- Plant rescue and protection.

11.2.3 Environmental Awareness Creation

Management Objective:

- Ensure that the Contractor, construction workers and site personnel are aware of the relevant provisions of the EMPr.

Target:

- All construction workers and employees to have completed appropriate environmental training.
- A record of environmental training undertaken to be kept on site.

Management Actions:

- The Contractor must arrange that all of his employees and those of his sub-contractor go through the project specific environmental awareness training courses before the commencement of construction and as and when new staff or sub-contractors are brought on site.
- The contractor's site staff including foremen and site management staff shall attend an environmental awareness training course provided by the ECO and a signed attendance register shall be kept available for confirmation.
- The environmental training is compulsory for all employees and structured in accordance with their relevant rank, level and responsibility, as well as the Environmental Specification as they apply to the works and site.

Responsibilities:

- Project Manager and ECO – to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.

- Records of environmental training and awareness creation.

11.2.4 Ongoing Consultation with Affected Parties

Management Objective:

- Establish and maintain a record of all complaints and claims against the project and ensure that these are timeously and effectively verified and responded to.
- Adhere to agreements made with affected parties regarding communication.

Target:

- All complaints and claims are to be acknowledged within five (5) working days and are to be responded to within 10 working days of receipt, unless additional information and/or clarification are required.
- No deviations from agreements made with affected parties.

Management Actions:

- Establish lines of communications with affected parties and adjacent landowners.
- Establish processes and procedures to effectively verify and address complaints and claims received.
- Complaints or liaison with affected parties with regard to environmental aspects, compensation or disturbance to activities or animals, must be recorded, reported to the correct person and a record of the response is to be entered in the complaints register.
- Provide the relevant contact details to affected parties for queries/raising of issues or complaints.
- Continued liaison with authorities with regards to compliance with the EA.

Responsibilities:

- Project Manager and ECO – to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.

11.3 Construction Phase

11.3.1 Site Clearing

Management Objective:

- Manage environmental impacts associated with site clearing.

- Ensure that only areas that are specifically required for the construction purposes are cleared.

Target:

- No damage is caused to sensitive environmental features outside of the demarcated construction areas, including marked and barricaded heritage resources, protected trees, structures and infrastructure.

Management Actions:

- Restrict site clearing activities to construction area/domain.
- Clearing of vegetation to be conducted in a phased manner (where possible), with due consideration of the search and rescue activities.
- Method Statement to be developed, which will provide the details of how site clearing will be executed. Where possible, clearing by hand is recommended in order to create employment opportunities.
- Topsoil must be stripped to at least 150mm depth and stored separately.
- Maintain barricading around sensitive environmental features.
- Avoid any disturbance to demarcated sensitive environmental features.
- Suitably experienced personnel (relevant to the potentially affected environmental features) to monitor the clearing activities, with particular focus on heritage resources, as well as protected fauna and flora species.
- The contractor has to clear the site of all inert waste and rubble, including surplus rock, foundations and batching plant aggregates.
- The site shall be cleared of all litter/waste prior to any construction related activities and the waste shall be disposed of at a registered waste disposal facility.
- During site preparation, topsoil and subsoil are to be stripped separately from each other and must be stored separately from spoil material for use in the rehabilitation phase. It should be protected from wind and rain, as well as contamination from diesel, concrete or wastewater.

Responsibilities:

- Project Manager and ECO – to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- No clearing outside of construction domain.
- Intact barricading.
- Public complaints register.
- Contractor's method statement.

11.3.2 Site Establishment

Management Objective:

- Minimise environmental impacts associated with site establishment.

Target:

- No damage to the environment outside construction area during site establishment.
- No access or encroachment into no-go areas.
- No justifiable complaints regarding general disturbance and nuisance received from the affected parties and community members.

Management Actions:

- The Contractor is to produce a site plan for the approval by the Project Manager/Engineer and ECO prior to the establishment of the site, which aims to identify construction activities, facilities and structures in relation to sensitive environmental features. This plan will serve as a spatial tool that facilitates the execution of the construction phase with due consideration of sensitive environmental features.
- Locate construction and labour camps in areas where sensitive environmental features will not be impacted on. The construction camp areas approved through the Basic Assessment process must be used as indicated in **Figure 4** of this EMPr.
- Facilities and structures shall be located with due cognisance of the terrain and geographical features of the project site.
- Positioning of the storage and laydown areas should aim to minimise visual impacts.
- Control the movement of all vehicles and plant (including suppliers), such that they remain on designated routes and comply with relevant agreements.
- Maintain barricading around sensitive environmental features until the cessation of construction works.
- Appoint security personnel.
- Ensure noise levels are within their lawfully acceptable limits as per SANS 10103.
- Minimise disturbance from lighting of the construction camp and site.
- The extent of the site should by all means be limited, to avoid any additional clearance of vegetation.
- The Contractor shall ensure that the Contractors camp and working areas are kept clean and tidy at all times. The Engineer or/and the ECO shall inspect these areas on a regular basis.
- The Contractor shall comply with all safety requirements enforced; these include emergency evacuation procedures, fire preventative measures, etc.
- The Contractor shall supply firefighting equipment in proportion to the fire risk presented by the type of construction and other on-site activities and materials used on site. This

equipment shall be kept in good operating order. This particularly applies to welding activities, etc.

- The contractor is to provide designated safe smoking areas.
- Every precaution should be taken, to prevent pollution of air, soil, ground and surface water as a result of construction or associated activities at the construction site.
- Fuel, lubricants, transmission and hydraulic fluids shall only be stored in the designated areas that comply with the OHS Act.
- Restrict development footprint to absolute minimum area necessary.

Responsibilities:

- Project Manager and ECO – to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Contractor's method statement.
- Public complaints register.

11.3.3 Management of Construction Camp and Eating Areas

Management Objective:

- Minimise environmental impacts associated with the construction camp and eating areas.

Target:

- No environmental contamination associated with the construction camp.
- Minimise visual impact associated with the construction camp.
- No complaints regarding the construction camp.

Management Actions:

- Construction camp to be screened to minimise the visual impact, where practicable.
- Labour camp to be screened to minimise the visual impact, where practicable.
- The Contractor shall provide eating areas for all staff. Eating areas be cleaned and shall provide adequate temporary shade.
- Open uncontrolled fires will be forbidden at the site camp. Rather, 'contained' cooking mechanisms will be used (e.g. gas stoves or an enclosed braai facility).
- Eating areas will be designated and demarcated.
- Refuse bins must be placed at all eating areas.
- The feeding, or leaving of food for animals, is strictly prohibited.
- Sufficient bins will be present in this area for all waste material.
- Dishwashing facilities will be provided to ensure that wastewater is disposed of appropriately.

- Failure to comply with the general code of conduct, or the rules and procedures implemented at the construction camp will result in disciplinary actions.
- Provide safe potable water for drinking.
- Prohibit the felling of trees for firewood.

Responsibilities:

- Project Manager and ECO – to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.
- Contractor's method statement.
- Disposal certificates.

11.3.4 Management of Ablution Facilities

Management Objective:

- Minimise environmental impacts associated with ablution facilities.

Target:

- No environmental contamination associated with ablution facilities.
- Minimise visual impact associated with ablution facilities.

Management Actions:

- Provide sufficient ablution facilities (e.g. mobile/portable toilets) at the construction camp and along construction sites, which conform to all relevant health and safety standards and codes.
- No pit latrines, french drain systems or soak away systems shall be allowed. Install and maintain conservancy tanks for any residential labour camp and site offices. The location of conservancy tanks is to be approved by the Project Manager/Engineer.
- A sufficient number of toilets shall be provided to accommodate the number of personnel working in any given area. Toilets may not be further than 100m from any working area. Toilet facilities supplied by the Contractor for the workers shall occur at a maximum ratio of 1 toilet per 30 workers.
- All staff to use the provided toilets at all times.
- All temporary/portable/mobile toilets shall be secured to the ground to prevent them from toppling over due to wind or any other cause.
- Ablutions are to be cleaned/emptied on a regular basis, before they are full and contaminate the environment. Proof of safe disposal must be kept on site.
- Ensure that no spillages occur when ablution facilities are emptied.

- Informal ablutions within the all riparian areas or wetlands must be prohibited.
- The entrances to the toilets will be adequately screened from public view.
- Sanitary hygiene bins will be provided for female staff.
- Toilet paper shall be provided.
- The Contractor will ensure that no spillage occurs when the toilets are cleaned or emptied and that a licensed service provider removes the contents from site. Disposal of such waste is only acceptable at a licensed waste disposal facility.

Responsibilities:

- Project Manager and ECO – to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.
- Maintenance register for ablution facilities.
- Disposal certificates.
- Contractor's method statement.

11.3.5 Management of Workshop and Equipment

Management Objective:

- Minimise environmental impacts associated with workshops and equipment use.

Target:

- No environmental contamination associated with workshops and equipment use.

Management Actions:

- Vehicles must be maintained and serviced according to the manufacturers' standards
- Checklists must be completed by drivers and operators before the vehicles and equipment are used.
- Vehicles and equipment must be turned off when not in use.
- Maintenance of equipment and vehicles will be performed in such a manner so as to avoid any environmental contamination (e.g. use of drip trays).
- All vehicles and equipment will be kept in good working order and serviced regularly. Leaking equipment will be repaired immediately or removed from the site.
- Suitable storage and disposal of hydraulic fluids and other vehicle oils in bunded facilities that can accommodate 110% of the stored volume.
- All diesel-powered equipment and vehicles used in construction activities must be suitably serviced, maintained and repaired in order to minimise the emission of diesel particulate matter and reduce subsequent worker exposure to this carcinogenic substance.

- Leaking equipment will be repaired immediately or removed from the site.
- Emergency on-site maintenance should be done over appropriate drip trays and all oil or fuel must be disposed of according to waste regulations. Drip-trays must be placed under vehicles and equipment when not in use.
- No washing of plant may take place on the construction site.
- Drip trays will be provided for the stationary plant and for the "parked" plant.

Responsibilities:

- Project Manager and ECO – to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Recorded evidence of spillages.
- Vehicle and equipment checklists
- Training register.
- Contractor's method statement.

11.3.6 Fencing and Barricades

Management Objective:

- To ensure and assist with controlled fencing and barricades in the working environment.
- Minimise disturbance to animals.

Target:

- Provide a clearly demarcated and safe working area.
- No direct harm to fauna due to inadequate fencing arrangements.

Management Actions:

- Sensitive environmental features must be fenced/barricaded off as 'no-go' areas, and the fencing/barricading must be regularly maintained.
- No pedestrian or vehicular access shall be allowed into 'no-go' fenced areas.
- In places where temporary fencing is required, the Contractor shall erect such fencing when and where required and re-erect and maintain temporary fencing as necessary. Temporary fencing shall remain in position either until it is replaced by permanent fencing or until completion of the works.
- Any fences damaged by the Contractor shall be repaired as soon as possible at his/her cost, and shall be of the standard of the original fence.

Responsibilities:

- Project Manager/Engineer and ECO – to monitor compliance.

- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.
- Agreements with landowners.

11.3.7 Management of Labour Force

Management Objective:

- Ensure suitable management of labour force to prevent security-related issues.
- Optimise the use of local labour.
- Provide a work environment that is conducive to effective labour relations.

Target:

- No complaints from adjacent landowners and community members regarding trespassing or misconduct by construction workers.
- All unskilled labour to be sourced from local communities.

Management Actions:

- Prevent trespassing of construction workers onto private property.
- Workers should be provided with identity cards and should wear identifiable clothing.
- Make suitable provision for transport of workforce.
- Creating nuisances and disturbances in or near communities shall be prohibited.
- Machine/vehicle operators shall receive clear instructions to remain within demarcated access routes and construction areas.
- Designated and demarcated smoking areas should be provided, with special bins for discarding of cigarette butts.
- Create opportunities for the employment of women.
- Use local labour as far as possible, where necessary (e.g. unskilled labour).
- Training of labour to benefit individuals beyond completion of the project.
- Local people should be employed to increase support for the project and reduce the potential for criminal activities.

Responsibilities:

- Applicant – employment targets.
- Project Manager and ECO – to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.

- Labour-related targets.

11.3.8 Management of Health and Safety

Management Objective:

- Provide a safe and healthy working environment to construction workers and the public.

Target:

- Approved Health and Safety Plan.
- Compliance with the OHS Act (Act No. 85 of 1993), Construction Regulations (2014) and other relevant regulations.

Management Actions:

- The Contractor must submit a Health and Safety Plan, prepared in accordance with the Health and Safety Specification, for approval prior to the commencement of work. These requirements are aligned with the Construction Regulations (2014).

Health –

- The Construction Regulations and the Occupational Health and Safety Act (Act No. 85 of 1993) require that all contractors conduct an initial health risk assessment of their workers activities prior to initiating any work on site.
- Ensure all workers are medically fit to conduct their activities, with priority being given to those workers required to engage in manual physical labour activities – pre-employment medical examinations are recommended.

Safety –

- First aid officers should be trained on site (levels 1 to 3) to deal with construction related injuries.
- When working in the area of encroachment is prevalent all open excavated trenches and foundations should be clearly marked and secured to keep people and fauna from falling in.
- Access by non-construction staff into any construction related sites should be restricted and clearly indicated as such by signposts.
- The requirements of the Occupational Health and Safety Act (Act 85 of 1993) and related regulations shall be adhered to.
- Emergency contact details will be prominently displayed.
- All construction personnel must be clearly identifiable. All employees must also be issued with employee cards for identification purposes.
- All workers will be supplied with the required Personal Protective Equipment as per the Occupational Health and Safety Act (Act No. 85 of 1993).

Responsibilities:

- Project Manager and ECO – to monitor compliance.
- Dedicated Occupational Health and Safety system to be implemented by Contractor's Safety Officer. To be monitored and audited by the Client's Safety Agent, in terms of the Construction Regulations (2014).
- Contractor to implement management actions.

Monitoring Requirements:

- Occupational Health and Safety system – checked by Safety Agent.

11.3.9 Management of Emergency Procedures

Management Objective:

- Minimise environmental impacts associated with emergency procedures.

Target:

- No site fires to be caused by construction activities and workers.
- Approved emergency response procedures, where relevant.

Management Actions:

Fire –

- Comply with the National Veld and Forest Fire Act (No. 101 of 1998).
- Proper emergency response procedure to be in place for dealing with fires.
- Burning of waste is not permitted.
- Suitable precautions will be taken (e.g. suitable fire extinguishers, water bowsers, welding curtains) when working with welding or grinding equipment.
- All fire control mechanisms (firefighting equipment) will be routinely inspected by a qualified investigator for efficacy thereof and be approved by local fire services.
- All staff on site will be made aware of general fire prevention and control methods, and the name of the responsible person to alert to the presence of a fire.
- No fires are allowed on site, unless in dedicated areas approved by the Project Manager.
- Dedicated smoking areas to be provided. Cigarette butts may not be disposed of onsite.

Accidental Leaks and Spillages –

- Proper emergency response procedure to be in place for dealing with spills and leaks.
- Ensure that the necessary materials and equipment for dealing with spills and leaks are available on site, where practicable.

- Remediation of the spill areas will be undertaken to the satisfaction of the Project Manager and ECO.
- In the event of a hydrocarbon spill, the source of the spillage will be isolated and contained. The area will be cordoned off and secured. The Contractor will ensure that there is always a supply of an appropriate absorbent material readily available to absorb, breakdown and where possible, encapsulate a minor hydrocarbon spillage.
- All staff on site will be made aware of actions to be taken in case of a spillage.
- Provide contact details of person to be notified in a case of spillages – signage to be displayed at strategic points within the construction domain (e.g. workshop, fuel storage area, hazardous material containers).

Responsibilities:

- Project Manager and ECO – to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Approved Emergency Response Plan.
- Training and awareness creation records.
- Signage displayed.
- Contractor's method statement.

11.3.10 Management of Access and Traffic

Management Objective:

- Ensure that all construction vehicles use only dedicated access routes to construction sites.
- Ensure proper access control.
- Prevent unlawful access to construction domain.
- Ensure the safety of all road users by implementing proper signage and traffic control measures.
- Limit construction-related nuisance to service nodes.

Target:

- No reports of construction vehicles using other unauthorised routes.
- No transporting of unsafe loads. Permits are to be obtained for abnormal loads.
- No speeding.
- No accidents.

Management Actions:

- Undertake negotiations and confirm arrangements with the affected parties regarding the use of public roads.
- The traffic rules within the Eskom Duvha Power Station must be adhered to.
- Site access should be controlled and no unauthorised persons should be allowed onto the site.
- Any clearing for access or haul roads outside the demarcated works area shall only be undertaken after approval from the Project Manager/Engineer and ECO.
- Ensure appropriate traffic safety measures are implemented.
- The Contractor must comply with all driving, vehicle, licensing and driver ability requirements.
- Permission required from the Project Manager for the movement of any vehicles and/or personnel outside of designated working areas.
- Existing roads shall be used as far as possible for construction purposes.
- Contractor to ensure safe access for adjacent landowners on all roads.
- Wet suppression of unpaved areas should be applied during dry windy periods, using a water cart and/or fixed sprinklers.
- Chemical suppression can also be used in conjunction with wet suppression. This involves the use of chemical additives in the water, which help to form a crust on the surface and bind the dust particles together. Chemical stabilisation reduces watering requirements, but any savings can be offset by the cost of the additives. Repeat treatments are usually required at intervals of 1-4 weeks, or as specified by the supplier. The method is best suited to permanent site roads and usually not cost-effective on temporary roads, which are common in construction sites.
- Provide hard-standing areas for vehicles and regularly inspect and clean these areas.
- The Principal Contractor shall organise the site in such a manner that pedestrians and vehicles can move safely and without risks to health, including sufficient and suitable traffic routes and safe walkways with relevant signage.
- Access roads to be maintained in a suitable condition.
- Suitable erosion protective measures to be implemented for access roads during the construction phase.
- Traffic safety measures (e.g. traffic warning signs, flagmen) to be implemented.
- Consult with local authorities and affected parties to ensure that all affected parties are informed of the timing and extent of any disruptions.

Responsibilities:

- Project Manager and ECO – to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Signage displayed and maintained.

- Public complaints register.
- Contractor's method statement.

11.3.11 Management of Waste

Management Objective:

- Minimise environmental impacts associated with waste.
- Apply waste management principles of prevent, minimise, recycle or re-use, with disposal as a last option.

Target:

- No littering on construction site.
- Maintain a clean and tidy construction site.
- 100% record of all waste generated and disposed at waste disposal facilities.
- Valid disposal certificates for all waste disposed.
- Provision of adequate waste containers that are easily accessible and maintained.
- Waste bins to be removed and cleaned weekly.

Management Actions:

- Waste management activities must comply with the National Environmental Management: Waste Act (Act No. 59 of 2008).
- Bins will be provided in sufficient numbers and capacity to store domestic waste. These bins must be kept closed to reduce odour build-up and emptied regularly to avoid overflowing and other associated nuisances.
- Where possible, waste must be separated at source (e.g. containers for glass, paper, metals, plastics, organic waste and hazardous wastes).
- Provide waste skips at the construction areas. These skips should be sufficient in number, the skip storage area should be kept clean, skips should be emptied and replaced before overflowing or spillage occurs.
- Ensure regularly site clean-ups to prevent the build-up of litter
- The Contractor will ensure that no burying, dumping or burning of waste materials, vegetation, litter or refuse occurs. All waste will be disposed of at suitable licensed disposal sites, based on the waste type (general versus hazardous).
- Proof of waste disposal must be kept on site.
- Ensure that solid waste is transported so as to avoid waste spills en-route.
- The following requirements shall be incorporated into the waste management programme:
 - Solid Waste:
 - Littering on site and the surrounding areas is prohibited.
 - Clearly marked litterbins must be provided on site. The Contractor must monitor the presence of litter on the work sites as well as the construction campsite.

- All bins must be cleaned of litter regularly.
- All waste removed from site must be disposed at a municipal/permitted waste disposal site.
- Excess concrete, building rubble or other material must be disposed of, or recycled where possible, and not indiscriminately over the construction site.
- No waste, including construction waste and spoil, may be stored within wetlands.
- The entire works area and all construction sites must be swept of all pieces of wire, metal, wood or other material foreign to the natural environment.
- Contaminated soil must be treated and/or disposed of at a permitted waste disposal site or be removed and the area rehabilitated immediately. Proof of waste disposal must be kept on site.
- Waste must be recycled wherever possible.
- Liquid Waste
 - The Principal Contractor must install and maintain mobile toilets at work sites.
 - The Principal Contractor must provide adequate and approved facilities for the storage. Such facilities must be designed and sited with the intention of preventing pollution of the surrounding area and environment.
 - Provision should be made for the recycling of used oil at a registered facility (e.g. ROSE Foundation).
 - All vehicles must be regularly serviced in designated area within the Contractors camp such that they do not drip oil. Where required, vehicles will be serviced in bunded areas and drip trays will be provided.
 - All chemical spills must be contained and cleaned up by the supplier or professional pollution control personnel.
- Hazardous Waste:
 - No hazardous materials must be disposed of in the veld or anyplace other than a registered landfill for hazardous material. Hazardous waste must be stored in containers with tight lids that must be sealed and must be disposed at an appropriately permitted hazardous waste disposal site. Such containers must not be used for purposes other than those originally designed for.
 - Proof of safe disposal of hazardous waste must be kept on site.

Responsibilities:

- Project Manager and ECO – to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.
- Waste register.

- Recycling targets.
- Disposal certificates.
- Contractor's method statement.

11.3.12 Management of Storage and Handling of Non-Hazardous Material

Management Objective:

- Effective and safe management of materials on site, in order to minimise the impact of non-hazardous materials on the environment.

Target:

- No pollution due to handling, use and storage of non-hazardous material.

Management Actions:

- Materials to be suitably stored to prevent environmental contamination and visual impacts. Storage requirements to be determined based on chemical qualities of material and Material Safety Data Sheets (MSDS).
- Hazardous substances must be stored in a bunded facility that can contain 110% of the stored volume.
- Stored material to be protected from rain and run-off to avoid environmental contamination.
- Materials to be appropriately transported to avoid environmental contamination. Loose loads (e.g. sand, stone chip, refuse, paper and cement) to be covered.
- Suitable remedial measures, depending on the nature of the contaminant and the receiving environment, to be instituted for spillages.
- Materials to be suitably used to prevent environmental contamination.

Responsibilities:

- Project Manager/Engineer and ECO – to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Evidence of spillages.
- MSDS register.
- Contractor's method statement.

11.3.13 Management of Storage and Handling of Hazardous Material

Management Objective:

- Ensure the protection of the natural environment and the safety of personnel on site, by the correct management and handling of hazardous substances.

Target:

- No pollution due to handling, use and storage of hazardous material.
- In the event of a spill, appropriate containment, clean up and disposal of contaminated material. Spills to be cleaned within 24 hours.

Management Actions:

- Hazardous substances must be stored and handled in accordance with the appropriate legislation and standards, which include the Hazardous Substances Act (Act No. 15 of 1973), the Occupational Health and Safety Act (Act No. 85 of 1993), relevant associated Regulations, and applicable SANS and international standards.
- Storage and use of hazardous materials will be strictly controlled to prevent environmental contamination and must adhere to the requirements stipulated on the MSDS.
- Where flammable liquids are being used, applied or stored the workplace must be effectively ventilated.
- No person may smoke in any place in which flammable liquid is used or stored.
- Install an adequate number of fire-fighting equipment in suitable locations around the flammable liquids store.
- Where flammable liquids are decanted, the metal containers must be bonded or earthed.
- No flammable material (e.g. paper, cleaning rags or similar material) may be stored together with flammable liquids.
- Staff that will be handling hazardous materials must be trained to do so.
- Any hazardous materials (apart from fuel) must be stored within a lockable store with a sealed floor and bund with 110% capacity. Suitable ventilation to be provided.
- All hazardous materials containers must be stored in bunded containment areas with impermeable surfaces. The bunded area must be able to contain 110% of the total volume of the stored hazardous material.
- MSDSs, which contain the necessary information pertaining to a specific hazardous substance, must be present for all hazardous materials stored on the site.
- Spill kits must be available for the clean-up of hazardous material spillages.
- Provide secondary containment where a risk of spillage exists.
- Drip trays to be placed under parked heavy vehicles, equipment and other receptacles of hazardous material to prevent spillages.
- In the event of spillages of hazardous substances, the contaminated soil must be removed, placed in a sealed bag, stored in a hazardous waste bin, and disposed of at a registered hazardous waste facility. Proof of waste disposal must be kept on site.
- Spill reporting procedures to be displayed at all locations where hazardous substances are being stored.
- Hazardous materials will be disposed of at registered sites or handed to registered hazardous waste disposal facilities for disposal/recycling.
- Proper and timeous notification of any pollution incidents associated with hazardous materials.

- Hazardous chemical substances containers be clearly marked with the contents and main hazardous category e.g. “Flammable” or “Corrosive”.

Responsibilities:

- Project Manager/Engineer and ECO – to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Evidence of spillages.
- MSDS register.
- Training register.
- Disposal certificates.
- Contractor’s method statement.

11.3.14 Management of Pollution Generation Potential

Management Objective:

- Ensure that all possible causes of pollution are mitigated as far as possible to minimise impacts to the surrounding environment.

Target:

- No complaints regarding pollution.
- No measurable signs of pollution.
- Noise – Comply with SANS 10103:2008.

Management Actions:

General –

- No waste of a solid, liquid or gaseous nature shall be emitted from the site without approval by the Engineer and ECO.
- Accidental pollution incidents shall be reported to the ECO immediately they occur and shall be cleaned-up (to the satisfaction of the Co-ordinator Environmental Rehabilitation or ECO) by the Contractor or a nominated clean-up organization at the expense of the Contractor.
- Cement powder must be allowed to contaminate soil. Any spillages of cement powder must be removed with contaminated soil, made wet, and disposed of as construction waste once dry.
- Batching plants must be set up with an impermeable bund and sump to collect any cement contaminated water and prevent such water from contaminating the environment.

- Cement contaminated water from the washing of tools and wheelbarrows must not be released into the environment as cement changes the chemistry of soil and is toxic to aquatic systems.
- Specific wash points must be made available for cleaning of tools and equipment contaminated with concrete, where water contaminated with cement is contained safely, and either re-used in cement batching, or allowed to evaporate, or removed for disposal at a registered facility.
- Concrete mixing must not take place directly on soil, or within wetlands. Suitable secondary containment must be used when mixing concrete.
- Any concrete spillages must be removed, allowed to dry, and then disposed as construction waste.

Soil –

The following requirements for soil pollution management shall apply:

- Soil should be exposed for the minimum time possible once cleared of invasive vegetation, that is the timing of clearing and grubbing should be co-ordinated as much as possible to avoid prolonged exposure of soils to wind and water erosion. Stockpiled topsoil must be either vegetated with indigenous grasses or covered with a suitable fabric to prevent erosion and invasion by weeds.
- All cut and fill surfaces need to be stabilized with appropriate material or measures when major civil works are complete.
- All equipment must be inspected regularly for oil or fuel leaks before it is operated. Leakages must be repaired on mobile equipment or containment trays placed underneath immobile equipment until such leakage has been repaired.
- Soil contaminated with oil must be appropriately treated and disposed of at a permitted landfill site or the soil can be regenerated using bio-remediation methods.
- Appropriate measures should be implemented in order to prevent potential soil pollution through fuel and oil leaks and spills and then compliance monitored by an appropriate person.

Noise –

- Noisy fixed facilities should be located well away from noise sensitive areas. Once the proposed final layouts are made available by the Contractor(s), the sites must be evaluated in detail and specific measures designed in to the system.
- The provisions of SANS 10103:2008 will apply to all areas at the perimeter of the site, within audible distance of residents.
- Working hours to be agreed upon with Project Manager, so as to minimise disturbance to adjacent landowners and community members.
- No unnecessary noise disruption or disturbance during school hours is to be allowed.

- No amplified music will be allowed on the site. The use of radios, tape recorders, compact disc players, television sets etc. will not be permitted unless at a level that does not serve as an intrusion to adjacent landowners.
- Construction activities generating output levels of 85 dB or more will be confined to the hours during normal working hours.
- The Contractor will take preventative measures (e.g. screening, muffling, timing, pre-notification of affected parties) to minimise complaints regarding noise and vibration nuisances from sources such as power tools.
- With regard to unavoidable very noisy construction activities in the vicinity of noise sensitive areas, the contractor should liaise with local residents on how best to minimise impact, and the local population should be kept informed of the nature and duration of intended activities.

Dust –

- Appropriate dust suppression measures or temporary stabilising mechanisms to be used when dust generation is unavoidable (e.g. dampening with water, chemical soil binders, straw, brush packs, chipping), particularly during prolonged periods of dry weather. Dust suppression to be undertaken for all bare areas, including construction area, access roads, site yard, etc.
- Fine materials must be covered during transportation.
- Speed limits to be strictly adhered to.
- The Contractor will take preventative measures to minimise complaints regarding dust nuisances (e.g. screening, dust control, timing, and pre-notification of affected parties).

Lights –

- Prior to construction the position and type of lighting will be planned to ensure unnecessary light pollution will be eliminated.
- All lighting installed on site must not lead to unacceptable light pollution to the surrounding community and natural environment (e.g. use of down-lighters).

Erosion –

- Protect areas of the construction site that are susceptible to erosion through suitable measures (e.g. watering, planting, retaining structures, commercial anti-erosion compounds).
- Particular care must be taken to prevent carrying of sediment onto roadways.
- Any erosion channels caused by construction activities to be suitably stabilised and rehabilitated.
- All efforts to prohibit ponding on surface and ensure stormwater runoff is channelled from the site must be made. The method used will be appropriate to the expected stormwater flows and the topography and geology of the site.

- Appropriate soil erosion and control procedures must be applied to all embankments that are disturbed and destabilized.

Responsibilities:

- Project Manager and ECO – to monitor compliance.
- Contractor to implement management actions.
- Contractor to conduct environmental monitoring for air quality (dust), noise and water quality.

Monitoring Requirements:

- Public complaints register.
- Evidence of pollution.
- Contractor's method statement.

11.3.15 Management of Topsoil

Management Objective:

- Ensure suitable removal, storage, transportation of topsoil for reuse during rehabilitation.

Target:

- The appropriate amount of recovered topsoil from disturbed areas to be stored for future use.
- No visual evidence of erosion from topsoil stockpiles.
- No visual evidence of erosion from areas where topsoil has been reinstated.

Management Actions:

- Topsoil should be stored for post-construction rehabilitation work and should not be disturbed more than is necessary.
- Topsoil should also be stored in such a way that does not compromise its plant-support capacity.
- Determine the average depth of the topsoil prior to excavations, however, a minimum of 150 mm must be stripped.
- Identify suitable areas to store topsoil in conjunction with the ECO.
- Stockpiled topsoil should not be compacted and should be replaced as the final soil layer. No vehicles are allowed access onto the stockpiles after they have been placed.
- Topsoil stripped from different sites must be stockpiled separately and clearly identified as such. Topsoil obtained from sites with different soil types must not be mixed.
- Remove topsoil from areas to be affected by construction activities.

- Topsoil to be adequately protected from contamination from construction activities and by aggregate, cement, concrete, fuels, litter, oils, domestic and industrial waste.
- Protect stored topsoil from compaction and should not be stockpiled higher than 1.5 m.
- Do not store topsoil in drainage lines or wetlands.
- Following the construction phase, the topsoil should be used in rehabilitation of affected areas.

Responsibilities:

- Project Manager and ECO – to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Topsoil stockpiles.
- Dust monitoring.
- Rehabilitated areas.
- Contractor's method statement.

11.3.16 Management of Excavations

Management Objective:

- Minimise environmental impacts associated with excavations.

Target:

- No damage to sensitive environmental features outside construction area during excavations.

Management Actions:

- Construction activities to remain within the designated construction areas.
- Subsoil and topsoil should be stockpiled separately to be returned for backfilling in the correct soil horizon order.
- Suitable barricading to be erected around open excavations/trenches, as per the Construction Regulations (2014). Provide signage as a warning of open excavations.
- Divert runoff away from excavations through the use of berms.
- Trench lengths will be kept as short as practically possible.
- Trench walls are to be stabilised using battering, shoring and bracing or similar techniques depending on the stability of the trench sides (where relevant).
- Inspect open trenches at least daily basis to ensure that animals have not become trapped. Such animals will be safely removed and released, where possible. Special equipment for handling of venomous snakes should be available on site to ensure safe removal.
- Filing of trenches to make provision for subsidence.

Responsibilities:

- Project Manager and ECO – to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Barricading of excavations.
- Excavation register.
- Contractor's method statement.

11.3.17 Management of Visual Aspects

Management Objective:

- Minimise impacts to the aesthetics/visual quality.
- Ensure that the visual appearance of the construction site is not an eyesore the adjacent areas.

Target:

- No complaints regarding impacts to visual quality.

Management Actions:

- Advertising and lighting will be in accordance with relevant standards.
- Lighting must not constitute an eyesore/hazard to users of the road and the surrounding community.
- Lighting will be sufficient to ensure security but will not constitute 'light pollution' to the surrounding areas.
- Where practicable, development designs to compliment the natural surroundings in order to preserve a sense of place.
- On-going housekeeping to maintain a tidy construction area.
- Discourage the unnecessary usage of high voltage lights during through-night construction. Lighting should be kept to an acceptable minimum and designed in position and height to minimise negative impact on surrounding inhabitants.
- The extent of unnecessary damage to natural surrounds must be kept to a minimum.

Responsibilities:

- Project Manager/Engineer and ECO – to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.
- Contractor's method statement.

11.3.18 Management of Flora

Management Objective:

- Preserve protected flora species outside of construction areas.
- Control alien plants and noxious weeds.

Target:

- No unpermitted disturbance to protected flora species.
- Ongoing eradication of alien plants and noxious weeds.

Management Actions:

- Comply with the requirements of the National Environmental Management: Biodiversity Act (No. 10 of 2004), National Forests Act (No. 84 of 1998) and National Veld and Forest Fire Act (No. 101 of 1998).
- Indigenous plants naturally growing on the proposed development sites that would be otherwise destroyed during clearing for development purposes should be incorporated into landscaped areas.
- Vegetation clearing should be kept to a minimum, and this should only occur where it is absolutely necessary. The use of a brush-cutter is highly preferable to the use of earth-moving equipment.
- Rehabilitate all disturbed areas as soon as the construction is completed within the proposed development areas.
- Ensure that all personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm. This can be achieved through provision of appropriate awareness to all personnel.
- The most significant way to mitigate the loss of habitat is to limit the footprint within the natural habitat areas remaining.
- No structures should be built, or activities take place, outside the area demarcated for the development.
- Although it is unavoidable that sections of the proposed developments will need to traverse areas of potential sensitivity, the construction of the interception drains should be constructed in such cases so as to avoid further impact to these areas.
- Appropriate measures should be implemented in order to prevent potential soil pollution through fuel and oil leaks and spills and then compliance monitored by an appropriate person.
- Make sure construction vehicles are maintained and serviced to prevent oil and fuel leaks.
- Emergency on-site maintenance should only be done over appropriate drip trays and all oil or fuel must be disposed of according to waste regulations. Drip-trays must be placed under vehicles and equipment when not in use.

- Implement suitable erosion control measures.
- During construction, the construction areas and immediate surroundings should be monitored regularly for emergent invasive vegetation.
- Promote awareness of all personnel.
- The establishment of pioneer species should be considered with the natural cycle of rehabilitation of disturbed areas, which assists with erosion control, dust and establishment of more permanent species. This can be controlled during construction phase and thereafter more stringent measures should be implemented during the rehabilitation and post rehabilitation.
- Proliferation of alien and invasive species is expected within the disturbed areas and they should be eradicated and controlled to prevent their spread into the Power Station.
- Larger exotic species that are not included in the Category 1b list of invasive species could also be allowed to remain for aesthetic purposes.
- All alien seedlings and saplings must be removed as they become evident for the duration of construction phase.
- Manual / mechanical removal is preferred to chemical control.
- Topsoil should be stored in such a way that does not compromise its plant-support capacity.
- Topsoil from the construction activities should be stored for post-construction rehabilitation work and should not be disturbed more than is absolutely necessary.
- Protect topsoil in order to avoid erosion loss on steep slopes.
- Protect topsoil from contamination by aggregate, cement, concrete, fuels, litter, oils, domestic and wastes.
- An ecologically-sound stormwater management plan must be implemented during construction and appropriate water diversion systems put in place.
- Vehicles and construction workers should under no circumstances be allowed outside the site boundaries to prevent impact on the surrounding vegetation.
- Where possible, natural vegetation must not be cleared and encouraged to grow.
- All stockpiles, construction vehicles, equipment and machinery should be situated away from the natural vegetation.
- Disturbance of vegetation must be limited only to areas of construction.
- Prevent contamination of natural grasslands by any pollution.
- Areas cleared of vegetation must be re-vegetated prior to contractor leaving the site.
- Construction activities should be restricted to the development footprint area and then the compliance in terms of footprint can be monitored by the ECO.
- Areas which could be deemed as no go should be clearly marked.
- Newly cleared soils will have to be re-vegetated and stabilised as soon as construction has been completed and there should be an on-going monitoring program to control and/or eradicate newly emerging invasives.

- All areas to be affected by the proposed project will be rehabilitated after construction and all waste generated by the construction activities will be stored in a temporary demarcated storage area, prior to disposal thereof at a licensed registered landfill site.
- As much vegetation growth as possible should be promoted within the proposed development site in order to protect soils and to reduce the percentage of the surface area which is left as bare ground. In this regard special mention is made of the need to use indigenous vegetation species as the first choice during landscaping. In terms of the percentage of coverage required during rehabilitation and also the grass mix to be used for rehabilitation, the EMPr will be consulted for guidance. However, the plant material to be used for rehabilitation should be similar to what is found in the surrounding area.

Responsibilities:

- Applicant – acquire permits
- Project Manager and ECO – to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Permits.
- Encroachment of alien invasive plants and noxious weeds.
- Successful rehabilitation.
- Contractor's method statement.

11.3.19 Management of Fauna

Management Objective:

- Ensure the protection of animals

Target:

- No direct/indirect harm to animals from construction activities.

Management Actions:

- Comply with the requirements of the National Environmental Management: Biodiversity Act (No. 10 of 2004), Natal Nature Conservation Ordinance 15 of 1974 and Animal Protection Act (No. 71 of 1962).
- Training of construction workers to recognise threatened animal species will reduce the probability of fauna being harmed unnecessarily.
- The contractor must ensure that no faunal species are disturbed, trapped, hunted or killed during the construction phase.
- Vehicles must adhere to a speed limit, 30-40 km/h is recommended for light vehicles and a lower speed for heavy vehicles.

- All construction and maintenance vehicles must stick to properly demarcated and prepared roads. Off-road driving should be strictly prohibited.
- No fires should be allowed at the sites.
- No dogs or other domestic pets should be allowed at the sites.
- The most significant way to mitigate the loss of habitat is to limit the footprint within the natural habitat areas remaining.
- No structures should be built outside the area demarcated for the development.
- Although it is unavoidable that sections of the proposed developments will need to traverse areas of potential sensitivity, the construction of the interception drains should be constructed in such cases so as to avoid further impact to these areas.
- Animals residing within the designated area shall not be unnecessarily disturbed.
- During construction, refresher training can be conducted to construction workers with regards to littering and poaching.
- The Contractor and his/her employees shall not bring any domestic animals onto site.
- Toolbox talks should be provided to contractors regarding disturbance to animals. Particular emphasis should be placed on talks regarding handling of snakes.
- Illegal hunting is prohibited in the Power Station.
- Any fauna (mammal, bird, reptile and amphibian) that becomes trapped in the trenches or in any construction or operational related activity may not be harmed and must be placed rescued and relocated by an experienced person.
- The disturbance of fauna should be minimized.
- Animals residing within the designated area shall not be unnecessarily disturbed.

Responsibilities:

- Applicant – acquire permits (if applicable)
- Project Manager and ECO – to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Permits (if applicable).
- Contractor's method statement.

11.3.20 Management of Archaeological and Cultural Features and Palaeontological Sensitivity

Management Objective:

- To have no adverse impact on the historical inheritance and fossil heritage of the area.
- The protection of land considered to be of traditional cultural value and palaeontological sensitivity.

- The protection of known archaeological sites against vandalism, destruction and theft during the construction phase.
- To avoid damage to or destruction of previously unknown or excavated archaeological artefacts and fossil heritage during construction.
- The preservation and appropriate management of new findings should these be discovered during construction.

Management Target:

- No archaeological and cultural resources or graves to be damaged during construction.

Management Actions:

- Mitigation will only be required for DUV 002 (burial ground):
 - Demarcate the site as a “no go” area, with a 30m buffer and a fence.
 - It is also recommended that the ECO monitor construction at this location.
 - If the graves will be disturbed in any way during construction or operation, and a buffer is not possible, a grave relocation process will need to take place.
- In the case where archaeological material is identified during construction the following measures must be taken:
 - Upon the accidental discovery of archaeological material, a buffer of at least 30 meters should be implemented.
 - If archaeological material is accidentally discovered during construction, activities must cease in the area and a qualified archaeologist be contacted to evaluate the find. To remove the material, permits must be applied for from SAHRA under Section 35 of the NHRA.
- In the case where a grave is identified during construction, the following measures must be taken:
 - Upon the accidental discovery of graves, a buffer of at least 50 meters should be implemented.
 - If graves are accidentally discovered during construction, activities must cease in the area and a qualified archaeologist be contacted to evaluate the find. To remove the remains a permit must be applied for from SAHRA (Section 36 of the NHRA) and other relevant authorities (National Health Act and its regulations). The local South African Police Services must immediately be notified of the find.
 - Where it is recommended that the graves be relocated, a full grave relocation process that includes comprehensive social consultation must be followed.
- The grave relocation process must include:

- A detailed social consultation process, that will trace the next-of-kin and obtain their consent for the relocation of the graves, that will be at least 60 days in length;
 - Site notices indicating the intent of the relocation;
 - Newspaper notices indicating the intent of the relocation;
 - A permit from the local authority;
 - A permit from the Provincial Department of Health;
 - A permit from the South African Heritage Resources Agency, if the graves are older than 60 years or unidentified and thus presumed older than 60 years;
 - An exhumation process that keeps the dignity of the remains intact;
 - The whole process must be done by a reputable company that is well versed in relocations;
 - The exhumation process must be conducted in such a manner as to safeguard the legal rights of the families as well as that of the development company.
- In the event that fossil remains are discovered during any phase of construction, either on the surface or exposed by fresh excavations, the Chance Find Protocol must be implemented by the ECO in charge of these developments. This Chance Find Protocol must also be included in the EMPr. These discoveries ought to be secured (preferably in situ) and the ECO ought to alert SAHRA so that appropriate mitigation (e.g. documented and collection) can be undertaken by a palaeontologist. The specialist would need a collection permit from SAHRA. Fossil material must be curated in an approved collection (museum or university) and all fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA.
 - The Chance Find Protocol is attached in Appendix A of this EMPr.

Responsibilities:

- Applicant – acquire permits.
- Project Manager and ECO – to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Permits (if applicable).
- Contractor's method statement.

11.3.21 Management of Water on site

Management Objective:

- Minimise environmental impacts associated with storm water as well as water services for construction workers.
- Minimise stormwater runoff from the site onto neighbouring roads.
- Minimise water use through recycling and water efficient practices.

Target:

- No visual evidence of erosion caused by wastewater or stormwater practices.
- No environmental contamination associated with wastewater or stormwater practices.

Management Actions:

- All construction activities to comply with NWA.
- Compliance with the Stormwater Management Plan compiled.
- During the construction stage, water will be required for various purposes, such as concrete batching, washing of tools and equipment in dedicated areas, dust suppression, potable use by construction workers, etc. Water tankers will supply water to the site.
- Manage stormwater from construction site to avoid environmental contamination and erosion.
- Manage stormwater from construction site to avoid environmental contamination and erosion.
- Measures must be taken to divert unpolluted water and runoff away from the site.
- All discharges to comply with legal requirements associated with the National Water Act (Act No. 36 of 1998).
- All wastewater discharges to comply with legal requirements associated with the National Water Act (Act No. 36 of 1998), including the General Authorisation that specifically deals with S21 (f) and (g) water uses.
- Ensure proper storage of material (including fuel, paint) that could cause water pollution. Ensure proper storage and careful handling of hazardous substances with spill prevention materials at hand.
- Visual inspections for the occurrence of erosion should be undertaken on a weekly basis.

Responsibilities:

- Project Manager and ECO – to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.
- Water monitoring programme – discharges.
- Disposal certificates
- Contractor's method statement.

11.3.22 Management of Watercourses

Management Objective:

- Ensure that the watercourses (including affected rivers, natural channels, wetlands, and drainage lines) are protected and incur minimal negative impact to resource quality (i.e. flow, water quality, riparian habitat, morphology, and aquatic biota).
- Existing water use entitlements not to be affected.

Target:

- Minimise the habitat unit destruction and potential loss of wetland/aquatic-dependent biodiversity.
- Unaltered downstream flow regime.
- Downstream water quality to remain within acceptable ranges, as determined through baseline monitoring.
- Ecological category not to be influenced by construction activities.

Management Actions:

General Mitigation Measures:

- Prevent uncontrolled access of vehicles through the wetlands that can cause a significant adverse impact on the hydrology and functioning of the systems;
- Laydown yards, camps and storage areas must be beyond the water resource areas and associated buffers. The construction site camps should be limited to the site camp areas authorised through the Basic Assessment.
- As much material must be pre-fabricated and then transported to site to avoid the risks of contamination associated with mixing, pouring and the storage of chemicals and compounds on site;
- All contractors and employees should undergo induction which is to include a component of environmental awareness. The induction is to include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good “housekeeping”;
- Adequate sanitary facilities and ablutions must be provided for all personnel throughout the project area. Use of these facilities must be enforced (these facilities must be kept clean so that they are a desired alternative to the surrounding vegetation);
- No dumping of construction material on-site may take place;
- All waste generated on-site during construction must be adequately managed. Separation and recycling of different waste materials should be supported; and
- Temporary and permanent erosion control methods may include silt fences, flotation silt curtains, retention basins, detention ponds, interceptor ditches, seeding and sodding, riprap of exposed embankments, erosion mats, and mulching.
- It is recommended that any effluents that are discharged into the surrounding wetland units be tested for harmful contaminants to ensure that no significant impacts to the supported

biodiversity will take place. Cross referencing the effluent quality to the present DHSWS target water quality guidelines should be undertaken;

- The use of the wetlands for water volume and quality management pertaining to the Duvha Power Station can be possible in a sustainable way and these wetlands can offer ecological services and functions that can reduce the costs of artificial water purification and volume management.

Mitigation Measures for the High Level Dam

- Excavation of drain
 - Demarcate working and access areas.
 - Avoid wetland areas.
 - Minimize drain footprint area.
- Contaminated seepage water input
 - Containment of water ingress, & pumping to dam.
 - Separation of clean and dirty water
 - Monitor groundwater quality.
 - Inspect the drains for level of affect.
- Drainage patterns change due to drain
 - Minimize drain footprint area.
 - Construction during the dry season.
 - Create temporary storm water channels around working area. Separate clean / dirty water.
 - Wetland areas must be made No Go areas.
 - Backfill of the drains must be concurrent (minor lag) with excavation, to limit the extent of the drain.
 - Stockpiling should take place outside of the water resources. All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds.
 - Any exposed earth should be rehabilitated promptly by planting suitable vegetation (vigorous indigenous grasses) to protect the exposed soil.
- Spills and leaks
 - Site induction to include the reporting and cleaning of spills and leaks and general good “housekeeping”.
 - All chemicals and toxicants during construction must be stored in bunded areas.
 - All machinery and equipment should be inspected regularly for faults and possible leaks, these should be serviced off-site.
 - Maintenance and fuelling of vehicles and machinery must be off-site in designated working or fuelling areas.
 - Have action plans on site, and training for contactors and employees in the event of spills, leaks and other impacts to the aquatic systems.

Mitigation Measures for the Ash Dam

- Excavation of drain
 - Demarcate working and access areas.
 - Avoid wetland areas (where possible).
 - Minimize drain footprint area.
- Stormwater management
 - Create temporary storm water channels around working area. Separate clean / dirty water.
 - Storm water channels and preferential flow paths should be filled with aggregate and/or logs (branches included) to dissipate and slow flows limiting erosion.
- Contaminated seepage water input
 - Containment of water ingress, & pumping to dam.
 - Separation of clean and dirty water
 - Monitor groundwater quality.
 - Inspect the drains for level of affect.
- Drainage patterns change due to drain
 - Minimize drain footprint area.
 - Construction during the dry season.
 - Create temporary storm water channels around working area. Separate clean / dirty water.
 - Wetland areas must be made No Go areas.
 - Backfill of the drains must be concurrent (minor lag) with excavation, to limit the extent of the drain.
 - Stockpiling should take place outside of the water resources. All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds.
 - Any exposed earth should be rehabilitated promptly by planting suitable vegetation (vigorous indigenous grasses) to protect the exposed soil.
- Vehicle activity
 - Demarcate working and access areas.
 - Avoid wetland areas (where possible).
 - Construct from existing access routes or disturbed areas.
 - Create only temporary access routes and working areas.
 - Vehicles should be inspected regularly for faults and possible leaks, these should be serviced off-site.
 - Maintenance and fuelling of vehicles must be off-site in designated working or fuelling areas.
 - Vehicles should be cleaned regularly off-site in designated wash bays.
- Spills and leaks

- Site induction to include the reporting and cleaning of spills and leaks and general good “housekeeping”.
- All chemicals and toxicants during construction must be stored in bunded areas.
- All machinery and equipment should be inspected regularly for faults and possible leaks, these should be serviced off-site.
- Maintenance and fuelling of vehicles and machinery must be off-site in designated working or fuelling areas.
- Have action plans on site, and training for contactors and employees in the event of spills, leaks and other impacts to the aquatic systems.

Mitigation Measures for the Low Level Dam

- Removal of vegetation
 - Stripping areas can be demarcated to avoid unnecessary removals (survey pegs).
 - Keep stripping areas to a minimum footprint area.
 - Vegetation should be stripped / removed in a phased manner.
 - Where possible, store vegetation for re-planting and rehab efforts. Impacted areas can be re-vegetated using sods from removed vegetation.
 - Sloped areas must be re-vegetated, either using removed vegetation or with a grass seed mix consisting of natural endemic species.
 - Mulch can be used to encourage re-vegetation efforts for re-growth.
- Stripping and stockpiling of topsoil
 - Removed soils, top soil and subsoil must be stockpiled next to the excavation area separately.
 - Soil stockpiles should be low and relatively flat to reduce wind and water erosion potential.
 - Soil stockpiles should be prioritised for backfill and rehabilitation efforts to limit standing time.
 - Areas with minimal disturbance and negligible signs of compaction can be ripped (to re-vegetate naturally).
- Excavation of drain
 - Demarcate working and access areas.
 - Avoid wetland areas (where possible).
 - Minimize drain footprint area.
- Stormwater management
 - Create temporary storm water channels around working area. Separate clean / dirty water.
 - Storm water channels and preferential flow paths should be filled with aggregate and/or logs (branches included) to dissipate and slow flows limiting erosion.
- Contaminated seepage water input
 - Containment of water ingress, & pumping to dam.
 - Separation of clean and dirty water

- Monitor groundwater quality.
- Inspect the drains for level of affect.
- Drainage patterns change due to drain
 - Minimize drain footprint area.
 - Construction during the dry season.
 - Create temporary storm water channels around working area. Separate clean / dirty water.
 - Wetland areas must be made No Go areas (where possible).
 - Backfill of the drains must be concurrent (minor lag) with excavation, to limit the extent of the drain.
 - Stockpiling should take place outside of the water resources. All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds.
 - Any exposed earth should be rehabilitated promptly by planting suitable vegetation (vigorous indigenous grasses) to protect the exposed soil.
 - Create surface and sub-surface flow paths down the wetland, around the drain area. These may include swales and perforated piping.
- Clearing & shaping of drain
 - Only “local” soils must be used for the shaping, soils should not be imported from elsewhere.
 - Restrict activities within the drain area.
 - Removed material must be moved off-site, avoid the wetland areas.
 - Conduct clearing and shaping in the dry season.
 - Contain dirty water, and use this for shaping. Do not discharge dirty water into the wetland.
- Cleaning of drain area
 - Silt traps should be set (downslope) within the wetlands during construction phase.
 - Signs of excess sediment within the system should be removed manually.
 - Limit the use of heavy machinery and equipment to clean the drain.
- Temporary access routes
 - Make use of existing routes or avoid wetland areas.
 - Rehabilitation of compacted areas post construction.
 - Ripping should be done to a maximum depth of 300 mm in two directions at right angles.
 - Ripping should be conducted during the drier period
 - After construction, compacted top soil should be ripped and vegetation re-planted or seeds dispersed
- Temporary working area
 - Make use of already disturbed areas or avoid wetland areas.
 - Rehabilitation of compacted areas post construction.

- Ripping should be done to a maximum depth of 300 mm in two directions at right angles.
- Ripping should be conducted during the drier period
- After construction, compacted top soil should be ripped and vegetation re-planted or seeds dispersed
- Layering of drain fill material
 - Ripping should be done to a maximum depth of 300 mm in two directions at right angles.
 - Ripping should be conducted during the drier period.
 - After construction, compacted top soil should be ripped and vegetation re-planted or seeds dispersed
- Vehicle activity
 - Demarcate working and access areas.
 - Avoid wetland areas.
 - Construct from existing access routes or disturbed areas.
 - Create only temporary access routes and working areas.
 - Vehicles should be inspected regularly for faults and possible leaks, these should be serviced off-site.
 - Maintenance and fuelling of vehicles must be off-site in designated working or fuelling areas.
 - Vehicles should be cleaned regularly off-site in designated wash bays.
- Spills and leaks
 - Site induction to include the reporting and cleaning of spills and leaks and general good “housekeeping”.
 - All chemicals and toxicants during construction must be stored in bunded areas.
 - All machinery and equipment should be inspected regularly for faults and possible leaks, these should be serviced off-site.
 - Maintenance and fuelling of vehicles and machinery must be off-site in designated working or fuelling areas.
 - Have action plans on site, and training for contactors and employees in the event of spills, leaks and other impacts to the aquatic systems.

Responsibilities:

- Project Manager and ECO – to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.
- Aquatic monitoring survey
- Water monitoring programme – discharges.

- Disposal certificates
- Contractor's method statement.

11.3.23 Management of Rehabilitation

Management Objective:

- Adequate reinstatement and rehabilitation of construction areas
- Conduct concurrent or progressive rehabilitation of areas affected by construction activities that are situated outside of the construction footprint.

Target:

- Complete site clean-up.
- Reinstatement and rehabilitate areas disturbed by construction activities that are located outside of the construction area.
- Landscaping of the finished development to complement the surrounding area.

Management Actions:

Removal of structures and infrastructure

- After the construction phase, the area disturbed through construction must be rehabilitated by appropriate landscaping, levelling, topsoil dressing, land preparation, alien plant eradication and vegetation establishment.
- Clear and completely remove from site all construction plant, equipment, storage containers, temporary fencing, temporary services, and fixtures.
- Ensure that all access roads utilised during construction which are not earmarked for use during the operational phase, are returned to a state no worse than prior to construction.

Inert waste and rubble

- Clear the site of all inert waste and rubble, including surplus rock, foundations and batching plant aggregates. After the material has been removed, the site shall be re-instated and rehabilitated.
- Load and haul excess spoil and inert rubble to be recycled, reused, or disposed at a registered facility.
- Remove from site all domestic waste and dispose of in the approved manner at a registered waste disposal site.

Hazardous waste and pollution control

- Remove from site all pollution containment structures.
- Remove from site all temporary sanitary infrastructure and wastewater disposal systems. Take care to avoid leaks, overflows and spills and dispose of any waste in the approved manner.

- Comply with relevant provisions under the following EMPr sections: Management of Storage and Handling of Hazardous Material, Management of Water, Management of Waste, Management of Pollution Generation Potential.

Landscaping / Rehabilitation

- The landscape profile should be restored, matching as closely as possible to the original land form prior to the distribution of the topsoil.
- In general, no slopes steeper than 1(V):3(H) are permitted in cut-and-fill areas, unless otherwise specified by the Project Manager.
- Programme the backfill of excavations so that subsoil is deposited first, followed by the topsoil. Compact in layers for best results.
- Erosion protection must be implemented on slopes.
- Where re-vegetation through the replacement of topsoil fails, re-vegetation with locally indigenous vegetation should be undertaken.
- Monitor backfilled areas for subsidence (as the backfill settles) and fill depressions using available material.
- Ensure that no excavated material or stockpiles are left on site.
- Rehabilitate construction camp according to DWAF's Integrated Environmental Management Series No.6: Environmental Best Practice Specifications (Construction).

Topsoil replacement and soil amelioration

- Execute top soiling activity prior to the rainy season or any expected wet weather conditions.
- Execute topsoil placement only after all construction work has ceased.
- Replace and redistribute stockpiled topsoil together with herbaceous vegetation, overlying grass and other fine organic matter in all disturbed areas of the construction site, including temporary access routes. Replace topsoil to the original depth.
- Place topsoil in the same area from where it was stripped. If there is insufficient topsoil available from a particular soil zone to produce the minimum specified depth, topsoil of similar quality may be brought from other areas of similar quality.
- The suitability of substitute material will be determined by means of a soil analysis addressing soil fraction, fertility, pH and drainage.
- Do not use topsoil suspected to be contaminated with the seed of alien vegetation (e.g. black wattle). Alternatively, the soil is to be appropriately treated.
- Ensure that stormwater run-off is not channelled alongside the gentle mounding, but that it is taken diagonally across it.
- Shape remaining stockpiled topsoil not utilised elsewhere in an acceptable manner so as to blend in with the local surrounding area.
- After topsoil placement is complete, spread available stripped vegetation randomly by hand over the top-soiled area.

- Newly cleared soils will have to be re-vegetated and stabilised as soon as construction has been completed and there should be an on-going monitoring program to control and/or eradicate newly emerging invasives.
- Machines should remove the stone material and transported to another location and re-used if it is required, and removed correctly to a licensed facility.
- The geotextile base material, and other foreign material should also then removed during rehabilitation.

Ripping and scarifying (if required)

- Rip and/or scarify all areas following the application of topsoil to facilitate mixing of the upper most layers. Whether ripping and/or scarifying is necessary will be determined based on the site conditions immediately before these works begin.
- The area should be ripped to an appropriate depth to remove any minor compaction.

Planting

- The areas that have been denuded and disturbed as a result of the construction on site must be vegetated with indigenous vegetation as soon as possible.
- No exotic plants may be used for rehabilitation purpose, only indigenous plants of the area may be utilised (no Kikuyu grass can be used).
- Plants should be located from other undisturbed areas, and this along with the original seed-bank within the replaced topsoil will assist with stabilising soils and re-vegetation of the area.
- Transplanting entails the removal of plant material and replanting the same plants in another designated position.
- Planting should preferably be done during the rainy season.
- After planting, each plant must be well watered, adding more soil upon settlement if necessary.

Grassing

- Suitably trained personnel must undertake grassing by making use of the appropriate equipment and grass species as specified by the terrestrial ecologist.
- Sodding may be done at any time of the year but seeding must be done during the summer when the germination rate is better.
- Hydroseeding with a winter mix will only be specified where regassing is urgent and cannot wait for the summer.

Maintenance

- Monitor the re-growth of invasive vegetative material.
- Cordon off areas that are under rehabilitation as no-go areas.

- Revegetation must match the vegetation type, which previously existed, unless otherwise indicated by a suitable specialist.
- Control invasive plant species and noxious weeds by means of extraction, cutting or other approved methods.
- For planted areas that have failed to establish, replace plants with the same species as originally specified.

11.4 Operational Phase

11.4.1 General Environmental Management

Note that where any activity and aspect associated with the operational phase of the project coincides with the receiving environment and activities of the construction phase (see **Section 11.3**), the same management requirements will apply.

11.4.2 Routine Maintenance Inspections and Repairs

Management Objective:

- Manage environmental impacts associated with drain maintenance.
- Restrict operation and maintenance activities to the drains and drain servitudes.
- Safeguarding of nearby watercourse and existing services.

Target:

- No damage to be caused to nearby watercourses and sensitive features.
- Ensure all affected parties are notified.

Management Actions:

- Affected parties should be notified in advance of any maintenance activities.
- During maintenance related activities, damage to roads and/or private property, will be restored to its original condition.
- Restrict operation and maintenance activities to the drain servitudes.
- Monitoring to be conducted to detect erosion (e.g. steep sections along the route and at outlet structures).
- Erosion should be remediated and additional mitigation put in place to prevent further erosion.
- To prevent unnecessary alien plant infestations, an alien plant monitoring and eradication programme needs to be in place, at least until the disturbed areas have recovered and properly stabilised.
- The disturbance of fauna should be minimized.
- Animals residing within the designated area shall not be unnecessarily disturbed.

Responsibilities:

- Applicant – monitor compliance and implement management actions

Monitoring Requirements:

- No impact on watercourses or sensitive features.

11.4.3 Pollution Control Measures

Management Objective:

- Ensure leaks or groundwater contamination are detected and repaired.
- Ensure that possible causes of pollution are mitigated as far as possible to minimise environmental and social impacts to the receiving environment.

Target:

- Timeous detection and repair of leaks or damage to drains.
- No measurable signs of pollution.
- Approved containment and rehabilitation strategy.

Management Actions:

- Containment and Rehabilitation Plan to be in place for pollution related impacts. The approach may require input from the authorities and affected parties.
- Proper emergency response procedure to be in place to address leaks along the pipeline servitude.
- All major incidents to be recorded by the Applicant and must be reported to DEFF and other relevant authorities.

Responsibilities:

- Applicant – to monitor compliance and implement management actions.
- Relevant authorities to monitor rehabilitation.

Monitoring Requirements:

- Containment and Rehabilitation Plan.
- Incident Register and Report.

12 REHABILITATION PLAN

12.1 Objectives of Rehabilitation Plan

The Objective of the Rehabilitation Plan is to ensure the return of biodiversity in rehabilitated areas by increasing the quality, uniformity, and efficiency of standards and processes for rehabilitation of indigenous vegetation and to allow effective monitoring and auditing of the rehabilitated areas. Adherence to this Rehabilitation Plan will ensure that the site is effectively rehabilitated to minimise lasting negative impacts on the environment.

Objectives for the rehabilitation of the construction area and sensitive areas affected along the proposed roads and stormwater infrastructure are as follows:

- Stabilisation and rehabilitation of adjacent areas to activities;
- Adequate rehabilitation of the cleared indigenous vegetation areas;
- Manage activities within the study area in order to improve ecological integrity of the study area;
- Stabilisation and rehabilitation of the identified watercourses and sensitive areas;
- Minimise adverse impacts on the receiving environment;
- Rehabilitation of site camps;
- Monitor the impact of the project on the receiving environment;
- Biodiversity conservation to maintain habitat for species associated with watercourses and sensitive areas identified.

12.2 Rehabilitation of Construction Camps and Storage Areas

During the construction phase, these camp and storage areas will be disturbed but major erosion risks are not expected as long as correct monitoring and training is carried out as per the specification of the EMPr. All permanent and temporary structures must be removed from the construction camps and storage areas following construction. Additionally, all construction material and waste material must be removed from the camps and storage areas footprint.

12.3 Rehabilitation of Construction Area

12.3.1 General Rehabilitation Measures

- All areas compacted by construction machines shall be ripped and disked after construction
- The Contractor shall re-vegetate the construction area as specific in the EMPr.
- Appropriate area specific plant species, seeding methods and replanting shall be used to achieve the re-vegetation of the construction area.

- All waste rock shall be removed from the area and no rocky debris with sharp edges should be left behind in the stream channel.

12.3.2 Soil Preparation

- The entire scarred area must be levelled and shaped to the level of the surrounding topography so as not to hinder water drainage and cause channelling which may in time lead to erosion.
- All gullies shall be filled in and compacted so that the final level of the gully is level with the surrounding soil surface and packed in overflow channels/berm offshoots, this would include those dislodged in any soil preparation works.
- The construction area must be adequately reinstated, and concurrent or progressive rehabilitation of affected areas must be conducted.

12.3.3 Site Clearance

- All construction/building related rubble left on site is to be collected and removed from site and disposed of at a licensed waste disposal site. The ECO must be provided proof of disposal in the form of an invoice from the Contractor or a weighbridge notice from the relevant disposal site.
- Rubble to a depth of 100mm in the soil must all be removed.

12.3.4 Excavation

- With any excavation, all soils must be replaced in the same order as they were removed ending with topsoil as the final layer. The sequence of replacing the soil layers plays a vital role regarding reinstating the subsurface layering of the soil profile.
- All dangerous excavations must be made safe by backfilling and grading, as required.

12.3.5 Topsoil

- Topsoil will be stockpiled in heaps of a maximum of 1.5 metres and protected from erosion and loss of any form of contamination.
- Execute top soiling activity prior to the rainy season or any expected wet weather conditions.
- Execute topsoil placement only after all construction work has ceased.
- Topsoil removed on site must be saved and stored. It is imperative that this soil be collected and stored to ensure that valuable seeds in the soil are not lost to the process of eventual rehabilitation of the site.
- Topsoil stockpiles must be covered during windy and rainy months in order to limit soil erosion.
- It must be ensured that topsoil used is clear of any alien and invasive species before being reinstated on re-profiled areas.

- No topsoil, which has been stripped, shall be buried or in any other way be rendered unsuitable for further use.
- Ensure that excavated and stockpiled soil material is stored and bermed on the higher lying areas of the site and not in any storm water run-off channels or any other areas where it is likely to cause erosion or where water would naturally accumulate.
- Place topsoil in the same area from where it was stripped. If there is insufficient topsoil available from a particular soil zone to produce the minimum specified depth, topsoil of similar quality may be brought from other areas of similar quality.
- Stockpiled topsoil must be replaced and redistributed together with herbaceous vegetation, overlying grass and other fine organic matter in all disturbed areas of the construction site, including temporary access routes and roads. Topsoil is to be replaced to its original depth.
- After topsoil placement is complete, spread available stripped vegetation randomly by hand over the top-soiled area.
- Do not use topsoil suspected to be contaminated with the seed of alien vegetation (e.g. black wattle, poplar,). Alternatively, the soil is to be sprayed with specified herbicides.
- Topsoil may not be mixed with spoil material before or during replacement.

12.3.6 Final shaping

- In general, no slopes steeper than 1(V):3(H) are permitted, unless otherwise specified by the Engineer. Steeper slopes require protection. New slopes must mimic the natural slopes and topography, where possible.
- Programme the backfill of excavations so that subsoil is deposited first, followed by the topsoil. Compact in layers for best results.
- Monitor backfilled areas for subsidence (as the backfill settles) and fill depressions using available material.
- The entire scarred area is to be levelled off as close as possible to the surrounding topography so as not to hinder water drainage and cause channelling which may in time lead to erosion.
- All disturbed areas should be shaped to blend in with the surrounding landscape, where possible.
- Ensure that no excavated material or stockpiles are left on site and that all material remaining after backfill is landscaped to blend in with the surrounding landscape.

12.3.7 Ripping and scarifying

- Rip and/or scarify all areas following the application of topsoil to facilitate mixing of the upper most layers. Whether ripping and/or scarifying is necessary will be based on the site conditions immediately before these works begin.

- Rip and/or scarify all disturbed (and other specified) areas of the construction site, including temporary access routes and roads, compacted during the execution of the works.
- Rip and/or scarify along the contour to prevent the creation of down-slope channels.
- Do not rip and/or scarify areas under wet conditions, as the soil will not break up.

12.3.8 Grassing

- All planting work is to be supervised by suitably experienced personnel, making use of the appropriate equipment.
- Only locally indigenous grass species can be used for rehabilitation. The grass seed mix can be established through consultation with an Ecological Specialist and ECO.
- Sodding may be done at any time of the year but seeding must be done during the summer when the germination rate is better.
- Re-vegetation shall take place at the start of the rainy season to maximise water availability and minimise the need for watering.
- Hydroseeding with a winter mix will only be specified where regrassing is urgent and cannot wait for the summer.
- Only locally indigenous vegetation must be used for landscaping and rehabilitation. Vetriver or Kikuyu grass must not be used on site as it will invade and outcompete indigenous grass species.

12.3.9 Die back

- A total die back not in excess of 5% will be accepted. Should a larger die back be experienced, plants must be replaced at the cost of the Contractor. This die back percentage will be determined 2 months after planting. Over this 2-month period it will be left to the Contractor's discretion as to whether or not to water. (The 2-month period applies to the months of September to March. If plants are planted from March to September, the 2-month assessment period will commence from end of September.)
- All replaced plants will be re-evaluated 2 months after planting on the same basis as above.

12.3.10 Erosion prevention measures

- Rehabilitation areas on steep slopes must be suitably stabilised to prevent erosion. Any erosion taking place must be remediated and measures put in place to further retard erosion.

12.3.11 Maintenance and monitoring

- All rehabilitation efforts including erosion control as well as re-vegetation must be monitored. Access to rehabilitated areas must be restricted.

- The re-growth of invasive vegetative material must be monitored and alien invasive species removed regularly from the rehabilitated areas.
- Areas that are under rehabilitation should be cordoned off as no-go areas.
- Re-vegetation must match the existing vegetation, unless otherwise indicated by the Engineer/ECO.
- Invasive plant species and noxious weeds must be controlled by means of extraction, cutting or other approved methods.
- For planted areas that have failed to establish, plants should be replaced with the same species as originally specified, unless otherwise specified by the ECO.

12.3.12 Control over noxious, invasive and problem vegetation

- All exotic vegetation and invasive plant species must be removed. Any disturbed sites must be correctly managed and maintained to ensure that invasive species do not occur in the rehabilitated areas.
- Only locally indigenous vegetation must be used for landscaping and rehabilitation. The Terrestrial Ecologist must be consulted in order to compile a list of some of indigenous plant species recorded on site. Vetriver or Kikuyu grass must not be used on site as it will invade and outcompete indigenous grass species.

12.4 Rehabilitation of the Wetland Areas

Soil erosion is an aspect that has the potential to result in the most significant and long-term impacts of all habitat units, with impact features that could potentially be on a regional scale. Special attention must be paid to active and ongoing avoidance and management of soil erosion throughout all phases of the Duvha Power Station seepage interception drains. This is an aspect that is easily managed, but, if allowed to develop unabated, will have profound impacts on the respective systems. Therefore, temporary and permanent erosion control methods should be utilised, such as silt fences, silt curtains, berms, retention basins, detention ponds, interceptor ditches, seeding and sodding, riprap of exposed embankments, erosion mats, and mulching.

The impacted wetland areas must after being levelled and the topsoil being returned, be regrassed again with wetland vegetation associated with the surrounding wetland areas or with the vegetation. This can be done either by procuring the relevant seeds from a suitable supplier or by taking grass pockets from surrounding wetlands and replanting them in the disturbed wetland areas.

Reinstatement of vegetation near watercourses should be supplemented with bands of grass plugs, 1m wide distributed along the slope following the contour. These bands of grass act as energy breakers for water flow across the site which reduces soil erosion. The frequency of plugged bands should increase with the increase of slope. The bands of grass should be

aligned and used in conjunction with rock pitching and berms placement to enhance the effect of slowing down water and breaking up the energy.

The Contactor shall reinstate the original watercourse geometry and topography in both cross-sectional and longitudinal profile. The Contractor shall the removal of all coffer dam, berms, bund walls and other foreign item used during construction from any of the identified watercourses, immediately after construction is completed.

Follow-up surveys should be conducted to determine the extent of the effectiveness and functionality of the mitigation measures provided for the construction phase of the Duvha Power Station seepage interception drains. Should the effectiveness and functionality of mitigation measures be found to be inefficient, amendments must be made to improve on the mitigation measures.

13 MAINTENANCE AND MONITORING

To ensure success of the rehabilitation, ongoing monitoring and maintenance of the site is fundamental. Monitoring will also be the tool which will indicate whether the pre-determined objectives have been met. Comprehensive monitoring should be undertaken to identify corrective action and to assess the success of the implemented rehabilitation measures. More information regarding monitoring is provided in the Monitoring Plan (**Appendix H** of the WULA Technical Report).

Appendix A

14 CHANCE FINDS PROTOCOL

The following procedure will only be followed in the event that fossils are uncovered during any stage of excavation.

14.1 Legislation

Cultural Heritage in South Africa (includes all heritage resources) is protected by NHRA. According to Section 3 of the Act, all Heritage resources include “all objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens”.

Palaeontological heritage is unique and non-renewable and is protected by the NHRA and are the property of the State. It is thus the responsibility of the State to manage and conserve fossils on behalf of the residents of South Africa. Palaeontological resources may not be broken or destroyed, excavated or moved by any development without prior assessment and without a permit from the applicable heritage resources authority as per section 35 of the NHRA.

14.2 Background

A fossil is the naturally preserved remains (or traces) of plants or animals embedded in rock. These plants and animals lived in the geologic past. Fossils are extremely rare and irreplaceable. By studying fossils, it is possible to determine the environmental conditions that existed in a specific geographical area millions of years ago.

14.3 Introduction

This informational document is intended for workmen and foremen on construction sites. It describes the actions to be taken when mining or construction activities accidentally uncovers fossil material.

It is the responsibility of the ECO of the project to train the workmen and foremen in the procedure to follow when a fossil is accidentally uncovered. In the absence of the ECO, a member of the staff must be appointed to be responsible for the proper implementation of the chance find protocol as not to compromise the conservation of fossil material.

14.4 Chance Find Procedure

- If a chance find is made, the person responsible for the find must immediately **stop working** and all work must cease in the immediate vicinity of the find.
- The person who made the find must immediately **report** the find to his/her direct supervisor which in turn must report the find to his/her manager and the ECO or site manager. The ECO must report the find to the relevant Heritage Agency (South African Heritage Research Agency, SAHRA). (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). The information to the Heritage Agency must include photographs of the find, from various angles, as well as the GPS co-ordinates.
- A preliminary report must be submitted to the Heritage Agency within **24 hours** of the find and must include the following: 1) date of the find; 2) a description of the discovery and a 3) description of the fossil and its context (depth and position of the fossil), GPS co-ordinates.
- Photographs (the more the better) of the discovery must be of high quality, in focus, accompanied by a scale. It is also important to have photographs of the vertical section (side) where the fossil was found.

Upon receipt of the preliminary report, the Heritage Agency will inform the ECO (site manager) whether a rescue excavation or rescue collection by a palaeontologist is necessary.

- The site must be secured to protect it from any further damage. **No attempt** should be made to remove material from their environment. The exposed finds must be stabilized and covered by a plastic sheet or sand bags. The Heritage agency will also be able to advise on the most suitable method of protection of the find.
- In the event that the fossil cannot be stabilized the fossil may be collected with extreme care by the ECO (site manager). Fossils finds must be stored in tissue paper and in an appropriate box while due care must be taken to remove all fossil material from the rescue site.

Once Heritage Agency has issued the written authorization, the developer may continue with the development.